HUNTER VALLEY OPERATIONS

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HVO NORTH OPEN CUT COAL CONTINUATION PROJECT

(EPBC 2025/10177)

DRAFT PUBLIC ENVIRONMENT REPORT

APRIL 2026

HVO North Open Cut Coal Continuation Project (EPBC 2025/10177)

Draft Public Environment Report

HV Operations Pty Ltd

H190408 RP20

April 2026

Version	Date	Prepared by	Reviewed by	Comments
1	10 April 2026	Samantha Hayes / James Wearne	Brett McLennan	Draft for adequacy review

Approved by

Brett McLennan
Director
10 April 2026

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Executive summary

ES1 Background

Hunter Valley Operations (HVO) is an established multi-pit open cut coal mining complex in the Hunter Valley of New South Wales (NSW), approximately 24 kilometres (km) north-west of Singleton. HVO comprises two mine sites separated by the Hunter River, HVO North and HVO South, which are operated as one complex with fully integrated environmental management systems. Operations first commenced at HVO in 1949. HVO is an important contributor to the Hunter Valley and NSW economy, producing high quality thermal and semi-soft coking coal suitable for use in international and domestic markets. HVO is owned by subsidiary companies of Yancoal and Glencore, as participants in the unincorporated HVO Joint Venture (JV). HV Operations Pty Ltd is the appointed manager of the JV.

HVO operates under separate approvals granted under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). HVO North operates under Development Consent DA 450-10-2003 (as modified) issued by the then NSW Minister for Infrastructure and Planning in 2004, which allows extraction of up to 22 million tonnes per annum (Mtpa) of run of-mine (ROM) coal until 31 December 2026. HVO North comprises the approved mining areas of West Pit, Mitchell Pit, Carrington Pit and North Pit, as well as the Hunter Valley Coal Preparation Plant (HVCPP), the Howick Coal Preparation Plant (HCPP), and the Howick and HVO North mine infrastructure areas (MIA). The train loading facilities at the Newdell Load Point (NLP) and Hunter Valley Load Point (HVLP) are also at HVO North.

HVO South operates under Project Approval 06_0261 (as modified) issued by the then NSW Minister for Planning in 2009, which allows extraction of up to 20 Mtpa of ROM coal at HVO South 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 Coal Preparation Plant (LCPP) and rail loop (both approved but not constructed).

There is one existing approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) granted on 10 October 2016 relating to HVO, EPBC 2016/7640, which allows for the continuation of coal mining operations in areas within the HVO Complex that were previously approved under the EP&A Act after the commencement of the EPBC Act. This approval has effect until 31 December 2030.

A referral (EPBC 2016/7641) was also submitted relating to the extension of open cut coal mining operations at HVO South and the proposed deeper mining in the Bayswater Seam within the Riverview Pit area. This was determined as 'not a controlled action' on 20 March 2018.

ES2 Project overview

HV Operations Pty Ltd 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 EP&A Act, and from the Federal Minister for the Environment under the EPBC Act.

Broadly, the Project involves the continuation of the life of HVO North and HVO South, from the current approved mining completion dates of 2026 and 2030 respectively, to the end of 2045 at HVO North and the end of 2042 at HVO South. The continuation of mining across the HVO Complex will optimise resource recovery from the existing operation, predominantly by mining through previously mined areas, extracting coal from deeper seams and to the extent of existing mining tenements.

In December 2022, HVO lodged two State significant development (SSD) applications with the then NSW Department of Planning and Environment (now the Department of Planning, Housing and Infrastructure (DPHI)) under the EP&A Act for the Project, as follows:

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

The SSD applications were supported by one environmental impact statement (EIS) titled *Hunter Valley Operations Continuation Project, Environmental Impact Statement* (EMM 2022a). The EIS was placed on public exhibition for a period of four weeks at the beginning of February 2023.

Following the receipt of submissions on the Project and following ongoing engagement with government agencies and stakeholders, HVO made some amendments to the design of the HVO North Project with the aim of further avoiding impacts to a critically endangered ecological community (CEEC).

HVO subsequently lodged a submissions report and amendment report in November 2023 with the DPHI for the Project. The *Hunter Valley Operations Continuation Project, Submissions Report* (EMM 2023a) responded to all submissions made following public exhibition of the EIS, while the *Hunter Valley Operations Continuation Project Amendment Report* (EMM 2023b), referred to as the HVO North Amendment Report, provided an assessment of the amendments made to the HVO North Project.

In December 2023, the NSW *Climate Change (Net Zero Future) Act 2023* (the NZF Act) was enacted, and in May 2024, the NSW Environment Protection Authority (EPA) released the then draft *NSW Guide for Large Emitters* (now finalised, EPA 2025) and the new climate change assessment requirements for large emitters. Following their release, a request for information (RFI) was received from DPHI requesting that HVO consider the implications for the Project if all coal extraction from gas Domain 1 at HVO North was avoided and for HVO to have further consideration of the guiding principles of the NZF Act.

In response to the RFI, HVO completed a detailed review of the Project and has amended the SSD applications for the Project, which includes, amongst other things, the removal of coal extraction in gas Domain 1. The *HVO Continuation Project, Amendment Report* (EMM 2025a), referred to as the Amendment Report, was lodged with DPHI in August 2025.

The Amendment Report was placed on public exhibition for a period of three weeks at the beginning of September 2025. On 21 November 2025, HVO lodged the *Hunter Valley Operations Continuation Project, Amendment Submissions Report* (EMM 2025e), referred to as the Amendment Submissions Report, which responded to all submissions made on the Amendment Report.

At the time of preparation of this draft public environment report (PER), DPHI were undertaking its assessment of the Project, including an assessment of the EIS (EMM 2022a), Submissions Report (EMM 2023a), HVO North Amendment Report (EMM 2023b), Amendment Report (EMM 2025a), and Amendment Submissions Report (EMM 2025e).

ES3 The Action

Consistent with the two SSD applications to the NSW government, two referrals were also submitted in September 2023 for the Project under the EPBC Act with the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW), as follows:

- 2023/09651 – HVO North Open Cut Coal Continuation Project (the HVO North Action)
- 2023/09652 – HVO South Open Cut Coal Continuation Project (the HVO South Action).

The EPBC Act referrals were withdrawn in October 2024, in anticipation of the proposed amendments being made to the Project which, as described above, were documented in the Amendment Report (EMM 2025a) and includes, amongst other things, the removal of coal extraction in gas Domain 1.

Revised referrals for the Project were submitted to DCCEEW in April 2025, being:

- EPBC 2025/10177 – HVO North Open Cut Coal Continuation Project (the HVO North Action)
- EPBC 2025/10176 – HVO South Open Cut Coal Continuation Project (the HVO South Action).

On 27 and 28 October 2025, a delegate of the Minister for the Environment determined that the actions are controlled actions and approval is required before the proposed HVO North Action and HVO South Action can commence as they are likely to have a significant impact on the following matters protected by the EPBC Act:

- listed threatened species and communities (sections 18 and 18A)
- unconventional gas or large coal mining development with impact on water resources (sections 24D and 24E).

The delegate also determined that the proposed actions will be assessed by PERs. DCCEEW subsequently issued guidelines for the content of the PERs (the PER guidelines) in correspondence dated 26 February 2026.

This draft PER has been prepared to address the PER guidelines for the HVO North Action. A separate draft PER has been prepared for the HVO South Action (EMM 2026a).

A summary of the key components of the HVO North Action are listed below:

- continuation of mining operations at HVO North from 1 January 2027 until 31 December 2045
- production of up to 22 Mtpa for HVO North (complex maximum extraction rate of 26 Mtpa) with no separation of extraction limits between West Pit and Carrington Pit
- infrastructure upgrades, as listed below:
  - realignment of Lemington Road and construction of a new bridge over the Hunter River
  - relocation of the HVO North site access road off the existing Lemington Road
  - increase in the capacity of Parnells Dam from approximately 1 gigalitre (GL) to approximately 4 GL
  - realignment of transmission and telecommunication lines that are currently within the proposed mining area
  - upgrades to the HVO North MIA
  - expansion of the HVO North ROM coal stockpile to improve coal management
  - maintenance and ancillary activities as required to facilitate operations, including the replacement of plant and equipment, where required
  - construction of access roads to facilitate service provider access
  - use of demountable/temporary buildings and other ancillary temporary facilities to enable construction activities and mining operations, as required
  - access road establishment to an existing mine-owned property east of realigned Lemington Road

- transport product coal by truck or overland conveyor from all coal processing plants (CPPs) to loading points (HVLP and NLP)
- receipt of ROM coal from HVO South via internal haul roads for processing at all CPP facilities approved for HVO North
- management of tailings in accordance with a Tailings Management Strategy
- upgrade of product coal infrastructure as follows:
    - establishment of a new Newdell product stockpile and upgrade of the existing Newdell train loading facility or an extension of the product coal stockpile footprint at the HVLP to increase the total stockpile capacity of the load point
    - construction of a haul road to enable ROM coal to be transported to the neighbouring Ravensworth Operations ROM pad via haul truck for processing, from where product coal is then transferred to the Ravensworth Coal Terminal for transport to market
    - ability to temporarily transport product coal by truck from the Howick CPP to the Liddell stockpile for transport to market via the Liddell coal handling and train loading facilities during upgrades of the NLP
- implementation of a revised water management system (WMS) including construction of levees, clean water diversions and the Carrington West Wing low permeability barrier wall.

