Main Text



WINCHESTER SOUTH PROJECT

Environmental Impact Statement

Additional Information

WHITEHAVEN COAL

Resource Strategies

TABLE OF CONTENTS

1 INTRODUCTION 1
2 OVERVIEW OF THE PROJECT 3
3 ANALYSIS OF SUBMISSIONS 4
3.1 BREAKDOWN OF DRAFT EIS SUBMISSIONS 4
3.1.1 Agency and Council Submissions 4
3.1.2 Organisation Submissions 4
3.1.3 Public Submissions 4
3.2 CATEGORISING SUBMISSIONS 9
4 ACTIONS TAKEN SINCE NOTIFICATION OF THE EIS 11
4.1 AMENDMENTS TO THE PROJECT 11
4.2 ENGAGEMENT 11
4.3 ON-SITE ACTIVITIES 12
4.4 FURTHER ENVIRONMENTAL ASSESSMENT 12
5 CHANGES TO THE PROJECT AND ADDITIONAL COMMITMENTS 13
5.1 OVERVIEW 13
5.2 AMENDMENT TO SURFACE DISTURBANCE EXTENT 13
5.3 RESOURCE RECOVERY AND QUALITY OF THE COAL RESOURCE 13
5.4 WATER MANAGEMENT 23
5.4.1 Water Consumption 23
5.4.2 Groundwater Inflows 23
5.4.3 Sediment Dams 23
5.4.4 Controlled Release Strategy 24
5.4.5 Simulated Performance of the Project Water Management System 24
5.4.6 Flooding and Regulated Structures 25
5.5 FINAL LANDFORM 26
5.6 ASSESSMENT OF IMPACTS 29
5.6.1 Ecology 29
5.6.2 Economic 42
5.6.3 Groundwater 45
5.6.4 Surface Water and Flooding 47
5.6.5 Groundwater Dependent Ecosystems 50
5.6.6 Air Quality and Greenhouse Gas 51
5.6.7 Noise and Vibration 53
5.6.8 Soils and Land Suitability 55
5.7 ADDITIONAL COMMITMENTS 58
6 ADDITIONAL INFORMATION REQUESTED 59
7 RESPONSE TO SUBMISSIONS 60
7.1 THE PROJECT 60
7.1.1 Rehabilitation 60
7.1.2 Project Final Landform 61
7.2 ENVIRONMENTAL MATTERS 75
7.2.1 Groundwater 75
7.2.2 Surface Water and Flooding 80
7.2.3 Ecology 87
7.2.4 Social and Community Infrastructure 98
7.2.5 Greenhouse Gas Emissions and Climate Change 106
7.2.6 Air Quality 119
7.2.7 Noise and Vibration 121
7.2.8 Economic 122
7.2.9 Land 129
7.2.10 Impacts on Other Industries 134
7.2.11 Transport 136
7.2.12 Waste 141
8 PROJECT EVALUATION 147
9 REFERENCES 148

LIST OF FIGURES

Figure 1-1 Project Location
Figure 3-1 Nature of Public & Organisation Submissions by Location
Figure 5-1 Project General Arrangement
Figure 5-2 General Arrangement – Project Year 2
Figure 5-3 General Arrangement – Project Year 5
Figure 5-4 General Arrangement – Project Year 9
Figure 5-5 General Arrangement – Project Year 19
Figure 5-6 General Arrangement – Project Year 27
Figure 5-7 Indicative Mining Sequence
Figure 5-8a Conceptual Optimised Final Landform
Figure 5-8b Indicative 2021 Draft EIS Final Landform and Optimised Final Landform Profiles Cross Section A – A[1]
Figure 5-9 Differences in the Surface Development Extent
Figure 5-10a Ground-truthed Regional Ecosystems (Remnant)
Figure 5-10b Matters of National Environmental Significance (MNES) - Threatened Ecological Communities

LIST OF FIGURES (CONTINUED)

Figure 5-10c	Matters of State Environmental Significance (MSES) Relevant to the Project
Figure 5-10d	Threatened Species Habitat Mapping – Ornamental Snake
Figure 5-10e	Threatened Species Habitat Mapping – Squatter Pigeon (southern subspecies)
Figure 5-10f	Threatened Species Habitat Mapping – Koala (combined populations of, Queensland, NSW and the ACT)
Figure 5-10g	Threatened Species Habitat Mapping – Greater Glider
Figure 5-11	Optimised Final Landform – Waterway Providing for Fish Passage
Figure 5-12	Conceptual Final Landform and Land Use – Waterways Providing for Fish Passage
Figure 5-13	Comparison of Draft EIS and Optimised Project Annual Average and Maximum 24-hour Average PM_{10} Contours - Years 5 and 19
Figure 5-14	Comparison of Draft EIS and Optimised Project Neutral and Adverse Meteorological Conditions Noise Contours - Years 5 and 19
Figure 7-1a	2021 Draft EIS Conceptual Final Landform
Figure 7-1b	2022 Additional Information Optimised Final Landform
Figure 7-1c	Indicative 2021 Draft EIS Final Landform and Optimised Final Landform Profiles Cross Section A – A[1]
Figure 7-1d	Conceptual Optimised Final Landform and Post-mining Land Use
Figure 7-1e	Indicative Residual Void Cross-section
Figure 7-2	Tenure – State-owned Land
Figure 7-3	Potential Strategic Cropping Land in the Vicinity of The Project
Figure 7-4	Regional Agricultural Land Class A and B Mapping

LIST OF TABLES

Table 5-1	Project Comparison Summary
Table 5-2	Indicative Mining Schedule
Table 5-3	Indicative Average Annual Water Balance for the Optimised Project Water Management System
Table 5-4	Summary of Residual Void Changes
Table 5-5	Ground-truthed Regional Ecosystems
Table 5-6	Likelihood of Significant Residual Impact on MSES
Table 5-7	Proposed Post-mining Land Suitability Classes
Table 5-8	Summary of Identified Soil Mapping Units
Table 7-1	Preliminary Completion Criteria for the PMLU Rehabilitation Areas
Table 7-2	Proposed Offset Area Management Measures
Table 7-3	Key Potential Customer Country Current Nationally Determined Contributions
Table 7-4	Scope 1 and 2 Emission Intensities of Coal Mining Operations in the Bowen Basin
Table 7-5	Estimated Maximum Annual Regulated Waste Produced by the Project

LIST OF CHARTS

Chart 3-1	Summary of All Submissions
Chart 3-2	Summary of Non-Government Organisation Submissions
Chart 3-3	Summary of Public Submissions
Chart 3-4	Summary of Public Objecting Submissions by Location
Chart 3-5	Summary of Public Supporting Submissions by Location
Chart 3-6	Key Matters Raised in Submissions
Chart 7-1	Ranked Plot of Isaac River Salinity during Controlled Releases
Chart 7-2	Analysis of Sediment Dam Overflows on Isaac River Water Quality

LIST OF ENCLOSURES

Enclosure 1	Assessment of Final Landform Alternatives

LIST OF ATTACHMENTS

Attachment 1	Submissions Summary
Attachment 2	Register of Submitters and Reconciliation of Comments
Attachment 3	Response to IESC Advice
Attachment 4	Response to DAWE Advice
Attachment 5	Additional Information – Groundwater
Attachment 6	Additional Information – Surface Water and Flooding
Attachment 7	Offset Management Strategy
Attachment 8	Supplementary Fauna Survey Report
Attachment 9	Additional Information – Aquatic Ecology and Stygofauna
Attachment 10	Aquatic Ecology and Stygofauna Assessment Addendum
Attachment 11	Additional Information – Social
Attachment 12	Greenhouse Gas Management and Abatement Plan
Attachment 13	Additional Information – Air Quality and Greenhouse Gas
Attachment 14	Additional Information – Noise and Vibration
Attachment 15	Additional Information – Road Transport
Attachment 16	Additional Information – Economics
Attachment 17	Additional Information – Soils and Land Suitability
Attachment 18	MEDLI Modelling Report

1 INTRODUCTION

The Winchester South Project (the Project) is located approximately 30 kilometres (km) south-east of Moranbah, in the Isaac Regional Council (IRC) Local Government Area (LGA) (Figure 1-1), within the Bowen Basin Coalfield, in Queensland.

The Project involves the development of an open cut metallurgical coal mine in an existing mining precinct. Products would include metallurgical coal for the steel industry and world class thermal coal for energy production.

Whitehaven WS Pty Ltd (Whitehaven WS) is the proponent for the Project and is a wholly owned subsidiary of Whitehaven Coal Limited (Whitehaven). In 2021, Whitehaven WS submitted the *Winchester South Project Environmental Impact Statement* (the Draft EIS) for assessment under the *State Development and Public Works Organisation Act 1971* (SDPWO Act).

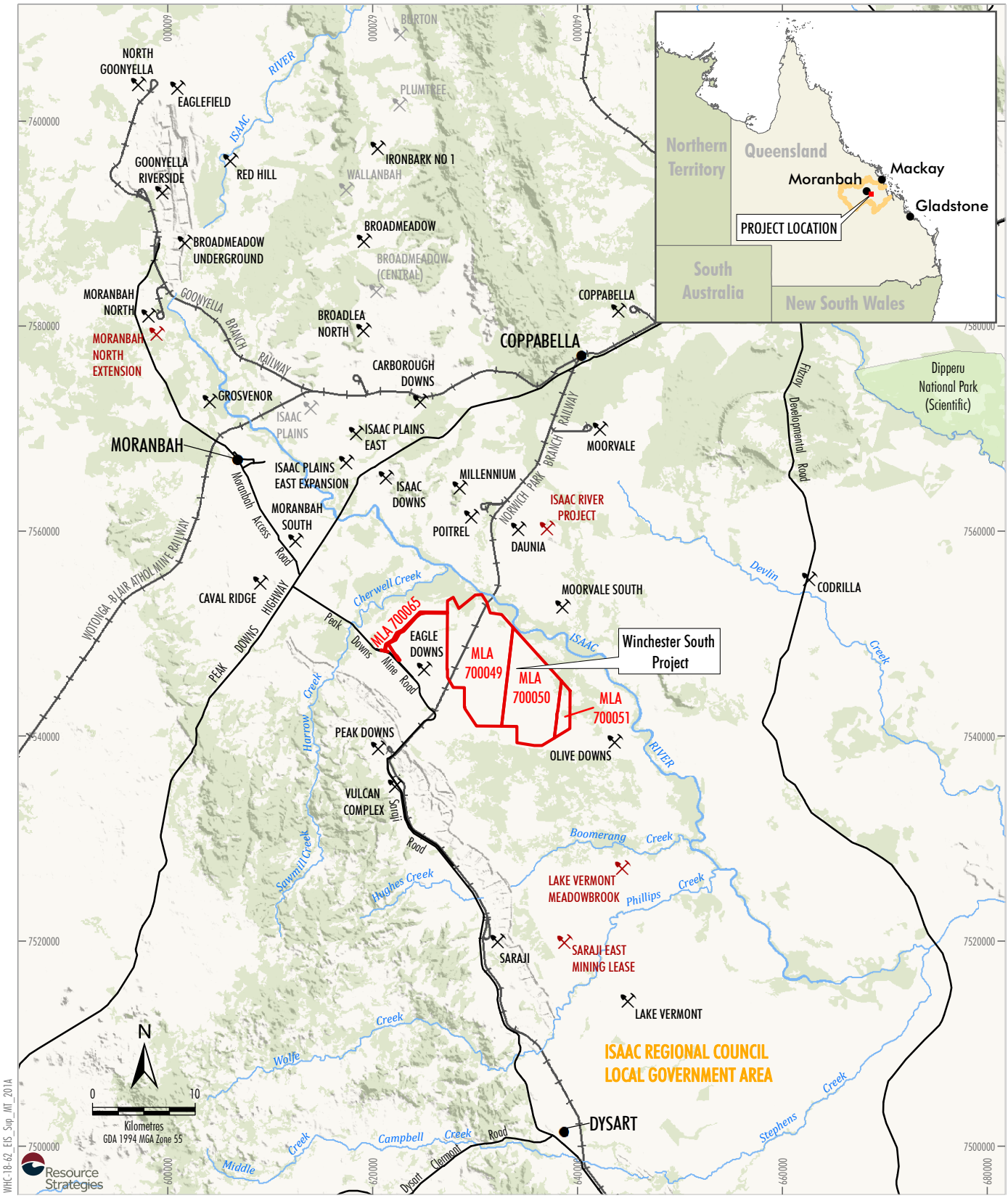
The Draft EIS was placed on public notification by the Office of the Coordinator-General (OCG) from 4 August 2021 until 15 September 2021. During and following this period, government advisory agencies, organisations and members of the public provided submissions on the Draft EIS to the OCG.

Subsequent to the public notification of the Draft EIS in 2021 and in response to comments raised in submission, Whitehaven WS reviewed the mine plan and mine schedule with the aim of reducing environmental impacts of the Project and modifying the proposed Project final landform. This review also considered new geological data, coal quality data and the outcomes of processing trials to further refine the mine plan.

On 3 December 2021, the OCG formally requested (in accordance with section 34B of the SDPWO Act) Additional Information on the environmental effects of the Project and other matters relating to the Project.

Accordingly, the Additional Information provides Whitehaven WS' response to the OCG's request and also provides responses to issues raised in submissions. The structure of this Additional Information is as follows:

Section 1	Provides an introduction to the Project and overview of the planning process to date.
Section 2	Provides an overview of the Project.
Section 3	Provides an analysis of the submissions received by the OCG on the Draft EIS.
Section 4	Summarises the actions taken since lodgement of the Draft EIS, including additional engagement activities and further refinements and assessment of the Project.
Section 5	Provides details on the changes to the Project, associated changes to any environmental assessment outcomes and additional commitments since public notification of the Draft EIS.
Section 6	Provides details on the additional information requested by the OCG.
Section 7	Provides responses to aspects raised in submissions.
Section 8	Provides an updated evaluation of the Project.
Section 9	Lists the documents referenced in the Additional Information.
Enclosure 1	Provides a detailed assessment of final landform alternatives.
Attachments 1 to 18	Provide further detail on the work undertaken to respond to and address the OCG's request and submissions received.



LEGEND
- Mining Lease Application Boundary
- Approved/Operating
- Proposed
- Care and Maintenance
- Local Government Area Boundary
- Railway
- Road

Source: The State of Queensland (2018 - 2020); Geoscience Australia (2018)

WHITEHAVEN COAL

WINCHESTER SOUTH PROJECT

Project Location

Figure 1-1

2 OVERVIEW OF THE PROJECT

The Project provides an opportunity to develop an open cut metallurgical coal mine and associated on-site and off-site infrastructure (e.g. electricity transmission line [ETL], water supply pipeline, mine access road, etc.) in an existing mining precinct. The open cut mine would produce a mix of products, including metallurgical coal, for use in the steel industry, and thermal coal.

The Project involves mining the coal reserves associated with the Rangal and Fort Cooper Coal Measures (Leichhardt Seams, Vermont Upper Seam and Vermont Middle Lower Seam) within mining lease application (MLA) 700049, MLA 700050 and MLA 700051. Consistent with the Draft EIS that was placed on public notification in 2021, the main activities associated with the development of the Project include:

- development and operation of an open cut coal mine within MLA 700049, MLA 700050 and MLA 700051;
- development and operation of an infrastructure corridor within MLA 700065, located outside Mineral Development Licence (MDL) 183;
- use of open cut mining equipment to extract run-of-mine (ROM) coal with a current forecast rate of approximately 15 million tonnes per annum (Mtpa) (and up to 17 Mtpa);
- approximately 28 years of mining operations, excluding construction and final landform establishment;
- placement of waste rock (i.e. overburden and interburden) in out-of-pit waste rock emplacements and within the footprint of the open cut voids;
- construction and operation of the mine infrastructure area (MIA), including a coal handling and preparation plant (CHPP), ROM pads, workshops, offices, raw and product coal handling systems, coal processing plant and train load-out facility;
- construction and operation of a Project rail spur and loop to connect the Project to the Norwich Park Branch Railway, including product coal stockpiles for loading of product coal to trains for transport to ports;
- progressive rehabilitation of out-of-pit waste rock emplacement areas;
- progressive backfilling and rehabilitation of the mine voids with waste rock behind the advancing open cut mining operations (i.e. in-pit emplacements);
- installation of a raw water supply pipeline;
- construction of a 132 kilovolt (kV)/22 kV electricity switching/substation and 132 kV ETL to connect to the existing regional power network;
- on-site excavation, if suitable, and/or the use of the existing hard rock quarry for construction activities;
- drilling and blasting of competent overburden/waste rock material;
- use of Winchester Access Road during the initial stages of the Project;
- construction of a mine access road (including associated railway crossing) from the Eagle Downs Mine Access Road, off Peak Downs Mine Road, to the MIA;
- construction and operation of ancillary infrastructure in support of mining, including electricity supply, consumable storage areas and explosives storage facilities;
- connection to the existing telecommunications network;
- co-disposal of coal rejects from the Project CHPP within the footprint of the open cut voids and/or out-of-pit emplacement areas;
- progressive development and augmentation of sediment dams and storage dams, pumps, pipelines and other water management equipment and structures (including up-catchment diversions, drainage channel realignments and levees);
- progressive construction and use of soil stockpile areas, laydown areas and gravel/borrow areas (e.g. for road base and ballast material);
- progressive development of haul roads, light vehicle roads and services;
- wastewater and sewage treatment by a sewage treatment plant;
- discharge of excess water off-site in accordance with relevant principles and conditions of the *Model water conditions for coal mines in the Fitzroy basin* (Department of Environment and Science [DES], 2013);
- an on-site landfill for the disposal of selected waste streams generated on-site;
- ongoing exploration activities; and
- other associated minor infrastructure, plant and activities.

Components of the Project that have been modified as part of responding to the additional information request are described in Section 5.

3 ANALYSIS OF SUBMISSIONS

3.1 BREAKDOWN OF DRAFT EIS SUBMISSIONS

A total of 507 submissions on the Project were received from Government agencies, non-government organisations (NGOs) and members of the public. Of these, some 312 of the public submissions received on the Draft EIS were in the form of a pro forma objection. As advised by the OCG, in describing the number of submissions, these pro forma objections have been counted as one NGO submission (the Do Gooder Group), as the issues raised are identical.

Chart 3-1 presents a summary of the total number of submissions by submitter category. The key aspects raised in submissions are summarised in Section 3.2.

A summary of the submissions received on the Draft EIS and register of submitters are provided in Attachments 1 and 2.

3.1.1 Agency and Council Submissions

A total of 15 submissions were received from State and Federal regulatory agencies and local council, which were in the form of comments, or suggested conditions. The Project is located in the IRC LGA. The IRC provided comments on the Project and suggested conditions, however, is overall in support of the Project.

The following agencies had minor or no comments on the Draft EIS, and although these submissions are noted, no formal response from Whitehaven WS is required:

- Department of State Development, Infrastructure, Local Government and Planning – Mackay Isaac Whitsunday Regional Office (Planning Group); and
- Department of State Development, Infrastructure, Local Government and Planning – Strategic and Indigenous Policy.

3.1.2 Organisation Submissions

A total of 15 submissions were received from NGOs. Of these, six supported the Project, three provided comment and six objected to the Project (Chart 3-2).

3.1.3 Public Submissions

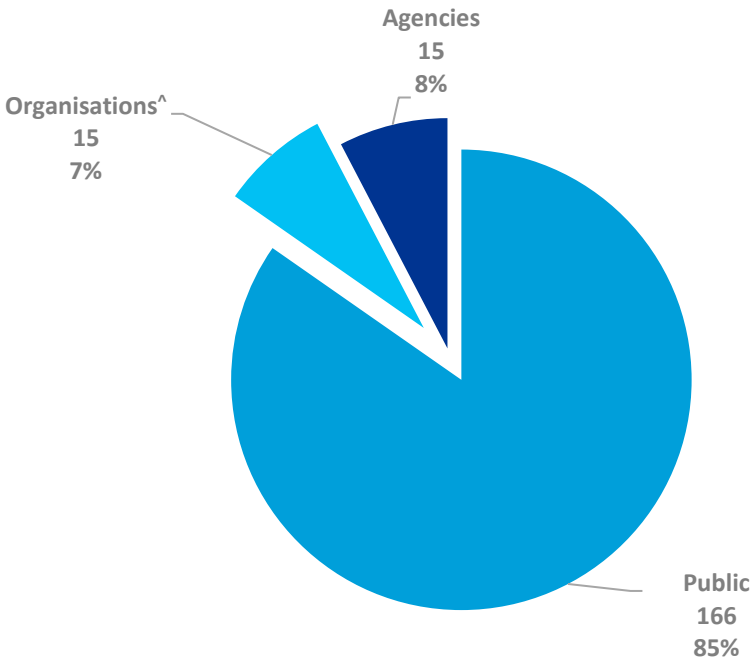
A total of 166 submissions were received from members of the public (excluding the 312 pro forma submissions, counted as one group submission). Of these, 154 supported the Project, three provided comments and nine objected to the Project (Chart 3-3).

Public submissions were received from a range of locations, including the two nearest LGAs (i.e. Isaac LGA and Mackay LGA), Queensland more generally or interstate locations. Both Isaac and Mackay LGAs had zero objecting submissions. These two LGAs make up the relevant local region to assess the Project in the Social Impact Assessment (SIA) and Economic Assessment for the Project (Appendices C and K of the Draft EIS). Further analysis of the distribution of objecting and supporting public submissions between these LGAs and other states is provided in Charts 3-4 and 3-5.

A large proportion of the objections received on the Project were from elsewhere in Queensland or otherwise the address was not provided in the submission (Chart 3-4). As stated above, a large proportion of the supporting submissions were from the Isaac and Mackay LGAs, with no objections from these LGAs (Charts 3-4 and 3-5).

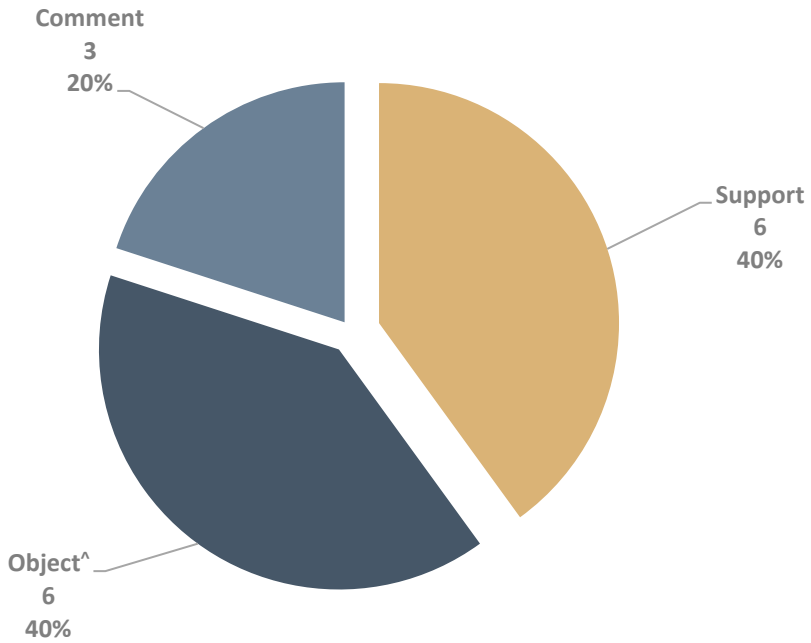
The nature of submissions received from members of the public and organisations in the Project region is shown on Figure 3-1.

Chart 3-1
Summary of All Submissions



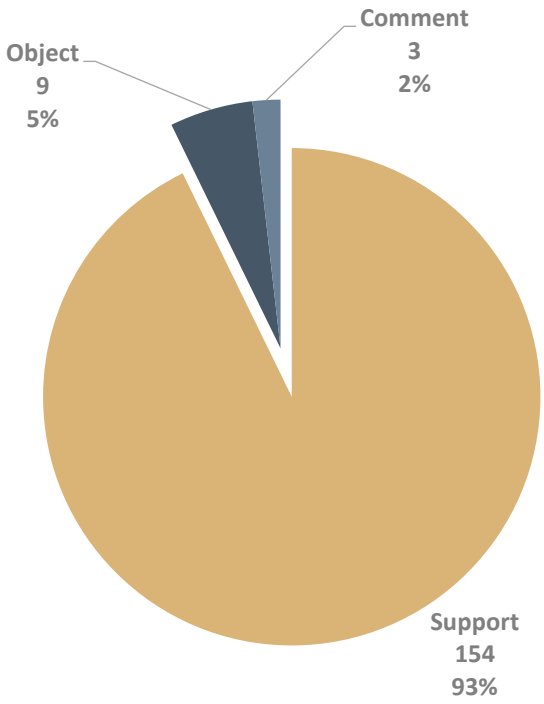
^ Includes the consolidated pro forma submissions as one submission (the Do Gooder Group).

Chart 3-2
Summary of Non-Government Organisation Submissions



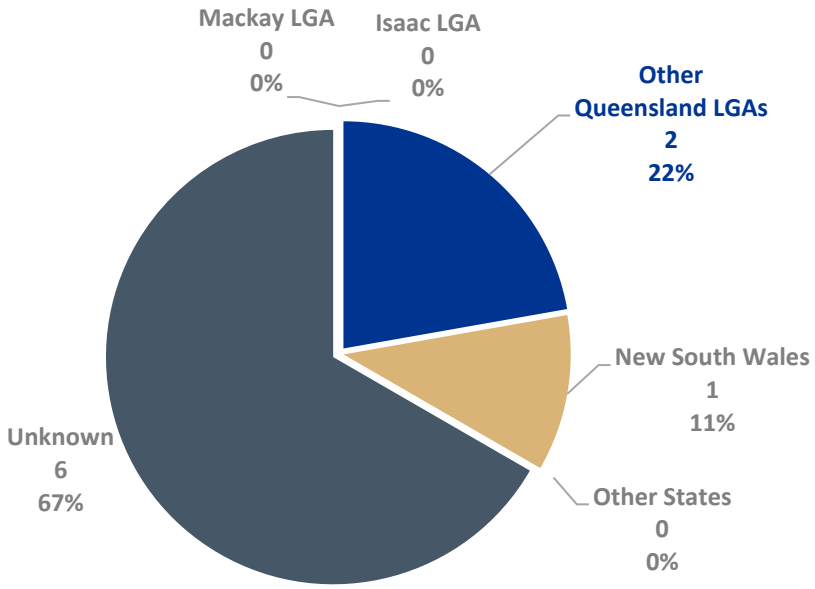
^ Includes the consolidated pro forma submissions as one submission (the Do Gooder Group).

Chart 3-3
Summary of Public Submissions



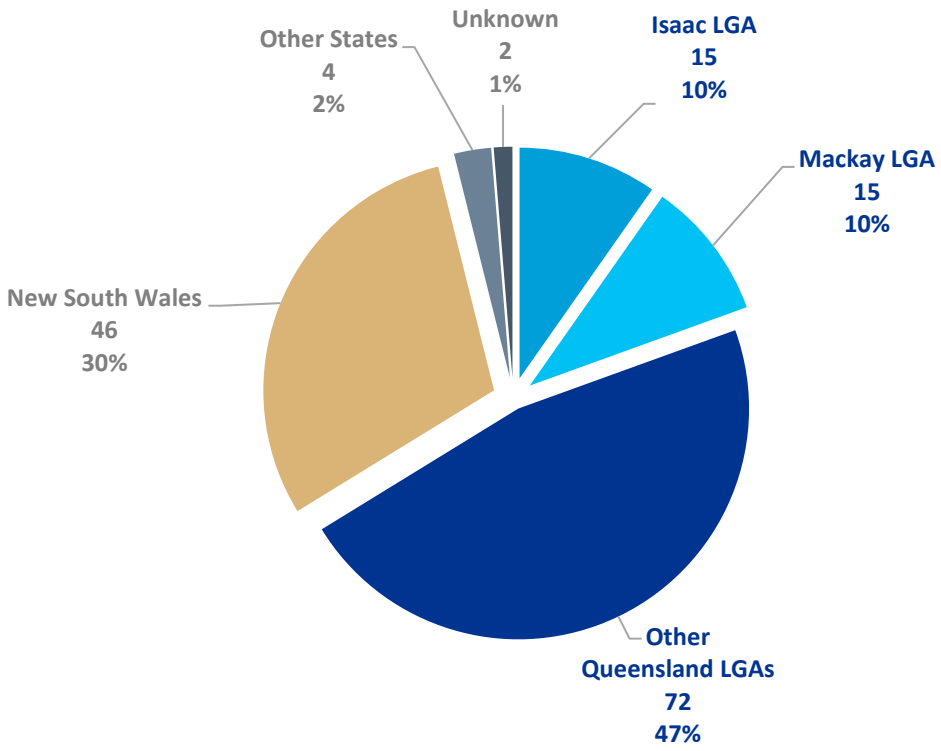
Excludes the pro-forma submissions as they have been grouped into one submission (the Do Gooder Group).

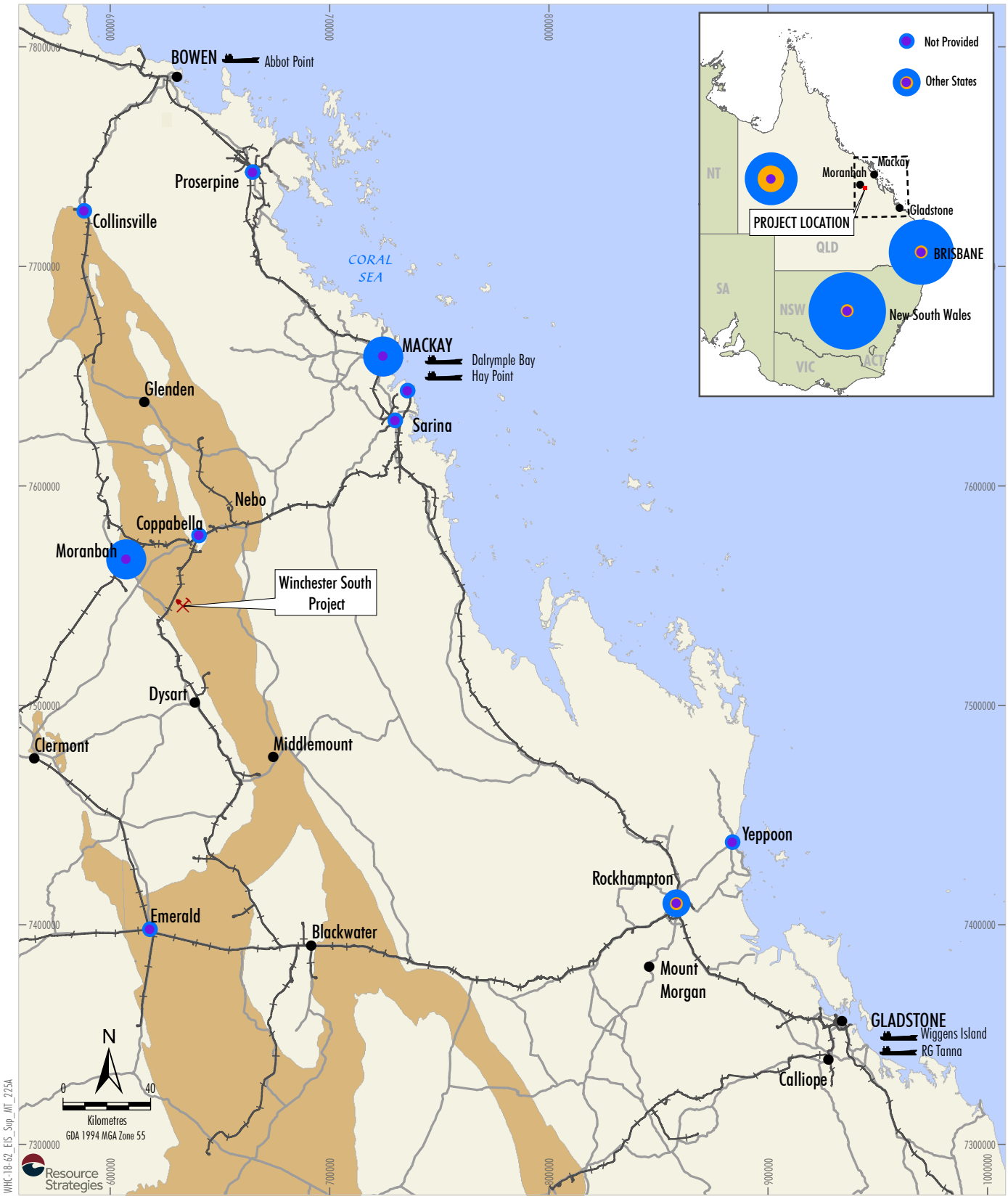
Chart 3-4
Summary of Public Objecting Submissions by Location



Excludes the pro-forma submissions as they have been grouped into one submission (the Do Gooder Group).

Chart 3-5
Summary of Public Supporting Submissions by Location





LEGEND

- Bowen Basin Coal Measures (DNRME, 2020)
- Road
- Railway
- Coal Terminal

Nature of Submissions

- Comment
- Support
- Objection

Number of Submissions

- 1
- 2 - 10
- 10 - 20
- 20 - 30
- 30 - 40
- 40 - 50

Source: The State of Queensland (2018 - 2020); Geoscience Australia (2018)

WHITEHAVEN COAL

WINCHESTER SOUTH PROJECT

Nature of Public & Organisation Submissions by Location

Figure 3-1

3.2 CATEGORISING SUBMISSIONS

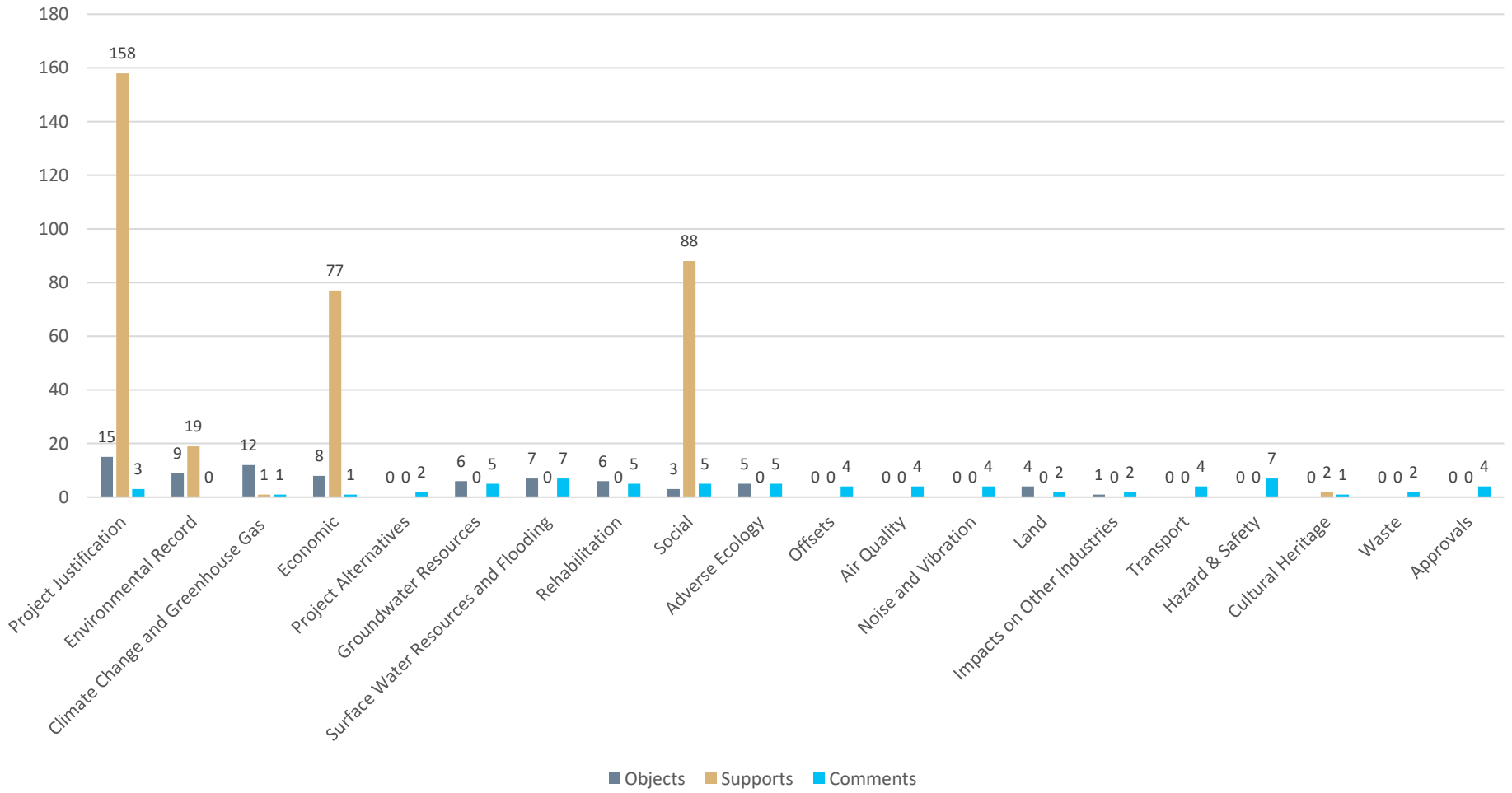
Whitehaven WS has categorised the issues raised in submissions generally into the following broad categories:

- submissions relating to the Project design (final landform) or rehabilitation;
- environmental matters;
- evaluation of the Project or Project justification; and
- other issues that are beyond the scope of the Project assessment or are not relevant to the Project.

The most commonly raised matters in relation to the Project are illustrated in Chart 3-6. As shown, the majority of comments pertained to the following matters:

- Project justification;
- greenhouse gas emissions and climate change;
- surface water resources and flooding;
- groundwater resources;
- rehabilitation and final landform;
- potential impacts to ecology (terrestrial and aquatic);
- socio-economic matters; and
- potential impacts on hazard and safety.

Chart 3-6
Key Matters Raised in Submissions



4 ACTIONS TAKEN SINCE NOTIFICATION OF THE EIS

4.1 AMENDMENTS TO THE PROJECT

Subsequent to the public notification of the Draft EIS in 2021, Whitehaven WS has reviewed the mine plan and mine schedule with the aim of reducing environmental impacts of the Project and optimising the Project final landform in response to comments raised in submissions, as well as incorporating new coal quality and geotechnical data to further refine the mine plan.

In summary, when compared to the Draft EIS, the proposed amendments to the optimised Project design would:

- reduce the extent of West Pit and South Pit out-of-pit waste rock emplacements, reducing the indicative surface disturbance extent of the Project;
- backfill an additional void (i.e. the South Pit mine void), which results in the addition of one year to the life of the Project to allow for final landform shaping; and
- incorporate new geological data and the outcomes of test work which:
  - increases the amount of ROM coal extracted by the Project, although not increasing the peak ROM coal extraction rate;
  - increases the amount of metallurgical coal produced by the Project; and
  - reduces thermal coal produced by the Project.

The changes to the indicative surface disturbance extent presented in the Draft EIS would reduce the overall surface disturbance by approximately 179 hectares (ha), reduce the impacts on threatened species and ecological communities, and increase the net benefit to the Queensland community from the optimised Project.

Amendments to the Project and additional commitments in response to submissions are further described in Section 5.

4.2 ENGAGEMENT

Since the lodgement of the Draft EIS and notification of the Mining Lease and Environmental Authority (EA) applications, Whitehaven WS has continued to consult with key State government agencies, the IRC and the public regarding the Project:

- Teleconference call with State government agencies on 26 August 2021 to provide an overview of the Project and key assessment outcomes.
- Whitehaven WS invited State government agencies to visit site and provide a tour of key features of interest to agencies and the OCG and DES attended the site visit on 7 September 2021.
- Teleconference call with State government agencies on 15 September 2021 on the Project final landform and waterways.

An overview of key recent consultation is provided below.

Office of the Coordinator-General

Whitehaven WS has met with the OCG to discuss the Project on multiple occasions. These meetings were to discuss assessment issues raised in submissions, the status of Whitehaven WS' preparation of the Additional Information, participation in joint meetings, and briefings on the outcomes of Whitehaven WS' consultation with key regulatory agencies.

Department of Environment and Science

Whitehaven WS held a teleconference call with DES and OCG on 14 January 2022 to update DES on the Project final landform and seek clarification on some issues raised by DES in relation to modelling of residual voids water quality and assessment of greenhouse gas emissions.

On 9 February 2022, Whitehaven WS, DES and OCG held a teleconference call to provide an update on water quality monitoring undertaken on-site and baseline water quality data used in the Project water assessments.

On 2 August 2022 and 12 August 2022, Whitehaven WS, DES and the OCG held teleconferences to provide updates on the optimised Project and associated impact assessment with comments received from DES addressed throughout Section 7.2.

Department of Climate Change, Energy, the Environment and Water (formerly Department of Agriculture, Water and the Environment)

Whitehaven WS held a teleconference call with the Department of Agriculture, Water and the Environment (DAWE) and OCG on 11 March 2022 to update DAWE on the Project and offset investigations to date.

On 18 August 2022, Whitehaven WS, Department of Climate Change, Energy, the Environment and Water (DCCEEW) and the OCG held an additional teleconference to provide an update on the Project and offset investigations, with comments received from DCCEEW addressed in Section 7.2.3 and Attachment 7.

Department of Agriculture and Fisheries

Whitehaven WS reached out to the Department of Agriculture and Fisheries (DAF) in September 2020, to attend the site tour. Unfortunately, DAF was unable to attend.

Isaac Regional Council

Whitehaven WS has consulted with the IRC throughout the Draft EIS process, including on the IRC submission on the Draft EIS. This has included several engagements in person, over the phone, and on-site, including with the IRC CEO and Mayor.

Whitehaven WS anticipates that consultation with the IRC will be ongoing throughout the assessment and operation of the Project.

Public Consultation

Whitehaven WS has continued to consult with nearby land-owners and members of the public during the Draft EIS notification phase and post-notification of the Draft EIS. Whitehaven WS set up a public Draft EIS drop-in sessions on 8 September 2021 in Moranbah which gave the public the opportunity to discuss the Project and the Draft EIS with Whitehaven WS.

After lodgement of the Draft EIS, Whitehaven WS gave notice of lodgement of applications for Mining Leases and EA in accordance with section 252A of the *Mineral Resources Act 1989* and section 152 of the *Environmental Protection Act 1994* (EP Act).

Whitehaven WS has also updated its website, providing a fact sheet and short video about the Project and a link to the Draft EIS along with an explanation on how feedback on the Project can be given.

4.3 ON-SITE ACTIVITIES

Of relevance to the optimised Project, the following activities have been undertaken:

- quarterly surface water monitoring has been undertaken on the Isaac River, Ripplestone Creek, Ripstone Creek and several un-named drainage features;
- quarterly groundwater monitoring of the Vermont and Leichhardt coal seams and interburden; and
- ongoing exploration programs within the Project area.

Data collected from the activities has been utilised in the additional analyses and assessments undertaken as part of preparing the Additional Information.

4.4 FURTHER ENVIRONMENTAL ASSESSMENT

Subsequent to the public notification of the Draft EIS, Whitehaven WS has continued investigating the potential to locate biodiversity offsets within the Brigalow Belt North Interim Biogeographic Regionalisation for Australia (IBRA) Region. This has included additional biodiversity surveys of land within the Brigalow Belt North IBRA Region.

Whitehaven WS also engaged E2M Pty Ltd (E2M) to undertake additional surveys of the Northern Quoll (*Dasyurus hallucatus*) and Corben's Long-eared Bat (*Nytophilus corbeni*) within the Project area. Ecological Service Professionals Pty Ltd (ESP) also undertook additional stygofauna surveys of bores in the regolith and alluvium near the Project and waterway determination assessments of ephemeral drainage lines within the Project area and surrounds (ESP, 2022a).

5 CHANGES TO THE PROJECT AND ADDITIONAL COMMITMENTS

5.1 OVERVIEW

Table 5-1 provides a summary of the optimised Project compared to the Project as presented in the Draft EIS. Note that the proposed amendments would not change or increase the following components of the Project:

- peak forecast ROM coal extraction rate (i.e. 17 Mtpa);
- peak product coal production rate and transport;
- electricity supply;
- general infrastructure;
- workforce;
- hours of operation; or
- capital investment value.

5.2 AMENDMENT TO SURFACE DISTURBANCE EXTENT

Since the lodgement of the Draft EIS, Whitehaven WS has continued to review the Project design and has identified opportunities to reduce the indicative surface disturbance extent. The reductions include a decrease in the extent of the West Pit out-of-pit waste rock emplacement and South Pit out-of-pit waste rock emplacement (reduction of approximately 179 ha) (Figure 5-1). The indicative surface disturbance extent for the optimised Project is presented in Figure 5-1.

5.3 RESOURCE RECOVERY AND QUALITY OF THE COAL RESOURCE

Whitehaven WS has undertaken additional exploration programs within the Project area to further improve its understanding of the coal resource. New drill holes have been added since lodgement of the Draft EIS for detailed pre-treatment, washability and product coal analysis, specifically targeting metallurgical coal definition.

As a result of the new coal quality data, this increases the amount of ROM coal that can be extracted by the Project (additional 43 Mt of ROM coal) and the proportion of metallurgical coal produced by the Project (i.e. 58% of product coal). The product coal mix for the Project has also been updated, with products now comprising of semi-hard coking coal as the primary product and thermal coal as a secondary product.

An indicative mining schedule for the optimised Project is provided in Table 5-2 and the mine progression is shown in Figures 5-2 to 5-7. Construction of the Project would commence in Year 1, with first coal expected to be extracted in Year 2.

The actual timing, mining sequence and annual coal production profile may vary to take account of localised features, coal quality characteristics, detailed mine design, economics, requirements of the coal market, product specification and/or blending requirements and/or adaptive management requirements.

As these requirements are likely to vary over the life of the Project, the development sequence of the open cut and coal extraction rates may also vary.

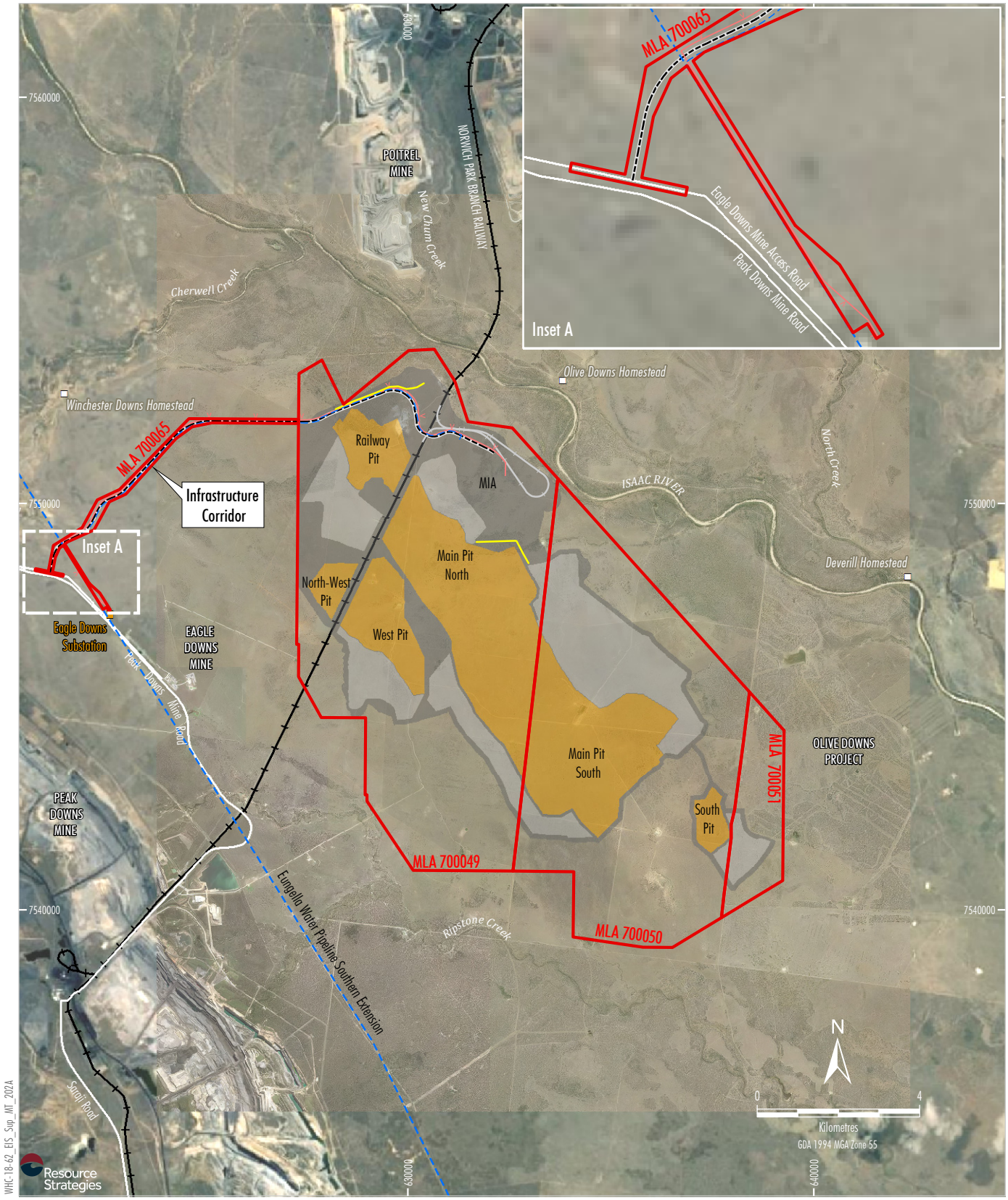
Table 5-1
Project Comparison Summary

Project Component	Summary of the Project as Presented in the Draft EIS	Summary of the Optimised Project
Project Life	Approximately 30 years. Projected three years of construction, 28 years of mining operations (overlapping with years 2 and 3 of constructions) and one year of final landform shaping.	Approximately 31 years. Projected three years of construction, 28 years of mining operations (overlapping with years 2 and 3 of constructions) and two years of final landform shaping.
Mining Method	Open cut mining to a depth of approximately 160 metres below ground level (mbgl).	**Unchanged from the Draft EIS.**
Resource Recovery	Approximately 353 million tonnes (Mt) of ROM coal from coal seams in the Rangal and Fort Cooper Coal Measures (Leichhardt Seams, Vermont Upper Seam and Vermont Middle Lower Seam).	Approximately 396 Mt of ROM coal from coal seams in the Rangal and Fort Cooper Coal Measures (Leichhardt Seams, Vermont Upper Seam and Vermont Middle Lower Seam). ROM coal will be extracted using truck and excavator, supported by cast blasting and dozer push operations.

Table 5-1 (Continued)
Project Comparison Summary

Project Component	Summary of the Project as Presented in the Draft EIS	Summary of the Amended Project
Annual Extraction	Forecast extraction of approximately 15 Mtpa of ROM coal, with a forecast peak extraction of up to approximately 17 Mtpa of ROM coal.	**Unchanged from the Draft EIS.**
Management of Waste Rock and Coal Rejects	Approximately 2,012 million bank cubic metres (Mbcm) of waste rock would be placed in the waste rock emplacement including within the footprint of the open cut void. Co-disposal of CHPP coal reject material from the Project CHPP within waste rock emplacement areas.	Approximately 2,062 Mbcm of waste rock would be placed in the waste rock emplacement including within the footprint of the open cut void. Co-disposal of CHPP coal reject material from the Project CHPP within waste rock emplacement areas.
Product Transport	Construction and use of train load-out and rail spur infrastructure for the transport of up to approximately 11 Mtpa of product coal by rail to port. An average of three (over the life of the Project) and a maximum of eight loaded train departures per day.	**Unchanged from the Draft EIS.**
Water Management	On-site water management system comprising water management storages and collection drains, flood levees, up-catchment diversions, sediment control and open cut dewatering.	Minor changes to the water management system to account for changes to the optimised Project.
Water Supply	Mine water supply to be obtained from inflows to open cut areas, processing water re-use and recycling, treated wastewater, rainfall and runoff collection and supplementary raw water supply expected from the Eungella pipeline network and/or surrounding mining operations. Mine water supply may also be obtained from flood harvesting, which would only include flood water taken flowing through site (i.e. surface runoff) during major rainfall events, and would not include take from the Isaac River during flood events.	**Unchanged from the Draft EIS.**
Electricity Supply	Construction of a 132 kV/22 kV electricity switching/substation and 132 kV ETL to connect to the existing regional power network.	**Unchanged from the Draft EIS.**
General Infrastructure	A range of supporting infrastructure including an MIA, CHPP and other ancillary infrastructure.	**Unchanged from the Draft EIS.**
Workforce	During operation, the Project would directly employ approximately 500 personnel[1]. Initial construction activities would require approximately 500 personnel.	**Unchanged from the Draft EIS.**
Rehabilitation	Progressive rehabilitation of waste rock emplacements and surface disturbance areas. At Project closure, four residual voids would remain in perpetuity, with no post-mining land use (PMLU) (i.e. for non-use management areas [NUMAs]).	At Project closure, three residual voids would remain in perpetuity, all of which have a PMLU. Progressive rehabilitation of waste rock emplacements and surface disturbance areas. No NUMAs.
Operating Hours	Mining, processing and train loading and rail movements on the Project rail spur would occur 24 hours per day, seven days per week.	**Unchanged from the Draft EIS.**
Estimated Capital Investment Value	Approximately $1 billion.	**Unchanged from the Draft EIS.**

[1] Whitehaven WS is investigating automation of the fleet for the Project. Direct employee numbers include consideration of automation. Employee numbers may increase depending on the extent of automation. The Draft EIS has considered the effect of the extent of automation on employee numbers as part of the SIA.



LEGEND

- Mining Lease Application Boundary
- Eungella Water Pipeline Southern Extension
- Railway
- Substation

Project Component*

- Indicative Infrastructure Area
- Indicative Out-of-pit Waste Rock Emplacement
- Indicative Open Cut Pit Including In-pit Waste Rock Emplacement
- Indicative Mine Access Road
- Indicative Rail Spur and Loop
- Indicative Electricity Transmission Line
- Indicative Raw Water Supply Pipeline
- Indicative Flood Levee

*Note: * Excludes some project components such as water management infrastructure, access tracks, topsoil stockpiles, explosives magazines, power reticulation, temporary offices, other ancillary works and construction disturbance.*

Source: The State of Queensland (2018 - 2020); Whitehaven (2022)
Orthophoto: Google Image (2019); Whitehaven (2017)

WHITEHAVEN COAL

WINCHESTER SOUTH PROJECT

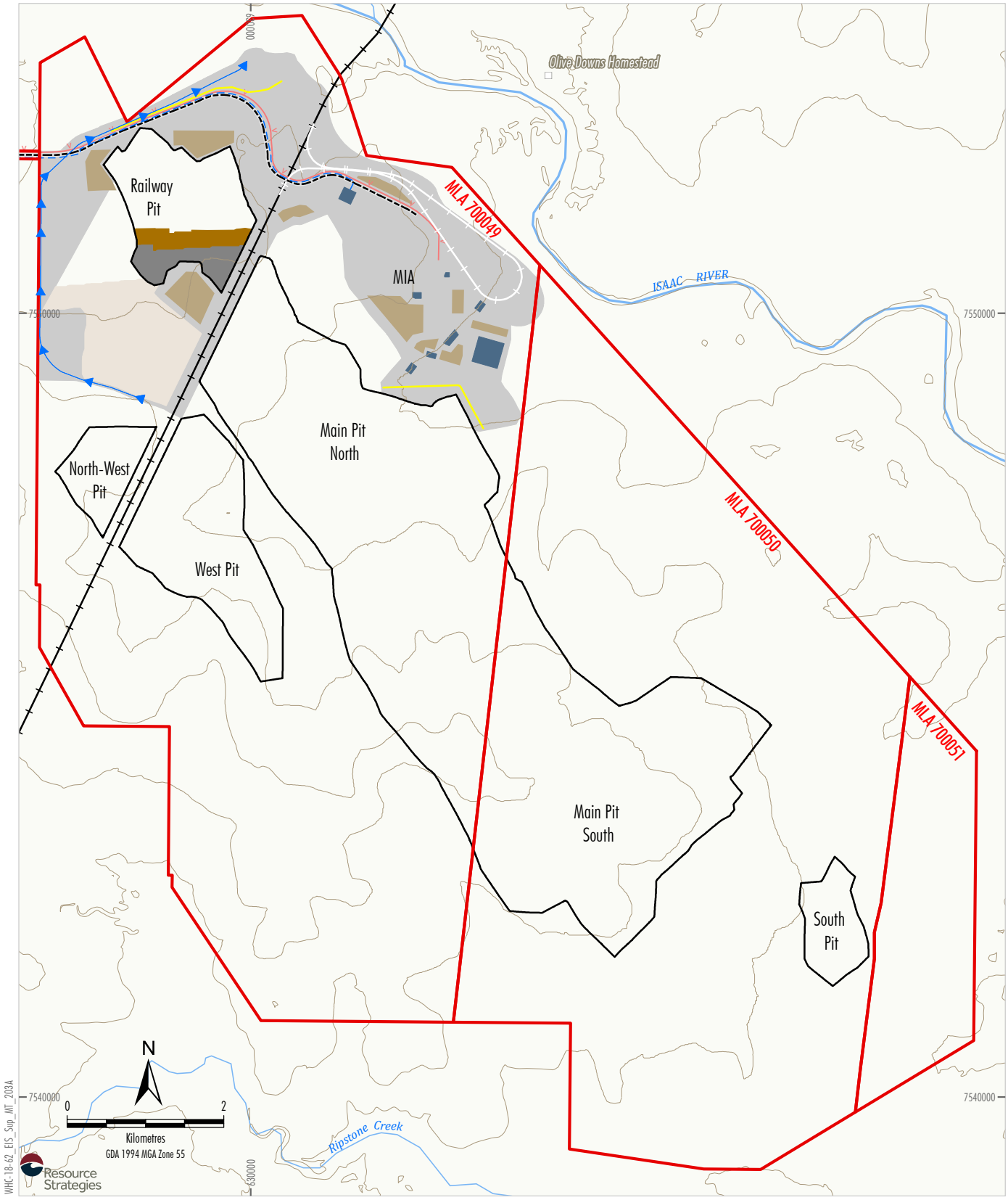
Project General Arrangement

Figure 5-1

Table 5-2
Indicative Mining Schedule

Project Year	Project ROM Coal Production (Mt)				Open Cut Waste Rock (Mbcm)	CHPP Coal Rejects (Mtpa)	Product Coal (Mtpa)
	Leichhardt Seams	Upper Vermont Seam	Vermont Middle Lower Seam	Total ROM Coal			
1	-	-	-	-	-	-	-
2	0.1	0.2	0.7	1.0	8.7	0.5	0.5
3	1.5	0.9	2.4	4.7	36.6	1.9	3.0
4	2.0	3.4	7.6	12.9	65.9	5.8	7.6
5	4.1	3.3	7.7	15.0	84.3	6.2	9.3
6	4.4	3.5	8.7	16.7	85.4	7.1	10.2
7	4.1	3.1	8.1	15.3	86.9	6.7	9.2
8	6.8	2.9	7.3	17.0	75.3	7.3	10.3
9	6.1	3.0	6.3	15.5	79.6	6.6	9.5
10	7.4	2.5	5.2	15.1	81.4	6.0	9.6
11	7.2	2.9	6.3	16.4	80.9	6.9	10.1
12	6.5	3.0	6.5	16.0	87.1	7.1	9.5
13	6.4	2.9	6.5	15.8	87.5	7.1	9.3
14	7.3	2.4	6.1	15.8	88.1	7.0	9.4
15	7.3	2.8	6.9	17.0	86.6	7.8	9.8
16	8.2	2.5	6.2	17.0	86.6	8.0	9.6
17	7.4	2.5	5.9	15.8	87.3	7.4	9.0
18	7.9	2.2	5.1	15.2	87.8	6.9	8.9
19	7.6	2.3	5.4	15.3	87.9	7.1	8.8
20	7.5	2.3	5.5	15.3	87.9	6.8	9.1
21	7.6	2.8	6.6	17.0	86.5	7.8	9.8
22	7.3	2.9	6.5	16.7	67.5	8.0	9.4
23	6.2	2.9	6.8	15.8	61.2	7.7	8.7
24	4.1	2.5	7.3	13.9	61.7	7.2	7.3
25	6.4	2.9	7.8	17.0	58.4	8.3	9.4
26	2.8	3.0	9.1	14.8	59.6	7.9	7.6
27	2.9	1.7	5.4	10.0	60.5	5.0	5.5
28	2.6	1.7	4.4	8.7	60.2	4.1	4.9
29	3.6	1.6	4.1	9.3	59.5	4.2	5.5
30	-	-	-	-	13.4	-	-
31	-	-	-	-	1.4	-	-
Total	**153**	**71**	**172**	**396**	**2062**	**181**	**231**

Note: The combined total of product coal and coal reject material is greater than total ROM coal due to changes in moisture content (data are presented on an "as received" moisture basis).
Totals may not add exactly due to rounding. ROM extraction rate is based on indicative mining schedule.



