HUNTER VALLEY OPERATIONS

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HUNTER VALLEY OPERATIONS CONTINUATION PROJECT

SUBMISSIONS REPORT

NOVEMBER 2023

Hunter Valley Operations Continuation Project

Submissions Report

HV Operations Pty Ltd

H190408 RP#1

November 2023

Version	Date	Prepared by	Reviewed by	Comments
1	7 November 2023	James Wearne	Nicole Armit	Submission to DPE

Approved by

Brett McLennan
Director
7 November 2023

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Executive Summary

ES1 Background

Hunter Valley Operations (HVO) is an established multi-pit open cut coal mining complex, comprising the two mine sites of HVO North and HVO South. HVO is approximately 24 kilometres (km) north-west of Singleton in the Hunter Valley of New South Wales (NSW) and is predominantly in the Singleton Local Government Area (LGA), with a small portion of the Project area (around 3%) falling in the Muswellbrook LGA.

HVO is seeking approval for the HVO Continuation Project (the Project) from the NSW Minister for Planning, or delegate, under the provisions of Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The Project broadly comprises the continuation of mining at HVO North and HVO South, from the current approved mining completion dates of 2025 and 2030 respectively, to the end of 2050 at HVO North and 2045 at HVO South. Given that the two mine sites operate as one complex, one environmental impact statement (EIS, EMM 2022a) was prepared to support the two State significant development (SSD) applications being:

- SSD-11826681 - HVO North Open Cut Coal Continuation Project; and
- SSD-11826621 – HVO South Open Cut Coal Continuation Project.

The EIS was submitted and subsequently placed on public exhibition for a period of four weeks from Monday 30 January 2023 through to Monday 27 February 2023.

ES2 Submissions received

Following the public exhibition of the EIS, a total of 1,047 submissions were received from individuals, organisations and one public authority. In addition, 11 government agencies and the two local councils provided advice on the Project.

The majority of individual submissions (75%) were from the local or regional LGAs in which the Project is situated, or immediately adjoining, and include the LGAs of Singleton, Maitland, Cessnock and Muswellbrook. Over 97% of submissions from these LGAs were in support of the Project.

On 3 March 2023, DPE requested that HVO prepare a written response to the issues raised in the submissions received during the public exhibition of the EIS. Accordingly, this submissions report has been prepared to respond to the matters raised in these submissions, in accordance with section 59(2) of the Environmental Planning and Assessment Regulation 2021.

Impacts of greenhouse gas emissions and the Project's contribution to climate change was the most frequently raised matter in objections from organisations and individuals, collectively raised in 54 submissions. Other commonly raised key matters in public submissions include:

- impacts on air quality
- impacts on biodiversity
- negative socio-economic impacts and inadequate justification for the Project
- impacts to Aboriginal heritage
- impacts on water resources
- impacts of the Project on human health.

Sustained job security and employment opportunities were frequently cited across individual and organisation submissions of support, identified in 602 submissions received. Other key reasons identified for supporting the Project included:

- the positive socio-economic impacts and benefits the Project would have on the local, regional, and State economies, including the Project providing ongoing benefits to individual and family livelihoods as a result of direct employment and indirect flow on effects to local businesses and suppliers
- contributions from past and ongoing investment by HVO in the local community through community grants, sponsorship and community events
- a demonstrated good historical environmental performance and compliance
- improved environmental outcomes as a result of the Project.

ES3 Actions taken since EIS exhibition

ES3.1 Project amendments

To respond to matters raised in submissions, some amendments have been made to the HVO North Project. No changes are proposed to HVO South as described and assessed in the EIS (EMM 2022a). The proposed amendments relating to HVO North are summarised as follows:

- A portion of the proposed Lemington Road alignment has been realigned to avoid all direct impacts to the Warkworth Sands Woodland Endangered Ecological Community (EEC).
- As a result of the proposed amendments to the Lemington Road realignment corridor, the HVO North Project area has been adjusted to accommodate this change, noting that the Project area will become the HVO North development consent boundary if the Project is approved. No additional land parcels, beyond those included in the schedule of lands provided in the EIS, are introduced as a result of this change to the proposed development consent boundary.
- A change is proposed to the construction timing of the low permeability barrier wall within the Carrington West Wing area. As part of the Project design presented and assessed in the EIS, the low permeability barrier wall would be constructed after mining within the Carrington West Wing area. Following further engagement with DPE Water after the public exhibition of the EIS, installation of the low permeability barrier wall is now proposed prior to mining within 100 m of the remnant western arm of the paleochannel in connection to the Hunter River.

An amendment report (EMM 2023a) has been prepared to describe these proposed design changes and provide an assessment of the impacts associated with these changes.

ES3.2 Additional technical investigations

A number of additional technical investigations and assessments have been completed by HVO following the exhibition of the EIS in response to matters raised in submissions. This additional work includes:

- A review of the predicted greenhouse gas emissions from the Project and the proposed approach to emissions reductions. This included an assessment of the impact of the federal Safeguard Mechanism reforms that commenced on 1 July 2023.
- Additional investigations within the section of the proposed Lemington Road realignment that intersects areas of Warkworth Sands Woodland EEC and surrounds, to inform the consideration of alternative routes aimed at further avoiding areas containing this EEC.

- Preparation of an updated Biodiversity Development Assessment Report (BDAR) to include an assessment of the amended Lemington Road alignment and incorporate the results of additional surveys conducted over the Project disturbance areas.
- A review of the Project's water licence requirements and strategy to secure the required water licence entitlements.
- Preparation of an Aboriginal Cultural Heritage Assessment Report (ACHAR) addendum in response to matters raised by Heritage NSW.

ES4 Stakeholder engagement

Since the lodgement of the EIS, HVO has continued to engage with key stakeholders including local councils, government agencies, Project RAPs, the local community, and neighbouring landholders, as the project design is refined in response to matters raised.

Engagement with government agencies has focused primarily on the content of the submissions provided during their review of the EIS and the amendments to the Project.

ES5 Evaluation and conclusion

Submissions received on the Project during the public exhibition of the EIS were overwhelmingly supportive of the Project, with 91 percent of submissions in support. The majority of these submissions received were from the local community, raising the sustained job security, employment opportunities, and the significant flow on effects to the community of the Project as key reasons for support.

The Project represents a brownfield mining proposal that involves the continuation of an existing mine in an area that is an established coal mining and power generation precinct, providing employment and other socio-economic contributions to the local and regional community. The Project aligns with strategic direction and policy objectives at a local, state and national level. Current national and NSW State policy recognises the ongoing demand for coal.

HVO is a significant employer in the Hunter Valley, with a workforce of approximately 1,500 full time equivalent (FTE) employees. The Project will secure employment for these employees and provide continued support to the regional Hunter community over a period of time where there is expected to be a gradual decline of coal mining in the region.

From an economic perspective, the Project will deliver an estimated net benefit of $1,739.0 million to the Lower Hunter region in net present value (NPV) terms, comprised of:

- royalties, payroll tax and council rates of $36.6 million
- net economic benefit to NSW workers of $954.5 million
- net economic benefit to NSW suppliers of $760.3 million
- indirect costs $12.4 million.

With the recent change in the royalty rate in NSW, scheduled to commence from 1 July 2024, from 8.2% (upon which the economic assessment of the EIS was based) to 10.8%, the economic benefits of the Project to NSW will now be even greater, and the numbers presented above are conservative.

The development of the Project design for which approval is sought has been an iterative one developed over a number of years taking into account environmental, engineering and financial considerations. The Project has been designed to avoid and minimise potential environmental and social impacts whilst achieving positive Project outcomes. Amendments to the Project have also enabled the avoidance of all direct impact to Warkworth Sands Woodland EEC at HVO North and the two culturally modified trees that were within the original realignment of Lemington Road. Numerous technical investigations have been carried out to support the Project. These assessments identified residual impacts of the Project and appropriate mitigation measures to address these impacts.

The Project is therefore justified and represents a net benefit to the local region and to NSW.

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1 Introduction

1.1 Background

Hunter Valley Operations (HVO) is an established multi-pit open cut coal mining complex, comprising the two mine sites of HVO North and HVO South. HVO is approximately 24 kilometres (km) north-west of Singleton in the Hunter Valley of New South Wales (NSW). HVO falls predominantly in the Singleton Local Government Area (LGA), with a small portion of the area (around 3%) falling in the Muswellbrook LGA, as shown on Figure 1.1.

The HVO Complex, comprising HVO North and HVO South, produces a high quality thermal and semi-soft coking coal suitable for use in international and domestic markets.

HVO North operates under Development Consent DA 450-10-2003, which was granted in 2004 and allows extraction of up to 22 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal until 12 June 2025. HVO North comprises- the approved mining areas of West Pit, Mitchell Pit, Carrington Pit and North Pit as well as the Hunter Valley (HV) and Howick Coal Preparation Plants (CPP) and the Howick and HVO North mine infrastructure areas (MIA). The Newdell Load Point (LP) and Hunter Valley LP (HVLP) train loading facilities are also at HVO North.

HVO South operates under Project Approval (PA) 06_0261, which was granted in 2009 and allows extraction of up to 20 Mtpa of ROM coal until 24 March 2030. HVO South comprises the approved mining areas of Riverview Pit, Cheshunt Pit, Riverview South-East Extension and South Lemington Pits 1 and 2, as well as the MIA, and the Lemington CPP (LCPP) and rail loop (approved but not constructed).

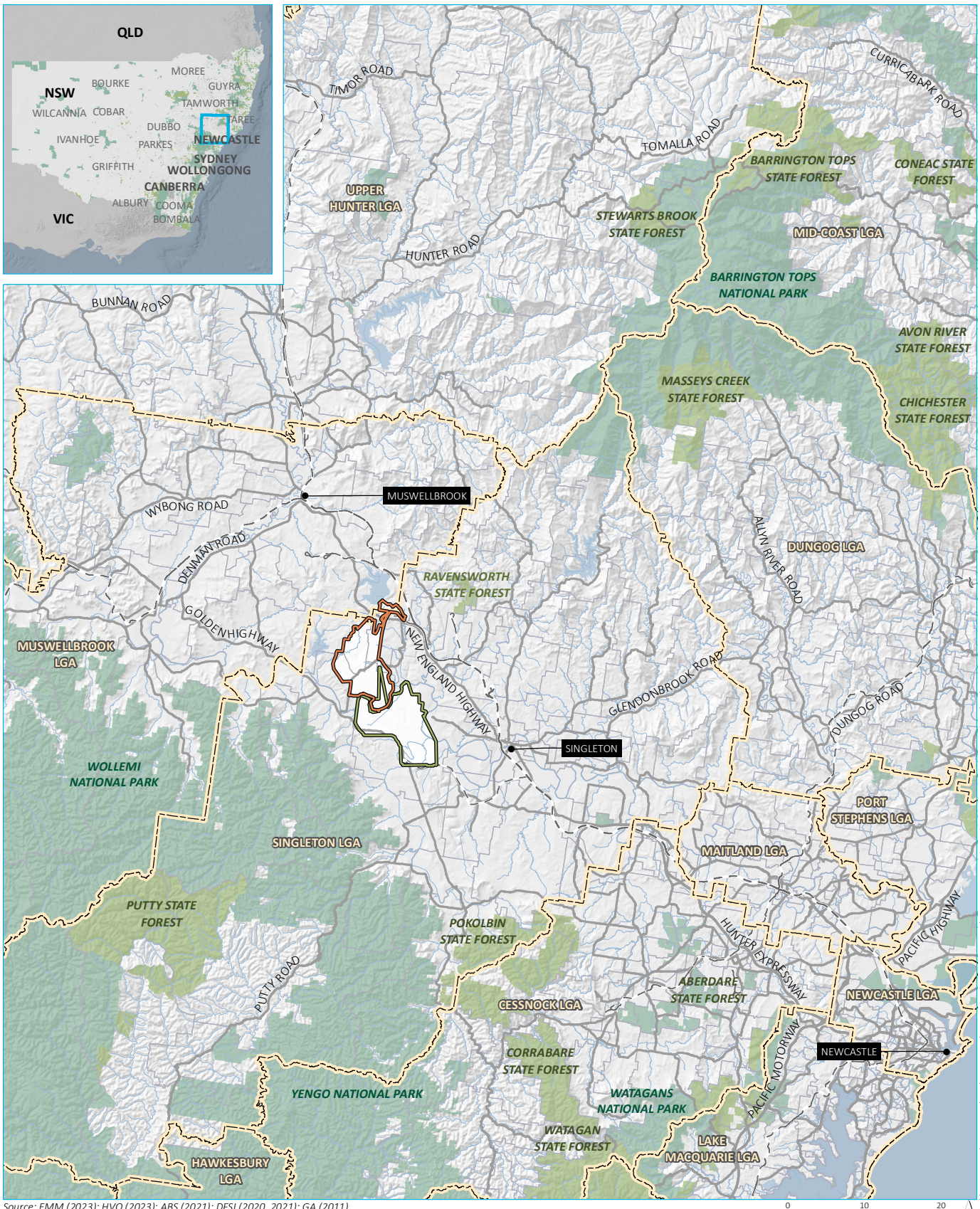
The existing and approved components of the HVO Complex are shown on Figure 1.2.

HVO is owned by subsidiary companies of Yancoal and Glencore, as participants in the unincorporated HVO Joint Venture (JV). HV Operations Pty Ltd (HVOPL) is the appointed manager of the JV. HVO is seeking approval for the HVO Continuation Project (the Project) from the NSW Minister for Planning, or delegate, under the provisions of Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The Project broadly comprises the continuation of mining at HVO North and HVO South, from the current approved mining completion dates of 2025 and 2030 respectively, to the end of 2050 at HVO North and 2045 at HVO South. To enable the Project to proceed, two new State significant development (SSD) consents are required; one for HVO North and one for HVO South.

Given that the two mine sites operate as one complex, one environmental impact statement (EIS) was prepared by EMM Consulting Pty Limited (EMM) on behalf of HVO to support the two SSD applications, being:

- SSD-11826681 - HVO North Open Cut Coal Continuation Project; and
- SSD-11826621 - HVO South Open Cut Coal Continuation Project.

The EIS was prepared in accordance with the Secretary's Environmental Assessment Requirements (SEARs) issued for HVO North and South on 11 March 2021, and the *State significant development guidelines - preparing an environmental impact statement* (DPIE 2022a). The EIS was placed on public exhibition for a period of four weeks from Monday 30 January 2023 through to Monday 27 February 2023.



Source: EMM (2023); HVO (2023); ABS (2021); DFSI (2020, 2021); GA (2011)

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GDA2020 MGA Zone 56

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KEY

- Existing HVO North development consent boundary (DA 450-10-2003)
- Existing HVO South project approval boundary (PA 06_0261)
- Rail line
- Major road
- Named watercourse
- Named waterbody
- Suburb boundary
- Local government area
- NPWS reserve
- State forest

Regional locality

HVO Continuation Project
Submissions Report
Figure 1.1

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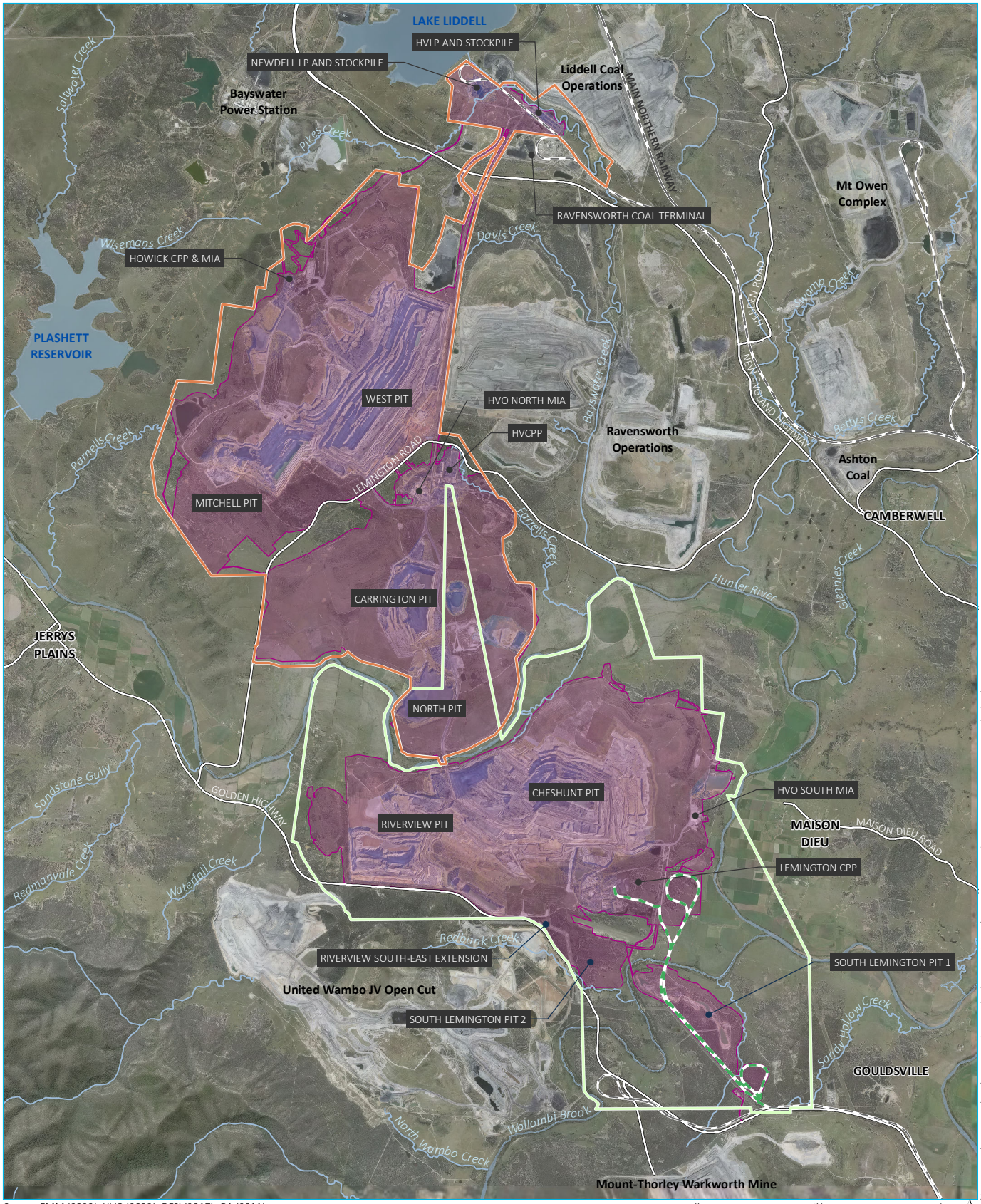

Source: EMM (2023); HVO (2023); DFSI (2017); GA (2011)

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GDA2020 MGA Zone 56

N

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KEY

- Existing HVO North development consent boundary (DA 450-10-2003)
- Existing HVO South project approval boundary (PA 06_0261)
- Existing and approved disturbance area
- South Lemington Rail Loop and haul route (approved, not yet constructed)

Existing environment

- Rail line
- Major road
- Named watercourse
- Named waterbody

Existing and approved operations

HVO Continuation Project
Submissions Report
Figure 1.2

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1.2 Purpose of this report

During public exhibition of the EIS, submissions were received from government agencies, councils, public authorities, organisations and individuals. On 3 March 2023, DPE requested that HVO prepare a written response to the issues raised in the submissions received during the public exhibition of the EIS. Accordingly, this submissions report has been prepared to respond to the matters raised in these submissions, in accordance with section 59(2) of the Environmental Planning and Assessment Regulation 2021 (EP&A Regulation). This submissions report has been prepared by EMM in accordance with the *State Significant Development Guidelines - Preparing a Submissions Report* (DPIE 2022b) (Submissions Report Guidelines).

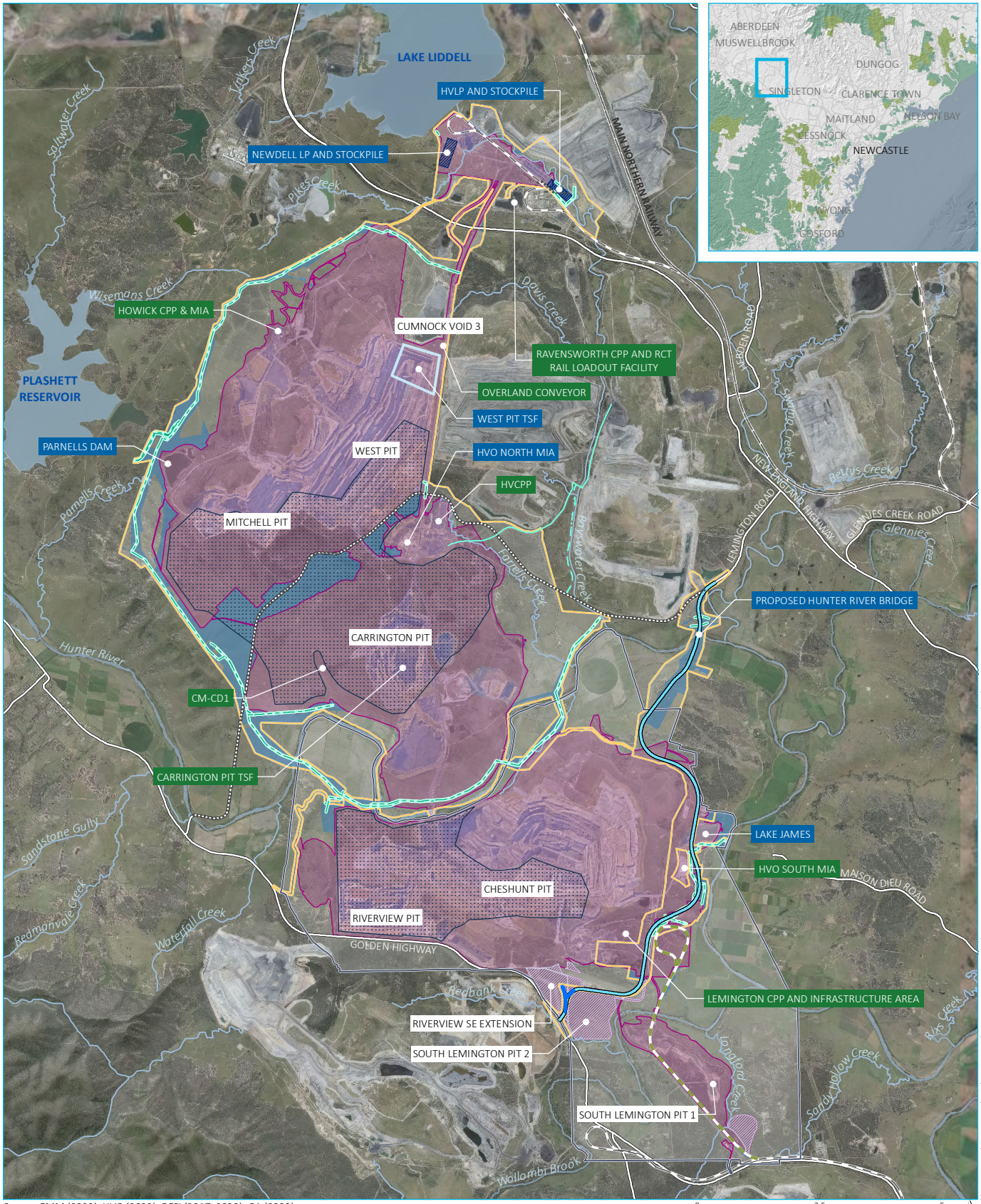
Since the receipt of submissions on the Project and following ongoing engagement with government agencies and stakeholders, HVO has refined the proposed project design in relation to Lemington Road to respond to the key issues raised. Specifically, a portion of Lemington Road has been moved to the west of the original location assessed in the EIS, to achieve avoidance of all direct impacts to the Warkworth Sands Woodland Endangered Ecological Community (EEC) at HVO North.

An amendment report (EMM 2023a) has been prepared to describe this proposed design changes and provide an assessment of the impacts associated with these changes. This submissions report should be read in conjunction with the amendment report.

1.3 Project overview

The Project proposes to extend the life of HVO primarily through the extraction of coal from deeper seams within existing mining tenements. The Project seeks to continue mining operations at the HVO Complex beyond the current approved mining completion dates of 2025 at HVO North and 2030 at HVO South, respectively, i.e. a further 25 years of mining operations at HVO North to 2050 and a further 15 years at HVO South to 2045.

The primary components of the Project at HVO North and HVO South are outlined below, with the key Project elements shown conceptually in Figure 1.3. The project layout presented in Figure 1.3 includes the amended Lemington Road design.



Source: EMM (2023); HVO (2023); DFSI (2017, 2020); GA (2009)

0 2.5 5 km

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KEY

- HVO North proposed development consent boundary
- HVO South proposed development consent boundary
- Existing and approved disturbance
- Previously approved area not retained
- Project related item
- Existing item

Existing HVO elements to be maintained

- South Lemington Rail Loop (approved, not yet constructed)

Proposed HVO Continuation Project elements

- Lemington Road realignment
- Indicative location of public road closure
- Haul route to Ravensworth Operations
- Transmission line relocation
- Alternative Golden Highway intersection
- Proposed mining area
- Product stockpile
- Additional disturbance area
- West Pit TSF

Existing environment

- Rail line
- Major road
- Ravensworth Operations access road
- Named watercourse
- Named waterbody
- NPWS reserve (refer to inset)
- State forest (refer to inset)

Proposed conceptual layout – amended project

HVO Continuation Project
Submissions Report
Figure 1.3

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1.3.1 HVO North

The key changes proposed by the Project to the approved HVO North operations include:

- an extension to the life of the mine until the end of 2050
- extraction of coal to the base of the Barrett seam across the HVO North mining area. Existing operations are approved to extract coal to the base of the Barrett seam in the West and Mitchell Pits; however, are only approved to the base of the shallower Bayswater seam in the Carrington Pit
- extraction of an additional approximate 400 million tonnes (Mt) of ROM coal through the extraction of coal from deeper seams and a small increase in the mining extent (between the existing West and Mitchell Pits and Carrington Pit)
- infrastructure upgrades, as listed below:
    - realignment of Lemington Road and construction of a new bridge over the Hunter River. While the proposed realigned road corridor is partly within the HVO South development consent boundary, the realignment is required to enable the progression of mining from the West and Mitchell Pits into the Carrington Pit area at HVO North. The works associated with the road realignment therefore form part of the HVO North Project
    - HVO North site access road relocation off the existing Lemington Road
    - an increase in the capacity of Parnells Dam (Dam 9W) from approximately 1 gigalitre (GL) to approximately 4 GL
    - realignment of transmission and telecommunication lines that are currently within the proposed mining area
    - MIA upgrade
    - construction of the North Void flood protection levee, Mitchell Diversion, Mitchell Dam and Caringtion West Wing Levee
    - ancillary activities as required to facilitate operations
    - access roads to facilitate service provider access
    - use of demountable/temporary buildings in Project compounds as required
    - upgrade of the existing Newdell LP train loading facility and construction of a new product stockpile; or an extension of the HVLP product coal stockpile. While approval for both options is sought, only one will be constructed
- coal haulage from the HVCPP to the Ravensworth ROM pad, via internal haul roads
- revision and implementation of the tailings strategy
- amendments to the approved final landform
- changes to the existing development consent boundary to incorporate the changes listed above.

Other than as set out above, all activities that are currently approved under the existing HVO North approval are intended to continue. Key aspects and outcomes of the approved development at HVO North that will remain the same under the Project include the following:

- the maximum allowable annual coal extraction and processing rate
- annual operational workforce numbers and associated traffic generation
- approved heights of overburden emplacement areas
- receipt of ROM coal from HVO South via internal haul roads for processing at all CPP facilities approved for HVO North
- continued avoidance of the Aboriginal heritage site known as Carrington Mine – Colluvial Deposit 1 (CM-CD1)
- the ridge between Jerrys Plains and HVO North will remain, continuing to provide an effective amenity barrier.

1.3.2 HVO South

The key changes proposed by the Project to the existing approved operations at HVO South include:

- an extension of the life of the mine until the end of 2045
- a reduction in the approved maximum ROM coal extraction rate from 20 Mtpa to 18 Mtpa
- changes to the approved mine sequencing (although noting that mining within the two primary open cut pits, Riverview and Cheshunt, will remain generally within the same footprint as approved)
- removal of coal extraction from the mine plan in the Riverview South East Extension, South Lemington Pit 1 and South Lemington Pit 2 mining areas
- infrastructure upgrades and changes to that currently approved, as listed below:
    - removal of the LCPP short rail loop option and the associated road or conveyor haulage options
    - removal of the approved conveyor from HVO South to the HVCPP at HVO North (the conveyor has not been constructed)
    - removal of the need to relocate Comleroi Road (due to the removal of coal extraction from the Riverview South-East Extension)
    - construction of the Cheshunt and Riverview Pit flood protection levees
    - realignment of transmission lines
    - enlargement of Lake James (Dam 15S) from approximately 0.7 GL to approximately 2 GL
    - additional tailings pipelines and pumps
    - ancillary activities as required to facilitate operations
    - access roads to facilitate service provider access

- use of demountable/temporary buildings in Project compounds as required

- revision and implementation of the tailings strategy
- amendments to the final landform due to rescheduling and or infrastructure relocations.

Other than as set out above, all activities that are currently approved under the existing HVO South approval are intended to continue. Key aspects of the approved development at HVO South that will remain the same under the Project include the following:

- the coal seams to be extracted (i.e. no increase in the depth of mining)
- the extent of approved mining areas within the Riverview and Cheshunt Pits
- approved heights of overburden emplacement areas
- construction of the LCPP and associated rail loop (long rail loop option only)
- transfer of coal from HVO South to HVO North for processing
- annual operational workforce numbers and associated traffic generation.

2 Analysis of submissions

2.1 Summary of submissions

Following the public exhibition of the EIS, a total of 1,047 submissions were received by DPE from individuals, organisations and one public authority. In addition, 11 government agencies and the two local council submissions were received providing advice on the Project. The majority of the submissions received (91%) were in support of the Project.

A summary of the submissions relating to the HVO Complex (i.e., HVO North and HVO South combined), including the total number of submissions that supported, objected, commented, or provided advice on the Project, is provided in Table 2.1.

Table 2.1 Submissions summary – HVO Continuation Project

Submission source	Support	Comment	Advice	Object	Total
Government agencies and Councils	0	0	13	0	**13**
Organisations	31	0	0	18	**49**
Individuals	932	11	0	54	**997**
Public authorities	0	1	0	0	**1**
Total	**963**	**12**	**13**	**72**	**1,060**

Of the 72 objecting submissions, 67 are considered unique submissions for the purposes of section 2.7(6) of the State Environmental Planning Policy (Planning Systems) 2021 (Planning Systems SEPP).

Submissions are available to view on the NSW Government's Major Projects website for HVO North at:

https://www.planningportal.nsw.gov.au/major-projects/projects/hvo-north-open-cut-coal-continuation-project

and HVO south at:

https://www.planningportal.nsw.gov.au/major-projects/projects/hvo-south-open-cut-coal-continuation-project

A submissions register is provided in Appendix A of this report, which summarises all submissions received and where the matters raised in those submissions have been addressed.

2.2 Origin of submissions

2.2.1 Public submissions

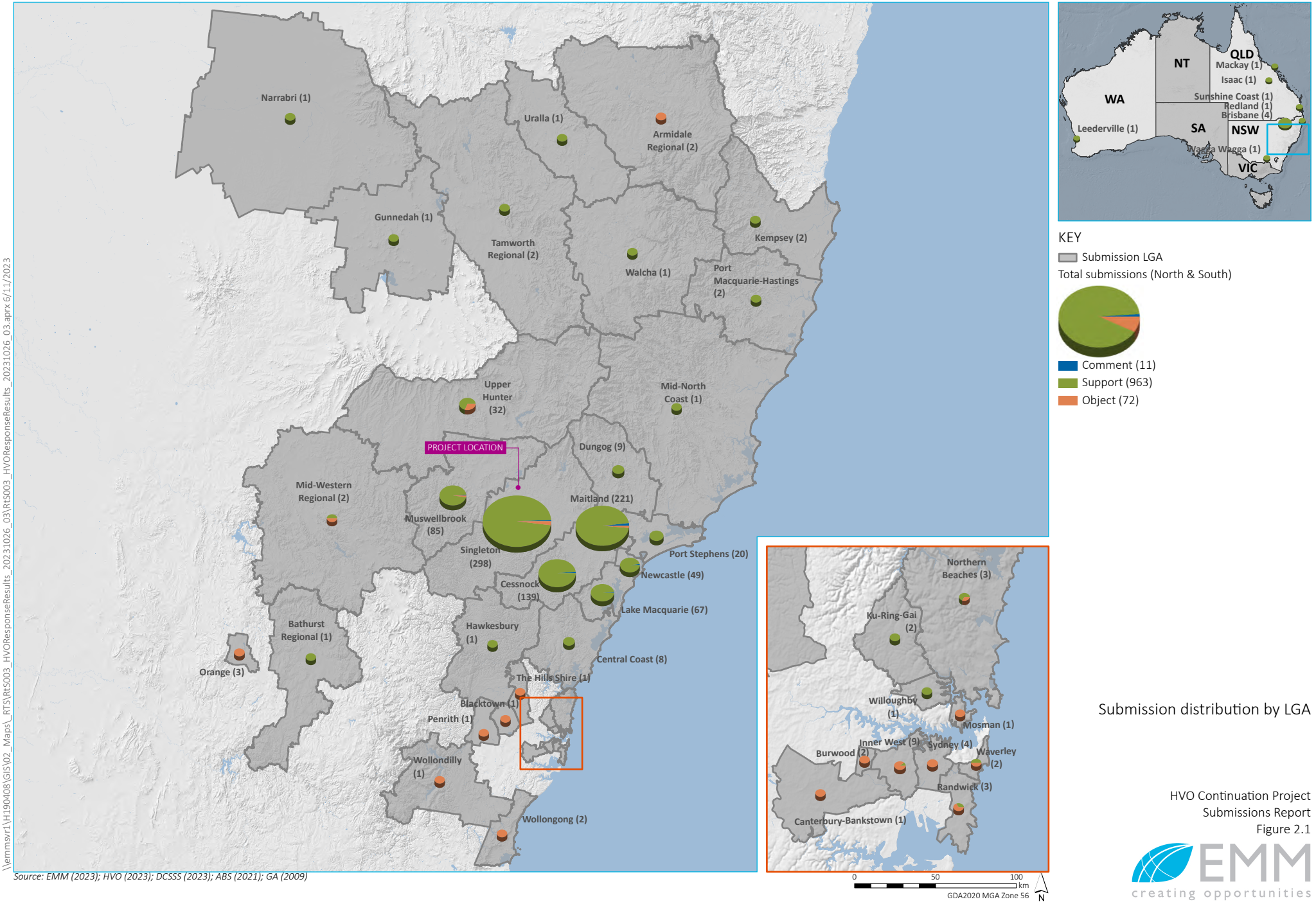
Submissions for the Project originated from 45 different LGA's. Submissions of support originated from 34 different LGAs with objection submissions originating from 20 different LGAs.

The majority of individual submissions (75%) were from the local or regional LGA's in which the Project is situated, or immediately adjoining, and include the LGA's of Singleton (298), Maitland (221), Cessnock (139) and Muswellbrook (85). Over 97% of submissions from these LGAs were in support of the Project and 1.5% of these submissions objected to the Project.

The majority of objections by individuals (10 of 54) originated from the Upper Hunter Shire LGA, representing 19% of objections received, eight (15%) were from the Inner West LGA, and 6 (11%) were from the Singleton LGA. Most objections received 32 (60%) were from within LGAs located over 100 km from the Project area.

Nine submissions were received from interstate, with eight from Queensland and one from Western Australia. All interstate submissions received were in support of the Project.

The distribution of public individual and organisation submissions received is illustrated in Figure 2.1.



KEY

Submission LGA

Total submissions (North & South)

Comment (11)

Support (963)

Object (72)

Submission distribution by LGA

HVO Continuation Project
Submissions Report
Figure 2.1

Source: EMM (2023); HVO (2023); DCSSS (2023); ABS (2021); GA (2009)

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2.2.2 Government agency submissions

The following State government agencies, in alphabetical order, provided a submission on both the HVO North and HVO South Projects offering advice:

- Department of Planning and Environment – Biodiversity and Conservation Division (BCD)
- Department of Planning and Environment – Climate and Atmospheric Science (CAS)
- Department of Planning and Environment – Crown Lands (DPE Crown Lands)
- Department of Planning and Environment – Water (DPE Water)
- Department of Primary Industries – Agriculture (DPI Agriculture)
- Department of Primary Industries – Fisheries (DPI Fisheries)
- Department of Regional NSW - Mining, Exploration and Geoscience (MEG)
- Environment Protection Authority (EPA)
- Heritage NSW
- NSW Fire and Rescue
- Transport for NSW (TfNSW)

2.2.3 Council submissions

Council submissions providing comment were received on both the HVO North Project and the HVO South Project from:

- Muswellbrook Shire Council
- Singleton Shire Council.

2.2.4 Public authority submissions

One submission was received from a public authority (Ausgrid), providing comment on both the HVO North and HVO South Projects.

2.2.5 Organisation submissions

The following organisations provided a submission of objection on the HVO North and/or the HVO South Project:

- Better Planning Network Inc
- The Australia Institute
- Lock the Gate Alliance
- Climate Action Sydney Eastern Suburbs (CASES)
- Central West Environment Council
- Denman Aberdeen Muswellbrook Healthy Environment Group Inc
- Wollar Progress Association
- Climate Change Balmain-Rozelle
- Hunter Communities Network
- Hunter Environment Lobby Inc
- Tipping Point
- Vote Earth Now
- Plains Clans of the Wonnarua People (PCWP)
- Hunter Thoroughbred Breeders Association
- Coolmore Australia
- Newgate Operations Pty Ltd
- Scone Equine Hospital
- Godolphin Australia

The following organisations provided a submission of support on the HVO North and/or the HVO South Project:

- KCE Pty Ltd
- Pump Tech Australia
- Coal Services
- Muswellbrook Chamber of Commerce & Industry
- Integrated Reliability Solutions
- McMahon Resources
- WesTrac Pty Ltd
- A Plus Contracting and Poly Welding
- Franks Fencing
- V2 Mining Services Pty Ltd
- Singleton Tyre and Batter Centre
- Programmed
- Fyfe Pty Ltd
- MC Quality Control Pty Ltd
- MMS Engineering
- TCX Services
- Agile Solutions
- PHC Group
- Les Russell & Son P/L
- Breathalyser Sales & Service Pty Ltd
- Expressway Spares Pty Ltd
- MB Engineering Solutions Pty Ltd
- C2G Energy Management
- Custom Fluidpower
- Morgan Engineering
- Fuchs Lubricants Australasia
- TACTech Mine Planning
- Singleton Shire Healthy Environment Group
- Pirtek (Hunter Valley) Pty Ltd
- Hunter Valley Gliding Club
- Atlantech Pty Ltd

2.3 Categorisation of issues

2.3.1 Overview

Matters raised in the submissions from organisations and individuals have been classified as one of the following five broad categories in accordance with the Submissions Report Guideline:

- The Project (such as the Project study area, the physical layout and design, key uses and activities, timing).
- Procedural matters (such as the level of quality of engagement, compliance with the SEARs, identification of relevant statutory requirements).
- The environmental, social or economic impacts of the project (such as amenity, air, biodiversity, heritage).
- The justification and evaluation of the Project as a whole (such as consistency of the Project with Government plans, policies or guidelines).
- Issues that are beyond the scope of the project assessment (such as broader policy issues) or not relevant to the Project.

Each of these categories have been divided into sub-categories (such as biodiversity, air quality, bushfire, cumulative impacts etc). A summary of the categorisation of matters raised in submissions from organisations and individuals objecting to and supporting the Project is presented in Section 2.3.2.

2.3.2 Organisation and individuals

A summary of matters raised in submissions from individuals and organisations is provided in Table 2.2. Many submissions raised multiple matters resulting in there being more issues captured than the number of submissions received.

Table 2.2 Categorisation of issues raised

Category	Sub-category	Objection	Support/Comment
		No. of submissions matter raised	**No. of submissions matter raised**
The project	Inadequate rehabilitation and final landform design	12	0
	Lack of detail on project schedule and activities	2	0
	General (no specific reason provided)	0	91
Sub-total		**14**	**91**
The economic, environmental and social impacts of the project	GHG emissions and climate change impacts	54	0
	Air quality impacts	27	1
	Biodiversity impacts	24	0
	Aboriginal heritage impacts	19	0
	Impacts to water resources	17	0
	Health impacts	14	0
	Impacts to the equine industry	11	0

Table 2.2 Categorisation of issues raised

Category	Sub-category	Objection	Support/Comment
		No. of submissions matter raised	No. of submissions matter raised
	Noise impacts	8	1
	Visual impacts	6	0
	Traffic impacts	0	1
	Handling and management of explosives	0	1
Sub-total		**180**	**4**
Justification and evaluation of the project as a whole	Negative socio-economic impacts and inadequate justification	23	0
	Project alignment with principals of ESG and EP&A Act objectives	4	0
	Inadequate cumulative impacts assessment	2	0
	Inadequate economic assessment	1	0
	Positive socio-economic impacts and project need	0	541
	Employment security and job opportunities	0	602
	Community contributions and support	0	172
	Good historical environmental performance and compliance	0	89
	Improved environmental outcome	0	23
Sub-total		**30**	**1427**
Procedural matters	Glencore not 'fit and proper'	16	0
	Inadequate consultation	2	0
	EPBC referral	1	0
Sub-total		**19**	**0**

Impacts of greenhouse gas emissions and the Project's contribution to climate change was the most frequently raised matter in objections from organisations and individuals, collectively raised in 54 submissions. Other commonly raised key matters in public submissions include:

- the Project's impact on air quality (28 submissions, including one submission in support of the Project)
- impacts on biodiversity (24 submissions)
- the negative socio-economic impacts and inadequate justification for the Project (23 submissions)
- impacts to Aboriginal heritage (19 submissions)
- impacts of the Project to water resources (17 submissions)

- impacts of the Project on human health (14 submissions).

Sustained job security and employment opportunities were frequently cited across individual and organisation submissions of support, identified in 602 submissions received. Other key reasons identified for supporting the Project included:

- the positive socio-economic impacts and benefits the Project would have on the local, regional, and state economies; including the Project providing ongoing benefit to individual and family livelihoods as a result of direct mining employment and indirect flow on effects to local business and suppliers (541 submissions).
- contributions from past and ongoing investment of the company in the local community through community grants, sponsorship and community events (172 submissions)
- a demonstrated good historical environmental performance and compliance (89 submission)
- improved environmental outcomes as a result of the Project (23 submissions).

A total of 91 submissions stated no specific issues or reasons for supporting the Project.

Figure 2.2 illustrates the range of issues raised in supporting and objecting submissions.

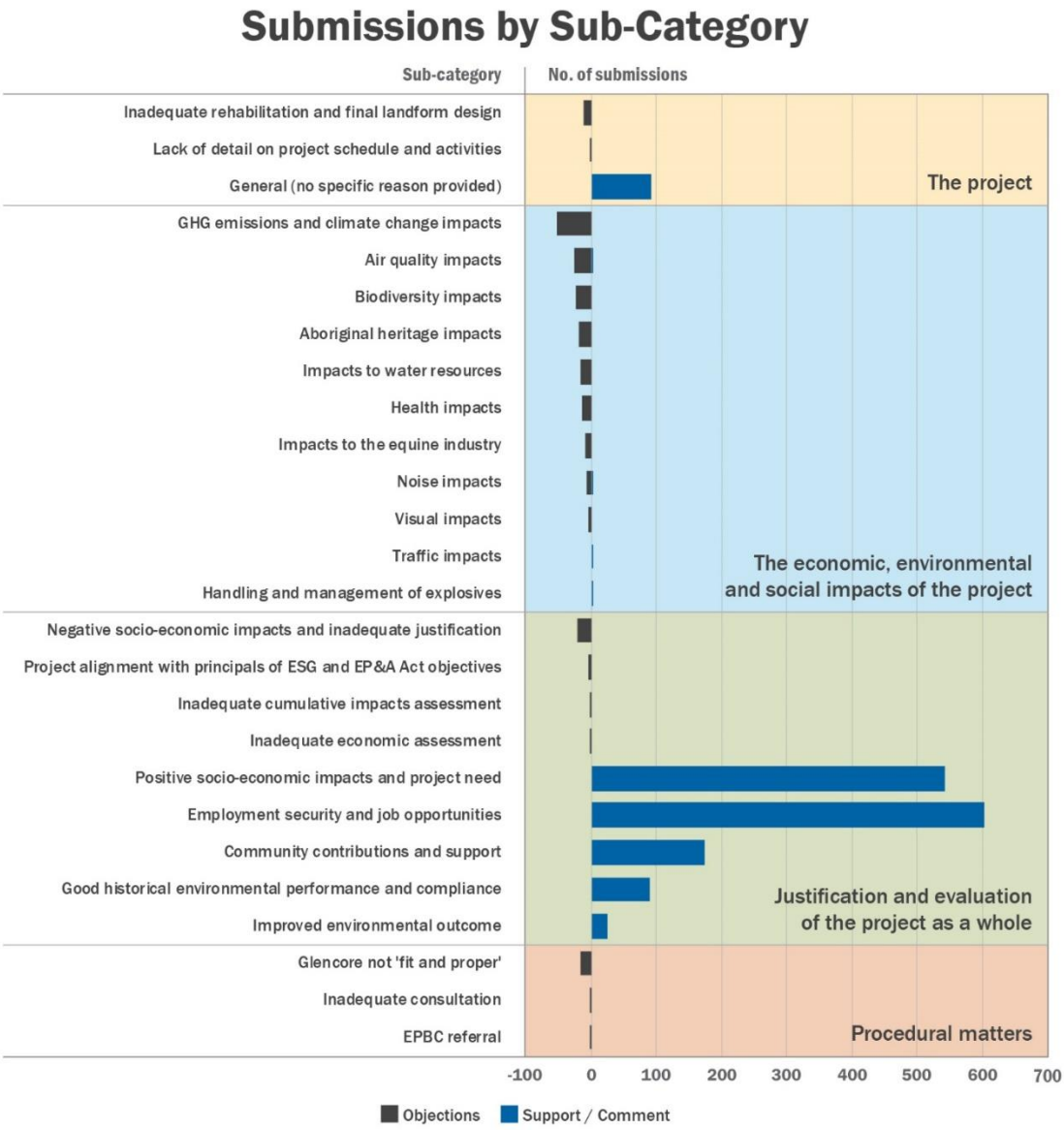


Figure 2.2 **Issues raised in submissions**

3 Actions taken since exhibition

3.1 Project amendments

3.1.1 Overview

As noted in Section 1.2, in response to matters raised in submissions and outcomes of engagement with government agencies and stakeholders, an amendment has been made to the proposed new Lemington Road alignment and associated disturbance footprint. This amendment is proposed to further avoid areas of the Warkworth Sands Woodland EEC and to further avoid impacts to identified areas of Aboriginal cultural heritage significance. To facilitate the proposed change to the Lemington Road realignment, minor changes to the HVO North Project development consent boundary have also been proposed. A summary of these changes is provided in the sub-sections below. These amendments are also documented in detail in the HVO North Continuation Project Amendment Report (Amendment Report) (EMM 2023a), which provides an assessment of the impacts of the amendments.

In addition, and following residual concerns raised by DPE Water in relation to the timing and installation of the low permeability barrier wall in the Carrington West Wing area, HVO has committed to installation of a low permeability barrier wall prior to mining within 100 m of the remnant western arm of the paleochannel in connection to the Hunter River. Further details of this commitment are presented in Section 5.6 of this report, and in the Amendment Report.

3.1.2 Lemington road realignment corridor

Lemington Road currently passes between the West/Mitchell Pits and the Carrington area at HVO North. As this area is proposed to be mined, the Project seeks to realign this part of Lemington Road to the east of the HVO Complex, linking the existing Comleroi Road in the south with the existing Lemington Road in the north, approximately 2.3 km south of the New England Highway.

The Lemington Road realignment presents an opportunity to improve the accessibility and reliability of the road as the primary access point between the Golden Highway and New England Highway. It includes the construction of a new bridge over the Hunter River which will meet the requirements of a 1 in 10 average recurrence interval (ARI) flood protection design. This will improve accessibility and safety of the crossing compared to the existing Moses Crossing low level bridge, which often results in closure of the road during times of heavy or sustained rainfall.

The proposed alignment of Lemington Road as presented in the EIS was carefully considered to avoid or minimise impacts to areas of environmental sensitivity, in particular the Warkworth Sands Woodland EEC and Central Hunter Grey Box – Ironbark Woodland EEC. The alignment presented in the EIS would result in a direct impact to 4.9 ha of the Warkworth Sands Woodland EEC when constructed.

Following the exhibition of the EIS, HVO completed further investigations into the vegetation communities present within the alignment presented in the EIS and in its vicinity, as discussed further in Section 3.2.2. Based on the outcomes of this review, coupled with engineering design considerations, an amendment is proposed to the section of the realignment to avoid impacts to all Warkworth Sands Woodland EEC and avoid impacts to two scarred trees of Aboriginal cultural heritage origin (AHIMS #37-3-1635 and AHIMS #37-3-1629), identified as being of high archaeological significance.

The amended alignment has been developed in consideration of the Austroads design criteria for 110 km/hr (and sign posted to 100 km/hr) roads. The new alignment adds approximately 580 m to the length of the realigned portion of Lemington Road above what was presented in the EIS, while maintaining current assessed crossing of the Hunter River.

The proposed amendment to the Lemington Road realignment corridor is illustrated in Figure 3.1 and has been further assessed in the Amendment Report, developed in conjunction with this Submissions Report.

3.1.3 Development consent boundary

The works associated with the Lemington Road realignment form part of the HVO North Project and are within the proposed HVO North development consent boundary, as presented in the EIS, which was developed to accommodate this infrastructure. As a result of the proposed amendments to the Lemington Road realignment corridor, the HVO North development consent boundary proposed in the EIS has been adjusted to accommodate this change. The change to the HVO North development consent boundary proposed in the EIS is presented in Figure 3.2. No additional land parcels, beyond those included in the schedule of lands provided in the EIS, are introduced as a result of this change to the proposed development consent boundary.

3.1.4 Low permeability barrier wall

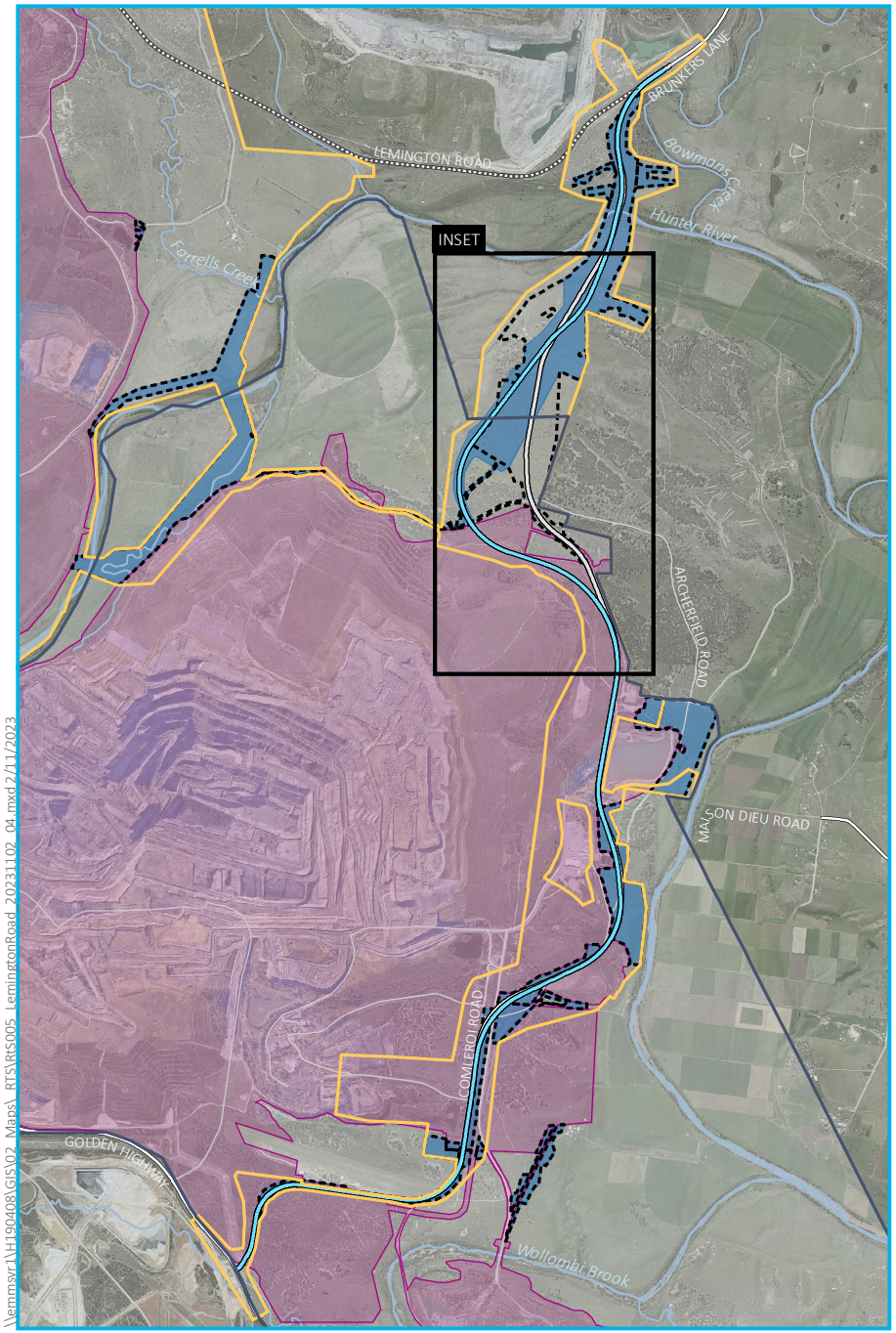
The existing HVO North development consent (DA 450-10-2003) requires the construction of a low permeability barrier wall in the Carrington West Wing area within the western arm of the paleochannel, and prior to undertaking mining within 100 m of the western arm of the paleochannel. This low permeability barrier wall has not been constructed due to the Carrington West Wing pit not being mined to date and not triggering this condition.

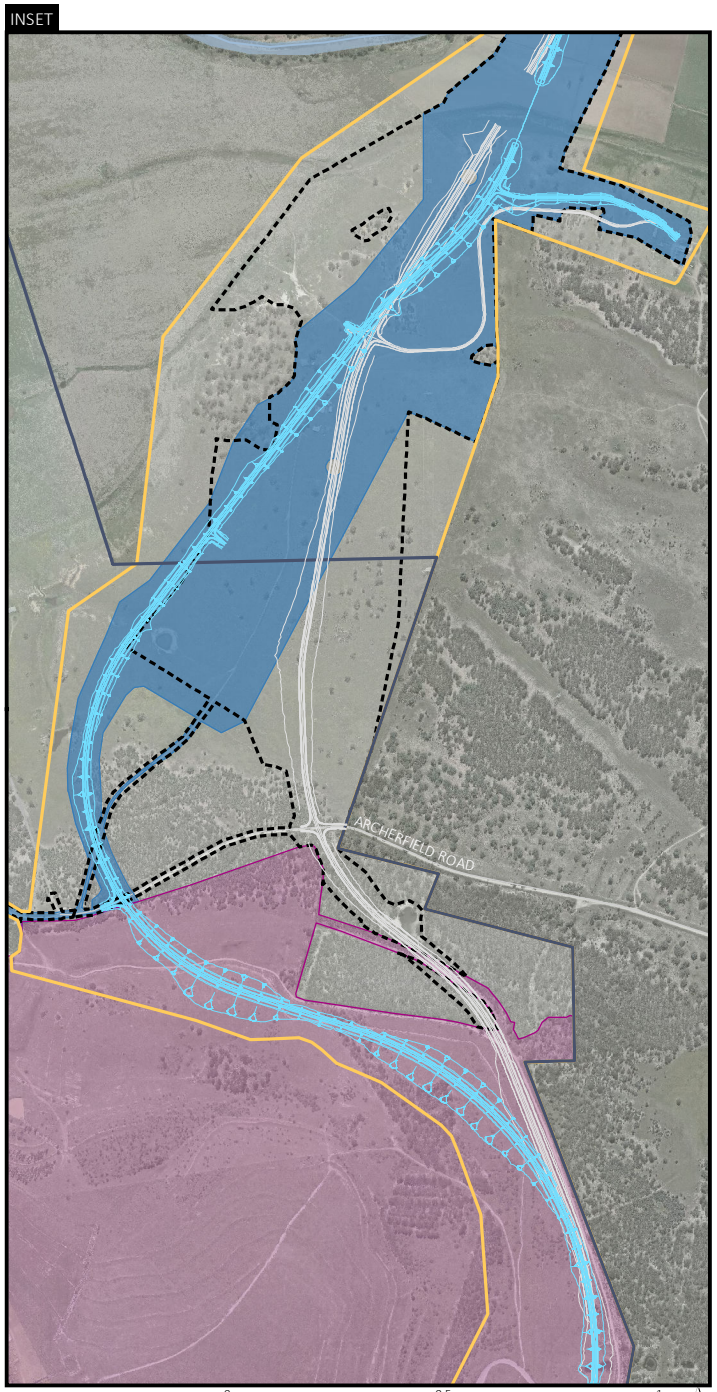
As part of the Project and as described in the EIS, HVO proposed to construct the low permeability barrier wall following the completion of mining in the Carrington West Wing area, but prior to backfilling with overburden and interburden material. The DPE Water submission raised residual concerns regarding the timing of the installation of the low permeability barrier wall and recommended that HVO either:

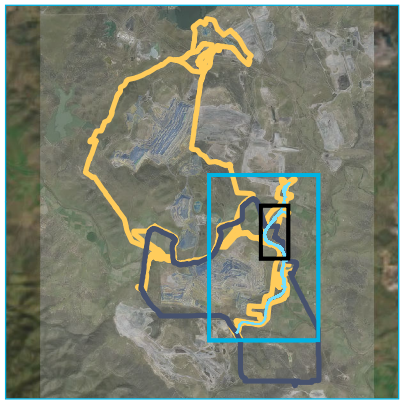
- implement a 150 metre (m) setback between the West Carrington Pit and the edge of the Hunter Regulated River Alluvial Water Source, and remove the requirement for the installation of a low permeability barrier wall to be constructed; or
- if a low permeability barrier is to be maintained, that its construction occurs prior to mining as currently approved (consistent with current consent requirements in conditions 23 and 24 of development consent DA 450-10-2003).

Following further engagement with DPE Water and subsequent to the exhibition of the EIS (Section 3.3), as part of the Project amendments, HVO is now proposing to construct the low permeability barrier wall prior to mining within 100 m of the remnant western arm of the paleochannel in connection to the Hunter River, as per the existing development consent requirement. The location and design of the proposed low permeability barrier remains the same as that proposed in the EIS; that is, consistent with the existing approved location and will be designed to meet the existing development consent specifications of a permeability of 1 x 10^{-8} metres per second (m/sec). The remnant western arm of the paleochannel and the proposed location of the low permeability barrier wall are depicted in Figure 3.3. Based on the current mine schedule, it is estimated mining will encroach within 100 m of the remnant western arm of the paleochannel in approximately Year 11 of the Project.

This commitment is further detailed in the response to the DPE Water submission, provided in Section 4.6.







KEY

- HVO North proposed development consent boundary
- HVO South proposed development consent boundary
- Existing and approved disturbance
- EIS Additional Disturbance Area
- Amended Additional Disturbance Area

Proposed HVO Continuation Project elements

- Amended Lemington Road alignment (centreline)
- Amended Lemington Road alignment (inset)
- EIS Lemington Road alignment (centreline)
- EIS Lemington Road alignment (inset)
- Indicative location of public road closure

Existing environment

- Major road
- Minor road
- Named watercourse
- Named waterbody

Source: EMM (2023); HVO (2023); DFSI (2017)

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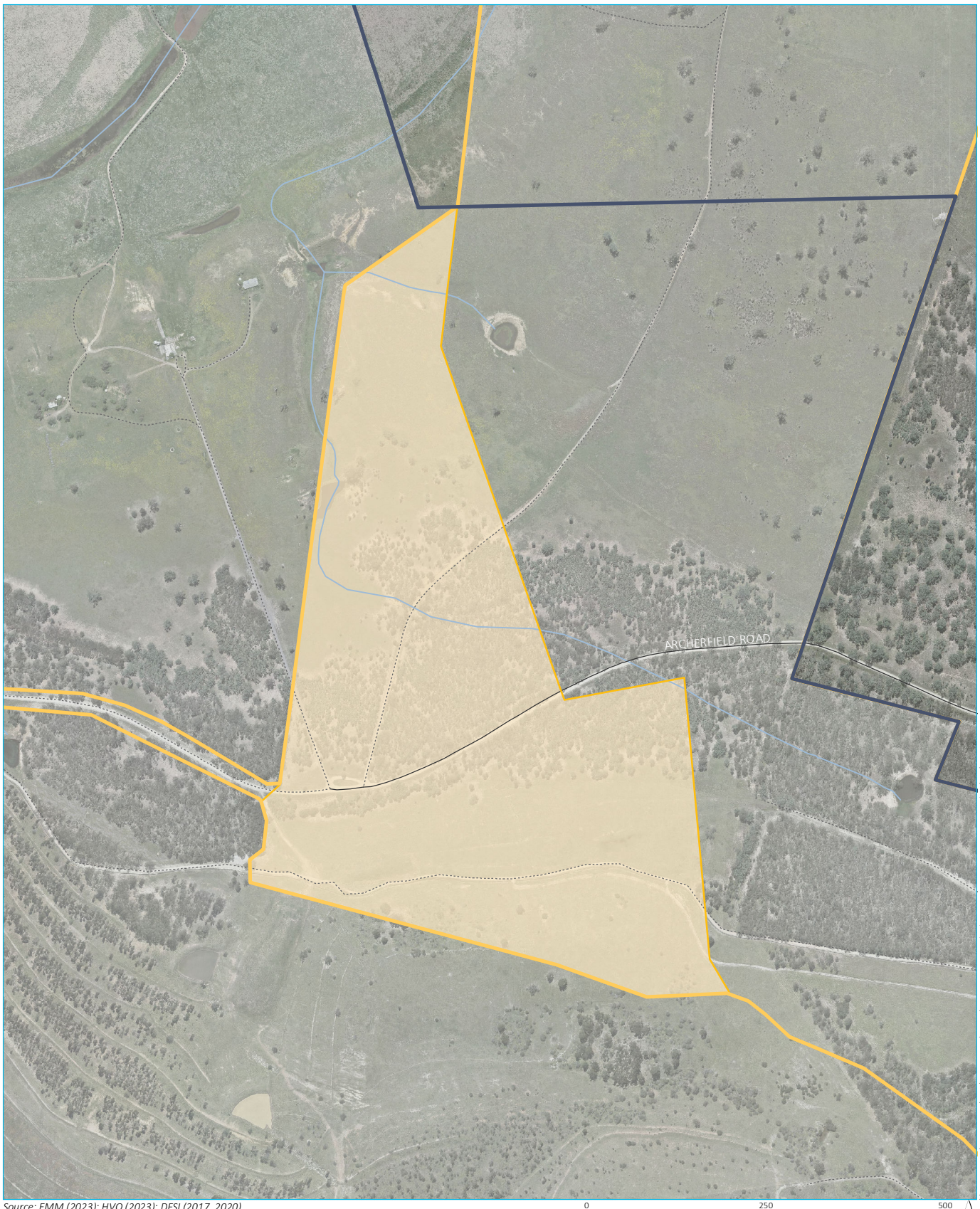
Amended Lemington Road realignment

HVO Continuation Project
Submissions Report
Figure 3.1

EMM
creating opportunities



Source: EMM (2023); HVO (2023); DFSI (2017, 2020)

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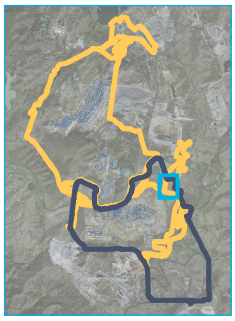


KEY

- HVO North proposed development consent boundary
- HVO South proposed development consent boundary
- Amended (additional) HVO North development consent boundary

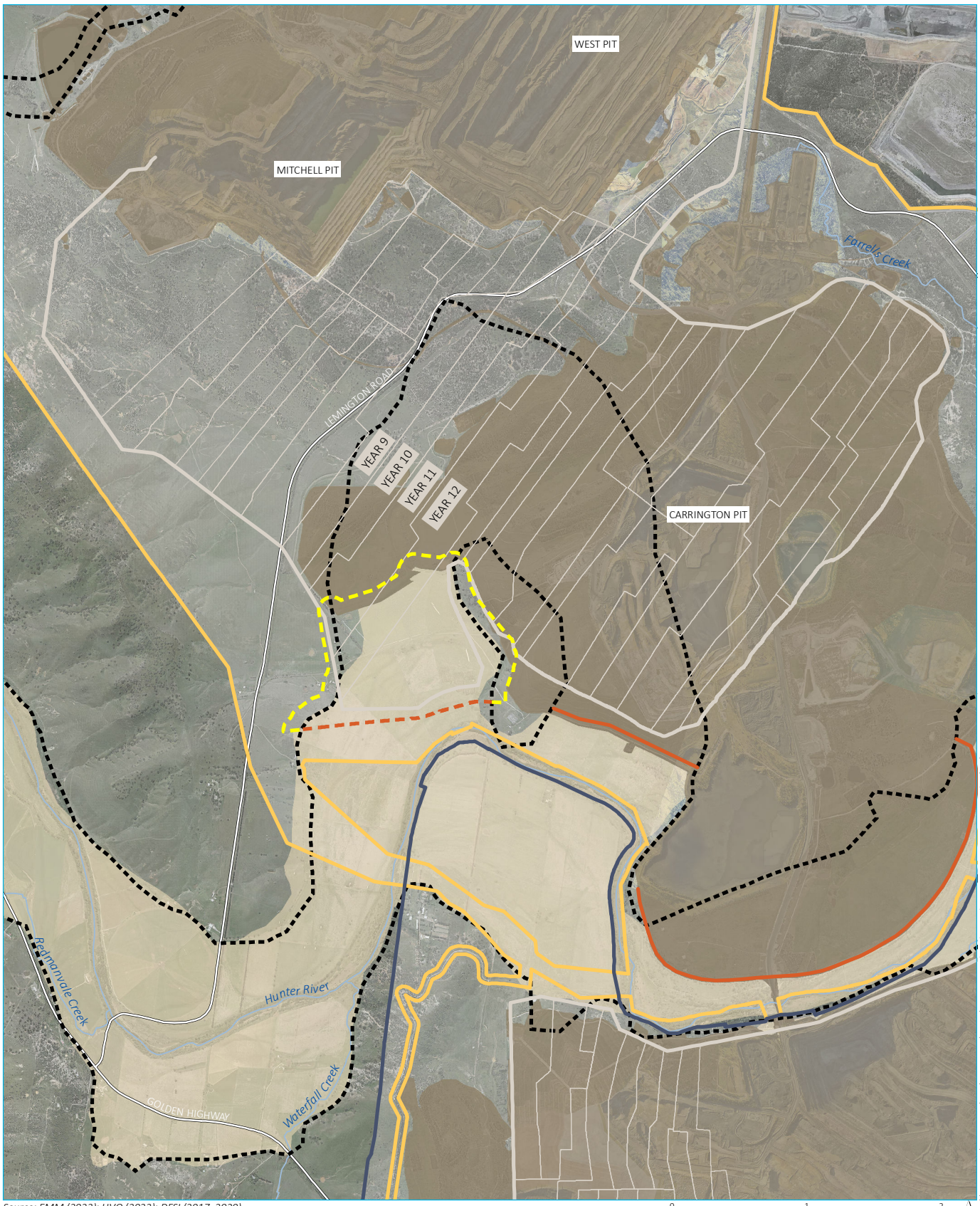
Existing environment

- Minor road
- Vehicular track
- Watercourse/drainage line

Amended HVO development consent boundary

HVO Continuation Project
Submissions Report
Figure 3.2

EMM
creating opportunities



Source: EMM (2023); HVO (2023); DFSI (2017, 2020)

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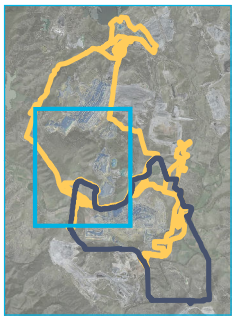


KEY

- HVO North proposed development consent boundary
- HVO South proposed development consent boundary
- Existing barrier wall
- Approved barrier wall (not yet constructed)
- Proposed pit shell crest
- Proposed pit progression
- Prior mining
- Paleochannel 100 m buffer
- Pre-mining extent of unconsolidated sediments (including paleochannel)
- Alluvial/unconsolidated sediments

Existing environment

- Major road
- Named watercourse

Paleochannel and low permeability barrier wall

HVO Continuation Project
Submissions Report
Figure 3.3

EMM
creating opportunities

3.2 Further technical assessments and investigations

To respond to issues raised in submissions, and assess the proposed Project amendments, a number of additional technical investigations and assessments have been completed by HVO following the exhibition of the EIS. These additional assessments are detailed in the following sub-sections.

3.2.1 GHG emission review

In response to matters raised in the submission from CAS, HVO completed a review of the predicted greenhouse gas (GHG) emissions from the Project and the proposed approach to emissions reductions. This included an assessment of the impact of the federal Safeguard Mechanism reforms that commenced on 1 July 2023. An input to the review of Project emissions was the results of the additional gas drilling and analysis undertaken in both HVO North and HVO South for the purposes of the *National Greenhouse and Energy Reporting Act 2007 (Cth)* (NGER Act). The additional gas content and composition information that was obtained from this drilling has further informed the gas assignment model for the Project and greenhouse gas emissions predictions for the Project.

The outcomes of this review are detailed in Section 4.2.

3.2.2 Biodiversity

Following the exhibition of the EIS and further engagement with BCD, additional investigations were undertaken within the section of the proposed Lemington Road realignment that intersects areas of Warkworth Sands Woodland EEC and surrounds, to inform the consideration of alternative routes aimed at further avoiding areas containing this EEC. The investigations included further survey of the vegetation present by Umwelt Environmental and Social Consultants (Umwelt) and soil types by Minesoils, to further identify the presence of Warkworth Sands Woodland. The indicative area of investigation was along the proposed new alignment, as shown in Figure 3.4.

These investigations identified that the vegetation community in this area of investigation is ecotonal; generally transitioning from Warkworth Sands Woodland in the east in proximity to the proposed EIS alignment to a vegetation community with floristic characteristics favouring box-ironbark woodland associations in the west. Based on this information, HVO redesigned this section of the realignment with the aim of moving the road away from the Warkworth Sands Woodland, while maintaining the previously proposed 100 km/hr speed limit design criteria.

An updated Biodiversity Development Assessment Report (BDAR) has been prepared by Umwelt to include an assessment of the amended Lemington Road alignment. It also addresses matters raised by BCD in their submission on the Project and incorporates the results of additional surveys conducted over the Project disturbance areas in response to this feedback.

The updated BDAR (Umwelt 2023) is provided as Appendix E to the Amendment Report. A summary of responses to the specific matters raised in the submission by BCD is provided in Section 4.4.

3.2.3 Licensing strategy

In response to matters raised in the submission by DPE Water, a review of the Project's water licence requirements and strategy to secure the required water licence entitlements has been prepared by EMM. The revised Water Licensing Strategy is provided as Appendix D, with a summary of responses to specific matters raised by DPE Water in relation to water licensing presented in Section 4.6.

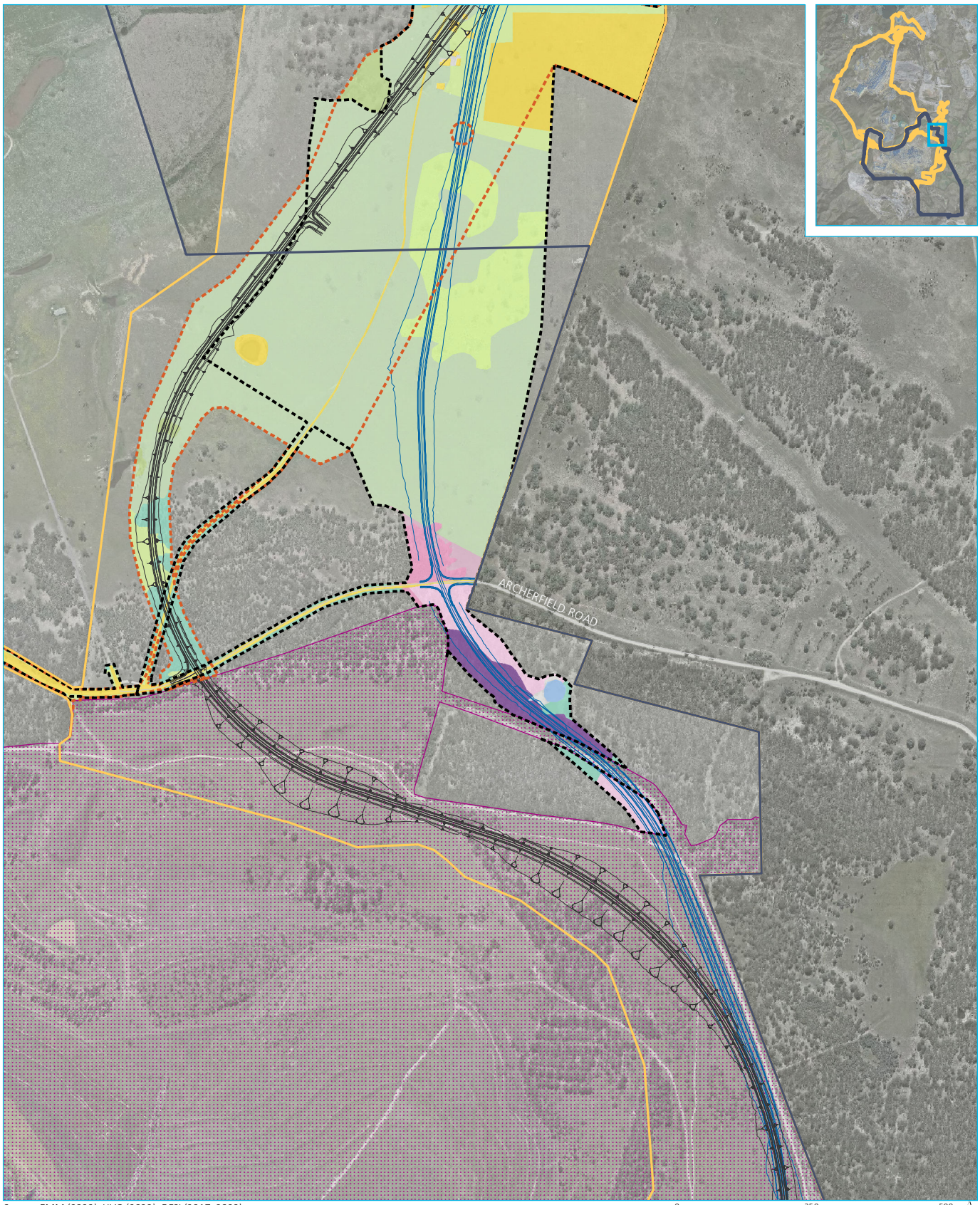
3.2.4 Aboriginal Cultural Heritage Assessment

To address feedback received from Heritage NSW and consider changes to the Lemington Road alignment made since the public exhibition of the EIS, an Aboriginal Cultural Heritage Assessment (ACHA) addendum has been prepared and is provided as Appendix C. A summary response to the specific matters raised in the submission by Heritage NSW is provided in Section 4.12.

3.2.5 Traffic assessment

A technical memorandum has been prepared by WSP in response to submissions received from TfNSW and Muswellbrook Shire Council relating to the Traffic and Transport Impact Assessment (TTIA) prepared for Project and provided as Appendix T to the EIS, and to address concerns raised by the Hunter Valley Glider Club (HVGC) in relation to site access to the HVGC. The technical memorandum includes additional analysis of updated traffic data and considerations to improve access and visibility of the HVGC access driveway. The technical memorandum also considers potential traffic and transport impacts of the amended section of the Lemington Road realignment corridor to avoid mapped Warkworth Sands Woodland.

The technical memorandum prepared by WSP is provided as Appendix H with responses to issues raised in submissions summarised in this Submissions Report in section 4.13 (TfNSW) Section 5.1 (Muswellbrook Shire Council) and Section 6.4 (HVGC).



Source: EMM (2023); HVO (2023); DFSI (2017, 2020)

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KEY

- HVO North proposed development consent boundary
- HVO South proposed development consent boundary
- Existing and approved disturbance
- Additional disturbance area (EIS)
- Amended additional disturbance area
- Lemington Road realignment (EIS)
- Revised Lemington Road realignment

Existing environment

- Minor road
- Category 1 - Exempt Land
- Dam
- Cleared

Plant Community Type (PCT)

PCT 1658 | Rough-barked Apple - Narrow-leaved Ironbark - Blakely's Red Gum - Bull Oak - Coast Banksia woodland on sands of the Warkworth area

- Exotic grassland
- Low to moderate
- Moderate

PCT 1691 | Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter

- Exotic grassland
- Moderate
- Poor condition Derived Native Grassland
- Thinned woodland
- Woodland with exotic understorey

PCT 1692 | Bull Oak grassy woodland of the central Hunter Valley

- Moderate

Warkworth Sands Woodland additional investigation area

HVO Continuation Project
Submissions Report
Figure 3.4

EMM
creating opportunities

3.3 Consultation

3.3.1 Introduction

Comprehensive stakeholder engagement for the Project was undertaken throughout Project scoping and preparation of the EIS, as detailed in Chapter 6 of the EIS (EMM 2022). Since the submission of the EIS, HVO has continued to engage with stakeholders including council, government agencies, Registered Aboriginal Parties (RAPs), the local community, and neighbouring landholders. An overview of the engagement activities carried out following the public exhibition of the EIS is provided in the sections below.

3.3.2 Community

HVO regularly distributes newsletters via letter box drop to the local community. These newsletters are also published on the HVO website. Since the public exhibition of the EIS, HVO has provided regular updates on the Project to the community through these newsletters. Newsletters since the public exhibition of the EIS were distributed to the local community in Jerrys Plains, Maison Dieu, Long Point, Camberwell and Gouldsville in:

- February 2023
- April 2023
- September 2023

Regular updates on the Project were also presented at the HVO Community Consultative Committee (CCC) meetings held in:

- February 2023
- May 2023
- August 2023

Material provided to the CCC is also made publicly available on the HVO website.

3.3.3 Government agencies

Key engagement with regulatory stakeholders continued post exhibition of the EIS and is summarised in Table 3.1.

Table 3.1 Summary of government agency engagement

Agency	Date	Summary of engagement
DPE – Energy, Resources & Industry | Planning and Assessments	18 April 2023	Request for additional information in relation to noise received including: • identification of the source of the noise which results in the marginal impacts; and • an assessment of whether there are any refinements that can be made to the Project to avoid these impacts.
	25 May 2023	Meeting to discuss DPE submission and assessment of noise presented in the EIS.
	8 May 2023	• DPE site visit to the HVO Project area.

Table 3.1 Summary of government agency engagement

Agency	Date	Summary of engagement
	2 August 2023	Meeting to discuss the greenhouse gas emissions predicted for the Project and works completed following EIS public exhibition in relation to refining Project's emissions profile and greenhouse gas reduction opportunities.
	10 August 2023	Meeting to raise the proposed amendment to the Lemington Road re-alignment to further avoid Warkworth Sands Woodland, and an update on other matters including greenhouse gas emissions.
	17 August 2023	Meeting to further discuss the proposed amendment to the Lemington Road re-alignment and the implications for biodiversity impacts, and an update on the referral of the Project under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
	30 October 2023	Pre lodgement meeting with DPE to discuss this Submissions Report and Amendment Report approach and outcomes.
EPA	23 August 2023	Meeting to discuss matters raised in CAS's submission and works completed following EIS public exhibition in relation to refining Project's emissions profile and greenhouse gas reduction opportunities. This meeting was also attended by DPE – Planning and Assessments.
Heritage NSW	2 May 2023	Meeting to discuss the matters raised by Heritage NSW in their submission and agree on the approach to respond to the matters in the submissions report.
TfNSW	8 June 2023	Meeting to discuss the matters raised by TfNSW in their submission and agree on the approach to respond to the matters in the submissions report.
DPE Water	25 July 2023	Meeting to discuss the matters raised by DPE Water in their submission and agree on the approach to respond to the matters in the submissions report.
	10 August 2023	Following the meeting on 25 July, DPE Water provided a supplementary submission providing further clarification on the defined extent of the Hunter Regulated River Alluvial Water Source and the interpretation of this, as well as DPE Water's recommendation regarding proposed mitigation and avoidance measures for impacts on this water source.
	28 September 2023	Follow up meeting with DPE Water in response to their supplementary submission on 10 August, to present HVO's understanding of the extent of the paleochannel deposits and the location in the mine schedule at which the installation of the barrier wall would be triggered. This meeting was also attended by DPE – Planning and Assessments.
Climate and Atmospheric Science	23 August 2023	Meeting to discuss matters raised in CAS's submission and works completed following EIS public exhibition in relation to refining Project's emissions profile and greenhouse gas reduction opportunities. This meeting was also attended by DPE – Planning and Assessments.

Table 3.1 Summary of government agency engagement

Agency	Date	Summary of engagement
BCD	19 October 2023	Meeting to discuss matters raised in the BCD submission regarding the biodiversity assessment, outline proposed amendments to the Lemington Road realignment to avoid all direct impacts to Warkworth Sands Woodland, and present outcomes of additional biodiversity assessment works completed following the submission of the EIS.
Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW)	23 March 2023	Meeting with DCCEEW to discuss the proposed EPBC Act referral strategy.
	27 April 2023	Meeting with DCCEEW to describe the updated EPBC Act referral strategy and outline further works to be completed to inform the revised referrals.
	11 September 2023	Pre referral lodgement meeting providing an overview of the outcomes of further work undertaken (including biodiversity studies), and an overview of the referrals prior to lodgement.
Singleton Council	26 September 2023	Meeting with Singleton Council to present the proposed amendments to the Lemington Road alignment, discuss the approach adopted for the flood modelling and discuss the matters raised in the submission from Council on the Project.
	1 November 2023	Meeting with Singleton Council technical staff to present the technical engineering aspects of the proposed amendments to the Lemington Road alignment.
	Various	Ongoing discussions with Singleton Council regarding the development of a Voluntary Planning Agreement (VPA) and closure of council road aspects.
Muswellbrook Shire Council	27 October 2023	Meeting with Muswellbrook Shire Council to discuss matters raised in the submission from Council on the Project and regarding the development of a VPA.

3.3.4 Registered Aboriginal Parties

On 16 February 2023, an email was sent to all RAPs advising them that the EIS was on public exhibition and providing them with a link to the HVO North and HVO South EIS available on DPE's major projects website.

A Project update letter was subsequently distributed to all RAPs on 26 July 2023. The correspondence provided a summary of the outcomes of the public exhibition of the EIS and an update on the status of responding to submissions. The correspondence outlines an amendment to the proposed alignment of Lemington Road that had been made to avoid the two scarred trees of Aboriginal cultural heritage origin (AHIMS #37-3-1635 and AHIMS #37-3-1629).

Specific additional engagement with Wattaka Wonnarua Cultural Consultants Services, Widescope Indigenous Group Pty Ltd and Hunter Valley Cultural Services was carried out between 18 September – 12 October 2023 to discuss the project and broader cultural values of the Project area. Further information on this engagement is presented in Section 4.12.2.

In addition to the Project specific engagement with the RAPs, copies of the HVO newsletters issued in February 2023, April 2023 and September 2023 were also provided to the RAPs via email.

Further details on the ongoing engagement with the RAPs is presented in the ACHA addendum provided as Appendix C.

3.3.5 Organisations

i Coolmore Australia Pty Ltd

In response to concerns raised in the submission by Coolmore Australia Pty Ltd (Coolmore) regarding visual impacts from the Project, representatives from HVO and EMM conducted a site visit to the Coolmore property on 13 June 2023. This site visit was designed to identify and agree on locations within the property for additional visual impact analysis to be undertaken.

Subsequent correspondence received from Coolmore (dated 26 June 2023) sought further clarification on the approach that would be taken by the additional visual assessment. A written response dated 26 July 2023 was provided by HVO to Coolmore advising of the viewshed analysis and photomontage locations that would be further assessed as part of the response to submissions and the staging over the life of the Project that would be considered. The results of the additional visual analysis were presented to Colmore in person on 19 September 2023 with copies of the analysis provided in writing on 26 September 2023.