Other than as set out above, all activities that are currently approved under the existing HVO North Consent and HVO EPBC Act 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 maximum allowable annual ROM coal extraction and processing rate of 22 Mtpa
- receipt of ROM coal from HVO South via internal haul road for processing at all CPP facilities approved for HVO North
- approved heights of overburden emplacement areas
- continued avoidance of the Aboriginal heritage site known as Carrington Mine – Colluvial Deposit 1 (CM-CD1)
- operating hours, annual workforce numbers and associated operational traffic generation.

ES4 Matters of national environmental significance – biodiversity

ES4.1 Overview

A biodiversity matters of national environmental significance (MNES) assessment (Umwelt 2026a) has been prepared to assess the potential impacts of the HVO North Action on listed threatened species and communities, which is attached to this report as Appendix D. In preparing this assessment, a HVO North Biodiversity Impact Assessment Area (BIAA) has been identified for assessment within the HVO North Action Area, which comprises areas currently approved for disturbance under Development Consent DA 450-10-2003 that will not be disturbed prior to 1 January 2027, rehabilitated areas that are to be re-disturbed as part of the HVO North Action, and areas that will be disturbed as part of the HVO North Action which are not currently approved for disturbance.

The potential impacts on these listed threatened species and ecological communities are addressed in this report (Chapter 5) and in detail in Appendix D (Umwelt 2026a).

ES4.2 Impact assessment

The HVO North Action will result in residual direct impacts on biodiversity values. Direct impacts include the loss of native vegetation and fauna habitats as a result of clearance works and subsequent mining activity.

The landscape within and surrounding the Project is characterised by extensive historical clearing for agricultural, mining and rural development. Targeted avoidance and minimisation measures have also been proposed for this Action to reduce impact on areas of higher value vegetation and habitat, including (but 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 remove all direct impacts to Warkworth Sands Woodland of the Hunter Valley CEEC
- careful consideration of proposed transmission line easement alignments 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.

With these avoidance measures implemented, the HVO North Action is anticipated to have a significant impact on one CEEC, the Central Hunter Valley Eucalypt Forest and Woodland CEEC, and two fauna species, Hunter Valley delma (*Delma vescolineata*) and Swift Parrot (*Lathamus discolor*). No other listed threatened species or communities will be significantly impacted by the HVO North Action.

Some indirect impacts associated with the HVO North Action that have the potential to impact on biodiversity features in the locality include:

- drawdown impacts on surrounding groundwater dependent ecosystems (GDEs)
- rubbish dumping along the re-aligned Lemington Road
- edge effects (weeds and other disturbances) reducing the viability of surrounding habitats
- cumulative impacts of the Project for biodiversity in the wider locality
- fugitive light emissions, noise and dust impacts into surrounding habitats.

There are no uncertain impacts predicted to occur as a result of the HVO North Action. It is considered that the potential impacts associated with the HVO North Action are well known, particularly noting the history of mining and similar operations in the Hunter Valley.

ES4.3 Biodiversity offset strategy

Following the application of avoidance and minimisation measures, the Biodiversity Assessment Method Calculator (BAM-C) identified the following biodiversity ecosystem credits required to offset the impacts of the HVO North Action:

- Central Hunter Valley Eucalypt Forest and Woodland CEEC (4,824)
- Hunter Valley delma (3,601)

- Swift Parrot (5,801)
- White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC (202)
- Regent honeyeater (5,840)
- Spotted-tailed quoll (8,176)
- Large-eared pied bat (6,120)
- Grey-headed flying-fox (6,588)
- White-throated needletail (6,734)
- Brown treecreeper (5,801).

Offsets comprise ecosystem credits required to meet NSW biodiversity offset obligations, including credits for habitat associated with EPBC-listed species that were determined unlikely to be significantly impacted.

It is HVO's intention that the offset strategy for the Project will primarily focus on purchasing credits on the market both locally and regionally, or through the Biodiversity Conservation Fund. It is also proposed that the retirement of credits will be staged prior to clearing of the HVO North BIAA.

ES5 Matters of national environmental significance – water

ES5.1 Overview

A water resources impact assessment (EMM 2026b) has been prepared and provided as Appendix E to this draft PER. It is summarised in Chapter 6.

The water resources impact assessment provides an assessment of the potential impacts of the Project on water resources including water-dependent assets.

ES5.2 Impact assessment

The HVO North Action and the broader Project considers a design that avoids and minimises impacts to water resources and water dependent assets, including:

- At HVO North:
  - realignment of Lemington Road and construction of a new Hunter River bridge crossing, which will significantly improve the flood immunity of this road adjacent to the Hunter River, reducing road closures in flooding events
  - improved flood protection levee for North Pit Tailings Storage Facility (TSF) – up to 0.1% Annual Exceedance Probability (AEP)
  - improved flood protection for the Carrington West Wing Levee (up to 0.1% AEP)
  - an increase in the capacity of Parnells Dam (Dam 9W) from approximately 1 gigalitre (GL) to approximately 4 GL

- construction of the Carrington West Wing low permeability barrier wall (LPBW) prior to mining within 100 metres (m) of the remnant western arm of the paleochannel in connection with the Hunter River
- construction of the Mitchell East Levee to provide flood protection for the HVO North Void
- construction of clean water diversions including the Mitchell clean water diversion
- reducing the number of final voids that will remain post closure from three to two final voids.

- At HVO South:
  - construction of the Cheshunt and Riverview Pit flood protection levees
  - enlargement of Lake James (Dam 15S) from approximately 0.7 GL to approximately 2 GL
  - removing the currently approved coal extraction in Riverview South East Extension, South Lemington Pit 1 and 2 areas from the Project mine plan (currently approved in the existing HVO South Approval).
- Across the Project:
  - mainly limiting disturbance to previously disturbed or approved areas, thereby limiting disturbing new catchments
  - continued operation of the existing WMS, including preferential use of sediment-laden and mine water over extraction from the Hunter River
  - operating in accordance with the requirements of Environment Protection Licence (EPL) 640, the Hunter River Salinity Trading Scheme (HRSTS) and water access licences (WALs).

With the above avoidance and management measures in place, the potential impact of the HVO North Action and the broader Project on surface water resources and aquatic ecology is insignificant. In summary:

- Impacts on Hunter River and Wollombi Brook streamflow will be negligible.
- Minor changes in streamflow is predicted for three ephemeral watercourses during operations. The predicted change in streamflow will have a minor impact on the number of dry days, as many of these ephemeral watercourses are dry (on average) for more than half of the year under current conditions. Post mining, potential streamflow impacts are expected to be negligible.
- Potential impacts on surface water downstream users will be negligible as no changes in streamflow regimes are predicted in the Hunter River, given it is a regulated system and HVO hold sufficient entitlement for the predicted reduction in streamflow due to the Project.
- No impacts are predicted on the aquatic ecology of the Hunter River, particularly as flow will be mitigated through regulated releases from Glenbawn Dam, and only minor impacts to the aquatic ecology in the tributaries to the Hunter River are expected.
- Potential impacts on surface water quality are expected to be minimal and will continue to be mitigated through an appropriately sized, designed and operated WMS, including release from sediment dams in accordance with their design and discharge of mine water in accordance with approved environment protection licence limits and HRSTS credits.

- The flood modelling for the Project indicates no impact on the use of the land (grazing and cropping or Crown land).
- The proposed realignment of Lemington Road will significantly improve flood immunity of this road adjacent to the Hunter River.

In relation to groundwater resources and GDEs:

- No impact is predicted at third-party groundwater bores.
- Construction of the approved (but not yet constructed) Carrington West Wing LPBW will limit 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. In addition, a low permeability barrier monitoring and management plan will be developed, including development of early warning trigger levels and response plan, identifying mitigation measures to manage potential unexpected effects.
- Minimal incremental drawdown (less than 0.2 m) is predicted in the Hunter River alluvium near mapped river red gum stands in the Carrington Billabong and widespread dewatering will not occur. This predicted drawdown will be buffered by leakage through the riverbed. Therefore, no significant impact in ecological receptors is predicted.
- No additional drawdown in the Wollombi Brook alluvium is predicted. In contrast, the avoidance measure of removing coal extraction in the Riverview South East Extension, 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.