LEGEND

- Mining Lease Application Boundary
- Railway

Project Component*

- Indicative Infrastructure Area
- Indicative Water Storage
- Indicative Maximum Extent of Open Cut Pit
- Indicative Up-catchment Diversion
- Indicative Mine Access Road
- Indicative Rail Spur and Loop
- Indicative Electricity Transmission Line
- Indicative Raw Water Supply Pipeline
- Indicative Flood Levee

Mine/Rehabilitation Status

- Indicative Advanced Soil Stripping
- Indicative Active Mining
- Indicative Active Emplacement
- Indicative Soil Stockpile

*Note: * Excludes some project components such as water management infrastructure, access tracks, topsoil stockpiles, explosives magazines, power reticulation, temporary offices, other ancillary works and construction disturbance.*

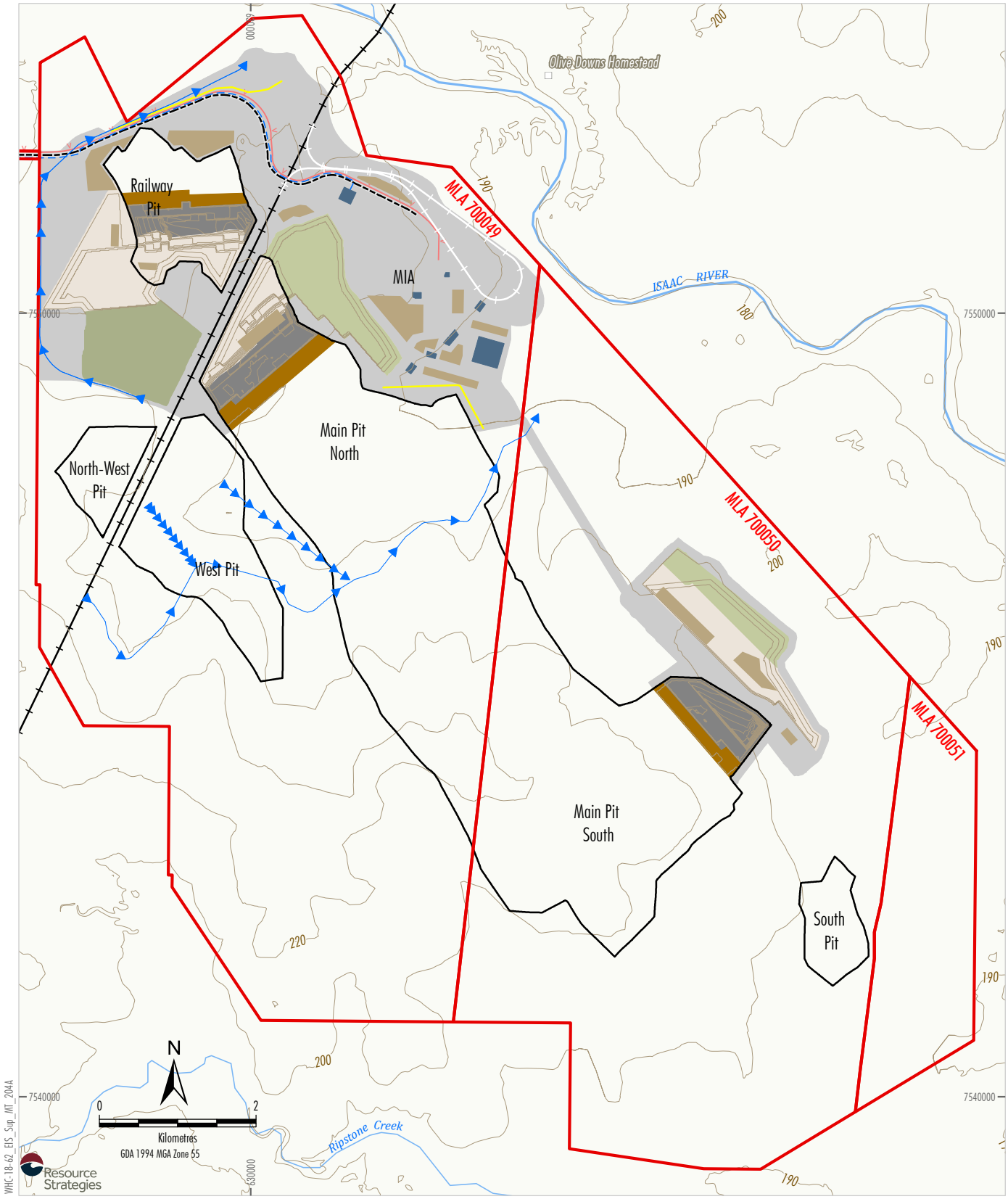
Source: The State of Queensland (2018 - 2020); Whitehaven (2022)

WHITEHAVEN COAL

WINCHESTER SOUTH PROJECT

General Arrangement - Project Year 2

Figure 5-2



WHC-18-62_EIS_Sup_MT_204A

LEGEND

Mining Lease Application Boundary
Railway

Project Component*

Indicative Infrastructure Area
Indicative Water Storage
Indicative Maximum Extent of Open Cut Pit
Indicative Up-catchment Diversion
Indicative Mine Access Road
Indicative Rail Spur and Loop
Indicative Electricity Transmission Line
Indicative Raw Water Supply Pipeline
Indicative Flood Levee

Mine/Rehabilitation Status

Indicative Advanced Soil Stripping
Indicative Active Mining
Indicative Active Emplacement
Indicative Initial Rehabilitation
Indicative Established Rehabilitation
Indicative Soil Stockpile

*Note: * Excludes some project components such as water management infrastructure, access tracks, topsoil stockpiles, explosives magazines, power reticulation, temporary offices, other ancillary works and construction disturbance.*

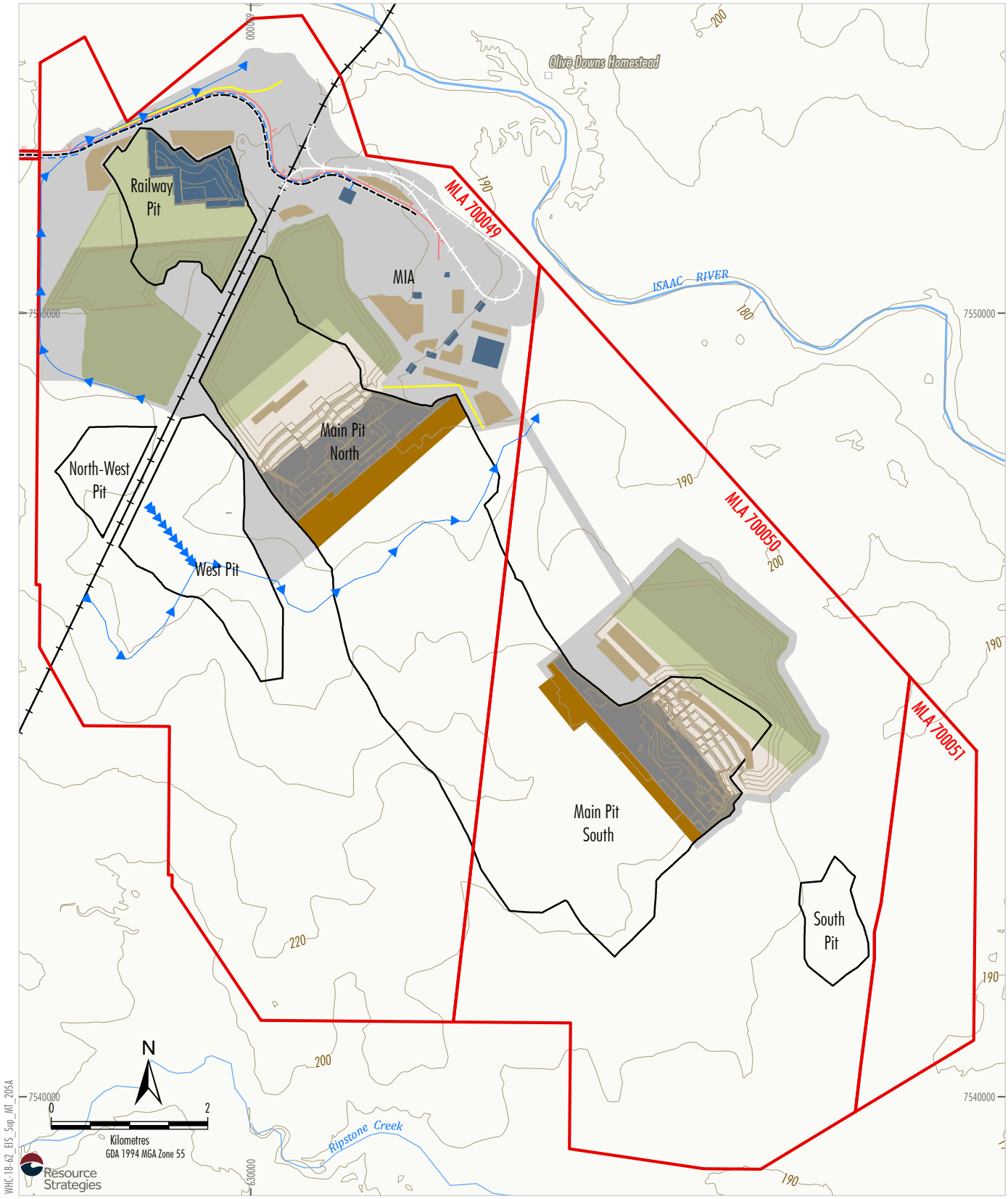
Source: The State of Queensland (2018 - 2020); Whitehaven (2022)

WHITEHAVEN COAL

WINCHESTER SOUTH PROJECT

General Arrangement - Project Year 5

Figure 5-3



LEGEND

- Mining Lease Application Boundary
- Railway

Project Component*

- Indicative Infrastructure Area
- Indicative Water Storage
- Indicative Maximum Extent of Open Cut Pit
- Indicative Up-catchment Diversion
- Indicative Mine Access Road
- Indicative Rail Spur and Loop
- Indicative Electricity Transmission Line
- Indicative Raw Water Supply Pipeline
- Indicative Flood Levee

Mine/Rehabilitation Status

- Indicative Advanced Soil Stripping
- Indicative Active Mining
- Indicative Active Emplacement
- Indicative Initial Rehabilitation
- Indicative Established Rehabilitation
- Indicative Soil Stockpile

*Note: * Excludes some project components such as water management infrastructure, access tracks, topsoil stockpiles, explosives magazines, power reticulation, temporary offices, other ancillary works and construction disturbance.*

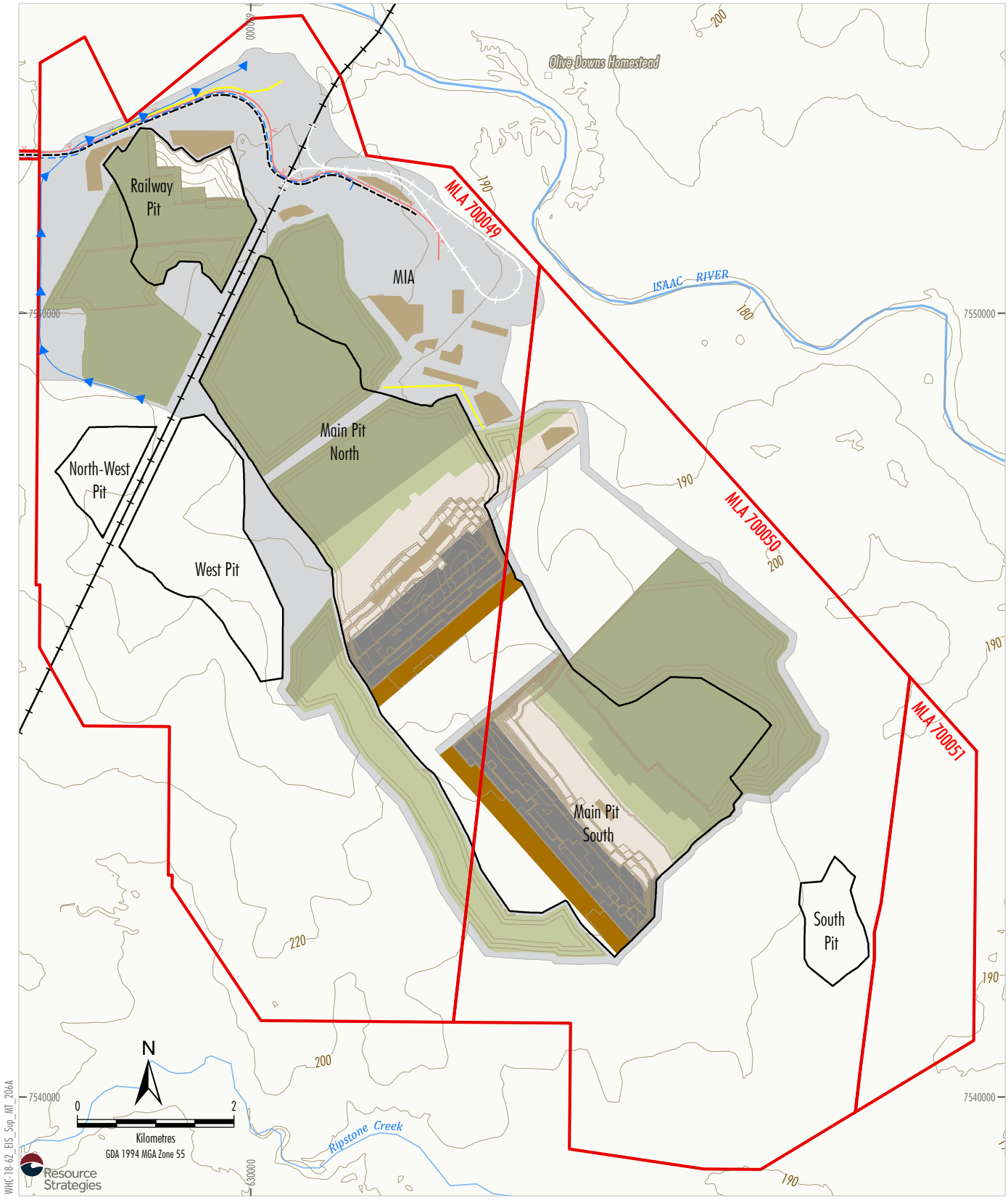
Source: The State of Queensland (2018 - 2020); Whitehaven (2022)

WHITEHAVEN COAL

WINCHESTER SOUTH PROJECT

General Arrangement
- Project Year 9

Figure 5-4



LEGEND

- Mining Lease Application Boundary
- Railway

Project Component*

- Indicative Infrastructure Area
- Indicative Maximum Extent of Open Cut Pit
- Indicative Up-catchment Diversion
- Indicative Mine Access Road
- Indicative Rail Spur and Loop
- Indicative Electricity Transmission Line
- Indicative Raw Water Supply Pipeline
- Indicative Flood Levee

Mine/Rehabilitation Status

- Indicative Advanced Soil Stripping
- Indicative Active Mining
- Indicative Active Emplacement
- Indicative Initial Rehabilitation
- Indicative Established Rehabilitation
- Indicative Soil Stockpile

*Note: * Excludes some project components such as water management infrastructure, access tracks, topsoil stockpiles, explosives magazines, power reticulation, temporary offices, other ancillary works and construction disturbance.*

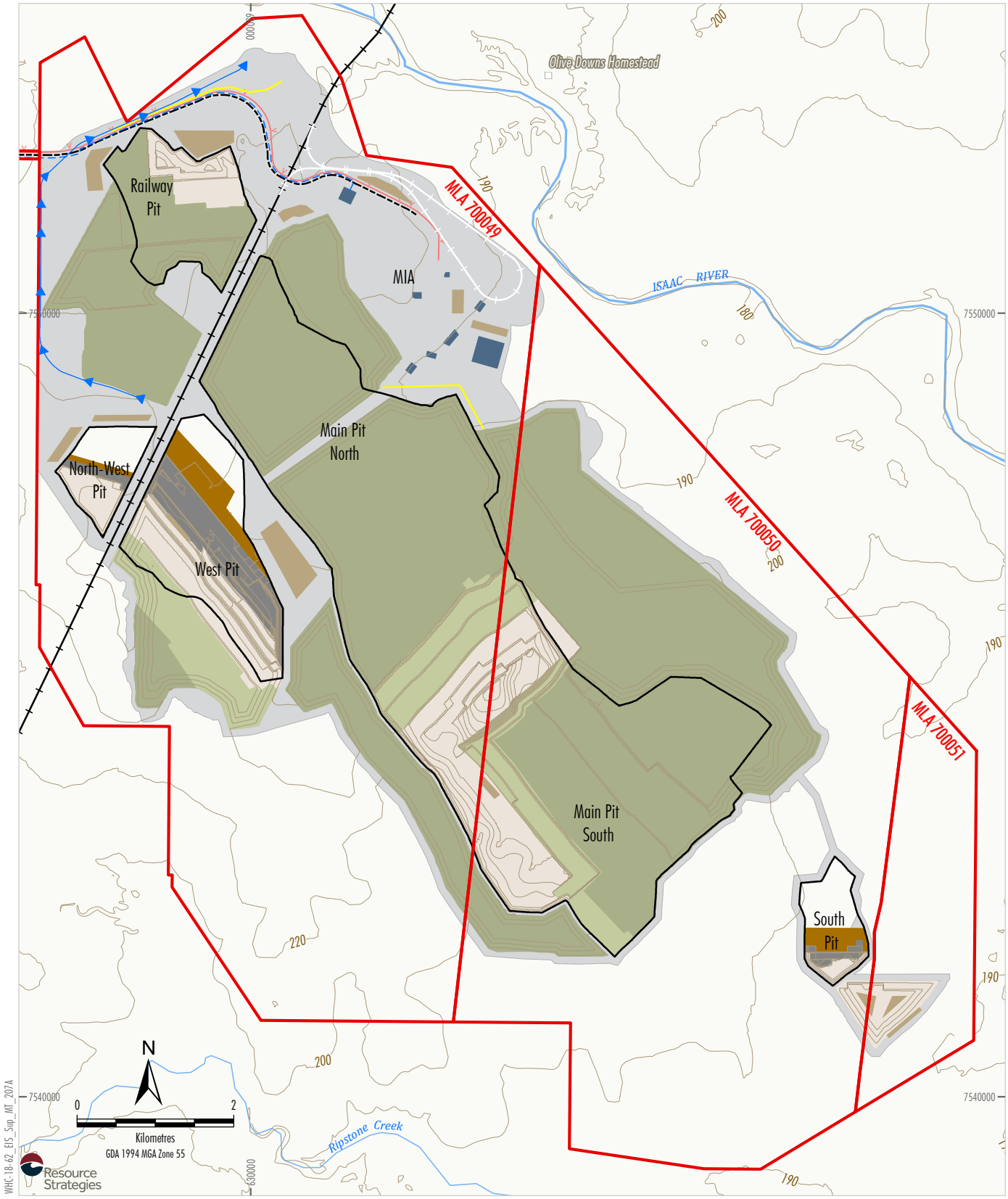
Source: The State of Queensland (2018 - 2020); Whitehaven (2022)

WHITEHAVEN COAL

WINCHESTER SOUTH PROJECT

General Arrangement - Project Year 19

Figure 5-5



LEGEND

- Mining Lease Application Boundary
- Railway

Project Component*

- Indicative Infrastructure Area
- Indicative Water Storage
- Indicative Maximum Extent of Open Cut Pit
- Indicative Up-catchment Diversion
- Indicative Mine Access Road
- Indicative Rail Spur and Loop
- Indicative Electricity Transmission Line
- Indicative Raw Water Supply Pipeline
- Indicative Flood Levee

Mine/Rehabilitation Status

- Indicative Advanced Soil Stripping
- Indicative Active Mining
- Indicative Active Emplacement
- Indicative Initial Rehabilitation
- Indicative Established Rehabilitation
- Indicative Soil Stockpile

*Note: * Excludes some project components such as water management infrastructure, access tracks, topsoil stockpiles, explosives magazines, power reticulation, temporary offices, other ancillary works and construction disturbance.*

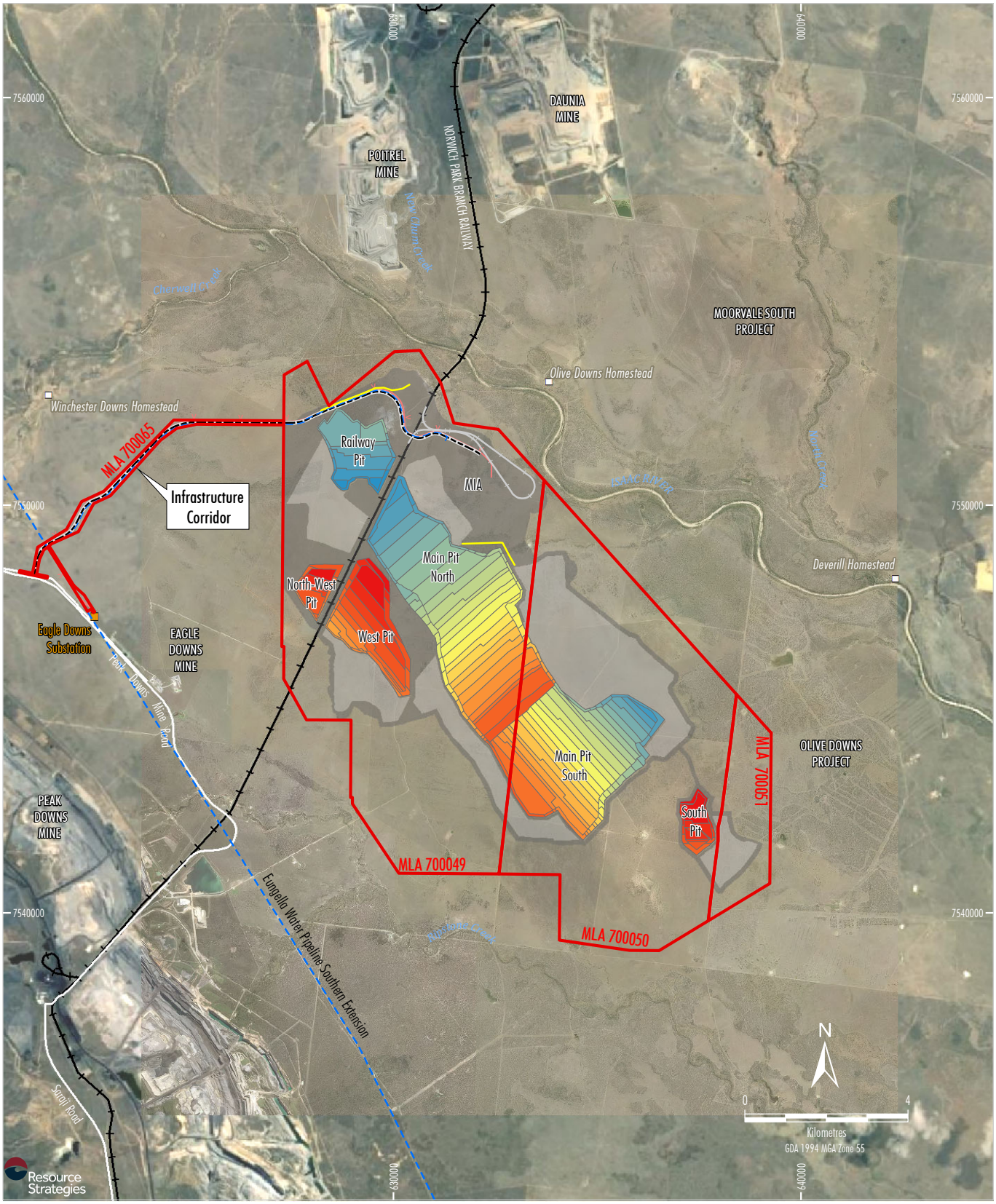
Source: The State of Queensland (2018 - 2020); Whitehaven (2022)

WHITEHAVEN COAL

WINCHESTER SOUTH PROJECT

General Arrangement - Project Year 27

Figure 5-6



LEGEND

- Mining Lease Application Boundary
- Eungella Water Pipeline Southern Extension
- Railway
- Substation

Project Component*

- Indicative Infrastructure Area
- Indicative Out-of-pit Waste Rock Emplacement
- Indicative Mine Access Road
- Indicative Rail Spur and Loop
- Indicative Electricity Transmission Line
- Indicative Raw Water Supply Pipeline
- Indicative Flood Levee

2025	2039	
2026	2040	
2027	2041	
2028	2042	
2029	2043	
2030	2044	
2031	2045	
2032	2046	
2033	2047	
2034	2048	
2035	2049	
2036	2050	
2037	2051	
2038	2052	

Source: The State of Queensland (2018 - 2020); Whitehaven (2020)
Orthophoto: Google Image (2019); Whitehaven (2017)

WHITEHAVEN COAL

WINCHESTER SOUTH PROJECT

Indicative Mining Sequence

Figure 5-7

5.4 WATER MANAGEMENT

A detailed description of the Project water management system is provided in the Surface Water and Flooding Assessment prepared by WRM Water and Environment Pty Ltd (WRM) (Attachment 6), with design input from Whitehaven WS.

The following subsections provide additional information on water management for the optimised Project.

5.4.1 Water Consumption

The water consumption requirements for the optimised Project and water balance of the system fluctuate with climatic conditions, production rates and as the extent of the mining operations change over time. A summary of main operational water demands for the optimised Project (i.e. CHPP water supply and haul road dust suppression) is provided below.

In addition, water would be required for coal crushing/conveyor dust suppression, supply for potable water treatment plant and other miscellaneous demands, including washdown of mobile equipment and other minor non-potable uses, such as firefighting.

CHPP Water Supply

The CHPP is a net user of water as, during the washing and sizing process, the moisture content of the coarse and fine rejects and coal product material is increased.

The CHPP water demand rate is related directly to the rate of ROM coal feed to the CHPP, and the rate of production and moisture content of the coal product, coarse and fine rejects. The net water demand for the CHPP (i.e. including water recycled on-site) is estimated to be approximately 166 litres per tonne of ROM coal.

Dust Suppression

Water for haul road dust suppression would be sourced from the water storage dams on-site. If required, chemical or other dust suppressants may be used to reduce the amount of water required for dust suppression.

Haul road dust suppression demands were calculated based on estimated haul road lengths, which vary over the life of the Project, predicted daily rainfall and predicted evaporation rates. The estimated average daily dust suppression usage for haul roads over the phases of the optimised Project ranges between 0.5 megalitres per day (ML/day) to 3.9 ML/day (Attachment 6).

A sensitivity analysis for the dust suppressant usage and water usage reduction was performed as part of the Surface Water and Flooding Assessment (Attachment 6).

5.4.2 Groundwater Inflows

Predicted groundwater inflows to each of the open cut pits over the life of the Project are presented in Attachment 5.

The total groundwater inflows are predicted to peak at approximately 280 megalitres per year (ML/year) of groundwater inflows to the open cut pits. The average groundwater inflows over the life of the Project are predicted to be approximately 155 ML/year (Attachment 5).

Water that accumulates in the open cut pits would be transferred (i.e. dewatered), preferentially, to contained water storages for beneficial use (i.e. dust suppression and/or CHPP water supply).

5.4.3 Sediment Dams

Sediment dams would contain runoff from waste rock emplacements, as well as areas of initial and established rehabilitation. The sediment dams would allow for gravity settling of sediment prior to release off-site. Sediment dams would be designed based on the *Best Practice Erosion and Sediment Control Guideline* (International Erosion Control Association [IECA], 2018) as described in Attachment 6.

Sediment dams would be maintained until such time as vegetation within the catchment of the sediment dams successfully establishes and where runoff has similar water quality characteristics to areas that are undisturbed by mining activities. Sediment dams may be maintained in rehabilitated areas when site water demand requires it.

Details regarding the sediment dams (including rehabilitation activities) would be provided in the Erosion and Sediment Control Plan (ESCP) for the Project.

5.4.4 Controlled Release Strategy

Consistent with the Draft EIS, controlled releases from the mine water management system for the optimised Project would occur rarely and only when the water quality and flows of the Isaac River meet the proposed release trigger levels. Therefore, it is expected that these controlled releases would have negligible impacts on the Isaac River water quality (Attachment 6).

Potential impacts of the proposed controlled releases on the downstream tributaries were assessed in the Geomorphology Technical Study (Fluvial Systems, 2020) for the Draft EIS. The Geomorphology Technical Study was prepared by Dr Christopher Gippel and included a comprehensive review of the geomorphology of the tributaries downstream of the proposed controlled release points.

The Geomorphology Technical Study for the Draft EIS described the proposed monitoring and management strategy for the tributaries, which would be undertaken using objective, scientifically sound methods, following a BACI (Before/After/Control/Intervention) design. Visual inspections would be undertaken following each controlled release event. A topographic survey (using LiDAR) would be undertaken if either of the following are observed:

- a channel exceeding 0.2 metres (m) deep for a length of 10 m or more; or
- initiation of a knickpoint higher than 0.3 m.

Appropriate mitigation measures would be applied in response to any observed geomorphic impacts. The appropriate mitigation would be assessed at the time and would range from doing nothing (self-sealing), to assisted recovery (e.g. plant vegetation and soft engineering such as coir matting and stakes), to hard engineering (e.g. rock rip-rap) (Fluvial Systems, 2020).

5.4.5 Simulated Performance of the Project Water Management System

A predictive assessment of the performance of the Project water management system (including supply, containment, risk of disruption to mining operations and controlled release volumes) is presented in Attachment 6.

The results of the assessment are summarised in Table 5-3 including the predicted external raw water requirements for the Project, water supply sources, water demands and storage volumes for the containment system for a range of different climatic scenarios.

The results presented in Table 5-3 are the average of all model iterations and include wet and dry periods distributed throughout the life of the Project, from Phases 1 to 6.

The water balance model results show that external water supply requirements would generally reduce over the life of the optimised Project (Attachment 6). The reduction in external water supply requirements is due to the increase in water captured on-site over time and the decrease in production throughput from Phase 2 onwards.

The water balance model results show that there is a greater than 78% probability that the proposed external water supply of 3,800 ML would be sufficient to meet all site demands, in any one year across the life of the optimised Project. Whitehaven WS would source water from either an external water supplier (e.g. Sunwater) via a water supply pipeline or via water sharing with surrounding mining operations.

Table 5-3
Indicative Average Annual Water Balance for the Optimised Project Water Management System

Process	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
Average Inflows (ML/year)						
Rainfall Runoff	787	2,120	2,527	2,903	3,414	3,925
Net Groundwater	109	205	167	123	37	132
External Water	1,526	2,403	2,330	2,241	2,376	1,464
Total Inflows	**2,422**	**4,728**	**5,024**	**5,267**	**5,826**	**5,521**
Average Outflows (ML/year)						
Evaporation	405	556	672	728	795	858
Dust Suppression	181	660	744	978	1,212	1,443
Other Water Usage	200	200	200	200	200	200
Net CHPP Demand	1,393	2,633	2,708	2,608	2,597	1,547
Controlled Releases	0	0	1	1	0	0
Mine-affected Water Dam Overflows	0	0	0	0	0	0
Sediment Dam Overflows	246	598	579	800	955	1,248
Total Outflows	**2,426**	**4,648**	**4,903**	**5,315**	**5,759**	**5,296**

Source: Attachment 6.

Note: The difference between the total average inflows and total average outflows is the change in water stored on-site. Totals may have minor discrepancies due to rounding.

5.4.6 Flooding and Regulated Structures

Temporary Flood Levees

The temporary flood levees would be progressively constructed as required to provide protection to Project operations and would be in place at Project Year 2 to prevent inundation of the open cut during operations. The temporary flood levees would be constructed to the north of the Railway Pit, and to the north-east of the Main Pit, to prevent inundation of the open cut during operations.

The temporary flood levees located to the north of the Railway Pit and the north-east of the Main Pit, respectively, would be removed once they are no longer required. Whitehaven does not propose to retain the temporary flood levees post-mining, however, if relevant land-owners and Government agencies advised retaining the temporary levees post-mining would be beneficial, Whitehaven WS would consider as part of the rehabilitation requirements for the Project.

Optimised Final Landform

The potential interactions between the optimised final landform and the Isaac River floodplain are generally minimal and would not significantly affect the natural channel morphology of Isaac River for events up to the 1% Annual Exceedance Probability (AEP). During extreme events, (e.g. 0.1% AEP), the interactions with the floodplain as a result of the optimised final landform configuration are minor and generally confined to within the Project area.

While the peak flood velocities are not considered excessive, appropriate scour protection measures would be considered as part of the optimised final landform detailed design process and detailed in the Erosion and Sediment Control Plan and/or Progressive Rehabilitation and Closure Plan (PRC Plan) for the Project. If erosion of the final landform is identified due to flooding event, a range of mitigation measures could be implemented from self-healing, to assisted recovery (e.g. plant vegetation and soft engineering such as coir matting and stakes) or to hard-engineering (e.g. rock rip-rap) as recommended in the Geomorphology Assessment.

5.5 FINAL LANDFORM

In consideration to comments received during public notification of the Draft EIS, Whitehaven WS has modified the mine plan to include additional backfilling, and in particular completely backfilling an additional void.

Whitehaven WS has reviewed the Project mine plan and sequence with the aim of reducing the number of residual voids in the final landform; reducing the impacts of the Project on threatened species habitat and investigating uses for the residual void water bodies. The optimised Project final landform provided in Figures 5-8a and 5-8b, would achieve this by:

1. Backfilling an additional void, the South Pit mine void.
2. Providing a PMLU for all remaining proposed residual voids (i.e. no NUMAs).
3. Reducing the overall surface disturbance extent by approximately 179 ha, with further minimised out-of-pit waste rock emplacements to reduce impacts to habitat for:
    a. the Koala (*Phascolarctos cinereus*) by approximately 145.7 ha (approximately 46% reduction);
    b. the Greater Glider (*Petauroides volans*) by approximately 34.3 ha (approximately 20% reduction); and
    c. the Squatter Pigeon (southern subspecies) (*Geophaps scripta scripta*) by approximately 145.7 ha (approximately 56% reduction).
4. Smoothing low-walls to minimise slopes to approximately 10 degrees (°) or lower.
5. Providing water supply to stock.
6. Re-establishing a post-mining surface water drainage that is sympathetic with the natural drainage lines.
7. Reinstating excised portions of the northern waterway in the final landform.

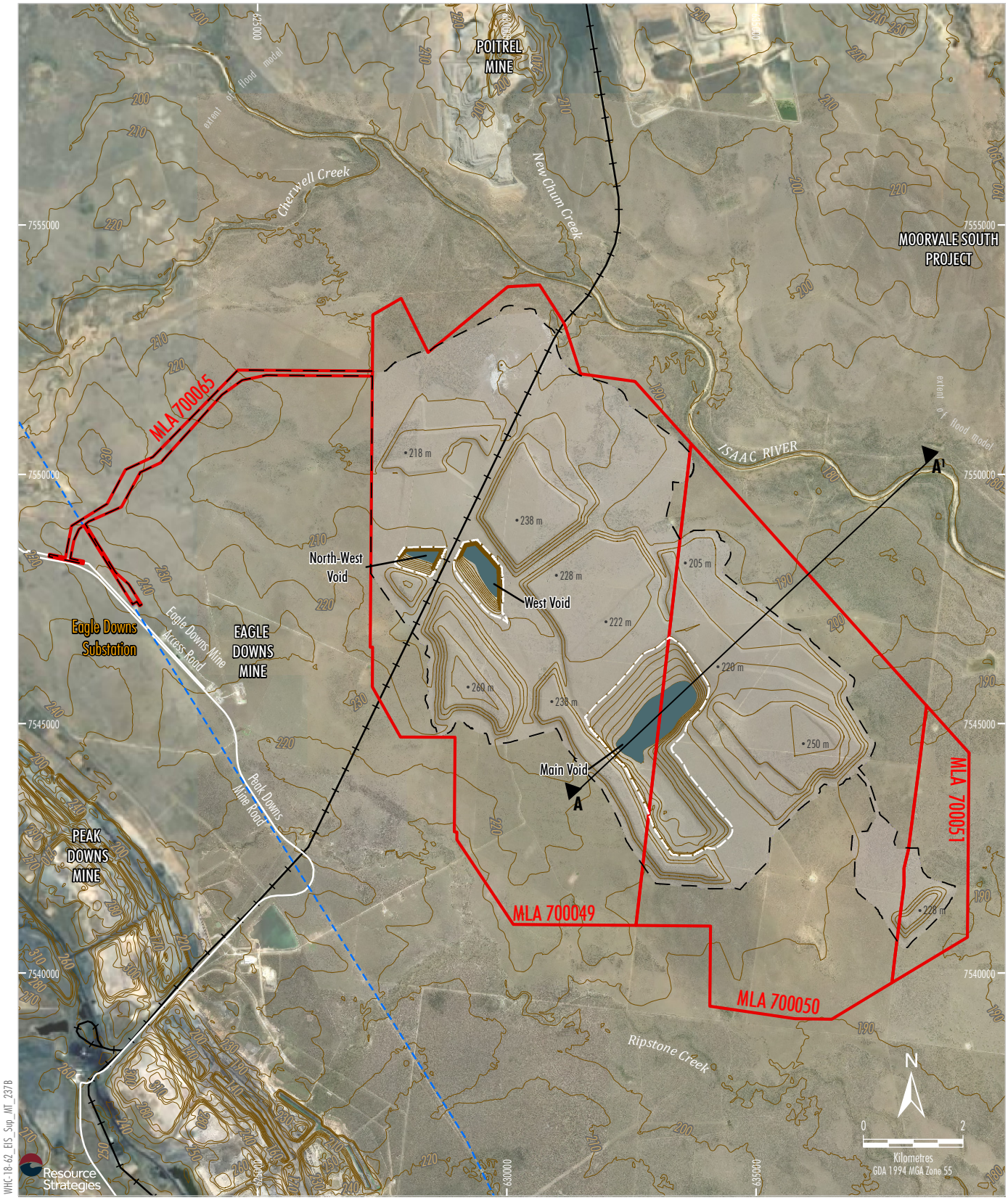
As a result of refinements to the optimised Project mine plan, South Void would be backfilled (Table 5-4). The maximum depths of the remaining residual voids have slightly increased compared to those presented in the Draft EIS, except for the West Void, which is shallower due to additional backfilling using waste rock from the out-of-pit emplacement.

The depth of the West Void has increased due to smoothing of the slopes to ensure the slope down to the void is more practical for stock access. As a result, less material is available for backfilling. Likewise, for the Main Void, the void slopes have been smoothed to maximise the potential for a PMLU to occur and ensure stability of the landform.

Table 5-4
Summary of Residual Void Changes

Residual Void	Maximum Depth (m AHD)		Volume (million loose cubic metres)	
	Draft EIS	Optimised Project	Draft EIS	Optimised Project
Main Void	90	72	309	315
North-west Void	117	114	14	22
West Void	77	80	68	64
South Void	101	-	14	-

m AHD = metres Australian Height Datum.



LEGEND

- Mining Lease Application Boundary
- Railway
- Eungella Water Pipeline Southern Extension
- Indicative Surface Disturbance Extent
- Indicative Residual Void Waterbody
- Indicative Extent of Water Storage
- Post-mining Land Use

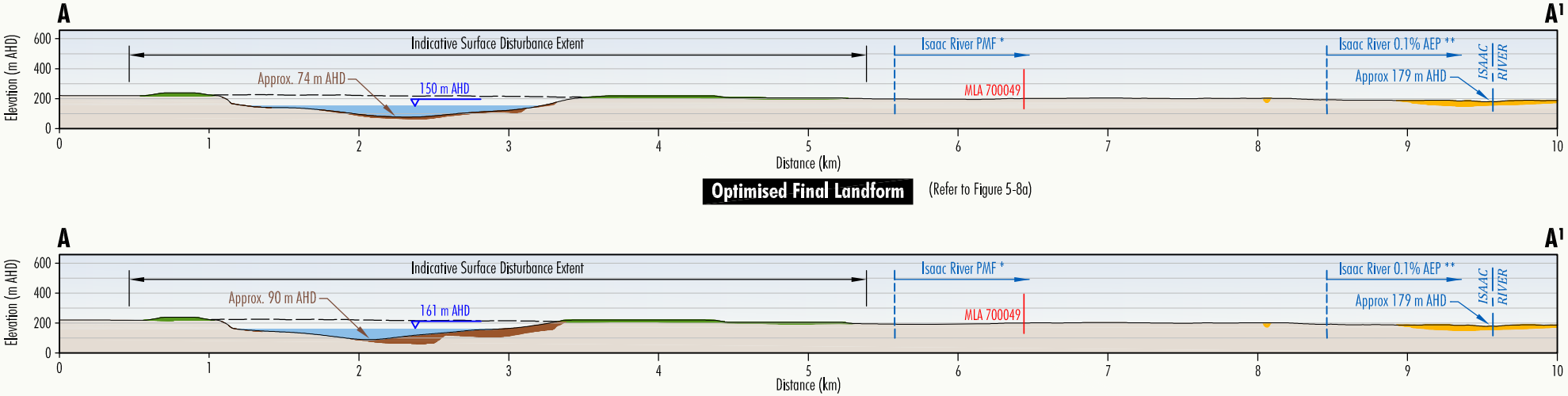
Source: The State of Queensland (2018 - 2020); Whitehaven (2022); Orthophoto: Google Image (2019); Whitehaven (2017)

WHITEHAVEN COAL

WINCHESTER SOUTH PROJECT

Conceptual Optimised Final Landform

Figure 5-8a



Optimised Final Landform (Refer to Figure 5-8a)

2021 Draft EIS Final Landform

* Isaac River Probable Maximum Flood Extent (PMF)
(Pre-mining and During Operations)

WHC-18-62_EIS_Sup_MT_101C

LEGEND

- Pre-mining Topography
- Indicative Final Landform Surface
- Isaac River Alluvium Extent
- In-pit Waste Rock Emplacement
- Out-of-pit Waste Rock Emplacement
- Residual Void Maximum Water Level

Scale 1 Horizontal : 1 Vertical

* Isaac River Probable Maximum Flood Extent (PMF)
(Pre-mining)

** Isaac River 0.1% AEP Flood Extent
(Pre-mining)

Source: The State of Queensland (2022); Whitehaven (2022)

WHITEHAVEN COAL

WINCHESTER SOUTH PROJECT

Indicative 2021 Draft EIS Final Landform and Optimised Final Landform Profiles Cross Section A - A¹

Figure 5-8b

5.6 ASSESSMENT OF IMPACTS

Changes to the key environmental outcomes from the Draft EIS associated with the optimised Project are detailed in the below sub-sections. Detailed investigations and assessments for the optimised Project are provided in Attachments 3 to 18.

5.6.1 Ecology

Direct Impacts

Land Clearance – Vegetation and Habitat

The optimised Project mine plan would reduce the overall surface disturbance extent by approximately 179 ha (including both remnant and non-remnant vegetation) compared to the mine plan presented in the Draft EIS (Figure 5-9). Figure 5-10a shows the areas of remnant vegetation within the optimised Project surface disturbance extent.

The optimised Project mine plan would require the clearance of 569.3 ha of remnant vegetation (Table 5-5) which is 150.6 ha less than the mine plan presented in the Draft EIS. There would be a 145.7 ha reduction in clearance of woodland (comprising 34.3 ha reduction in clearance of Regional Ecosystem [RE] 11.5.3 and 111.4 ha reduction in clearance of RE 11.9.2) as well as a 4.9 ha reduction in clearance of natural grasslands (comprising 4.9 ha reduction in clearance of RE 11.9.3). These REs are all least concern under the Queensland *Vegetation Management Act 1999* (VM Act).

The optimised Project mine plan would result in no change to the clearance of threatened ecological communities (TECs) listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) compared to the mine plan presented in the Draft EIS as the disturbance footprint had already been optimised in terms of minimising and avoiding impacts to TECs (Figure 5-10b).

Land Clearance – Aquatic Habitat

A supplementary Aquatic Ecology and Stygofauna Assessment (Attachment 10) (ESP, 2022b) was prepared in consideration of the optimised Project mine plan. It concluded that the optimised Project mine plan would result in no change to the clearance of aquatic habitat, however, it would have a positive impact due to the reduction of the overall disturbance footprint and an increase of the catchment area reporting to the natural ecosystems as a result of backfilling the previously proposed South Pit mine void (ESP, 2022b).

Changes to Water Quality and Flow Regime

The changes to the water quality and flow regime are discussed in Section 5.6.4.

Stygofauna

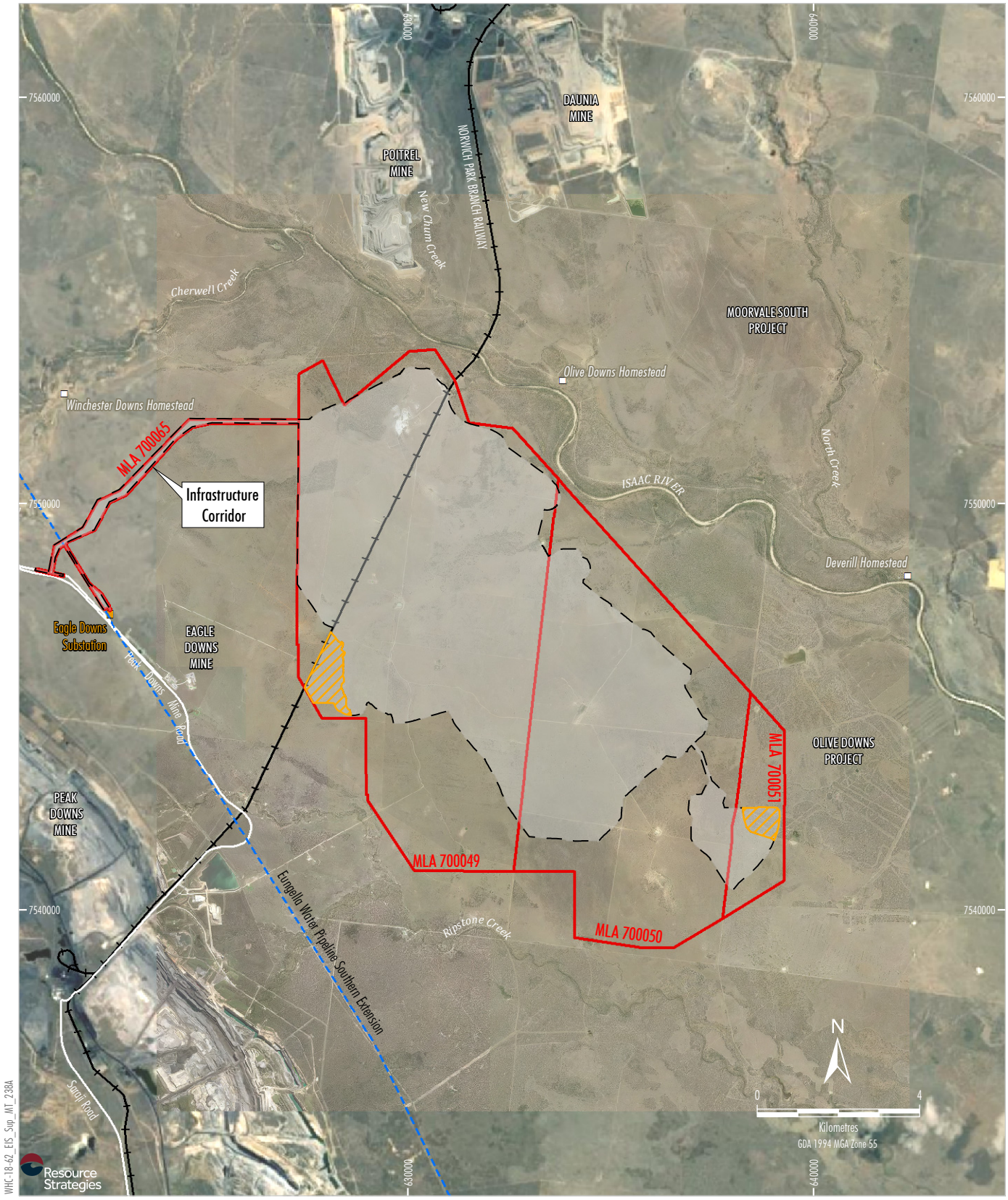
A stygofauna pilot study was undertaken as part of the Aquatic Ecology and Stygofauna Assessment (Appendix E of the Draft EIS) (ESP, 2021) and no Stygofauna were detected. As discussed in Section 5.6.5, supplementary stygofauna surveys by ESP (2022b) recorded two stygofauna taxa within the alluvium along the Isaac River (Attachment 9). As described in Section 5.6.5, no impacts to aquatic ecosystems downstream of the Project are expected (ESP, 2022b) (Attachment 10).

Indirect Impacts

Indirect impacts on native flora and fauna (such as noise, dust and artificial lighting, vehicle strike, changes to fire regimes, leaks and spills, and introduced species) are expected to be similar for the optimised Project mine plan compared to the mine plan presented in the Draft EIS.

Matters of State Environmental Significance

The optimised Project mine plan would reduce the clearance of Matters of State Environmental Significance (MSES) as described below. Figure 5-10c shows the MSES within the optimised Project surface disturbance extent.



LEGEND

- Mining Lease Application Boundary
- Eungella Water Pipeline Southern Extension
- Railway
- Substation
- Optimised Project Surface Disturbance Extent
- 2021 Draft EIS Surface Disturbance Extent
- Differences in the Surface Development Extent

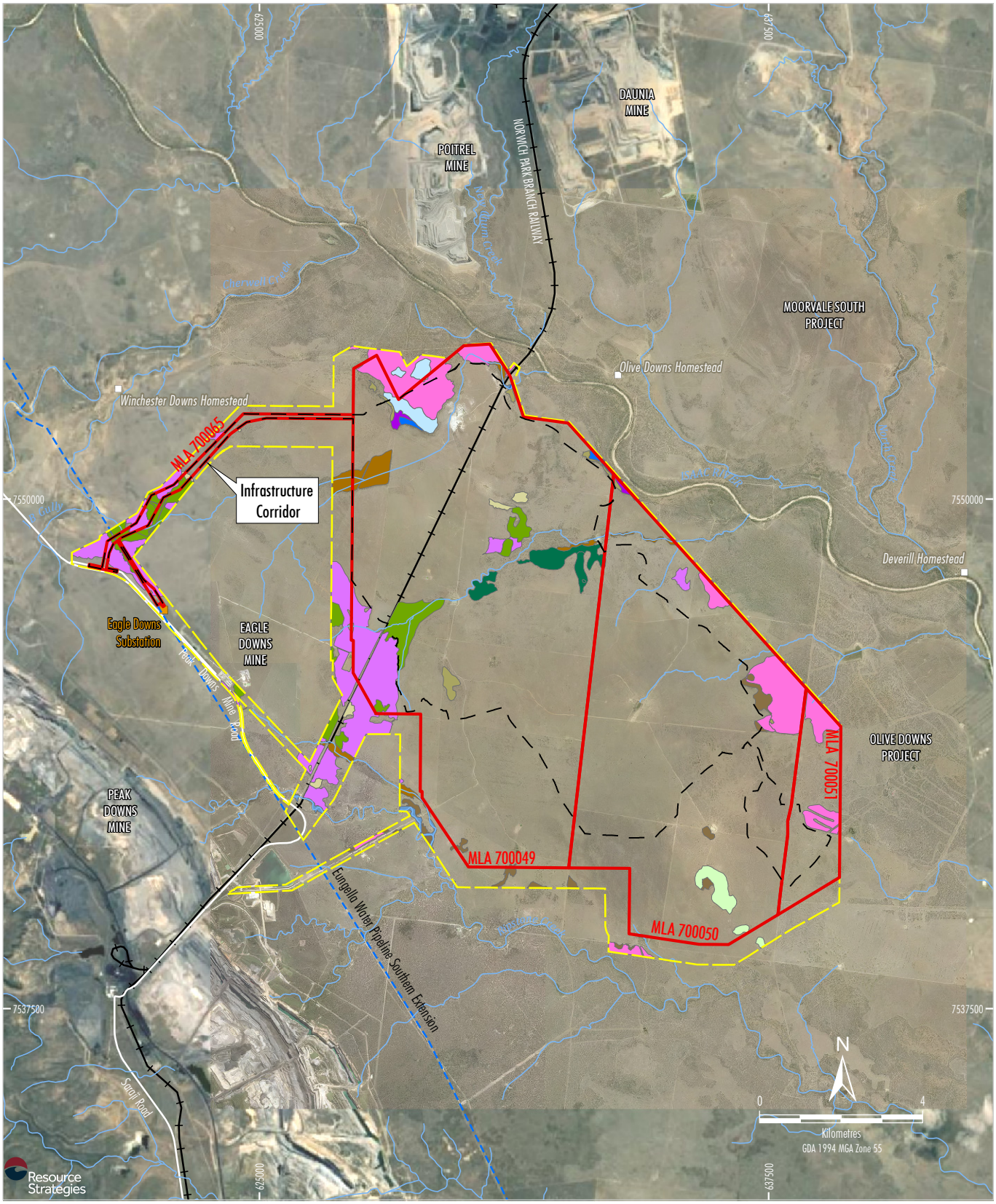
Source: The State of Queensland (2018 - 2020); Whitehaven (2022)
Orthophoto: Google Image (2019); Whitehaven (2017)

WHITEHAVEN COAL

WINCHESTER SOUTH PROJECT

Differences in the Surface Development Extent

Figure 5-9



LEGEND

- Mining Lease Application Boundary
- Indicative Surface Disturbance Extent
- Terrestrial Ecology Study Area Boundary
- Railway
- Eungella Water Pipeline Southern Extension
- Vegetation Management Watercourse/Drainage Feature Mapping (DES, 2019)

Eucalypt woodlands on alluvials (BVG 16)

- *E. tereticornis* and *E. camaldulensis* on fringing drainage lines (11.3.25)
- *E. coolabah* woodland (11.3.3c)
- *E. tereticornis* and *Eucalyptus* spp. on alluvials (11.3.4)

E.populnea/E.melanphloia woodlands on sandplains (BVG 17)

- *E. populnea* woodland on alluvial plains (11.3.2)
- Eucalypts on sandplains and/or remnant surfaces (11.5.3)
- *E. melanophloia* and *E. orgadophila* on sedimentary rock (11.9.2)

Eucalypt woodlands on sand or depositional plains (BVG 18)

- *E. crebra* and other eucalypts on sandplains and/or remnant surfaces (11.5.9)

Acacia harpophylla woodlands on heavy clay (BVG 25)

- *A. harpophylla* and/or *C. cristata* on heavy clay (11.3.1)
- *E. cambageana* with *A. harpophylla* + *A. argyrodendron* on clay (11.4.8)
- *A. harpophylla* with *Terminalia oblongata* on clay (11.4.9)
- *A. harpophylla* and/or *C. cristata* on sedimentary rock (11.9.5)

Tussock grasslands on forblands (BVG 30)

- *Dichanthium* spp. and/or *Astrebla* spp. grassland on Cainozoic clay plains (11.4.4)
- *Dichanthium* spp. and *Astrebla* spp. grassland on sedimentary rock (11.9.3)

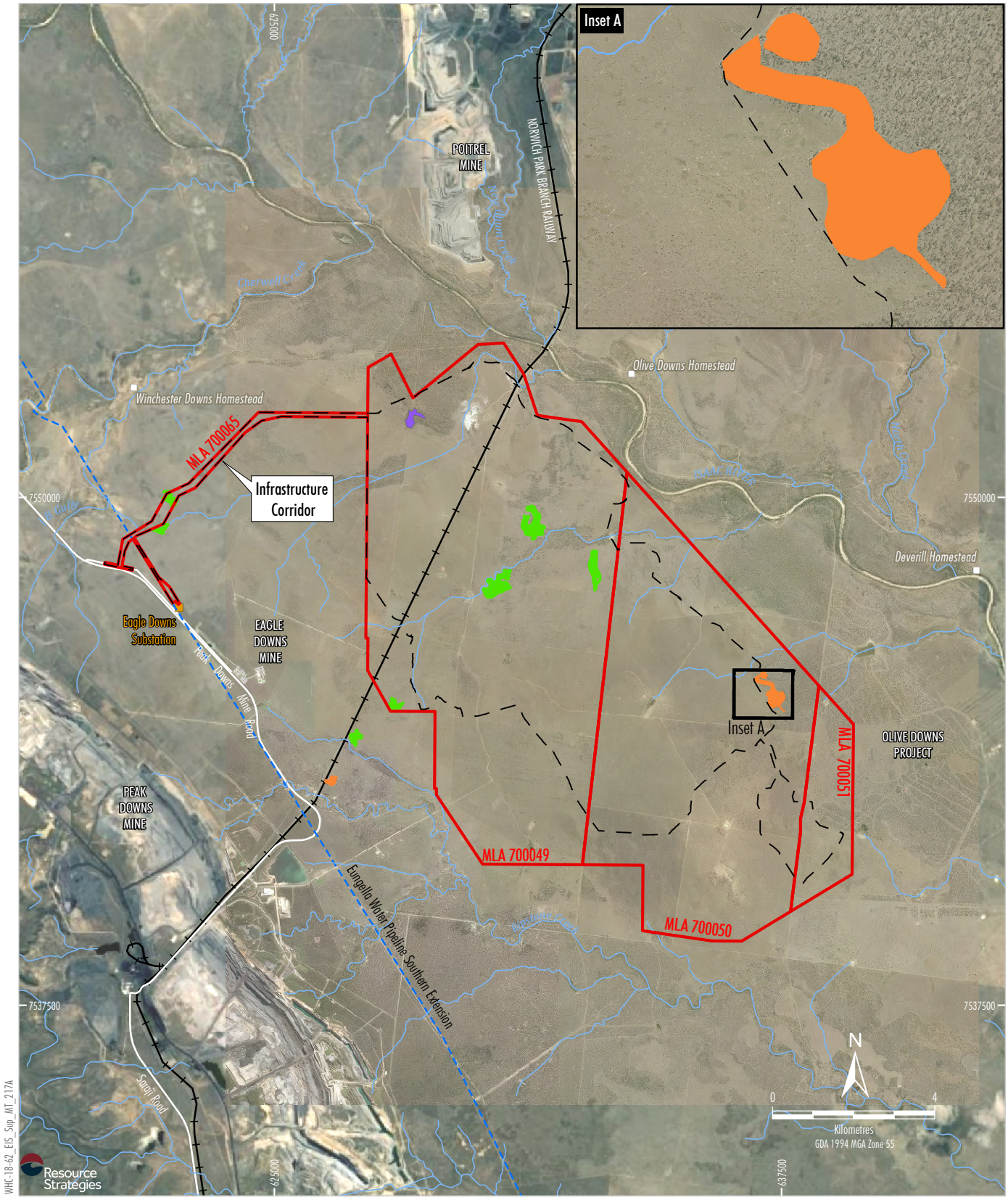
Source: The State of Queensland (2018 - 2020); Whitehaven (2020); E2M (2021)
Orthophoto: Google (2019); Whitehaven (2017)

WHITEHAVEN COAL

WINCHESTER SOUTH PROJECT

Ground-truthed Regional Ecosystems (Remnant)

Figure 5-10a



LEGEND

- Mining Lease Application Boundary
- Indicative Surface Disturbance Extent
- Railway
- Eungella Water Pipeline Southern Extension
- Vegetation Management Watercourse/Drainage Feature Mapping (DES, 2019)
- Substation

Threatened Ecological Community

- Poplar Box Grassy Woodland on Alluvial Plains
- Natural Grasslands of the Queensland Central Highlands and Northern Fitzroy Basin
- Brigalow (*Acacia harpophylla* Dominant and Co-dominant)

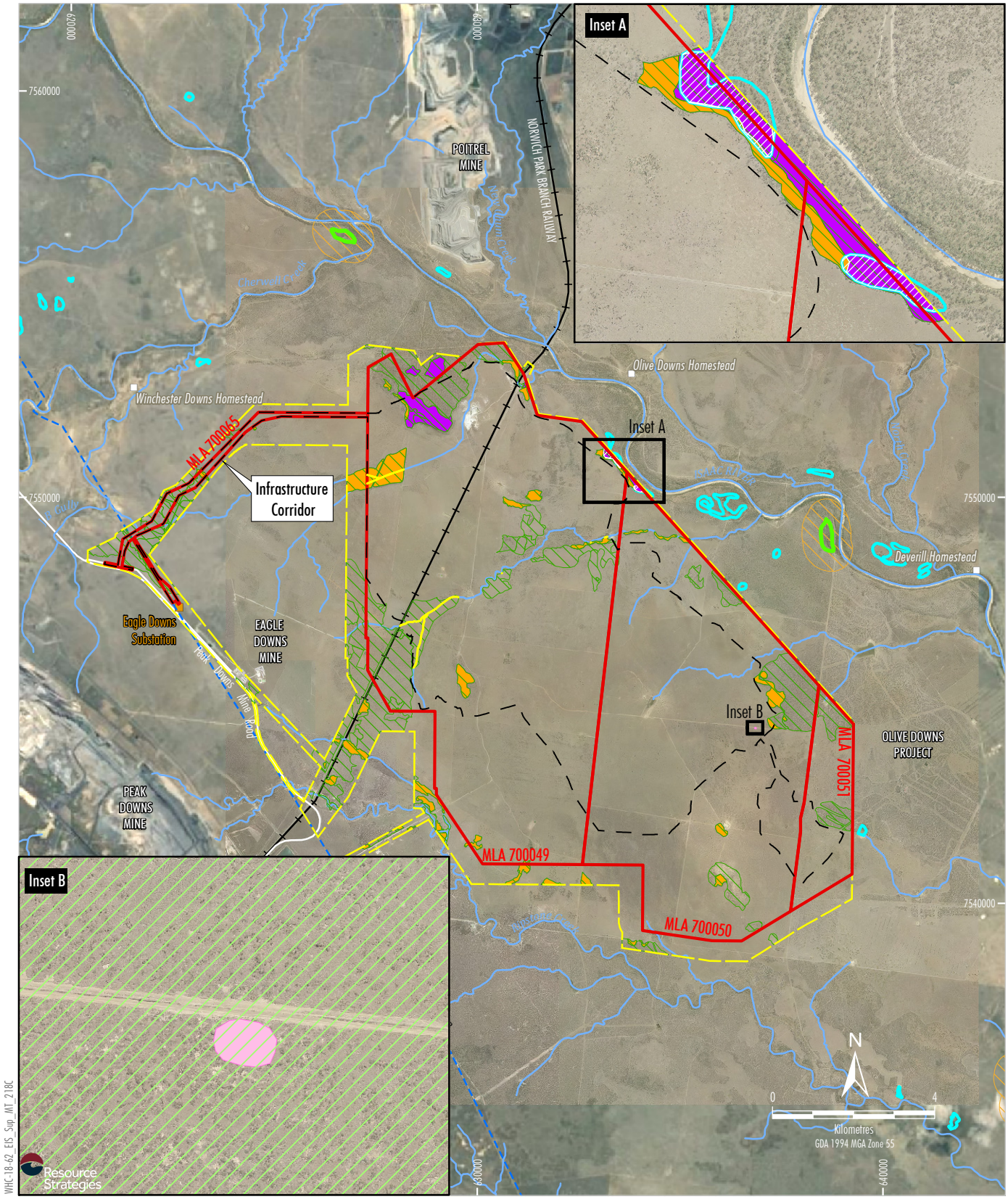
Source: The State of Queensland (2018 - 2020); Whitehaven (2020); EZM (2021)
Orthophoto: Google (2019); Whitehaven (2017)

WHITEHAVEN COAL

WINCHESTER SOUTH PROJECT

Matters of National Environmental Significance (MNES) – Threatened Ecological Communities

Figure 5-10b



LEGEND

- Mining Lease Application Boundary
- Indicative Surface Disturbance Extent
- Terrestrial Ecology Study Area Boundary
- Railway
- Vegetation Management Watercourse/Drainage Feature Mapping (DES, 2020)
- Substation

Matters of State Environmental Significance

Regulated Vegetation

- Endangered Regional Ecosystem (11.3.1, 11.4.8, 11.4.9 and 11.9.5)
- Of Concern Regional Ecosystem (11.3.2, 11.3.3c and 11.3.4)
- Regional Ecosystem that Intersects a Mapped Vegetation Management Wetland
- Regional Ecosystem within the Defined Distance of a Vegetation Management Watercourse

Wetlands and Watercourses

- High Ecological Significance Wetland (DES, 2020)
- Vegetation Management Wetland Mapping (DES, 2020)
- Wetland Protection Area (DES, 2020)

Connectivity

- Remnant Vegetation

Protected Wildlife Habitat*

- *Solanum adenophorum* Habitat

**Note: The Protected Wildlife Habitat for species that are also Matters of National Environmental Significance (i.e. the Ornamental Snake, Squatter Pigeon, Koala and Greater Glider) are assessed and presented in Section 5, including Essential Habitat (Protected Wildlife Habitat for the Ornamental Snake).*

Source: The State of Queensland (2018 - 2020); Whitehaven (2020); E2M (2021)
Orthophoto: Google (2019); Whitehaven (2017)

WHITEHAVEN COAL

WINCHESTER SOUTH PROJECT

Matters of State Environmental Significance (MSES) Relevant to the Project

Figure 5-10c

Table 5-5
Ground-truthed Regional Ecosystems

RE[#]	Description	Conservation Status[1]	Approximate Area within Project Area (ha)
BVG 16 – Eucalypt woodlands on alluvials			
11.3.3c	*Eucalyptus coolabah* woodland to open woodland (to scattered trees) with a sedge or grass understorey	OC	6.9
11.3.4	*Eucalyptus tereticornis* and/or *Eucalyptus* spp. woodland on alluvial plains	OC	39.8
BVG 17 – *Eucalyptus populnea/Eucalyptus melanophloia* woodlands on sandplains			
11.3.2	*Eucalyptus populnea* woodland on alluvial plains	OC	9.6[A]
11.5.3	*Eucalyptus populnea +/- Eucalyptus melanophloia +/- Corymbia clarksoniana* woodland on Cainozoic sand plains and/or remnant surfaces	LC	76.7
11.9.2	*Eucalyptus melanophloia +/- Eucalyptus orgadophila* woodland on fine-grained sedimentary rocks	LC	55.7
BVG 25 – *Acacia harpophylla* woodlands on heavy clays			
11.3.1	*Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains	E	64.5
11.4.8	*Eucalyptus cambageana* woodland to open forest with *Acacia harpophylla or Acacia argyrodendron* on Cainozoic clay plains	E	2.4
11.4.9	*Acacia harpophylla* shrubby woodland with *Terminalia oblongata* on Cainozoic clay plains	E	23.1
11.9.5	*Acacia harpophylla* and/or *Casuarina cristata* open forest on fine-grained sedimentary rocks	E	17.7
BVG 30 – Tussock grasslands on forblands			
11.4.4	*Dichanthium* spp., *Astrebla* spp. grassland on Cainozoic clay plains	LC	112[B]
11.9.3	*Dichanthium* spp., *Astrebla* spp. grassland on fine-grained sedimentary rocks	LC	160.9[C]
Total			**569.3**

[#] REs are shown on Figure 5-10a.