A detailed response to the matters raised in the Coolmore submission is provided in Chapter 6 with the additional viewshed and photomontage analysis provided in Appendix J.

ii Hunter Valley Glider Club

In response to concerns relating to site access and road safety by the HVGC in their submission, HVO investigated additional access improvements to the club that could be implemented. Representatives from HVO met with the HVGC on 18 September 2023 to discuss the access improvements proposed to the HVCG intersection with Comleroi Road.

A detailed response to the matters raised in the HVGC submission is presented in Section 6.3 of this report and in Appendix H.

4 Response to agency submissions

4.1 Introduction

The below sections provide a response to each of the 11 agency submissions received on the Project during the public exhibition period. In addition, responses to information requested by DPE – Energy & Resource Assessments following the public exhibition period have also been provided in Section 4.3.

In each section, issues raised by each government agency is re-produced in the grey box, with the response provided directly below.

4.2 Climate and Atmospheric Science

4.2.1 Introduction

The DPE Science, Economics and Insights Net Zero Emissions Modelling (NZEM) team provided advice and recommendations on the GHG assessment for the Project. Their review of the GHG assessment (Jacobs 2022) contained in Appendix H of the EIS found that emissions estimates were consistent with contemporary practice and the emission factors in general appear to be adequate for the calculations, while also providing some recommendations. Responses to the recommendations of the NZEM team are provided in Sections 4.2.3 to 4.2.8.

Before responding to the recommendations from the NZEM team, some further information is presented on the revised predicted GHG emissions for the Project. Work has been ongoing on the fugitive emissions modelling since submission of the EIS to meet National Greenhouse Gas Reporting Scheme (NGERS) reporting requirements for future mining in the mining areas that are the subject of the Project's development applications. This has included additional drilling to further inform the gas assignment model for HVO, which has enabled the greenhouse gas assessment for the Project to be updated. The revised predicted GHG emissions for the Project are presented in Section 4.2.2.

4.2.2 Revised GHG emissions

The revised predicted GHG emissions from the Project for the HVO Complex are summarised in Table 4.1. The GHG emissions have been updated since submission of the EIS based on:

1. Updated electricity usage (Scope 2 emissions), which has been adjusted to reflect the Australian Government's grid decarbonisation forecast (DCCEEW December 2022), as requested by the NZEM team. This has resulted in a reduction in GHG emissions by the Project from 1.88 Mt CO_2-e to 0.34 Mt CO_2-e. Further, adopting 2024 as Year 1 of the Project (rather than 2023, refer to point 3 below) results in a further reduction in Scope 2 emissions. The resulting net reduction in GHG emissions is approximately 1.6 Mt CO_2-e (i.e., from 1.88 Mt CO_2-e predicted in the EIS to 0.28 Mt CO_2-e now predicted over the life of the Project).

2. Revised fugitive emissions forecast, based on updated gas content and composition information obtained from additional drilling in both HVO North and HVO South. This has reduced the predicted total Scope 1 emissions over the life of the Project by approximately 3.3 Mt CO_2-e.

3. An assumption that 2024 will be Year 1 of the Project, rather than 2023, as was presented in the EIS. This has reduced the predicted GHG emissions over the life of the Project by 0.66 Mt CO_2-e (Scope 1) (in addition to the 3.3Mt CO_2-e reduction from the updated gas model), 0.06 Mt CO_2-e (Scope 2) and 31.28 Mt CO_2-e (Scope 3).

As shown in Table 4.1, Scope 1 and 2 emissions are estimated to average 1.10 Mt CO_2-e per year over the life of the Project, from approximately 2024 to 2050. The Scope 1 and 2 emissions presented in the EIS were approximately 1.26 Mt CO_2-e per year, and therefore the revisions to the GHG estimates listed above have resulted in a reduction in the predicted Scope 1 and 2 emissions by approximately 0.16 Mt CO_2-e per year and 5.6 Mt CO_2-e over the life of the Project. The predicted total Scope 3 emissions have also reduced over the life of the Project by 31.43 Mt CO_2-e on the basis that Year 1 of the Project is now assumed to be 2024, and therefore predicted emissions from operations in 2023 have been removed (notwithstanding, it is noted that 2050 remains the end date of the Project). Revised GHG emissions by activity of the amended Project are reported in Appendix F of the Amendment Report (EMM 2023a).

Table 4.1 Revised summary of estimated GHG emissions for the Project (HVO Complex)

Period	Estimated GHG emissions (Mt CO_2-e)					
	Scope 1		Scope 2		Scope 3	
	EIS	**Revised**	EIS	**Revised**	EIS	**Revised**
Annual average	1.19	**1.09**	0.07	**0.01**	41.67	**42.05***
Total over life of the Project	33.28 (2023-2050)	**29.31** (2024-2050)	1.88 (2023-2050)	**0.28** (2024-2050)	1,166.86 (2023-2050)	**1,135.43** (2024-2050)

*Note: while the total predicted Scope 3 emissions have reduced over the life of the Project, the annual average has increased slightly due to the average production profile between 2024-2050.

The revised Scope 1 and 2 emissions for the HVO Complex are illustrated in Figure 4.1, which presents the revised composition of the total GHG emissions over the life of the Project, and also compares the revised total to the GHG emissions presented in the EIS.

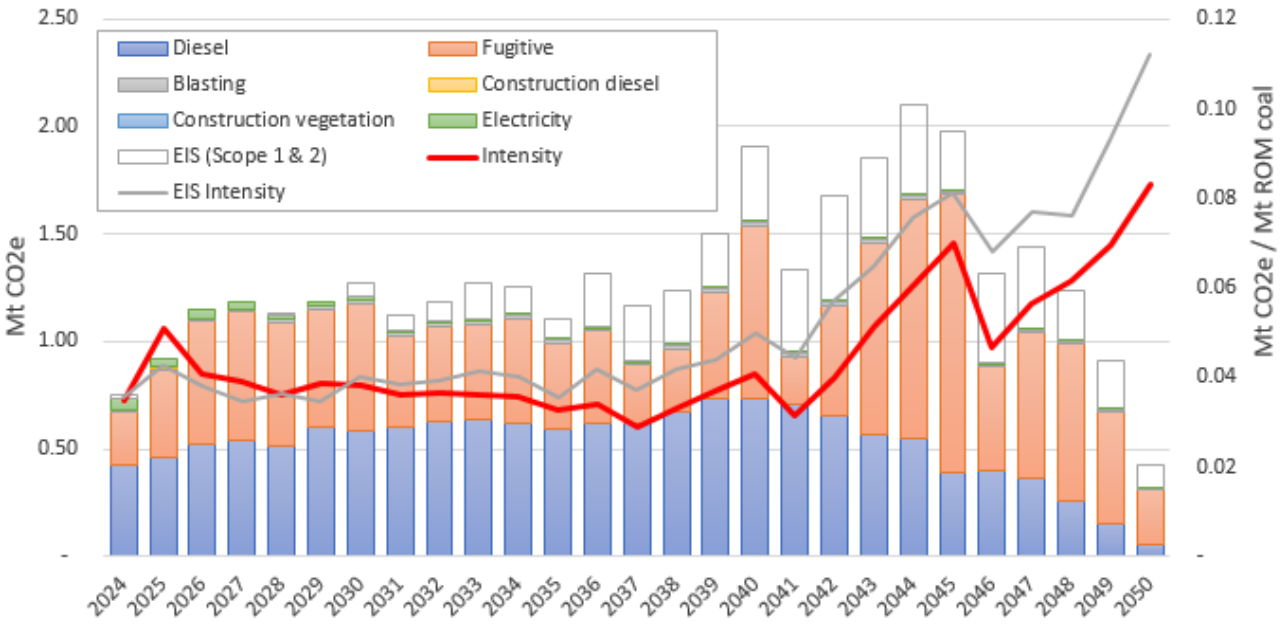


Figure 4.1 Revised Scope 1 and 2 GHG emissions for the HVO Complex

The predicted Scope 1 GHG emissions for the Project across the HVO Complex is provided is Table 4.2. The data shows that the direct (Scope 1) emissions intensity of the Project would be, on average, 0.04 t CO_2-e/t ROM coal over the life of the mine, which is reduced compared to the intensity reported in the EIS (0.05 t CO_2-e/t ROM coal).

The Scope 1 emissions intensity for HVO, both as a Project average and as a peak, are low relative to other Australian coal operations. This is demonstrated in Figure 4.2. The graph includes the emissions reported under the NGERS, including the reported emissions from HVO, for 2020/2021. It also shows the predicted Project average intensity for HVO.

Table 4.2 Revised Scope 1 GHG emissions and intensity – HVO Complex

Operation	ROM coal (Mt/yr)*		Scope 1 (Mt CO_2-e/yr)		Intensity (t CO_2-e/t ROM)	
	EIS (2023-2050)	**Revised (2024-2050)**	EIS (2023-2050)	**Revised (2024-2050)**	EIS (2023-2050)	**Revised (2024-2050)**
HVO Complex	26.31	**26.54**	1.19	**1.09**	0.05	**0.04**

Note * Based on the average ROM coal production over the life of the Project.

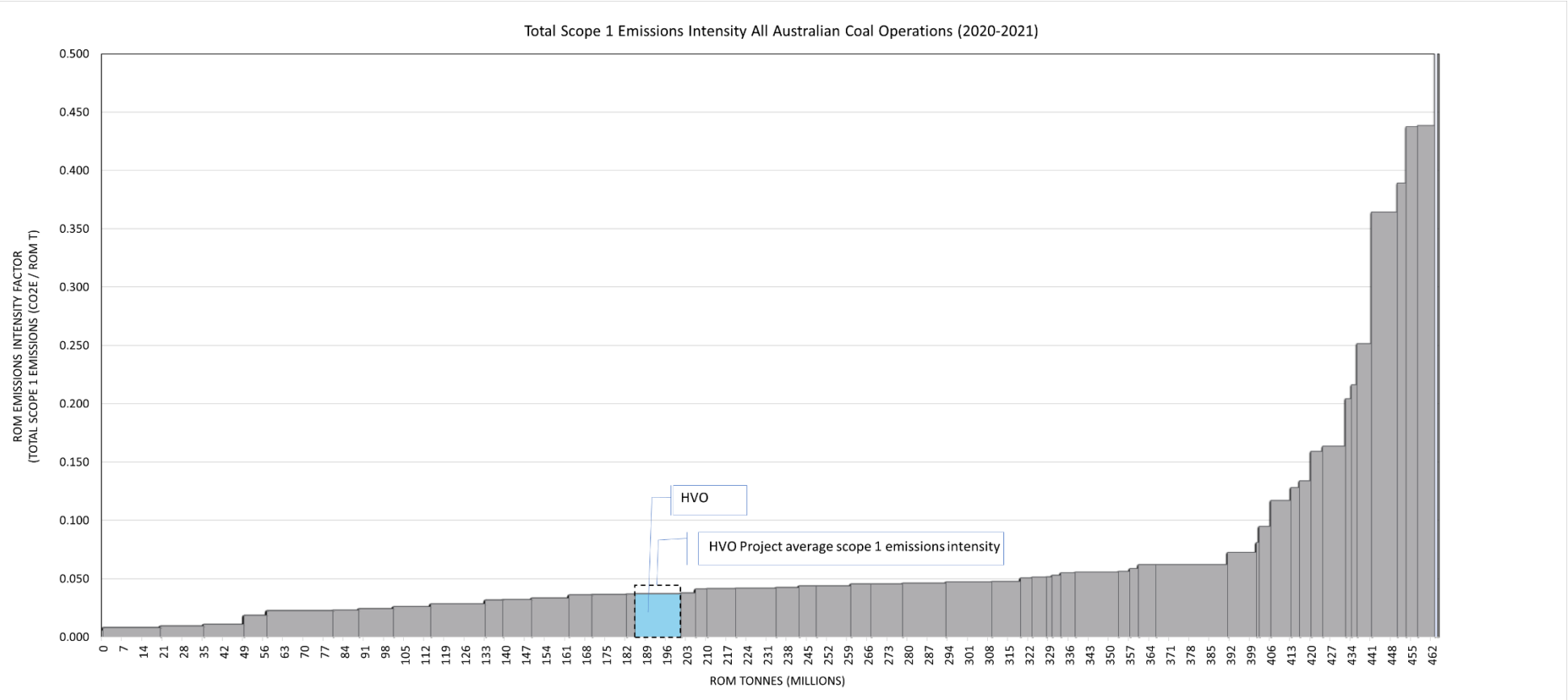


Figure 4.2 Scope 1 emissions intensity – all Australian Coal Operations (2020-2021)[1]

[1] Source:

Total Scope 1 emissions sourced from the Commonwealth Clean Energy Regulator's (CER) Safeguard Mechanism data set - *Safeguard data (cleanenergyregulator.gov.au)*.

GCAA ROM tonnes sourced from internal records.

Queensland ROM tonnes sourced from the Queensland Government's Open Data Portal – Production by individual mines - *Production by individual mines - Coal industry review statistical tables - Open Data Portal | Queensland Government*.

NSW ROM tonnes sourced from NSW Coal Services' statistics report - *NSW coal industry statistics - Coal Services*.

To put the projected GHG emissions from the Project in context, they have been compared with the latest emissions officially recorded on the National Greenhouse Gas Inventory. The latest available data through the inventory is from 2022. The national figures in context with the revised projected emissions from the Project are presented below in Table 4.3. The original predictions presented in the EIS are also shown for comparison (with reference to the latest 2022 inventory data).

Table 4.3 HVO GHG emissions in the National context

Parameter	Value	
National statistics		
2022 Total Australia GHG emissions (Mt CO_2-e)	463.9	
Project statistics	**Value (EIS)**	**Value (revised emissions)**
Average projected Scope 1 and 2 GHG emissions per year (Mt CO_2-e)*	1.26	1.10
Proportion of 2022 total Australia emissions	0.27%	0.24%

Note *Scope 2 emissions for the Project have been included in the Project statistics above, despite Scope 2 not being included in the National statistics (since the Scope 2 emissions of all facilities within Australia are accounted for as the Scope 1 emissions of other facilities). The proportions stated in the above table are therefore conservative.

The estimated annual average Scope 1 and 2 emissions from the Project (1.10 Mt CO_2-e) represent approximately 0.24% of Australia's 2022 emissions.

4.2.3 Fugitive emissions

I.	More detail is required on the calculation of fugitive emissions for the Project in light of large forecast increases in these emissions after 2030. The annual fugitive emissions from HVO North and South should be reported separately along with the relevant emission factors for each mine.

The annual Scope 1 fugitive emissions estimates for HVO North and HVO South are summarised in Table 4.4. The table also presents the fugitive emissions factors for the Project over the life of the Project.

Table 4.4 Revised fugitive emissions over the life of the Project from HVO North, HVO South, and the HVO Complex

Year	HVO North			HVO South			HVO Complex		
	ROM Coal (t)	Fugitive scope 1 (t CO_2-e/yr)	Emission factor	ROM Coal (t)	Fugitive scope 1 (t CO_2-e/yr)	Emission factor	ROM Coal (t)	Fugitive scope 1 (t CO_2-e/yr)	Emission factor
1 (2024)	10,093,579	16,257	0.002	10,883,310	233,561	0.021	20,976,889	249,818	0.012
2 (2025)	9,075,360	18,145	0.002	9,102,541	386,357	0.042	18,177,901	404,503	0.022
3 (2026)	18,078,636	36,246	0.002	10,094,594	534,080	0.053	28,173,230	570,325	0.020
4 (2027)	21,000,000	55,867	0.003	9,409,148	543,247	0.058	30,409,148	599,113	0.020
5 (2028)	22,000,000	134,912	0.006	9,213,520	438,117	0.048	31,213,520	573,029	0.018
6 (2029)	22,000,000	143,963	0.007	8,710,095	407,818	0.047	30,710,095	551,780	0.018
7 (2030)	22,000,000	148,054	0.007	9,500,000	446,211	0.047	31,500,000	594,265	0.019
8 (2031)	22,000,000	139,876	0.006	7,370,406	279,661	0.038	29,370,406	419,538	0.014
9 (2032)	22,000,000	103,418	0.005	8,057,815	332,826	0.041	30,057,815	436,245	0.015
10 (2033)	22,000,000	63,805	0.003	8,797,847	375,064	0.043	30,797,847	438,870	0.014
11 (2034)	22,000,000	42,720	0.002	9,500,000	442,199	0.047	31,500,000	484,919	0.015
12 (2035)	22,000,000	12,483	0.001	9,012,508	383,645	0.043	31,012,508	396,127	0.013
13 (2036)	22,000,000	7,111	0.000	9,500,000	422,225	0.044	31,500,000	429,336	0.014
14 (2037)	22,000,000	4,856	0.000	9,433,780	265,471	0.028	31,433,780	270,327	0.009
15 (2038)	20,344,138	4,596	0.000	9,108,132	287,425	0.032	29,452,270	292,021	0.010
16 (2039)	20,380,477	4,535	0.000	13,620,418	489,955	0.036	34,000,894	494,490	0.015
17 (2040)	20,299,363	5,526	0.000	17,963,739	790,470	0.044	38,263,102	795,996	0.021
18 (2041)	21,528,117	15,252	0.001	8,468,126	207,013	0.024	29,996,243	222,265	0.007
19 (2042)	22,000,000	102,459	0.005	7,500,000	406,751	0.054	29,500,000	509,210	0.017
20 (2043)	22,000,000	488,339	0.022	6,830,479	401,683	0.059	28,830,479	890,022	0.031

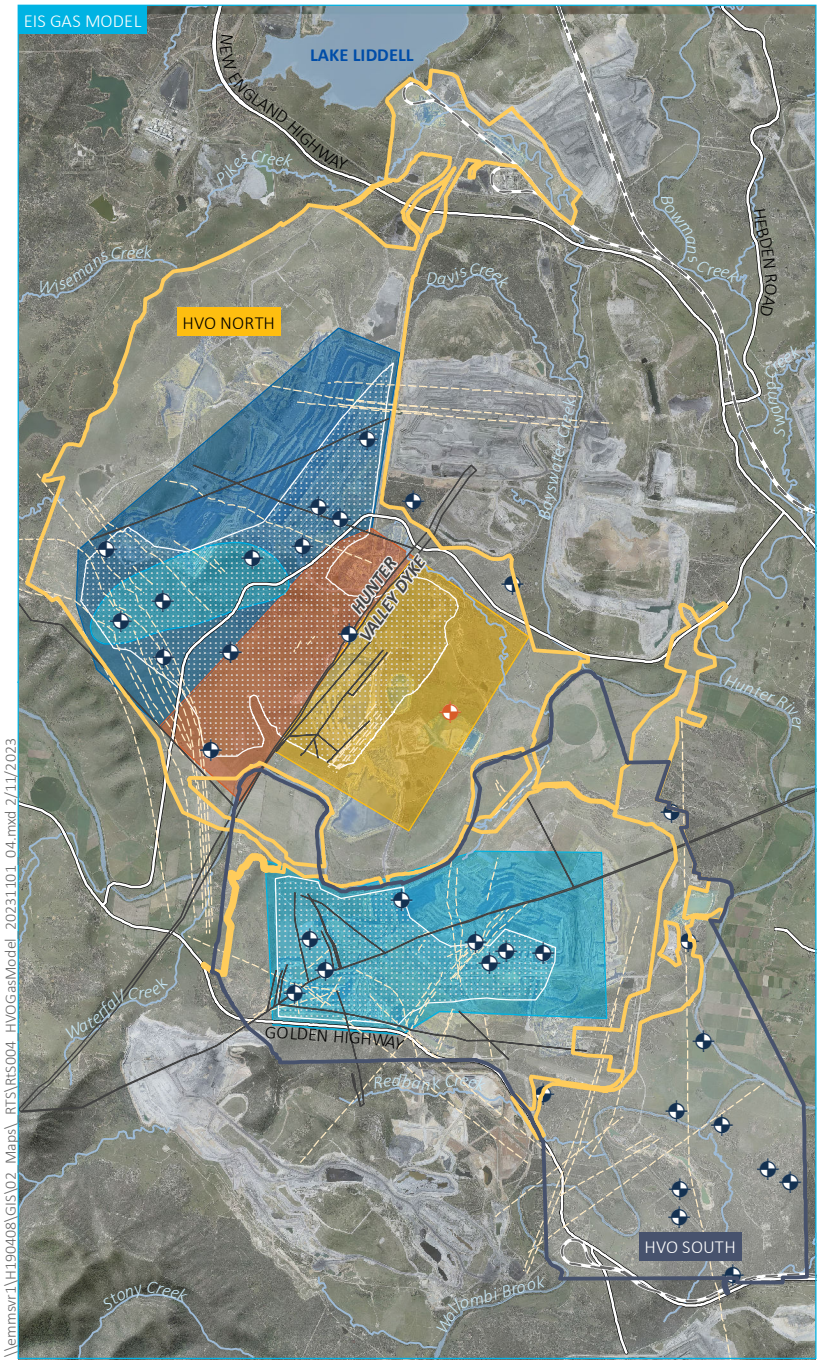
Year	HVO North			HVO South			HVO Complex		
	ROM Coal (t)	Fugitive scope 1 (t CO_2-e/yr)	Emission factor	ROM Coal (t)	Fugitive scope 1 (t CO_2-e/yr)	Emission factor	ROM Coal (t)	Fugitive scope 1 (t CO_2-e/yr)	Emission factor
21 (2044)	22,000,000	798,076	0.036	5,723,390	311,776	0.054	27,723,390	1,109,851	0.040
22 (2045)	21,359,094	1,143,304	0.054	2,959,507	149,352	0.050	24,318,601	1,292,656	0.053
23 (2046)	19,310,031	487,005	0.025	-	-	-	19,310,031	487,005	0.025
24 (2047)	18,626,435	674,569	0.036	-	-	-	18,626,435	674,569	0.036
25 (2048)	16,291,191	730,639	0.045	-	-	-	16,291,191	730,639	0.045
26 (2049)	9,742,001	520,112	0.053	-	-	-	9,742,001	520,112	0.053
27 (2050)	3,789,709	252,716	0.067	-	-	-	3,789,709	252,716	0.067
Total	**515,918,131**	**6,154,841**	**0.014**	**200,759,355**	**8,534,906**	**0.043**	**716,677,486**	**14,689,747**	**0.020**

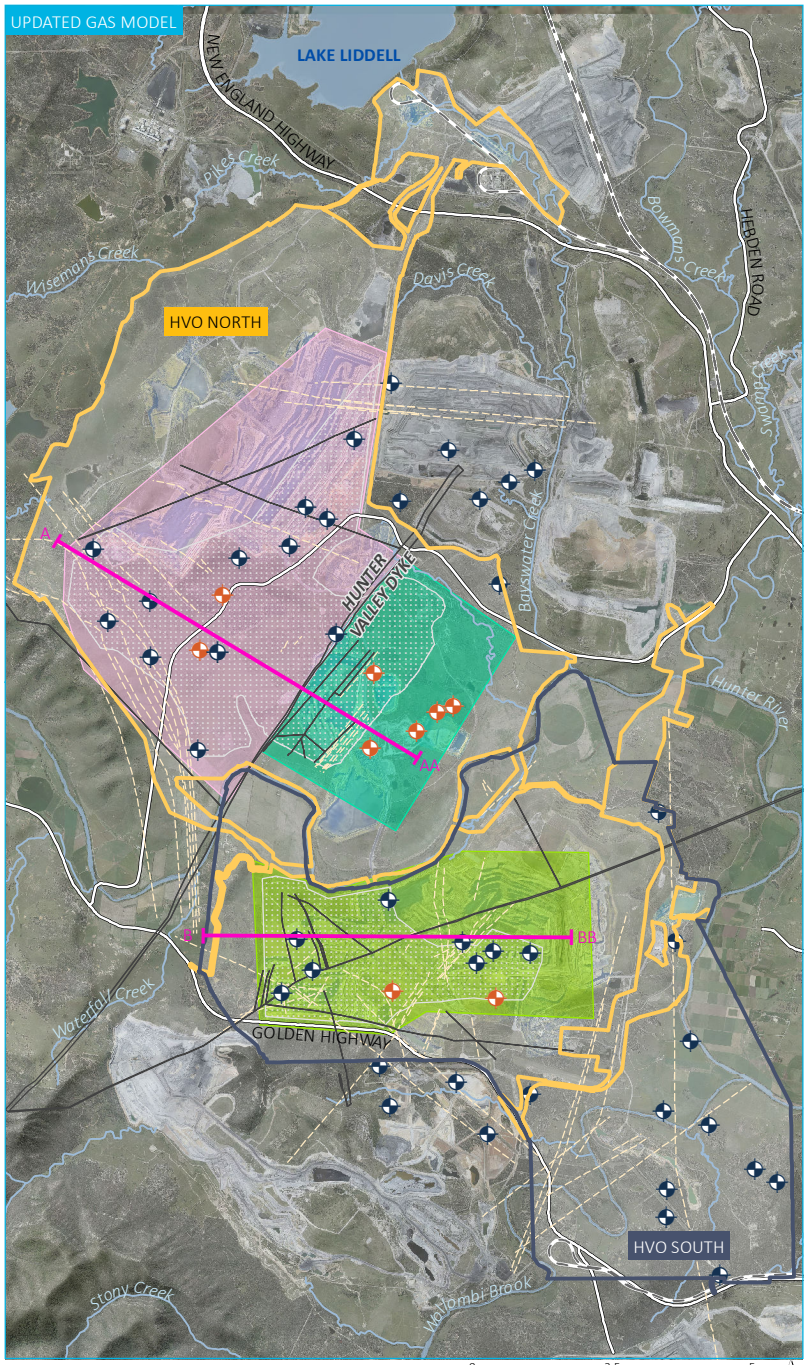
II.	The likely changes in the fugitive emissions factor should be discussed as each pit deepens over time. Will the stated fugitive emissions factor of 0.014 tCO2-e/t ROM from Table 22 of the GHG Assessment remain relevant over the Project lifetime? The Proponent should provide annual fugitive emission factors for each mine over the life of the Project. These factors should be based on core samples, gas composition measurements and any associated gas reservoir modelling.

The predicted annual fugitive emissions from the Project, and the annual fugitive emission factors, are presented above in Table 4.4, which shows that emissions will vary over time as the mine progresses through different parts of the coal resource.

The predicted fugitive emissions from the Project are based on gas assignment modelling which has been informed by the results of extensive gas drilling and sampling in the region, and also considers wider regional gas distribution trends. The HVO gas assignment model has been updated since submission of the EIS, to include the results of further drilling and gas analysis in both HVO North and South. The gas assignment model is based on Method 2 methodology as per the *National Greenhouse and Energy Reporting (Measurement) Determination 2008* and includes data from over 30 gas drill holes – some fully sampled (NGER "type" holes), some partially sampled (additional validation holes). The holes used to inform the gas assignment model are illustrated in Figure 4.3. As shown, six additional holes have been drilled and sampled since submission of the EIS in HVO North, with four in the proposed mining area on the south-eastern side of the Hunter Valley dyke and two north-west of the dyke, and two additional holes in HVO South.

The mining areas across the HVO Complex have been divided into three gas domains in the gas assignment model, which are defined by gas concentration and gas composition. HVO North is within Domain 1 and Domain 2 (bounded at the Hunter Valley dyke), while south of the Hunter River HVO South is entirely within Domain 3. Each domain is then further divided into a vertical sequence of zones which vary in depth, driven by changes in gas content and composition. The near-surface Low Gas Zone (Zone 0 in HVO South) is present across all the domains (although much thicker in Domain 2), as is Zone 1, which has a typically low gas content. Domains 1 and 3 also have Zones 2 to 4 modelled to better represent the variation in the vertical gas distribution, which generally trends an increase in gas content with increased depth. The 20 m sub-floor interval is also modelled for each domain. The zone boundaries have been interpreted using the gas drilling data on a borehole-by-borehole basis, and were initially defined at the type holes within each domain and supported by the validation hole data where available. The mine plan for the Project moves through these different domains, which are illustrated in cross-sections in Figure 4.4. The locations of these two cross sections are shown in Figure 4.3.





KEY

- HVO North proposed development consent boundary
- HVO South proposed development consent boundary
- Gas borehole: 2021 – 2023
- Gas borehole: historic
- Dyke
- Modelled fault
- Cross section
- Proposed pit shell

Domain (EIS gas model)

- Domain 1 (unchanged from pre-2021)
- Domain 2A
- Domain 2B
- Domain 2C

Domain (updated gas model)

- Domain 1
- Domain 2
- Domain 3

Existing environment

- Rail line
- Major road
- Named watercourse
- Named waterbody

0 2.5 5 km

GDA2020 MGA Zone 56

N

\\emmsvr1\H190408\GIS\02 Maps\ RTS\RtS004 HVOGasModel 20231101 04.mxd 2/11/2023

Source: EMM (2023); HVO (2023); DFSI (2017, 2020)

HVO gas assignment model

HVO Continuation Project
Submissions Report
Figure 4.3

EMM
creating opportunities

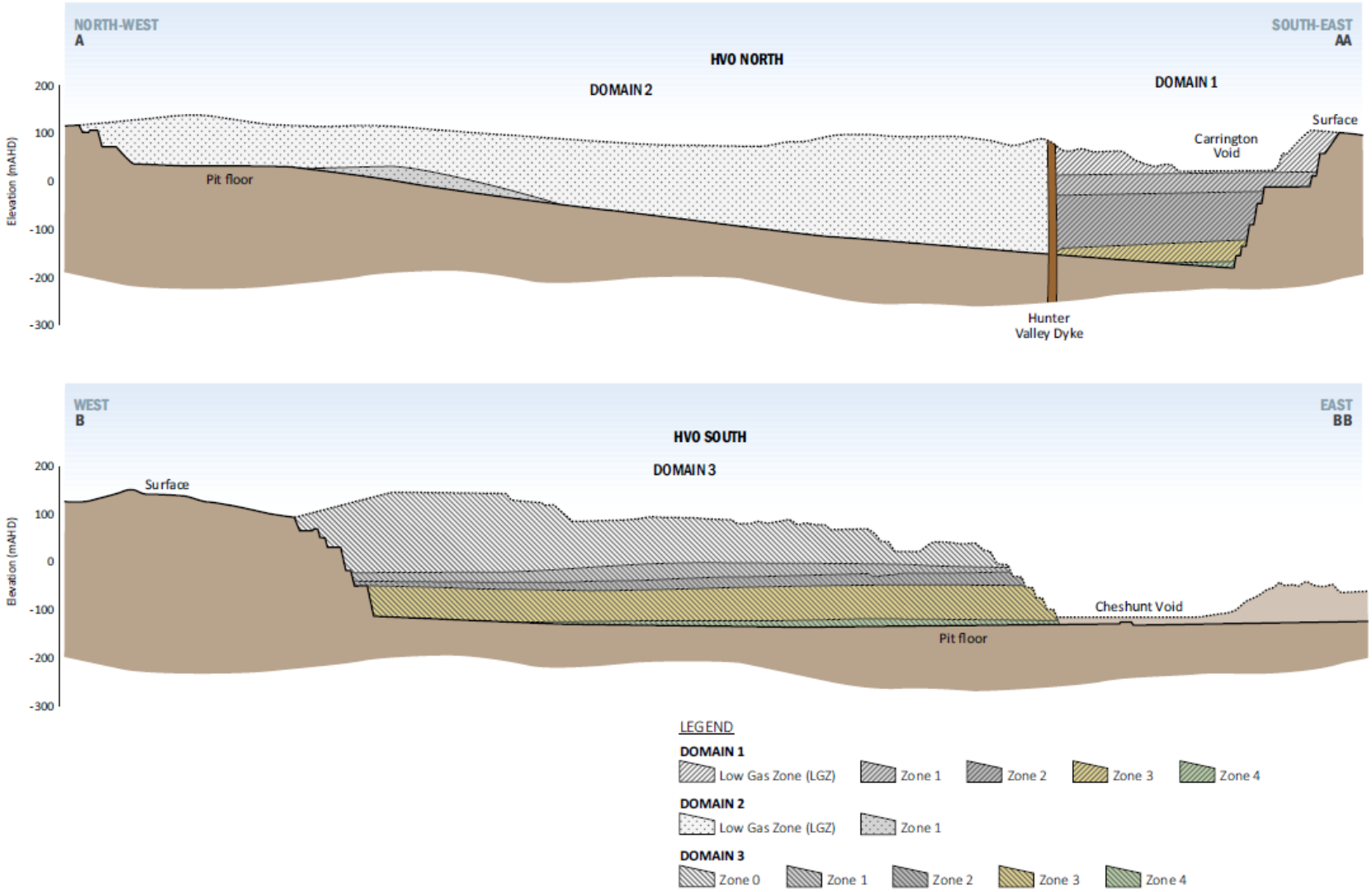


Figure 4.4 **Gas domains and zones across the HVO Complex**

The predicted fugitive emissions profile over the life of the Project, based on the gas assignment modelling, is shown in Figure 4.5 for the HVO Complex, along with ROM coal production. As shown, fugitive emissions will remain below 0.6 $MtCO_2$-e/yr until year 17, or around 2040, of the Project. This is except for years 14 and 15 (around 2037 and 2038), when emissions will drop to less than 0.3 Mt CO_2-e/yr. From year 17 (around 2040), more variability in the fugitive emissions from the complex is predicted. A description of the contributing factors to this variability at key stages (points 1, 2 and 3 on Figure 4.5) is provided in Table 4.5.

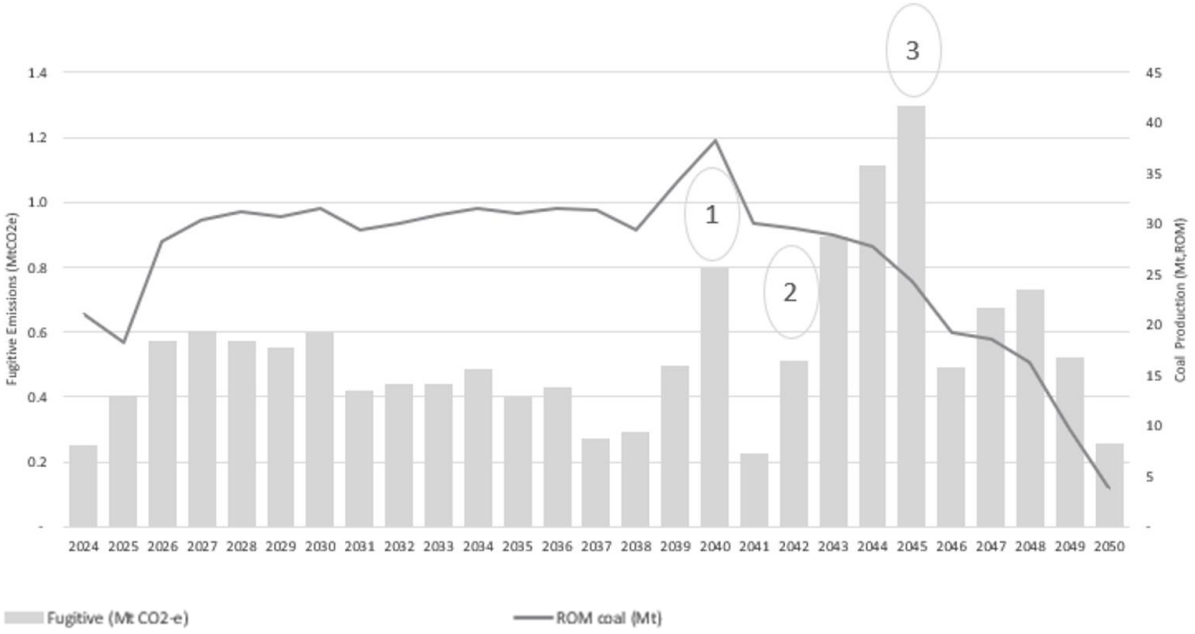
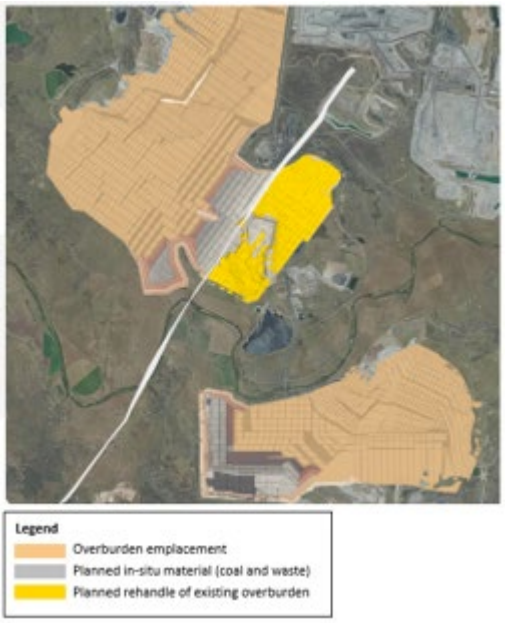


Figure 4.5 Fugitive emissions and ROM coal production over the life of the Project (HVO Complex)

Table 4.5 Fugitive emissions at key stages post year 17 (2040) – HVO Complex

Reference - Figure 1.5	Description	Mine plan snapshot
1 - Year 17 (around 2040)	In year 17, fugitive emissions will increase to around 0.8 Mt CO_2-e/yr. ROM coal extraction remains steady in HVO North and still in the relatively low gas Domain 2 north-west of the dyke. However, the ROM coal production peaks this year in HVO South, and there will be an increased ratio of deeper seams as the west end wall floor at HVO South is released by the end of 2040. That is, much of the mining will be occurring in the deeper coal seams, where the gas content is higher, with reduced extraction of the shallower seams at this stage.	
2 - Year 19 (around 2042)	In around mid-year 19, mining in HVO North will start to progress into the gassier zones in the Domain 1 region, south-east of the dyke. Mining will continue to progress through this region until year 22 (around 2045) – see point 3. At HVO South, mining progresses again into the lower seams against the southern end wall with all the shallower seams having been extracted at this stage.	
– Year 22 (around 2045)	In mid-year 22 (around 2045), all mining in HVO North is occurring within Domain 1, south-east of dyke, with activities focussed on the southern area (final landform driven).	

4.2.4 Diesel consumption

III. More detail is required on the diesel consumption associated with the Project (i.e. for stationary and mobile purposes). Having more detailed information on the sources of diesel consumption will better inform potential abatement measures.

Diesel consumption accounts for approximately 42% of Scope 1 and Scope 2 emissions at HVO, as shown in Figure 4.6, and is the second largest source of Scope 1 emissions, with fugitive emissions being the largest source at approximately 52%.

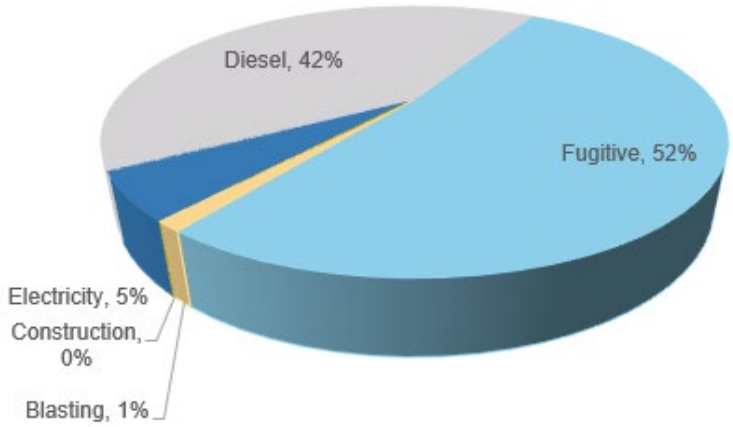


Figure 4.6 Composition of Scope 1 and 2 emissions from the Project

A breakdown of the source of diesel consumption over the life of the Project is provided in Figure 4.7.

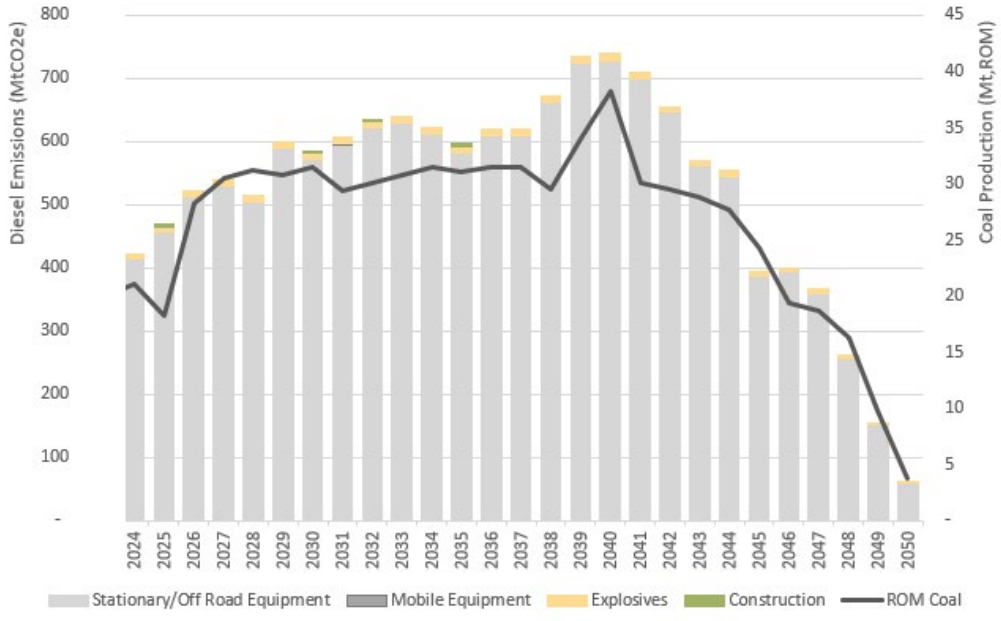


Figure 4.7 Diesel consumption by type of activity/equipment at the HVO Complex

As shown in Table 4.7, 'stationary/off road equipment' accounts for the majority of diesel consumption at HVO, at approximately 98%. Stationary/off road equipment is defined as the non-road registered mining fleet (and includes heavy mobile equipment such as haul trucks and excavators), as per NGERs reporting terminology. 'Mobile equipment', defined as road registered vehicles (i.e. generally light vehicles), accounts for a negligible percentage of usage, at approximately 0.03% of total diesel consumption.

A further breakdown of diesel emissions by equipment fleet is provided in Figure 4.8, which shows that the truck fleet is the largest consumer of diesel at HVO (at approximately 56% of the off road fleet), followed by loading equipment at 19%.

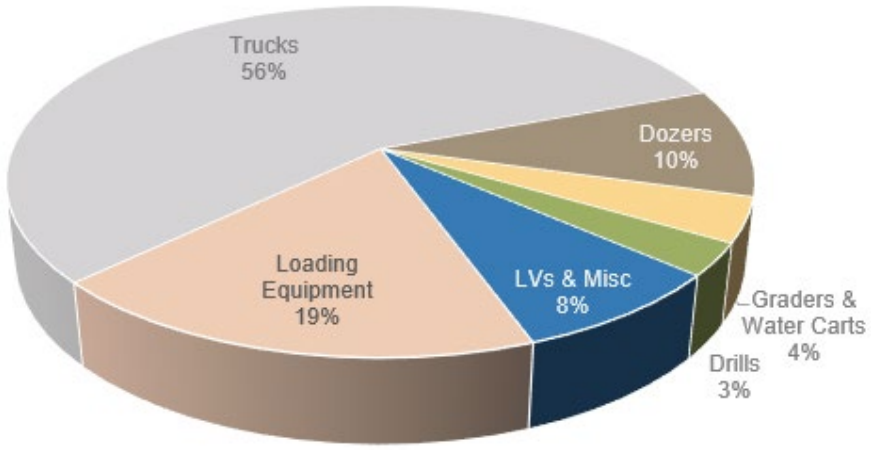


Figure 4.8 Diesel consumption by fleet from the Project

Discussion on available technologies and opportunities at HVO for reducing this diesel usage is provided in the response in Section 4.2.7.

4.2.5 Scope 2 and 3 electricity emissions

IV.	The Proponent should revise forecasted scope 2 and 3 electricity emissions from 2023 to 2035 using DCCEEW's Australia's Emissions Projections 2022 forecasts. These forecasts take account of the expected rapid decarbonisation of the NSW electricity grid.

DCCEEW's grid decarbonisation forecasts (DCCEEW 2022) have been incorporated into the revised GHG emissions for the Project, in particular the Scope 2 and 3 electricity emissions, presented in Section 4.2.2. This revised emission forecast has resulted in a net reduction of approximately 1.6 $MtCO_2$-e in GHG emissions from the Project. However, it is noted that the rate of decarbonisation of the grid is beyond HVO's control, and therefore while the revised Scope 2 estimates presented for the Project are based on the government's current forecasts, HVO cannot be accountable for anticipated Scope 2 emissions reductions that it does not control.

4.2.6 Safeguard mechanism

The Proponent should consider the recently proposed Safeguard Mechanism reforms, in particular the annually declining baselines that will apply to all existing and new safeguard facilities until 2030, with limited exceptions. NZEM recommends that the Proponent consider including a new set of annual emissions projections that include the impacts of the declining baseline.

Under the new Safeguard Mechanism requirements, HVO's baseline will decline in accordance with the reforms, and this will result in significant reductions in net emissions to 2050.

Safeguard Mechanism reforms

The Safeguard Mechanism reforms are effected through amendments to several pieces of existing Commonwealth legislation, and commenced on 1 July 2023. The Safeguard Mechanism reforms are designed to reduce emissions at Australia's largest industrial facilities (or Safeguard facilities) whilst maintaining their international competitiveness as the world decarbonises.

The Safeguard Mechanism applies to facilities that emit more than 100,000 t CO_{2e} per annum. It sets legislated targets, known as baselines, on the net GHG emissions of covered Safeguard facilities. The reforms apply a decline rate to facilities' baselines so that they are reduced predictably and gradually over time on a trajectory consistent with achieving Australia's GHG emission reduction targets of 43% below 2005 levels by 2030 and net zero by 2050.

In addition to the above requirement to reduce net emissions from all Safeguard facilities, there is also a requirement for total emissions from all Safeguard facilities to reduce over time, measured on a 5-year rolling average. From 1 July 2025, the rolling average of Safeguard Mechanism covered emissions over the previous 5-years are required to be lower than the 5-year rolling average from three years earlier; and from 1 July 2027, the 5-year rolling average of Safeguard Mechanism covered emissions is required to be lower than the 5-year rolling average from two years earlier.

To deliver the Safeguard Mechanism budget consistent with Australia's emissions reduction targets, the Commonwealth Government has set a decline rate for Safeguard facilities' baselines that reflects the following considerations:

This decline rate reflects the final policy design of the Safeguard Mechanism reforms and projected emissions in the absence of the reforms, based on Australia's *Emissions Projections 2022*, which includes expected emissions from existing and new Safeguard facilities.

A reserve has also been built into baseline decline rate calculations to ensure the 2030 target is met. The reserve accounts for any higher-than-expected production growth at new and existing facilities and any higher-than-expected use of the trade exposed baseline adjustments.

The Commonwealth Government has also committed to a review of Safeguard Mechanism policy settings in 2026-27, to ensure they are appropriately calibrated. The review will consider, among other things, the initial impacts of resetting and declining baselines, including the costs and availability of domestic offsets, the suitability of arrangements for emissions-intensive, trade-exposed activities. The review will also have regard to important issues of sovereign capacity for the transition to net zero, the impacts on recent investments, technology readiness, efficiency of Australian production against international competitors.

Impact of the Safeguard Mechanism reform on the Project

Figure 4.9 below depicts the Project's GHG emissions as follows:

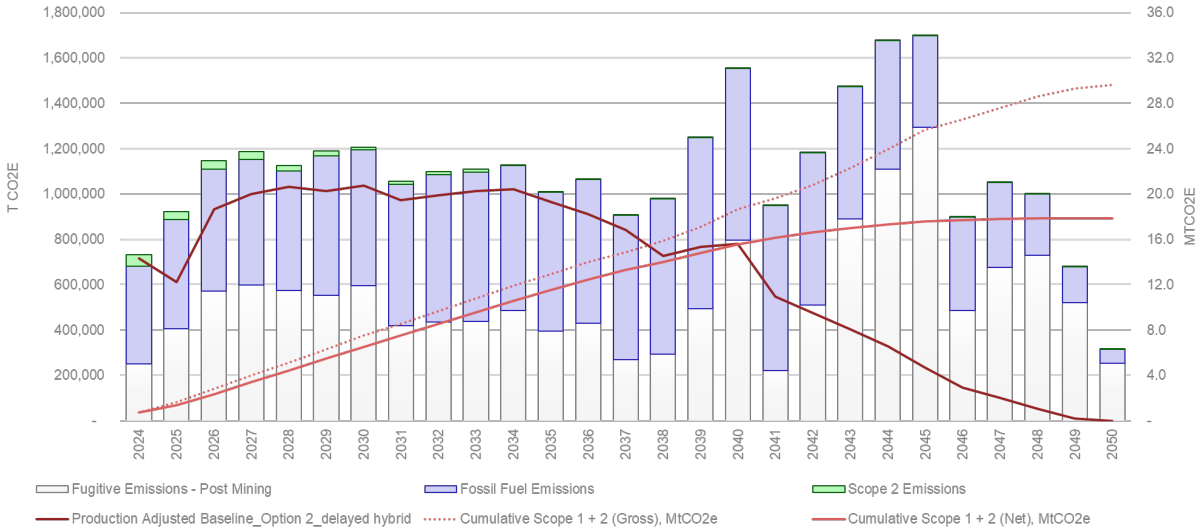
- The components of Scope 1 and 2 emissions in columns.
- The Safeguard Mechanism baseline in a bold maroon line (further explanation on the baseline mechanics are provided below the figure).

Cumulative gross emissions total approximately 29.6 $MtCO_2$-e; however, due to the Safeguard Mechanism reforms, cumulative net emissions are significantly lower at approximately 17.9 $MtCO_2$-e.

The difference of 11.7 $MtCO_2$-e due to the Safeguard Mechanism reforms reflects carbon offsets such as Australian carbon credit units (ACCUs) or Safeguard Mechanism credit units (SMCs) that HVO will need to purchase and surrender, or abatement activities that HVO will implement, whichever is cost effective and practical at the time.

As the impact of the decline rate accumulates over time, the Safeguard Mechanism reforms will require HVO to achieve a net emissions position which is significantly lower than its gross emissions, particularly post-2035.

Given HVO is already, and will remain, a covered facility under the Safeguard Mechanism, project-level emission reduction requirements will apply to HVO as a result of the Safeguard Mechanism reforms. Introduction of the Safeguard Mechanism reforms on 1 July 2023 followed an extensive stakeholder consultation process, including in respect to establishing the declining baselines for individual facilities. Since the Safeguard Mechanism reforms have now commenced, any conditions of consent imposed for HVO North and HVO South should not duplicate the Safeguard Mechanism requirements.



HVO site-specific EI = 0.0346 t CO2e/ROM tonne based on FY18 - 22 data (indicative, subject to approval from CER)

Figure 4.9 Safeguard Mechanism baseline and the Project's gross and net emissions

The drivers of the Safeguard Mechanism baseline are:

- Based on production variables (PV): For the Project the relevant production variable is the ROM coal PV.
- Based on declining emission intensity (EI) per ROM coal tonne.
- Production-adjusted, i.e. baseline equals declining EI multiplied by actual ROM tonnes.
- EI is determined using a "hybrid" approach as a means to transition existing facilities from a greater proportion of their site-specific EI to an industry average EI. For the ROM coal PV, the hybrid approach starts at 95% site-specific: 5% industry average in FY2024, and over time transitions to 50% site-specific: 50% industry average by FY2030. The Safeguard Taskforce has not disclosed when the transition to 100% industry average would occur for the ROM Coal PV, but in the data presented in this report HVO has assumed this would occur by FY2035.
- The above hybrid EI will decline by 4.9% pa until 2030, then to net zero by 2050 (3.285% pa decline).

4.2.7 GHG mitigation – alternatives to diesel powered equipment

In the EIS, the Proponent has only given cursory consideration to hydrogen and electric-powered trucks. Given that the Project extends the life of the HVO Complex to 2050 and that there will likely be significant advancements in mining technology over this period, it is strongly recommended that the Proponent commit to a regular review of best practice technologies in relation to low emissions alternatives to diesel-powered equipment and transition the mining fleet accordingly in line with best practice.

i Opportunities to reduce diesel consumption - overview

Given the off road mining fleet is by far the largest user of diesel, further information is provided on available technology and opportunities at HVO for reducing this diesel usage.

Firstly, a joint industry program facilitated by the International Council on Mining and Metals (ICMM), the Initiative for Cleaner, Safer Vehicles (ICSV), exists to leverage the broader industry learnings for solving constraints to development of emissions reduction technologies in mining equipment. Based on existing relationships and governance requirements, the ICMM and CharIN with involvement of the original equipment manufacturers (OEM) are the industry bodies with the most influence to help achieve the emission reduction objectives. CharIN is a not-for-profit global organisation in the field of charging systems for electric vehicles of all types around the world. It provides a community of technological collaborators, with over 300 members and eight years of work and learnings that can be built on. Glencore is a founding and active member of the ICSV program, and therefore HVO is in a position to stay abreast of technological developments and implementation progress through association with these bodies, which it does so on a regular basis.

Using this available information, together with its own market intelligence, Glencore undertook an assessment of the readiness of alternative technologies to diesel powered equipment for the mining sector and engaged Hatch Pty Ltd (ICSV Technical and Facilitation Support) to peer review this work. A summary of the findings is provided below.

The frameworks and methodology used by the Australian Renewable Energy Agency (ARENA) were used to assess readiness of technology for use in the mining sector by considering both the Technology Readiness Level (TRL), and Commercial Readiness Index (CRI) of the technology. These concepts are illustrated in Figure 4.10.

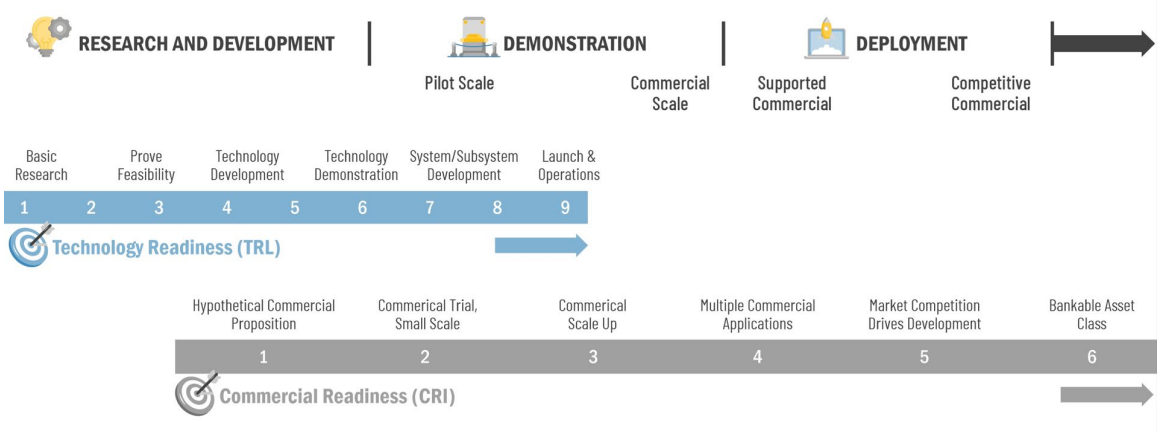


Figure 4.10 Technology Readiness Level and Commercial Readiness Index concepts

The review considered electrically powered equipment, as well as equipment powered by alternative fuels such as hydrogen, biofuels, ammonia and synthetic diesel. An overview of the findings as they apply to HVO are summarised below.

An overview of the potential technologies for powering surface mining equipment, currently typically powered by diesel, is shown below in Figure 4.11. It shows the current TRL status of a range of technologies that might be suitable. Clearly diesel as a fuel supply is, as a technology, refined and adopted. It can be seen that 20% biodiesel and catenary supplied electric power are also at TRL9. The second phase of full adoption is the CRI and, when considering commercial readiness, diesel is again a fully adopted and commercially competitive fuel for mining equipment. As will be discussed below, biodiesel and catenary power while technologically ready, are not as advanced on a CRI basis and not as readily adopted.

Figure 4.11 also shows that while technologies such as hybrid, fuel cell or battery power technologies are developing and being adopted in smaller scale sectors such as for automotive, they are not yet adequately developed for use with mining equipment. This may not continue to be the case through the duration of the Project and therefore HVO will commit to reviewing technologies on a regular ongoing basis for suitability for adoption at HVO.

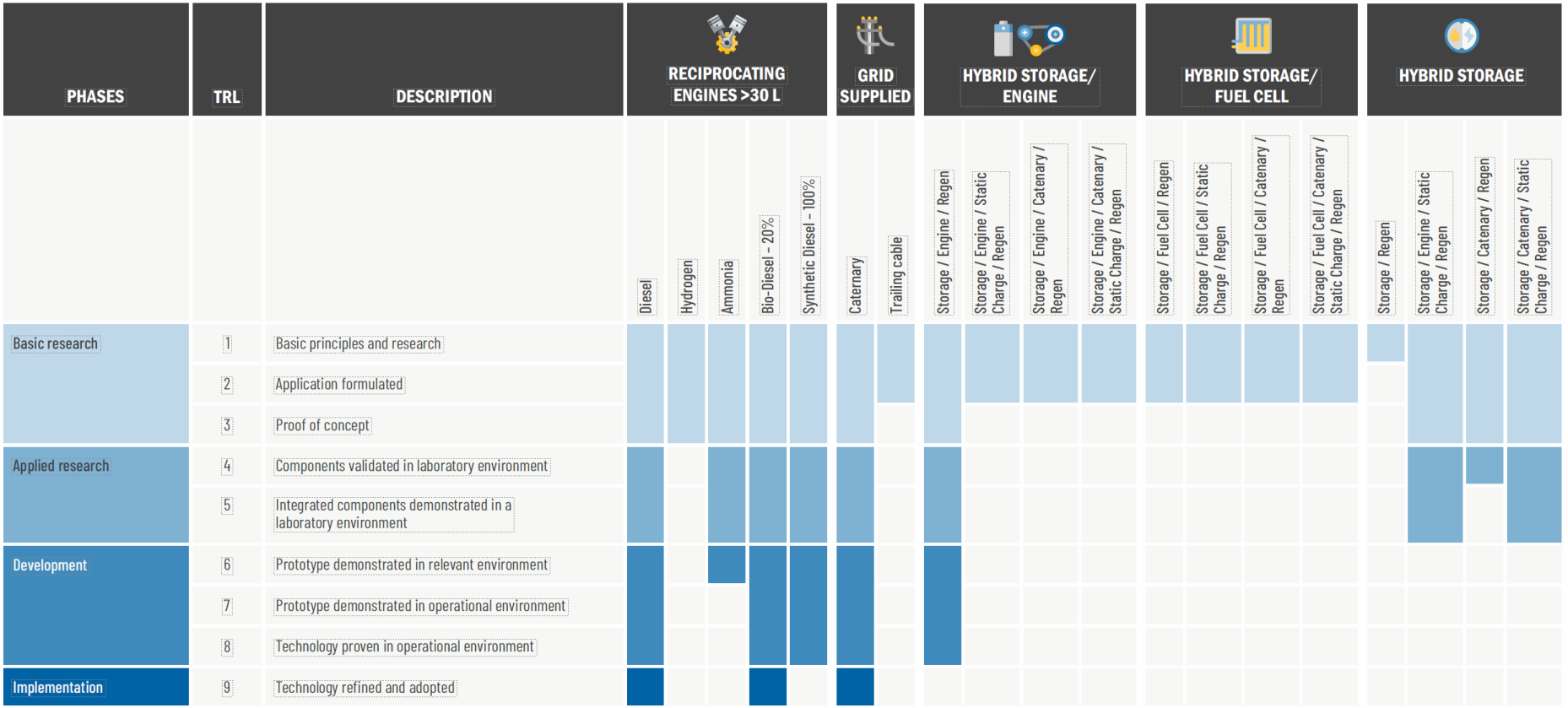


Figure 4.11 **Potential technologies for powering surface mining equipment with current TRL**

ii Electric powered equipment

A number of technologies exist for electrically powered equipment, including tethered cable electric machines, and high capacity overhead catenary systems. As demonstrated in Figure 4.12, catenary system technology is well developed for trucks with an overhead mounted system, and electric tethered cable system for hydraulic face shovel configured excavators in hard rock mining applications. However, there are a number of complexities and constraints to their implementation in a coal mining geological environment as discussed below Figure 4.12.

High capacity overhead catenary systems can be used to support diesel-electric truck fleets and potentially hybrid or battery powered fleets. Overhead catenary support for diesel-electric trucks is used in some limited non-coal instances globally; however, there is little opportunity to use this sort of system in the coal sector and HVO in particular. This is mainly due to the progressive nature of mine advancement during coal extraction and the subsequent continual changing of the location of suitable haul ramps, which would necessitate continually moving the significant support infrastructure involved.

In relation to cabled electric machines, while electric shovels and large capacity drills are available as shown in Figure 4.12, and are currently used at HVO, the nature of the cabled connection renders them useful for specific, usually high volume, tasks only. As a multi-seam open cut with multiple thin seams of coal and interburden which require frequent relocation, a large number of smaller hydraulic excavators in backhoe configuration are required for efficient mining. These are available as electric cable supplied machines however are also too restrictive for the flexibility required at HVO. Similarly smaller drills that require flexibility of movement within the mine are more appropriate as diesel machines.

In summary, some equipment is utilised as electric cable supplied machines at HVO however the further use of electric equipment for all excavators and drills is constrained by practicality and efficiency. As excavators and drills are replaced, forecasts of their respective uses will be assessed including whether cable supply might be appropriate.

iii Alternative fuels – biofuels and hydrogen

Biofuels are fuels produced by biogenic resources and have been in development and limited use for some time, while hydrogen as a fuel is still an emerging technology, as shown in Figure 4.12, which presents the TRL of engines fuelled by hydrogen and biodiesel.

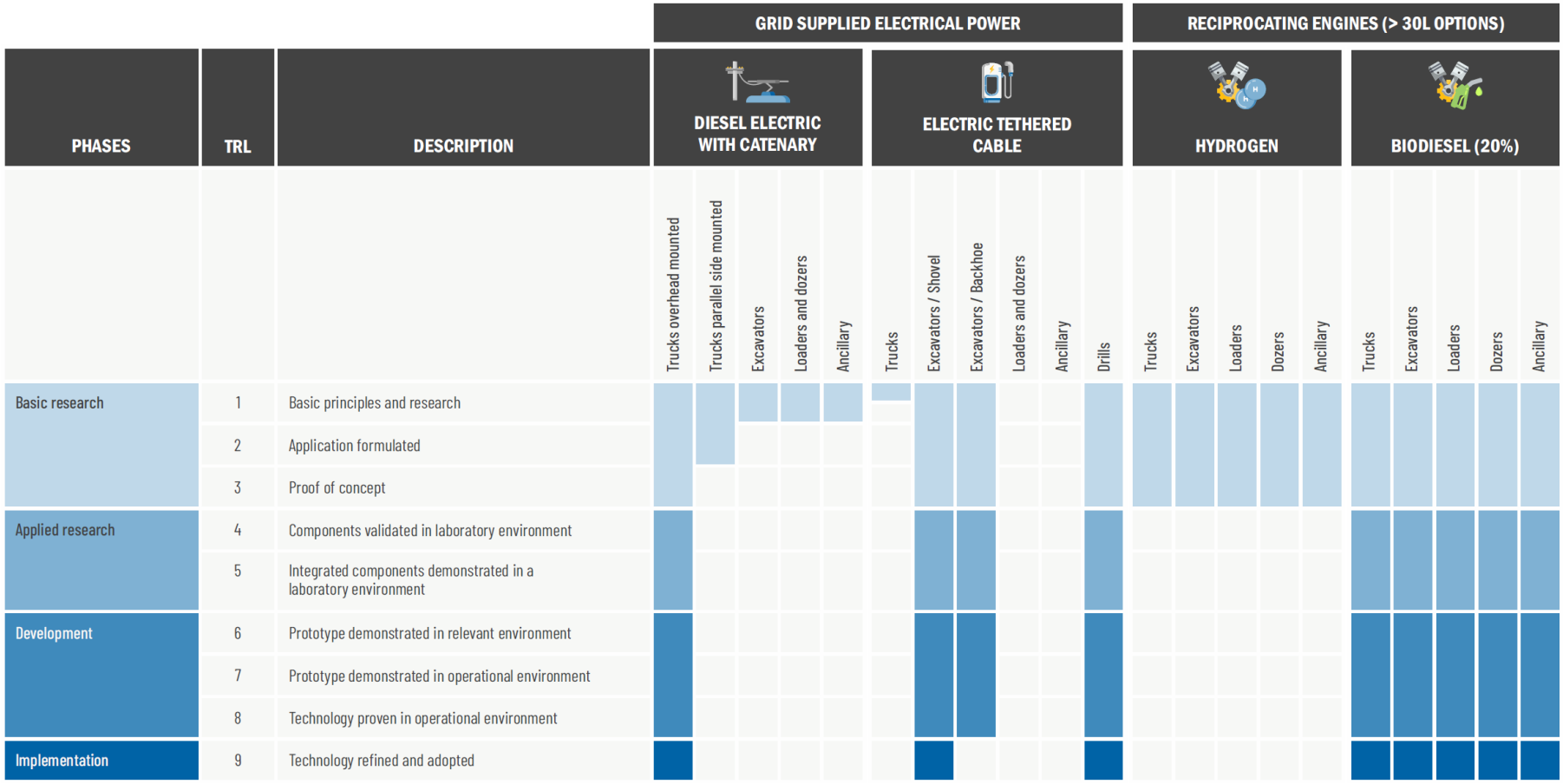


Figure 4.12 **Mining equipment optionality with current TRL – grid supplied electrical power and alternate fuels**

As shown above, the use of hydrogen as a fuel in mining equipment does not currently meet TRL requirements for implementation and is therefore not yet an option for the industry. Further research and development is needed before this technology could be considered for use at an operation like HVO.

On the other hand, biofuel has been developed to a point where it can be considered for use in large mining equipment. Glencore's coal operations have previously used biofuels in mining equipment (i.e. B20, which is a diesel fuel containing 20% biofuel); however, operations do not currently use this fuel due to both cost and availability. Biofuel supply is currently outstripped by demand. Studies also indicate that biofuels reduce some component lives, particularly injectors. Engines running biofuel are also less efficient and burn more biofuel than regular diesel.

A further complexity of note in relation to the use of biofuels is that Glencore have been advised by a major mining equipment manufacturer that Tier 4 Final engines (which are being promoted by the NSW EPA for adoption in new equipment in the NSW mining industry) are not currently compatible with biofuels.

HVO will continue to review the availability and feasibility of the use of these fuel alternatives.

4.2.8 GHG mitigation – gas pre-drainage

The Proponent has ruled out pre-drainage of coal seams as economically unviable for a multiseam open cut operation. However, the Proponent has provided no evidence or explanation for this in the EIS. Given the very large growth expected in fugitive emissions from the HVO Complex over the next 20-25 years, the Proponent must provide a comparison of the costs and benefits of pre-drainage to support the claim that it is not an economically viable option. The Proponent should also carry out in the first instance a feasibility study to assess the gas resource in the seams and the potential to extract that gas for beneficial use.

HVO engaged CoalBed Energy Consultants Pty Ltd (CoalBed) to undertake an initial study into the feasibility of pre-drainage capture of gas for the Project (Appendix M). A summary of the findings of this report are provided below, including the geological factors relevant to the viability of gas drainage, pre-drainage capture methods, and recommended next steps.

i Geological factors

The following fundamental characteristics of a gas reservoir are relevant to pre-drainage capture. Each of these are briefly discussed below.

- gas content (m^3/t)
- gas composition (%)
- gas saturation (%)
- permeability (mD).

Gas content and composition

HVO has an extensive exploration database and significant knowledge of the sub-surface gas content, which has been used to inform the gas assignment model for the complex. A high-level summary of the gas contents across the proposed mining area for the Project are presented in Table 4.6. As shown, significant variation occurs across the mining areas, reflected in separate and distinct gas domains. These domains are illustrated above in Figure 4.3.

Table 4.6 HVO fugitive gas assignment model as at 0723

	Domain 1 - HVON					Domain 2 - HVON					Domain 3 - HVOS				
		Depth (m)	Gas Content (m3/t)	CH4 (%)	CO2 (%)		Depth (m)	Gas Content (m3/t)	CH4 (%)	CO2 (%)		Depth (m)	Gas Content (m3/t)	CH4 (%)	CO2 (%)
LGZ/Zone 0**		0 to 70	0.3	-	50%		0 to 70	0.3	0%	50%		0 to 90	0.7	31%	40%
Z1		70 to 120	1.4	62%	18%		Below LGZ to Pit Floor*	2.3	86%	7%		90 to 120	1.2	56%	22%
Z2		120 to 150-300	3.1	91%	5%							120 to 130-200	2.5	82%	17%
Z3		150-300 to 330	5.3	95%	3%							130-200 to 250	6.1	59%	41%
Z4		Below Z3 to Pit Floor*	6.8	94%	4%							Below Z3 to Pit Floor*	4.4	55%	45%
20m below floor		-	2.8	90%	4%		-	0.2	4%	22%		-	2.2	55%	45%

Notes * where zones do not extend to pit floor

** Zone 0 in Domain 3 only

As shown in Table 4.6, the gas content of the coal seams generally increases with depth, with a gas-depleted surface zone down to around 70 m in Domain 1, 180 m in Domain 2 and 90 m in Domain 3. This is typical in the Sydney basin, with the depleted zone commonly extending to 100-150 m. As can also be seen by the data in Table 4.6 there is a high variability between domains and zones, which is also consistent with the inherent variability in Sydney basin coal seams.

In terms of gas composition:

- Domain 1 shows higher levels of methane in Zone 3 and 4
- Domain 2 has little gas, and very little methane
- Domain 3 shows mixed methane and carbon dioxide in Zone 3 and 4.

The gas content and composition data at HVO suggests there is varying potential for pre-drainage across the proposed mining area, as summarised below:

- Domain 1 shows some potential in Zone 3 and 4 which represents <10% of the ROM coal modelled in Domain 1
- Domain 2 shows the least potential for pre-drainage, due to the low gas content
- Domain 3 may show some potential for gas drainage within Zone 3 and Zone 4 over the deeper seams (~50%) of the deposit, with the proviso that the CO_2 gas composition modelled is high compared to Domain 1.

Fugitive emissions in Domain 1 from Zone 3 and 4, based on the indicative mine plan, would commence in Year 20 (around 2043). Figure 4.13 illustrates the ROM coal production in the identified gas zones at HVO, while Figure 4.14 shows the fugitive emissions by zone. As shown, the zones identified as having some potential for pre-drainage represent a small proportion of the ROM coal to be extracted and the associated fugitive emissions.

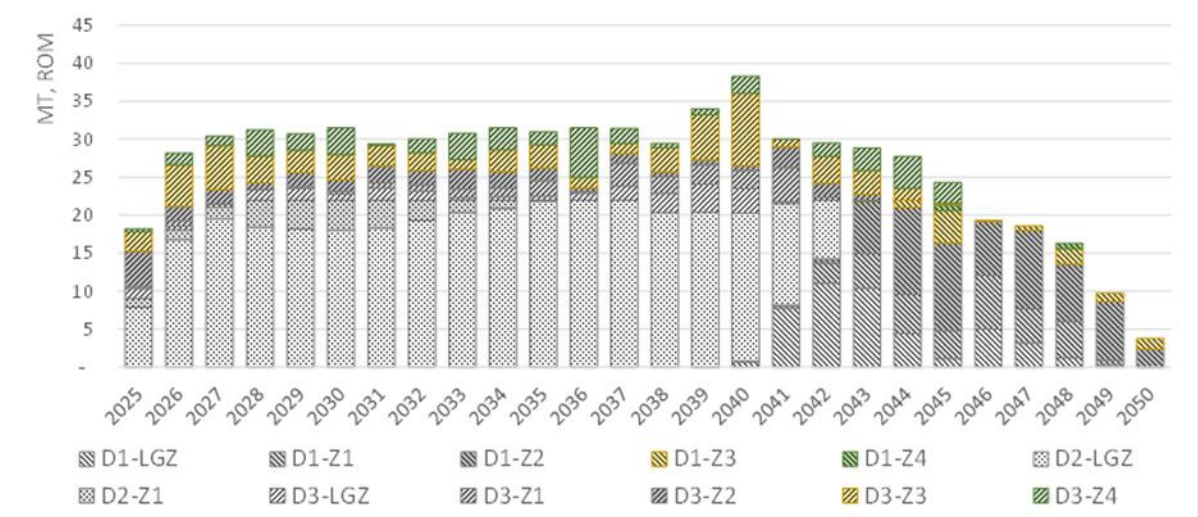


Figure 4.13 ROM coal production by zone

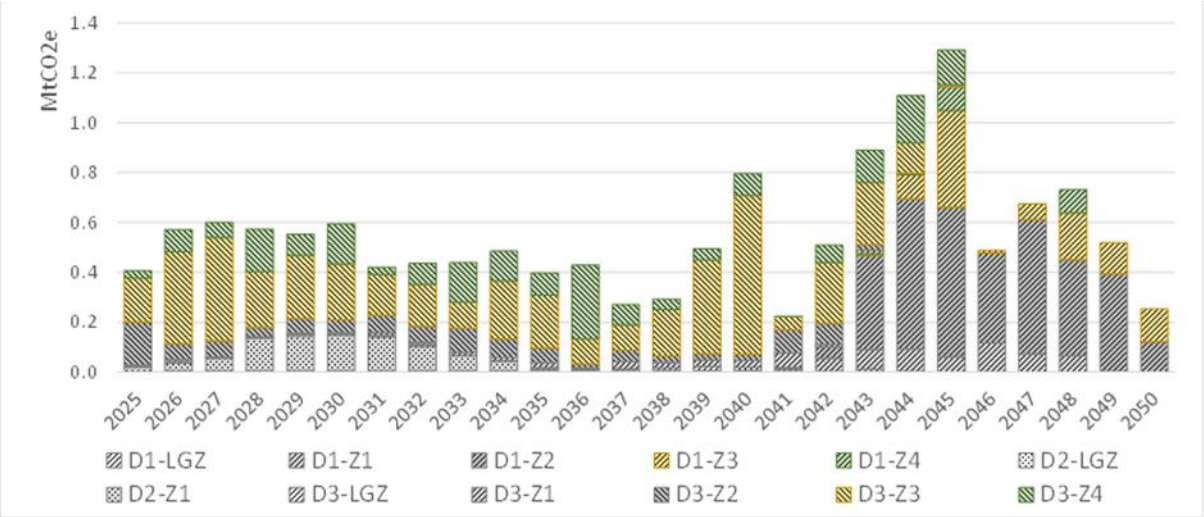


Figure 4.14 Fugitive emissions by zone

Gas saturation

The concept of saturation relates to the relationship between the amount of gas a given coal holds and the amount it can theoretically hold. If coals are saturated, they tend to be relatively easy to produce gas from and likely contain significant quantities of gas. Undersaturated coals imply that significant depressurisation will need to take place to produce gas, may produce large volumes of water to be managed, and the production life of the well may be limited.

Available isotherm data, which, alongside analogue data from the public record, suggests high undersaturation levels are likely to apply. Further investigation is recommended into the level of saturation, as part of a trial discussed below.

Permeability

Permeability in a coal seam is a product of the "openness" of the fracture system and the ability of the gas (and water) to flow from the micropore network. If permeability is too low, producing gas will be extremely difficult. Permeability determines to a large extent the method of gas production that is likely to be deployed (for instance, low permeability often favours surface to inseam directional drilling techniques; however, this is not a favoured approach for multiple seam environments, such as at HVO).

Available permeability data which, alongside analogue data from the public record, suggests that permeability will be low at the depths most suitable for pre-drainage. This is challenging for pre-drainage at HVO.

As per gas saturation, further investigation is recommended into permeability levels, as part of a trial discussed below.

ii Operational challenges of pre-drainage

Drilling for pre-drainage at HVO presents several challenges to consider in planning which will be investigated as part of the development of a trial. These challenges, which will be considered in the context of developing technology, include the following:

- Carrington void, which is above Domain 1 south-east of the Hunter Valley dyke in HVO North, is currently full of tailings and water. Tailings recovery is planned for completion by around year 16 (2039). The location of a trial would therefore target areas outside of the Carrington Void.
- Interactions with ongoing and prior mining activities would require additional drilling considerations.

- The target seams are very likely to be under saturated and have relatively low permeability.
- In relation to pre-drainage capture methods, multiple seam environments like at HVO tend to favour a vertical drilling approach. Low permeability (as anticipated at depth at HVO) means that some form of gas well stimulation may be required.
- Low gas saturation means that water may need to be produced and disposed of to produce gas.
- The concentration and the volume of the gas recovered would need to be assessed for abatement and utilisation purposes e.g. flaring, power generation, disposal/storage.

iii Overall indicative feasibility

The review of geological and gas properties by CoalBed at HVO found the following:

- coal gas is contained in a multiple-seam environment
- coals generally have low gas content (<6m^3/t), but vary across the Project
- coals are variably undersaturated
- CO_2 is commonly found in parts of the proposed mine
- permeability is anticipated to be low at pre-drainage depths, based on regional observations. Site specific data will need to be collected as part of further studies.

Given these gas reservoir properties, it may be challenging to produce meaningful gas at HVO through pre-drainage. Further study is recommended to examine areas of higher potential and to investigate the feasibility of a pre-drainage program.

Based on current available data, across the planned HVO mine area there is varying potential for pre-drainage, driven by varying gas content and composition as follows:

- Domain 1 shows some potential for pre-drainage within Zone 3 and Zone 4, which represents <10% of the ROM coal modelled in Domain 1.
- Domain 2 has the least potential given the low gas content in this area.
- Domain 3 may show some potential for gas drainage within Zone 3 and Zone 4, over the deeper seams (approximately 50%) of the deposit, with the proviso that the CO_2 gas composition modelled is high compared to Domain 1.

iv Proposed trial

HVO proposes to undertake a trial in areas with higher potential for pre-drainage to investigate the feasibility and effectiveness of gas pre-drainage. It is envisaged that the scope of the trial would be developed in consultation with relevant stakeholders to the satisfaction of the Planning Secretary and be provided within two years of commencement of consent should approval be granted for the Project. The scope of the gas pre-drainage trial would:

- include trial objectives
- identify the extent of the areas subject to further investigation

- utilise additional data that will be necessary to inform the design of the trial e.g. gas saturation and permeability data to develop a gas reservoir model.
- outline the timing for the completion of the trial
- outline the results, review and conclusions processes.

Following agreement of the scope above, HVO will implement the gas pre-drainage trial to the satisfaction of the Planning Secretary.

As noted above, timing considerations such as fugitive emissions in Domain 1 from Zones 3 and 4 commencing in around Year 20 (approximately 2043), would allow sufficient time to undertake a trial into conducting pre-drainage, and then undertaking gas drainage if the trial proves successful.

4.2.9 Conclusion

The revised estimated annual average Scope 1 and 2 GHG emissions from the Project (1.10 Mt CO_2-e) represent approximately 0.24% of Australia's 2022 emissions. In total, approximately 29.3 Mt CO_2-e of Scope 1 and 0.28 Mt CO_2-e Scope 2 are anticipated to be emitted over the Project life. The average Scope 1 emission intensity over the life of the mine (0.04 t CO_2-e/t ROM coal), and the peak intensity, when compared to Scope 1 emissions intensity of all Australian Coal Operations (2020-2021) are low relative to other Australian coal operations. However, as a designated large facility under the NGER Act, the Safeguard Mechanism applies to HVO, and therefore ongoing operations at HVO will be subject to the emissions reduction requirements that are contained within it. Under the Safeguard Mechanism requirements, HVO will have a declining baseline which will result in significant reductions in net emissions to 2050. Therefore, due to the Safeguard Mechanism, cumulative net emissions from the Project will be significantly lower at approximately 17.9 MtCO_2-e. The difference of 11.7 Mt CO_2-e due to the Safeguard Mechanism reforms reflects carbon offsets such as ACCUs or SMCs that HVO will need to purchase and surrender, or abatement activities that HVO will implement, whichever is cost effective and practical at the time.

HVO note that in January 2023, the EPA released its Climate Change Policy and Climate Action Plan which proposes a staged approach for the NSW Government to achieve the NSW Climate Change Policy Framework of net zero emissions by 2050. However, as outlined in correspondence by the NSW Minister for Planning and Public Spaces to the NSW Minerals Council dated 17 October 2023 (refer Appendix L) until such time as the Climate Action plan requirements are specified, the assessment of GHG emissions are to continue to be assessed in accordance with planning legislation.

Given HVO is already, and will remain, a covered facility under the Safeguard Mechanism, project-level emission reduction requirements will apply to HVO as a result of the Safeguard Mechanism reforms. Introduction of the Safeguard Mechanism reforms on 1 July 2023 followed an extensive stakeholder consultation process, including in respect of establishing the declining baselines for individual facilities. Since the Safeguard Mechanism reforms have now commenced, any conditions of consent imposed for HVO North and HVO South should not duplicate the Safeguard Mechanism requirements.

HVO will continue to undertake regular reviews of technologies and abatement measures to reduce GHG emissions from the Project, including whether these measures are reasonable and feasible to implement at HVO. These reviews will be undertaken every three years, and will include consideration of the use of alternate fuels including biofuels and hydrogen, and the transition to an electric powered fleet, as these technologies advance and more information becomes available.

Further, HVO will conduct a trial of gas pre-drainage in an area identified where pre-drainage has higher potential for effectiveness.

Under the NGER Act, relevant sources of GHG emissions and energy consumption must be measured and reported on an annual basis, enabling major sources and trends in emissions and energy consumption to be identified. HVO will continue to use this information, combined with the regular reviews of all reasonable and feasible technologies as they become available and throughout the life of the Project, to improve efficiencies and reduce emissions.

4.3 Department of Planning and Environment – Energy and Resource Assessments

4.3.1 Noise

The Department requests that Glencore provide the following information:

- identification of the source of the noise which results in the marginal impacts; and
- an assessment of whether there are any refinements that can be made to the project to avoid these impacts.

There is no one noise source responsible for the marginal impacts in the Jerrys Plains area. Identification of the highest contributing sources was part of the rigorous feasible and reasonable noise mitigation assessment of the Project, which was undertaken prior to determining the residual noise impacts. The feasible and reasonable mitigation measures applied to the Project are described in Table 4.7.

Table 4.7 Feasible and reasonable noise mitigation

Mitigation	Justification
Best Available Technology Economically Achievable (BATEA) equipment	HVO currently operates a combined attenuated and unattenuated mining fleet and is progressively attenuating the remaining fleet of large mining equipment. BATEA sound power has been adopted where reasonable and feasible in the NIA for significant noise generating mobile equipment.
Best Management Practices (BMP)	HVO currently implements BMP, consistent with contemporary industry standards, and as described in Section 4.1 of the Noise Impact Assessment prepared for the Project (EMM 2022b) (NIA). The BMP will continue to be applied to the Project and were applied where relevant in the noise modelling for the Project.
Attenuated fixed infrastructure	Significant fixed infrastructure at the yet to be constructed Lemington CPP area includes cladding and BATEA (Best Available Technology Economically Achievable). Sound power levels adopted for the Project plant and equipment reflect this.
Dozers restricted to 1st gear	Restricting dozers to 1st gear operation during enhancing weather conditions is feasible and reasonable. This control was applied to the modelling assessment.
Restrict operation of rehabilitation dozers	Restricting operation of rehabilitation dozers during enhancing weather conditions is feasible and reasonable. This control was applied to the modelling assessment.
Restrict operation of drills in exposed locations	Restricting operation of exposed drills during enhancing weather conditions is feasible and reasonable. This control was applied to the modelling assessment.
Roadside bunds	An 8 m high roadside bund is to be constructed on the exposed side of the haul road from the Mitchell Pit towards the Howick CPP for approximately 900 metres. Other roads are designed to maximise shielding from natural topography within the mining areas.
Low level dumps	Emplacement areas at varying elevations were considered to evaluate benefit of dumping of overburden in more shielded locations.
Alternative haulage routes	Where reasonable and feasible, alternative haul routes and roads will be utilised during enhancing weather conditions. This control was applied to the modelling assessment.
Relocation of attenuated equipment to high impact areas	Identification of high and low impact areas will determine if allocation of attenuated equipment is required. This may be required during periods of enhancing weather conditions.
Fixed infrastructure located in protected area	The HV CPP and Howick CPP fixed infrastructure is located in suitably protected areas with a buffer distance of approximately 8,000 and 5,000 metres respectively to the nearest receptors. The yet to be constructed Lemington CPP fixed infrastructure is approximately 3,000 metres to the nearest receptor and includes BATEA.

