Central Queensland Coal Project

ii – Executive Summary

Supplementary Environmental Impact Statement

CDM Smith

listen. think. deliver.

Central Queensland Coal Project
ii Executive Summary

20 December 2018

CDM Smith Australia Pty Ltd
ABN 88 152 082 936
Level 4, 51 Alfred Street
Fortitude Valley
QLD 4006
Tel: +61 7 3828 6900
Fax: +61 7 3828 6999

Table of Contents

1 Introduction 1
1.1 The Proponent 3
1.2 Project Need, Benefits and Opportunities 3
1.3 Impact Assessment 4
1.4 Consultation 4
1.5 SEIS Structure 4
2 Regulatory Framework 6
2.1 Key Project Approvals and EIS Process 6
2.1.1 Accredited Process for Controlled Actions 10
3 Project Description 11
3.1 Key Features of the Project 11
3.2 Development Schedule and Construction 14
3.3 Workforce 14
3.4 Water Requirements 14
3.5 Alternatives and Justification 15
3.5.1 Changes since the Release of the EIS 15
3.6 Overview of Existing Environment 17
4 Climate 18
5 Land 19
5.1 Visual Amenity 20
6 Traffic and Transport 21
7 Waste Management 22
8 Waste Rock and Rejects 23
9 Surface Water 25
10 Groundwater 29
11 Rehabilitation and Decommissioning 35
12 Air Quality and Greenhouse Gases 36
12.1 Greenhouse Gases 36
13 Noise and Vibration 37
14 Terrestrial Ecology 38
15 Aquatic Ecology 40
16 Matters of National Environmental Significance 42
17 Biosecurity 45
18 Cultural Heritage 46
19 Social and Economic 47
20 Health and Safety 49
21 Hazard and Risk 50
22 Conclusions 51
23 Major Commitments 53

List of Figures

Figure ES1 – Project location 2
Figure ES2 – EIS and approvals process 8
Figure ES3 – General arrangement 13
Figure ES4 – Indicative Project development schedule 14
Figure ES5 - Flowchart for assessing the effects of mining on water resources 31

List of Tables

Table 1-1 Volume 1 chapter content 5
Table 1-2 Volume 2 specialist technical reports and laboratory results appended to this SEIS 5
Table 2-1 Key Project approvals 6
Table 2-2 Environmentally relevant activities for the Project 6
Table 2-3 Anticipated notifiable activities for the Project 7
Table 3-1 Material changes to the Project description since the EIS release 15

1 Introduction

Central Queensland Coal Proprietary Limited (Central Queensland Coal) and Fairway Coal Proprietary Limited (Fairway Coal) (the joint Proponents) are seeking the approval of the Australian and Queensland Governments to develop the Central Queensland Coal Project (the Project) located near Marlborough, approximately 130 km northwest of Rockhampton in Central Queensland (Figure ES1). If approved, Central Queensland Coal would commit to substantial capital investment to develop the Project which would provide opportunities for employment and businesses and generate government and export revenues.

The Project comprises the Central Queensland Coal mine where open-cut coal mining will occur. Support infrastructure would also be built including a train loadout facility (TLF) and a haul road to truck coal from the mine to the TLF. The mine is expected to be in operation for approximately 20 years producing mostly coking and some thermal coal and including final rehabilitation and mine closure activities.

An Environmental Impact Statement (EIS) is required as part of the Project's approval process under the *Environmental Protection Act 1994* (Qld) (EP Act) and *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) respectively. The EIS has been prepared by CDM Smith on behalf of Central Queensland Coal and addresses the scope set out in the Project's EIS Terms of Reference. The EIS was publicly notified for submissions between 6 November and 18 December 2017, following which Central Queensland Coal responded to all questions and comments received, with the amended EIS lodged in May 2018.

This Executive Summary provides an overview of the content and conclusions of the EIS, to which readers should refer to for more detailed information. The following sections of the Executive Summary set out:

- Information about Central Queensland Coal, the need for the Project, its benefits and approval requirements;
- The existing receiving environment;
- Key Project activities;
- The objectives of the EIS process and its methodology;
- The results and conclusions of the EIS; and
- Central Queensland Coal's major commitments.

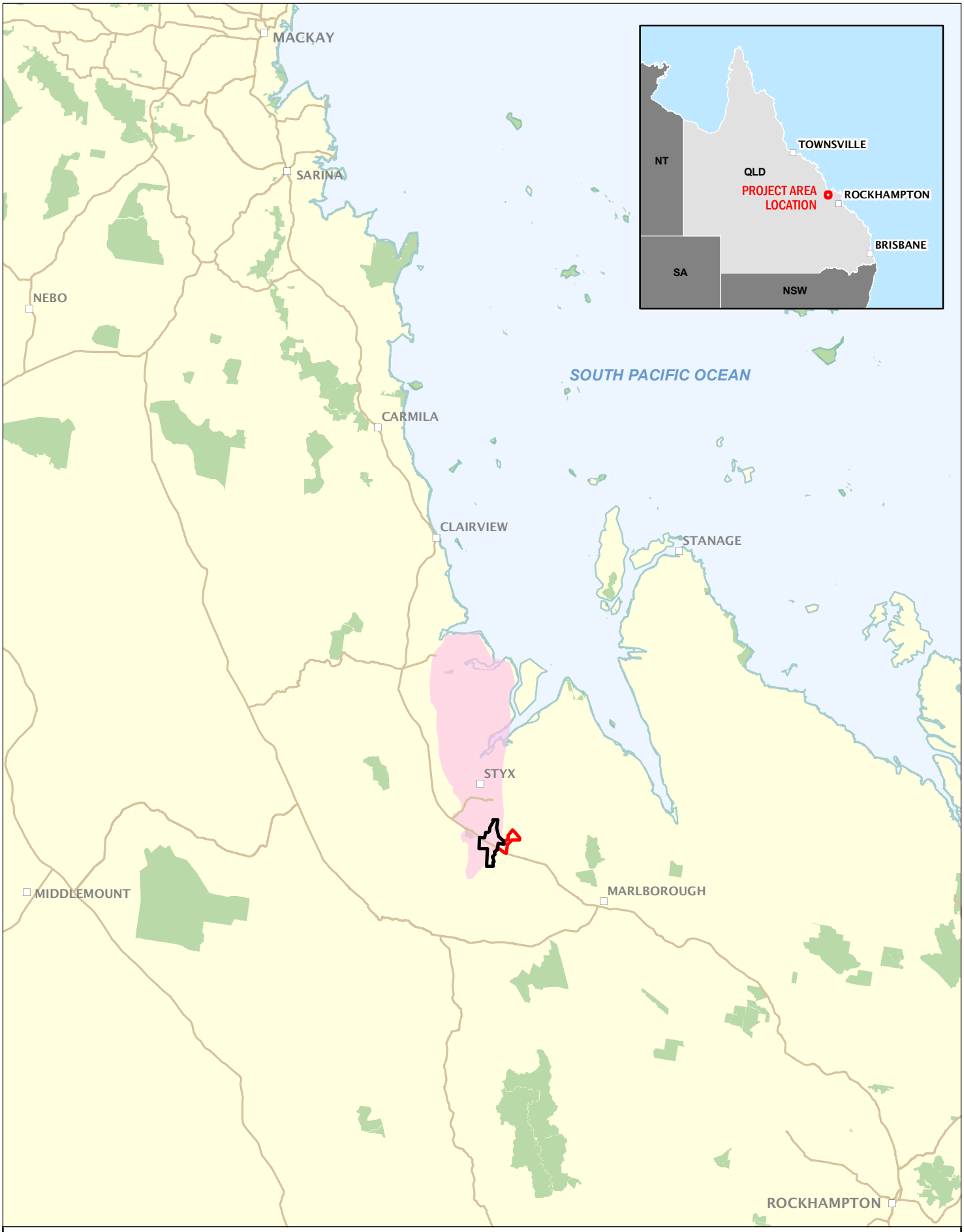

Figure ES1
Project location

N

0 10 20 km

Legend

- ML 80187
- ML 700022
- Styx Coal Basin

Scale @ A4 1:1,050,000
Date: 11/07/17
Drawn: Gayle B.

DATA SOURCE
QLD Spatial Catalogue (QSpatial), 2017
Geoscience Australia, 2017

CDM Smith

BRUGGEMANNGD B:\BES150160 Styx Coal\GIS\DATA\MXD\FINAL\03 EIS Preparation\BES150160.03-012 R1 project location.mxd 7/11/2017

1.1 The Proponent

The Project will be developed and operated by Central Queensland Coal and Fairway Coal. Both companies are associates of Waratah Coal Pty Ltd (Waratah Coal), which has over 25 years' experience developing, funding and managing a range of major resource projects.

Waratah Coal is an Australian coal exploration and coal development company. Waratah Coal holds extensive mining concessions within the rich mineral basins of Laura, Bowen, Galilee, Surat, Moreton, Maryborough, Nymboida and the Northern Territory, in addition to the Styx Basin. Waratah Coal has been operating for over 10 years and has formed major international alliances in China and domestically during this time. From 2005 to 2009, Waratah Coal was dual-listed on the Toronto Stock Exchange and Australian Stock Exchange. In 2009, Waratah Coal was privatised and incorporated into Mineralogy Pty Ltd. Waratah Coal is committed to the economic development of regional growth in Queensland through the growth of mineral wealth while operating with an excellent record in the area. Waratah Coal aims to be a valued member of the local community and to openly engage and build trust and respect in Queensland over time.

Central Queensland Coal and Fairway Coal jointly own mineral development licence (MDL) 468 which will form the Project. Both Fairway Coal and Central Queensland Coal are registered as suitable operators with DES (#701901 and #686364, respectively), meaning the company is registered as being suitable to carry out industrial activities requiring an EA.

1.2 Project Need, Benefits and Opportunities

The Project proposes to efficiently extract the substantial undeveloped coal resources within the Project site. The Project site comprises both coking and thermal coal. Coking and thermal coal are in demand globally to generate steel and electricity. Recent demand for both coking and thermal coal has continued to increase. The current increases in global demand for coal, particularly in South East Asia and India, together with forecast increases in steel and power production support the justification for the Project.

The Project is predicted to provide a significant contribution to these economic benefits, including employment and a boost to the townships of Ogmore, St Lawrence and Marlborough. The Project is anticipated to result in a range of positive impacts including:

- Economic stimulus to the regional, state and national economies during the construction and operational phases of the project;
- Export revenues from coal produced across the life of the mine is estimated to be in the order of $7.78 billion to $8.23 billion, which assuming royalty rates remain unchanged would yield royalties of approximately $703.3 million to $766.0 million over the life of the mine;
- Increased employment opportunities within Central Queensland which would help to reverse the trend of increasing unemployment within the region; and
- Opportunities for suppliers in the Central Queensland region to support the construction and operation of the Project.

The Project will provide key social and economic benefits to the locality, region and state including flow on business, employment skills and training programs, and royalties and taxes.

1.3 Impact Assessment

For each social, economic and environmental issue identified within the EIS process, a risk assessment was carried out to judge whether the Project was likely to result in impacts. Mitigation measures were proposed to reduce the risk of impacts, where appropriate. The risk assessment was then repeated with the proposed mitigation measures included to determine the residual risk level. The adopted residual risk levels are as low as reasonably practicable to avoid or minimise the risk of impacts occurring. If risks were still unacceptable then environmental offsets have been proposed to further manage their impact.

1.4 Consultation

Community consultation commenced with neighbouring landholders in January / February of 2017. Further Community consultation occurred in Marlborough in November / December 2017 where the results of the EIS were presented in a community forum. Central Queensland Coal also used this forum as a means to assist interested parties in understanding the process to lodge properly made submissions in response to the EIS.

A second community consultation meeting was held on 19 July 2018 at the Marlborough Community Hall. The purpose of this forum was for the Project management team to socialise updates about the Project's development and how comments to the EIS have been addressed.

In addition to the community meeting, interviews were again held with property owners that immediately adjoin the Mamelon Property. Various businesses at The Caves, Yaamba, Rockhampton and St Lawrence were also consulted. Both LSC and RRC were briefed on the Project as part of this engagement process. Through this process, at various times, both State and Federal Government Representatives, for the local and regional areas, were updated on the Project.

Following the Project's EIS approval, engagement with Project stakeholders and the community will continue for the life of the Project and be delivered through a Community and Stakeholder Engagement Strategy. The Strategy will remain a dynamic document and will be updated as required throughout the Project's duration.

1.5 SEIS Structure

The SEIS consists of two volumes:

- Volume 1 - SEIS chapters; and
- Volume 2 - SEIS appendices.

A summary of the contents of each volume is shown in Table 1-1 and Table 1-2. The following structure of the SEIS has been developed to meet the scope objectives of the final ToR, DES technical guidelines and to address section 125 of the EP Act.

Table 1-1 Volume 1 chapter content

Chapter	Chapter title	Chapter	Chapter title
i	Glossary and Abbreviations	**Chapter 13**	Noise and Vibration
ii	Executive Summary	**Chapter 14**	Terrestrial Ecology
Chapter 1	Introduction	**Chapter 15**	Aquatic Ecology
Chapter 2	Project Need and Alternatives	**Chapter 16**	MNES
Chapter 3	Description of the Project	**Chapter 17**	Biosecurity
Chapter 4	Climate	**Chapter 18**	Cultural Heritage
Chapter 5	Land	**Chapter 19A**	Economics
Chapter 6	Traffic and Transport	**Chapter 19B**	Social Environment
Chapter 7	Waste Management	**Chapter 20**	Health and Safety
Chapter 8	Waste Rock and Rejects	**Chapter 21**	Hazard and Risk
Chapter 9	Surface Water	**Chapter 22**	Key Commitments
Chapter 10	Groundwater	**Chapter 23**	Draft EA Conditions
Chapter 11	Rehabilitation and Decommissioning	**Chapter 24**	References
Chapter 12	Air Quality		

Table 1-2 Volume 2 specialist technical reports and laboratory results appended to this SEIS

Appendix	Appendix title	Appendix	Appendix title
A1	Approvals	**A9g**	Results of Landscape Fragmentation and Connectivity
A2	Standard Criteria	**A9h**	Broad Sound – shorebird survey count data
A3	Soil Survey Results	**A10**	Queensland Regional Profiles
A4a	Road Impact Assessment	**A11**	Final ToR for EIS
A4b	Geotechnical Assessment	**A12a**	Draft Construction EMP Structure
A4c	Draft Road-Use Management Plan	**A12b**	Draft Operational EMP Structure
A5a	Surface Water and Groundwater Quality Results	**A13**	EIS Submissions
A5b	Historical Surface Water Quality Results	**A14**	Stakeholder Engagement Plan
A6	Groundwater Technical Report	**A15**	ESCP Typical Drawings
A7	Air Quality and GHG Technical Report	**A16**	Construction Design Drawings
A8	Noise and Vibration Technical Report	**A17**	Social Impact Assessment
A9a	Terrestrial Fauna Reports	**A18**	Draft Offsets Delivery Plan
A9b	Flora and Vegetation Assessment	**A19**	Vegetation Map Amendment
A9c	Ecological Desktop Search Results	**A20**	*Draft* Significant Species Management Plan
A9d	Ecological Field Survey Results	**A21**	Water Way Barrier Work Mapping Amendment Application
A9e	Aquatic Ecology Results	**A22**	Independent Groundwater Model Peer Review
A9f	Stygofauna Results	**A23**	IESC Guideline Checklist

2 Regulatory Framework

2.1 Key Project Approvals and EIS Process

The key Project approvals are presented in Table 2-1. These approvals are required prior to the construction of the Project.