[1] Conservation status under the VM Act.

E Endangered

OC Of Concern

LC Least Concern

[A] Approximately 9.6 ha of RE 11.3.2 is also listed under the EPBC Act as E: Poplar Box TEC.

[B] Approximately 45.7 ha of RE 11.4.4 is also listed under the EPBC Act as E: Natural Grasslands TEC.

[C] Approximately 35.2 ha of RE 11.9.3 is also listed under the EPBC Act as E: Natural Grasslands TEC.

Regulated Vegetation

The optimised Project mine plan would result in no change to the clearance of regulated vegetation compared to the mine plan presented in the Draft EIS (Figure 5-10c).

Connectivity

Connectivity within the optimised Project is a measure of the remnant vegetation within the disturbance extent. The optimised Project mine plan would require the clearance of 569.3 ha of connectivity (remnant vegetation) (Table 5-6) which is 150.6 ha less than the mine plan presented in the Draft EIS.

Protected Wildlife Habitat

The optimised Project mine plan would result in no change to the clearance of *Solanum adenophorum* (Figure 5-10c) or Ornamental Snake habitat (Figure 5-10d) but would result in a reduction to the clearance of habitat for the Squatter Pigeon (southern subspecies), Koala, and Greater Glider.

The optimised Project mine plan would reduce clearance of Squatter Pigeon (southern subspecies) breeding and foraging habitat (Figure 5-10e) by 145.7 ha, Koala breeding and foraging habitat (Figure 5-10f) by 145.7 ha, and Greater Glider breeding and foraging habitat (Figure 5-10g) by 34.3 ha.

Waterways for Fish Passage

The *Environmental Offsets Regulation 2014* states that any part of a waterway providing for passage of fish is a MSES only if the construction, installation or modification of waterway barrier works carried out under an authority will limit the passage of fish along the waterway.

Additional field assessments of potential waterways providing for fish passage were completed for the optimised Project by ESP in February 2022 (ESP, 2022a) (Attachment 9). The additional field assessments confirmed that the northern unnamed waterway (Figure 5-11) was the only waterway providing for fish passage.

There is 3.3 km (constituting 5.3 ha) of the northern unnamed waterway within the mining lease. The majority of the northern unnamed waterway within the mining lease would be avoided. However, the optimised Project would require the removal of up to approximately 46% (1.5 km constituting 2.5 ha) that equates to the waterway providing for fish passage MSES (Figure 5-11).

A supplementary Aquatic Ecology and Stygofauna Assessment (ESP, 2022b) (Attachment 10) was prepared in consideration of the optimised Project mine plan and included a detailed assessment of the significance of the residual impacts to waterways providing for fish passage in accordance with the *Queensland Environmental Offsets Policy – Significant Residual Impact Guideline* (Department of Environment and Heritage Protection [DEHP], 2014). Consistent with the Aquatic Ecology and Stygofauna Assessment (Appendix E of the Draft EIS) (ESP, 2021), the optimised Project is not expected to have a significant residual impact on waterways providing for fish passage (ESP, 2022b).

Avoidance and Mitigation Measures

Measures to Avoid Impacts

In addition to the impact avoidance measures described in Section 5.4 of the Draft EIS, the optimised Project mine plan would reduce the overall surface disturbance extent by approximately 179 ha and to the extent noted above, this would reduce the impacts of the optimised Project on threatened species habitat. The previous avoidance measures described in the Draft EIS are still relevant to the optimised Project's impact avoidance, however, optimisation of the mine plan has further reduced overall impacts of the Project.

Management of the Northern Unnamed Waterway

During the life of the Project, fencing would be used to exclude livestock from the portion of the northern unnamed waterway that is outside the development footprint and inside the mining lease. This would have the benefit of reducing grazing pressure on the waterway and associated riparian vegetation.

During the life of the Project, weed management (prevention, monitoring and control) would be undertaken to mitigate the abundance and diversity of weeds in the MLAs, including along the northern waterway, and minimise the potential for weed spread.

Table 5-6
Likelihood of Significant Residual Impact on MSES

MSES			Total Area of Impact (ha)	DEHP (2014) Residual Significant Impact Test	Significant Residual Impact?
Regulated Vegetation	'Endangered' Regional Ecosystem	RE 11.3.1	64.5	Clearing exceeds 0.5 ha of a dense to mid-dense (structural category) regional ecosystem.	Yes
		RE 11.4.8	2.4		Yes
		RE 11.4.9	23.1		Yes
		RE 11.9.5	17.7		Yes
	'Of Concern' Regional Ecosystem	RE 11.3.2	9.6[1]	Clearing exceeds 2 ha of a sparse (structural category) regional ecosystem.	Yes
		RE 11.3.3c	6.9		Yes
		RE 11.3.4	39.8		Yes
	Regional Ecosystem within the defined distance of a vegetation management watercourse	RE 11.3.1	1.3	Clearing exceeds 0.5 ha of a dense to mid-dense (structural category) regional ecosystem. Clearing within 5 m of defining bank.	Yes
		RE 11.4.4	0.1[2]	Clearing does not exceed 5 ha where in a grassland (structural category) regional ecosystem.	No
		RE 11.9.3	3.1	Clearing within 5 m of defining bank.	No
	Essential habitat		1,834.2	The mapped known important habitat for the Ornamental Snake is considered to be essential habitat, as defined under the VM Act as the species was recorded in these areas and they contain suitable microhabitat features of which the species relies on (Appendix D of the Draft EIS).	Yes
Connectivity Areas			569.3	Application of the DES (2020a) *Environmental offset landscape connectivity assessment tool* determined that the Project is likely to have a significant impact on connectivity.	Yes
Protected Wildlife Habitat[#]	*Solanum adenophorum*		0.2	The Project is likely to result in a significant residual impact due to the potential long-term decrease in the size of the local population (Appendix D of the Draft EIS).	Yes
	Ornamental Snake (*Denisonia maculata*)[3]		1,834.2	The Project is likely to result in a significant impact on the habitat associated with these endangered and vulnerable species (Section 5 of the Draft EIS).	Yes
	Squatter Pigeon (southern subspecies) (*Geohaps scripta scripta*)[3]		115.5		Yes
	Koala (*Pharscolartos cinereus*)[3]		168.9		Yes
	Greater Glider (*Petauroides volans*)[3]		132.8		Yes
Waterways Providing for Fish Passage			2.45	The Project is not likely to have a significant impact on waterways providing for fish passage (Attachment 10).	No

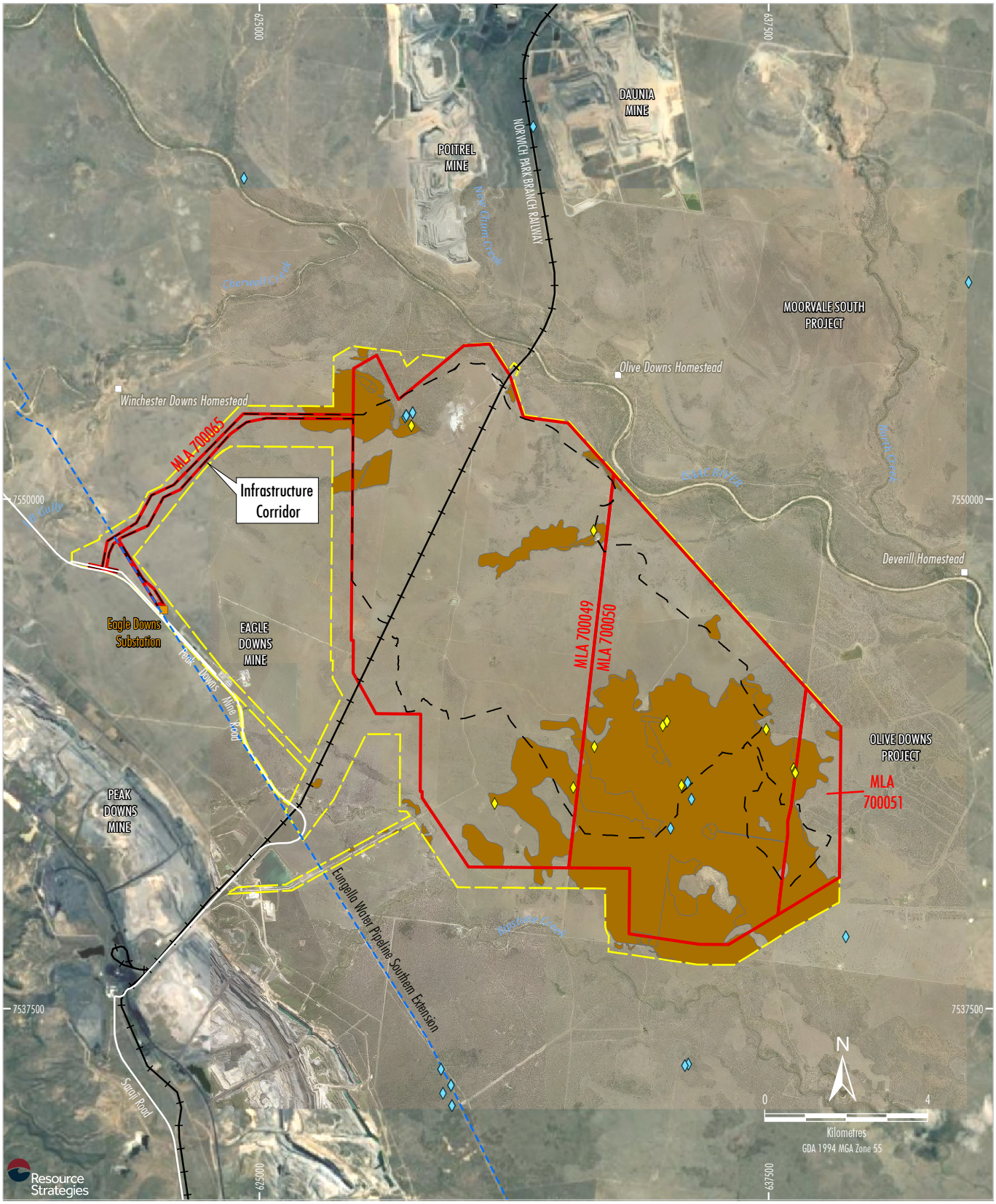
Source: Attachments 7 and 10.

[1] The area associated with this MSES equates to the Poplar Box TEC under the EPBC Act (i.e. is also a Matter of National Environmental Significance [MNES]).

[2] The area associated with this MSES equates to the Natural Grasslands TEC under the EPBC Act (i.e. is also a MNES).

[3] This species is also listed under the EPBC Act (i.e. is also a MNES).

[#] The REs and species habitats overlap (i.e. the REs and species habitats are not mutually exclusive).



LEGEND

- Mining Lease Application Boundary
- Indicative Surface Disturbance Extent
- Terrestrial Ecology Study Area Boundary
- Eungella Water Pipeline Southern Extension
- Railway
- Substation

E2M (2021) Surveys

- Ornamental Snake

Previous Surveys

- Ornamental Snake

Potential Habitat

- Ornamental Snake Important Habitat

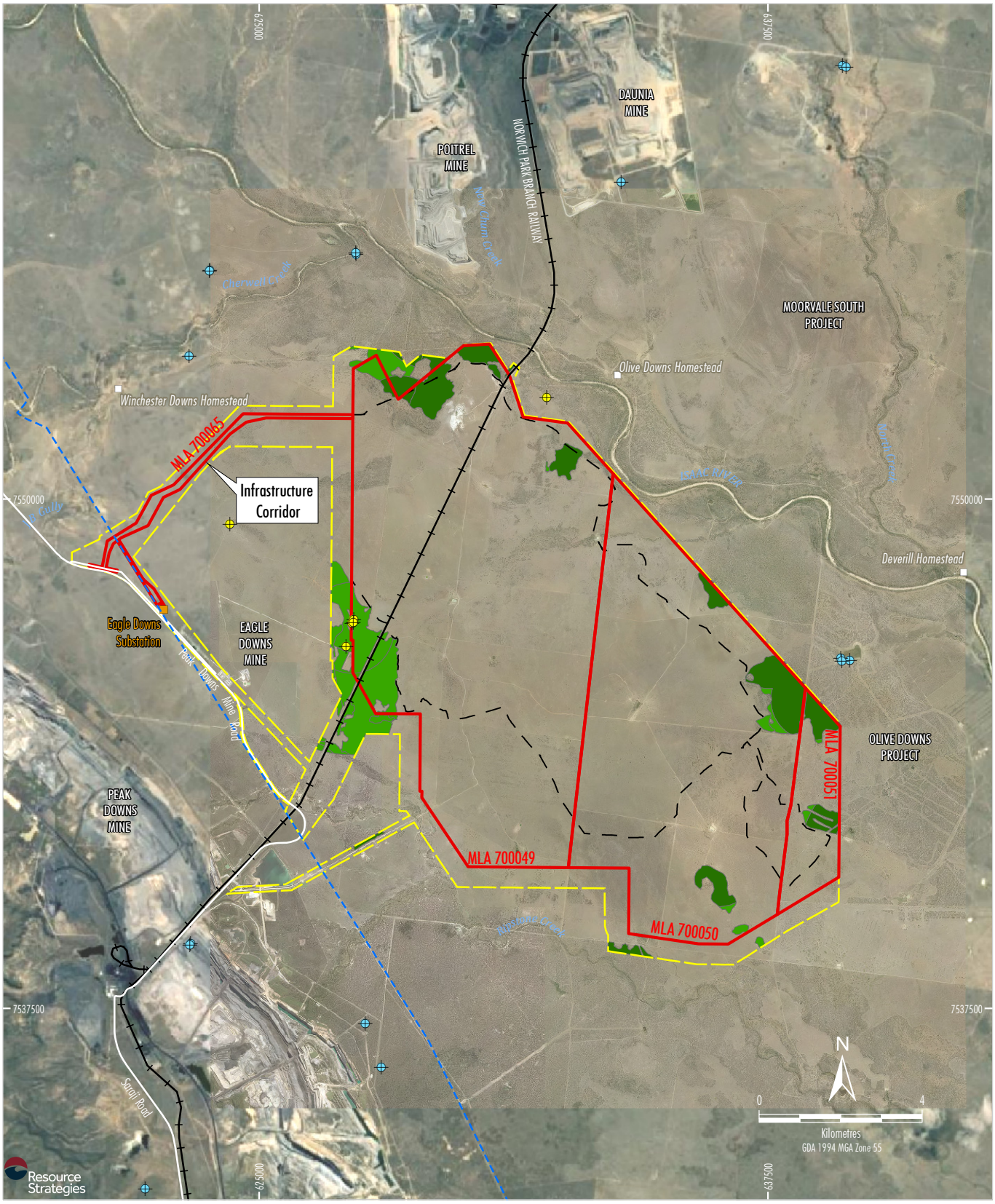
Source: The State of Queensland (2018 - 2020); Whitehaven (2020); E2M (2021)
Orthophoto: Google (2019); Whitehaven (2017)

WHITEHAVEN COAL

WINCHESTER SOUTH PROJECT

Threatened Species Habitat Mapping - Ornamental Snake

Figure 5-10d



LEGEND

- Mining Lease Application Boundary
- Terrestrial Ecology Study Area Boundary
- Indicative Surface Disturbance Extent
- Eungella Water Pipeline Southern Extension
- Railway
- Substation

E2M (2021) Surveys

- Squatter Pigeon (southern subspecies)

Previous Surveys

- Squatter Pigeon (southern subspecies)

Potential Habitat

- Squatter Pigeon Breeding and Foraging Habitat
- Squatter Pigeon Foraging Habitat

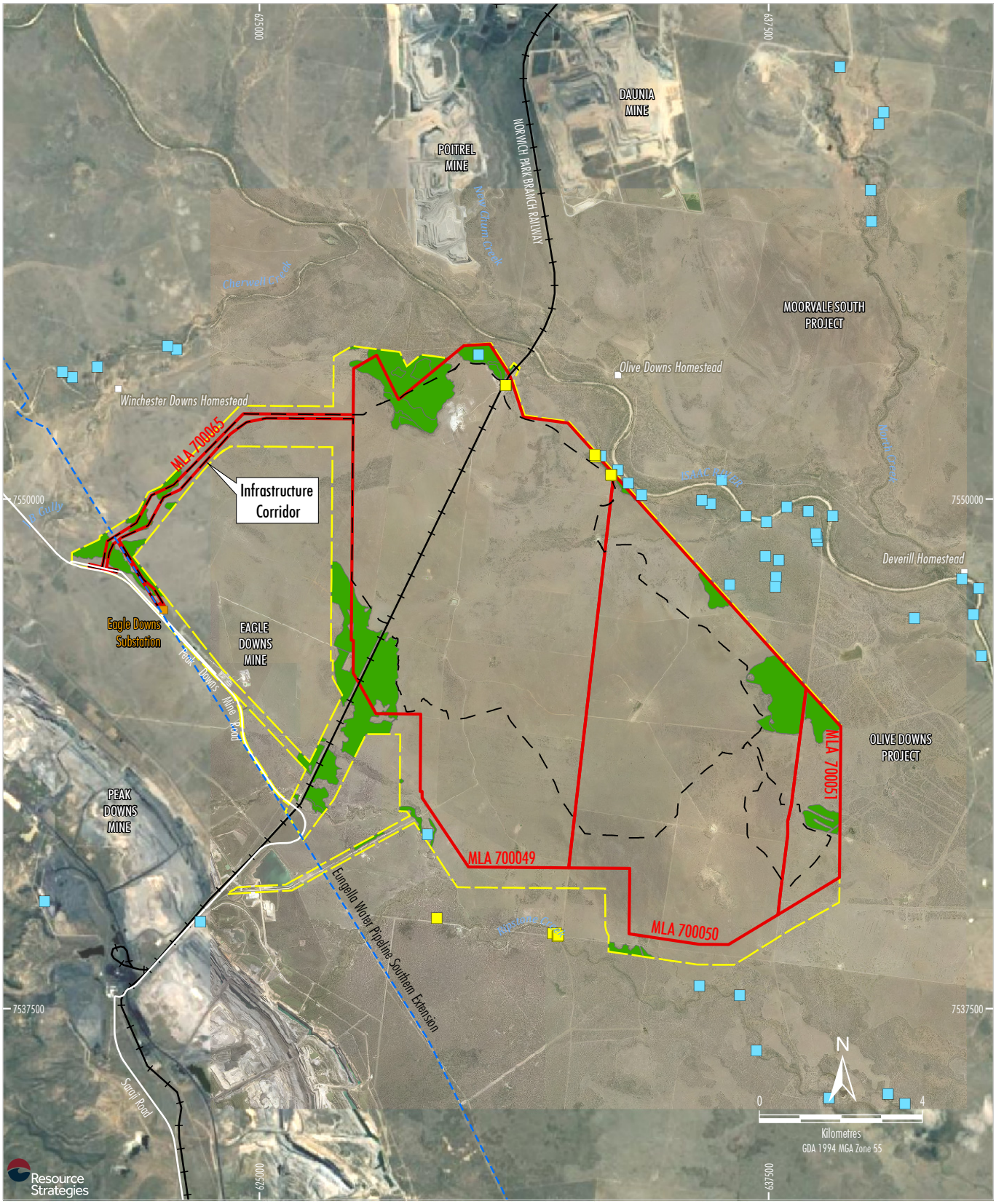
Source: The State of Queensland (2018 - 2020); Whitehaven (2020); E2M (2021)
Orthophoto: Google (2019); Whitehaven (2017)

WHITEHAVEN COAL

WINCHESTER SOUTH PROJECT

Threatened Species Habitat Mapping - Squatter Pigeon (southern subspecies)

Figure 5-10e



LEGEND

- Mining Lease Application Boundary
- Indicative Surface Disturbance Extent
- Terrestrial Ecology Study Area Boundary
- Eungella Water Pipeline Southern Extension
- Railway
- Substation

E2M (2021) Surveys

- Koala

Previous Surveys

- Koala

Potential Habitat

- Koala Habitat (Potential Breeding and Foraging)

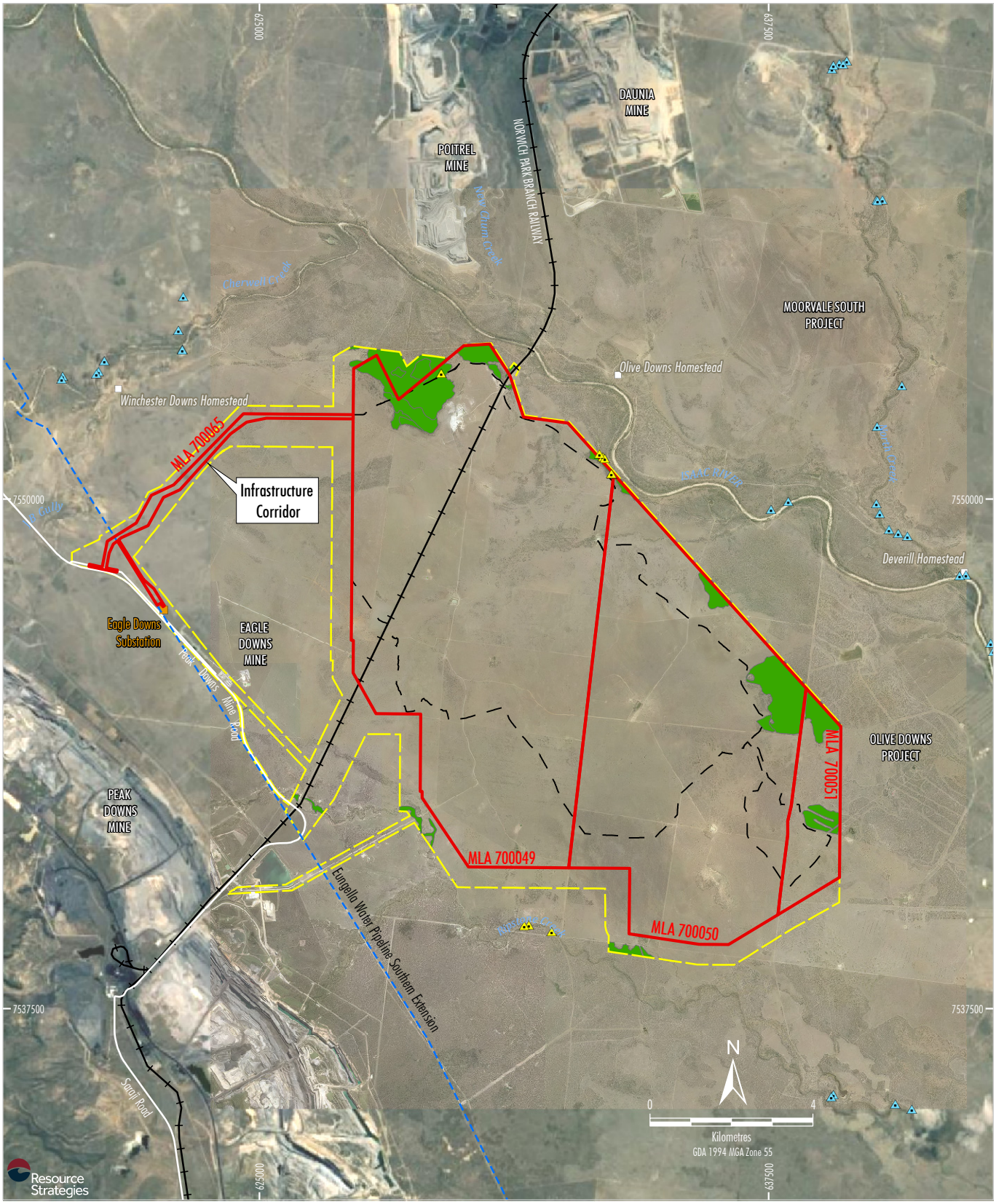
Source: The State of Queensland (2018 - 2020); Whitehaven (2021); E2M (2021)
Orthophoto: Google (2019); Whitehaven (2017)

WHITEHAVEN COAL

WINCHESTER SOUTH PROJECT

Threatened Species Habitat Mapping - Koala (combined populations of Queensland, NSW and the ACT)

Figure 5-10f



LEGEND

- Mining Lease Application Boundary
- Indicative Surface Disturbance Extent
- Terrestrial Ecology Study Area Boundary
- Eungella Water Pipeline Southern Extension
- Railway
- Substation

E2M (2021) Surveys

- Greater Glider

Previous Surveys

- Greater Glider

Potential Habitat

- Greater Glider Habitat (Potential Breeding and Foraging)

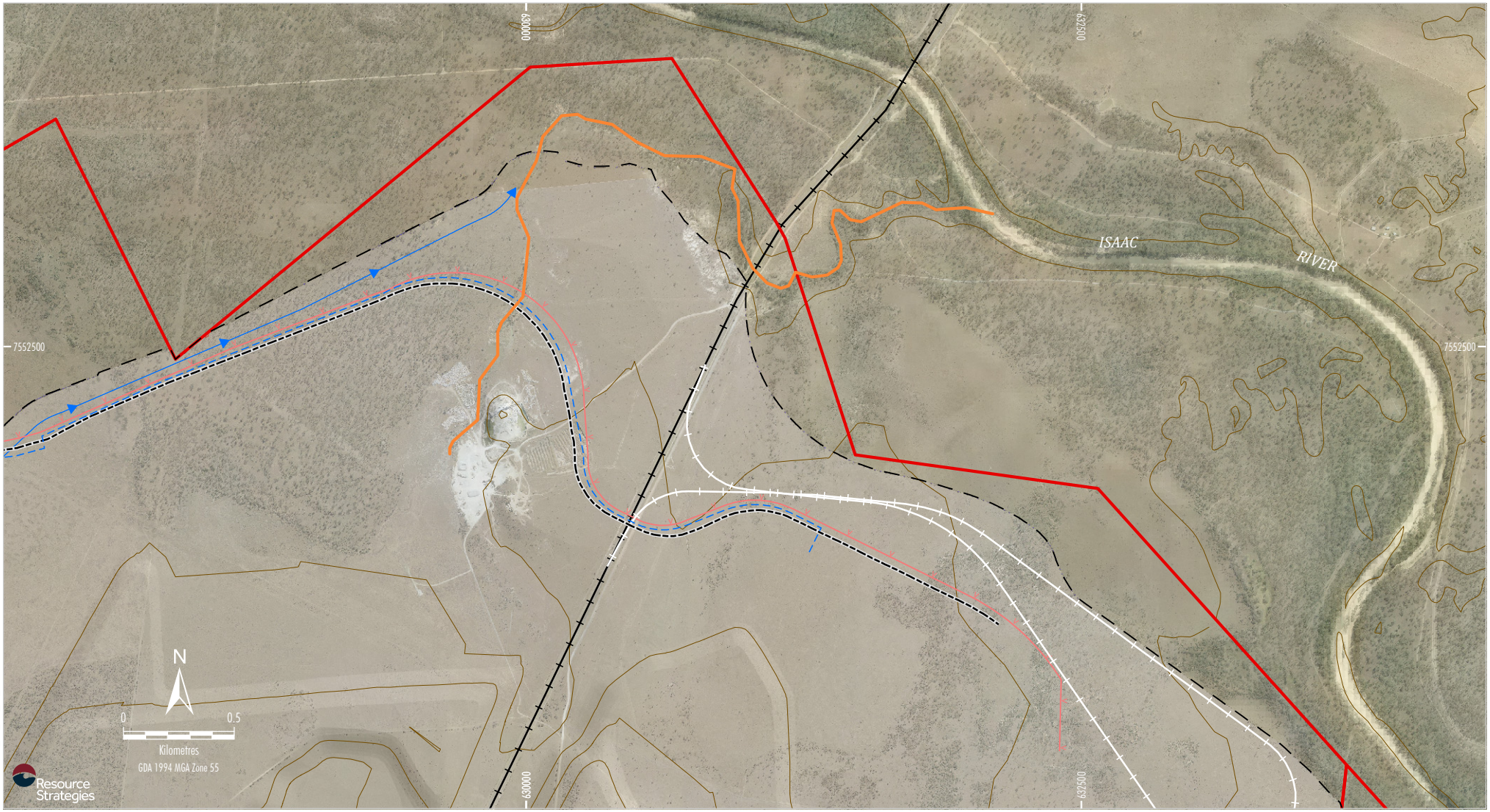
Source: The State of Queensland (2018 - 2020); Whitehaven (2020); E2M (2021)
Orthophoto: Google (2019); Whitehaven (2017)

WHITEHAVEN COAL

WINCHESTER SOUTH PROJECT

Threatened Species Habitat Mapping - Greater Glider

Figure 5-10g



WMC-18-62_EIS_Sup_MT_239A

LEGEND

- Mining Lease Application Boundary
- Railway
- Indicative Surface Disturbance Extent
- Indicative Up-catchment Diversion
- Indicative Mine Access Road
- Indicative Rail Spur and Loop
- Indicative Electricity Transmission Line
- Indicative Raw Water Supply Pipeline

Matters of State Environmental Significance

- Ground-truthed Waterways Providing for Fish Passage ^

Source: The State of Queensland (2018 - 2020); Whitehaven (2022); Orthophoto: Google Image (2019); Whitehaven (2017)

Note: ^ As stated in the Environmental Offsets Regulation 2014, any part of a waterway providing for passage of fish is a Matter of State Environmental Significance (MSES) only if the construction, installation or modification of waterway barrier works carried out under an authority will limit the passage of fish along the waterway.

WHITEHAVEN COAL

WINCHESTER SOUTH PROJECT

Optimised Final Landform – Waterway Providing for Fish Passage

Figure 5-11

Reinstating Excised Portions of the Northern Unnamed Waterway

In accordance with the *Mined Land Rehabilitation Policy* (DEHP, Department of Natural Resources and Mines [DNRM], and Queensland Treasury, 2017), the Project would be progressively rehabilitated during mining as land becomes available in disused area to achieve a stable and non-eroding land surface over time. The rehabilitation activities would involve the reinstatement of excised portions of the northern unnamed waterway to mitigate the impacts on the waterway providing for fish passage MSES.

The reinstated excised portion of the northern unnamed waterway would be designed to mitigate impacts associated with removal of the 1.5 km section (constituting 2.5 ha) of the northern unnamed waterway that provides for fish passage, in terms of area, quality and functionality (Figure 5-12). This would allow for the upstream and downstream passage of fish in a naturalised manner.

The reinstated excised portion of the northern unnamed waterway would incorporate features that ensure the upstream and downstream passage of fish. This will include:

- ensuring functionality and longevity of the riparian corridor, including revegetation and management of the riparian vegetation;
- ensuring that the diversion is constructed at a gradient of no more than 5%;
- ensuring that conditions within the diversion (depth and velocities) would be suitable to provide adequate fish passage during 1, 2 and 5 year Average Recurrence Intervals (ARI);
- reinstating habitat and geomorphic features by salvaging and using material such as woody debris to create habitat diversity within the diverted waterway; and
- including natural features such as pools and meanders, bed and bank profiles, and providing a mix of suitable substrate types.

5.6.2 Economic

Due to the addition of ROM and product coal under the optimised Project (Section 5.3), this section presents the updated economic benefits of the optimised Project as opposed to comparing against the Draft EIS.

Net Benefit for Queensland

The optimised Project would result in a total net benefit to the Queensland community of $882 million in net present value (NPV) terms over its life. This value is inclusive of estimated costs for environmental externalities and internalisation of environmental mitigation and management costs by Whitehaven WS (Attachment 16) (Deloitte Access Economics, 2022).

The estimated net benefit of the optimised Project for Queensland in NPV terms would consist of royalties of $696 million, company income tax of $167 million and net producer surplus of $134 million (Attachment 16).

It is noted that the royalty component of the net benefit of the optimised Project for Queensland has not been calculated based on the latest Queensland Government royalty structure that includes higher royalty rates and commences on 1 July 2022. Given the above, in the event of higher coal prices in the future, the royalties that would be paid by Whitehaven WS would increase resulting in increased net benefits to Queensland.

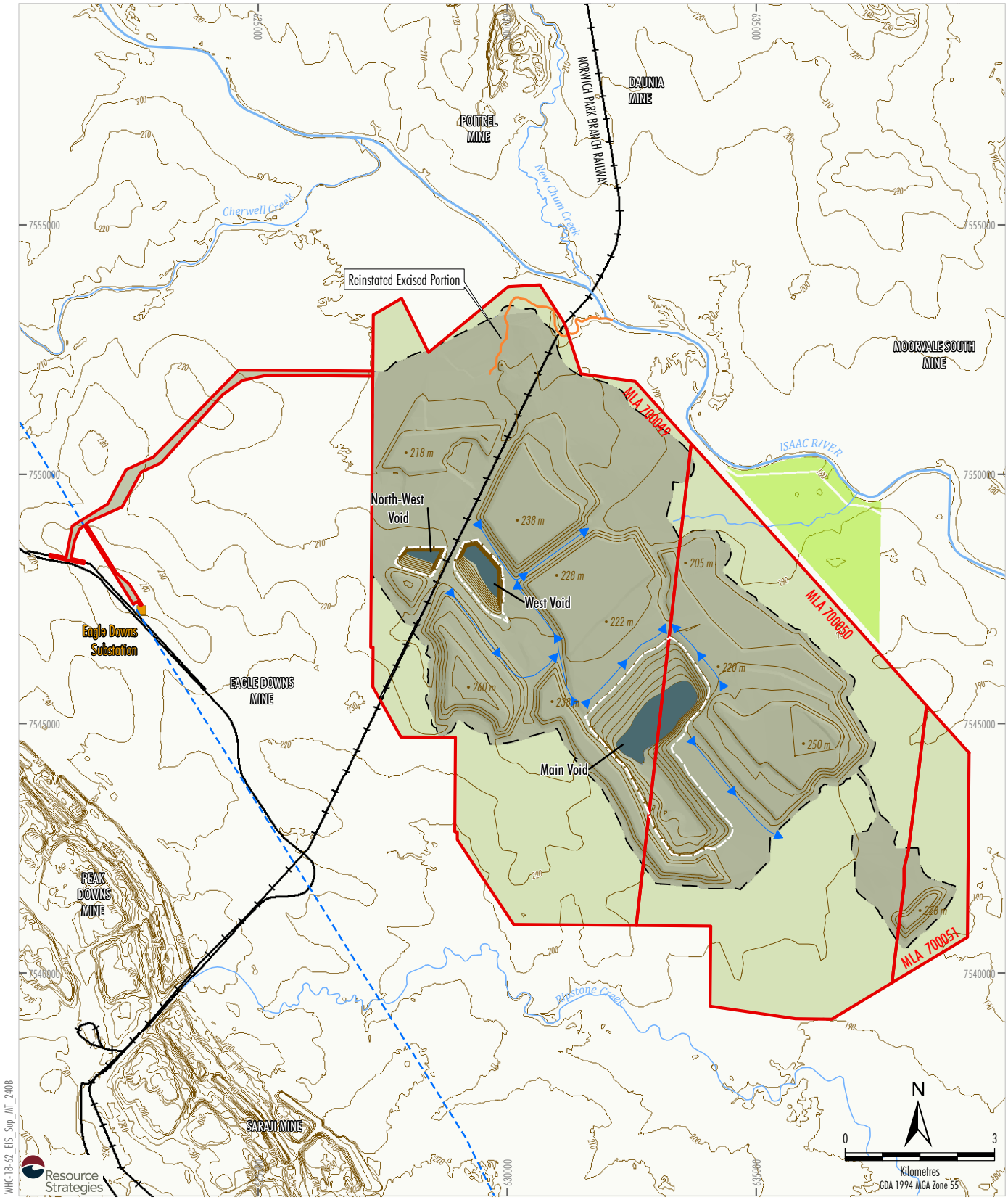
Sensitivity analysis undertaken shows that the optimised Project would generate significant net benefits to the Queensland community under a range of circumstances (including variations in coal prices) (Attachment 16).

Employment and Income

One of the primary economic effects of a mining development is generating employment within the development's locality.

Direct local employment effects are the benefits associated with the optimised Project's employment of people that reside within the local area, region and Queensland.

The optimised Project would generate approximately 500 new direct, long term jobs. A significant proportion of the optimised Project workforce is expected to be employed from the region during the construction phase and operations phase, respectively.



LEGEND

- Mining Lease Application Boundary
- Indicative Surface Disturbance Extent
- Indicative Residual Void Waterbody
- Indicative Extent of Rehabilitation to Low-Intensity Grazing Post-Mining Land Use*
- Land Outside Indicative Surface Disturbance Extent with a Low-Intensity Grazing Post-Mining Land Use
- Contours (10 m)
- Indicative Extent of Water Storage Post-mining Land Use
- Watercourse (Water Act 2000)
- Indicative Surface Water Drain

Matters of State Environmental Significance

- Ground-truthed Waterways Providing for Fish Passage ^
- Wynette Offset Area

Source: The State of Queensland (2018 - 2020); Whitehaven (2020); ESP (2022)

*Note: * Should the Winchester Quarry remain at the end of the Project life, the PMLU for its extent would be quarrying and not low-intensity grazing.*

^ As stated in the Environmental Offsets Regulation 2014, any part of a waterway providing for passage of fish is a Matter of State Environmental Significance (MSES) only if the construction, installation or modification of waterway barrier works carried out under an authority will limit the passage of fish along the waterway.

WHITEHAVEN COAL

WINCHESTER SOUTH PROJECT

Conceptual Final Landform and Land Use - Waterways Providing for Fish Passage

Figure 5-12

Economic benefits to workers include any wage premiums paid above the minimum wage that workers could receive elsewhere in the mining sector. It is estimated that an increase in disposable income of up to $254 million in NPV terms would accrue to Project workers, as a result of comparisons between the average wage for the mining industry relative to the average wage in the region (Attachment 16).

The optimised Project is also predicted to result in incremental indirect employment effects associated with related upstream or downstream industries, accounting for any spill-over or crowding-out effects. Over its life, the optimised Project is estimated (on average) to generate the following additional jobs (Attachment 16):

- 261 full-time equivalent (FTE) in the local area;
- 858 FTE in the region; and
- 1,750 FTE in Queensland.

Benefits to Suppliers and Other Flow-on Effects

In addition to employment, the other major economic effect of the Project is expenditure with local and regional contractors and suppliers, which will generate local economic activity and have broader economic impacts (Attachment 16).

Whitehaven WS is committed to maximising opportunities for local businesses to provide goods and services to the Project. Whitehaven WS would seek to enhance benefits to local and regional businesses by implementing procurement policies that encourage local content and are consistent with the *Queensland Resources and Energy Sector Code of Practice for Local Content* and *Australian Industry Participation National Framework* (Appendix C of the Draft EIS).

Appendix C and Section 4.4 of the Draft EIS detail management and enhancement measures that Whitehaven WS would implement to maximise opportunities for local business and industry to benefit from the Project.

There would be expenditure effects on the local, regional and Queensland economies associated with capital expenditure and operating costs during the construction phase and ongoing operations of the Project (Attachment 16).

It is estimated that $5.7 billion in NPV terms would accrue to suppliers in Queensland as a result of the Project (Attachment 16).

There would also be flow-on or 'second round' effects associated with the Project. For example, workers at the Project may spend some of their additional income at shops within the locality which, in turn, helps to support additional employment at these shops.

The primary variable used to measure the change in economic activity in the local, regional and Queensland economies, based on changes in economic output, is gross value added. At the Queensland (State) level, gross value added is known as Gross State Product; and at the regional level, Gross Regional Product.

The Project would have a positive impact on gross value added due to local and regional employment and expenditure effects, including any crowding-out effects experienced by upstream and downstream industries. Deloitte Access Economics predicted that (Attachment 16):

- Gross value added in the local area would increase by $2 billion in NPV terms;
- Gross Regional Product would increase by $7.8 billion in NPV terms; and
- Gross State Product would increase by $11.0 billion in NPV terms.

Additional Considerations

As described in Section 5.1, the Project base case has been assumed for the Economic Assessment (i.e. autonomous fleet and workforce of approximately 500 personnel for the construction and operations phases).

Notwithstanding, Deloitte Access Economics has conducted an analysis of the changes to the net economic benefits associated with the Project under a non-automated scenario. Deloitte Access Economics found that a non-automated fleet (i.e. additional workforce requirements and associated effects on capital and operational costs) would also result in a significant incremental net economic benefit to the Queensland community, albeit lower in comparison to the Project base case (Attachment 16).

Specifically, changes to the economic impacts on the local, regional and Queensland economies associated with the non-automated scenario, relative to the optimised Project base case, would include (Attachment 16):

- an increase in incremental indirect employment opportunities; and
- a decline in gross value added.

Attachment 16 provides further detail on the changes to the economic effects expected for the optimised Project under the non-automated scenario.

End of Project Life

The establishment and operation of the Project would stimulate demand in the local, regional and Queensland economies leading to increased employment and benefits to suppliers. Cessation of the mining operations would result in a contraction in economic activity in these economies.

The magnitude of the local, regional and Queensland economic impacts of cessation of the Project would depend on a number of interrelated factors, including the movements of workers and families, alternative development opportunities, and economic structure and trends in the broader regional economy at the time.

Whitehaven WS is committed to local employment and businesses. Whitehaven WS would implement management and enhancement measures to maximise opportunities for local business and industry to benefit from the Project (Appendix C of the Draft EIS).

These management and enhancement measures would include implementing procurement policies that encourage local content and are consistent with the *Queensland Resources and Energy Sector Code of Practice for Local Content* and *Australian Industry Participation National Framework* (Section 4.11 of the Draft EIS).

To minimise economic hardships for Project employees and their families following the cessation of operations, Whitehaven WS would:

- provide workers with advanced notice of the impending conclusion of operations;
- develop and implement a post-closure management plan;
- consult with employees regarding potential impacts and identify strategies which will reduce or avoid economic hardship for those affected; and
- where possible, offer to redeploy workers to other proponent-operated projects.

A Social Impact Management Plan (SIMP) was prepared as part of the Draft EIS and has been revised as part of this Additional Information (Attachment 11), consistent with *Social Impact Assessment Guideline* (Department of State Development, Manufacturing, Infrastructure and Planning, 2018).

The objectives and potential benefits/impacts of each sub-plan within the SIMP (i.e. the Workforce Management Plan, Housing and Accommodation Plan, Local Business and Industry Procurement Plan, Health and Community Wellbeing Plan and Community Stakeholder Engagement Plan) are summarised in the SIMP (Section 7 of the SIA [Attachment 11]).

The SIA and SIMP recognise that the social context of the Bowen Basin is fluid and can radically change due to the cyclical nature of the mining industry. The SIMP would be reviewed regularly to assess the effectiveness and relevancy of the measures and commitments within the SIMP. This would include reviewing the SIMP both during operations and prior to closure of the Project.

5.6.3 Groundwater

SLR Consulting Australia Pty Ltd (SLR Consulting) (2022) (Attachment 5) undertook an assessment of the potential groundwater impacts associated with the optimised Project.

Groundwater Quality

In-Pit and Out-of-Pit Waste Rock Emplacements

No changes from the Draft EIS to the potential impacts of the optimised Project on groundwater quality due to seepage from the in-pit and out-of-pit waste rock emplacements or the residual voids associated with the optimised Project.

Workshops and Storages

There is limited potential for groundwater contamination to occur with relation to workshops and fuel/chemical storage areas as each would be developed in accordance with current Australian Standards (e.g. adequate bunding and equipped for immediate spill clean-up).

Groundwater Resources

Influence on Baseflow (Groundwater)

The Isaac River is ephemeral in nature, with flows following rainfall events that generate runoff. The Isaac River is largely a losing system, with seepage of surface water into the underlying alluvium (Attachment 5). Changes to water levels induced by mining activities for the Project would increase the hydraulic gradient between the Isaac River and associated alluvium.

The numerical groundwater model conservatively predicted the rate of seepage from the Isaac River to the underlying alluvium. The increased seepage from the Isaac River to the alluvium due to the Project would be insignificant in relation to the natural flows in the Isaac River (Attachment 5).

Direct Groundwater Inflows/Interception

The total groundwater inflows are predicted to peak in Project Year 11, with approximately 280 ML/year of groundwater inflows to the open cut pits. The average groundwater inflows over the life of the Project are predicted to be approximately 155 ML/year (Attachment 5).

The Project would not directly intercept groundwater from the Quaternary alluvium, and therefore no direct take from Isaac Connors Groundwater Unit 1 (aquifers of the Quaternary alluvium) would occur from the mining operations. All direct groundwater take predicted by the model would be from Groundwater Unit 2 (sub-artesian aquifers) (Attachment 5).

Post-mining, the residual voids would accumulate water over time due to rainfall runoff and groundwater inflows. There would also be evaporation from the water bodies that would form within the residual voids. The model predicted that there would be negligible direct or indirect take post-mining.

Groundwater Drawdown

Consistent with the Draft EIS, the numerical groundwater modelling results indicate there would be negligible drawdown within the Isaac River alluvium due to the optimised Project (Attachment 5).

Impacts on Groundwater Users

Consistent with the Draft EIS, the numerical groundwater modelling predicted no privately-owned bores in the vicinity of the optimised Project would experience more than 1 m drawdown (Attachment 5).

Cumulative Groundwater Depressurisation and Drawdown

Consistent with the Draft EIS, cumulative impacts associated with approved and foreseeable open cut and underground coal mines surrounding the optimised Project were modelled (Attachment 5), including:

- Olive Downs Project;
- Moorvale South Project;
- Eagle Downs Mine;
- Daunia Mine;
- Poitrel Mine;
- Peak Downs Mine;
- Saraji Mine;
- Caval Ridge Mine; and
- Lake Vermont Mine.

The numerical groundwater model indicated that the contribution of the Project to the cumulative drawdowns in the Quaternary alluvium would be negligible. The numerical groundwater model indicated that the zone of drawdown in the regolith from the Project would only interact with the zone of drawdown from the Eagle Downs Mine and Pit 9 at the Olive Downs Project located immediately west and south-east of the Project, respectively (Attachment 5).

The numerical groundwater model indicated that the zone of drawdown in the Leichhardt and Vermont Seams from the Project would only interact with the zone of drawdown from Pit 9 at the Olive Downs Project located immediately south-east of the Project (Attachment 5).

Residual Voids

In response to feedback from regulatory and community stakeholders, Whitehaven WS has reviewed the Project mine plan and sequence with the aim of reducing the number of residual voids in the final landform. The review produced an optimised final landform including, among other changes, the complete backfilling of an additional void, the South Pit mine void.

Additional modelling and assessment was undertaken by SLR Consulting and WRM Water & Environment Pty Ltd (WRM) for the optimised final landform (Attachments 5 and 6, respectively), as well as assessment of the requested final landform alternatives (Enclosure 1).

Following the cessation of mining at the Project, three residual voids would remain for the optimised final landform. Water levels in the residual voids would vary over time, depending on the prevailing climatic conditions, and the balance between evaporation losses and inflows from rainfall, surface runoff and groundwater (Attachment 6).

A GOLDSIM model (separate to the operational simulation model [OPSIM] model used for the operational modelling) was used to assess the likely long-term water level behaviour of the residual voids (Attachment 6). Each residual void water body is predicted to equilibrate at different levels. Maximum long-term equilibrated water levels are predicted to be up to approximately (Attachment 6):

- 131 m AHD in North-west Void (78 m below the level at which overflows would reach the receiving environment);
- 109 m AHD in West Void (87 m below the level at which overflows would reach the receiving environment); and
- 149 m AHD in Main Void (59 m below the level at which overflows would reach the receiving environment).

The equilibrated residual void water levels are predicted to be well below their respective full supply levels (i.e. the levels above which spill to the surrounding environment would occur) and the surrounding pre-mining groundwater levels, which means the residual voids would act as groundwater sinks.

Furthermore, SLR Consulting (2022) (Attachment 5) undertook groundwater fate modelling (e.g. particle movement simulations) to simulate the flow of water throughout the backfilled spoil and residual voids of the optimised final landform. The particle movement simulation predicted that water within the backfill spoil and residual voids would remain within the optimised final landform in perpetuity with no water predicted to flow from the optimised final landform to the receiving environment (e.g. demonstrated residual voids would remain groundwater sinks in perpetuity).

Mitigation Measures, Management and Monitoring

As recommended by the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (IESC) and SLR Consulting (2022), an additional monitoring bore in the regolith groundwater unit in the vicinity of the Project would be installed and incorporated into the groundwater monitoring program. This would allow natural groundwater level fluctuations to be distinguished from potential groundwater level impacts due to depressurisation resulting from proposed mining activities.

Notwithstanding, SLR Consulting (2022) (Attachment 5) concluded that the existing groundwater monitoring network is considered sufficient and there is also opportunity for sharing of data with the surrounding developments.

5.6.4 Surface Water and Flooding

Surface Water Quality

WRM (2022) (Attachment 6) undertook an assessment of the potential surface water impacts associated with the optimised Project.

Geochemistry (Drainage and Seepage), Runoff and Contaminants and Controlled Releases

No changes from the Draft EIS to the potential impacts of the Project on surface water quality due to uncontrolled and controlled releases of mine-affected water are predicted (WRM, 2022) (Attachment 6).

Coal rejects would preferentially be emplaced in-pit during the Project, however disposal of coal rejects within the out-of-pit waste rock emplacement may be required (e.g. at the commencement of the Railway Pit and Main Pit when there is no in-pit storage available). Coal rejects would be trucked from the reject bin and placed within out-of-pit waste rock emplacements and buried by at least 10 m of waste rock (Terrenus, 2021). In this way, the coal rejects would not report to the final landform surface and would not interact with surface water runoff in the final landform.

To mitigate and manage the potential low degree of environmental risk of coal rejects within out-of-pit emplacements (e.g. coal reject cells), runoff from coal reject emplacement areas would, prior to capping, report to the mine-affected water management system rather than the sediment-laden water management system. Coal rejects in pit emplacement would also be buried by at least 10 m of waste rock. The management of coal rejects would be controlled in accordance with the requirements of the Waste Management Plan to be developed for the Project.

Coal rejects from the CHPP would be co-disposed with waste rock and would be buried with at least 10 m of waste rock. Reject material would be co-disposed in locations such that any runoff or infiltration would report to the Project water management system for mine water. Therefore, when placed amongst waste rock, the overall risk of environmental harm and health-risk that emplaced coal reject poses is low (Terrenus, 2021).

Whitehaven WS would undertake validation geochemical test-work for coal reject from the CHPP during development of the Project, particularly during the first two years of CHPP operation and whenever new seams/plys are being processed. Test-work would comprise a broad suite of environmental geochemical parameters, such as pH, electrical conductivity (EC) (salinity), acid-base account parameters and total and soluble metals/metalloids (Terrenus, 2021).

Cumulative Impacts

Given that the Project mine-affected water releases would be managed within an overarching strategic framework for management of cumulative impacts of mining activities, the proposed management approach for mine water from the Project is expected to have negligible cumulative impact on surface water quality and associated environmental values (Attachment 6).

Surface Water Resource

Catchment Excision

During mining operations, the water management system would capture runoff from areas that would have previously flowed to the receiving waters of the Isaac River and Ripstone Creek. The estimated maximum captured catchment areas during the Project are provided in Attachment 6. The maximum catchment areas excised by the Project represent:

- up to approximately 1% of the Isaac River catchment (to the confluence with Ripstone Creek); and
- up to approximately 4.5% of the Ripstone Creek catchment (to the confluence with the Isaac River).

The loss of catchment flows in the Isaac River and Ripstone Creek during the Project would be indiscernible. Therefore, the potential impact on water quantity in the Isaac River and Ripstone Creek due to the excision of catchment during the Project is considered to be negligible (Attachment 6).

At the completion of mining, surface runoff from rehabilitated in-pit and out-of-pit waste rock emplacement areas would flow to the receiving environment. An area of approximately 13.7 square kilometres (km^2) would report to the residual voids at the completion of mining. The changed topography following completion of the Project would have the following impacts on catchment areas:

- The catchment draining to the Isaac River (to the confluence of the Isaac River and Ripstone Creek) would reduce by approximately 13.7 km^2 (compared to pre-mining conditions), a decrease of less than 0.3%.
- The catchment draining to Ripstone Creek would reduce by around 4.3 km^2 (compared to pre-mining conditions), a decrease of less than 1.5%.

Due to the revised mine planning (e.g. backfilling of the South Pit mine void), the catchment excision from the Isaac River and Ripstone Creek associated with the optimised final landform for the Project has been reduced by 0.6 km^2 and 3.2 km^2, respectively, in comparison to the final landform proposed for the 2021 Draft EIS.

As such, the loss of catchment flows in the Isaac River and Ripstone Creek would be indiscernible, and the potential impact on water quantity in Isaac River and Ripstone Creek due to the final landform are considered negligible (Attachment 6).

Furthermore, the Geomorphology Assessment (Appendix F of Appendix 3 of the Draft EIS) (Fluvial Systems, 2020) prepared for the Project concluded that the predicted overall geomorphic impact of the Project would be relatively minor. The Project would have negligible impact on the Isaac River; it would reduce the length of some small first and second order drainage features, but these would be reinstated to some extent in the post-mining landform. Thus, the regional cumulative impacts of the Project on geomorphic characteristics of streams would be negligible (Fluvial Systems, 2020). This would remain consistent with the optimised Project.

Regional Water Availability

A significant proportion of site water requirements would be sourced from water collected on-site, including rainfall runoff and groundwater inflows to the open cut pits. Collected water would be stored in the mine-affected water storages for recycling and reuse (Attachment 6).

Consistent with the Draft EIS, Whitehaven WS would source water from either an external water supplier (e.g. Sunwater) via a water supply pipeline or via water sharing with surrounding mining operations. Therefore, there would be no material impacts to regional water availability due to the Project.

Residual Voids

As described in Section 5.6.3, additional modelling and assessment was undertaken by SLR Consulting and WRM for the optimised final landform (Attachments 5 and 6, respectively), as well as assessment of the requested final landform alternatives (Enclosure 1).

Following the cessation of mining at the Project, there would be three residual voids for the optimised final landform. Water levels in the residual voids would vary over time, depending on the prevailing climatic conditions, and the balance between evaporation losses and inflows from rainfall, surface runoff and groundwater (Attachment 6).

As such, the residual voids for the optimised final landform are not predicted to spill and present a negligible risk of water within the residual voids interacting with the surrounding environment (including the surrounding groundwater systems).

Salt occurring naturally in the Project groundwater systems and surface water runoff would also enter the residual voids. Evaporation from the residual void water bodies would lead to the accumulation of salt over time, however, water balance modelling predicts the following salinity levels for the residual void water bodies would generally range between (Attachment 6):

- approximately 2,000 to 6,000 microsiemens per centimetre (µS/cm) for North-west Void (with a maximum of 18,000 µS/cm when the stored water volume is low);
- approximately 2,000 to 4,000 µS/cm for West Void (with a maximum of 8,500 µS/cm when the stored water volume is low); and
- approximately 1,000 to 4,000 µS/cm for Main Void (with a maximum of 6,500 µS/cm when the stored water volume is low).

For the optimised final landform, an opportunity was identified to beneficially re-use the water from the residual voids for agricultural or other purposes (e.g. water for cattle consumption). Given the predicted water quality, the re-use of residual void water would slow down the accumulation of salt in the residual voids, which may allow for a sustained PMLU without potential impacts to the surrounding environment.

Progressing this re-use opportunity would be subject to further feasibility assessment and design, in addition to identification, negotiation and agreement with the final water users.

On that basis, the residual void water bodies for the optimised final landform would not pose a risk to the surrounding groundwater regime or receiving environment as the residual voids water quality is predicted to sustain a PMLU and the residual voids would remain as groundwater sinks in perpetuity (Attachments 5 and 6).

The post-mining flood modelling identified that based on the optimised final landform design, flood waters would not enter any of the residual voids in events up to and including the probable maximum flood (PMF) event (Attachment 6).

Additional analysis on the residual void behaviour was undertaken to assess extreme storm events with rainfall depths equivalent to the 1% Annual Exceedance Probability (AEP), 0.1% AEP and probable maximum precipitation (PMP) design events (Attachment 6). The analysis indicated that there would be minimal impact on the water level in the residual voids from such an event, with simulated water levels well below the residual void overflow level (Attachment 6).

The residual void modelling indicates that the expected water levels are below the total storage volume levels (e.g. level at which overflows would reach the receiving environment) for each residual void, and the residual voids would remain as long-term groundwater sinks (Attachments 5 and 6).

Flooding

Consistent with the Draft EIS, there would be no significant impacts on flood levels and velocities in the Isaac River channel and floodplain associated with the optimised Project during operations and post-mining (Attachment 6).

The Project would only interact with the Isaac River for the rarer flood events (1% AEP and rarer design events), with the impacts identified on the Isaac River floodplain for these rare events generally localised and relatively minor in magnitude (Attachment 6).

There would be no impacts on flood levels and velocities in Ripstone Creek, as the Project is located well outside of the Ripstone Creek floodplain.

Mitigation Measures, Management and Monitoring

The mitigation measures, management and monitoring proposed would largely be unchanged. However, to minimise the potential impacts on the receiving environment from sediment dam overflows, the following management and mitigation measures are proposed if the Isaac River flow is less than 50 ML/day and/or the salinity within a sediment dam is greater than 2,000 µS/cm (Attachment 6):

- pump back the sediment dam to the water management system; or
- treat the sediment dam water through flocculation prior to discharge.

With the implementation of this mitigation strategy, the potential impact of sediment dam discharges on the Isaac River salinity would be negligible.

5.6.5 Groundwater Dependent Ecosystems

Aquatic and Terrestrial Ecosystems

Based on extensive field surveys and site specific data (e.g. transient electromagnetic [TEM] survey), an assessment of likely dependence of groundwater and the potential impacts on the following potential groundwater dependent ecosystems (GDEs) were assessed in the Draft EIS:

- Ecosystems dependent on the sub-surface presence of groundwater (i.e. terrestrial GDEs, including some riparian vegetation communities):
  - riparian vegetation along Isaac River and Cherwell Creek;
  - vegetation associated with wetlands on the Isaac River floodplain and tributaries;
  - vegetation on the Isaac River floodplain and tributaries (outside of wetlands);
  - vegetation in the vicinity of the Project mapped as having low potential for groundwater interaction (e.g. various patches of woodland to the north and east of the Project); and
- Ecosystems dependent on the surface-expression of groundwater (i.e. aquatic GDEs):
  - aquatic in-stream ecosystems associated with the Isaac River and Cherwell Creek; and
  - wetlands and farm dams in the vicinity of the Project.

Consistent with the Draft EIS, the Project is not predicted to have any material impacts on potential or actual GDEs due to changes in groundwater quality or groundwater resources.

Stygofauna

The stygofauna pilot study for the Draft EIS (ESP, 2021) was designed to detect stygofauna if present in the Project area or surrounds in accordance with the *Guideline for the Environmental Assessment of Subterranean Aquatic Fauna* (DES, 2015). No stygofauna were recorded during the pilot study for the Draft EIS (ESP, 2021). The highly saline and largely unsaturated regolith throughout the broader region suggested that the groundwater environment within the Project area was not ideal for stygofauna (ESP, 2021). However, stygofauna were considered likely to occur in the alluvium associated with the Isaac River (DPM Envirosciences, 2018; ESP, 2021).

Supplementary stygofauna sampling was completed by ESP in February 2022, targeting bores in the regolith and Isaac River alluvium (ESP, 2022a). During the supplementary survey, stygofauna taxa were recorded from one bore targeting the Isaac River alluvium (i.e. bore IF3839P):

- Ostracods from family Candonidae (2 specimens); and
- Syncarida from family Bathynellidae (10 specimens).