Once all reasonable and feasible controls in Table 4.7 were incorporated into the Project noise model, exceedances of the Project Noise Trigger Levels (PNTLs) at some sensitive receptors were still being predicted for the Project. The only remaining option to further reduce predicted noise levels at sensitive receptors was to shut down plant and equipment during noise enhancing meteorological conditions. Table 4.6 of the Noise Impact Assessment (NIA), provided as Appendix I to the EIS, shows that operational shutdowns would be required for 45-54% of the time to achieve the PNTLs at Jerrys Plains from HVO North. This level of shutdown is not feasible or reasonable for the Project to remain viable.

Further consideration was then given to what level of shutdown could be considered feasible, enabling the Achievable Noise Levels (ANLs) for the Project to be determined. To achieve the ANLs, shutdown hours up to 24% were predicted in the worst case modelled year (night time period) at HVO North, with a machine hour impact of up to 9,301 hours. This is a significant impact on the Project; however, this level of shutdown has been incorporated into the Project schedule. Any further shutdowns would not be feasible.

Further, while the NIA found that 19 receptors will be entitled to voluntary mitigation rights based on predicted marginal residual noise impacts as a result of the Project, 13 of these already have existing rights under current HVO approvals. The other six are in the outskirts of Jerrys Plains, and while a marginal noise impact is predicted at these receptors due to the Project, it is noted that the PNTLs for these receptors in the evening and night-time periods are less than the current Environment Protection Licence (EPL) limits that apply to these residences, and the recommended noise criteria for these receptors is consistent with the current EPL criteria. Further, seven receptors that already have mitigation rights in accordance with the HVO South Project approval are not predicted to experience noise levels such that they would be entitled to voluntary mitigation rights for the Project; however, HVO proposes to retain voluntary noise mitigation rights for these receptors.

4.4 Department of Planning and Environment – Biodiversity and Conservation Division

4.4.1 Biodiversity

BCD recommends that if the project is approved that it includes specific conditions of consent that will minimise the impact of the project on Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregion EEC and Warkworth Sands Woodland in the Sydney basin Bioregion EEC. BCD further recommends that management and mitigation strategies for these EECs are produced, and this is done in consultation with Planning and Assessment Group and with BCD.

In response to the Serious and Irreversible Impacts (SAII) as a result of the Project on Hunter Floodplain Red Gum Woodland EEC and Warkworth Sands Woodland EEC, it is proposed that the development of an Ecological Restoration Plan (ERP) for each of the threatened ecological communities (TECs) is undertaken prior to the disturbance of the EECs. Each plan would provide a framework for the management of the vegetation community during and post-development of the Project, and form part of the existing Integrated Biodiversity Management Plan proposed to be updated on receipt of approval of the Project. The ERP would include management actions to inform specific weed control, re-establishment of vegetation, security /protection measures and a trigger response plan to ensure the continued improvement of each of the TECs. Further detail on these additional management measures is addressed in Section 5.6 of the revised BDAR, provided as Appendix E to the Amendment Report.

The proponent should provide the following information to demonstrate the effectiveness of the two-phase grid-based systematic survey technique applied for this assessment:

- A table of candidate threatened plant species surveyed for this project with the area of suitable habitat within the Project area given in hectares by Vegetation Zone and by Plant Community Type (PCT), and a total area within the subject land; the number of circular survey areas per Vegetation Zone, per PCT and in the Project area; and the area surveyed by these circular survey areas by Vegetation Zone, by PCT and for the subject land.
- A description of how the two-phase grid-based systematic survey approach was applied for this project, including details of how the one kilometre grids that were sampled were chosen, and a discussion on any assumptions and limitations of the use of this method.

Due to the size of the impact area and varying condition of PCTs (i.e. mosaic of vegetation zones) across the development footprint, it was determined that the two-phase grid method was most suitable to effectively cover the site (rather than assess habitat discretely by vegetation zone). The NSW survey guide for surveying threatened plants and their habitats (DPIE 2020) does not specify a requirement to undertake the two-phase grid-based approach by a vegetation zone-basis.

Further detail and justification on this grid-based approached is provided in Section 4.1.3.1 and Table 4.1 of the revised BDAR provided as Appendix E to the Amendment Report.

Columns should be added to a revised version of Table D2.2 of the BDAR that cover:

- ‘minimum survey effort requirements’
- ‘survey requirements met?’ (to be answered by ‘Yes’, ‘No’ or ‘Partially’).

A ‘Notes’ column may be added, or the same text otherwise provided to explain why survey effort and survey methods used may not have met survey requirements.

An updated Table D2 of Appendix D is provided in the revised BDAR provided as Appendix E to the Amendment Report to include the information requested.

Further assessment should be undertaken for the potential presence of the koala where survey effort does not meet BCD's survey requirements. The additional assessment may be in the form of additional targeted threatened species survey, done in accordance with current survey guidelines, or from the provision of an expert report, or by assuming the presence of the koala in areas of suitable habitat.

Thermal drone surveys and additional spot assessment technique (SAT) surveys for the koala have been undertaken following the exhibition of the EIS. Table 4.2 and Table D2 of the BDAR has been updated to reflect these surveys. Figure 4.2 of the BDAR has been updated to identify the extent of survey coverage. Table D3 in Appendix D of the revised BDAR outlines the assessment of suitable koala habitat as described in the Koala (*Phascolarctos cinereus*) Biodiversity Assessment Method Survey Guide.

No koalas or signs of koala were recorded during the targeted surveys. The revised BDAR is presented as Appendix E to the Amendment Report.

Appendix D 'Threatened Species Assessment and Survey Methodology' and the BAM Calculator file shows that the targeted surveys for some threatened species were either partially (e.g., Gang-gang Cockatoo, Eastern Pygmy Possum, and *Thesium australe*), or fully (e.g., *Cryptostylis hunteriana*) done outside of the specified survey months. Further details are required to demonstrate that BCD's minimum survey requirements have been followed and that the minimum survey effort has been done; if not those species will require further surveys (in the appropriate months), or an assessment by an Expert Report or to be assumed to be present and offset accordingly.

Further information should be provided about the survey effort undertaken within the specified months for targeted surveys for all candidate species-credit species, and that surveys within the specified months are compared against the required survey effort. If some species have been inadequately surveyed then further surveys (done in the appropriate months), an expert report, or the species is assumed to be present and offset accordingly.

Table D2 of Appendix D has been updated in the revised BDAR, provided as Appendix E to the Amendment Report, where relevant, to reflect the additional surveys complete since the exhibition of the EIS.

Additional survey effort undertaken following the exhibition of the EIS have included:

- Targeted hollow surveys for glossy black-cockatoo 14-18 and 29 August 2023 across 36 potential hollow sites within the Development Footprint and surrounds. No records of glossy black-cockatoo or signs of breeding was detected in August 2023 or in any previous survey periods.

Further surveys are proposed in October 2023 and November 2023 that include:

- Hollow tree searches for breeding activity for gang-gang cockatoo.
- Threatened flora transects targeting species detectable in November.

The outcomes of this survey will be presented in a supplementary report to be provided to DPE following the completion of these surveys. This approach was discussed with BCD at the meeting held 19 October 2023.

Additional remote camera surveys are currently being undertaken to support the Commonwealth assessment for the Project.

Each of the threatened species identified by BCD in their submission were adequately surveyed, with surveys undertaken during the survey windows specified in the TBDC. Additional surveys undertaken during sub-optimal seasons are also included in Table D2 of Appendix D of the revised BDAR as supplementary surveys which contribute to the overall survey effort. It is noted that the majority of threatened species can be identified outside of the nominated survey period and these surveys provide important contextual surveys for all species.

The survey requirements for the common Planigale (Planigale maculata) have not been met. The appropriate survey technique for this species is pitfall trapping however, Table 4.1 'Species-credit Species Surveys' of the BDAR states that the following survey has been conducted for common Planigale:

• Nocturnal spotlighting; and

• Remote camera survey.

The Threatened Biodiversity Data Collection in BioNet states that 'surveys must be undertaken using pitfall traps.' Where that is not possible, due to rocky ground, for example, then the alternative is an expert report.

Areas of suitable habitat for the common planigale in the subject land should be surveyed using pitfall trapping, or the species is assessed by an expert report, or that the species is assumed to be present and then offset in accordance with the Biodiversity Offset Scheme.

Following public exhibition of the EIS, consultation with BCD was undertaken to determine the survey effort required across the development footprints for the common planigale (*Planigale maculata*). BCD advised that the survey effort where total suitable habitat is greater than 50 ha: 22 arrays plus one additional for every 10 ha of suitable habitat above 50 ha would be required. The development footprint contains approximately 420 ha of potentially suitable habitat for the common planigale in accordance with the predicted vegetation zones in the Threatened Biodiversity Data Collection (TBDC).

Based on the advice from BCD, 64 pitfall trap arrays were installed in suitable habitat across the development footprint to adequately survey for the common planigale. No common planigales were recorded.

Details on the additional surveys and results are presented in the revised BDAR provided as Appendix C to the BDAR.

Section 4.2.2.1 'Southern Myotis (Myotis macropus)' of the BDAR outlines that habitat polygon mapping for the southern Myotis was calculated on the direct impacts to the population by buffering all recorded individuals by 30 metres. This approach does not cover all waterbodies within the project site. Under the BAM 2020, for fauna species assessed by area (as per the threatened biodiversity data collection (TBDC)), the species polygon is meant to be used to measure the area of suitable habitat on the subject land.

The 'Species credit' threatened bats and their habitats - NSW survey guide for the Biodiversity Assessment Method, outlines that 'All habitat on the subject land where the subject land is within 200m of a waterbody with pools/ stretches 3m or wider including rivers, creeks, billabongs, lagoons, dams and other waterbodies on the subject land' should be included in the species polygon for the southern Myotis.

The species and habitat polygons for the southern Myotis should be updated to include waterbodies as outlined in the BAM 2020 and associated guidance documents. The BDAR should be amended to include an assessment of prescribed impacts to the southern Myotis from the removal of water bodies within the subject land.

The southern myotis habitat polygon mapping presented in Section 4.2.2.1 of the BDAR, was undertaken by clipping associated PCTs within the development footprint and within 200 m of a waterbody what was 3 m or wider. This included rivers (such as the Hunter River), creeks and dams within the locality of the Project. This is consistent with the requirements outlined in Table 1 of 'Species credit' threatened bats and their habitats NSW survey guide for the Biodiversity Assessment Method (OEH 2018).

No changes to the assessment in the revised BDAR have been undertaken.

The assessor should not exclude the Stephens banded snake from assessment and should provide further details of potential habitat for cave-dwelling bats within the project area that could be provided by built structures and mine shafts.

Stephens banded snake (*Hoplocephalus stephensii*) – the TBDC notes that this species uses very old primary forest with many large old hollow bearing trees and therefore discounts this species. However, this description is provided as a general guidance and the TBDC also states that fallen timber, hollow bearing trees and areas within 500 metres of arboreal vine tangles can also provide habitat. As the Project area contains these features, the species habitat constraints, the species should not be ruled out due to lack of habitat.

Cave-dwelling microbats (*Chalinolobus dwyeri* and Bentwings) – the BDAR does not contain enough information to quantify prescribed impacts to threatened microbats from the loss of mine shafts, and other old mine workings, and buildings in the Project area.

Foraging *Miniopterus australis* bats were recorded on site. This species roosts in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges, and buildings. BAM assessments that require surveys for roosting sites for this species and also require an assessment of the importance of the habitat to the migration of this species. This species is very selective for roosting habitat and will move between roosts sites depending on temporal variance. The removal of any roosting habitat should be compensated with supplementary habitat so as to not disrupt migration to the maternity roost: a significant impact to a maternity roost for this species would be considered to be a Serious and Irreversible Impact.

Clarification is provided in Section 4.1.3 of the revised BDAR, provided as Appendix E to the Amendment Report, stating that "Recommendations from the BCD following review of the BDAR also include the requirement to survey for Stephens banded snake (*Hoplocephalus stephensii*). As this species has strict seasonal survey requirements in accordance with the Threatened reptiles BAM survey guide (DPE 2022), surveys are proposed to be conducted in suitable habitat between October 2023 – March 2024. The outcomes of this survey will be presented in a supplementary report to be provided to DPE following the completion of these surveys. This approach was discussed with BCD at the meeting held 19 October 2023.

Additional text has been added to the justification in Table D1 in Appendix D of the revised BDAR noting that there are no mine shafts, workings, or old buildings within the development footprints. As there was no roosting habitat identified in the Development Footprint, or nearby, further assessment of the disruption to migratory patterns is not warranted. As there is no impact to roosting or maternity habitat of *Miniopterus australis*, the species is not at risk of a significant or irreversible impact.

An assessment of potential impacts to Warkworth Sand Woodland in areas adjacent to BAM Plot 18 should be undertaken if development activities in that area are likely to change local groundwater conditions (e.g. by either draining the upslope section of sandsheet or blocking the flow of water).

Further discussion on this is provided in Table 6.4 of the revised BDAR, provided as Appendix E to the Amendment Report, including a graphic (Figure 6.2) from the groundwater assessment demonstrating that the community relies on the perched aquifer and will not be altered by groundwater impacts.

Figure 6.1 'Location of Prescribed Impacts' shows the general location of corridors within the project area. However, the BDAR does not show how the corridors in the project area fit within the wider landscape and important corridors have not been identified. This does not meet the requirements of Section 7.2.1 (c) of the BAM 2020, which requires the proponent to '*locate the proposal to avoid severing or interfering with corridors connecting different areas of habitat and migratory flight paths, to important habitat or local movement pathways*.'

The BDAR should be amended to discuss how the project fits within the wider landscape and presents a new, or revised version of Figure 6.1, or both that has clear lines that indicate probable corridors.

Figure 6.1 has been updated and presented in the revised BDAR, provided as Appendix E to the Amendment Report, to show regional corridors based on native vegetation mapped on State Vegetation Type Map.

Further justification is provided in Table 6.6 of the revised BDAR, demonstrating that HVO is not located within an important regional corridor and that the Project will not result in the severing of regional corridors.

Further details should be provided around measures to be implemented to prevent new weeds from becoming established in Warkworth Sands Woodland from the re-routed Lemington Road.

In response to the SAII as a result of the Project on Hunter Floodplain Red Gum Woodland EEC and Warkworth Sands Woodland EEC, it is proposed that the development of an Ecological Restoration Plan (ERP) for each of the TECs is undertaken prior to the disturbance the of the EECs. Each plan would provide a framework for the management of the vegetation community during and post-development of the Project, and form part of the existing Integrated Biodiversity Management Plan proposed to be updated on receipt of approval of the Project. The ERP would include management actions to inform specific weed control, re-establishment of vegetation, security /protection measures and a trigger response plan to ensure the continued improvement of each of the TECs. Further detail on these additional management measures is addressed in Section 5.6 of the revised BDAR, provided as Appendix E to the Amendment Report.

The BDAR should be revised include the limitations and risk of failure of the proposed measures to mitigate or manage impacts, as required under the BAM 2020.

Additional text has been provided in Table 5.4 and Section 5.4 of the revised BDAR, provided as Appendix E to the Amendment Report, to confirm that the impact minimisation and mitigation strategies are well known and represent a low risk of failure. These strategies are implemented widely across mining projects in the Hunter Valley and elsewhere and will be documented in a revised Biodiversity Management Plan to be prepared should the Project be approved.

The BDAR should be amended to provide more information on the location of temporary or ancillary construction facilities that will require additional clearing, and to show these locations on one or more maps.

The proposed location of ancillary or temporary construction facilities is now shown on Figure 1.4 of the revised BDAR, provided as Appendix E to the Amendment Report.

While these locations are indicative only, HVO will ensure this infrastructure is sited in existing approved disturbance areas or within the proposed development footprints following approval of the Project.

Ancillary or temporary construction facilities will not be constructed outside these boundaries and therefore no additional impacts are proposed.

The BDAR should be amended to include a map, or maps of likely indirect impacts from the project in order to meet requirements of the BAM 2020.

A revised BDAR has been prepared and provided as Appendix E to the Amendment Report.

Figure 6.1A and 6.1B of the revised BDAR show Wollombi Brook and Hunter River (respectively) alluvium - maximum cumulative drawdown during operations.

Figure 6.2 of the revised BDAR has been updated to show the Warkworth Sands Woodland EEC in relation to the perched aquifer and groundwater dependent ecosystem (GDE) impacts.

Figure 6.3 of the revised BDAR has been updated to show edge effects around Lemington Road realignment and indicative habitat connectivity in the locality and region based on the State Vegetation Type Map for native vegetation extent.

The BDAR should include a discussion on the limitations and assumptions in the assessment of indirect impacts of the project to meet the requirements of the BAM 2020.

Section 6.2 of the revised BDAR, provided as Appendix E to the Amendment Report, has been updated with a statement relating to the confidence of the indirect impacts assessed in the BDAR, which have been based on a long history of assessment and monitoring of impacts to biodiversity due to mining in the Hunter Valley over the last 20 years.

The BDAR does not include all of the information required by BAM 2020, including:

- The BAM 2020 assesses the biodiversity values of the 'subject land', however the BDAR does not define the 'subject land' for this project.
- Figures 2.1 'Site Map', 2.2A 'Location Map – HVO North' and 2.2B 'Location map - HVO South' do not show dams and mine sites on a Map as required under Section 3.1.3 'Identify landscape features' of the BAM 2020.
- Maps of Native Vegetation Extent are not presented at <1:10,000 scale, as required by Section 4.1 'Map of native vegetation extent on the subject land' of the BAM 2020 (The maps of native vegetation extent in Appendix C are presented at a scale of 1:28,000).
- Threatened Ecological Communities that are dependent on or use habitat features associated with prescribed impacts are not listed, as required under Section 6.1 of the BAM 2020.

BCD recommends that additional information is provided to meet the requirements of the BAM 2020.

A revised BDAR has been prepared and provided as Appendix E to the Amendment Report.

The definition of 'Subject Land' has now been included in Section 1.2 of the revised BDAR.

Figure 2.2A and 2.2B of the revised BDAR have been updated to show dams and surrounding mining sites.

Appendix C figures of the revised BDAR have been updated to be 1:10,000 scale.

Habitat features have been added to Table 6.6 of the revised BDAR.

4.4.2 Flooding

The proponent has not demonstrated that there will be no adverse flood impacts on the township of Singleton. BCD recommends that the proponent's flood model is peer reviewed to identify the cause of boundary condition instabilities and assess the model's suitability for assessing flood impacts.

i Modelling peer review

Between March 2020 and October 2022, Barry Rodgers (Principal Scientist) at BMT undertook a peer review of the flood modelling completed for the Project. As BMT has undertaken an update of the Hunter River Flood Study for Singleton Council (draft published in December 2022), HVO engaged BMT as the peer reviewer of the HVO flood model to seek consistency in approach and outcomes between the two models.

Peer review of flood models and outputs was undertaken by BMT at key stages throughout the assessment, including:

- review baseline flood model in March 2020
- in August 2021, BMT reviewed updated flood model (updated in response to BMT's March 2020 review and to include recent data). Models reviewed included an 'existing case' and an 'operational case'
- in September 2022, a follow up review of the modelling results based on BMT's review in August 2021
- additional meetings between the Project team and BMT as required to progressively discuss recommendations made and the proposed approach.

BMT's review focused on the modelling approach and the ability of the modelling to adequately define project related flood impacts. The peer review found the modelling adequately met the requirements of the SEARs, with additional clarification in reporting provided in the final SWIA. The peer review process and outcomes were documented in a letter from BMT that was appended to the Water Assessment report (Appendix K of the EIS). Following receipt of submissions on the EIS, BMT provided an updated letter addressing of the flood related submissions received. The updated letter (dated 21 June 2023) is provided in Appendix E. Key outcomes of that letter summarised as follows:

- Concerns with showing mapping in Singleton was noted due to potential differences in flood levels and extents between the HVO flood model and the Singleton Council flood model due to different model objectives and purposes, different design assumptions, proximity to the downstream boundary and model detail due to Project distance upstream of the town.
- Given peak level impacts from the Project (mapped to 20 mm) were a significant distance upstream of the mapping limit, BMT agreed with the approach and considered the mapping limit acceptable. A plot of the flow hydrograph at the mapping limit demonstrates insignificant increase in downstream flow beyond that point.
- BMT clarified based on their review there was not an issue with boundary stability. Rather, suitability of assessing impacts in town related to the close proximity of the boundary to Singleton.

ii Model extent

The extent of the HVO flood model was selected to define flood behaviour and flood risk for the Project and assess potential Project flood impacts. The purpose of the HVO flood model is to evaluate potential impacts, rather than inform floodplain planning and risk management, which is the purpose of the Singleton Council flood model.

The HVO flood model extended to Singleton to allow calibration to Singleton gauge levels; however the detail of the model is focused on the rural lands upstream of town, consistent with the objectives and purpose of the HVO flood model.

iii Comparison with Singleton Council draft flood study

BCD's recommendation also mentions the potential for the HVO flooding assessment to use the TUFLOW model developed for the 2022 Singleton Flood Study. However, the Singleton flood study (and associated model) was not available when the HVO flood modelling was being developed.

Engeny provided a comparison between the Singleton flood study and the HVO flood model, which is summarised below:

- Both models have broadly similar methodology with some notable differences
- Both models prioritise statistical models for Hunter River flow (i.e. flood frequency analysis)
- The Singleton study used a hydrology model for residual catchment inflow (downstream of Jerry's Plains) while the HVO study used the residual hydrograph method
- Both use TUFLOW hydraulic software, noting there are differences in the level of detail, extent and manning's roughness values
- Both models prioritise calibration to the 2007 flood event with validation to 1955 flood event
- Focal areas:
    - The HVO study focused on the area near mine and extent of expected impacts. The HVO model has greater emphasis on calibration to Liddell and nearby level gauges.
    - The Singleton Council study covers the full LGA but with greatest emphasis on urban area of Singleton. The Singleton model has greater emphasis on calibration to Singleton flows and levels.

Based on the above and peer review advice, the HVO flood model is suitable for setting design flood levels at the HVO Complex and for assessing Project impacts.

iv Predicted impacts

Flood impacts less than 20 mm have not been assessed. BCD recommends that the proponent provides mapping that shows flood impacts down to 10 mm and clearly identifies all private land and residential dwellings where flood impacts are predicted to occur.

Insufficient information has been provided to determine the extent of flooding impacts on private property.

BCD recommends that the proponent provides mapping, at a suitable scale, such that all impacted private landholders can clearly understand the predicted change in flood behaviour on their land. This mapping should include property boundaries and residential dwellings.

BCD recommends that the proponent provides mapping that clearly identifies all private land and residential dwellings where flood impacts are predicted to occur.

As presented in the SWIA, the HVO flooding assessment outcomes are:

- relative to baseline conditions, impacts to properties not owned by the JV partners are predicted to be minor
    - A small number of properties in the area (15 properties being contiguous landholdings, or 31 individual lots) have a minor flood level change between 20-50 mm, but generally less than 30 mm.
    - There are no dwellings that transition from not flooded to flooded during the 1% AEP event.
- negligible change in flood affected area
- no impact on:
    - current land use (agricultural (grazing and cropping) or crown land); or
    - any dwellings; or
    - infrastructure.
- no significant change to velocities on properties owned by others (i.e. non-JV partners)
- no change to flood hazard categories

As presented to Singleton Council and BCD, and based on supporting advice from the peer reviewer (see Appendix E), a 20 mm threshold is sufficient for evaluating potential Project impacts given:

- Almost all of the modelled and impacted area is rural (Primary Production RU1)
- The environmental assessment of the Singleton Bypass project, which also involves modelling on the Hunter River but is focused on the Singleton area, applied a 20 mm threshold for impact mapping (NSW Roads and Maritime Services 2019). The HVO flooding assessment is consistent with this.
- Although there is no published guidance on acceptable flood level impacts, a recent guideline by Austroads (2023) assumes a 25 mm change in peak level at residential buildings is generally acceptable with greater tolerance for non-residential uses.

To further support the results presented in the SWIA, figures of the summarised property impacts have been provided in Appendix F. These present the modelled peak flood level afflux for the 1% AEP event. These figures highlight the properties not owned by the JV partners that have impacts greater than 20 mm.

Figure 4.15 below shows that each of the non-JV owned impacted properties (>20 mm) are zoned RU1 (primary production) or SP2 (infrastructure).

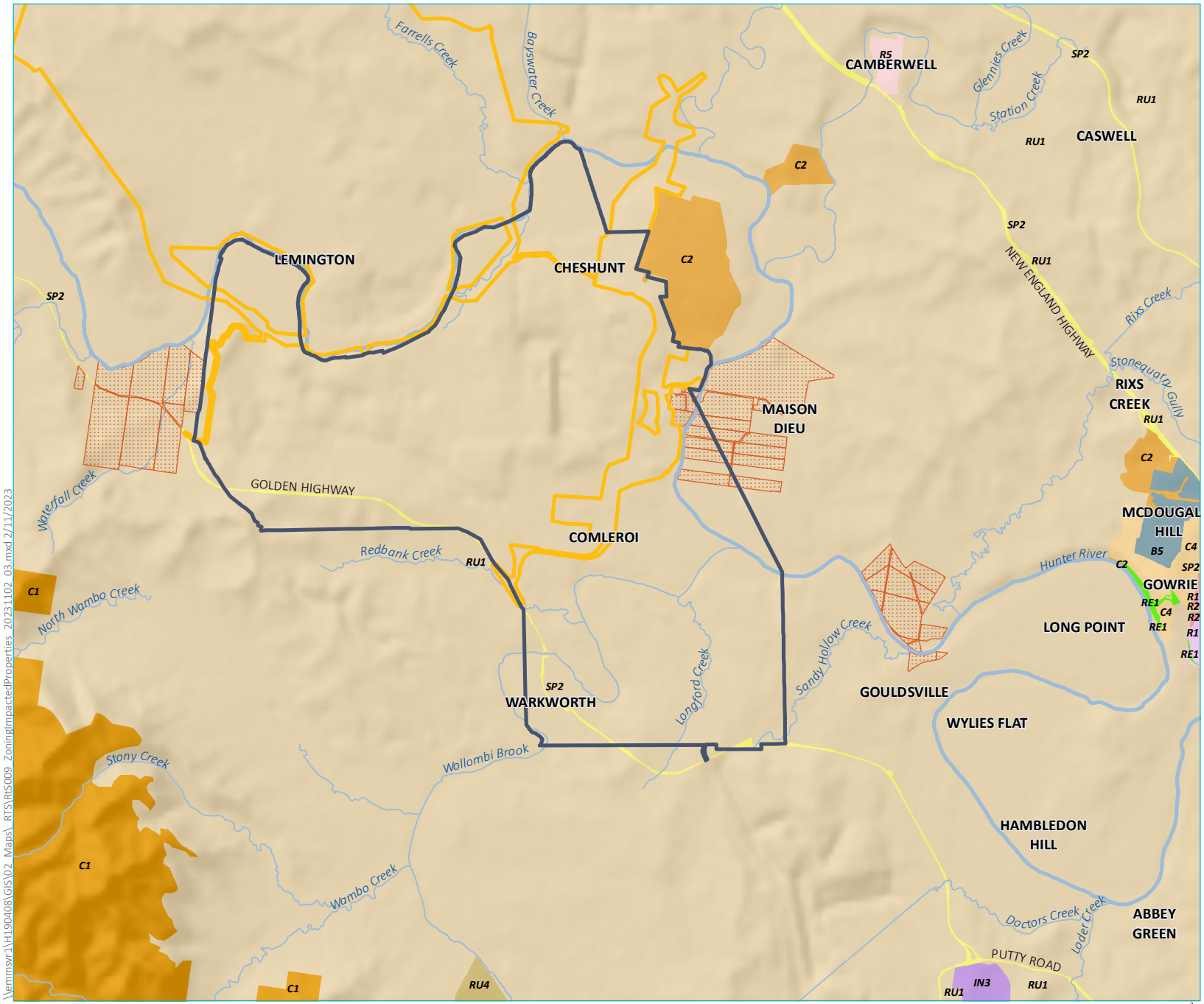
The floodplain areas adjacent to the Hunter River upstream of Maison Dieu are all zoned RU1 (primary production) or C2 (environmental conservation). At Masion Dieu there is a small section adjacent to the Hunter River that is zoned RE1 (public recreation). There is no land within the flooding extents for the 1% AEP mapped for the SWIA that lie within residential zoning areas (refer to https://maps.singleton.nsw.gov.au/geocortexviewer/?viewer=planning).

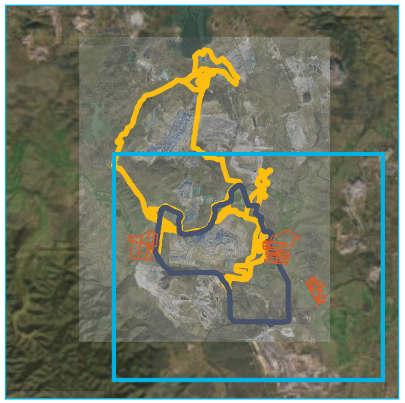
As can be seen by the mapping included in Appendix F the modelling indicates that there are no dwellings that transition from not flooded to flooded during the 1% AEP event.

Changes in the frequency and duration of flooding has not been assessed.

BCD recommends that the proponent assesses the change to the frequency and duration of flooding on all impacted private property.

As presented in the SWIA for the Project, there is no material impact on the frequency and duration of flooding. Peak flood depth afflux (for the 1% AEP) for the area predicted to have a minor flood level change (between 20-50 mm) is presented in greater detail in Appendix F (showing individual lots).





KEY

- HVO North proposed development consent boundary
- HVO South proposed development consent boundary
- Non-JV owned impact >20 mm
- Hunter River
- Other named watercourse

Singleton Local Environmental Plan 2013

- B5 | Business Development
- C1 | National Parks and Nature Reserves
- C2 | Environmental Conservation
- C4 | Environmental Living
- IN3 | Heavy Industrial
- R1 | General Residential
- R2 | Low Density Residential
- R5 | Large Lot Residential
- RE1 | Public Recreation
- RU1 | Primary Production
- RU4 | Primary Production Small Lots
- SP2 | Infrastructure

Source: EMM (2023); HVO (2023); ESRI (2023); DPIE (2022); DFSI (2017)

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Impacted properties and council land zoning

HVO Continuation Project
Submissions Report
Figure 4.15

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4.5 Department of Planning and Environment – Crown Lands

4.5.1 Impacts to Crown Land and Crown Roads

All Crown Land and Crown Roads within a Mining Lease (with surface rights), subject to mining or mining related activity, must be subject to a Compensation Agreement issued under section 265 of the *Mining Act 1992*, to be agreed and executed prior to any mining activity taking place. The Compensation Agreement may include conditions requiring the Mining Lease Holder to purchase Crown land impacted on by mining activity.

All Crown Land and Crown Roads located within an Exploration Licence, subject to exploration activity, must be subject to an Access Arrangement issued under section 141 of the *Mining Act 1992*, to be agreed and executed prior to any exploration activity taking place.

All Crown Land and Crown Roads within a Mining Lease (with sub-surface rights only) must be subject to a section 81 Consent under the *Mining Act 1992* where surface activities are proposed, to be agreed and executed prior to any surface activity taking place.

All Crown Roads within a Mining Lease or Exploration Licence must be subject to a works consent approval under s138 and or s71 of the *Roads Act 1993* where exploration, mining or mining related activity impact on these roads.

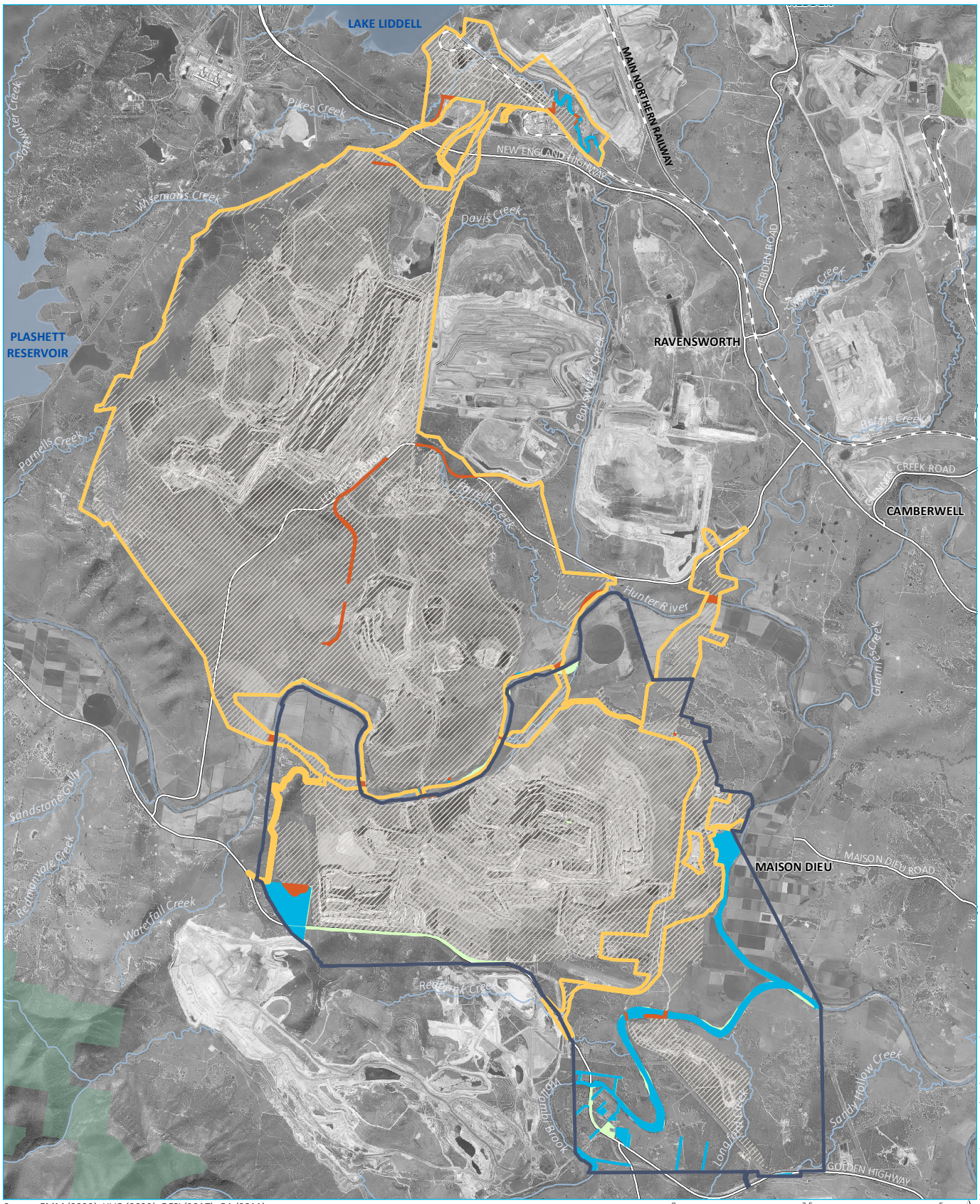
The matters raised by Crown Lands are noted.

There are a number of areas of Crown land parcels and roads within the Project area, including near the HVLP, adjacent to Lake James and the realigned Lemington Road, Hunter River, Bayswater Creek and Wollombi Brook. Crown land and roads within the Project area were shown in Figure 5.2 of the EIS and reproduced in Figure 4.16 below.

As noted in Table 5.1 of the EIS, HVO will seek the appropriate authorisation to enable the occupation and use of the identified Crown land and roads within the Project area prior to being impacted by any mining or mining related activities (including exploration activities). This includes:

- Entering into a Compensation Agreement with Crown Lands where required prior to impacts from mining or mining related activities within a mining lease with surface rights in accordance with the requirements of section 265 of the NSW *Mining Act 1992* (Mining Act).
- Entering into an Access Agreement with Crown Lands where required for any exploration activities, undertaken under an exploration lease, prior to exploration activities being undertaken on Crown land or roads in accordance with section 141 of the Mining Act.
- Obtaining relevant approvals under the Roads Act prior to any mining or mining related activities impacting on Crown land or roads.

No mining or mining related activities are currently proposed where no surface rights exist. As such, it is considered that approvals from Crown Lands under section 81 of the Mining Act will not be required.



Source: EMM (2022); HVO (2022); DFSI (2017); GA (2011)

0 2.5 5 km

GDA2020 MGA Zone 56

N

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KEY

- HVO North proposed development consent boundary
- HVO South proposed development consent boundary
- Project disturbance area
- Crown Land within Project disturbance area
- Crown Land within Project Area
- Lot/road/watercourse parcel with Crown as controlling authority

Existing environment

- Rail line
- Major road
- Named watercourse
- Named waterbody
- NPWS reserve
- State forest

Crown Land within the HVO Project Area

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Figure 4.16

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4.6 Department of Planning and Environment – Water

4.6.1 Water licensing

i Water access licences

That the proponent provides Water Access Licence numbers that are to be used to account for water take due to the project and that the corresponding points of water take are defined.

The documentation has included totals of entitlements held, however details of the specific Water Access Licences and which is to be used to account for what component of water take has not been provided. This is required to understand the adequacy of the water licensing approach.

Table 4.8 summarises water access licence (WAL) entitlements held by HVO by Water Sharing Plan, water source, management zone and licence category. These were summarised in the Water Assessment report, as Appendix K to the EIS. Details of all HVO WAL holdings and associated work approvals are listed in Appendix D, and also reported in the HVO Water Management Plan.

HVO holds multiple work approvals and WALs for the HVO Complex. To reduce the administrative demand on HVO and NSW Government, and following approval of the Project, HVO proposes to consolidate WALs and consolidate works into a Miscellaneous Work approval each for HVO South and HVO North.

Table 4.8 HVO water access licence entitlements by water source and management zones

Water Source	Domestic & stock	General Security	High Security	Supplementary	Aquifer	Unregulated river
Hunter Regulated River Water Sources						
Zone 1B (U/S Glennies Ck)	8	5,244	3,180	98		
Zone 2A (D/S Glennies Ck)		1,393	1,506	301.5		
Zone 2B (D/S Wollombi Bk)	16	613		128.4		
Hunter Unregulated River & Alluvial Water Sources						
Regulated river alluvial -U/S Glennies Creek MZ					568[1]	
Regulated river alluvial -D/S Glennies Creek MZ					289	
Regulated river alluvial -Glennies Creek MZ					-	
Jerrys					-[1]	705
Glennies					-	-
Lower Wollombi Brook					144	88
Singleton					225	
North Coast fractured and porous rock water source						
Sydney Basin North					5,560	

Notes: 1. The Water Assessment Report (Appendix K to the EIS) listed 448 unit shares in the Regulated River Alluvial Water Source – Upstream Glennies Creek and 120 shares in the Jerrys Water Source; however, following review of the NSW Water Register, that WAL actually relates to the Regulated River Alluvial Water Source – Upstream Glennies Creek Management Zone.

ii Water licensing pathway

That the proponent demonstrate sufficient entitlement can be acquired in all relevant water sources to account for the maximum predicted water take.

a Introduction

As described in the Water Assessment report (Appendix K of the EIS) and the Water Licensing Strategy included in Appendix D, HVO holds substantial water entitlement in the relevant water sources in the Project area. The Water Licensing Strategy (Appendix D) provides a detailed response to the recommendation from DPE-Water and other related recommendations, including additional background and context, discussion on the relevant regulatory framework and demonstrates a robust water licensing pathway for the Project (including entitlement to account for the maximum predicted water take). This section summarises the water licensing pathway detailed in Appendix D.

b Water licensing strategy

Groundwater take

Groundwater 'take' by the Project, as defined under the *Water Management Act 2000* (WM Act) and Aquifer Interference Policy (AIP), includes:

- groundwater inflows to mining areas; and
- reduction in baseflow (groundwater discharge) to watercourses due to watertable drawdown.

Groundwater take (over time) for the Project has been predicted by the numerical groundwater flow model developed by AGE (2022) and described in Appendix K of the EIS. The mechanism for groundwater take over time is predominantly driven by mining and associated groundwater level/pressure decline rather than variation in rainfall.

The WAL category needed to account for groundwater take is "aquifer" access licences.

The predicted peak and post-mining groundwater take from each groundwater source and management zone associated with the Project is summarised in Table 4.9, together with the HVO entitlement held in the corresponding area. Charts of the predicted take over time (during operations) for each water source are presented in Appendix D.

HVO holds more than sufficient entitlement to account for the predicted groundwater take over the Project life and beyond in most water sources. During operations and prior to Mining Year 28, HVO will purchase entitlement via the open market to account for the small predicted take in the Jerrys Water Source (5 ML/yr). As part of closure planning, HVO will review the post-closure entitlement requirements. If entitlements are required, HVO will purchase entitlement via the open market for the small predicted take in the Hunter Regulated River Alluvial Water Source – Glennies Creek management zone (3 ML/yr) and Jerrys Water Source (18 ML/yr), prior to closure.

Table 4.9 Predicted peak groundwater take (ML/yr)

Water Source/Zone	Peak take (Mining year)	Ongoing (post-closure)	Entitlement held by HVO	Licensing pathway
Hunter Unregulated River & Alluvial Water Sources				
Hunter Regulated River Alluvial Water Source – U/S Glennies Creek management zone	280 (Mining Year 14)	468	568	Existing entitlement
Hunter Regulated River Alluvial Water Source – D/S Glennies Creek management zone	15 (Mining Year 28)	33	289	Existing entitlement
Hunter Regulated River Alluvial Water Source – Glennies Creek management zone	0	3	0	Review post-closure entitlement as part of closure planning. If entitlement required, market purchase prior to closure
Jerrys Water Source	5 (Mining Year 28)	18	0	Market purchase of 5 unit shares (aquifer access licence) by year 28. Review post-closure entitlement as part of closure planning. If entitlement required, market purchase prior to closure
Glennies Water Source	0	0	0	N/A
Lower Wollombi Brook Water Source	26 (Mining Year 1)	22-27	144	Existing entitlement
Singleton Water Source	1 (Mining Years 10-28)	2	255	Existing entitlement
North Coast fractured and porous rock water sources				
Sydney Basin-North Coast Groundwater Source	2,133 [1] (Mining Year 18)	1,200 – 1,300	5,560	Existing entitlement

Notes: 1. This total is broken down by area/voids in Table D 15 of the Groundwater Impact Assessment Appendix to the EIS

Shading indicates predicted take below HVO's existing entitlement (green) or above existing entitlement (beige); N/A = not applicable

Surface water take

Surface water 'take' by the Project, as defined under the WM Act and AIP, includes:

- increase in surface water leakage to groundwater due to watertable drawdown
- water taken for operational requirements from the Hunter Regulated River Water Source
- runoff captured by the water management system (noting some surface water take is exempt under excluded works exemptions or can be covered under the Maximum Harvestable Rights Dam Capacity (MHRDC)).

Methods used to estimate surface water take (over time) for the Project is listed in Table 4.10, and includes the WAL category needed to account for the relevant take (where not exempt). For the bottom two points in the list above, actual surface water take will be dependent on climate variability (mainly rainfall and evaporation). For example, low rainfall periods will result in less runoff captured by the water management system, but may result in a greater demand from the Hunter Regulated River Water Source to meet operational water supply requirements. These scenarios have been evaluated through the peer reviewed water balance modelling conducted by Engeny (2022) for the EIS.

Table 4.10 Method used to estimate Project surface water take

Type of take	Method used to estimate take	WAL category needed for take (where not exempt)
Surface water leakage to groundwater	Groundwater flow model developed by AGE (2022)	High Security or General Security WAL if indirect take is from the Hunter Regulated River Water Source; OR Unregulated River WAL if take is from: • Jerrys Water Source • Lower Wollombi Brook Water Source • Singleton Water Source • Glennies Water Source
Water extracted from the Hunter Regulated River Water Source to meet operational requirements	Water balance model developed by Engeny (2022), noting actual take will be metered	High Security or General Security WAL for take from the Hunter Regulated River Water Source
Runoff captured by the water management system under a range of climate scenarios	Water balance model developed by Engeny (2022)	Unregulated River WAL if take is from: • Jerrys Water Source • Lower Wollombi Brook Water Source • Singleton Water Source

The predicted peak and post-mining surface water take from each relevant water source and management zone associated with the Project is summarised in Table 4.11, together with the HVO entitlement held in the corresponding area. Charts of the predicted take over time (during operations) for each water source are presented in Appendix D.

HVO holds more than sufficient entitlement to account for the predicted surface water take over the Project life and beyond in all relevant water sources. A summary of the additional detail that is presented in the Water Licensing Strategy in Appendix D is provided below.

Operational demands

As described in the Surface Water Impact Assessment (SWIA) report for the EIS (Appendix K to the EIS; Engeny (2022)), mine and sediment water is preferentially used to meet Project operational demands. Where required, shortfalls are met from the Hunter Regulated River Water Source. This is detailed in the SWIA for a range of rainfall scenarios over the Project life. The current HVO high security regulated river licence of 4,686 shares is sufficient to meet all predicted demands except for during very dry years over the middle years of the Project. During any shortfall years, HVO can use its significant general security regulated river licence of 7,250 shares to make up any shortfall.

River leakage

HVO holds sufficient regulated river and unregulated river entitlements to account for the predicted surface water take (as river leakage) associated with watertable decline (drawdown). The numerical groundwater model predicted river leakage during operations and post-closure. This is described in the Groundwater Impact Assessment (GIA) prepared for the EIS (AGE 2022).

Table 4.11 Predicted peak surface water take (ML/yr)

Water source	River leakage		Runoff captured		Unregulated river entitlement held by HVO	Operational water requirements		Regulated river entitlement held by HVO	
	During operations	Post-closure (Yr 127)	50th percentile	80th percentile		50th percentile	80th percentile	High security	General security
Hunter Regulated River									
Zone 1B (U/S Glennies Ck)	288 (Yr 13)	63	N/A	N/A	N/A	4,306	5,345	**4,686**	**7,250**
Zone 2A (D/S Glennies Ck)	8 (Yr 28)	3	N/A	N/A	N/A				
Zone 2B (D/S Wollombi Bk)	1	0	N/A	N/A	N/A				
Hunter Unregulated River and Alluvial Water Sources									
Jerrys	0	0	18 (non-minor streams)	48 (non-minor streams)	**705**	N/A	N/A	N/A	N/A
Glennies	0	0	0	0	**0**	N/A	N/A	N/A	N/A
Lower Wollombi Brook	1	0	0	0	**88**	N/A	N/A	N/A	N/A
Singleton	0	0	0	0	**0**	N/A	N/A	N/A	N/A

Capture of catchment runoff

A detailed description of the Project water management system, including dams and diversions, is provided in the SWIA at Appendix K to the EIS. Figures 3-1 and 3-2 in the SWIA show the existing water management system and Figures 3-3 to 3-20 show the proposed water management system for the Project (during operations and at closure). Section 3.1.3.1 and 3.1.3.2 of the SWIA describes the design criteria (sourced from the Blue Book (DECC 2008)) for the clean water drains and sediment water drains, respectively.

The 'hydroline' spatial dataset contains mapped information about watercourses and waterbodies in NSW and is used to determine the Strahler stream order of a stream, which in turn identifies 'minor streams' for the purpose of determining:

- whether certain exemptions to the requirement for WALs and approvals apply under the Water Management (General) Regulation 2018 (WM Regulation)
- dams that may be considered (or constructed) as harvestable rights dams or mixed rights dams
- where infrastructure is located in relation to mapped watercourses and waterbodies.

A list of the dams in the water management system, including capacity, mapped hydroline and exemption eligibility is provided in the Water Licensing Strategy in Appendix D and shows that:

- Five existing dams (that will also form part of the Project water management system) are located on non-minor streams, according to the current WM Regulation hydroline
- There are five small clean water dams on minor streams. While these do not meet the excluded works purpose definitions in Schedule 1 of the WM Regulation, take associated with these can be accounted for under the landholdings harvestable right
- All other dams (27) are on minor streams and meet the excluded works purpose definitions in Schedule 1 of the WM Regulation and accompanying fact sheet. These are exempt from requiring a WAL for any associated take in accordance Schedule 4 of the WM Regulation.

The mine water management system is designed to exclude capture and take of clean water from undisturbed catchments. HVO wants to exclude clean water from pits, mine water dams and sediment dams as the clean water diminishes the utility of these structures.

The WM Regulation hydroline dataset does not reflect the on-ground reality at the Project site. Mine plans and water management infrastructure, and associated landform and drainage line (hydroline) changes (including stream diversions) have been approved by Government under the EP&A Act development consents and modifications over time. As the mine operations have progressed consistent with the approved activities, the WM Regulation hydroline dataset has not been updated. The status of the hydroline in relation to mine infrastructure seems to be based on the original 1980s topographic map-based stream delineation.

HVO is seeking an amendment of the WM Regulation hydroline dataset to reflect the approved water management system, including approved stream diversions, and to have any residual licensing liability for captured rainfall runoff based on this amended drainage configuration. Specific details on each of the five structures, and a licensing pathway for each are discussed in Appendix D and demonstrates there is a legitimate water licensing pathway for the Project.

4.6.2 Water balance

A consolidated water balance be provided for a range of climatic scenarios during the project life and post closure until equilibrium is reached for all relevant sources (both surface and groundwater) including any direct and indirect take.

The section above describes the different methods used to predict direct and indirect take from all relevant water sources, which includes a water balance model developed by Engeny (2022) and described in the SWIA included in Appendix K to the EIS. The following sub-sections describe the water balance modelling approach further, including climate variability and integration with the groundwater modelling conducted by AGE (2022).

i Climatic variability used in the water balance model

As discussed in the SWIA (Engeny (2022); included in Appendix K to the EIS), historical climate records for use in the water balance model were obtained from the SILO database at the HVO site from 1892 to 2012 (121 years). This 121-year period was adopted to match the available Integrated Quantity and Quality Model (IQQM) streamflow data for the Glencore Coal Assets Australia (GCAA) Greater Ravensworth Area Water Balance Model (GRAWBM). The IQQM is an integral component of the HVO water balance model to incorporate the Hunter River Salinity Trading Scheme (HRSTS) release logic.

A site water balance model of the Project was developed using GoldSim modelling software to represent the water management system over the life of the Project. The model uses the Australian Water Balance Model (AWBM) to estimate rainfall runoff from the 121-year climate data inputs and considers:

- direct rainfall onto water storage surfaces
- water loss due to evaporation from water storages and pits
- runoff from natural, rehabilitated, and disturbed catchments
- groundwater inflows into open cut pits (predicted using the numerical groundwater flow model developed by AGE (2022))
- water lost to product coal through the coal preparation plant
- water used on site for dust suppression and vehicle washdown
- transfers to and from other sites
- extraction from the Hunter River.

The water balance model uses a time shifting element and a Monte Carlo analysis to forecast 121 possible climate sequences (‘realisations’) over the 27-year project life. The first realisation is based on climatic data from 1892 to 1919, the second from 1893 to 1920, and so on.

For the closure pit lake recovery modelling, the same 121-year climatic data set was used and repeated several times to obtain an extended period of approximately 2000 years to allow the pit lake level to equilibrate.

The data from all realisations have been used to predict the model response (e.g. water management system performance or pit lake recovery) under a range of climate conditions such as the median (50th percentile), 5th percentile (very dry) and 95th percentile (very wet) climate scenarios. Therefore, given the use of long-term historical climate data and Monte Carlo analysis, the water balance model inherently assesses climate variability. A summary of the statistics presented in the SWIA are provided in the following sections along with extraction of additional statistics for reference.

ii Groundwater inflow estimates

As described in the EIS and above, groundwater inflow into mining areas for the Project was predicted using a numerical groundwater flow model (AGE 2022). The groundwater model predicts all groundwater intercepted and was therefore adjusted to estimate 'pumpable groundwater' prior to input into the water balance model. The 'pumpable groundwater' volume excludes estimates of:

- water evaporating directly from the highwall before it reaches the floor (estimates based on an average annual evaporation rate of 1,520 mm/year and a net coal seam thickness of 30 m)
- water adhered to the spoils and coal after blasting that does not flow to in-pit sumps (an adjustment factor of 0.75 has been applied to the remaining groundwater to account for the water entrained in coal and spoil following blasting)

The resulting estimates of pumpable groundwater were input into the water balance model as a time series to align with the mine plan.

The difference noted in DPE-Water submission (1,136 ML/yr vs 2,000 ML/yr presented in the documentation) relates to the adjustment discussed above. Noting that the groundwater model predictions have been used to inform the water licensing requirements for the Project, rather than the adjusted 'pumpable groundwater' volumes which has been used to inform site water management requirements and water management system performance.

iii Operational water balance results

Section 4 and Appendix G of the SWIA presented the predicted *average* annual water balance (inflows and outflows) for the Project. Figure 4.17 to Figure 4.19 and Table 4.12 below show the predicted operational water balance for the median, 5th and 95th percentile climate scenarios.

Storage Inventory, Hunter River extraction and Hunter River Salinity Trading Scheme (HRSTS) release results were also further detailed in Section 4 and Appendix G of the SWIA for the above climate scenarios.

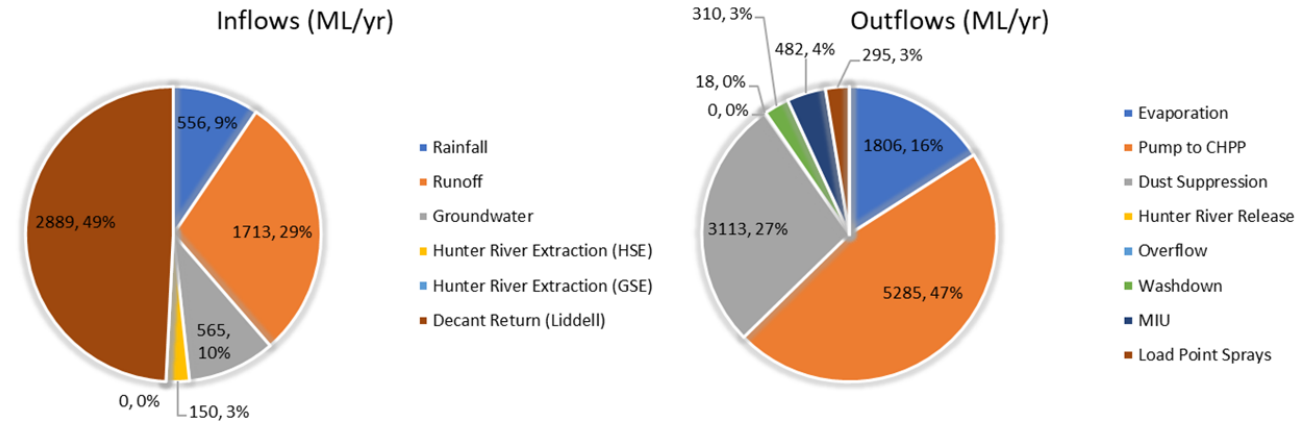


Figure 4.17 Predicted annual water balance (5th percentile)

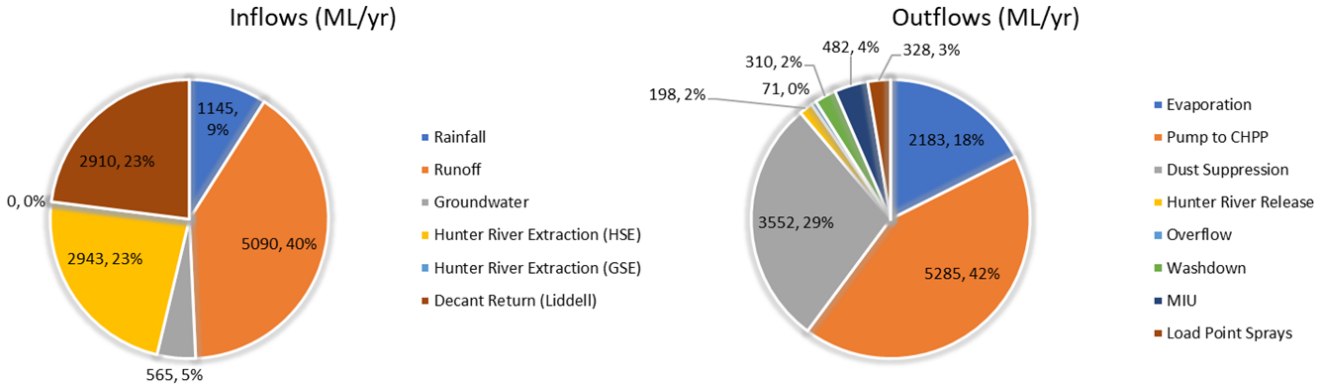


Figure 4.18 Predicted annual water balance (median)

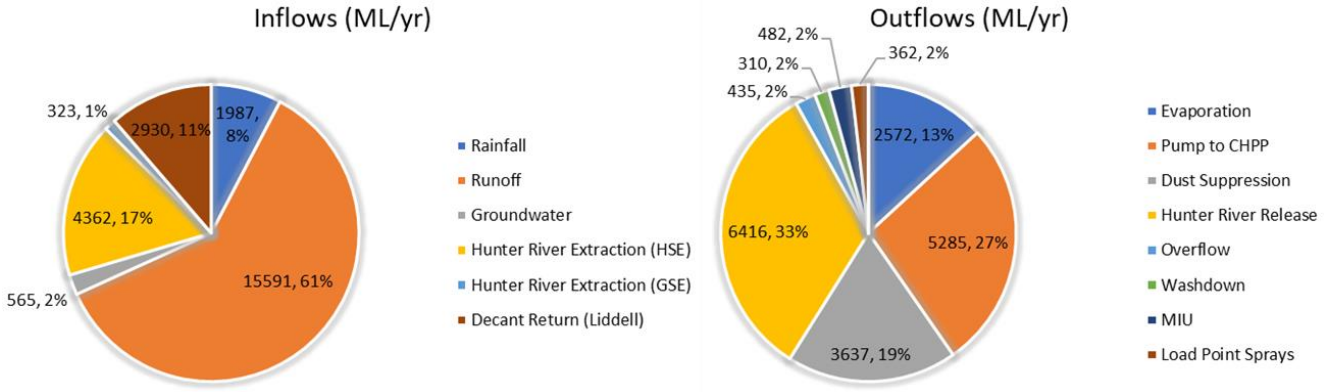


Figure 4.19 Predicted annual water balance (95th percentile)

Table 4.12 Annual water balance (ML/year)

Water stream	2025 (Year 3)			2029 (Year 7)			2033 (Year 11)			2040 (Year 18)			2040 (Year 18)		
	5th Percentile	Median	95th Percentile	5th Percentile	Median	95th Percentile	5th Percentile	Median	95th Percentile	5th Percentile	Median	95th Percentile	5th Percentile	Median	95th Percentile
Inflows															
Rainfall	550	1,100	1,892	550	1,152	1,932	531	1,128	2,093	551	1,173	1,962	577	1,283	2,160
Runoff	1,799	5,027	15,666	1,848	5,287	16,126	1,797	4,994	16,229	1,504	4,901	14,918	1,188	5,074	15,030
Groundwater Inflows	283	283	283	690	690	690	1,136	1,136	1,136	809	809	809	128	128	128
Hunter River Extraction (HSE)	338	3,759	4,704	222	3,700	4,707	531	4,263	4,707	119	1,952	3,967	204	629	2,420
Hunter River Extraction (GSE)	0	0	448	0	0	646	0	0	528	0	0	0	0	0	0
Decant Return (Liddell)	3,157	3,175	3,176	3,147	3,165	3,172	4,097	4,143	4,219	2,937	2,952	2,987	1,202	1,257	1,281
Total Inflows	**6,127**	**13,344**	**26,168**	**6,457**	**13,994**	**27,274**	**8,092**	**15,664**	**28,912**	**5,921**	**11,787**	**24,643**	**3,300**	**8,371**	**21,019**
Outflows															
Evaporation	1,873	2,140	2,570	1,812	2,179	2,465	1,676	2,135	2,483	1,763	2,188	2,557	1,863	2,403	2,885
Pump to CPP	5,819	5,819	5,819	5,804	5,804	5,804	7,402	7,402	7,402	5,364	5,364	5,364	2,115	2,115	2,115
Dust Suppression	3,685	3,987	3,987	3,665	4,224	4,224	3,710	4,532	4,532	3,056	3,867	3,952	936	1,102	1,337
HRSTS Release	0	0	6,529	0	0	6,117	0	0	5,706	0	840	7,599	0	943	7,072
Overflows	86	173	707	14	50	307	12	50	251	11	53	346	7	55	379
Washdown	310	310	310	310	310	310	311	311	311	311	311	311	310	310	310

Table 4.12 Annual water balance (ML/year)

Water stream	2025 (Year 3)			2029 (Year 7)			2033 (Year 11)			2040 (Year 18)			2040 (Year 18)		
	5th Percentile	Median	95th Percentile	5th Percentile	Median	95th Percentile	5th Percentile	Median	95th Percentile	5th Percentile	Median	95th Percentile	5th Percentile	Median	95th Percentile
Miscellaneous Industrial Use (MIU)	350	350	350	672	672	672	634	634	634	351	351	351	350	350	350
Load Point Sprays	296	330	362	296	330	362	295	328	363	295	327	363	294	325	362
Total Outflows	**12,418**	**13,108**	**20,633**	**12,572**	**13,568**	**20,260**	**14,040**	**15,392**	**21,681**	**11,150**	**13,300**	**20,842**	**5,874**	**7,603**	**14,810**
Change	**-6,292**	**236**	**5,536**	**-6,114**	**426**	**7,013**	**-5,948**	**272**	**7,231**	**-5,229**	**-1,513**	**3,802**	**-2,575**	**769**	**6,210**

iv Final pit lake recovery

a Modelling approach

As described in the SWIA, a water and salt balance model of the HVO South and HVO North final voids was developed to estimate equilibrium pit lake water levels, pit lake recovery rate and water quality (as total dissolved solids (TDS)) long-term post closure. The modelling was conducted using the GoldSim software using calibrated hydrology inputs from the operational water balance model. The recovery model simulates inflows from rainfall runoff over the residual final void catchment (including direct rainfall), groundwater fluxes (inflow or outflow) from bedrock and spoil seepage (predicted by the groundwater model (AGE 2022)) as well as outflow due to evaporation. Figure 4.20 illustrates the components of the final void water balance modelling.

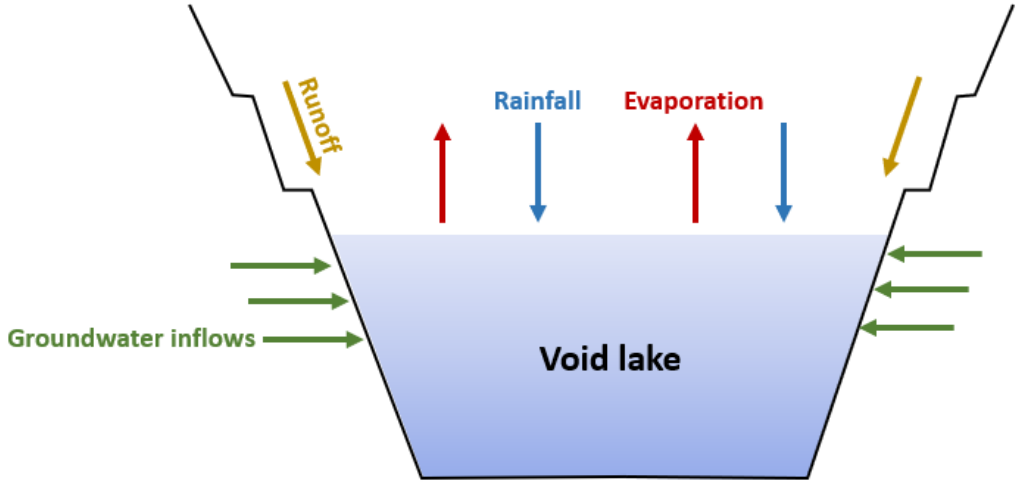


Figure 4.20 Illustration of final void water balance model inputs and outputs

b Closure water balance model results

The outcomes for the range of climatic scenarios were presented in the form of annual long-term water balance (inflows and outflows) for the average, 20th percentile and 80th percentile in the SWIA for the EIS. The SWIA and Water Assessment report (Appendix K to the EIS) also presented the average predicted pit lake level and salinity for each void (HVO North and HVO South).

The results of the final void recovery model for the average, median, 20th percentile and 80th percentile are presented in Table 4.13. Figure 4.21 and Figure 4.22 show the predicted final pit lake water levels and salinity for the HVO North void and HVO South void, respectively.

Table 4.13 Water recovery results at 1,000 years following mining

Parameter	HVO North void				HVO South void			
	Average	20th percentile	Median	80th percentile	Average	20th percentile	Median	80th percentile
Long-term pit lake level (mAHD)	-80.4	-81.2	-80.3	-79.8	-83.9	-84.8	-84.0	-83.3
Lake salinity as TDS (mg/L)	14,800	14,700	14,800	15,100	10,300	10,200	10,400	10,600
Freeboard at long-term pit lake level (m)	155	156	155	155	159	160	159	158

Notes: TDS = total dissolved solids

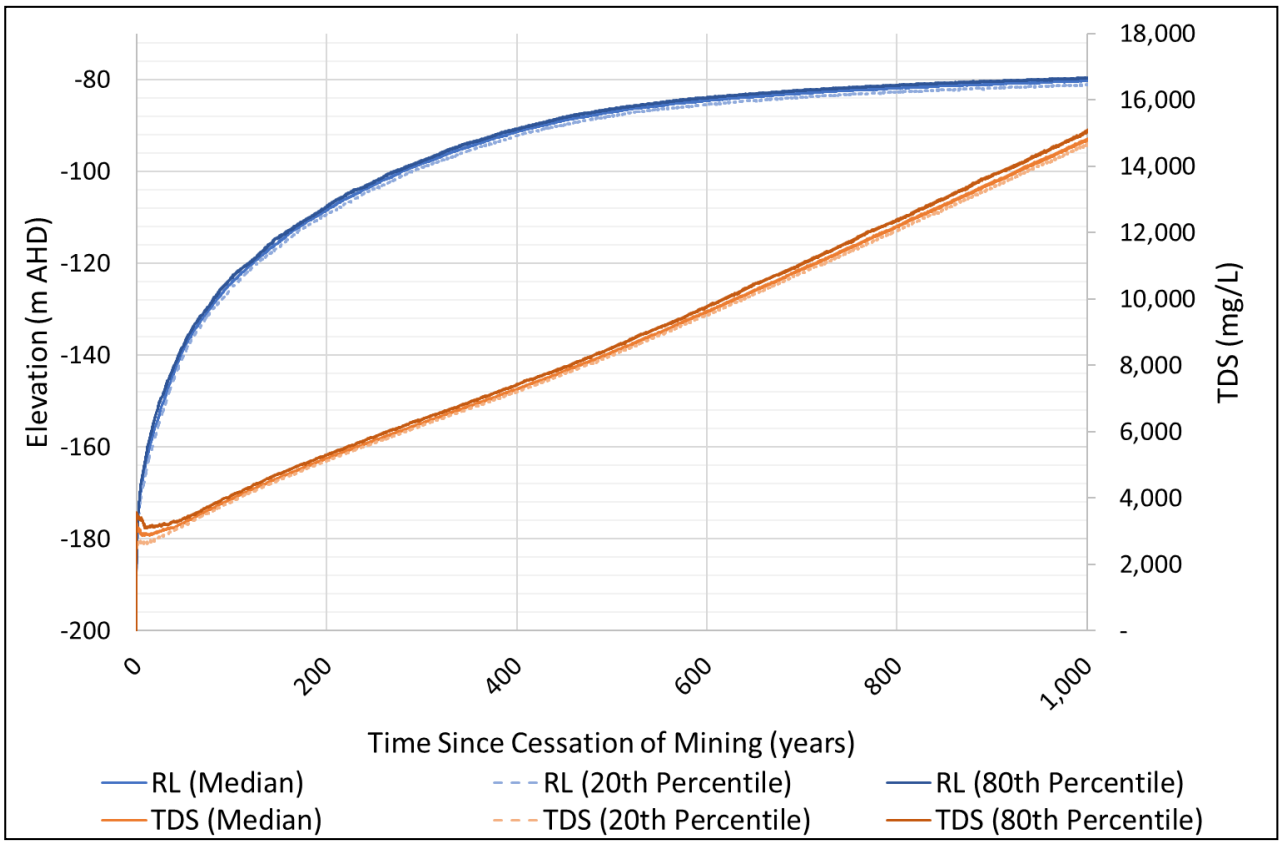


Figure 4.21 HVO North predicted pit lake recovery and salinity (Engeny 2022)

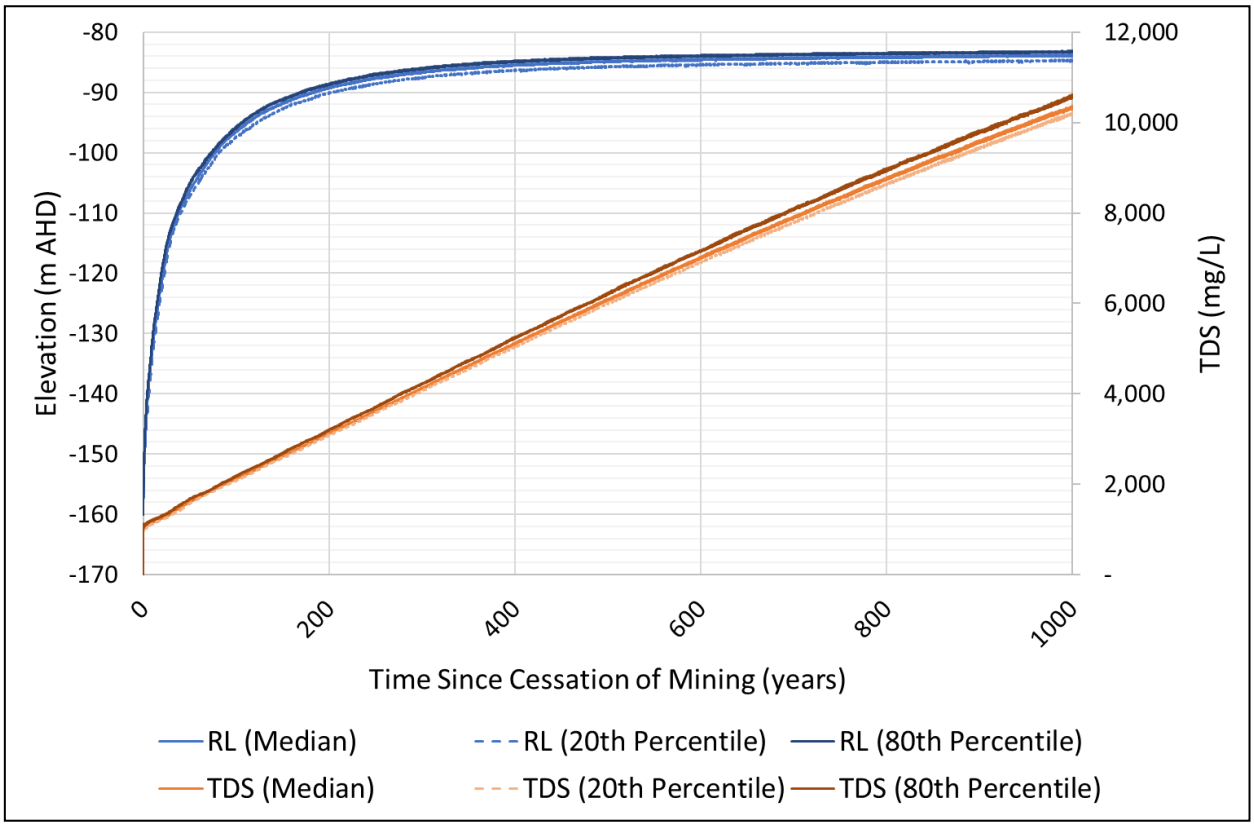


Figure 4.22 HVO South predicted pit lake recovery and salinity (Engeny 2022)

4.6.3 Activities on waterfront land

That the proponent confirm how the Guidelines for Controlled Activities on Waterfront Land (DPE 2022) have been applied to the proposed activities and that a clear assessment of impacts on watercourses has been provided.

In accordance with section 4.41(1) of the EP&A Act, an activity approval under section 91 of the WM Act is not required for State significant development that is authorised by development consent. However, HVO proposes to undertake any works within waterfront land generally in accordance with the CCA guidelines (DPE 2022) and Volumes 2A, 2C, 2D and 2E (DECC 2008) (the Blue Book).

The existing approved HVO operation has well-established systems in place for monitoring and management of surface water. It is proposed that the Project will maintain and build off these systems.

Controls are documented in the Water Management Plan (WMP) (dated 2018, noting an updated version of WMP (dated 2022) is currently under review by DPE), which includes a Surface Water Management Plan and Groundwater Management Plan as well as sections that address erosion and sediment control and response plans.

It is proposed to manage and construct the proposed infrastructure using the same methods and controls that are currently in place and specified in the WMP. When work is required within or adjected to watercourses (i.e. waterfront land), work will be in accordance with guidelines from Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom 2004) and the Blue Book, including:

- Works within the riparian zone will maximise, where possible the preservation of any existing vegetation and minimise site disturbance.

- Designs for works within or near water bodies will ensure the retention of natural functions and maintenance of fish passage in accordance with NSW Fisheries Guidelines (undated) Fish Friendly Waterway Crossings.
- When designing individual catchment configurations, retain naturally functioning streams and drainage lines, avoid aggregation of several sub catchments and clearly define maintenance requirements prior to construction.
- Where works are to be undertaken within the 2 year flood level, measures will be incorporated to ensure C-factors (i.e. factor relating to vegetation coverage and/or soil stabilisation methods as outlined in Appendix A of Volume 1 of the Blue Book (Landcom 2004)) are always below 0.05 during possible erosion events.
- Works will be planned in consideration of forecast weather.
- Planned works within or near watercourses will have inspections completed as per Ground Disturbance Permit (as specified in the WMP) specific conditions.

4.6.4 Bank stabilisation works

That works which will result in alterations to the hydrology of the Hunter River or its floodplain and tributaries be reviewed to ensure no impact to the structural integrity of Hunter Valley Flood Mitigation Scheme bank stabilisation works.

Velocity results for the 1% and 10% Annual Exceedance Probability (AEP) events were assessed for all stabilisation works within the flood assessment area. The ArcGIS layer presented in Appendix B of the DPE-Water submission was sourced from Local Land Services (LLS). Figures for these results are presented in Appendix G and summarised in Table 4.14.

The potential for the Project to impact the stabilisation works is considered negligible, as modelling indicates only minor changes to peak velocities in these areas. There is negligible risk to the integrity or functionality of the Hunter Valley Flood Mitigation Scheme bank stabilisation works.

In summary:

- 1% AEP – two stabilisation works locations with modelled decreases of 0.1 metres per second (m/s) and one stabilisation works location with an increase of 0.1 m/s.
- 10% AEP – four stabilisation works locations with modelled decreases in velocity of 0.1 to 0.2 m/s and two stabilisation works locations with modelled increases in velocity of 0.1 m/s.

Table 4.14 Peak velocities at stabilisation work locations

Levee label	Maximum velocity (m/s) - 1% AEP			Maximum velocity (m/s) - 10% AEP		
	Baseline	Operational	Change	Baseline	Operational	Change
HR RB 193.6	4.2	4.2	-	2.2	2.2	-
HR LB 191.4	1.7	1.7	-	1.4	1.4	-
HR LB 191.0	1.5	1.5	-	1.3	1.3	-
HR RB 189.8	2.1	2.1	-	2.0	2.0	-
HR 186.2 LB	1.2	1.1	- 0.1			-
HR 184.6 LB	1.7	1.7	-	1.7	1.7	-
HR RB 180.40	3.3	3.3	-	2.0	2.0	-
HR RB 179.80	2.9	2.9	-	2.2	2.2	-
HR LB 179.50	2.5	2.4	- 0.1	1.6	1.6	-
HR LB 179.00	2.6	2.6	-	1.9	1.9	-
HR RB 179.00	1.8	1.8	-	1.6	1.6	-
HR RB 178.90	1.7	1.7	-	1.6	1.6	-
HR RB 178.8	1.8	1.8	-	1.8	1.8	-
HR RB 178.5	1.7	1.7	-	1.7	1.7	-
HR RB 177.60	2.2	2.2	-	1.6	1.7	0.1
WB LB 9.1	0.4	0.4	-	0.3	0.3	-
WB RB 5.6	2.0	2.0	-	1.9	1.9	-
WB RB 5.2	2.3	2.3	-	2.0	1.9	- 0.1
WB LB 1.85	2.0	2.0	-	1.4	1.4	-
WB RB 1.4	1.8	1.8	-	1.3	1.3	-
WB LB 0.4	1.3	1.3	-	0.4	0.4	-
HR RB 160.0	2.6	2.6	-	1.8	1.8	-
HR RB 159.8	2.8	2.8	-	1.3	1.4	0.1
HR RB	2.4	2.4	-	2.1	2.1	-
HR LB	1.6	1.6	-	1.4	1.4	-
BC LB 1.8	0.5	0.5	-	0.4	0.4	-
BC LB 0.5	0.7	0.7	-	0.4	0.4	-
HR LB 172.00	2.2	2.2	-	2.3	2.2	- 0.1
HD SR BP 171.00	1.8	1.8	-	1.7	1.7	-
GC0.00RB	1.5	1.5	-	1.5	1.5	-

Table 4.14 Peak velocities at stabilisation work locations

Levee label	Maximum velocity (m/s) - 1% AEP			Maximum velocity (m/s) - 10% AEP		
	Baseline	Operational	Change	Baseline	Operational	Change
BoC0.10LBP	1.1	1.1	-	0.6	0.6	-
HR LB 169.2	2.0	2.0	-	1.8	1.8	-
GC2.40LB	1.4	1.4	-	1.3	1.3	-
BoC2.80LBP	1.2	1.2	-	1.0	1.0	-
GC LB 3.6	2.4	2.4	-	1.8	1.8	-
GC RB 4.0	2.2	2.2	-	1.7	1.7	-
GC LB 4.0	1.8	1.8	-	1.2	1.2	-
ARL 6.2 GC	0.3	0.3	-	0.2	0.2	-
GC 6.4 ARL P	0.2	0.2	-	0.1	0.1	-
GC LB 6.60	0.1	0.1	-	0.1	0.1	-
8.6 RB Mesh GC	0.1	0.1	-	Outside flood extent	Outside flood extent	-
BC RB 3.6	1.3	1.3	-	1.1	1.1	-
BC LB 4.3	0.7	0.7	-	0.6	0.6	-
BC RB 4.5	0.5	0.5	-	0.4	0.4	-
ARL 6.2 GC	0.3	0.3	-	0.2	0.2	-
GC 6.4 ARL P	0.2	0.2	-	0.1	0.1	-
GC LB 6.60	0.1	0.1	-	0.1	0.1	-
GC 9.8 RB Mesh	0.2	0.3	0.1	Outside flood extent	Outside flood extent	-
BC LB 1.8	0.5	0.5	-	0.4	0.4	-
BC RB 3.1	1.0	1.0	-	0.6	0.4	- 0.2
BC RB 3.6	1.3	1.3	-	1.1	1.1	-
BC LB 4.3	0.7	0.7	-	0.7	0.6	- 0.1
BC RB 4.5	0.5	0.5	-	0.4	0.4	-
HR LB 172.00	2.2	2.2	-	2.3	2.2	- 0.1

4.6.5 Carrington West Wing barrier wall

Prior to determination the proposed change in location and design of the currently approved Carrington West Wing Pit low permeability barrier not be supported due to potential increased risk to the Hunter River, the alluvium and water users. It is recommended one of the following two options be implemented to mitigate this risk:

1. Implement a 150 m setback between the West Carrington Pit and the edge of the Hunter Regulated River Alluvial Water Source. This would be consistent with the guideline, "Management of stream/aquifer systems in coal mining development – Hunter Region (DIPNR 2005)" and remove the requirement for the installation of a low permeability barrier.
2. If a low permeability barrier is to be maintained, that its construction occur prior to mining as currently approved, and that this include a demonstration of its performance consistent with current consent requirements in conditions 23 and 24 of development consent DA 450-10-2003.

i Introduction

Following consultation with DPE-Water in July 2023, DPE-Water clarified the advice provided above, specifically regarding the 150 m setback distance between the pit and the Hunter Regulated River Alluvial Water Source. In advice dated 10 August 2023, DPE-Water clarified that the Hunter Regulated River Alluvial Water Source applies at the boundary of the unconsolidated alluvial sediments and the hard rock material of the North Coast Porous Rock Groundwater Source, and includes the paleochannel sediments.

It is understood that the intent of DPE-Water's advice relates to limiting the potential impact on the Hunter River and associated alluvial aquifer, which includes the unconsolidated sediments that make up the remnant paleochannel.

The 150 m mining setback distance from the remnant paleochannel (option 1) would negate the need for the barrier wall.

ii Background

The Carrington West Wing low permeability barrier wall was a commitment that came out of modification 3 for HVO North DA 450-10-2003 in 2010. Mackie Environmental Resource (MER) prepared the groundwater impact assessment and associated analysis to support the modification to mining into the Carrington West Wing extension area, which included mining into the western arm of the identified paleochannel to mine down to the Bayswater Seam. The modelling and assessment were reviewed by Dr Franz Kalf and there was correspondence post-EIS clarifying aspects of the modelling and updated analysis to provide confidence to Dr Kalf and the NSW Government.

The original purpose of the Carrington West Wing barrier wall was to:

- prevent groundwater drainage from the Hunter River alluvium to the mining area, and associated drawdown in the alluvium
- prevent seepage from emplacement areas to the Hunter River alluvium

The location of the remnant paleochannel, as inferred in 2010 by MER and presented in the EIS for modification 3, is re-presented in Figure 4.23 below. The figure also shows the location of a geological cross section which is reproduced in Figure 4.24. The figures presented by MER in 2010 demonstrate that the portion of the paleochannel in hydraulic connection with the Hunter River and associated alluvium is the remnant area south of the previously mined (and rehabilitated) Carrington West Wing area (north of the extension area).