Table 2-1 Key Project approvals

Approval	Legislation	Administering Authority	Background
Environmental Authority	*Environmental Protection Act 1994*	Department of Environment Science (DES)	An application was made by Central Queensland Coal to the DES on 16 December 2016, under section 71 of the EP Act, for the preparation of a voluntary EIS. The application was approved on 27 January 2017 and DES' decision notice accepting the application to prepare a voluntary EIS was signed and forwarded to Central Queensland Coal. The final Terms of Reference for the EIS was issued to Central Queensland Coal on 4 August 2017 for the preparation of the EIS. The EIS was made available for public comment and review from 6 November 2017 through to 18 December 2017.
EPBC Act Approval	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)	Department of the Environment and Energy (DotEE)	On 3 February 2017, DotEE deemed the Project to be a controlled action under the EPBC Act. The EIS will be carried out under the assessment bilateral agreement between the Commonwealth and the State of Queensland, which allows DotEE, to rely on the State EIS process for the assessment of Project impacts on Matters of National Environmental Significance (MNES).
Mining Lease	*Mineral Resources Act 1989*	Department of Natural Resources, Mines and Energy (DNRME)	Central Queensland Coal currently holds ML80187 which was lodged with DNRME 15 June 2012 and contains the mine pits, MIA and various ancillary infrastructure. A second ML (700022) was lodged with DNRME on 23 May 2017, for the haul road and TLF, and future mine expansion.

In addition to the approval of the Project's EIS and the issue of the ML additional permits are required.

Pursuant to the EP Act, activities that will, or have the potential to, release contaminants into the environment and which may cause environmental harm are defined as Environmentally Relevant Activities. The Project has the potential to involve three ERAs applicable to the construction and operational stages as listed in Table 2-2.

Table 2-2 Environmentally relevant activities for the Project

ERA number	Relevant activity	Location and activity summary
ERA 13	Mining Black Coal.	Central Queensland Coal Area – ML 80187 and ML 700022.
ERA 8 (1)(a)	Chemical Storage – more than 500 m3 of chemicals of class C1 or C2 combustible liquids under AS 1940 or dangerous goods class 3; or (EP Regulation – Sch 2, Part 2).	Central Queensland Coal Area – ML 80187 and ML 700022.
ERA 31 (2b)	Mineral Processing – processing in a year >1,000,000 tonnes or more of mineral products (EP Regulation – Sch 2, Part 7).	Central Queensland Coal Area – ML 80187 and ML 700022.

Notifiable Activities

Land contamination and activities that have been identified as likely to cause land contamination are listed as notifiable activities in Schedule 3 of the EP Act. Potentially notifiable activities associated with the Project are listed in Table 2-3.

Table 2-3 Anticipated notifiable activities for the Project

Item number (Schedule 3 EP Act)	Description of activity
1	Abrasive blasting—carrying out abrasive blast cleaning (other than cleaning carried out in fully enclosed booths) or disposing of abrasive blasting material.
23	Metal treatment or coating - treating or coating metal including, for example, anodising, galvanising, pickling, electroplating, heat treatment using cyanide compounds and spray painting using more than 5L of paint per week.
24	Mine wastes – (a) Storing hazardous mine or exploration wastes, including, for example, tailings dams, overburden or waste rock dumps containing hazardous contaminants; and (b) Mining or processing, minerals in a way that exposes faces, or releases groundwater, containing hazardous contaminants.
29	Petroleum product or oil storage in above ground tanks.
37	Waste storage, treatment or disposal – storing, treating, reprocessing or disposing regulated waste including operating a sewage treatment facility with on-site disposal facilities.

Note: Under Section 371 of the EP Act, the owner or occupier of land must notify DES within 20 business days of becoming aware of the notifiable activity having occurred or going to occur on the subject land.

This EIS is being undertaken under the statutory process set out within Chapter 3 of the EP Act. The EIS process and the EA and ML approval processes are presented in Figure ES2.

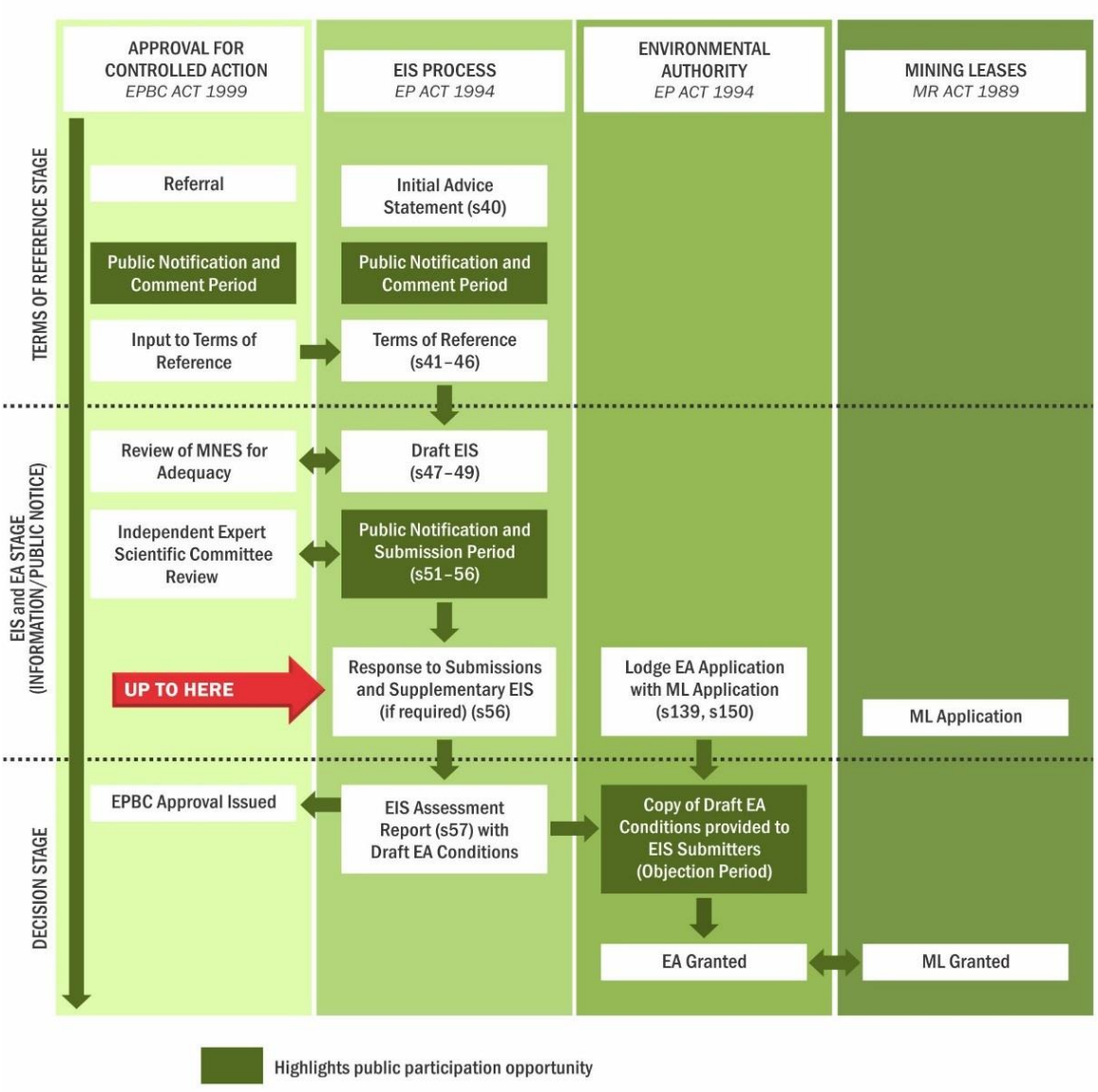

Figure ES2 – EIS and approvals process

The EIS process under the EP Act has several stages and decision milestones. The main steps involved in obtaining approval for the Project (including the EIS preparation and approval process) are outlined below.

Step 1 – Preliminary Planning

Several investigations were undertaken as part of the preliminary planning phase. These assessments included exploration of resource and initial mine planning, assessments of Environmental Values (EVs) including flora and fauna, assessments of surface and subsurface water features and investigations into locations of surrounding sensitive receptors. This assisted to identify environmentally sensitive areas (ESA), develop targeted EIS field studies, select appropriate locations for mining infrastructure and establish the occurrence of the targeted resource.

Since the release of the EIS further site-specific studies have been undertaken to refine elements of the Project. The studies have been used to inform the Supplementary EIS (SEIS) and are either included in the relevant chapter or as appendices.

Step 2 – Community and Government Consultation

Throughout the EIS process, community and State Government consultation has been ongoing and will continue throughout the duration of the Project. The Social Impact Assessment (SIA) utilised results of research conducted previously in the Livingstone Shire Council (LSC) area and the broader region (i.e. Isaac Regional Council (IRC) and Rockhampton Region Council (RRC) areas), along with submissions received from the draft ToR and results of various consultation processes conducted by government agencies and other proponents. Following the release of the EIS, Central Queensland Coal held a community consultation meeting at Marlborough and continued consultation with various Government agencies.

Step 3 – Initial Advice Statement and Terms of Reference

On 16 December 2016, Central Queensland Coal submitted to DES an application to undertake a voluntary EIS under the EP Act which was subsequently approved on 27 January 2017. Further information on statutory requirements and legislative processes are discussed in SEIS Section 1.9. The draft ToR for the EIS was prepared under the EP Act and placed on public exhibition, together with the IAS. The final ToR for the Project was issued by DES on 4 August 2017 and the EIS has been prepared in accordance with the final ToR. To simplify assessment against the Project's final ToR, a cross-referencing checklist of each aspect has been included in the EIS (see final ToR cross-reference tables at the end of each chapter).

Step 4 – EIS Preparation

This EIS was prepared to address the final ToR and relevant technical guidelines for an EA application. Preparation of the EIS followed the completion of baseline technical assessments, consideration of engineering, planning, operational requirements (which determined the ultimate level of potential impacts) and measures required to mitigate those impacts. Baseline site surveys of soils, surface water, groundwater, ecology, cultural heritage and noise were completed during the development of the EIS. Impact assessments were undertaken by a multi-disciplinary team of qualified technical specialists from a range of organisations.

Step 5 – Submission and Release of the EIS

Upon submission of the EIS, DES had a 20-business day review period to determine whether the EIS can proceed to public submission. Once approved for public release, the public and government agencies were able to provide comment on the EIS between 6 November 2017 through to 18 December 2017.

Step 6 – Proponent Response

EIS submissions were collated and forwarded by DES to Central Queensland Coal for consideration and reply. Central Queensland Coal analysed the issues and level of concerns and provided DES with appropriate responses to the submissions in parallel to the submission of the original SEIS.

Following review of the original SEIS by DES and DotEE, together with other key Government stakeholders, further information was sought from Central Queensland Coal before the SEIS could be accepted for assessment. The responses to the additional information requests have been included in this version of the SEIS.

Step 7 – Assessment under the EP Act

Following Central Queensland Coal's responses to submissions to the EIS, DES will assess the EIS and SEIS and produce an EIS assessment report. This report will outline the adequacy of the EIS in assessing the ToR, determine if impacts have been appropriately mitigated or avoided and recommend if the Project should proceed subject to any conditions. The EIS process is complete once the assessment report is provided to Central Queensland Coal.

This report, as well as documentation for the above steps will be available on the DES website: https://www.des.qld.gov.au/management/impact-assessment/eis-processes/styx-coal-project.html.

Step 8 – Decision of Environmental Authority

Central Queensland Coal intends to apply for a site-specific Environmental Authority (EA) to authorise the Project. The EA application will be evaluated by DES once the EIS process is completed in Step 7. Based on the information provided in the EIS, DES will prepare a draft EA for the Project. Copies of the draft EA will be provided by DES to any person that made a submission on the EIS during Step 5 above. The submitters must then decide whether the final EIS and the draft EA resolve their concerns. If no submitters elect to object to the draft EA, then DES will grant the EA at the same time the ML applications are granted. If, however, submitters elect to object to the draft EA, those objections will be heard in the Land Court. Draft EA conditions proposed by Central Queensland Coal are included in SEIS Chapter 23 – Draft EA Conditions as a starting point for the negotiation of the Project's approval conditions.

2.1.1 Accredited Process for Controlled Actions

The Project was identified as having the potential to impact on MNES and was referred to the DotEE. The Project was deemed to be a controlled action requiring approval under the EPBC Act on 22 December 2016 (EPBC ref 2016/7851). In accordance with DotEE's guidelines for the preparation of the draft EIS for the Project, a stand-alone chapter has been prepared and assessed as part of approval under the EPBC Act. The assessment bilateral process allows for the assessment of impacts on MNES to be undertaken as part of the State EIS process, with input from the DotEE throughout. DotEE will issue a separate approval for the Project which outlines the required conditions to mitigate any impacts to MNES following completion of Step 7. The accredited process is presented at Figure ES2.

3 Project Description

The Project will involve mining a maximum combined tonnage of up to 10 Million tonnes per annum (Mtpa) of semi-soft coking coal (SSCC) and high grade thermal coal (HGTC). The Project will be located within ML 80187 and ML 700022, which are adjacent to MDL 468 and Exploration Permit for Coal (EPC) 1029, both of which are held by the Proponent. It is intended that all aspects of the Project will be authorised by a site specific EA. Development of the Project is expected to commence in 2019 with initial early construction works and extend operationally for approximately 20 years until the depletion of the current reserve, and rehabilitation and mine closure activities are successfully completed.

The Project consists of two open cut operations that will be mined using a truck and shovel methodology. The ROM coal will ramp up to approximately 2 Mtpa during Stage 1 (2019 - 2022), where coal will be crushed, screened and washed to SSCC grade with an estimate 80% yield. Stage 2 of the Project (2023 - 2038) will include further processing of up to an additional 4 Mtpa run of mine (ROM) coal within another coal handling and preparation plant (CHPP) to SSCC and up to 4 Mtpa of HGTC with an estimated 95% yield. At full production two CHPPs, one servicing Open Cut 1 and the other servicing Open Cut 2, will be in operation. Rehabilitation works will occur progressively through mine operation, with final rehabilitation and mine closure activities occurring between 2036 and 2038.

A new TLF will be developed to connect into the existing Queensland Rail North Coast Rail Line. This connection will allow the product coal to be transported to the established coal loading infrastructure at the Dalrymple Bay Coal Terminal (DBCT).

Access to the Project will be via the Bruce Highway. The Project will employ a peak workforce of approximately 275 people during construction and between 100 (2019) to 500 (2030) during operation, with the workforce reducing to approximately 20 during decommissioning. Central Queensland Coal will manage the Project construction and ongoing operations with the assistance of contractors.

3.1 Key Features of the Project

The overall general arrangement for the proposed mine infrastructure that will be located at ML 80187 and ML 700022 is at Figure ES3. The following features are assessed as part of this EIS for which Central Queensland Coal is seeking approval:

Mine Pit and Infrastructure Area

- Two open cut pits (Open Cut 1 and Open Cut 2);
- Two CHPP and product coal stockpiles;
- Two ROM coal stockpile areas and ROM dump stations (comprising dump hopper, product conveyor, crushers and surge bin);
- ROM coal haul roads and waste rock haul roads and conveyor;
- Three out of pit waste rock stockpiles (1a, 1b and 2);
- Internal water distribution pipelines and management facilities, including raw water supply, storage and a water treatment plant to treat water to potable quality;
- Mine affected water dams, sediment affected water dams and clean water dams;

- Light and heavy vehicle internal roads;
- Main gate and security building;
- Internal energy distribution network; and
- Explosives storage facility.

Haul Road Corridor

- An approximate 5.48 km long haul road and loop from the product stockpiles to the TLF;
- Access roads;
- Cross-drainage structures; and
- Fencing.