Both of these families are obligate inhabitants of groundwater ecosystems (i.e. stygobites). Bathynellidae are widespread and occur in most alluvial aquifers across Australia. The taxonomy of the family Bathynellidae is relatively unresolved, with only a few genera described (ESP, 2022a). All are obligate groundwater dwellers that rely on groundwater habitats for their entire lifecycle.

Candonidae includes both surface water and groundwater dwelling ostracod species. Although it was not possible to identify the specimens recorded during the current survey to species level, examination of key features determined that they were likely obligate stygofauna species (ESP, 2022a).

Notwithstanding, there would be no impacts to stygofauna taxa recorded during the supplementary survey within the Isaac River alluvium, as the numerical groundwater modelling results indicate there would be negligible drawdown within the Isaac River alluvium due to the Project (SLR Consulting, 2022).

5.6.6 Air Quality and Greenhouse Gas

Overall, the outcomes of the air quality assessment (including consideration of the optimised Project) are very similar to those in the Draft EIS (Attachment 13) (Katestone Environmental Pty Ltd [Katestone], 2022).

Dust Deposition

When compared to the Draft EIS, predicted changes due to the Project are considered negligible as the Project would continue to comply with the guidelines at all sensitive receptors, for all modelled Project scenarios, in isolation and cumulatively.

TSP

Consistent with the Draft EIS, the predicted concentrations of TSP comply with the relevant air quality objective at all sensitive receptors, in all modelled Project scenarios, in isolation and cumulatively.

PM_{10}

Similar to the Draft EIS, predicted 24-hour average and annual concentrations of PM_{10} due to the Project in isolation comply with the relevant air quality objectives at all sensitive receptors, in all modelled Project scenarios, with the application of the proactive dust management system.

Additional receptors were included in the modelling such as South32's Eagle Downs mine assets which are considered workplaces and, therefore, any potential exposure should be considered as a workplace exposure matter.

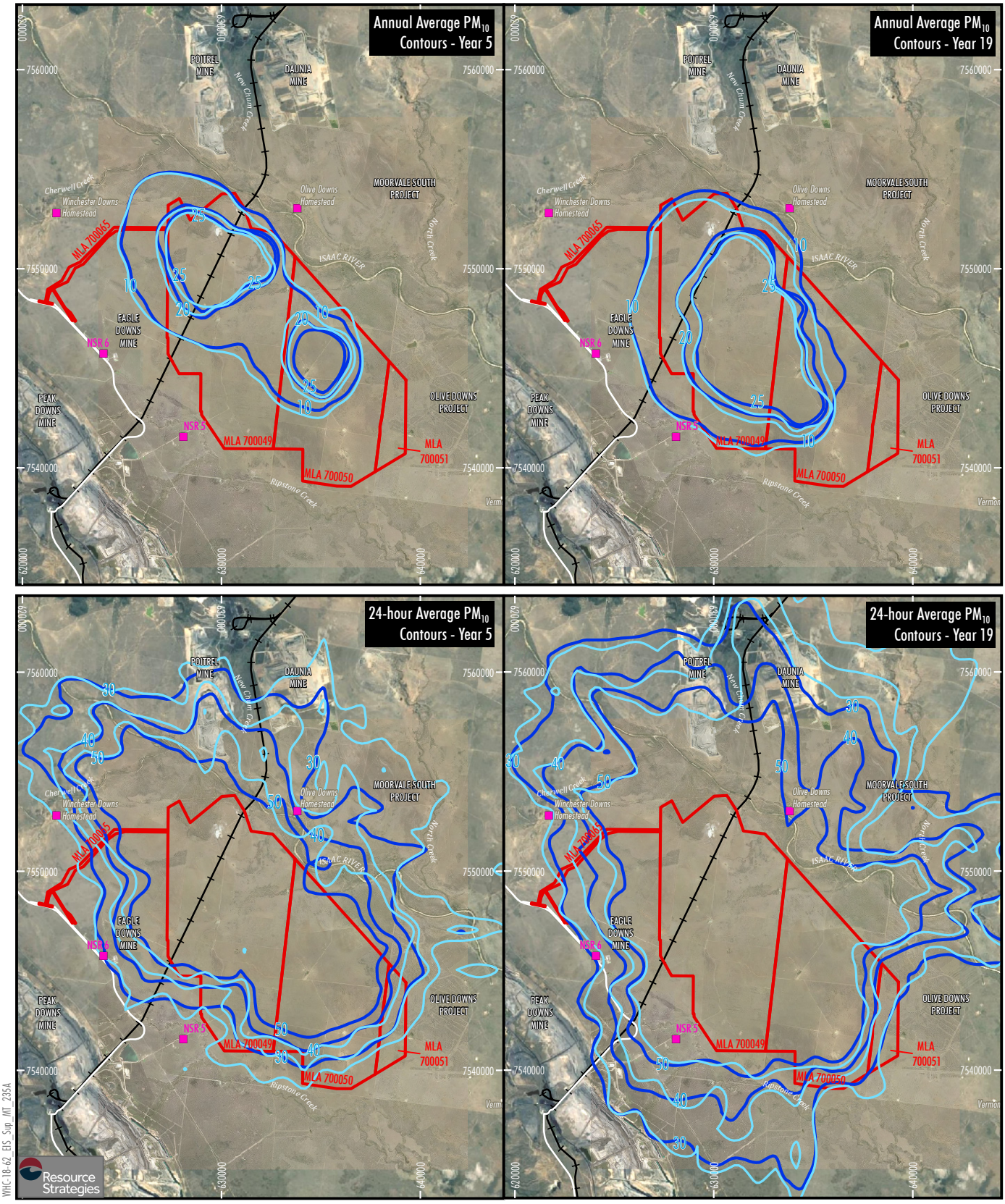
To address the risk of elevated cumulative concentrations of PM_{10}, Project dust emissions would be managed using a proactive dust management system whereby background dust levels in the region would be monitored and mine operations will be altered when background levels are elevated.

With the implementation of these measures, the Project complies with the PM_{10} criteria with the exception that predicted cumulative concentrations of annual average and 24-hour average PM_{10} were found to be elevated at the Olive Downs Homestead. Whilst PM_{10} is less of a health concern relative to $PM_{2.5}$, in recognition of this potential impact, Whitehaven WS intends to reach a mutually beneficial agreement with the land-owner of the Olive Downs Homestead.

All other sensitive receptors comply with the relevant air quality objectives, with the application of the proposed proactive dust management system.

The abovementioned outcomes are consistent with the Draft EIS.

Comparative predicted 24-hour average and annual average PM_{10} isopleth diagrams between the Draft EIS and the optimised Project for Years 5 and 19 are shown on Figure 5-13.



WHITEHAVEN COAL

WINCHESTER SOUTH PROJECT

Comparison of Draft EIS and Optimised Project Annual Average and Maximum 24-hour Average PM_{10} Contours - Years 5 and 19

Figure 5-13

$PM_{2.5}$

Consistent with the Draft EIS, predicted 24-hour average and annual concentrations of $PM_{2.5}$ due to the Project comply with the relevant air quality objective at all sensitive receptors, in all modelled Project scenarios, in isolation and cumulatively (Attachment 13).

Greenhouse Gas

Greenhouse gas emissions associated with the Project have been considered and estimated on an annual basis for the life of the Project. In relation to Scope 2 emissions, Whitehaven WS has committed to purchasing carbon neutral electricity for the Project, eliminating estimated emissions for the optimised Project including associated Scope 3 emissions associated with the transmission and distribution of electricity.

A summary of estimated Scope 1 emissions associated with the optimised Project, expressed as tonnes of carbon dioxide equivalent per annum (t CO_2-e per annum) is presented. The optimised Project would be carried out in three phases:

- Construction: Years 1 to 3;
- Operations: Years 2 to 29; and
- Decommissioning (including final rehabilitation): Years 30 to 31.

Average annual greenhouse gas emissions associated with the optimised Project have been estimated to be 498,605 t CO_2-e, excluding greenhouse gas emissions associated with land clearing.

Greenhouse Gas Mitigation and Management

Whitehaven WS would maintain the greenhouse gas mitigations and management measures proposed in the Draft EIS. A Greenhouse Gas Management and Abatement Plan has been prepared and is included as Attachment 12.

5.6.7 Noise and Vibration

Renzo Tonin & Associates (Renzo Tonin) (2022) (Attachment 14) undertook an assessment of the potential noise and vibration impacts associated with the optimised Project.

Operational Noise

Noise Modelling Scenario

Overall, the operational noise modelling scenarios used in the Project are unchanged from the Draft EIS (i.e. potential noise impacts were assessed for Project Years 5, 9, 19 and 27) due to the similarity of the mine plan. Therefore, the outcomes of the assessment (including consideration of the optimised Project) are very similar to those in the Draft EIS.

Neutral and Adverse Weather Conditions

Consistent with the Draft EIS, operational noise levels during neutral weather conditions are predicted to comply with the relevant noise objectives at all receivers except Olive Downs Homestead, which is predicted to exceed objectives relevant to the mine by up to 5 A-weighted decibels (dBA) despite the implementation of reasonable and feasible mitigation measures. Accordingly, Whitehaven WS intends to reach a mutually beneficial agreement with the land-owner.

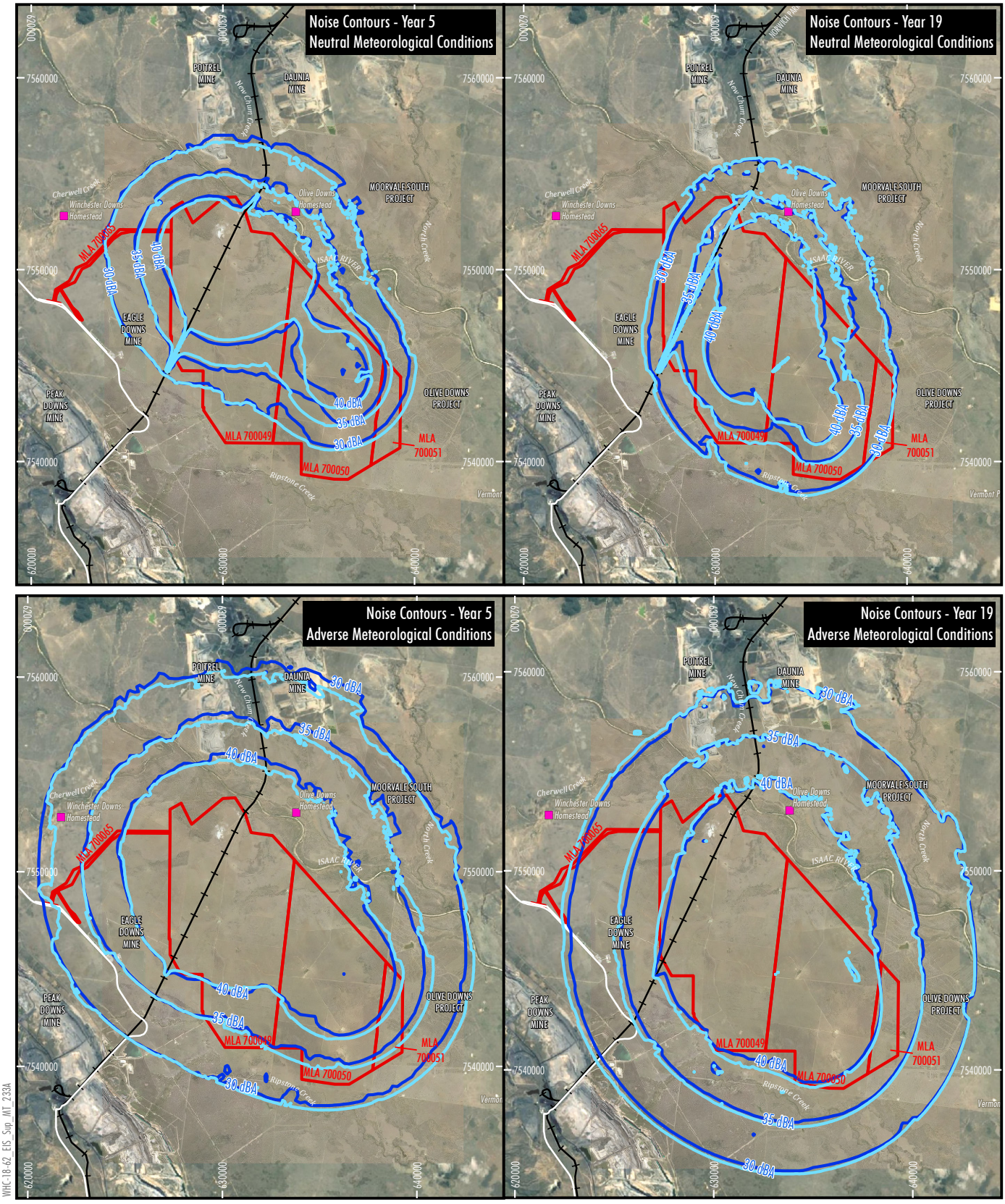
During adverse weather conditions noise levels are predicted to exceed the relevant noise objectives at Olive Downs Homestead by up to 11 dBA despite reasonable and feasible mitigation measures. Accordingly, Whitehaven WS intends to reach a mutually beneficial agreement with the land-owner. Operational noise levels are predicted to comply with the relevant noise objectives at all other receptors.

A comparison of the Draft EIS and the optimised Project's predicted noise contours for Years 5 and 19 under neutral and adverse (i.e. the maximum extent of predicted impacts) meteorological conditions are shown on Figure 5-14.

Sleep Disturbance

Based on predicted noise levels during neutral and adverse weather conditions, the Project is expected to comply with the sleep disturbance criterion (external location) at all noise sensitive receptors (excluding Olive Downs Homestead).

Operational noise levels are predicted to marginally exceed the sleep disturbance criterion (external location) at Olive Downs Homestead despite reasonable and feasible mitigation measures. Accordingly, Whitehaven WS intends to reach a mutually beneficial agreement with the land-owner.



LEGEND

- Mining Lease Application Boundary
- Sensitive Receptor
- Darft EIS $L_{Aeq\ (15\ Minute)}$ Noise Contour
- Optimised Project $L_{Aeq\ (15\ Minute)}$ Noise Contour
- Railway
- Road

N

0 10

Kilometres

GDA 1994 MGA Zone 55

Source: The State of Queensland (2018 - 2020); Whitehaven (2020); Renzo Tonin (2021, 2022) Orthophoto: Google Image (2019); Whitehaven (2017)

WHITEHAVEN COAL

WINCHESTER SOUTH PROJECT

Comparison of Draft EIS and Optimised Project Neutral and Adverse Meteorological Conditions Noise Contours - Years 5 and 19

Figure 5-14

WHC-18-62_EIS_Sup_MT_233A

Blasting

With the use of typical explosive charge sizes and practices, the relevant vibration and overpressure objectives for the optimised Project would not be exceeded at receptors (Attachment 14).

5.6.8 Soils and Land Suitability

GT Environmental Pty Ltd (GTE) (2022) undertook an assessment of the potential soils and land suitability impacts associated with the optimised Project (Attachment 17).

Land use

Consistent with the Draft EIS, Whitehaven WS would rehabilitate the Project area to a low-intensity grazing PMLU, consistent with the existing land use within the Project area and approved land use outcomes for the mining operations/projects surrounding the Project.

Agricultural Land Class

GTE (2022) has updated the land suitability mapping within the study area based on the relevant contemporary guidelines, including *Guidelines for Agricultural Land Evaluation in Queensland* (GALE) (Department of Science, Information Technology and Innovation [DSITI] and the DNRM, 2015), *Regional Land Suitability Frameworks for Queensland* (Regional Frameworks) (DSITI and DNRM, 2013) and *Queensland Land Resource Assessment Guidelines, Volume 1: Soil and Land Resource Assessment* (DES and Department of Resources [DoR], 2021). Where guidance is not specifically provided in GALE or Regional Frameworks, reference and assessment were also made to the *Land resource survey and evaluation of the Kilcummin area, Queensland* (Shields and Williams, 1991).

Details of the updated land suitability mapping is provided in Attachment 17.

Land Suitability

GTE (2022) has reviewed the land suitability for all cropping within the Project area and surrounds and concluded that all land was assessed to be Class 3, Class 4 or Class 5 due to plant available water content, erosion hazards, surface conditions and effective rooting depth that limit cropping success (Attachment 17).

GTE (2022) determined that land suitability for grazing within the Project area in accordance with the framework and methodology prescribed in *Land resource survey and evaluation of the Kilcummin area, Queensland* (Shields and Williams, 1991). The suitability of the land within the Project area and surrounds for beef cattle grazing has been assessed as suitable with some limitations (Classes 3 and 4) (Attachment 17).

Details of the spatial extent of the mapped land suitability classes for cropping and grazing within the Project area is provided in Attachment 17.

Post-mining Land Suitability Class

Whitehaven WS has proposed a PMLU for all areas of the Project (including residual void water bodies) and repurposing their final landform from a NUMA to potential water storage for agricultural production (e.g. supply water to cattle) as part of the optimised Project.

In the long-term, the disturbed areas of the Project area would be rehabilitated to the proposed post-mining land suitability class as detailed in Table 5-7.

Table 5-7
Proposed Post-mining Land Suitability Classes

Disturbance Type	Proposed Post-mining Land Suitability Class
Open cut mining, out-of-pit and in-pit waste rock emplacement areas	Class 3 to Class 4 – Grazing Class 5 – Cropping
Residual voids	**Residual void water body** Class 5 - Cropping/Grazing N/A[1]
Infrastructure areas, including the MIA and infrastructure corridor	Same classes as pre-mining

Source: GTE (2022).

[1] Residual void water bodies in the Project final landform would be of suitable quality to be water storages for agricultural production (supply water to cattle).

Potential Impacts

The Project would result in the progressive disturbance (and rehabilitation) of existing agricultural lands in the short-term. In the long-term, the disturbed areas of the Project area would be rehabilitated to the proposed post-mining land suitability class (Attachment 17).

The revised residual voids post mine land use (as stated above) for the Project would, overall, result in a final landform that closer represents the land conditions pre-mining when compared to the Draft EIS.

Soils

GTE (2022) has reclassified the soil mapping units within the Project area and surrounds in accordance with *The Australian Soil Classification, Third Edition* (Isbell, 2021) (Attachment 17).

Table 5-8 provides a summary of the soil mapping units within the Project area and surrounds.

Consistent with the Draft EIS, potential impacts of the optimised Project on soils would relate primarily to:

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

A detailed description of the soil mapping units (including mapping) is provided in Attachment 17.

Mitigation Measures, Management and Monitoring

There would be no change to the mitigation measures, management and monitoring proposed for the Draft EIS for the revised Project.

Table 5-8
Summary of Identified Soil Mapping Units

Soil Mapping Unit	Concept Summary
C1-BL	Black Vertosols on flat plains with melon hole microrelief. Soils are dominant black clays with minor interfingering sub-dominant brown clays. Microrelief is present with poor quality subsoils from increased salt, sodium and sodic attributes. Soils are suitable for grazing of native pastures.
C1-BR	Brown Vertosols on flat plains with melon hole microrelief. Soils are dominant brown clays with minor interfingering sub-dominant black clays. Microrelief is present with poor quality subsoils from increased salt, sodium and sodic attributes. Soils are suitable for grazing of native pastures.
C3-BL	Black Vertosols on gently undulating plains. Soils are dominant black clays with minor interfingering sub-dominant brown clays. Soils have dispersive attributes in subsoils with minor salinity attributes increasing with depth. This soil mapping unit is suitable for a wide range of current and potential broadacre and horticultural crops.
C3-BR	Brown Vertosols with sub-dominant Brown Dermosols on gently undulating plains. Soils are dominant brown clays with minor interfingering sub-dominant black clays. Soils have dispersive and salinity attributes in subsoils increasing with depth. This soil mapping unit is suitable for grazing native pastures.

Table 5-8 (Continued)
Summary of Identified Soil Mapping Units

Soil Mapping Unit	Concept Summary
C4	Black Vertosols on gently undulating plains with linear microrelief. Soils feature uniform dark clays associated with linear gilgai, have dispersive and salinity attributes in subsoils increasing with depth. This soil mapping unit is suitable for a wide range of current and potential broadacre and horticultural crops.
C5	Deep Black Vertosols on alluvial plains. Soils feature cracking uniform black clays with calcium carbonate extending to 1.0 m below the surface. The soil mapping unit has limitations with dispersive attributes in subsoils at 0.90 mbgl and is suitable for a wide range of current and potential broadacre and horticultural crops.
K1	Very shallow Claustic Rudosol on wide crests. Soils are firm with coarse fragments and extend to approximately 0.10 mbgl. The major limitation is the very shallow soil profile and are suitable for grazing of native pastures.
R3	Deep Red Kandosol on flat plains. Soils are firm, no coarse fragments and extend to 1.0 m below the surface. The soil has limited plant available water capacity (PAWC) and is suitable for grazing native pastures.
S1	Deep Brown Sodosol on gently undulating plains. Soils are soft surfaced loamy sands on dispersive sandy clay loams extending 1.0 m below the surface. The soil has PAWC and erosive limitations and is suitable for grazing native pastures.
S3	Deep Brown Chromosol on flat to gently undulating plains. Soils have surface salt concentrations in the A1 horizon, however, is suitable for a narrow range of crops and sown pastures.
S4	Deep Brown Arenosols on flat plains. Soils are soft surfaced, low fertility free draining uniform sands. This soil mapping unit is suitable for grazing native pastures.
T1-B	Deep Brown Dermosol on gently undulating plains. Soils are deep clayey to light clay soils with soil water availability limitations allowing it to be suitable for a narrow range of crops, specifically cotton.
T1-R	Very deep Red Dermosols on wide crests. Soils are deep clayey to light clay soils with soil water availability limitations allowing it to be suitable for a narrow range of crops, specifically cotton.
T2	Deep Red Chromosol on gently undulating plains. Soils are deep texture contrast soils with favourable attributes and is suitable for a wide range of current and potential broadacre and horticultural crops.
T3	Deep Brown Dermosol associated with flat plains. Soils have sodic and salinity attributes in subsoils and are suitable for grazing native pastures.

Source: GTE (2022).

5.7 ADDITIONAL COMMITMENTS

In response to the environmental matters raised in submissions (Section 7), Whitehaven WS has first addressed the regulatory submissions, and then responded to NGO and public submissions under a separate subsection. In order to reduce duplication, where an issue raised by a NGO or public submission has already been addressed in response to regulatory submissions, the reader is referred to the earlier response.

In support of this Additional Information, Whitehaven WS has commissioned additional specialist advice to assist in responding to some regulatory or public submissions and to review the impacts of the optimised Project. This additional advice is provided in Attachments 5 to 18. None of the additional advice or assessment clarification has materially altered the findings of any key environmental assessment matters.

Notwithstanding, in response to submissions received on the Draft EIS, Whitehaven WS has committed to the additional management and monitoring measures, including, but not limited to:

- Purchase of carbon neutral electricity, abating all estimated Scope 2 greenhouse gas emission associated with the Project.
- Backfilling an additional void, the South Pit mine void.
- Providing a use for all remaining proposed residual voids (i.e. no NUMAs).
- Additional commitments in the SIMP, for example increasing the Whitehaven Community Fund from $20,000 to $50,000.
- Provision of a detailed Stage 1 biodiversity offset.
- Commitment to reinstating excised portions of the northern waterway in the final landform.
- Commitment to fund research targeted at reducing greenhouse gas emissions associated with the Project.
- Providing an updated Road Transport Assessment, including a Pavement Impact Assessment and associated marginal cost calculations, prepared in accordance with the Department of Transport and Main Roads' (DTMR) (2018a) *Guide to Traffic Impact Assessment,* to DTMR for assessment and approval no later than six months prior to construction commencing.
- An additional monitoring bore for the regolith groundwater unit in the vicinity of the Project would be installed and incorporated into the groundwater monitoring program for the Project. This allows natural groundwater level fluctuations to be distinguished from potential groundwater level impacts due to depressurisation resulting from proposed mining activities.
- Additional sediment dam management and mitigation measures associated with Isaac River flows and monitored salinities within the sediment dams.

A number of clarifications to address concerns that were raised on the basis of alternative interpretations of the information contained within the Draft EIS are presented, where relevant, in Section 7.

6 ADDITIONAL INFORMATION REQUESTED

On 3 December 2021, the OCG requested additional information about the environmental effects of the Project and other matters relevant to the Project, in accordance with section 34B of the SDPWO Act (Section 1). Guidance was provided by the OCG on the additional information required to be provided before the Draft EIS can be finalised.

The OCG highlighted the following key matters which are provided in this Additional Information:

1. Justification for the proposed final landform, including presenting and assessing Project alternatives that fully consider residual void rehabilitation scenarios that include backfilling of all four residual voids; partial backfilling of all residual voids above the groundwater level; partial backfilling of all residual voids above the exposed coal seam; best environmental management practice; and maximising the area of PMLUs (Section 7.1 and Enclosure 1).
2. A greenhouse gas management and carbon abatement plan which details specific short, medium and long-term commitments, clearly demonstrates how the Project's Scope 1 and 2 greenhouse gas emissions will be abated and how the plan aligns with the Queensland Government's Climate Transition Strategy (Attachment 12).
3. All matters raised by the IESC (Attachment 3).

The OCG further requested that Whitehaven WS provide a response to all submissions and advice received on the Draft EIS (Section 7).

7 RESPONSE TO SUBMISSIONS

7.1 THE PROJECT

7.1.1 Rehabilitation

Agency Submissions

7.1.1.1 No-Use Management Area – Low Wall Justification

DES requested additional justification in accordance with the public interest criteria for the residual void low wall not providing a PMLU.

Response

As part of the optimised Project, the optimised final landform has a proposed PMLU for all rehabilitation areas.

Notwithstanding, the EP Act was amended by the *Mineral and Energy Resources (Financial Provisioning) Act 2018* (MERFP Act) to require EA applicants or holders to develop a PRC Plan setting out a detailed schedule of binding and enforceable milestones for mine rehabilitation (Schedule), and other rehabilitation requirements associated with PRC Plans, including the requirement for consideration to each public interest consideration for any NUMAs proposed in the PRC Plan (section 126D[2] of Part 2 of Chapter 5 of the EP Act).

The public interest considerations include (section 316PA of the EP Act):

a) the benefit, including the significance of the benefit, to the community resulting from the mining activity or resource project the subject of the EA application to which the Schedule relates;

b) any impacts, including long-term impacts for the environment or the community, that may reduce the benefit or have other negative impacts on the environment or community;

c) whether there are any alternative options to approving the area as a NUMA having regard to:

   i. the costs or other consequences of the alternative options;

   ii. the impact of the costs or other consequences on the financial viability of the mining activity or resource project;

d) whether the benefit to the community, weighed against the impacts, is likely to justify the approval of the NUMA having regard to any alternative options; and

e) another matter prescribed by regulation.

Whitehaven WS is a "mining EA applicant" under the EP Act, as the application for the Project site-specific EA was lodged in June 2019 (before the 'PRCP start date'). As such, transitional provisions in the EP Act apply to the EA application for the Project and the pre-amended EP Act, Chapter 5, Parts 1 to 5 apply to Whitehaven WS, as if the amending Act (the MERFP Act) had not commenced, including PRC Plan requirements.

Whitehaven WS will be required to have approved and comply with a PRCP for the Project, but as a result of the transitional provisions, it does not form part of the EA application requirements.

7.1.1.2 Rehabilitation Schedule, Strategy, Milestones and Completion Criteria

DES and IRC requested additional specific measurements and reference to best practice measures be included in the completion criteria for the Project. DES also requested additional information in relation to rehabilitation schedules, strategy and milestones.

Response

As stated above, the EP Act was amended by the MERFP Act to require EA applicants or holders to develop a PRC Plan setting out a detailed schedule of binding and enforceable milestones for mine rehabilitation (Schedule), and other rehabilitation requirements associated with PRC Plans.

Whitehaven WS is required to separately prepare a PRC Plan for the Project in accordance with the timeframes stated in a notice issued by DES after the grant of the EA. Whitehaven WS has developed the Project rehabilitation strategy in consideration of the Terms of Reference (ToR) and requirements of the *Guideline – Progressive rehabilitation and closure plans (PRC plans)* (DES, 2019) for transitional projects.

Accordingly, the Project has been designed to:

- Be rehabilitated to a safe and stable landform.
- Not cause environmental harm.
- Sustain a PMLU.

This approach is consistent with the 2021 Draft EIS, albeit that the optimised Project no longer contains any NUMAs as a PMLU has been proposed for all rehabilitation areas of the optimised final landform.

Notwithstanding, Table 7-1 provides proposed preliminary completion criteria for each rehabilitation area. These preliminary completion criteria would be reviewed and revised if necessary, in accordance with the *Guideline – Progressive rehabilitation and closure plans (PRC plans)* (DES, 2019) as part of developing the PRC Plan for the Project.

7.1.2 Project Final Landform

7.1.2.1 Alternative Final Landform Scenarios

DES and the OCG requested additional assessment of residual void rehabilitation scenarios, including:

- complete backfill of residual voids;
- partial backfilling above the groundwater level;
- covering of the exposed coal seams;
- best environmental management practice; and
- maximising the area of PMLUs.

Response

A comprehensive analysis and assessment of the alternative final landform scenarios requested by DES and the OCG is provided in Enclosure 1.

In response to feedback from regulatory and community stakeholders, Whitehaven WS has reviewed the Project mine plan and sequence with the aim of reducing the number of residual voids in the final landform (see Figures 7-1a to 7-1e); reducing the impacts of the Project on threatened species habitat and investigating uses for the residual void water bodies. The optimised final landform (Figure 7-1b), achieves this by:

1. Backfilling the South Pit mine void.
2. Providing a use for all remaining proposed residual voids, i.e. no NUMAs.
3. Reducing the overall surface disturbance extent by approximately 179 ha, with further minimised out-of-pit waste rock emplacements to reduce impacts to habitat for:
    a. the Koala (*Phascolarctos cinereus*) by approximately 145.7ha (approximately 46% reduction);
    b. Greater Glider (*Petauroides volans*) by approximately 34.3 ha (approximately 20% reduction); and
    c. Squatter Pigeon (southern subspecies) (*Geophaps scripta scripta*) by approximately 145.7 ha (approximately 56% reduction).
4. Smoothing low-walls to minimise slopes to approximately 10° or lower (Figure 7-1e).
5. Providing water supply to stock.
6. Re-establishing a post-mining surface water drainage that is sympathetic with the natural drainage lines.

The optimised final landform reduces the number of proposed residual voids, increases benefits to the Queensland community and presents a more usable and sustainable site post-mining.

The other alternatives would reduce the net economic benefits to the Queensland community associated with the Project for similar or worse environmental outcomes when compared with the optimised final landform.

Additionally, the increased rehabilitation and mine closure costs associated with the full backfill and partial backfill of all residual voids above the pre-mining groundwater level alternatives would reduce the financial viability and likelihood of the Project proceeding.

7.1.2.2 Groundwater Take Associated with Residual Voids

Concern that residual voids will drain groundwater in perpetuity.

Response

The groundwater numerical modelling undertaken for the revised Groundwater Assessment prepared by SLR Consulting (2022) predicts there would be negligible take from Groundwater Unit 1 (e.g. Isaac River alluvium) and from Groundwater Unit 2 (e.g. sub-artesian aquifers), as defined in the *Water Plan (Fitzroy Basin) 2011* under the *Water Act 2000*.

Table 7-1
Preliminary Completion Criteria for the PMLU Rehabilitation Areas

Rehabilitation Area	Rehabilitation Milestone	Rehabilitation Objective	Performance Indicator	Completion Criteria
Infrastructure Areas (RA1)	Safe (RM1)	Potential safety risks (e.g. risks associated with retained infrastructure) are identified and appropriately addressed so the site is safe.	Safety assessment (including risk assessment) prepared by a suitably qualified person. The safety assessment forms a part of the Project Post-mining Management Report.	The safety assessment concludes that the rehabilitated infrastructure areas and any retained infrastructure do not pose a safety risk.
	Stable (RM2)	Landform water management features functioning as designed and minimal presences of erosion.	Erosion monitoring data (erosion rates and sheets, rills and gully formation). Erosion monitoring data forms a part of the Project Post-mining Management Report.	Erosion monitoring data demonstrates the following for two years post-rehabilitation: ▪ Limited erosion (i.e. presence of sheet, rill and gully erosion) observed. ▪ Soil loss rates are comparable to relevant rehabilitation reference monitoring sites. ▪ Erosion maintenance requirements are comparable to relevant rehabilitation reference monitoring sites.
			Surface water quality monitoring data (e.g. pH, EC, heavy metal content, etc.). Surface water quality monitoring data forms a part of the Project Post-mining Management Report.	Receiving water quality monitoring results comply with the EA surface water quality criteria, for a period of at least two years post-rehabilitation.
	Non-polluting (RM3)	Potentially contaminated areas are remediated and are safe.	Contaminated land assessment prepared in accordance with the *Queensland auditor handbook for contaminated land* (DES, 2018) by a suitably qualified person. The contaminated land assessment forms a part of the Project Post-mining Management Report.	No contaminated land exists within the Project final landform.

Table 7-1 (Continued)
Preliminary Completion Criteria for the PMLU Rehabilitation Areas

Rehabilitation Area	Rehabilitation Milestone	Rehabilitation Objective	Performance Indicator	Completion Criteria
Infrastructure Areas (RA1) (Continued)	Able to sustain proposed PMLU (RM4)	Establish low-intensity cattle grazing land use. The post-mining Land Suitability Class is the same class as pre-mining.	Rehabilitation monitoring (e.g. erosion, soil physical and chemical parameters, organic matter and nutrient presence, cycling and vegetation dynamics, and habitat complexity and quality for woodland patches). Monitoring data forms a part of the Project Post-mining Management Report.	Rehabilitation monitoring demonstrates that: ▪ Physical, chemical and biological properties of the growth media are similar to relevant rehabilitation reference monitoring sites. ▪ Pasture vegetation comprises grass species suitable for grazing and comparable to relevant rehabilitation reference monitoring sites (e.g. Buffel Grass [*Cenchrus ciliaris*], Wiregrass [*Aristida sp*] and Kangaroo Grass [*Themeda triandra*]). ▪ Woodland patches comprise vegetation species diversity (and demonstrate generational succession) comparable to relevant rehabilitation reference monitoring sites, including monitoring sites within woodland patches of comparable low-intensity grazing land uses. ▪ Vegetation cover and densities are comparable to relevant rehabilitation monitoring reference sites for a period of at least two years post-rehabilitation. ▪ Weed diversity and abundance is comparable to relevant rehabilitation monitoring reference sites. ▪ Pests do not occur in substantial numbers (i.e. are not greater than relevant reference sites) or visibly affect the pasture and woodland vegetation development. ▪ The post-mining Land Suitability Class is the same class as pre-mining.
			Cattle stocking rate. Cattle stocking rate monitoring data forms a part of the Project Post-mining Management Report.	Cattle stocking rate monitoring demonstrates target stocking rate is approximately 0.4 adult equivalents per hectare (AE/ha) consistent with pre-mining stocking rates.
Waste Rock Emplacements (RA2)	Safe (RM1)	Potential safety risks are identified and appropriately addressed so the site is safe.	Safety assessment (including risk assessment) prepared by a suitably qualified person. The safety assessment forms a part of the Project Post-mining Management Report.	The safety assessment concludes that the rehabilitated waste rock emplacements do not pose a safety risk.

Table 7-1 (Continued)
Preliminary Completion Criteria for the PMLU Rehabilitation Areas

Rehabilitation Area	Rehabilitation Milestone	Rehabilitation Objective	Performance Indicator	Completion Criteria
Waste Rock Emplacements (RA2) (Continued)	Stable (RM2)	Rehabilitated waste rock emplacements within the final landform are geotechnically stable.	Geotechnical assessment of the rehabilitated waste rock emplacements prepared by a suitably qualified person. The geotechnical assessment forms a part of the Project Post-mining Management Report.	The geotechnical assessment concludes: ▪ Waste rock emplacement final landform slopes are approximately 10° or lower. ▪ The toe of out-of-pit waste rock emplacements is set back by an appropriate distance from the crest of residual voids and drainage systems installed to exclude surface water runoff from reporting to the residual voids. ▪ The final landform demonstrates the level of stability as specified in the design.
		Landform water management features functioning as designed and minimal presence of erosion.	Erosion monitoring data (erosion rates and sheets, rills and gully formation). Erosion monitoring data forms a part of the Project Post-mining Management Report.	Erosion monitoring data demonstrates the following for two years post-rehabilitation: ▪ Limited erosion (i.e. presence of sheet, rill and gully erosion) observed. ▪ Soil loss rates are comparable to relevant rehabilitation reference monitoring sites. ▪ Erosion maintenance requirements are comparable to relevant rehabilitation reference monitoring sites.
	Non-polluting (RM3)	Runoff and seepage from rehabilitated waste rock emplacements are a low risk of causing environmental harm.	Surface and groundwater quality monitoring data (e.g. sediment load, pH, heavy metal content, etc.). Surface and groundwater quality monitoring data forms a part of the Project Post-mining Management Report.	Receiving water quality monitoring results comply with EA water quality criteria, for a period of at least two years post-rehabilitation.
			Environmental risk assessment prepared by a suitably qualified person. The environmental risk assessment forms a part of the Project Post-mining Management Report.	The environmental risk assessment concludes that there is a low risk of environmental harm.
		Potentially contaminated areas are remediated and are safe.	Contaminated land assessment prepared in accordance with the *Queensland auditor handbook for contaminated land* (DES, 2018) by a suitably qualified person. The contaminated land assessment forms a part of the Project Post-mining Management Report.	No contaminated land exists within the Project final landform.

Table 7-1 (Continued)
Preliminary Completion Criteria for the PMLU Rehabilitation Areas

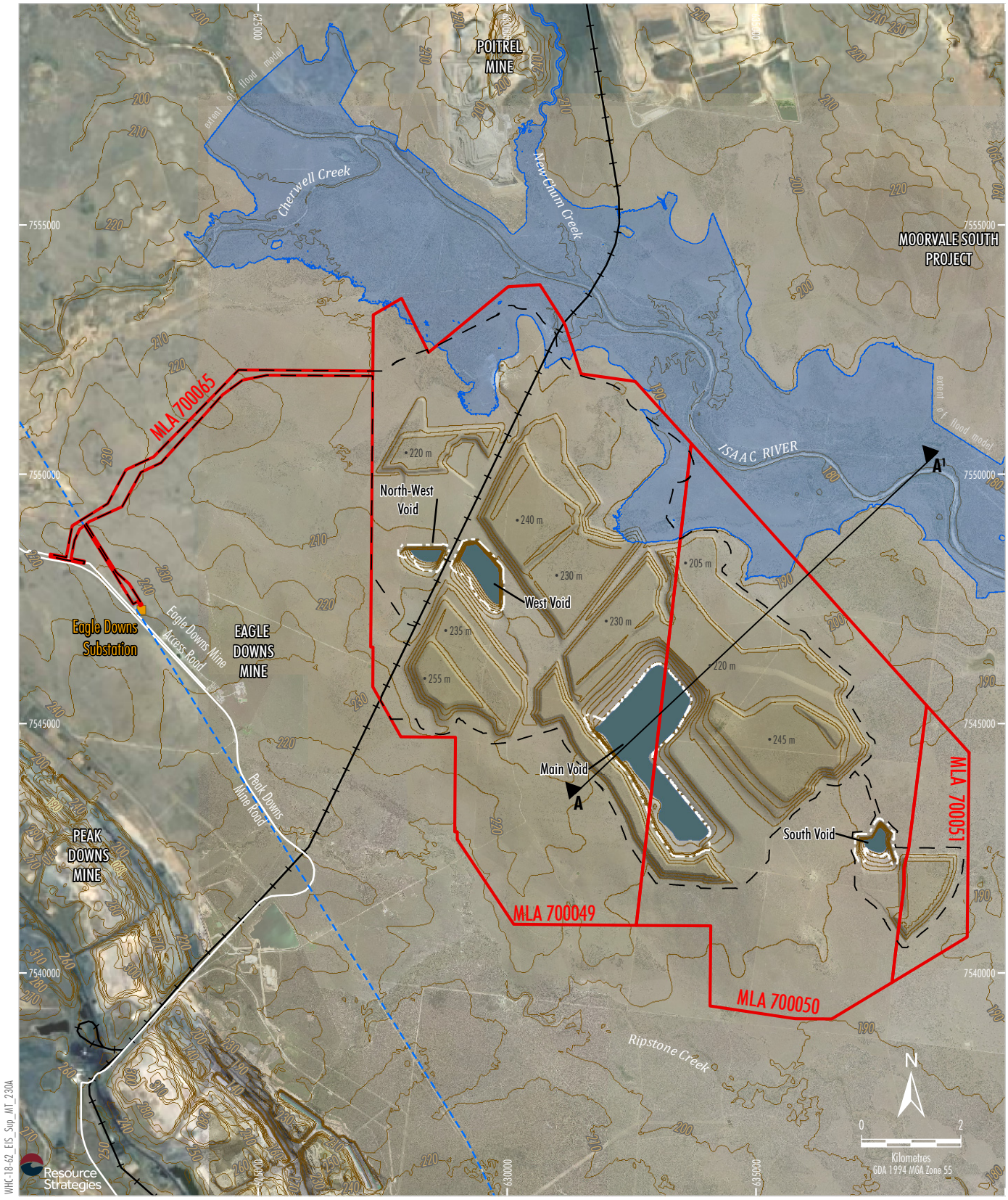
Rehabilitation Area	Rehabilitation Milestone	Rehabilitation Objective	Performance Indicator	Completion Criteria
Waste Rock Emplacements (RA2) (Continued)	Able to sustain proposed PMLU (RM4)	Establish low-intensity cattle grazing land use. The post-mining Land Suitability Class is Class 3 to 4 for Grazing and Class 5 for Cropping.	Rehabilitation monitoring (e.g. erosion, soil physical and chemical parameters, organic matter and nutrient presence, cycling and vegetation dynamics, and habitat complexity and quality for woodland patches). Monitoring data forms a part of the Project Post-mining Management Report.	Rehabilitation monitoring demonstrates that: ▪ Physical, chemical and biological properties of the growth media are similar to relevant rehabilitation reference monitoring sites. ▪ Pasture vegetation comprises grass species suitable for grazing and comparable to relevant rehabilitation reference monitoring sites (e.g. Buffel Grass [*Cenchrus ciliaris*], Wiregrass [*Aristida sp*] and Kangaroo Grass [*Themeda triandra*]). ▪ Woodland patches comprise vegetation species diversity (and demonstrate generational succession) comparable to relevant rehabilitation reference monitoring sites, including monitoring sites within woodland patches of comparable low-intensity grazing land uses. ▪ Vegetation cover and densities are comparable to relevant rehabilitation monitoring reference sites for a period of at least two years post-rehabilitation. ▪ Weed diversity and abundance is comparable to relevant rehabilitation monitoring reference sites. ▪ Pests do not occur in substantial numbers (i.e. not greater than relevant reference sites) or visibly affect the pasture and woodland vegetation development. ▪ The post-mining Land Suitability Class is Class 3 to 4 for Grazing and Class 5 for Cropping.
			Cattle stocking rate. Cattle stocking rate monitoring data forms a part of the Project Post-mining Management Report.	Cattle stocking rate monitoring demonstrates target stocking rate is approximately 0.4 AE/ha consistent with pre-mining stocking rates.

Table 7-1 (Continued)
Preliminary Completion Criteria for the PMLU Rehabilitation Areas

Rehabilitation Area	Rehabilitation Milestone	Rehabilitation Objective	Performance Indicator	Completion Criteria
Residual Voids (RA3)	Safe (RM1)	Potential safety risks are identified and appropriately addressed so the site is safe.	Safety assessment (including risk assessment) prepared by a suitably qualified person. The safety assessment forms a part of the Project Post-mining Management Report.	The safety assessment concludes: ▪ Safety perimeter bunding or fencing is installed around the crest of highwalls to prevent access by native fauna, livestock and people. ▪ The residual voids do not pose a safety risk.
	Stable (RM2)	Residual voids within the final landform are geotechnically stable.	Geotechnical assessment of the residual voids prepared by a suitably qualified person. The geotechnical assessment forms a part of the Project Post-mining Management Report.	The geotechnical assessment concludes: ▪ Residual void highwalls have been constructed as designed and are stable. ▪ In-pit waste rock emplacements that are not re-graded and rehabilitated as part of the PMLU have been constructed as designed and are stable. ▪ The toe of out-of-pit waste rock emplacements is set back by an appropriate distance from the crest of residual voids. Drainage systems are installed to design. ▪ The distance of the safety perimeter bunding or fencing installed around the crest of highwalls accommodates potential for degradation or slope failure over time. ▪ The final landform demonstrates the level of stability as specified by the design.
	Non-polluting (RM3)	Residual Voids are isolated from the Isaac River floodplain. Residual voids act as groundwater sinks.	Flood assessment prepared by a suitably qualified person. The flood assessment forms a of the Project Post-mining Management Report.	The flood assessment concludes that the residual voids are isolated from all flood events, up to and including a PMF event.
		Residual void water bodies have a low risk of environmental harm.	Surface water and groundwater quality monitoring data (e.g. EC, pH, etc). Surface water and groundwater quality monitoring data forms a part of the Project Post-mining Management Report.	Water quality monitoring results indicate residual voids are behaving as surface water and groundwater sinks at least two years post-rehabilitation.

Table 7-1 (Continued)
Preliminary Completion Criteria for the PMLU Rehabilitation Areas

Rehabilitation Area	Rehabilitation Milestone	Rehabilitation Objective	Performance Indicator	Completion Criteria
Residual Voids (RA3) (Continued)	Non-polluting (RM3) (Continued)	Residual void water bodies have a low risk of environmental harm.	Groundwater assessment prepared by a suitably qualified person. The groundwater assessment forms a part of the Project Post-mining Management Report.	The groundwater assessment concludes that the residual voids are acting as groundwater sinks, preventing the migration of potentially saline water into adjacent aquifers and watercourses.
			Residual void water balance prepared by a suitably qualified person. The residual void water balance forms a part of the Project Post-mining Management Report.	The residual void water balance concludes that the residual void lakes would equilibrate below the point at which they would spill to the surrounding environment.
			Environmental risk assessment prepared by a suitably qualified person. The environmental risk assessment forms a part of the Project Post-mining Management Report.	The environmental risk assessment concludes that there is a low risk of environmental harm.
	Able to sustain proposed PMLU (RM4)	Residual voids provide water supply for agriculture or other purposes. Establish low-intensity cattle grazing land use on low walls.	Surface water and groundwater quality monitoring data (e.g. EC, pH, etc). Rehabilitation monitoring (e.g. erosion, soil physical and chemical parameters, organic matter and nutrient presence, cycling and vegetation dynamics, and habitat complexity and quality for woodland patches). Monitoring data forms a part of the Project Post-mining Management Report.	For residual void water bodies, the water quality monitoring results indicate water quality is suitable for the PMLU for a period of at least two years post-rehabilitation. Rehabilitation monitoring demonstrates that low walls outside of the residual void water body demonstrates the RM4 completion criteria for Waste Rock Emplacements (RA2).



LEGEND

- Mining Lease Application Boundary
- Railway
- Eungella Water Pipeline Southern Extension
- Substation
- Indicative Surface Disturbance Extent
- Isaac River 0.1% AEP Flood Extent (Pre-mining)
- Indicative Extent of Non-Use Management Area
- Indicative Residual Void Waterbody

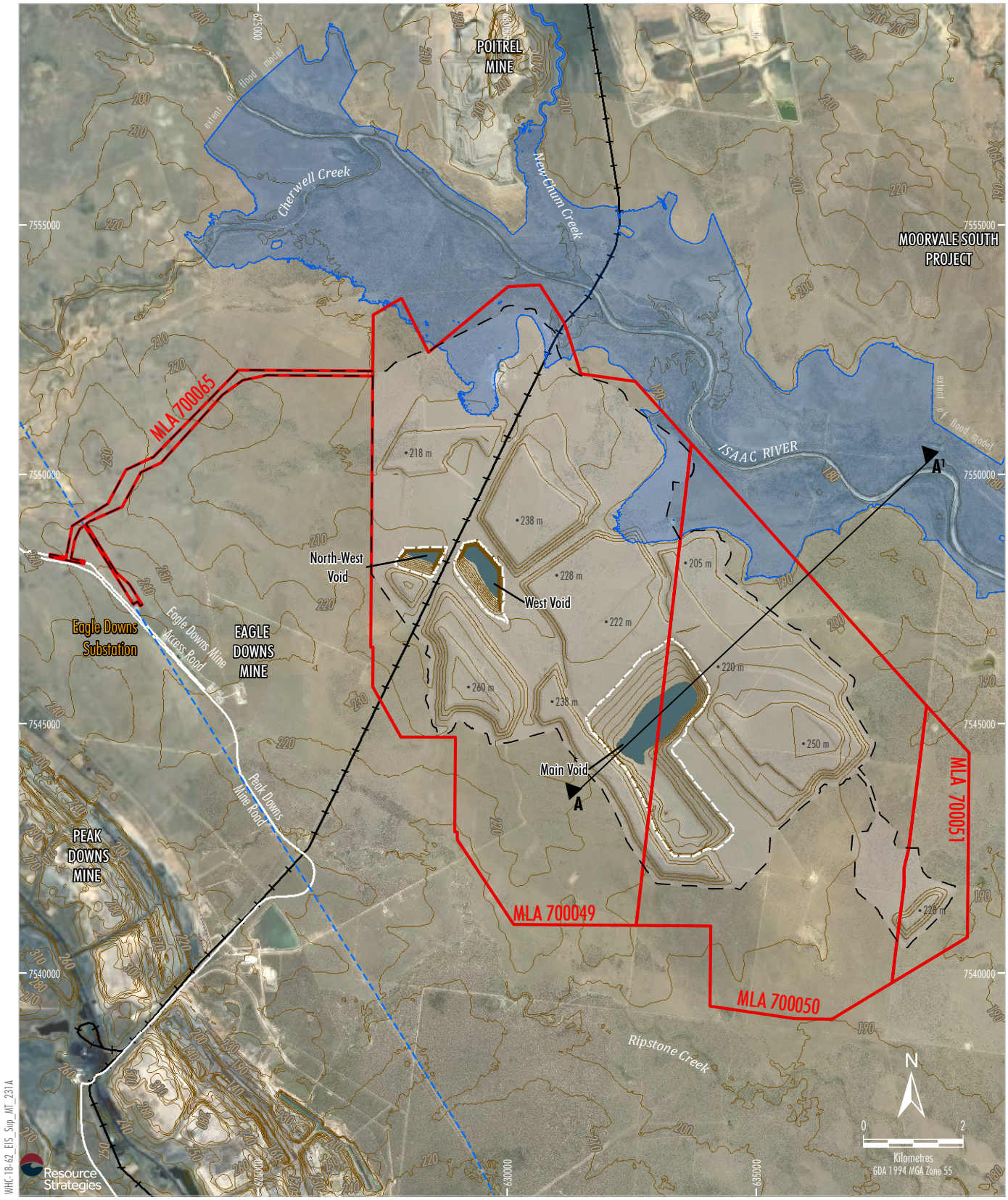
Source: The State of Queensland (2018 - 2020); Whitehaven (2022); WRM (2021)
Orthophoto: Google Image (2019); Whitehaven (2017)

WHITEHAVEN COAL

WINCHESTER SOUTH PROJECT

2021 Draft EIS Conceptual Final Landform

Figure 7-1a



LEGEND

- Mining Lease Application Boundary
- Railway
- Eungella Water Pipeline Southern Extension
- Indicative Surface Disturbance Extent
- Isaac River 0.1% AEP Flood Extent (Pre-mining)
- Indicative Residual Void Waterbody
- Indicative Extent of Water Storage
- Post-mining Land Use

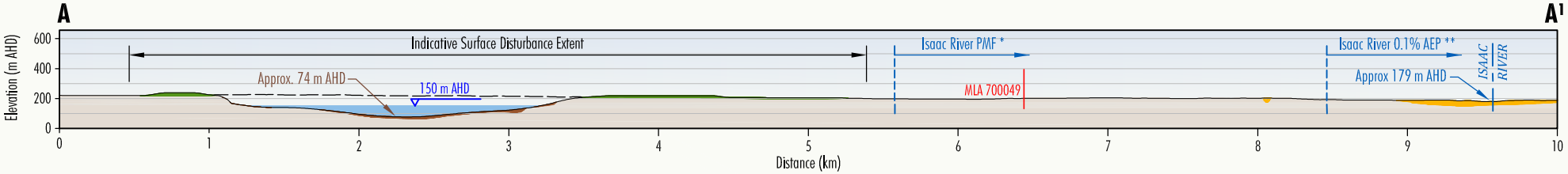
Source: The State of Queensland (2018 - 2020); Whitehaven (2022); Orthophoto: Google Image (2019); Whitehaven (2017)

WHITEHAVEN COAL

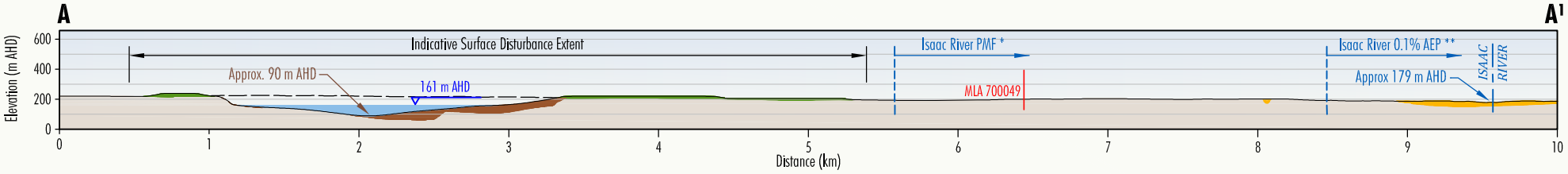
WINCHESTER SOUTH PROJECT

2022 Additional Information
Optimised Final Landform

Figure 7-1b



Optimised Final Landform (Refer to Figure 7-1b)



2021 Draft EIS Final Landform (Refer to Figure 7-1a)

* Isaac River Probable Maximum Flood Extent (PMF)
(Pre-mining and During Operations)

WHC-18-62_EIS_Sup_MT_102A

LEGEND

- Pre-mining Topography
- Indicative Final Landform Surface
- Isaac River Alluvium Extent
- In-pit Waste Rock Emplacement
- Out-of-pit Waste Rock Emplacement
- Residual Void Maximum Water Level

Scale 1 Horizontal : 1 Vertical

* Isaac River Probable Maximum Flood Extent (PMF)
(Pre-mining)

** Isaac River 0.1% AEP Flood Extent
(Pre-mining)

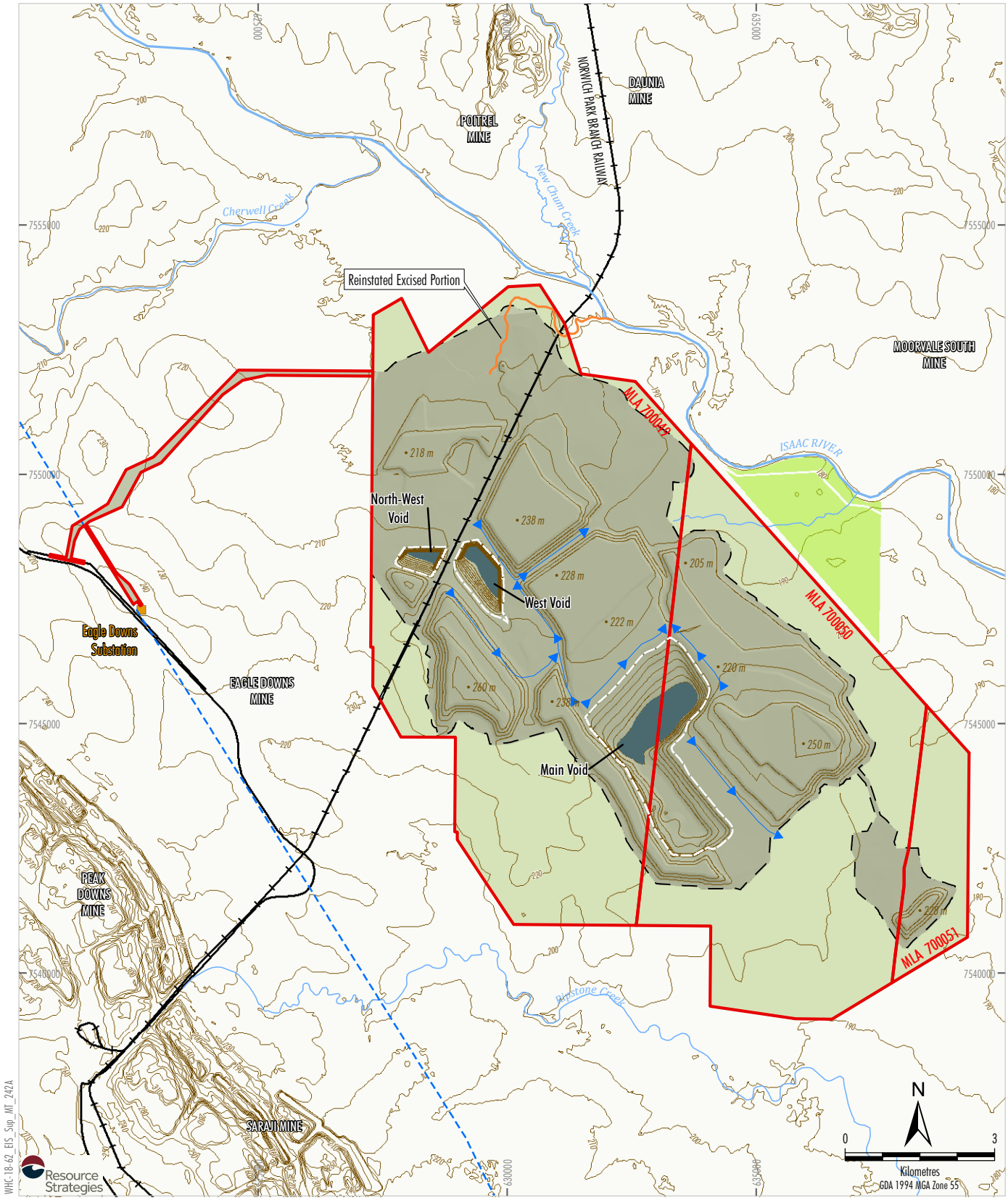
Source: The State of Queensland (2022); Whitehaven (2022)

WHITEHAVEN COAL

WINCHESTER SOUTH PROJECT

Indicative 2021 Draft EIS Final Landform and Optimised Final Landform Profiles Cross Section A - A¹

Figure 7-1c



LEGEND

- Mining Lease Application Boundary
- Indicative Surface Disturbance Extent
- Indicative Residual Void Waterbody
- Indicative Extent of Rehabilitation to Low-Intensity Grazing Post-Mining Land Use*
- Land Outside Indicative Surface Disturbance Extent with a Low-Intensity Grazing Post-Mining Land Use
- Contours (10 m)
- Indicative Extent of Water Storage Post-mining Land Use
- Watercourse (Water Act 2000)
- Indicative Surface Water Drain

Matters of State Environmental Significance

- Ground-truthed Waterways Providing for Fish Passage ^
- Wynette Offset Area

Source: The State of Queensland (2018 - 2020); Whitehaven (2020); ESP (2022)

*Note: * Should the Winchester Quarry remain at the end of the Project life, the PMLU for its extent would be quarrying and not low-intensity grazing.*

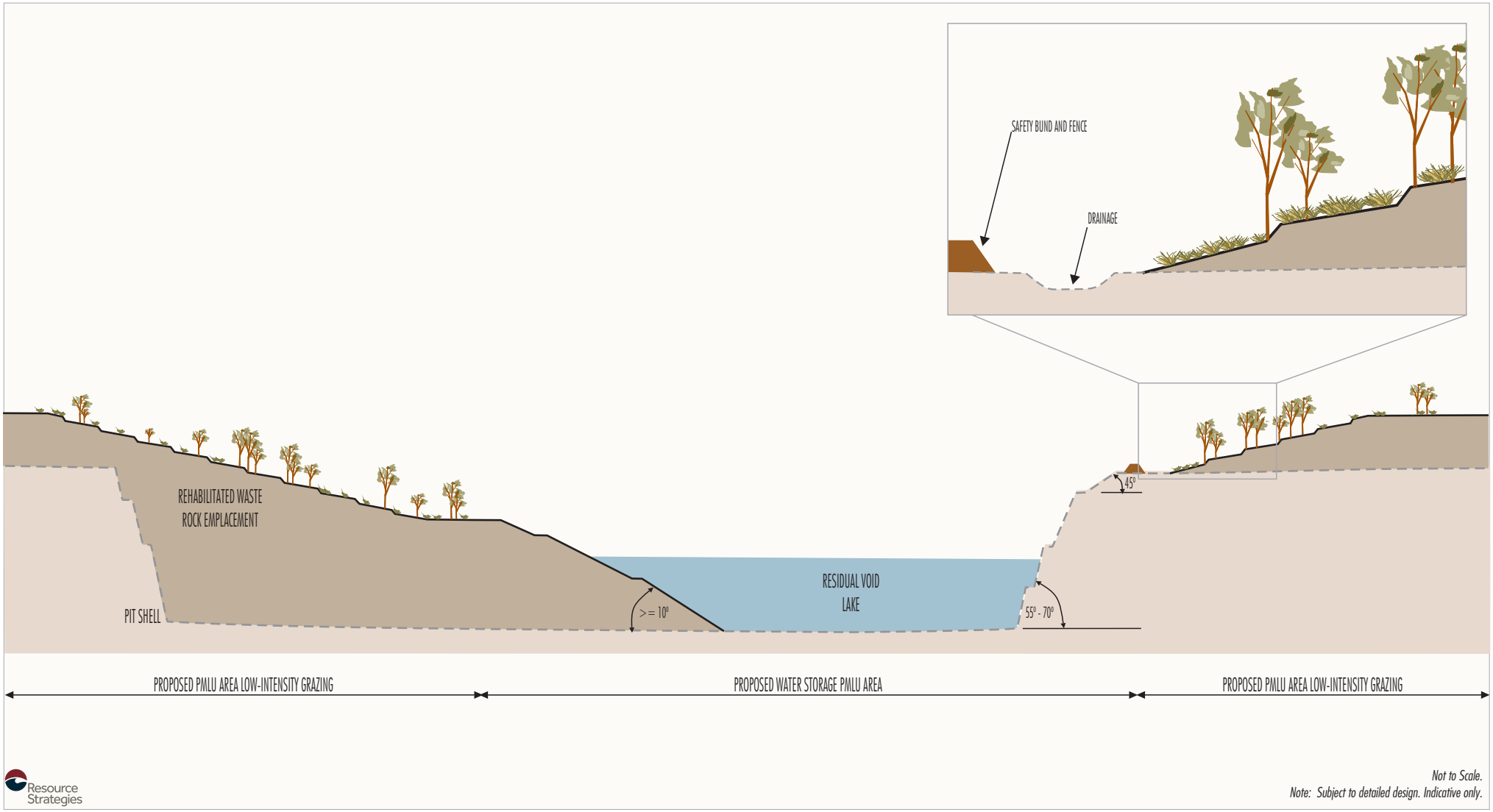
^ As stated in the Environmental Offsets Regulation 2014, any part of a waterway providing for passage of fish is a Matter of State Environmental Significance (MSES) only if the construction, installation or modification of waterway barrier works carried out under an authority will limit the passage of fish along the waterway.