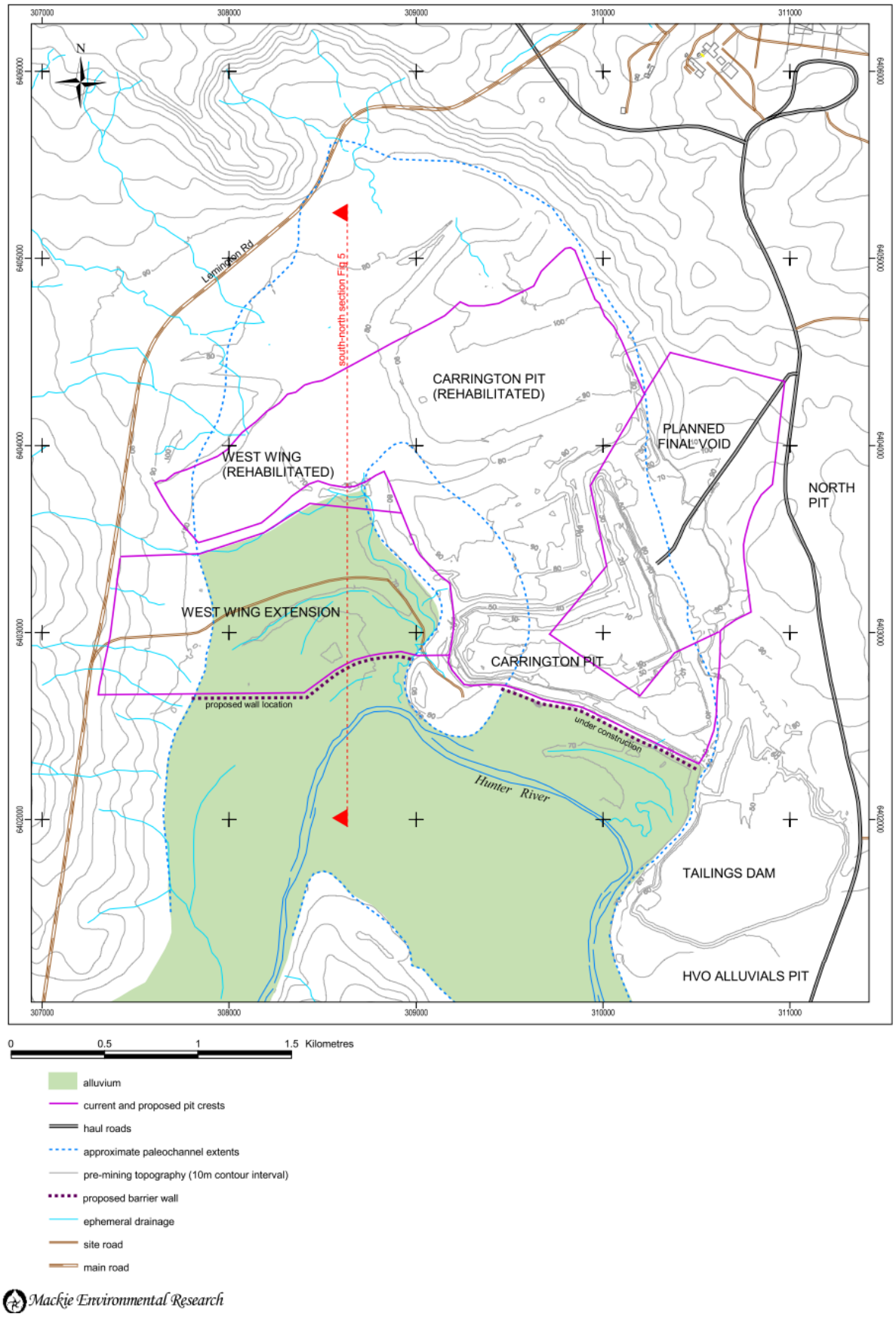


Figure 4.23 Remnant paleochannel location (original from MER 2010)

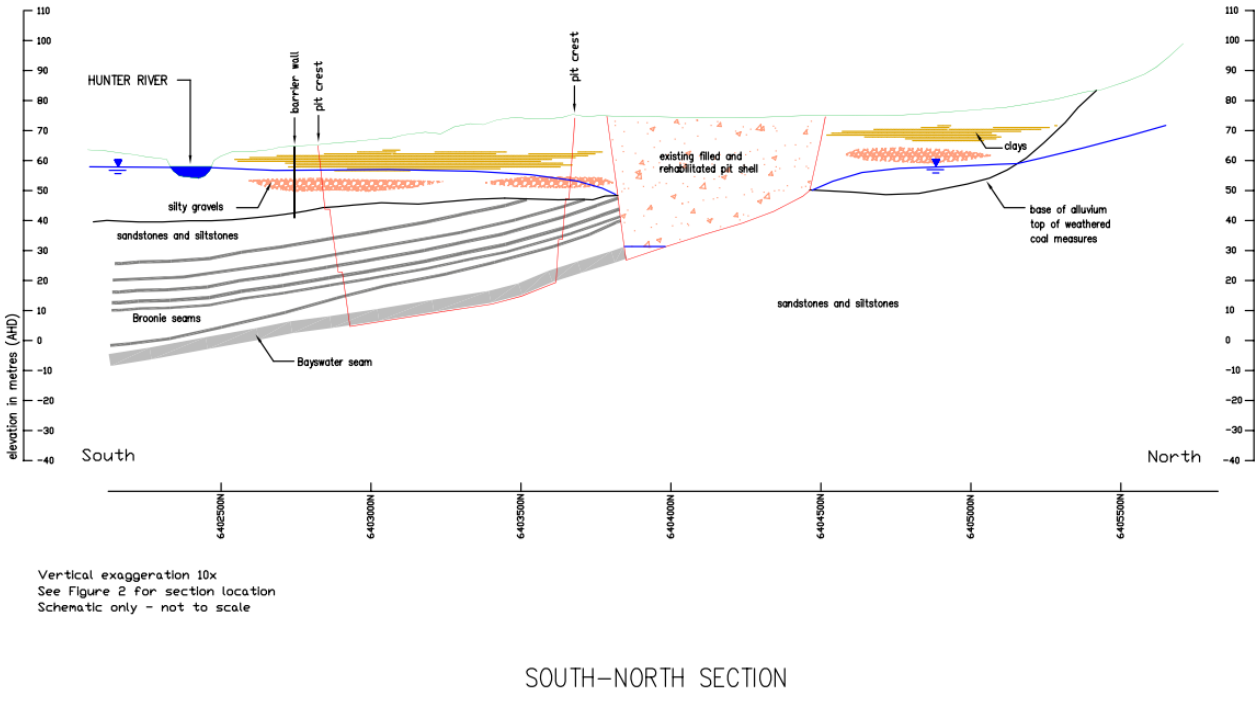


Figure 4.24 Cross section through the western arm of the paelochannel and HVO North mined areas (MER 2010)

As part of the modification approval, Condition 23 and 24 were added to DA 450-10-2003 stating the requirements for designing the barrier wall to the satisfaction of the NSW Government and constructing the barrier wall prior to mining *within 100 m of the western arm of the Hunter River paleochannel*.

The EIS for the Project proposed constructing the barrier wall following mining and prior to backfilling the pit, consistent with the construction methodology used for the constructed Carrington Pit barrier wall (located at the edge of the pit and the eastern arm of paleochannel).

iii Revised approach

HVO proposes to install the low permeability barrier wall consistent with the existing consent requirements in Condition 23 and 24 of DA 450-10-2003 (that is, Option 2 in DPE-Water's recommendation on the EIS), as it meets DPE-Water's intent to limit the potential impact of the Project on the Hunter River and associated alluvium and dependent assets.

As the mapped boundary of the Hunter Regulated River Alluvial Water Source (in the NSW Government online dataset) does not include the remnant paleochannel, and should the Project be approved, HVO proposes the relevant condition in the revised development consent for the Project be amended to:

> Prior to undertaking mining operations within 100 metres of the remnant western arm of the Hunter River paleochannel in connection to the Hunter River, the Applicant must install the low permeability barrier wall across the western arm of the remnant…

The conceptual location of the barrier wall is shown in Figure 3.3 and would be appended to the development consent to limit uncertainty about the location and interpretation of the boundary between the Hunter Regulated River and Alluvial Water Source (and associated unconsolidated sediments) and the hard rock material of the North Coast Porous Rock Groundwater Source.

The current proposed annual pit progression indicates the mine will come to within 100 m of the remnant paleochannel in connection to the Hunter River in approximately Year 11.

iv Updated water management plan

Post approval the proponent prepares a Water Management Plan to prescribe comprehensive monitoring, management and mitigation options that minimise groundwater losses from the Hunter Regulated River and alluvium.

DPE Water hold residual concerns that with mining proposed in close proximity to the Hunter Regulated River and with the interception of the floodplain, there is the risk of a significant hydrological connection being generated that would permit interflow of surface water and groundwater between the Hunter Regulated River/alluvial aquifer towards the mine pit. This is due to the coal seams that are being mined also sub-cropping beneath the Hunter Regulated River and alluvium.

The Water Management Plan must present a descriptive strategy that will monitor and evaluate groundwater ingress into the mine originating from the Hunter Regulated River and alluvial aquifer.

a Overview

As described in the Water Assessment prepared for the EIS (Appendix K to the EIS), following Project approval, HVO will update the WMP in consultation with DPE-Water and relevant agencies to incorporate the proposed additional monitoring, management and mitigation measures for the Project.

The updated WMP will address any specific development consent or licence conditions and will include:

- proposed mitigation and management measures for the Project
- objectives and performance criteria including trigger levels for investigating any potentially adverse impacts associated with the Project, including groundwater level and quality trigger levels for the Carrington Billabong area and Hunter River alluvium south of the Carrington West Wing barrier wall (discussed further below)
- details of monitoring, inspection and maintenance programs
- reporting procedures for the results of the monitoring program
- plans to respond to any exceedances of the performance criteria and indicators.

HVO has an established substantial groundwater monitoring network to monitor groundwater levels / pressures and quality at the HVO Complex, as detailed in the WMP and the GIA (Appendix A to Appendix K of the EIS). The monitoring network was augmented in the early stages of the Project planning and EIS, with additional monitoring locations added to the existing network. Following Project approval, HVO will undertake a gap analysis of the existing monitoring and management plans to identify potential changes required to the monitoring program or management measures (including performance measures and trigger action response plans) as described above.

In addition, a review of the groundwater monitoring network and monitoring equipment will be conducted as part of updates to the WMP. This would consider installation of additional pressure transducer data loggers at other monitoring bores to increase or complement the existing the monitoring frequency.

b Carrington West Wing barrier wall area

As described in the Water Assessment (Appendix K of the EIS), the existing monitoring network within the area of, and south of, the approved location of the Carrington West Wing barrier wall is currently limited to four monitoring locations. Additional monitoring bores will be installed between the barrier wall and the Hunter River to monitor for potential impacts in this area.

A network of eight nested monitoring bores will be installed in this area, with separate bores screened with the alluvium and Permian strata. The bores will be equipped with pressure transducer data loggers to record changes in groundwater pressure, the records of which will be calibrated with regular (e.g. quarterly) manual measurements of depth to groundwater level. The bores will be installed approximately one year prior to mining commencement in the connected remnant paleochannel, to allow collection of background groundwater level and quality trends.

In addition, piezometers will be installed downstream of the Carrington West Wing barrier wall, consistent with the approach used for the Carrington Pit barrier wall. The purpose of the piezometers would be to monitor for changes in salinity and pressure as mining advances.

In accordance with condition 25 of the HVO North development consent (DA 450-10-2003), HVO will develop a low permeability barrier monitoring and management plan (LPB MMP) following Project approval and in consultation with DPE-Water.

The LPB MMP would include the following:

- Identification and design of dedicated groundwater monitoring bores in the area described above that will be installed approximately one year prior to mining in the remnant paleochannel.
- Monitoring requirements and methodologies, including monitoring of groundwater levels/pressures and salinity at a suitable frequency (such as daily records at alluvial monitoring bores using level temperature conductivity (LTC) data loggers), and sampling for comprehensive laboratory water quality analysis at a suitable frequency, to evaluate the efficacy of the Carrington West Wing barrier wall.
- Identification and design of piezometers to be installed downstream of the Carrington West Wing barrier wall during construction.
- Summary of the Carrington West Wing barrier wall construction methodology and design requirements.
- Identification of other monitoring requirements or adjustments, such as at the Hunter River and/or river red gum stands.
- Selection of trigger levels, and appropriate action response plan(s), for groundwater level and salinity in the Hunter River alluvium south of the Carrington West Wing barrier wall so that groundwater level and quality is adequately managed.
- Summarising reporting commitments that will evaluate multiple lines of evidence for assessing potential impacts at receptors, including groundwater quality, groundwater levels/pressures, mining activity, climate (rainfall and temperature), streamflow, surface water quality and riparian vegetation health monitoring. This is because changes to groundwater (quantity or quality) are likely to precede any impacts to the biological indicators associated with groundwater dependent ecosystems (termed secondary impacts by Serov et al (2012)) and should be used as early indicators of possible receptor impact.

Groundwater quality performance triggers for the Carrington West Wing barrier wall area will be reviewed as baseline data is collected (prior to mining in the remnant paleochannel in connection to the Hunter River). The performance triggers will be based on statistical analysis of the recorded ranges in baseline concentrations of selected leading indicators (e.g. salinity and sulphate concentrations). Groundwater level (as elevation or trends) performance triggers will be based on a combination of baseline data for selected monitoring bores as well as comparison of measured and model predicted levels/heads for different stages of the Project.

4.6.6 Groundwater model

Prior to determination the proponent completes refinements to the groundwater modelling as follows:

- Design and run additional model scenarios to assess the impacts of the proposed HVO Project (the Project) separately from other ongoing/historical mining operations, in addition to the provided cumulative impact assessment. This is also to include the aim of reducing the scaled root mean squared error (SRMS) of the model to within guideline limits. It is to include:
  - an assessment of the Project's direct and cumulative groundwater level drawdown impacts at all bores and Groundwater Dependent Ecosystems (GDEs) in the area. The assessment should be presented from the onset of HVO to the year 2100. This can be provided in graphical form (hydrographs) and/or table format for key years. It must include an assessment of uncertainty analysis.

Carefully designed model scenarios should be run to assess the impacts of the Project separately from other mining operations. This is required in addition to the cumulative impacts presented in the Groundwater Modelling Technical Report, the Groundwater Impacts Assessment, and the Water Assessment report. Additional model scenarios could reduce the models SRMS.

Groundwater level drawdown effects from the Project and groundwater level drawdown from all projects in the area must be assessed to be able to address the minimal impact considerations and make-good provisions as required by the AIP. The assessment must also include an adequate uncertainty analysis as required by the Australian Groundwater Modelling Guidelines (AGMG 2012) and the NSW SSD minimum groundwater modelling requirements (DPE 2022).

i Overview

A regional numerical groundwater flow model was developed using MODFLOW-USG to predict the potential changes to the groundwater regime from the Project. The model was based on previously approved models within or near the Project area, including the model developed for HVO South MOD 5 (AGE 2017) and Glendell Continued Operations Project (AGE 2019).

The groundwater model represents the main hydrogeological units within the area and the hydrogeological conceptual model described in the GIA (AGE 2022) and the Water Assessment report (Appendix K of the EIS). The predictive model represented cumulative effects from regional mining activities as well as the new elements of the Project. Details of all the mining operations represented within the numerical model are provided in AGE (2022) Table D3 and shown graphically in Figures D5 and D6.

The modelling was conducted in accordance with the Australian Groundwater Modelling Guidelines (Barnett et al 2012) and meets the criteria outlined in the Australian Groundwater Modelling Guidelines for a Class 3 model classification, with some characteristics of a Class 2 model. The modelling approach is also generally consistent with the requirements of the NSW SSD minimum groundwater modelling requirements (DPE 2022).

Assessment criteria for the various water-related assessments is listed in Section 6 of the Water Assessment report (Appendix K of the EIS). The potential impacts of the Project on groundwater resources and associated assets have been assessed against the minimal harm thresholds defined in the AIP. The AIP assessment framework has been completed and is included in Appendix E to Appendix K of the EIS.

Table 4.15 provides a summary of the groundwater modelling approach described in the GIA (Appendix A to Appendix K of the EIS).

Table 4.15 Summary of groundwater modelling approach

Modelling stage	Summary
History-matching (calibration)	The groundwater model was calibrated with an initial, pre-mining steady state stress period (to end of 1969) and a transient run (1970 to 2020) using available groundwater level data. The calibration effort focused on replicating the key regional trend of depressurisation within the Permian strata adjacent to mining areas, and the limited drawdown observed in the alluvial aquifers. Transient calibration was carried out to simulate conditions between 1970 and 2020, and the resulting (unweighted) scaled root mean square (SRMS) error is 9.2%, which is within the guidance range of 10% recommended by the Australian Groundwater Modelling Guidelines (Barnett et al 2012).
Predictive modelling	Three main scenarios were simulated to assess the potential incremental impact of the Project (in comparison to the current approved operations) and the cumulative impact of the existing approved and foreseeable proposed mining activities in the area: • 'Baseline' - The results of this scenario provide a baseline for estimating cumulative (total) impacts, as per the requirements listed in the AIP (to assess the cumulative post-water sharing plan (WSP) impacts). In this baseline model, simulated mining at HVO ceases after 2009[2]. Climate stresses and other approved mining activities in the model domain are simulated. This scenario is conservative as it does not simulate reality and results in exaggerated predictions of groundwater drawdown and changes in surface water-groundwater interaction for the Project. • 'Approved' – This scenario included the currently approved operations at the HVO Complex (i.e. approved mine plan ceasing at HVO North in 2025 and at HVO South in 2030), as well as approved and foreseeable operations within the model domain to represent cumulative effects. This included simulation of the approved but not yet constructed Carrington West Wing barrier wall prior to mining in that area at HVO North. This scenario also included simulation of the current approved mining at South Lemington Pit 1 and 2. • 'Proposed' – This scenario included simulation of the Project and all approved and foreseeable operations in the model domain, again to represent cumulative effects. This included simulation of one pit at HVO North moving from the current Mitchell Pit towards the Carrington Pit in the south-east. In addition, the Carrington West Wing barrier wall was simulated, as proposed in the EIS, following mining in the Carrington West Wing area but prior to backfilling. This is a conservative scenario in comparison to HVO's adjusted approach to installing the barrier wall as per the current consent requirements, prior to mining within 100 m of the remnant paleochannel. The potential additional impact of the Project on the groundwater regime (termed incremental) was calculated by comparing the results of the 'proposed' scenario to the 'approved' scenario. The cumulative effects (with the Project) were calculated by comparing the results of the 'proposed' scenario to the 'baseline' scenario. During the predictive modelling, the Hunter River streamflow was simulated using the average annual streamflow, and the height of water in the river was allowed to vary with changes in baseflow and river leakage.

[2] Cumulative variation in the watertable and/or pressure head decline criteria in the AIP are for 'post-WSP' variations only. EMM understands the reference to 'post-WSP' (in regards to minimal impact considerations) to mean that projects /activities should be assessed against environmental conditions at the time of a WSP being enacted (or soon after), allowing for climate variation. For the Hunter River alluvium (managed under the Hunter Unregulated River and Alluvial WSP), this is late 2009. It is an acknowledgement of activities prior to commencement of the WSP

Table 4.15 Summary of groundwater modelling approach

Modelling stage	Summary
Predictive uncertainty analysis	Middlemis and Peeters (2018) outline three general approaches to analysing parameter uncertainty in increasing order of complexity and the level of resources required for each of them. For this Project, a Null-space Monte Carlo uncertainty analysis (type 3) was undertaken to quantify the magnitude of uncertainty in the predicted drawdown in the alluvium. This type of analysis produces probability distributions for predictive impacts and an indication of the likelihood of drawdown occurring by assessing and ranking the predictions from hundreds of models 'realisations'. Of the 378 models run, 149 model runs converged, and 56 model runs did not produce acceptable calibration statistics, leaving 93 model runs, which provided a suitable number of runs to quantify uncertainty. Hydraulic conductivity (vertical and horizontal) and storage properties of hydrogeological units, tailings and spoil; stream bed conductance and recharge were included in the parameter uncertainty. Parameter sensitivity analysis was also conducted and is reported in the GIA (AGE 2022).

ii History-matching and the scaled root mean square (SRMS)

The HVO model is a very large regional model representing many dynamic processes occurring in the model domain. Practically, not all processes occurring in the area being modelled can be represented in a large numerical model – this is normal for all numerical models.

History-matching efforts were focused on groups of bores (refer Figures D19-D21 in the GIA (AGE (2022)), prioritising modelling of important trends observed within Hunter Regulated Alluvium Water Source and underlying coal measures between HVO North and HVO South (including vertical gradients).

A significant history-matching exercise was undertaken to reduce as much as possible the uncertainties of hydraulic properties that are represented in a model, and hence of predictions that are sensitive to them.

In addition, complex predictive uncertainty analysis (Type 3 as per IESC Explanatory Note on predictive uncertainty (stochastic)) was conducted, recognising residual uncertainty in hydraulic properties and model boundary conditions.

One of the Guiding Principles in Section 7.4 of the Australian Groundwater Modelling Guidelines (Barnett 2012) also states:

> It is not unusual for modellers to find that the calibration does not allow all aspects of historical measurements to be reproduced. Sometimes absolute values of heads are too high or too low, suggesting that hydraulic conductivities and recharge are not in balance, but trends are reasonable, suggesting that the relationship between hydraulic conductivity and storage coefficient is reasonable, or that the relationship between perturbations in recharge and specific yield are reasonable. In such cases calibration may be considered reasonable if differences in heads seem to be reasonable. There may be no theoretical reason to support this conclusion, but sometimes there appears to be no alternative.

Based on the focus of the history-matching and associated outcomes, and peer review process (discussed further below), the predictive capability of the regional model (and associated SRMS) is fit for purpose.

iii Predicted drawdown

As described in the GIA and the Water Assessment prepared to support the EIS (within Appendix K of the EIS), the groundwater modelling completed for the Project included various scenarios to evaluate incremental (comparison between approved and proposed) and cumulative (estimating the effects of historic approved, the Project and other planned mining activities) changes in groundwater levels/pressures.

The predicted incremental and cumulative drawdown focused on the alluvium, as it provides habitat for and access to water for water-dependent assets. These results were presented in Section 8 of the GIA (AGE 2022) and reproduced in Section 8 of the Water Assessment (both within Appendix K of the EIS).

Figure 4.25 and Figure 4.26 below show the maximum cumulative and incremental drawdown predicted to occur during operations, as presented in the GIA (Appendix A of Appendix K to the GIA). The locations of groundwater dependent ecosystems are shown on these figures.

The proposed change to mining at HVO South will result in less groundwater drawdown in the Wollombi Brook alluvium in comparison to the approved operations, through the removal of mining in the South Lemington Pit 1 and 2 areas from the mine plan. As such, the incremental drawdown in the Wollombi Brook alluvium due to proposed changes to mining at HVO South is not visible in Figure 4.26.

At HVO North, as mining will be progressing deeper through previously disturbed or currently approved mining areas, the incremental effects of the Project at HVO North are predicted to be minor as much of the disturbance has already occurred.

The groundwater model predicts minor additional drawdown in the Carrington Billabong area (between 0.2 and 0.5 m) due to mining to the deeper Permian seams in this area.

There are no third-party water supply bores within the predicted extent of drawdown. Therefore, no third-party bores will be impacted by the Project.

To be conservative, the predictive uncertainty analysis was focused on the cumulative drawdown effects. The results of the uncertainty analysis did not indicate any impact to third party bores and displayed only minor changes to the predicted extent of cumulative alluvial drawdown. The extent of drawdown in GDE areas (river red gums) also reported minor changes in comparison to the base case, with no significant changes predicted in the extent of saturation within the Quaternary alluvium.

Assessment of potential post mining impacts is provided in Chapter 10 of the Water Assessment (Appendix K to the EIS), as this is inter-related with the final void water balance modelling completed by Engeny (2022). The groundwater model simulated recovery within the groundwater flow regime over a period of 1,000 years, representing the predicted pit lake recovery predicted by the final void hydrology model (Engeny 2022).

The GIA (AGE 2022) presented the maximum incremental and cumulative post mining alluvial drawdown.

Post mining maximum incremental drawdown in the Hunter River alluvium is predicted to be less than the incremental drawdown predicted during operations. The cause of the long-term drawdown in the alluvium is due to groundwater pressures in the Permian remaining depressed due to the final voids acting as regional sinks.

The magnitude of the post mining cumulative drawdown is predicted to remain in the same areas as during operations but is predicted to spread slightly. This is due to the influence of the continuing evaporative pumping effect from the final voids post mining whilst the groundwater regime reaches a new equilibrium.

Post mining, the cumulative drawdown in the Wollombi Brook alluvium is predicted to be the same as during operations.

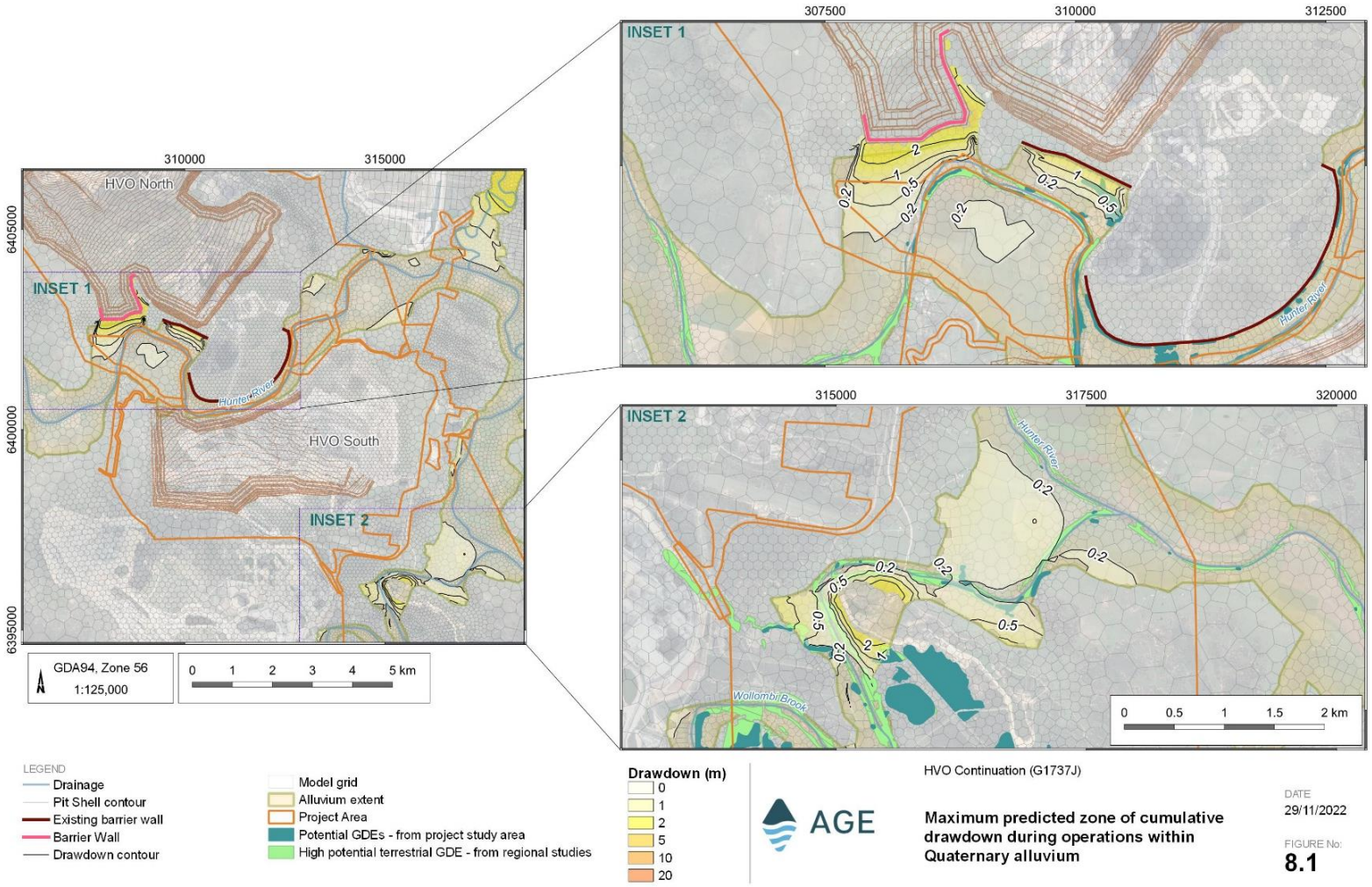


Figure 4.25 Maximum predicted cumulative drawdown during operations within Quaternary alluvium (AGE 2022)

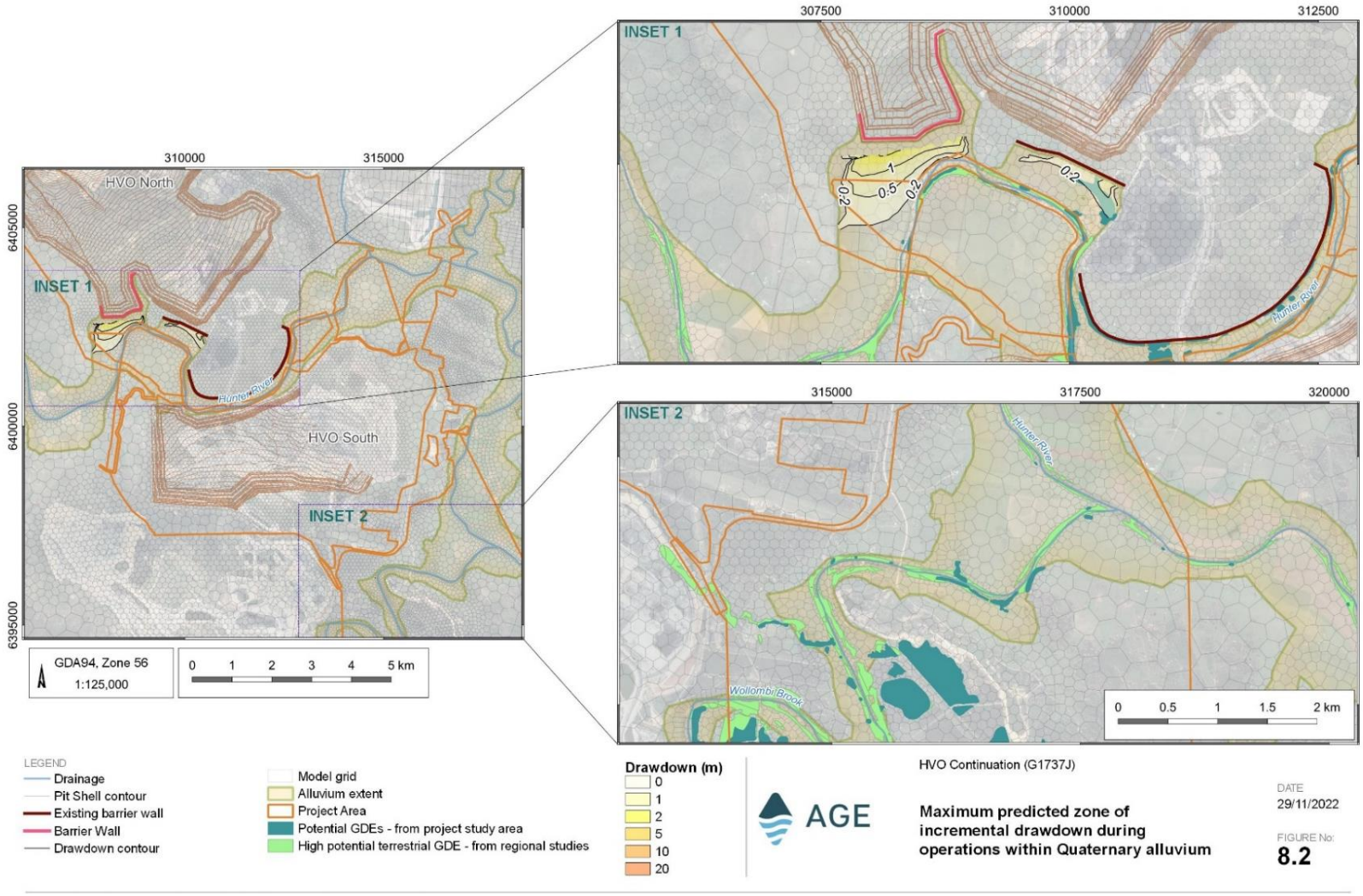


Figure 4.26 Maximum predicted incremental drawdown during operations within Quaternary alluvium (AGE 2022)

iv Groundwater model peer review

Prior to determination the proponent undertakes a modelling review independent of the project joint venture partners and their consultants.

The Project documentation includes a peer review of the groundwater model that is described to be 'independent'. However, it is undertaken by an employee of EMM, the company that commissioned the modelling to AGE. Hence, the review is not independent as required in the Australian Groundwater Modelling Guidelines (AGMG 2012), the NSW Aquifer Interference Policy (AIP 2012) and the NSW SSD minimum groundwater modelling requirements (DPE 2022).

Prior to commencing the technical studies to support the EIS, HVO spoke with DPE in April 2020 regarding engaging Dr Doug Weatherill as peer reviewer for the Project. The Department's verbal advice was:

- no in-principle concerns and thought it was appropriate that Doug be engaged by HVO
- the peer review is for HVO's benefit in ensuring the modelling and assessment is robust
- DPE does not consider any peer review paid for by the proponent as independent and that DPE may engage their own peer reviewer in this space if deemed necessary.

HVO was also transparent regarding the role during consultation with DPE-Water and NRAR in October 2020, and through later consultation with DPE and DPE-Water.

The review followed the standard approach to model peer reviews and was undertaken in accordance with the Australian Groundwater Modelling Guidelines (Barnett et al 2012) and included input and involvement over the three main stages of groundwater modelling as follows:

- conceptualisation and model updates;
- model calibration; and
- model predictions/uncertainty.

The peer review process involved AGE presenting to Doug and the Project team on the modelling approach, to which he provided comment (as well as review of the modelling report). Doug was not part of the management and assessment team within EMM. As such, Doug did not provide direction or instruction on how to do the modelling, but rather provided comment regarding the appropriateness of the modelling approach, history-matching results and consideration of Government expectations.

Based on the advice from DPE in 2020 and the approach to the peer review, HVO does not agree that an additional peer review of the modelling is required prior to determination.

Prior to determination the proponent revise the title of Table D13 in Appendix D (Groundwater modelling technical report) of the AGE Groundwater Impact Assessment report and check all relevant documents to ensure the use of proper units for determining water take for the project.

The title of Table D13 refers to ML/day whereas the information included in the table is based on ML/year.

The title of Table 13 in the Groundwater Modelling Technical report appended to the GIA (AGE 2022) did include an error. The correct title should have been "Table D 13 Model budgets" and is re-produced below.

The typographical error in Table D13 of the modelling report has not affected the reported water take volumes, as this was calculated and reported separately.

Table 4.16 Model budgets

Budget item	Steady state (ML/year)			Transient average (ML/year)		
	In	Out	In - Out	In	Out	In - Out
Storage	0	0	0	7,899.7	2,881	5,018.7
Head dependent boundaries	1,541.6	599.8	941.8	1,608.9	894.1	714.8
Constant head boundaries	31.9	0.2	31.7	58.6	0.2	58.3
Drains	0	0	0	0	5,635.8	-5,635.8
River leakage	0	1,971.2	-1,971.2	0	1,712.4	-1,712.4
Stream leakage	1,794.2	5,703.4	-3,909.1	1,885.2	5,991.3	-4,106.1
Recharge	4,906.8	0	4,906.8	5,661.5	0	5,661.5
Total	8,274.5	8,274.6	-0.1	17,113.9	17,114.8	-1
Percent discrepancy	-	-	0.00%	-	-	0.00%

Source: Australasian Groundwater and Environmental Consultant Pty Ltd (AGE)

v Model validation and verification

Post approval the proponent validate (post-audit) and update the groundwater model over time as follows:

- every three years until the end of the mining operations; and
- every five years thereafter until 2060.

As discussed in the Water Assessment report (Appendix K of the EIS), continuous improvements to the numerical groundwater flow model will be undertaken as and when new data become available, particularly where there is a divergence of observed groundwater system response from that predicted by the model. Groundwater monitoring data will be used to validate and verify the groundwater model predictions. New data may require a revision and update of the conceptual hydrogeological model prior to updating and recalibrating the numerical model and re-running of predictive scenarios. Where this is deemed necessary, the WMP may also require updating depending on any changes to the conceptualisation and model predictions.

As mining progresses, a need for further model updates will be assessed every three years during operations based on evaluation of groundwater monitoring data and findings of impact verification.

4.7 Department of Primary Industries – Agriculture

DPI Agriculture noted in their submission that:

> Key impacts are noted as being overall reduction in LSC across the site, and temporary reduction in agricultural land across the site throughout the extended mine operation timeframe. These impacts are considered by DPI-Agriculture to be acceptable in the context of the site, locality and proposal, pending clarification of overall loss or gain of agricultural land as discussed above.

A response to the questions raised about an overall loss or gain of agricultural land is responded to below.

4.7.1 Impacts to agricultural land

There are inconsistencies between the EIS and Agricultural Impact Assessment (AIS), and the Mine Closure and Rehabilitation Strategy (MCRS) with respect to whether there is a net loss of agricultural land as a result of the proposal. It is stated throughout the EIS and AIS that there will be no net loss (e.g. p.351 of the EIS, and p.51 of the AIS), while the MCRS states that the area of land to be dedicated to agriculture following rehabilitation will be reduced (e.g. p. 30). The latter is consistent with our interpretation of land and soil capability (LSC) area change between Tables 7 and 17 of the AIS, representing baseline LSC and proposed post-mining LSC respectively. Clarification is requested around this point including if possible consolidated tables for baseline and proposed LSC for ease of interpretation.

To establish a frame of reference by which to determine impacts on land available for agricultural use as a result of the Project, the Agricultural Impact Statement (AIS) (Minesoils 2022), provided as Appendix Q to the EIS, used the anticipated agricultural use of the currently approved final landform as a baseline. That is, land that would be used for agriculture within the Project area, if the Project area was rehabilitated in accordance with current approvals. This area, combined with land currently used for agriculture within the additional disturbance area for the Project, is approximately 4,182 ha.

The proposed final land use domains for the Project include agricultural grazing (Domain B), which comprises areas to be rehabilitated with selected native and exotic grasses and pasture species to facilitate grazing. Section 4.1.1 (Table 16) of the AIS shows that Domain B covers an area of 4,320 ha. Compared to the baseline of 4,182 ha, this is therefore a net increase of 138 ha of land to be used for agriculture as a result of the Project. In effect, this results in land currently within the additional disturbance area and used for other purposes such as roads, infrastructure, dams or existing vegetation becoming available for agriculture in the proposed final landform developed for the Project.

The Project Mine Closure and Rehabilitation Strategy (MCRS) (EMM 2022c), refer to Appendix T to the EIS, notes that approximately 70% of the currently approved HVO North final landform is proposed to be rehabilitated to meet the final land use of agriculture. The Project will reduce the total percentage of land rehabilitated to meet the final land use of agriculture to approximately 60%. Similarly, at HVO South, approximately 60–70% of the currently approved final landform is proposed to be rehabilitated to achieve a final land use of agriculture. This will reduce to approximately 50% as a result of the Project.

Consequently, although the total area of land to be rehabilitated to an agricultural grazing land use will increase as a result of the Project (by a net of 138 ha), when compared to the approved final landform, the land that will be available at the end of mine life for an agricultural land use as an overall percentage of the disturbance footprint has decreased (see Table 4.17).

This is due largely to the newly designed final landform incorporating natural landform design principles without relying on constructed surface flow drainage control structures. This design has a higher drainage density to accommodate surface runoff, resulting in a smaller proportion of the surface remaining at flat or low slope gradients, and therefore reducing the area suitable for an agricultural land use. In addition, the Project does not seek to retain the approved mining areas of South Lemington Pit 1, South Lemington Pit 2 and the Riverview South East Extension, which were proposed to be rehabilitated to an agricultural grazing land use. As a result, while the total percentage of land proposed to be rehabilitated to an agricultural land use at HVO will be reduced by the Project, there will be a net increase in the area of rehabilitated land used for agriculture.

Table 4.17 Post mining land available for agriculture

	Currently approved (HVO North and HVO South)	Proposed (HVO North and HVO South)	Difference
Final land area available for agriculture	4,182 ha	4,320 ha	+138 ha
Total disturbance area	6,777 ha	8,432 ha	+1,655 ha
Percent of project area to be rehabilitated to agriculture land	62	51	-11%

4.8 Department of Primary Industries – Fisheries

4.8.1 Impacts to waterways and aquatic ecosystems

DPI Fisheries has reviewed the EIS and notes the presence and/or close proximity of key fish habitat in the proposed footprint and notes the projects proposal to construct a new bridge over the Hunter River. The design and construction of the new bridge may include direct and indirect impacts to key fish habitats, both onsite and downstream. DPI Fisheries therefore recommends the following:

1. Waterway crossings should be designed and constructed in accordance with the national guidelines entitled '*Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings*' (Fairfull and Witheridge 2003).
2. Environmental safeguards (silt curtains, booms etc) are to be used during the works to ensure that there is no escape of turbid plumes into the adjacent aquatic environment.
3. Any material removed from the waterway that is to be temporarily deposited or stockpiled on land is to be located well away from the waterway and to be contained by appropriate sediment control devices.

DPI Fisheries (1800 043 536) and the Environment Protection Authority (131 555) is to be notified immediately if any fish kills occur in the vicinity of the works. In such cases, all works other than emergency response procedures are to cease until the issue is rectified and approval is given by DPI Fisheries and/or the Environment Protection authority for the works to proceed.

The matters raised by DPI – Fisheries are noted.

The Project includes the realignment of Lemington Road and the construction of a new bridge over the Hunter River. The new bridge will replace an existing single-lane low level bridge with one that will meet the requirements of a 1 in 10 ARI flood protection design. The construction and operation of the new bridge is not expected to directly or indirectly significantly impact on the aquatic ecology of the Hunter River, including key fish habitats either upstream or downstream from the bridge.

Should the Project obtain the approvals under the EP&A Act and EPBC Act, a subsequent approval for the realignment of Lemington Road and the construction of the new road and bridge over the Hunter River will be required under the NSW *Roads Act 1993* (Roads Act). A detailed design of the road and bridge will be undertaken to support the approval process under the Roads Act.

During preparation of the detailed design of the bridge, HVO will take into consideration the national guidelines *Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings* (Fairfull and Witheridge 2003). It will also be taken into consideration during the construction of the bridge.

In addition, during construction, appropriate safeguards will be installed to ensure the protection of waterways and the aquatic environment from runoff from disturbed areas and stockpiled material. Stockpiles of any materials will be located at a distance of at least 40 m of any watercourse and will contain appropriate sediments controls.

In the unlikely event of an environmental incident as a result of the onsite construction activities resulting in fish kills, all construction works in the immediate area will cease, and DPI Fisheries and the EPA will be notified. No works, except for emergency response requirements necessary to prevent any ongoing impacts to the waterway and aquatic environment, will recommence until approval to proceed is received from DPI Fisheries or the EPA.

These requirements will be detailed within a Construction Environmental Management Plan, or equivalent, which will be prepared prior to the commencement of any construction activities.

4.9 Department of Regional NSW – Mining, Exploration and Geoscience

4.9.1 Mining leases

The Proponent must ensure that it holds the appropriate titles as required for making planning applications for coal as relating to the Project which satisfies the requirements of section 380AA of the *Mining Act 1992*.

Mineral authorities relevant to the Project were presented in Appendix E and Figure 5.1 of the EIS and is reproduced in Figure 4.27 below. HVO holds all mineral authorities necessary to make an application relating to coal as required by section 380AA of the Mining Act.

For ancillary mining activities as, in so far as the ancillary activities are to be carried out in connection with and in the immediate vicinity of a mining lease in respect of a mineral, the Proponent is required to hold a Mining Lease for ancillary mining activities or an 'off title' designated ancillary mining activity as defined by clause 7 of the Mining Regulation 2016 (the Regulation).

Where a proposal includes Crown Land the Proponent is required to comply with the Commonwealth *Native Title Act 1993* and undertake the right to negotiate process for the Crown Lands within the current exploration licence area(s) if proof of extinguishment cannot be determined.

As detailed in Table 5.1 of the EIS, the surface water impact assessment (provided as Appendix J to the EIS) identified the need for an additional clean water diversion and sediment dams adjacent to the Mitchell Pit at HVO North and the Riverview Pit at HVO South. A portion of these water management works will be outside of existing mining leases.

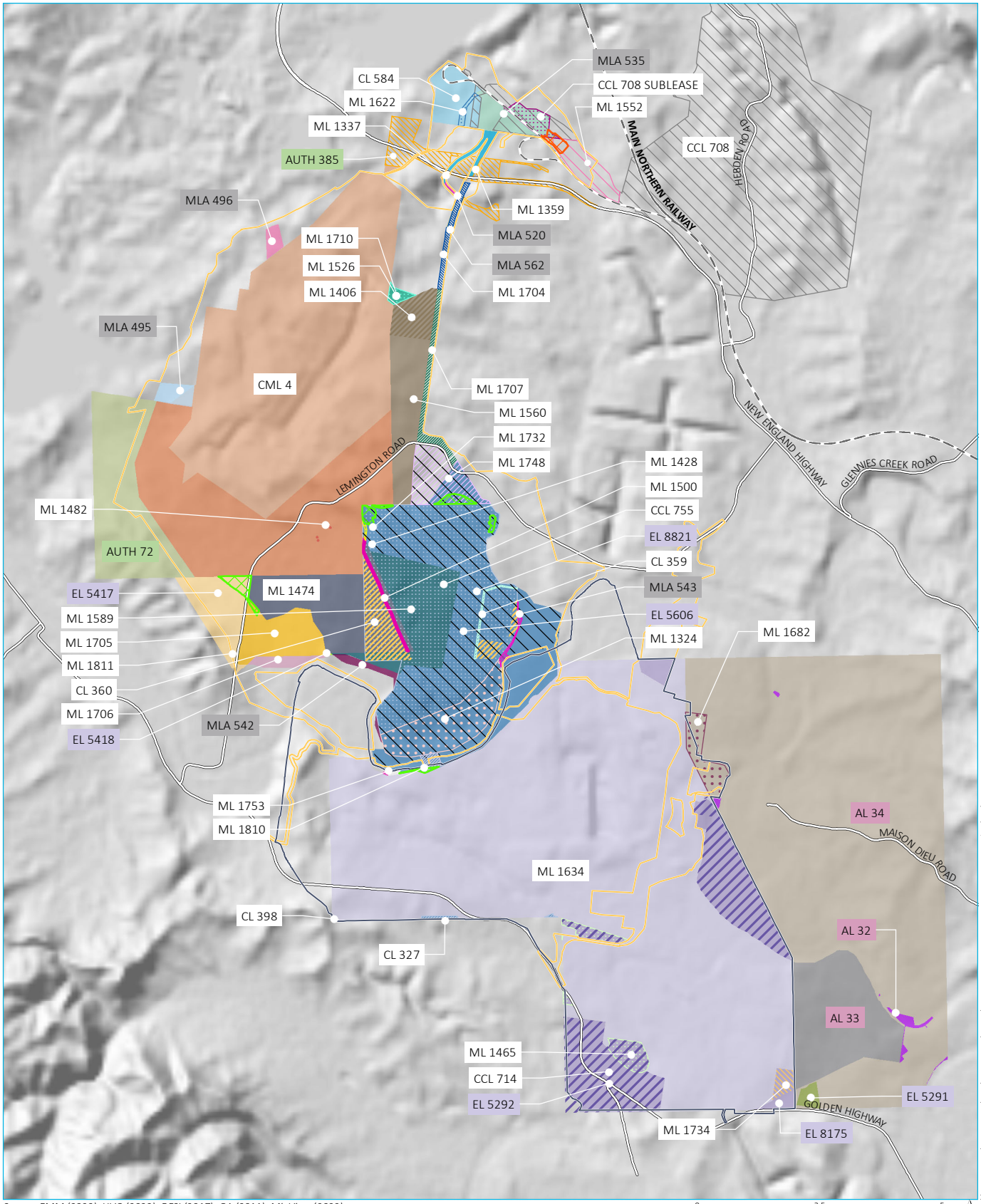
Clean water diversion is an ancillary mining activity for the purposes of section 6 of the Mining Act and must be authorised by a mining lease or via a condition included in an adjoining mining lease. HVO holds adjoining mining leases to where these works will occur (ML 1428 and ML 1634). Prior to construction outside existing authorisation, HVOPL propose that either a new mining lease for ancillary mining activities will be obtained or a condition be added to these mining leases authorising the clean water diversion works on the land adjoining them. Consultation with the Department of Regional NSW – Mining, Exploration & Geoscience (MEG) will be undertaken prior to any application for mining lease.

A development application under the *Environmental Planning and Assessment Act 1979* must be approved before a mining lease can be granted. A mining lease will only be granted for activities specified in the development consent.

This comment by MEG is noted.

As outlined in Table 5.1 of the EIS, for the Project to proceed, a number of new mining leases and amendments to existing mining leases will be required. The new mining leases will largely involve the conversion of exploration licences to mining leases.

Should the development consents be granted for the Project, HVO will submit applications for the necessary mining leases as outlined in Table 5.1 of the EIS. Consultation with MEG will be undertaken prior to any application for mining lease.



Source: EMM (2023); HVO (2023); DFSI (2017); GA (2011); MinView (2022)

0 2.5 5 km

GDA2020 MGA Zone 56

N

\\emmsvr1\H190408\GIS\02_Maps_RTS\RtS011_SVCAreas_20231012_01.mxd 2/11/2023

KEY

- HVO North proposed development consent boundary
- HVO South proposed development consent boundary
- SVC 41389276
- SVC 12575722

Existing environment

- Rail line
- Major road

Mining authority (HVO)

- AL 32
- AL 33
- AL 34
- Auth 72
- CCL 708 Sublease
- CCL 714
- CCL 755
- CL 327
- CL 359
- CL 360
- CL 398
- CL 584
- CML 4
- EL 5291
- EL 5292
- EL 5417
- EL 5418
- EL 5606
- EL 8175
- EL 8821
- ML 1324
- ML 1337
- ML 1359
- ML 1406
- ML 1428
- ML 1465
- ML 1474
- ML 1482
- ML 1500
- ML 1526
- ML 1560
- ML 1589
- ML 1622
- ML 1634
- ML 1682
- ML 1704
- ML 1705
- ML 1706
- ML 1707
- ML 1710
- ML 1732
- ML 1734
- ML 1748
- ML 1753
- ML 1810
- ML 1811
- MLA 495
- MLA 496
- MLA 520
- MLA 535
- MLA 542
- MLA 543
- MLA 562

Mining authority (other)

- AUTH 385
- CCL 708
- ML 1552

HVO mineral authorities

HVO Continuation Project
Submissions Report
Figure 4.27

EMM
creating opportunities

4.9.2 Biodiversity

MEG requests that the Proponent consider potential resource sterilisation should any future biodiversity offset areas be considered. The Proponent must consult with MEG and any holders of existing mining or exploration authorities that could be potentially affected by the proposed creation of any such biodiversity offsets, prior to creation occurring. This will ensure there is no consequent reduction in access to prospective land for mineral exploration or potential for the sterilisation of mineral and extractive resources.

The comments from MEG on resource sterilisation in biodiversity offset areas are noted.

As detailed in Chapter 13 of the EIS, an assessment was undertaken to identify the biodiversity credits required to offset the impacts of the Project. HVO is committed to delivering a biodiversity offset strategy in accordance with the NSW *Biodiversity Conservation Act 2016* (BC Act) and Biodiversity Offsets Scheme (BOS) that appropriately compensates for the unavoidable loss of biodiversity values and residual impacts of the Project.

A preliminary offset strategy was provided in the biodiversity development assessment report (BDAR) that was contained in Appendix L of the EIS and summarised in Chapter 13 of the EIS. The preliminary offset strategy includes both land-based offsets and the retirement of credits through the BOS. The BDAR has been updated to account for the amendment to the Project and includes an updated preliminary offset strategy.

To account for the Project's impacts to Warkworth Sands Woodland EEC, an offset site referred to as the South Lemington Offset, has been identified near South Lemington Pit 1 at HVO South. This site covers an area of approximately 50 ha between the Hunter River and the New England Highway in the Warkworth locality. This land is owned by HVO and is therefore not subject to any access arrangements.

The South Lemington Offset is proposed to provide for impact to the WSW vegetation community due to future activities at HVO South and is not anticipated to be required prior to stage 1 impacts arising from commencement of construction or continued mining activities. An updated biodiversity offset strategy is provided in Section 9 of the revised BDAR presented as Appendix E to the Amendment Report.

Should the Project be approved, HVO will liaise with MEG prior to utilising this area as a land based offset site should it be required.

4.10 Environment Protection Authority

4.10.1 Air quality

The NSW Environment Protection Authority (EPA) requested additional information from the Air Quality and Greenhouse Gas Assessment (AQGHGA) before determining whether it can recommend conditions for the project. The AQIA predicts there are additional exceedances at various sensitive receptors and that these impacts can be reduced by implementing measures in the air quality management plan. However no supporting evidence has been provided to demonstrate implementation of such measures will ensure compliance with the impact assessment criteria.

To respond to this request, further modelling has been carried out by Airen Consulting to demonstrate the effectiveness of potential management measures, to be implemented by HVO, to minimise the risk of cumulative impacts exceeding the EPA assessment criteria. It is noted that some exceedances of criteria will be inevitable under adverse air quality events outside of the control of HVO such as bushfires and dust storms. The focus of the additional modelling was on the identified key issues from the AQGHGA. That is, operational impacts, all relevant classifications of particulate matter (in particular, maximum 24-hour average PM_{10}), worst case operational years, and representative sensitive receptor locations.

The specific information requested by the EPA in reference to the statement above is discussed in further detail in below. The additional information prepared to respond to the EPA's request demonstrates that the relevant conclusions of the AQGHGA for the Project (Jacobs 2022) remain valid. Specifically, that:

> "Operational dust emissions due to the ongoing mining activities are not expected to cause adverse air quality impacts at the nearby local communities." [pg 95]
>
> "Maximum 24-hour average PM_{10} concentrations would be within the range of historically measured days above the criteria, excluding extraordinary events. The review of recent and historical air quality monitoring data showed that, in the representative year, all monitoring locations recorded between one and six days above the air quality criteria set by the EPA for project assessment purposes. Based on the modelling the Project is not anticipated to change this outcome. The potential for the Project activities to cause exceedances of the criteria can be managed through existing site air quality management measures and this approach has been successfully demonstrated by the site compliance history." [pg 95]

Provide revised dispersion modelling scenarios to include the actual implementation of the proposed reactive mitigation measures to demonstrate that their implementation will reduce the risk of additional exceedances occurring.

Section 7.2 of the AQGHGA provided the results from the dispersion modelling. These results suggested that the highest air quality risks for the Project would be:

- maximum 24-hour average PM_{10} concentrations
- in the Maison Dieu and Jerrys Plains areas
- around Year 11 of operations.

The air quality risks for other averaging times, air quality indicators, locations and operational years were found to be lower than those listed above, based on comparisons between model results and EPA assessment criteria. Revised dispersion modelling scenarios have been developed to meet the EPA request. The revised modelling is discussed below.

Consideration must be given to but not limited to the following:

a) Detailed discussion to demonstrate that the dispersion modelling has allowed for 'reaction time/delay' to implement the corresponding reactive measures.

b) Specific 'triggers' (e.g., meteorological conditions, concentrations) and specific actions to be used to inform the implementation of reactive measures.

The CALPUFF air dispersion model works on an hourly time-step. HVO's alert system is based on 10-minute average PM_{10} concentrations measured at representative real-time monitors. This means that site operators are capable of responding to air quality alerts in less than an hour; a timeframe that is more responsive than can be accounted for by modelling.

HVO currently utilises a network of Tapered Element Oscillating Microbalance (TEOM) units and meteorological stations in support of the proactive and reactive air quality management system. HVO's Air Quality and Greenhouse Gas Management Plan (AQGGMP) (HVO 2019) details the specific triggers and actions that are used to inform the implementation of reactive controls. Table 4.18 shows the triggers and responses from the AQGGMP.

Table 4.18 Real time air quality alarm system overview

Monitoring location	Trigger level	Response actions
HVO Corporate Met Station	Wind speed >8 m/s	• Validation of alarm (verify monitors functioning correctly and review meteorological conditions). • Notify relevant Open Cut Examiner. • Response as per flowchart below.
HVO Cheshunt Met Station	Wind speed >8 m/s	
Maison Dieu (TEOM)	Stage 1: • 10 min average PM_{10} > 150 µg/m^3. • 1 hour average PM_{10} > 50 µg/m^3 for three consecutive hours. Stage 2: • Rolling 24 hour average PM_{10} > 50 µg/m^3 for six consecutive hours (winds in arc of mine to monitor). • 10 min average PM_{10} > 150 µg/m^3 for three consecutive hours (winds in arc of mine to monitor).	
Knodlers Lane (TEOM)		
Warkworth (TEOM)		
Wandewoi (TEOM)		

Figure 4.28 shows a response actions flowchart from the AQGGMP. This process is consistent with best practice as per Katestone (2011).

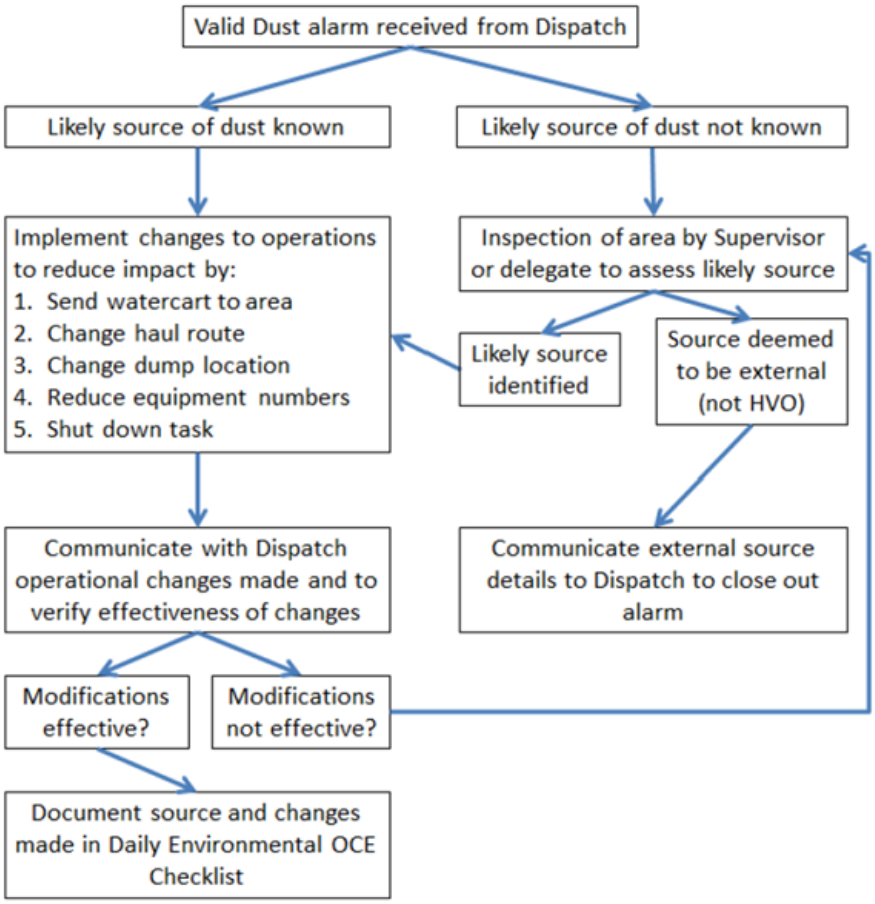


Figure 4.28 **Actions in response to dust alarm**

HVO's real time air quality monitoring stations continuously log information and transmit data to a central database, generating alarms when particulate matter levels exceed internal trigger limits to guide the operational management of air quality on site. Table 4.19 provides a history of the actual number of annual alarms and hours of equipment downtime due to air quality management from 2014 to 2022 (inclusive) (Rio Tinto 2015, Rio Tinto 2016, Rio Tinto 2017, Yancoal 2018, HVO 2019, HVO 2020, HVO 2021, HVO 2022, HVO 2023). These data show that (for the years examined) there have been between 287 and 2,527 real-time alarms per year. This means that alarms are typically generated, on average, 11% of the time. For 6 of the 9 years alarms were generated less than 10% of the time and for 3 of the 9 years, between 15 and 29% of the time. A higher frequency of alarms also correlated with years of lower rainfall, that is 2017 to 2020. The data also show that HVO proactively shuts down any activities that may be increasing the risk of air quality impacts.

Table 4.19 **Historical number of alarms and equipment downtime at HVO**

Year	Number of real time alarms for air quality and meteorological conditions received and acknowledged	Hours of equipment downtime recorded due to air quality management (does not include occasions where operations were changed/modified but not stopped)
2014	367 (4% of year)	3,066
2015	429 (5% of year)	3,835
2016	287 (3% of year)	2,569
2017	750 (9% of year)	8,584

Table 4.19 Historical number of alarms and equipment downtime at HVO

Year	Number of real time alarms for air quality and meteorological conditions received and acknowledged	Hours of equipment downtime recorded due to air quality management (does not include occasions where operations were changed/modified but not stopped)
2018	1,471 (17% of year)	6,428
2019	2,527 (29% of year)	7,206
2020	1,361 (15% of year)	906
2021	797 (9% of year)	1,054
2022	551 (6% of year)	1,175

The air quality management system described above has led to a good history of compliance. That is, HVO has complied with the PM_{10} criteria specified in the HVO North development consent (DA 450-10-2003) and HVO South Project Approval (PA 06_0261) on every day in the nine years reviewed (2014 to 2022) except on three occasions; the Hunter Valley Gliding Club (29 July 2017), Knodlers Lane (28 July 2021) and Cheshunt East (12 September 2021).

c) Detailed discussion to specify how individual activities were modified (i.e., modelled) to be representative of the actual implementation of the proposed reactive mitigation measures.

A revised dispersion model has been configured to simulate HVO's air quality management system as closely as possible. The hourly average modelled PM_{10} concentrations at the closest Maison Dieu property (161) and closest Jerrys Plains property (308) were examined and reactive controls were assumed to be implemented when an alarm was determined. An alarm was defined by:

- modelled 1-hour average $PM_{10} > 50$ µg/m^3 for two consecutive hours or rolling 24-hour average $PM_{10} > 50$ µg/m^3 for one hour (winds in arc of mine to monitor)
- wind was from the direction of either HVO North or HVO South towards Maison Dieu (property 161) or Jerrys Plains (property 308). The directions were defined as 260 to 350 degrees and 0 to 120 degrees.

The following reactive controls were assumed for each determined alarm:

- downtime for stripping
- downtime for drilling and blasting
- downtime for loading, hauling and unloading of coal and overburden
- downtime for dozers
- downtime for grading
- reduced level of activity from processing (additional 50% control)
- shutdown on three days in the year for air quality management.

The revised model is referred to as the "reactive control" model. The modelling was developed to provide an indication of whether modifying activities in response to monitored air quality conditions will be effective for minimising air quality impacts. It is not possible to precisely reproduce all alarm situations, the changes in emissions, or the site responses through modelling; however, as the model works on an hourly time step and HVO's alert system is based on 10-minute averages, the model assumptions can be considered to provide a conservative representation of the actual implementation of reactive mitigation measures.

d) A summary of the number of hours/days the reactive measures were included in the modelling.

There was a total of 918 hours in the model year when an alarm was determined at either Maison Dieu or Jerrys Plains. This represents approximately 10% of the year when reactive control may need to be implemented and is within the range of historical alarm frequencies (from Table 4.19). Table 4.20 and Table 4.21 provide the calculated distribution of these hours by month and by time of day. Based on the modelling, it is anticipated that reactive controls will most likely be required in the warmer months (January and February) and in the early morning or evening. These are the times that are more commonly associated with stable atmospheric conditions and less dispersion of dust.

Table 4.20 Calculated number of hours requiring reactive control by month

Month	Number of hours in the month (non-leap year)	Number of hours requiring additional control and assumed for 'reactive control' model	Percentage of time requiring additional control and assumed for 'reactive control' model
Jan	744	186	25%
Feb	672	160	24%
Mar	744	70	9%
Apr	720	71	10%
May	744	55	7%
Jun	720	59	8%
Jul	744	55	7%
Aug	744	85	11%
Sep	720	39	5%
Oct	744	68	9%
Nov	720	52	7%
Dec	744	18	2%
Total	**8760**	**918**	**10%**

Table 4.21 Calculated number of hours requiring reactive control by hour of day

Hour of day	Number of hours requiring additional control and assumed for 'reactive control' model
1	35
2	37
3	43
4	49
5	57
6	66
7	55
8	43
9	19
10	15
11	12
12	17
13	18
14	18
15	25
16	23
17	22
18	31
19	58
20	66
21	66
22	57
23	46
24	40
Total	**918**

e) Presenting a timeseries graph of cumulative impacts showing the effect of implementing the reactive control measures at a minimum of two of the most impacted receptors (i.e. receptors with the largest predicted increments). This must include but is not necessarily limited to:

- Predicted concentrations with and without the implementation of the proposed reactive controls.
- The levels used to trigger the implementation of the proposed reactive controls.

The requested graphs are provided in Figure 4.29 and Figure 4.30. This information shows that, in the worst-case modelled operational year (Year 11) at the closest sensitive receptor areas, the implementation of reactive controls (in response to elevated off-site air quality levels) can be effective at reducing the Project contribution to 24-hour average PM_{10} concentrations in a representative meteorological year. By nature, the reactive controls primarily address days when the PM_{10} concentrations may be approaching or exceeding the 24-hour average criterion. These results do not reflect any similar reactive controls that are employed at other mining operations so the cumulative results can be considered as worst case.

Historical air quality monitoring across NSW (Section 4.3.1 of the AQGHGA) has shown that some exceedances of the EPA's impact assessment criteria for 24-hour average PM_{10} (50 µg/m^3) will be inevitable under adverse air quality events outside of the control of HVO such as bushfires and dust storms. However, the results from the modelling below show that HVO's reactive controls can be effective at minimising the Project contribution and risk of causing an exceedance of the EPA's impact assessment criteria, in the worst-case operational year and at the nearest sensitive receptors.

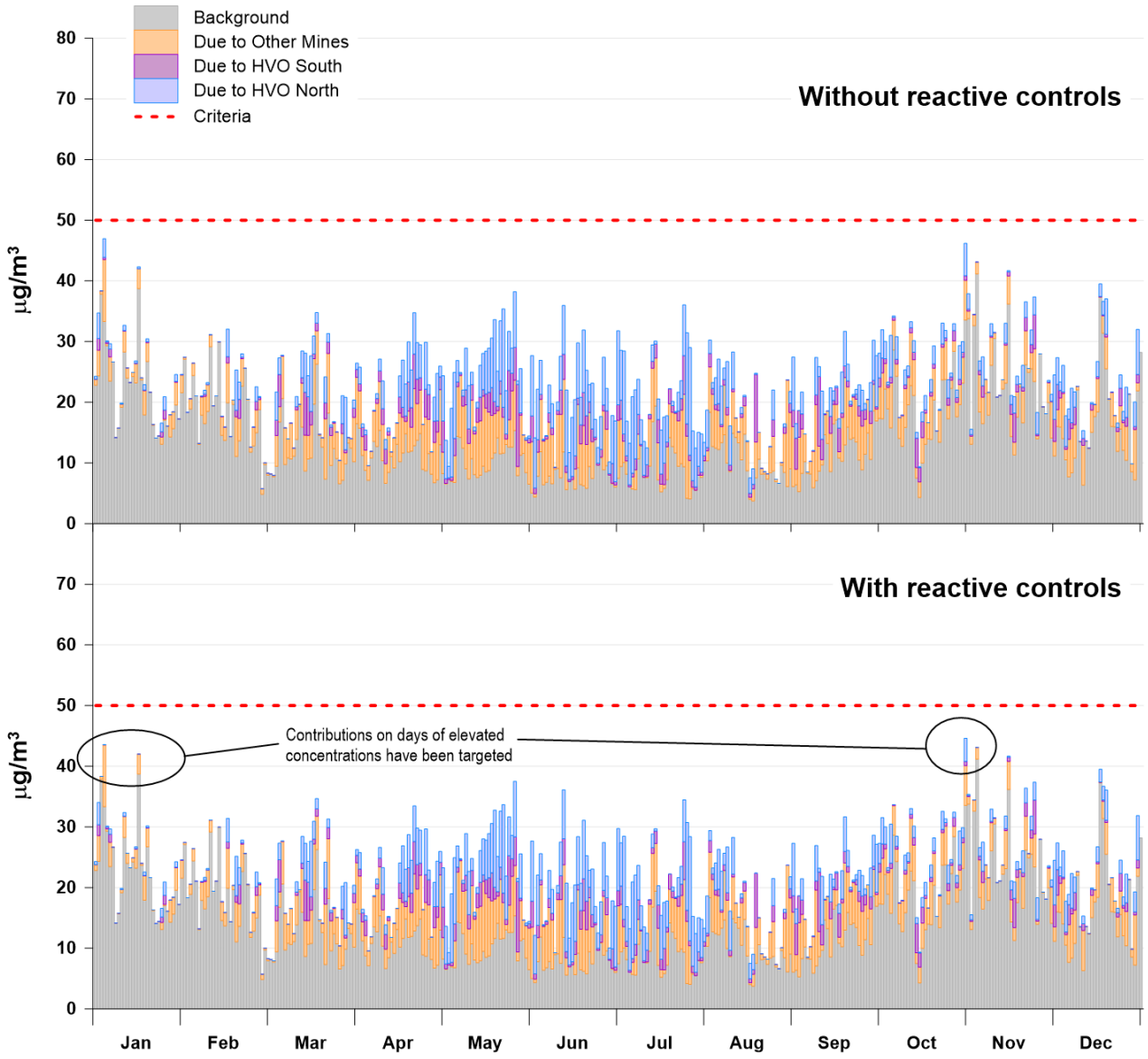


Figure 4.29 Modelled 24-hour average PM_{10} concentrations at Maison Dieu (property 161)

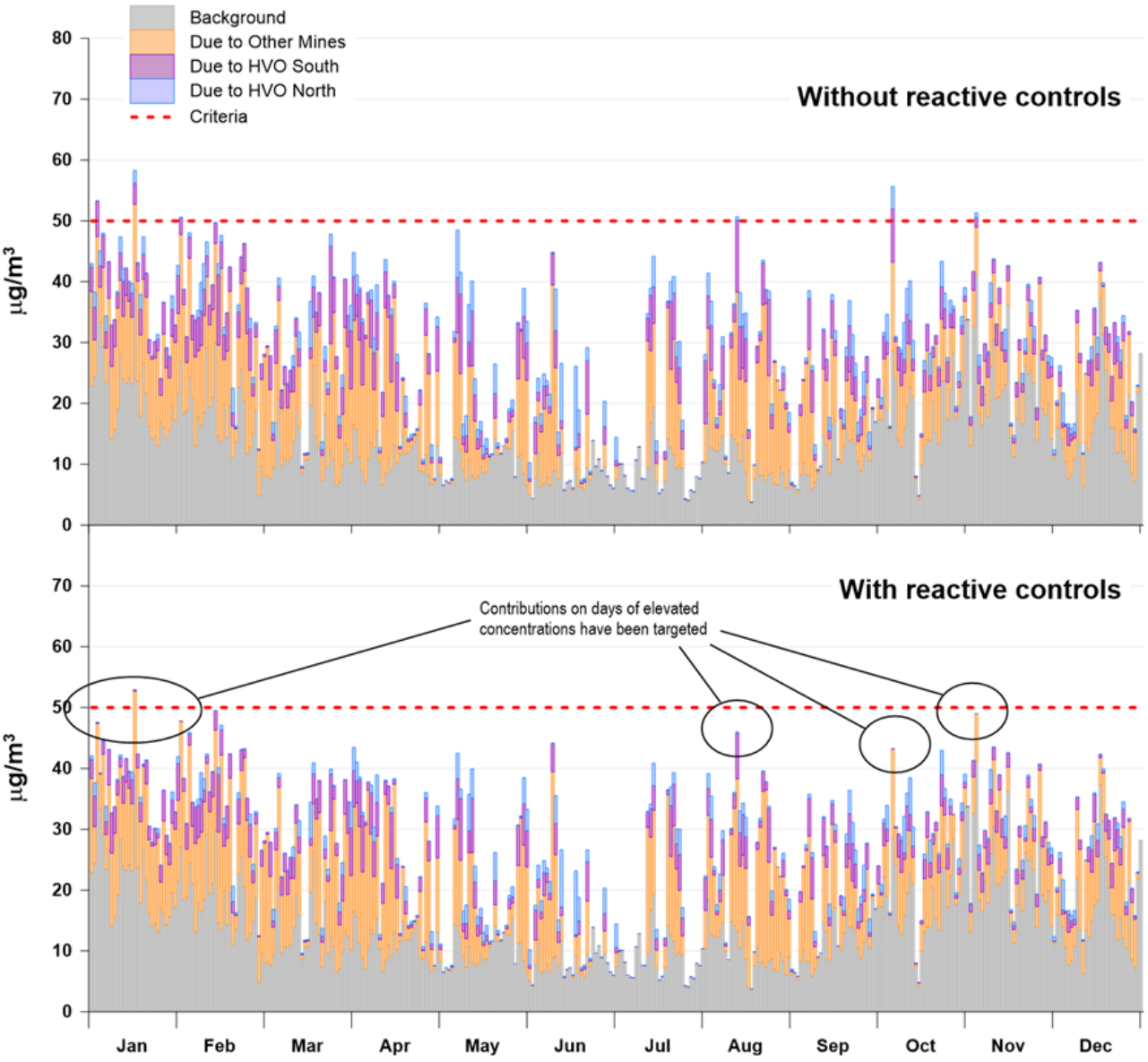


Figure 4.30 Modelled 24-hour average PM_{10} concentrations at Jerrys Plains (property 308)

f) A summary table showing incremental and cumulative ground level concentrations to demonstrate that no additional exceedances are predicted at any of the identified receptors for any of the modelling scenarios.

Appendix B provides the tabulated modelled incremental and cumulative ground level PM_{10} concentrations at private receptors within Maison Dieu (161) and Jerrys Plains (308) in the worst-case operational year. The modelling demonstrates that, with the continued implementation of HVO's reactive controls and air quality management system, no additional exceedances are predicted at any of the identified receptors. There is one instance when the model simulated a 24-hour average PM_{10} concentration above 50 µg/m^3 (a concentration of 52.9 µg/m^3 on 16 January in the modelled year at Jerrys Plains) however this was not determined as an additional exceedance due to HVO (in this case, HVO's modelled contribution on the day was in the order of 0.2 µg/m^3).

Provide a rank of individual source contributions to the ground level concentration(s) at the most impacted receptors (i.e. receptors with the largest predicted increments).

a) Based on the rank, provide discussion to demonstrate that all feasible and reasonable mitigation measures are being proposed to reduce the predicted impacts.

b) Where priority is not given to the highest level of control, the proponent should provide justification with supporting evidence on why these measures are not feasible or practical for implementation.

The source contributions to Maison Dieu and Jerrys Plains (and other sensitive receptors) will change from day-to-day depending on the meteorological conditions and intensity of activities taking place at the time. However, a rank of the source contributions can be identified by considering the modelled annual average PM_{10} concentrations. Table 4.22 shows the ranked source contributions to annual average PM_{10} concentrations at Maison Dieu (property 161) and Jerrys Plains (property 308) in Year 11, the expected worst-case operational year in terms of off-site air quality impacts.

Table 4.22 Ranked source contributions to PM_{10} concentrations

Activity/source	Percentage contribution to annual average PM_{10} in Year 11 (HVO Complex)	
	Maison Dieu (161)	Jerrys Plains (308)
Drilling and blasting	3.3%	6.0%
Loading, haulage, unloading	63.6%	65.3%
Dozers	19.3%	19.6%
Processing	1.0%	0.2%
Wind erosion	12.8%	9.0%
Total	**100%**	**100%**

Based on modelling, the loading, haulage and unloading activities clearly present the highest risk of air quality impacts at the nearest sensitive receptors, at both Maison Dieu and Jerrys Plains. This is because of the relative proportion of these emissions to the overall site emissions inventories. The next highest contributing sources will likely be dozer activities, followed by wind erosion. Drilling, blasting, and other processing activities will likely be less significant contributors to PM_{10} concentrations at these receptor locations.

The mitigation measures proposed by HVO, that directly relate to the outcomes above, include the following:

- **Loading and unloading** – minimising material drop height during loading. Provision for less wind exposed dump locations to use during high wind conditions. Modifying or ceasing operations during adverse dust conditions. Water sprays at the ROM hoppers.
- **Haulage** – watering of haul routes. Regular maintenance of haul routes and roads. Restricting vehicle speeds. Clearly marked haul routes. Fleet optimisation to vehicle kilometres travelled. Minimised haul distances.
- **Dozers** – modify or cease operations during dusty conditions. Reduced travel speed during dusty conditions.
- **Wind erosion** – minimising the extent of exposed areas as far as practicable. Primary rehabilitation and temporary seeding / stabilisation of long-term inactive overburden dumps. Water sprays on coal stockpiles in adverse wind conditions.

- **Drilling and blasting** – water suppression during drilling. Dust curtains. Ceasing operations when excessive visible dust is sustained. Pre-blast checks including review of meteorological conditions.

- **Processing** – water sprays, covered conveyors, and belt cleaning.

These measures are consistent with best practice at coal mining operations as per Katestone (2011). In addition, it can be seen from above that the mitigation measures target those sources that will most significantly contribute to the predicted ground level concentrations at the key sensitive receptor areas of Maison Dieu and Jerrys Plains (for example, haulage on unsealed roads). Priority has therefore been given to the sources with the highest potential to cause adverse air quality impacts at the nearest sensitive receptors.

Provide a comparison table showing the anticipated rehabilitation and/or land stabilisation targets for future operating years, and the assumed areas used in the preparation of the emissions inventory.

Table 4.23 shows a comparison between the assumed "temporary stabilisation" areas for the AQGHGA with HVO's rehabilitation targets in future operational years. The assumed areas are lower than HVO's rehabilitation targets. This means that the modelling has assumed larger areas susceptible to wind erosion than is anticipated. Consequently, the model results would represent conservative estimates of air quality impacts in this regard.

Table 4.23 Comparison of assumed stabilisation areas with rehabilitation targets

Operation	Assumed "temporary stabilisation" areas for AQGHGA (ha)					Rehabilitation targets (ha)*				
	Year 3	Year 7	Year 11	Year 18	Year 22	Year 3	Year 7	Year 11	Year 18	Year 22
Complex	389	430	350	284	272	2,773	3,258	3,411	3,804	4,175

Source: * HVO Mine Closure and Rehabilitation Strategy (MCRS).

Provide information to justify the selection of 2014 as a representative modelling year including quantitative information to demonstrate that using a different meteorological year is unlikely to result in additional exceedances of the corresponding short-term impact assessment criteria.

Section 4.2 of the AQGHGA provides information on the meteorological conditions that are relevant to the Project, including tabulated and graphical data from two site-specific meteorological stations. The *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (Approved Methods) (EPA 2022) includes requirements for meteorological data that are to be used in dispersion modelling. According to the Approved Methods the requirements for dispersion modelling, when using site-specific meteorological data, are as follows:

> "Level 2 impact assessments are conducted using at least one year of site-specific meteorological data. The meteorological data must be 90% complete in order to be acceptable for use in Level 2 impact assessments (i.e. for one year, there can be no more than 876 hours of data missing)". Approved Methods Section 4.1.

The data from the 2014 calendar year meet the EPA requirements. However, the AQGHGA (Section 4.2) provided further analysis to confirm that the 2014 data also addressed other considerations for the assessment of the Project. In particular, the 2014 data were 100% complete, exhibited statistics close to the longer-term averages, had rainfall slightly below (and closest to) the long-term average, had a comprehensive database of concurrent air quality monitoring and operational data to allow for model performance evaluations, and was not an extraordinary year from an air quality perspective. No other datasets delivered all these outcomes.

Table 4.24 provides additional statistics from the meteorological data. There is no one year that will provide a better correlation with the long-term averages (i.e. 2013-2020), for all locations, for every statistic. Overall, the data from 2014 are generally within the range observed over the nine years considered.

Table 4.24 Statistics from meteorological data collected between 2013 and 2020

Statistic	2013	2014	2015	2016	2017	2018	2019	2020	2013-2020
Percent complete (%)									
Corporate	99	100	100	58	100	100	100	99	94
Cheshunt	100	100	91	75	100	100	99	99	95
Mean wind speed (m/s)									
Corporate	2.6	2.7	2.9	2.6	2.7	2.8	3.1	3.0	2.8
Cheshunt	3.7	3.6	3.7	3.8	4.1	4.2	4.2	4.1	3.9
Both locations	3.2	3.1	3.2	3.3	3.4	3.5	3.6	3.5	3.4
Percent calms (<=0.5 m/s) (%)									
Corporate	15.0	4.2	4.7	7.6	4.0	5.7	2.8	3.3	5.8
Cheshunt	2.1	2.4	4.0	2.6	0.3	0.3	1.2	1.3	1.7
Both locations	8.5	3.3	4.4	4.8	2.2	3.0	2.0	2.3	3.8
Percent wind speeds > 6 m/s (%)									
Corporate	5.5	5.3	5.3	5.4	4.7	6.1	8.4	6.9	6.0
Cheshunt	13.4	11.8	12.1	15.7	17.6	20.3	19.0	17.5	16.0
Both locations	9.5	8.6	8.6	11.2	11.1	13.2	13.6	12.2	11.0
Rainfall (mm)									
Corporate	750	603	814	693	469	477	337	793	662 (BoM)

It is also relevant to note that air quality in the Hunter Valley was adversely influenced by drought conditions between 2017 and early 2020 with lower than average rainfall. The use of years with elevated air quality levels, largely driven by extraordinary events or extreme climatic conditions (or both) are avoided in modelling studies primarily because they do not address the definition of representative. In addition, extraordinary events cannot be reliably simulated in air dispersion models as it is not possible to identify all possible factors that led to these events, for example, the factors that influence the time, location and intensity of bushfires.

The simulation of the Project contribution using meteorological data from 2020 was presented in the AQGHGA (refer to Appendix H) to examine effects for an alternative year, rather than to be the basis for a comprehensive assessment in representative conditions. However, some further analysis has been carried out. Table 4.25 shows the annual average PM_{10} concentrations at the nearest sensitive receptor at Long Point, as extracted from Figure H1 of the AQGHGA. It can be seen from these results that the potential increase in the contribution of HVO due to the difference in meteorological conditions (that is, around 1.3 µg/m^3) was compensated by lower background levels that occurred in those conditions. These results do not highlight an increased air quality risk that would change the conclusions of the AQGHGA.

Table 4.25 Comparison of annual average PM_{10} for two meteorological datasets

Met data	Annual average PM_{10} concentrations (µg/m³)								
	Long Point			Maison Dieu			Jerrys Plains		
	Modelled contribution of HVO (Y3)	As measured*	Potential cumulative concentration	Modelled contribution of HVO (Y3)	As measured*	Potential cumulative concentration	Modelled contribution of HVO (Y3)	As measured*	Potential cumulative concentration
2014	2.8	20	22.8	3.1	20	23.1	2.4	20	22.4
2020	4.1	17	21.1	3.0	17	20.0	2.4	17	19.4

Notes * excluding extraordinary events.

Provide additional information about the assumptions made to derive the $PM_{2.5}$ background levels used in the assessment.

The AQGHGA adopted a "Level 2" assessment as per the Approved Methods. The background air quality data requirements for a Level 2 assessment (from Section 5.1.1 of the Approved Methods) are as follows:

- "Obtain ambient monitoring data that includes at least one year of continuous measurements and is contemporaneous with the meteorological data used in the dispersion modelling.
- At each receptor, add each individual dispersion model prediction to the corresponding measured background concentration (e.g. add the first hourly average dispersion model prediction to the first hourly average background concentration) to obtain hourly predictions of total impact."

The existing HVO monitoring network did not provide sufficient coverage to fully comply with the requirements listed above, in terms of $PM_{2.5}$. The ideal configuration would have included real-time (hourly resolution) $PM_{2.5}$ monitors co-located with real-time PM monitors. HVO operates two high volume air samplers (Kilburnie South and Maison Dieu) that collect $PM_{2.5}$; however, the measurements are only available every six days, so it was not possible to carry out a contemporaneous model data and background data assessment for every day in the meteorological year. An alternative approach had to be adopted so the assessment considered $PM_{2.5}$ data from other locations including the sites referred to as Thelander and Kelly. These monitors collect hourly $PM_{2.5}$ data.

For PM_{10}, an hourly variable background dataset was derived for 2014 from three local monitoring stations, as per Figure 18 of the AQGHGA. For $PM_{2.5}$, where 2014 data did not exist, it was necessary to make an assumption that the variation in hourly $PM_{2.5}$ concentrations would follow the variation in hourly PM_{10} concentrations. This involved examining each hourly PM_{10} concentration and calculating a corresponding hourly $PM_{2.5}$ concentration based on the annual $PM_{2.5}$ to PM_{10} ratio, where the annual PM_{10} was 14 µg/m³ (derived from DPE monitors) and the annual $PM_{2.5}$ was 5.2 µg/m³ (derived from the Kelly monitor). This approach also prevented any instances of $PM_{2.5}$ concentrations exceeding PM_{10} concentrations.

Figure 4.31 provides an alternative representation of the background PM_{10} and $PM_{2.5}$ concentrations. It can be seen from this figure that the $PM_{2.5}$ concentrations follow the same trend as the PM_{10} concentrations but scaled to match the local measurement data.

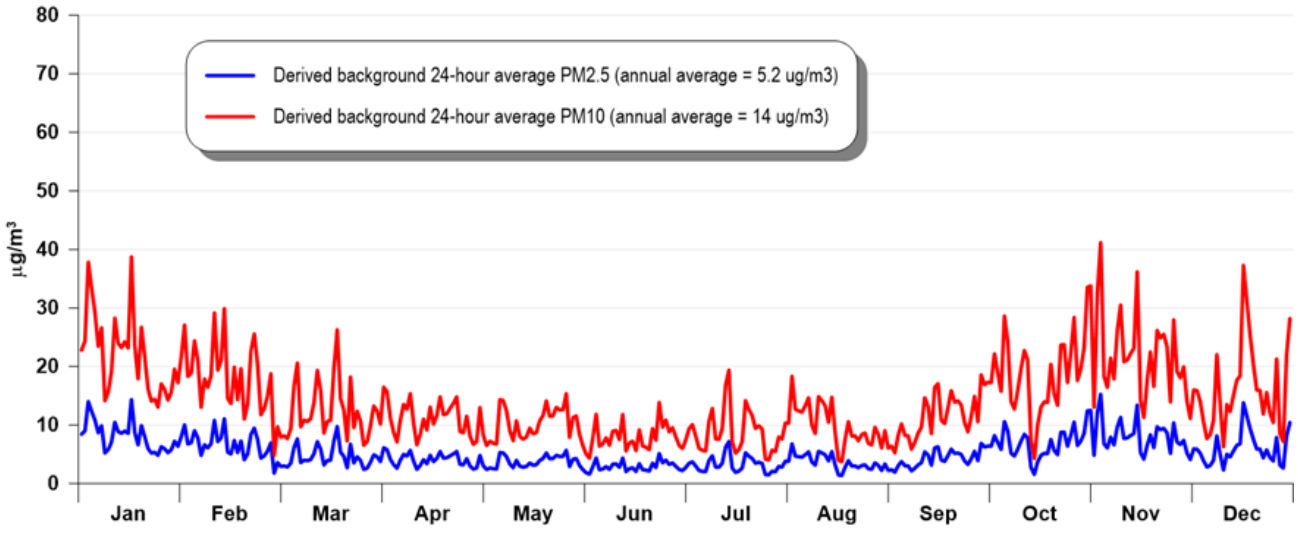


Figure 4.31 Background PM_{10} and $PM_{2.5}$ concentrations as inferred from the measurement data

4.10.2 Noise

The EPA also provided advice and requested further information relating to the Noise Impact Assessment (NIA) (EMM 2022b), prepared for the Project. The specific comments and responses are provided below.

i Ability to receive noise mitigation rights have been considered

The NIA states: "15 receptors (equivalent to 11 landholders) are in new areas of marginal impact, being NAGs 5A and 5B in the area of Jerry Plains. Of these, six are 'isolated' and therefore qualify for voluntary noise mitigation rights. The remaining nine are within the Jerrys Plains village and therefore do not qualify for mitigation as per Section 4.2 of the NPfI that states that "Receiver treatment, including the extreme case of voluntary acquisition, is normally only applicable for isolated residences in rural areas."