Train Loadout Facility

- Product coal stockpile;
- Rail line approximately 4.85 km in length connecting to the North Coast Rail Line and balloon loop;
- Power, water and telecommunication services;
- Hard stand area to receive haul trucks from the transport corridor;
- Environmental dam; and
- Access roads.

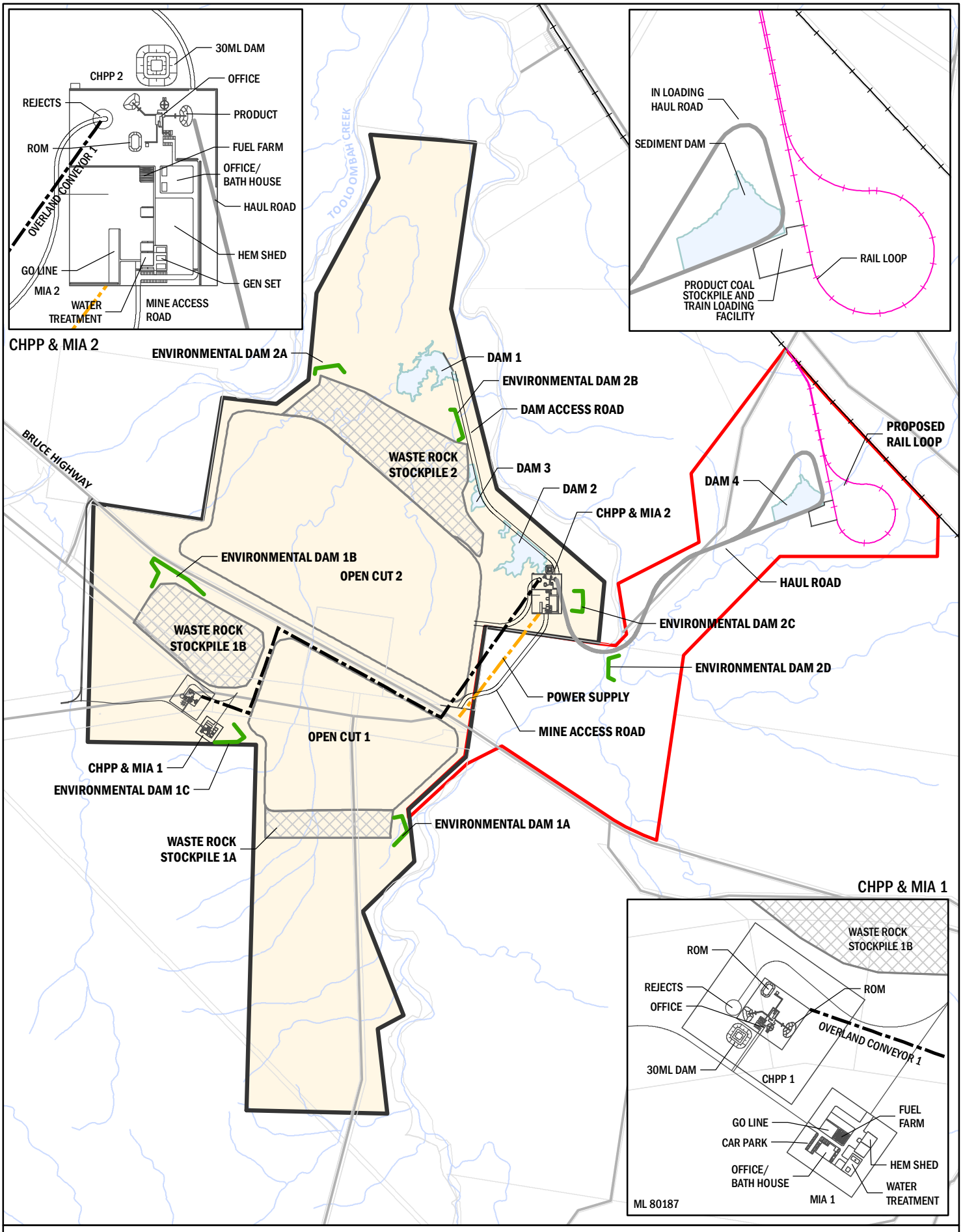

Figure ES3
General arrangement

3.2 Development Schedule and Construction

Construction of Open Cut 2, CHPP, the haul road, the TLF and associated mine infrastructure located on the north-eastern side of the Bruce Highway is planned to commence simultaneously in Year one. Construction works will comprise: site preparation, managed vegetation and topsoil removal, topsoil stockpiling, earthworks, civil works, and building of structures and plant. An indicative development schedule is shown in Figure 4.

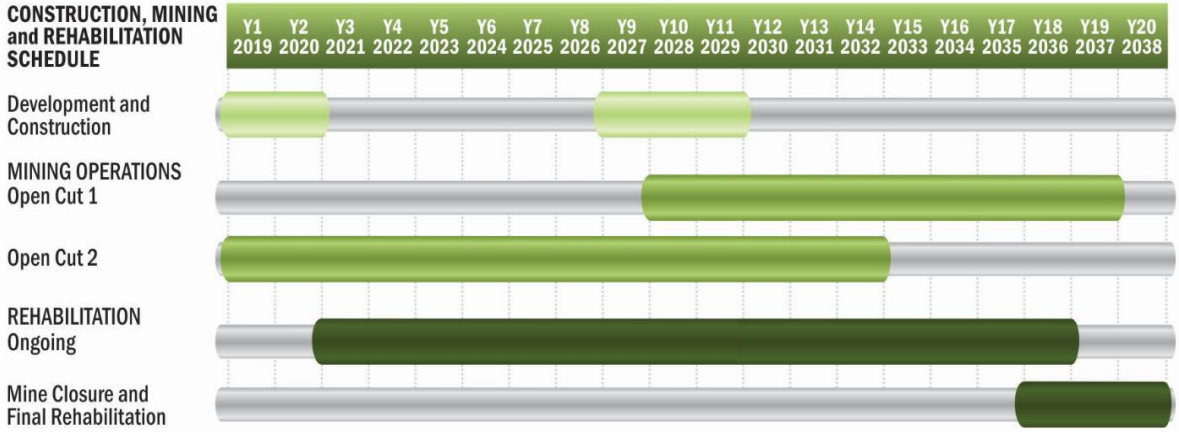

Figure ES4 – Indicative Project development schedule

3.3 Workforce

The Project will employ a peak workforce of approximately 275 people during construction and between 100 (2019) to 500 (2030) during operation, with the workforce reducing to approximately 20 during decommissioning. It is expected that most of the workforce will be sourced from the general local area (Marlborough, St Lawrence, Yaamba and The Caves) as a commute workforce, augmented by a regional workforce from centres such as Yeppoon, Rockhampton and Mackay. The nearest town to the Project is Ogmore, located approximately 10 km to the north of the Project. Marlborough, another nearby town, is located approximately 25 km to the southeast. Workers will be accommodated at existing accommodation in the Marlborough, Ogmore, The Caves and St Lawrence region.

Where these local and regional towns are not able to service the personnel required for the project, the accommodation facilities proposed for development at the Marlborough Caravan Park will be used for any non-local workers. The proposed upgrade of the Marlborough Caravan Park is outside the scope of this EIS.

3.4 Water Requirements

Mining operations will require 3.76 megalitres of water per day. This consists of the demand generated by the coal processing and the requirements for potable water, sewage, dust suppression and washdown. This water requirement will be supplied from harvesting on-lease stormwater runoff, mine affected water from pit dewatering activities and water reuse within the CHPP. Flood harvesting from Tooloombah Creek is no longer under consideration. Fire water supply provisions are incorporated into the raw water dam storage capacity.

3.5 Alternatives and Justification

As part of the EIS process, alternative Project layouts and mining methods were compared to determine the optimal concept design. The following alternatives were considered:

- **Not developing the Project:** this option was discounted because the benefits of the Project would not be realised if the development did not occur;
- **Different locations for the mine workings:** the proposed mine area boundary is defined by the location of the targeted coal seams and existing geological conditions. Two options were considered for the layout of the mine infrastructure area;
- **Different locations for the transport corridor and TLF:** different haulage routes and TLF options were initially considered, as presented in the Project's Initial Advice Statement. The preliminary study involved five different options. Three preferred options were then selected based on their shorter distance, lower earthwork volumes, similar requirements for vegetation clearance and impacted areas of mapped environmental values and number of affected landholders. Site surveys were then used to identify the option presented in the EIS;
- **Different mining methodologies:** underground longwall and open-cut pit mining were compared for their suitability. The key mine design parameters included: percentage recovery, annual production volumes, value per tonne of ROM and the mining design limitations of each mining method. These were compared using a margin ranking process to identify the most suitable method for the site. Given the mining operation will target up to 10 seams of coal in a relatively shallow environment open-cut mining has been selected; and
- **Different rejects and tailings management methods:** Two main options were assessed for the management of the fine rejects from the CHPP. The use of tailings (fines suspended in waste water) storage dams and the avoidance of tailings storages through the implementation of paste thickeners and filter pressing technology. The preferred method is to truck all coarse reject and dewatered fine reject material to in-pit and out of pit waste rock stockpile areas. The process is in line with Ecologically Sustainable Development principles identified in cleaner production methods, including water reclamation, maximising density of fine rejects, avoiding storages, and reusing for mine backfill thereby eliminating the risks of storage failures.

3.5.1 Changes since the Release of the EIS

Project optimisation studies finalised since the release of the EIS have resulted in several material changes to the description of the project. These changes are outlined in Table 3-1.

Table 3-1 Material changes to the Project description since the EIS release

Aspect	EIS Project Description	SEIS Project Description
Mine Pits and Waste Stockpile		
Mine Pit Layout – Pit 2 and Pit 4	The EIS proposed two pits (Open Cut 2 and Open Cut 4) on the eastern side of the Bruce Highway.	The supplementary environmental impact statement (SEIS) proposes one pit on the eastern side of the Bruce Highway. The single pit is a result of combining Open Cut 2 and Open Cut 4. This pit is now referred to as Open Cut 2.
Mine Pit Layout – Pit 1	The EIS proposed a single mine pit (Open Cut 1) on the western side of the Bruce Highway.	The SEIS still proposes a single mine on the western side of the Bruce Highway; however, the pit is now significantly smaller than proposed in EIS.
Mining Sequence	The EIS proposed a south to north mining direction in Open Cut 1 and Open Cut 2.	The SEIS proposes a north to south mining direction in Open Cut 2 and a west to east mining direction in Open Cut 1.
Open Cut 1 void	The EIS was based on a void being retained in Open Cut 1.	Open Cut 1 will now be back-filled and no void will be retained.

Aspect	EIS Project Description	SEIS Project Description
Open Cut 4 void	The EIS was based on a void being retained in Open Cut 4.	Open Cut 4 now forms part of Open Cut 2. No void will be retained in Open Cut 2.
Waste Rock Stockpile 1	The EIS proposed a single waste rock stockpile on the western side of the Bruce Highway.	The SEIS proposes two waste rock stockpiles on the western side of the Bruce Highway. Waste Rock Stockpile 1b will be removed during rehabilitation.
Waste rock stockpile areas	The EIS proposed a disturbance area of 133 ha for Waste Rock Stockpile area 1 and 164 ha for Waste Rock Stockpile 2.	The SEIS proposed a combined disturbance area of 161 ha for Waste Rock Stockpile 1a (72.7 ha) and 1b (88.5 ha) and 245 ha for Waste Rock Stockpile 2.
		The updated SEIS proposes a combined disturbance area of 118.8 ha for Waste Rock Stockpile 1a (35.6 ha) and 1b (83.2 ha) and 124.5 ha for Waste Rock Stockpile 2. This amounts to a total disturbance area of 243.5 ha for the three waste rock stockpiles compared to a total of 406 ha for the three waste rock stockpiles as proposed in the original SEIS.
Redesign of Open Cut 4 (now incorporated in Open Cut 2) to avoid Semi-Evergreen Vine Thicket (SEVT)	The Open Cut 4 area was predicted to clear the edge (0.4 ha) of a SEVT Threatened Ecological Community (TEC) adjacent to Tooloombah Creek.	Open Cut 2 has been redesigned to avoid impacts to SEVT and includes a 100 m buffer between Open Cut 2 and the TEC.
Blasting activities requiring the closure of the Bruce Highway	The EIS identified the requirement to close the Bruce Highway during blasting activities within a 500 m distance.	Following discussions with DTMR, it has been determined by Central Queensland Coal that no blasting will be undertaken requiring the closure of the Bruce Highway.
Conveyor Arrangement		
Location of the conveyor	The EIS proposed the conveyor between CHPP 1 and MIA 2 would be located beneath the Deep Creek road bridge.	The SEIS proposes the conveyor will now be located outside of the Deep Creek channel and constructed in a new culvert arrangement passing beneath the Bruce Highway.
Site Access and Internal Roads		
Entry point to the eastern infrastructure area and Open Cut 2 and Open Cut 4	The EIS proposed the entry point to the eastern infrastructure approximately 3.3 km from Deep Creek, travelling to the north along the Bruce Highway.	The new access road to the eastern infrastructure will be located approximately 600 m from Deep Creek, travelling to the north along the Bruce Highway.
Internal access and overburden haul between eastern entry point and the CHPP and MIA 2	The EIS proposed a small internal access and overburden haul road between the eastern entry point and CHPP and MIA 2.	The Project will now utilise a smaller internal access road (1.5 km in length) from the new eastern entry point to the CHPP and MIA 2.
Relocation of MIA 2 access road to avoid Brigalow	The proposed access road to MIA 2 impacts 0.2 ha of a small patch of Brigalow TEC.	The new access road to MIA avoids the Brigalow TEC altogether.
Light Vehicle access road to Dam 1	The EIS did not include a light vehicle assess road between CHPP and MIA 2 and Dam 1.	A light vehicle access road has been included to provide access from the CHPP and MIA 2 to Water Dam 1.
Bruce Highway closure	The EIS proposed periodic closures to the Bruce Highway may be required during blasting activities.	The Project commits to ensuring all Project related activities are conducted in a manner that avoids the need for any closure to the Bruce Highway. No closures to the Bruce Highway are proposed.
Train Loadout Facility		
Train loading method	The EIS proposed coal would be loaded into wagons by front end loaders, with a separate veneering station.	The TLF design now includes an overhead bin, flood loading the rail wagons. A veneering station will be attached to the overhead loader.

Aspect	EIS Project Description	SEIS Project Description
Water Supply and Dams		
Construction and operation water supply from Tooloombah Creek	The EIS indicated water permits will be sought to provide a construction and operation water supply.	No water permits to harvest water from Tooloombah Creek are anticipated.
Additional Water Supply Dams		Two additional water supply dams have been located on the eastern side of the Bruce Highway and included in the mine water balance
Dam 5	A pit dewater dam (Dam 5) located on the western side of the Bruce Highway and nearby to two listed wetlands was proposed in the EIS and original SEIS.	To address the concern around perceived impacts to the Wetland 2, Dam 5 will no longer form part of the Project.
Power Supply		
Power connection to the Project	The EIS indicated an option to connect to existing the 11kV transmission line.	The connection has now been confirmed with Ergon Energy. The existing line is 22kV not 11kV as originally reported.

The updated general arrangement for the Project is shown at Figure ES3.

3.6 Overview of Existing Environment

The Project is in a rural area with very few homesteads nearby. The closest homestead to the mining operations is the TSC Res 1 homestead located approximately 1.9 km northwest of the mine area boundary and is the closest dwelling to the Project. There are no occupied homesteads within the proposed ML boundaries; however, there are several farm dams and bores used for stock watering, access tracks and fences along the paddock boundaries.

Existing land uses in the area comprise mainly of cattle grazing on improved pasture with limited areas of native remnant vegetation. Remaining vegetation is generally confined to rockier hilly areas, linear strips of roadside vegetation, riparian vegetation and relatively small isolated remnants. Clearing over the past 150 years has resulted in a highly-fragmented landscape with remnant vegetation patches separated by large expanses of cleared land. The land within the Project area can be described as gently undulating.