In relation to final voids:

- The predicted long-term watertable and pit lake levels will be depressed, with groundwater flow directions towards the HVO North Voids and HVO South Void.
- 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, 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 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 to the environment is negligible.
- The Project is predicted to have a negligible impact on Hunter River flow and flooding regime post mining.
- The Hunter River alluvium is predicted to remain saturated due to the strong hydraulic connection with the Hunter River.

ES6 Project objectives and need

The primary objective of the HVO North Action is to efficiently and economically recover remaining coal reserves within existing mining tenements and predominantly within existing and approved disturbance areas, using existing infrastructure. The HVO North Action will:

- enable the continuation of a brownfield mining complex in a long-established coal mining and power generation precinct
- maximise resource recovery by mining to the base of the Barrett seam in West, Mitchell and Carrington Pit areas and the base of the Bayswater seam in the Carrington West Wing area in HVO North, within existing mining tenements, using mostly existing or already approved infrastructure and minimising further disturbance
- provide ongoing employment opportunities for an FTE workforce of up to 1,500 across the HVO Complex well beyond the life of the current approvals under which the HVO 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 where areas disturbed by mining activities as a result of the Project will reflect a landform that is sympathetic to the surrounding landscape
- maintain the maximum annual ROM coal extraction rate at HVO North at up to 22 Mtpa
- continue the ongoing contribution to the local, regional, and State economies from a well-established mining operation.

The HVO North Action will generate significant net benefits to NSW, including increased economic activity and employment within the NSW community. The estimated net benefit of the HVO North Action to NSW is $3,719.5 million in net present value (NPV) terms, while the Project as a whole will result in a net benefit to NSW of $5,692.4 million (NPV).

At a local scale, the HVO North Action is expected to deliver a net benefit to the Lower Hunter (SA3) region of $1,207.7 million, while the broader Project will deliver a net benefit to the local region of $1,778.1 million.

Not proceeding with the HVO North Action would forgo these benefits for the local community and the State of NSW.

At a Commonwealth level, the Commonwealth *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 greenhouse gas (GHG) emissions to net zero by 2050. The life of the Project (2045 at HVO North and 2042 at HVO South) 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 were the proposed amendments to the Safeguard Mechanism that commenced on 1 July 2023. For the 2023-2024 reporting year the Safeguard Mechanism applies to 219 designated large facilities as defined by the Commonwealth *National Greenhouse and Energy Reporting Act 2007* (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.

In relation to the demand for coal, the International Energy Agency (IEA 2024) predicts that future demand will range under a variety of 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.

ES7 Conclusion

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, and the HVO North Action will facilitate the efficient extraction of this high-quality coal resource, via mining through existing tenements and predominantly within existing or previously approved disturbance areas.

Significant avoidance measures have been incorporated into the design of the HVO North Action, resulting in the complete avoidance of all direct impacts to Warkworth Sands Woodland of the Hunter Valley CEEC at HVO North.

With these avoidance measures implemented, the HVO North Action is anticipated to have a significant impact on one vegetation community (the Central Hunter Valley Eucalypt Forest and Woodland CEEC) and two fauna species (Hunter Valley delma and Swift Parrot). No other listed threatened species or communities will be significantly impacted by the HVO North Action. Residual impacts of the HVO North Action on MNES will be appropriately offset via the implementation of a biodiversity offset strategy.

In relation to water resources, the potential impact of the Project on surface water resources and aquatic ecology is anticipated to be insignificant. No impact will occur to third-party groundwater bores, and construction of the approved (but not yet constructed) Carrington West Wing LPBW is expected to effectively limit drawdown in the Hunter River alluvium and the potential for seepage from the backfilled mine areas to the alluvium.

The HVO North Action and broader Project involve the continuation of an existing mine in an established coal mining and power generation precinct that aligns with the strategic direction and policy objectives at a local, state and national level. It will provide ongoing direct employment opportunities for up to 1,500 FTE workers and will deliver significant economic benefits to the State and local region.

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Appendices

Tables

Figures

1 Introduction

1.1 Background

1.1.1 NSW approvals

Hunter Valley Operations (HVO) is a well-established multi-pit open cut coal mining complex in the Hunter Valley of New South Wales (NSW). HVO comprises two mine sites separated by the Hunter River, HVO North and HVO South (refer to Figure 1.1 and Figure 1.2). While the two mine sites are separated by the Hunter River, they are operated as one complex with fully integrated environmental management systems. The HVO Complex is illustrated at a local scale in Figure 1.3.

Operations first commenced at HVO over 70 years ago, in 1949. Since its inception HVO has been, and continues to be, an important contributor to the Hunter Valley and NSW economy, producing high quality thermal and semi-soft coking coal suitable for use in international and domestic markets.

HVO operates under separate approvals granted under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). HVO North operates under Development Consent DA 450-10-2003 (as modified) issued by the then NSW Minister for Infrastructure and Planning in 2004, which allows extraction of up to 22 million tonnes per annum (Mtpa) of run of-mine (ROM) coal until 31 December 2026. Development Consent DA 450-10-2003 is herein referred to as the HVO North Consent. HVO North comprises the approved mining areas of West Pit, Mitchell Pit, Carrington Pit and North Pit as shown in Figure 1.3, as well as the Hunter Valley Coal Preparation Plant (HVCPP), the Howick Coal Preparation Plant (HCPP), and the Howick and HVO North mine infrastructure areas (MIA). The train loading facilities at the Newdell Load Point (NLP) and Hunter Valley Load Point (HVLP) are also at HVO North, as shown in Figure 1.3.

HVO South operates under Project Approval 06_0261 (as modified) issued by the then NSW Minister for Planning in 2009, which allows extraction of up to 20 Mtpa of ROM coal at HVO South until 24 March 2030. Project Approval 06_0261 is herein referred to as the HVO South Approval. 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 Coal Preparation Plant (LCPP) and rail loop (both approved but not constructed), as shown in Figure 1.3.

Further details of the existing approvals at HVO are provided in Section 2.1.

Source: EMM (2025); ABS (2021); DCSSS (2024); GA (2009)

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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 environment