The EPA disagrees with this statement and recommends the 9 receptors in NAG 5A within the Jerrys Plains village predicted to receive noise levels 3-5 dB (receptors 336, 347, 359, 360, 361, 362, 363, 368 and 377) above the PNTL receive mitigation rights under the NSW Government's *Voluntary Land Acquisition and Mitigation Policy for State Significant Mining, Petroleum and Extractive Industry Developments*, (VLAMP) dated 15 December 2014.

The NSW EPA's *Noise Policy for Industry* (NPfI) considers a broad cross section of Industry but in this situation the VLAMP should take precedent over the guidance of 'isolated receivers' in the NPfI. The NPfI is not a statutory document but may be referenced in instruments in relation to the assessment and management of industry noise sources. The EPA uses the NPfI to inform its decision making but where there is inconsistency with another instrument, the provisions of the other instrument prevail.

Firstly, although not mentioned in the EPA's submission, Receptor 327 is one of the six receptors in Noise Assessment Group (NAG 5B) that qualified for voluntary noise mitigation rights in the NIA. This residence has since been demolished; therefore, voluntary mitigation rights are no longer applicable. The receptor was included in the private land assessment (Section 4.4 of the NIA) and predictions were below the relevant Voluntary Land Acquisition and Mitigation Policy (VLAMP) (NSW Government 2018) criteria.

In relation to the specific matters raised in the EPA submission, the VLAMP states the following on the applicability of noise mitigation and acquisition criteria:

A consent authority can apply voluntary mitigation and voluntary land acquisition rights to reduce:

- *operational noise impacts of a development on privately owned land; and*
- *rail noise impacts of a development on privately owned land near a non-network rail line (private rail line), that is on, or exclusively servicing an industrial site (see Appendix 3 of the RING);*

But not:

- *construction noise impacts, as these impacts are shorter term and can be controlled;*
- *noise impacts on the public road or rail network; or*
- *modifications of existing developments with legacy noise issues, where the modification would have beneficial or negligible noise impacts.*

Although two new SSD consents are being sought, as required, for the Project at both HVO North and HVO South, and not a 'modification' in a planning sense to the existing development consent, the Project is an existing development with a long-standing history of a noise presence in Jerrys Plains Village (the village), that warrants careful consideration before strictly applying policy ratified well after mining operations, particularly HVO, first commenced in the area. The VLAMP states that rights *can* be applied to reduce operational noise impacts of a development; however, it is important to note that the Project is not proposing to increase noise above the current limits that apply (as set out in the existing HVO North and South development consents or EPL 640).

HVO exhausted all feasible and reasonable control options to reduce noise towards Project Noise Trigger levels (PNTL) (Section 4.2.4 of the NIA). The resulting achievable noise levels, particularly for Jerrys Plains, are consistent with current HVO development consent/Project Approval and EPL limits and should not adversely impact the Jerrys Plains community. Noise levels there should not change as HVO would continue to operate within existing approved limits.

The EPA has agreed with the NIA where it proposes that the $L_{Aeq,15minute}$ 40 dB limit in the village, current in both the current HVO North consent DA 450-10-2003 and EPL 640, continues to apply. It is acknowledged that this criterion is higher than the relevant PNTL.

At present there is no requirement for receiver treatment at any residence in the village.

Compliance monitoring conducted in accordance with the approved HVO Noise Management Plan shows that Jerrys Plains has experienced mining noise from HVO up to $L_{Aeq,15minute}$ 40 dB in the past. An assessment of recent monitoring data from 2016 up to and including 2021 is provided in section 3.2.4 of the NIA and demonstrates that operations have predominately been compliant with noise criteria. Non-compliant measurements account for a small percentage of the dataset and are not sustained exceedances.

Figure 4.32 presents HVO historical noise complaints since 2016 and shows there has been a downward trend in complaint history indicating low community concern about HVO noise in the Jerrys Plains area, constituting negligible noise impact including no noise complaints, at any location, in 2022.

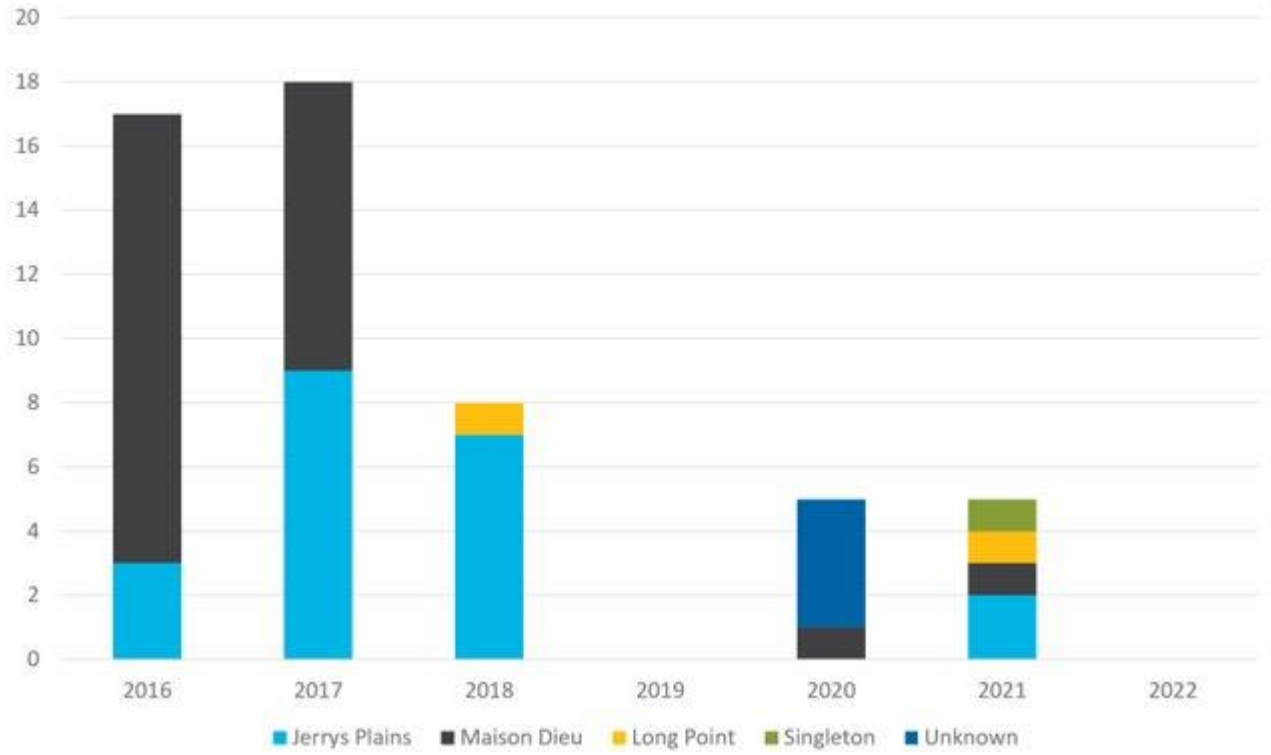


Figure 4.32 2016 - 2022 historical noise complaints

Figure 4.33 shows residences in the village with predicted HVO North noise levels higher than the PNTL. Highlighted in orange are those with a PNTL exceedance of 3 dB (none are higher than this) that would commonly be afforded mitigation rights as per the NPfI and VLAMP.

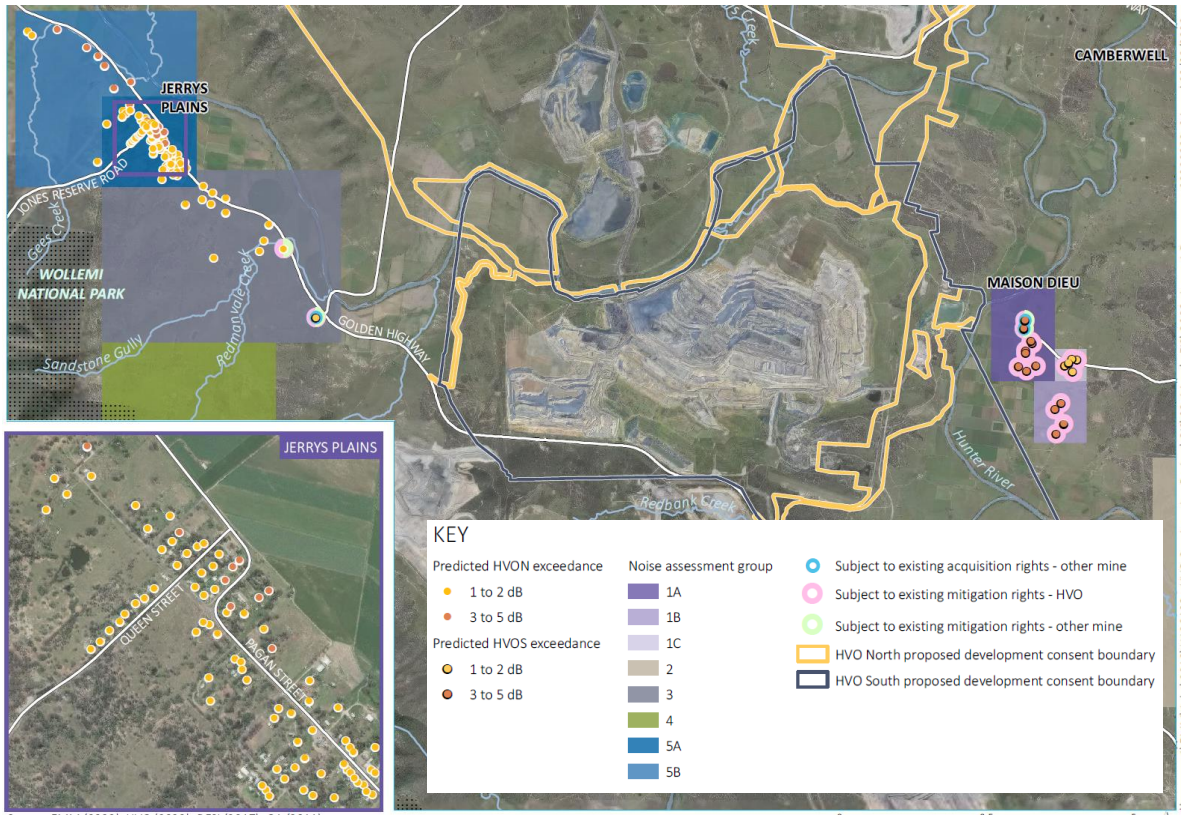


Figure 4.33 Jerrys Plains exceedances of PNTL

Figure 4.34 presents maximum predicted $L_{Aeq,15minute}$ levels in the village for all stages of the Project. Of note is that all predictions are within a 2 dB range, which is widely accepted as an imperceptible difference in noise level.

HVO's concerns with the suggestion that mitigation rights could be applied for some residences in the village and not others are:

- This may indicate some (i.e. those offered mitigation rights) will be subjected to perceptibly different noise levels than others, which is not the case.
- It could indicate to the community that noise levels will be increasing above current levels associated with the existing operation (no mitigation rights have previously been applicable), which is not the case.
- It may cause unnecessary social impacts and community frustration because some residents are afforded residential receiver treatments while immediately neighbouring residents are not.

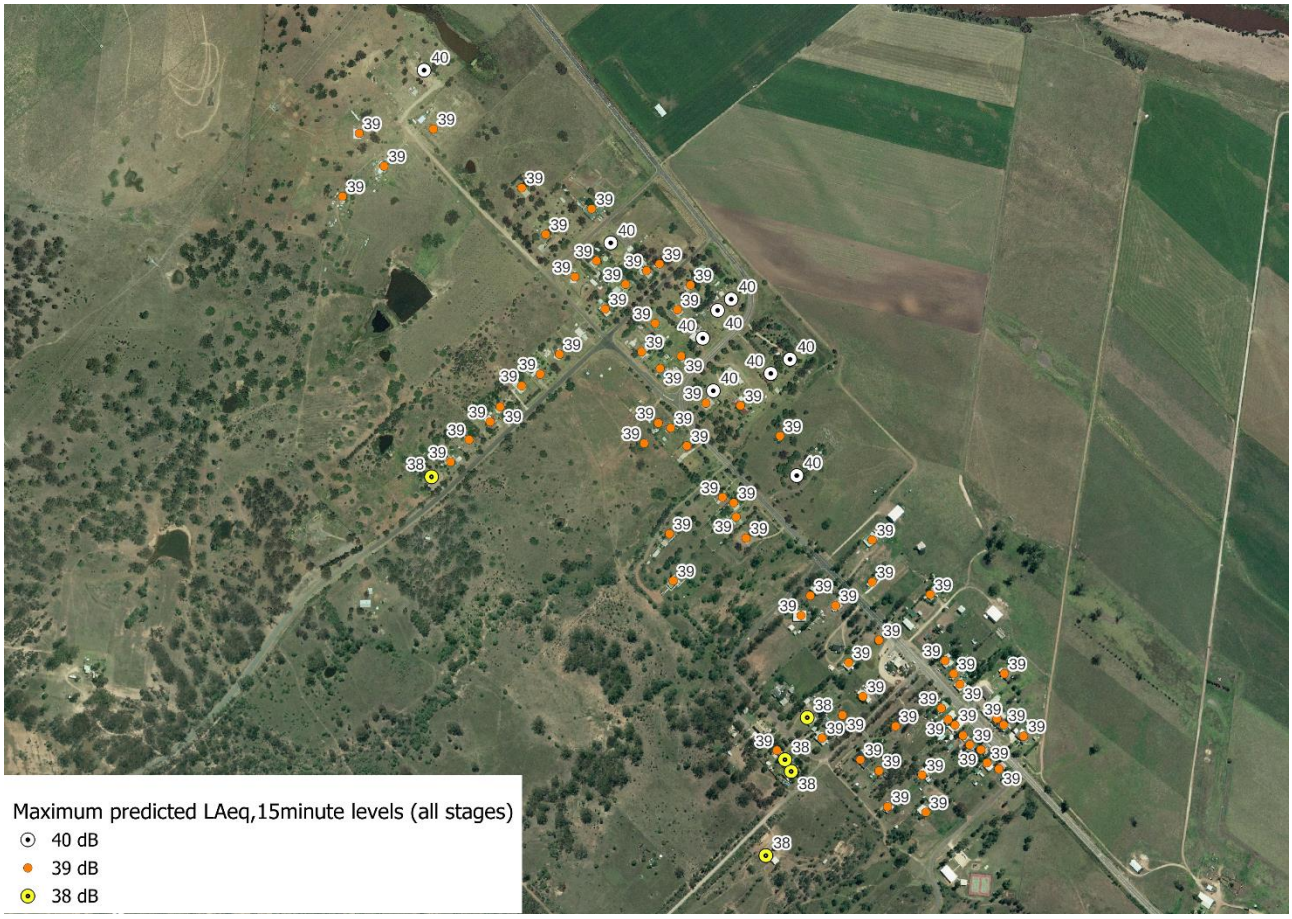


Figure 4.34 Predicted noise levels in Jerrys Plains

It is therefore proposed that mitigation rights are not applicable to those nine receptors in the village where predicted levels are 3 dB higher than PNTL in accordance with the VLAMP exclusions where:

- there are legacy noise issues (the predicted level has been approved and experienced for many years)
- the modification to operations has negligible noise impact (as shown by low noise complaint numbers).

Regarding these exclusions, the VLAMP references "modifications of existing developments". While a new SSD consent is sought for the Project for both HVO North and HVO South, as noted above, the Project relates to the continuation of an operation that has existed in some capacity since 1949. Mining noise in the village is expected to continue as before and is not new.

Finally, the introduction of mitigation rights to a small number of residences within the village may have a social impact in the community whereby some residences would be entitled to treatments, falsely indicating they will be subjected to perceptibly different noise levels than others.

HVO are proposing to continue operating within current noise limits at Jerrys Plains. Proposed limits are the same as existing and the community should therefore not experience noise levels above what is currently approved.

ii Assessment of sleep disturbance criteria

The NIA proposes adopting the NPfI sleep disturbance noise criteria of 52dB (LAFmax) increased from the existing licence criteria of 45dB (LA1min). The EPA notes that HVO have been reasonably complying with the existing sleep disturbance criteria and the proposal demonstrates they can continue to comply within a range of 1-2dB.

In conjunction with the NPfI, the EPA published the 'Implementation and Transitional Arrangements for the Noise Policy for Industry'. This transitional note states "Where an application is made to vary requirements using the new policy, the NSW Environment Protection Authority (EPA) will take into account existing commitments and requirements, and performance against those requirements, as evidence of the ability of the proponent/licensee to implement reasonable and feasible measures to mitigate noise. That is, where a licence holder meets current noise limits or can do so, this will be considered evidence that practical measures can be implemented to mitigate pollution for the purposes of s.45(d) of the *Protection of the Environment Operations Act 1997* when the EPA makes a licensing decision."

Considering the transitional note and the ongoing compliance by HVO with sleep disturbance criteria the EPA recommends continuing compliance criteria of 45-46 dB.

The sleep disturbance assessment completed for the Project and detailed in section 4.6 of NIA indicates all predictions would meet the EPA's proposed L_{Amax} limits. Accordingly, HVO has no objection in adopting these revised limits proposed by the EPA and will be acceptable for the Project to operate as proposed.

Table 4.26 lists the EPA's proposed L_{Amax} noise limits.

Table 4.26 L_{Amax} noise limits, dB

NAG	Night L_{Amax}
1A	46
1B	46
1C	46
2	46
3	46
4	46
5	46
All other privately owned land	45

4.11 Fire and Rescue NSW

Given the size and complexity of the proposed facility, and to ensure first responders have information readily available to render safe any incident, FRNSW make the following recommendations:

- That safe, efficient, and effective access is provided in accordance with FRNSW Fire Safety Guideline – Access for fire brigade vehicles and firefighters.
- That an Emergency Response Plan (ERP) is developed for the site in accordance with HIPAP No.1.
- That an Emergency Services Information Package (ESIP) be prepared in accordance with FRNSW fire safety guideline – Emergency services information package and tactical fire plans.

The comments from Fire and Rescue NSW are noted.

HVO will continue to offer safe, efficient, and effective access for emergency services across the site as part of the Project. HVO has an established site safety management system and emergency response procedures in place. Should the Project be approved, HVO will review the sites safety management systems and emergency response procedures to ensure consideration of the *Hazardous Industry Planning Advisory Paper No 1* (DoP, 2011) and the Fire and Rescue NSW *Fire safety guideline – Emergency services information package and tactical fire plans* (Fire and Rescue NSW, 2019).

4.12 Heritage NSW

In response to the submission from Heritage NSW, an Aboriginal Cultural Heritage Assessment (ACHA) addendum (EMM, 2023b) has been prepared and provided as Appendix C. This report builds on the information presented in the ACHA report (EMM, 2022a) provided as Appendix N to the EIS. A summary response to the specific matters raised by Heritage NSW is provided below.

4.12.1 Geomorphology and Pleistocene deposits

There are several examples within a regional context (e.g., Spur Hill, Wambo, along Wollombi Brook, Ravensworth Mine) where large numbers of artefacts and/or Pleistocene aged material have been identified on terraces in the vicinity, but not directly adjoining, the Hunter River, Wollombi Brook, and Bowmans Creek. Further explication is required on the potential for Pleistocene aged deposits within the Project area. Following this updated assessment, the predictive model may require updating and additional areas may require further investigation.

Undertaken as a requirement of the SEARs was the re-excavation and dating of Aboriginal site Carrington Mine Colluvial Deposit 1 (CM-CD1, 37-2-1877), which identified that the lower deposits dated between ~9,000-16,000 years ago. The test excavation program across the Project area identified four areas (5, 9, 11, and 12) that contained a minimum of 50 cm of sediment and relatively high numbers of artefacts. However, the ACHAR did not discuss whether, in light of the results from CM-CD1 (37-2-1877), these four areas had the potential to contain Pleistocene deposit.

Further information is also required on the extent that the landform associated with CM-CD1 (37-2-1877) may extend further into the disturbance area and whether any potential sub-surface archaeological deposits may be impacted.

Following the test excavation results, dating of CM-CD1 (37-2-1877), and updated Section 5, detailed assessment and mapping are required of potential localities within the Project Area that have not been subject to test excavations that may contain highly significant sub-surface materials.

A review of the geomorphic and archaeological literature for the Project area and surrounds has been undertaken and presented in Section 3 of the ACHA addendum, provided as Appendix C. This review highlights the importance of the Warkworth sand system as being the main deposits within which older cultural material may be present.

While the Warkworth sand system and colluvial units of CM-CD1 (37-2-1877) have been identified as Pleistocene, cultural assemblages recovered often have Holocene (<5,000 years ago) typology and characteristics. This extends to the findings of the ACHA report, provided as Appendix N to the EIS, where at both Area 12 (within the Warkworth sand system) and CM-CD1 (37-2-1877), the cultural assemblage appeared younger than the surrounding deposits. The ability to disentangle the mixing of older and younger cultural assemblages within these types of deposits in some instances has not always proven possible.

An additional geomorphological assessment has been undertaken of the Project area to explore the potential for Pleistocene deposits (Appendix C to the ACHA addendum), and with specific reference to the archaeological excavations undertaken for the Project. This identified that:

- Area 9 is located on a buried alluvial fan which is likely to be common within the Hunter Valley. It may have deeper deposits potentially of Pleistocene age; however, such deposits would be approximately 3 m below current surface and inaccessible when applying required Heritage NSW guidelines for archaeological excavation. As such, further investigation and potential salvage of these deposits is proposed and will be included as part of the revised Aboriginal Cultural Heritage Management Plan (ACHMP) should development consent be granted for the Project, with further details of the draft methodology provided in Section 6 of the ACHA addendum.

- Area 12 reflects a portion of the Warkworth sand system – a documented Pleistocene deposit – that extends from a larger expression of these deposits found south-east of the Project area. While the deposit can be of Pleistocene age, the cultural assemblage recovered is considered to be of Holocene age (<5,000 years ago) based on typological analysis, as documented in the ACHA report. Regardless, further investigation and salvage is proposed for inclusion in any future ACHMP developed for the Project as detailed in Section 6 of the ACHA addendum.

- CM-CD1 (37-2-1877) was considered a constrained geomorphological unit constrained by a unique set of conditions and is unlikely to be present elsewhere in the Project area. The deposit itself was well mapped through geotechnical investigation following its identification in the 1990s; and is being avoided in its entirety by the Project. Other potential comparable deposits in the broader region are presented in Appendix C of the ACHA addendum. The Project avoids all direct impact to site CM-CD1 (37-2-1877).

- No further locations beyond those listed above are considered likely to contain Pleistocene deposits.

4.12.2 Aboriginal consultation

Please provide additional documentation of the consultation process as there may be a gap of 10 months between November 2021 and September 2022. Heritage NSW requires that consultation with Registered Aboriginal Parties (RAPs) is continuous. Under our guidelines, breaks in consultation of over six months may not constitute continuous consultation. If an unexplained break of greater than six months has occurred, the applicant may be required to restart the consultation process.

Additional information on Aboriginal consultation undertaken for the Project has been presented in the ACHA addendum provided as Appendix C and supplementary information provided to Heritage NSW, which includes consultation activities during the November 2021 – September 2022 period. This consultation primarily focussed on the cultural values mapping study with key knowledge-holders, while the Project was being substantively re-designed to avoid CM-CD1.

Please provide evidence that the test excavation methodology was provided to the RAPs. The ACHAR notes that the methodology was discussed during an onsite meeting with the RAPs present, however it is unclear if the methodology was provided in writing to all RAPs.

As per the consultation log presented in the ACHA report, the test excavation methodology was issued on the 17 March 2021 to all RAPS. This consisted of a letter, which is presented in Appendix B of the ACHA addendum provided as Appendix C to this report; and which was also discussed at the Aboriginal Focus Group meetings during this period (25-26 May 2021).

Further information is required on the consultation undertaken with the Plains Clans of Wonnarua People (PCWP). It is understood from the details provided in the ACHAR that PCWP chose to not provide further information as part of the consultation process. However, from the provided correspondence and information in the ACHAR it is apparent that additional discussions were had, which have not been provided in the ACHAR.

Tocomwall Pty Limited – the organisation representing the withdrawn Plains Clan of the Wonnarua People (PCWP) native title application – and as a RAP for the Project have been provided all required documentation under the Heritage NSW *Aboriginal Cultural Heritage Consultation Requirements for Applicants in NSW* (DECCW, 2010a), as presented in the ACHA report. This includes the distribution of project information, assessment methodologies, invitation to meetings, and offers of participation in fieldwork. Their involvement and attendance has been generally limited, but a site officer of the PCWP, Mary Franks, did participate in some components of the field survey, test excavation and culturally modified tree activities for the Project.

Overall, some 91 interactions have occurred between the proponent and Tocomwall between September 2020 and November 2022. This included numerous offers to meet with HVO personnel, to undertake their own cultural values assessment and various other opportunities to engage with the Project. To date, all offers have been declined. Following the submission of the EIS, PWCP were provided the following Project update information:

- letter and email dated 16 February 2023 advised of the submission of the EIS to DPE and providing a link to the documents
- letter and email dated 26 July 2023 advising them of the response to submissions process and further avoidance measures undertaken since the submission of the EIS.

Further explication is required on the comments made by Wattaka Wonnarua Cultural Consultants Services (represented by Mr. Des Hickey) regarding the details provided in the Cultural Values Report. While we understand that Wattaka Wonnarua Cultural Consultants Services were afforded the opportunity to participate, Heritage NSW would recommend that the assessment of Cultural Values and further interviews be an ongoing process to ensure additional Wonnarua voices are included.

HVO has made further attempts to engage with Wattaka Wonnarua Cultural Consultants Services to understand any residual concerns regarding the cultural values assessment.

On 30 March 2023, correspondence was sent to Wattaka Wonnarua Cultural Consultants Services extending an invitation for them to participate in further discussions and site visits with Dr Phil Clarke (Anthropologist), and to ensure their knowledge and views in relation to the cultural values surrounding the Project area can be heard and considered. At that time, Wattaka Wonnarua Cultural Consultants Services did not want to progress the cultural values further.

A recent invitation was provided to the Hickey family to further discuss the Project and undertake a site visit following recent amendments and project refinements outlined in subsequent sections. An invitation was sent to Wattaka Wonnarua Cultural Consultants Services and Widescope Indigenous Group Pty Ltd on 18 September 2023 and a meeting was held on 12 October 2023 with representatives of the Hickey Family where the amendments to the Project were discussed focussing on the avoidance of impacts to scarred culturally modified trees within the Lemington Road realignment corridor. It is noted that a number of other discussions held, outside of the formal events discussed above, with Wattaka Wonnarua Cultural Consultants Services and the family more broadly have occurred since submission of the EIS. During these discussions it was noted that there was limited opportunity for RAPs to access Country and pass down cultural and knowledge to future generations. This discussion highlighted potential mitigations strategies which HVO could consider to assist RAPs.

The outcomes of the noted meetings and discussions were generally positive, and resulted in two main outcomes:

- There was strong support for the ongoing efforts to minimise impacts to cultural materials, and notably the culturally modified trees (HVOCP TR212-ST1 [37-3-1629], and HVOCP TR216-ST1 [37-3-1635]) along the Lemington Road re-alignment. At least one of which has specific value to the Hickey family.
- Suggestions for the proposed mitigation programs, as documented in the ACHAR (EMM 2022) to include requests for assistance in supporting local cultural events or returns to Country, and also for the development of materials associated with knowledge, connection and learning of Country, that would become increasing inaccessible into the future. This may include videos and other digital methods to capture such information and enable its distribution.

This second request has been integrated into the broader social enhancement strategies proposed for adoption and incorporated into the revised summary of commitments presented in Appendix C to the Amendment Report.

4.12.3 Section 10 application

Consideration must be given to the potential impacts the project may have on the Aboriginal cultural heritage values associated with the Section 10 application under the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* that encompasses several areas in the HVO North Project Area. Additional archaeological investigation may be required within these areas, subject to the Section 10 application.

The *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (ATSIHP Act) preserves and protect areas and places of particular significance to Aboriginal people from damage or destruction. Steps necessary for the protection of a threatened place are outlined in a gazetted Ministerial Declaration (Sections 9 and 10).

The northern portion of the Project area, primarily east of the New England Highway and surrounding Davis Creek, is subject to an application under the ATSHIP Act. The application was lodged by a representative of the Plains Clan of the Wonnarua People native title application, and has been under determination by the Department of Climate Change, Energy the Environment and Water for over four years. The application encompasses only a small portion of the HVO North Project area, and would not be critical to the success of the Project should the application be successful. Regardless, the Section 10 application under the ATSIHP Act is outside and separate to the consideration of the Project under the NSW planning system.

4.12.4 The archaeological resource

Heritage NSW notes that the Aboriginal Heritage Information Management System (AHIMS) search is greater than 12 months old at the time of submission. Heritage NSW requires, as per Requirement 1b of the Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW (DECCW 2010) ('the Code of Practice'), that AHIMS searches are contemporaneous with the project. We consider that AHIMS searches of over 12 months old need to be updated. Please provide an updated AHIMS extensive search.

The AHIMS database is managed by Heritage NSW and includes a location and description of Aboriginal objects and sites recorded through academic research and cultural heritage management throughout NSW. The AHIMS database was originally searched on the 8 – 9 June 2021, with updated data redownloaded from AHIMS on 16 September 2021. The original search conducted 17 AHIMS extensive searches covering a total area of approximately 18,300 ha, centred on the HVO Complex.

Another updated search was conducted on the 1 June 2023 in response to comments by Heritage NSW, using the same parameters as the original search (17 AHIMS extensive searches covering a total area of approximately 18,300 ha centred on the HVO Complex). Copies of the updated searches are presented in Appendix D of the ACHA addendum.

Generally, Heritage NSW does not permit vehicle surveys as a replacement for pedestrian surveys, as per Requirement 5 of the Code of Practice. It is understood that vehicle survey was undertaken where the land was inaccessible owing to dense vegetation cover (thistle) and where heavily disturbed. Please clarify where vehicle survey was employed owing to past disturbances and where it was used owing to inaccessibility. Further, please provide additional information on whether these areas, and other areas not subject to survey, will require survey if conditions change prior to proposed impacts.

Section 6.3 of the ACHA report provided as Appendix N to the EIS presents the methods and results of the archaeological survey conducted across the Assessment area. It was noted that thickly grassed hillslopes and plains covered in very dense thistle made completion of pedestrian survey ineffective and unsafe for the field team at these locations and thus slow vehicle traverses were employed in these areas where possible.

Vehicle traverse was undertaken across the following landform elements: hillcrest, floodplain, plain, terrace, hill slope 1 and 2, watercourse, and modified. The landforms which had the densest thistle or vegetation corresponded to the floodplain landforms which were either under crop or densely overgrown by invasive species.

Generally, the modified or heavily disturbed landforms are not considered to have archaeological potential which would require further survey.

Further details on the field survey approach adopted is presented in Section 4 of the ACHA addendum.

Please update mapping of test pit locations to include the number of artefacts recovered in each unit.

Additional maps of the test excavations presenting recovered stone artefacts is presented in Appendix D of the ACHA addendum.

The significance assessment stated that 84% of all extant Aboriginal cultural heritage sites to be impacted by the development are of low significance. While a number of these sites are isolated artefacts and/or low-density artefact scatters, many of the sites are part of larger site complexes. The ACHAR and Significance Assessment must take into consideration the influence these larger site complexes (including destroyed sites) have on the overall significance of the sites and the landform within which they are situated.

Please clarify and map where impacts have occurred to sites, the relevant approvals impacts were conducted under, and the current status of these approvals (e.g., expired, expiry date). It is unclear in the significance assessment and Appendix I of the ACHAR, which sites have been impacted and to what extent this has impacted their designated significance. Please provide additional justification on how works conducted under prior approvals have influenced the significance of applicable sites.

Further assessment of the significance of each identified site has been undertaken, including consideration given the loss of cultural materials over the last several decades from regional development activities (and thereby increasing the rarity of some site types). The results of this additional assessment are presented in Section 4 of the ACHA addendum.

As requested by Heritage NSW, a review of the cultural significance of Aboriginal cultural heritage sites within the Project disturbance area was undertaken following the submission of the EIS to include both consideration against the four established criteria (aesthetic, historic, scientific, social) *and* whether this ranking requires reconsideration due to the level of cumulative impact that has occurred in the region. The consideration of cumulative impacts primarily affects the rarity and representativeness of site's as cultural deposits are lost across the region.

As an outcome of this review, moderate significance has been allocated to stone artefact scatters which have moderate densities and are located on landforms which have greater potential to retain sub surface deposits such as alluvial terraces or terraces in proximity to the intersection of waterways and their tributaries. While these sites may have moderate densities of artefacts, they are still likely to be Holocene in age (<10,000 years old) and may or may not have intact stratified deposits depending on geomorphology and depositional context.

Highest significance has been allocated to those sites which demonstrate very high densities of stone artefacts and have potential for Pleistocene age deposits. Stone artefact scatters demonstrating higher densities, stratification and potential to be of greater age (i.e. late Pleistocene) are more likely to be identified within aeolian or colluvial sand dune/sheets contexts as they are characterised by deeper deposits with better preservation contexts. These landforms comprise source bordering dunes which are associated with the Warkworth sand system and are generally found within proximity to the Hunter River, Wollombi Brook and their immediate tributaries (usually within 5 -10 km of their intersection).

Culturally modified trees are also assigned a high value because of their increasing rarity in the region as a result of development activities. Two previously recorded culturally modified trees are present within the Project area and an additional three were identified as part of field surveys for the EIS.

When applying this approach, of the 279 sites within the Project disturbance area (comprising the existing and approved disturbance area at HVO, and the additional disturbance area associated with the Project):

- 252 sites have been assessed as being of low or low-moderate significance
- 16 sites have been assessed as being of moderate significance

- 11 sites have been assessed as being of high significance.

The 11 sites considered of high significance, include five culturally modified trees, three sites containing stratified and potential or demonstrated Pleistocene cultural deposits, and three high density artefact scatters with some potential for stratified cultural deposits. The 16 sites assigned a moderate significance are characterised as moderate to high density stone artefact scatters constrained to shallow texture contrast soil profiles. The remaining 252 sites typically reflect isolated or low-density stone artefacts that are consistent with the broader background scatter found across the Hunter Valley, indicative of use of the region by Aboriginal people for several millennia, and typically of low significance.

The outcomes of this review broadly align with the findings of the ACHA report (provided as Appendix N to the EIS), which identified 252 sites of low significance. The difference in the presented numbers reflects additional sites being recorded and lost since the submission of the ACHA report with the EIS, and the refinement of a small number of sites following the broader review undertaken to address Heritage NSW comments.

Additional information on the previous and existing Aboriginal Heritage Impact Permits (AHIPs) that have been obtained across the Project area, and their status is presented in Section 4 of the ACHA addendum.

4.12.5 Cumulative impacts

The ACHAR argues that Ecologically Sustainable Development (ESD) and cumulative impact will be addressed through the conservation of materials ex situ and that as many of the sites are considered to be of low scientific significance this is appropriate. However, as explained above, we have concerns about the accuracy of the significance assessments that may limit the reliability of this argument.

The ACHAR argues that cumulative impact will be managed through conservation of materials collected as part of the salvage program. Little consideration was given to the additional loss of at least 220 known sites as a result of the project. When coupled with the loss of over 700 sites in the local area, the cumulative impact to Aboriginal cultural heritage is quite large. The ACHAR argues that ex situ conservation may be comparable to in situ preservation, however, unlike the Kiribati case study provided, the impacts from the project are avoidable.

There is limited consideration for the avoidance and conservation of significant ACH sites. The ACHAR outlines that 84 sites will be avoided by the project, including one Pleistocene aged site, however, most of these have been deemed to be of low scientific significance with a greater number of moderate to high significance sites being impacted rather than conserved.

As presented in the ACHA report (EMM 2022a), CM-CD1 was avoided due to both the sites significance and uniqueness within the region. The unique landform of CM-CD1 has been further highlighted in additional geomorphological assessments completed following the submission of the EIS and presented in the ACHA addendum provided as Appendix C. Several other sites currently within areas approved for disturbance were also committed to be retained and conserved into the future.

Following the review and identification of cultural materials of moderate and high significance subsequent to the submission of the EIS (detailed in Section 4 of the ACHA addendum), further Project refinement and re-design has occurred. This has focussed on the Lemington Road alignment, and has resulted in the avoidance of two scarred trees (TR212-ST1 (37-3-1629) and TR216-ST1 (37-3-1635)) and a reduction of 2.78 ha of disturbance to Area 12 (associated with the Warkworth sands sheet).

As detailed above, a review of the cultural significance of Aboriginal cultural heritage sites within the Project disturbance area was undertaken following the submission of the EIS to include both consideration against the four established criteria (aesthetic, historic, scientific, social) *and* whether this ranking requires reconsideration due to the level of cumulative impact that has occurred in the region. The consideration of cumulative impacts primarily affects the rarity and representativeness of site's as cultural deposits are lost across the region.

As an outcome of this review, of the 279 sites within the Project disturbance area:

- 252 sites have been assessed as being of low or low-moderate significance
- 16 sites have been assessed as being of moderate significance
- 11 sites have been assessed as being of high significance.

A total of 205 sites are proposed to be impacted by the Project, following the adoption of significant avoidance measures. Of the 205 sites, 193 sites have been assessed as being of low or low-moderate significance, ten sites of moderate significance and two sites of high significance. The two sites of high significance, HVOCP TR195-AS2 (37-3-1619) and HVOCP TR213-AS1 (37-3-1626), are situated on the constrained Lemington Road alignment. The ten moderately significant sites all consist of moderate to high density stone artefact scatters within texture contrast soils.

Management measures for all archaeological sites impacted by the Project is proposed and detailed in in the ACHA addendum provided as Appendix C.

Further assessment of cumulative impact has been undertaken and presented in the ACHA addendum. This assessment shows that despite the previous destruction of 557 sites through past mining activities, and the proposed loss of 205 site recordings for this Project, this would constitute limited loss to the broader cultural assemblage.

Please clarify the extent of expected disturbances within the transmission line relocation areas.

Due to the flexibility in the location of electricity transmission line (ETL) poles, the span between poles and the location of access tracks has resulted in the avoidance of harm to some Aboriginal sites located within the proposed ETL construction corridors. As a result of this process to minimise impacts, of the 73 Aboriginal sites located within proposed ETL corridors harm to 33% (n = 24) has been avoided, including several sites of high and moderate significance: TR178-ST1 (37-3-1629), HVOCP TR47-AS2 (37-2-6497), and HVOCP TR47-AS3 (37-2-6514).

4.12.6 Aboriginal heritage mitigation and management

Further details are required regarding the three scarred trees identified as part of the ACHAR, including:
- Provisional management options for the scarred trees in the event of their removal;
- Further explication on the number of scarred trees that have been impacted in a regional context and the different management options that have been used for their removal and/or conservation; and
- Further information on the potential uses of the removed bark from the scarred trees, as there is potential for use as a burial covering.

Five culturally modified trees are identified within the Project area. Project re-design following the exhibition of the EIS has been developed to avoid these sites, but guiding principles for their management in the event of loss is presented in Section 6 of the ACHA addendum provided as Appendix C.

All management of culturally modified trees would be incorporated into the ACHMP.

Given these sites are no longer proposed for impact and being avoided, additional research to determine cumulative impact is no longer warranted.

Further details are required on the proposed salvage excavation methodologies for areas 5, 9, 11, and 12 as well as any additional areas identified in the above reassessment. The methodology should also include provisions for redesign and avoidance if the materials identified are of high local and/or regional significance.

General archaeological salvage methodologies for nine Aboriginal sites of moderate and high significance located with the Project disturbance boundary have been described in Section 6 of the ACHA addendum, with further refinement recommended as part of the ACHMP development. These include further characterisation and recovery of cultural deposits found primarily within the broader Test Excavation Areas 9, 11 and 12, as well as a smaller number of other discrete cultural deposits across the Project disturbance area.

Given the spatial extent of several of the sites, archaeological excavation would typically include an investigative phase followed by a salvage excavation where cultural materials and/or findings meet certain thresholds. The approach and methods would be undertaken to inform and answer the research questions, as well as to recover a substantive portion of the cultural materials that may be lost due to development activities.

Heritage NSW recommends that an ACHMP be developed and implemented for the project. Heritage NSW recommends the requirement for an ACHMP should be included in the Conditions of Approval and that an ACHMP be created and approved by Department of Planning and Environment prior to any development activities occurring within the project area. Included in the ACHMP should be provisions for project redesign if sites of high local and/or regional significance, as agreed to by the RAPs, are identified during the course of salvage excavations.

HVO has taken into consideration the avoidance of Aboriginal heritage sites through the Projects design, as presented in the EIS, and subsequent amendments to the design following the submission of the EIS. Should the Project be approved, HVO will prepare an ACHMP in accordance with the requirements of any conditions of consent. The HVO Complex is already subject to two ACHMPs for their current operation, so is familiar with the framework and requirements of cultural heritage management under these instruments of approval.

Please clarify the procedure that HVO will undertake in the transition from Aboriginal Heritage Impact Permits (AHIPs) to an ACHMP. For example, will the AHIPs be surrendered following project approval and/or will the AHIP methodologies be incorporated into the ACHMP?

HVO propose to include the following in the ACHMP should the Project be approved:

- Processes and procedures for the modification and/or surrendering of the existing Aboriginal Heritage Impact Permits (AHIP) across the Project area, including #4050 (C0002193), #4089 (C0002525), #2086 (expired), #2547, #2804, #3393, SZ300 and SZ315. This would include:
    - Review any overlap of the existing AHIP and identify whether the permit requires variation to encompass a revised boundary or to be surrendered.
    - Review of the conditions of each AHIP to determine any outstanding requirements, such as cultural assemblage analysis, reporting and/or curation.
    - Integration of any outstanding conditions into the project specific requirements of the ACHMP
    - Submission of AHIP variation and/or surrender forms for each active AHIP to Heritage NSW for processing. Liaison with Heritage NSW to ensure changes/relinquishment only come into effect following approval of the ACHMP.
- Processes and procedures for the modification and/or surrendering of the existing Care and Control Agreements (being the instrument of approval from Heritage NSW in the long term management and curation of Aboriginal objects recovered by various activities across the Project in the last two decades that dictate the location and methods that the Aboriginal objects are stored into perpetuity) including #2863 (expired), C0001890 and C00004768. This would include:
    - Consultation with the registered Aboriginal parties to determine the suitability and ongoing validity of curation management for the Project area.

- Integration and/or amendment of the requirements of the Care and Control Agreements into the ACHMP.

- Submission of variation and/or surrender forms for each active to Heritage NSW for processing. Liaison with Heritage NSW to ensure changes/relinquishment only come into effect following approval of the ACHMP.

4.13 Transport for NSW

Transport for NSW (TfNSW) provided comments on the Traffic and Transport Impact Assessment (TTIA) (WSP, 2022) provided as Appendix R to the EIS in a submission dated 16 February 2023. A detailed response to the matters raised by TfNSW has been prepared by WSP and provided as Appendix H. A response to the specific matters raised by TfNSW is provided in the below sections.

4.13.1 Traffic

In Section 5.2.1 of the submitted TTIA, an upgrade of the intersection of the Golden Highway / Comleroi Road to include an CHR and AUL is identified. Further discussion on how these upgrades have been calculated is sought in accordance with Figure 3.25 from *Austroads Guide to Traffic Management Part 6: Intersections, Interchanges and Crossing Management*.

Upgrades to the intersection of the Golden Highway / Comleroi Road were determined via a warrant assessment for a Type BA, AU and CH turn treatment. The results of the warrant assessments are presented in Appendix H. This was done by analysing the traffic volume demands on the minor and major roads at the intersection and assessing these values against the graphs shown in Figure 3.25 from *Austroads Guide to Traffic Management Part 6: Intersections, Interchanges and Crossing Management*.

As part of the Project, HVO proposes to convert the layout of this intersection to consist of auxiliary left turn (AUL) and channelised right turn (CHR). As depicted in Figure 4.35, it currently has a short AUL measuring approximately 50 m and basic right (BAR) treatment, which overlaps with the left turn treatment into an access driveway for the United Wambo site.

Figure 4.35 Comleroi Road–Golden Highway existing intersection layout (MetroMap, April 2021)

Based on the assessment presented in Appendix H, it was found that the existing conditions turn demand warrants the intersection to operate with BAL/BAR for the respective left and right turn. As such the current AULs and BAR layout at the intersection is sufficient to service this demand.

In 2025 with HVO, the background growth on the Golden Highway triggers the requirement for the right turn treatment to consist, as a minimum, of a short channelised right turn (CHRs). The left turn requirement would remain at BAL.

In 2035 with HVO, the warrant requires the right turn to operate with CHR and the left turn can remain at BAL.

In 2045 with HVO, the right turn would remain at CHR, and the left turn would be a short auxiliary lane (AULs). This scenario includes considerations in the reduction of right turn demand into Comleroi Road as Ravensworth Operations would conclude its operation in 2039.

The proposed AUL and CHR treatments at Comleroi Road–Golden Highway as part of the Lemington Road realignment therefore would satisfy the warrant requirement at the intersection and suitable for future operations, subject to the appropriate design process.

Further to the Lemington Road realignment, the Project would also require the closure of the private access driveway with the Lemington Road realignment which currently intersects with Comleroi Road just north of the Hunter Valley Gliding Club (HVGC).

All traffic that would utilise this private driveway to access Golden Highway (and the reverse) would now use the Comleroi Road-Golden Highway intersection. The amount of daily traffic that utilises this driveway is 610 vehicles per day which equates to approximately 60 vehicles in a peak hour. The impact of this change is presented in the assessment provided as Appendix H. In summary, this change would result in the CHR requirement on Golden Highway, initially triggered in 2035 with HVO, to be needed earlier in 2025 with HVO. The AULs (as a minimum) is required earlier in 2035 instead of 2045.

The proposed AUL and CHR treatments would still satisfy the warrant requirement at the intersection, with the closure of the private driveway.

It is understood that the exact location of this upgrade is dependent upon whether the realignment of the Golden Highway proceeds under the approved 'United Wambo' project to the south. The intersection works should facilitate through-movements along the Golden Highway for PBS Level 3 vehicles.

This comment by TfNSW is noted.

HVO will consider this requirement in the intersection design to ensure through-movements along the Golden Highway for PBS Level 3 vehicles can be provided.

In Section 2.2.1 of the submitted TTIA, a discussion is present upon the data collected during the COVID-19 lockdown. It is recommended that an analysis be given with any recent available traffic volumes to determine appropriate baseline data.

Traffic data on the New England Highway was verified using TfNSW's permanent traffic counter installed near Rixs Creek (Station ID 6153). In the TTIA (provided as Appendix R to the EIS), a discussion was made comparing traffic volumes during survey vs pre-covid which only indicates slight reduction. This is reproduced in Table 4.27 below.

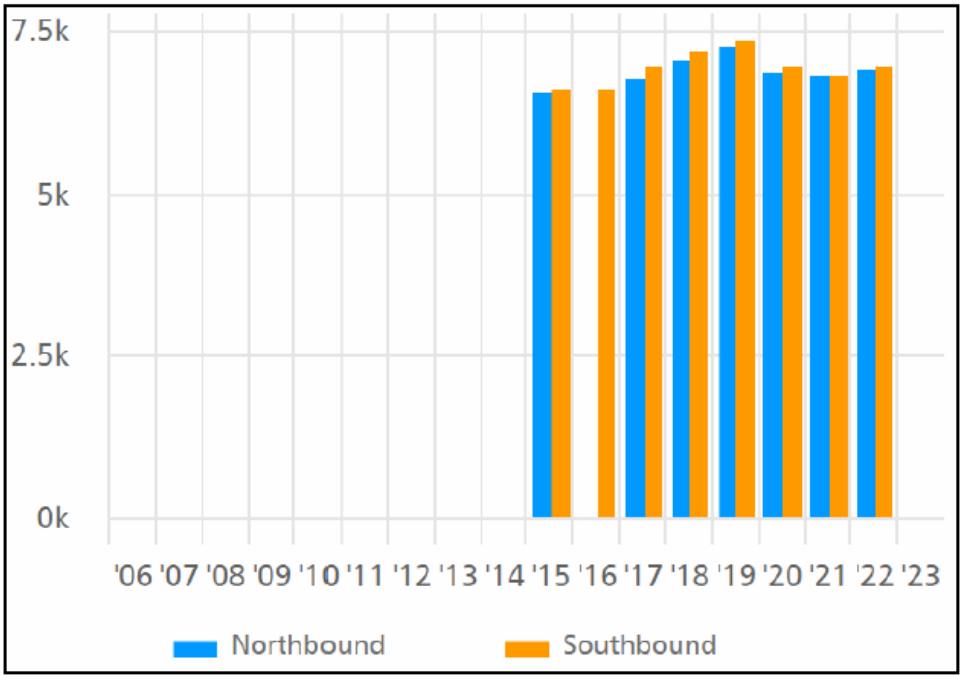
Table 4.27 Traffic volume comparison to assess COVID-19 impact

Source	Date of survey	7-day average traffic volume (vehicles per day)
Transport for NSW Traffic Volume Viewer Station ID 6153: New England Highway south-east of Lemington Road	September 2019	15,083
	September 2020	14,492
	March 2022	13,915
Automatic tube counts New England Highway south-east of Lemington Road	September 2020	14,525

TfNSW's Traffic Volume Viewer ID 6153 collected data on the New England Highway up until March 2022. The Annual Average Daily Traffic (AADT) in 2022, up until it stops operating, was 13,915 vehicles per day, which is lower than those surveyed in September 2020.

As shown in Figure 4.36, the traffic demand on the New England Highway has not grown since 2020. The traffic growth observed in the years prior to COVID-19 pandemic has not been observed in recent years.

As such, the traffic data collected in September 2020, as reported in the TTIA, is considered appropriate to be used as baseline assessment.



Source: Transport for NSW Traffic Volume Viewer

Figure 4.36 New England Highway (ID 6153) traffic volume pattern (vehicles per day)

Additional Automatic Tube Counts were undertaken on the Golden Highway, between 23 June 2023 to 30 June 2023, to obtain the latest Annual Average Daily Traffic (AADT) volumes at different parts of the Golden Highway.

The survey in June 2023 also included tube counts on Comleroi Road, north of the HVO Private Access Driveway to verify the data collected at the same location in September 2020.

The results of this survey are presented in Appendix H. Based on the results, it is considered that the data used and reported in the TTIA is consistent with the current traffic condition.

Delays at intersections I-02, I-05 & I-08 indicate that drivers may be inclined to take less than satisfactory gaps. Existing crash data gives evidence towards fatigue related crashes. TfNSW seeks further discussion on how HVO development operations can assist in making these intersections safer and maintain efficiency.

As discussed in a meeting with TfNSW (dated 8 June 2023), HVO have a fatigue management plan and policies in place which includes regular refresher training with the workforce. HVO will continue to emphasise the risk of fatigue in decision making during driving to and from site, including awareness of traffic at intersections. Ongoing training for the workforce will be provided for the duration of the Project.

Part of Lemington Road / Comleroi Road offers restricted vehicle access up to 25/26m B-Double and PBS Level 2A access. Comleroi Road and Lemington Road also form part of the NSW Oversize Overmass Load Carrying Vehicles network.

These roads would continue to accommodate the specific restricted, oversize and overmass vehicle types subject to road design checks and any swept path/bridge/pavement/structural requirements.

With the realignment of Lemington Road, Council will need to consider the design of the road and target level of freight access.

This comment by TfNSW is noted.

HVO will consider this recommendation in the detailed Lemington Road design process as part of the design criteria.

Additional commentary is sought as to why the 6:00-7:00 am peak was used noting that slightly higher traffic volumes were identified between 5:00-6:00 am. Is this the time that the employee shifts start and finish?

The 6 am-7 am peak period was used for the TTIA assessment as this was found to be the peak traffic activity for HVO and on the Golden Highway (refer Figure 4.37, Figure 4.38 and Figure 4.39).

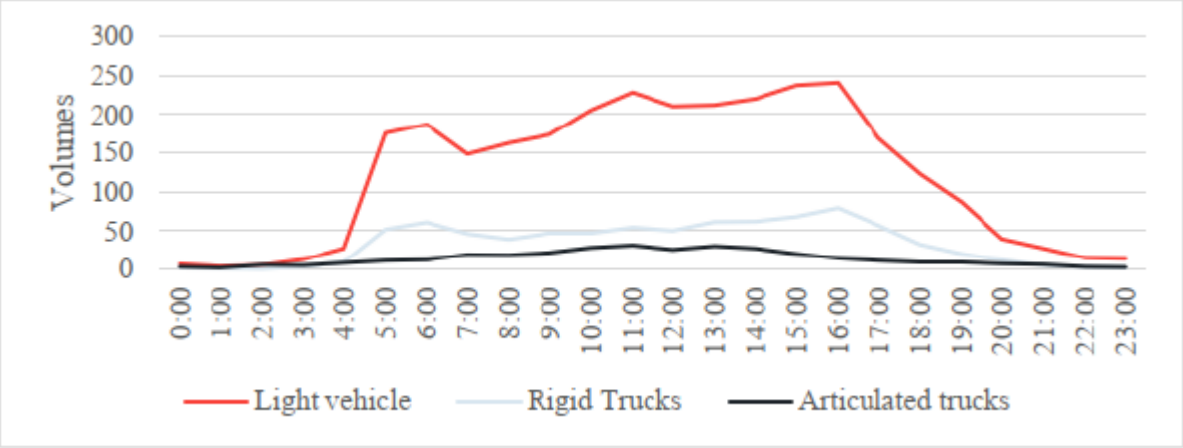


Figure 4.37 Golden Highway east of Lemington Road – heavy vehicle volumes (total)

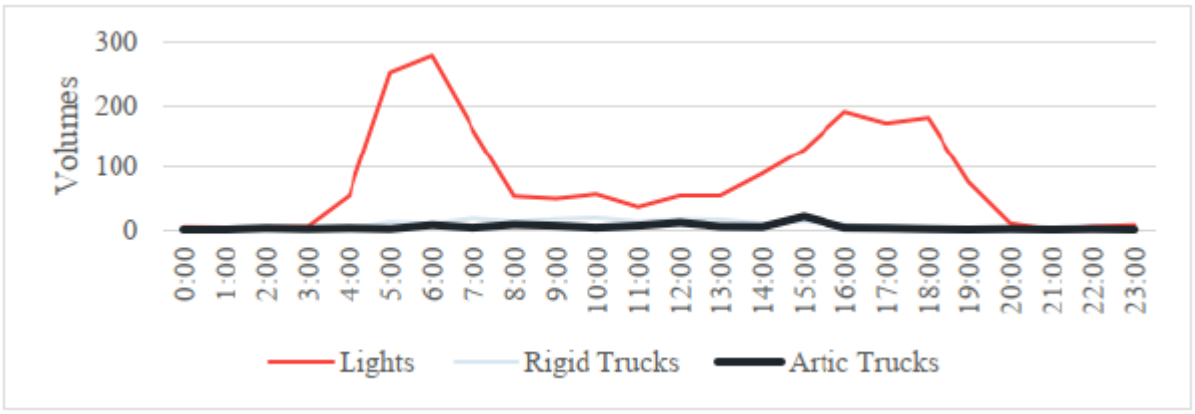


Figure 4.38 Lemington Road south of New England Highway – heavy vehicle volumes (total)

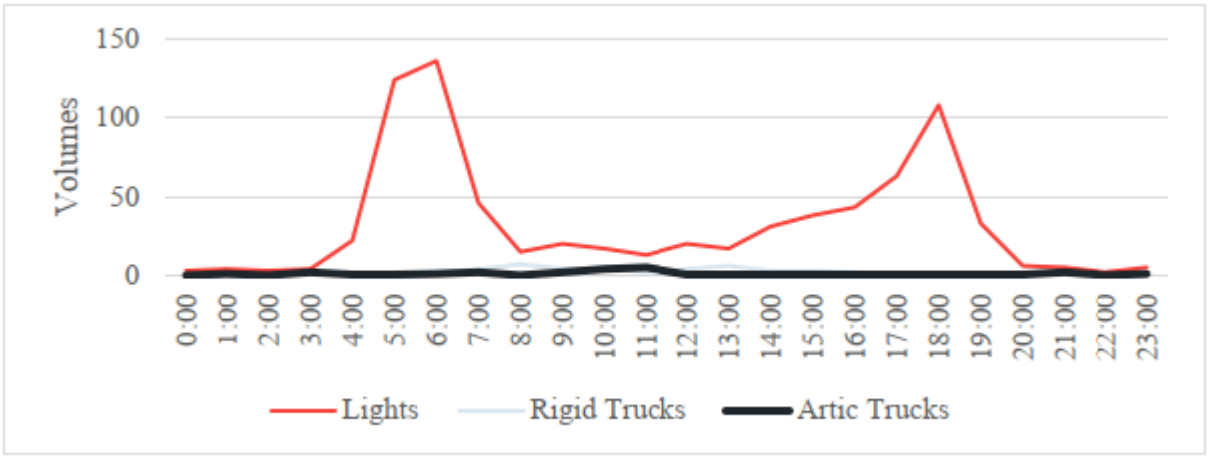


Figure 4.39 Comleroi Road – heavy vehicle volumes (total)

A 5 am-6 am peak was found on the New England Highway only. Additionally, the intersection surveys across the TTIA study area covered periods from 6 am onwards, which was decided given the information available at the time. As a result, the peak periods were also validated from these surveys, indicating a peak period between 6 am and 7 am.

Any roadwork on the classified road network is to be designed and constructed in accordance with the current Austroads Guidelines, Australian Standards and TfNSW Supplements.

This comment by TfNSW is noted.

HVO will ensure all roads required to form part of the classified road network are designed and constructed in accordance with current Austroads Guidelines, Australian Standards and TfNSW Supplements.

5 Response to council and public authority submissions

5.1 Muswellbrook Shire Council

5.1.1 Hunter Regional Plan 2041

Section 2 of the EIS references the Draft Hunter Regional Plan (HRP) 2041, which has now been finalised by DPE. A review should be undertaken to confirm that the Project aligns with the directions of the final HRP 2041.

The EIS included a review of the Project against the *Draft Hunter Regional Plan 2041* (draft HRP 2041) (DPIE, 2021c). The plan was finalised and published in December 2022 at the same time that the EIS was published.

The final Hunter Regional Plan (HRP) 2041 continues to acknowledge the ongoing importance the contribution from the mining, energy and manufacturing sectors will have to the regional economy and employment generation into the future. The final HRP 2041 continues to acknowledge the finite lifespan of coal as an energy source and the transition to other forms of clean energy. The final HRP 2041 contains nine objectives for the Hunter. Of relevance to the Project is the first objective, being a focus on the diversification of the Hunter's mining, energy, and industrial capacity.

The Project continues to align with and support the objective of diversification to the Hunter's mining, energy and industrial capacity through providing employment opportunities to the local and regional communities and critical economic support to the local, regional and state economies as the transition to a low emission future and target of net zero emissions is progressed.

A key strategy outlined in the final HRP 2041 to achieve the objective of diversification in the Hunter is the identification of alternative land uses for former mines and early planning for rehabilitation and closure. Detailed consideration of mine closure objectives and opportunities for final land use was presented in Chapter 21 of the EIS. The proposed final land uses for the Project area include a combination of:

- grazing
- cropping on the Hunter River alluvial flats
- biodiversity and habitat
- water storages and evaporative sinks in the final voids.

At this stage, any future uses of the land beyond what has currently been proposed will require further consideration, consultation, and assessment. As is noted in the EIS, the approval and implementation of alternate land uses post the Project will be subject to local, State and potentially Commonwealth environmental planning controls in place at the time (i.e. after 2050), and will also be subject to commercial feasibility assessment. Alternate land uses which may be suitable at the time of closure include, but are not limited to, intensive agriculture, electricity transmissions, pumped hydro energy generation, solar energy generation, wind energy generation and battery energy storage.

5.1.2 Employment strategy

Officers encourage employment of people who reside within the Muswellbrook Shire and employment of women, Aboriginal and young people. To achieve these outcomes, the proponent should:

a) Engage the equivalent of two apprentices per year from the Muswellbrook Local Government Area.

b) Engage permanent employees over casual labour or labour from labour hire companies.

c) Target 25% of supplier expenditure being paid to companies with offices in Muswellbrook Shire.

d) Commit to a strong workforce diversity policy with a target of 20% woman, 10% of Aboriginal people and 10% trainees.

Should the Project be approved, it will provide stability and continuity of employment opportunities for the existing approved HVO workforce of around 1,500 FTEs and new employees where natural attrition and retirement occurs. The majority of the current workforce resides in suburbs in the local and regional area of the Project area, with around 26% residing in Singleton LGA and 9% in Muswellbrook LGA. HVO will continue to prioritise local employment where possible to avoid changes to the local population caused by the influx of external workers.

Construction aspects of the Project including water management infrastructure, infrastructure upgrades, power reticulation and the realignment of a portion of Lemington Road will create a peak of 600 construction jobs over a five-year total construction period. It is anticipated that a local workforce will be engaged, where possible.

Like its approach to employment, HVO prioritises expenditure on local suppliers to maximise benefits to the local economy.

HVO currently employs 30 full-time Aboriginal and Torres Strait Islander employees. It is anticipated the Project will provide new employment opportunities and training pathways for Aboriginal and/or Torres Strait Islander people during the construction and operational phases. As detailed in the SIA provided as Appendix V to the EIS, HVO will liaise further with the Aboriginal community to provide awareness to Aboriginal suppliers around works programs that may be suitable. This includes working with the community to define an appropriate location and a frequency where briefings could be held on the HVO procurement processes. In addition, HVO will consider providing funding to support business/procurement training programs.

A Social Impact Management Plan (SIMP) will be prepared to support the Project should it be approved. The SIMP will include the identification of measures to encourage local participation, including:

- Identify training and employment agencies in the local and regional area who have demonstrated success in training and placement of young and mature aged people in construction industry roles.
- Seek to identify particular job positions and supply work packages that will be targeted for local people.
- Continue partnerships with secondary education providers in the regional area to support skill development i.e. provision of work experience opportunities on HVO Projects, provision of school-based certificate level training opportunities in skill sets that support employment in the construction and mining sector.

5.1.3 Voluntary planning agreement

Section 2.6 of the EIS states that "HVO will discuss a Voluntary Planning Agreement (VPA) accounting for the changes arising from the Project with Singleton Council." Whilst only 4% of the Project Boundary falls within the Muswellbrook Shire LGA, approximately 9% of the current workforce reside in the LGA i.e. approximately 140 employees. The mines are also within the visual gateway to Muswellbrook Shire. Council requests a VPA that includes a contribution for community projects and contribution toward employment of an Environmental Officer to offset community impacts and the cost to ratepayers for Council to review plans, monitor outcomes and contribute to closure / rehabilitation planning in the future.

Muswellbrook Shire Council's comments on a VPA are noted.

HVO will continue to engage with Muswellbrook Shire Council around development of a VPA. HVO intend to have the terms of a VPA agreed with Muswellbrook Shire and Singleton Council prior to the Project being referred to the Independent Planning Commission for a determination.

5.1.4 Traffic

A portion of Liddell Station Road is proposed to be closed as part the Project to enable the extension of the HVLP product coal stockpile. Clarification is required, including a figure showing, that there will be no impacts to Council local roads within the Muswellbrook LGA.

As noted within Section 1.2.1 of the EIS, the HVO North Project description includes the closure of a section of Liddell Station Road if the HVLP Extension option is pursued to increase product stockpile capacity. The section proposed to be closed, which is not a publicly accessible road, is identified in Figure 5.1. The purpose of this road closure is to accommodate the HVLP product stockpile extension (if constructed). Given this section of road is not accessible to the public, no impacts to the public or Muswellbrook Shire Council as a result of the road closure are anticipated.

Following determination of the Project, and should the HVLP be progressed, HVO will further consult with Muswellbrook Shire Council to initiate formal road closure processes for the relevant section of Liddell Station Road, in accordance with the Roads Act.

Source: EMM (2023); HVO (2023); DFSI (2017, 2022)

0 250 500 m

GDA2020 MGA Zone 56

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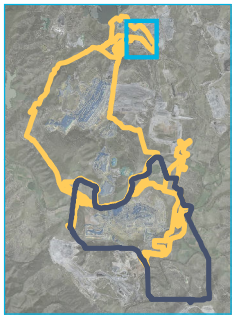


KEY

- HVO North proposed development consent boundary
- HVO South proposed development consent boundary
- Existing and approved disturbance area
- Additional disturbance area
- Project related item
- Existing item
- Indicative location of road closure
- Transmission line relocation
- Product stockpile

Existing environment

- Rail line
- Major road
- Minor road
- Vehicular track
- Named watercourse

Liddell Station Road

HVO Continuation Project
Submissions Report
Figure 5.1

EMM
creating opportunities

Section 19.3.2 of the EIS and Section 5 of the TTIA states that "workforce numbers will remain approximately as approved...in terms of traffic generation, the Project is not expected to change vehicle movements associated with the operation of HVO". It is difficult to interpret traffic distribution i.e. how many vehicles will enter and leave the site over a given time period without reading the previous EIS's for the existing mine. The Proponent should briefly include this information within the current application for transparency and better communication with the community given the age of the previous approvals.

A Traffic and Transport Impact Assessment (TTIA) of the Project was prepared by WSP and is provided as Appendix R to the EIS. The outcomes of the TTIA were summarised in Chapter 19 of the EIS.

Section 3 of the TTIA provides explanation of the existing conditions relating to the approved HVO North site. Within this section, Section 3.3 documented the Origin-Destination survey for Lemington Road which outlines the existing traffic generated from HVO and Ravensworth Operation sites and the corresponding distributions throughout the day, AM peak and PM peak.

Information presented in Appendix H detail the number of vehicles originating from and arriving to six key locations (Golden Highway (west), Golden Highway (east), New England Highway (west), New England Highway (east), HVO North MIA & HVCPP, Ravensworth Operations) between 6am-7pm.

Network diagrams showing traffic movements during peak hours have also been recorded for the intersections in the study area to gauge the current demand (refer to Appendix H). This includes trips at HVO North access point (off Lemington Road), and those using Liddell Station Road and the north-western section of the Project area.

Additional surveys completed in 2023 and presented in Appendix H indicate an AADT of 836 vehicles per day which indicate generally no change in operations.

5.1.5 Air quality

The closest receivers to the Project in the Muswellbrook LGA are located approximately 5.5 km northeast along Hebden Road and north near Lake Liddell. The facilities north of the NEH including the Newdell LP train loading facility, new product stockpiles, HVLP stockpiles and Liddell stockpile area has not been included in the air quality modelling. Provide justification as to why this is the case, and if a reasonable justification cannot be determined, remodel to include these areas.

An air quality and greenhouse gas assessment (AQGHGA) was prepared to support the Project and presented as Appendix H to the EIS. The AQGHGA considered impacts from both construction and ongoing operations proposed by the Project.

Section 7.1 of the AQGHGA includes consideration of dust impacts arising from construction activities. Construction activities assessed included the proposed upgrade of the existing Newdell Load Point (LP) and construction of a new product stockpile or extension of the Hunter Valley Load Point (HVLP) product coal stockpile at the facility area located north of the New England Highway. Impacts from dust as a result of construction activities were determined from a qualitative review taking into consideration the intensity, scale, location and duration of the proposed works.

Operational dust impacts were quantified by modelling and included consideration of all Project operational activities, including those activities associated with the Newdell LP and associated stockpiles located at the facilities north of the New England Highway at HVLP. An emissions inventory of all sources of air emissions was presented in Appendix D to the AQGHGA.

All activities associated with the construction and operations undertaken at the facility north of the New England Highway have already been considered and no additional remodelling is warranted to assess the impact of dust from the HVO North and HVO South operations on the surround environment and sensitive receptors beyond what was presented in the AQGHGA.

5.1.6 Noise

The Lake Liddell Recreation area and caravan park has not been included in the Noise Impact Assessment. The recreation area comprises an extensive camping ground and recreational activities such as go-karting, laser tag and rock climbing. Confirmation is required as to why this area has not been included in the assessment.

The Lake Liddell Recreation area was not included in the Noise Impact Assessment (NIA) given its distance from the Project boundary is approximately 4 km, and its distance from the nearest mining pit (West pit) is approximately 8 km. Indicative noise contour figures in Appendix C of the NIA show the Lake Liddell Recreation area sits outside of the 40 dB noise contour for all modelled stages and periods, and so is predicted to receive noise below recommended amenity levels per Table 2.2 of the *Noise Policy for Industry* (NPfI) for recreation areas.

5.1.7 Biodiversity

Officers are concerned about the water quality and ecological health of Bayswater Creek located at monitoring points Bayswater Creek Upstream NLP, Bayswater Creek Upstream HVLP, Bayswater Creek Midstream and Bayswater Creek Downstream. Very little information can be found for this area other than the following:

a) At least 0.14ha of riparian vegetation adjacent to Bayswater Creek must be revegetated to represent Swamp Oak Floodplain Forest Community (EIS Section 3.2.8).

As noted in Section 3.2.8 of the EIS, an area of at least 0.14ha of riparian vegetation adjacent to Bayswater Creek must be revegetated to represent Swamp Oak Floodplain Forest community. This is consistent with approved at activities at HVO North under DA 450-10-2003. The Project does not seek to change or modify this requirement.

b) It is located near the licenced discharge point and was subject to uncontrolled discharges of sediment in 2017 and 2018 (2019 Independent Audit).

Historical uncontrolled discharges events noted in the HVO Independent Audit (Hansen Bailey 2020), covering the audit period November 2016 to November 2019, were reported in accordance with regulatory requirements with follow up actions completed (Hansen Bailey 2020). No further action is required to address historical uncontrolled discharge events and as such is not considered further under the Project. HVO will continue to implement, and update as required on receipt of approval of the Project, the approved HVO Water Management Plan (HVO WMP). The HVO WMP provides reasonable and feasible measures to address potential water impacts of HVO as identified in relevant approvals documentation and satisfy the relevant conditions of the HVO consents.

c) All monitoring points were on a “watching brief” following trigger exceedances in 2021 (2021 Annual Review).

Monitoring results were again reviewed and documented within the HVO 2022 Annual Environmental Review (HVO 2023), with surface water monitoring results assessed against Australia and New Zealand Environment and Conservation Council (ANZECC) criteria and previous environmental assessment predictions. Data relied upon within the HVO 2022 Annual Environmental Review, and previous versions, was relied upon to inform relevant studies supporting the Project EIS.

Monitoring points are reviewed annually as part of both the Annual Review and Management Plan review process under current consents. The review of established monitoring points sit outside of the scope of the Project.

d) Bayswater Creek was dry in April and September 2020, and the channel was full of terrestrial weeds, and was assessed to be poor habitat (Section 4.7.3 Water Assessment).

Noted. The Aquatic ecology and groundwater dependent ecosystem assessment (AEGDEA, Ecological 2022, see appendix M of the EIS) determined Bayswater Creek constitutes poor aquatic habitat and is only likely to flow following periods of high rainfall or when there is discharge from Lake Liddell.

e) The site was not visited in January 2022 (Section 6.2 Aquatic Ecology and GDE Assessment).

As the April and September 2020 site inspections of Bayswater Creek determined the creek constituted poor aquatic habitat the site was not inspected in January 2022.

5.1.8 Housing and accommodation

The Upper Hunter regularly experiences shortages in temporary accommodation, affordable accommodation, and housing close to mines, particularly in phases of infrastructure construction, and mine and power station shut down periods where larger maintenance workforces are required for a short-term. The cumulative impact of mining and other development on the surrounding short-term housing market is likely to peak in years 2023-2025 with the commencement of construction for Maxwell Underground (up to 250 personnel), Mangoola Continued Operations and Mount Pleasant (up to 645 additional temporary personnel), Muswellbrook Bypass (up to 120 personnel) Bowmans Creek Wind Farm (up to 156 personnel) and Hunter Gas Pipeline. The SIA appears to assume that up to 180 construction workers will require temporary accommodation for six months during the peak construction period. Council requests that prior to commencement of construction, the proponent prepares a Workforce Accommodation Strategy that:

a) provides updated estimates of the likely accommodation demand of the development, including consideration of the potential interaction with other projects and in consultation with the applicant of those projects

b) proposes a strategy to facilitate the accommodation of the workforce associated with the development

c) investigates options for prioritising the employment of local workers for the construction of the development where feasible

d) includes a program to monitor and review the effectiveness of the strategy during the construction period.

A social impact assessment (SIA) of the Project was prepared and contained in Appendix V and summarised in Chapter 23 of the EIS.

The SIA indicates that Project would not result in any change to the existing operational workforce and therefore there is little to no long-term substantial population change associated with the Project. It indicates that the Project may result in slight short-term changes to local populations through the temporary influx of the construction workforce for a duration of 3–6 months.

It is an anticipated that the construction workforce will peak at 600 workers. It is likely that all construction workers sourced from within a one hour commute will be accommodated at their existing place of residence within the local, regional area and area of reference. As outlined in Section 6.1 of the SIA, the assumption that around 30% of the construction workforce would need to be sourced from beyond a one hour commute distance, would result in up to 180 construction workers needing to be accommodated when working on the Project. It is anticipated that the preferred form of accommodation sought by these workers would be short-term accommodation (hotels/motels etc); however, due to the limited availability of short-term accommodation, rental accommodation may also be sought most likely from neighbouring towns within an hour commute such as Muswellbrook, Singleton, Jerrys Plains, and Denman.

The influx of up to 180 construction workers due to the Project may result in additional demand for rental accommodation which places upward pressure on rental prices. However, it is also noted that the peak construction period in which there is the potential for heightened demand for accommodation is only anticipated to occur for up to 6 months. Subsequently any upward pressure on rental prices is likely to be marginal and short lived and therefore potential impacts on vulnerable groups would possibly not eventuate.

Mitigation measures to avoid impacts associated with the short-term construction workforce recommended in the SIA included:

- where possible, prioritisation of short-term accommodation rather than rental accommodation to meet requirements

- maximising the number of workers with applicable skills able to be sourced from within a one hour commute from HVO
- development of a social impact management plan (SIMP).

The measures recommended above by Muswellbrook Council can be considered during development of the SIMP.

5.1.9 Heritage

Officers request a summary identifying any significant links to heritage items within the Muswellbrook LGA from those items identified in Table 7.2 of the Heritage Impact Assessment.

As noted within Table 7.2 of the Historic Heritage Assessment (HHA) contained in Appendix O of the EIS, there are a number of mine owned heritage listed items located within the existing and proposed development consent boundaries for the Project.

No listed items of historic heritage will be directly impacted by the Project. One unlisted item considered to have local significance (remnant stockyards) will be directly impacted at HVO North. However, it is noted that mining activities will occur no closer to listed heritage items considered in the HHA to those that have previously occurred or are currently approved to occur.

5.1.10 Rehabilitation and closure

Some of the Project infrastructure within the Muswellbrook LGA is within the project boundaries for Liddell Coal Mine (DA 305-11-01) and Ravensworth Coal Mine (PA 09_0176). Rehabilitation responsibilities in these areas (including for the extension of the HLVP product coal stockpile area) should be clearly documented and evidence that neighbouring sites have agreed to responsibilities. Is it assumed that the underlying tenements will govern rehabilitation, however, this needs to be clarified as tenement holders vary. Noting that the extent of HVO rehabilitation is the southern side of Bayswater Creek (see Figure 4.1 of the EIS Appendix T).

Rehabilitation responsibilities fall with the holder of a mining lease. The infrastructure areas associated with the Newdell LP and stockpile and HVLP and stockpile, fall within mining leases held by HVO.

All existing and proposed areas of disturbance by the Project, located within the HVO North Project Development Consent boundary, will be the responsibility of HVO to rehabilitate. Rehabilitation of these areas will be detailed within the HVO Rehabilitation Plan that will be updated following approval of the Project.

Areas within the HVO North Project Application Area that are approved for disturbance by either the Ravensworth Coal Mine (PA 09_0176) or Liddell Coal Mine (DA 305-11-01) will be subject to rehabilitation by the mine owners Glencore and detailed within the respective approvals and rehabilitation plans relevant to those operations.

A new conceptual final landform has been designed utilising geomorphic landform design principles and erosion modelling techniques. Officers support these techniques. For areas within the Muswellbrook LGA, there are no contours shown on the “Proposed final landforms and post mine land uses” figure in the Mine Closure and Rehabilitation Strategy so it is assumed that slopes will remain generally as they are.

A rehabilitation and closure strategy was provided in Appendix T and summarised in Chapter 21 of the EIS. It is acknowledged that no contours are provided within the Muswellbrook local government area (LGA) in Figure 4.1 of the strategy. Muswellbrook Shire Council’s assumption that no contours are provided for this area as they will generally remain as they are, is correct, broadly reflective of the natural topology.

Council supports rehabilitation and closure mitigation measure RC4 outlined in the EIS to prepare a "detailed closure plan within five years of cessation of mining". Council requests that any Closure Plan outlines measure to:

a) actively manage site closure to minimise adverse impacts for workers, firms and the community – the goal should be to secure new uses that would employ a similar number of people on site pre and post closure

b) assist workers to secure new jobs and to maximise their future career options

c) strengthen the long-term sustainability of the upper hunter economy

d) maintain and improve social cohesion and community spirit throughout the change process

e) maintain collaborative and inclusive governance dedicated to promoting community cohesion through the transformation process.

A detailed mine closure plan will be developed within five years of the cessation of mining and in consultation with key government agencies and other relevant stakeholders such as Muswellbrook Shire Council. A key focus of the detailed mine closure planning process will be to identify suitable alternate land uses, taking into consideration the surrounding environment, landform, infrastructure and needs of the community.

A SIA will be undertaken as part of the detailed mine closure planning process to assess the impacts of mine closure on the local and regional communities. As part of planning for mine closure, HVO will work to minimise the impacts of mine closure on the workforce and subsequent impacts on the local communities of Singleton and Muswellbrook.

A working party with participants from the two councils, DPE, Premier and Cabinet, the Proponent, Chamber of Commerce, traditional owners, local land council members and the Hunter JO Economic Transitions Committee should be established within five years of cessation of mining to commence planning for the transition to a post-mining suite of uses for the site.

As stated above, as part of the detailed mine closure planning within five years of the cessation of mining, consultation with key government agencies and other relevant stakeholders such as Muswellbrook Shire Council will be undertaken. The key stakeholders to be engaged with during the detailed mine closure planning process will be determined closer to the time of mine closure however it is acknowledged that mine closure planning requires input from a broad range of stakeholders to guide the development of closure principles.

Majority of land within the Muswellbrook LGA is proposed to be returned to Agriculture – grazing post-mining, with some areas of native ecosystem and swamp oak floodplain forest adjacent Bayswater Creek. For areas proposed as Agriculture – grazing, completion criteria should include evidence that cattle have been successfully grazed.

Detailed completion criteria for proposed lands to be rehabilitated for grazing post mining will be developed and detailed within the HVO Rehabilitation Plan which will be revised should the Project be approved. Monitoring of rehabilitation performance against the completion criteria will be undertaken and reported annually as part of the Annual Review prepared for the HVO complex.

HVO has a demonstrated capacity for the rehabilitation of disturbed lands to achieve the final land use and restore natural resource. Rehabilitation of disturbed lands has been undertaken progressively and successfully at HVO throughout the mine's life. At the end of 2022 of the 4,265 ha of total disturbance, 2,713 ha of land will be under rehabilitation. This includes approximately 1,515 ha of existing and planned pasture rehabilitation and 63 ha of Class II agricultural land, in accordance with the former rural land classification scheme (Cunningham et al, 1988), that was able to achieve a lucerne hay productivity yield of 'at least equivalent to the average crop productivity yields for the Upper Hunter Region for three consecutive years' as well as 102 ha of Class IV grazing.

A number of trials have been undertaken at HVO to assess the performance of mine rehabilitated grazing lands against the performance of unmined natural grazing lands. The results of the trials consistently showed that cattle on the rehabilitated pasture performed better, meaning they put on more weight, than those on natural pasture. They also revealed that the rehabilitated pasture provided higher-quality feed than natural pasture. Research to improve the success of mine rehabilitation of grazing lands are ongoing, however overall, trials completed demonstrate that post-mining land can be successfully transformed into sustainable cattle grazing land.

Section 21.3.3 of the EIS provides a discussion on alternate post-mining land uses and states that viability of alternate land uses "cannot be anticipated at this stage", and "commercial negotiations over the ownership and use of mine infrastructure could be undertaken closer to the time when coal mining is planned to cease, and detailed mine closure planning can be undertaken". Officers are aware that proponents have obligations under the *Mining Act 1992* to rehabilitate the site. However, these obligations can inhibit the future land use of the site for other industry and utilisation of infrastructure that was constructed for the operation of the Mine and may still have an economic purpose. Whilst Council Officers acknowledge that in the first instance the site should be safe, stable, and non-polluting, there should be an increasing move in the industry toward planning for a range of uses on sites dependent on capability, services and infrastructure and vehicle access. This may allow employment generating activities on part of the site, and similar equivalent employment numbers, rather than the simply returning all the site back to farmland and native ecosystems with minimal employment opportunities. The HRP 2041 contains a discussion on strategic land use opportunities in Strategy 1.1 and 1.2 to encourage early consideration of alternate land uses in mine planning. Although the timing of when alternate land use planning is required is not clear, the proponent should incorporate any relevant outcomes of these studies as part of mine closure. Any final land use option study should consider and build upon future plans for the neighbouring AGL site, where appropriate.

As noted in Section 21.3.3 of the EIS, approval and implementation of alternative land uses post the Project will be subject to local, State and potentially Commonwealth environmental planning controls in place at the time and will be subject to commercial feasibility assessments at that time. HVO notes that significant infrastructure features such as water storages, railway lines, industrial buildings, access roads, pipelines and electricity transmission infrastructure may be suitable for use as part of the future alternate land uses.

As part of the detailed mine closure planning, a review of all potential land uses will be considered and developed in consultation with key government agencies and other relevant stakeholders. Detailed mine closure and investigations into potential alternate land uses will occur within five years of planned closure. The outcomes of investigations into alternate uses including consultation outcomes will be documented in the detailed closure plan.

Officers are drafting a Rehabilitation Policy which is expected to be finalised in 2023. The Policy will include an expectation that any rehabilitated slopes facing the NEH and Golden Highway (designated tourist route) is designed utilising geomorphic landform design principles/micro relief and erosion modelling techniques to improve visual amenity.

Mined areas of HVO South have generally been rehabilitated in accordance with traditional engineering landform design principles, which have been shaped to the approved final landform as per the Rehabilitation Management Plan, including contour banks and rock lined drains to facilitate a free draining landform.

As detailed in Chapter 21 of the EIS, a rigorous landform design and refinement process has been undertaken for the Project so that the landforms are appropriate for the site overburden and soils, and can be rehabilitated to be stable to support the nominated post mining land uses. This involved the following key steps:

- bulk samples of representative spoils and soils were collected and sent for laboratory erodibility testing using simulated rain and overland flow
- target tolerable annual average and peak erosion rates were determined for the landforms

- the overland flow and simulated rain data was input into the Water Erosion Prediction Project (WEPP) erosion model to develop slope length, steepness and profile design rules for the geomorphic landform design
- further development of HVO's final landform using geomorphic landform design principles, informed by the design parameters developed by the erodibility parameters
- the WEPP erosion model was used to provide guidance on the percentage vegetative soil surface required to achieve the target erosion rates
- landform evolution modelling was undertaken on the geomorphic landform design to identify any locations where unacceptable rates of erosion may occur and the design was modified accordingly.

The outcome of this final landform design process is the production of a stable final landform that will reflect a sympathetic landform to the surrounding landscape and minimise long term visual impacts. implementation of progressive rehabilitation over the life of the project will reduce the duration of visual impacts arising throughout the operation of the Project when viewed from surrounding land.

5.1.11 Project application area

Clarification is required on why the HVO North Project Boundary has been amended to include the Liddell Coal stockpile area when this area is not shown as "infrastructure" in the EIS mine plans (EIS Figures 4.5 – 4.9).