WHITEHAVEN COAL

WINCHESTER SOUTH PROJECT

Conceptual Optimised Final Landform and Post-mining Land Use

Figure 7-1d



WHC-18-62_EIS_Sup_MI_002A

Resource Strategies

Source: Whitehaven (2020).

WHITEHAVEN COAL

WINCHESTER SOUTH PROJECT

Indicative Residual Void Cross-section

Figure 7-1e

7.1.2.3 Post-Mining Land Use for Residual Voids

DES requested a comprehensive assessment of potential PMLUs for the four residual voids.

Response

As discussed above, the optimised final landform involves backfilling South Pit mine void, resulting in three residual voids. Further analysis and detailed investigation has been undertaken for the remaining residual voids to assess the potential for a beneficial use.

The residual void modelling undertaken by WRM (2022) adopted a large number of climate sequences reflecting the full range of historical climatic conditions (e.g. including risk associated with extreme weather conditions) and provides an assessment of the system performance under very wet, very dry and average climatic conditions (WRM, 2022).

Water levels in the residual voids would vary over time, depending on the prevailing climatic conditions, and the balance between evaporation losses and inflows from rainfall, surface runoff, and groundwater. A GOLDSIM model was developed and used to assess the likely long-term water level behaviour of the residual voids, with the historical rainfall and evaporation sequences (133 years) repeated five times to create an indicative long-term climate record (WRM, 2022).

Salt occurring naturally in the Project groundwater systems and surface water runoff would also enter the residual voids. Evaporation from the residual void water bodies would lead to the accumulation of salt over time, however, water balance modelling predicts the following salinity levels for the residual void water bodies would generally range between (WRM, 2022):

- approximately 2,000 to 6,000 µS/cm for North-west Void (with a maximum of 18,000 µS/cm when the stored water volume is low);
- approximately 2,000 to 6,000 µS/cm for West Void (with a maximum of 8,500 µS/cm when the stored water volume is low); and
- approximately 1,000 to 4,000 µS/cm for Main Void (with a maximum of 6,500 µS/cm when the stored water volume is low).

For the optimised final landform, an opportunity was identified to beneficially re-use the water from the residual voids for agriculture or other purposes (e.g. water for cattle consumption), given the predicted salinity of the residual void water bodies.

Australian and New Zealand Guidelines for Fresh and Marine Water Quality (Australian and New Zealand Environment and Conservation Council [ANZECC], 2000) was used for guidance on livestock drinking water quality requirements, as the Australian and New Zealand Governments' (ANZG) guideline *Primary Industries – Livestock Drinking Water Guidance* (ANZG, in prep.) is currently not publicly available. ANZECC (2000) outlines that beef cattle can consume water with a salinity (e.g. total dissolved solids [TDS]) of up to 5,000 milligrams per litre (mg/L) (approximately 7,800 µS/cm) without loss to production. Furthermore, ANZECC (2000) outlines that sheep can consume water with a salinity (e.g. TDS) of up to 10,000 mg/L (approximately 15,600 µS/cm) without loss to production.

To quantify the beneficial use of water from the residual void for cattle, an approximate cattle carrying capacity was adopted based on existing site specific data and was applied to the MLA area. Therefore, in approximate terms, the MLA area would have a carrying capacity of 4,700 adult equivalent cattle, which would require 70 ML/year (based on a water consumption rate of 15,000 litres per year per adult equivalent cattle [ANZECC, 2000]).

The cattle consumption rate was incorporated into the residual void water balance for the optimised final landform and the final landform alternatives with suitable residual void water quality (e.g. covering exposed coal seams only, as partial backfilling above pre-mining groundwater level scenario is predicted to result in higher residual void water bodies salinities not suitable for cattle use).

The re-use of residual void water would also slow down the accumulation of salt in the residual voids, which may allow for a sustained PMLU without potential impacts to the surrounding environment.

Progressing this re-use opportunity would be subject to further feasibility assessment and design, in addition to identification, negotiation and agreement with the final water users.

7.1.2.4 *Proposed Non-Use Mining Areas for Final Landform*

DES requested detailed justification as to how retention of residual voids as NUMAs is in the public interest and the associated environmental risks. DES requested consideration of the potential PMLU that can be provided by the low walls and highwalls of the residual has not been given.

Response

Given the analysis and detailed investigation undertaken for the optimised final landform, NUMAs are not proposed for the Project. The low walls, highwalls and water bodies of the residual void would provide a PMLU as water storage infrastructure for agriculture or other purposes as shown on Figure 7-1d. The water bodies providing the water to be reused and the low walls and highwalls providing the infrastructure to retain the water.

7.1.2.5 *Management of Residual Voids*

DES requested details on any resultant risks and how the residual voids will be managed to ensure that the rehabilitated land will be safe, stable, not causing environmental harm and able to sustain the PMLU.

Response

Additional modelling was undertaken by WRM and is presented in the Surface Water and Flooding Assessment for the optimised final landform (Attachment 6). Each residual void lake is predicted to equilibrate at different levels. Each residual void water body is predicted to equilibrate at different levels. Maximum long-term equilibrated water levels are predicted to be up to approximately (WRM, 2022):

- 131 m AHD in North-west Void (78 m below the level at which overflows would reach the receiving environment);
- 109 m AHD in West Void (87 m below the level at which overflows would reach the receiving environment); and
- 149 m AHD in Main Void (59 m below the level at which overflows would reach the receiving environment).

Predicted equilibrated residual void water levels are predicted to be well below their respective full supply levels (i.e. the levels above which spill to the surrounding environment would occur) and the surrounding pre-mining groundwater levels, which means the residual voids would act as sinks to groundwater flow.

Salt occurring naturally in the Project groundwater systems and surface water runoff would also enter the residual voids. Evaporation from the residual void water bodies would lead to the accumulation of salt over time, however, water balance modelling predicts the following salinity levels for the residual void water bodies would generally range between (WRM, 2022):

- approximately 2,000 to 6,000 µS/cm for North-west Void (with a maximum of 18,000 µS/cm when the stored water volume is low);
- approximately 2,000 to 6,000 µS/cm for West Void (with a maximum of 8,500 µS/cm when the stored water volume is low); and
- approximately 1,000 to 4,000 µS/cm for Main Void (with a maximum of 6,500 µS/cm when the stored water volume is low).

The residual voids have been designed to avoid spills and present negligible risk of water within the residual voids interacting with the surrounding environment (including the surrounding groundwater systems) and therefore, would be safe, stable, not causing environmental harm. Furthermore, the PMLU of water storage infrastructure for agriculture or other purposes would allow for a sustained PMLU without potential impacts to the surrounding environment.

At equilibrium, the majority of the water stored within the residual voids is located within Main Void (around 89%), with around 10% stored within West Void and around 1% stored within North-west Void. If there are periods of low volume and elevated salinity post-mining in North-west and West Voids, the water could be pumped into the Main Void as a management measure, due to the significantly larger volume of lower salinity water within the Main Void (Attachment 6).

Under these circumstances, Main Void would still be able to supply suitable water quality, as the relatively small salt loads transferred from North-west Void and West Void would only have a minor impact on Main Void salinity. Pumping all the higher salinity water from North-west Void and West Void into Main Void would only increase Main Void salinity by approximately 100 µS/cm (on average) (Attachment 6).

7.2 ENVIRONMENTAL MATTERS

7.2.1 Groundwater

Agency Submissions

7.2.1.1 Water Availability

Concerns were raised by the Department of Regional Development Manufacturing and Water and DAF that there would be material impacts to regional water availability and water supply bores.

Response

Consistent with the Draft EIS, the numerical groundwater modelling predicted no privately-owned bores in the vicinity of the Project would experience more than 1 m drawdown (Attachment 5) hence, it is not expected the Project would have material impacts to water supply bores.

The Project would not directly intercept groundwater from the Quaternary alluvium, and therefore no direct take from Isaac Connors Groundwater Unit 1 (aquifers of the Quaternary alluvium) would occur from the mining operations. All direct groundwater take predicted by the model would be from Groundwater Unit 2 (sub-artesian aquifers) (Attachment 5).

Post-mining, the residual voids would accumulate water over time due to rainfall runoff and groundwater inflows. Evaporation from the water bodies that would form within the residual voids would also occur. The model predicted that there would be negligible direct or indirect take post-mining.

A significant proportion of site water requirements would be sourced from water collected on-site, including rainfall runoff and groundwater inflows to the open cut pits. Collected water would be stored in the mine-affected water storages for recycling and reuse (WRM, 2022).

Consistent with the Draft EIS, Whitehaven WS would source water from either an external water supplier (e.g. Sunwater) via a water supply pipeline or via water sharing with surrounding mining operations. Therefore, there would be no material impacts to regional water availability due to the Project.

7.2.1.2 Impacts to Groundwater System

Several submitters including DES, IESC and DAWE have raised concerns that there will be potential impacts on the alluvium and surrounding groundwater system due to the residual voids.

Response

In response to feedback from regulatory and community stakeholders, Whitehaven WS has reviewed the Project mine plan and sequence with the aim of reducing the number of residual voids in the final landform, which includes backfilling of the South Pit mine void for the optimised final landform.

Additional modelling and assessment was undertaken by SLR Consulting and WRM for the optimised final landform (Attachments 5 and 6, respectively), as well as assessment of the following requested final landform alternatives (Enclosure 1):

- Scenario 1: Full backfill of all residual voids.
- Scenario 2: Partial backfill of all residual voids above the pre-mining groundwater level.
- Scenario 3: Covering of exposed coal seams in the walls of all residual voids.

Following the cessation of mining at the Project, three residual voids would remain for the optimised final landform. Water levels in the residual voids would vary over time, depending on the prevailing climatic conditions, and the balance between evaporation losses and inflows from rainfall, surface runoff and groundwater (Attachment 6).

A GOLDSIM model (separate to the OPSIM model used for the operational modelling) was used to assess the likely long-term water level behaviour of the residual voids (Attachment 6). Each residual void water body is predicted to equilibrate at different levels.

Maximum long-term equilibrated water levels are predicted to be up to approximately (Attachment 6):

- 131 m AHD in North-west Void (78 m below the level at which overflows would reach the receiving environment);

- 109 m AHD in West Void (87 m below the level at which overflows would reach the receiving environment); and
- 149 m AHD in Main Void (59 m below the level at which overflows would reach the receiving environment).

The equilibrated residual void water levels are predicted to be well below their respective full supply levels (i.e. the levels above which spill to the surrounding environment would occur) and the surrounding pre-mining groundwater levels, which means the residual voids would act as groundwater sinks.

Furthermore, SLR Consulting (2022) (Attachment 5) undertook groundwater fate modelling (e.g. particle movement simulations) to simulate the flow of water throughout the backfilled spoil and residual voids of the optimised final landform. The particle movement simulation predicted that water within the backfill spoil and residual voids would remain within the optimised final landform in perpetuity with no water predicted to flow from the optimised final landform to the receiving environment (e.g. demonstrating residual voids would remain groundwater sinks in perpetuity).

To assess the risk of potential density-driven flow resulting in saline water migrating from the residual voids to the surrounding groundwater system, the long-term equilibrated water levels were converted to 'equivalent freshwater heads'. The calculated equivalent freshwater head can be compared to water level elevations in the surrounding groundwater system to determine if there is a gradient away from the residual void water bodies (Attachment 3).

The calculated equivalent freshwater heads are less than 1 m above the long-term equilibrated water levels. The surrounding groundwater levels remain well above the calculated equivalent freshwater heads and therefore the risk of density-driven flow is considered negligible (Attachment 3).

The requested final landform alternatives are assessed in Enclosure 1. In summary, Scenarios 1 and 2 represent a risk of water flowing from the final landform off-site. The water modelling results for Scenario 3 are not materially different to the optimised final landform (i.e. residual voids would remain groundwater sinks, with negligible risk of off-site water quality impacts).

7.2.1.3 Adequacy of Groundwater Assessment

DES raised concerns regarding the consistency of the Groundwater Assessment in relation to current State guidelines and legislative requirements. DES also requested further information on cumulative impacts to groundwater quality.

Response

The Groundwater Assessment prepared for the Draft EIS (SLR Consulting, 2021) and the Groundwater Assessment prepared for the Additional Information (SLR Consulting, 2022) have been prepared in accordance with the following contemporary guidelines and requirements:

- *Australian Groundwater Modelling Guidelines* (Barnett et al., 2012);
- *Murray-Darling Basin Commission – Groundwater Flow Modelling Guideline* (Middlemis et al., 2001);
- *Requirements for site-specific and amendment applications—underground water rights* (DES, 2016a);
- *Underground water impact reports and final reports* (DES, 2017);
- *Application requirements for activities with impacts to water (ESR/2015/1837) (Version 4.04)* (DES, 2021a);
- *Information guidelines for proponents preparing coal seam gas and large coal mining development proposals* (IESC, 2018a);
- *Information Guidelines explanatory note. Uncertainty analysis—Guidance for groundwater modelling within a risk management framework* (IESC, 2018b); and
- *Information Guidelines Explanatory Note. Assessing groundwater-dependent ecosystems* (Doody et al., 2019).

The numerical groundwater model was developed based on the conceptual groundwater model (Attachment 5). The model was developed using Geographic Information Systems (GIS) in conjunction with MODFLOW-USG, which is distributed by the United States Geological Survey (USGS). MODFLOW-USG is a relatively new version of the popular MODFLOW code (McDonald and Harbaugh, 1988) developed by the USGS. MODFLOW is the most widely used code for groundwater modelling and has long been considered an industry standard.

Model geometry has been adopted from the numerical groundwater model for the Olive Downs Project (HydroSimulations, 2018) as updated for the Moorvale South Project (SLR Consulting, 2019). Further revisions were incorporated into the numerical groundwater model for the Project, including the expansion of the model domain to the north-west. Calibration of the model undertaken to replicate the groundwater levels measured in the Olive Downs Project, Moorvale South Project, Eagle Downs Mine and the Project groundwater monitoring networks and available privately-owned bores, in accordance with *Australian Groundwater Modelling Guidelines* (Barnett et al., 2012).

Barnett et al. (2012) also developed a system within the modelling guidelines to classify the confidence level for groundwater models. The numerical groundwater model for the Project would be classified as a Confidence Level 2 (Class 2) groundwater model, which is appropriate for an EIS.

Finally, the peer review of the Groundwater Assessment (including peer review of the numerical groundwater model) conducted by Dr Noel Merrick concluded:

> *The reviewer concurs with the entire modelling methodology described in Document #2 and recognises it as "state-of-art".*

Where Document #2 refers to the Groundwater Assessment for the Draft EIS undertaken by SLR Consulting.

SLR Consulting (2022) undertook an additional review of the groundwater assessments for surrounding operations (Moorvale South Project and Olive Downs Project) to assess a likelihood for cumulative water quality impacts (Attachment 5).

The groundwater assessments for Olive Downs Project (HydroSimulations, 2018) and Moorvale South Project (SLR Consulting, 2019) each identified no water quality impacts as a result of each project. Therefore, given no groundwater quality impacts are identified for the Project, it is unlikely there would be cumulative impacts to the water quality of the surrounding groundwater systems (Attachment 5).

7.2.1.4 Recovery Period

DAWE and IESC raised concerns that the modelling of post-mining groundwater levels in the coal seams have not considered a range of recovery periods or uncertainties in modelling.

Response

Attachments 3 and 4 provide detailed responses to the IESC and DAWE.

7.2.1.5 Groundwater Monitoring Network

Several submitters including DAWE, DES and IESC requested additional information on groundwater quality indicators and management measures that would be incorporated into the Groundwater Monitoring Network. The IESC also recommended additional groundwater monitoring is undertaken in the regolith.

Response

Consistent with the standard conditions of an EA, a Water Management Plan would be established for the Project. The Water Management Plan would include site-specific trigger levels values for groundwater quality. Groundwater quality triggers would be established to monitor predicted impacts on both environmental values and predicted changes in groundwater quality.

Groundwater would continue to be monitored for the following existing parameters:

- Water level.
- pH, EC, TDS, total suspended solids (TSS) and Sulphate.
- Major Ions (Ca, F, Mg, K, Na, Cl, SO_4), hardness and ionic balance (total anions/cations).
- Total alkalinity as calcium carbonate ($CaCO_3$), HCO_3, carbonate (CO_3).
- Total and dissolved metals (Ag, Al, As, B, Ba, Be, Cd, Co, Cr, Cu, Fe, Hg, Pb, Mn, Mo, Ni, Se, U, V and Zn).
- Nutrients (Total nitrogen, nitrogen oxides, ammonia, phosphate).
- Organics (total petroleum hydrocarbons C_6-C_{40}).

Whitehaven WS would also commence monitoring for turbidity, nitrate, dissolved inorganic nitrogen (DIN) and fluoride.

Furthermore, as recommended by the IESC and SLR Consulting (2022), additional bore monitoring the for the regolith groundwater unit in the vicinity of the Project would be installed and incorporated into the groundwater monitoring program for the Project.

7.2.1.6 Conceptualisation of Groundwater Model

DAWE and IESC raised concern regarding impacts to groundwater recharge and discharge in the Project area as a result of excision of ephemeral creeks has not been considered. In addition to this, both agencies raised concern regarding the conceptualisation of the groundwater system not being adequate.

Response

Attachments 3 and 4 provide detailed responses to the IESC and DAWE regarding the conceptualisation of the groundwater systems and potential impacts to groundwater recharge and discharge in the Project area as a result of excision of ephemeral creeks. Attachment 5 also provides an updated conceptualisation of the groundwater model.

7.2.1.7 Impacts to GDEs

DAWE and IESC raised concern regarding the impacts to GDEs and potential drawdown impacts on GDEs not being fully understood.

Response

Attachments 3 and 4 provide detailed responses to the IESC and DAWE regarding potential likelihood of occurrence and potential impact to GDEs. In summary, based on extensive field surveys and site-specific data (e.g. TEM survey), an assessment of likely dependence of groundwater and the potential impacts on the following ecosystems were assessed in the 2021 Draft EIS:

- Ecosystems dependent on the sub-surface presence of groundwater (i.e. terrestrial GDEs, including some riparian vegetation communities):
  - riparian vegetation along Isaac River and Cherwell Creek;
  - vegetation associated with wetlands on the Isaac River floodplain and tributaries;
  - vegetation on the Isaac River floodplain and tributaries (outside of wetlands);
  - vegetation in the vicinity of the Project mapped as having low potential for groundwater interaction (e.g. various patches of woodland to the north and east of the Project); and
- Ecosystems dependent on the surface-expression of groundwater (i.e. aquatic GDEs):
  - aquatic in-stream ecosystems associated with the Isaac River and Cherwell Creek; and
  - wetlands and farm dams in the vicinity of the Project.

Consistent with the Draft EIS, including Appendix F of the Draft EIS that provides a standalone assessment of GDEs, the Project is not predicted to have any material impacts on potential or actual GDEs due to changes in groundwater quality or groundwater resources.

NGO and Public Submissions

Several submitters raised similar concerns to those raised in agency submissions, including:

- general concerns regarding potential impacts of the Project on water resources; and
- the adequacy of the groundwater monitoring network, particularly in the alluvium and regolith.

These issues have been addressed above and are not reproduced in this section.

7.2.1.8 Groundwater Modelling Accuracy and Confidence Level

Several submitters raised concerns regarding the accuracy of the groundwater model. Several submitters have raised concerns regarding the confidence level of the groundwater model not being adequate (including recommending that a Class 1 groundwater model should be developed).

Response

The numerical groundwater model was developed based on the conceptual groundwater model (Attachment 5). The model was developed using GIS in conjunction with MODFLOW-USG, which is distributed by the USGS. MODFLOW-USG is a relatively new version of the popular MODFLOW code (McDonald and Harbaugh, 1988) developed by the USGS. MODFLOW is the most widely used code for groundwater modelling and has long been considered an industry standard.

Model geometry has been adopted from the numerical groundwater model for the Olive Downs Project (HydroSimulations, 2018) as updated for the Moorvale South Project (SLR Consulting, 2019). Further revisions were incorporated into the numerical groundwater model for the Project, including the expansion of the model domain to the north-west. The model is roughly 65 km x 70 km at its widest extents and comprises a maximum of 72,700 cells per layer. The model domain is discretised into 14 layers representing key geological units within the alluvium, regolith, Rewan Group, Rangal Coal Measures, Fort Cooper Coal Measures and Moranbah Coal Measures. Over the 14 model layers, with pinch out areas (where a layer is not present) in Layers 3 to 14, the total cell count for the model is 787,789.

The model grid has been developed as a Voronoi mesh, with cells aligned and variably sized to focus on key features such as rivers, mine areas and faults.

The numerical model includes a steady-state calibration (pre-2006) and transient calibration (2006 to 2021). Both the steady-state and transient calibrations capture historical mining at Peak Downs, Caval Ridge, Saraji, Lake Vermont, Eagle Downs, Poitrel and Daunia Mines. Mining was represented in the model using the MODFLOW drain package, with the drain cells set to the base of the target coal seam for each open cut pit and within the target coal seam for underground mines. Calibration of the model undertaken to replicate the groundwater levels measured in the Olive Downs Project, Moorvale South Project, Eagle Downs Mine and the Project monitoring networks and available privately-owned bores, in accordance with *Australian Groundwater Modelling Guidelines* (Barnett et al., 2012).

Steady-state calibration for the model achieved a 5.3% scaled root mean square (SRMS) error, which is within the acceptable limits (i.e. 10%) recommended by Barnett et al. (2012). Observations from recently installed Project monitoring bores have been included in the transient calibration statistics. Project monitoring bore residuals were calculated as the difference between the observed water level and simulated head for the corresponding time period in the predictive model. With the Project monitoring bores residuals included, the transient calibration achieved an 2.4% SRMS error, which is well within the acceptable limit of 10% SRMS error.

Barnett et al. (2012) also developed a system within the modelling guidelines to classify the confidence level for groundwater models. Models are classified as Class 1, Class 2 or Class 3 in order of increasing confidence based on key indicators such as available data, calibration procedures, consistency between calibration and predictive analysis and level of stresses (Class 1 being the lowest model confidence and Class 3 being the highest). The numerical groundwater model for the Project would be classified as a Confidence Level 2 (Class 2) groundwater model, which is appropriate for an EIS. The Class 2 groundwater model classification exceeds the Class 1 groundwater model classification recommended by the submitters.

A comprehensive Type 3 Monte Carlo uncertainty analysis was undertaken in accordance with the methodology recommended by the IESC in *Uncertainty analysis—Guidance for groundwater modelling within a risk management framework* (Middlemis and Peeters, 2018).

Dr Noel Merrick in the peer review of the Groundwater Assessment reviewed the outcomes of the uncertainty analysis and concluded:

> *A comprehensive IESC-compliant Type-3 uncertainty analysis has been undertaken by means of a monte carlo technique, using 257 alternative calibrated realisations out of a trial set of 1,400 selections. The parameters subject to variation were horizontal hydraulic conductivity, hydraulic conductivity anisotropy, specific yield, specific storage and diffuse recharge.*
>
> *…*
>
> *The groundwater modelling has been conducted to a very high standard and a rigorous monte carlo uncertainty analysis offsets much of the uncertainty that is inherent in a groundwater model, as noted in the Limitations Section 9 of Document #1.*

Finally, the peer review of the Groundwater Assessment (including peer review of the numerical groundwater model) conducted by Dr Noel Merrick concluded:

> *The reviewer concurs with the entire modelling methodology described in Document #2 and recognises it as "state-of-art".*

Where Document #2 refers to the Groundwater Assessment undertaken by SLR Consulting.

7.2.1.9 Location of Water Supply Bores

A submitter requested further information regarding the location of water supply bores and the aquifers that are being sourced.

Response

The location of water bores identified in the vicinity of the Project is shown on Figure 5-24 of the Groundwater Assessment (Attachment 5). Aquifers accessed by these bores are discussed in Section 5.6.1 of the Groundwater Assessment (Attachment 5).

Full results of the relevant bore census surveys are provided in Appendix A4 of the Groundwater Assessment (Attachment 5).

7.2.2 Surface Water and Flooding

Agency Submissions

7.2.2.1 Site Water Management System

DES questioned the classification of water storages as sediment dams rather than mine-affected water dams.

Response

Whitehaven WS has addressed concerns regarding the classification of sediment dams and mine-affected water dams in separate correspondence to DES and OCG in March 2022 and May 2022.

On 2 August 2022 and 12 August 2022, Whitehaven WS, DES and the OCG held teleconferences to address comments received from DES on the sediment dams and mine-affected water dams assessment which has been address in Attachment 6.

In consideration of feedback from DES, additional mitigation measures, management and monitoring proposed minimise potential impacts on the receiving environment from sediment dam overflows.

The maximum modelled increases in downstream Isaac River salinity typically occur when a sediment dam overflow occurs during lower flow conditions in the Isaac River (less than 50 ML/day), as there is less dilution capacity available within the Isaac River flow. Therefore, the following management and mitigation measures are proposed if the Isaac River flow is less than 50 ML/day and/or the salinity within a sediment dam is greater than 2,000 µS/cm (Attachment 6):

- pump back the sediment dam to the water management system; or
- treat the sediment dam water through flocculation prior to discharge.

With the implementation of this mitigation strategy, the potential impact of sediment dam discharges on the Isaac River salinity would be negligible.

7.2.2.2 Water Management Infrastructure and Loss of Waterways

A range of submitters including DES, DAWE and IESC have requested additional information on the proposed water management infrastructure, in particular, the erosion and sediment controls.

Response

The Project water management system is described in Attachment 6, including the surface water management principles/objectives and an overview of key water management infrastructure. This level of detail is considered appropriate for determining the potential impacts of the Project on the downstream environment.

Details of sizing and placement of erosion and sediment controls would be finalised during detailed design of the Project. Further detail regarding erosion and sediment control structures will be provided prior to commencement in an ESCP, once detailed engineering designs of Project components are available. The ESCP will describe the measures that are proposed to monitor and maintain erosion and sediment control structures.

As described in Attachment 6, the ESCP will adopt the three cornerstones of erosion and sediment control:

- Drainage control – prevention or reduction of soil erosion caused by concentrated flows and appropriate management and separation of the movement of diverted and surface water through the area of concern.
- Erosion control – prevention or minimisation of soil erosion caused by rain drop impact and exacerbated overland flow on disturbed surfaces.
- Sediment control – trapping or retention of sediment within runoff.

The loss of catchment flows in the Isaac River and Ripstone Creek due to catchment excised within the Project water management system would be indiscernible (Attachment 6).

7.2.2.3 Changes to Flow Durations

DAF, DAWE and IESC have raised concerns that changes to flow durations and waterholes within the Isaac River and other impacted waterways as a result of groundwater drawdown and catchment excision.

Response

The Isaac River is ephemeral in nature, with flows following rainfall events that generate runoff. The Isaac River is largely a losing system with seepage of surface water into the underlying alluvium (Attachment 5). Changes to water levels induced by mining activities for the Project would increase the hydraulic gradient between the Isaac River and associated alluvium.

The numerical groundwater model conservatively predicted the rate of seepage from the Isaac River to the underlying alluvium would increase by less than 4 ML/year over the life of the Project (Attachment 5). When the Isaac River flows, an average of 161,863 ML/year of surface water is discharged downstream.

Therefore, the increased seepage from the Isaac River to the alluvium due to the Project would be insignificant (Attachment 5).

During mining operations, the water management system would capture runoff from areas that would have previously flowed to the receiving waters of the Isaac River and Ripstone Creek. The estimated maximum captured catchment areas during the Project are provided in Attachment 6. The maximum catchment areas excised by the Project represent:

- up to approximately 1% of the Isaac River catchment (to the confluence with Ripstone Creek); and
- up to approximately 4.5% of the Ripstone Creek catchment (to the confluence with the Isaac River).

The loss of catchment flows in the Isaac River and Ripstone Creek during the Project would be indiscernible. Therefore, the potential impact on water quantity in the Isaac River and Ripstone Creek due to the excision of catchment during the Project is considered to be negligible (Attachment 6).

At the completion of mining, surface runoff from rehabilitated in-pit and out-of-pit waste rock emplacement areas would flow to the receiving environment. An area of approximately 13.7 km^2 would report to the residual voids at the completion of mining. The changed topography following completion of the Project would have the following impacts on catchment areas:

- The catchment draining to the Isaac River (to the confluence of the Isaac River and Ripstone Creek) would reduce by approximately 13.7 km^2 (compared to pre-mining conditions), a decrease of less than 0.3%.
- The catchment draining to Ripstone Creek would reduce by around 4.3 km^2 (compared to pre-mining conditions), a decrease of less than 1.5%.

It should be noted that due to the revised mine planning (e.g. backfilling of the South Pit mine void), the catchment excision from the Isaac River and Ripstone Creek associated with the optimised final landform for the Project has been reduced by 0.6 km^2 and 3.2 km^2, respectively, in comparison to the final landform proposed for the Draft EIS.

As such, the loss of catchment flows in the Isaac River and Ripstone Creek would be indiscernible and hence, the potential impact on water quantity in Isaac River and Ripstone Creek due to the final landform is considered negligible (Attachment 6).

7.2.2.4 Water Quality

Several submitters have raised concerns regarding the potential impacts of controlled releases and sediment dam overflows on downstream watercourses, including the Isaac River and Ripstone Creek.

DES also recommended that receiving water monitoring locations should be established on Ripstone Creek to monitor the effects of sediment dam overflows.

Response

Controlled releases from the mine water management system would occur rarely and only when the water quality and flows of the Isaac River meet the proposed release trigger levels. Therefore, it is expected that these controlled releases would have negligible impacts on the Isaac River water quality (WRM, 2022). Chart 7-1 shows a ranked plot of modelled Isaac River salinity during controlled release events and provides, on controlled release days the controlled releases will have a negligible impact on the Isaac River salinity (WRM, 2022).

The assessment indicated that the receiving river flow is, at minimum, more than 400 times larger than the controlled release flow for all model iterations. Therefore, controlled releases would have a negligible impact on Isaac River water quality (WRM, 2022). To minimise the potential for mine-affected water releases, the Project would utilise the Railway Pit and Main Pit as in-pit water storages when available.

With respect to sediment-laden water, a 'best practice' approach would be adopted for the design of erosion and sediment controls that is consistent with the IECA recommendations.

In rainfall events below the design standard of the sediment dams, runoff from disturbed areas would be intercepted and treated by sediment dams. In larger events that exceed the design standards, these dams would overflow. Temporary storage within the sediment dams prior to overflow would reduce suspended sediment concentrations through settlement of sediment particles (WRM, 2022).

Available geochemical information indicates that the runoff draining to the sediment dams would have low to moderate salinity. Overflows would only occur during significant rainfall events which would also generate large volumes of runoff from surrounding undisturbed catchments. Therefore, it is unlikely that sediment dam overflows would have a measurable impact on receiving water quality or environmental values (WRM, 2022).

The Surface Water and Flooding Assessment (WRM, 2022) included a comprehensive assessment of the potential impacts of sediment dam overflows, including modelling of the salinity of the sediment dam overflows and receiving Isaac River. WRM (2022) concluded the following which is represented in Chart 7-2.

The sediment dam overflow would have a negligible impact on the Isaac River quality with additional mitigation measures proposed as outlined in Section 5.6.4 and 7.2.2.

Potential impacts of the proposed releases on the downstream tributaries were assessed in the Geomorphology Technical Study (Appendix F of Appendix B of the Draft EIS). The Geomorphology Technical Study was prepared by Dr Christopher Gippel and included a comprehensive review of the geomorphology of the tributaries downstream of the proposed discharge points. The Geomorphology Technical Study describes the proposed monitoring and management strategy for the tributaries, which would be undertaken using objective, scientifically sound methods, following a BACI design. Visual inspections and would be undertaken following each controlled release event. A topographic survey (using LiDAR) would be undertaken if either of the following are observed:

- a channel exceeding 0.2 m deep for a length of 10 m or more; or
- initiation of a knickpoint higher than 0.3 m.

Appropriate mitigation measures would be applied in response to any observed geomorphic impacts. The appropriate mitigation would be assessed at the time and would range from do nothing (self-healing), to assisted recovery (e.g. plant vegetation and soft engineering such as coir matting and stakes), to hard-engineering (e.g.rock rip-rap) (Fluvial Systems, 2020).

Notwithstanding the above, an ESCP and Water Management Plan would be developed and implemented throughout construction and operation of the Project. If implemented effectively, environmental risks from disturbed area runoff (i.e. sediment-laden runoff) are expected to be low (WRM, 2022). The Water Management Plan for the Project would also include a program for monitoring and review of the effectiveness of the Water Management Plan.

Chart 7-1
Ranked Plot of Isaac River Salinity during Controlled Releases

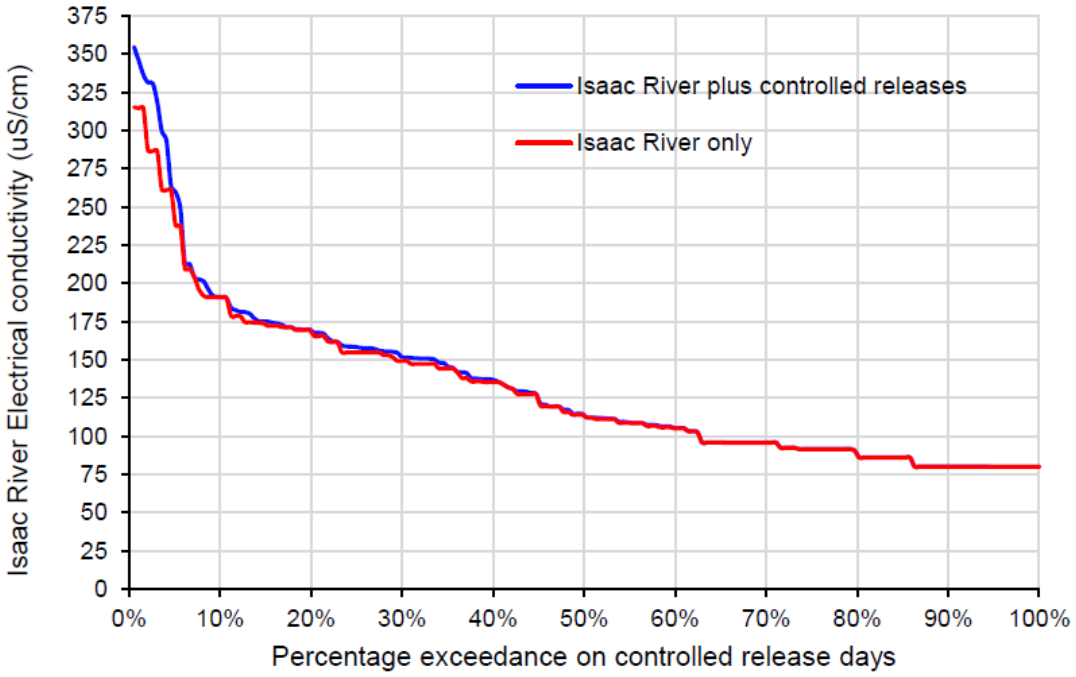
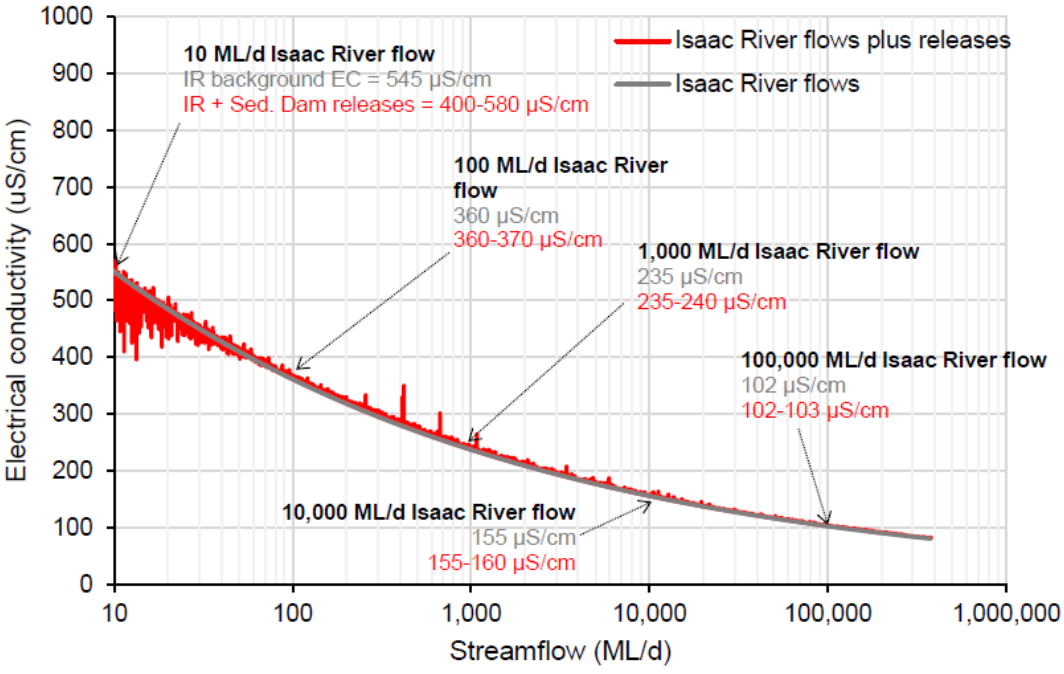


Chart 7-2
Analysis of Sediment Dam Overflows on Isaac River Water Quality



7.2.2.5 Post-mining Flooding

DES raised concerns regarding the removal of flood levees post-mining, including potential long-term erosion risk to the final landform.

Response

WRM (2022) has undertaken modelling of the flood levels and velocities in the vicinity of the Project final landform (Attachment 6). In summary:

- The Isaac River has minimal interaction with the final landform during a 1% AEP event.
- The peak velocity along the interface between the flood extent and the final landform is generally less than 0.3 metres per second (m/s) during a 0.1% AEP event.

While the peak flood velocities at the boundary are not considered excessive, appropriate scour protection measures would be considered as part of the final landform detailed design process (Attachment 6).

7.2.2.6 Flooding in Isaac River Tributaries

DAF requested clarification on potential impacts to flooding in the ephemeral tributaries of the Isaac River that are downstream of the Project, including for potential impacts on fish passage during floods that are more frequent than the 5% AEP.

Response

Consistent with the Draft EIS, there would be no significant impacts on flood levels and velocities in the Isaac River channel and floodplain during operations and post-mining (Attachment 6).

The Project would only interact with the Isaac River for the rarer flood events (1% AEP and rarer design events), with the impacts identified on the Isaac River floodplain for these rare events generally localised and relatively minor in magnitude (Attachment 6). During these events, the tributaries of the Isaac River are inundated by backwater flows from the Isaac River and, therefore, potential impacts on flood levels and velocities in these tributaries has been assessed in Attachment 6.

There would be no impacts on flood levels and velocities in Ripstone Creek, as the Project is located well outside of the Ripstone Creek floodplain.

Potential impacts on fish passage have been assessed in the Additional Information Aquatic Ecology and Stygofauna Baseline Report (ESP, 2022a) (Attachment 9).

7.2.2.7 Consequence Category Assessment

DES have raised concerns regarding the Consequence Category Assessment with reference to the State guideline requirements.

Response

The Surface Water and Flooding Assessment (Attachment 6) for the Project provided a preliminary Consequence Category Assessment (WRM, 2022) for the three mine-affected water dams that may discharge to the receiving environment:

- Mine Water Dam;
- MIA Dam; and
- Coal Contact Dam.

All proposed mine affected water dams which overflow internally (i.e. do not discharge to the receiving environment) have been assigned a preliminary category of low consequence due to the low risk of significant consequence in the event of a failure to contain or dam break.

A preliminary assessment of these dams has been undertaken by WRM (2022) against Table 1 of the *Manual for assessing consequence categories and hydraulic performance of structures* (DES, 2016b) and have been assigned a low consequence category for the failure to contain criteria based on the predicted water quality results from the water balance model, assuming that the mine-affected water storages will be appropriately designed and constructed to minimise the risk of seepage.

7.2.2.8 Potable Water Supply

IRC requested additional information regarding the source and quantity of potable water used during construction.

Response

It is anticipated that potable water supply would be trucked to site during construction. Whitehaven WS proposes to source the trucked potable water from a local potable water supplier until the on-site water treatment facility is operational. It is proposed that the construction of water pipeline and on-site water treatment facility would be completed and commissioned by the end of Year 2 of the Project (i.e. sourcing of potable water from an external supplier would only be for a short period of time). Whitehaven WS has not identified a specific potable water supplier at this early stage of Project development.

Potable water supply requirements during construction are not expected to be material relative to the operational water requirements for the Project.

7.2.2.9 Water Supply Arrangement with Isaac Regional Council

IRC requested that Whitehaven WS is conditioned to enter into a water supply agreement.

Response

Whitehaven WS would consult with IRC regarding a water supply agreement for the Project (consistent with the approach undertaken for other mining developments in the region). However, Whitehaven WS does not support this being conditioned in the EA.

NGO and Public Submissions

Several submitters raised similar concerns to those raised in agency submissions, including:

- potential impacts of controlled releases and sediment dam overflows on downstream watercourses, including the Isaac River and Ripstone Creek; and
- potential impacts to ephemeral tributaries of the Isaac River.

These issues have been addressed above and are not reproduced in this section.

7.2.2.10 Water Supply

Several submitters raised concerns that the Project will impact the water supply of local towns and draw water from the Isaac River. Submitters also have raised concern that the Project would not have enough external water supply to meet operational demands.

Response

The Isaac River is ephemeral in nature, with flows following rainfall events that generate runoff.

During mining operations, the water management system would capture runoff from areas that would have previously flowed to the receiving waters of the Isaac River and Ripstone Creek. The estimated maximum captured catchment areas during the Project are provided in Attachment 6.

The maximum catchment areas excised by the Project represent:

- up to approximately 1% of the Isaac River catchment (to the confluence with Ripstone Creek); and
- up to approximately 4.5% of the Ripstone Creek catchment (to the confluence with the Isaac River).

The loss of catchment flows in the Isaac River and Ripstone Creek during the Project would be indiscernible. Therefore, the potential impact on water quantity in the Isaac River and Ripstone Creek due to the excision of catchment during the Project is considered to be negligible (Attachment 6).

At the completion of mining, surface runoff from rehabilitated in-pit and out-of-pit waste rock emplacement areas would flow to the receiving environment. An area of approximately 13.7 km^2 would report to the residual voids at the completion of mining. The changed topography following completion of the Project would have the following impacts on catchment areas:

- The catchment draining to the Isaac River (to the confluence of the Isaac River and Ripstone Creek) would reduce by approximately 13.7 km^2 (compared to pre-mining conditions), a decrease of less than 0.3%.
- The catchment draining to Ripstone Creek would reduce by around 4.3 km^2 (compared to pre-mining conditions), a decrease of less than 1.5%.

It should be noted that due to the revised mine planning (e.g. backfilling of the South Pit mine void), the catchment excision from the Isaac River and Ripstone Creek associated with the optimised final landform for the Project has been reduced by 0.6 km^2 and 3.2 km^2, respectively, in comparison to the final landform proposed for the Draft EIS.

As such, the loss of catchment flows in the Isaac River and Ripstone Creek would be indiscernible and hence, the potential impact on water quantity in Isaac River and Ripstone Creek due to the final landform is considered negligible (Attachment 6).

A significant proportion of site water requirements would be sourced from water collected on-site, including rainfall runoff and groundwater inflows to the open cut pits. Collected water would be stored in the mine-affected water storages for recycling and reuse (WRM, 2022).

Consistent with the Draft EIS, Whitehaven WS would source water from either an external water supplier (e.g. Sunwater) via a water supply pipeline or via water sharing with surrounding mining operations. Therefore, there would be no material impacts to regional water availability due to the Project.

7.2.2.11 Flood Risk

Several submitters raised concerns regarding potential impacts to flood levels and velocities in the Isaac River due to the Project flood levees. Concerns were also raised regarding potential flooding impacts to the infrastructure corridor and agricultural production to the north of the Project.

Response

Consistent with the Draft EIS, there would be no significant impacts on flood levels and velocities in the Isaac River channel and floodplain during operations and post-mining (Attachment 6).

The Project would only interact with the Isaac River for the rarer flood events (1% AEP and rarer design events), with the impacts identified on the Isaac River floodplain for these rare events generally localised and relatively minor in magnitude (Attachment 6).

The infrastructure corridor is located inside of the Project flood levee and therefore has been considered in the flood modelling presented in Attachment 6.

7.2.2.12 Water Quality Monitoring Program

Several submitters have expressed concern regarding the water quality monitoring program and derivation of trigger levels are not adequate and do no align with current State and Federal guidance. They have requested further detail on water quality parameters and water quality triggers.

Response

Consistent with the standard conditions of an EA, a Water Management Plan would be established for the Project. The Water Management Plan would include site-specific trigger levels values for water quality.

Whitehaven WS would continue to consult with the relevant Government agencies during the assessment process regarding the conditions of any EA issued for the Project.

7.2.2.13 Site Water Balance Modelling

A concern was raised by a submitter that the water balance modelling assumptions are incorrect.

Response

A computer-based OPSIM was used to assess the dynamics of the mine water balance under conditions of varying rainfall and catchment conditions throughout the development of the Project. The OPSIM model dynamically simulates the operation of the water management system and keeps complete account of all site water volumes and representative water quality on a daily time step. The model has been configured to simulate the operations of all major components of the water management system (Attachment 6).

The peer review of the Surface Water and Flooding Assessment prepared for the Draft EIS conducted by Tony Marszalek (Hydro Engineering & Consulting, 2021) concluded (bold emphasis added):

> *Through the peer review process I have made a number of requests for clarification and suggestions for modifications to the methodology and reporting. The majority of these were resolved to my satisfaction.* ***It is concluded that the assessment as it stands is sufficient and fit for purpose for the EIS, in terms of the assessment of surface water-related impacts****, as it has:*
>
> - *adequately described the existing surface water environment in the vicinity of the Project, and the relevant environmental values;*
> - *developed and described a proposed operational water management system and demonstrated through modelling that such a system is predicted to operate adequately under a range of climatic scenarios; and*
> - *assessed the potential impacts on relevant environmental values due to the development of the Project.*

7.2.3 Ecology

Agency Submissions

7.2.3.1 Impacts to Broad Fauna Habitat Types

DES requested clarification on broad fauna habitat type mapping.

Response

The broad fauna habitat types shown on Figure 5-8 of the Draft EIS are defined in Section 5.2 of the Terrestrial Ecology Assessment (Appendix D of the Draft EIS). As the broad fauna habitats do not constitute a Matter of National Environmental Significance (MNES), this detail was not duplicated in Section 5 of the Draft EIS.

Figure 4-12 of the Draft EIS showed the Indicative Surface Disturbance Extent associated with the Project as a black dotted line, with the updated Indicative Surface Disturbance Extent for the optimised Project provided in Figure 5-9.

7.2.3.2 Offset Management Strategy

DES, DCCEEW, Queensland Fire and Emergency Services and DoR requested additional information in regard to the proposed offset strategy for the Project, including the location of the offset areas, timing, management measures for the offset areas and figures showing staging.

DES also requested further information regarding any potential interactions between the rail, water pipeline and ETL infrastructure associated with the Olive Downs Project and the Wynette Offset Area.

Response

Attachment 7 provides the updated Offset Management Strategy for the Project, including additional information and figures of the proposed land-based offset properties for Stage 1 and the offset requirements. The updated Offset Management Strategy for the Project includes the Stage 1 Offset Area Assessment prepared by E2M. Two baseline ecological survey reports are appended to the Stage 1 Offset Area Assessment.

These baseline reports outline the survey methodology, outcomes and MNES/MSES recorded but also contain additional figures as requested showing the regional location of the offset property.

Additional figures have been included in the updated Offset Management Strategy to separately show the MNES and MSES values and their impact areas for the three stages.

Table 7-2 outlines the management measures proposed by Whitehaven WS for the offset areas, albeit are subject to review as part of securing the offset areas and developing the Offset Management Plans.

Pembroke Olive Downs Pty Ltd are proponents for the Olive Downs Project Water Pipeline (EPBC 2017/7868), Olive Downs Project Rail Spur (EPBC 2017/7870) and Olive Downs Project Electricity Transmission Line (EPBC 2017/7869). The *Olive Downs Coking Coal Project – Environmental Impact Statement* (Pembroke Olive Downs Pty Ltd, 2018) assessed the potential impacts of the Olive Downs Project and associated infrastructure.

The Olive Downs Project infrastructure is approved under the State and Commonwealth legislation and will be located outside of the Wynette Offset Area to the south and east (Appendix A of Attachment 7).

The habitat within the Wynette Offset Area will remain connected to the more extensive habitat along the Isaac River to the north. The location of the approved Olive Downs Project water pipeline, rail spur and electricity transmission line would not compromise the viability of the four listed threatened species within the Wynette Offset Area (Appendix A of Attachment 7).

Pembroke Olive Downs Pty Ltd are required to construct and operate the infrastructure in accordance with the State and Commonwealth approvals (Appendix A of Attachment 7).

7.2.3.3 Appropriate Survey of Waterways Providing for Fish Passage

DAF requested additional aquatic ecology surveys undertaken following periods of rain.

Response

Additional aquatic ecology surveys were undertaken as part of the Additional Information Aquatic Ecology and Stygofauna Baseline Report (ESP, 2022a) (Attachment 9).

The Aquatic Ecology and Stygofauna Supplementary Impact Assessment (ESP, 2022b) (Attachment 10) states:

> *Surveys were completed over a range of seasons and rainfall conditions (see ESP 2022 for a detailed summary of rainfall conditions prior to and during each survey). During the most recent survey by ESP in February 2022, there was 8.6 millimetres (mm) of rain recorded over two days during the survey (24-25 February; assessed from nearby BOM Station No. 34035).*
>
> *February rainfall prior to the survey was 3.6 mm. Rainfall was above average in the three months prior to the survey, and as such conditions were considered to be representative of the wet season. Regardless of this, most waterway features were dry during the survey, with no standing water. The assessed dams contained water.*
>
> *The mapped waterways within the Project area are drainage features that convey water during and immediately after significant rainfall events only. It is not possible to survey fish within the mapped waterways within the Project area when they are flowing due to logistical constraints (i.e. the very short periods of flow during and immediately following a rainfall event), access constraints (there is no vehicle access allowed on wet unsealed tracks), and safety considerations (Whitehaven WS does not permit anyone to enter fast flowing water or any creek during a storm).*

Table 7-2
Proposed Offset Area Management Measures

Management Measure	Rationale	Relevant Offset Areas
Livestock management	Installation and maintenance of stock proof fencing: Installation and maintenance of stock proof fence would allow for effective controlled grazing to take place and exclude livestock when required. Controlled grazing of livestock: Monitoring of livestock grazing intensity would assist in improving the cover and composition of native species in the ground cover as well as minimise the potential spread of exotic grasses. Specifically, grazing during dry season to reduce exotic ground cover, and limiting/excluding grazing during the wet season to prevent soil compaction. No grazing within Squatter Pigeon (southern subspecies) habitat during the breeding season (April to end October). Exclusion of livestock during the wet season: Exclusion of livestock during the wet season would reduce soil compaction and enable native groundcover species to flower and set seed, increasing native cover and diversity over time. Exclusion of livestock from the Inderi Offset Area.	Wynette Offset Area Inderi Offset Area Ellensfield Offset Area
Weed control	Weed identification: Detailed field survey of weeds is required to identify the distribution and type of species present at Year 1 (baseline data). This would allow for prioritisation of potential hot spots and high-risk species. Weed prevention: Control of weeds is difficult once established/introduced. Prevention of introduction or further spread would increase the success rate of weed management across the offset area. Weed control: Weed control would reduce the extent and abundance of weeds across the offset areas, which in turn would assist in improving native species richness and recruitment.	Wynette Offset Area Inderi Offset Area Ellensfield Offset Area
Pest animal control	Pest fauna identification: Detailed field survey of pest fauna is required to identify the distribution and type of species present. This would allow for prioritisation of potential hot spots and high-risk species (e.g. wild dogs and pigs). Pest fauna prevention: Control of pest fauna is difficult once established/introduced. Prevention of introduction or further spread would increase the success rate of pest management across the offset area. Pest fauna control: Pest fauna control would reduce the abundance of pest fauna across the offset areas, which would in turn reduce predation risk of threatened fauna, reduce habitat degradation through tramping and pig-rooting, and reduce the potential spread of weeds.	Wynette Offset Area Inderi Offset Area Ellensfield Offset Area
Fire management	Fire management program: Altered fire regimes are interrelated with environmental threats including weed encroachment, changes to vegetation structure and damage to fire sensitive vegetation communities. As such, a fire management program, produced by a suitably qualified professional, would be established for the offset area and incorporate fire guidelines for REs present. Fire breaks: Fire breaks would be established along existing fence lines and any new fencing that is to be installed. This would reduce the risk of uncontrolled burns which may negatively affect the offset areas.	Wynette Offset Area Inderi Offset Area Ellensfield Offset Area
Vegetation regrowth management	Thinning of dense undesirable regrowth: Where regrowth becomes un-naturally thick and dominated by species not consistent with the pre-cleared RE, vegetation thinning may occur to assist in achieving mature vegetation consistent with the prescribed RE.	Wynette Offset Area
Barbed wire fencing management	Barbed wire fencing within and surrounding the offset areas (that presents a risk of entanglement) would be modified so the top strand is plain wire fencing.	Wynette Offset Area Ellensfield Offset Area
Greater Glider Nest Box Programme	Installation and maintenance of 60 nest boxes: designed specifically for the Greater Glider (i.e. contains features that would benefit use by the gliders). Monitoring: using Smart Nest Box principles (i.e. boxes fitted with video/audio data collection capability).	Wynette Offset Area Ellensfield Offset Area

7.2.3.4 *Quantification of Residual Impacts on MSES Waterways Providing for Fish Passage*

DAF requested further information on the quantification of residual impacts on MSES waterways providing for fish passage.

Response

The extent of impacts on waterways to fish passage is more extensively assessed within the Aquatic Ecology and Stygofauna Supplementary Impact Assessment (ESP, 2022b) (Attachment 10).

The Project would require the removal of up to 46% (1.5 km constituting 2.5 ha) of the northern unnamed waterway that equates to the waterway providing for fish passage MSES (Attachment 10).

7.2.3.5 *Avoidance, Mitigation and Offsetting Significant Residual Impacts on MSES Waterways Providing for Fish Passage*

DAF requested further information on how significant residual impacts on MSES waterways providing for fish passage were avoided, mitigated and offset.

Response

The Aquatic Ecology and Stygofauna Supplementary Impact Assessment (ESP, 2022b) (Attachment 10) provides further information on how significant residual impacts on MSES waterways providing for fish passage were avoided, mitigated and offset.

The Aquatic Ecology and Stygofauna Supplementary Impact Assessment (ESP, 2022b) (Attachment 10) states:

> *There is 3.28 km (constituting 5.28 ha) of the northern unnamed waterway within the mining lease. The majority of the northern unnamed waterway within the mining lease would be avoided. However, the Project would require the removal of up to 46% (1.52 km constituting 2.45 ha) of northern unnamed waterway that equates to the waterway providing for fish passage Matter of State Environmental Significance. Noting, however that 0.63 km of this (constituting 1.0 ha) runs through the existing quarry site. No remnant Regulated Vegetation occurs along the northern unnamed waterway in the disturbance footprint.*

Measures to minimise and mitigate the impacts on the waterway providing for fish passage MSES include:

- management of the northern unnamed waterway outside of the development footprint;
- construction of an up-catchment diversion system; and
- reinstating excised portions of the northern unnamed waterway in the final landform.

The Aquatic Ecology and Stygofauna Supplementary Impact Assessment (ESP, 2022b) (Attachment 10) includes a detailed assessment of the significance of the residual impacts to waterways providing for fish passage in accordance with the *Queensland Environmental Offsets Policy – Significant Residual Impact Guideline* (DEHP, 2014). Consistent with Aquatic Ecology and Stygofauna Assessment for the Draft EIS (ESP, 2021), the conclusion is that the Project is not expected to have a significant residual impact on waterways providing for fish passage (ESP, 2022b).

Although an offset is not necessary for waterways providing fish passage, offset areas will be provided for impacts on other matters (e.g. regulated vegetation and threatened terrestrial species). One of the proposed offset areas, the Wynette Offset Area, is located next to the Isaac River and contains an unnamed waterway (Figure A7-12 of Attachment 7). The section of the waterway in the Wynette Offset Area appears as a wide, deep channel that may provide fish passage opportunities during periods of flow from upstream catchments.

7.2.3.6 *Rehabilitation of MSES Waterways Providing for Fish Passage*

DAF requested further information on the re-establishment of the waterways diverted by the mining activity versus the retention and maintenance of the waterway realignment.

Response

The rehabilitation activities would involve the reinstatement of excised portions of the northern unnamed waterway to mitigate the impacts on the waterway providing for fish passage MSES.

The reinstated excised portion of the northern unnamed waterway would be designed to mitigate impacts associated with removal of the 1.5 km section (constituting 2.5 ha) of the northern unnamed waterway that provides for fish passage, in terms of area, quality and functionality (Figure 11 of Attachment 10). This would allow for the upstream and downstream passage of fish in a naturalised manner.

The reinstated excised portion of the northern unnamed waterway would incorporate features that ensure the upstream and downstream passage of fish. This will include:

- ensuring functionality and longevity of the riparian corridor, including revegetation and management of the riparian vegetation;
- ensuring that the diversion is constructed at a gradient of no more than 5%;
- ensuring that conditions within the diversion (depth and velocities) would be suitable to provide adequate fish passage during 1, 2 and 5 year ARIs;
- reinstating habitat and geomorphic features by salvaging and using material such as woody debris to create habitat diversity within the diverted waterway; and
- including natural features such as pools and meanders, bed and bank profiles, and providing a mix of suitable substrate types.

7.2.3.7 Hydrological Modelling

DAF requested additional hydrological modelling of more frequent events to determine the impact to fish passage.

Response

The Aquatic Ecology and Stygofauna Supplementary Impact Assessment (ESP, 2022b) (Attachment 10) states:

> *Annual Exceedance Probability (AEP) is defined as the probability that a given rainfall total accumulated over a given duration will be exceeded in any one year (Bureau of Meteorology [BoM], 2021). WRM (2021) modelled 5%, 1%, 0.1% AEP and Probable Maximum Flood (PMF) events for the Isaac River, including the catchments from tributaries of the Isaac River. The 0.1% AEP flood event for Ripstone Creek was also modelled.*
>
> *Flood modelling during a 5% AEP flood event (1 in 20-year event) for the Isaac River (most frequent flood event) shows that the flood extent of the Isaac River would not interact with the DAF-mapped waterways. As such, the flood extent of the Isaac River would not interact with the DAF-mapped waterways during more minor and frequent flood events.*
>
> *Flood modelling has not been completed for the mapped waterways to be impacted by the Project. These mapped waterways are drainage features that convey water during and immediately after significant rainfall events only. It is not appropriate to use a flood model to describe the depth of water within these mapped waterways during different rainfall events and would also require gauging stations along each of the drainage features to collect data from flooding events for calibration (historical flooding event data not currently available for these drainage features). Rather than using hydrological modelling to determine the extent of waterways providing for fish passage, detailed ground-truthing was completed to identify the extent of waterways within the Project area.*

7.2.3.8 Up-catchment Diversion System and Fish Habitat

DAF requested additional information on the up-catchment diversion system and whether the system would be designed to provide for fish passage.

Response

An up-catchment diversion system would be constructed as part of the Project to divert up-catchment runoff around the advancing open cut during operation. The up-catchment diversion system would temporarily allow runoff from the upstream catchment to the northern unnamed waterway prior to reinstating of the excised portions of the northern unnamed waterway in the final landform. The up-catchment diversion system is not designed for fish passage because it would be designed to drain water away.

However, the reinstated excised portion of the northern unnamed waterway would be designed to mitigate impacts associated with removal of the 1.5 km section (constituting 2.5 ha) of the northern unnamed waterway that provides for fish passage, in terms of area, quality and functionality (Figure 11 of Attachment 10). This would allow for the upstream and downstream passage of fish in a naturalised manner.

7.2.3.9 Monitoring of Waterways Providing for Fish Passage

DAF requested clarification on how mitigation for waterways providing for fish passage would be monitored.

Response

The Aquatic Ecology and Stygofauna Supplementary Impact Assessment (ESP, 2022b) (Attachment 10) describes that inspection and monitoring programs would also be designed and implemented to confirm the performance of the reinstated excised portion of the northern unnamed waterway. Rehabilitation progress would be monitored against milestones and completion criteria to demonstrate successful rehabilitation of the Project (Section 6.6 of the Draft EIS).

7.2.3.10 Waterway Barrier Works

DAF requested further clarification around works that may be waterway barrier works.

Response

The Aquatic Ecology and Stygofauna Supplementary Impact Assessment (ESP, 2022b) (Attachment 10) states:

> *No impacts to waterways providing for fish passage are proposed as a result of crossings by linear infrastructure. The mine access road crosses a mapped unnamed tributary of the Isaac River (i.e. site U3a in the Aquatic Ecology and Stygofauna Assessment, ESP 2021). However, the upper section of the northern unnamed tributary crossed by the mine access road has been ground-truthed and does not meet the definition of a waterway providing for fish passage (ESP 2022), and is therefore not considered further.*

7.2.3.11 Biosecurity

The IRC and DAF requested additional information in regard to biosecurity management and consistency with regional and State guidelines and legislation.