The Styx Basin is relatively undeveloped, except for two small scale, government owned mines that were in operation from 1919 to 1963. The Ogmore and Bowman collieries, located close to the north and northeast of ML80187 respectively, produced small qualities of low quality coal, for use in steam trains and other boiler requirements.

The Project area contains Strategic Cropping Land (SCL). SCL is land that is, or is likely to be, highly suitable for cropping because of a combination of the land's soil, climate and landscape features. The location of the Project activities do not impact any mapped SCL. The land surrounding the Project area is predominately used for cattle grazing. The closest protected area is the Tooloombah Creek Conservation Park which is located approximately 1 km to the north of Open Cut 1. The Project area comprises several wetlands of varying size. Most of these have been artificially created ('turkey nest' dams and dammed creek lines). Two wetlands mapped as Matters of State Environmental Significance (MSES) are located near the western boundary of ML80187.

The Project mine area is located on the Mamelon property, the TLF is located on the Strathmuir property and a small section of the haul road is located on the Brussels property. Access to the Project will be from the Bruce Highway which divides the Project. The Project is situated within the lower catchments of Tooloombah Creek and Deep Creek, which are sub-catchments within the Styx River catchment.

4 Climate

The climate assessment of the region identified that the Project area experiences a tropical climate which is characterised by high variability rainfall, evaporation and temperature. The Project region experiences warmer summer months and cooler winter months with the majority of rainfall occurring in the warmer months between December and March. This is typical of the tropical Queensland climate. Relative humidity in the region is generally higher in the mornings and in summer. The primary wind direction is from the southeast and east and is greater in the summer months and in the mornings.

Natural or induced climate related hazards such as severe storms, cyclones, floods, bushfires and droughts have potential to occur and pose risks which require management. Landslides and earthquakes are not considered likely to pose any risks to the Project. Climate change predictions show a certain anticipated increase of severe climate events, particularly drought, floods and storms.

The short duration of the Project suggests that project is not likely to be significantly influenced by climate change. Notwithstanding, the Project has proactively considered climate change adaptation measures in the design and operation to ensure the mine can minimise high risk impacts from these events which have potential to cause significant damage and impacts on the Project. The residual risk, the risk after mitigation measures have been implemented, for all climate related impacts is low to medium. Medium risk scores relate to the damage or destruction of mine infrastructure and the pump out of mine pit waters which may result in the release of potentially hazardous wastes to the environment; however, releases during high flows will dilute impacts.

Central Queensland Coal is committed to undertaking a cooperative approach with government and other industry and sectors to address adaptation to climate change.

5 Land

The Project will occupy land that is presently used for cattle grazing for both fattening and breeding of stock. There are no occupied homesteads within the proposed mining lease boundaries but there are various farm access tracks, two windmills, two dams, two vacant homesteads and farming infrastructure and fence lines along paddock boundaries. No other infrastructure such as water, power, telecommunications or gas pipelines are present within the Project disturbance area.

The only designated ESA predicted to be directly affected are areas of mapped endangered remnant vegetation. There are no National Parks, nature refuges or declared catchments within the Project area, or registered areas of existing contaminated land.

Soils within the Project area have a low erosion potential although some soils within parts of the transport corridor and TLF have a higher erosion risk. Soil types include clay soils with a relatively high fertility.

In terms of agriculture, the soils provide moderate quality grazing pastures with some areas of good quality grazing land over vertosols in the north of the Project area. No areas of mapped SCL will be disturbed by the Project.

Physical impacts to the land will include land clearing and topsoil removal for the open-cut pits, mineral waste rock stockpiles, water storage dams and other surface infrastructure including the haul road and TLF.

Measures to minimise these impacts include:

- Sensitive clearance, handling and storage of topsoils;
- Establishing appropriate soil erosion and sediment controls; and
- Progressive rehabilitation of disturbed land will occur in a manner which allows the land to be returned to land suitable for the continued natural regeneration of land undisturbed by mining activities or land that has been rehabilitated to meet conservation objectives.

An assessment of potential Project impacts against the Reef 2050 Water Quality Triggers (WQT) has been completed. The assessment takes into consideration the benefits associated with the installation of specifically designed and engineered erosion and sediment control measures, the removal of grazing from the majority of the Mamelon Property and the anticipated ongoing reduction in sediments reporting to the GBR associated with the change in land use.

The assessment concluded the Project would result in a positive contribution to the Reef 2050 WQT through:

- A reduction in nutrients because of the cessation of grazing activities and subsequent managed regeneration of native vegetation on the majority of the Mamelon Property;
- 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;
- A reduction of grazing lands, either as disturbed land associated within mining activities, or land where cattle have been destocked. The destocked land will positively contribute to achieving

WQTs associated with increasing late dry season groundcover and increasing the extent of riparian vegetation; and

- An increase of the extent of riparian vegetation through the cessation of grazing on the vast majority of Mamelon property. The destocking of cattle and subsequent Project management of native revegetation will enable vegetation to regenerate within the riparian corridors associated with Deep and Tooloombah Creeks, both of which currently remain as narrow bands of vegetation within heavily cleared lands (as they occur adjacent to the ML).

5.1 Visual Amenity

The Project is likely to be visible from three homesteads (Oakdean, Brussels and Neerim-2) and the Bruce Highway. The visual impact assessment presented in the EIS did not account for vegetation. Vegetation has the potential to screen the visibility of the Project. Appropriately designed and located night lighting for the Project will minimise the risk of sky-glow impacts regionally; however, there is anticipated to be some light spill that will be evident during the night. In addition, an analysis has been undertaken to assess the impact the Project is likely to have on people travelling along the Bruce Highway and local road network surrounding the Project. The topography and existing vegetation in the area in unlikely to provide a natural screen, and as such mining operations will be visible from the road. Bund Walls will be constructed alongside the Bruce Highway to block visibility of the mining operations.

6 Traffic and Transport

All traffic associated with the Project is assumed to access the site via a single vehicular access point to the east and a separate and staggered single access point to the west proposed on the Bruce Highway. The eastern access will be utilised from year 2019 whilst the western will be utilised for the commencement of construction of Open Cut 1 in year 10 (2028). Both entry points will remain open until completion of mine closure activities.

The operational phase of the Project when Open Cut 2 is operational and Open Cut 1 is under development will generate most traffic with the total movements during peak operations equating to approximately five heavy vehicle movements in and five heavy vehicle movements out per hour at both the eastern and western access off the Bruce Highway. It is anticipated that 50% of the traffic will use the eastern access and 50% will use the western access during peak operations.

All materials, plant and equipment are intended to be delivered to the Project via road-based transport. It is expected that construction traffic will primarily involve a mix of rigid trucks, articulated vehicles (i.e. semi-trailers) and B-Doubles. Some oversize loads are also expected, particularly during the CHPP, dump station, stacker / reclaimer and heavy mining equipment construction and installation phase. These loads will be hauled from either the Port of Brisbane, Port of Mackay, or the Port of Gladstone.

It is not anticipated that the Project will result in significant traffic delays because of construction and operation. Analysis of potential pavement impacts predict impacts of less than 5% on the Bruce Highway for the entirety of the Project operation.

Following discussions with the DTMR since the release of the EIS, Central Queensland Coal has agreed to not undertake any construction or operational activity (i.e. blasting activities) that requires the closure of the Bruce Highway. Central Queensland Coal will continue to work with DTMR to establish appropriate excavation methods that facilitate the mining of coal within the 500 m buffer area adjacent to the Bruce Highway to avoid the need for road closures. Procedures to safely manage blasting will be articulated in a Blast Management Plan which will be prepared prior to the commencement of any blast activities to safeguard the users of the Bruce Highway.

The geotechnical assessment has shown that excavation of coal mining pits on either side of the highway is feasible without disruption to the highway. Additional geotechnical investigation will be undertaken within six months of the Project commencing within the 500 m blasting buffer zone. Requirements for additional investigation would be discussed with DTMR prior to proceeding.

The Project's workforce will be expected to drive to and from the Project site at the commencement and end of their roster. A local shuttle will be established to transport the non-commute workforce between the Marlborough Caravan Park and the mine. Central Queensland Coal will manage risks associated with driver fatigue and safety.

7 Waste Management

Waste will be generated throughout the construction, operation and decommissioning phases of the Project and have the potential to impact the existing environmental values and human health.

For general and recyclable waste, it is estimated that a total volume of 151 tonnes per annum of solid waste will require offsite disposal and 127 tonnes per annum of solid waste can be recycled during the construction period. Annually during the operational period 383 tonnes of solid waste will require disposal and 317 tonnes of solid waste can be recycled. This will be removed from site by a licensed contractor and Central Queensland Coal will work with the contractor to adopt sustainable reuse and the reprocessing of marketed recyclable wastes. The closest local municipal landfill is located at Rockhampton.

The RRC has confirmed the current annual and long-term capacities of the landfill can receive general waste for the duration of operations. Cumulative impacts are anticipated to be low and within current capacity of the existing landfill operations.

Regulated wastes produced include sewage sludge, oils and chemical waste which will also be stored in designated areas and segregated in clearly labelled containers. Regulated wastes will be removed by the licensed contractor and oils recycled using the new Gladstone lube oil recycling plant. Sewage effluent waste will be taken by licenced contractor to Rockhampton for disposal.

Waste management and mitigation measures put forward in this assessment reduce the impacts resulting from uncontrolled releases via methods such as bunding, containing and segregating potentially hazardous and odorous wastes. Management measures also aim to reduce pressures on existing land fill locations via implementing the waste management hierarchy (avoid, reduce, reuse, recycle, recover, treat and dispose).

8 Waste Rock and Rejects

Geochemical characterisation was undertaken for a total of 195 samples (including overburden, potential rejects, and fine coal reject samples) from 15 bore holes covering a range of depths from 11.6 meters below ground level (mbgl) to 147 mbgl in various lithologies. The majority of samples were classifiable as NAF. A total of four samples had positive NAPP, two of which were classifiable as PAF (with ANC / MPA ratio <2 and NAPP >10 kg H_2SO_4/t), two as low capacity PAF (with Sulphide-sulphur (SCR) >0.2 % and NAPP between 0 and 10 kg H_2SO_4/t) and one sample was classified as uncertain (UC; with ANC / MPA ratio <2 and NAPP <0 kg H_2SO_4/t). There was no discernible trend for which type of materials (waste rock or potential coal reject) would be more likely to contain PAF. As such fine coal rejects (21 samples) were also analysed to provide an indication of the acid potential and composition of the coal processing waste stream.

Similar to the potential rejects and waste rock results the fine rejects were largely classifiable as NAF with ANC/MPA ratios indicative of negligible risk. The acid potential for the fine rejects (tested to date) were summarised as follows:

- One sample was potentially acid forming (PAF-low capacity) (with NAPP 4.2 kg H_2SO_4/t);
- All other samples were non-acid forming (NAF) (most with relatively high buffering capacity); and
- Seven samples were acid consuming with acid neutralization capacity greater than 100 kg H_2SO_4/t.

The elemental composition of fine rejects was also similar to the potential rejects and waste rock samples which would suggest that components (in feed stocks) do not concentrate as a result of processing.

Based on works to date, the waste rock and coarse / fine rejects generated during the extraction and processing of the resource have limited potential to impact upon the EVs described in Section 8.8.

Without appropriate management there is some potential for leachate from extracted waste rock and fine rejects to enter local waterways and degrade water quality. Although the waste rock is expected to have a low capacity to generate acidity it does have moderate saline drainage potential and the KLC results indicated that leachate may contain elevated concentrations of dissolved As, Mo, Se and V when compared to potential water quality monitoring criteria. The leachate derived from the kinetic leach study generally showed that there is an initial flush of soluble metals / metalloids and salts which decreased after the first two to three flushes. This initial flush is likely related to the particle size; the fine materials with smaller particle size have a larger surface area for chemical reactions to occur and thus tend to yield higher leached metals / metalloids and salts concentrations.

There is likely to be a smaller average grain-size in the laboratory experiments compared to the average grain-size in the waste rock stockpiles. This will likely result in a comparatively reduced 'first flush effect'. The KLC study, although a short-term study, indicates a reduction in leached concentrations of most species with time. The study appears to show that the release of As, Mo, Se and V are not controlled by pyrite oxidation, indicated by the steady decline in leached concentrations.

The waste rock management plan incorporates filter pressing (to reduce water content) and integration/ stacking with dry overburden, which is likely to decrease infiltration and subsequent

leaching potential of these materials. According to the management plan the dried coarse rejects and filter pressed rejects will be mixed with overburden waste and strategically placed within both the out-of-pit waste rock stockpiles and in the open cut mine void. The waste water generated by the filter press process will be captured and treated (sedimentation or other process). High intensity rainfall events should be expected to occur over the course of mine-life and measures to deal with such events might include controlled discharge to take advantage of increased available dilution.

Management measures have been determined in response to mitigating potential impacts and best reflects the requirements for land management through the construction, operation and rehabilitation phases of the Project. These measures include further characterisation of overburden and waste materials which will inform the placement strategy (or treatment) of potentially acid-forming materials.

In addition to engineering controls, water monitoring will be undertaken at the environmental dams, mine-affected water dams, discharge locations and locations both upstream and downstream of the Project area to identify potential risks as they may arise. As identified in the risk assessment, although potential risks and impacts have been identified (associated with the waste rock and coal reject materials) through implementation of adequate controls and monitoring measures the residual risks will be adequately mitigated.

9 Surface Water

The Project is wholly contained within the Styx River Basin, which is comprised of Styx River, Waverley and St Lawrence Creeks. The Project is bordered by two watercourses as defined under the Water Act, namely Tooloombah Creek and Deep Creek. These creeks meet at a confluence downstream of the Project area to form the Styx River.

Three un-named surface water features drain the Project area into Deep Creek, along the eastern boundary of the ML. The most distinct drainage feature is the 2nd order stream that runs through Open Cut 1 in a northeast direction passing under the Bruce Highway and finally discharging to Deep Creek to the northwest of MIA 2. This drainage feature is impounded by two existing farm dams, one of which is located within the proposed Open Cut 1 pit shell. The upper catchment of this 2nd order stream will be diverted towards Deep Creek as a clean water diversion around the proposed mine pits. The middle portions of the drainage feature will be mined out as the pits progress.

There are three unnamed surface water features that drain the western section of the Project area into Tooloombah Creek. These features are not clearly defined and are classified as 1st order drainage features.

There are four existing farm dams of varying size within the Project area, all dams are located adjacent to the Bruce Highway. These dams are predominantly used for stock water, are highly disturbed and do not support vegetation communities. There is also catchment contouring within the Mamelon property to the south of the Bruce Highway for capturing and storing overland runoff and preventing erosion. Existing contour bunds will be upgraded to environment dams that capture runoff from overburden stockpiles and remove sediment prior to discharge to Deep Creek.

The ephemeral watercourses and wetlands (including farm dams) within the Project area and surrounding region are classified as moderately disturbed, with the background water quality reflecting that the land is largely given over to grazing.

All waterways showed exceedances for ammonia at virtually all times (dry or flood), with organic nitrogen and total nitrogen almost always above the guidelines at Deep and Tooloombah Creeks and total phosphorous at Deep Creek. During rainfall periods, exceedances were also encountered for organic nitrogen, total nitrogen, total phosphorous and bioavailable phosphorous (FRP) at all sites. The toxicants data show many exceedances across the sites, with the most common being for iron (though based on a low reliability trigger value), aluminium, copper, selenium and zinc (except at Tooloombah). Antimony and vanadium exceeded the guideline value at Deep and Tooloombah Creeks. Other exceedances were recorded for lead (Deep), chromium (Deep, Tooloombah), silver (Deep, Tooloombah) tin (Tooloombah) and uranium (Tooloombah – one occurrence only).