The stockpile and associated infrastructure area at Liddell Coal Operations was included within the HVO North proposed development consent boundary to provide additional construction laydown area to support proposed coal handling infrastructure improvements. Specifically, improvements included the extension of the HVLP product coal stockpile and the new product stockpile and train loading facilities at the Newdell LP, noting only one of the improvements options will be undertaken under the Project.

5.1.12 Tailings storage and management

Officers support the use of the Liddell Coal South Cut Void for tailings disposal to assist in achieving the "Complete Fill Scenario" proposed in GRAWTS Stage 2 Modification for Liddell Coal Mine. As the Glendell Mine has not been approved, there may be additional capacity within the Liddell Mine South Cut Void to store tailings.

Fine rejects (tailings) have been emplaced in various approved tailings storage facilities (TSFs) across the HVO Complex. Currently, tailings are emplaced within approved TSFs in Carrington Pit as well as Cumnock Void 3 under agreement with Ravensworth Operations to utilise the void capacity. Tailings from the Howick CPP are currently pumped via a pipeline to Cumnock Void 3, while tailings from the HVCPP are pumped via a pipeline to the Carrington Pit TSF. Intermittent deposition of tailings occurs in Dam 6W TSF and Central TSF as part of ongoing management towards decommissioning.

Glencore established the Greater Ravensworth Area Water and Tailings Sharing System (GRAWTS) to facilitate the transfer of mine water and tailings between Liddell Coal Operations, Ravensworth Operations, Mount Owen Operations and the Integra Underground Mine. Approval was granted to Liddell Coal Operations for the establishment of Stage 2 of the GRAWTS (DA 305-11-01 MOD 8) on 15 May 2023. That approval authorises the receipt of tailings at Liddell Coal Operations from nearby mining operations to enable the Liddell Coal South Cut void to operate as a multi-user tailings facility.

The GRAWTS involves a system of approved pipelines, transfer dams and associated ancillary infrastructure that facilitates the transfer of mine water and tailings between the mining operations.

The GRAWTS allows for operational and economic efficiencies across those operations by facilitating more efficient water and tailings transfers and enables additional tailings emplacement within the South Cut Void at Liddell Coal Operations in order to minimise the overall size and depth of the final void, as well as minimise the need to establish additional TSFs at Mount Owen Operations and Ravensworth Operations.

As detailed in Section 4.4.4 of the EIS, disposal of additional tailings from the Project is proposed in the Liddell Coal South Cut void located immediately north of the New England Highway and HVO North. The emplacement of HVO tailings in the South Cut void will have a number of benefits, including the beneficial use of an existing open cut void by effectively utilising the storage capacity of this void, and avoiding the establishment of an additional TSF at HVO. A further benefit of utilising the South Cut void is that it reduces the number of voids in the local area. The indicative pipeline route to the South Cut void was shown in Figure 4.11 of the EIS.

5.1.13 Land use

Section 2.4 of the EIS states that existing land uses surrounding HVO include buffer land that is used for low intensity grazing. The Hunter Regional Plan 2041 states that "mine buffer land could be suitable for employment-generating purposes subject to site specific investigation". This land could also be used for alternate power generating activities to minimise electricity use at the site. Officers request that alternate uses for buffer land be continually considered and investigated as part of the project.

This comment by Muswellbrook Shire Council is noted. Other than areas that are required for the establishment of biodiversity offsets, mine owned buffer land could host a number of land use options. The use of buffer land for alternative land uses will be considered in more detail during detailed mine closure planning, which will occur within five years of planned closure. At this stage, the consideration of alternative uses for these buffer lands are beyond the scope of the Project.

5.1.14 Visual

Officers are concerned about the combined landscape and visual/aesthetic effect of the presence of coal mines adjacent the NEH and Golden Highway, and how they impact the perception of Muswellbrook. The results of the viewshed analysis indicate that a number of the selected viewpoints already do, and will continue to, experience cumulative visual amenity impacts (i.e. concurrent views of multiple mining operations)". Officers request an assessment of views travelling north along New England Highway and Golden Highway, including a figure showing existing visual treatments (if any) and options for additional treatments to mitigate cumulative impacts adjacent each road.

A visual impact assessment (VIA) was prepared to assess potential visual impacts of the Project on the surrounding area. The VIA was provided as Appendix S and summarised in Chapter 20 of the EIS. Recognising that operations at HVO have a visual impact on the surrounding area, including at static viewpoints like residences and transient viewpoints like road, the VIA focused on what will change from approved operations as a result of the Project and the proposed timing of those changes as operations are completed.

To address Muswellbrook Shire Council's comment about the impact of transient views of motorists travelling along the Golden Highway and New England Highway, two additional viewshed analyses have been completed, which have considered:

- views from the Golden Highway along an approximately 9 km section of the road between Lemington Road in the north and Comleroi Road in the south
- views from the New England Highway along an approximately 13 km section of the road between the overpass of Pikes Gully Road and Liddell Station Road in the north and Glennies Creek Road in the south.

There are no existing or proposed visual treatments along the assessed roads; however, it is acknowledged that roadside vegetation currently obstructs views of the HVO Complex.

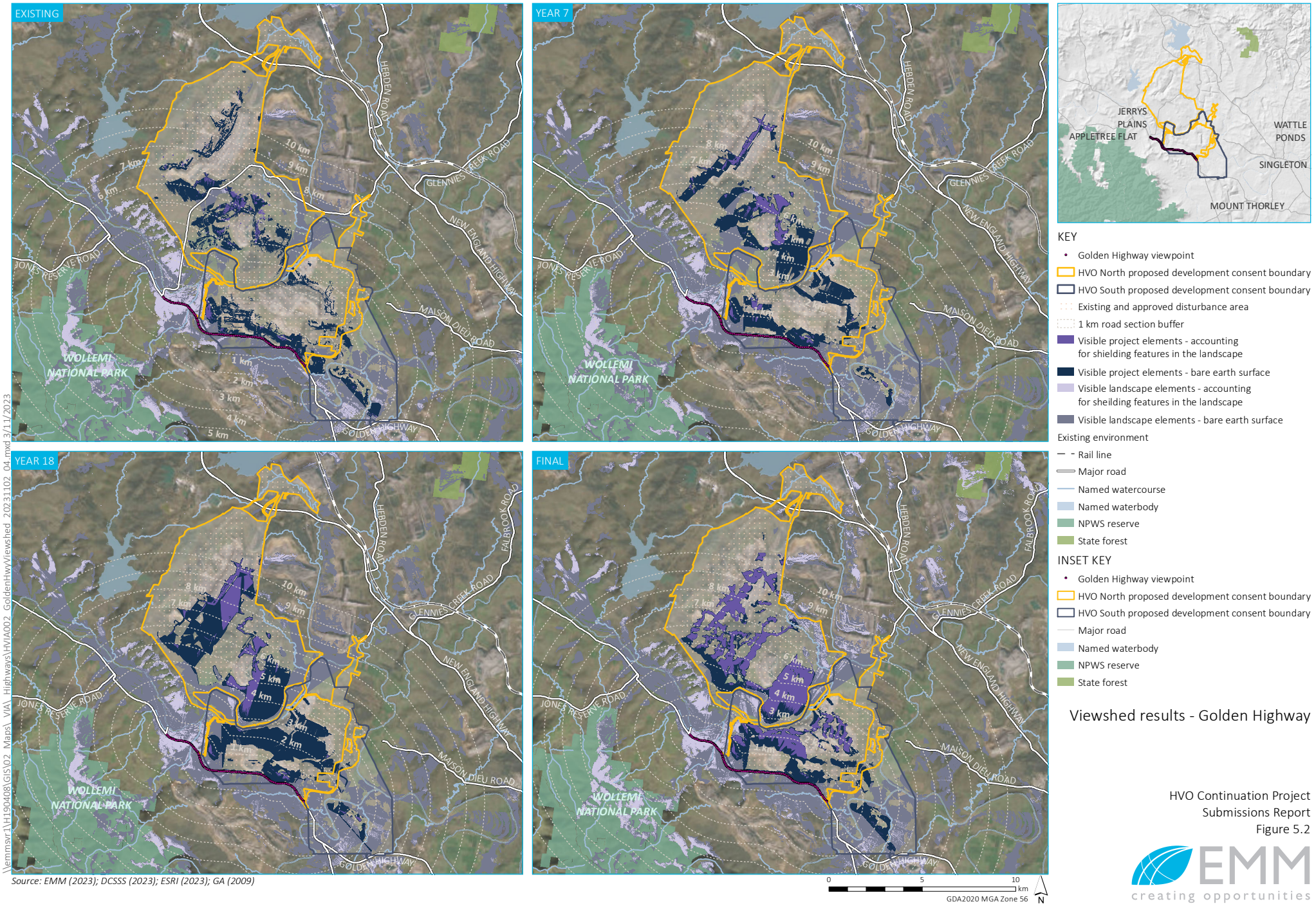
Rather than considering impacts experienced from a single viewpoint, views experienced every 100 m along the selected road corridors have been assessed to identify areas of visibility under existing and proposed conditions. Whilst it is acknowledged that the focus of Muswellbrook Shire Council's submission was on views experienced by motorists while travelling north towards Muswellbrook, the viewshed analysis has conservatively considered 360° views experienced from each of the assessed points.

The viewshed analysis has been generated using both a digital elevation model (DEM) and a digital surface model (DSM). The DEM is representative of the bare earth surface and only considers the topography of the landscape. The DSM is representative of the actual surface of the earth and considers a variety of different features in the landscape, including vegetation and built structures.

A viewshed analysis based on the DSM alone cannot be used to identify the potential visual impacts of the Project as it does not provide a true representation of the ability of certain features to shield views of Project infrastructure from a given location. For example, in the case of vegetation, a viewshed analysis based only on the DSM may over exaggerate the shielding potential of this feature. In reality, depending on the nature of the vegetation (e.g. canopy cover only), views of Project elements through vegetation may still be possible. Subsequently, the results of the viewshed analysis have included results from both the DEM (layer titled, 'visible project element – bare earth surface') and the DSM (layer titled, 'visible project elements – accounting for shielding features in the landscape').

To assist with the interpretation of the results presented in Figure 5.2 (Golden Highway) and Figure 5.3 (New England Highway), the reader should consider the total area identified as 'visible project elements – bare earth surface' as representative of the worst-case scenario for each viewpoint (i.e. the maximum visible extent of Project elements from the selected viewpoint). The total area identified as 'visible project elements – accounting for shielding features in the landscape' should be considered representative of the best-case scenario for each viewpoint (i.e. the minimum visible extent of Project elements from the selected viewpoint).

The results of the viewshed analysis are shown on Figure 5.2 (Golden Highway) and Figure 5.3 (New England Highway) and summarised in Table 5.1.



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Source: EMM (2023); DCSSS (2023); ESRI (2023); GA (2009)

Viewshed results - Golden Highway

HVO Continuation Project
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Figure 5.2

EMM
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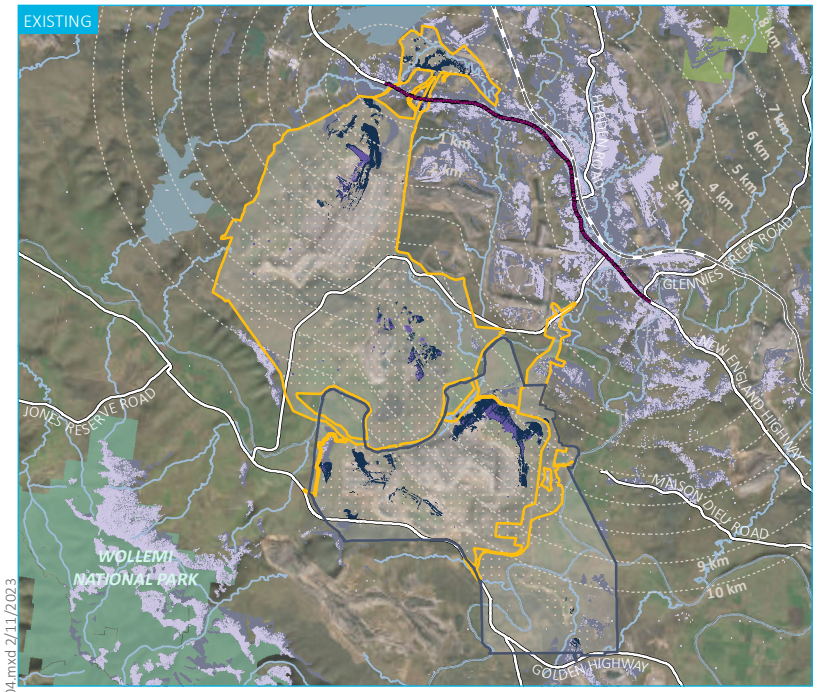

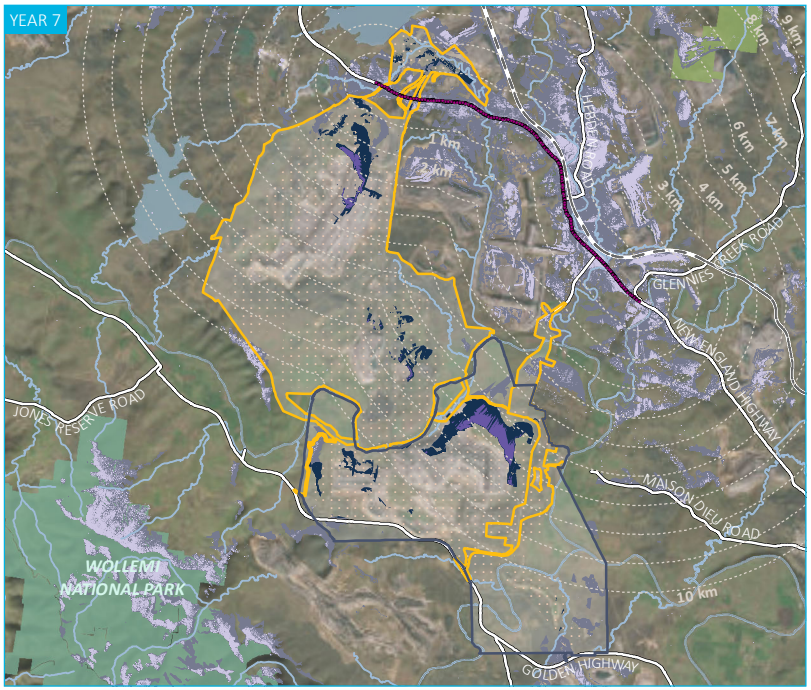

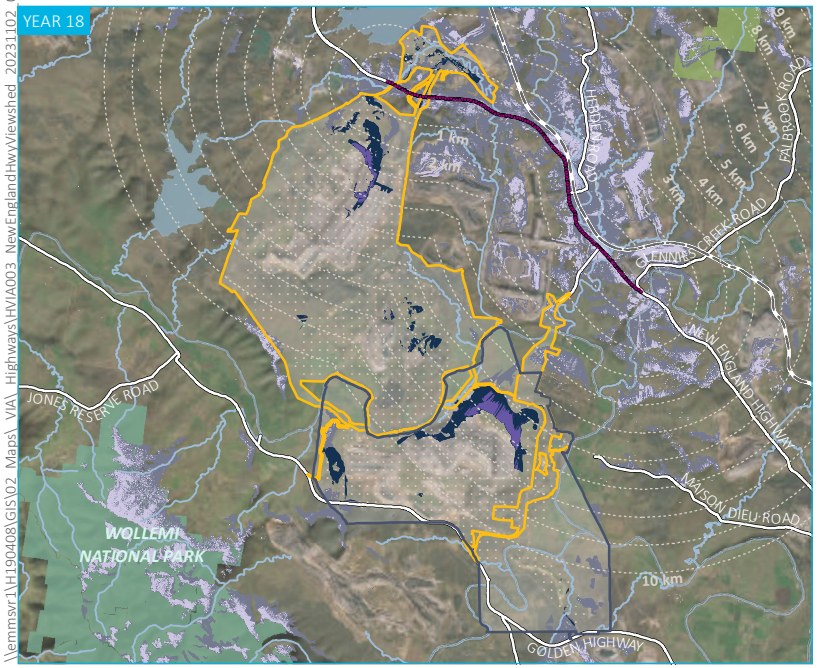

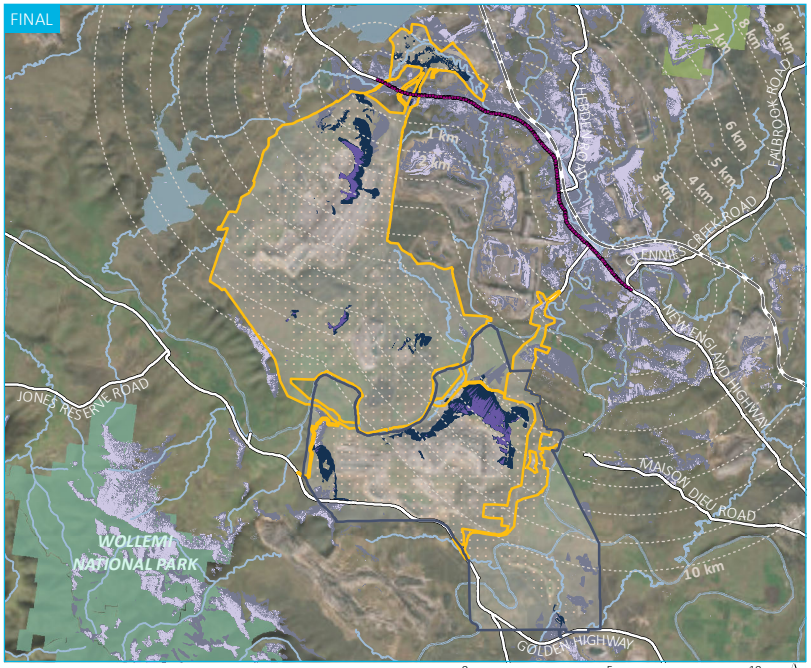

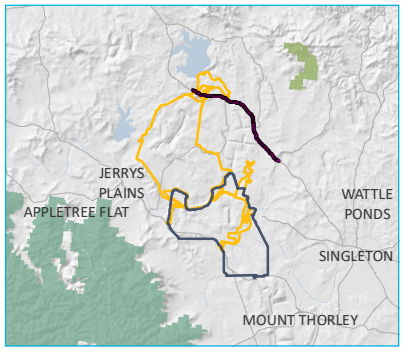

KEY

- New England Highway viewpoint
- HVO North proposed development consent boundary
- HVO South proposed development consent boundary
- Existing and approved disturbance area
- 1 km road section buffer
- Visible project elements - accounting for sheilding features in the landscape
- Visible project elements - bare earth surface
- Visible landscape elements - accounting for sheilding features in the landscape
- Visible landscape elements - bare earth surface

Existing environment

- Rail line
- Major road
- Named watercourse
- Named waterbody
- NPWS reserve
- State forest

INSET KEY

- New England Highway viewpoint
- HVO North proposed development consent boundary
- HVO South proposed development consent boundary
- Major road
- Named waterbody
- NPWS reserve
- State forest

Source: EMM (2023); DCSSS (2023); ESRI (2023); GA (2009)

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Viewshed results - New England Highway

HVO Continuation Project
Submissions Report
Figure 5.3

EMM
creating opportunities

Table 5.1 Visibility of Project elements from Golden Highway and New England Highway

Project area	Modelled visible area (ha)			
	Baseline	Year 7	Year 18	Final landform
Golden Highway				
HVO North – bare earth	764	1,186	1,824	1,797
HVO North – shielding features	38	259	560	1,202
HVO South – bare earth	681	744	1,248	1,218
HVO South – shielding features	16	51	30	382
New England Highway				
HVO North – bare earth	220	246	240	300
HVO North – shielding features	24	41	38	66
HVO South – bare earth	241	351	365	407
HVO South – shielding features	34	101	100	120

Notes: Modelled visible areas are based on the existing approved disturbance area (baseline), indicative mine plans (Year 7 and Year 18) or proposed final landform. Data was intersected with the proposed development consent boundaries and areas calculated to give the area of visibility per scenario per consent boundary area.

The results of the viewshed analysis for the Golden Highway indicate that:

- The HVO Complex is already visible from the Golden Highway and views of the HVO Complex will continue throughout the life of the Project.
- The modelled visible area of HVO North and HVO South will increase throughout the life of the Project; however, shielding features within the landscape have the potential to continue to significantly screen views of HVO South, with views of HVO North predominantly setback at a minimum distance of approximately 3 km and up to 10 km or more from the assessed road corridor.
- Motorists travelling along the Golden Highway are predicted to experience transitory views of Project elements, as is currently the case, with views interrupted by roadside vegetation.
- After accounting for shielding features in the landscape, the highest modelled visibility occurs once the final landform is achieved, at which point, views would predominantly be of a rehabilitated landscape.

The assessed section of the Golden Highway is approximately 40 km south of Muswellbrook at its closest point. Assuming no screening features in the landscape, motorists travelling at 80 km/h along the assessed section of the Golden Highway could be exposed to views of the HVO Complex for approximately 6 minutes and 45 seconds. The viewshed analysis results presented in Figure 5.2 demonstrate the significant potential of landscape elements (such as dense roadside vegetation) to continue to obstruct views of Project elements during this time. Further, it is assumed that the focus of these motorists will be in line with their direction of travel along the Golden Highway. It is noted that other mining and power generation-related infrastructure will also continue to be visible from Golden Highway whilst they remain operational and undergo decommissioning and rehabilitation.

The results of the viewshed analysis for the New England Highway indicate that:

- The HVO Complex is already visible from the New England Highway and views of the HVO Complex will continue throughout the life of the Project.
- The modelled visible area of HVO North and HVO South will increase throughout the life of the Project; however, shielding features within the landscape have the potential to continue to significantly screen views of HVO North, with views of HVO South predominantly setback at a minimum distance of approximately 6 km and up to 10 km or more from the assessed road corridor.
- Motorists travelling along the New England Highway are predicted to experience transitory views of Project elements, as is currently the case, with views interrupted by topography and roadside vegetation.
- After accounting for shielding features in the landscape, the highest modelled visibility occurs once the final landform is achieved, at which point, views would predominantly be of a rehabilitated landscape.

The assessed section of the New England Highway is approximately 21 km south of Muswellbrook at its closest point. Assuming no screening features in the landscape, motorists travelling at 90 km/h along the assessed section of the New England Highway could be exposed to views of the HVO Complex for approximately 8 minutes and 40 seconds; however, for the majority of this time, separation distances from the road corridor would be greater than 2 km (refer Figure 5.3). The viewshed analysis results presented in Figure 5.3 demonstrate the significant potential of landscape elements (such as dense roadside vegetation) to continue to obstruct views of Project elements during this time. This includes existing vegetation screening immediately adjacent to the New England Highway, which will continue to obstruct views of the Newdell LP and associated infrastructure (both existing and proposed) to the north of the road corridor. Further, it is assumed that the focus of these motorists will be in line with their direction of travel along the New England Highway.

Significant areas of mining and power generation-related infrastructure are visible from the New England Highway and Golden Highway. Motorists that use these roads are already exposed to a heavily modified landscape and this will continue throughout the life of the Project. Based on the limited duration of exposure to Project elements and low viewer sensitivity of motorists travelling on main roads, no visual treatments are proposed to further obstruct the visibility of the HVO Complex.

5.2 Singleton Council

5.2.1 Water resources

i GRAWTS and HVO water management system

Council seeks further clarification from the Applicant on the intra- and inter-relationship between the operations with inter- and intra-dependency on this Project, particularly around the role of the GRAWTS or other water sharing system in ensuring adequate water licenses are held for the Project, including whether additional water licenses will be required for other participants in the GRAWTS as a result of this Project and therefore the impact that current and additional licensing might have on downstream and Water Sharing Plan users.

The provision of one figure that depicts the intra and inter-relationships, flow pathways and volumes of each flow pathway for all input and outputs related to the inter-dependencies.

The HVO Complex currently operates under an integrated water management system across HVO North and HVO South. The integrated mine water management system also facilitates approved water transfers with other mining operations (Mount Thorley-Warkworth, United Wambo, Liddell Coal Operations, and Ravensworth Operations). The Project will result in no changes to existing water sharing arrangements between HVO and Liddell Coal Operations and/or Mount Thorley-Warkworth or agreements with other mines.

To manage water surplus and water shortfalls across mining operations, GCAA previously established the Greater Ravensworth Area Water and Tailings Sharing System (GRAWTS) to facilitate the transfer of mine water and tailings between the Liddell Coal, Ravensworth and Mount Owen Operations as well as the Integra Underground Mine. The GRAWTS also enables additional tailings emplacement within the South Cut Void at Liddell Coal Operations from these neighbouring mines (including HVO) subject to approval. The implementation of the GRAWTS aims to minimise the overall size and depth of the final Liddell South Cut void, as well as minimise the need to establish additional tailings emplacement areas at Mount Owen and Ravensworth Operations.

The Project only involves linking into the GRAWTS to transfer tailings to the Liddell South Cut Void. The Project is not intending to participate in additional water transfers under the GRAWTS (other than the current water sharing agreements mentioned above). The transfer of HVO tailings to the Liddell South Cut Void forms part of the tailings management strategy to assist Liddell Coal Operations achieve the complete fill scenario for the Liddell South Cut Void and includes the construction of a pipeline to facilitate tailings transfers. As part of these transfers, the portion of recovered decant water attributable to HVO tailings would be returned to HVO for reuse. During wet periods, the decant water may be temporarily held at Liddell Coal Operations to improve management of excess inventory at HVO.

To the extent that tailings deposition requires pumping of water and return pumping of decant water, HVO will be sharing water with GRAWTS, however, the Project will not have an impact on water licences held and used by other participants in the GRAWTS. The water licensing strategy for the Project is described in detail in Appendix D and summarised in Section 4.6.1. HVO holds sufficient entitlement to account for the predicted surface water take over the Project life and beyond in all relevant water sources.

Due to the complexity of the HVO water management system, the links and interdependencies are presented on three figures in the SWIA (Figure 3-21, Figure 3-22 and Figure 3-23), which is consistent with presentation of the water management system in the approved WMP. Appendix G to the SWIA provides further detailed discussion on the water management system including discussion on interdependencies and performance.

ii Water licensing and HRSTS

Further clarification on the timing of water licensing needs across the Project, including the Hunter River Salinity Trading Scheme credits required, as well as the volume and location for internal water transfers, particularly mine water and its associated storage locations as generated by the Project.

a Water access licences

The water licensing strategy for the Project is described in detail in Appendix D and demonstrates there is a legitimate water licensing pathway for the Project. A summary is also provided in Section 4.6.1. The following is a brief summary of the water licensing strategy for the Project.

Groundwater take

HVO holds more than sufficient entitlement to account for the predicted groundwater take over the Project life and beyond in most water sources. During operations and prior to Mining Year 28, HVO will purchase entitlement via the open market to account for the small predicted take in the Jerrys Water Source (5 ML/yr). As part of closure planning, HVO will review the post-closure entitlement requirements. If entitlements are required, HVO will purchase entitlement via the open market for the small predicted take in the Hunter Regulated River Alluvial Water Source – Glennies Creek management zone (3 ML/yr) and Jerrys Water Source (18 ML/yr), prior to closure.

Surface water take

HVO holds more than sufficient entitlement to account for the predicted surface water take over the Project life and beyond in all relevant water sources.

- Operational demands: The current HVO high security regulated river licence of 4,686 shares is sufficient to meet all predicted demands except for during very dry years over the middle years of the Project. During any shortfall years, HVO can use its significant general security regulated river licence of 7,250 shares to make up any shortfall.

- River leakage: HVO holds sufficient regulated river and unregulated river entitlements to account for the predicted surface water take (as river leakage) associated with watertable decline (drawdown).

- Capture of catchment runoff:

    - Five existing dams (that will also form part of the Project water management system) are located on non-minor streams, according to the current WM Regulation hydroline dataset. However, the hydroline dataset does not reflect the approved on-ground reality at the Complex which includes approved stream diversions. As the mine operations have progressed consistent with the approved activities, the WM Regulation hydroline dataset has not been updated, but appears to be based on the original 1980s topographic map-based stream delineation. HVO is seeking an amendment of the WM Regulation hydroline dataset to reflect the approved water management system, including approved stream diversions, and to have any residual licensing liability for captured rainfall runoff based on this amended drainage configuration. Following this amendment, four of the five dams would become an ‘offstream’ storage, or at most on a minor stream, and therefore exempt from the requirement for a WAL.

    - There are eight small clean water dams on minor streams. While these do not meet the excluded works purpose definitions in Schedule 1 of the WM Regulation, take associated with these can be accounted for under the landholdings harvestable right.

- All other dams (29) are on minor streams and meet the excluded works purpose definitions in Schedule 1 of the WM Regulation and accompanying fact sheet. These are exempt from requiring a WAL for any associated take in accordance Schedule 4 of the WM Regulation.

b HRSTS

As previously described, the existing operation has a well-established water management system in place to minimise surface water impacts and operates in accordance with existing water access licences (for surface water and groundwater take) and EPL 640, as well as the Hunter River Salinity Trading Schedule (HRSTS) to manage excess water.

The existing water management system will continue to be used to manage runoff with all water captured in active mining areas and mine surface runoff directed to the water management system. The existing approved clean water diversions will continue to divert runoff around the water management system. There are no new creek diversions proposed or required as part of the Project, and there are no proposed changes to water access licences or HRSTS credits.

Releases from sediment dams will occur in accordance with their design and discharge of mine water will occur in accordance with approved EPL limits and HRSTS credits. No changes to existing approvals or licences for the discharge of mine water under the HRSTS are planned.

Section 4.4 of the SWIA (Engeny 2022) summarises the predicted HRSTS releases for the Project, based on the existing EPL release limits and the 145 HRSTS salt credits currently held by HVO. A summary of the resulting average HRSTS release volumes is presented in Figure 5.4. Results for the 5th percentile, median and 95th percentile releases are summarised in Table 5.2. The Project is forecast to utilise on average, 20% to 40% of the average total allowable discharge opportunities. HVO proposes to retain sufficient salt credits for the Project.

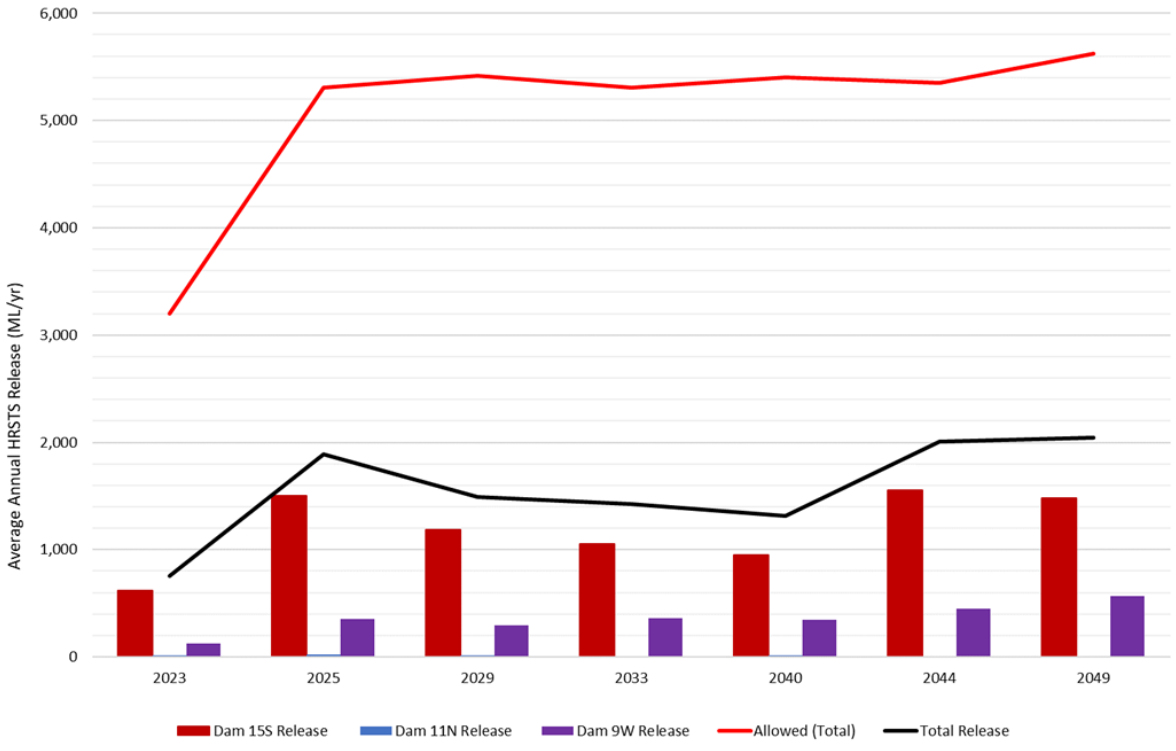


Figure 5.4 Modelled controlled HRSTS releases (Engeny 2022)

Table 5.2 Modelled HRSTS release statistics

Mine Year	5th percentile		Median		95th percentile	
	Total release	Total allowed	Total release	Total allowed	Total release	Total allowed
1	0	0	0	3,365	6,587	21,730
3	0	0	122	2,889	7,432	19,658
7	0	0	0	2,907	6,525	24,966
11	0	0	0	2,679	6,157	22,116
18	0	0	0	2,312	5,681	22,191
22	0	0	757	2,642	7,283	23,814
27	0	0	943	2,775	7,136	24,186

Source: Engeny 2022

c Internal transfers and storage locations

Internal mine water transfers between key storage systems during the Project are summarised in Table 5.3 for single modelled realisation and water years, representative of a 5th percentile rainfall year, 50th percentile (median) rainfall year and 95th percentile rainfall year. The results included in this summary are for the key transfer dams which transfer water between HVO North and HVO South.

The results indicate that the greatest transfers occur between Dam 9N and Dam 15S (i.e. HVO North to HVO South), which is indicative of the high HRSTS EPL release limit at Dam 15S (200 ML/d).

The stored mine water inventory (5th, 50th and 95th percentile volumes) for key bulk storages and operational areas is presented in Appendix G of the SWIA (Engeny 2022) including plots for Dam 9W (Parnells Dam), Dam 9N, Dam 15S (Lake James) and Dam 27S (South Lemington Void).

Table 5.3 Internal transfers

Transfer	Annual transfer volume (ML)		
	5th percentile water year	Median water year	95th percentile water year
Dam 9W to Dam 9N	1,511	2,796	2,343
Dam 9N to Dam 9W	2,730	3,145	2,125
Dam 9N to Dam 15S	3,591	3,093	3,923
Dam 15S to Dam 9N	1,893	1,577	2,520
Dam 15S to Dam 27S (South Lemington Void)	0	138	475
Liddell to Dam 9N (TSF Decant Return)	4,143	4,143	4,143

Source: Engeny 2022

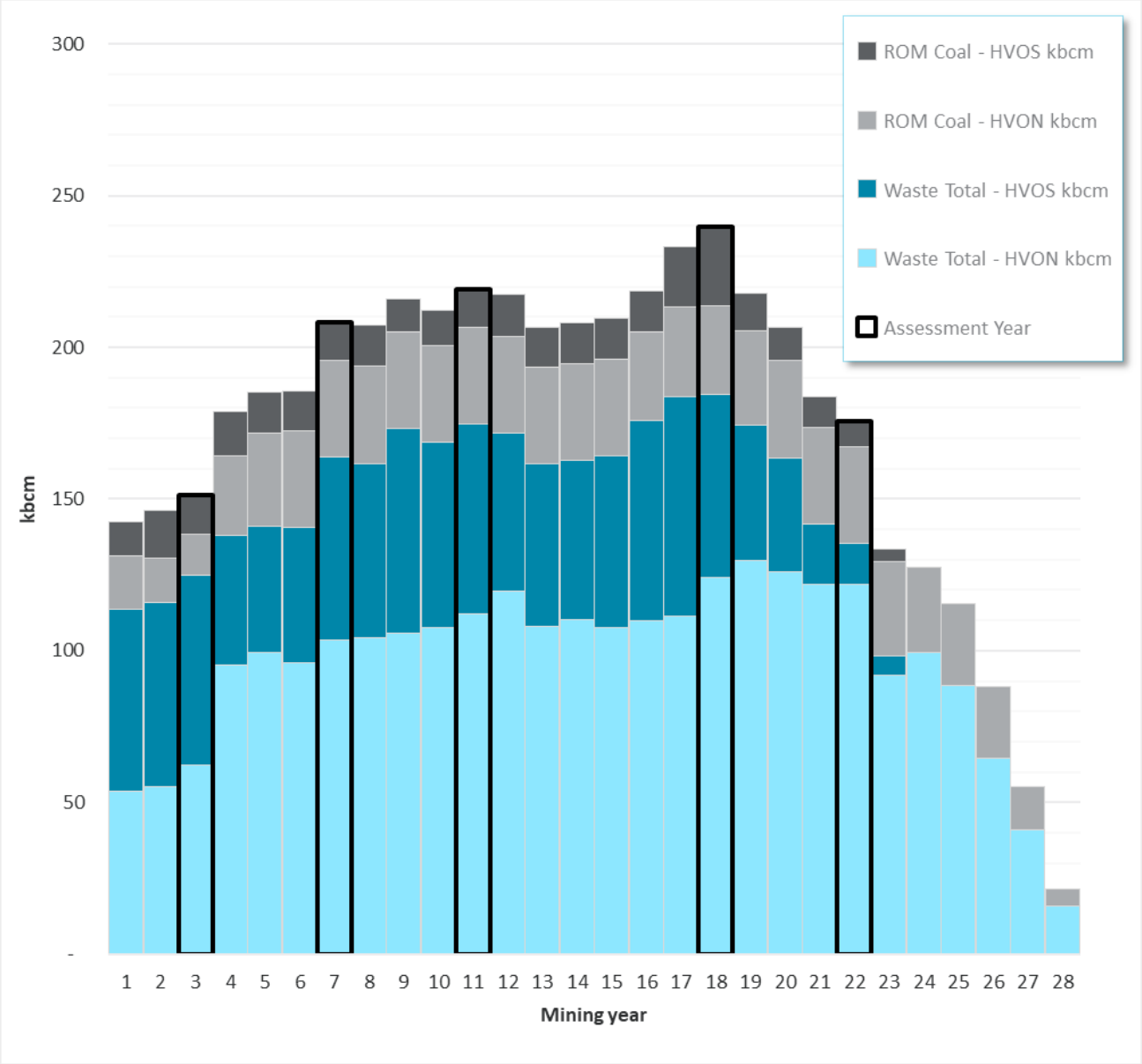
5.2.2 Waste management

Further clarification on overburden emplacement across the operations, including scheduling.

Overburden will continue to be emplaced across HVO complex within pits or out of pit within approved disturbance areas. The sequence of overburden emplacement presented in the EIS for the Project reflects the extended mine life and additional mining areas (i.e. between Mitchell/West Pit and the Carrington area). No increase in the height of overburden emplacement, beyond a maximum height of 240 mAHD that is currently approved, is proposed.

Conceptual Project stages and schedule are detailed in Section 4.3 of the EIS. Conceptual staged mine plans for the life of the Project are also provided for indicative years 3, 7, 11, 18 and 22 in Figure 4.5 to Figure 4.9 of the EIS.

The total annual volume of overburden material anticipated to be handled by the Project is presented in Figure 5.5.



Source: HVO Physicals data provided by HVO

Figure 5.5 Mining schedule for EIS assessment

The volumes of waste material generated by the current operation and proposed to be generated by the Project require quantification, including projected volumes of tailings (and the subsequent impact of this on management and rehabilitation of tailings disposal areas at both HVO and surrounding mines).

The Project is anticipated to produce approximately 145 Mt of coarse coal reject material. This material will be transported by truck and buried below the final surface within approved overburden emplacement areas. This volume of coarse coal reject material has been considered in the development of the final landform design for the Project as presented in Chapter 21 of the EIS.

Tailings will be stored within various tailings storage facilities (TSFs) across the HVO complex as follows:

- emplacement in the West Pit TSF to be established in the northern extent of West Pit
- continuation of tailings emplacement in the Carrington Pit TSF and Cumnock Void 3 TSF
- emplacement of tailings in the Liddell Coal Operations (LCO) South Cut Void.

The location of the TSFs were shown in Figure 4.11 of the EIS.

An overview of the project tailings production and deposition schedule is shown in Figure 5.6. Most of the Project tailings are proposed to be deposited at the LCO South Cut Void with some tailings storage within the other TSFs identified above.

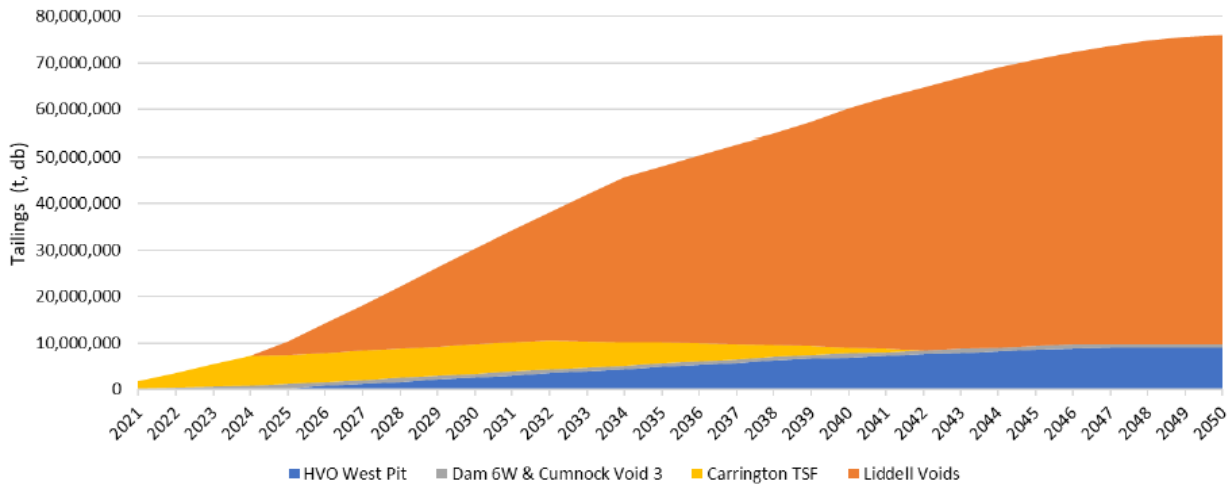


Figure 5.6 Tailings production and deposition schedule

Decommissioning and rehabilitation of TSFs no longer required will continue throughout the life of the Project.

The Project has determined that there is sufficient storage capacity for the anticipated volume of tailings material that will be produced by the Project across the existing and proposed TSFs, particularly the LCO South Cut Void. The rehabilitation of TSFs has been incorporated into the final landform design for the Project.

Over the life of the Project, the tailings and reject management strategy will continue to be refined to meet operational needs.

Non-mineral waste streams, disposal methods and estimated quantities associated with both construction and operational activities are presented in Table 25.1, Table 25.2 and Table 25.3 of the EIS.

The EIS should consider the objectives of the NSW EPA Waste Strategy and the targets set within the Strategy, identify waste streams and how the management of these waste streams will contribute to meeting State and local waste targets.

Waste will continue to be managed in accordance with well-established site waste management protocols, which have been developed in accordance the *NSW Waste Avoidance and Resource Recovery Strategy 2014–21* (EPA 2014).

The objectives of the *NSW Waste Avoidance and Resource Recovery Strategy 2014–21* and how HVO plan to address these are outlined in Table 5.4.

Table 5.4 NSW Waste Avoidance and Resource Recovery Strategy 2014–21 objectives and targets

Objective	Target	HVO response
Avoid and reduce waste generation	By 2021–22, reduce the rate of waste generation per capita.	HVO continually strives to avoid and reduce the volume of waste produced through the review of procurement systems so that excess ordering of materials/products does not occur and educating the workforce on waste avoidance measures.
Increase recycling	By 2021–22, increase recycling rates for: • municipal solid waste from 52% (in 2010–11) to 70% • commercial and industrial waste from 57% (in 2010–11) to 70% • construction and demolition waste from 75% (in 2010–11) to 80%.	The 2022 Annual Review (HVO 2023) reposted that there was an increase in recycling of non-mineral waste in 2022 from previous years. As reported in the 2022 Annual Review (HVO 2023), 11% of non-mineral waste material generated at HVO was disposed of in licenced landfill facilities and 89% of waste was recycled. All non-mineral waste at HVO is removed by a licenced waste removal company and either recycled or disposed of at an appropriate facility. As stated above, most of this waste is recycled. HVO will continue to maintain a high recycling rate for the life of the Project.
Divert more waste from landfill	By 2021–22, increase the waste diverted from landfill from 63% (in 2010–11) to 75%.	
Manage problem wastes better	By 2021–22, establish or upgrade 86 drop-off facilities or services for managing household problem wastes state-wide.	This is a matter for the EPA and local councils to address.
Reduce litter	By 2016–17, reduce the number of litter items by 40% compared with 2011–12 levels and then continue to reduce litter items to 2021–22.	Non-mineral waste is managed on site through the installation of colour coded bins around the site. Regular site inspections are undertaken to ensure the site is managed in a tidy manner. This will continue for the life of the Project.
Reduce illegal dumping	From 2013–14, implement the NSW Illegal Dumping Strategy 2014–16 to reduce the incidence of illegal dumping state-wide. As part of this strategy, by 2016–17: • reduce the incidence of illegal dumping in Sydney and the Illawarra, Hunter and Central Coast regions by 30% compared with 2010–11 • establish baseline data to allow target-setting in other parts of the state.	This is largely a matter for the EPA and local councils. Notwithstanding this, all non-mineral waste at HVO is removed by a licenced waste removal company and either recycled or disposed of at an appropriate facility. Heavy plant tyre waste generated on the premises is disposed of in pit in accordance with Condition O6 of EPL 640.

The EIS should include an assessment of how demolition waste will be managed, including asbestos and other contaminated materials. Demolition waste will be generated from Lemington Road and the demolition of the Newdell train loading facility and may include wastes such as asbestos.

Waste streams, disposal methods and estimated quantities associated with both construction, demolition and operational waste can be found in Table 25.1, Table 25.2 and Table 25.3 of the EIS.

As detailed in Table 25.2 of the EIS, approximately 10 t of asbestos material has been identified in the quantity of waste predicted from the demolition of the Newdell Load Point. A detailed assessment of asbestos material will be undertaken prior to the commencement of construction activities. If any asbestos is identified during demolition works, works will stop immediately and an appropriately licenced asbestos removalist will be contacted.

Asbestos will be stored in accordance with the relevant guidelines and will be removed from site by an appropriately qualified and licenced professional and disposed from at a facility licenced to receive the waste.

Inert demolition waste produced by the Project, for which a beneficial use or reuse has not been identified, is proposed to be disposed of within appropriate emplacement areas across the complex. This includes include concrete and bitumen. Waste will be managed appropriately, by means of being buried at an appropriate depth to minimise interaction with future potential land uses, and relevant approvals under the POEO Act will be sought prior to disposal. Where a use is identified for inert waste, the waste will be stockpiled within the Project disturbance area prior to re-use onsite as required.

The Applicant does not have approval to dispose of any waste on site, and is seeking to dispose of potentially contaminated materials (including waste tyres, conveyor belts, drilling wastes) within overburden and other emplacement areas. The EIS estimates that approximately 700 heavy earthmoving tyres and 21,000 kg of conveyor belt will be generated each year. Over the life of the Project, this equates to 19,600 tyres and 588,000 kg of conveyor belt. The EIS does not include an assessment of the impact of these wastes on potential surface and groundwater systems. The disposal of wastes within the emplacement areas is considered by Council to be inconsistent with the NSW EPA Waste Strategy, and consideration should be given to alternative, higher order uses of these waste streams within the EIS.

HVO has approval to dispose of heavy plant tyres on site in accordance with Condition O6 of EPL 640. This states:

> The Licensee is authorised to dispose of heavy Plant-tyre waste generated on the premises, in the pit. The Licensee must:
>
> a) ensure that heavy Plant waste tyres are re-used on the premises as much as practical;
>
> b) ensure that any surplus heavy Plant waste tyres can be emplaced by being spread out on the pit-floor and buried as deep as practical, but, covered by at least 20 m of inert material beneath any final rehabilitated surface;
>
> c) place heavy Plant waste tyres at least 10 m away from coarse reject material or tailings emplacement areas;
>
> d) not place any heavy Plant waste tyres near heated material;
>
> e) not place any heavy Plant waste tyres in an area likely to leach to any watercourse.

HVO report the volume of heavy plant-tyre disposal with the Annual Return in accordance with Condition R5.7 of EPL 640 which includes:

- each tyre serial number
- supplier of each tyre
- purchase date of each tyre
- disposal date of each tyre
- co-ordinates (easting and northings) of the disposal of each tyre
- the Real Level (RL) in metres AHD of each tyre placed in the pit
- the number of tyres buried in a particular area
- the total number of tyres and tonnage of tyres disposed of at the premises in each annual return year.

In relation to conveyor belts, HVO's preference is to recycle these. If they can't be recycled, HVO propose to dispose them in pit so they aren't being disposed of at a local landfill. The management of the in-pit disposal of conveyor belts will be consistent with current heavy plant tyre disposal management practices.

At this stage, there are limited available feasible options for the recycling and re-use of waste tyres and conveyors. HVO will continue to investigate alternative options for the recycling of waste tyres and conveyors generated by the Project to minimise the requirement for on-site disposal.

5.2.3 Project schedule

Further clarification on scheduling of construction, mining, decommissioning and rehabilitation activities across the Project, which impact not only approved production limits for the respective mining operations, but also approved workforce numbers, water licensing requirements (as identified above), and cumulative amenity impacts to be felt by the community for a longer period of time, including demand for housing.

Conceptual mine plans were developed for various stages over the Project life and were presented in Figure 4.5 to Figure 4.9 of the EIS. These plans show the planned progression of the mining and rehabilitation activities over the life of the Project. The mine years chosen for inclusion in the assessment were selected as they were considered representative of key mining stages for the Project and were designed to capture the range of conservative scenarios (such as maximum material movement and closest proximity of activity) for assessment in terms of potential impacts to neighbouring properties with respect to air quality, noise and visual amenity. Actual mining may progress at a different rate depending on several factors.

In year 1, or commencement, mining will continue in HVO North and HVO South, generally in accordance with the indicative staged mine plans presented in Figure 4.5 to Figure 4.9 of the EIS. Mining will continue in the West Pit and Mitchell Pit areas, progressing in a southerly direction towards the Carrington area, mining through the section currently separating these two areas including Lemington Road.

Also in year 1 of the Project, the construction of the infrastructure upgrades at HVO North will commence. Those works must occur prior to mining activities progressing through the existing Lemington Road and the transmission lines in the area, i.e. the relocation of Lemington Road and transmission and telecommunication lines within the HVO North proposed mining area.

The indicative Project years identified for assessment in the EIS generally represent the following:

- Year 3 – relatively high volume of overburden material movement at HVO South in the early Project years. Construction activities occurring during this Project year include:
  - Parnells dam enlargement
  - upgrades to the HVO North and South MIAs and the HVLP
  - construction of the Newdell product stockpile, or extension to the HVLP product stockpile
  - improvements to water infrastructure.
- Year 7 – this stage plan represents the highest volume of material movement across the complex in the early Project years, from Year 1 to Year 9. This Project stage was also selected due to the location of overburden emplacement activities at HVO South and proximity to key receptors areas including Maison Dieu and Long Point.
- Year 11 – the highest volume of material movement in this stage across the period from approximately Year 9 to Year 15, and includes the commencement of excavation activities in the Carrington West Wing area in HVO North, where the distance to nearby Jerrys Plains is the shortest. Overburden emplacement and overburden shaping for rehabilitation occurs at this stage in South Lemington Pit 1, being the closest mining-related activities to Maison Dieu and Long Point.
- Year 18 – this stage includes the highest volume over the life of the Project of:
  - overburden extracted and transported across the complex
  - ROM coal extracted at HVO South
  - ROM coal across the complex
  - total material moved across the complex (inclusive of overburden and coal).
- Year 22 – the final stage with relatively high material movements, after which the volume of material moved in subsequent years decreases significantly towards the cessation of mining in HVO South around 2045. During this Project year, final overburden emplacement is undertaken in South Lemington Pit 1 alongside overburden shaping for rehabilitation which continues past Year 22.

Figure 7.1 of the EIS illustrates the indicative material movement over the life of the mine.

HVO currently employs approximately 1,500 FTE workers. This is not proposed to change as a result of the Project. Construction activities will generate approximately 600 jobs over an approximate five-year period. The impact of the continuation of employment of the operation workforce over the life of the Project and the impact of the generation of the construction workforce was comprehensively considered and addressed in the EIS, particularly the SIA that was contained in Appendix V and summarised in Chapter 23, and the EIA that was contained in Appendix W and summarised in Chapter 24. As the SIA and EIA conclude, overall, the Project will have significantly positive social and economic impacts locally and regionally.

Water licensing requirements for the Project have been addressed in a revised water licensing strategy provided as Appendix D.

Cumulative impacts of the Project, including amenity impacts, were comprehensively addressed in Chapter 26 of the EIS. In particular, cumulative noise and air quality impacts were considered against the cumulative impact criteria specified in section 2.16 of the *State Environmental Planning Policy (Resources and Energy) 2021* (which were previously contained in clause 12AB of the former *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*.

5.2.4 Surface water

i Downstream flooding impacts

Further clarification on the impact and consequences of the proposed flood levees on downstream flooding, particularly of low-lying areas outside the Singleton Flood Levee, in a scenario that considers the impacts of climate change (noting Council currently has on exhibition a revised Floodplain Management Study and Plan).

The potential impact of the Project, including proposed flood levees, on downstream flooding is described in Section 6.2 of the SWIA for the Project. The SWIA presents mapping of flood depth, velocity and hazard rating for baseline, operations and closure scenarios for events from the 10% AEP event up to an Extreme Event. Flood level and velocity impact assessment was focused on events up to and including the 1% AEP event.

Figure 5.7 presents a hydrograph extracted from the HVO flood model that shows the difference between the flow at the mapping limit for the 1% AEP, 10% AEP and Extreme Event for Project baseline and operations and for the Extreme Event at closure. It demonstrates the Project is predicted to have a negligible impact on flood peak and flows downstream of the Project for the 1% AEP and 10% AEP events, and a minor impact for the Extreme Event.

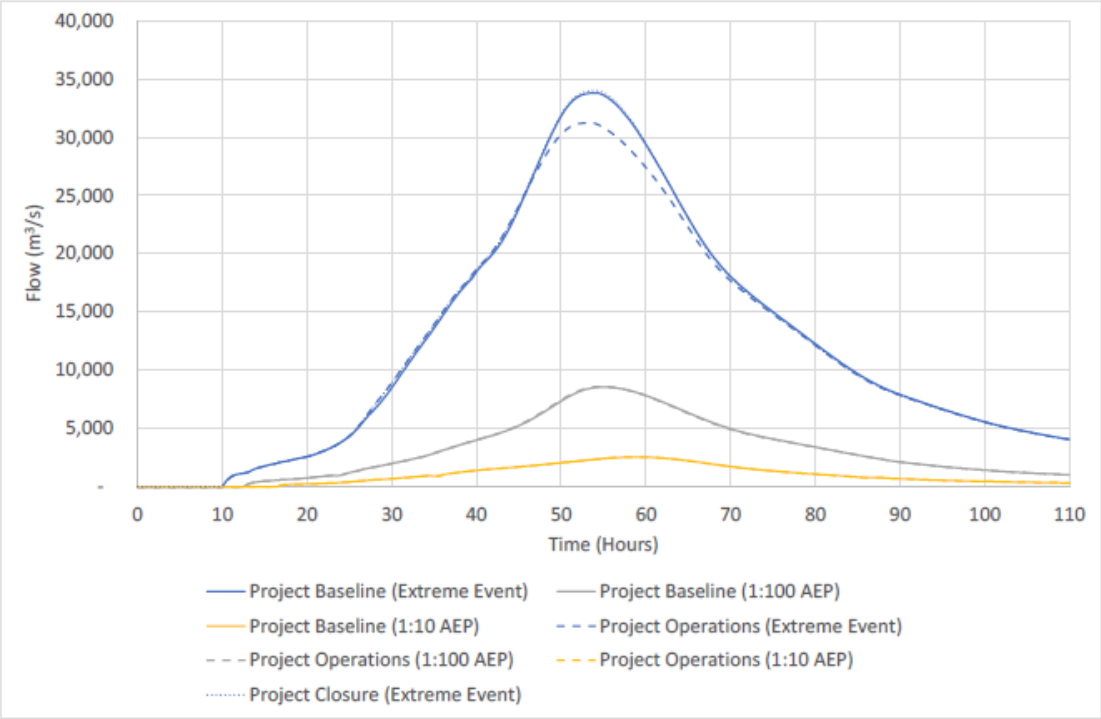


Figure 5.7 Flow hydrographs and flood peak at mapping limit

As part of the SWIA, a climate change sensitivity assessment was undertaken to understand the sensitivity of flooding and flood impacts to climate change to assess sensitivity to an increase in rainfall intensity. It should be noted that this approach is consistent with the NSW Biodiversity and Conservation Division (now BCS) SEARs for the Project. The 0.5% and 0.2% AEP design events are typically used as proxies for climate change. As described by BMT as the peer reviewer of the HVO flood modelling during consultation with Singleton Council in August 2023, use of these events is typical proxy for evaluating climate change effects.

ii Lemington Road Hunter River crossing

The project will also have significant influence over flooding within the Hunter River catchment and its tributaries. The impacts will be affected by changes in infrastructure proposed by the Project (levees, new roads) and will have a cumulative impact on flood behaviour downstream of the Project.

As described above, the potential impact of the Project, including proposed flood levees and infrastructure such as the new Lemington Road crossing of the Hunter River, on downstream flooding is described in Section 6.2 of the SWIA (Engeny 2022). The modelling simulated three Project scenarios: Project baseline (existing site arrangement forecast at 2025), Project Operations, and Project Closure. Both the Operations and Closure modelling scenarios included the proposed realignment and new Hunter River bridge crossing of Lemington Road.

The northern bridge crossing over the Hunter River consists of four spans with three sets of four approximately 900 mm diameter concrete piers between the two outside bridge abutments. The southern bridge is a lower structure over an existing flood breakout channel from the primary Hunter River channel to the west (i.e. upstream) of the bridge and consists of five spans with four sets of four approximately 900 mm diameter concrete piers between the two outside bridge abutments.

a Flood attenuation

The area around the southern bridge experiences the largest changes in flood depths and velocities. This is primarily due to water attenuation behind the proposed realigned Lemington Road, which directs additional flows from the primary channel towards the flood breakout channel. Attenuation of water (i.e. increased depth of water at the flood peak) will occur behind (i.e. upstream of) the two bridges and the realigned Lemington Road, with a maximum water depth of approximately 1.6 m at this location in the Operations and Closure scenarios, compared to 1.17 m in the Baseline scenario in the 10% AEP event (i.e. a 0.42 m increase). This property is mine-owned.

b Channel stability and geomorphology

As described in Section 6.2.5 of the SWIA (Engeny 2022), the magnitude of velocities in areas of impact generally remain within the existing range experienced and remain a low likelihood of causing scour (<2 m/s).

Further details on the flood modelling predictions in the area of the proposed Lemington Road Hunter River crossing (along with supporting figures) are provided in Appendix K.

5.2.5 Policy

The Project requires the acquisition and closure of the old Lemington Road. In 2004, consent was granted to deviate old Lemington Road to the current alignment (DA 450-10-2003). The old Lemington Road provides access to two properties that are owned by the mining operation. The EIS does not include the requirement to close old Lemington Road under the *Roads Act 1993*.

The Project will also require closure of additional roads where council is the roads authority. These include Pikes Gully Road and Liddell Station Road. The EIS does not include an assessment of the need for these roads to service users other than those of this Project, or other mining operations owned by either Glencore or Yancoal. Where these roads are no longer required for public use, the Applicant should enter into a formal road closure process with council.

The Project proposes to close a portion of the current Lemington Road once the new portion of Lemington Road has been constructed. As detailed in Table 5.1 of the EIS, it is recognised that various approvals from Singleton Council under the *Roads Act 1993* (Roads Act) are required for the construction of the Lemington Road realignment and closure of the existing portion. HVO will continue to consult with Singleton Council regarding the progression of the necessary applications under the Roads Act. The former alignment of Lemington Road is closed to public traffic and managed in accordance with relevant s138 Roads Act approvals. Discussions are ongoing with Singleton Council regarding the permanent closure of the former alignment of Lemington Road.

In addition, the Project proposes the closure of a section of Liddell Station Road to accommodate the HVLP product stockpile extension if constructed. The section of Liddell Station Road proposed to be closed is not currently accessible to the public and is fully maintained by HVO. Given the section of the road proposed to be closed, is currently closed to the public and not maintained by either Singleton or Muswellbrook Councils, no impacts to the public are predicted.

With the realignment of Lemington Road and other works to be undertaken across the site, the Applicant will be required to seek development consent for subdivision to allow those activities to take place. The EIS does not include consideration of this, nor does it provide a timeframe within which these activities would occur.

Should the Project be approved, HVO will continue to work with Singleton Council for the subdivision of land to establish a new road easement for the construction of the new portion of Lemington Road alignment.

The rezoning of land is undertaken in accordance with the provisions set out in Part 3, Division 3.2 of the *Environmental Planning and Assessment Act 1979*. Rezoning cannot occur through a Part 4 development application, and a separate application must be made to amend the Local Environmental Plan to allow for any rezoning to occur. As the consent authority for amendments to the Local Environmental Plan, Council has not received an application for the rezoning of land.

No land is required to be rezoned to support the Project. Should the Project be approved, HVO will pursue any land rezoning requirements through a separate application to Council.

The Project proposes to demolish existing buildings and construct new ones. In order to do so, the Applicant will require, amongst other things, construction certificates, fire safety certificates and an approval to install and operate on site sewerage management systems. The EIS should include details of the buildings proposed as part of the development and the associated wastewater treatment to enable council to assess whether the proposed buildings meet the relevant statutory requirements.

Upgrades are proposed to the HVO North Mine Infrastructure Area (MIA) to provide the necessary support for the continuation of mining activities. Proposed improvements to the HVO North MIA include the upgrade of existing and construction of new facilities as required, including the following key items:

- an extension to the existing heavy mobile equipment workshop
- additional administration buildings
- car park extensions and associated access roads
- upgraded and additional bathhouse and washroom facilities inclusive of sewerage services
- upgraded or changed access roads, electricity, communications and water infrastructure
- use of demountable/temporary buildings in construction compounds or for ongoing use as required.

Construction associated with the Project will be compliant with the Building Code of Australia, as relevant, and all other relevant statutory requirements. Where applicable, construction certificates, fire safety certificates and an approval to install and operate on site sewerage management systems will be sought and obtained.

5.2.6 Traffic

Further clarification on how the Applicant intends to provision for the long term (in perpetuity) maintenance of the new Lemington Road to meet the asset life requirements.

Contributions to the maintenance of the realigned Lemington Road are anticipated to form a component of the VPA between HVO and Singleton Council. HVO have continued to engage with Council in relation to development of a VPA. These discussions are ongoing.

HVO intend to have the terms of the VPA agreed with Council prior to the Project being referred to the Independent Planning Commission (IPC) for determination.

5.2.7 Economic

Further clarification on the impact of not realigning Lemington Road, including transparent costs and lost coal value, and the consequent environmental, social and economic impacts and benefits of not relocating the road.

Excluding the existing Lemington Road from the mining footprint at HVO North was considered as an alternative option presented as option 6 in the Mine Plan Options Report provided as Appendix D to the EIS. For this option, a pillar approximately 150 m wide at the crest was assumed, leaving Lemington Road in place and extracting coal on either side. This option requires an additional crossing of Lemington Road to allow for haulage of waste material from the southern void to the northern emplacement areas, to reduce coal sterilisation and minimise final voids.

Some of the key considerations of this option that did not meet Project objectives include:

- increase in strip ratio, with additional coal mined from deeper coal seams as the mine progressed further south-east
- the sterilisation of approximately 65 Mt of ROM coal
- impact to haulage being constrained by bridges over Lemington Road to transport material to the north side of the road
- potential increased amenity impact due to the crossing of Lemington Road at or above topography by haul trucks to backfill the northern void
- mining proximity to existing infrastructure – blasting impacts, no upgrade to road, visual amenity considerations
- change to final landform to accommodate not mining through the road
- increased complexity of surface water management systems required in the area.

The impacts on mine life and lost royalties were presented in the Mine Plan Options Report which identified a loss of $53M in royalties if the existing Lemington Road alignment was to remain.

The proposed closure of the existing Lemington Road and associated realignment provides for an improved public infrastructure outcome for the community. In particular, it will provide a new road designed and constructed to current road design standards and guidelines and a higher bridge crossing of the Hunter River. As stated in Chapter 19 of the EIS, the current bridge crossing (Moses Crossing) has been inundated for over 19,000 hours since 2010 (a cumulative inundation of 26 months). The new bridge crossing would have provided ongoing access throughout this same period.

It is also noted that Lemington Road was closed to through traffic (between Golden Highway and New England Highway) south of the HVO North access road between 3 February 2023 and 2 October 2023 due to its poor condition.

The benefits of a new Lemington Road would not be realised if the existing alignment remained as is.

5.2.8 Rehabilitation and closure

The options included in Appendix D rely on the premise that mining operations cease in 2025 and 2030 for HVO North and South, respectively. However, this is not entirely the case. Whilst mining operations will no longer be authorised under PA 06_0261 Mod 7 and DA 450-10-2003 Mod 7, Schedule 2, Condition 5 and 6, respectively, allows for the continuation of the consent for rehabilitation and additional undertakings to the satisfaction of both the Planning Secretary and Resources Regulator. Therefore, the EIS should include an assessment of the process for rehabilitation and mine closure under the existing approvals, within all options, but specifically the Do-Nothing Option (Option 2, Section 5.2). Whilst Option 2 would result in a significant economic impact to the Applicant, an assessment of the rehabilitation and closure costs to a post mining land use that achieves the outcomes set in the *Hunter Regional Plan 2041* should be assessed to allow for a complete assessment of alternatives.

Council considers that reliance on the potential for a new Project approval is not an adequate justification to delay mine closure planning for the current operations. In addition, given the short time frame until the current approval expires, Council considers that it would be imperative to include detailed mine closure planning in the EIS, and that the EIS must include a timetable for completion of a detailed mine closure plan and a stakeholder engagement plan to underpin closure planning outcomes, under both scenarios – if the Project gains approval, and if it does not.

HVO North is within five (5) years of mine closure, with over 4,000 ha of mining disturbance that is yet to be rehabilitated. As such, detailed mine closure planning for the HVO North should have commenced in accordance with its current conditions of approval, in particular Condition 63 of schedule 3 of DA 450-10-2003. This condition of approval requires Hunter Valley Operations to, within 5 years of the date of the consent, a Mine Exit Strategy, in consultation with Singleton Council and Muswellbrook Shire Council, investigate the minimisation of adverse socio-economic effects of a significant reduction in local employment levels and closure of the development at the end of its life. The Independent Audit, completed in February 2023 identifies that compliance with this condition of consent is 'not triggered', however the rationale for this is not described.

Appendix T does not consider the need for employment land generating development as identified in the Hunter Regional Plan. It is clear from a State and local policy perspective, that post mining land uses (including buffer land) must consider the highest and best use of the land at first principles. The EIS focuses on landform design and integration but does not consider the long term uses of the site post closure. As Hunter Valley Operations currently has a finite life (but for this development application), the need for closure planning that considers alternative post mining land uses is urgent.

The option of not proceeding with the preferred Project and ceasing mining operations at the HVO Complex at the end of the HVO North consent period in 2025, was presented as option 2 in the Mine Plan Options Report provided as Appendix D to the EIS. Should the Project not proceed and the 'Do Nothing' option pursued, rehabilitation at HVO North and HVO South will be completed in accordance with the HVO Rehabilitation Management Plan (RMP) and existing conditions of consent. The current and proposed post mine land uses identified for the HVO Complex includes a mix of agriculture land and native vegetation habitat corridors. The current land zoning of the Project site being RU1 Primary Production supports the approved and proposed land use outcomes. Accordingly, the statement that "Council considers that reliance on the potential for a new Project approval is not an adequate justification to delay mine closure planning for the current operations" is incorrect.

HVO considers that the Project, as proposed, will result in an improved final land use outcome for the site by reducing the number of residual voids, and in turn, maximising the area of land available for alternative post mine land uses. In determining the final landform proposed by the Project, HVO considered a range of potential alternate future land uses, so that the landform does not preclude them from being developed.

Alternate land uses which may be suitable at the time of closure include, but are not limited to, intensive agriculture, electricity transmissions, pumped hydro energy generation, solar energy generation, wind energy generation and battery energy storage. However, as noted within the EIS, these options require further investigation and consultation with Singleton Council, Muswellbrook Shire Council, the community and government agencies.

To-date, no alternative land use options beyond returning the land to a post mine mixed land use of native vegetation and agriculture have been identified. There are currently several regulatory barriers that exist that restrict the ability for suitable alternative post mine land uses to be implemented on site, specifically in relation to the mining lease requirements. These barriers require adoption of a multi-agency collaborative approach to ensure the regulatory framework is in place to achieve a post mine land use that supports alternative post mine land uses, economic diversification and the sustainable transition of the region to a post coal mining economy. In some instances, land rezoning would be required to either encourage or facilitate alternative land use investment in the area. These requirements will be identified and pursued where and when required, in consultation with key stakeholders through the development of a detailed mine closure plan.

HVO is committed to work with Singleton Council, Muswellbrook Shire Council, the community and government agencies to implement a coordinated and collaborative approach to land use planning to ensure any post mine land use achieves a suitable, long-term benefit for the local and regional communities, maximises the potential for the rehabilitated land for employment and ensures the impacts of mine closure on the local and regional communities are minimised. Approval of the Project will provide more time for all stakeholders to assess and plan for a post mine land use that achieves these outcomes and ensure future infrastructure investment opportunities can be realised. In addition, approval will also ensure that the ongoing employment opportunities for the approximate 1,500 FTE workforce at HVO. As demonstrated in the SIA and EIS, this employment and the support it provides to local businesses will provide ongoing social and economic support to the local area as it transitions away from a coal based economy.

Currently, coal mining is considered the highest and best use of the land at HVO. Significant areas of the HVO have been previously disturbed by coal mining activities and existing infrastructure is in place to support the Project. Progressive rehabilitation is currently undertaken at HVO in accordance with existing rehabilitation management plans and development consents. Disturbed land available for rehabilitation, and no longer required for mining activities, will continue to be progressively rehabilitated in accordance with the rehabilitation management plans to be prepared should the Project be approved. These rehabilitated areas will provide alternative land use opportunities to be realised on a progressive basis.

HVO acknowledged that achieving successful rehabilitation objectives and completion criteria for the current and proposed post mine land use options could take a number of years post mining to be realised.

The EIS proposes to continue the previously approved final land uses for both operations. These include:

1. Grazing (low intensity agriculture)

2. Native woodland/biodiversity

3. Water storage

4. Cropping on the Hunter River alluvial flats.

With the exception of agriculture, these uses are not land uses as defined under the Standard Instrument Local Environmental Plan. These land uses do not meet the expected outcomes for post mining land use identified in both the Hunter Regional Plan and Council's Local Strategic Planning Statement. Appendix T focusses on rehabilitation outcomes, not land use outcomes.

The EIS predicts that the Project will meet the final land use, however, a final land use is not defined by area (or domain) within the final rehabilitated landform, has not been assessed for suitability, permissibility or sustainability, does not provide any linkage between the final landform and any of the final land use options, all of which is proposed to be deferred to a plan of management post approval. For the reasons set out above, and further below, Council requires further clarification and justification for this rationale.

More detailed information is required on the relationship between post mining land use and the principles of strategic land use planning as set out in the adopted *Hunter Regional Plan 2041*, including the extent to which the Applicant has consulted with council on the future strategic land use planning outcomes for the local government area.

More detailed information is required on the viability of the proposed final land uses, including where on the lease or buffer areas these uses could be applied, the relationship between the proposed final land uses and final landform, the integration of these uses with other existing and proposed land uses in the region, including the compatibility and viability of potentially competing uses.

More detailed information is required on the timing of detailed closure planning for the existing operation, should the Project not be approved, including the actions needed to be taken to achieve a post mining land use that is suitable, and does not result in a negative socioeconomic impact to the community. This analysis must include:

a) potential areas of the mining lease (or mine owned land) where these land uses could be applied

b) relationship between the proposed final land uses and the final landform

c) the integration of these uses with other existing and proposed land uses in the region, including the compatibility and viability of potentially competing uses

d) whether any or all of these options will be safe, stable, non-polluting and sustainable in the context of the final landform

e) a timeframe/timetable for investigation and implementation of one or more option(s) through to feasibility.

Rehabilitation at HVO is undertaken in accordance with the requirements of the existing development consents for HVO North and HVO South, the HVO Rehabilitation Plan, the Forward Works Programs submitted to the Resources Regulator in accordance with the requirements of the NSW *Mining Act 1992*, and mining lease conditions. The rehabilitation is developed based on the current knowledge of rehabilitation practices and supported by specialist investigations and advice. Should the Project not be approved, HVO will continue to implement the existing rehabilitation and mine closure requirements in accordance with existing approvals and approved management plans.

The overall land use objectives for the Project have not changed from that proposed in previous approval documents and rehabilitation management plans which are to restore the land that HVO is responsible for to a combination of grazing and native woodland habitat final land uses.

These land uses include stable landforms and self-sustaining vegetation developed in consideration of several factors including opportunities (such as proximity to remnant native vegetation areas) and constraints (such as slope and soil quality), ecological and rural land use values and existing strategic land use objectives.

The Project's final landforms have been designed to integrate with the approved final uses and existing established rehabilitation areas that will remain on site as the Project is developed.

Notwithstanding the above, as detailed in Chapter 21 of the EIS and described above, a rigorous landform design and refinement process has been undertaken for the Project so that the landforms are appropriate for the site overburden and soils and can be rehabilitated to be stable to support the nominated post mining land uses. The outcome of this final landform design process is the production of a stable final landform that will reflect a sympathetic landform to the surrounding landscape and minimise long term visual impacts. Implementation of progressive rehabilitation over the life of the project will reduce the duration of visual impacts arising throughout the operation of the Project when viewed from surrounding land.

Grazing final land use has generally been allocated to link with the more productive alluvial lands of the Hunter River and lands with slopes less than 30% to facilitate safe vehicle and machinery access for agricultural operations and efficient stock management activities such as fencing and stock movement. Native woodland habitat final land use has been assigned to landforms generally not considered suitable for agricultural use mainly due to slope steepness and potential impacts of grazing on landform stability. The proposed final land uses are consistent with both the pre-mining rural land uses undertaken on the site prior to mining, and the current rural land uses undertaken adjacent to the site. This approach allows for future alternate land uses to be proposed and developed by others following the completion of rehabilitation of the Project.

The key adjoining mines with established rehabilitation strategies are United Wambo JV (SSD 7142) to the south, Ravensworth Operations (PA 09-0176) to the east and Liddell Coal Operations to the north-east (DA 305-11-01). The proposed rehabilitation and final land use strategy for the Project has been developed to be consistent with the approved final rehabilitation strategies for adjoining mines and will complement the proposed wildlife corridors approved for those mines.

The conceptual rehabilitation strategies proposed for adjoining operations, with the proposed rehabilitation strategy for the Project is shown in Figure 5.8.

HVO has previously successfully rehabilitated strategic agricultural land. In May 1993, consent was granted to mine 170 ha of Hunter River alluvial flood plain (Alluvial Lands Project). The approval required verification that mining and subsequent rehabilitation would not result in the loss of prime agricultural land and that a sustainable post mining land use could be achieved once mining had been completed.

The post mine land uses identified are generally consistent with the objectives of the current land zoning of RU1 Primary Production under the Singleton LEP which are:

- to encourage sustainable primary industry production by maintaining and enhancing the natural resource base
- to encourage diversity in primary industry enterprises and systems appropriate for the area
- to minimise the fragmentation and alienation of resource lands
- to minimise conflict between land uses within this zone and land uses within adjoining zones.

As identified in the *Hunter Regional Plan 2041*, agriculture plays an important role in the Hunter. HVO considers that the identification of land for future agricultural use supports a sustainable and diversified post mining land use consistent with the objectives of the regional plan. This land use reduces land use conflict with current surrounding land uses with the future agricultural use being supported by its proximity to existing infrastructure and transport networks.

The Project does not preclude alternative future land uses being identified and implemented. Viable alternative future post-mining land uses are yet to be determined due to the long life of the Project (to 2050), however these may include a range of land use options at various locations across the site including intensive feedlot style agriculture, solar farms and battery energy storage systems, pumped hydro energy storage systems, water storage for various uses such as irrigation, energy or industrial use, recreation or a range of industrial uses of mining infrastructure areas including industrial buildings, access roads, rail loop etc.

A detailed mine closure plan will be developed within five years of the cessation of mining and in consultation with key government agencies and other relevant stakeholders. A key focus of the detailed mine closure planning process will be to identify suitable alternate land uses, taking into consideration the surrounding environment, landform, infrastructure and needs of the community. Alternative post mine land use options may require changes to land zoning to encourage and facilitate alternative uses that do not result in land use conflict while encourages employment generating development.

More detailed information is required on the role of both council and the community in the post mining land use options assessment and analysis, including the extent to which such consultation has occurred and its outcomes.

HVO acknowledges that Singleton Council will play a role in assisting the transition of the site to a post mine land use that meets the needs and requirements of both council and the community. Alternative post mine land uses, beyond what is currently proposed, may require rezoning to encourage and facilitate alternative investment opportunities. Areas that Singleton Council consider would support alternative long term industry investment and the identification of strategic growth areas will be a critical input to the development of the mine closure strategy.

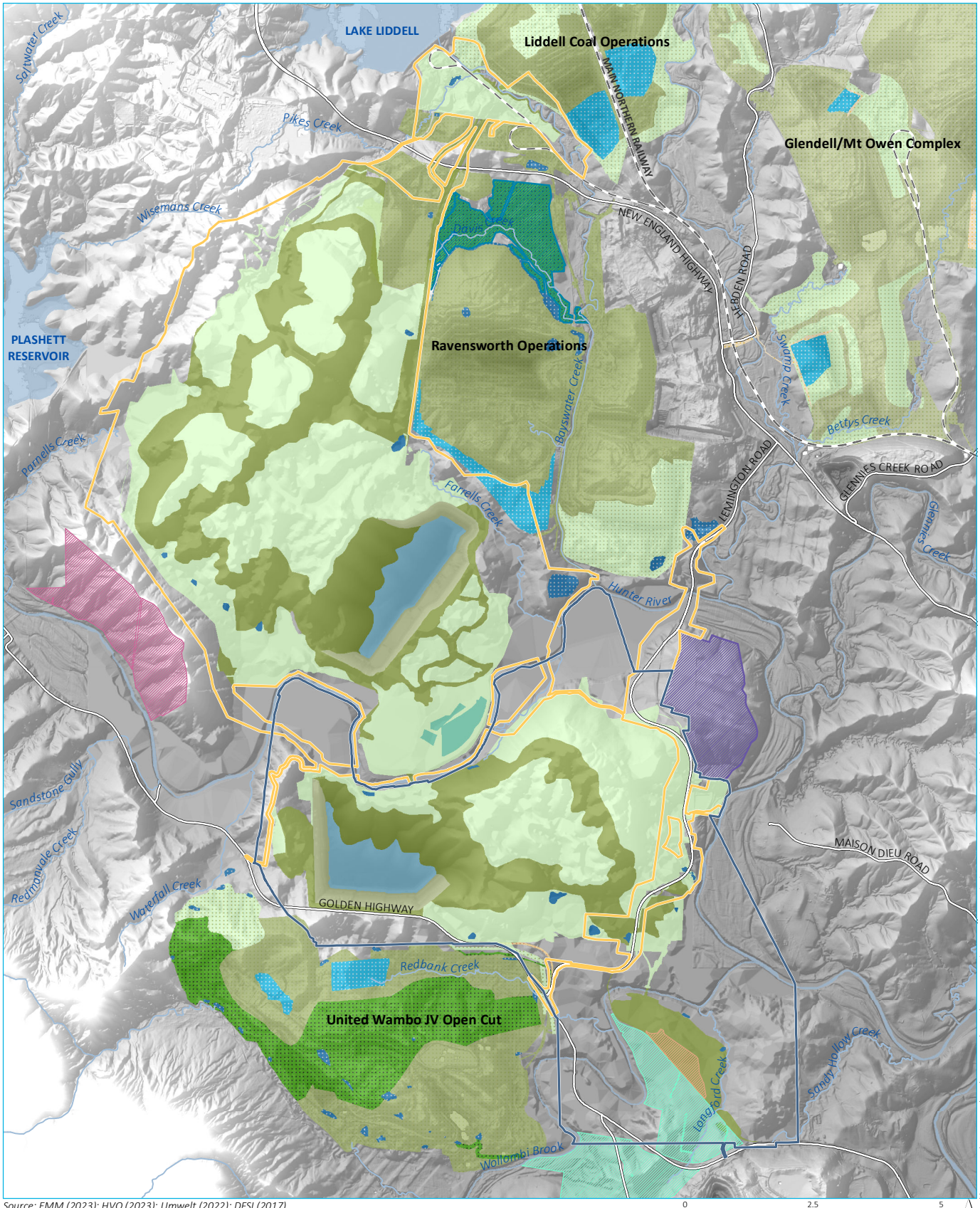
A regional approach to achieve suitable post mine land use objectives is required to ensure land is developed in a way to prevent future land use conflict, while ensuring the current importance agriculture plays in the regional economy is maintained.

As part of the detailed mine closure planning, consultation with key government agencies and other relevant stakeholders will be undertaken. HVO is committed to work with Singleton Council, the community and relevant government agencies to implement a coordinated and collaborative approach to land use planning to ensure any post mine land use achieves a suitable, long-term benefit for the local and regional communities, maximises the potential for the rehabilitated land for employment and ensures the impacts of mine closure on the local and regional communities are minimised.

Section 6.2, states that there will be a net deficit of overburden material to allow for the backfilling of voids. No mass balance of overburden material has been included in the EIS to establish the volume of overburden handled compared to the volume required to backfill voids. The Project is proposing to rehandle over 2,770 ha of existing overburden to extract an additional 497 MT ROM coal. The opportunity cost and benefit of undertaking the rehandling of overburden for coal extraction should be considered against the opportunity cost and benefit of rehandling overburden to backfill final voids.

As presented in the Mine Plan Options Report provided as Appendix D to the EIS, completely filling the proposed voids would require approximately 730 million cubic metres (Mm^3) of material to be mined from existing rehabilitated emplacement areas at the end of coal extraction. This would result in the additional disturbance of more than 1,100 hectares (ha) of rehabilitated land established during the Project and require an approximate 21-year extension of site works post-mining, prolonging potential air quality and noise impacts with limited economic return. Completely backfilling the voids was not considered reasonable and feasible and would significantly delay the establishment of a final landform that could transition to an alternative post mine land use. Due to these reasons, this option was not considered further in the EIS.

It is noted that the Project includes two voids, functioning as pit lakes, which is two less than the number of currently approved voids for HVO North and HVO South.



Source: EMM (2023); HVO (2023); Umwelt (2022); DFSI (2017)

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GDA2020 MGA Zone 56

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KEY

- HVO North proposed development consent boundary
- HVO South proposed development consent boundary
- Proposed HVO South Lemington offset
- Ravensworth North offset area
- Warkworth Northern biodiversity offset area
- Warkworth Southern biodiversity offset area
- HVO Wandewoi offset area

Final land use domain

- Domain A | Native ecosystem
- Domain A - Sub domain Ka | Other - native ecosystem - partial vegetation on highwall benches
- Domain B | Agriculture - grazing
- Domain B - Sub domain Kb | Other - agriculture - alluvial land
- Domain G | Water storage
- Domain J | Pit lake

Approved other mine final land use

- Native ecosystem
- Agricultural - grazing
- Rehabilitation biodiversity offset area
- Infrastructure
- Water storage
- Pit lake

Existing environment

- Rail line
- Major road
- Named watercourse
- Named waterbody

NOTE: Final land uses have been inferred from existing data

Proposed rehabilitation strategy and adjoining mines

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Figure 5.8

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The EIS states that final voids could be filled faster with existing HVO water licences or potential future land uses, neither option has been assessed for impact.

As identified in the EIS, options exist to increase the rate of void filling by pumping water to the voids, with the potential benefits of reducing saline groundwater seepage to the voids. This outcome, if pursued would result in reduced salinity in the void stored water over time.

HVO propose to investigate this option further, during detailed mine closure planning, when the details of the void shape and size, and the availability of suitable water supplies and licences is known.