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

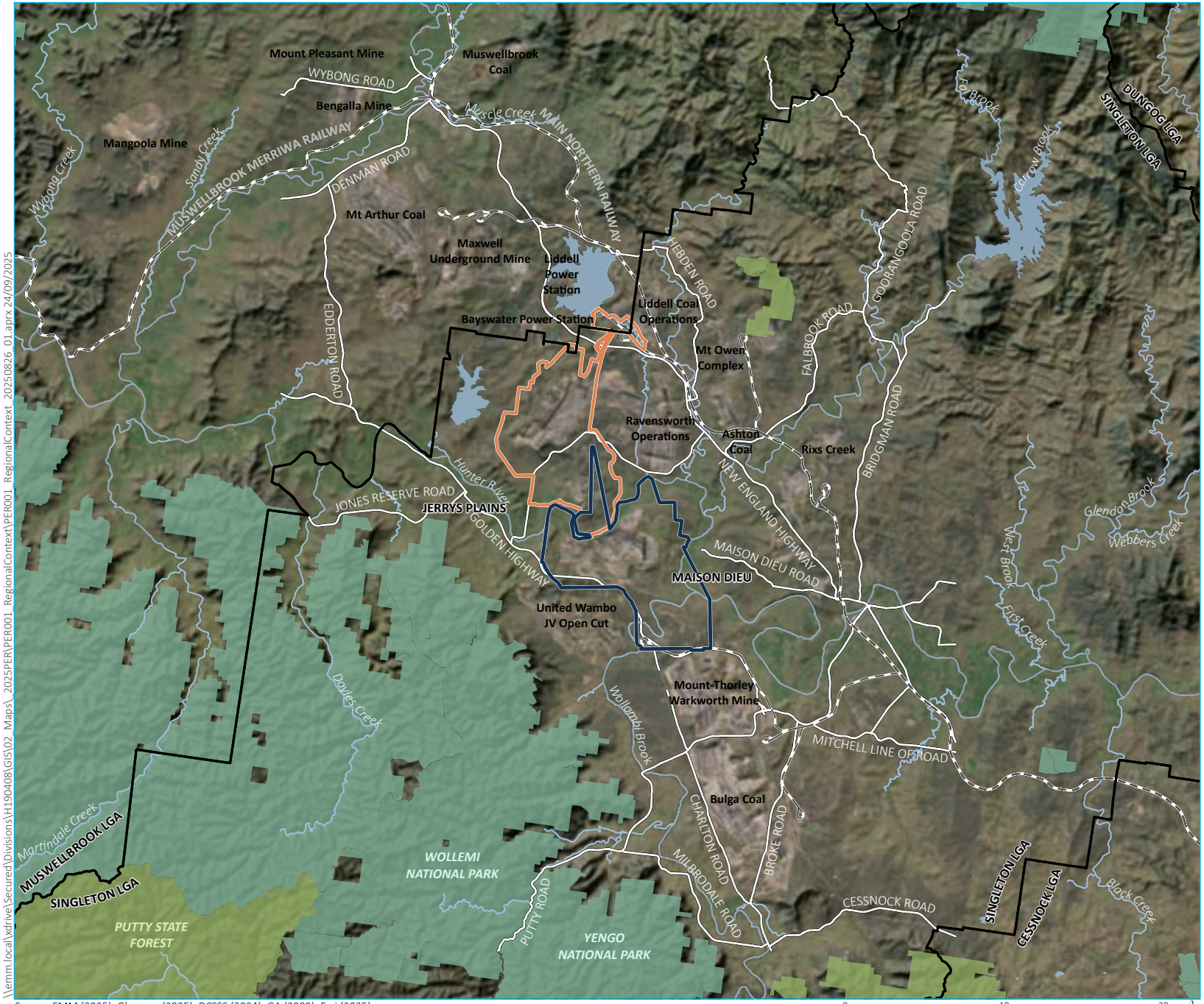
INSET KEY

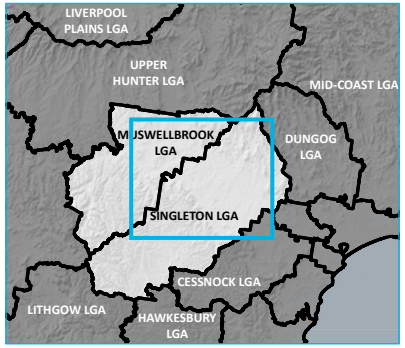
- NPWS reserve
- State forest

Regional locality

HVO Continuation Project
HVO North Public Environmental Report
Figure 1.1

EMM creating opportunities





KEY

- Existing HVO North development consent boundary (DA 450-10-2003)
- Existing HVO South project approval boundary (PA 06_0261)

Existing environment

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

Source: EMM (2025); Glencore (2025); DCSSS (2024); GA (2009); Esri (2025)

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Regional context

HVO Continuation Project
HVO North Public Environment Report
Figure 1.2

EMM creating opportunities

Source: EMM (2025); Glencore (2025); DCSSS (2024); GA (2009)

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KEY

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

Existing environment

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

Local context

HVO Continuation Project
HVO North Public Environment Report
Figure 1.3

EMM creating opportunities

Significant coal resources remain across the HVO Complex beyond what is currently approved for extraction under the EP&A Act. HVO has undertaken extensive investigations into a long-term plan for the complex beyond the approved mine life to increase recovery of the remaining coal resources using existing infrastructure, while balancing social, environmental and economic outcomes. Based on the outcomes of these investigations, HVO is seeking the relevant approvals under the EP&A Act for the HVO Continuation Project (herein referred to as the Project).

Broadly, the Project comprises the continuation of the life of HVO North and HVO South, from the current approved mining completion dates of 2026 and 2030 respectively, to the end of 2045 at HVO North and to the end of 2042 at HVO South. The continuation of mining across the HVO Complex will increase resource recovery from the existing operation, predominantly by mining through previously mined areas, extracting coal from deeper seams within existing mining tenements.

In December 2022, HVO lodged two State significant development (SSD) applications with the then NSW Department of Planning and Environment (DPE, now the NSW Department of Planning, Housing and Infrastructure (DPHI)) under the EP&A Act for the Project, as follows:

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

The SSD applications were supported by one environmental impact statement (EIS) titled *Hunter Valley Operations Continuation Project, Environmental Impact Statement* (EMM 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. A total of 1,047 submissions were received by DPHI from individuals, organisations and one public authority. The majority of the submissions received (91%) were in support of the Project. In addition, 11 government agencies and two local council submissions were received providing advice on the Project.

Following the receipt of submissions on the Project and following ongoing engagement with government agencies and stakeholders, HVO made some amendments to the design of the HVO North Project with the aim of further avoiding impacts to an endangered ecological community (EEC).

HVO subsequently lodged a submissions report and amendment report on 7 November 2023 with the DPHI for the Project. The *Hunter Valley Operations Continuation Project, Submissions Report* (EMM 2023a) responded to all submissions made following public exhibition of the EIS, while the *Hunter Valley Operations Continuation Project, Amendment Report* (EMM 2023b) provided an assessment of the amendments made to the HVO North Project, including an updated description of the justification of the Project and the mitigation measures committed to be implemented. EMM (2023b) is herein referred to as the HVO North Amendment Report.

During the subsequent assessment of the Project by DPHI, the Department issued a number of requests for information (RFI) to HVO, who provided responses as required. In March 2024, DPHI requested the NSW Independent Expert Advisory Panel for Mining (IEAPM) conduct an assessment of the Project in respect to water resources and greenhouse gas (GHG) emissions. The IEAPM advice concluded that:

- in relation to water-related impacts, there is no reason why the Project should not be conditionally approved
- in relation to GHG emissions, the IEAPM acknowledged that the only fugitive emissions avoidance measure available is changes to the mine plan that restricts the areal extent of mining and/or depth of mining, and that a significant fugitive emissions avoidance measure would be not to mine Zones 2, 3 and 4 in gas Domain 1.

On 5 July 2024, a further RFI from DPHI was received by HVO, which included supporting information made up of correspondence to the Planning Secretary from the Hon Paul Scully (Minister for Planning and Public Spaces) and the Hon Penny Sharpe (Minister for Climate Change, Minister for Energy, Minister for the Environment and Minister for Heritage) regarding consideration of the NSW *Climate Change (Net Zero Future) Act 2023* (the NZF Act) which was enacted after the SSD applications were lodged. In his correspondence to the Planning Secretary, the Minister for Planning and Public Spaces acknowledged that NSW is not on track to meet its 2030 and 2035 targets of the NZF Act without action by the NSW Government and private sector. Further, it was reiterated that agencies involved in the decision-making process within the planning system have regard to the NSW Government's emission reduction targets, the guiding principles for the NZF Act, and the then draft *NSW Guide for Large Emitters* (now finalised, EPA 2025) and the new climate change assessment requirements for large emitters.

The RFI from DPHI stated that, in light of the correspondence from the Minister and the conclusions of the IEAPM, the Department requested that HVO provide a response that further considered the implications for the Project if all coal extraction from gas Domain 1 at HVO North was avoided and for HVO to have further consideration of the guiding principles of the NZF Act.

In response to the RFI, HVO completed a detailed review of the Project and amended the SSD applications for the Project, which included, amongst other things, the removal of coal extraction in gas Domain 1. The *HVO Continuation Project, Amendment Report* (EMM 2025a) provided an assessment of the amendments made to the Project, including an updated description of the justification of the Project and the mitigation measures committed to. EMM (2025a) is herein referred to as the Amendment Report.

The Amendment Report was placed on public exhibition for a period of three weeks from Friday 5 September through to Thursday 25 September 2025. In response, a total of 1,717 individual submissions were received from the public and organisations, of which 1,323 were assessed as unique. In addition, six government agency submissions, one public authority submission and one local council submission were received providing advice on the amended Project. Most submissions from the public and organisations (91%) were in support of the amended Project. This is consistent with submissions received during public exhibition of the EIS (2022a), where 91% of the 1,047 submissions received were in support of the Project.

HVO subsequently lodged a submissions report on 21 November 2025 with the DPHI for the Project. The *Hunter Valley Operations Continuation Project, Amendment Submissions Report* (EMM 2025e) responded to all submissions made following public exhibition of the Amendment Report. EMM (2025e) is herein referred to as the Amendment Submissions Report.

At the time of preparation of this draft public environment report (PER), DPHI were undertaking its assessment of the Project, including an assessment of the EIS (EMM 2022a), Submissions Report (EMM 2023a), HVO North Amendment Report (EMM 2023b), Amendment Report (EMM 2025a) and Amendment Submission Report (EMM 2025e).

1.1.2 Commonwealth approval

There is one existing approval granted on 10 October 2016 under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) relating to HVO, EPBC 2016/7640, which allows for the continuation of coal mining operations in areas within the HVO Complex that were previously approved under the EP&A Act after the commencement of the EPBC Act. EPBC 2016/7640 is herein referred to as the HVO EPBC Act Approval.

A second referral (EPBC 2016/7641) was also submitted relating to the extension of open cut coal mining operations at HVO South and the proposed deeper mining in the Bayswater Seam within the Riverview Pit area. This action was considered not likely to significantly impact on a water resource and was determined to be 'not a controlled action' on 20 March 2018.

Further details of the HVO EPBC Act Approval are provided in Section 2.1.

On 15 September 2023, HVO lodged two referrals for the Project under the EPBC Act with the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW), as follows:

- 2023/09651 – HVO North Open Cut Coal Continuation Project
- 2023/09652 – HVO South Open Cut Coal Continuation Project.