The water quality confirms the disturbed nature of the catchment due to catchment disturbance and nutrient inputs, which are consistent with impacts from land clearing, erosion and cattle grazing and the nature of the soils.

The seasonally influenced creeks report a wide range of water quality in response to the rainfall catchment generated flows and groundwater interactions. Key distinguishing factors between the creeks appears to be their physical structure and position in the catchment. Deep Creek appears to have a possibly flashier response to rainfall runoff than does Tooloombah Creek. Water quality data also suggests Deep Creek interacts less with groundwater than Tooloombah Creek, which shows a divergence away from a rainfall signature at the end of the dry season toward perhaps a groundwater signature.

Deep Creek

The Deep Creek channel is deeply incised (up to around 10 m deep). The channel width is variable, ranging from around 2 m to 3 m wide upstream and 5 m to 10 m downstream of the Project. The creek bed is comprised of silts, sands and clays, having a generally smooth channel with little vegetation that would provide resistance to flow. Deep Creek is highly responsive to rainfall, with sharp rises in stream height and turbidity during rainfall events.

Deep Creek tends to have small isolated pools during the dry season giving rise to variability in water quality reported for the creek during periods of no flow. Pooled surface water in Deep Creek typically has a relatively high turbidity indicative of the presence of fines (clays and silts) that are not readily settled by the force of gravity. The nature of the soils and responsiveness to rainfall flows means that turbidity and suspended solids are often elevated and often exceed the nominated water quality objectives.

Water salinity data (as electrical conductivity, EC) shows water is generally fresh, ranging from 35.9 to 1,254 µS/cm EC, with a general salinity increase during periods of dry / no flow and following the first flush of salts and nutrients experienced at the beginning of the wet season. Deep Creek pH is typically circum-neutral although has been recorded at time weakly acidic to alkaline (pH 4.96-9.54).

The creek water quality reflects the local pastoral land use with elevated ammonia and total nitrogen levels (0.06 and 1.5 mg/L respectively) predominantly exceeding the water quality objectives (0.02 and 0.5 mg/L respectively). Total phosphorus is also elevated with a mean water quality of 0.32 mg/L as compared with the water quality objectives of 0.05 mg/L. Generally the level of metallic toxicants are low however several metals including copper (average 0.002 mg/L), iron (average 0.43 mg/L) and lead (average 0.004 mg/L) exceed the water quality objectives (0.0014 mg/L, 0.35 mg/L and 0.0034 mg/L respectively) most of the time.

Tooloombah Creek

The Tooloombah Creek streambed is rocky, comprising gravels and boulders, and outcropping sandstone is present within the creek channel near the Bruce Highway bridge. Significant and dense vegetation is established on the banks, including full-grown trees creating a stable bank that is resistant to scour. The water within the creek is typically brackish, most likely a combination of the saline tidal wedge and freshwater runoff, as demonstrated by the varying electric conductivity of 87.2 µs/cm and 3,530 µs/cm. A rocky to sandy substrate occurs upstream of the Bruce Highway bridge that crosses Tooloombah Creek which acts as a barrier to water flows.

Large pools of water occur within the creek following extended dry periods. Water held in these pools appear to be less turbid than Deep Creek pools, due to a combination of catchment hydrology (less erosion and slower flows), possible reduced stock access and increased residence time of pool water enabling sediments to settle. Elevated salinity is associated with the drier periods and is likely due to the increased proportional influence of groundwater on creek surface flows during baseflow periods. During rain events and due to the larger catchment size, salinity levels were reduced in Tooloombah Creek compared to Deep Creek due likely to greater levels of runoff.

Tooloombah Creek pH varied from a high of 9.8 to a low of 5.9. Suspended solids and turbidity were generally within the water quality objectives although exceeded on some occasions. Elevated nutrient levels found in this creek reflect the disturbed areas and grazing activities within the catchment. Ammonia (average 0.05 mg/L), total Nitrogen (average 0.51 mg/L) and total Phosphorus (average 0.047 mg/L) all exceed the water quality objectives (0.02, 0.5 and 0.05 mg/L respectively). Metal concentrations within Tooloombah Creek are generally within the water quality

objectives expecting copper (0.0014 mg/L) which typically exceeds with an average concentration of 0.088 mg/L.

Livestock and Irrigation

The ANZECC Guidelines for livestock watering indicated TDS levels encountered in the streams were generally in the range regarded as having 'no adverse effects on animals expected'. Of the toxicants aluminum was above the recommended low risk range during wet periods.

Drinking Water

When compared to Table 7.3.1 - Guidelines for drinking water supply in the vicinity of storage off-takes or in groundwater supplies, before treatment in the QWQG, the recommended water quality objectives were exceeded for manganese and iron, and during rainfall events turbidity and, to a lesser degree, suspended solids. Dissolved oxygen was below the target in Deep Creek but generally above in Tooloombah Creek.

Based on the Australian Drinking Water Guidelines 2011 (NHMRC and NRMMC, 2011), salinity (as total dissolved solids) can be regarded as of good quality in Deep Creek (except during December flows) and fair quality in Tooloombah Creek. Several of the toxic metals did breach the ADWG's and would require removal prior to use in potable water supplies. The key elements included iron and manganese and aluminum for aesthetic reasons; and antimony and / or arsenic and lead with exceedances occurring during the December to March (wet) period.

Intermittent flooding is a natural feature of the landscape, reflected in the predominance of ephemeral watercourses. Flood modelling identified that the CHPP and MIA 1 will be outside of the area of flood risk and, with the use of sediment control devices, no impact is anticipated to watercourses within and surrounding the Project site during construction. CHPP and MIA 2 are within the flood risk for events greater than 0.1%, with water ponding on the pad surface. During the probable maximum flood annual exceedance probability event a maximum water depth of 0.99 m was recorded on the pad; this is with the existing surface elevation raised by between 1.0-2.5 m.

The mine water balance confirms that the planned mining and processing water demands will be met by water sourced from catchment rainfall, groundwater dewatering from mining activities, and reuse of water around the site. The on-site water storages are not expected to be regulated structures due to the relatively low volume and height / depth required to meet the project water storage requirements. During the driest years, there is more reliance on catchment and groundwater water supply, whereas during the wettest years there is more opportunity for water reuse. Moreover, during the wetter years there is a greater net storage requirement to contain open pit mine dewater volumes as well as catchment runoff volumes and direct rainfall falling on the storage areas.

Impacts on surface water resources assessed within the EIS include:

- Reduced water availability to existing users;
- Increased local flood risk; and
- Changes to stream flows and water quality.

To avoid impacts on the availability of surface water in the area, water will be reused and recycled during operations to reduce overall water demand.

The Project drainage system has been designed to divert clean water flows around working areas. The drainage system will also capture rainfall, groundwater from the mine workings, and any accidental spills or leaks to reduce the risks to water quality in the area. Any releases of water from the site will be in accordance with Queensland water quality standards and water quality will be monitored.

A Project Receiving Environment Monitoring Program (REMP) will be developed that specifies the threshold and trigger levels for management actions and identifies the mitigating or reparative actions required to reduce the risk or effect of impacts. A Water Management Plan will be developed prior to construction, to monitor the effects on the waterways which will receive the highest level of disturbance. Although some level of impacts is unavoidable, the assessment has identified that mitigation and management measures can be employed to significantly reduce the potential for adverse impacts on the area's surface water EVs.

10 Groundwater

Apart from alluvial aquifers associated with major watercourses, the Styx River Basin is typified by relatively low permeability coal measures and basement rocks. In low elevation areas, the water table is hosted by alluvial and colluvial deposits, and in some areas the coal measures. in higher elevation areas, the water table is hosted by variably weathered and fractured basement rocks.

Groundwater flow is driven by rainfall recharge and discharge (via evapotranspiration and baseflow) in low elevation areas. Stream flow generated by rainfall events may be the source of localised recharge to alluvial aquifers, but only on a seasonal basis. In the lower reaches of Tooloombah and Deep Creeks (Styx River tributary catchments), the water table slopes toward the major drainage lines, suggesting groundwater discharge supports in-stream (creek) pools, and that a large component of the shallow groundwater flow system for the Tooloombah and Deep Creek catchments naturally discharges close to, but upstream of the confluence (behaving to a large degree as closed groundwater catchments). Groundwater discharge also occurs to Styx River and the Broad Sound estuary, depending on tides. Deeper groundwater (under) flow to Broad Sound and coastal areas is also likely to occur, primarily as a result of the large thickness of the Styx Coal Measures.

Based on available data, the depth to water table across the Basin is typically in the range 2 to 15 m, and the water table surface is a subdued reflection of topography.

Several third-party bores are located within the Styx River Basin, most of which appear to source water from alluvial aquifers or residual (weathered) basement in places where relatively shallow groundwater occurs. In general, groundwater resources report salinity concentrations that are not suitable for livestock, as is evidenced by allowing stock access to instream pools of Deep and Tooloombah Creeks. Groundwater is generally unsuitable for potable use without treatment. A bore census undertaken in 2017 suggests that most, if not all, wells are used for stock supply. There may be some small-scale irrigation development around 16 km downstream of the proposed mine but there is no evidence of irrigation within the Tooloombah and Deep Creek catchments.

Available data show the groundwater chemistry for alluvium bores in close proximity to the Project is either similar to the Styx Coal Measures or to recharge from rainfall or streamflow events. The data also shows alluvial groundwaters typically demonstrate a shift toward a rainwater signature toward the end of the wet season.

The available major ion data for Styx Coal Measures groundwater do not show a distinctly seawater signature, but do show evidence of direct recharge from rainfall or interaction with surface water. Concentrations of major ions in Styx Coal Measures groundwaters also vary widely but the waters are typically sodium-chloride dominant, which may be representative of the depositional environment. Seasonal variability in water quality is not evident in the Styx Coal Measures groundwaters.

Concentrations of major ions in Basement groundwater generally display calcium-chloride dominance, likely indicating reverse ion exchange processes where sodium is exchanged with calcium.

Concentrations of aluminium, arsenic, cobalt copper, lead, manganese, molybdenum, iron, fluoride, zinc, chromium, barium, nickel, silver, uranium and vanadium in groundwater often occur above the Water Quality Objectives defined for each of the Groundwater Chemistry Zones within which the Project area. Hydrocarbons are reported in in a number of laboratory analyses, particularly for groundwaters sampled from the Styx Coal Measures.

The Queensland Government has identified the following EVs for groundwater in the Styx River Basin – aquatic ecosystems, irrigation, farm supplies, stock water, and cultural and spiritual. The groundwater studies undertaken suggest that each of these EVs have varying degrees of reliance on groundwater.

Groundwater Dependent Ecosystem (GDE) surveys undertaken in the broader study area (and reported in this chapter) show:

- Type 1 GDEs (stygofauna) have been identified in the Project area within the alluvial aquifer, but do not appear to be widely occurring;
- Type 2 GDEs (ecosystems reliant on the surface expression of groundwater):
  - Are present within Tooloombah and Deep Creeks (in-stream pools) as well as Styx River and Broad Sound estuary (estuarine)
  - Two wetlands located on the western extent of the Mine Lease (Wetland 1 and Wetland 2) have been found to not be Type 2 GDEs (Wetlands 1 and 2 appear to be reliant on surface water inundation following rainfall events, and Wetland 1 may be reliant to some extent on groundwater i.e. Wetland 1 is likely to be a Type 3 GDE)
- Type 3 GDEs (ecosystems reliant on subsurface expression of groundwater) occur within the Project area. Wetland 1 appears to have some reliance on groundwater, as do Forest Gum woodlands (Regional Ecosystems) where the water table occurs at depths of less than 10 m.

Semi-evergreen Vine Thicket has been found not to be groundwater dependent and demonstrates vadophytic tendencies.

There are four direct effects of mining on groundwater resources that need to be considered for any mining operation –altered groundwater quantity and quality, surface water / groundwater interactions, and aquifer disruption. A numerical groundwater flow model has been used to assist in assessing the extent to which mining will give rise to direct effects. The model represents the groundwater system within which the proposed mining operation will take place, as well as upstream and downstream of the proposed mine. Model predictive uncertainty and sensitivity in relation to adopted hydraulic properties and boundary conditions has been comprehensively assessed and reported, including non-uniqueness of hydraulic property sets, lower than average rainfall (drought) periods, hydraulic loading of the alluvial aquifer beneath waste landforms.

The numerical groundwater flow model does not simulate surface water flows, and this provides for a conservative assessment as surface water (particularly following large stream flow events) is likely to be an important source of water for maintaining aquatic and riparian zone ecological function. Other conservative aspects of the model include the following:

- Adopted HSU hydraulic properties – sensitivity and uncertainty analysis spanned at least 1 order of magnitude beyond best calibrated values for hydraulic conductivity;
- Backfill moisture content – assumed to be zero, but this is very unlikely to be the case meaning the model predicted groundwater recovery period is probably over-estimated;
- Storage co-efficients – represented at very low levels which will overestimate the spatial extent of predicted drawdown (but may underestimate pit backfill recovery timeframes); and
- River and Creek flows – the adopted boundary condition to represent interactions between groundwater and surface water allow water to be removed from the model but do not allow water to enter the model as flood recharge.

The mining activity having the most potential to significantly result in direct groundwater effects is the quarrying and dewatering of mine pits and the subsequent progressive backfilling of pit voids during mining.

Other activities associated with mining that may have the potential to impact on groundwater resources include, for example, waste rock stockpiles, water storage dams, storage and use of hazardous chemicals dust suppression, monitoring infrastructure and hydraulic loading of ground beneath waste landforms.

The NWC *Framework for assessing local and cumulative effects of mining on groundwater and connected systems* has provided the template for undertaking the groundwater impact assessment for the Project. The framework essentially follows a 'source-receptor-pathway' analysis and involves a seven-step methodology (see Figure ES5).