The EIS does not include an assessment of the final void rock slope angles, geomorphology, void slopes and highwall benches to determine whether the proposed conceptual design will achieve a safe, stable and sustainable landform.

Highwall stability will be dependent on performance during mining, however, there is no discussion on how stability will be monitored and to what condition, nor is there discussion on the actions that will be taken in the event of highwall failure and its subsequent impact on rehabilitation outcomes and performance, particularly as final voids work towards equilibrium. It is possible that highwall stability will improve as the void fills, however, given the timeframe for this to occur and stabilise, and that equilibrium will be over 100 m below natural ground level, this does not appear to be a sufficient or manageable control. The consequences of this on the intergenerational equity principle of ecologically sustainable development has not been assessed.

More detailed information is required on the final void management actions that will be taken to ensure highwall stability during and post mining, including contingencies for final landform design and rehabilitation outcomes should the highwall destabilise during and/or post mining.

More detailed information is required on the safety, stability, pollution potential and sustainability of the proposed final land uses in the context of the final landform.

As part of the mine design process, a geotechnical assessment was undertaken by Encompass Mining with the outcomes presented in Section 2.8 of the EIS.

A slope stability assessment for the HVO North and HVO South pit design was undertaken considering wall design geometries, in-pit dump profiles and final void long-term stability. Various failure mechanisms were considered within the assessment, and the outcomes support the mine design and mining methodology in that all slopes assessed in the design achieved an acceptable factor of safety (FoS) and indicate safe and stable slopes during mining (considering both overall slope, and individual batter/inter-ramp scale failure), and long-term safe and stable slopes within the final void.

The majority of the HVO North an HVO South pit shells will be progressively backfilled with overburden as the mining operation advances, with ongoing shaping and rehabilitation of the spoil. The conceptual final landform includes one final void in the HVO North and one final void in HVO South. Modelling indicates that the slope profiles, including the spoil slopes, are suitable for long term stability.

it is noted that neither the slope design or geotechnical models are static and as additional data becomes available ongoing updates and development of the geotechnical model will occur and designs refined throughout the ongoing operation of HVO to ensure long term stability is achieved.

There are a number of other risks that have the potential to influence and impact rehabilitation and mine closure outcomes that have not been considered in the EIS. These risks relate primarily to how a Project will be designed to adapt to the changing environmental conditions that are projected to occur, not only for the duration of the mining operation, but for the life of the rehabilitated landform (and in this case, the significant timeframe to final void equilibrium). These changes in weather patterns are likely to have a significant impact on the future success of rehabilitation activities across the Hunter Region, including at Hunter Valley Operations. For example, with a likely decrease in availability of water during peak growing seasons for newly established rehabilitation, and a commitment to re-establish native vegetation communities that rely on spring rainfall, it is not clear in the rehabilitation strategy how these consequences of climate change will be managed.

More detailed information is required on the analysis of the climate changing risks (temperature, rainfall, fire) on the success of rehabilitation, including the contingency measures that would be implemented in the event rehabilitation fails.

Section 6 of the Mine Closure and Rehabilitation Strategy (MCRS), provided as Appendix T to the EIS, identifies and assesses the risks to achieving the proposed rehabilitation objectives, including the impact of climate change in the region. As identified in the MCRS, by 2050, DECCW (2010c) predicts the Hunter Valley climate will be hotter, with a likely decrease in rainfall in winter and an increase in rainfall in spring, summer and autumn. Run-off and stream flows are likely to increase in summer and autumn and decrease in spring and winter with associated increases in soil erosion on steeper slopes in the upper catchments. The predicted changes are not expected to necessitate a change to proposed rehabilitation communities; however, it is possible that increased drought may impact on vegetation and additional seeding/planting may be required if failure occurs in accordance with a trigger action response plan (TARP) provided in the HVO RMP.

Rehabilitation criteria for the Project have been developed with the current knowledge of rehabilitation practices and success at HVO and in similar environments. They provide evidence that the closure objectives have been met, using vegetation and ecological monitoring, agricultural productivity measures, site inspections and specialist reports. Aspects to be monitored and reported include final landform shape and surface covers, vegetation establishment and sustainability, the removal of infrastructure and carbonaceous material, treatment of soil contamination etc. These criteria will be refined over the life of the Project in response to advances in rehabilitation techniques, outcomes of rehabilitation research, and influences such as climate change or changes to the agreed final land uses. Criteria are submitted and confirmed with each RMP renewal provided to the Resource Regulator.

Initial rehabilitation criteria for each of the proposed final land use domains are provided in Appendix C of the MCRS. The completion criteria will be updated in future RMPs once the final land use is agreed for these domains.

Monitoring of rehabilitation performance against the completion criteria will be undertaken and reported annually as part of the Annual Review prepared for the HVO complex. Rehabilitation monitoring reports include an assessment of results against both the TARP in the RMP and the closure criteria. Where rehabilitation areas are not progressing towards the criteria, recommendations will be made to improve rehabilitation performance.

In addition, each year HVO undertakes an annual walkover inspection of rehabilitated areas to provide a general assessment on rehabilitation health and potential emerging issues that require maintenance (e.g. weeds, erosion and poor growth rates).

More detailed information is required on the final void land uses compatible with the expected timeframe to reach equilibrium and expected final depth.

Two voids, functioning as pit lakes, will remain post mining, one each at HVO North and HVO South, which is two less than the currently approved operations. The HVO North pit lake equilibrium water level is predicted to be approximately -80 m AHD, after 1000 years, which represents a water storage volume of approximately 126 GL and approximately 155 m of freeboard to the natural ground level (Engeny 2022).

The HVO South pit lake equilibrium water level is predicted to be approximately -84 m AHD after 1000 years, which represents a water storage volume of approximately 71 GL and approximately 160 m of freeboard to the natural ground level (Engeny 2022).

The pit lakes will be permanent water bodies functioning as groundwater sinks (AGE 2022). The pit lake water margins will be planted with appropriate riparian and estuarine species, with the low walls and highwalls (where practical) planted with woodland species for a native woodland habitat final land use.

In September 2022, the Energy Corporation of NSW (EnergyCo) announced funding to assist with feasibility investigations into the viability of utilising upper Hunter Valley mining voids as components of pumped hydro energy storage systems, through the Pumped Hydro Recoverable Grants Program. The viability of this potential future use of the HVO voids can be reviewed during the closure planning process to be undertaken nearer to the cessation of mining at the Project. Alternate industrial or agricultural uses of void water may also be feasible and will be considered at the time.

More detailed information is required on the consequences of the final land use options, including the final use of the void, on the principles of ecologically sustainable development, in particular, inter-generational equity.

An assessment of the Project against the principles of ecologically sustainable development (ESD) was completed and outlined in Section 28.7(i) of the EIS. In relation to inter-generational equity, the only beneficial land use that could be affected by the Project is agriculture. In this regard, the agricultural capability of the land to be disturbed will be progressively reinstated so that, with the exception of the final void, the Project area can be used for agriculture at the end of the mine life. The total area allocated for agriculture land use (Domain B: Agricultural – grazing) following the life of the Project is 4,216 ha. This is a net increase of 138 ha from the baseline area of land use for agriculture.

5.2.9 Land ownership

Further clarification on the Applicant's understanding of the land ownership by Council within the existing and proposed mine and Project footprint.

Figure 5.9 presents the land owned by Singleton Council and Muswellbrook Shire Council within the Project area.

5.2.10 Voluntary planning agreement

To date, no agreement has been reached on a Planning Agreement quantum, as such council would ask that the Project not be determined until such time as an agreement is reached and endorsed by Council.

HVO have continued to engage with Singleton Council in relation to of the terms of a VPA. Discussions are ongoing and HVO intend to have the terms of a VPA agreed with Singleton Council prior to the Project being referred to the IPC for determination.

Source: EMM (2023); HVO (2023); DFSI (2017, 2020)

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GDA2020 MGA Zone 56

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KEY

- HVO North proposed development consent boundary
- HVO South proposed development consent boundary
- Public - Singleton Council
- Lot/road parcel with Council as controlling authority

Existing environment

- Rail line
- Major road
- Named watercourse
- Named waterbody
- Lot boundary

Council owned land within the Project area

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Figure 5.9

EMM
creating opportunities

5.2.11 Air quality

Given the expected life of the proposed Project, the relationship between the air quality observations and the climate change indicators published by AdaptNSW has not been established, including the Project's role in either improving or exacerbating the impact. For example, inclusion of an assessment of the air quality impacts associated with a projected decrease in rainfall during spring and winter months, where PM_{10} and $PM_{2.5}$ have been identified as having greatest impact.

Council seeks further clarification from the Applicant on the impact of a changing climate (as per AdaptNSW projections) on air quality impacts for the life of the proposed Project, including post closure.

The potential impacts of climate change on the Project cannot be determined with a high degree of confidence. This is because of inherent uncertainties associated with the climate change projections. For example, Dowdy et al. (2015) project a generally drier climate, whereas NARCliM (2015) projects a wetter climate. The climate projections and data used throughout the AdaptNSW website primarily use NARCliM projections, which were released in 2014 and are known as NARCliM1.0.

For the Project area, NARCLiM predict an increase in annual temperatures of 0.69 °C and an increase of 1.37% annual rainfall in the near future up to 2039. HVO acknowledges average temperatures are likely to rise in the Project area, with more frequent extreme temperature events. Rainfall has the potential to both increase and decrease with heavier rainfall events likely to become more frequent. The air quality management and mitigation measures adopted for the Project will continue to apply which have been demonstrated to have been effective in reducing exceedances of air quality criteria in the past.

The Air Quality and Greenhouse Gas Assessment (AQGHGA) provided as Appendix H to the EIS was undertaken in accordance with the requirements of the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (EPA 2022).

The Project proposes existing management controls to address the potential air quality impacts. The EIS and air quality assessment do not quantify the effectiveness of these controls under such conditions. Primary sources of PM_{10} include traffic on haul roads, overburden removal and wind erosion of exposed areas, and the proposed controls for the Project include, but are not limited to:

- minimising the area of disturbed land at any one time, in line with the approved Rehabilitation Management Plan
- continued implementation of timely progressive rehabilitation and the use of temporary rehabilitation and stabilisation measures on disturbed land.

Both controls assume a mining operation that is progressively working towards closure and reducing the potential for PM_{10} generation. As noted above, the rehabilitation and mine closure planning for the current and proposed operation is lacking detail. Additionally, the air quality impact assessment does not quantify how successful these measures are in reducing the impact of the existing operation, to enable certainty regarding the impact of the proposed Project.

Council seeks further clarification from the Applicant on the evidence to support the effectiveness of existing controls in reducing impacts of air quality, in particular the generation of PM_{10} and $PM_{2.5}$.

Table 33 of the AQGHGA summarises the standard emission management measures, currently implemented at the HVO Complex in accordance with the approved Air Quality and Greenhouse Gas Management Plan (AQGGMP) (HVO 2019) which are consistent with best practice dust mitigation measures. These measures will continue to be adopted as part of the Project.

HVO currently utilises a network of Tapered Element Oscillating Microbalance (TEOM) units and meteorological stations in support of the proactive and reactive air quality management system. AQGGMP details the specific triggers and actions that are used to inform the implementation of reactive controls. Table 5.5 and Figure 5.10 show the triggers and responses from the AQGGMP. These are consistent with best practice as per Katestone (2011).

Table 5.5 Real time air quality alarm system overview

Monitoring location	Trigger level	Response actions
HVO Corporate Met Station	Wind speed >8 m/s	• Validation of alarm (verify monitors functioning correctly and review meteorological conditions). • Notify relevant Open Cut Examiner. • Response as per flowchart below.
HVO Cheshunt Met Station	Wind speed >8 m/s	
Maison Dieu (TEOM) Knodlers Lane (TEOM) Warkworth (TEOM) Wandewoi (TEOM)	<u>Stage 1:</u> • 10 min average PM_{10} > 150 µg/m^3. • 1 hour average PM_{10} > 50 µg/m^3 for three consecutive hours. <u>Stage 2:</u> • Rolling 24 hour average PM_{10} > 50 µg/m^3 for six consecutive hours (winds in arc of mine to monitor). • 10 min average PM_{10} > 150 µg/m^3 for three consecutive hours (winds in arc of mine to monitor).	

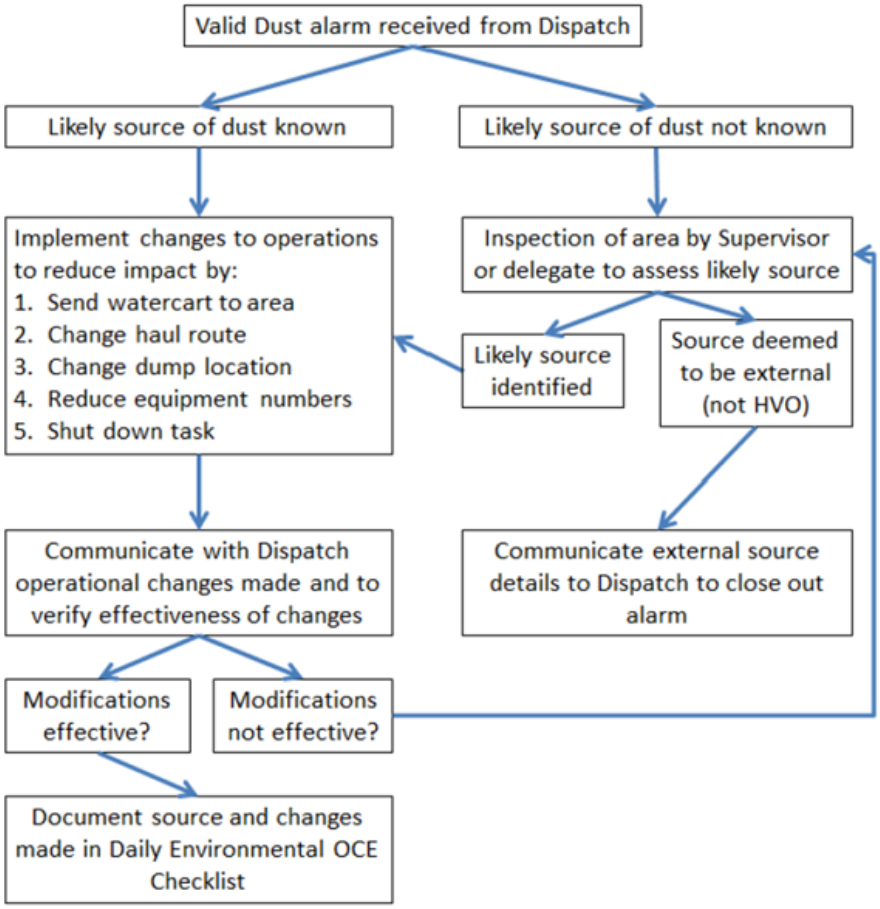


Figure 5.10 Actions in response to dust alarm

HVO's real time air quality monitoring stations continuously log information and transmit data to a central database, generating alarms when particulate matter levels exceed internal trigger limits to guide the operational management of air quality on site. Table 5.6 provides a history of the actual number of annual alarms and hours of equipment downtime due to air quality management from 2014 to 2022 (inclusive) (Rio Tinto 2015, Rio Tinto 2016, Rio Tinto 2017, Yancoal 2018, HVO 2019, HVO 2020, HVO 2021, HVO 2022, HVO 2023). These data show that (for the years examined) there have been between 287 and 2,527 real-time alarms per year. This means that alarms are typically generated, on average, 11% of the time. For six of the nine years alarms were generated less than 10% of the time and for three of the nine years, between 15 and 29% of the time. A higher frequency of alarms also correlated with years of lower rainfall, that is 2017 to 2020. The data also show that HVO proactively shuts down any activities that may be increasing the risk of air quality impacts.

Table 5.6 Historical number of alarms and equipment downtime at HVO

Year	Number of real time alarms for air quality and meteorological conditions received and acknowledged	Hours of equipment downtime recorded due to air quality management (does not include occasions where operations were changed/modified but not stopped)
2014	367 (4% of year)	3,066
2015	429 (5% of year)	3,835
2016	287 (3% of year)	2,569
2017	750 (9% of year)	8,584
2018	1,471 (17% of year)	6,428
2019	2,527 (29% of year)	7,206
2020	1,361 (15% of year)	906
2021	797 (9% of year)	1,054
2022	551 (6% of year)	1,175

The air quality management system described above has led to a good history of compliance. That is, HVO has complied with the PM_{10} criteria specified in the HVO North development consent (DA 450-10-2003) and HVO South Project Approval (PA 06_0261) on every day in the nine years reviewed (2014 to 2022) except on three occasions; the Hunter Valley Gliding Club (29 July 2017), Knodlers Lane (28 July 2021) and Cheshunt East (12 September 2021).

A review of the existing air quality monitoring locations will be undertaken within 12 months of the commencement of the Project, so that the monitoring network provides adequate coverage of the Project area particularly in areas identified by the modelling with a potential for increased air quality impact risk.

5.2.12 Greenhouse gas and climate change

Of the predicted Scope 1 emissions for the Project, almost 50% are attributable to emissions from diesel usage from transport operations. The EIS does not provide any management actions to reduce these emissions over the life of the Project.

Measures to minimise or mitigate Scope 1 and Scope 2 emissions were considered throughout the development and assessment of the Project and are outlined in Table 9.6 of the EIS (EMM 2022d). These measures include:

- Minimisation of the length of haulage routes to optimise fuel use, dust and noise emissions.
- Ramp gradients have been optimised in the mine design based on pit geometry.
- Payload and equipment productivities will continue to be constantly monitored and actively managed to maintain efficient haulage.
- Fuel use efficiency has been an important selection criterion when procuring existing trucks at HVO. New fuel use technology will be considered should any new trucks be purchased, or engine repowers are required over the life of the Project.
- Scheduling the location and use of equipment and mobile plant is a routine part of mining operations. HVO will continue to prepare short, medium, and long term production plans to optimise production.

Since submission of the EIS, HVO has continued to investigate measures to reduce GHG emissions from the Project. The review considered grid supplied electric powered equipment, as well as equipment powered by alternative fuels such as hydrogen, biofuels, ammonia and synthetic diesel. The outcomes of this review are discussed in Section 4.2, and are summarised as follows:

- While technologies such as hybrid, fuel cell or battery power technologies are developing and being widely adopted in smaller scale sectors such as for automotive, they are not yet adequately developed for use with mining equipment. This may not continue to be the case for the duration of the Project and therefore HVO will commit to reviewing technologies on an ongoing basis for suitability for adoption.

- A number of technologies exist for grid supplied electric powered equipment, including tethered cable electric machines, and high capacity overhead catenary systems; however, there are a number of complexities to their implementation and these technologies are constrained by practicality and efficiency.

- The use of hydrogen as a fuel in mining equipment does not currently meet Technology Readiness Level (TRL) requirements and is therefore not yet an option for the industry.

- The use of biofuels is limited due to both cost and availability. Additionally, engines running biofuel are less efficient and burn more biofuel than regular diesel and Tier 4 Final engines are not currently compatible with biofuels.

HVO will continue to undertake regular reviews of technologies and abatement measures to reduce GHG emissions from the Project, including whether these measures are reasonable and feasible to implement at HVO. These reviews will be undertaken every three years and will include consideration of the use of alternate fuels including biofuels and hydrogen, and the transition to an electric powered fleet, as these technologies advance and more information becomes available.

Council acknowledges the corporate targets and actions set to work towards achieving a net zero outcome by 2050, however, the EIS does not provide any detail on how the Project will support the growing climate change policy framework in the following areas:

- The Project's contribution towards achieving (or otherwise) the NSW target of net-zero emissions by 2050, including any quantifiable actions that can (or have been) taken to support this objective.
- How the emissions proposed by the Project will be managed through the Safeguard Mechanism and inclusion of the costs of compliance with the Safeguard Mechanism in a revised Economic Impact Assessment.
- The measures proposed by the Applicant to ensure that the Project will be more resilient to a changing climate.
- How the 33 MT of Scope 1 emissions proposed for the life of the Project will be reduced so as to not contribute to the current increasing trend in annual scope 1 emissions in NSW6 (where half of all NSW emissions are from stationary energy sources with transport emissions the second largest component of NSW greenhouse gas emissions).
- What reductions in emissions are expected as a result of the proposed actions and management controls, and whether these actions will in fact mitigate the emissions of the Project.

The impact of alternative scenarios for the Project on the framework objectives.

HVO is governed by a range of climate change commitments made by Yancoal and Glencore, as the JV partners of HVO. Both Yancoal and Glenore have developed robust climate change strategies for their global operations. Glencore's strategy includes company-wide emission reduction targets and a commitment to a responsible managed decline of its global coal business over time. Yancoal's strategy includes commitments to monitoring relevant policy, market, and technological developments and financial signals to inform how Yancoal's investment and development priorities should adapt to transitions in the global energy mix, and to support innovation and investment in carbon capture, utilisation and storage (CCUS) through various industry and policy initiatives. Further discussion on the JV partners commitments is provided in Section 2.2.3 of the EIS (EMM 2022d).

Following submission of the EIS, and as described in the response to the CAS submission in Section 4.2, HVO has completed additional modelling on the predicted fugitive emissions from the Project to meet NGERS reporting requirements for the Project mining areas and to address comments from CAS on the predicted GHG emissions from the Project. As a result, the GHG emissions have been updated based on:

- Updated electricity usage (Scope 2 emissions), which has been adjusted to reflect the Australian Government's grid decarbonisation forecast (DCCEEW December 2022), as requested by the NEZM team. This, combined with the assumption that Year 1 of the Project will be 2024, rather than 2023 (see third dot point below), has resulted in a net reduction in GHG emissions by the Project of approximately 1.6 Mt CO_2-e (i.e. from 1.88 Mt CO_2-e predicted in the EIS to 0.28 Mt CO_2-e now predicted over the life of the Project).
- Revised fugitive emissions forecast, based on updated gas content and composition information obtained from additional drilling and analysis in both HVO North and HVO South. This has reduced the predicted total Scope 1 emissions over the life of the Project by approximately 3.3 Mt CO_2-e.
- An assumption that 2024 will be Year 1 of the Project, rather than 2023, as was presented in the EIS. This has reduced the predicted GHG emissions over the life of the Project by 0.66 Mt CO_2-e (Scope 1) (in addition to the 3.3Mt CO_2-e reduction from the updated gas model), 0.06 Mt CO_2-e (Scope 2) and 31.28 Mt CO_2-e (Scope 3).

The revised predicted GHG emissions from the Project for the HVO Complex, as presented in Section 4.2, are re-produced here in Table 5.7.

Table 5.7 Revised summary of estimated GHG emissions for the Project (HVO Complex)

Period	Estimated GHG emissions (Mt CO_2-e)					
	Scope 1		Scope 2		Scope 3	
	EIS	**Revised**	EIS	**Revised**	EIS	**Revised**
Annual average	1.19	**1.09**	0.07	**0.01**	41.67	**42.05***
Total over life of the Project	33.28 (2023-2050)	**29.31** (2024-2050)	1.88 (2023-2050)	**0.28** (2024-2050)	1,166.86 (2023-2050)	**1,135.43** (2024-2050)

*Note: while the total predicted Scope 3 emissions have reduced over the life of the Project, the annual average has increased slightly due to the average production profile between 2024-2050.

As shown in Table 6.3, Scope 1 and 2 emissions are estimated to average 1.10 Mt $CO_{2\text{-}e}$ per year over the life of the Project, from approximately 2024 to 2050. The Scope 1 and 2 emissions presented in the EIS were approximately 1.26 Mt $CO_{2\text{-}e}$ per year, and therefore the revisions to the GHG estimates listed above have resulted in a reduction in the predicted Scope 1 and 2 emissions by approximately 0.16 Mt $CO_{2\text{-}e}$ per year and 5.6 Mt $CO_{2\text{-}e}$ over the life of the Project. The direct (Scope 1) emissions intensity of the Project would be, on average, 0.04 t $CO_{2\text{-}e}$/t ROM coal over the life of the mine, which is reduced compared to the intensity reported in the EIS (0.05 t $CO_{2\text{-}e}$/t ROM coal). The emissions intensity for HVO, both as a project average and as a peak, are low relative to other Australian coal operations, as discussed further in the response in Section 4.2.

The predicted total Scope 3 emissions have also reduced over the life of the Project by 31.43 Mt $CO_{2\text{-}e}$ on the basis that Year 1 of the Project is now assumed to be 2024, and therefore predicted emissions from operations in 2023 have been removed (noting that 2050 remains the end date of the Project). To put the projected GHG emissions from the Project in context, they have been compared with the latest emissions officially recorded on the National Greenhouse Gas Inventory in 2022. The revised estimated annual average Scope 1 and 2 emissions from the Project (1.10 Mt $CO_{2\text{-}e}$) represent approximately 0.24% of Australia's 2022 emissions (compared to 0.27% in the EIS).

Since submission of the EIS, HVO has continued to investigate measures to reduce GHG emissions from the Project. However, firstly it is important to note that as a designated large facility under the NGER Act, the Safeguard Mechanism applies to HVO, and therefore ongoing operations at HVO will be subject to the emissions reduction requirements that are contained within it. Under the Safeguard Mechanism requirements, HVO will have a declining baseline which will result in significant reductions in net emissions to 2050. Therefore, due to the Safeguard Mechanism, cumulative net emissions from the Project will be significantly lower at approximately 17.9 $MtCO_{2\text{-}e}$. HVO will be required to purchase and surrender carbon offsets such as Australian carbon credit units (ACCUs) or Safeguard Mechanism credit units (SMCs) or implement abatement activities, whichever is cost effective and practical at the time, to comply with the requirements of the Safeguard Mechanism.

5.2.13 Social

The social consequences of mining and construction workforces on housing in the Singleton local government area has been identified in both the Local Housing Strategy and the Community Development Plan. These documents, adopted by Council, set out the actions required to address a housing affordability crisis. The social impact assessment and EIS do not consider tangible actions to address the impacts of the Project on housing affordability.

Further commitment and action is required through the assessment of the development towards addressing the impacts of the Project on, amongst other things, housing supply, affordability and availability. Importantly, the social impact assessment does not include the social and economic impacts and benefits associated with mine closure (as required by current conditions of consent).

The Project would not result in any change to the existing operations workforce and therefore there is little to no long-term substantial population change associated with the Project. The Project may result in slight short-term changes to local populations through the temporary influx of the construction workforce which is anticipated to peak at 600 workers (for a duration of 3–6 months).

It is likely that all construction workers sourced from within a one-hour commute will be accommodated at their existing place of residence within the local, regional area and area of reference. As outlined in Section 6.1 of the SIA, the assumption that around 30% of the construction workforce would need to be sourced from beyond a 1 hour commute distance, would result in up to 180 construction workers needing to be accommodated when working on the Project. It is anticipated that the preferred form of accommodation sought by these workers would be short-term accommodation (hotels/motels etc); however, due to the limited availability of short-term accommodation, rental accommodation may also be sought most likely from neighbouring towns within an hour commute such as Muswellbrook, Singleton, Jerrys Plains, and Denman.

The influx of up to 180 construction workers due to the Project may result in additional demand for rental accommodation which places upward pressure on rental prices. However, it is also noted that the peak construction period in which there is the potential for heightened demand for accommodation is only anticipated to occur for up to 6 months. Subsequently any upward pressure on rental prices is likely to be marginal and short lived and therefore potential impacts on vulnerable groups would possibly not eventuate.

Not proceeding with the Project would mean the cessation of mining at the HVO Complex in mid-2025. Currently, the HVO South Project Approval allows for mining to continue to 2030; however, as HVO South coal is currently processed through HVO North-based CPP facilities, this option would likely mean that no further coal extraction at HVO South would occur as the CPP facilities cease approval for use when the HVO North consent lapses in 2025. This option would therefore forego the approved ROM coal remaining to be extracted, as well as the additional approximate 400 Mt of ROM coal to be extracted by the Project. It would also mean cessation of employment and the associated flow-on benefits to the approximate 1,500 FTE HVO workforce.

The Project will deliver an additional 25 years of mining at HVO North, and a further 15 years of mining at HVO South, beyond that currently approved. The Project will secure continued support for local businesses and employment opportunities of around 1,500 FTE and would provide the community additional time to transition before mine closure, including opportunities for:

- workers to transition to new industries through reskilling
- transition planning to manage withdrawal of the mine's direct and indirect economic contributions to business and community organisations, allowing these groups to adapt their approach and offerings
- the local and regional community to make informed decisions and extending the time within which these decisions can be made
- new infrastructure and employment opportunities in the region are likely to develop and become viable, for example employment opportunities in the renewable energy sector, as there is a strong local and regional planning context for transitioning away from the economic reliance on the mining sector, which has not yet been fully realised.

As documented in Chapter 23 of the EIS, if approved, HVO will develop a social impact management plan (SIMP).

5.2.14 Biodiversity

The new Lemington Road alignment is expected to impact biodiversity that is part of an existing offset for the Warkworth Mine under its SSD 5464. Council is seeking additional clarification on the intended outcome for this offset land.

The proposed Lemington Road alignment has been designed to avoid impacts on the adjacent Warkworth offset lands. No impacts to these lands are anticipated as a result of the construction of the new Lemington Road alignment. This existing Warkworth offset site is currently zoned C2 Environmental Conservation.

The BDAR completed for the Project relied on an existing Biodiversity Management Plan (2018) as a management control. Council considers that this is not appropriate, as the Plan is out of date. A revised Plan should be provided that takes into consideration the impacts identified in the BDAR.

Should the Project be approved, HVO will review and revise the existing approved HVO Integrated Biodiversity Management Plan (IBMP) in accordance with any development consent requirements. It will describe aspects such as:

- pre-clearance and clearance protocols for vegetation and fauna
- pest, weed and pathogen control measures
- bushfire management actions
- monitoring and adaptive management strategies.

The biodiversity management measures detailed in in the Biodiversity Development Assessment Report (BDAR), provided as Appendix L to the EIS, will be incorporated into the IBMP. This will include the following commitments:

- Installation of wildlife warning signs and 'Injured Native Wildlife' signs in likely high impact locations along the realigned Lemington Road.
- Measures to protect the river red gum populations located within the river red gum Additional Disturbance Area.

- Continuation of river red gum health monitoring, in accordance with the River Red Gum Rehabilitation and Restoration Strategy, which will be updated for the Project.
- Development of a biodiversity offset strategy (BOS) based on the credits required to be retired to offset the impacts of the Project and the options available under the NSW *Biodiversity Conservation Act 2016* (BC Act) and its Regulation.

The security of offsets ahead of mining activities is an important mechanism to secure and preserve biodiversity and reduce losses. Where security arrangements are tied to other operations, these should be clearly identified in the EIS and legally binding arrangements to secure them should be made.

As detailed in Chapter 13 of the EIS, an assessment was undertaken to identify the biodiversity credits required to offset the impacts of the Project. HVO is committed to delivering a BOS in accordance with BC Act that appropriately compensates for the unavoidable loss of biodiversity values and residual impacts of the Project. The BOS will be developed in consultation with DPE and BCD and will be implemented prior to clearing occurring and in accordance with the process outlined in the BC Act.

Biodiversity offset credits will be retired prior to impacts occurring. HVO proposes to stage the retirement of credits as clearing of the development footprint occurs, given that some aspects of the Project (for example construction of the LCPP) will not occur for some time.

To account for the Project's impacts to Warkworth Sands Woodland (WSW), an offset site referred to as the South Lemington Offset, has been identified near South Lemington Pit 1 at HVO South. This site covers an area of approximately 50 ha between the Hunter River and the New England Highway in the Warkworth locality. This land is owned by HVO and not associated with any other mining operations. As such, this proposed offset site is not subject to any third party access arrangements to facilitate use or long term security. This direct offset site, used partially or in full, is anticipated to provide for the entire WSW ecosystem credit requirements for the Project.

Council is seeking clarification on the total area of existing disturbance at Hunter Valley Operations, where the offsets would be located, including the tenure of land offsets, the areas of ecological rehabilitation proposed on site, the long-term tenure of ecological rehabilitation and whether the required credits are available for purchase.

At the commencement of the Project, HVO estimates that the total surface disturbance area will be approximately 7,155 ha, of which approximately 2,773 ha will be rehabilitated in accordance with the HVO Forward Program (submitted to the Resource Regulator, August 2022). It is noted that approximately 1,580 ha of varying stages of rehabilitation will be re-disturbed by the Project.

As stated above, HVO is committed to delivering a BOS in accordance with BC Act that appropriately compensates for the unavoidable loss of biodiversity values and residual impacts of the Project. The BOS will be developed in consultation with DPE and BCD and will be implemented prior to clearing occurring and in accordance with the process outlined in the BC Act.

Biodiversity offset credits will be retired prior to impacts occurring. HVO proposes to stage the retirement of credits as clearing of the development footprint occurs, given that some aspects of the Project (for example construction of the LCPP) will not occur for some time.

Both the HVO Forward Work Program and the life of mine plan should be included in the EIS to enable assessment of the impacts to on and off-site biodiversity.

The HVO Forward Works Program and RMP, required in accordance with the NSW Mining Regulation 2016 and mining lease conditions, are available on the HVO website.

The EIS includes an assessment of all impacts of the activities proposed by the Project on biodiversity, with impacts to be offset and progressive rehabilitation implemented to mitigate and manage impacts. The proposed rehabilitation and rehabilitation schedule for the Project is discussed in Chapter 21 of the EIS and further detailed in the Mine Closure and Rehabilitation Strategy provided as Appendix T to the EIS. Should the Project be approved, the RMP will be revised and updated to align with the rehabilitation requirements and commitments of the approved Project.

5.3 Ausgrid

There are existing overhead electricity network assets within the proposal area.

Safework NSW Document – *Work Near Overhead Powerlines: Code of Practice*, outlines the minimum safety separation requirements between these mains/poles to structures within the development throughout the construction process. It is a statutory requirement that these distances be maintained throughout construction. Special consideration should be given to the positioning and operating of cranes and the location of any scaffolding.

The "as constructed" minimum clearances to the mains should also be considered. These distances are outlined in the Ausgrid Network Standard, NS220 Overhead Design Manual. This document can be sourced from Ausgrid's website, www.ausgrid.com.au

Should the existing overhead mains require relocating due to the minimum safety clearances being compromised in either of the above scenarios, this relocation work is generally at the developers cost.

It is also the responsibility of the developer to ensure that the existing overhead mains have sufficient clearance from all types of vehicles that are expected be entering and leaving the site. Refer to Ausgrid's website www.ausgrid.com.au for information related to contestable asset relocation projects.

Any works undertaken near overhead powerlines will be undertaken in accordance with the requirements as outlined in AS/NZ7000, NS220 and the Safework NSW Document – *Work Near Overhead Powerlines: Code of Practice* and with consideration to minimum distance requirements.

There are existing underground electricity network assets within the proposal area. Special care should also be taken to ensure that driveways and any other construction activities within the footpath area do not interfere with the existing cables in the footpath. Ausgrid cannot guarantee the depth of cables due to possible changes in ground levels from previous activities after the cables were installed. Hence, it is recommended that the developer locate and record the depth of all known underground services prior to any excavation in the area. Safework Australia – *Excavation Code of Practice*, and Ausgrid's *Network Standard NS156* outlines the minimum requirements for working around Ausgrid's underground cables.

HVO has a surface disturbance process in place, which will continue to be applied during the Project, to identify the location of any underground cables that may have the potential to be impacted by any construction activities. All works will be designed to avoid impacts to Ausgrid assets wherever practical or minimise disruptions.

There are existing electricity substation assets within the proposal area.

Subsidence and vibration must be minimised at the substation site. The use of ground anchors under a substation is generally not permitted due to the presence of underground cabling and earthing conductors which may be more than 10 m deep. A further area of exclusion may be required in some circumstances. Substation ventilation openings, including substation duct openings and louvered panels, must be separated from building air intake and exhaust openings, natural ventilation openings and boundaries of adjacent allotments, by separation distances which meet the requirements of all relevant authorities, building regulations, BCA and Australian Standards including *AS 1668.2: The use of ventilation and air-conditioning in buildings - Mechanical ventilation in buildings*.

Ausgrid requires the substation ventilation openings, including duct openings and louvered panels, to be separated from building ventilation system air intake and exhaust openings, including those on buildings on adjacent allotments, by not less than 6 m.

Any portion of a building other than a BCA class 10a structure constructed from non-combustible materials, which is not sheltered by a non-ignitable blast-resisting barrier and is within 3 metres in any direction from the housing of a kiosk substation, is required to have a Fire Resistance Level (FRL) of not less than 120/120/120. Openable or fixed windows or glass blockwork or similar, irrespective of their fire rating, are not permitted within 3 metres in any direction from the housing of a kiosk substation, unless they are sheltered by a non-ignitable blast resisting barrier.

The development must comply with both the Reference Levels and the precautionary requirements of the ICNIRP *Guidelines for Limiting Exposure to Time-varying Electric and Magnetic Fields* (1 HZ – 100 kHZ) (ICNIRP 2010). For further details on fire segregation requirements refer to Ausgrid's *Network Standard 141*. Existing Ausgrid easements, leases and/or right of ways must be maintained at all times to ensure 24 hour access. For further details refer to Ausgrid's *Network Standard 143*.

Vibration impacts at Ausgrid's electrical substation assets will be minimised. HVO will ensure the development complies with both the Reference Levels and the precautionary requirements of the ICNIRP Guidelines for Limiting Exposure to Time-varying Electric and Magnetic Fields (1 HZ – 100 kHZ) (ICNIRP 2010). HVO will comply with the requirements of Ausgrid's Network Standard 141 and NS192 Blasting near substations and power lines and ensure right of ways are maintained at all times to ensure 24-hour access in accordance with Ausgrid's Network Standard 143.

The following conditions apply for any activities within Ausgrid's electricity easements:

1. All construction works on or near the easement and/or powerlines must adhere to the Safework NSW – *Work Near Overhead Powerlines: Code of Practice*, 2006.
2. Safework Australia – *Excavation Code of Practice*, and Ausgrid's *Network Standard NS156* outlines the minimum requirements for working around Ausgrid's underground cables.
3. Ausgrid is not responsible for the reinstatement of any finished surface within the easement site.
4. Ausgrid requires 24 hour access along the easement for plant and personnel. For the purpose of exercising its rights under the easement, Ausgrid may cut fences and/or walls and install gates in them. Where the easements on a site do not provide practical access to all of Ausgrid's infrastructure, a suitable right of access at least 5 m wide must be provided to each asset.
5. Access driveways shall withstand the weight of a heavy rigid truck when fully laden weighing 30 t.
6. Access gates, minimum 4.5 m wide, may be required in all fences crossing any transmission line easement.
7. No vehicles, plant or equipment having a height exceeding 4.6 m are to be brought into the easement site without written approval from Ausgrid.
8. Vehicles brought into the easement, with a height less than 4.6 m but having an extension capable of extending greater than 4.6 m above ground, must not have that extension operated at all whilst within the easement.
9. Adequate removable protection must be installed to prevent vehicles inadvertently colliding with any transmission towers. This proposed form of protection must be forwarded to Ausgrid for review and consent.
10. Driveways and other vehicle access must be capable of supporting the heaviest vehicle likely to traverse the driveway without damaging Ausgrid's assets.
11. No buildings/structures or parts thereof constructed may encroach the easement.
12. No machine excavation is permitted within the easement without Ausgrid's express permission.
13. No obstruction of any type shall be placed within 10 m of any part of a transmission line structure except where installed to protect transmission structure from vehicle impacts when Ausgrid has approved such structures.
14. Care must be taken to prevent any damage to underground metalwork which can extend up to 15 m away from the transmission line structure.
16. Bulk solids (e.g. sand and gravels) are not to be stored within the easement area.
17. The storage of non-flammable materials is allowable provided access is maintained along the easement and subject to height limitations of 2.5 m if climbable or 4.6 m if not climbable. Lifting of materials within the easement area must consider the clearance requirements given in Safework NSW *Code of Practice*.
18. The erection of minor structures such as clothes hoists, barbecues, and the like are permitted within the easement site provided they do not exceed a height of 2.5 m if climbable or 4.6 m if not climbable, and the metallic components are earthed. The positioning of such structures should allow a 5 m wide vehicular access along the full length of the subject easement area. Ausgrid reserves the right to remove such structures where required for safety, access and maintenance.
19. The flying of kites, model aircraft etc. is not permitted within the easement site.
20. Any change to ground levels must be submitted to Ausgrid for approval.
21. Trees, shrubs, or plants which have root systems likely to grow greater than 250 mm below ground level are not permitted within the easement or close to the cable infrastructure. The planting of other vegetation is to ensure Ausgrid's access and maintenance requirements are maintained.

Trees, shrubs, or plants which have a mature height of greater than 3.0 m, or climbable portions greater than 2.5 m above ground, are not permitted within the easement. The planting of other vegetation is to ensure Ausgrid's access and maintenance requirements are maintained.

All works undertaken within Ausgrid's electricity easements will be undertaken in compliance with the conditions outlined above. All works will be designed in consideration of NS143 Easements, Leases and Rights of Way to avoid impacts to Ausgrid assets wherever practical or minimise disruptions.

6 Response to organisation and public individual submissions

6.1 Overview

Eighteen organisations and 54 individuals provided a submission of objection to the Project. The key matters raised in objection submissions from organisations and where they have been addressed is summarised in Table 6.1. The submissions from the Australia Institute, the Plains Clans of the Wonnarua People (PCWP) and the Hunter Valley Glider Club (HVGC) have been responded to in Sections 6.2, 6.3 and 6.4, respectively, given the specific matters raised by these submissions. The broad issues raised in the remaining organisation submissions and in individual submissions are addressed in Section 6.5 as per the themes raised. In this section, similar issues raised in organisation and individual submissions have been consolidated and paraphrased with a single response provided.

Table 6.1 Summary of organisation submissions and matters raised

Organisation	Issues raised	Where addressed
Better Planning Network Inc	Greenhouse gas and climate change	Section 6.5.1
	Impacts to water resources	Section 6.5.6
	Health impacts	Section 6.5.8
	Rehabilitation and final landform	Section 6.5.9
	Inadequate stakeholder engagement	Section 6.5.16
	EPBC referral requirement	Section 6.5.17
The Australia Institute	Economic assessment adequacy	Section 6.2 and Appendix I
Lock the Gate Alliance	Greenhouse gas and climate change	Section 6.5.1
	Air quality impacts	Section 6.5.2
	Biodiversity impacts	Section 6.5.3
	Aboriginal cultural heritage impacts	Section 6.5.5
	Failure of fit and proper person test	Section 6.5.7
	Rehabilitation and final landform	Section 6.5.9
Climate Action Sydney Eastern Suburbs (CASES)	Greenhouse gas and climate change	Section 6.5.1
Central West Environment Council	Greenhouse gas and climate change	Section 6.5.1
	Lack of public benefit and justification	Section 6.5.4
Denman Aberdeen Muswellbrook Healthy Environment Group Inc	Greenhouse gas and climate change	Section 6.5.1
	Biodiversity impacts	Section 6.5.3
	Failure of fit and proper person test	Section 6.5.7
	Rehabilitation and final landform	Section 6.5.9

Table 6.1 Summary of organisation submissions and matters raised

Organisation	Issues raised	Where addressed
Wollar Progress Association	Greenhouse gas and climate change	Section 6.5.1
	Lack of public benefit and justification	Section 6.5.4
	Failure of fit and proper person test	Section 6.5.7
Climate Change Balmain-Rozelle	Greenhouse gas and climate change	Section 6.5.1
	Lack of public benefit and justification	Section 6.5.4
	Failure of fit and proper person test	Section 6.5.7
Hunter Communities Network	Greenhouse gas and climate change	Section 6.5.1
	Air quality impacts	Section 6.5.2
	Lack of public benefit and justification	Section 6.5.4
	Impacts to water resources	Section 6.5.6
	Health impacts	Section 6.5.8
Hunter Environment Lobby Inc	Greenhouse gas and climate change	Section 6.5.1
	Air quality impacts	Section 6.5.2
	Biodiversity impacts	Section 6.5.3
	Aboriginal cultural heritage impacts	Section 6.5.5
	Failure of fit and proper person test	Section 6.5.7
	Rehabilitation and final landform	Section 6.5.9
Tipping Point	Greenhouse gas and climate change	Section 6.5.1
	Aboriginal cultural heritage impacts	Section 6.5.5
Vote Earth Now	Greenhouse gas and climate change	Section 6.5.1
	Biodiversity impacts	Section 6.5.3
	Aboriginal cultural heritage impacts	Section 6.5.5
	Failure of fit and proper person test	Section 6.5.7
	Rehabilitation and final landform	Section 6.5.9
Plains Clans of the Wonnarua People (PCWP)	Lack of engagement	Section 6.3
	Impacts on Section 10 ATSHIP application	Section 6.3
Hunter Thoroughbred Breeders Association	Greenhouse gas and climate change	Section 6.5.1
	Air quality impacts	Section 6.5.2
	Lack of public benefit and justification	Section 6.5.4
	Aboriginal cultural heritage impacts	Section 6.5.5
	Impacts to water resources	Section 6.5.6

Table 6.1 Summary of organisation submissions and matters raised

Organisation	Issues raised	Where addressed
	Impacts to the equine industry	Section 6.5.10
	Noise impacts	Section 6.5.11
	Visual impacts	Section 6.5.12
Coolmore Australia	Air quality impacts	Section 6.5.2
	Impacts to water resources	Section 6.5.6
	Impacts to the equine industry	Section 6.5.10
	Noise impacts	Section 6.5.11
	Visual impacts	Section 6.5.12
Newgate Operations Pty Ltd	Air quality impacts	Section 6.5.2
	Impacts to water resources	Section 6.5.6
	Impacts to the equine industry	Section 6.5.10
	Noise impacts	Section 6.5.11
Scone Equine Hospital	Air quality impacts	Section 6.5.2
	Lack of public benefit and justification	Section 6.5.4
	Aboriginal cultural heritage impacts	Section 6.5.5
	Impacts to water resources	Section 6.5.6
	Impacts to the equine industry	Section 6.5.10
	Noise impacts	Section 6.5.11
	Visual impacts	Section 6.5.12
Godolphin Australia	Air quality impacts	Section 6.5.2
	Impacts to water resources	Section 6.5.6
	Noise impacts	Section 6.5.11
	Impacts to the equine industry	Section 6.5.10
	Alignment with principals of ESG	Section 6.5.13

In addition to the organisations above, additional information has been presented in response to matters raised by the Hunter Valley Gliding Club (HVGC) despite a submission of support for the Project being received. The additional information in response to the matters raised in the HVGC submission is provided in Section 6.4.

6.2 The Australia Institute

The Australia Institute (TAI) provided a submission relating to the economic impact assessment of the Project undertaken by EY (2022). In their submission, TAI claimed that the value of the Project was inflated in the economic impact assessment. They questioned a number of aspects of the assessment, including:

- indirect benefits to workers
- indirect benefits to suppliers
- the cost of greenhouse gas emissions
- taxation and the broader financial benefits of the Project.

EY have provided a response to the TAI submission, which is appended to this report in Appendix I.

In their response, EY demonstrate that the economic assessment of the Project was conducted in strict accordance with the *Guidelines for the economic assessment of mining and coal seam gas proposals* (NSW Government 2015) (the guidelines), as required by the SEARs. It follows the logical framework set out in the guidelines, with the results of the assessment further confirmed by Computable General Equilibrium (CGE) modelling. In contrast, the arguments put forward by TAI are demonstrated to be invalid, without evidence to support their claims, or are inconsistent with the guidelines.

Notably, in their response EY comment that:

> it is inconceivable that the Project will not result in significant economic benefits due to the additional employment and sales of goods and services required by the Project (relative to the base case of the Project not proceeding).

The economic impact assessment robustly demonstrates that the Project will generate significant benefits to the State of NSW and the local region.

6.3 The Plains Clans of the Wonnarua People

The PCWP Native title party have not been consulted for this project.

Extensive attempts to engage with Tocomwall Pty Limited – the organisation representing the Plains Clan of the Wonnarua People (PCWP) – in relation to the Project were made throughout Project planning and the preparation of the EIS. Overall, some 91 interactions occurred between HVO and Tocomwall between September 2020 and November 2022. This included numerous offers by HVO to meet with HVO personnel, for the PCWP to undertake their own cultural values assessment and various other opportunities to engage with the Project. To date, all offers have been declined. Consultation has continued following the submission of the EIS with PWCP being provided the following Project update information:

- Letter and email dated 16 February 2023 advised of the submission of the EIS to DPE and providing a link to the documents
- Letter and email dated 26 July 2023 advising them of the response to submissions process and further avoidance measures undertaken since the submission of the EIS.
- Copies of the HVO newsletters issued in February 2023, April 2023 and September 2023.

Further, Tocomwall Pty Limited have been provided all required documentation in accordance with the Heritage NSW *Aboriginal Cultural Heritage Consultation Requirements for Applicants in NSW (DECCW 2010a)*, as presented in the ACHA report (EMM 2022a) provided as Appendix N to the EIS. This includes the distribution of Project information, assessment methodologies, invitation to meetings, and offers of participation in fieldwork.

While PWCP involvement and attendance has been generally limited, a sites officer of the PCWP, Mary Franks, did participate in some components of the field survey, test excavation and culturally modified tree activities for the Project.

The project will impact the section 10 ATSHIP boundary.

The *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (ATSIHP Act) preserves and protects areas and places of particular significance to Aboriginal people from damage or destruction. Steps necessary for the protection of a threatened place are outlined in a gazetted Ministerial Declaration (Sections 9 and 10).

The northern portion of the Project area, primarily east of the New England Highway and surrounding Davis Creek, is subject to an application under the ATSHIP Act. The application was lodged by a representative of the Plains Clan of the Wonnarua People native title application, and has been under determination by the Department of Climate Change, Energy the Environment and Water for over four years. The application encompasses only a small portion of the HVO North Project area, and would not be critical to the success of the Project should the application be successful. Regardless, the Section 10 application under the ATSIHP Act is outside and separate to the consideration of the Project under the NSW planning system.

6.4 Hunter Valley Glider Club

The HVGC should be classified as a sensitive receptor and the impact of dust on the HVGC users, aircraft and facilities should be considered.

The air quality impacts resulting from the Project at the HVGC were assessed and results presented in the Air Quality and Greenhouse Gas Assessment, provided as Appendix H to the EIS.

Under the *Voluntary Land Acquisition and Mitigation Policy* (NSW Government 2018) (VLAMP), voluntary acquisition rights may apply to a landholder where, even with best practice management, the development contributes to exceedances of the specified criteria.

Although the HVGC is predicted to experience exceedances of the VLAMP criteria, as the HVGC is not regularly occupied, it is not considered as a sensitive receptor for the purposes of the Project.

In accordance with Schedule 3, Condition 47 of the existing HVO South Project Approval (PA 06_0261), HVO is required to maintain an agreement with the HVGC to address potential impacts of the mine on the use and operation of the HVGC's facilities. Further, Condition 49 requires the development of an amenity management plan for HVGC's facilities within HVO. This agreement and amenity management plan are currently in place and will both be updated to reflect the Project should it be approved.

HVGC requests that a condition for a Concessions and Mitigation Agreement (CMA) and Amenities Management Plan (AMP) be part of the project approval and that the current CMP and AMP be renegotiated to reflect the changes to the original approval that are the subject of the Environmental Impact Statement.

As noted above, an agreement and amenity management plan are currently in place with the HVGC in accordance with the requirements of the existing HVO South Project Approval (PA 06_0261). If any changes are necessary as a result of the Project (should it be approved), both the agreement and amenity management plan will be updated in consultation with the HVGC.

The cumulative impacts of successive coal mine approvals and extensions has materially increased the impact on the HVGC over the period of operation, which predates coal mining in the immediate area. These increases over time have affected and will continue to affect the HVGC's ability to attract and retain members as well as the experience and enjoyment of members and visitors when at the HVGC due to the visual, noise and dust impacts from mining operations.

The EIS included an assessment of impacts on the HVGC as a result of the Project, including cumulative impacts of the Project with consideration to surrounding mines.

The impacts of the Project are not predicted to significantly increase when compared to existing operations. As the HVGC is not regularly occupied, impacts from air and noise are considered to be able to continue to be managed consistent with current air and noise management practices. As noted above, an agreement and amenity management plan are currently in place with the HVGC in accordance with the requirements of the existing HVO South Project Approval (PA 06_0261). Both the agreement and amenity management plan will be updated in consultation with the HVGC to reflect the Project should it be approved.

Regarding visual impacts, it is predicted that visual impacts to the HVGC will be reduced compared to what is currently approved at HVO South, given that mining is no longer proposed within the Riverview South-East Extension and South Lemington Pit 2 mining areas, which border the HVGC.

Comleroi Road provides access to the HVGC and the HVO South operations. It is an unmarked, sealed two-way, two-lane road, approximately 7-8 m across with approximately 3.5 m travel lanes in each direction.

While the increase is not shown explicitly in the traffic data in the EIS, the realignment will materially and significantly increase traffic on Comleroi Road, perhaps in the order of 50%. During peak traffic flows such as shift change in adjacent mines, queues of traffic will be expected to form from the intersection with the Golden Highway.

While there will be some loss of amenity because of increased noise, the most concerning impact is on safety.

The driveway to the HVGC facilities and Warkworth Airfield is relatively narrow and visually unobtrusive. It requires vehicles to all but stop in the travel lane before turning. This is especially so for club members' vehicles towing glider trailers which are typically 9 m in length.

Appropriate traffic management measures will be required to avoid creating a hazard as other drivers have limited visual cues that there is an exit and vehicles may be slowing and stopping.

WSP prepared the traffic impact assessment for the Project (refer to Appendix R of the EIS (EMM 2022)), and therefore assisted in this response to traffic related issues raised by the HVGC. The full memo prepared by WSP is included as Appendix H to this report. This assessment includes additional assessments and access design improvements to address HVGC's concerns for safety at their access driveway. A number of modifications have been considered to improve access and visibility of the access driveway at its approaches. These include:

- Widening the existing HVGC driveway and gate access to allow two-way traffic. Given the limited daily operation of HVGC, it is assumed that the club generates approximately 6 movements (combined inbound and outbound) daily at its peak. Additionally, HVGC has indicated an anecdotal observation of six movements per month of vehicles consisting of a car and trailer combination. While this demand is low, this treatment would further minimise potential queuing on Comleroi Road resulting from sharing the same driveway for inbound and outbound traffic movements. The access gate location is to be approximately 22 m away from the shoulder line marking to ensure that the entire length of a car towing a glider trailer can be accommodated away from the road carriageway to ensure safety. HVGC club member are able to pull in entirely off Comleroi Road to lock/unlock the gates as necessary.

- Increase the footprint of the intersection to accommodate concurrent inbound and outbound traffic movements. This is particularly important for the left turn inbound and right turn outbound movements, given that most trips into/out of the HVGC via the Golden Highway are serviced by these movements.

- Provide "Hunter Valley Gliding Club" signage at the access gate to face eastbound and westbound, and at the approaches to the access gate at an appropriate distance to inform road users of the location of the access gate.

This widening would be consistent with Austroads' Guide to Road Design Part 4's guideline for access driveway design (with indented access) on a rural road, and bespoke to the type of vehicles using the HVGC facilities.

The schematic design is shown in Figure 6.1. The scaled drawings and turning path assessments are provided in Appendix H.

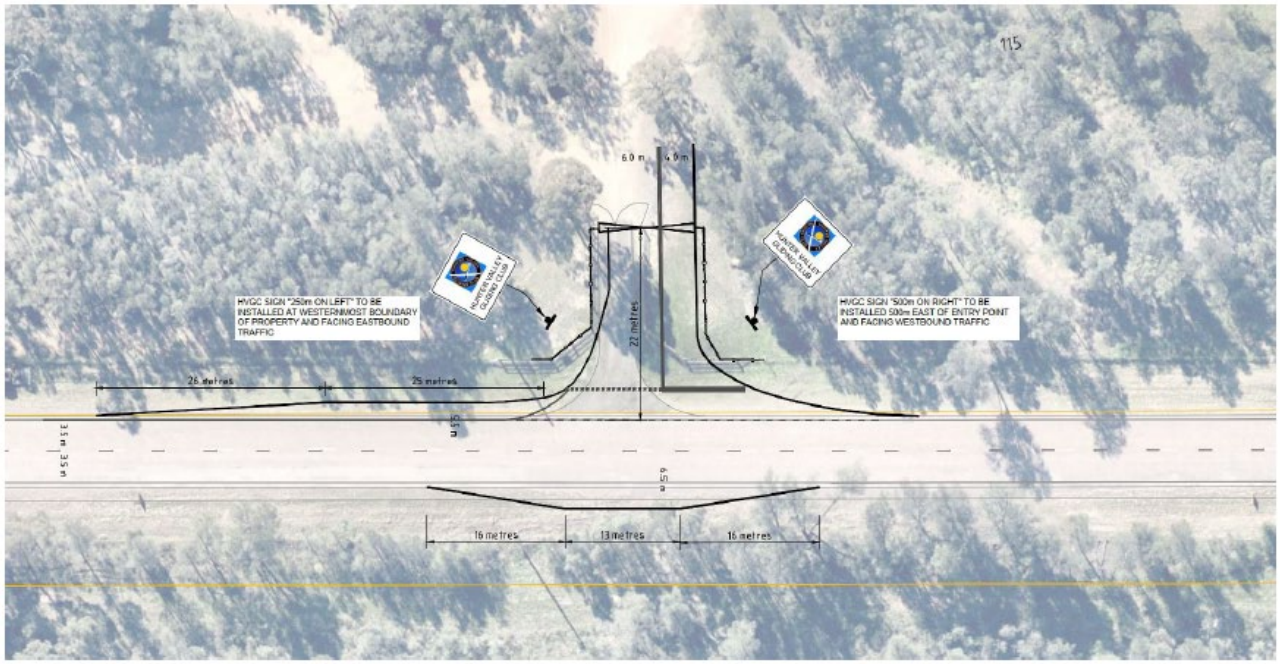


Figure 6.1 HGVC Driveway treatment schematic design

It was not apparent whether the Environmental Impact Statement has modelled the noise impacts of increased traffic along Comleroi Road, particularly during peak periods which may be between 4:00 – 8:00 am and 4:00 – 8:00 pm. The HVGC would like to understand the noise levels expected from the expected traffic changes.

The Noise Impact Assessment (EMM 2022b) of the Project, provided as Appendix I to the EIS, included a detailed road traffic noise results for nearby privately owned residential receptors in Section 4.9. It was calculated, but not reported in the Noise Impact Assessment, that proposed traffic volumes on the Lemington Road realignment which ties into the existing Comleroi Road are predicted to meet the NSW EPA Road Noise Policy (RNP) day period $L_{Aeq,15hour}$ criterion of 60dB at the HVGC on the basis that the HVGC is designated a recreational facility.

Road traffic noise from the Lemington Road realignment / Comleroi Road was calculated in consideration of the 2025 AM peak hour traffic volumes, being the predicted worse case, with these traffic volumes presented in Table 6.2 and representative of the existing through traffic currently relying on the existing Lemington Road alignment.

Table 6.2 Realigned Lemington Road 2025 worst case AM hour traffic volumes

Direction	Total traffic volumes	Heavy vehicle %
Northbound	53	5.7%
Southbound	18	11.1%

6.5 Other matters raised in organisation and public individual submissions

6.5.1 Greenhouse gas emissions and climate change

54 submissions received related to GHG and climate change. Concerns related to the quantum of GHG emissions predicted for the Project, the proportion of these emissions to Australia's GHG inventory, and the alignment of the Project with relevant State and international climate change policies. Further claims were made that no assessment was made of the impact of GHG emissions, and no consideration was given to implementing measures to electrify the mining fleet to eliminate diesel emissions or diversification to move away from coal.

HVO is governed by a range of climate change commitments made by Yancoal and Glencore, as the JV partners of HVO. Both Yancoal and Glenore have developed robust climate change strategies for their global operations. Glencore's strategy includes company-wide emission reduction targets and a commitment to a responsible managed decline of its global coal business over time. Yancoal's strategy includes commitments to monitoring relevant policy, market, and technological developments and financial signals to inform how Yancoal's investment and development priorities should adapt to transitions in the global energy mix, and to support innovation and investment in carbon capture, utilisation and storage (CCUS) through various industry and policy initiatives. Further discussion on the JV partners commitments is provided in Section 2.2.3 of the EIS (EMM 2022d).

Following submission of the EIS, and as described in the response to the CAS submission in Section 4.2, HVO has completed additional modelling on the predicted fugitive emissions from the Project to meet NGERS reporting requirements for the Project mining areas and to address comments from CAS on the predicted GHG emissions from the Project. As a result, the GHG emissions have been updated based on:

- Updated electricity usage (Scope 2 emissions), which has been adjusted to reflect the Australian Government's grid decarbonisation forecast (DCCEEW December 2022), as requested by the NEZM team. This has resulted in a net reduction in GHG emissions by the Project of approximately 1.6 Mt CO_2-e (i.e. from 1.88 Mt CO_2-e predicted in the EIS to 0.28 Mt CO_2-e now predicted over the life of the Project).
- Revised fugitive emissions forecast, based on updated gas content and composition information obtained from additional drilling and analysis in both HVO North and HVO South. This has reduced the predicted total Scope 1 emissions over the life of the Project by approximately 3.3 Mt CO_2-e.
- An assumption that 2024 will be Year 1 of the Project, rather than 2023, as was presented in the EIS. This has reduced the predicted GHG emissions over the life of the Project by 0.66 Mt CO_2-e (Scope 1)(in addition to the 3.3Mt CO_2-e reduction from the updated gas model), 0.06 Mt CO_2-e (Scope 2) and 31.28 Mt CO_2-e (Scope 3).

The revised predicted GHG emissions from the Project for the HVO Complex, as presented in Section 4.2, are re-produced here in Table 6.3.

Table 6.3 Revised summary of estimated GHG emissions for the Project (HVO Complex)

Period	Estimated GHG emissions (Mt CO_2-e)					
	Scope 1		Scope 2		Scope 3	
	EIS	**Revised**	EIS	**Revised**	EIS	**Revised**
Annual average	1.19	**1.09**	0.07	**0.01**	41.67	**42.05***
Total over life of the Project	33.28 (2023-2050)	**29.31** (2024-2050)	1.88 (2023-2050)	**0.28** (2024-2050)	1,166.86 (2023-2050)	**1,135.43** (2024-2050)

*Note: while the total predicted Scope 3 emissions have reduced over the life of the Project, the annual average has increased slightly due to the average production profile between 2024-2050.

As shown in Table 6.3, Scope 1 and 2 emissions are estimated to average 1.10 Mt $CO_{2\text{-}e}$ per year over the life of the Project, from approximately 2024 to 2050. The Scope 1 and 2 emissions presented in the EIS were approximately 1.26 Mt $CO_{2\text{-}e}$ per year, and therefore the revisions to the GHG estimates listed above have resulted in a reduction in the predicted Scope 1 and 2 emissions by approximately 0.16 Mt $CO_{2\text{-}e}$ per year and 5.6 Mt $CO_{2\text{-}e}$ over the life of the Project. The direct (Scope 1) emissions intensity of the Project would be, on average, 0.04 t $CO_{2\text{-}e}$/t ROM coal over the life of the mine, which is reduced compared to the intensity reported in the EIS (0.05 t $CO_{2\text{-}e}$/t ROM coal). The emissions intensity for HVO, both as a project average and as a peak, are low relative to other Australian coal operations, as discussed further in the response in Section 4.2.

The predicted total Scope 3 emissions have also reduced over the life of the Project by 31.43 Mt CO2-e on the basis that Year 1 of the Project is now assumed to be 2024, and therefore predicted emissions from operations in 2023 have been removed (noting that 2050 remains the end date of the Project). To put the projected GHG emissions from the Project in context, they have been compared with the latest emissions officially recorded on the National Greenhouse Gas Inventory in 2022. The revised estimated annual average Scope 1 and 2 emissions from the Project (1.10 Mt CO2-e) represent approximately 0.24% of Australia's 2022 emissions (compared to 0.27% in the EIS).

In relation to mitigation and minimisation of GHG emissions, measures to minimise or mitigate Scope 1 and Scope 2 emissions were considered throughout the development and assessment of the Project and are outlined in Table 9.6 of the EIS (EMM 2022d). These measures include:

- Minimisation of the length of haulage routes to optimise fuel use, dust and noise emissions.
- Ramp gradients have been optimised in the mine design based on pit geometry.
- Payload and equipment productivities will continue to be constantly monitored and actively managed to maintain efficient haulage.
- Fuel use efficiency has been an important selection criterion when procuring existing trucks at HVO. New fuel use technology will be considered should any new trucks be purchased, or engine repowers are required over the life of the Project.
- Scheduling the location and use of equipment and mobile plant is a routine part of mining operations. HVO will continue to prepare short, medium, and long term production plans to optimise production.

Since submission of the EIS, HVO has continued to investigate measures to reduce GHG emissions from the Project. However, firstly it is important to note that as a designated large facility under the NGER Act, the Safeguard Mechanism applies to HVO, and therefore ongoing operations at HVO will be subject to the emissions reduction requirements that are contained within it. Under the Safeguard Mechanism requirements, HVO will have a declining baseline which will result in significant reductions in net emissions to 2050. Therefore, due to the Safeguard Mechanism, cumulative net emissions from the Project will be significantly lower at approximately 17.9 $MtCO_{2\text{-}e}$. HVO will be required to purchase and surrender carbon offsets such as Australian carbon credit units (ACCUs) or Safeguard Mechanism credit units (SMCs) or implement abatement activities, whichever is cost effective and practical at the time, to comply with the requirements of the Safeguard Mechanism.

In addition to the review of fugitive emissions from the Project which were incorporated into the revised GHG emissions forecast described above, HVO has undertaken a further review of opportunities to reduce emissions, including diesel consumption on site. Diesel consumption accounts for approximately 42% of Scope 1 emissions at HVO. The review considered grid supplied electric powered equipment, as well as equipment powered by alternative fuels such as hydrogen, biofuels, ammonia and synthetic diesel. The outcomes of this review are discussed in Section 4.2, and are summarised as follows:

- While technologies such as hybrid, fuel cell or battery power technologies are developing and being widely adopted in smaller scale sectors such as for automotive, they are not yet adequately developed for use with mining equipment. This may not continue to be the case for the duration of the Project and therefore HVO will commit to reviewing technologies on an ongoing basis for suitability for adoption.

- A number of technologies exist for grid supplied electric powered equipment, including tethered cable electric machines, and high capacity overhead catenary systems; however, there are a number of complexities to their implementation and these technologies are constrained by practicality and efficiency.

- The use of hydrogen as a fuel in mining equipment does not currently meet Technology Readiness Level (TRL) requirements and is therefore not yet an option for the industry.

- The use of biofuels is limited due to both cost and availability. Additionally, engines running biofuel are less efficient and burn more biofuel than regular diesel and Tier 4 Final engines are not currently compatible with biofuels.

HVO will continue to undertake regular reviews of technologies and abatement measures to reduce GHG emissions from the Project, including whether these measures are reasonable and feasible to implement at HVO. These reviews will be undertaken every three years and will include consideration of the use of alternate fuels including biofuels and hydrogen, and the transition to an electric powered fleet, as these technologies advance and more information becomes available.

In addition to the above, HVO engaged CoalBed Energy Consultants Pty Ltd (CoalBed) to undertake an initial study into the feasibility of pre-drainage capture of gas for the Project (Appendix M). The review found that it will be challenging to produce meaningful gas at HVO through pre-drainage; however, more data is needed in relation to geological and gas reservoir properties to confirm the feasibility of a pre-drainage program. HVO proposes to undertake a trial to confirm feasibility and effectiveness of gas pre-drainage should approval be granted for the Project. It is envisaged that the scope of the trial would be developed in consultation with relevant stakeholders to the satisfaction of the Planning Secretary and be provided within two years of commencement of consent should approval be granted for the Project.

Additional information into the review of emissions and emission reduction opportunities for the Project is presented in Section 4.2.

Further, under the NGER Act, relevant sources of GHG emissions and energy consumption must be measured and reported on an annual basis, enabling major sources and trends in emissions and energy consumption to be identified. HVO will continue to manage its contribution to Australian GHG emissions inventories through reporting under the obligations of the NGER Act.

6.5.2 Air Quality

27 submissions of objections received raised concerns relating to air quality, with some submissions claiming that the Air Quality Impact Assessment does not adequately consider impacts of climate change and the increase in regularity of extreme weather events such as bushfires.

HVO acknowledge average temperatures are likely to rise in the Project area, with more frequent extreme temperature events. Rainfall has the potential to both increase and decrease with heavier rainfall events likely to become more frequent. However, the potential impacts of climate change on the Project cannot be determined with a high degree of confidence. This is because of inherent uncertainties associated with the climate change projections.

The air quality management and mitigation measures adopted for the current operations and detailed in the air quality and greenhouse gas assessment prepared to support the EIS (refer to Appendix H of the EIS (EMM 2022d)), will continue to apply to the Project. These mitigation measures are consistent with best practice at coal mining operations as per Katestone (2011).

The air quality management system implemented at HVO has led to a good history of compliance with the EPA assessment criteria. The effectiveness of these mitigation measures has been further assessed and presented in Section 4.10.1 with it being determined that the current mitigation approach to manage air quality is effective at reducing the risk of air quality exceeding the EPA assessment criteria. Regardless, it is noted that some exceedances of criteria will be inevitable under adverse air quality events outside of the control of HVO such as bushfires and dust storms.

Some submissions relating to air quality also raised concerns about the quantum of Total Suspended Particulates (TSP), PM10 and PM2.5 that would be emitted by the Project every year. Claims were made that the expansion of activities at HVO would result in degraded air quality, with significant and prolonged air pollution in the form of PM10 and PM2.5 emission further exacerbating already unacceptable air quality impacts.

An air quality and greenhouse gas assessment (AQGHGA) was prepared by Jacobs for the Project and provided as Appendix H to the EIS.

During continued operations, modelling undertaken for the AQGHGA found that TSP and deposited dust concentrations will comply with air quality criteria at all privately owned sensitive receptors not subject to existing air quality acquisition rights. The Project will not be the cause of any exceedance of criteria relating to TSP and deposited dust at neighbouring residences, nor are exceedances of criteria predicted when contributions from other mines are also accounted for.

In relation to finer dust particles (PM_{10} and $PM_{2.5}$), the air quality assessment found that the maximum 24-hour PM_{10} and $PM_{2.5}$ concentrations may continue to exceed air quality criteria from time-to-time; however, these events would be within the range of historically measured days above the criteria, excluding extraordinary events. A review of recent and historical air quality monitoring data showed that, in the representative year, all monitoring locations operated by HVO recorded between one and two days above the air quality criteria. Based on modelling outputs, the Project is not anticipated to change this outcome.

To monitor regional air quality, the Upper Hunter Air Quality Monitoring Network was created by DPE, in partnership with the Upper Hunter coal and power industries, in response to community concern about the effect of coal mining on air quality in the region. 12 monitoring stations in the Upper Hunter were established between 2010 and 2012. Particulate Matter $(PM)_{10}$ is monitored at Jerrys Plains, Camberwell and Maison Dieu. $PM_{2.5}$ is monitored at Camberwell. The AQGHGA includes a comprehensive review of background air quality in the region surrounding the Project. Air quality in the region is impacted by a range of emission sources. As noted in the AQGHGA, the Upper Hunter Fine Particle Characterisation Study (OEH, 2013) investigated the factors which contributed to elevated $PM_{2.5}$ concentrations in the Hunter Valley. This study identified a clear seasonal trend with higher $PM_{2.5}$ concentrations occurring in the cooler months, and predominantly due to wood smoke from domestic heating. Specifically, in Singleton, wood smoke accounted for an average of approximately 14% of the total $PM_{2.5}$, peaking at around 38% in winter.

Concerns were also raised relating to the use of existing management measures to manage dust, which were claimed to be insufficient and fail in periods of dry weather and high winds, and it was claimed that the nominated efficiencies of proposed management measures are not supported by evidence.

HVO currently utilises a network of Tapered Element Oscillating Microbalance (TEOM) units and meteorological stations in support of the proactive and reactive air quality management system. HVO's real time air quality monitoring stations continuously log information and transmit data to a central database, generating alarms when particulate matter levels exceed internal trigger limits to guide the operational management of air quality on site. HVO proactively shuts down any activities that may be increasing the risk of air quality impacts in accordance with a trigger action response plan presented in HVO's Air Quality and Greenhouse Gas Management Plan (AQGGMP) (HVO 2019). The air quality management system implemented at HVO has led to a good history of compliance.

In response to submissions received relating to air quality, further modelling has been carried out by Airen Consulting to demonstrate the effectiveness of management measures to be implemented by HVO, to minimise the risk of cumulative impacts exceeding the EPA assessment criteria. The results of the additional modelling are presented in Section 4.10.1 of this report. This review determined that the current mitigation approach to manage air quality at HVO is effective at reducing the risk of air quality impacts exceeding the EPA assessment criteria.

Air quality at HVO is managed and monitored in accordance with the HVO Air Quality and Greenhouse Gas Management Plan. This management plan details the monitoring and management controls to be implemented to manage air quality impacts. Should the Project be approved, this management plan will be updated to reflect the Project and include ongoing implementation of the proactive and reactive management protocols. The air quality monitoring network will also be reviewed and incorporated into a revised management plan to ensure that the monitoring network provides adequate coverage of the Project area, particularly in areas identified by the modelling with a potential for increased air quality impact risk. associated with the Project.

A program will also be established for all private residences within 4 km of the proposed mining area whereby these residences will be eligible for tank inspections, and cleaning and installation of first flush filter systems for residential water tanks and domestic taps.

One submission identified receptor 308 as having increased air quality impact risks and as being identified as qualifying for air quality acquisition rights. The submission claimed that this receptor is a clear indicator of the potential air quality impacts of the Project on Coolmore (situated only some 3 km away from the HVO North operation).

An air quality and greenhouse gas assessment (AQGHGA) was prepared by Jacobs (2022) for the Project and provided as Appendix H to the EIS.

In relation to predicted annual average PM_{10} concentrations, compliance is predicted at all privately owned residential sensitive receptors (not subject to existing air quality acquisition rights) except for receptor 308 in modelled Year 11. This result is influenced by the combined contributions from the Project, and external sources of PM_{10}. The contribution of the Project to annual average PM_{10} concentrations is in the order of 5 µg/m^3 or less. This suggests that the modelled non-compliance at receptor 308 is a conservative estimate and is unlikely to eventuate, given that historical air quality monitoring has shown that annual average PM_{10} concentrations near this location in non-extraordinary years (with respect to climatic conditions) have not exceeded 21 µg/m^3 with levels ranging from 16 to 21 µg/m^3.

Compliance with cumulative annual average PM_{10} and $PM_{2.5}$ air quality criteria is expected to be achieved at sensitive receptors that are not already subject to existing acquisition rights from HVO or other surrounding mines, apart from one receptor (308). It is anticipated receptor 308 will therefore be entitled to voluntary acquisition rights, as outlined in the VLAMP.

In response to the submission by the EPA, and as described above, further modelling has been carried out by Airen Consulting to demonstrate the effectiveness of management measures to be implemented by HVO, to minimise the risk of cumulative impacts exceeding the EPA assessment criteria. The results of the additional modelling are presented in Section 4.10.1. Figure 6.2 below presents the cumulative impacts of the Project with and without the reactive controls being implemented at receptor 308.

This figure shows that, in the worst-case modelled operational year (Year 11), the implementation of reactive controls (in response to elevated off-site air quality levels) can be effective at reducing the Project contribution to 24-hour average PM_{10} concentrations in a representative meteorological year and demonstrates that these controls can be effective at minimising the Project contribution and risk of causing an exceedance of the EPA's impact assessment criteria.

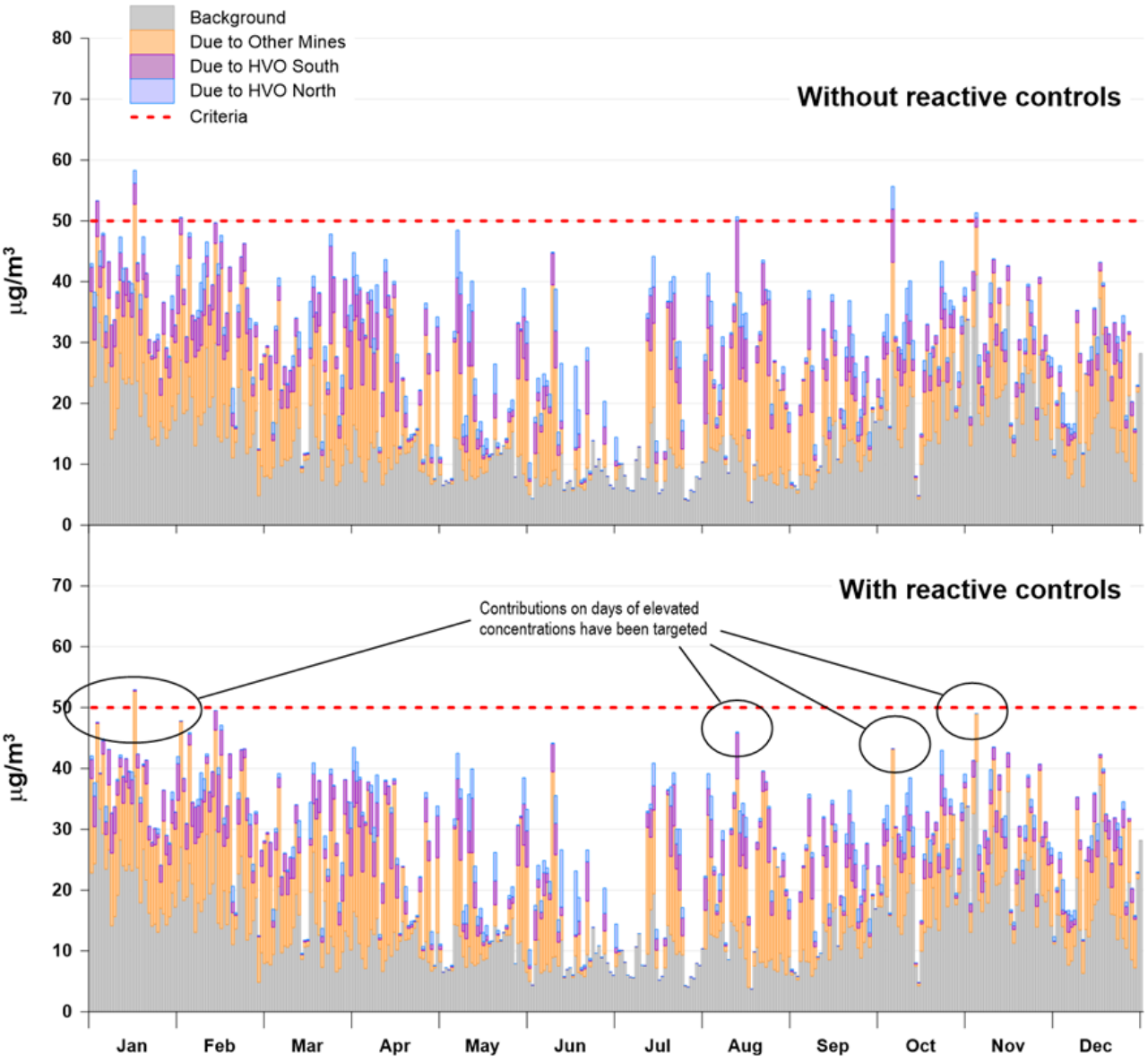


Figure 6.2 Modelled 24-hour average PM_{10} concentrations at Jerrys Plains (property 308)

Submissions also claimed that the air quality assessment is inadequate as it has used 'questionable' baseline analysis (using 2014 as the baseline representative year); is missing contemporary data sets (for 2021 and 2022); uses assumptions of consistent run of mine (ROM) production annually which are contradicted elsewhere in the Environmental Impact Statement, and does not include a proper cumulative assessment of air quality impacts.

Section 4.2 of the AQGHGA provides information on the meteorological conditions that are relevant to the Project, including tabulated and graphical data from two site-specific meteorological stations. The *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (Approved Methods) (EPA 2022) includes requirements for meteorological data that are to be used in dispersion modelling. According to the Approved Methods the requirements for dispersion modelling, when using site-specific meteorological data, are as follows:

> "Level 2 impact assessments are conducted using at least one year of site-specific meteorological data. The meteorological data must be 90% complete in order to be acceptable for use in Level 2 impact assessments (i.e. for one year, there can be no more than 876 hours of data missing)". Approved Methods Section 4.1.

The data from the 2014 calendar year meet the EPA requirements. However, the AQGHGA (Section 4.2) provided further analysis to confirm that the 2014 data also addressed other considerations for the assessment of the Project. In particular, the 2014 data were 100% complete, exhibited statistics close to the longer-term averages, had rainfall slightly below (and closest to) the long-term average, had a comprehensive database of concurrent air quality monitoring and operational data to allow for model performance evaluations, and was not an extraordinary year from an air quality perspective. No other datasets delivered all these outcomes.

Table 6.4 provides additional statistics from the meteorological data. There is no one year that will provide a better correlation with the long-term averages (i.e. 2013-2020, for all locations, for every statistic). Overall, the data from 2014 are generally within the range observed over the nine years considered.

Table 6.4 Statistics from meteorological data collected between 2013 and 2020

Statistic	2013	2014	2015	2016	2017	2018	2019	2020	2013-2020
Percent complete (%)									
Corporate	99	100	100	58	100	100	100	99	94
Cheshunt	100	100	91	75	100	100	99	99	95
Mean wind speed (m/s)									
Corporate	2.6	2.7	2.9	2.6	2.7	2.8	3.1	3.0	2.8
Cheshunt	3.7	3.6	3.7	3.8	4.1	4.2	4.2	4.1	3.9
Both locations	3.2	3.1	3.2	3.3	3.4	3.5	3.6	3.5	3.4
Percent calms (<=0.5 m/s) (%)									
Corporate	15.0	4.2	4.7	7.6	4.0	5.7	2.8	3.3	5.8
Cheshunt	2.1	2.4	4.0	2.6	0.3	0.3	1.2	1.3	1.7
Both locations	8.5	3.3	4.4	4.8	2.2	3.0	2.0	2.3	3.8
Percent wind speeds > 6 m/s (%)									
Corporate	5.5	5.3	5.3	5.4	4.7	6.1	8.4	6.9	6.0
Cheshunt	13.4	11.8	12.1	15.7	17.6	20.3	19.0	17.5	16.0
Both locations	9.5	8.6	8.6	11.2	11.1	13.2	13.6	12.2	11.0
Rainfall (mm)									
Corporate	750	603	814	693	469	477	337	793	662 (BoM)

6.5.3 Biodiversity

24 submissions of objection raised concerns relating to the impact of the Project on native vegetation and Threatened Ecological Communities (TECs). Submissions stated that the Project would clear 397 ha of native vegetation, 97.4 ha of which is home to TECs. At least two TECs face Serious and Irreversible Impacts (SAII) being Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions Endangered Ecological Community and Warkworth Sands Woodland in the Sydney Basin Bioregion Endangered Ecological Community. Claims were made that the approval of the Project would exacerbate pressure on TECs and threatened species.

HVO completed a detailed biodiversity constraints study as part of the Project's pre-feasibility assessment to guide the development and detailed design of the Project. Targeted avoidance and minimisation measures were implemented at this time, to reduce the Project's impact on areas of higher value vegetation and habitat. This included, but was not limited to:

- locating impacts predominantly in previously mined and/or disturbed areas, and areas approved to be disturbed
- refinement and location selection of the Lemington Road realignment to avoid larger areas of Warkworth Sands Woodland EEC
- careful consideration of proposed transmission line easement alignment to avoid areas of higher quality vegetation and habitats, and to provide for maximum vegetation and habitat retention in easement corridors
- habitat retention following decommissioning of existing transmission lines
- removal from the Project of some components previously approved under HVO South's existing Project Approval, including coal extraction from the Riverview South East Extension, mining in the South Lemington Pits 1 and 2 and the construction of the short rail loop associated with the Lemington Coal Preparation Plant.

This work completed as part of the prefeasibility study, resulted in the Project, as proposed in the EIS, avoiding:

- 7.2 ha of Warkworth Sands Woodland EEC
- 38.5 ha of Central Hunter Grey Box – Ironbark Woodland EEC
- 6.2 ha of Hunter Floodplain Red Gum Woodland EEC
- 2.6 ha of Hunter Valley Footslopes Slaty Gum Woodland VEC
- 206 individual river red gum (*Eucalyptus camaldulensis*).

A BDAR was prepared by Umwelt and provided as Appendix L to the EIS. The BDAR was prepared using the biodiversity assessment method (BAM 2020) in accordance with the *Biodiversity Conservation Act 2016* (BC Act) to determine the potential impacts of the Project on biodiversity values, and to identify offsetting requirements to mitigate residual impacts following the implementation of all feasible and reasonable avoidance and minimisation measures.