On 13 December 2023, a delegate of the Minister for the Environment determined that the actions are controlled actions and approval is required before the proposed actions can commence, as they are likely to have a significant impact on the following matters protected by the EPBC Act:

- listed threatened species and communities (sections 18 and 18A)
- coal seam gas or large coal mining development with impact on water resources (sections 24D and 24E).

The delegate also determined on 13 December 2023 that the proposed actions would be assessed through PERs, one for HVO North and one for HVO South.

The referrals were withdrawn on 1 October 2024, in anticipation of the proposed amendments being made to the Project which, as described above, include, amongst other things, the removal of coal extraction in gas Domain 1.

Revised referrals for the Project were submitted to DCCEEW on 16 April 2025 and deemed valid on 1 May 2025, being:

- EPBC 2025/10177 – HVO North Open Cut Coal Continuation Project (the HVO North Action)
- EPBC 2025/10176 – HVO South Open Cut Coal Continuation Project (the HVO South Action).

On 27 and 28 October 2025 respectively, a delegate of the Minister for the Environment determined that the actions are controlled actions and approval is required before the proposed HVO North Action and HVO South Action can commence as they are likely to have a significant impact on the following matters protected by the EPBC Act:

- listed threatened species and communities (sections 18 and 18A)
- unconventional gas or large coal mining development with impact on water resources (sections 24D and 24E).

The delegate also determined that the proposed actions will be assessed by PERs; one for HVO North and one for HVO South. DCCEEW subsequently issued guidelines for the content of the PERs (the PER guidelines) in correspondence dated 26 February 2026.

1.2 Overview of actions

As stated above, there are two actions related to the Project, titled as follows:

- 2025/10177 – HVO North Open Cut Coal Continuation Project (the HVO North Action)
- 2025/10176 – HVO South Open Cut Coal Continuation Project (the HVO South Action).

This draft PER has been prepared for the HVO North Action (EPBC 2025/10177). A separate draft PER has been prepared for the HVO South Action (EMM 2026a).

1.2.1 HVO North Action summary

A summary of the key components of the HVO North Action are listed below. A full description of the HVO North Action is provided in Chapter 3 of this report with the key components shown on Figure 3.1. Project stages are conceptually illustrated on Figure 3.4 to Figure 3.8 and include:

- continuation of mining operations at HVO North from 1 January 2027 until 31 December 2045
- production of up to 22 Mtpa for HVO North (complex maximum extraction rate of 26 Mtpa) with no separation of extraction limits between West Pit and Carrington Pit
- infrastructure upgrades, as listed below:
  - realignment of Lemington Road and construction of a new bridge over the Hunter River
  - relocation of the HVO North site access road off the existing Lemington Road
  - increase in the capacity of Parnells Dam from approximately 1 gigalitre (GL) to approximately 4 GL
  - realignment of transmission and telecommunication lines that are currently within the proposed mining area
  - upgrades to the HVO North MIA
  - expansion of the HVO North ROM coal stockpile to improve coal management
  - maintenance and ancillary activities as required to facilitate operations, including the replacement of plant and equipment, where required
  - construction of access roads to facilitate service provider access
  - use of demountable/temporary buildings and other ancillary temporary facilities to enable construction activities and mining operations, as required
  - access road establishment to an existing mine-owned property east of realigned Lemington Road
- transport product coal by truck or overland conveyor from all CPPs to loading points (HVLP and Newdell LP)
- receipt of ROM coal from HVO South via internal haul roads for processing at all CPP facilities approved for HVO North
- management of tailings in accordance with a Tailings Management Strategy
- upgrade of product coal infrastructure as follows:
  - establishment of a new Newdell product stockpile and upgrade of the existing Newdell train loading facility or an extension of the product coal stockpile footprint at the HVLP to increase the total stockpile capacity of the load point
  - construction of a haul road to enable ROM coal to be transported to the neighbouring Ravensworth Operations ROM pad via haul truck for processing, from where product coal is then transferred to the Ravensworth Coal Terminal for transport to market

- ability to temporarily transport product coal by truck from the Howick CPP to the Liddell stockpile for transport to market via the Liddell coal handling and train loading facilities during upgrades of the Newdell LP

- implementation of a revised water management system (WMS) including construction of levees, clean water diversions and the Carrington West Wing low permeability barrier wall.

Other than as set out above, all activities that are currently approved under the existing HVO North Consent and HVO EPBC Act 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 maximum allowable annual ROM coal extraction and processing rate of 22 Mtpa
- receipt of ROM coal from HVO South via internal haul road for processing at all CPP facilities approved for HVO North
- approved heights of overburden emplacement areas
- continued avoidance of CM-CD1
- operating hours, annual workforce numbers and associated operational traffic generation.

1.2.2 HVO South Action summary

A summary of the key components of the HVO South Action are listed below, and further detailed in a separate draft PER (EMM 2026a):

- continuation of mining operations at HVO South from 24 March 2030 until 31 December 2042
- a reduction in the approved maximum extraction rate from 20 Mtpa to 13 Mtpa for HVO South (complex maximum extraction rate of 26 Mtpa)
- removal of coal extraction from the mine plan for the Riverview South East Extension, and South Lemington Pit 1 and 2
- infrastructure upgrades including:
  - relocation of some 11 kilovolt (kV) and 66 kV Ausgrid transmission lines
  - realignment of internal transmission lines to support mining activities
  - HVO South access road relocation to join the realigned Lemington Road
  - access roads to facilitate service provider access
  - use of demountable/temporary buildings and other ancillary temporary facilities including laydown areas to enable construction activities and mining operations, as required
  - removal of the approval for the construction and operation of the LCPP and rail facilities
  - removal of the construction and operation of the approved conveyor from HVO South to the HVCPP at HVO North (the conveyor has not been constructed)

- continuation of integrated water management with HVO North and water transfers with other mining operations (where permitted under the development consents that apply to those other mining operations)
- construction of the Cheshunt and Riverview flood protection levees
- enlargement of Lake James from approximately 0.7 GL to 2 GL.

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

- no change to the receipt of HVO South coal at all HVO North CPPs via internal haul road for processing
- no change to operating hours
- no change in annual workforce numbers or associated operational traffic generation
- no increase to approved heights of overburden emplacement areas.

1.3 The proponent

HVO is owned by subsidiary companies of Yancoal and Glencore, as participants in the unincorporated HVO Joint Venture (JV). HV Operations Pty Ltd is the appointed manager of the HVO JV in which:

- 51% interest is held by Coal & Allied Operations Pty Ltd (a wholly owned subsidiary of Yancoal)
- 49% interest is held by Anotero Pty Ltd (a wholly owned subsidiary of Glencore).

HV Operations Pty Ltd is the proponent of the Project. The proponent and nominated contact details are detailed in Table 1.1.

Table 1.1 Proponent details

Requirement	Detail
Proponent	HV Operations Pty Ltd
Postal address	PO Box 315, Singleton NSW 2330
ABN	76 606 478 399
Nominated contact	Peter Walsh
Contact details	1800 888 733

1.4 Objectives of HVO North Action

The primary objective of the HVO North Action is to efficiently and economically recover remaining coal reserves within existing mining tenements and predominantly within existing and approved disturbance areas, using existing infrastructure. The HVO North Action will:

- enable the continuation of a brownfield mining complex in a long-established coal mining and power generation precinct
- maximise resource recovery by mining to the base of the Barrett seam in West, Mitchell and Carrington Pit areas and the base of the Bayswater seam in the Carrington West Wing area in HVO North, within existing mining tenements, using mostly existing or already approved infrastructure and minimising further disturbance
- provide ongoing employment across the HVO Complex well beyond the life of the current approvals under which the HVO 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 where areas disturbed by mining activities as a result of the Project will reflect a landform that is sympathetic to the surrounding landscape
- maintain the maximum annual ROM coal extraction rate at HVO North at up to 22 Mtpa
- continue the ongoing contribution to the local, regional, and State economies from a well-established mining operation.

1.5 Location of the HVO North Action

HVO North is approximately 24 kilometres (km) north-west of Singleton in the Hunter Valley of NSW (refer to Figure 1.1 and Figure 1.2).

1.6 Other actions in region

HVO is located within a well-established coal mining and power generation region in the Hunter Valley and is one of the oldest mines in the Hunter Valley. The coal industry in Singleton can be traced back to the 1850s in Rix's Creek and Glendon.

Existing land uses surrounding HVO are shown in Figure 1.2 and include mining operations and mine-owned buffer land, power generation industries, agricultural land, transport infrastructure, rural residential areas and conservation areas.

The general area surrounding the HVO Complex comprises a number of operating and former open-cut and underground coal mining operations. Existing open cut pits, mine-related infrastructure and rehabilitated former mining areas are to the north, south-east and south-west of the HVO Complex.