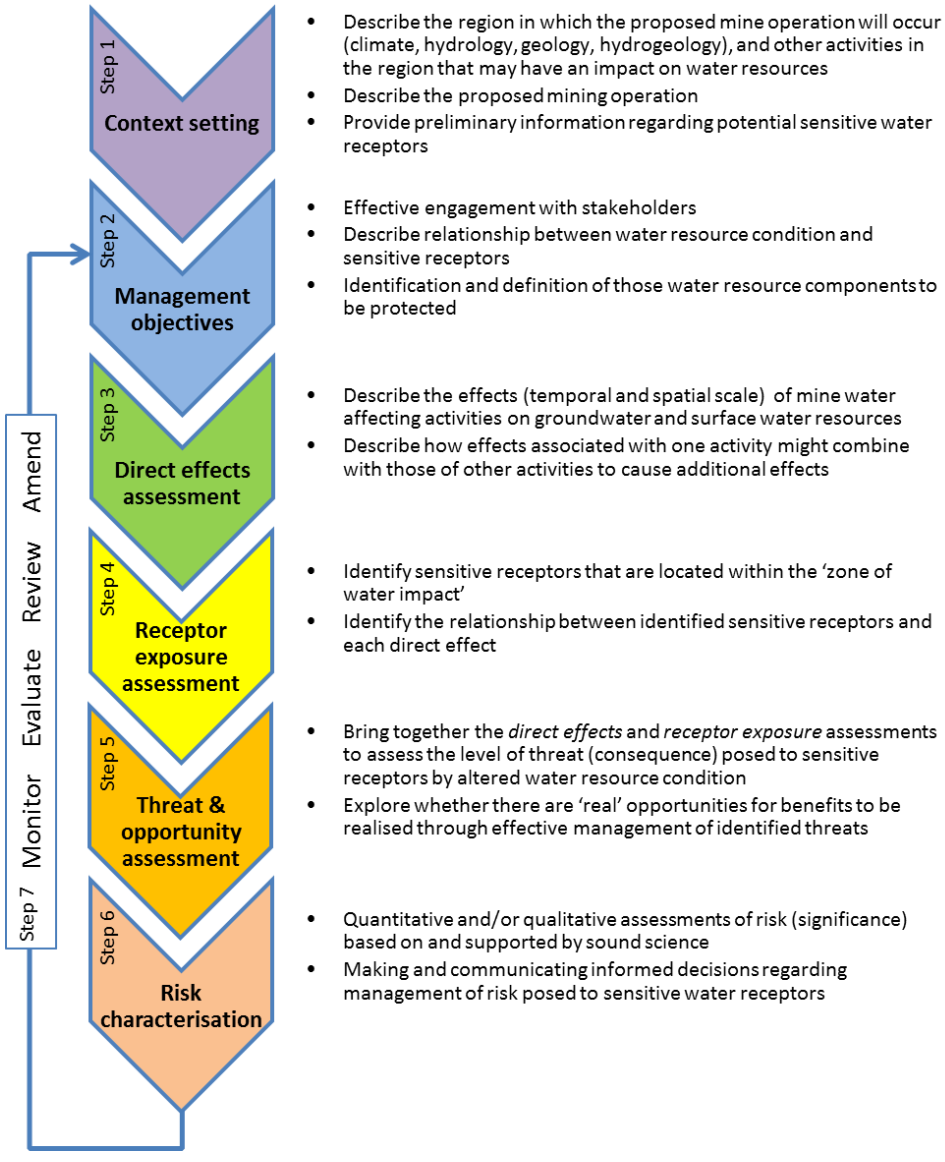

Figure ES5 - Flowchart for assessing the effects of mining on water resources

The following presents a summary of the groundwater effects assessment undertaken for the Project:

Groundwater quantity

During mining, it is predicted there will be very little change to water table elevations upstream and downstream of the proposed mine, but there will likely be significant reduction in water table / potentiometric surface elevation in the vicinity of the mine due to dewatering that is required to provide efficient and safe conditions for mining. The limited drawdown predicted to occur downstream of the mine is consistent with the observation that the Tooloombah and Deep Creek catchments behave as closed groundwater catchments, and that mining intercepts groundwater discharge above the confluence of the creeks and has little measurable, if any, impact to Styx River and Broad Sound downstream of the confluence.

The zone of mine-related drawdown influence is predicted to align northwest to southeast and does not interfere with the tidal reach of Styx River. This drawdown persists for up to 50 years post-mining but, because the mine pits are progressively backfilled, the groundwater system is conservatively predicted to fully recover sometime after 50 years (but before 100 years).

The mid- to lower reaches of both Tooloombah and Deep Creeks, immediately adjacent to the mining pits, are predicted to receive lower rates of baseflow due to drawdown, which may impact on the longevity of in-stream pools that occur along these reaches. Recovery of groundwater levels such that baseflow returns to average pre-mine conditions is conservatively predicted to occur sometime after 50 years following mine closure.

The rate of water table decline in areas of terrestrial and riparian GDEs is not expected to be sudden and may allow vegetation to adapt to a declining water table through extension of rooting depth or having access to a larger soil water reservoir. Of course, due to physiological limitations, there will be a depth where different types of phreatophytic vegetation cannot extend their roots to. The rate of decline, however, will allow observations to be made concerning vegetation health and development of management approaches to address any circumstances where adverse impacts are likely.

Groundwater quality

As the backfilled mine pits will recover from bottom up, i.e. the Styx Coal Measures (HSU2) and then later the alluvium (HSU1), groundwater salinity (and other water quality parameters) will likely represent the source of recovering waters after mining is completed.

Geochemical studies undertaken for the Project indicate the coal measures and other materials that will be excavated and stockpiled as top soil, overburden or waste are essentially non-acid forming, and pose little threat to generation of acid drainage, meaning AMD is unlikely to impact on any leachate that may be generated from these materials.

The potential for ASS in the Styx River catchment is largely restricted to the coastal zone below Ogmore on Styx River. Groundwater model predictions indicate drawdown associated with mine water affecting activities will not extend downstream to Styx River and, so, any threat to marine and aquatic ecosystems associated with ASS is considered negligible.

The seawater-fresh water interface does not extend as far inland as the confluence of Styx River and Broad Sound estuary (below Ogmore), groundwater salinity and corrected head data demonstrates this is the case. Based on drawdown predictions and the hydrogeological conceptualisation, it is considered highly unlikely that the interface will be mobilized in response to mining related water affecting activities.

With regard to the handling and storage of hazardous goods and chemicals on site, engineering design of storage and handling infrastructure along with strict handling, use and storage controls,

as mandated by specific and relevant legislation, will reduce the potential for uncontrolled release of pollutants to the environment and contamination of groundwater.

Groundwater and surface water interaction

Water table drawdowns associated with mine dewatering and during recovery of groundwater after completion of mining will result in temporarily (around 50 years post mining) reduced interactions between groundwater and surface water, particularly during dry periods. The zone of influence is predicted to not extend as far as the confluence between Tooloombah and Deep Creeks or Styx River, and be largely restricted to the mid-and lower reaches of the creeks, adjacent to the mining pits.

Aquifer disruption

Pit voids will not remain after closure as the pits will be progressively backfilled during mining. However relatively small (remnant) waste rock stockpiles will remain after mining (most of the waste storages will be used to backfill the mine pits). Modelling shows these storages are unlikely to result in hydraulic loading that is significant enough to result in water table rise to the surface or significantly disrupt groundwater flow paths.

In relation to threats posed to potentially sensitive groundwater receptors in response to the direct effects of mining related water affecting activities:

- The potential for irrigation supplies to be impacted by the mine (during and following closure) will be restricted to any alluvial aquifer supplies located within the zone of water table decline. A single pair of registered bores is located within the western boundary of ML. However, these bores are no longer in use and they are located on the Mamelon property, which is owned by Central Queensland Coal. There are four other registered or landholder bores located within the periphery of the predicted zone of influence (0.1 m of predicted ground water drawdown) and the threat of reduced groundwater access by third party users is considered to be low;
- Of the locations where Type 1 GDEs (stygofauna) have been identified, the nearest location on the eastern Mine Lease boundary (STX 093) is predicted to experience the greatest drawdown, with the predicted loss of habitat (saturated thickness) to be around 90%. However, at locations further upstream and downstream of the mine lease, where stygofauna also likely occur, the loss of habitat is predicted to be much less than at STX 093. As a consequence, the assessed level of threat posed to Type 1 GDEs ranges between low and high and the longevity of this threat is temporary (decades). The residual risk posed to TYPE 1 GDEs by the proposed mining related water affecting activities is assessed as being medium to high, largely because management options are limited;
- In the case of aquatic ecosystems (Type 2 GDEs), predicted drawdown of between 0.1 and 0.5 m along reaches of Tooloombah and Deep Creeks total around 7 km, and reaches where more than 0.5 m drawdown is predicted total around 6 km. As a consequence, the assessed level of threat posed to Type 2 GDEs ranges between low / moderate and high and the longevity of this threat is temporary (decades). The residual risk posed to Type 2 GDEs by the proposed mining related water affecting activities is assessed as being medium to high, also largely because management options are limited, being restricted to supplementing flows with alternative sources of water such as groundwater or site water storages (treated if required);
- For riparian vegetation (Type 3 GDEs), the area where drawdown of between 0.1 and 1 m is predicted occurs within the riparian zone along reaches of Tooloombah and Deep Creeks totals around 135 ha, and the area along reaches where more than 1 m drawdown is predicted totals around 38 ha. The assessed level of threat posed to Type 3 GDEs ranges between low and high and the longevity of this threat is temporary (decades). The residual risk posed to Type 3

riparian GDEs by the proposed mining related water affecting activities is assessed as being low to medium;

- For terrestrial vegetation (Type 3 GDEs):
  - For locations where the water table lies within 10 m of the ground surface, the area where drawdown of between 0.1 and 5 m is predicted totals around 97 ha, whilst the area where drawdown of more than 5 m is predicted totals around 3 ha. The assessed level of threat posed to Type 3 (terrestrial) GDEs where the water table is less than 10 m deep ranges between low and high, depending on the drawdown threshold (less than 5 m or more than 5 m, respectively). The longevity of this threat is temporary (decades), and the residual risk posed to these types of GDEs is assessed as being low to medium
  - For locations where the water table lies more than 10 m below the ground surface, the area where drawdown of between 5 and 10 m is predicted totals around 8 ha, whilst the area where drawdown of more than 10 m is predicted totals around 18 ha. The assessed level of threat posed to Type 3 (terrestrial) GDEs where the water table is more than 10 m deep ranges between low and high, depending on the drawdown threshold (5 to 10 m or more than 10 m, respectively). The longevity of this threat is temporary (decades), and the residual risk posed to these types of GDEs is assessed as being low to medium.

Management and mitigation measures that are available for managing impact (and risk) include the following, noting that ongoing monitoring will provide the opportunity for refining and adapting these measures once mining commences:

- Establishing an appropriate monitoring and evaluation program, including establishment of science-based water level and quality thresholds;
- Make good any impact on groundwater bores outside the mining lease, including the provision of alternate water supply, deepening or relocating bores to areas outside impact areas, or providing new pumps to extract deeper groundwater;
- GDE condition monitoring;
- Where ecological impacts occur or are envisaged because of changes to natural groundwater discharges Central Queensland Coal will provide environmental flows to supplement local shallow water table levels;
- Strict handling use and storage controls will reduce the risks of pollution affecting groundwater quality;
- Providing offsets for the direct loss of habitat within the mine footprint (e.g. Type 3 GDEs), including commitment to appropriate monitoring and management efforts to monitor for potential indirect loss of habitat outside the mine footprint (i.e. Type 2 and Type 3 GDEs), as appropriate; and
- Regular validation and refinement of the numerical groundwater flow model. as required, based on monitoring results and observed groundwater system / sensitive receptor response to mining related water affecting activities.

11 Rehabilitation and Decommissioning

Over the Project's life approximately 1,323 ha of land may be disturbed. All disturbed areas will be rehabilitated and maintained as mining progresses rather than at the end of the mine's life. Infrastructure areas will be decommissioned, dismantled and removed once mining operations are complete. Rehabilitation will occur progressively throughout the life of the Project to create a low maintenance, geotechnically stable landform commensurate with the agreed final land use.

Central Queensland Coal intends to manage its operations and conduct decommissioning and rehabilitation activities to ensure that the land disturbed is returned to land suitable for the continued natural regeneration of land undisturbed by mining activities or land that have been rehabilitated to meet conservation objectives. A small section of the Mamelon property, located at the southern extent of the ML boundary, will continue to be set aside for grazing. Central Queensland Coal will demonstrate that the land is safe to humans and wildlife, non-polluting and geotechnical stable before relinquishing the mining tenement at the end of the mine's life.

Specific rehabilitation and decommissioning measures to avoid or minimise any impacts will be identified in the EA and ultimately the Plan of Operations and the Mine Closure Plan (MCP) that will be finalised prior to the commencement of mine closure activities. Should guidelines be issued regarding the preparation of a Progressive Rehabilitation and Closure Plan, this will be completed in place of a Plan of Operations and MCP.

It may be the case that the best beneficial use of some of the supporting infrastructure is to leave the infrastructure in place to support the region. This will be discussed with the relevant authorities and landholders prior to formalising the decommissioning strategy. If the preferred outcome is to leave some of the infrastructure components *in situ* as operating infrastructure, Central Queensland Coal will facilitate the transfer of operating licences and obligations to the relevant parties.

12 Air Quality and Greenhouse Gases

Air quality within the existing environment is relatively good and typical of rural areas. The closest homestead to the mining operations is the TSC Res 1 homestead located approximately 1.9 km northwest of the mine area boundary and is the closest dwelling to the Project. The predominant wind directions are from the north northeast or southeast, depending on the season.

Air quality standards will not be exceeded at any homestead, or any other sensitive location. Model results show that the highest predicted pollutant concentrations from the construction of the Project are predicted to occur at the Tooloombah Creek Service Station, TSC Res 1 and TSC Res 2; however, these concentrations are all below the relevant criteria.

Mitigation to further control potential air emissions will include:

- Preparation and implementation of an Air Quality Management Plan prior to commencing construction activities on site;
- Monitoring in the event of a complaint;
- Engineering control measures;
- Dust suppression measures;
- Rehabilitation of exposed surfaces; and
- Operational procedures.

12.1 Greenhouse Gases

The Project will unavoidably generate greenhouse gases through the consumption of electricity, extracting coal and diesel combustion. Equipment usage was calculated to be the largest contributor to greenhouse gas release.

The maximum annual greenhouse gas emissions rate is estimated at 480 kilotonnes of carbon dioxide equivalent. Carbon dioxide equivalent is the amount of carbon dioxide that would have the same warming effect as the mixture of the three greenhouse gases emitted by the Project individually. The Project's emissions amount to 0.09% of Australia's total greenhouse gas emissions and 0.32% of Queensland's total greenhouse gas emissions.

Central Queensland Coal will implement a Greenhouse Gas Abatement Strategy to avoid and minimise greenhouse gas emissions over the life of the Project. Compensation for actual emissions will also be provided, as appropriate.

13 Noise and Vibration

The noise environment near the Project can be characterised as 'very rural', with only mild sources of activity noise, mostly local activity at dwellings and plant and machinery used for agriculture and livestock. The Bruce Highway cuts through the proposed ML area and the North Coast Rail Line is located approximately 1.5 km from the northern boundary of the proposed ML area. These are likely to have an influence on the acoustic environment; however, traffic is spasmodic but constant on road and intermittent on rail. Environmental noise (wildlife, flora, and wind) is the predominant noise.

Noise emissions assessed by the EIS include:

- Construction works;
- Operational activities during the peak production year (year 12); and
- Blasting.

Potential noise and vibration impacts from the construction and operation of the Project were assessed against applicable criteria based on the Department of Environment and Heritage Protection's Model Mining Conditions (MMC) and Queensland Environmental Protection (Noise) Policy 2008.

Future potential noise levels at the nearest noise sensitive and commercial receptors were predicted using the SoundPlan noise model for the construction and operational scenarios. For the operational scenario, mining activities in Year 11 of the mining schedule was modelled as this has greatest potential for noise impacts.

Noise levels for construction and operation are predicted to exceed the noise criteria at the nearest receptors and thus noise mitigation is required. Noise impacts will be managed through a Noise Management Plan and for blasting outside of MMC stipulations, a Blast Management Plan. A complaints procedure will allow for all complaints regarding the Project's noise to be documented, investigated and reported, with corrective actions provided as appropriate. The main noise reduction measure during operations is the replacement of CAT793D trucks with CAT793 XQ haul trucks leading up to achieving peak production of 10 Mtpa.

The Noise Management Plan will be developed in consultation and engagement with potentially affected receptors to achieve alternative arrangements, in particular at BAR H-1, Brussels, Strathmuir and TSC Res 1 and TSC Res 2.

Potential ground vibration and airblast overpressure levels were predicted based on AS2187.2-2006. Blasting impacts are expected to comply with blasting criteria with appropriate stemming.

14 Terrestrial Ecology

The Project is located largely within the Marlborough Plains subregion of the Brigalow Belt South bioregion. A small portion in the south of the mine area lies within the adjacent Nebo-Connors Range subregion. The region has experienced a long history of human disturbance due to agriculture and mining activities. The Project area is representative of the wider region and landscape with over 79% of the Project area cleared and currently mapped as non-remnant. Remnant vegetation within the Project area is largely confined to the south and western portions of the mine area. The TLF and haul road lie entirely in cleared lands excepting a linear riparian strip of vegetation associated with Deep Creek that is crossed by the haul road. The ground layer in cleared areas and in remnant open woodland was often observed to be dominated by the exotic Buffel Grass, particularly that portion of the mine ML located north of the Bruce Highway.