Response

Section 1.7.6 of the Draft EIS describes that the *Biosecurity Act 2014* (Biosecurity Act) imposes a 'general biosecurity obligation', to:

- take all reasonable and practical measures to prevent or minimise the biosecurity risk;
- prevent or minimise adverse effects on a biosecurity consideration of the person's dealing with the biosecurity matter or carrier or carrying out the activity;
- minimise the likelihood of causing a biosecurity event, or to limit the consequences of a biosecurity event caused, by dealing with the biosecurity matter or carrier or carrying out the activity; and
- not to do or omit to do something if the person knows or ought reasonably to know that doing or omitting to do that thing may exacerbate the adverse effects, or potential adverse effects, of the biosecurity matter, carrier or activity on a biosecurity consideration.

Whitehaven WS will observe its general biosecurity obligation and any subsequent duties to notify DAF of biosecurity risks (Section 1.7.6 of the Draft EIS).

Whitehaven WS would develop and implement environmental management plans outlining (amongst other things) vegetation clearing measures, weed management and monitoring, animal pest management, in accordance with requirements of relevant legislation and local strategic plans, including the *Biosecurity Regulation 2016*, *Mackay, Isaac and Whitsunday Regional Plan* (Department of Local Government and Planning, 2012) and *Isaac Regional Biosecurity Plan 2020-2023* (IRC, 2020) (Sections 4.5.4, 4.14.4 and Appendix D of the Draft EIS). Management of weeds and pests would be prioritised in accordance with the Biosecurity Act and *Isaac Regional Biosecurity Plan 2020-2023* (IRC, 2020).

The environmental management plans would include the following measures related to biosecurity (Sections 4.5.4 and 4.14.4 of the Draft EIS):

- identification of feral animal populations and weed infestations;
- strategies for preventing spread of feral animals (i.e. maintaining a clean, rubbish-free environment) and weeds (i.e. machinery wash-down, boot scrubbing facilities, appropriate disposal of weed material);
- prioritisation of treatment of weed infestations or weed species and ongoing treatment measures (as necessary);
- appropriately qualified persons would be engaged to undertake pest animal monitoring and recommended feral animal control strategies (e.g. baiting and trapping) and weed removal strategies (including those appropriate for aquatic habitats); and
- feral animal and weed monitoring protocols and follow-up control methods and protocols.

Whitehaven WS would implement pest and weed control/management measures every six months, or as required during weather conditions which are conducive to the outbreak of weeds and feral animal populations.

Feral animal control strategies for the Project would be consistent with the *Threat Abatement Plan for Predation by Feral Cats* (Department of the Environment, 2015), *Threat Abatement Plan for Competition and Land Degradation by Rabbits* (Department of the Environment and Energy [DEE], 2016) and *Threat Abatement Plan for Predation, Habitat Degradation, Competition and Disease Transmission by Feral Pigs* (DEE, 2017) (Section 4.14.4 of the Draft EIS).

The *Central Queensland Sustainability Strategy 2030* (Fitzroy Basin Association, 2021) is a roadmap detailing directions to achieve the level of sustainable practice needed by 2030. One of the 33 strategies detailed in the Strategy is promoting and supporting management practices that minimise the impacts of weed and pest species.

As described above, Whitehaven WS would implement mitigation and management measures to minimise the spread of weeds, pest animals and control existing weeds and pests (Section 4.14.4 of the Draft EIS).

7.2.3.12 Offset Area Bushfire Management

Queensland Fire and Emergency Services requested the opportunity to comment on Bushfire management plans.

Response

Whitehaven WS would give the Queensland Fire and Emergency Services opportunity to comment on the bushfire management of the offset areas.

NGO and Public Submissions

7.2.3.13 Assessment of Impacts on the Painted Snipe and Painted Honeyeater

Concerns were raised regarding the assessment of impacts on the Painted Snipe and Painted Honeyeater.

Response

The Australian Painted Snipe is not known to breed near the Project and breeding was not observed despite targeted surveys for the species. The *Draft National Recovery Plan for the Australian Painted Snipe Rostratula australis* (DEE, 2019) states the species mainly breeds south of the Project:

> *This species has mainly been recorded breeding in the Murray-Darling region, but has also been recorded in coastal central Queensland (Black et al. 2010), south-east Queensland, eastern NSW, the Channel Country, south-east South Australia and the Mt Lofty Ranges.*

In central Queensland, Black et al. (2010) recorded breeding at the Broad Sound wetlands, about 125 km north of Rockhampton on the coast.

Appendix D of the Draft EIS acknowledges that the Project would require the clearing of potential intermittent foraging habitat (after significant rainfall) for the Australian Painted Snipe. Appendix D of the Draft EIS concludes that the Project would not result in significant residual impacts on the species and an offset is not required.

A desktop search was initially undertaken by E2M (2021) to check if there had been any records of the Painted Honeyeater nearby to the Project area. Although no records of the Painted Honeyeater were found, E2M (2021) recognised that there was potentially suitable habitat for the species in the study area and wider locality. Targeted surveys were undertaken by E2M (2021) for the species in accordance with the *Targeted Species Survey Guidelines for Painted Honeyeater (Grantiella picta)* (Rowland, 2012). As a result of this detailed survey work, the Painted Honeyeater was not detected in Project extent or surrounds and was considered unlikely to occur within the Project area. This finding was most likely because the Project area is located within the peripheral distribution of the species. Appendix D of the Draft EIS concludes that the Project would not result in significant residual impacts on the species and an offset is not required.

7.2.3.14 Offsets for the Ornamental Snake and Natural Grassland

Concerns were raised in relation to the Stage 1 offset requirement for the Ornamental Snake would not be satisfied and the Offset Area C is in a fragmented condition and would be difficult to maintain.

Response

The Stage 1 residual significant impacts on the Ornamental Snake would be offset in the Wynette Offset Area. The potential habitat for the Ornamental Snake is brigalow-dominant communities characterised by gilgai with cracking, clay soils (REs 11.3.1, 11.4.8 and 11.4.9), and regrowth patches of REs 11.4.8 and 11.4.9 where suitable microhabitat features were present to support the species (Figure A7-17 of Attachment 7).

7.2.3.15 Stage 1 Offset Details

Calculations and methodology for proposed offset areas were requested.

Response

Section A7.3 of Attachment 7 provides further information regarding the calculations and methodology for the offset areas.

7.2.3.16 Quantification of Impacts

Concern was raised regarding the recognition of impacts on remnant and non-remnant vegetation.

Response

Appendix D of the Draft EIS and Section 2.1.2 of the Draft EIS states that the Project disturbance footprint is approximately 7,130 ha. Section 7 of Appendix D of the Draft EIS contains additional text which clarifies that of the 7,130 ha within the overall surface disturbance extent, 6,408.6 ha of vegetation is non-remnant and 719.9 ha is remnant vegetation as per the Queensland Herbarium mapping methodology. All habitat mapping considers the occurrence of habitat resources in both remnant and non-remnant vegetation.

7.2.3.17 Cumulative Impacts

Concern was raised regarding the assessment of cumulative impacts on threatened species and communities.

Response

The assessment of cumulative impacts on threatened species and communities is discussed in Appendix D of the Draft EIS and Section 5.4.6 of the Draft EIS. Table 5-13 of Appendix D of the Draft EIS summarises the cumulative impacts of the Project by comparing the potential habitat available within the Northern Bowen Basin and Isaac-Comet Subregions compared to the amount of habitat within the disturbance footprint for the Project. The Isaac-Comet subregion and the Northern Bowen Basin have been used to estimate local available habitat because the Project spans across two sub-regions, traversing sections of both the Northern Bowen Basin subregion and the Isaac-Comet Downs subregion as described in the Appendix D of the Draft EIS.

7.2.3.18 Risks to Threatened Species

Concern was raised regarding the risks to threatened species, including the Koala, Greater Glider and Ornamental Snake.

Response

The impacts to the Koala, Greater Glider and Ornamental Snake will be offset in accordance with the *Queensland Environmental Offsets Policy* (DES, 2021b) and *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy* (Commonwealth of Australia, 2012a). The updated Offset Management Strategy is provided in Attachment 7.

7.2.3.19 Impacts on Connectivity

Concern was raised regarding the impacts on fauna corridors and habitat connectivity.

Response

Connectivity Areas are areas of remnant vegetation (a regional ecosystem located in a category B area on the regulated vegetation management map) outside urban areas containing prescribed regional ecosystems that are required for ecosystem functioning (DES, 2021b).

Figure 4-13 of the Draft EIS shows areas of connectivity mapped within the Project area and surrounds, which includes areas along part of the central drainage line that runs through the centre of the Project area.

The Landscape Fragmentation and Connectivity Tool developed by DES identifies and quantifies any significant impact on connectivity for an individual impact area (DEHP, 2014). The tool was run for the Project impact area and determined there would be a significant impact to connectivity. Whitehaven WS would offset impacts to connectivity in accordance with the *Queensland Environmental Offsets Policy* (DES, 2021b) and *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy* (Commonwealth of Australia, 2012a).

There are no well-defined fauna movement corridors that would be impacted by the Project (Section 7.2 of Appendix D of the Draft EIS).

Notwithstanding, a clean water drain, which would divert clean water runoff to the Isaac River, would be established in the final landform in general alignment to the central drainage line that would be excised.

7.2.3.20 Wet Season Survey Effort

Concerns were raised regarding the adequacy of the wet season survey effort conducted in May 2019.

Response

Terrestrial ecological surveys were undertaken at various times of the year, between 2018 and 2019, with the timing of the surveys conducted in accordance with State and Commonwealth guidelines.

Between 2 and 10 May 2019, a component of the terrestrial fauna surveys were undertaken consistent with the survey timing recommended for the Brigalow Belt region for Autumn (March – mid May) as detailed in the *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland* (Eyre et al., 2018). The May 2019 survey period for terrestrial fauna was appropriate as region received approximately 180 millimetres (mm) of rain over the preceding three months. This produced the emergence of annual herbs, grasses and the presence of reproductive material on many species of flora.

Aquatic ecological surveys were undertaken at various times of the year, between 2019 and 2020. Late-wet season aquatic ecology surveys were conducted between 15 to 22 May 2019, consistent with the survey timing recommended in *Queensland Australian River Assessment System (AusRIVAS) Sampling and Processing Manual* (May – July) (DNRM, 2001). Aquatic sites sampled that contained water were characterised by pool habitat that would typically persist intermittently following high rainfall events; other sites were characteristic of highly ephemeral waterways that channel water, but do not hold significant pools for extended periods.

Stygofauna surveys were also conducted between 15 to 22 May 2019, in accordance with the *Guideline for the Environmental Assessment of Subterranean Aquatic Fauna* (DSITI, 2015) (after the wet season).

7.2.3.21 Adequate Survey Effort for the Northern Quoll and Corben's Long-eared Bat

Concerns were raised regarding the need for additional surveys be undertaken for locating the Northern Quoll and Corben's Long-eared Bat using hair tubes and harp traps.

Response

Northern Quoll

The Northern Quoll (*Dasyurus hallucatus*) was considered unlikely to occur in the Study Area, as there were no previous records within the Study Area, nor any suitable habitat for the species. The closest species record is more than 40 km north-east of the Study Area (Appendix D of the Draft EIS).

No species-specific State guideline for the Northern Quoll is provided, however the Commonwealth *Survey guidelines for Australia's threatened mammals* (Commonwealth of Australia, 2012b) and *EPBC Act referral guideline for the endangered northern quoll Dasyurus hallucatus* (Department of the Environment, 2016) recommend trapping or camera techniques. The *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland* (Eyre et al., 2018) provides general terrestrial mammal survey methods and effort, which include spotlight searches, camera trapping, hair tubes and scat and sign search and incidental detection.

E2M (2021) conducted camera trapping, cage trapping, spotlighting, active and habitat assessment surveys during October 2018, May 2019, September 2019 and February 2020; the Northern Quoll was not recorded in any survey event. The absence of Northern Quoll habitat within the Study Area paired with the absence of detection from Commonwealth and State prescribed survey methods (i.e. baited remote activated cameras, cage trapping, nocturnal spotlight survey and active search [i.e. scat]) supported the conclusion that the species is unlikely to occur within the Study Area and therefore, a significant, residual Project impact on the species is not expected (Attachment 8).

Notwithstanding, additional surveys were undertaken in February 2022, comprising 20 funnels baited with oats, sardines and peanut butter over a five-night period, totalling 100 trap nights. The species was not recorded during this survey event. A reconciliation of the total survey effort, including these additional surveys, against State and Commonwealth guidelines is provided in Attachment 8.

Corben's Long-eared Bat

As above, Corben's Long-eared Bat (*Nyctophilus corbeni*) was considered unlikely to occur in the Study Area, as there were no previous records within the Study Area, nor any suitable habitat for the species (Appendix D of the Draft EIS).

No species-specific State guideline for Corben's Long-eared Bat is provided, however the Commonwealth *Survey guidelines for Australia's threatened bats* (Commonwealth of Australia, 2010) recommend passive acoustic detection and trapping (mistnets and harp traps) techniques. The *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland* (Eyre et al., 2018) provides general terrestrial mammal survey methods and effort, which include harp trapping and acoustic detection.

E2M (2021) conducted acoustic detections during October 2018, May 2019, September 2019 and February 2020; the passive acoustic detection effort (i.e. Anabat) recorded multiple *Nyctophilus* species calls, however, the calls were attributed to either *N. geoffroys* and/or *N. gouldi* as the distribution range of the Corben's Long-eared Bat is unlikely to extend into the Moranbah area (Greg Ford, *pers comm*).

Notwithstanding, a total of four harp traps within potentially suitable habitat within the Study Area, were established in February 2022, with each harp trap set up for a period of five nights, totalling 20 traps nights. The species was not recorded during this survey event. A reconciliation of the total survey effort, including these additional surveys, against State and Commonwealth guidelines is provided in Attachment 8.

7.2.3.22 Adequate Survey Effort within the Major Areas of Remnant Vegetation

Concerns were raised regarding the need for additional surveys in the major areas of remnant vegetation.

Response

Flora and fauna survey sites were selected through the use of aerial imagery, regional ecosystem mapping and geological information to stratify the Study Area. Sites were then selected which best represent the Study Area. Flora and fauna survey sites were selected in accordance with the *Methodology for Surveying and Mapping Regional Ecosystems and Vegetation Communities in Queensland* (Neldner et al., 2020) and *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland* (Eyre et al., 2018), respectively (Appendix D of the Draft EIS).

Brad Dreis (E2M), a Principal Ecologist with over 15 years' experience throughout Queensland, New South Wales (NSW), Northern Territory and South Australia and a suitably qualified ecologist (flora and fauna) under the EPBC Act, conducted the surveys for the Terrestrial Ecology Assessment.

The total survey effort undertaken for Appendix D of the Draft EIS comprised:

- Flora surveys:
  - 318 quaternary assessments;
  - 54 BioCondition assessments;
  - six tertiary assessments;
  - targeted searches (random meanders) for threatened species;
  - 98 TEC assessments, including four *Poplar Box Grassy Woodland on Alluvial Plains* threatened ecological community (Poplar Box TEC) assessments;
  - 51 *Natural Grasslands of the of the Queensland Central Highlands and Northern Fitzroy Basin* threatened ecological community (Natural Grasslands TEC) assessments; and
  - 43 Brigalow TEC assessments;
- Fauna surveys:
  - 820 trap nights (Elliot);
  - 45 trap nights (cage);
  - 180 trap nights (pit fall);
  - 261 trap nights (funnel);
  - 128 trap nights (baited infrared);
  - 60 Anabat detection nights;
  - 189 person hours (bird surveys);
  - 153 person hours (active searches);
  - 149 person hours (spotlighting);
  - 12 person hours (water source watch); and
  - 13 Koala Spot Assessment Technique (SAT) searches.

7.2.3.23 Brigalow TEC

Concerns were raised regarding the survey and assessment of Brigalow TEC.

Response

Brigalow communities within the Study Area were assessed to determine whether they met the condition requirements of Brigalow TEC.

Brigalow communities of poor condition with patches less than 0.5 ha and exotic perennial cover of more than 50% were excluded from the Brigalow TEC. Section 4.2.3 of Appendix D of the Draft EIS explains that two small areas of Brigalow community within the Study Area were found to meet the condition criteria for Brigalow TEC under the EPBC Act but these patches are outside of the Project area.

Section 7.1 of Appendix D of the Draft EIS describes that approximately 28.9 ha of Brigalow TEC was identified within the Study Area, but it is located outside of the Project area hence, Table 17 of Appendix D of the Draft EIS does not classify the 105.3 ha of Brigalow Woodland within the Project clearance area as Brigalow TEC because the Brigalow TEC is outside of the Project area. Table 17 of Appendix D of the Draft EIS does specify which of the remnant vegetation within the Project area is classified as Poplar Box and Natural Grasslands TECs.

7.2.3.24 Potential Impacts to Fauna from Waste and Artificial Lighting

Concerns were raised regarding the risks of waste products, contamination or artificial lighting on native wildlife and threatened species.

Response

The construction of the ETL as part of the Project would involve the use of artificial lighting within the surrounding landscape. Artificial lighting would be used in accordance with Australian Standards, and in a way that focuses on disturbance/work areas and minimises/avoids lighting of remnant vegetation.

Concerns were also raised regarding the risks of waste products, dust and noise generated by the Project. Whitehaven WS would perform a risk assessment specific to hazardous chemicals stored on-site during the detailed design phase of the Project. The Project design has also been amended to reduce the surface disturbance extent of the Project thus reducing the extent of the waste rock emplacements. With progressive rehabilitation of these waste rock emplacements being undertaken to reduce residual impacts (e.g. runoff and seepage from rehabilitated waste rock emplacements have a lower risk of causing environmental harm). Dust and noise will be minimised where possible. Noise emissions from mining operations are expected to be continuous with common fauna species that may inhabit nearby areas typically are more tolerant to disturbance.

7.2.4 Social and Community Infrastructure

Agency Submissions

7.2.4.1 Aboriginal and Torres Strait Islander Employment Targets

The Department of Seniors, Disability Services and Aboriginal and Torres Strait Islander Partnerships (DSDSATSIP) recommended hard targets are set in relation to employment of Aboriginal and Torres Strait Islander peoples and procurement from Aboriginal and Torres Strait Islander owned businesses for both the construction and operations stages of the Project.

Response

Whitehaven WS has demonstrated a high level of commitment to providing opportunities for Aboriginal and Torres Strait Islander people, including partnering with the Clontarf Foundation to help keep young Indigenous boys and men in school, and the Winanga-Li Aboriginal Child and Family Centre in Gunnedah and Narrabri to help more children get to and from school, and families access to medical care.

For the Project, a close working relationship has been established with the Barada Barna People. Whitehaven WS has committed to a range of initiatives which will enhance both employment and procurement opportunities. This includes financial contributions as part of Whitehaven's *Stretch Reconciliation Action Plan September 2021 – September 2024* (RAP) (Whitehaven, 2021), specifically for Aboriginal and Torres Strait Islander peoples' training and skills development, and ensuring Indigenous cultural heritage surveys are fully funded, supported, and undertaken by the rightful parties.

As outlined in the RAP, Whitehaven WS is committed to working in partnership with Aboriginal and Torres Strait Islander peoples to improve employment and economic opportunities in order to create a stronger future together. Whitehaven WS is also committed to maximising Aboriginal and Torres Strait Islander employment as reflected in its current workforce (associated with existing operations in NSW) with approximately 9% identifying as Aboriginal and/or Torres Strait Islander. Whitehaven WS will maintain ongoing engagement with the Barada Barna People (including to promote direct employment as well as contracts for Indigenous owned local business) and DSDSATSIP to achieve its commitments under the RAP, as they relate specifically to the Project.

7.2.4.2 *Consistency with the Social Impact Assessment Guideline Principles*

IRC raised concerns regarding consistency with the *Social Impact Assessment Guideline* (Department of State Development, Manufacturing, Infrastructure and Planning [DSDMIP], 2018) and some elements of the Draft EIS Social Impact Assessment (Appendix C of the Draft EIS) in respect to the principles of lifecycle-focused, reasonable, rigorous and effective management.

SMEC Holdings Ltd (SMEC) (2022a) has prepared a stand alone response to submissions relevant to the Draft EIS SIA and SIMP which is provided in Attachment 11. The below subsections provide responses to the following concerns raised by IRC as presented in Attachment 11.

Lifecycle-Focused

IRC questioned whether the commitment to provide financial contribution to support community health outcomes and for a childcare solution should apply for the life of the Project.

Response

The *Social Impact Assessment Guideline* (DSDMIP, 2018) requires an SIA to consider the full project life cycle, however, impacts over the life of a project can be addressed through a combination of approaches. The *Social Impact Assessment Guideline* (DSDMIP, 2018) does not obligate a proponent specifically to make a direct financial contribution over the life of the project. Whitehaven WS' contribution is based on the anticipated Project impact on the capacity of health services.

Likewise, Whitehaven WS' contribution to a childcare solution is based on the anticipated Project impact on the availability of childcare, which is most likely to occur between Project Years 1 to 5. If the anticipated impact is managed and the availability of childcare is enhanced as a result of Whitehaven WS' contribution, then additional funding would not be required (i.e. for the life of the Project) when the Project is not contributing to further impacts.

Whitehaven WS also notes that this proposed commitment does not extinguish if not used by Project Year 5 or if further need arises over the life of the Project.

Whitehaven WS recognises the importance of an adaptive management approach for the Project. If evidence of impacts outside of those anticipated in the SIMP is provided, the SIMP (as a living document) will be reviewed and revised to incorporate appropriate mitigation or management measures.

Reasonable

IRC requested consideration to funding concerns for health and other emergency services and investment in the Moranbah Youth and Community Centre (MYCC) Trust Fund to ameliorate potential impacts to this facility.

Response

Whitehaven WS will continue to advocate for appropriate levels of funding and service provision for health and other essential services.

The Whitehaven Community Fund established for the Project will include annual funding of $50,000 that local organisations, including the MYCC, can apply for during four application rounds each year.

Rigorous

IRC raised concerns in regard to the property market data sets used to infer the housing and accommodation strategies for the Project.

Response

The SIA is an assessment at a particular point in time, and utilises the latest data available at that time. The SIMP, including the housing and accommodation strategies, will be subject to periodic reviews and updates, and will incorporate updated datasets where those become available.

Whitehaven WS will maintain ongoing engagement with IRC regarding housing and accommodation strategies prior to the commencement of Project construction and operations.

Effective Management

IRC requested clarification on some commitments and application of additional mitigation and management measures to impacts should they be identified over the life of the Project.

Commitments

Response

Whitehaven WS acknowledges IRC's request in regard to removal of the 'option' caveat in regard to:

1. construction of a maximum of 20 to 34 houses in Moranbah between Project Years 1 to 11;
2. payment to the Isaac Affordable Housing Trust and/or Emergency and Long Term Accommodation Moranbah (ELAM); and
3. contribution towards a childcare solution.

The 'options' wording in relation to the above commitments has been removed from Tables 7-2 and 7-4 of the SIMP (SMEC, 2022b).

Whitehaven WS will undertake an analysis of Moranbah's housing market prior to commencement of construction and engage with IRC to determine an appropriate housing provision approach.

Whitehaven WS will also engage with IRC at the commencement of Project construction to determine current childcare needs and the appropriate solution to contribute towards.

Whitehaven WS also notes IRC's comment on Whitehaven WS' intent in regards to provision of flexible shifts and job-share arrangements. Whitehaven WS is committed to offering flexible shifts and job-share arrangements where feasible given the nature and responsibilities of the role(s) in question. Table 7-1 of the SIMP has been updated with the following (SMEC, 2022b):

> *Provision of job-share/flexible shift arrangements for specific positions where feasible in consideration of matters such as standard shift arrangements, fatigue management, and health and safety. This may include positions such as administrative and support staff.*

Unidentified Impacts

Response

It is anticipated that a substantial majority of prospective workers who may relocate for the Project would be attracted to Moranbah due to the level of services and amenities available. Accordingly, a worst-case scenario of all workers relocating to Moranbah is assumed resulting in the proposed contribution commensurate to where the anticipated impact is likely to occur.

Whitehaven WS recognises the importance of an adaptive management approach for the Project. If evidence of impacts on schools, childcare, healthcare, mental health and domestic violence service providers or housing outside of Moranbah is provided, the SIMP (as a living document) will be reviewed and revised to incorporate appropriate mitigation or management measures.

As described in Section 7.7 of the SIA (SMEC, 2022b), the SIMP would be regularly reviewed to assess its effectiveness and relevancy. Whitehaven WS will review, and if necessary, revise the SIMP every two years for the first four years of the Project, and then every three years up to Project Year 10. The SIMP may be reviewed and revised within a shorter period of time should Whitehaven WS consider the amendment of the SIMP necessary (such as evidence of Project impacts not predicted to occur).

7.2.4.3 Live Local Initiative

IRC acknowledged and supported the intent of the Live Local Initiative, however, requested additional consideration to other mechanisms to achieve genuine choice for employees to reside where they wish and further information on the Live Local Program.

Response

Whitehaven WS acknowledges the point raised by IRC and is committed to providing employees with genuine housing choice. The Live Local Initiative is only one of the mechanisms in which employees can be provided additional choice regarding where they want to live. Further, Whitehaven WS confirms that there will be no cap applied to the uptake of the Live Local Initiative, and that it will be offered to all employees regardless of length of service and commencement date.

As noted by the IRC, Whitehaven WS will monitor the percentage of the Project workforce that reside locally and report annually on the workforce number and composition during operation. Whitehaven WS will review and revise the SIMP (inclusive of proposed management measures) where necessary as per Section 7.7 of the SIA.

As described in the Appendix I of the Draft EIS, Whitehaven WS would provide shuttle bus services to transport the majority of the workforce between the Project and accommodation facilities at Moranbah. However, use of the service will not be made mandatory. Regarding housing assistance for employees, Whitehaven WS has proposed the following commitments in Section 7.3 of the SIA:

- subsidised housing equating to $13,000 per annum per employee to encourage members of the workforce to live locally;
- provision of housing register, connections advice, and support networks for workers seeking to reside locally; and
- maximising local employment through implementing a recruitment hierarchy, staggered recruitment scheduling, tailored advertising to local communities, and establishing a project office in Moranbah.

7.2.4.4 Housing Demand

IRC have raised concerns that the SIA does not consider the potential housing demand from prospective employees already residing locally in accommodation modelling.

Response

Whitehaven WS notes IRC's request, however, the potential housing demand from prospective employees already residing locally is not clearly quantifiable as this will be dependent on the individual choices and circumstances of prospective workers. Whitehaven WS will undertake an analysis of Moranbah's housing market prior to commencement of construction and engage with IRC in regard to an appropriate housing provision approach.

7.2.4.5 Workforce Accommodation Villages

IRC requested priority is given to Workforce Accommodation Village (WAV) facilities that enable on-resident workers to positively interact with the local community and reduce psychosocial stressors.

Response

It is Whitehaven WS' preference to accommodate its workforce in facilities located within nearby communities where feasible, however, this is subject to capacity and availability.

7.2.4.6 Definition of 'Local'

IRC requested adoption of 'local' as defined in the Queensland Local Content Leaders Network (2019) *Keeping it in the Regions,* in preference to the definition supplied by the *Queensland Resources and Energy Sector Code of Practice for Local Content* (Queensland Resources Council, 2013) referred to in the *Social Impact Assessment Guideline* (DSDMIP, 2018).

Response

Whitehaven WS acknowledges IRC's request and will take into consideration 'local' as defined by the Queensland Local Content Leaders Network (2019) *Keeping it in the Regions*.

7.2.4.7 Identification of Key Stakeholders

IRC and DSDSATSIP requested clarification on the stakeholder identified in the SIA and SIMP.

Response

Whitehaven WS acknowledges IRC's recommendation and has engaged with the Greater Whitsunday Alliance (GW3). The SIMP (SMEC, 2022b) has been updated to include ongoing engagement with GW3 and IRC's Economy and Prosperity team, and remove reference to the Moranbah Traders Association, which as advised by IRC has been placed in care and maintenance.

Reference to the Department of Aboriginal and Torrres Strait Islander Partnerships (DATSIP) (now DSDSATSIP) in the Draft EIS SIA (Appendix C of the Draft EIS), in regard to consultation is correct, given the Department SMEC (2021) consulted with at the time (in 2019) was DATSIP. Reference to DSDSATSIP will be included in future iterations of the SIMP.

7.2.4.8 Isaac Business Alliance Project

IRC have requested commitment to financial and in-kind support for the Isaac Business Alliance Project and/or other regional business development programs which are mature and active in the region at the commencement of Project operations.

Response

Whitehaven WS is committed to delivering social value beyond compliance, and takes pride in supporting communities through direct investments, job creation, partnerships with local suppliers, and working with local community groups. The Whitehaven Community Fund established for the Project will include annual funding of $50,000 that local organisations can apply for during the four application periods provided each year. Financial contributions available through the Community Fund are in addition to the range of commitments outlined in the SIMP to support local and regional businesses.

7.2.4.9 Payment Terms

IRC have requested commitment to 30-day payment terms for small businesses supplying the Project.

Response

Whitehaven WS is committed to 30-day payment terms for local small businesses supplying the Project.

7.2.4.10 Whitehaven Community Fund

IRC requested further detail on the Whitehaven Community Fund, including the financial value and criteria of the fund.

Response

The Whitehaven Community Fund will comprise an annual total fund of $50,000 and four application rounds each year. Funding categories include:

- Health – support for medical equipment, training, projects and organisations that promote healthy lifestyle.
- Education – support for the development of academic and other skills.
- Environmental – support for sustainable environmental initiatives.
- Indigenous empowerment – initiatives across early childhood education and support, schooling, skills development, employment and economic development.
- Regional sport – support for local sporting clubs and associations.
- Whole of community – support for organisations or initiatives that have significant local, regional, State, national or international reach.

Further information on the Whitehaven Community Fund can be found at: https://whitehavencoal.com.au/sustainability/community/donations-sponsorships/.

7.2.4.11 Automation Hub

IRC requested further information on the location of the automation hub.

Response

Whitehaven WS will maintain ongoing engagement with IRC regarding the automation hub location.

7.2.4.12 COVID-19 Considerations

IRC requested consideration to the effect of COVID-19 on the social characteristics and outcomes from the SIMP.

Response

Whitehaven WS acknowledges that changing social conditions such as those presented during the COVID-19 global pandemic, present a challenge for councils, communities, and the resource industry. Social impact assessments capture social characteristics at a point in time and how they may be affected by a proposed project. The principle of adaptive management is integral to the SIMP which will be reviewed and regularly updated to ensure that proposed mitigation measures are reflective of current social conditions (SMEC, 2022b).

7.2.4.13 Housing and Accommodation Plan

The Department of Communities, Housing and Digital Economy requested clarification in regard to the housing and stakeholder consultation commitments.

Response

Whitehaven WS commits to (SMEC, 2022b):

- actively engage and collaborate with the IRC and other stakeholders (such as through a Cumulative Impacts Reference Group) with respect to future accommodation; and
- facilitate the construction of a maximum of 20 to 34 new houses in Moranbah dedicated for Project employees between Project Years 1-11.

7.2.4.14 Impacts on Community Health and Services Infrastructure

The Queensland Ambulance Service requested information on the Project's impact on the surrounding community health and services infrastructure and the ability to piggyback and expand radio and telecommunications networks.

Response

The Project would result in a small increase to the local resident population along with an increase in the non-resident population. This would increase the burden on social infrastructure including early childhood education and care services, hospital and health services, and emergency services. The Project is also likely to positively contribute to population retention and growth in the local study area though the generation of employment and other economic opportunities.

This population growth would contribute to improved community vitality and resilience and support the ongoing provision of social infrastructure and community services (SMEC, 2022b).

The following key management measures would be implemented to reduce the Project's impact on health and community well-being (SMEC, 2022b):

- Direct contribution to improved accessibility to childcare services.
- Reduce additional demands on local health services through the provision of on-site first aid facilities for workers with appropriately trained personnel available that can assist with attending to minor workforce health issues, as well as providing first response services for emergency situations and site accidents.
- Support positive mental health outcomes through funding local and regional mental health and suicide prevention initiatives.
- Address any effect on road safety by developing and implementing a Fatigue Management Standard including the swipe on/swipe off system, use of buses to transport workers to and from worksites and car-pooling arrangements.
- Participate in any community groups assessing and monitoring cumulative dust emissions, including potential contributions to additional dust monitoring stations.
- Support community culture and well-being through the Whitehaven Community Fund which invites community organisations to apply for annual funding.

With the implementation of mitigation and management measures, the Project would have a residual risk rating of negligible to medium in regards to the Project's impact on health and community well-being (SMEC, 2022b).

Whitehaven WS acknowledge there may be opportunities for the Queensland Ambulance Service to 'piggy-back' onto Project communication infrastructure to improve the Queensland Ambulance Service radio network coverage. Whitehaven WS will discuss these opportunities with the Queensland Ambulance Service during development of the Emergency Response Procedure.

7.2.4.15 Impacts on Affordable Accommodation

The Isaac Affordable Housing Trust raised concerns in regard to the Project's impact on the availability of affordable accommodation and the Project's contribution to the genuine benefit to liveability in the Isaac region.

Response

The Project's impact on housing is driven by workforce housing demand generally observed during the start/ramp up of operations when workforce concentration peaks. Following this initial increase in demand, the Project-induced market demand stabilises as the Project progresses. As such, it is not anticipated that the Project will create a sustained increase in demand for the life of its operations. Accordingly, the financial contributions and commitments to acquiring new housing outlined in the SIMP is commensurate with the anticipated Project impacts (SMEC, 2022a).

Whitehaven WS recognises the importance of an adaptive management approach for the Project, therefore the SIMP (as a living document) will be reviewed and revised during the life of the Project to incorporate appropriate housing mitigation or management measures where required (SMEC, 2022b).

NGO and Public Submissions

7.2.4.16 Assessment of Literature Review

Multiple submissions have raised concerns that a literature review of the social impacts of resource extraction projects has not been conducted.

Response

The SIA has been prepared to be consistent with the requirements of the *Strong and Sustainable Resource Communities Act 2017* (SSRC Act), the *Social Impact Assessment Guideline* (DSDMIP, 2018) and the ToR issued for the Project (SMEC, 2022a).

7.2.4.17 Lack of Community Consultation

Several submissions have raised concerns that the wider community has not been consulted.

Response

Engagement to inform the SIA was undertaken in accordance with the *Social Impact Assessment Guideline* (DSDMIP, 2018) and the ToR. Prior to initiation of SIA engagement, details of the scope of engagement including the specific entities to be engaged were presented to and accepted by the Coordinated Project Delivery Division in the OCG. It was agreed that SIA engagement was not to include any opinion poll style broad community sentiment survey. This decision was made in consideration of the nature of the Project and the heritage and social characteristics of potentially affected communities, as well as the consultation fatigue existing in the community (SMEC, 2022a).

Insights from local communities were gathered through direct engagement with political representatives, such as Councillors who represent the local community. Local community insight was further strengthened through engagement with a range of local service providers in sectors including education, health and emergency services, training and employment, and community development (SMEC, 2022a).

As described in the Community and Stakeholder Engagement Plan provided in the SIMP (SMEC, 2022b), Whitehaven WS will continue to engage with the local communities and IRC throughout Project construction and operation.

7.2.4.18 Distribution of Social Impacts

Several submissions have raised concerns relating to the assessment of social impacts outside of Moranbah.

Response

It is anticipated that the majority of Project impacts and benefits will be experienced in Moranbah due to its proximity to the Project and being the likely host community for workers who may relocate for the Project (SMEC, 2022a). However, the Project will derive economic benefits for the broader region as well. Broader economic impact are addressed in the Economic Assessment (Attachment 16).

Whitehaven WS recognises the importance of an adaptive management approach for the Project. If evidence of impacts outside of those anticipated in the SIMP is provided, the SIMP (as a living document) (SMEC, 2022b) will be reviewed and revised to incorporate appropriate mitigation or management measures.

7.2.4.19 Consideration to Declining Resident Worker Population

A submission raised concerns that the SIA does not assess the impact of the Project on the declining population in the Isaac and Mackay LGAs due to increased fly-in/fly-out (FIFO) workers and automation, and hence requested additional information on the application of automation and analysis of the likely social impact on unemployed persons.

Response

The SIA assesses the impacts of the Project against baseline social conditions as defined by the most relevant and reliable available data. The SIA provides an analysis of both automated and non-automated Project fleet scenarios (SMEC, 2022b).

The basis of the estimated job numbers for the Project is derived from Whitehaven's experience and expertise as an operator of four (current) mining operations in Australia.

A breakdown of the types of potential jobs required for both the construction and operation phases are provided in Section 6.3.1 of the SIA (SMEC, 2022b).

The SIA identifies the creation of employment opportunities as a positive impact for unemployed persons (SMEC, 2022b). In an in-person engagement session in Moranbah on 24 June 2021, the *Queensland Resources Industry Development Plan* (State of Queensland, 2022) stakeholder groups, including agriculture, business enterprise, local government, and resource industry, resource workers identified automation will provide opportunities for the resources sector and, while this means traditional roles will become fewer, new, and different jobs will take their place (State of Queensland, 2022). The workshop participants noted, "*right skilling and training courses will be important to ensure that we are prepared for the future, and transferable skills will be critical as the sector transforms*" (State of Queensland, 2022).

Whitehaven WS is committed to maximising recruitment of local residents as per measures outlined in the Workforce Management Plan in Section 7.2 of the SIA.

7.2.4.20 Assessment of Alternative 'No Project' Scenario

Several submissions raised concerns regarding the lack of assessment of an alternative scenario to the Project scenario (i.e. "no go").

Response

The Project is a greenfield project (not an extension of an existing operation [i.e. brownfield project]), as such, should the Project not go ahead, the social benefits and impacts of the Project as described in the SIA (SMEC, 2022b) would not occur. Consideration to the effects of the Project not proceeding ('no go" scenario) is provided in Section 8.

7.2.4.21 Insufficient Support and Benefits

Several submissions raised concerns regarding the number of jobs and benefits to the region is insufficiently supported and the new majority of social benefits that will be held down by non-resident workers.

Response

Analysis of the potential social impacts of the Project non-resident workers on the local and regional population is provided in Section 6.6 of the SIA (SMEC, 2022b).

7.2.4.22 Environmental Record of Proponent

Multiple concerns have been raised by submitters that Whitehaven's record in NSW has not been considered as part of the assessment. Whitehaven WS has adhered to its regulatory responsibilities associated with the exploration activities undertaken at the Project. Whitehaven WS has not been the subject of any environmental legal proceedings.

Whitehaven takes its regulatory and environmental obligations seriously. Whitehaven has successfully operated multiple mining operations for many years in the North-Western region of NSW and is required to comply with an extensive range of conditions within multiple regulatory approvals granted by State and Federal regulatory agencies.

While Whitehaven continually works to improve its environmental performance, systems and compliance, there have been some instances of non-compliance with environmental regulation over the past decade. Whitehaven's performance is in line with NSW sector-wide performance.

Response

Every project must be assessed based on the best available information and what is most relevant to the project in question. The SIA does not assume that a poor relationship with a local residential community can be mended simply by providing employment and business opportunities. However, providing employment and business opportunities for local residents is a key contributing factor to establishing, repairing, and/or maintaining long-term positive relationships (SMEC, 2022a).

7.2.5 Greenhouse Gas Emissions and Climate Change

Agency Submissions

7.2.5.1 Greenhouse Gas Management and Abatement Plan

DES requested provision of a Greenhouse Gas Management and Carbon Abatement Plan, detailing the Project's predicted greenhouse gas emissions, abatement and mitigation strategies and management measures.

Response

Attachment 12 provides the proposed Greenhouse Gas Management and Abatement Plan for the Project. The Plan was developed based on advice provided by DES in its submission and conditions for recently approved projects. The greenhouse gases of relevance to the Project are carbon dioxide (CO_2), methane (CH_4) and nitrous oxide.

Greenhouse Gas Management and Abatement Measures

The sub-sections below detail the greenhouse gas management and abatement measures associated with the key sources of greenhouse gas emissions for the Project and other measures that will be implemented to reduce overall emissions associated with the Project. The Project greenhouse gas management and abatement measures are generally consistent with *Climate Action Plan* (Minerals Council of Australia, 2020), *Industry Action on Climate Change Mitigation and Low Emissions Technologies* (Climate Change Authority, 2020) and *Climate Risk and Decarbonization: What every mining CEO needs to know* (Delevingue et al., 2020).

Scope 1 and 2 Emissions – Emissions from Diesel Consumption

The following management and abatement measures will be implemented at the Project to promote the efficient use of diesel (i.e. reduction of diesel consumed):

- Regular maintenance of plant and equipment to minimise fuel consumption and associated emissions, including training staff on continuous improvement strategies regarding efficient use of plant and equipment.
- Monitoring and maintaining equipment in accordance with manufacturer recommendations.
- Optimising diesel consumption through logistics analysis and planning (e.g. review of the mine plan to optimise haul lengths, dump locations, reduction of engine idle times and minimising the road gradients).
- Implementation of high-efficiency motors.

Diesel and electricity usage and greenhouse gas emissions from the Project will be tracked and reported each year in the Annual Energy Audit and through the *National Greenhouse and Energy Reporting Scheme* (NGER Scheme) (Attachment 12).

Whitehaven WS will also comply with the Australian Government's Safeguard Mechanism and will manage and maintain emissions to ensure they remain below or at the baseline set by the Clean Energy Regulator. It is noted that current Australian policy includes a target of net zero emissions by 2050. Net zero emissions does not mean 'no emissions', and Whitehaven WS will continue to advocate for coal's role in supporting an orderly and just energy transition over the coming decades.

Scope 1 and 2 Emissions – Emissions from Consumption and Purchase of Electricity

The following management and minimisation measures will be implemented at the Project to reduce emissions from energy use and improve energy efficiency:

- Purchase of certified carbon neutral electricity.
- Use of procurement policies that preference the selection of energy efficient equipment and vehicles.

The purchase of certified carbon neutral electricity will offset all Scope 2 emissions associated with the Project, which account for approximately 8% of all emissions (Scope 1 and 2) produced by the Project (abatement of approximately 1.46 Mt CO_2-e).

Scope 1 and 2 Emissions – Fugitive Emissions

Fugitive CH_4 released from mining coal deposits can be converted to CO_2 through flaring or capture for use in electricity production through pre-drainage of coal seams for underground mines. As the Project is an open cut mine, the coal seams are closer to the surface, as such, the likelihood of significant in-situ gas in places is lower (Clean Energy Regulator, 2021a). Whitehaven WS has investigated pre-drainage for the Project and it is not considered to be feasible based on current technology.

Scope 1 and 2 Emissions – Carbon Capture and Storage

Whitehaven WS considered the potential use of carbon capture and sequestration of greenhouse gas emissions for the Project; however, it has been determined that these measures are not viable at this stage.

Whitehaven WS will prepare and implement a Research Program for the Project, and allocate funds towards implementation of the program, which will include research into capture of CO_2 for beneficial reuse or sequestration (Attachment 12).

Scope 1 and 2 Emissions – Carbon Credits

The Safeguard Mechanism applies to the Project; accordingly, as part of reporting under the NGER Scheme, Whitehaven WS will report on compliance with the Project's baseline (to be determined) (Attachment 12).

If the Project's emissions exceed or are expected to exceed the baseline, Whitehaven WS would surrender Australian Carbon Credit Units (ACCUs) to offset emissions, to ensure compliance.

Scope 1 and 2 Emissions – Incidental Emissions from Project

The following minimisation measures will be implemented at the Project to reduce overall emissions associated with the Project:

- Limiting vegetation clearance, as far as practical, within the Project area.
- Maximising opportunities for local businesses to provide goods and services to the Project, by collaborating with Moranbah Traders Association, Local Content Leaders Network and the Regional Industry Network and any other appropriate stakeholders in establishing a local supplier listing tailored to the Project, and implementing other enhancement measures as outlined in the SIMP.
- Monitoring and reducing waste in accordance with the Project Waste Management Plan, including implementation of a waste recycling program for the Project to promote and encourage recycling of materials such as paper, cardboard and scrap metal.
- Encouraging car-pooling and the use of the shuttle bus service.

Whitehaven WS will also legally secure and manage land-based properties to offset impacts to biodiversity, in accordance with State and Commonwealth requirements. These offsets will be secured in-perpetuity and would ensure ongoing carbon sequestration and indirect net greenhouse abatement benefits.

The Project will be progressively rehabilitated in accordance with the PRC Plan, which includes the establishment of patches of woodland on waste rock emplacements, where appropriate, and along drainage paths in the final landform. These plantings will capture CO_2 and provide indirect abatement benefits.

Scope 3 Emissions

Whitehaven acknowledges there are emissions associated with the products it produces. These downstream emissions are classified as Scope 3 for Whitehaven while being the direct or Scope 1 emissions of organisations which use the products.

The United Nations Framework Convention on Climate Change (UNFCCC) and related rules have been in place since 1992 and represent the foundation for the accountability of national governments to progress their international commitments. The rules specify that all emissions associated with an activity within a nation's borders count towards that nation's emissions total. This means emissions associated with the production of goods imported into Australia ('upstream' Scope 3 emissions) are accounted for in producing countries' greenhouse accounts, just as emissions associated with Australian exports ('downstream' Scope 3 emissions) are accounted for in importing countries' greenhouse accounts. This approach avoids double-counting and promotes complete, global coverage of emissions, as well as transparency, accuracy and comparability across all countries.

With the adoption of the *Paris Agreement* almost all countries, including major developing countries, have for the first time committed to respond to climate change and track their progress over time. Nations are individually responsible and accountable for determining their contribution to the global response to climate change.

The NGER scheme is a single, national framework for reporting on energy production, consumption and emissions. It supports the Australian Government's reporting obligations and so does not require reporting of Scope 3 emissions. The scheme is consistent with reporting systems in operation in the USA, the EU and South Korea. In its recent review of the NGER scheme, the Australian Government's Climate Change Authority considered a requirement to report Scope 3 emissions. The Authority concluded that the challenges and burden of reporting Scope 3 emissions outweigh any benefits, because an accurate estimation of Scope 3 emissions associated with a specific economic activity is inherently complex and uncertain, involving many value chains across multiple economies.

Whitehaven will continue to focus on reducing emissions over which it has direct control over, being Scope 1 and 2 emissions. In addition, the countries to which Whitehaven currently exports coal to and the key countries to which coal from the Project is expected to be exported to are covered by each respective country's Nationally Determined Contributions (NDCs) or, in the case of Taiwan, have domestic energy policies consistent with the objectives of the *Paris Agreement.* Accordingly, greenhouse gas emissions produced by the end use of Project coal overseas would be accounted for and managed in accordance with the laws that have been adopted to implement the NDCs of the countries to which the coal is exported (Attachment 12).

Furthermore, the commitment to purchase carbon neutral electricity also offsets 'upstream' Scope 3 emissions associated with the transmission and distribution of electricity to the Project, as these emissions are also offset by the purchase and retirement of carbon offset units.

Whitehaven will also continue to work with commercial partners to analyse and evaluate opportunities to reduce operational emissions and investigate measures at each point of its value chain to reduce emissions, consistent with the actions outlined in the *Climate Action Plan* (Minerals Council of Australia, 2020).

Initiatives and Research

Whitehaven has invested in carbon capture technologies through its funding for Low Emission Technology Australia (LETA). The organisation identifies, researches and develops technologies that capture and permanently store CO_2 or reuse CO_2 in other applications.

Whitehaven WS supports an industry-wide approach to mitigating emissions. Whitehaven is a member of the Minerals Council of Australia which, in 2020, released its *Climate Action Plan*. The plan details the mineral industry's ambition to achieving the goal of net zero emissions and its actions, among others, on renewable energy investments at mine sites and collaborations with partners on low-emissions technologies and processes.

Whitehaven is undertaking an analysis of opportunities to originate carbon offsets across its operations and property portfolio, in addition to a general assessment of abatement opportunities for Scope 1 and 2 emissions produced by its operations.

Whitehaven WS would prepare and implement a Research Program for the Project, and allocate funds towards the implementation of the program. This program would:

a) be prepared in consultation with DES;

b) be submitted to DES for approval within three years of approval of the Project;

c) be targeted at genuine research, as opposed to implementing the matters required by the Project and be prepared in collaboration with industry bodies, research organisations or other operations where possible; and

d) be directed at encouraging research into improving the abatement of direct Scope 1 greenhouse gas emissions by:

- minimising fugitive emissions post-mining;
- capture of CO_2 for beneficial re-use or sequestration;
- understanding opportunities for electrification; and
- other potential abatement options that may be identified.

Monitoring, Reporting and Review

Monitoring

Diesel and electricity usage and ROM coal and waste extraction will be monitored for the Project, to track diesel and electricity efficiency. These values will be reported in the Annual Energy Audit and analysed for trends in the data (Attachment 12).

Greenhouse gas emissions from the Project will be tracked and reported each year in the Australian Government's NGER Scheme and National Pollutant Inventory (Attachment 12).

NGER Reporting

Annual assessment of greenhouse gas emissions will be reported in accordance with the *National Greenhouse and Energy Reporting Act 2007* (NGER Act) and the *National Greenhouse and Energy Reporting (Measurement) Determination 2008*.

The report would be provided to the Clean Energy Regulator by the end of October each year, provided in the manner and form in accordance with the requirements of the *Guideline – Manner and Form Sections 19 22G and 22X reports* (Clean Energy Regulator, 2021b).

Annual Energy Audit

Whitehaven WS will review and evaluate the energy efficiency of the Project by the end of December each year (for the preceding calendar year) or other such timing as agreed by the DES.

The Annual Energy Audit will:

- include a comprehensive review of the diesel and electricity usage at the Project over the past year, which includes a comparison of these results against the:
  - relevant objectives for diesel consumption and energy usage; and
  - monitoring results of the previous years;
- identify any trends in the data over the life of the Project; and
- describe what mitigation or control measures that will be implemented over the next year to improve the performance of the Project.

Review

The Greenhouse Gas Management and Abatement Plan will be reviewed, and if necessary revised, following submission of each Annual Energy Audit.

Whitehaven WS will also regularly assess, review and evaluate greenhouse gas emission abatement opportunities for implementation at the Project, for subsequent revision and inclusion in the Greenhouse Gas Management and Abatement Plan.

Sustainability Report

Whitehaven prepares an annual, company-wide Sustainability Report that reflects the additional investment commitments in relation to environmental, social and governance reporting, and to allow closer alignment with internationally-recognised sustainability reporting approaches (Whitehaven, 2022).

Whitehaven (2022) provides the company-wide greenhouse gas emissions for the past five years, including the most recent reportable period, and reinforces the commitment to ongoing efforts to reduce operational emissions from energy use and haulage (Whitehaven, 2022).

Whitehaven (2022) also identifies and evaluates the potential climate-related risks and opportunities, with significant risks reviewed annually, while material and emerging risks are continually and proactively identified, monitored and assessed. The detailed climate risk and scenario planning has been undertaken using the voluntary framework recommended by the Financial Stability Board's Task Force on Climate-related Financial Disclosures (TCFD).

Further information on the Whitehaven's *Sustainability Report 2022* can be found at: https://whitehavencoal.com.au/whitehaven-coal-sustainability-report-2022/

7.2.5.2 Assessment of Climate Change Risk

DES requested additional assessment of future climate risks, including transition risk.

Response

Consideration of the potential implications of climate change involves complex interactions between climatic, biophysical, social, economic, institutional and technological processes.

Although scientific understanding of climate change has improved, projections are still subject to a wide range of uncertainties such as (Commonwealth Scientific and Industrial Research Organisation [CSIRO] and Bureau of Meteorology [BoM], 2015):

> *…scenario uncertainty, due to the uncertain future emissions and concentrations of greenhouse gases and aerosols; response uncertainty, resulting from limitations in our understanding of the climate system and its representation in climate models; and natural variability, the uncertainty stemming from unperturbed variability in the climate system.*

The Intergovernmental Panel on Climate Change (IPCC) has completed a number of comprehensive reports on potential climate change. The IPCC has published the first part of the Sixth Assessment Report, *Climate Change 2021: The Physical Basis*, the Working Group 1 contribution to the Sixth Assessment Report. The Sixth Assessment Report will consist of contributions from each of the three IPCC Working Groups and a Synthesis Report, which integrates the Working Group contributions and the Special Reports produced in the cycle. The Sixth Assessment Report is expected to be completed in September 2022.

As part of the Sixth Assessment Report, a special report on the potential impacts of global warming of 1.5 degrees Celsius (°C) above pre-industrial levels was released (IPCC, 2018). A summary of the key potential impacts described in the special report are provided below.

Global Warming of 1.5°C Special Report – Key Potential Impacts

The IPCC (2018) projects that, between 2030 and 2052, global warming is likely to reach 1.5°C above pre-industrial levels (i.e. the mean temperature over the period 1850 to 1900) if it continues to increase at its current rate.

Extreme climatic events (e.g. hot extremes, heavy rainfall events and droughts) are projected to be more frequent if global warming reaches 1.5°C above pre-industrial levels, and even more frequent if global temperatures are raised to 2°C above pre-industrial levels (IPCC, 2018).

Climate Change Projections for Australia

Climate Change in Australia Technical Report – Projections for Australia's NRM Regions (CSIRO and BoM, 2015) provides climate change projections relevant to the Project area. In Australia, the climate is projected to become warmer and drier (Section 2 of the Draft EIS).

Climate change may result in changes to rainfall patterns, runoff patterns and river flow. The potential implications of climate change to the residual void water balance and on design flood levels were considered in Attachment 6.

The long-term (2090) climate projections for the Representative Concentration Pathway 4.5 (RCP4.5) climate change scenarios adopted in the Surface Water and Flooding Assessment (Attachment 6) to assess impacts on residual void behaviour. WRM also assessed the impact of climate change on design discharges for the 0.1% AEP event. In accordance with the *Australian Rainfall and Runoff: A Guide to Flood Estimation* (Ball et al., 2019) guideline the design rainfall in the model was increased by 12%, based on a 30-year planning horizon and a high RCP producing an estimated temperature increase of between 1.5°C and 3°C (Attachment 6).

The Representative Concentration Pathway 8.5 (RCP8.5) scenario, where minimal greenhouse gas emissions controls are introduced, does not reflect the measures currently being pursued by Parties to the *Paris Agreement*. Notwithstanding, WRM has assessed the effect of the RCP8.5 scenario on residual void behaviour (e.g. water level and quality) (Attachment 6).

Over the life of the Project, it is anticipated that such climatic modelling for Australia, Queensland and various regions will be updated many times as international greenhouse gas emissions mitigation measures are adjusted based on the uptake of less carbon-intensive technology and as climate science continues to evolve. The implications of this on the Project would continue to be evaluated.

Potential Impacts of the Project

Biological diversity, or 'biodiversity', is considered to be the number, relative abundance, and genetic diversity of organisms from all habitats (including terrestrial, marine and other aquatic ecosystems, and the ecological complexes of which they are a part) and includes diversity within species and between species as well as diversity of ecosystems (Lindenmayer and Burgman, 2005).

Many natural ecosystems are considered to be vulnerable to climate change. Patterns of temperature and rainfall are key factors affecting the distribution and abundance of species (Preston and Jones, 2006). Projected changes in climate will have diverse ecological implications. Habitat for some species will expand, contract and/or shift with the changing climate, resulting in habitat losses or gains, which could prove challenging, particularly for species that are threatened.

"*Loss of climatic habitat caused by anthropogenic emissions of greenhouse gases*" is listed as a key threatening process under the EPBC Act. It is acknowledged that (subject to the efficacy of national and international greenhouse gas abatement measures) all sources of greenhouse gas emissions will contribute in some way towards the potential global, National, State and regional effects of climate change.

Project Scope 1 and 2 Emissions[1]

Greenhouse gas emissions associated with the Project have been considered and estimated on an annual basis for the life of the optimised Project. In relation to Scope 2 emissions, Whitehaven WS has committed to purchasing carbon neutral electricity for the Project, eliminating these emissions for the Project.

The Project's contribution to Australian emissions would be relatively small, as estimated maximum annual Scope 1 emissions from the Project during operations represent approximately 0.43% of the estimated total greenhouse gas emissions in Queensland from 2019 (148.2 Mt CO_2-e) and approximately 0.12% of Australia's annual greenhouse gas emissions from 2019 (554.4 Mt CO_2-e) (Attachment 13) (Katestone, 2022).

The Project's contribution to global climate change effects would be proportional to its contribution to global greenhouse gas emissions. Greenhouse gases directly generated at the Project (i.e. Scope 1 emissions) have been estimated at approximately 0.499 Mt CO_2-e per year during operations (Attachment 13) (Katestone, 2022). These emissions would be small in the context of global greenhouse gas emissions.

Whitehaven would continue to report on its contribution to Australian greenhouse gas emissions inventories through its obligations for reporting under the NGER Act, and would comply with other applicable laws and policies implemented by the government to manage emissions under Australia's progressive NDCs, including under the Safeguard Mechanism.

Project Scope 3 Emissions

The Project's Scope 1 and 2 emissions would be significantly less than the Scope 3 emissions produced by customers using Project product coal. The estimated Scope 3 emissions associated with the combustion of coal produced by the Project by customer entities would represent approximately 0.04% of the total anthropogenic greenhouse gas emissions globally (excluding land use change) in 2019 (approximately 51.5 gigatonnes CO_2-e) (United Nations Environment Programme, 2020).

[1] All emission predictions in this section exclude greenhouse gas emissions associated with land clearing.

Under the *Paris Agreement*, each Party is required to prepare, communicate and maintain NDCs that will contribute to the long-term goals of the *Paris Agreement* (UNFCCC, 2021).

It is important to note that, under the *Paris Agreement*, each NDC reflects the country's ambition for reducing emissions, taking into account its domestic circumstances and capabilities (UNFCCC, 2021). Each country will have its own range of opportunities and priorities to trade off various alternative emission reduction (and carbon sink) options having regard to the economic priorities and physical attributes of the country.

Table 7-3 provides a high-level summary of the NDCs under the *Paris Agreement* of the Expected Export Countries for Project product coal. It should be noted that, under the *Paris Agreement*, these NDCs are successive and are to be updated every five years (UNFCCC, 2021).

The review mechanisms under the *Paris Agreement*, therefore, provide for increasing the stringency of emission control measures as required over time to achieve the goals of the *Paris Agreement*. All of Whitehaven's customer countries and the countries to which coal from the Project is expected to be exported are signatories to the *Paris Agreement*, or in the case of Taiwan, have domestic energy policies consistent with the objectives of the *Paris Agreement*.

Potential Future Climate Risk to the Project

Due to the inherent uncertainties associated with climate change described above, the potential impacts of climate change cannot be determined with a high degree of confidence. Notwithstanding, the IPCC (2018), BoM and CSIRO (2015) reports indicate average temperatures are likely to rise in the Project area, and extreme temperature events may increase in frequency. This is supported by the projections in the *Sixth Assessment Report Working Group I – The Physical Science Basis: Regional fact sheet – Australasia* (IPCC, 2021b). This suggests that bushfire activity may become more prevalent in the region.

Table 7-3
Key Potential Customer Country Current Nationally Determined Contributions

Destination Country/State	Summary of NDC[1]
Japan	A 46% reduction in greenhouse gas emissions compared to 2013 emissions by 2030, or a total of approximately 1,000 Mt CO_2-e in 2030, aligning with achieving net zero by 2050. A 50% reduction of emissions compared to 2013 emissions.
South Korea	A 24.4% reduction in greenhouse gas emissions compared to 2017 by 2030, or a total of approximately 709.1 Mt CO_2-e in 2030.
India	A 33-35% reduction in greenhouse gas emissions per unit of Gross Domestic Product (GDP) from the 2005 level by 2030.
Vietnam	A 9% reduction in greenhouse gas emissions compared to the business-as-usual projection for 2030 by 2030, or a total of approximately 83.9 Mt CO_2-e in 2030 (unconditional with domestic resources). A 27% reduction in greenhouse gas emissions compared to the business-as-usual projection for 2030 by 2030, or a total of approximately 250.8 Mt CO_2-e in 2030 (conditional with international support).

After: Government of Japan (2021), Government of South Korea (2020), Government of India (2016) and Government of Vietnam (2020).

1 As at December 2021.

In addition, rainfall has the potential to both increase and decrease, particularly seasonally, with heavier rainfall events and river floods likely to become more frequent (IPCC, 2021b).

Whitehaven WS could implement an adaptive management approach to climate change impacts throughout the life of the Project. This would include monitoring and reviewing information from the CSIRO and BoM relating to observed changes in the region's climate, identifying any emerging trends or potential impacts of a changing climate relevant to the Project, and reviewing current mitigation measures with a view to implementing additional adaptation measures as required.

This could also include conducting climate change risk assessments in consideration of Queensland Government's *Climate change risk management matrix: a process for assessing impacts, adaptation, risk and vulnerability* (Brundell et al., 2011).

Assessment of the potential future climate risks to the Project, including people and property associated with the Project, in consideration of the methodologies outlined in Infrastructure Australia (2021) *Guide to risk and uncertainty analysis – Technical guide of the Assessment Framework* and *Climate - EIS information guideline (ESR/2020/5298)* (DES, 2022), is provided in the sub-sections below.

Potential Direct Effect – Bushfire

The potential for increased bushfire activity in the region poses risks to both the Project workforce and Project infrastructure. The Project is located within areas mapped as "medium potential bushfire intensity" bushfire hazard in the *Isaac Regional Planning Scheme 2021* Bushfire Hazard Overlay. Bushfire in these areas has the potential for high to extreme levels of flame attack, radiant heat and ember attack, as a result of high potential fuel levels, slope and fire weather severity (State of Queensland, 2019a).

Bushfires have the potential to (State of Queensland, 2019a):

- adversely impact on the Project workforce health and safety (direct flame contact, heat exposure, ember attack and smoke inhalation);
- impact on the Project's safe operation (direct flame contact, heat exposure, ember attack and wind and smoke attack); and
- damage Project infrastructure and property (direct flame contact, heat exposure, ember attack and wind attack).

An Emergency Response Protocol would be developed for the Project which would include fire prevention measures to be implemented during the operation of the Project to reduce the likelihood and impact of bushfires.