Table 1.2 summarises the controlled actions relevant to these surrounding mining operations.

Table 1.2 Controlled actions surrounding HVO

Reference number	Project name	Status
2002/629	Extending existing operations at Warkworth Coal Mine	Condition variation being considered
2002/773	Bulga Complex Underground Coal Mine Extension	Approval decision made
2003/1138	Wambo Coal Mine Development Project	Approval decision made
2009/5081	Warkworth Mine Extension	Approval decision made
2010/5389	Ravensworth Operations Project	Approval decision made
2011/5795	Mount Pleasant Project	Approval decision made
2011/5866	Mt Arthur Coal Extension Project	Approval decision made
2013/6908	Extension of Liddell Open Cut Coal Mining Operations	Approval decision made
2013/6978	Mt Owen continued coal mining operation	Approval decision made
2014/7377	Mt Arthur Coal open cut mine modification	Approval decision made
2015/7600	United and Wambo open cut coal mine project, Hunter Valley, NSW	Approval decision made
2016/7636	South Wambo underground coal mine extension, NSW	Approval decision made
2018/8280	Mangoola Coal Continued Operations Project	Approval decision made
2018/8287	Maxwell Coal Mine	Approval decision made
2018/8300	Bulga Coal Optimisation Project Modification	Approval decision made
2019/8409	Glendell Mine Continued Operations Project	Assessment approach determined
2020/8735	Mount Pleasant Optimisation Project	Approval decision made
2022/09208	Ashton Coal Operations Ravensworth Underground Mine	Approval decision made
2024/09796	Mt Arthur Coal Mine Modification 2	Referral decision made
2024/09874	Hunter Transmission Project	Assessment Approach determined
2025/10131	Rix's Creek North Open Cut Mine	Awaiting delegate decision
2025/10132	Rix's Creek North Continuation of Open Cut Coal Mining Project	Assessment approach determined
2025/10236	Continuation of Bengalla Mine Modification 8	Assessment approach determined

The HVO South Action (EPBC 2025/10176) is subject to a separate assessment and approval under the EPBC Act, with details of the HVO South Action provided in a separate draft PER. Due to the inter-relationships between the HVO North Action and the HVO South Action, a summary of the HVO South Action is outlined in this report in Section 3.1. This draft PER also considers the cumulative impacts of both the HVO North Action and the HVO South Action.

1.7 Status of HVO North Action

As previously stated, while the Project requires approval under the EPBC Act, it also requires development consent under the provisions of Part 4 of the EP&A Act. At the time of publication of this draft PER, the SSD applications for the HVO North Continuation Project and the HVO South Continuation Project have yet to be determined. The DPHI will undertake its assessment of the Project considering all the documentation before it, before providing its assessment report to the consent authority (the NSW Independent Planning Commission (IPC)) for determination.

Further details on the approvals process are provided in Chapter 8 of this draft PER.

1.8 Consequences of not proceeding

Not proceeding with the HVO North Action would likely mean the cessation of mining at the HVO Complex (i.e. both HVO North and HVO South) at the end of the HVO North Consent (as modified) being 31 December 2026.

Currently, the HVO South Approval allows for mining to continue to 24 March 2030; however, as HVO South coal is currently processed through HVO North-based facilities, no further coal extraction at HVO South would occur if the HVO North Action did not proceed, as the ability to use the processing facilities would cease when the end date for approved mining under the HVO North Consent is reached on 31 December 2026. Not proceeding with the HVO North Action would therefore forego the approved ROM coal remaining to be extracted at HVO South, as well as the extraction of approximately 307 Mt of ROM coal at HVO North, comprising approximately 200 Mt in areas beyond those currently approved for extraction. It would also mean cessation of employment of the existing HVO workforce and the associated flow-on benefits.

As described in detail in Section 8.4, the HVO North Action will generate significant net benefits to NSW, including increased economic activity and employment within the NSW community. In 2024, HVO spent $1,050 million on Australian suppliers, contributed $276 million on taxes and royalties and spent $224 million on wages to 1,515 direct employees. Not proceeding with the HVO North Action would mean that these significant benefits would not be realised. The estimated net benefit of the HVO North Action to NSW is $3,719.5 million in net present value (NPV) terms, while the Project as a whole will result in a net benefit to NSW of $5,692.4 million NPV. At a local scale, the HVO North Action is expected to deliver a net benefit to the Lower Hunter (SA3) region of $1,207.7 million, while the broader Project will deliver a net benefit to the local region of $1,778.1 million. Not proceeding with the HVO North Action would forgo these benefits for the local community and the State of NSW.

1.9 Purpose of this document

DCCEEW issued guidelines for the content of this draft PER (the PER guidelines). The requirements listed in the PER guidelines for HVO North, and where they have been addressed in this report, is provided in Appendix A.

The PER guidelines states that the PER should be a document that focuses on the matters listed below:

- listed threatened species and communities (section 18 and section 18A)
- unconventional gas or large coal mining development with impact on water resources (sections 24D and 24E).

For listed threatened species and communities, the PER guidelines state that the PER must provide information for listed threatened species and ecological communities identified as being significantly impacted by the proposed HVO North Action, but not limited to:

- Central Hunter Valley Eucalypt Forest and Woodland – critically endangered
- Hunter Valley delma (*Delma vescolineata*) – endangered.

The PER guidelines also state that DCCEEW considers that there is potential for the HVO North Action to have an impact on additional species and communities, including but not limited to:

- Spotted-tailed Quoll (*Dasyurus maculatus maculatus*) south-eastern mainland population – endangered
- Large-eared Pied Bat (*Chalinolobus dwyeri*) – endangered
- Grey-headed Flying-fox (*Pteropus poliocephalus*) – vulnerable
- Swift Parrot (*Lathamus discolor*) – critically endangered
- Regent Honeyeater (*Anthochaera phrygia*) – critically endangered
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland ecological community – critically endangered
- Warkworth Sands Woodland of the Hunter Valley ecological community – critically endangered.

In relation to unconventional gas or large coal mining development with impact on water resources, the PER guidelines state that the PER must provide a description of the water resources which may be impacted by the proposed HVO North Action including impacts from upgrades to infrastructure, expansion of mining areas and the extension of mine life.

This draft PER has been prepared in accordance with the PER guidelines and Schedule 4 of the Commonwealth *Environment Protection and Biodiversity Conservation Regulations 2000* (EPBC Regulations).

The draft PER was submitted to DCCEEW on 10 April 2026 for review against the PER guidelines. The Department subsequently determined that the document meets those guidelines and approved its release for public exhibition and comment.

Following the public exhibition period, a final PER will be prepared that addresses submissions received during public consultation. DCCEEW will then assess the HVO North Action based on the final PER and prepare a recommendation report for the Commonwealth Minister for the Environment's consideration. The Minister will subsequently decide whether to approve or refuse the action, including any conditions of approval, having regard to the recommendation report.

1.10 Draft PER structure

This draft PER is structured as follows:

- Chapter 1 – Introduction. This chapter introduces the HVO North Action and provides information required in Section 1 of Part B of the PER guidelines.
- Chapter 2 – Overview of existing operations. This chapter provides on overview of operations at HVO, including the extraction of coal, transportation of coal, waste rock management, water management and rehabilitation. It also provides an overview of the workforce and operating hours.
- Chapter 3 – Description of the HVO North Action. This chapter provides details on the broader Project, including the key elements of the HVO North Action. The chapter also describes alternatives considered for the HVO North Action and information required by section 2 of Part B of the PER guidelines.
- Chapter 4 – Existing environment. This chapter provides a general overview of the existing environment within and surrounding the HVO North Action Area.

- Chapter 5 – MNES – biodiversity. This chapter focuses on the relevant biodiversity related MNES including listed threatened species and communities. This chapter includes details of biodiversity related MNES present within the HVO North Action Area, assesses impacts to biodiversity related MNES, and identifies management and offset measures for MNES that will be implemented for the Project.

- Chapter 6 – MNES – water resources. This chapter focuses on the relevant water resource related MNES including impacts to surface water and groundwater. This chapter includes an assessment of impacts to water resources and identifies management and mitigation measures that will be implemented for the Project.

- Chapter 7 – Rehabilitation and closure. This chapter provides an overview of the rehabilitation and closure approach and objectives for the Project and the rehabilitation management measures that will be implemented for the Project.

- Chapter 8 – Other requirements. This chapter provides information on other approvals required for the Project, including a description of the monitoring, enforcement and review procedures that may apply to the Project should development consent be granted for the Project under the EP&A Act. This chapter includes an assessment of the social and economic matters relevant to the Project and a statement in relation to the environmental record of the proponent.

- Chapter 9 – Consultation. This chapter includes an overview of consultation undertaken and proposed for the Project.