Vegetation was composed of 12 RE types situated on five landforms: alluvial river and creek flats; Cainozoic clay plains; Cainozoic sand plains / remnant surfaces; coarse-grained sedimentary rocks; moderately to strongly deformed and metamorphosed sediments and interbedded volcanics; reflecting the underlying geology and position in the landscape. Field verification of REs within the Project area identified a number of inconsistencies in current RE mapping, relating to RE composition and polygon size. Remnant vegetation listed as Endangered under the VM Act, and as a TEC under the EPBC Act, was observed during field assessments as two small polygons of semi-evergreen vine thicket located on the west boundary of the mine area, and two polygons of Brigalow vegetation adjacent to the eastern boundary of the ML. The majority of remnant vegetation within the ML comprises communities listed as Of Concern and Least Concern under the VM Act.

No listed flora species were observed during the field assessments and no species identified as occurring in the wider area during desktop searches was identified as having a high likelihood of occurring within the Project area.

Listed fauna species observed in the Project area include Koala, Greater Glider and Squatter Pigeon (all listed as Vulnerable under the NC and EPBC Act) and several bird species listed as Migratory (EPBC Act) and Special Least Concern (NC Act). Suitable habitat for Koala occurs within the mine area and along the haul road and adjacent riparian communities associated with Deep Creek and Tooloombah Creek. Suitable gilgai habitat for Ornamental Snake (listed as Vulnerable under the NC Act and EPBC Act), identified in remnant Brigalow habitat to the west of the Project area, also occurs in cleared lands north of the Bruce Highway.

The Project will require unavoidable significant impacts to ecological matters of State and Commonwealth significance including: remnant vegetation listed as Of Concern under the VM Act; habitat for listed species (Koala and Ornamental Snake); and watercourse remnant vegetation (listed as Least Concern under the VM Act). There will also be significant impacts to drainage lines mapped under the waterway barrier works for fish passage, although the extent of these impacts is subject to further assessment. Significant impacts will be a result of clearing for mining infrastructure, open cut pits and environmental dams. The total extent of these impacts has been calculated to be 108.22 ha and is the subject of the Project Offset Management Plan (OMP).

Other potential impacts of concern include the drawdown of the groundwater table because of open cut mining. This may have long-term impacts on permanent waterholes and riparian vegetation (including habitat for Koala), largely in those areas closest to mining operations where the groundwater drawdown is at its greatest. Based on ground-truthed vegetation mapping, mining effects are predicted to pose a low level threat (< 1 m drawdown) to areas of riparian Forest Red Gum vegetation (RE 11.3.25) along Tooloombah Creek (40.3 ha) and Deep Creek (62.4 ha). A

moderate to high threat (> 1 m drawdown) is predicted in vegetation communities encompassing 8.3 ha along Tooloombah Creek and 34.2 ha along Deep Creek. There may also be a low to moderate threat (< 5 m drawdown) on 14.25 ha of a terrestrial Forest Red Gum vegetation community (RE 11.3.4).

The mitigation measures proposed as part of the Project will minimise additional indirect impacts to terrestrial fauna and flora communities within and surrounding the Project area from construction and operational activities. These measures include fauna crossing infrastructure to minimise fauna traffic collisions along the haul road and a detailed ecological monitoring program to monitor the health of vegetation communities adjacent to the Project for indirect impacts such as dust and surface water contamination. With control measures in place indirect impacts to fauna and flora are not expected to be significant.

Central Queensland Coal owns the Mamelon property, of which the majority of the Project's disturbance footprint occurs. Central Queensland Coal has proposed utilise areas outside of the ML and within Mamelon for offsetting purposes for predicted residual impacts of the Project. Central Queensland Coal seeks to achieve synergistic habitat and conservation benefits through the retention and improvement of existing vegetation, and the rehabilitation of previously cleared lands on the property. Central Queensland Coal considers that, with suitable management of the available lands on the property (outside of the Project footprint), a conservation benefit can be derived that goes well beyond the immediate direct impacts of vegetation clearing for the Project. The draft OMP describes the approach taken by Central Queensland Coal to offset significant residual impacts to MSES.

15 Aquatic Ecology

The Project is located within the Styx River basin occupying the lower catchments of two major creek lines – Deep Creek and Tooloombah Creek. The region has experienced a long history of human disturbance largely due to grazing activities which occupies 78% of the Styx River catchment. Deep Creek and Tooloombah Creek lie adjacent to the east and west boundaries of the Project. These creeks are ephemeral, merging two kilometres north of the Project area whereupon it becomes the Styx River. The Styx River is subject to tidal influence almost to the confluence of the two creeks.

The Styx River widens into a large estuary that is located within the wider Broad Sound area 10 km downstream of the Project. Broad Sound is listed as a Fish Habitat Area, is on the Directory of Important Wetlands of Australia and is part of the Great Barrier Reef Coastal Marine Park (GBRCMP) and the Great Barrier Reef World Heritage Area.

Aquatic habitats sampled in the area appear to be in good condition when surveyed during flow events despite the impact of cattle grazing in the wider area. Riparian cover along Tooloombah Creek and Deep Creek is largely continuous. Water quality across the catchment recorded generally high values of nutrients including ammonia, nitrogen and phosphorus. Deep Creek was recorded as having significant turbidity levels during no flow conditions. Macroinvertebrate assemblages within survey sites were diverse and representative of healthy aquatic systems when creeks were flowing.

No listed aquatic flora was recorded during the surveys. Observations during wet and dry season surveys across the wider area recorded a number of sedge / wetland plants associated with ephemeral wetlands including Swamp Lily, *Eleocharis blakeana* and *Juncus polyanthemus.* A total of 28 fish species were recorded during a detailed site survey in 2011 which included the Styx River. The species recorded are generally typical of what would be expected to occur in a Central Queensland coastal catchment. There are no records of introduced fish species from either desktop information or field surveys indicating the catchment may be relatively free of introduced fish taxa.

One threatened aquatic species has potential to occur in the waters adjacent to the Project and is likely to occur downstream. Anecdotal evidence indicates that Estuarine Crocodile (listed as Vulnerable – NC Act) occurs in the Styx River. Four species of large marine fauna (all considered Vulnerable under the NC Act) are considered likely to occur downstream of the Project in the waters of Broad Sound: Green Turtle, Flatback Turtle, Australian Hump-backed Dolphin, and Australian Snubfin Dolphin. The nearest available habitat for these species is considered to be in the waters of the lower estuary of the Styx River adjacent to Rosewood Island.

Stygofauna communities were recorded during a comprehensive (seasonal) study sampling from groundwater bores located within the mine lease boundary and the wider area. Five species were identified to the north of the Project. Only a single species was located on the eastern boundary of the mine lease. This species was found within the predicted groundwater drawdown impact area resulting from mine activities. It is considered highly unlikely this species is restricted to the localised area of Project groundwater impact. Therefore, no stygofaunal species is considered restricted to the potential impact area and there will be no significant impacts.

Predicted groundwater drawdown impacts close to open cut mining activities have the potential to cause long-term impacts to localised habitat for fish species (and to a lesser extent Estuarine Crocodile) through reduction of water levels in permanent waterholes. This effect is predicted to pose a low threat of adverse impact (< 0.5 m drawdown) to 3.4 km of Tooloombah Creek and 3.3 km of Deep Creek, while a moderate to high threat (> 0.5 m drawdown) is expected along 2.4 km of

Tooloombah Creek and 3.9 km of Deep Creek. This is an overestimate of the extent of potential impact area as waterholes do not occur along the entirety of this impact area.

Groundwater drawdown may also have long-term impacts on adjacent riparian vegetation. Based on ground-truthed vegetation mapping, mining effects are predicted to pose a low level threat (< 1 m drawdown) to areas of riparian Forest Red Gum vegetation (RE 11.3.25) along Tooloombah Creek (40.3 ha) and Deep Creek (62.4 ha). A moderate to high threat (> 1 m drawdown) is predicted in vegetation communities encompassing 8.3 ha along Tooloombah Creek and 34.2 ha along Deep Creek.

Estuarine crocodile will be subject to a Significant Species Management Plan. No impacts from groundwater drawdown are expected to downstream aquatic values of the GBRCMP (including habitat for Matters of State Environmental Significance - aquatic fauna or shorebird species).

The mitigation measures proposed as part of the Project will minimise additional indirect impacts to aquatic EVs within, surrounding or downstream of the Project area from construction and operational activities. These measures include monitoring and management measures under the REMP and WMP, to monitor the health of wetlands, streams and riparian vegetation adjacent to the Project for indirect impacts such as water level reductions (in permanent waterholes), dust and surface water contamination. Management measures will include provisions of replenishment in permanent waterholes should water level reductions be detected. With control measures in place indirect impacts to aquatic EVs and aquatic fauna are not expected to be significant.

16 Matters of National Environmental Significance

The Project is located largely within the Marlborough subregion of the Brigalow Belt South bioregion. A small portion in the south of the Central Queensland Coal mine area lies within the adjacent Nebo-Connors Ranges subregion. The region has experienced a long history of human disturbance due to agriculture and mining activities. The Project area is representative of the wider region and landscape with over 79% of the Project area cleared and currently mapped as non-remnant. Remnant vegetation within the Project area is largely confined to the south and west of the mine area and along the adjacent creek lines of Tooloombah Creek and Deep Creek. Within the Central Queensland Coal mine area, the ground layer in cleared habitats was generally observed to be highly disturbed and often dominated by the exotic Buffel Grass, particularly on the dark clay soils north of the Bruce Highway.

The Project lies approximately 8 km from the boundary of the Great Barrier Reef World Heritage Area which occurs along the Styx River estuary. The Styx River empties into Broad Sound which is listed in the Directory of Important Wetlands of Australia. The wetland lies north of the Project and encompasses the Great Barrier Reef waters and comprising the Outstanding Universal Values pertinent to the Project.

The Broad Sound wetland encompasses an area of approximately 2,100 km^2 comprising a complex aggregation of tidal marine and estuarine wetlands. These have been formed in a sheltered embayment and have a very large tidal range of approximately 9 m. The large tidal range has substantial impacts on water quality in the area due to tidal resuspension impacting water clarity, which in turn inhibits the occurrence and diversity of habitat such as seagrasses and coral communities. This in turn appears to limit potential habitat for a number of Matters of National Environmental Significance (MNES) marine species associated with the Great Barrier Reef.

Broad Sound comprises a number of Outstanding Universal Values (OUVs) associated with the Great Barrier Reef including wetland habitats such as lower intertidal and supratidal mudflats and saltmarsh, and mangroves. Brackish and freshwater swamps and lagoons occur in adjacent upland areas. The wetland is noted as providing significant habitat for waterbirds including substantial aggregations of a range of migratory shorebirds. Surveys at shorebird roost sites in western Broad Sound indicates the area regularly supports nationally important numbers of a range of species such as Eastern Curlew and Great Knot. The nearest roost sites to the Project are Charon Point (32 km north-east of the Project) and Hoogly Point (35 km north).

Small fringing reefs occur on Turtle Island and Charon Point approximately 35 km north-northeast of the Project boundary where the mouth of the Styx River empties into the main body of Broad Sound. A larger reef area occurs on the southwest edge of Long Island (52 km northeast), a continental island to the west of the Torilla Peninsula. Several small reefs also occur in the Clairview area as do the nearest substantial areas of seagrass (approximately 55 km north).

Marine fauna species considered likely to occur in Broad Sound and listed as MNES and contributing to the OUVs of the Great Barrier Reef include Green Turtle and Flatback Turtle (both listed as Vulnerable and Migratory under the EPBC Act), and Australian Snubfin Dolphin, and Australian Hump-back Dolphin (both listed as Migratory under the EPBC Act). In particular, Flatback Turtle is known to have large nesting aggregations on islands in the surrounding area at Wild Duck Island (74 km north north-east of the Project) and Avoid Island (75 km north of the Project). There are few records of these species downstream of the Project. The nearest suitable habitat for these species is

considered to be in the lower estuary of Styx River around Rosewood Island due to the wide ranging tides and lack of habitat upstream of this area.

Vegetation within the Project area was composed of 12 different vegetation communities situated on five landforms: alluvial river and creek flats; Cainozoic clay plains; Cainozoic sand plains / remnant surfaces; coarse-grained sedimentary rocks; moderately to strongly deformed and metamorphosed sediments and interbedded volcanics; reflecting the underlying geology and position in the landscape. Field verification of vegetation communities within the Project area identified inconsistencies in current Queensland government vegetation mapping, relating to composition and polygon size. Remnant vegetation communities listed as the Brigalow Threatened Ecological Community (TEC) and Semi-Evergreen Vine Thicket (SEVT) TEC were observed during field assessments. Brigalow was recorded as a small polygon located in the east of the mine area, with a second larger polygon located in the south of the TLF ML. Several polygons of SEVT associated with riparian vegetation along Tooloombah Creek are located adjacent to the western boundary of the mine ML.

No listed flora species were observed during the field assessments and no species identified as occurring in the wider area during desktop searches was identified as having a high likelihood of occurring within the Project area.

Listed fauna species observed in the Project area include Greater Glider, Koala and Squatter Pigeon (all listed as Vulnerable under the EPBC Act) and several bird species listed as Migratory (EPBC Act). Ornamental Snake (listed as Vulnerable under the EPBC Act) was recorded 3 km west of the Project area in 2011 and 2012.

The Project will require unavoidable significant impacts to ecological matters of Commonwealth significance including habitat that may be considered as 'critical to the survival' of Koala. Significant impacts will be a result of clearing for open cut mining and associated infrastructure and the haul road. The total extent of these impacts to all MNES has been calculated to be 108.22 ha and will be the subject of the Project Offset Management Plan.

The Project area is dominated by shallow alluvial aquifers. Groundwater modelling indicates there are potential long-term impacts associated with groundwater drawdown on Groundwater Dependent Ecosystems (GDEs). This includes riparian vegetation dominated by emergent Forest Red Gums along the creek lines that provide habitat for Koala. The magnitude of drawdown on these habitats ranges up to approximately 10 mbgl although for the most part are below 5 mbgl. The maximum extent of drawdown is predicted to occur 10 years after the cessation of mining. Impacts to GDEs are predicted to occur in the mid-reach areas of Tooloombah Creek and Deep Creek closest to open cut pit operations.

Based on ground-truthed vegetation mapping, mining effects are predicted to pose a low level threat (< 1 m drawdown) to areas of riparian Forest Red Gum vegetation (RE 11.3.25) along Tooloombah Creek (40.3 ha) and Deep Creek (62.4 ha). A moderate to high threat (> 1 m drawdown) is predicted in vegetation communities encompassing 8.3 ha along Tooloombah Creek and 34.2 ha along Deep Creek. There may also be a low to moderate threat (< 5 m drawdown) on 14.25 ha of a terrestrial Forest Red Gum vegetation community (RE 11.3.4).

The mitigation measures proposed as part of the Project will minimise additional indirect impacts to terrestrial fauna and flora communities within and surrounding the Project area from construction and operational activities, including downstream impacts to the Great Barrier Reef World Heritage Area. These measures include fauna crossing infrastructure to minimise fauna traffic collisions along the haul road, a comprehensive water management system and Erosion and Sediment Controls, and a detailed receiving environment monitoring program to monitor the health

of vegetation, aquatic health and fauna communities adjacent to the Project for indirect impacts such as dust, surface water contamination and groundwater drawdown. A detailed targeted study program has been developed and implemented to better understand the local connections between the water table and GDEs. This program will continue and be expanded to provide input into improving actions within the receiving environment monitoring program and further mitigations to potential groundwater drawdown impacts. With control measures in place indirect impacts to fauna and flora are not expected to be significant.