Following the exhibition of the EIS, further avoidance measures were investigated by HVO in relation to the location of the proposed Lemington Road realignment and impacts on Warkworth Sands Woodland EEC. Previous Warkworth Sands Woodland EEC mapping undertaken by Umwelt identified ecotonal (transition) zones to the west of the original proposed alignment (shown as 'possible WSW' on the BDAR figures in the EIS), where the depth of potential aeolian sandy substrate varies and floristic characteristics appear to favour box-ironbark woodland associations.

In further effort to minimise impacts of the Project, HVO conducted detailed investigations to move the proposed Lemington Road realignment further to the west with the aim of avoiding the HVO North Project's overall impacts to areas of known/accepted Warkworth Sands Woodland EEC. The additional design review sought an alignment that considered:

- adopting an alignment further away (west) on land that transitions away from known/accepted Warkworth Sands Woodland EEC
- adopting an alignment further away from existing biodiversity offsets where Warkworth Sands Woodland EEC is present
- further minimising the Project disturbance footprint of the proposed road corridor through remnant vegetation and utilising areas of existing disturbance or rehabilitation areas at HVO
- maintaining the already established principal design requirements.

This further work identified an alternative alignment for the portion of the Lemington Road realignment that originally passed through areas of Warkworth Sands Woodland EEC. As a result, no areas of Warkworth Sands Woodland EEC will be directly impacted by the amended Lemington Road corridor. These amendments are described and assessed in the Amendment Report (EMM 2023a), with updated impacts to biodiversity presented in a revised BDAR (Umwelt 2023), which is provided as Appendix E to the Amendment Report.

HVO is committed to delivering a biodiversity offset strategy that appropriately compensates for the unavoidable loss of biodiversity values and residual impacts of the Project. HVO proposes to stage the retirement of credits to align with main development activities of the Project as defined by three primary stages. The biodiversity offset strategy will be developed in consultation with the DPE and based on the offset options available under the BC Act and BC Regulation.

Submissions objecting to the Project also raised concerns regarding the increased risks of impacts as a result of the Project on the Hunter Valley delma (*Delma vescolineata*) given that this species is only known to occur in a geographically restricted area in the Hunter Valley, which is heavily impacted by mining and agriculture.

Approximately 229 ha of grasslands to be impacted by the Project may provide habitat for the Hunter Valley delma (*Delma vescolineata*). The Hunter Valley delma was recorded relatively consistently across the native grasslands in the wider Development Footprints. The Hunter Valley delma is not currently listed as threatened under the BC Act.

6.5.4 Socio-Economic

23 objections received raised concerns in relation to the inadequate justification for the Project, the need to transition away from fossil fuels and the lack of benefit the Project provides.

The primary objective of the Project is to efficiently and economically recover an additional approximate 400 Mt of ROM coal reserves over and above coal that is approved to be extracted across HVO, over approximately 25 years. Mining operations will continue within existing mining tenements and predominantly within existing and approved disturbance areas across the HVO Complex, using existing infrastructure. The Project will:

- enable the continuation of a brownfield mining complex in a long-established coal mining and power generation precinct
- maximise resource recovery by mining the deeper Barrett seam in HVO North, within existing mining tenements utilising existing or already approved infrastructure minimising further disturbance
- provide ongoing employment opportunities for the existing approximate 1,500 FTE workforce well beyond the life of the current planning approvals under which the complex operates, which will become increasingly important as the local and regional Hunter Valley economy continues to diversify beyond coal
- provide improvements in terms of reliability and accessibility of Lemington Road in heavy rainfall through the realignment of the road, which will include the construction of a new bridge over the Hunter River
- provide the opportunity to contemporise the HVO final landform by incorporating natural landform design principles. Areas disturbed by mining activities as a result of the Project will reflect a landform that is sympathetic to the surrounding landscape
- continue the ongoing contribution to the local, regional, and State economies from a well-established mining operation.

Since the submission of the EIS, the International Energy Agency (IEA) has released the World Energy Outlook WEO for 2023. Like the previous WEOs, the 2023 WEO considers how the world will respond to the energy crisis using several scenarios. The 2023 WEO notes that continued investment in fossil fuels is essential in all of the scenarios modelled. In all scenarios, the production from HVO will continue to represent a relatively low percentage, albeit an important one, providing high quality thermal coal over the modelled period, assisting to meet global demand as investment in coal continues to decline. While coal demand is predicted to continue to reduce over time in advanced economies under all scenarios modelled by the IEA, in developing and emerging market economies, overall coal consumption shows a more sustained rise in a few fast-growing countries and regions, notably India and south-east Asia, which is a key market for HVO.

The Project involves the continuation of an existing mine in an established coal mining and power generation precinct, providing employment and other socio-economic contributions to the local and regional community consistent with that proposed under the EIS. The strategic planning framework for the area is well established, and mining projects are permissible with development consent on the land within the site.

The Project represents a brownfield mining proposal that aligns with strategic direction and policy objectives at a local, state and national level. Current national and NSW state policy recognises the ongoing demand for coal, particularly in the Asian export market (which is the primary current key market for HVO) and its importance to the NSW and Australian economy (IPC 2022a and IPC 2022b). In NSW, the state government's strategic statement on coal recognises that mining will continue to be an important part of the State economy into the future. Further, the strategic statement makes it clear that the NSW Government seeks to recognise existing industry investment by continuing to consider responsible applications to extend the life of current coal mines. The Project is such an application.

At a Commonwealth level, the Commonwealth Government's *Climate Change Act 2022* (CC Act) commenced on 14 September 2022, which enshrines Australia's commitments under the Paris Agreement to reduce Australia's national GHG emissions to net zero by 2050. The life of the Project (2045 at HVO South and 2050 at HVO North) is consistent with the assumptions which underpin the net zero commitment timeline. One of the Federal Government's key policy measures designed to achieve its GHG emissions reduction target is the proposed amendments to the Safeguard Mechanism. The Safeguard Mechanism applies to 215 designated large facilities as defined by the NGER Act. HVO is a designated large facility, and therefore the Safeguard Mechanism applies and HVO will be subject to the emissions reduction requirements contained within it.

Both Yancoal and Glenore have developed robust climate change strategies for their global operations. Glencore has carefully considered its position regarding the future of its coal mining operations and how it intends to support the global transition to a low-carbon future. In 2020, Glencore announced it would adopt a responsibly managed decline of its global coal portfolio. Glencore believes that by managing the depletion of its coal portfolio and responsibly realising the remaining value in these assets it can make a meaningful contribution to global climate change goals. Glencore has factored the continued development of its coal project pipeline, including HVO, into its this plan.

Yancoal also recognises that energy production associated with the consumption of traditional fossil fuel energy sources contributes to global warming through the release of GHG emissions, and it therefore has an important role to proactively manage the direct (Scope 1) and indirect (Scope 2) emissions and energy intensity of its operations, and to support research into technologies that will reduce GHG emissions from the downstream consumption of its products (Scope 3). In this regard, GHG emission mitigation is a key consideration in the development of the mine plan, and measures to minimise or mitigate Scope 1 and Scope 2 GHG emissions have been considered throughout the development and assessment of the Project.

The Project is justified economically due to the net economic benefits and the economic stimulus it will provide locally and to NSW. Importantly, the Project involves a mining operation that will, consistent with the objects of the Mining Act, extract a State-owned resource for the benefit of the State of NSW.

A project is economically beneficial if its benefits exceed its costs measured in today's values. The net benefit of the amended Project for NSW is estimated at $4,848.5million in NPV terms (present values at 7% discount rate), comprised of the following:

- direct benefits of $2,122.5 million (NPV), comprising;
    - royalties, payroll tax and council rates of $1,725.1 million;
    - company income tax apportioned to NSW of $397.4 million;
- indirect benefits of $2,739.6 million (NPV), comprising:
    - net economic benefit to NSW workers of $1,023.8 million;
    - net economic benefit to NSW suppliers of $1,715.8 million; and
- incremental indirect costs of $13.7 million, noting this value is considered conservative given the reduction in GHG gas emission as documented in the Chapter 4.2 of the Submission Report.

A number of flow-on effects will occur as a result of the amended Project's capital and operating expenditure, and ongoing employment opportunities, which will benefit the regional economy.

The amended Project will deliver an estimated net benefit of $1,739.0 million to the Lower Hunter region (SA3) in NPV terms, comprised of:

- royalties, payroll tax and council rates of $36.6 million;
- net economic benefit to NSW workers of $954.5 million;
- net economic benefit to NSW suppliers of $760.3 million; and
- indirect costs $12.4 million.

Given the significant net benefits of the amended Project, the Project is desirable and justified from an economic efficiency perspective.

The impacts and benefits associated with the Project, are likely to be experienced most acutely by those people who live nearby; however, they also extend throughout the broader region. No mitigated social impacts rated as a high risk have been identified for the amended Project, with all potential impacts ranked as medium or low, unchanged from that reported in the EIS. A number of social benefits have also been identified with a very high or high benefit rating.

The key social impacts that were identified by the SIA for the Project (all ranked as 'medium' risks) are:

- impact of continued traffic congestion and road delays during construction;
- impacts due to continued generation of dust;
- impact on community cohesion due to divergent opinions on the Project;
- impacts from ongoing noise and vibration; and
- impact on perceived safety due to realignment of Lemington Road.

A range of mitigation measures are proposed to minimise these impacts.

The key social benefits of the Project that were identified by the SIA are:

- benefit of the realigned Lemington Road and new bridge over the Hunter River, improving the reliability and safety of this road;
- benefit of the Project contributing to ongoing stability of the local population;
- benefit of continued royalty payments to the NSW state government;
- benefit related to ongoing community grants and sponsorship;
- benefit of rehabilitation, future land use and ongoing land management, with natural design principles being incorporated into the final landform;
- benefit of the continued opportunities for local employment and training;
- benefit of the continuation of procurement opportunities for local businesses; and
- benefit of allowing more time for transition planning.

These benefits were all ranked as being either a 'high', or 'very high' benefit of the Project.

Issues raised in objections also related to the social impacts of the Project, with claims that the concerns of the community, particularly in relation to dust pollution and its links with health, was ignored in the EIS, and the impacts of the community as a result of property acquisition is a significant impact that is not adequately assessed or mitigated.

Concerns raised by the community have been taken into consideration throughout the development of the Project to ensure the Project provides a balance between the environmental, social, and economic impacts and benefits. To appropriately understand the community concerns regarding the Project, a Social Impact Assessment was prepared and provided as Appendix V to the EIS (EMM 2022d). The key social impacts identified by the SIA relate to the continued generation of dust and noise associated with ongoing operations, traffic congestion during construction activities, divergent opinions on the Project and the possible impact on community cohesion, and issues relating to pest and land management.

Notably, the Project is a brownfield development, thereby continuing an existing land use. Importantly in relation to dust and noise impacts, the Project does not propose an increase in the annual ROM coal extraction rate across the complex. At HVO South, a reduction is proposed, from up to 20 Mtpa to 18 Mtpa, and at HVO North the approved annual ROM coal extraction rate will stay the same at up to 22 Mtpa. The Wondewoi ridgeline which provides an amenity barrier between the HVO Complex and Jerrys Plains will remain, and no increase in the approved overburden emplacement heights is proposed. The site employs real time air quality monitoring and response systems to enable effective dust minimisation practices to be implemented. The Project will not impact on any privately owned bores, and no additional surface water or groundwater licences are required. The blast impact assessment of the Project (refer to Appendix J of the EIS) determined that exposure to vibration and airblast overpressure can be effectively managed, as it is now, via the application of reduced charge masses for private residential receptors in the nearest communities of Maison Dieu and Jerrys Plains. From a visual amenity perspective, the Project provides the opportunity to contemporise the HVO final landform by incorporating natural landform design principles. Areas disturbed by mining activities as a result of the Project will reflect a landform that is sympathetic to the surrounding landscape.

Notwithstanding, the Project does involve the continuation of mining operations beyond that currently approved, and after the implementation of avoidance and mitigation measures in the Project design some residual impacts will occur. Based on the outcomes of the modelling and assessments prepared to support the EIS, a range of mitigation measures have been identified to effectively manage these residual impacts of the Project to the receiving environment. These measures are also based on a comprehensive understanding of the environmental conditions in and around the Project area, gained over a very long history of mining at HVO.

In relation to property acquisition, no additional properties have been identified as triggering voluntary acquisition rights due to noise from the Project. For air quality, compliance with cumulative annual average PM_{10} and $PM_{2.5}$ air quality criteria is expected to be achieved at sensitive receptors that are not already subject to existing acquisition rights from HVO or other surrounding mines, apart from two receptors (121 and 308). Subject to approval of the Project, it is anticipated receptors 121 and 308 will therefore be entitled to voluntary acquisition rights, as outlined in VLAMP.

Further measures to manage the social impacts of the Project will be detailed in a Social Impact Management Plan (SIMP) for the Project. It is proposed that the monitoring and management framework of the SIMP addresses elements which include:

- providing regular Project updates to the broader community and targeted notifications and Project updates to affected parties
- ongoing community engagement
- tracking progress of mitigation and management strategies
- regular review of actual Project impacts against predicted impacts

- key performance indicators, targets and outcomes
- effective, monitored and reported complaints handling processes
- Project wide mechanisms for ongoing adaption of management measures when and if required.

In addition, HVO has committed to the establishment of a social mitigation funding framework, which will be further developed as part of the preparation of the SIMP for the Project and will be focussed on funding Closing the Gap initiatives. The framework will include:

- a program to assist in increasing job readiness and work experience for local Aboriginal people
- a funding framework to enable funding of programs and projects that align to Closing the Gap initiatives or community mental health, to the value of $1,000,000 over the first 10 years of the Project
- further liaison with the Aboriginal Community to define an appropriate location and frequency where briefings could be held on the HVO procurement processes to enable Aboriginal suppliers to be able to tender for work. In addition to briefings, HVO will consider providing funding to support business/procurement training programs.

6.5.5 Aboriginal heritage

19 submissions of objection identified concerns related to impacts from the Project to items of Aboriginal cultural heritage, with concerns raised that the expansion of open cut coal mining at HVO would impact significant Aboriginal cultural heritage values.

An Aboriginal Cultural Heritage Assessment (ACHA) was prepared for the Project and provided as Appendix N to the EIS. The ACHA was prepared in accordance with applicable guidelines including:

- *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011)
- *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW 2010a)
- *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (the Code of Practice) (DECCW 2010b).

The avoidance of impacts to Aboriginal cultural heritage was a key consideration in the design of the Project, which was an iterative process undertaken in consideration of the outcomes of technical studies as they were prepared for the EIS (EMM 2022d). As described in the EIS, a previously identified Aboriginal heritage site, known as CM-CD1 (AHIMS #37-2-1877), is present at HVO North. CM-CD1 is a north-south linear landform feature immediately west of the Carrington Mine, north of the Hunter River, and south of the current Lemington Road alignment. Despite being identified in environmental and planning documents for nearly 20 years as possibly high significance due to being potentially of Pleistocene antiquity, little investigation has occurred to CM-CD1 beyond its initial discovery in the late 1990s (CQCHM 2009).

As part of the ACHA completed for the Project, investigations of CM-CD1 were undertaken to determine the archaeological content and age of the deposit, which confirmed the 'Older Stratum' of CM-CD1 is of significant age relating to the early Holocene and late Pleistocene periods (10,000–12,000 years ago). As such, this is one of the few deposits in the Hunter Valley of this age, and the site is considered of high scientific (archaeological) and cultural significance.

As presented in the ACHA report (EMM 2022a), CM-CD1 was avoided due to both the site's significance and uniqueness within the region. The unique landform of CM-CD1 has been further highlighted in additional geomorphological assessments completed following the submission of the EIS and presented in the ACHA addendum provided as Appendix C. Several other sites currently within areas approved for disturbance were also committed to be retained and conserved into the future.

Following submission of the EIS, further Project refinement and re-design has occurred. This has focussed on the Lemington Road alignment, and has resulted in the avoidance of two scarred trees of Aboriginal cultural heritage origin (TR212-ST1 (37-3-1629) and TR216-ST1 (37-3-1635)) and a reduction of 2.78 ha of disturbance to Area 12 (associated with the Warkworth sands sheet).

Consequently, as a result of the Project's redesign following the submission of the EIS, the Project will now have no impacts to any identified scarred trees of Aboriginal cultural heritage origin.

In addition to refinements to the Project design, further assessment of the cultural significance of each identified site has been undertaken, including consideration given the loss of cultural materials over the last several decades from regional development activities (and thereby increasing the rarity of some site types). The results of this additional assessment are presented in Section 4 of the ACHA addendum provided as Appendix C.

In summary, a total of 279 sites are within the Project disturbance area (that is, the combination of the existing and approved disturbance area and the additional disturbance area for the Project). While the ACHA prepared for the EIS identifies 304 Aboriginal objects, sites and places, newly undertaken AHIMS searches for the Project area post-EIS exhibition found additional sites have been both created and lost since its completion; and minor refinement of the ACHA field results have also been undertaken (leading to the amalgamation of some closely located sites).

Of the 279 sites within the Project disturbance area:

- 252 sites have been assessed as being of low or low-moderate significance
- 16 sites have been assessed as being of moderate significance
- 11 sites have been identified as of high significance.

A total of 205 sites are proposed to be impacted comprising:

- 193 sites assessed as being of low or low-moderate significance
- 10 sites assessed as being of moderate significance
- two sites assessed as being of high significance.

The two sites of high significance, HVOCP TR195-AS2 (37-3-1619) and HVOCP TR213-AS1 (37-3-1626), are high-density artefact scatters with potential archaeological deposit (PAD) situated on the constrained Lemington Road alignment, and the ten moderately significant sites all consist of moderate to high density stone artefact scatters within texture contrast soils.

Further assessment of cumulative impact to Aboriginal cultural heritage sites is presented in the ACHA addendum provided as Appendix C. This further assessment demonstrates that despite the previous destruction of 557 sites through past mining activities, and the proposed loss of 205 site recordings for this Project, this would constitute limited loss to the broader cultural assemblage.

Management for all sites to be impacted by the Project is proposed and presented in the presented in the ACHA addendum provided as Appendix C. These management measures will be documented in a consolidated HVO North and HVO South Aboriginal Cultural Heritage Management Plan (ACHMP). The ACHMP will be developed in consultation with RAPs and Heritage NSW and provide details of:

- all Aboriginal sites identified during the archaeological investigation for the Project
- management and mitigation measures for each identified Aboriginal site
- procedures and protocols outlining ongoing consultation and involvement of RAPs
- Aboriginal community access to the Project Area
- protocols for newly identified sites and unexpected finds
- protocols for educating staff and contractors of their obligations relating to Aboriginal cultural heritage values through a site induction process
- protocols for suspected human skeletal materials
- protocols for the ongoing care of salvaged Aboriginal objects within a keeping place
- protocols for the ongoing protection of sites located within restricted access zones
- provisions for review and updates of the ACHMP.

One submission of objection requested clarification on the approach undertaken to evaluate Aboriginal heritage site significance and confirmation that the significance assessment had been undertaken in accordance with the ICOMOS Burra Charter.

As detailed in Section 15.4 of the EIS, cultural significance is described in Article 1.2 of *The Burra Charter: the Australia ICOMOS Charter for Places of Cultural Significance* (Australia ICOMOS 2013) as "aesthetic, historic, scientific, social, or spiritual value for past, present or future generations". The evaluation of significance for the identified Aboriginal heritage sites was determined on the basis of the average of these criteria.

As requested by Heritage NSW, a review of the cultural significance of Aboriginal cultural heritage sites within the Project disturbance area was undertaken following the submission of the EIS to include both consideration against the four established criteria (aesthetic, historic, scientific, social) *and* whether this ranking requires reconsideration due to the level of cumulative impact that has occurred in the region. The consideration of cumulative impacts primarily affects the rarity and representativeness of site's as cultural deposits are lost across the region.

As an outcome of this review, 27 sites within the Project disturbance area have been assessed to have moderate and high cultural significance. Of the 27 sites of moderate and high significance, 12 would be adversely affected by the Project. These consist of two sites of high significance, HVOCP TR195-AS2 (37-3-1619) and HVOCP TR213-AS1 (37-3-1626), situated on the constrained Lemington Road alignment, and nine moderately significant sites; all consisting of moderate to high density stone artefact scatters within texture contrast soils.

The results of this additional assessment are presented in Section 4 of the ACHA addendum provided as Appendix C.

6.5.6 Water resources

5% of issues raised in objections to the Project were in relation to the inadequate assessment of impacts to groundwater and water resources due to inadequate or outdated baseline data and climatic and hydrological assumptions used in modelling.

The groundwater impact assessment and associated modelling used available groundwater and surface water monitoring data, including HVO data, JV data and publicly available data. The date of the datasets was current at the time of model development and history-matching.

In addition, a peer review of the groundwater model was conducted by Dr Doug Weatherill, following consultation with DPE in 2020. The modelling and the peer review was undertaken in accordance with the Australian Groundwater Modelling Guidelines (Barnett et al 2012). The peer review included input and involvement over the three main stages of groundwater modelling as follows:

- conceptualisation and model updates
- model history-matching
- model predictions/uncertainty

The peer reviewer deemed that the model objectives were satisfied and that the model is fit for purpose where the purpose is indicative mine inflows and potential impacts on groundwater resources and receptors.

The outcomes of the groundwater modelling is reported in the GIA prepared by AGE (2022) and provided in Appendix A to Appendix K of the EIS. An overarching Water Assessment report formed part of the EIS (Appendix K of the EIS) and provides an assessment of potential impacts of the Project on water resources and water-dependent assets. The Water Assessment report documents and summarised the findings of the different water-related technical assessments conducted for the Project.

Submissions objecting to the Project also raised concerns regarding the risk of impacts from the Project to the Hunter River, the Hunter River alluviums, and groundwater drawdown impacts on private bores and groundwater dependent ecosystems and considered these impacts to be in breach of the Aquifer Interference Policy.

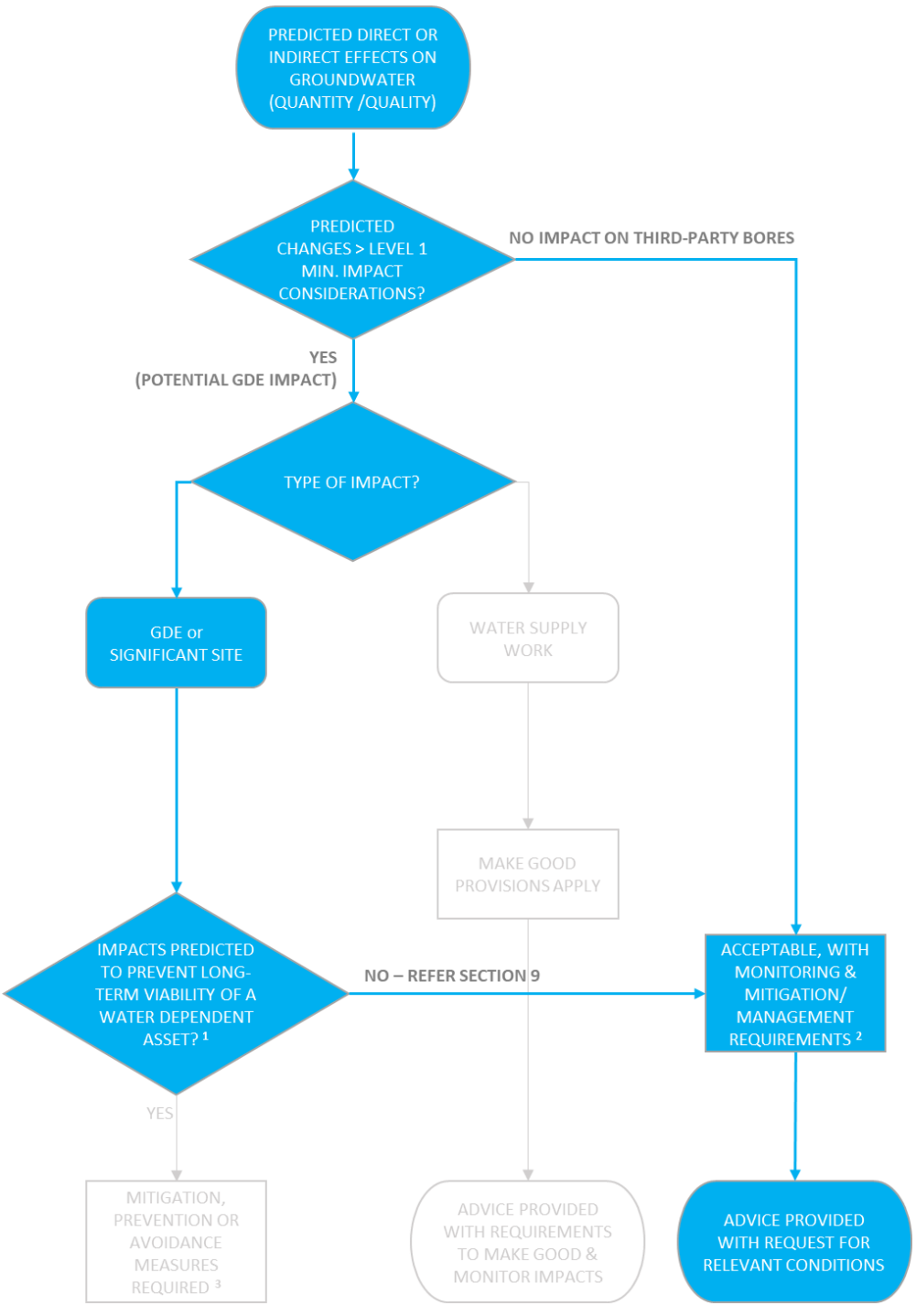
The water-related impact assessments have been conducted in accordance with the requirements of the NSW Government (including SSD guidelines), AIP and Australian Groundwater Modelling Guidelines (Barnett et al 2012). The outcomes of the assessments are summarised below:

- No impact is predicted at privately-owned bores.
- Construction of the approved Carrington West Wing barrier wall will limit the long-term drawdown in the Hunter River alluvium and the potential for seepage from the backfilled mine areas to the alluvium. The potential impact on water quality is minor to negligible.
- Minimal drawdown (less than 0.5 m) is predicted in the Hunter River alluvium near mapped river red gum communities and dewatering will not occur. This predicted drawdown will be buffered by leakage through the riverbed. Therefore, no significant impact is predicted.
- Impacts on Hunter River and Wollombi Brook streamflow will be negligible.
- No additional drawdown in the Wollombi Brook alluvium is predicted. In contrast, the avoidance measure of removing mining in the South Lemington Pit 1 and 2 areas from the mine plan is predicted to result in a reduction in potential drawdown in the Wollombi Brook alluvium (in comparison to the approved operations).

- No changes to the environmental, community and cultural values are predicted due to the Project.

The predicted cumulative drawdown is very conservative as the long-term predicted watertable is compared to a model where mining effects cease in 2009, effectively allowing groundwater levels to recover. The predicted cumulative alluvial drawdown (post mining) exceeds the AIP level 1 minimal impact considerations; however, the aquatic ecology and GDE assessment (ELA 2022) demonstrates that the predicted change in watertable will not prevent the long-term viability of the ecosystem. Exceeding the AIP level 1 minimal impact considerations does not mean that the impacts are unacceptable. As described in the AIP and SSD guidelines (DPE 2022), where level 1 minimal impact considerations are exceeded, a further detailed evaluation and assessment is required to demonstrate the impacts do not prevent the long-term viability of the water-dependent asset(s). This additional evaluation and assessment was completed for the Project and described in the Water Assessment report (Appendix K to the EIS) and is illustrated in Figure 6.3.

River red gums and riparian vegetation that opportunistically use shallow groundwater will continue to have access to shallow alluvial groundwater. In addition, the Project is predicted to have a negligible impact on Hunter River flow and flooding regime post mining. Therefore, river red gum communities will continue to rely on flooding for germination.



1. Assessment as per Serov et al 2012, with consideration of uniqueness, ecological/cultural value and timeframe of the impact.
2. Conditions of approval may include requirements for adaptive management to monitor and mitigate or remediate impacts that exceed level 1 thresholds.
3. Where there are no suitable or practical mitigation or prevention options, the proponent may be asked to avoid impacts by modifying the proposed activity.

Figure 6.3 Overview of Project assessment against the AIP minimal impact considerations process

Some of the submission in objection to the Project considered that the information presented in the EIS regarding the relationship between the alluvial and the Permian confusing and considered that the assessments demonstrated a clear relationship between these systems given the loss of surface water baseflows predicted.

As described in the Water Assessment report, recharge to the alluvium occurs via infiltration of rainfall and leakage from surface water to the watertable. In the Hunter River alluvium, groundwater levels and aquifer saturation is predominantly due to leakage from the Hunter River, which is mostly a losing watercourse in the Project area. The strong connection between the Hunter River and the associated alluvium masks the downward gradient caused by the historical approved mining depressurising in the Permian coal measures, which is observed in the historical and existing groundwater level monitoring data.

The Project is predicted to increase depressurisation in the Permian as mining progresses to the deeper Barrett seam at HVO North. However, the potentiometric surface in the Permian strata is already lower than the alluvial watertable due to approved existing and historical mining.

Section 6.6 of the GIA (AGE 2022) states:

> Prior to the occurrence of mining activities, the main discharge mechanism for groundwater within the Permian strata was through slow upward flow to Quaternary alluvium deposited along watercourses, particularly the Hunter River. In the present day, approved mining activities have depressurised the Permian groundwater systems and reduced the pressure within coal seams to the point where groundwater levels exist below the base of the Quaternary alluvium. This means the main discharge zone for groundwater within the Permian interburden and coal seams has changed from the alluvial aquifer to the surrounding mining operations, either closed or operating. The alluvial aquifer is effectively disconnected from the Permian with levels maintained primarily by river leakage.

Some of the submissions objecting to the Project raised concerns that the groundwater assessment had not considered monitoring data collected prior to 2000 and that this information should be used to assess the long term cumulative impacts from the Project.

As described in the GIA (AGE 2022), historical monitoring data from the groundwater monitoring network is available from 1995 to 2022 (the time of the reporting) and has been used to inform the assessment. Groundwater monitoring data is also available for monitoring networks maintained by surrounding Ravensworth, Glendell, Liddell, Mt Owen Complex, Integra, Mt Thorley Warkworth Complex, United and Wambo operations.

Figure 6.4 is an example of one of many figures presented in the GIA for the EIS (AGE 2022) and presents monitoring data back to 2013.

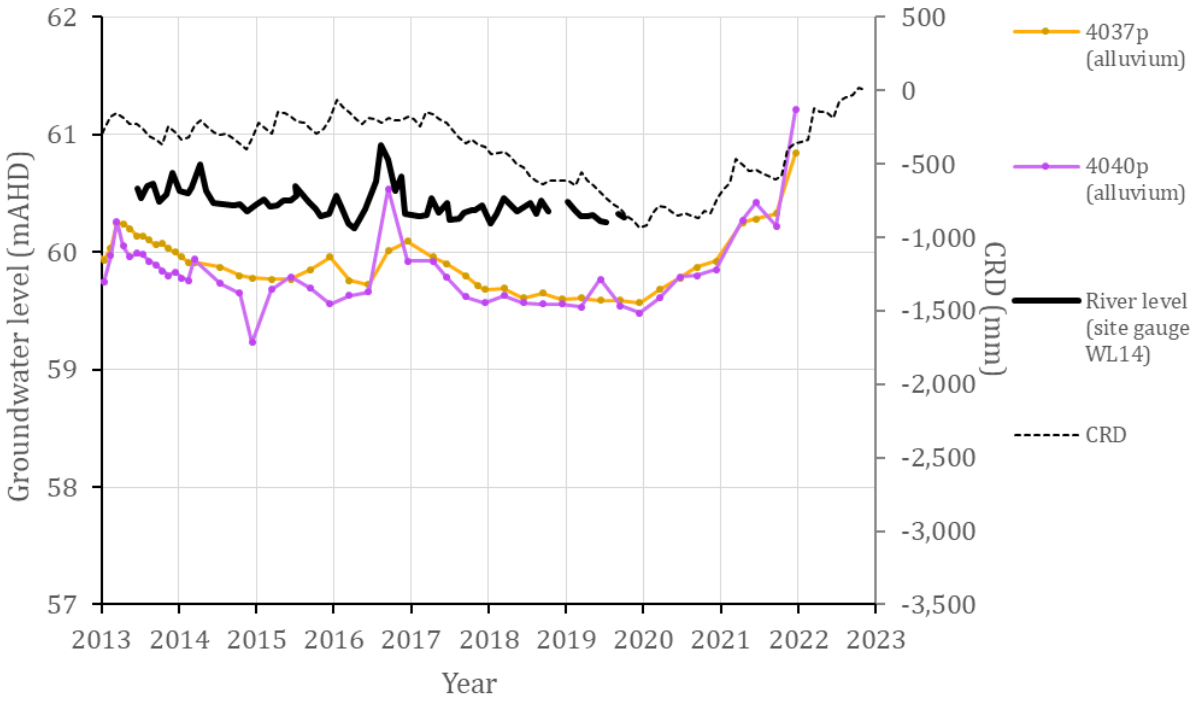


Figure 6.4 Water levels in the Hunter River and alluvium west of Carrington Pit (AGE 2022)

Clearer flood mapping/cross-sections showing estimated flood levels and final open void levels to demonstrate risk of breach/inflow of Hunter River flow into the open voids during large to extreme flow events. Any risk of uncontrolled inflow in the open voids would represent a major environmental issue for both the operational life of the Project as well as long-term post-closure

Section 6 of the SWIA describes the results of the flood modelling and impact assessment, with further detail of the modelling approach, assumptions, limitations and outcomes provided in Appendix C to the SWIA (Engeny 2022). The following text is an extract from Section 6.2.2 of the SWIA regarding mine infrastructure flood immunity.

The immunity of key mine infrastructure is summarised in Table 6.5.

Major Project elements and open cut mining pits with a potential risk of flood inundation up to the Extreme Event (determined to be four times the 1% AEP) are included. Detailed mapping of Hunter River flooding for the full extent of the Project is provided in Appendix D of the SWIA for Project Baseline, Project Operations and Project Closure scenarios. In summary the modelling indicates:

- All active open cut pits are shown to meet the minimum 0.1% AEP flood immunity plus freeboard standard adopted by HVO during the operational phase of the Project.
- North Pit will be exposed to a risk of flood ingress during the later years of operations via overtopping of the Carrington West Wing Levee in events exceeding the design standard (i.e. the Extreme Event).
- The final voids (i.e. HVO North and HVO South voids) will have flood immunity up to and including the Extreme Event.

Table 6.5 Simulated event that first causes inundation (mine infrastructure)

Element	Project Baseline	Project Operations	Project Closure
South Lemington Pit 1	0.5% AEP	N/A [1]	N/A [1]
North Void TSF	0.2% AEP	Extreme Event [2]	Extreme Event [2]
Cheshunt Pit	Extreme Event	No Ingress	No Ingress [4]
North Pit	No Ingress	Extreme Event	No Ingress [4]
Lake James (Dam 15S)	Extreme Event	No Ingress	N/A [3]

Source: Engeny 2022

1. South Lemington Pit 1 back-filled progressively: Western half in 2033 stage plan improves immunity to approx. 0.1% AEP; Eastern half in 2044 stage plan and no longer subject to flood ingress.
2. North Void TSF capped in mine year 18 stage plan (however timing is indicative and will occur as soon as practical once tailings crust strength is sufficient to enable capping). Extreme Event would flow over the capping layer rather than tailings after this stage plan.
3. Lake James (Dam 15S) to be decommissioned and rehabilitated with the proviso that a small stock water dam may be formed at the time.
4. For Project Closure, these elements represent the residual voids (HVO South void and HVO North void).

In addition, the flooding assessment was peer reviewed by Barry Rodgers (BMT). During the development of the HVO flood model and assessment of Project impacts, a separate flood study of the Hunter River was being undertaken by BMT on behalf of Singleton Council. Barry Rodgers has been engaged throughout the development of the HVO flood model to provide a peer review and to align methodologies and broad outcomes of this study with the Singleton Council study. Another outcome of the peer review is that the approach to the HVO flood model meets the requirements of the SEARs.

6.5.7 Fit and proper person requirements

16 submissions objecting to the Project related to Glencore's compliance with the 'fit and proper person' requirements in the NSW Mining Act and Commonwealth EPBC Act , stating that both have provisions which require a mining title holder to be 'fit and proper'. Claims were made that Glencore is not a fit and proper entity to be granted further mining rights in NSW.

In accordance with section 393 of the NSW *Mining Act 1992*, if a person is found not to be 'fit and proper' they are then determined as being a 'declared person'.

Glencore has not been determined as a 'declared person' under the *Mining Act 1992* and is therefore eligible to hold a NSW mining title.

The term 'fit and proper' is not defined under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). However, *t*he minister may take into account the environmental history of the individual or company proposing to take the action, including the environmental history of the executive officers of companies, and parent companies and their executive officers. This is one of a number of factors taken into account and Glencore will make all required disclosures but at no time has it had any application under the EPBC Act refused due to its environmental history.

6.5.8 Health impacts

14 submissions objecting to the Project raised concerns regarding the impacts of continuing poor air quality in the Hunter as a result of the Project on health and that the impacts on health had been inadequately assessed.

The potential impacts to human health are addressed in Section 22.4 of the EIS. Potential risks to human health resulting from the Project were assessed against accepted safety or health-based assessment criteria established by the NSW Government. A health risk assessment was completed to support the EIS with consideration of the *Environmental Health Risk Assessment: Guidelines for assessing human health risks from environmental hazards* (enHealth 2012) and relevant legislation. Table 6.6 presents the assessment completed with regard to the potential impact to human health from air quality associated with the Project. Risks to human health as a result of the Project will continue to be monitored by HVO with the results of monitoring programs to be provided to the community and stakeholders as per the conditions of the development consent.

Table 6.6 Air quality human health assessment

Potential risk to human health	Summary of key findings
Air quality	
Human exposure to particulates (PM_{10} and $PM_{2.5}$)	Maximum 24-hour average PM_{10} and $PM_{2.5}$ concentrations would be within the range of historically measured days above the criteria, excluding extraordinary events. Annual average PM_{10} and $PM_{2.5}$ concentrations will comply with EPA air quality assessment criteria at all privately owned sensitive receptors not subject to existing air quality acquisition rights; however, an increased air quality impact risk was identified for one property in Jerrys Plains (308) in the later years of the Project (around Year 11).
Human exposure to NO_2 from blasting	Operational post blast fume concentrations will not exceed EPA's criterion of 246 µg/m^3 at the sensitive receptors. Based on dispersion modelling, with predominantly worst-case assumptions, and proposed implementation of site-specific pre-blast procedures, the Project will not lead to adverse air quality impacts with respect to post blast fume. Blast fume will be managed in accordance with the blast management plan.

Table 6.6 Air quality human health assessment

Potential risk to human health	Summary of key findings
Human exposure to diesel emissions	Modelled maximum 1-hour average NO_2 concentrations (assuming 20% of the NO_x is NO_2 at the locations of maximum ground-level concentrations and a maximum background concentration of 74 µg/m^3) comply with the EPA's 246 µg/m^3 criterion at all sensitive receptors. Modelled annual average NO_2 concentrations (assuming 100% of the NO_x is NO_2 and 16 µg/m^3 background levels) comply with the EPA's 62 µg/m^3 criterion at all sensitive receptors. The Project will not lead to adverse air quality impacts with respect to diesel exhaust. Mitigation measures to manage diesel combustion emissions includes servicing machinery in accordance with maintenance contracts and adopting original equipment manufacturer recommendations for maintenance.

Based on the assessments completed and presented in the EIS, risks to human health as a result of the Project were determined to be low.

6.5.9 Rehabilitation and final landform

12 submissions of objection to the Project raised concerns related to the Projects rehabilitation and the proposal to leave two large voids at the end of the mine life.

More detailed information was requested on the reasoning and consequences of the proposed approach to leave voids in the final landform, together with an assessment of the risks and impacts of leakage/seepage of water from open mine pits into the surrounding groundwater and surface water over the life of this legacy.

Four voids are currently approved to remain across the HVO Complex; three at HVO North and one at HVO South as follows:

- HVO North:
  - Carrington Pit (evaporative sink)
  - West Pit
  - Mitchell Pit.
- HVO South:
  - Riverview Pit.

The Project includes only two final voids at the cessation of mining, one at HVO North and one at HVO South. Consequently, the Project will result in an improved final land use outcome than what is currently approved and would remain should the Project not be approved.

The two final voids that are proposed to remain have been designed to ensure the maintenance of long term stability and reduce any ongoing risk to safety or the environment. A final void assessment was completed as part of the surface water impact assessment prepared by Engeny and provided as Appendix K to the EIS.

Key findings of the final void assessment show that:

- the predicted long-term water table and pit lake level will be depressed, with groundwater flow directions towards the voids

- the Hunter River alluvium is predicted to remain saturated due to the strong hydraulic connection with the Hunter River
- the long-term pit lake level is considerably deeper than the base of the alluvium and the base of weathering, therefore the risk of seepage from the pit lakes to shallow groundwater is negligible
- the risk of spill from the pit lakes is negligible
- the runoff area contributing to the voids is sufficiently small so that evaporation dominates, and the voids remain as strong long-term groundwater sinks thereby attracting seepage from the surrounding strata (at a very low rate)
- infiltration of rainfall in the backfilled mine areas will gradually flow towards the pit lakes, as evidenced by the groundwater particle tracking completed as part of the groundwater impact assessment and the risk of seepage from the backfilled mine areas migrating through the existing and proposed barrier walls to the Hunter River alluvium is negligible.

The pit lakes will be permanent water bodies functioning as groundwater sinks. Salinity levels are expected to increase over time due to evaporation and groundwater seepage prior to reaching equilibrium. Modelled total dissolved solids (TDS) levels after 1,000 years are predicted to be approximately 11,000 mg/L and 6,600 mg/L at HVO North and HVO South, respectively. This assumes pit lakes reach equilibrium naturally and are not filled by relying on existing HVO water licenses, or as appropriate as determined by any number of potential future land uses.

For comparison purposes, the tolerance level for sheep to salinity in drinking water is up to 10,000 mg/L TDS without loss of production. Sheep can tolerate drinking water salinity up to 13,000 mg/L TDS for short periods or for extended periods if feeding on lush green feed (ANZECC & ARMCANZ 2000).

The final voids are not predicted to require active management in perpetuity and will not have a significant impact on alternative post land uses that may be considered for the site.

Submissions of objection also raised concerns that Glencore were unlikely to undertake rehabilitation of the site.

Progressive rehabilitation has been undertaken at HVO; and will continue to be implemented over the life of the Project to achieve approved final landform objectives. Rehabilitation across the HVO Complex is undertaken in accordance with the HVO Rehabilitation Management Plan with rehabilitation activities and performance against completion criteria reported annually as part of the HVO Annual Review and in accordance with the Mining Regulation 2016.

The NSW Resources Regulator is responsible for regulating rehabilitation under the *Mining Act 1992* to ensure that land disturbed by exploration and mining activities is returned to a safe, stable and sustainable land use.

Under Part 12A of the *Mining Act 1992*, the Minister (or delegate) may impose and vary security deposit conditions on authorisations and petroleum titles to cover the obligations of the title holder. The security deposit is required for the fulfilment of obligations under the title, including those related to rehabilitation, and obligations that may arise in the future.

Title holders are required to submit a rehabilitation cost estimate (RCE) whenever a potential change in rehabilitation liability occurs and at other key points throughout the tenure of a title. The RCE is used by the department to assist in determining the amount of the security deposit required for the title.

6.5.10 Impacts to the equine industry

11 submissions objecting to the Project raised concerns about the Projects impacts to the Hunters equine Critical Industry Cluster (CIC) and that impacts of the Project to the CIC had not been adequately assessed in the EIS.

A mapped equine Critical Industry Cluster (CIC) is approximately 2.6 km from the nearest point of the Project area (i.e. HVO North). Notably, the Project is not within this CIC.

An agricultural impact statement (AIS) has been prepared for the Project and is provided as Appendix G to the EIS. The AIS considered the presence of the CIC and completed a risk assessment of the Project in accordance with the *Guideline for Agricultural Impact Statements at the Exploration Stage* (DTIRIS 2012). The risk assessment determined the impacts on equine CIC within the Project locality as low. The findings state that "due to the distance away from the Project area, there will be no additional impacts on the existing equine CIC".

Specifically, at HVO North which is closest to the CIC, mining will continue progressing away from the CIC, in a south-easterly direction. In addition, the Project does not propose to change the annual ROM coal extraction rate at HVO North from the currently approved rate (up to 22 Mtpa). The ridgeline which provides an amenity barrier between the HVO Complex and Jerrys Plains will remain, and no increase in the approved overburden emplacement heights is proposed. Further, the site employs real time air quality monitoring and response systems to enable effective dust minimisation practices to be implemented. The Project is therefore not anticipated to result in impacts to the CIC located in proximity to the Project area beyond what has previously been experienced.

Further investigations into the potential visual impacts on Coolmore Australia, one of the properties in the CIC, were also undertaken to respond to the submission from Coolmore. The results of this investigation are provided in Section 6.5.12, which demonstrated the negligible changes in views anticipated from Coolmore as a result of the Project.

6.5.11 Noise and vibration

8 submissions objecting to the Project raised concerns regarding the Project's impacts on noise and that the noise exceedances at night were significant.

A Noise Impact Assessment (NIA) (EMM 2022b) was prepared for the project and provided as Appendix I to the EIS.

The NIA found that 19 receptors will be entitled to voluntary mitigation rights based on predicted marginal residual noise impacts as a result of the Project, 13 of which already have existing rights under current HVO approvals. The other six are in the outskirts of Jerrys Plains, and while a marginal noise impact is predicted at these receptors due to the Project, it is noted that the PNTLs for these receptors in the evening and night-time periods are less than the current EPL limits that apply to these residences, and the recommended noise criteria for these receptors is consistent with the current EPL criteria. Further, seven receptors that already have mitigation rights in accordance with the HVO South Project Approval are not predicted to experience noise levels such that they would be entitled to voluntary mitigation rights for the Project; however, HVO proposes to retain voluntary noise mitigation rights for these receptors.

With regards to sleep disturbance, the model predictions were less than the L_{Amax} trigger level of 52 dB for all receptors. Further, as discussed in Section 4.10.2ii, the sleep disturbance assessment completed for the Project and detailed in section 4.6 of NIA indicates all predictions would meet the EPA's proposed L_{Amax} limits of 45-46 dB.

One submission of objection to the Project raised concerns regarding the noise and blasting impacts on the nearby Coolmore property and the associated impacts on both the thoroughbreds and people that reside there.

A blasting impact assessment (BIA) was prepared for the Project and provided as Appendix J to the EIS. Blasting is proposed to be continued throughout the life of the Project, consistent with the current blasting times and frequency allowed under the existing development consents being:

- Monday–Saturday: 7.00 am–6.00 pm.
- Sunday, public holidays or other times: no blasting.

There are a number of studies involving observations of animals' responses to sonic boom which displays similar characteristics to airblast overpressure from blasting. The studies on observational behaviour reactions of various animal species including ponies, beef cattle and sheep concluded that generally the observed behaviour consisted of startle reactions that were considered minimal (Nixon et al (1968), Bond et al (1974) and Espmark et al (1974)). This applies to the exposure to sonic booms, which generated change in the air pressure in the range of 132-145 dBL. Based on these studies a conservative limit criterion of the 125 dBL level was adopted for livestock.

The modelling undertaken as part of the BIA confirmed that based on the predicted ground vibration and airblast overpressure there are no concerns for the wellbeing of livestock (including equine industry) on private land surrounding the Project area.

HVO North is positioned beyond a ridgeline referred to as the Wondewoi Ridge. The Wondewoi Ridge will have a mitigating impact on noise/sound transmission from the Project due to the physical shielding effect it provides.

6.5.12 Visual

6 submissions objecting to the Project raised concerns regarding the visual impacts the Project would have on Coolmore and the Hunters thoroughbred breeding activities at Jerrys Plains.

HVO has continued to consult with representatives from Coolmore Australia since the public exhibition of the EIS.

To determine potential visibility of the Project from Coolmore, two additional viewshed analyses were completed from representative viewing locations consisting of:

- Coolmore Viewpoint 1 – referred to by Coolmore as 'farm road at Strowan'
- Coolmore Viewpoint 2 – referred to by Coolmore as 'lookout at Batty Hill'.

As part of a site visit attended by representatives from HVO, Coolmore Australia and EMM, it was observed that both of these viewpoints are elevated and would therefore offer the highest potential for views towards the Project (in comparison to other locations within Coolmore that are closer to Golden Highway and therefore more likely to be screened by existing landform features).

The results of the additional viewshed analyses are presented in Appendix J. Consistent with the approach adopted in the EIS, the focus of the additional viewshed analyses has included the existing landform (i.e. baseline), the indicative mine plans for approximately Year 7 and Year 18 of the Project, and the proposed final landform. An additional analysis has also been completed for Coolmore that is representative of the previously approved final landform. The figures identify the likely changes to views experienced at each viewpoint due to the Project.

The viewshed analyses have been generated using both a DEM and DSM, both of which cover the Project area, the selected viewpoints and their immediate surrounds. The DEM and DSM were built using light detection and ranging (LiDAR) data, as well as predicted landform contours (Year 7, Year 18 and final landform) for the Project. The DEM Is representative of the bare earth surface and only considers the topography of the landscape. The DSM is representative of the actual surface of the earth and considers a variety of different features in the landscape, including vegetation and built structures.

The viewshed analysis results for Coolmore Viewpoint 1 indicate:

- Views to HVO North are currently possible at a minimum distance of approximately 7 km. Visible areas are within the existing approved disturbance area and are north-west of Mitchell Pit. The viewshed analysis indicates no existing views of HVO South from this location.

- The visible area at HVO North in Year 7 of the Project is not modelled to significantly change from existing baseline views and all visible areas are within the existing approved disturbance area. Visible Project elements within the indicative mine plan are predominantly rehabilitation. The viewshed analysis indicates no views of HVO South from this location at Year 7.

- The visible area at HVO North in Year 18 of the Project is not modelled to significantly change from existing baseline views and all visible areas are within the existing approved disturbance area. Visible Project elements within the indicative mine plan are predominantly rehabilitation. Viewshed analysis indicates no views of HVO South from this location at Year 18.

- The final landform at HVO North is modelled to be visible from this viewpoint at a distance of approximately 7 km. Final land use domains visible from this viewpoint will include native ecosystems and grazing land. The extent of the visible area is not modelled to significantly change from existing baseline views and all visible areas are within the existing approved disturbance area. The viewshed analysis indicates no views of HVO South's final landform from this location.

The viewshed analysis results for Coolmore Viewpoint 2 indicate:

- Views to HVO North are currently possible at a minimum distance of approximately 9 km. Visible areas are within the existing approved disturbance area and include areas adjacent to Mitchell Pit and West Pit. The viewshed analysis indicates existing views of HVO South at a minimum distance of approximately 14 km may also be possible from this location.

- The visible area at HVO North in Year 7 of the Project is not modelled to significantly change from existing baseline views and all visible areas are within the existing approved disturbance area. Visible Project elements within the indicative mine plan are predominantly rehabilitation. The viewshed analysis indicates distant views of HVO South from this location may continue at Year 7; however, these will be predominantly associated with existing rehabilitated land.

- The visible area at HVO North in Year 18 of the Project is not modelled to significantly change from existing baseline views and all visible areas are within the existing approved disturbance area. Visible Project elements within the indicative mine plan are predominantly rehabilitation. The viewshed analysis indicates distant views of HVO South from this location will continue at Year 18; however, these will be predominantly associated with existing rehabilitated land.

- The final landform at HVO North is modelled to be visible from this viewpoint at a distance of approximately 9 km. Final land use domains visible from this viewpoint will include native ecosystems and grazing land. The extent of the visible area will increase from existing baseline views. All visible areas are within the existing approved disturbance area. The final landform at HVO South is modelled to be visible from this viewpoint at a distance of approximately 14 km. The final land use domain visible from this viewpoint will be native ecosystems. The extent of the visible area at HVO South is not modelled to significantly change from existing baseline views.

In addition to the viewshed analyses, photographs captured during the site visit to Coolmore have also been used to prepare photomontages to illustrate how views from these viewpoints may change as a result of the Project. The photomontages are presented in Appendix J and include photomontages from three separate locations. Two are representative of views experienced from Coolmore Viewpoint 1 and Coolmore Viewpoint 2 and the third is from the main entry to Coolmore from the intersection with the Golden Highway.

The purpose of the photomontages is to demonstrate potential views of HVO's existing and proposed operations. Photomontages have been generated for the following scenarios:

- existing (baseline)
- currently approved landform
- Project year 7
- Project year 18
- Project final landform.

Markers have been placed into the photomontages to identify where HVO sits in the landscape and, where applicable, confirm the elevation of existing and proposed features hidden behind existing topography. Where relevant, impacted areas have been highlighted in bright green shading so that the viewer can accurately review them and identify changes to the existing view. Additional versions have also been included within which impacted areas have been rendered to suit the visible Project elements (e.g. rehabilitated land).

The photomontages demonstrate the separation distance between Coolmore Viewpoint 1 and Coolmore Viewpoint 2 and the HVO Complex. The photomontages also illustrate the negligible changes in views anticipated from Coolmore as a result of the Project.

6.5.13 ESG principles and EP&A Act objectives

4 submissions objecting to the Project related to the conformance of the Project with the principles of ecologically sustainable development, particularly with respect to the precautionary principle, and intra and inter-generational equity, claiming that the Project is not in the public interest.

An assessment of the project against the principals of ecologically sustainable development (ESD) was completed and described in Section 28.7(i) of the EIS. This assessment has been supplemented with a further updated evaluation of the Project against the principals of ESD is presented in Table 6.7.

Table 6.7 Evaluation of ESD principles

Principles	Evaluation against Project
Precautionary principle	The precautionary principle—namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by— (i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and (ii) an assessment of the risk-weighted consequences of various options, The proposed mine plan and overall Project design has been developed based on the assessment of environmental, engineering and financial considerations. The Project has been designed to avoid and minimise potential environmental and social impacts whilst achieving positive Project outcomes. Each technical assessment has included multiple rounds of review and refinement to avoid impacts or, if unavoidable, minimise or offset them. Importantly, the principle of avoidance has been adopted wherever possible, particularly with respect to: • CM-CD1; • noise and visual amenity impacts to sensitive receptors, notable the Jerrys Plains locality, associated with mining north-west of Mitchell Pit; • Warkworth Sands Woodland EEC, with amendments to the Project avoiding all direct impacts to this ecological community at HVO North. Cumulative impacts from the Project have therefore been reduced through the amendment from 5.2 ha (as presented in the EIS) to 0.3 ha (at HVO South). • Aboriginal heritage items and biodiversity features associated with the Lemington Road realignment, transmission line realignment, and Lemington CPP and associated rail loop; and • historic heritage items associated with the transmission line realignment. A biodiversity offset strategy will also be implemented to achieve a net positive biodiversity outcome. Unavoidable impacts will meet applicable regulatory criteria. An extensive list of mitigation measures is proposed to mitigate and manage the impacts, where unavoidable. These mitigation measures have been informed by the technical assessments prepared in support of this EIS which have been prepared by technical experts in each relevant field. For environmental aspects where a potential high risk or particular community concern was identified in the early stage of project planning, further experts were engaged to peer review technical studies to ensure the robustness of the project design and the environmental assessment. Therefore, the project has been developed in accordance with the precautionary principle.
Inter-generational equity	Inter-generational equity is the principle that the present generation should ensure the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations. The only beneficial land use that could be affected by the Project is agriculture. In this regard, the agricultural capability of the land to be disturbed will be progressively reinstated so that, with the exception of the final void, the Project area can be used for agriculture at the end of the mine life. The total area allocated for agriculture land use (Domain B: Agricultural – grazing) following the life of the Project is 4,216 ha. This is a net increase of 138 ha from the baseline area of land use for agriculture. Some impacts to biodiversity will occur through the disturbance of native vegetation and habitat for species credit species listed under the BC Act. However, an offset strategy has been developed and once implemented, will mean a net beneficial gain in biological resources. The water management system for the Project is predicted to maintain an overall balance without excess accumulation or shortfall of mine water demands, minimising business disruption and potential impacts on surface water resources. The Project will not result in adverse changes to the environmental and community values of groundwater or surface water. The mitigation measures outlined in Chapter 27 of the EIS will be implemented for the life of the Project to ensure the health, diversity and productivity of the environment for the present generation and generations to come.

Table 6.7 Evaluation of ESD principles

Principles	Evaluation against Project
Conservation of biological diversity and ecological integrity	This principle holds that the conservation of biological diversity and the maintenance of ecological integrity should be a fundamental consideration for development proposals. The Project is on land that has a long history of disturbance from mining and agricultural land uses. There have been many refinements in the Project design to avoid impacts to biodiversity and to maintain ecological integrity. HVO has undertaken investigations into biodiversity offsetting options, and as a result identified land in the South Lemington Pit 1 area that is proposed to offset impacts to the Warkworth Sands Woodland EEC. A final biodiversity offset strategy will be developed in consultation with DPE and BCD.
Improved valuation, pricing and incentive mechanisms	This principle includes activities which involve valuation, pricing and/or incentive mechanisms for the production, delivery, distribution or consumption of goods and services, especially those that are derived from natural or social capital or from ecological services. As demonstrated by the economic impact assessment (refer to Appendix W (EY 2022) of the EIS), the Project's benefits significantly outweigh its costs. HVO accepts the financial costs associated with all the measures required for the Project to avoid, minimise, mitigate and manage potential environmental and social impacts.

Some of those submissions also raised concerns regarding the Projects alignment with the objects of the EP&A Act, claiming that it fails to meet these objects, including:

- Promoting the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources – Object 1.3 (a).
- Facilitating ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision – making about environmental planning and assessment – Object 1.3 (b).
- Promoting the orderly and economic use and development of land – Object 1.3 (c).
- Protecting the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats – Object 1.3 (e).
- Promoting the sustainable management of built and cultural heritage (including Aboriginal cultural heritage) – Object 1.3 (f).
- Providing increased opportunity for community participation in environmental planning and assessment – Object 1.3 (j).

Compliance with the objects of the EP&A Act is discussed in Section 28.5 of the EIS and is this is supplemented below in Table 6.8.

Table 6.8 Project's consistency with the objects of the EP&A Act

Object	Consistency with the project
To promote the social and economic welfare of the community and better environment by the proper management, development and conservation of the State's natural and other resources.	The Project involves a mining operation that will, consistent with the objects of the Mining Act, extract a State-owned resource for the benefit of the State of NSW. The Project will facilitate the extraction of approximately 737 Mt of ROM coal from a brownfield mine in a well-established mining and power generation precinct. Through the Project, HVO will therefore develop a valuable resource by providing the necessary capital and skills, without which the resource would likely remain in situ and the economic benefits documented in Chapter 24 of the EIS and social benefits documented in Chapter 23 of the EIS would not be realised.

Table 6.8 Project's consistency with the objects of the EP&A Act

Object	Consistency with the project
To facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment.	This EIS describes the economic, environmental and social context of the project and the potential impacts of it to allow informed consideration of these aspects in determining the development application.
To promote the orderly and economic use and development of land.	The orderly and economic use of land is best served by development that is permissible under the relevant planning regime and predominately in accordance with the prevailing planning controls. The Project is permissible with development consent and is consistent with statutory and strategic planning controls. It is a brownfield mining proposal involving the continuation of a well-established mining operation using predominantly existing infrastructure. As detailed in this EIS, the Project will result in positive economic impacts, with appropriate mitigation measures and management strategies being proposed to minimise any adverse environmental and social impacts.
To promote the delivery and maintenance of affordable housing.	Not directly applicable to the Project.
To protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats.	Measures to avoid and minimise impacts to native vegetation and threatened species habitat were considered during the initial design stages of the project, resulting in avoidance of significant biodiversity values and minimisation of impacts on other areas of native vegetation. All unavoidable impacts will be offset in accordance with NSW Government biodiversity offset scheme. Establishing offsets will enhance biodiversity values in the medium to short-term.
To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	Avoidance of Aboriginal cultural heritage values has been a key aspect of the Project refinement process, with the Project specifically designed to avoid CM-CD1. Further refinements of the Project since the submission of the EIS has resulted in the avoidance of impacts to two scarred trees of Aboriginal cultural heritage origin (AHIMS #37-3-1635 and AHIMS #37-3-1629). Management and mitigation measures to be applied to Aboriginal cultural heritage maters are presented in the ACHA addendum provided as Appendix C.
To promote good design and amenity of the built environment.	Potential air, noise and visual impacts on sensitive receptors have been fully assessed and described in Chapters 8, 10 and 20 of the EIS respectively.
To promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants.	Over the life of the Project, infrastructure will be maintained, or upgraded, to ensure safe and efficient operations. Construction associated with the Project will be compliant with the Building Code of Australia, as relevant, and all other relevant statutory requirements.
To promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State.	This is a matter for the different levels of government in the State. As summarised in Chapter 6 of the EIS, a wide range of government agencies have been consulted regarding the Project, including Singleton Council, Muswellbrook Shire Council, DPE and DCCEEW.
To provide increased opportunity for community participation in environmental planning and assessment.	As described in Chapter 6 of the EIS, a range of engagement activities have been undertaken to inform the community about the Project and to seek community (and other stakeholder) feedback. The EIS provides further detailed information regarding the Project and its potential impacts. It was placed on public exhibition by DPE, and community members have been able to make formal submissions. HVO has prepared this Submission Report to respond to those submissions.

6.5.14 Cumulative impacts

2 submissions objecting to the Project raised concerns in relation to the lack of consideration in the EIS of cumulative impacts, particularly in relation to air and water impacts.

Cumulative impacts of the Project are presented in Chapter 26 of the EIS. The assessment of cumulative impacts was completed in consideration of the *Cumulative Impact Assessment Guidelines for State Significant Projects* (DPIE 2021a) and the *Social Impact Assessment Guideline for State Significant mining, petroleum production and extractive industry development* (DPIE 2021b). The technical studies, including air and water assessments, undertaken to inform this EIS considered cumulative impacts of surrounding development. The modelling for air quality and noise included surrounding operations in their models and outputs, as did the groundwater model, which included surrounding the model domain.

A list of the nearby coal mines considered as part of the cumulative assessment is listed in Table 26.1 of the EIS and the anticipated life of these mines were taken into consideration.

When considering the cumulative impacts of the Project, some submissions of objections raised concerns that HVO were not adopting best practice management and mitigation measures in relation to the management of noise and air quality impacts.

HVO is committed to implementing best practice mitigation and management measures where reasonable and feasible. These management measures to be adopted for the Project were presented throughout the EIS.

The air quality assessment prepared for the Project (Jacobs 2022) considered the potential impacts relating to construction dust, operational dust, operational post-blast fume and operational diesel exhaust, associated with the Project. Operational diesel exhaust emissions associated with off-road vehicles and equipment are not expected to result in any adverse air quality impacts. HVO also considers fuel use efficiency during the equipment selection and procurement process.

The air quality assessment included an assessment of best practice measures. The dust management measures proposed for the Project were compared to the measures outlined in the *NSW Coal Benchmarking Study: International Best Practice Measures to Prevent and/or Minimise Emissions of Particulate Matter from Coal Mining* (Donnelly et al, 2011). This comparison, which is documented in Section 9.1 and Table 33 of the AQGHGA (Jacobs 2022), shows that the proposed measures at HVO are consistent with best practice dust mitigation measures.

Noise management at HVO also employs best management practices consistent with contemporary industry which include the following:

- real-time noise monitoring locations used for noise management
- proactive operational planning based on predicted meteorological conditions
- a tiered alarming system that incorporates real-time monitoring and meteorological data is used to notify site personnel when elevated noise levels occur off site. The NMP includes a detailed procedure outlining management protocols in response to noise trigger levels
- monthly attended noise monitoring is used to assess compliance against impact assessment criteria
- sound power testing is completed on one third of the attenuated fleet annually to ensure equipment noise levels are consistent with modelled levels
- noise management awareness is provided to all personnel as part of the induction process

- a detailed management procedure is in place to ensure any community complaints are recorded, investigated and communicated appropriately.

HVO will continue to review the management measures at HVO to ensure the operation remains compliant with conditions of consent and relevant performance criteria. As new technology becomes available, or best practice management measures evolve, HVO will review the suitability of these measures to the Project and adopt where considered reasonable and feasible to do so.

6.5.15 Project schedule

2 submissions objecting to the Project considered the EIS lacked information on details in relation to the Project scheduling and equipment location and use over the life of the Project. These submissions suggested additional information should be made available to enable the impacts over the life of the Project to be adequately understood and scrutinised.

The mine plan scenarios and indicative schedule for the Project are described in Chapter 7 of the EIS.

The conceptual mine years chosen for assessment as part of the EIS are considered representative of key mining stages for the Project and selected to capture the range of conservative scenarios (such as maximum material movement and closest proximity of activity) in terms of potential impact.

The indicative Project years identified for assessment in relevant technical assessments, and the associated conceptual mine plan, generally represent the following:

- Year 3 – relatively high volume of overburden material movement at HVO South in the early Project years. Construction activities occurring during this Project year include:
  - Parnells dam enlargement
  - upgrades to the HVO North and South MIAs and the HVLP
  - construction of the Newdell product stockpile, or extension to the HVLP product stockpile
  - improvements to water infrastructure.
- Year 7 – this stage plan represents the highest volume of material movement across the complex in the early Project years, from Year 1 to Year 9. This Project stage was also selected due to the location of overburden emplacement activities at HVO South and proximity to key receptors areas including Maison Dieu and Long Point.
- Year 11 – the highest volume of material movement in this stage across the period from approximately Year 9 to Year 15, and includes the commencement of excavation activities in the Carrington West Wing area in HVO North, where the distance to nearby Jerrys Plains is the shortest. Overburden emplacement and overburden shaping for rehabilitation occurs at this stage in South Lemington Pit 1, being the closest mining-related activities to Maison Dieu and Long Point.
- Year 18 – this stage includes the highest volume over the life of the Project of:
  - overburden extracted and transported across the complex
  - ROM coal extracted at HVO South
  - ROM coal across the complex

- total material moved across the complex (inclusive of overburden and coal).

- Year 22 – the final stage with relatively high material movements, after which the volume of material moved in subsequent years decreases significantly towards the cessation of mining in HVO South around 2045. During this Project year, final overburden emplacement is undertaken in South Lemington Pit 1 alongside overburden shaping for rehabilitation which continues past Year 22.

Figure 6.5 illustrates the indicative material movement over the life of the Project for both HVO North and HVO South. The total life of mine production volume for the Project is stated in this EIS as being approximately 737 million ROM tonnes, or 535 million product tonnes.

The annual ROM coal extraction rate at HVO North will be maintained at 22 Mtpa, consistent with current approvals, while the annual extraction rate at HVO South will reduce from 20 Mtpa to 18 Mtpa, representing a decrease in mining intensity when compared to current approved operations. Although actual mining may progress at a different rate depending on a number of factors, all impacts from the Project are considered to remain within those assessed and presented in the EIS.

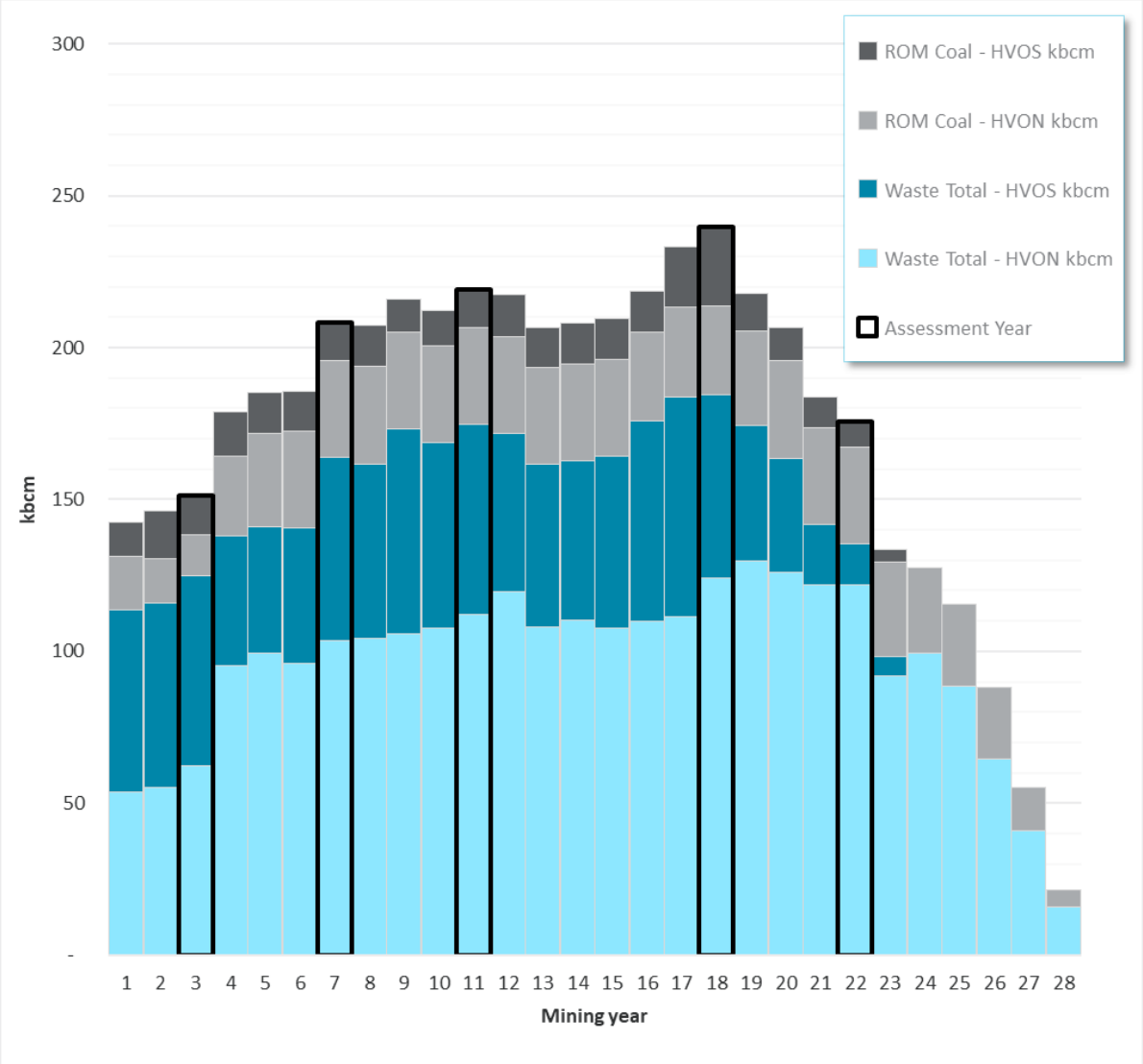


Figure 6.5 Mining schedule for EIS assessment

Equipment assumed to be operating for each assessed year of the Project is presented in Section 4.2.2 of the NIA (EMM 2022b) with modelled locations of equipment presented in Appendix B to the NIA.

6.5.16 Stakeholder consultation and engagement

2 submissions objecting to the Project raised concerns related to stakeholder engagement, with claims made that only one agency advice was sought, and that no agency advice was received from NSW Environment Protection Authority (EPA), NSW Health, or the Department of Planning and Environment – Water (DPE Water).

Extensive stakeholder engagement was undertaken by HVO throughout the preparation of the EIS, including with all agencies questioned in submissions. Briefings were undertaken by the HVO Project team (including face to face and online via Microsoft Teams) with key government officers, agencies, elected representatives and local government. These stakeholders were briefed on the Project as well as the findings of the technical studies.

Key stakeholder groups consulted included DPE, DPE Water, EPA, BCD, Heritage NSW, Resources Regulator, MEG, TfNSW, DCCEEW and both Singleton and Muswellbrook shire councils. Consultation undertaken with government agencies by HVO throughout the Project is detailed in Appendix G of the EIS.

In preparing the Secretary's environmental assessment requirements (SEARs) for the EIS, DPE also sought input from various agencies. The correspondence from agencies on the SEARs is available on the DPE Major Projects Planning Portal. Appendix B to the EIS identifies all matters for identified by government agencies for consideration in preparing the EIS, and where in the EIS they have been addressed.

Following submission of the EIS, the EIS was placed on public exhibition with government agency feedback sought. This Submissions Report responds to feedback provided by those government agencies and will be taken into consideration by DPE when assessing the Project. Agency advice received during the public exhibition period is also available on the DPE Major Projects Planning Portal.

Consultation undertaken by HVO following the submission of the EIS, and during the preparation of this Submissions Report, is presented in Section 3.3.

6.5.17 EPBC referral requirements

One submission of objection to the Project noted that the Project should be referred to the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) if there are likely to be any significant impacts on Matters of National Environmental Significance.

The Project was originally referred to DCCEEW under the EPBC Act in April 2022, with revised referrals submitted on 13 September 2023. The Project will be subject to further assessment and approval under the EPBC Act. The assessment under the EPBC Act will be independent of the State assessment process.

HVO has had extensive engagement with DCCEEW throughout the Project planning as detailed in Appendix G of the EIS and Section 3.3 of this Submissions Report.

Equipment assumed to be operating for each assessed year of the Project is presented in Section 4.2.2 of the NIA (EMM 2022b) with modelled locations of equipment presented in Appendix B to the NIA.

6.5.16 Stakeholder consultation and engagement

2 submissions objecting to the Project raised concerns related to stakeholder engagement, with claims made that only one agency advice was sought, and that no agency advice was received from NSW Environment Protection Authority (EPA), NSW Health, or the Department of Planning and Environment – Water (DPE Water).

Extensive stakeholder engagement was undertaken by HVO throughout the preparation of the EIS, including with all agencies questioned in submissions. Briefings were undertaken by the HVO Project team (including face to face and online via Microsoft Teams) with key government officers, agencies, elected representatives and local government. These stakeholders were briefed on the Project as well as the findings of the technical studies.

Key stakeholder groups consulted included DPE, DPE Water, EPA, BCD, Heritage NSW, Resources Regulator, MEG, TfNSW, DCCEEW and both Singleton and Muswellbrook shire councils. Consultation undertaken with government agencies by HVO throughout the Project is detailed in Appendix G of the EIS.

In preparing the SEARs for the EIS, DPE also sought input from various agencies. The correspondence from agencies on the SEARs is available on the DPE Major Projects Planning Portal. Appendix B to the EIS identifies all matters for identified by government agencies for consideration in preparing the EIS, and where in the EIS they have been addressed.

Following submission of the EIS, the EIS was placed on public exhibition with government agency feedback sought. This Submissions Report responds to feedback provided by those government agencies and will be taken into consideration by DPE when assessing the Project. Agency advice received during the public exhibition period is also available on the DPE Major Projects Planning Portal.

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HVO has had engagement with DCCEEW throughout the Project planning as detailed in Appendix G of the EIS and Section 3.3 of this Submissions Report.

6.5.18 Explosives handling and management

One submission of support for the Project raised concerns in relation to the manufacture, transport, and storage of ammonium nitrate and considered that there had been no assessment of risk or assessment of consequences should there be an unplanned explosion.

HVO currently operates an ammonium nitrate emulsion facility for the purposes of manufacturing ammonium nitrate emulsion to support blasting activities, which will continue for the Project. This facility provides for manufacturing and storage facilities to a scale required by operations, such that the facility meets all the required industry and regulatory standards. The storage of up to 7,250 tonnes of ammonium nitrate, located away from sensitive receivers, was approved under modification 8 to PA 06_0261 (HVO South) on 6 February 2023. The specific location of this facility may change from time to time, provided that it is within the Project disturbance area, and meets all the required industry and regulatory requirements.

A preliminary hazardous analysis (PHA) was prepared by Riskcon Engineering for the Project and provided as Appendix U to the EIS to identify potential hazards that may be present at the site as a result of operations or storage of materials. The PHA was prepared to in accordance with the *Hazardous Industry Planning Advisory Paper No.6 – Hazard Analysis* (HIPAP 6) (DoP 2011b) and assesses the PHA results using the criteria in *Hazardous Industry Planning Advisory Paper No. 4 – Risk Criteria for Land Use Planning* (HIPAP 4) (DoP 2011a). The analysis presented in the PHA identified that there would be no incidents originating from the Project which would result in offsite impacts; and the potential for fatality, injury or environmental impacts to occur would be negligible.

7 Updated project justification

HVO is seeking approval to continue mining operations at the HVO Complex beyond the life of current approvals. Significant coal resources remain across the HVO Complex beyond what is currently approved for extraction. The Project will result in the recovery of an additional approximate 400 Mt of ROM coal reserves to that approved to be extracted across HVO, over approximately 25 years, via mining through existing tenements and predominantly within existing or previously approved disturbance areas, using existing infrastructure.

Additional work has been undertaken by HVO to respond to submissions received on the EIS. Project amendments proposed have resulted in improvements to the Project's environmental outcomes due to additional impact avoidance to both the Warkworth Sands Woodland EEC and sites of high archaeological significance. While these are significant improvements in terms of environmental outcomes, the changes to the project design are limited to a portion of the Lemington Road realignment, an associated change to the proposed HVO North development consent boundary in this area, and a change in the timing of construction of the barrier wall in HVO North, with no changes required to the project design in terms of mining operations as a result of submissions on the Project. Therefore, despite some amendments, the Project evaluation and justification, as presented in the EIS, remain a true and accurate reflection of the Project for which approval is sought.

In summary, the Project represents a brownfield mining proposal that involves the continuation of an existing mine in an area that is an established coal mining and power generation precinct, providing employment and other socio-economic contributions to the local and regional community. The Project aligns with strategic direction and policy objectives at a local, state and national level. Current national and NSW state policy recognises the ongoing demand for coal. In NSW, the NSW Government's strategic statement on coal was released in 2020 and describes its position on the use of coal to 2050, and the approach to a global transition to a low carbon future. The strategic statement notes that over the coming decades, the coal mining industry will be directly affected by the global transition to different forms of energy generation. However, it is noted that this transition will occur over an extended period of time and recognises that mining will continue to be an important part of the State economy into the future.

Since the submission of the EIS, the IEA has released the WEO for 2023. In this latest outlook, the IEA acknowledges that while some of the tensions in energy markets have receded in 2023 since the extreme volatility of the global energy crisis, the situation remains fragile. Like the previous WEOs, the 2023 WEO considers how the world will respond to the energy crisis using several scenarios. The 2023 WEO notes that continued investment in fossil fuels is essential in all of the scenarios modelled. It will be needed to meet increases in demand over the period to 2030 in the Stated Policies Scenario (STEPS), which explores how the energy system will evolve if current policy settings are retained, and will also be needed to avoid a precipitous decline in supply that would far outstrip even the rapid declines in demand seen in the Net Zero Emissions (NZE) scenario. While global coal demand is set to fall within the next few years, strong demand will remain for coal in the power sector out to 2050 under the STEPS.

HVO is a significant employer in the Hunter Valley, with a workforce of approximately 1,500 FTE employees. The Project will secure employment for these employees and provide continued support to the regional Hunter community over a period of time where there is expected to be a gradual decline of coal mining in the region. Consistent with the strategic statement, the Project will support the local community while the local economy diversifies away from its reliance on coal mining, and while the global economy transitions to an increased reliance on low carbon energy, by providing ongoing direct and indirect employment and state revenue.

From an economic perspective, the Project will deliver an estimated net benefit of $1,739.0 million to the Lower Hunter region in NPV terms, comprised of:

- royalties, payroll tax and council rates of $36.6 million
- net economic benefit to NSW workers of $954.5 million

- net economic benefit to NSW suppliers of $760.3 million
- indirect costs $12.4 million.

With the recent change in the royalty rate in NSW, scheduled to commence from 1 July 2024, from 8.2% (upon which the economic assessment of the EIS was based) to 10.8%, the economic benefits of the Project to NSW will now be even greater, and the numbers presented above are conservative.

The development of the Project design for which approval is sought has been an iterative one developed over a number of years taking into account environmental, engineering and financial considerations. The Project has been designed to avoid and minimise potential environmental and social impacts whilst achieving positive Project outcomes. Numerous technical investigations have been carried out to support the Project. These assessments identified residual impacts of the Project and appropriate mitigation measures to address these impacts. The Project's design and proposed management measures are based on a comprehensive understanding of the environmental conditions in and around the Project area, gained over a very long history of mining at HVO.

The Project is therefore justified and represents a net benefit to the local region and to NSW.

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Abbreviations

Aboriginal Cultural Heritage Assessment	ACHA
Aboriginal Heritage Impact Permits	AHIP
Aboriginal and Torres Strait Islander Heritage Protection Act 1984	ATSIHP Act
Agricultural Impact Statement	AIS
Air Quality and Greenhouse Gas Assessment	AQGHGA
Air Quality and Greenhouse Gas Management Plan	AQGGMP
Annual Average Daily Traffic	AADT
Aquifer Interference Policy	AIP
Australian carbon credit unit	ACCU
Australian Renewable Energy Agency	ARENA
Australian Water Balance Model	AWBM
auxiliary left turn	AUL
Biodiversity and Conservation Division	BCD
Biodiversity Development Assessment Report	BDAR
Carrington Mine – Colluvial Deposit 1	CM-CD1
channelised right turn	CHR
Climate Action Sydney Eastern Suburbs	CASES
Climate and Atmospheric Science	CAS
CoalBed Energy Consultants Pty Ltd	CoalBed
Coal Preparation Plants	CPP
Commercial Readiness Index	CRI
Community Consultative Committee	CCC
Coolmore Australia Pty Ltd	Coolmore
Department of Climate Change, Energy, the Environment and Water	DCCEEW
Department of Planning and Environment	DPE
Department of Planning and Environment – Crown Lands	DPE – Crown Lands
Department of Planning and Environment – Water	DPE Water
Department of Primary Industries	DPI
Department of Primary Industries – Agriculture	DPI – Agriculture
Department of Primary Industries – Fisheries	DPI Fisheries
Ecological Restoration Plan	ERP

ecologically sustainable development	ESD
electricity transmission line	ETL
emission intensity	EI
Environment Protection Licence	EPL
Environmental impact statement	EIS
EMM Consulting Pty Limited	EMM
Endangered Ecological Community	EEC
Environment Protection Authority	EPA
Environmental Planning and Assessment Act 1979	EP&A Act
Environmental Planning and Assessment Regulation 2021	EP&A Regulation
Environment Protection and Biodiversity Conservation Act 1999	EPBC Act
greenhouse gas	GHG
gigalitre	GL
Glencore Coal Assets Australia	GCAA
Greater Ravensworth Area Water Balance Model	GRAWBM
groundwater dependent ecosystem	GDE
Groundwater Impact Assessment	GIA
hectares	ha
Hunter River Salinity Trading Scheme	HRSTS
Hunter Valley	HV
Hunter Valley Glider Club	HVGC
Hunter Valley Load Point	HVLP
Hunter Valley Operations	HVO
HV Operations Pty Ltd	HVOPL
Integrated Quantity and Quality Model	IQQM
Initiative for Cleaner Safer Vehicles	ICSV
International Council on Mining and Metals	ICMM
Joint Venture	JV
kilometres	km
Lemington Coal Preparation Plant	LCPP
level temperature conductivity	LTC
Local Government Area	LGA

Load Point	LP
low permeability barrier monitoring and management plan	LPB MMP
Maximum Harvestable Rights Dam Capacity	MHRDC
metre	m
metres per second	m/sec
Mine Closure and Rehabilitation Strategy	MCRS
mine infrastructure area	MIA
Mining Act 1992	Mining Act
Mining, Exploration and Geoscience	MEG
million tonnes	Mt
million tonnes per annum	Mtpa
National Greenhouse and Energy Reporting Act 2007	NGER Act
National Greenhouse Gas Energy Reporting Scheme	NGERS
Net Zero Emissions Modelling	NZEM
New South Wales	NSW
Noise Assessment Group	NAG
Noise Impact Assessment	NIA
Noise Policy for Industry	NPfI
original equipment manufacturers	OEM
Plains Clans of the Wonnarua People	PCWP
production variables	PV
Project Approval	PA
Project Noise Trigger levels	PNTL
Registered Aboriginal Party	RAP
Roads Act 1993	Roads Act
run-of-mine	ROM
Secretary's Environmental Assessment Requirements	SEARs
Serious and Irreversible Impacts	SAII
spot assessment technique	SAT
State Environmental Planning Policy	SEPP
State Environmental Planning Policy (Planning Systems) 2021	Planning Systems SEPP
State significant development	SSD

Tapered Element Oscillating Microbalance	TEOM
Technology Readiness Level	TRL
threatened ecological community	TEC
tonnes	t
total dissolved solids	TDS
Traffic and Transport Impact Assessment	TTIA
Transport for NSW	TfNSW
Umwelt Environmental and Social Consultants	Umwelt
Voluntary Land Acquisition and Mitigation Policy	VLAMP
voluntary planning agreement	VPA
water access licence	WAL
Water Management Act 2000	WM Act
Water Management (General) Regulation 2018	WM Regulation

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