- Chapter 10 – Summary of mitigation measures. This chapter includes a detailed summary of all mitigation, management and monitoring commitments that will be implemented tor the Project.

- Chapter 11 – Conclusion. This chapter provides an overall conclusion as to the environmental acceptability of the HVO North Action, including discussion on its compliance with the principles of ecological sustainable development (ESD) and the objects and requirements of the EPBC Act.

1.11 Terminology

Key terms used throughout this draft PER in relation to the HVO North Action and the broader Project are defined below.

Table 1.3 Key terminology

Term	Definition
HVO Complex Biodiversity Impact Assessment Area (HVO Complex BIAA)	Area requiring assessment for potential impacts to MNES (threatened species and communities) as a result of both the HVO North and South Actions. It comprises Domains 2b, 3 and 4, as described in Section 3.2.
HVO North Biodiversity Impact Assessment Area (HVO North BIAA)	Area requiring assessment for potential impacts to MNES (threatened species and communities) as a result of the HVO North Action. It comprises Domains 2b, 3 and 4 at HVO North, as described in Section 3.2.
HVO South Biodiversity Impact Assessment Area (HVO South BIAA)	Area requiring assessment for potential impacts to MNES (threatened species and communities) as a result of the HVO South Action. It comprises Domains 2b, 3 and 4 at HVO South, as described in Section 3.2.
HVO EPBC Act Approval	The existing approval under the EPBC Act (EPBC 2016/7640) that applies to the HVO Complex.
HVO Complex	The combined operations of HVO North and HVO South.

Term	Definition
HVO North	Existing operations authorised by Development Consent DA 450-10-2003 (as modified) (the HVO North Consent) and EPBC 2016/7640.
HVO North Action Area	Area defined on Figure 3.1. The HVO North Action Area is consistent with the proposed State Development Consent boundary sought under the EP&A Act (SSD-11826681).
HVO North Open Cut Coal Continuation Project (HVO North Action)	All activities for which approval is sought at HVO North under the EPBC Act as described in Section 3.
HVO South	Existing operations authorised by Project Approval 06_0261 (as modified) (the HVO South Approval) and EPBC 2016/7640.
HVO South Action Area	Area defined on Figure 3.1. The HVO South Action Area is consistent with the proposed State Development Consent boundary sought under the EP&A Act (SSD-11826621).
HVO South Open Cut Coal Continuation Project (HVO South Action)	All activities for which approval is sought at HVO South under the EPBC Act as described in the HVO South draft PER (EMM 2026a).
The Project	The HVO Continuation Project in its entirety, as described in Section 3.1 of this report, encompassing the continuation of the life of the complex, i.e. both HVO North and HVO South, within their respective proposed Action Areas, as illustrated in Figure 3.1. Approval for the Project is sought by: • HVO North: – SSD-11826681 (under the EP&A Act) – EPBC 2025/10177 (under the EPBC Act). • HVO South: – SSD-11826621 (under the EP&A Act) – EPBC 2025/10176 (under the EPBC Act).

2 Overview of existing operations

2.1 Existing approvals and development history

2.1.1 Commonwealth approvals

As stated in Section 1.1, there is one existing approval under the EPBC Act at HVO – the HVO EPBC Act Approval.

In 2016, a referral (EPBC 2016/7640) was submitted to allow for the continuation of coal mining operations in areas within the HVO Complex that were previously approved under the EP&A Act after the commencement of the EPBC Act. This referral covered discrete areas across both HVO North and HVO South and related to the presence of the critically endangered ecological community (CEEC) Central Hunter Valley Eucalypt Forest Woodland, which was listed as a CEEC by the Federal Government in 2015. The action was declared a controlled action and was approved by the Minister on 10 October 2016. The HVO EPBC Act Approval has effect until 31 December 2030.

The HVO EPBC Act Approval was varied on 11 August 2017 to delete conditions 5, 6, 7 and 9 attached to the approval and substitute with the conditions specified in the variation notice.

In 2016, a second referral (EPBC 2016/7641) was also submitted relating to the extension of open cut coal mining operations at HVO South and the proposed deeper mining in the Bayswater Seam within the Riverview Pit area. This action was considered not likely to significantly impact on a water resource and was determined to be 'not a controlled action' on 20 March 2018.

In addition, large portions of HVO North benefit from the provisions of the EPBC Act relating to actions with prior authorisation, as set out under section 43A of the EPBC Act. These rights are afforded to HVO because of approvals and licences issued under the EP&A Act and the NSW *Protection of the Environment Operations Act 1997* (POEO Act), respectively, that were in place as at the commencement of the EPBC Act in July 2000 and the commencement of the 'water trigger' under the EPBC Act in 2013 (see section 22 of the *Environment Protection and Biodiversity Conservation Amendment Act 2013*). Where this PER refers to existing approved operations at HVO North, this includes operations which benefit from the prior authorisation provisions under the EPBC Act.

2.1.2 NSW planning approvals

Since the beginning of operations in 1949, the development of HVO has occurred through a series of expansions and acquisitions that, at one point, resulted in the operation managing 18 separate development approvals for activities north of the Hunter River, and 25 separate development approvals for activities south of the Hunter River.

HVO North operates under the HVO North Consent, which was granted on 12 June 2004 by the then NSW Minister for Infrastructure and Planning under Part 4 of the EP&A Act. The HVO North Consent consolidated the 18 historical approvals for activities at HVO North, authorising the continuation of all aspects of HVO North as it currently operated at the time and extending and altering certain aspects as described in the EIS that accompanied the development application (DA).

The HVO North Consent has since been modified on eight occasions with the latest modification, Modification 8 (MOD 8), approved on 24 April 2025 and permits ongoing mining operations through to 31 December 2026.

The HVO South Approval was granted on 24 March 2009 by the then NSW Minister for Planning. This approval, amongst other things, consolidated 25 separate consents and 10 project modifications that applied to HVO South into a single project approval. As was the case with the HVO North Consent, the HVO South Approval also authorised continuation of all operational activities and aspects that were in place at the time under historical approvals. HVO South Approval has been modified on eight occasions.

A summary of the current approvals and development consents held by HVO is provided in Table 2.1, including the history of modifications of these approvals.

Table 2.1 HVO planning approval history

Approval number	Issue date	Summary of approved activity
HVO North		
DA 450-10-2003	12 June 2004	Consolidation of 18 existing development approvals applying to HVO North, into a single consent, fully integrating West Pit into existing operations. Continuation of all aspects of HVO north of the Hunter River as it operated at the time under historical approvals. Extension of open cut mining in West Pit to the east. Production rate of 12 Mtpa ROM coal from West Pit, 10 Mtpa ROM coal from Carrington Pit. Coal haulage of 16 Mtpa from HVO South to the HVCPP. Total processing capacity of 20 Mtpa at HVCPP, 6 Mtpa at HCPP and 4.5 Mtpa at Newdell CPP (subsequently demolished as approved under this development consent). Movement of coal and rejects between areas of HVO, including between HVO South and HVO North. Temporary crossings of the Hunter River for heavy equipment too heavy for the existing bridge. Mining operations permitted until 12 June 2025. Operations 24 hours a day, 7 days a week.
DA 450-10-2003 MOD 1	16 August 2005	Upgrade of HVLP to increase the loading rate from 4,000 tonnes per hour (tph) to an average rate of approximately 5,100 tph with a peak load of up to 7,200 tph.
DA 450-10-2003 MOD 2	25 June 2006	Extension of open cut mining to the south and east of Carrington Pit to access approximately 19 Mt of ROM coal. Construction of up to three levees and potential construction of groundwater low permeability barrier walls. Diversion of an existing drainage channel. Construction of a service corridor and modification of the development consent boundary.
DA 450-10-2003 MOD 3	19 March 2013	Extension of the Carrington Pit to the west (in an area known as the Carrington West Wing) to allow an additional 17 Mt of ROM coal to be extracted over a period of six years. Development of an out-of-pit overburden emplacement area to the north of the extension area. Construction of flood levees, a groundwater low permeability barrier wall, a temporary watercourse diversion and a service corridor to the south of the extension area. Rehabilitation of the site. Modification of the development consent boundary to include the extension area. Realignment and increase in the size of the approved Carrington Pit final void to 100 hectares (ha).
DA 450-10-2003 MOD 4	16 January 2014	Installation of overland pipelines to transport fine reject slurry. Construction and operation of a new fine reject emplacement area. Modification to the development consent boundary to encompass Cumnock Void 3, located to the north-east of West Pit.
DA 450-10-2003 MOD 5	9 December 2016	Upgrade of a sediment dam and relocation of a powerline corridor at the HVLP. Approval for communication towers to be constructed anywhere within the HVO North mining complex.