Section 4 of the Draft EIS outlines the management measures to reduce the risk of bushfire, including the construction and maintenance of fire breaks; provision and maintenance of firefighting equipment around the Project; provision of firefighting equipment training for staff; management of fuel loads within the Project mining leases and implementing access tracks for emergency purposes.

It is noted that the Queensland Fire and Emergency Services supported the assessment of bushfire risk presented in Appendix N of the Draft EIS and the commitments to manage risk from bushfire.

An Emergency Response Procedure would be developed for the Project, which would include the actions that would be implemented in for any natural events (e.g. flooding, bushfire, cyclone) and fire.

Potential Direct Effect – Increased Temperature

Increased air temperatures, resulting in increased frequency of extremely hot days, are projected for Australia (CSIRO and BoM, 2020). Heat extremes affect human health and infrastructure.

The Project workforce health and safety would be managed through implementation of the Whitehaven Coal Health and Safety Management Systems. Worker fatigue will be managed through implementation of the Whitehaven Fatigue Management Standard and associated Fatigue Assessment Form and Fatigue Risk Assessment Chart.

Building work associated with the Project will comply with the Building Code of Australia published by the Australian Building Codes Board and the Queensland Development Code published by the Department of Energy and Public Works. Project infrastructure would be designed in consideration to extreme weather conditions (including extreme heat).

Potential Direct Effect – Variations in Rainfall (Drought/Flooding)

Significant variations in rainfall patterns also have the potential to affect the Project in regard to water storage overtopping (e.g. during storm surges) and water reliability (drought) and flooding risks, which have the potential to impact on the Project's operation, workforce and property.

The potential implications of climate change on surface water sources and flooding have been considered in the Surface Water and Flooding Assessment (Attachment 6):

- Preliminary water storage designs and water reliability estimates have been determined in consideration of a wide range of potential climate scenarios, including prolonged dry periods and long periods of heavy rainfall.
- Residual void water balance modelling considered the 'best case', 'maximum consensus case' and 'worst case' climate scenarios for the Year 2090 RCP8.5 projection, which showed that the residual voids water level will be lower than under baseline climatic conditions for 'best case' and 'maximum consensus case'; and higher than under baseline climate conditions for the 'worst case'. In addition, a post-mining extreme rainfall event (storm surge) has been evaluated for the residual void and determined that no residual void overtopping would occur.
- Residual void water balance modelling considered the 'best case', 'maximum consensus case' and 'worst case' climate scenarios for the Year 2090 RCP8.5 projection, which showed that the residual void salinities would be similar to or higher than baseline climatic conditions for 'best case', 'maximum consensus case', and 'worst case'.
- The potential impact of climate change on the 0.1% AEP flood event extent was assessed, and indicated that the flood modelling would not be significantly different compared to the current climate scenario modelled. As no significant impacts on flood levels and velocities in the Isaac River channel and floodplain under Project operational and post-mining scenarios under the current climate scenario are predicted, the risk climate change poses, inclusive of the Project, to property surrounding the Project, is negligible.

A key objective of the Project site water management system is to maximise the reuse of captured surface water runoff and groundwater inflows to minimise the volume of external water required to satisfy site demands.

The Project operations would not interact with flooding inflow through the construction of temporary flood protection levees, which would be designed with a crest level above the 0.1% AEP plus freeboard. The location of the MIA has been designed to be located outside the 0.1% AEP flood extent, as far as practicable. Modelling demonstrates that the mine water dam and coal content dam embankment would not be inundated by Isaac River floodwater for all events up to and including the 0.1% AEP design event (Attachment 6).

WRM (2022) also considered the implications of the Year 2090 RCP8.5 maximum consensus climate change on residual void behaviour and concluded the equilibrium water levels would be lower, with a higher rate of salinity increase. As such, the residual void would have an even lower risk of discharging to the environment under the Year 2090 RCP8.5 climate change projection (Attachment 6).

The potential risk of climate change (drought) on the establishment of revegetation as part of the Project rehabilitation is considered to be low, as the species that would be seeded would be either native and improved pasture species (suitable for arid, dry conditions) or other appropriate species suited to the Project final landform. During the initial growth stages, if rainfall is low, active watering of plants or application of fertilisers would be undertaken. Furthermore, rehabilitation trials would be undertaken to develop knowledge of site conditions, test and assess the performance of rehabilitation practices for the Project, and/or to mitigate potential risks to rehabilitation success.

Potential Direct Effect – Cyclones

There has been a decrease in the number of tropical cyclones observed in Australia since 1982 and it is expected that there will be fewer tropical cyclones but a greater proportion projected to be of high intensity (CSIRO and BoM, 2020). Four tropical cyclones made landfall on the Isaac Regional coast in the last 50 years (IRC, 2019) and the Project is located outside of the Coastal Hazard Zone as mapped by the *Isaac Regional Planning Scheme 2021*. Therefore, the historical incidence frequency of cyclones in the Project area has been low.

Notwithstanding, heavy rainfall and thunderstorms that occur on the peripheral or in the wake of cyclones could impact the Project, and these risks (flooding, overtopping) would be managed, as described above.

Potential Transition Risk

It is recognised that international measures to 'decarbonise' global economies may alter the future demand for and/or supply of coal. Expected global trends are factored into coal price forecasts considered in the Draft EIS Economic Assessment (Deloitte Access Economics, 2021). The Economic Assessment also includes sensitivity analysis for variations in export coal prices and the social cost per tonne of carbon emissions. The sensitivity analysis shows that the Project would still generate a substantial net benefit to the Queensland community under the scenarios considered (Deloitte Access Economics, 2021).

Whitehaven has undertaken detailed climate risk and scenario planning using the voluntary framework recommended by the Financial Stability Board's TCFD. In undertaking this analysis Whitehaven stress-tested the resilience of its operating asset portfolio against the enduring International Energy Agency (IEA) scenarios, the Stated Policies Scenario (STEPS) and Sustainable Development Scenario. Mitigation measures to market change, policy and regulation and access to funding and insurance risks include continuously monitoring the global environment and global and domestic policy and regulation with a focus on changes or trends in policy of customer countries, conducting detailed analyses on coal markets to ensure Whitehaven is well-positioned to respond to market changes that affect its business, and exploring alternative sources of funding and insurance (Whitehaven, 2022).

Consistent with the TCFD's recommendations to monitor relevant external metrics to determine the most likely eventuating scenario over time, Whitehaven has identified signposts for each World Energy Outlook scenario, which will be used to monitor the changing energy landscape and to inform judgments about the probability of different IEA scenarios materialising over time (Whitehaven, 2022).

7.2.5.3 Project Greenhouse Gas Emissions and Climate Change Action

DES requested assessment of the potential impacts of the Project on State and National greenhouse gas inventories and emission targets.

Response

The Queensland Government has committed to achieving zero net emissions by 2050, with an interim target to reduce emissions below 2005 levels by 2030 (DES, 2021c).

Australia's updated and enhanced maintain NDC communicates that Australia (Commonwealth of Australia, 2021):

- adopts an economy-wide target of net zero emissions by 2050;
- commits to seven low emissions technology stretch goals; and
- reaffirms its ambitious economy-wide target to reduce greenhouse gas emissions by 26% to 28% below 2005 levels by 2030, and will exceed it by up to nine percentage points.

The Project's impact on State and National greenhouse gas emissions targets would be proportional to its contribution to State and National greenhouse gas emission inventories.

Estimated maximum annual greenhouse gases directly generated by the Project (i.e. Scope 1 emissions) have been estimated at approximately 0.64 Mt CO_2-e. This is a relatively small contribution to Australian emissions, representing approximately 0.43% of the estimated total greenhouse gas emissions in Queensland from 2019 (148.2 Mt CO_2-e) and approximately 0.12% of Australia's annual greenhouse gas emissions from 2019 (554.4 Mt CO_2-e) (Attachment 13) (Katestone, 2022).

Whitehaven WS will comply with Federal emission reduction policies, including the Safeguard Mechanism and reporting obligations under the NGER Act. Consistent with the Queensland Government's expectations as provided in the *Queensland Resources Industry Development Plan* (State of Queensland, 2022), Whitehaven WS will implement greenhouse gas mitigation and minimisation measures to reduce Scope 1 and 2 emissions associated with the Project (Attachment 13), including the use of carbon neutral electricity at the Project.

7.2.5.4 Land Clearing

DES requested quantification of emissions as a result of land clearing.

Response

Consistent with the requirements of the *National Greenhous Gas and Energy Reporting Scheme*, greenhouse gas emissions associated with land clearing were not quantified as part of the Draft EIS. Furthermore, as mining operations progress, the open cut and waste emplacement landforms will be progressively rehabilitated with the aim of offsetting any previous greenhouse gas emissions from land clearing. This approach is consistent with the approach taken for greenhouse gas assessments as part of recently approved projects (DES, 2021d).

Additionally, greenhouse gas emissions originating from land clearing are not expected to be significant compared to the annual Scope 1 greenhouse gas emissions associated with the Project, with emissions from land clearing estimated to account for approximately 6% of the overall annual greenhouse gas emissions of the Project (Katestone, 2022).

Notwithstanding emissions associated with land clearing have been calculated by Katestone (2022) and are estimated to be 0.03 Mt CO_2-e on average per year.

NGO and Public Submissions

7.2.5.5 Project Greenhouse Gas Emissions and Climate Change Action

Concerns were raised regarding the Project's estimated greenhouse gas emissions in light of State and Federal commitments to reduce greenhouse gas emissions and global climate change targets (e.g. 1.5°C warming), and a perceived lack of carbon offsets or greenhouse gas emission reduction strategies.

Response

Whitehaven acknowledges that the production and consumption of coal contributes to greenhouse gas emissions. Whitehaven also acknowledge the challenge of integrating international emissions reduction efforts with the legitimate economic and social development aspirations of people, communities and countries.

The Project's contribution to global climate change effects would be proportional to its contribution to global greenhouse gas emissions.

As described above, estimated maximum annual greenhouse gas emissions directly generated at the Project (i.e. Scope 1 emissions) would have a relatively small contribution to Australian emissions, representing approximately 0.43% of the estimated total greenhouse gas emissions in Queensland from 2019 (148.2 Mt CO_2-e) and approximately 0.12% of Australia's annual greenhouse gas emissions from 2019 (554.4 Mt CO_2-e) (Attachment 13) (Katestone, 2022).

The Project's Scope 1 and 2 emissions would be significantly less than the Scope 3 emissions produced by customers using Project product coal. The estimated Scope 3 emissions would represent approximately 0.04% of the total annual anthropogenic greenhouse gas emissions globally (excluding land use change) in 2019 (Attachment 13). It is anticipated that a significant majority of the Scope 3 emissions from the use of Project coal would occur overseas, as coal from the Project would be exported. Expected export markets for Project coal are described in Attachment 12 (e.g. Japan, South Korea, India and Vietnam) and all of these export markets are signatories to the *Paris Agreement* (Table 7-3).

Under the *Paris Agreement*, each Party is required to prepare, communicate and maintain NDCs that will contribute to the long-term goals of the *Paris Agreement* (UNFCCC, 2021).

It is important to note that, under the *Paris Agreement*, each NDC reflects the country's ambition for reducing emissions, taking into account its domestic circumstances and capabilities (UNFCCC, 2021). Each country will have its own range of opportunities and priorities to trade off various alternative emission reduction (and carbon sink) options, having regard to the economic priorities and physical attributes of the country.

Whitehaven WS would implement various management and minimisation measures to minimise the overall generation of Scope 1 and 2 greenhouse gas emissions from the Project (Attachment 12). Whitehaven WS would manage its contribution to Australian greenhouse gas emissions inventories through participation in the NGER Scheme, as well as other applicable government initiatives and policies implemented to manage emissions at the national level under Australia's progressive NDCs.

In 2021, Whitehaven became a signatory to the World Coal Association's *Responsible Coal Principles*, which include acknowledging the impact of climate change and importance of mitigating all emissions from coal, committing to actively supporting low emission coal technologies, investment and innovation. In transitioning to a lower-carbon future, Whitehaven is committed to:

- Supplying its customers with high-quality coal for use in high-efficiency, low-emissions coal-fired power stations.
- Finding and implementing measures at each point of the value chain to reduce emissions.
- Supporting relevant UN Sustainable Development Goals, including universal access to affordable energy.

Whitehaven is a member of the Minerals Council of Australia which, in 2020, released its *Climate Action Plan*. The plan details the mineral industry's ambition to achieving the goal of net zero emissions and its actions, among others, on renewable energy investments at mine sites and collaborations with partners on low-emissions technologies and processes.

Scope 3 emissions from the use of Project coal in overseas customer countries would be managed in accordance with customer countries commitments under the *Paris Agreement* and would not contribute to Australian greenhouse gas emissions or factor into Australian greenhouse gas reduction targets. It is therefore anticipated these emissions would not increase Australia's current greenhouse gas emissions.

The Project would produce metallurgical coal for the steel industry (predominantly) and thermal coal (as a secondary product) for energy production.

Metallurgical coal is used in the production of steel, iron alloys, carbon and other metals. Global demand for metallurgical coal correlates to industrialisation and urbanisation. For example, CRU predicts Indian steel demand will grow at 5% compound annual growth rate to 2040 (CRU, 2021). Steel is an integral component to enable a high-quality of life, which every person has a right to. Furthermore, steel will enable the development of renewable energy equipment that the world needs to decarbonise, such as wind turbines and solar panels, and the steelmaking process currently has few cost-competitive, low-emissions alternatives (State of Queensland, 2022).

Furthermore, ECP modelling indicates that global steel demand would increase by 1.1% per annum by 2035. Given this quality advantage, Queensland is also well-placed to capitalise on any emerging pockets of increased demand for thermal coal (State of Queensland, 2022).

If the Project does not proceed, global demand for thermal coal could be satisfied by other sources and, therefore, there would not be a corresponding reduction in global greenhouse emissions in the atmosphere. The Project's relatively low greenhouse gas emissions intensity (0.04 t CO_2-e per t ROM coal) and low cost of production (due to relatively low strip ratios) means that it would remain competitive in the global coal market. If the Project does not proceed, and therefore does not produce high-quality thermal coal, the existing and future demand for coal is likely to be satisfied by lower-quality (and thus more emissions-intensive) coal, which means that more coal would need to be burned to meet the same energy needs, resulting in higher greenhouse gas emissions. For example, currently more than 5% of the coal imported by Asia-Pacific Countries is from Indonesia, which has a typical calorific value of 4,640 kilocalories per kilogram net as received (kcal/kg) (Ashurst, 2022), compared with the Project's coal, which has a calorific value of 5,270 kcal/kg.

The Queensland Government's (2022) *Queensland Resources Industry Development Plan* sets out a 30 year vision for Queensland's resources industry to be a resilient, responsible and sustainable industry that grows as it transforms. The Plan states, "*Coal projects will continue to be supported as long as they stack up economically, environmentally, and socially*". The optimised Project would be consistent with the statement (Section 8).

It is also noted that the *Queensland Resources Industry Development Plan* reiterates that the coal mining industry will continue to be a strength for Queensland over the coming years (State of Queensland, 2022).

In relation to Australian and Queensland laws and policies, it is noted that:

- There is nothing in existing climate change laws and policies which prohibits the approval of new coal mining developments.
- None of the mechanisms or measures that Australia has adopted for the purpose of meeting its NDC under the *Paris Agreement* include restrictions on coal mine expansions.

- Whitehaven WS will continue to comply with its obligations to report greenhouse gas emissions and energy consumption/production under the NGER Act.
- Whitehaven WS will comply with the Federal Government's Safeguard Mechanism by remaining at or below the baseline for the Project (to be set by the Clean Energy Regulator), offsetting its emissions above its baseline, or otherwise managing compliance.
- It is the Queensland Government's policy that coal in Queensland continues to be developed in consideration to the highest environmental and community standards.
- The Minister for Resources of the newly elected Australian Government predicts that thermal coal will continue to be a major export for the country to 2050 and beyond.

7.2.5.6 Fugitive Emissions

A submission queried the calculation of fugitive emissions for the Project, in reference to calculating the fugitive emissions based on satellite imagery, and lack of abatement measures associated with fugitive emissions.

Response

The predicted fugitive gas emissions for the Project were calculated using data from a site-specific geological sampling program (Attachment 13).

Furthermore, the satellite imagery data referred to in the submission does not provide enough clarity to differentiate fugitive gas emissions from mining operations, wastewater, landfill or agricultural industries in the Bowen Basin. In the Department of Industry, Science, Energy and Resources (DISER)'s (2021) *Quarterly Update of Australia's National Greenhouse Gas Inventory: March 2021*, DISER states, consistent with the IPCC, that it is premature to use satellite data to quantify emissions from methane sources. Analysis of data from the Sentinel 5P satellite requires a pollution dispersion model to determine the emission point and the data only showed methane emissions at a point in time, instead of annually (DISER, 2021).

A Greenhouse Gas Management and Abatement Plan has been prepared for the Project and is provided in Attachment 12. For underground mines, fugitive methane released from mining coal deposits can be converted to carbon dioxide through flaring or capture for use in electricity production through pre-drainage of coal seams. As the Project is an open cut mine, the coal seams are closer to the surface, as such the likelihood of significant in-situ gas in places is lower (Clean Energy Regulator, 2021a). Considering current technology, Whitehaven WS does not consider pre-drainage to be a viable option.

7.2.5.7 Project Emissions Intensity Factor

A submission raised a concern regarding the Scope 1 emissions intensity factor for the Project, as the emissions factor was reported to be lower than neighbouring mining operations.

Response

The Scope 1 and 2 greenhouse gas emissions intensity of the Project is estimated to be approximately 0.04 t CO_2-e/t ROM coal. This compares favourably with other approved and operating coal mining operations in the Bowen Basin, which have estimated greenhouse gas emissions intensities ranging from 0.036 to 0.13 t CO_2-e/t ROM coal (Table 7-4).

The low greenhouse gas emissions intensity is related to the relatively low strip ratios at the Project, which also lowers the cost of coal production. Scope 1 greenhouse gas emissions were based on emissions factors as provided in the *National Greenhouse Accounts Factors August 2019* (DEE, 2019), *National Greenhouse and Energy Reporting (Measurement) Determination 2008* (as at July 2020), current at the time of assessment and site specific geological data. Estimated diesel and electricity usage predicted for the Project was based on data from Whitehaven's existing operations.

Table 7-4
Scope 1 and 2 Emission Intensities of Coal Mining Operations in the Bowen Basin

Mining Operation	Total ROM Resource (Mt)	Total Emissions (Scope 1 and 2) (Mt)	Emissions Intensity Factor (t CO_2-e/ t ROM coal)
Project[1]	396	14.96	0.04
Isaac Downs Mine[2]	35.4	2.15	0.06
Olive Downs Project[3]	611.5	71.91	0.12
Caval Ridge Mine[4]	-	11.14	0.036 – 0.043
Goonyella Riverside Mine[5]	750	39.25	0.05
Broadmeadow Underground Mine[5]	138	11.51	0.08
Red Hill Mine[5]	234	24.21	0.11 – 0.13
Central Queensland Coal Project[6]	64.1	3.45 (Scope 1 only)	0.05

Note: Values have been rounded.

1 *Air Quality and Greenhouse Gas Assessment for the Winchester South Project* (Katestone, 2021).

2 *Air Quality and Greenhouse Gas Assessment for the Isaac Downs Project* (Katestone, 2020).

3 *Air Quality and Greenhouse Gas Assessment for the Olive Downs Coking Coal Project* (Katestone, 2018).

4 *Caval Ridge Environmental Impact Statement* (BHP Billiton Mitsubishi Alliance [BMA], 2009).

5 *Red Hill Mining Lease Environmental Impact Statement* (BMA, 2013).

6 *Central Queensland Coal Project Air Quality Assessment* (Vipac Engineers & Scientists, 2020).

7.2.6 Air Quality

Agency Submissions

7.2.6.1 Trigger Action Response Plan for Air Quality Objectives

Concern was raised that the Trigger Action Response Plan would not be adequate to respond to exceedances of air quality objectives.

Response

Whitehaven WS would operate the Project with a proactive dust management system (including a Trigger Action Response Plan) to minimise dust generation during times of high potential for impact as far as practicable. The system would include the use of weather forecasting and real-time measurement of dust levels and meteorological conditions to identify opportunities to reduce the likely impacts with reference to applicable air quality objectives at the nearest sensitive receptors.

When air quality monitoring and meteorological forecasting indicate the potential for upcoming exceedances of the applicable air quality objectives, Whitehaven WS would seek to modify mining operations in accordance with an Air Quality Management Plan (AQMP). A hierarchy of proactive mitigative actions would be stated in the AQMP and will seek to reduce potential impacts, such as:

- applying additional dust controls such as using chemical suppressant (or alternative technologies with equivalent effectiveness) to haul roads;
- relocating operations; and/or
- reducing the intensity of certain operations.

In summary, the Trigger Action Response Plan would include:

- identification of separate trigger levels for:
  - investigation; and
  - action;
- a process to identify the main source of dust impacts;
- implementation of additional mitigation measures; and
- internal and external reporting requirement.

It is also proposed that a predictive meteorology forecast system be implemented, and data be made available for the ensuing period (approximately 2 to 3 days, where forecast confidence levels are higher than longer term predictions). This system would download meteorological data and forecasts on a daily basis which would be used to inform air quality management planning.

7.2.6.2 Potential Impacts on Olive Downs Homestead

Concern was raised that agreement in regard to predicted air quality emissions with the owners of Olive Downs Homestead will not be reached.

Response

As described in Attachment 13 (Katestone, 2022), Whitehaven WS intends to reach a mutually beneficial agreement with the land-owner of the Olive Downs Homestead in order to mitigate the potential impact.

Discussions with the land-owner have substantially progressed since the Draft EIS, with several consultation meetings taking place. Whilst discussions with the land-owners are confidential, they have been centred on relocating the residents to other properties to avoid the potential impacts of the Project. Should the dwelling continue to be occupied, there are a number of measures that could potentially be implemented at the dwelling (with the agreement of the land-owner) to reduce the effects of potential air quality impacts:

- air conditioning, including heating;
- insulation;
- first flush water systems;
- installation and regular replacement of water filters;
- cleaning of rainwater tanks;
- clothes dryers; and
- regular cleaning of the residence and its related amenities, such as barbeque areas and swimming pools.

7.2.6.3 Product Coal Rail Transport Dust Emissions

Concern was raised that mitigation measures for potential emissions associated with product coal transport are not consistent with Aurizon's *Coal Dust Management Plan*.

Response

As described in Attachment 13 (Katestone, 2021), a number of management measures to minimise the generation of coal dust from rail loading and transport would be implemented by Whitehaven WS, consistent with the dust mitigation activities presented in the *Coal Dust Management Plan* (Aurizon, 2020), including:

- Profiling of coal in wagons to a “garden bed” shape profile.
- Veneering system using a biodegradable spray after profiling to reduce coal dust generation during transit to port.

As described in Aurizon (2020), the implementation of these measures in the coal train network is highly effective in reducing the loss of coal dust from loaded rail wagons during transport.

7.2.6.4 Cumulative Impacts

Concern was raised that the assessment has not considered impacts on nearby coal mining and exploration projects.

Response

The background concentration used in the cumulative assessment encompasses dust levels from existing sources in the region including activities in Moranbah (construction and vehicle use), regional industrial activities (existing coal mines, quarries and dumps) and natural dust (bush fires and dust storms).

Attachment 13 also considered a number of existing and approved, but not developed, nearby projects from a cumulative impact perspective, including:

- Poitrel Mine;
- Daunia Mine;
- Moorvale South Project; and
- Olive Downs Project.

More recently, Katestone (2022) (Attachment 13) also considered the Caval Ridge Mine (including the Caval Ridge Mine Horse Pit Extension Project).

7.2.7 Noise and Vibration

Agency Submissions

7.2.7.1 Mitigation of Noise Impacts

Concern was raised that no noise mitigation measures are proposed and noise impacts will be unmitigated.

Response

The noise assessment methodology by Renzo Tonin (2022) (Attachment 14) involved a review of reasonable and feasible mitigation measures that could be implemented to reduce noise emissions from the Project. The iterative steps undertaken are described below:

1. Preliminary noise modelling of scenarios representative of various stages of the Project (including stages when noise levels at sensitive receptors would be expected to be greatest) to identify the potential for noise exceedances.
2. Evaluation of various combinations of noise management and mitigation measures to assess their relative effectiveness.
3. Review of the effectiveness of these measures and assessment of their feasibility by Whitehaven WS.
4. Adoption of management and mitigation measures to appreciably reduce noise emissions associated with the Project.

The CHPP was modelled by Renzo Tonin (2022) at a sound power level of 117 dBA, which is considered to be representative of reasonable attenuation, and is based on sound power levels at Whitehaven's Maules Creek Mine. Analysis of the noise model and noise source locations indicated the CHPP is the dominant noise source contributing to noise levels at the nearest receptor, Olive Downs Homestead.

With the adoption of reasonable attenuation for the CHPP and associated processing areas, noise levels at Olive Downs Homestead are predicted to remain above the Project noise limits. Further mitigation of the CHPP and other sources was not considered feasible.

In addition, Project noise adaptive management measures would include:

- response to community issues or complaints including discussions with relevant land-owners;
- refinement of on-site noise mitigation measures and mine operating procedures, where required and practicable;
- use of real-time noise and meteorological monitoring as a management tool; and
- if necessary (i.e. as informed by operational noise monitoring results and subject to any agreements), implementation of feasible and reasonable mitigation at relevant sensitive receptors, in accordance with the Noise Environment Protection Policy.

7.2.7.2 Potential Impacts on Olive Downs Homestead

Concern was raised that agreement in regard to predicted noise emissions with the owners of Olive Downs Homestead will not be reached.

Response

As described in Attachment 14, Whitehaven WS intends to reach a mutually beneficial agreement with the land-owner of the Olive Downs Homestead in order to mitigate the potential impact.

Whilst discussions with the land-owners are confidential, they have been centred on relocating the residents to other properties to avoid potential impacts of the Project. In addition, the following measures that could potentially be implemented at the dwelling to reduce the effects of potential impacts:

- double glazing, insulation and air conditioning at the residence; and
- roof and wall noise insulation.

7.2.7.3 Blasting Impacts on Rail Infrastructure

Concern was raised that blasting will impact the existing railway corridor and operations.

Response

The potential for flyrock ejected from blasting events impacting on rail infrastructure was considered in the Attachment 14. Renzo Tonin (2022) described that, given the proximity of mining areas to the Norwich Park Branch Railway, Whitehaven WS would consult with Aurizon, operators of the railway, regarding potential flyrock impact and, if necessary, temporary closure of the railway during blast events.

Whitehaven WS would similarly work with Aurizon to comply with any vibration limits that may apply for this infrastructure.

7.2.7.4 Cumulative Impacts

Concern was raised that the assessment has not considered impacts on nearby coal mining and exploration projects.

Response

Appendix G of the Draft EIS (Renzo Tonin, 2021) also considers a number of existing and approved, but not developed, nearby projects from a cumulative impact perspective, including:

- Poitrel Mine;
- Daunia Mine;
- Moorvale South Project; and
- Olive Downs Project.

More recently, Renzo Tonin (2022) (Attachment 14) also considered the Caval Ridge Mine (the Caval Ridge Mine Horse Pit Extension Project) as well as the Eagle Downs Mine.

7.2.8 Economic

Agency Submissions

7.2.8.1 Discount Rate Adopted in the Cost Benefit Analysis

The Queensland Treasury requested justification for the discount rate adopted in the cost benefit analysis component of the Economic Assessment (Appendix K of the Draft EIS).

Response

The cost benefit analysis component of the Economic Assessment (Appendix K of the Draft EIS) was prepared with respect to the net benefits attributable to Queensland, which is the community of interest specified in the ToR, *Economic Impact Assessment Guideline* (Department of State Development, 2017) and the *Project Assessment Framework – Cost-benefit analysis* (Queensland Treasury, 2015). The cost benefit analysis is not an assessment of the benefits of the Project from Whitehaven WS' perspective and therefore a discount rate reflecting Whitehaven WS' relevant investment considerations is not appropriate.

Given the above, the cost benefit analysis component of the Economic Assessment (Appendix K of the Draft EIS) adopted a discount rate of 7% in the base case and the sensitivity analysis included consideration of 3% and 10% discount rates. This approach is consistent with the *Economic Impact Assessment Guideline* (Department of State Development, 2017) which provides the following in relation to the discount rates to be adopted:

> *A higher discount rate may be appropriate for projects that are expected to generate impacts over a short time period, as there is greater certainty about the value of these benefits. Lower rates may be appropriate for projects with impacts extending over long periods. Justification should be provided for the discount rate used.*
>
> *… As a minimum, sensitivity analysis should be conducted using an upper, lower and predicted discount rate.*

As neither the *Economic Impact Assessment Guideline* (Department of State Development, 2017) nor the *Project Assessment Framework – Cost-benefit analysis* (Queensland Treasury, 2015) specify discount rates to be adopted in economic impact assessments, the specific discount rates adopted in the cost benefit analysis were selected in accordance with the guidance in:

- *Cost-benefit Analysis Guidance Note* (Australian Department of the Prime Minister and Cabinet, 2020);
- *Guidelines for the economic assessment of mining and coal seam gas proposals* (NSW Department of Planning and Environment [DPE], 2015); and
- *Technical Notes Supporting the Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals* (DPE, 2018).

The adopted central case discount rate (i.e. 7%) is consistent with other recent economic assessments for coal mining projects in Queensland (e.g. Olive Downs Project [Gillespie Economics, 2018], Ensham Life of Mine Extension Project [CDM Smith, 2020]).

The discount rates adopted in the cost benefit analysis component of the Economic Assessment (Appendix K of the Draft EIS) are considered to be appropriate for assessing the net benefits of the Project attributable to Queensland, are consistent with relevant Australian guidelines, and are therefore also adopted in the revised Economic Assessment (Attachment 16).

7.2.8.2 Future Thermal Coal Demand

The Queensland Treasury requested further information in regard to the future global market for coal in light of global greenhouse gas reduction efforts, and also concerns regarding potential implications for Project product coal demand and prices adopted in the cost benefit analysis component of the Economic Assessment.

Response

The Queensland Government's *Resource Industry Development Plan* (State of Queensland, 2022) notes the following in regard to the ongoing demand for Queensland coal exports and thermal coal (State of Queensland, 2022) (bold emphasis added):

> *While the global market for thermal coal is likely to decline as countries choose their own path to reduce emissions, demand from the fast-developing countries in the Indo-Pacific region could create pockets of future growth.* ***The high quality of our thermal coal means that Queensland is well placed to respond to these opportunities.***
>
> *Growing economies within the Indo-Pacific region will see a growth in demand for Queensland's high-quality resources, while demand for ethically sourced resources—such as from Europe and North America—****will provide a significant opportunity for Queensland resource companies that can prove strong, independent ESG credentials and resource provenance.***

In addition to the primary metallurgical product, the Project would supply high quality (low emission) thermal coal to this Asia Pacific region.

The coal prices adopted by Deloitte Access Economics (2022) for projecting revenue from the Project adopted in the revised Economic Assessment (Attachment 16) were developed from Whitehaven WS' price forecasts (based on Broker Consensus price forecasts). Deloitte Access Economics (2022) also independently benchmarked Whitehaven WS' price forecasts against Consensus Economics price forecasts. As the Consensus Economics price forecasts are considered to be a reasonable and independent source for coal prices, Whitehaven WS' price forecasts are considered reasonable. In addition, sensitivity analyses for potential changes in coal prices were also conducted, and demonstrate that in all modelled scenarios, the Project would still have a substantial net benefit to Queensland.

The Queensland Government's (2022) *Resource Industry Development Plan* outlines how the Queensland Government will continue to support responsible coal resource development. The Plan states, "*Coal projects will continue to be supported as long as they stack up economically, environmentally, and socially".* The Project would be consistent with this position.

7.2.8.3 Coal Price Sensitivity Analysis Range

The Queensland Treasury requested justification for the coal price range adopted in the sensitivity analysis component of the cost benefit analysis of the Economic Assessment (Appendix K of the Draft EIS).

Response

The sensitivity analysis included in the cost benefit analysis component of the Economic Assessment (Appendix K of the Draft EIS) considered a sustained 25% decrease and increase in coal price relative to the base case coal price over the whole 28 year Project production life. As described above, the coal price forecasts adopted in the base case of the cost benefit analysis are considered reasonable.

The adopted coal price sensitivity analysis range is considered conservative as the coal price is unlikely to remain depressed or elevated, to the extent modelled, over that extended period.

Notwithstanding the above, Deloitte Access Economics (2022) has subsequently considered a sustained 50% decrease and increase in coal price relative to the base case coal price over the whole 28 year Project production life in the revised Economic Assessment (Attachment 16). Even under this conservative assumption, the sensitivity analyses demonstrates that in all modelled scenarios, the Project would have a substantial net benefit to Queensland.

7.2.8.4 Consideration of Scope 1 and 2 Greenhouse Gas Emissions

The Queensland Treasury requested justification that externalities associated with Project Scope 1 and 2 greenhouse gas emissions included in the cost benefit analysis component of the Economic Assessment (Appendix K of the Draft EIS) are not underestimated as the methodology adopted accounts for costs to Queensland only.

Response

The cost benefit analysis component of the Economic Assessment (Appendix K of the Draft EIS) was prepared with respect to the net benefits attributable to Queensland, which is the community of interest specified in the ToR, *Economic Impact Assessment Guideline* (Department of State Development, 2017) and the *Project Assessment Framework – Cost-benefit analysis* (Queensland Treasury, 2015). This means that all costs (e.g. greenhouse gas emissions) and benefits (e.g. producer surplus, company tax payments) estimated in the cost benefit analysis are consistently those that accrue to the Queensland community only.

Consistent with this approach, the estimated costs associated with the Project Scope 1 and 2 greenhouse gas emissions in the Economic Assessment (Appendix K of the Draft EIS) were limited to Queensland. This methodology is consistent with the *Guidelines for the economic assessment of mining and coal seam gas proposals* (DPE, 2015) and the *Technical Notes Supporting the Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals* (DPE, 2018).

This consistent approach has also been adopted in the revised Economic Assessment (Attachment 16).

7.2.8.5 Company Tax

The Queensland Treasury requested clarification on including company tax payments as a benefit in the cost benefit analysis component of the Economic Assessment (Appendix K of the Draft EIS).

Response

The cost benefit analysis component of the Economic Assessment (Appendix K of the Draft EIS) was prepared with respect to the net benefits attributable to Queensland, which is the community of interest specified in the ToR, *Economic Impact Assessment Guideline* (Department of State Development, 2017) and the *Project Assessment Framework – Cost-benefit analysis* (Queensland Treasury, 2015). This means that the costs and benefits that accrue to the Queensland community have been consistently estimated in the cost benefit analysis. The company tax generated by the Project attributable to Queensland (based on Queensland's population relative to the total Australian population [i.e. approximately 20%]) has therefore been included as a benefit of the Project.

As the *Economic Impact Assessment Guideline* (Department of State Development, 2017) does not provide guidance on how company tax payments should be considered, the methodology adopted was based on the *Guidelines for the economic assessment of mining and coal seam gas proposals* (DPE, 2015) and the *Technical Notes Supporting the Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals* (DPE, 2018).

Notwithstanding the above, sensitivity analyses for potential changes in company tax payments (including consideration of zero company tax payments) were conducted in the cost benefit analysis in the revised Economic Assessment, and showed that in all modelled scenarios the Project would still have a substantial net benefit to Queensland (Attachment 16).

7.2.8.6 Rehabilitation Costs

The Queensland Treasury questioned whether costs associated with the Financial Provisioning Scheme have been incorporated into the cost benefit analysis component of the Economic Assessment (Appendix K of the Draft EIS).

Response

The Economic Assessment (Appendix K of the Draft EIS) considered the Project rehabilitation and decommissioning costs in the cost benefit analysis. These rehabilitation and decommissioning costs included allowance for costs associated with the Financial Provisioning Scheme.

The same approach has been adopted in the revised Economic Assessment (Attachment 16).

7.2.8.7 Accuracy of Flow-on Benefits Estimations

The Queensland Treasury questioned if the Computable General Equilibrium (CGE) model used in the regional impact analysis component of the Project Economic Assessment overstated flow-on benefits.

Response

The regional impact analysis component of the Project Economic Assessment (Appendix K of the Draft EIS) was prepared in accordance with the *Economic Impact Assessment Guideline* (Department of State Development, 2017).

The *Economic Impact Assessment Guideline* (Department of State Development, 2017) provides for the use of either CGE or input-output (IO) modelling to identify and assess the potential economic impacts on the local, regional and Queensland economies.

Deloitte Access Economics adopted its Regional General Equilibrium Model (DAE-RGEM) CGE model in the regional impact analysis component of the Economic Assessment (Appendix K of the Draft EIS). In contrast to IO modelling, CGE modelling generally assumes that the economy and sectors within the economy are competing for the use of resources. This means that increases in demand from the Project may result in effects such as increased prices in other markets and crowding out effects (rather than just increased output). In this sense, CGE modelling is likely to provide more conservative estimates of economic impacts than the economic contribution estimates of IO modelling (Attachment 16). Given the above, the CGE model is considered to be appropriate for assessing potential economic impacts on the local, regional and Queensland economies.

CGE modelling has been adopted in the revised Economic Assessment and a detailed description of DAE-RGEM CGE model is provided in Attachment 16.

NGO and Public Submissions

7.2.8.8 Consideration of Scope 1 and 2 Greenhouse Gas Emissions

Concerns were raised that externalities associated with Project Scope 1 and 2 greenhouse gas emissions included in the cost benefit analysis component of the Economic Assessment (Appendix K of the Draft EIS) are underestimated as the methodology adopted accounts for costs to Queensland only.

Response

Refer to response to this issue above.

7.2.8.9 Greenhouse Gas Emission Externalities

Concerns were raised that externalities associated with Project Scope 1 and 2 greenhouse gas emissions adopted in the cost benefit analysis component of the Economic Assessment (Appendix K of the Draft EIS) underestimated as the social cost of carbon cost adopted was not reflective of current cost estimates.

Response

The value of externalities associated with Project Scope 1 and Scope 2 greenhouse gas emissions (i.e. the adoption of a social cost of carbon) was incorporated into the cost benefit analysis component of the Economic Assessment (Appendix K of the Draft EIS).

As the *Economic Impact Assessment Guideline* (Department of State Development, 2017) does not specify specific greenhouse gas costs to be adopted in economic impact assessments, the greenhouse gas costs adopted in the cost benefit analysis were selected in accordance with the guidance in the *Guidelines for the economic assessment of mining and coal seam gas proposals* (DPE, 2015) and the *Technical Notes Supporting the Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals* (DPE, 2018). Consistent with these guidelines, the cost benefit analysis included a sensitivity analysis that adopted alternative greenhouse gas costs which showed that in all modelled scenarios, the Project would have a substantial net benefit to Queensland.

Deloitte Access Economics (2022) has adopted the following updated estimates of the social cost of carbon in the revised Economic Assessment (Attachment 16):

- European Union Emission Allowance Units long term forecast price;
- Australian Treasury Clean Energy Future Policy Scenario prices; and
- US Environmental Protection Agency (US EPA) Social Cost of Carbon.

The cost benefit analysis in the revised Economic Assessment showed that in all modelled scenarios the Project would still have a substantial net benefit to Queensland (Attachment 16).

7.2.8.10 Discount Rate Adopted in the Cost Benefit Analysis

It was suggested that a higher discount rate should specifically be applied to the externalities associated with Project Scope 1 and 2 greenhouse gas emissions in the cost benefit analysis component of the Economic Assessment (Appendix K of the Draft EIS) as the impacts would be over the long-term.

Response

The cost benefit analysis component of the Economic Assessment (Appendix K of the Draft EIS) adopted a consistent discount rate of 7% to all costs and benefits in the base case and the sensitivity analysis included consideration of 3% and 10% discount rates. This approach is consistent with the *Economic Impact Assessment Guideline* (Department of State Development, 2017) which provides the following in relation to the discount rates to be adopted (bold emphasis added):

> *All costs and benefits of a project should be discounted **at the same rate**.*
>
> *… As a minimum, sensitivity analysis should be conducted using an upper, lower and predicted discount rate.*

As the *Economic Impact Assessment Guideline* (Department of State Development, 2017) or the *Project Assessment Framework – Cost-benefit analysis* (Queensland Treasury, 2015) do not however specify specific discount rates to be adopted in economic impact assessments, the specific discount rates adopted in the cost benefit analysis were selected in accordance with the guidance in:

- *Cost-benefit Analysis Guidance Note* (Australian Department of the Prime Minister and Cabinet, 2020); and
- *Guidelines for the economic assessment of mining and coal seam gas proposals* (DPE, 2015) and the *Technical Notes Supporting the Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals* (DPE, 2018).

The discount rates adopted in the cost benefit analysis component of the Economic Assessment (Appendix K of the Draft EIS) are considered to be appropriate for assessing the net benefits of the Project attributable to Queensland and are consistent with other relevant Australian guidelines.

The same approach has therefore been adopted in the revised Economic Assessment (Attachment 16).

7.2.8.11 Consideration of Third Party Greenhouse Gas Emissions

Concerns were raised that externalities associated with greenhouse gas emissions adopted in the cost benefit analysis component of the Economic Assessment (Appendix K of the Draft EIS) are underestimated as the costs associated with the combustion of Project product coal by third parties were not included in the cost benefit analysis.

Response

The value of externalities associated with Project Scope 1 and Scope 2 greenhouse gas emissions (i.e. the adoption of a social cost of carbon) was incorporated into the cost benefit analysis component of the Economic Assessment (Appendix K of the Draft EIS).

The value of externalities from greenhouse gas emissions associated with the combustion of Project product coal by third parties (i.e. Scope 3 greenhouse gas emissions) are not considered in the cost benefit analysis. This is consistent with conventional cost benefit analysis, where the potential direct costs and benefits of an activity (e.g. the Project) are considered together, in the country where the activity takes place (e.g. economic benefits and costs of Japanese steel manufacturing in a customer industrial facility, including the Scope 1 greenhouse gas emissions of that facility). This approach was adopted consistently for all costs and benefits in the cost benefit analysis component of the Economic Assessment (Appendix K of the Draft EIS).

The same approach has been adopted in the revised Economic Assessment (Attachment 16).

7.2.8.12 Implications of Carbon Border Adjustment Mechanisms

It was suggested that the Economic Assessment (Appendix K of the Draft EIS) did not evaluate thermal and coking coal demand scenarios that considers the potential introduction of carbon border adjustment mechanisms (CBAMs).

Concerns were raised that externalities associated with greenhouse gas emissions are underestimated as the implications of CBAMs were not included in the cost benefit analysis.

Response

CBAMs are a policy that would place a fee on imports based on the carbon emissions incurred in the production of those goods. CBAM are being considered by the European Union and China, but they have not been enacted yet. The CBAM is proposed to initially apply only to direct (Scope 1) greenhouse gas emissions associated with the imported materials. For coal imports, this means that the CBAM would only apply to greenhouse gas emissions emitted during the extraction of coal and not to the greenhouse gas emissions associated with the combustion of the coal (Attachment 16).

Deloitte Access Economics (2022) (Attachment 16) has considered the potential implications of the implementation of the CBAM to all of the Project product coal and concluded that the potential impact of a CBAM would be well within the coal price sensitivity range as part of the revised Economic Assessment which showed that in all modelled scenarios, the Project would have a substantial net benefit to Queensland (Attachment 16).

7.2.8.13 Consideration of the International Energy Agency's Sustainable Development Scenario

Some submissions raised a concern that the Economic Assessment (Appendix K of the Draft EIS) did not evaluate a thermal coal demand scenario that considers the IEA's Sustainable Development Scenario in the *World Energy Outlook 2020*.

Response

The IEA has released the *World Energy Outlook 2021* (IEA, 2021) since the Project was placed on public notification and therefore the more contemporary *World Energy Outlook 2021* (IEA, 2021) will be referred to in this response.

Firstly, it must be recognised that the *World Energy Outlook 2021* (IEA, 2021) does not forecast what will happen. The IEA does not endorse any particular scenario in the *World Energy Outlook 2021* (IEA, 2021).

The *World Energy Outlook 2021* (IEA, 2021) includes a Sustainable Development Scenario that assumes a "surge in clean energy policies and investment" to meet the goal of the *Paris Agreement* (i.e. to limit global temperature increases to well below 2°C above pre-industrial levels). It is noted that the Sustainable Development Scenario does not reflect currently announced policy and emission reduction targets made by countries under the *Paris Agreement.*

The *World Energy Outlook 2021* (IEA, 2021) forecasts a global coking coal demand of approximately 850 million tonnes coal equivalent (Mtce) in 2030 and 410 Mtce in 2050 under the Sustainable Development Scenario, respectively. Global thermal coal demand is forecast to be approximately 2,840 Mtce and 770 Mtce in 2030 and 2050 under the Sustainable Development Scenario, respectively. This shows significant demand for coking and thermal coal is expected in the medium and long-term under the Sustainable Development Scenario.

It is noted that the Asia Pacific region, which the Project would supply, would make up approximately 85% of the total global coal demand in 2030 and 2050 under the Sustainable Development Scenario. Australia is expected to continue to be the largest exporter of coal with only a 5% reduction in total coal exports predicted in 2030 (IEA, 2021).

This is consistent with the Queensland Government's *Resource Industry Development Plan* (State of Queensland, 2022) that notes the following in regard to the ongoing demand for Queensland coal exports and thermal coal (State of Queensland, 2022):

> *While the global market for thermal coal is likely to decline as countries choose their own path to reduce emissions, demand from the fast-developing countries in the Indo-Pacific region could create pockets of future growth.* ***The high quality of our thermal coal means that Queensland is well placed to respond to these opportunities.***
>
> *Growing economies within the Indo-Pacific region will see a growth in demand for Queensland's high-quality resources, while demand for ethically sourced resources—such as from Europe and North America—****will provide a significant opportunity for Queensland resource companies that can prove strong, independent ESG credentials and resource provenance.***

The Queensland Government (2022) states the following in regard to the ongoing demand for Queensland coking coal exports:

> *Demand for metallurgical coal is expected to be stronger for longer than thermal coal. This is because the steelmaking process that uses metallurgical coal does not face as many immediate, low-emission alternatives as the thermal coal used to produce electricity. Steel will also remain in strong demand, including for renewable energy equipment such as wind turbines.*

The coal prices adopted by Deloitte Access Economics (2022) for projecting revenue for the optimised Project (Attachment 16) were developed from Whitehaven WS' price forecasts (based on Broker Consensus price forecasts). Deloitte Access Economics (2022) also independently benchmarked Whitehaven WS' price forecasts against Consensus Economics price forecasts. As the Consensus Economics price forecasts are considered to be a reasonable and independent source for coal prices, Whitehaven WS' price forecasts are considered reasonable. In addition, sensitivity analyses for potential changes in coal prices were also conducted, and demonstrated that in all modelled scenarios, the Project would still have a substantial net benefit to Queensland.

It is noted that the ToR or the *Economic Impact Assessment Guideline* (Department of State Development, 2017) do not require consideration of any particular IEA scenario, such as the Sustainable Development Scenario.

Notwithstanding, if the Sustainable Development Scenario was to occur, Whitehaven WS anticipates there would be contraction in the number of operating coal mines, as less efficient, higher-cost and higher-emission coal mines begin to close as global demand for coal falls. Long life and low operating-cost projects would, however, continue to supply the reduced global demand under the Sustainable Development Scenario.

The Project would comprise a long life, low-cost and low-emission mining operation as the geology of the coal deposit allows the recovery of low strip ratio coal that is recognised and accepted internationally.

Based on the above, Whitehaven WS considers the Project would continue to supply the global seaborne coking and thermal coal market under the IEA's (2021) Sustainable Development Scenario.

7.2.8.14 Company Tax

It was suggested that the Economic Assessment (Appendix K of the Draft EIS) overestimated the company tax payments and therefore overstated the benefits of the Project.

Response

As the *Economic Impact Assessment Guideline* (Department of State Development, 2017) does not provide guidance on how company tax payments should be considered, the methodology adopted was based on the *Guidelines for the economic assessment of mining and coal seam gas proposals* (DPE, 2015) and the *Technical Notes Supporting the Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals* (DPE, 2018).

Notwithstanding the above, sensitivity analyses for potential changes in company tax payments (including consideration of zero company tax payments) were conducted in the cost benefit analysis component of the revised Economic Assessment, and showed that in all modelled scenarios the Project would still have a substantial net benefit to Queensland (Attachment 16).

7.2.8.15 Project Capital Costs

Concerns were raised that the capital costs assumed for the Project in the cost benefit analysis component of the Economic Assessment (Appendix K of the Draft EIS) appear to be too low.

Response

The Project capital costs are based on engineering and construction planning conducted for the Project Pre-feasibility Study. The capital cost estimates also take into consideration Whitehaven's recent experience constructing other greenfield coal mining projects in Australia. The capital cost estimates are therefore considered to be robust.

Notwithstanding the above, sensitivity analyses for potential changes in capital costs (+/- 25%) were conducted in the cost benefit analysis component of the revised Economic Assessment, and showed that in all modelled scenarios the Project would still have a substantial net benefit to Queensland (Attachment 16).

7.2.9 Land

Agency Submissions

7.2.9.1 State Land

DoR requested clarification on the location and tenure of the land that is proposed to be developed to provide accommodation for the Project workforce.

Response

Whitehaven WS has committed to constructing or purchasing a maximum of 20 to 34 houses in Moranbah for the Project workforce (SMEC, 2021; 2022a; 2022b). At this time, the exact location and number of the proposed houses for the Project workforce has not been decided. Whitehaven WS will undertake an analysis of Moranbah's housing market prior to commencement Project construction works and will engage with the IRC to determine an appropriate housing provision approach.

7.2.9.2 Land Tenure

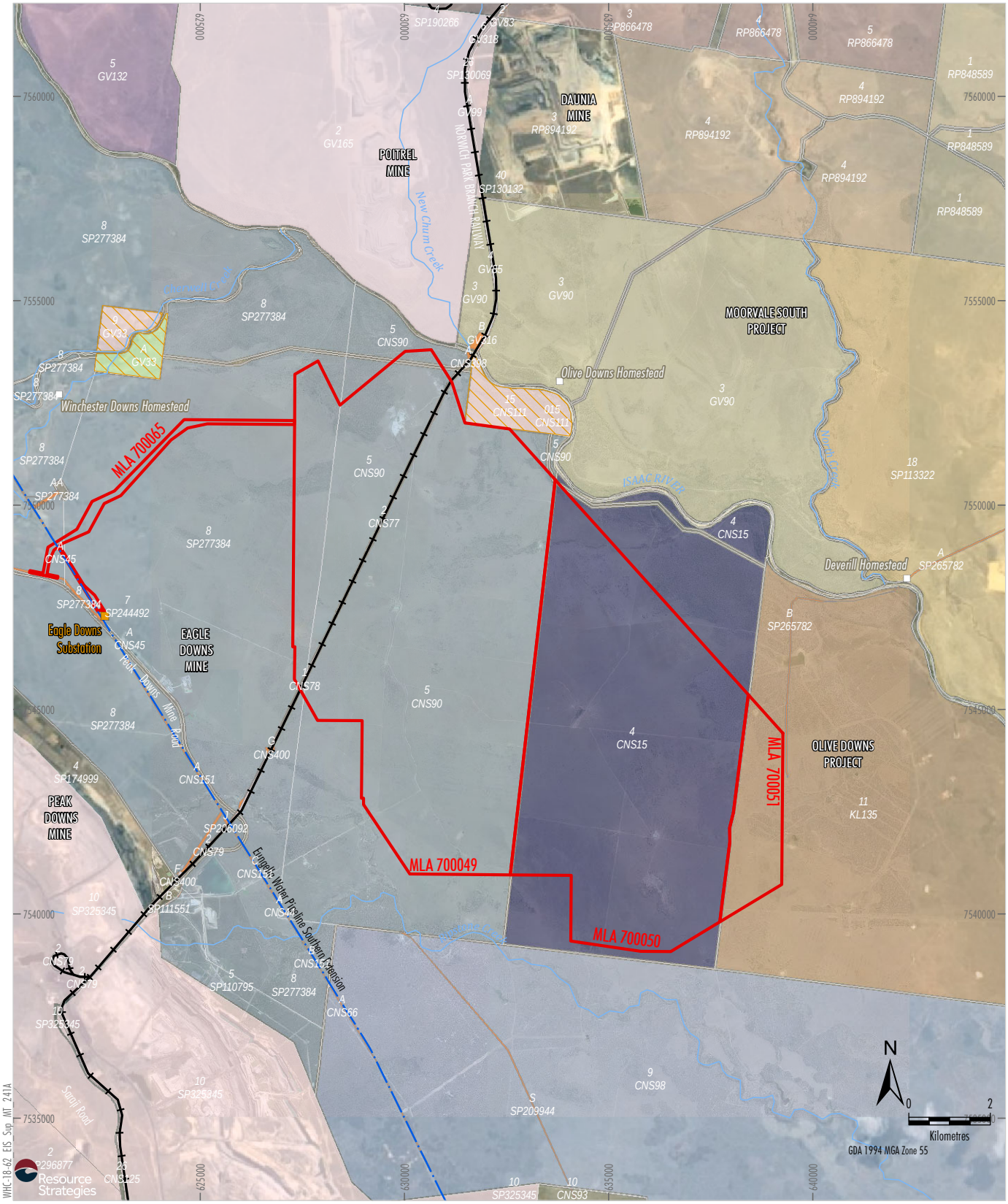
DoR requested additional detail on the land tenure that would be impacted by the Project and clarification on real property descriptions of the Project area.

Response

Figures 2-14 and 2-15 of the Draft EIS show the relevant tenure of the lands within the Project area (resource tenements and real property description).

Land within the Project area and to the east and south is made up of freehold land. The rural properties in the vicinity of the Project are shown on Figure 7-2, namely the Winchester Downs, Iffley, and Wynette properties. Winchester Downs is privately-owned, Wynette is owned by Whitehaven WS and Iffley is owned by Pembroke Resources.

The proposed production mining lease applications for the Project include MLA 700049, MLA 700050 and MLA 700051 (replacing the pre-existing MDL 183) held by Whitehaven WS. The transport mining lease application (MLA 700065), which would contain the Project water supply pipeline, ETL and mine access road, is located within Mining Lease (ML) 70389 held by South32 Eagle Downs Pty Ltd.



LEGEND

- Mining Lease Application Boundary
- Eungella Water Pipeline Southern Extension
- Railway
- Substation

State Land

- Travelling Stock Route - Reserve

Tenure

- Freehold
- Easement
- Lands Lease
- Reserve

Property

- Deverill
- Iffley
- Lake Lindsay
- Mavis Downs
- Moorvale
- Olive Downs
- Vermont Park
- Wotonga
- Winchester Downs
- Wynette

Source: The State of Queensland (2018 - 2020). Orthophoto: Google (2019); Whitehaven (2017).

WHITEHAVEN COAL

WINCHESTER SOUTH PROJECT

Tenure - State-owned Lands

Figure 7-2

A petroleum tenement (Authority to Prospect [ATP] 1103) held by Arrow Energy Pty Ltd (Arrow) overlaps the Project area (Section 2.1.1 of the Draft EIS). Whitehaven WS has engaged with Arrow in accordance with sections 121 and 122 of the *Minerals and Energy Resources (Common Provisions) Act 2014*. Arrow confirmed that Whitehaven WS has 'right of way', and will decommission pilot wells located within land covered by the MLAs (Section 4.10.2 of the Draft EIS).

Whitehaven WS has commenced negotiations with relevant land-owners and is engaging with South32 Eagle Downs Pty Ltd regarding the interactions between the overlapping mining leases.

Other than road reserves, two reserves (stock routes) are located in the vicinity of the Project, but outside the Project area. These reserves form part of the Barada Barna People Native Title Determination Area (QC2016/007).

The Barada Barna People are the native title holders for the general Project region. Investigations indicate that native title has been extinguished over all land within the area of the mining lease applications and the land does not form part of the Barada Barna People's Native Title Determination (Sections 2.2.1 and 4.10.2 of the Draft EIS). Whitehaven WS has formed a Cultural Heritage Management Plan (CHMP) agreement with the Barada Barna Aboriginal Corporation, which is the prescribed body corporate for the Barada Barna People (the Aboriginal party for the purposes of Indigenous cultural heritage management).

The CHMP was approved by the then DATSIP (now the DSDSATSIP) pursuant to section 107 of the *Aboriginal Cultural Heritage Act 2003* on 31 March 2020 (Section 2.2.1 of the Draft EIS).

There are no forests or nature conservation areas, including National or State Parks, in the Project area or immediate surrounds (Section 2.2.1 of the Draft EIS).

Whitehaven WS will prepare a PRC Plan for the Project which will provide the information requested by DoR, being the:

- proposed future land tenure of all lands impacted by the Project;
- proposed future management and ownership arrangements for the lands associated with the Project; and
- the final proposed land tenure, landform and rehabilitation outcomes that will be achieved at the decommissioning of the Project and how these tenures will interact with the surrounding lands following decommissioning.

Whitehaven WS notes DoR's comment and will seek to engage early with DoR regarding tenure matters.

7.2.9.3 Strategic Cropping Area

DoR requested clarification on a portion of Strategic Cropping Area (SCA), located within the MLA areas.

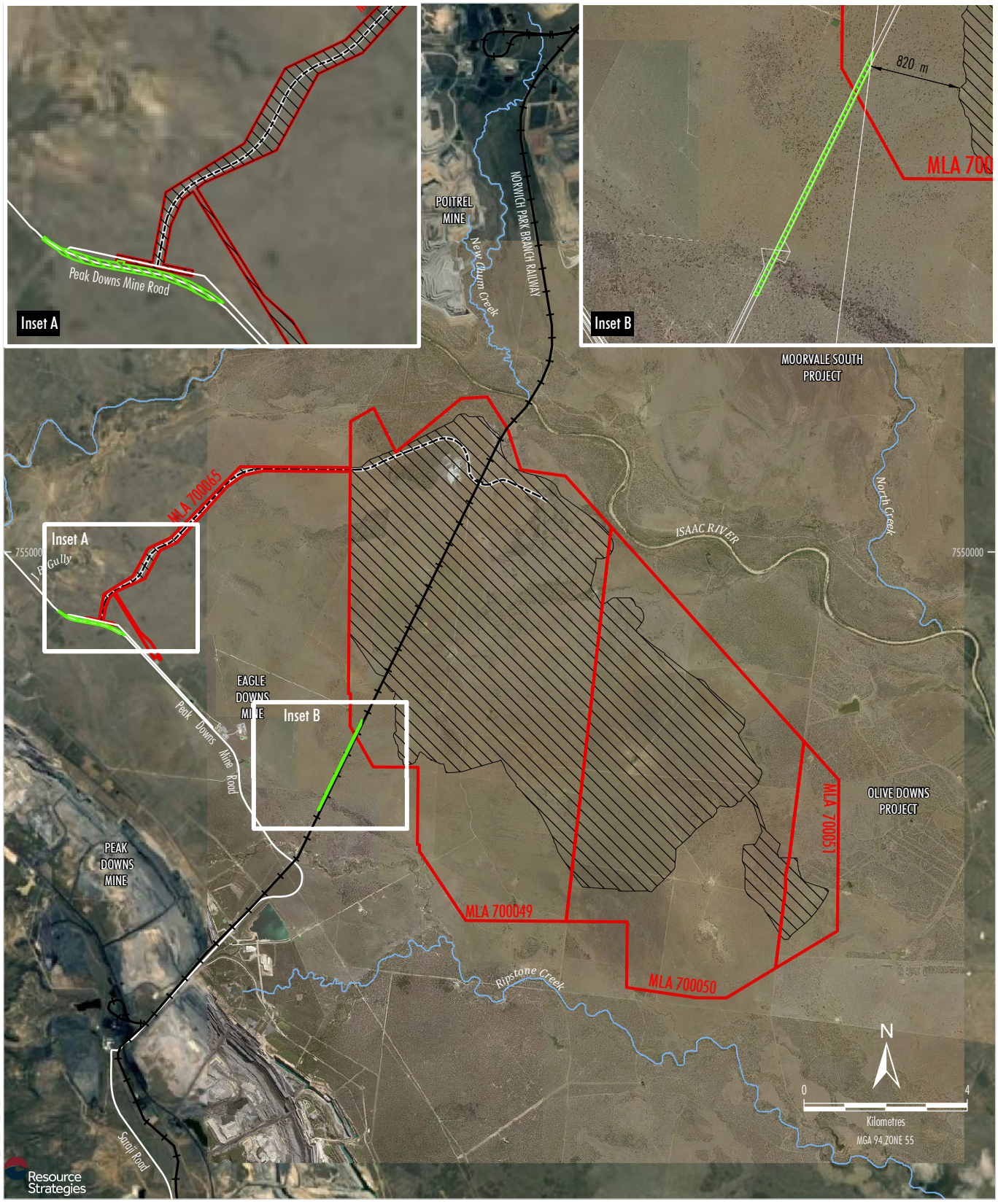
Response

The *Regional Planning Interests Act 2014* repealed the *Strategic Cropping Land Act 2011*. The repealed policies were migrated into the new legislation through the declaration of the SCA as an area of regional interest. SCA consists of areas identified as Strategic Cropping Land (SCL).

No SCL is located within the Project area (extent of surface disturbance). A small area of regionally mapped SCL intersects the mining lease boundary for the Project (within the Norwich Park Branch Railway corridor). However, this area of SCL is located outside the Project area (extent of disturbance), with a buffer of around 800 m at the closest point, and therefore will not be impacted (Figure 7-3).

7.2.9.4 Soil Classification

DoR queried the classification of certain soil mapping units identified and requested additional information on the Australian Soil Classifications mapped within the Project area and reassessment of the soil mapping units in consideration to *The Australian Soil Classification, Third Edition* (Isbell, 2021).



LEGEND
- Mining Lease Application Boundary
- Indicative Surface Disturbance Extent
- Strategic Cropping Land (DoR, 2022)
- Railway

Source: The State of Queensland (2018 - 2022); Whitehaven (2020) Orthophoto: Google Image (2017)

WHITEHAVEN COAL

WINCHESTER SOUTH PROJECT

Potential Strategic Cropping Land in the Vicinity of The Project

Figure 7-3

Response

GTE (2022) has reclassified the soil mapping units within the Project area and surrounds in accordance with *The Australian Soil Classification, Third Edition* (Isbell, 2021) (Attachment 17). In particular, GTE (2022) has reclassified several soil mapping units as Vertosols based off of the following attributes:

- clay field texture or has 35% or more clay throughout the solum except for thin, surface crusty horizons 30 mm or less thick;
- unless too moist, has open cracks at some time in most years that are at least 5 mm wide and extend upward to the surface or to the base of any plough layer, peaty horizon, self-mulching horizon or thin surface crusty horizon; and
- at some depth in the solum, has slickenside and/or lenticular peds.