The Project is located on the Mamelon property which encompasses a total area of 6,478 ha of which the Project footprint covers approximately 1,124 ha. Central Queensland Coal have proposed destocking the majority of the property and restricting cattle access to already cleared habitat in the south-west and south of the property. The remaining area, including the creek lines which lie adjacent to the mine area, will be managed and allowed to regenerate. Approximately 303 ha of this will be utilised for environmental offsets to offset residual impacts of the Project. This measure will in the long-term increase the area of remnant vegetation on the property and reduce nutrient inputs from cattle dung, reduce soil erosion and mobilisation of sediments during rainfall events. This will provide benefits to adjacent and downstream aquatic values including that of the Great Barrier Reef World Heritage Area. The draft OMP describes the approach taken by Central Queensland Coal to offset significant residual impacts to MNES.

17 Biosecurity

The increased movement of people and machinery in the area, storage of wastes and clearing of vegetation may result in the increase in pest and weed species to the region. Site-specific controls that are consistent with Livingstone Shire Council's pest and weed management strategies, will be developed and will mitigate these potential risks by ensuring equipment is free from soil and pests before entering the area. Wastes will be handled and stored in an appropriate manner, to minimise access to pest fauna. During construction and operations, disturbed areas will be progressively rehabilitated and buffers will be created around undisturbed areas of remnant vegetation to minimise the risk of weed incursion.

There is the potential for weeds, pests and to a much lesser likelihood plant disease to be introduced to the area by equipment and machinery brought to site. The risk of the Project activities resulting in the introduction of plant disease is anticipated to be low given national and state regulatory requirements.

The appropriate management of the risks associated with vector borne diseases, including mosquitos, will be addressed in a Mosquito and Biting Insects Management Plan. The objective of management measures is to ensure the public health well-being of the employees and visitors to the site. Management includes a framework for identifying and monitoring mosquito populations as well as outlining procedures for implementing management strategies during the construction and operation phases of the Project.

18 Cultural Heritage

The assessment of Indigenous and non-Indigenous cultural heritage collated site data throughout the Project area from a range of sources including database searches, consultation with relevant Aboriginal parties and field surveys. There are no registered or known significant Indigenous or non-Indigenous sites within the Project area.

The potential historical heritage places identified during the field survey were assessed as being below the threshold for places of either local or state heritage significance. No areas within the Project were identified as having any non-Indigenous archaeological potential.

The closest site listed on a National, State or local register is the GBRWHA, with the nearest boundary located approximately 8 km to the north of the Project area. With the lack of known non-Indigenous cultural heritage at the site there is a low risk of discovery of unknown sites during construction and operation. Management and mitigation measures will be implemented as a precaution to identify any items and, where necessary, appropriately deal with any discovery in accordance with the *Queensland Heritage Act 1991*.

Central Queensland Coal commits to continue to engage with the Darumbal People, the Barada Kabalbara Yetimarala People #1 and Barada Kabalbara Yetimarala People #2 to develop the Project specific Cultural Heritage Management Plans (CHMP). The CHMP will address the management of cultural heritage on land within the two MLs. This will include pre-clearance surveys where required. Central Queensland Coal aims to promote an understanding of Indigenous cultural heritage in the workplace through employee induction programs and other specific training activities.

19 Social and Economic

A social impact assessment and an economic impact assessment were carried out as part of the EIS. Both assessments considered local and regional communities and economies that could be affected by the Project. The study area includes Livingstone Shire Council Local Government Area (LGA), Rockhampton Regional Council LGA and the Isaac Regional Council LGA.

The Project is seen as an opportunity to reinvigorate the nearby townships of Ogmore and Marlborough, in addition to the rural centres Yaamba, The Caves, St Lawrence and Clairview. With the large buy-up of local land by the Department of Defence as part of the Shoalwater Bay Training Area expansion the Project is seen as an opportunity to replace the commercial and social impacts, as families leave the area. Further, the Project is seen as an opportunity to ensure population numbers remain stable to avoid potential erosion of essential services that are driven by population thresholds.

The Project's labour resources will be sourced from within the general local area (Marlborough, Ogmore, Yaamba, The Caves, St Lawrence and Clairview) as a daily commute workforce. It is anticipated that the majority of the workforce will already live within the general local area and as such workforce accommodation will be minimal and limited to non-local construction and operational workers. Since the release of the EIS, Central Queensland Coal has been in discussions with the owners of the Marlborough Caravan Park regarding upgrading the facilities there to provide additional accommodation facilities. The expansion of the Marlborough Caravan Park is expected to provide increased local employment and services opportunities in the Marlborough area.

The potential social impacts associated with the construction, operation and decommissioning of the Project were defined through the assessment of Project effects against the attributes of the existing receiving social environment.

The assessment of impacts considered the following key attributes:

- Opportunities for employment;
- Business opportunities;
- Transportation;
- Community participation and exclusion;
- Community disruption;
- Increased demand on community infrastructure and social services; and
- Housing market.

The assessment of the Project's relationship to these attributes, together with the consideration of the values the community places on these attributes allowed for the identification of positive and negative impacts. The Project has the potential to generate positive social benefits for the region, state and nation. Key benefits of the Project identified in the social assessment include:

- Opportunities for employment;
- Potential business opportunities;
- Improved social infrastructure to support increases in local population; and
- Increased wealth within the community.

Whilst the Project will provide social benefits, the Project will also potentially result in adverse impacts, including:

- Transport and site access issues;
- Exclusion of the community;
- Disruption to community cohesion;
- Increased demand on community services;
- Potential for inflationary pressure in local housing, commercial and industrial property markets; and
- Increased burden on local and regional infrastructure.

The adverse impacts will be mitigated through the implementation of the Social Impact Strategy. Central Queensland Coal has developed five indicative management strategies as part of the Social Impact Strategy to address social impacts associated with the Project. The indicative management strategies and associated action plans address the following aspects:

- Community and Stakeholder Engagement;
- Workforce Management;
- Local Business and Industry Content;
- Health and Community Wellbeing; and
- Housing and accommodation.

The management strategies will support ongoing management of the social change processes and social impacts and benefits associated with the Project. Consequently, it is expected that following the application of mitigation measures and management strategies, the Project will have an overall positive social effect on the local and regional area. The associated ongoing monitoring, reporting and review processes will ensure the appropriateness of mitigation measures and management strategies by enabling continual improvement of strategies.

The Project has the potential to generate economic benefits for the region, state and nation. Economic stimulus is likely to result from the construction and operation of the Project along with increased regional supply chain and employment opportunities. Key benefits of the Project identified in the social and economic assessment include:

- Economic stimulus to the regional, state and national economies during the construction and operational phases of the project;
- Export revenues from coal produced across the life of the mine is estimated to be in the order of $7.78 billion to $8.23 billion, which assuming royalty rates remain unchanged would yield royalties of approximately $703.3 million to $766.0 million over the life of the mine;
- Increased employment opportunities within Central Queensland which would help to reverse the trend of increasing unemployment within the region; and
- Opportunities for suppliers in the Central Queensland region to support the construction and operation of the Project.

Central Queensland Coal will monitor changes in demand on government and community services and facilities caused by the Project through consultation with affected providers. Central Queensland Coal will also seek to promote positive interactions between the non-residential workforce and existing communities and families.

20 Health and Safety

The potential impacts to existing values relating to the community health and safety for the Project area have been examined. There are eight inhabited homestead receptors, three uninhabited homesteads and a commercial place (Tooloombah Creek Service Station) identified in the vicinity of the Project. The Ogmore township is approximately 9 km to the northeast, a service station on the Bruce Highway is 1 km from the western boundary of the Project area and the Tooloombah Creek Recreation Reserve is 600 m further west of the service station. The Project has potential health and safety impacts involving dust, noise and vibration, contamination of groundwater and surface water, pests and diseases and traffic incident risks.

Assessments were carried out on the risk of the Project's activities to personal health and safety and property. This included an assessment of standard operations and abnormal conditions such as:

- Unpredictable natural events, for example bushfire, landslides and flooding;
- Operational hazards including explosions, fire, dam failure, vehicle collisions; and
- Accidental spills and leaks.

All risks assessed are typical of all open-cut activities. That is, no new or untested processes will be carried out as part of the Project which could present relatively higher risk levels. No extreme risk ratings were identified during the assessment. With the implementation of specific risk management measures and operational procedures, the hazards associated with the Project are not significant.

Through the adoption and implementation of management and mitigation strategies, it is expected that these health and safety implications identified have a low residual risk. As well as providing these mitigation strategies, Central Queensland Coal will implement a Safety and Health Management System that integrates risk management elements and practices to ensure the safety of workers, contractors and the community.

21 Hazard and Risk

The main hazard and risks arising from a coal mine include natural hazards, coal hazards, major operational hazards, general worksite hazards and hazards associated with dangerous goods transport and storage. The site is relatively free from natural hazards other than flooding which presents a potential risk. Coal poses several hazards from spontaneous combustion and respirable dust; the highest risk areas of the Project are the stockpiles and processing plants. Measures to minimise the risks of spontaneous combustion and dust have been included into the design and operation planning for the site.

A review of Queensland and Australian incident statistics identified the high risk operational hazards which cause the greatest number of incidents and fatalities within coal mines. These hazards and risk will be examined and areas which could pose these hazards will have a prevention and detection system in place to manage the risk to the lowest possible levels. General workplace hazards have also been identified and will be managed through onsite training and the health and safety management system.

A preliminary risk screen was undertaken of all the identified dangerous goods storage and transportation volumes against the NSW SEPP 33 which was adopted as guidance to offsite hazard and risk. None of the stored hazardous materials exceeded the trigger limits and required further assessment or consequence modelling.

Project construction and operational preliminary risk assessment results indicated that the baseline safety and health risk profile varied from low to high. Once mitigation measures and design treatments were applied to the assessed hazards, residual risk scores were reduced. The residual medium risks identified for the Project include:

- Coal hazards such as spontaneous combustion;
- Major operational hazards including: vehicle collisions, exposure to high voltage or contact with electrified wires, toxic atmospheres in confined spaces and entrapment or wall failure. Mining is inherently a higher risk industrial activity and controls and design will minimise these risks as far as possible; and
- General worksite hazards including falling objects, body and heat stress, fatigue, fitness for duty, manual handling, fauna related injury and potential for disease from biting insects.

Overall the risks to community receptors, environmental sensitive receptors and State and Local government controlled roads can be considered acceptable. A robust and detailed integrated risk management process and safety plans will be required and implemented to ensure that the hazards and risks onsite are kept as low as practically possible.

22 Conclusions

This Environmental Impact Statement has been prepared in accordance with the requirements of the EP Act and EPBC Act. A detailed assessment via modelling, technical reports, field surveys, literature reviews and desktop searches identified the potential impacts that the Project may have on the existing environment, social values and economy. Based on these findings management and mitigation measures have been proposed to firstly avoid negative impacts where possible, then mitigate, manage, monitor and lastly offset any residual negative impacts. These measures are proposed to meet the environmental objectives and performance outcomes specified in the Environment Protection Regulation 2008 and Project Terms of Reference.

The conclusions of the EIS are:

- Employment and business opportunities for local and regional areas will be realised through the Project's construction, operations and rehabilitation / closure phases;
- No significant impacts on land, land use, surface waterways or farm dams following the rehabilitation of mined areas;
- The nearest off-lease bores to the proposed mine (BH01X, BH16, BH20 and BH04, located along Styx River) are not expected to be impacted by mine dewatering and can continue to be used for current purposes. One bore (BH28) is located on ML 80187 but is currently not in use. The bore is predicted to have less than 10% reduction in available drawdown in response to mine dewatering, and it is expected that if it were to be recommissioned it would be able to support its previous purpose for stockwater supply;
- Unavoidable impacts on 108.22 ha of terrestrial ecology resources (based on Queensland vegetation mapping), including important vegetation communities and threatened species habitat, namely Koala, Squatter Pigeon, Greater Glider and Ornamental Snake. Mitigation measures to minimise impacts on retained ecological resources will be provided along with the provision of biodiversity offsets to achieve an overall net ecological gain for MSES;
- There will be no significant impacts to the GBRWHA or GBRCMP. Mitigation measures will be put in place to minimise any potential impact to downstream water quality including erosion and sediment control measures. Land management of the surrounding property will include destocking and native vegetation regeneration which will also contribute to reducing sediment and nutrient run-off into the Great Barrier Reef lagoon area;
- There will be unavoidable impacts on 108.22 ha to Matters of National Environmental Significance (based on ground-truthed vegetation mapping) including clearing of habitat for threatened species, namely Koala, Squatter Pigeon, Greater Glider and Ornamental Snake. Mitigation measures to minimise impacts on retained ecological resources will be provided along with the provision of biodiversity offsets to achieve an overall net ecological gain for national matters of ecological importance;
- There are potential impacts on ecological resources resulting from the long-term impact of groundwater drawdown on the localised water table. Waterholes and vegetation communities featuring Forest Red Gum in the mid-reach of Deep Creek and Tooloombah Creek are predicted to be impacted. Mitigation measures including vegetation and waterhole monitoring and supplementary flows will be put in place. Where mitigation measures are unsuccessful these areas will subject to the Project's biodiversity offsets plan to achieve an overall net ecological gain;

- The combined Tooloombah Creek and Deep Creek catchment, within which the Project is located, is essentially a closed groundwater system. Shallow groundwater discharges to the mid- and lower reaches of the creeks above the confluence of the creeks where they merge to form the Styx River. Upstream of the confluence, mine dewatering will result in drawdown of groundwater levels and pressures which largely intercepts discharge from the combined Tooloombah Creek and Deep Creek catchment. Downstream of the confluence, within the tidally influenced Styx River, water table elevations and groundwater pressures are predicted to remain relatively unchanged from the pre-mine baseline, meaning the mine poses little, if any, threat to inland mobilisation of the seawater interface at the coast or along the estuarine reaches of Broad Sound and Styx River. Also, as the Project is not expected to alter the groundwater baseline downstream of the confluence, areas prone to ASS will not present as threat to water and soil quality.
- No significant impacts because of the Project's emissions to air, land or water;
- No significant negative impacts on local and regional communities or cultural heritage;
- No significant impacts to local or regional transport networks; and
- No significant cumulative impacts.

Central Queensland Coal is committed to effective ongoing community engagement throughout the Project's development and operational phases. This is an important and necessary process to build and maintain relationships with impacted communities and other stakeholders, to contribute as appropriate to the sustainable development of local communities and to therefore earn and maintain a social license to operate.

Central Queensland Coal is committed to delivering a project founded on ecologically sustainable principles and commissioned with a social license to operate. Metro Mining will deliver an environmentally, socially and economically sustainable project which will support and enhance regional advancement throughout the Project life.

23 Major Commitments

The EIS provides many specific commitments about the Project (refer to Chapter 22-Key Commitments).

Central Queensland Coal's major commitments are to:

- Invest substantial capital to develop the Project;
- Maximise resource recovery and minimise land disturbance;
- Engage with affected landholders, mine tenure holders and interested parties;
- Implement CHMPs with each of the relevant Indigenous parties;
- Support local and regional businesses;
- Protect ecologically important vegetation and wildlife, and offset biodiversity impacts;
- Minimise impacts on groundwater and surface water caused by the Project;
- Implement make good agreements with property owners in respect of any impacts to groundwater supply;
- Progressively rehabilitate land within the ML to support the desired end result of net improvements to conservation values;
- Continually review and improve the Project's economic, social and environmental performance;
- Implement a rigorous and robust groundwater and surface water monitoring program; and
- Return Mamelon to conservation land use purposes through the destocking of the property during and post-mining.