Detailed responses to specific soil classification technical issues raised by DoR (e.g. analysis of Exchangeable Sodium Percentage results) are provided in Attachment 17.

7.2.9.5 Soil Management and Amelioration

DoR requested additional information regarding the application rates and associated potential risks of proposed soil ameliorants during rehabilitation.

Response

GTE (2022) has provided further recommendations in regard to the application of ameliorants in the Soils and Land Suitability Assessment Addendum (Attachment 17).

7.2.9.6 Organic Matter Horizon

DoR requested more detail into an organic matter horizon can be established and maintained.

Response

Establishment of an organic matter horizon would be encouraged during rehabilitation to reduce the time bare soils are exposed. Organic matter may be incorporated by the use of available site based organic matter, such as stripped vegetation. Elevated scrapers or blading with bulldozers would be used to strip vegetation which would then be place into stockpiles separate from the stripped soils.

The establishment of a crop rotation such as cover crops perennial grasses and legumes may initially assist in providing organic matter initially and form part of the long-term rehabilitation plan of native species established after. Other alternative organic amendments may be considered, including composted organic matter, biosolids and mulch if economically viable (GTE, 2022) (Attachment 17).

Application rates of 2-30 t composted organic matter per ha, 50 t biosolids per ha or 20 bales of hay mulch per ha could be applied to facilitate the establishment of an organic matter horizon (GTE, 2022) (Attachment 17).

7.2.9.7 Erosion and Sediment Control

DoR requested clarification on the erosion and sediment control measures that would be implemented at the Project.

Response

An ESCP would be prepared by a Certified Professional in Erosion and Sediment Control (CPESC) and developed in accordance with the IECA's *Best Practice Erosion and Sediment Control Guideline* (IECA, 2018).

The ESCP would adopt the three cornerstones of erosion and sediment control:

1. Drainage control – prevention or reduction of soil erosion caused by concentrated flows and appropriate management and separation of the movement of diverted and surface water through the area of concern.
2. Erosion control – prevention or minimisation of soil erosion (from dispersive, nondispersive or competent material) caused by rain drop impact and exacerbated overland flow on disturbed surfaces.
3. Sediment control – trapping or retention of sediment either moving along the land surface, contained within runoff (i.e. from up-slope erosion) or from windborne particles.

7.2.9.8 Impacts to Agricultural Land

DAF requested additional information on impacts to agricultural land as a result of the Project.

Response

Regional mapping of agricultural land class (ALC) maps Class A and Class B agricultural areas within the Project area (approximately 1,614 ha, 23%) (Figure 7-4). This is a reduction of 7% compared to the Draft EIS in which 1,734 ha of regionally mapped ALC Class A was located within the extent of surface disturbance.

Grazing is the primary land use across the Project area (Section 4.10.2 of the Draft EIS). The majority of the land within the Project area has been historically cleared for livestock grazing, with other areas cleared to allow for quarrying, a rail line and access to the property, including the areas of mapped Class A.

The Project area would be progressively rehabilitated to provide low-intensity cattle grazing at stocking rates consistent with those currently on the properties the Project is located within. For the optimised final landform, an opportunity was identified a PMLU for the residual voids (e.g. water for cattle consumption), given the predicted salinity of the residual void water bodies. The areas of regionally mapped ALC Class A that would be disturbed by the Project would be rehabilitated to a condition consistent with current conditions (suitable for cattle grazing).

The environmental offsets for the Project are either located outside of regional mapping of ALC Class A or Class B or are currently primarily used for grazing, with pockets of remnant and regrowth vegetation, with no cropping currently being undertaken on the property. As such the application of an environmental offset over the portion of ALC Class A mapped within the property would not sterilise the cropping capability of the land.

Accordingly, it is not considered that the Project would have an irreversible impact on ALC Class A.

NGO and Public Submissions

7.2.9.9 Agricultural Production

Several submitters raised concerns that the flood levees from the Project would impact surface water flows north of the Project area and impact agricultural production in this area.

Response

The proposed Project temporary levees would be regulated structures designed with a crest level above the 0.1% AEP design event plus freeboard. The flood modelling undertaken for the Project shows that the changes to the flood regime (i.e. levels) due to the Project are largely limited within the MLA area, with a minor excursion (360 m) to the north of the northern temporary levee only predicted during a 1 in 1,000 year flood event (Attachment 6).

Given the above, no significant flood impacts on agricultural land are as a result of the Project.

7.2.10 Impacts on Other Industries

NGO and Public Submissions

7.2.10.1 Compatibility with Existing Operations

A submission raised concerns regarding potential impacts to a nearby operation as a result of the Project infrastructure corridor.

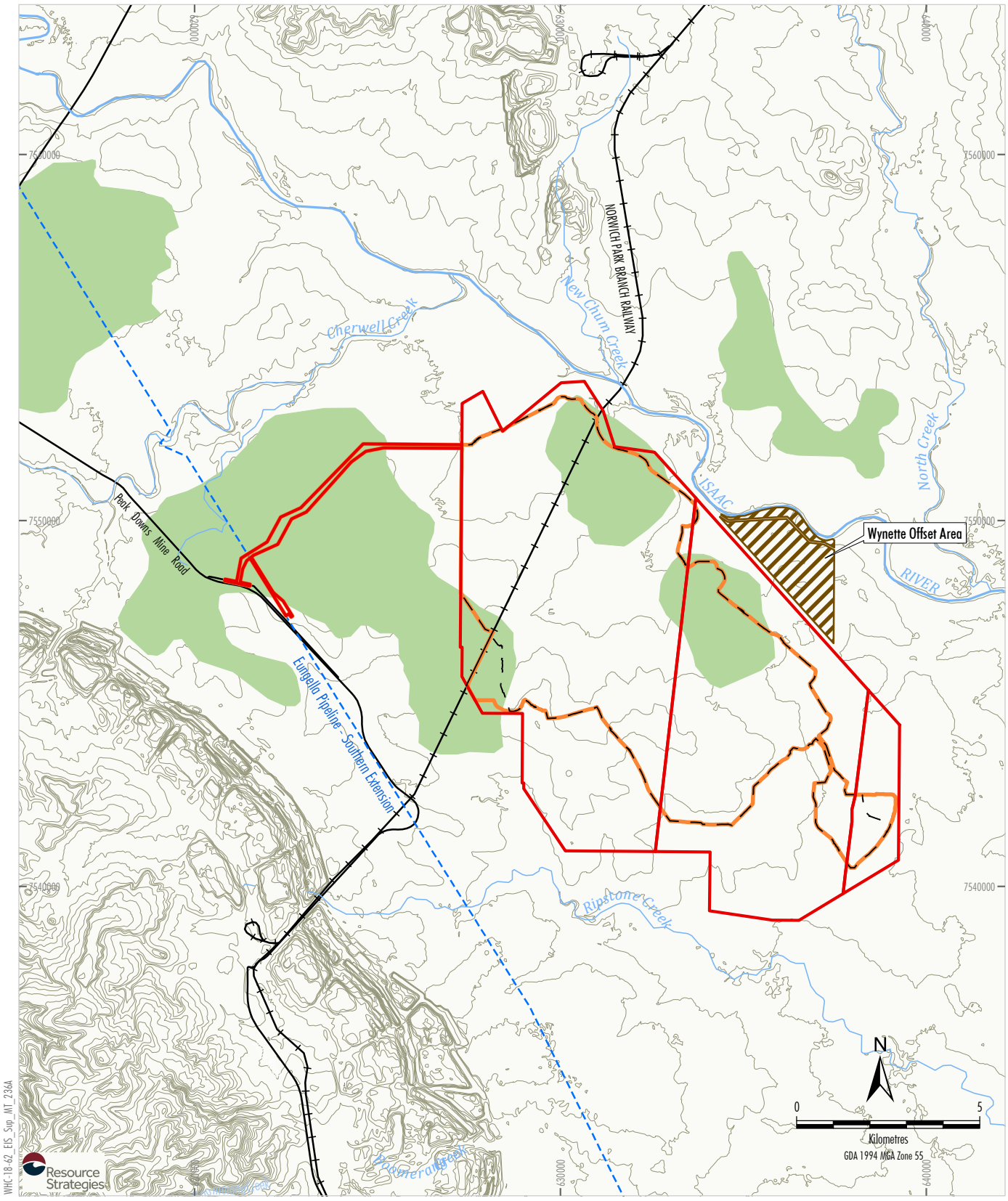
Response

Whitehaven WS has applied for a transport mining lease for the Project infrastructure corridor (mine access road, water pipeline and ETL) under section 316 of the *Mineral Resources Act 1989* (MLA 700065).

MLA 700065 is also located within ML 70389 and petroleum lease (PL) 485 owned by South32 Eagle Downs Pty Ltd (Section 1.7.5 of the Draft EIS).

The alignment of the Project infrastructure corridor (and MLA 70065) has been designed in consultation with Eagle Downs Coal Mine Joint Venture in regard to minimising potential impacts to the Eagle Downs Mine (such as avoiding a vent shaft required for the mine) and avoiding any potential sterilisation of coal resource, as the alignment follows a faulted zone.

Whitehaven WS will continue to consult and work closely with the Eagle Downs Coal Mine Joint Venture (owner of the Eagle Downs Project) in relation to the interaction between MLA 700065 and the ML 70389.



LEGEND

- Mining Lease Application Boundary
- Optimised Project Indicative Surface Disturbance Extent
- 2021 Draft EIS Indicative Surface Disturbance Extent
- Regional Agricultural Land Class A and B (DoR, 2022) (formerly DNRME).

Source: The State of Queensland (2018 - 2022); Whitehaven (2020)

WHITEHAVEN COAL

WINCHESTER SOUTH PROJECT

Regional Agricultural Land Class A and B Mapping

Figure 7-4

7.2.10.2 Compatibility with Existing Exploration Projects

A submission raised concerns regarding potential impacts to a nearby exploration projects a result of the Project mine access road.

Response

Until the new mine access road is constructed, vehicular access to and from the Project would be via Winchester Access Road, an existing private road, which is accessed via the former Dysart Road and is the designated access road for MLA 70051 (Iffley property). Use of Winchester Access Road for this period would minimise long-term potential impacts on Peak Downs Mine Road between Eagle Downs Mine Road and the former Dysart Road. Once the Project mine access road is constructed and commissioned, all operational vehicular access to and from the Project would be via the Mine Access Road from Eagle Downs Mine Access Road, within MLA 700065.

The Transport Planning Partnership (TTPP) (2021) assessed the potential road transport impacts of the Project should the Project proposed mine access road from Eagle Downs Mine Access Road not be constructed. The outcomes of this assessment are provided in Appendix E of Appendix I of the Draft EIS. This assessment included assessment of the road safety of the road links and intersections affected by the Project.

TTPP (2021) concluded no additional mitigation measures would be required for the ongoing use of the existing Winchester Access Road for the lift of the Project in regards to road safety, and recommended that the existing road be upgraded in accordance with Austroads road design guidelines, with a minimum sealed width of 8.0 m, plus minimum 1.0 m unsealed shoulder on each side.

Part of Winchester Access Road is located within MDL 519 (Eagle Downs South MDL) held by Aquila Exploration Pty Ltd, associated with the Eagle Downs South Coking Coal Project.

Whitehaven WS would seek to engage Aquila Resources Pty Ltd in regard to the use of Winchester Access Road and ways to minimise and manage impacts to the Eagle Downs South MDL.

7.2.11 Transport

Agency Submissions

7.2.11.1 Assessment of Closure and Decommissioning of the Project

DES requested further information on the potential impacts on transport network during the closure and decommissioning the Project.

Response

To assess the potential road transport impacts of the Project and consistent with principles of the *Guide to Traffic Impact Assessment* (DTMR, 2018a), the following scenarios were adopted for the Road Transport Assessment:

- initial construction activity in Year 1 of the Project (Year 2022);
- peak construction and initial coal production stage in Year 2 of the Project (Year 2023); and
- peak operational stage (i.e. peak operational workforce) in Year 8 of the Project (Year 2029).

The scenarios represent the busiest conditions (most conservative) expected throughout the development of the Project. The decommissioning and closure stage of the Project was not assessed in detail as part of the Road Transport Assessment (TTPP, 2021), noting that the operational life of the Project is anticipated to be approximately 30 years.

The level of activity (i.e. traffic movements) associated with mine closure is expected to be lower than the ongoing operational activity. Therefore, the potential impacts on road transport for the decommissioning and closure stage of the Project do not need to be included as they would be less than the potential impacts of the operational and construction phases of the Project that were assessed as part of the Road Transport Assessment (TTPP, 2021).

7.2.11.2 Road Transport Assessment and Pavement Impact Assessment

The DTMR requested Whitehaven WS be conditioned to provide an updated Road Transport Assessment, including a Pavement Impact Assessment and associated marginal cost calculations, prepared in accordance with DTMR's (2018a) *Guide to Traffic Impact Assessment,* to DTMR for assessment and approval no later than six months prior to construction commencing.

Response

The Road Transport Assessment (Appendix I of the Draft EIS) was prepared in accordance with the requirements of the *Guide to Traffic Impact Assessment* (DTMR, 2018a) and includes a Pavement Impact Assessment (Section 5.5 of Appendix I of the Draft EIS).

Whitehaven WS provided an early version of the Road Transport Assessment to the OCG, prior to adequacy lodgement of the Draft EIS, the OCG provided minor comments on the Road Transport Assessment which were addressed in the version that was originally lodged in December 2020 for adequacy review. As part of this review DTMR was asked to provide comment on the adequacy of the Draft EIS against the ToR for the Project.

The submissions received on the original Draft EIS were addressed by Whitehaven WS and a revised Draft EIS was lodged with the OCG in July 2021, along with detailed responses to all comments. Overall DTMR had no objections to the Draft EIS in terms of potential impacts to the rail network or State Controlled Road network.

The OCG subsequently confirmed that the revised Draft EIS was deemed to have adequately addressed all requirements of the ToR, which includes undertaking a road impact assessment in accordance with the *Guide to Traffic Impact Assessment* (DTMR, 2018a).

Notwithstanding the above, Whitehaven WS commits to providing an updated Road Transport Assessment, including a Pavement Impact Assessment and associated marginal cost calculations, prepared in accordance with DTMR's (2018a) *Guide to Traffic Impact Assessment,* to DTMR for assessment and approval no later than six months prior to construction commencing.

Whitehaven WS would implement the recommendations of the Road Transport Assessment (TTPP, 2021), including the Pavement Impact Assessment, to mitigate Project impacts on the road environment.

7.2.11.3 Road-use Management Plan

DTMR requested Whitehaven WS be conditioned to prepare and adhere to a Road-use Management Plan (RMP), that covers all stages of the Project and:

a) is developed in accordance with DTMR's (2018b) *Guideline for Preparing a Road-use Management Plan* with a view to also optimising project logistics and minimising road-based trips on all SCRs and local roads;

b) details the non-infrastructure impact mitigation strategies proposed, such as designated heavy vehicle haulage routes to minimise road safety and pavement impacts;

c) includes a table of RMP mitigation commitments, detailing responsibilities for actions along with protocols to ensure the mitigation commitments are complied with; and

d) is finalised and approved in writing by DTMR no later than six months prior to the commencement of significant construction works generating project traffic, or as otherwise agreed between Whitehaven WS and DTMR.

Response

Whitehaven WS concurs with DTMR's recommendations regarding the RMP and will engage a suitably qualified technical specialist to prepare an RMP. Whitehaven WS will consult with DTMR as well as IRC and emergency service providers in regard to the RMP and will provide the RMP to DTMR once it is complete.

7.2.11.4 Potential Earthwork Impacts to Existing Railway Infrastructure and Operations

DTMR raised concerns that the earthworks associated with the Project would impact the existing rail network and provided recommendations to mitigate potential impacts to the railway corridor.

Response

Consistent with the recommendation outlined in DTMR's submission, Whitehaven WS commits to:

1. Provision and adherence to an Earthworks and Blasting Management Plan prepared by a Registered Professional Engineer of Queensland (RPEQ) for the Project that demonstrates the Project would operate in a way that does not jeopardise the safety, efficiency or structural integrity of the Norwich Park Branch Railway.
2. Provision and adherence to a RPEQ certified Ground Movement and Vibration Monitoring Plan which investigates any potential construction and operational impacts of the Project on the Norwich Park Branch Railway.
3. Provision of RPEQ certified conceptual structural engineering design and earthworks plans for the development, including cross sections/elevations and any required supporting technical details showing the earthworks/batters/retaining structures in proximity to the existing railway corridor, such as:
    a. the location and extent of proposed excavation and filling (earthworks), including likely volumes of cut and fill adjacent to the railway corridor;
    b. cross-sections at regular intervals along the existing rail corridor showing the interface between proposed mining areas/pits, the landform between mining areas/pits and the existing rail corridor (existing and proposed), and the existing rail corridor;
    c. the maximum depth of any excavation adjacent to the railway corridor;
    d. the maximum height and intended form/design of any proposed retaining walls or structures adjacent to the railway corridor;
    e. where proposed excavations, filling/backfilling or retaining works will be greater than 1 m in depth or height abutting the railway, RPEQ certified drawings would be provided demonstrating that the works will not de-stabilise rail transport infrastructure or the rail corridor land supporting this infrastructure. This would include the loading configuration of any embankments and retaining walls, including foundation and retaining structures;
    f. fencing arrangements to prevent unauthorised access, stormwater drainage, location of utilities and emergency and maintenance access to the existing railway corridor; and
    g. the scope of any 'future rail track'.

7.2.11.5 Potential Impacts from the Transport of Dangerous Goods to the Existing Railway Operations

DTMR raised concerns that the transport of dangerous goods associated with the Project would impact the existing rail network and provided recommendations to mitigate potential impacts to the railway corridor.

Response

Whitehaven WS concurs with DTMR's recommendations and commits to providing:

1. a RPEQ certified risk assessment in accordance with Chapter 2.6 (Dangerous Goods and Fire Safety) and Appendix 1 (Development Risk Assessment Guide) of the *Guide to Development in a Transport Environment: Rail* (DTMR, 2015), which demonstrates how measures will be incorporated into the development design to minimise identified risks, to DTMR; and
2. RPEQ certification that the Project has been design in accordance with management measures.

7.2.11.6 Potential Stormwater and Flooding Impacts to the Existing Railway Operations

DTMR raised concerns that the Project could cause stormwater or flooding impacts to the existing rail network.

Response

WRM (2022) modelled 5% AEP, 1% AEP and 0.1% AEP flood design events for the following model scenarios (Attachment 6):

- Existing conditions – existing conditions (i.e. without the Project), including consideration to the flood protection levees and waste rock emplacements of neighbouring existing mining operations or approved mining operations.

- Proposed conditions – existing conditions, including consideration to existing and approved mining operations, as well as the proposed temporary flood levees for the Project (i.e. with the Project).

The above model scenarios included the existing Norwich Park Branch Railway.

The water level difference between the proposed conditions and the existing conditions (i.e. effect of the Project) in the vicinity of the Norwich Park Branch Railway for the 0.1% AEP flood design event (1 in 1000 years flood event), including consideration of climate change, was between -0.1 m to 0.1 m. Similarly, under the 1% AEP flood design event, a change in flood depth of between -0.1 m to 0.1 m would occur as a result of the Project. For the 5% AEP flood design event, no change in flood depth would occur as a result of the Project. WRM (2022) concluded that the Project would not result in flooding impacts to key infrastructure (e.g. residences, roads, rail).

In addition, in accordance with DTMR's recommendations, Whitehaven WS will commit to:

1. provide a Water Management Plan prepared and monitored by an RPEQ, investigating construction and operational impacts (such as earthworks, boring, piling and blasting) on the Norwich Park Branch Railway, to DTMR;
2. construct and operate the Project in accordance with the Water Management Plan; and
3. provide RPEQ certification to DTMR that the Project is in accordance with requirements.

7.2.11.7 Australian Level Crossing Assessment Model

DTMR and the IRC requested an Australian Level Crossing Assessment Model (ALCAM) assessment of the existing railway level crossing of Norwich Park Branch Railway and Peak Downs Mine Road.

Response

The Norwich Park Branch Railway is part of the Goonyella system managed and operated by Aurizon.

ALCAM assessments are undertaken by Aurizon to specify key risks, prioritise any works and ensure appropriate controls are in place to maintain the safety of private and public road users. An ongoing program of ALCAM assessments is required for Aurizon to maintain its rail operational accreditation.

As Aurizon is required to complete the ALCAM assessments, Whitehaven WS would consult with Aurizon in regard to the ALCAM assessment of the existing railway level crossing of Norwich Park Branch Railway and Peak Downs Mine Road.

TTPP (2022) has prepared the relevant road transport inputs for inclusion in the ALCAM assessment (Attachment 15).

7.2.11.8 Infrastructure Access Agreement

IRC requested Whitehaven WS be conditioned to enter into an Infrastructure Access Agreement.

Response

Consistent with advice from DTMR and the IRC, to ensure traffic impacts associated with the Project will not exceed predictions, Whitehaven WS will:

- provide an updated Road Transport Assessment, including Pavement Impact Assessment in accordance with DTMR's (2018a) *Guide to Traffic Impact Assessment* to DTMR for assessment and approval no later than six months prior to construction commencing, and implementing any mitigation and management measures recommended;
- develop a RMP for the Project;
- install permanent traffic monitoring sites at locations to be determined in consultation with the IRC;
- provide appropriate contributions to IRC's maintenance of Moranbah Access Road and Peak Downs Mine Road to address specific safety risks; and
- pay appropriate contributions to DTMR and IRC to support accelerated maintenance, pavement reconstruction and rehabilitation works.

These commitments will be detailed in an Infrastructure Access Agreement, to be developed in consultation with the IRC.

7.2.11.9 Construction Management Plan

DTMR requested Whitehaven WS be conditioned to ensure construction of the Project would not disrupt the safety and operational integrity of the Norwich Park Branch Railway.

Response

To ensure construction of the Project would not disrupt the safety and operational integrity of the Norwich Park Branch Railway, Whitehaven WS will commission an RPEQ to prepare a Construction Management Plan, which will be provided to DTMR prior to construction of the Project.

7.2.11.10 Oversized-Overmass Movements

The IRC queried whether all impacts arising from oversized-overmass (OSOM) vehicle movements were considered in the Road Transport Assessment.

Response

The Project may require some OSOM vehicles movements on an "as required" basis during construction and operation of the Project. OSOM vehicle movements would be undertaken and managed in accordance with relevant guidelines (e.g. National Heavy Vehicle Regulator guidelines) and requirements of any permit approvals conditions and curfews provided by the relevant government agencies (e.g. no OSOM vehicle movements between 5 am to 7 am and 5 pm to 7 pm on Moranbah Access Road and Peak Downs Mine Road) and would include consideration of any level crossings (Attachment 15).

7.2.11.11 Intersections

The IRC requested Whitehaven WS undertake a geometric assessment of the existing intersections and a swept path assessment based on maximum foreseeable design vehicle.

Response

TTPP (2022) has undertaken a geometric assessment of the existing intersections and a swept path assessment based on maximum foreseeable design vehicle (Attachment 15).

7.2.11.12 Project Transport Task

DTMR and the IRC requested further information and breakdown of the Project transport inputs and outputs (e.g. waste, hard rock deliveries, etc.).

Response

The Road Transport Assessment (TTPP, 2021) for the Draft EIS assessed the Project transport task based on the best available knowledge of the Project available at the time in relation to the light vehicle and heavy vehicle movements predicted to be required and the direction of these vehicles (including breakdown of vehicle type) (Section 2.4 in Appendix I of the Draft EIS).

This information was based on the pre-feasibility study Whitehaven WS prepared for the Project. Whitehaven WS is progressing towards the detailed feasibility study phase of the Project, however, the information provided in Section 2.4 of the Road Transport Assessment (Appendix I of the Draft EIS) is the most current information.

Whitehaven WS will provide quantitative estimates of the inputs and outputs to be transported to and from the Project during the construction and operational phases once this information is available, prior to construction of the Project, and to be provided in tabular form in the RMP to be prepared in consultation with DTMR and the IRC. This information would provide estimates of:

a) Annual volumes of Project consumables and wastes (for example, fuel, explosives, truck tyres, workforce consumables), number of truck movements for each consumable and truck tyre type.

b) Machinery and equipment, number of truck movements and truck type.

c) OSOM truck movements.

7.2.11.13 Queensland Transport and Roads Investment Program

The IRC requested consideration to the QTRIP *2021-2022 to 2024-25* (State of Queensland, 2021).

Response

The Draft EIS Road Transport Assessment (TTPP, 2021) considered the QTRIP *2019-2020 to 2022-23* (State of Queensland, 2019b), which was current at the time the Draft EIS was lodged for adequacy review in December 2020. The QTRIP *2021-2022 to 2024-25* (State of Queensland, 2021) was released in June 2021.

Attachment 15 provides consideration to the latest QTRIP. TTPP (2022) noted that the Road Transport Assessment (TTPP, 2021) identified that the intersection of Mills Avenue with Moranbah Access Road would require upgrading to a seagull arrangement to achieve an acceptable level of service under base conditions without the Project. Any upgrading of the intersection would appropriately assess active transport options.

7.2.11.14 Cumulative Assessment

The IRC queried the consideration to traffic associated with the Olive Downs Project on Peak Downs Mine Road and Moranbah Access Road as part of the cumulative assessment.

Response

TTPP (2022) considers the traffic associated with the Olive Down Project has been appropriately assessed and included as part of the cumulative effects analysis for the Road Transport Assessment (TTPP, 2021).

As outlined in the Road Transport Assessment (TTPP, 2021), the Olive Downs Project comprises the Olive Downs South Mining Domain, which will have vehicular access via Annandale Road and Daunia Road, and the Willunga Mining Domain, which will have vehicular access via Fitzroy Developmental Road. TTPP (2021) updated the forecasts presented by GTA Consultants in the Olive Downs Coking Coal Project Road Transport Assessment and its Request for Information Response Letter, based on information provided by Pembroke Resources. The cumulative traffic impact assessment presented in the Road Transport Assessment includes the relevant components of the traffic generated by the Olive Downs Project on each part of the road network.

Further detail on the cumulative assessment of Peak Downs Mine Road and Moranbah Access Road is provided in Attachment 15.

7.2.12 Waste

Agency Submissions

7.2.12.1 Waste Management

The IRC advised that the Council's waste management facilities will not accept any wastes from the Project in line with other recent mining developments.

Response

Whitehaven WS acknowledges IRC's position and will consult with IRC in regards to waste management and use of alternative waste management facilities outside the Isaac LGA if capacity within the LGA is not available.

7.2.12.2 Project Waste Inventory

DES requested additional information on the potential sources of waste during the Project's decommissioning phase.

Response

Mining operations would ramp down over the last three years of the Project. The period of ramp-down would provide opportunity to flexibly and progressively decommission components of the Project as they become redundant, while maintaining other components as required.

The *Waste Reduction and Recycling Act 2011* (WRR Act) waste management hierarchy (i.e. "avoid, reduce, reuse, recycle, recover, treat, and dispose") would be used to manage waste at the Project. As part of the progressive decommissioning of infrastructure, on-site disposal of waste (e.g. decommissioned infrastructure and associated general waste) may be required. If waste must be disposed of, Whitehaven WS would do so in a way that prevents or minimises adverse effects on environmental values. Areas of potential contamination identified in the post-mining landform would be investigated and managed/remediated if required prior to relinquishment (Section 4.15.2 of the Draft EIS).

Further, a Waste Management Program would be developed and implemented for the Project and would describe the objectives and measures for protecting environmental values from potential impacts associated with waste. The PRC Plan for the Project would detail the infrastructure that would be decommissioned or retained (if safe to do so or if an agreement is secured with the land-owner to which ownership of the infrastructure is being transferred).

7.2.12.3 Regulated Wastes

DES requested classification of the proposed regulated wastes generated by the Project, in accordance with the *Environmental Protection Regulation 2019* (EP Regulation).

Response

Table 7-5 provides classification of the proposed regulated waste, in accordance with Schedule 9 of the EP Regulation.

7.2.12.4 Waste Management Program

DES requested additional information on the management of waste generated by the Project, in particular, how co-disposal of coal rejects and waste rock will be managed to minimise environmental harm and result in a stable deposit and an assessment of risks associated with landfill disposal of waste streams, including end of life tyres.

Response

Terrenus (2021) assessed the geochemical characteristics of the coal rejects (coarse and fine) and waste rock that would be generated by the Project (Appendix M of the Draft EIS).

Minimal Environmental Harm (Coal Rejects)

Coal rejects would preferentially be emplaced in-pit during the Project, however disposal of coal rejects within the out-of-pit waste rock emplacement may be required (e.g. at the commencement of the Railway Pit and Main Pit when there is no in-pit storage available). Coal rejects would be trucked from the reject bin and placed within out-of-pit waste rock emplacements and buried by at least 10 m of waste rock (Terrenus, 2021). In this way, the coal rejects would not report to the final landform surface and would not interact with surface water runoff in the final landform.

To mitigate and manage the potential low degree of environmental risk of coal rejects within out-of-pit emplacements (e.g. coal reject cells), runoff from coal reject emplacement areas would, prior to capping, report to the mine-affected water management system rather than the sediment-laden water management system. Coal rejects in pit emplacement would also be buried by at least 10 m of waste rock. The management of coal rejects would be controlled in accordance with the requirements of the Waste Management Plan to be developed for the Project.

Coal rejects from the CHPP would be co-disposed with waste rock and would be buried with by at least 10 m of waste rock. Reject material would be co-disposed in locations such that any runoff or infiltration would report to the Project water management system for mine water. Therefore, when placed amongst waste rock the overall risk of environmental harm and health-risk that emplaced coal reject poses is low (Terrenus, 2021).

Whitehaven WS would undertake validation geochemical test-work for coal reject from the CHPP during development of the Project, particularly during the first two years of CHPP operation and whenever new seams/plys are being processed. Test-work would comprise a broad suite of environmental geochemical parameters, such as pH, EC (salinity), acid-base account parameters and total and soluble metals/metalloids (Terrenus, 2021).

Minimal Environmental Harm (Waste Rock)

Waste rock is overwhelmingly non-acid forming (NAF) with excess acid neutralising capacity (ANC) and has negligible risk of developing acid conditions. Furthermore, waste rock is expected to generate relatively low to moderate salinity surface water runoff and seepage with relatively low soluble metal/metalloid concentrations. However, waste rock is expected to be sodic with some potential for dispersion and erosion (to varying degrees) (Appendix M of the Draft EIS).

In accordance with the recommendations provided by Terrenus, Whitehaven WS would take reasonable measures to identify and selectively place (or alternatively manage) highly sodic and dispersive waste rock. Where selective handling is not practicable, waste rock landforms would also be constructed with short and low (shallow) slopes and progressively rehabilitated to minimise erosion. Where practical, and where competent rock is available, armouring of slopes should be considered.

Surface water runoff and seepage from waste rock emplacements, including any rehabilitated areas, would be monitored for 'standard' water quality parameters including, but not limited to, pH, EC, major anions (sulfate, chloride and alkalinity), major cations (sodium, calcium, magnesium and potassium), TDS and a broad suite of soluble metals/metalloids. With the implementation of the proposed management and mitigation measures, the waste rock is regarded as posing a low risk of environmental harm (Appendix M of the Draft EIS).

Table 7-5
Estimated Maximum Annual Regulated Waste Produced by the Project

Waste Type/Waste Category	Form	Source	Approximate Quantity (per annum)		Dispersal Characteristics	Risk of Causing Environmental Harm*	Management Strategies (Waste Management Hierarchy Level)^	Proposed Disposal Location
			Construction	Operation				
Regulated Waste – Category 2 (Moderate Risk)								
Air filters (i.e. from machinery)	Solid	Machinery maintenance workshops	<1 t	<1 t	NA	Low	Stored on-site in skips and regularly transported off-site by a licenced waste transport contractor for disposal (g).	Licenced and approved landfill.
Waste oils	Liquid	Machinery maintenance workshops	1,000 kg	1,000 kg	Liquid run off and breach from storages.	Medium	Temporary storage on-site and regular collection and transport off-site by licenced contractor to licenced facility for re-use (c), recycling (d) or disposal (g).	Licenced and approved recycling facility or landfill.
Empty waste oil containers	Solid	Machinery maintenance workshops	<5 t	<10 t	NA	Medium	Appropriate temporary storage on-site and regular collection and transport off-site by licenced contractor to licenced facility for recycling (d).	Licenced and approved recycling facility.
Oils rags	Solid	Machinery maintenance workshops	5,000 kg	5,000 kg	NA	Low	Stored on-site in skips and regularly transported off-site by a licenced waste transport contractor for disposal (g).	Licenced and approved landfill.
Engine oil/fuel filters	Solid/liquid	Machinery maintenance workshops	<15 t	<50 t	Liquid run off and breach from storages.	Medium	Temporary storage on-site and regular collection and transport off-site by licenced contractor to licenced facility for treatment (with solvent wash) and re-use of oil (c), and recycling (d) or disposal (g) of filters.	Licenced and approved recycling facility or landfill.
Waste grease	Liquid	Machinery maintenance workshops	<150 kL	<200 kL	Liquid run off and breach from storages.	Medium	Appropriate temporary storage on-site (e.g. sealed container in bunded area) and regular collection and transport off-site by licenced contractor to licenced facility for treatment and recycling (d) or disposal (g).	Licenced and approved recycling facility or landfill.

Table 7-5 (Continued)
Estimated Maximum Annual Regulated Waste Produced by the Project

Waste Type/Waste Category	Form	Source	Approximate Quantity (per annum)		Dispersal Characteristics	Risk of Causing Environmental Harm*	Management Strategies (Waste Management Hierarchy Level)^	Proposed Disposal Location
			Construction	Operation				
Regulated Waste – Category 2 (Moderate Risk)								
Sewage	Liquid	Offices, workshops, administration buildings and other locations with restroom facilities.	<100 kL	<100 kL	Liquid run off and breach from storages.	Medium	Until on-site treatment is operational, sewage collected and transported by licenced contractor to a local council sewage treatment plant (f). Once on-site treatment is operational, biosolids from on-site treatment plant collected and transported by licenced contractor to licensed facility for disposal (g).	Licenced and approved sewage treatment facility (before on-site treatment is operational) or licenced and approved landfill (when on-site treatment is operational).
Paints (i.e. general paint, air dried insulating varnish)	Liquid/gas	Machinery maintenance workshops.	5,000 L	5,000 L	Liquid/fume breach.	Medium	Appropriate temporary storage on-site (e.g. sealed container in bunded area) and regular collection and transport off-site by licenced contractor to licenced facility for treatment (f) and disposal (g).	Licenced and approved recycling facility or landfill.
Batteries (i.e. dry cell, gel cell, lead-acid)	Solid	Machinery maintenance workshops, offices, workshops, administration buildings.	<1 t	<1 t	Liquid contents breach from storages.	Medium	Appropriate temporary storage on-site and regular collection and transport off-site by licenced contractor to licenced facility for recycling (d) or disposal (g).	Licenced and approved recycling facility or landfill.
Tyres (i.e. from light vehicles and heavy machinery)	Solid	Machinery maintenance workshops.	200 units	300 units	NA	Low	Temporary storage a minimum distance of 10 m away from flammable material. Transported off-site for re-treading where practicable (c) or disposed within the mine open cut as part of backfilling (g).	Within the open cut and out-of-pit waste rock emplacement extent.
Regulated Waste – Category 1 (Highest Risk) – N/A								

* In consideration of potential hazards, toxicity and dispersal mechanisms.

^ Waste management hierarchy as defined in section 9 of the WRR Act: (c) reuse; (d) recycling; (f) treat prior to disposal; and (g) disposal. These measures would be implemented after waste avoidance and minimisation measures have been exhausted.

~ The estimated average annual disturbance of land (i.e. green waste) assuming the life of the Project is 30 years.

kg = kilogram, kL = kilolitre

Stable

As described in the Geochemistry Assessment (Appendix M of the Draft EIS), fine coal reject (tailings) is proposed to be dewatered at the CHPP and combined with mid/coarse coal reject at the reject bin within the CHPP. Coal reject would be trucked from the reject bin and placed within in-pit and out-of-pit emplacements and buried by waste rock with appropriate management measures.

The optimised Project final landform adopts the recommendations from the geotechnical stability assessment prepared by Blackrock Mining Solutions (2020), as either design criteria for the Project landform or commitments for management and further assessment during Project operation.

These recommendations include (Blackrock Mining Solutions, 2020):

- To achieve the required factor of safety, residual void highwalls would have maximum batter angles of up to 45° in the Cenozoic horizon, 55° in the weathered Triassic/Permian horizon, and up to 70° in the fresh Triassic/Permian horizon. Assuming the presence of 20 m wide benches constructed at appropriate heights, the average angle of residual void highwalls would be approximately 50° from crest to toe.
- Safety perimeter bunding or fencing would be installed around the crest of highwalls to accommodate degradation or slope failure over time. Drainage systems would be installed to protect any perimeter bunding and residual void crests.
- Further geotechnical assessment would be carried out during Project operation to further refine the residual void design. This assessment would be undertaken as part of the progressive rehabilitation and mine closure planning process.
- Monitoring would be undertaken to evaluate the predicted geotechnical stability of the final landform.

Waste Tyre Management

It is estimated up to approximately 300 waste vehicle tyres from mining equipment per year of operation would be stockpiled and would require disposal within waste rock emplacements.

Where practicable, waste vehicle tyres would be transported off-site for re-treading. However, re-treading all waste vehicle tyres may not be feasible or viable for the optimised Project and therefore on-site disposal is considered the preferred management strategy for this waste stream.

The following notes regarding the limited feasibility and viability of recycling waste heavy vehicle tyres have been primarily sourced from Australian Coal Association Research Program (ACARP) (2000) and DES (2014):

- Disposal of heavy vehicle tyres in waste rock emplacements is acceptable, provided the tyres are placed as deep as possible but not directly on the pit or emplacement floor. Placement should ensure waste tyres do not impede saturated aquifers and do not compromise the stability of the final landform.
- Currently available recycling technology is predominantly focused around road passenger tyres (i.e. not heavy vehicle tyres).
- Limited recycling facilities exist proximal to the Project and transport of waste heavy vehicle tyres to these facilities is not viable. These recycling facilities are also generally designed on a local council scale mostly for on-road passenger tyres and thus capacity for storage, handling capability, and processing of large heavy vehicle tyres is an issue.

Recycling of waste heavy vehicle tyres via processing into crumbled rubber and steel is not currently feasible in Australia. Waste tyre recycling is an energy intensive process which requires multiple stages of size reduction, adding to processing costs (Tyre Stewardship Australia, 2020). There are several pyrolysis plants that have either been built, are in commissioning, under construction or in early planning stages in Australia (Tyre Stewardship Australia, 2020), however it is not clear whether any are located proximal to the Project (Tyre Stewardship Australia, 2020).

The disposal methodology for waste tyres and associated monitoring have been developed in consideration of *Guideline Waste Handler, Management of End-of Life Tyres (Waste Tyres)* (DES, 2020b).

Disposal of waste heavy vehicle tyres will include stockpiling and transport to identified disposal locations within the waste rock emplacement areas, as determined by mine progression. The disposal methodology will generally include the following:

- operational personnel will initiate tyre disposal once a stockpile has accumulated that warrants a feasible disposal event;
- completion of a pre-task risk assessment for each waste tyre disposal event, to consider both the location and manner in which the tyres will be disposed, as well as required monitoring;
- relocation of the tyres will be undertaken in accordance with Whitehaven WS' internal Mine Tyre Disposal Environmental Procedure;
- tyres will be placed as deep into the waste rock emplacement area as is reasonably practical, with a minimum of 20 m of material to be emplaced over all tyre disposal areas;
- tyres will not be disposed of in areas with potential to impede saturated aquifers, compromise the stability of the consolidated final landform or have any long-term effects on rehabilitation;
- tyre dumps will be located more than 15 m from any coal rejects to minimise the potential for spontaneous combustion.

The pre-task risk assessment must consider the following:

- fire hazards and their management;
- safety hazards and their management;
- potential for interaction with the surrounding groundwater systems;
- required depth to prevent uprising and ensure stability of the final consolidated landform; and
- proximity to coal rejects and depth of cover.

Whitehaven WS would continue to investigate feasible and reasonable opportunities for recycling waste heavy vehicle tyres from the optimised Project as options become available during the life of the Project.

Whitehaven's internal Mine Tyre Disposal Environmental Procedure provides further detail on proposed used heavy vehicle tyre storage and disposal methods, and will be reviewed periodically and amended as required.

The method of disposal described in the procedure includes the loading of waste tyres at the designated storage location onto a flat-bed type truck or equivalent piece of heavy equipment suitable for transporting large heavy equipment tyres, for transportation to and unloading at the final disposal location. The proposed water quality monitoring program for the Project includes a suite of analytes would also assist in identifying any potential contamination from waste disposal and prompt remediation actions (if required).

Stockpiling of tyres at the allocated disposal area may be required prior to final coverage and burial. Stockpiles will be sized and located in consideration of potential fire risk and would be temporary only.

7.2.12.5 Sewage Treatment

In response to the requested Additional Information, MEDLI Modelling was undertaken by Sustainable Solutions International Pty Ltd for both the autonomous and non-autonomous scenarios. The MEDLI Modelling was aimed at designing an appropriate sewage treatment system for the optimised Project. Attachment 18 provides the details of the MEDLI Modelling.

As suggested in Attachment 18, the sewage treatment for the Project would be designed to meet a Class A effluent quality for dust suppression and firefighting purposes.

Furthermore, the depth to groundwater table at the preferred location for the effluent irrigation area would be approximately 20 m below ground level, consistent with the pre-mining groundwater levels modelled by SLR Consulting (2022).

8 PROJECT EVALUATION

While coal demand is expected to decline in line with global efforts to reduce greenhouse gas emissions, the pace of this change will depend on individual customer choices in response to their own national policies and global capital market drivers. In these circumstances, the quality and comparatively low emissions profile of Queensland coal is expected to maintain, and likely increase, demand for longer than other countries coal reserves. Additionally, ongoing innovations to reduce emissions from the Project, as well as in coal-fired power and steelmaking processes, will be critical to maintaining the global competitiveness of coal.

Approximately 58% of the product coal from the Project is metallurgical coal. Metallurgical coal is an essential component for the production of steel, with approximately 70% of all steel manufacturing requiring the burning of metallurgical coal (DAWE, 2021). Steel is a critical input for supplying the world with clean and renewable energy, as it is an integral ingredient in manufacturing the hardware of decarbonisation to facilitate energy transition (e.g. solar panels, wind turbines, the construction of dams and electric vehicles depend on steel to varying degrees).

Steel demand is driven by construction and infrastructure development as it is a fundamental building block for modern and developing economies. The construction of homes, schools, hospitals and bridges rely heavily on steel (DAWE, 2021).

Notwithstanding, the Queensland Government's position is that "*Coal projects will continue to be supported as long as they stack up economically, environmentally, and socially*". Each project must proceed on its own merits, based on demand and economic viability, and meet the highest environmental and community standards.

The potential impacts of the optimised Project (including the revised mine plan and optimised final landform) have been assessed against established thresholds of acceptability contained in relevant guidelines and policies. Potential impacts have been avoided or minimised as far as is reasonable or feasible. Mitigation and management measures and offset strategies are proposed where residual impacts are predicted.

Throughout the process for Project design, Whitehaven WS has carefully considered the feedback provided by the local community, government agencies and other stakeholders, including feedback on the Draft EIS. Since the lodgement of the Draft EIS, Whitehaven WS has refined and optimised the Project design to reduce the environment impacts of the Project and address comments on the Draft EIS. In summary, when compared to the project proposed in the Draft EIS, the optimised Project would:

- reduce the extent of West Pit and South Pit out-of-pit waste rock emplacements, reducing the indicative surface disturbance extent of the Project;
- provide a post-mining land use (PMLU) for all parts of the final landform;
- backfill South Pit mine void, adding an additional year of final landform shaping at the end of the Project life to achieve this outcome; and
- incorporate new geological data from the outcomes of processing trials which:
  - increases the amount of ROM coal extracted by the Project, although not increasing the peak ROM coal extraction rate;
  - increases the amount of metallurgical coal produced by the Project; and
  - reduces thermal coal produced by the Project.

The changes to the indicative surface disturbance extent presented in the Draft EIS would reduce the overall surface disturbance by approximately 179 ha, reducing the impacts on threatened species and ecological communities while maintaining the economic benefits of the Project.

The potential for the Project to create increased local employment options and benefit local businesses is a key benefit identified in local community and other stakeholder engagement. The Project would generate a significant net benefit to the State of Queensland. Economic benefits potentially forgone if the Project does not proceed amount to a net benefit to the State of Queensland of $882 million in NPV terms.

In weighing up the environmental impacts (costs and benefits) associated with the Project as assessed and described in the Additional Information, the Project is, on balance, considered to be in the public interest.

9 REFERENCES

Australian Coal Association Research Program (2000) *Management of Waste Tyres in the Mining Industry*.

Ashurst (2022) Narrabri Underground Mine Stage 3 Extension Project (SSD-10269) *Submission To The Independent Planning Commission On Greenhouse Gas Emissions And Climate Change.*

Aurizon Holding Limited (2020) *Coal Dust Management Plan.*

Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*.

Australian and New Zealand Governments (in prep.) *Primary Industries – Livestock Drinking Water Guidance.*

Ball, J., Babister, M., Nathan, R., Weeks, W., Weinmann, E., Retallick, M. and Testoni, I. (2019) *Australian Rainfall and Runoff: A Guide to Flood Estimation.*

Barnett, B., Townley, L.R., Post, V., Evans, R.E., Hunt, R.J., Peeters, L., Richardson, S., Werner, A.D., Knapton, A. and Boronkay, A. (2012) *Australian Groundwater Modelling Guidelines*.

BHP Billiton Mitsubishi Alliance (2009) *Caval Ridge Environmental Impact Statement*.

BHP Billiton Mitsubishi Alliance (2013) *Red Hill Mining Lease Environmental Impact Statement.*

Black, R., Houston, W. & Jaensch, R (2010) *Evidence of regular seasonal migration by Australian Painted Snipe Rostratula australis to the Queensland tropics in autumn and winter.* The Stilt 58: 1-9.

Blackrock Mining Solutions Pty Ltd (2020) *Winchester South Project – Preliminary Geotechnical Assessment*. Unpublished report for Whitehaven WS Pty Ltd.

Brundell, J., Cobon, D. and Stone, G. (2011) *Climate change risk management matrix: a process for assessing impacts, adaptation, risk and vulnerability*.

CDM Smith (2020) *Economic Assessment of Ensham Coal Mine*.

Clean Energy Regulator (2021a) *Estimating emissions and energy from coal mining guideline*.

Clean Energy Regulator (2021b) *Guideline – Manner and Form Sections 19 22G and 22X reports.*

Climate Change Authority (2020) *Industry Action on Climate Change Mitigation and Low Emissions Technologies.*

Commonwealth of Australia (2010) *Survey guidelines for Australia's threatened bats*.

Commonwealth of Australia (2012a) *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy.*

Commonwealth of Australia (2012b) *Survey guidelines for Australia's threatened mammals.*

Commonwealth of Australia (2021) *Australia's Nationally Determined Contribution – Communication 2021*.

Commonwealth Scientific and Industrial Research Organisation and Bureau of Meteorology (2015) *Climate Change in Australia Technical Report – Projections for Australia's NRM Regions*.

Commonwealth Scientific and Industrial Research Organisation and Bureau of Meteorology (2020) *State of the Climate 2020*.

CRU (2021) *Metallurgical Long Term Market Outlook*.

Delevingue, L., Glazener, W., Grégoir, L. and Henderson, K. (2020) *Climate Risk and Decarbonizarion: What every mining CEO needs to know*. Website: https://www.mckinsey.com/business-functions/sustainability/our-insights/climate-risk-and-decarbonization-what-every-mining-ceo-needs-to-know
Date accessed: November 2021.

Deloitte Access Economics (2021) *Winchester South Project – Economic Assessment*.

Deloitte Access Economics (2022) *Winchester South Project Additional Information – Economic Assessment*.

Department of Agriculture Water and the Environment (2021) *Statement of Reasons for Approval under the Environment Protection and Biodiversity Conservation Act 1999*.

Department of Environment and Heritage Protection (2014) *Queensland Environmental Offsets Policy – Significant Residual Impact Guideline.*

Department of Environment and Heritage Protection, Department of Natural Resources and Mines and Queensland Treasury (2017) *Mined Land Rehabilitation Policy*.

Department of Environment and Science (2013) *Model water conditions for coal mines in the Fitzroy basin.* Version 3.01. March 2013.

Department of Environment and Science (2014) *Mining Operational Policy – Disposal and storage of scrap tyres at mine sites*.

Department of Environment and Science (2015) *Guideline for the Environmental Assessment of Subterranean Aquatic Fauna*.

Department of Environment and Science (2016a) *Requirements for site-specific and amendment applications—underground water rights*.

Department of Environment and Science (2016b) *Manual for assessing consequence categories and hydraulic performance of structures.*

Department of Environment and Science (2017) *Underground water impact reports and final reports*.

Department of Environment and Science (2018) *Queensland auditor handbook for contaminated land.*

Department of Environment and Science (2019) *Guideline – Progressive rehabilitation and closure plans (PRC plans).*

Department of Environment and Science (2020a) *Environmental offset landscape connectivity assessment tool. Version 1.6*.

Department of Environment and Science (2020b) *Guideline Waste Handler, Management of End-of Life Tyres (Waste Tyres)*.

Department of Environment and Science (2021a) *Application requirements for activities with impacts to water (ESR/2015/1837) (Version 4.04)*

Department of Environment and Science (2021b) *Queensland Environmental Offsets Policy* (Version 1.11).

Department of Environment and Science (2021c) *Climate Action Plan 2030*.
Website:
https://www.des.qld.gov.au/climateaction
Date accessed: November 2021.

Department of Environment and Science (2021d) *Environmental Impact Statement (EIS) assessment report under the Environmental Protection Act 1994 for the Isaac Downs Project*.

Department of Environment and Science (2022) *Climate - EIS information guideline (ESR/2020/5298)*.

Department of Environment and Science and Department of Resources (2021) *Queensland Land Resource Assessment Guidelines, Volume 1: Soil and Land Resource Assessment.*

Department of Industry, Science, Energy and Resources (2021) *Quarterly Update of Australia's National Greenhouse Gas Inventory: March 2021*.

Department of Local Government and Planning (2012) *Biosecurity Regulation 2016, Mackay, Isaac and Whitsunday Regional Plan*.

Department of Natural Resources and Mines (2001) *Queensland Australian River Assessment System (AusRIVAS) Sampling and Processing Manual.*

Department of Natural Resources and Mines and the Department of Science, Information Technology, Innovation and the Arts (2013) *Regional Land Suitability Frameworks for Queensland*.

Department of Science, Information Technology and Innovation and the Department of Natural Resources and Mines (2015) *Guidelines for Agricultural Land Evaluation in Queensland*.

Department of Science, Information Technology and Innovation (2015) *Guideline for the Environmental Assessment of Subterranean Aquatic Fauna.*

Department of State Development (2017) *Economic Impact Assessment Guideline*.

Department of State Development, Manufacturing, Infrastructure and Planning (2018) *Social Impact Assessment Guideline*.

Department of the Environment (2015) *Threat Abatement Plan for Predation by Feral Cats*.

Department of the Environment (2016) *EPBC Act referral guideline for the endangered northern quoll Dasyurus hallucatus.*

Department of the Environment and Energy (2016) *Threat Abatement Plan for Competition and Land Degradation by Rabbits*.

Department of the Environment and Energy (2017) *Threat Abatement Plan for Predation, Habitat Degradation, Competition and Disease Transmission by Feral Pigs*.

Department of the Environment and Energy (2019) *Draft National Recovery Plan for the Australian Painted Snipe (Rostratula australis)*.

Department of the Prime Minister and Cabinet (2020) *Cost-benefit Analysis Guidance Note.*

Department of Transport and Main Roads (2015) *Guide to Development in a Transport Environment: Rail.*

Department of Transport and Main Roads (2018a) *Guide to Traffic Impact Assessment*.

Department of Transport and Main Roads (2018b) *Guideline for Preparing a Road-use Management Plan.*

Doody, T.M., Hancock, P.J., Pritchard, J.L. (2019) *Information Guidelines Explanatory Note: Assessing groundwater-dependent ecosystems*. Report prepared for the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development through the Department of the Environment and Energy, Commonwealth of Australia 2019.

DPM Enviroscienses Pty Ltd (2018) *Olive Downs Coking Coal Project – Aquatic Ecology Assessment*.

E2M Pty Ltd (2021) *Winchester South Project – Terrestrial Ecology Assessment*. Prepared for Whitehaven WS Pty Ltd.

E2M Pty Ltd (2022) *Winchester South Project – Supplementary Terrestrial Ecology Survey Report.* Prepared for Whitehaven WS Pty Ltd.

Ecological Service Professionals Pty Ltd (2021) *Winchester South Project - Aquatic Ecology and Stygofauna Assessment*. Prepared for Whitehaven WS Pty Ltd.

Ecological Service Professionals Pty Ltd (2022a) *Winchester South Project - Aquatic Ecology and Stygofauna Additional Information*. Prepared for Whitehaven WS Pty Ltd.

Ecological Service Professionals Pty Ltd (2022b) *Winchester South Project - Aquatic Ecology and Stygofauna Supplementary Assessment*. Prepared for Whitehaven WS Pty Ltd.

Eyre, T.J., Ferguson, D.J., Hourigan, C.L., Smith, G.C., Mathieson, M.T., Kelly, A.L., Venz, M.F., Hogan, L.D. and Rowland, J (2018) *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland.* Version 3.0.

Fitzroy Basin Association (2021) *Central Queensland Sustainability Strategy 2030.*

Fluvial Systems Pty Ltd (2020) *Winchester South Project Environmental Impact Statement – Technical Study Report – Geomorphology Assessment.* Prepared for Whitehaven WS Pty Ltd.

Ford, G. (2022) *Phone Conversation* [Personal communication].

Gillespie Economics (2018) *Olive Downs Coking Coal Project Economic Impact Assessment*.

Government of India (2016) *India's Intended Nationally Determined Contribution: Working Towards Climate Justice*. Website: https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/India%20First/INDIA%20INDC%20TO%20UNFCCC.pdf Date accessed: December 2021.

Government of Japan (2021) Japan's Nationally Determine Contribution (NDC). Website: https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Japan%20First/JAPAN_FIRST%20NDC%20(UPDATED%20SUBMISSION).pdf Date accessed: December 2021.

Government of South Korea (2020) *Submission under the Paris Agreement: The Republic of Korea's Update of its First Nationally Determined Contribution*. Website: https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Republic%20of%20Korea%20First/201230_ROK%27s%20Update%20of%20its%20First%20NDC_editorial%20change.pdf Date accessed: December 2021.

Government of Vietnam (2020) *Updated Nationally Determined Contribution (NDC).* Website: https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Viet%20Nam%20First/Viet%20Nam_NDC_2020_Eng.pdf Date accessed: December 2021.

GTE Environmental Pty Ltd (2021) *Soils and Land Suitability Assessment.*

GTE Environmental Pty Ltd (2022) *Soils and Land Suitability Assessment Addendum*.

Hydro Engineering & Consulting Pty Ltd (2021) Winchester South Project EIS – *Surface Water and Flooding Assessment Peer Review.*

HydroSimulations (2018) *Olive Downs Project – Groundwater Assessment*. Prepared for Pembroke Olive Downs Pty Ltd. May 2018.

Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (2018a) *Information guidelines for proponents preparing coal seam gas and large coal mining development proposals*.

Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (2018b) *Information Guidelines explanatory note. Uncertainty analysis—Guidance for groundwater modelling within a risk management framework*.

Infrastructure Australia (2021) *Guide to risk and uncertainty analysis – Technical guide of the Assessment Framework.*

Intergovernmental Panel on Climate Change (2018) *Global Warming of 1.5°C*. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. In Press.

Intergovernmental Panel on Climate Change (2021a) *Climate Change 2021: The Physical Science Basis*. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.

Intergovernmental Panel on Climate Change (2021b) *Sixth Assessment Report Working Group I – The Physical Science Basis: Regional fact sheet – Australasia.*

International Energy Agency (2021) *World Energy Outlook 2021*.

International Erosion Control Association (2018) *Best Practice Erosion and Sediment Control Guideline*.

Isaac Regional Council (2019) *Sustainable Isaac Coastal Development*.

Isaac Regional Council (2020) *Isaac Region Biosecurity Plan 2020-2023*.

Isbell, R.F (2021) *The Australian Soil Classification, Third Edition*. CSIRO Publishing, Melbourne.

Katestone Environmental Pty Ltd (2018) *Air Quality and Greenhouse Gas Assessment for the Olive Downs Coking Coal Project*.

Katestone Environmental Pty Ltd (2020) *Air Quality and Greenhouse Gas Assessment for the Isaac Downs Project*.

Katestone Environmental Pty Ltd (2021) *Winchester South Project – Air Quality and Greenhouse Gas Assessment*. Prepared for Whitehaven WS Pty Ltd.

Katestone Environmental Pty Ltd (2022) *Winchester South Project – Air Quality and Greenhouse Gas Additional Information*. Prepared for Whitehaven WS Pty Ltd.

Lindenmayer, D.B., Burgman, M.A., 2005. Practical Conservation Biology. CSIRO Publishing, Melbourne.

McDonald, M. and Hardbaugh, A.W. (1998) *A Modular Three – Dimensional Finite Difference Ground Water Flow Model*.

Middlemis, H., Merrick, N., and Ross, J. (2001) *Murray-Darling Basin Commission – Groundwater Flow Modelling Guideline*. Report for Murray-Darling Basin Commission. January 2001.

Middlemis, H. and Peeters, LJM. (2018) *Uncertainty analysis—Guidance for groundwater modelling within a risk management framework*. A report prepared for the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development through the Department of the Environment and Energy, Commonwealth of Australia 2018.

Minerals Council of Australia (2020) *Climate Action Plan*.

Neldner, V.J., Wilson, B.A., Dillewaard, H.A., Ryan, T.S., Butler, D.W., McDonald, W.J.F, Addicott, E.P. and Appelman, C.N. (2020) *Methodology for Surveying and Mapping Regional Ecosystems and Vegetation Communities in Queensland.* Version 5.1. Updated March 2020. Queensland Herbarium, Queensland Department of Environment and Science, Brisbane.

NSW Department of Planning and Environment (2015) *Guidelines for the economic assessment of mining and coal seam gas proposals.*

NSW Department of Planning and Environment (2018) *Technical Notes Supporting the Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals*.

Pembroke Olive Downs Pty Ltd (2018) *Olive Downs Coking Coal Project – Environmental Impact Statement.*

Preston, B. and Jones, R. (2006) *Climate Change Impacts on Australia and the Benefits of Early Action to Reduce Global Greenhouse Gas Emissions*.

Queensland Local Content Leaders Network (2019) *Keeping it in the Regions.*

Queensland Resources Council (2013) *Queensland Resources and Energy Sector Code of Practice for Local Content.*

Queensland Treasury (2015) *Project Assessment Framework – Cost-benefit analysis*.

Renzo Tonin & Associates (2021) *Winchester South Project Noise and Vibration Assessment*. Prepared for Whitehaven WS Pty Ltd.

Renzo Tonin and Associates (2022) *Noise and Vibration Assessment*. Prepared for Whitehaven WS Pty Ltd.

Rowland, J (2012) *Targeted Species Survey Guidelines for Painted Honeyeater (Grantiella picta)*.

Shields, P.G. and Williams, B.M (1991) *Land resource survey and evaluation of the Kilcummin area, Queensland*. Land Resources Bulletin QV91001. Department of Primary Industries. Brisbane.

SLR Consulting Australia Pty Ltd (2019) *Moorvale South Project Groundwater Assessment*. Report prepared for Peabody Energy, August 2019.

SLR Consulting Australia Pty Ltd (2021) *Winchester South Project EIS – Groundwater Impact Assessment.* Prepared for Whitehaven WS Pty Ltd.

SLR Consulting Australia Pty Ltd (2022) *Winchester South Project Additional Information – Groundwater Impact Assessment.* Prepared for Whitehaven WS Pty Ltd.

SMEC (2021) *Social Impact Assessment – Winchester South Project*.

SMEC (2022a) *EIS Submission Responses – SIA and SIMP*.

SMEC (2022b) *Social Impact Assessment – Winchester South Project*.

State of Queensland (2019a) *Bushfire Resilient Communities Technical Reference Guide for the State Planning Policy State Interest 'Natural Hazards, Risk and Resilience - Bushfire'*. October 2019.

State of Queensland (2019b) *Queensland Transport and Roads Investment Program 2019-2020 to 2022-23.*

State of Queensland (2021) *Queensland Transport and Roads Investment Program 2021-2022 to 2024-25.*

State of Queensland (2022) *Queensland Resources Industry Development Plan*.

Terrenus Earth Sciences (2021) *Winchester South Project – Geochemical Assessment of Potential Waste Rock and Coal Reject Materials*. Report prepared for Whitehaven WS Pty Ltd.

The Transport Planning Partnership (2021) *Winchester South Project – Road Transport Assessment*.

The Transport Planning Partnership (2022) *Winchester South Project Response to Submissions from Department of Transport and Main Roads and IRC.*

Tyre Stewardship Australia (2020) *Mining Industry - Off-The-Road Used Tyre Analysis*.

United Nations Environment Programme (2020) *Emissions Gap Report 2020*.

United Nations Framework Convention on Climate Change (2021) *The Paris Agreement*. Website: https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement
Date accessed: November 2021.

Vipac Engineers & Scientists (2020) *Central Queensland Coal Project Air Quality Assessment*.

Whitehaven Coal Limited (2021) *Stretch Reconciliation Action Plan September 2021 – September 2024.*

Whitehaven Coal Limited (2022) *Sustainability Report 2022.*

WRM Water & Environment Pty Ltd (2022) *Winchester South Project Additional Information Surface Water and Flooding Assessment*.