Approval number	Issue date	Summary of approved activity
DA 450-10-2003 MOD 6	25 January 2017	Emplacement of fine rejects in Carrington Pit.
DA 450-10-2003 MOD 7	28 July 2017	Administrative modification to include mining lease application areas within the development consent boundary.
DA 450-10-2003 MOD 8	24 April 2025	An extension of time to authorise the continuation of mining for an additional 18 months until 31 December 2026.
884/2004	February 2005 (Singleton Council)	Construction and use of an access road to the former Energy Australia (now Ausgrid) substation.
HVO South		
PA 06_0261	24 March 2009	Consolidation of 25 separate consents and 10 associated modifications that applied to HVO South. Continuation of all aspects of HVO South as it operated at the time under historical approvals. Extraction of up to 16 Mtpa of ROM coal, using opencut and highwall/auger mining methods. Transportation of coal by truck to the LCPP or any existing CPP at HVO North, and continuation of the approval to construct a coal conveyor to HVO North. Processing capacity of 16 Mtpa at LCPP. Transport of ROM coal from all HVO South pits for processing at any HVO CPP. Emplacement of coal reject within HVO North and HVO South overburden emplacements, and storage of tailings in existing and additional facilities at HVO South. Construction of either of two options for the rail line, rail loop and coal loading facilities (adjacent to the LCPP or South Lemington Pit 1). Transportation of overburden and product coal between HVO South and HVO North in either direction. Mining operations permitted until 24 March 2030. Operations 24 hours a day, 7 days a week.
PA 06_0261 MOD 1	17 December 2009	Amendment of the HVO South Approval boundary to incorporate Lake James and associated infrastructure. Increased storage capacity (730 megalitres (ML)) and maximum discharge rate (200 megalitres per day (ML/day)) of Lake James, which forms part of HVO's WMS.
PA 06_0261 MOD 2	3 February 2012	Reallocation of 140 ha of remnant woodland vegetation and native enhancement areas with the Archerfield Biodiversity Enhancement Area to an alternative site within the Goulburn River Biodiversity Area (part of the offset package for the Warkworth Continuation Project, previously known as the Warkworth Extension Project).
PA 06_0261 MOD 3	31 October 2012	Inclusion of reference to (and biodiversity conservation measures for) the Goulburn River Biodiversity Offset Area, and to amend the Statement of Commitments to remove the suggestion that HVO South has ongoing obligations in relation to the Archerfield Biodiversity Enhancement Area.
PA 06_0261 MOD 4	31 October 2012	Clarification that HVO would not undertake mining-related activities in the biodiversity offset areas established for the Warkworth Extension Project that lie within the area subject to the HVO South Approval. Relinquishment of a yet to be constructed western heavy equipment access route, with respect to Warkworth Mine's former Habitat Management Area.
PA 06_0261 MOD 5	28 February 2018	The progression of mining from the Cheshunt Pit into Riverview Pit to mine to the base of the deeper Bayswater seam and in South Lemington Pit 2 to mine to the base of the Vaux seam below the Bowfield seam; amendment to the overburden emplacement strategy, an increased rate of extraction to 20 Mtpa of ROM coal and an update to the Statement of Commitments within the HVO South Approval to remove inconsistencies with approved management plans.

Approval number	Issue date	Summary of approved activity
PA 06_0261 MOD 6	26 November 2021	Construction and operation of a modular ammonium nitrate emulsion manufacturing plant within the existing approved HVO South mine disturbance area.
PA 06_0261 MOD 7	27 May 2022	Augmenting the existing approved water management infrastructure to enable the transfer and storage of water into the existing Lemington Underground Mine void for later extraction and reuse at Mount Thorley Warkworth (MTW) and HVO. Construction of bores and associated infrastructure (e.g. pumps and power supply) at three transfer sites and adjacent to the existing Lemington underground (LUG) bore, and the use of these bores to transfer water from HVO into and out of the former Lemington Underground Mine void, and development of supporting infrastructure (including pipelines and powerlines).
PA 06_0261 MOD 8	23 February 2023	Increased storage capacity for raw materials used in the manufacturing of ammonium nitrate emulsion.

2.1.3 Other approvals

i Environment protection licence

HVO operates under one environment protection licence (EPL) issued under the POEO Act, EPL 640, which applies across the HVO Complex and is detailed in Table 2.2.

Table 2.2 HVO licensed activities

Licence number	Date issued	Licensee detail	Scheduled activity and scale
EPL 640	29 September 2000 (as varied from time to time)	Licensee: HV Operations Pty Ltd Premises: Hunter Valley Operations	Coal works: >5 Mtpa handling capacity. Crushing, grinding or separating: >2 Mtpa processing capacity. Dangerous goods production: >25 kilotonnes per annum (ktpa) production capacity. General chemicals storage: >5,000 to 100,000 kL storage capacity. Mining for coal: >5 Mtpa production capacity. Other extractive activities >50 to 100 ktpa extracted or processed.

ii Mining tenements

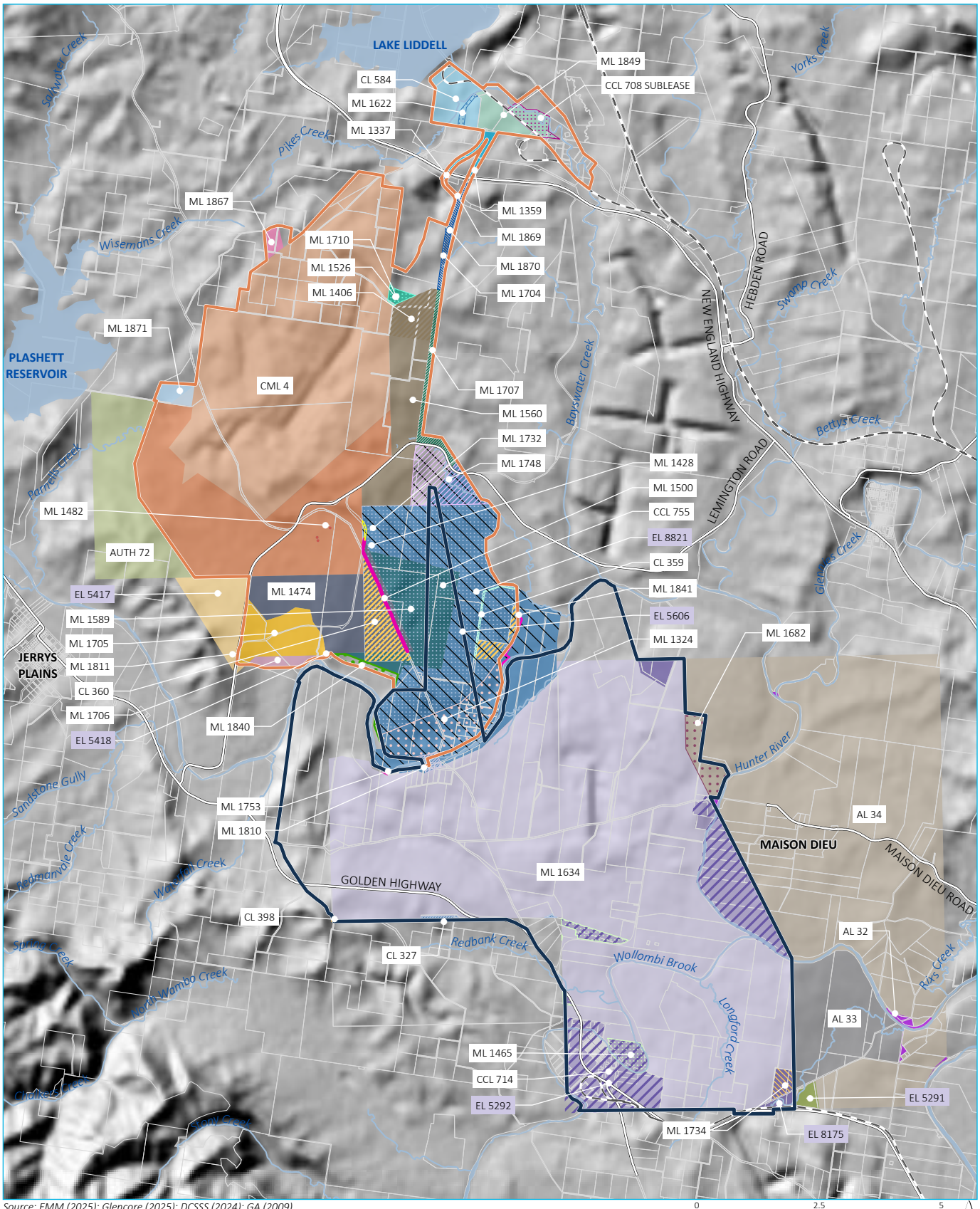
There are 53 tenements held across the HVO Complex including one sublease area (shown in Figure 2.1). Table 2.3 provides a list of tenements, their purpose, depth and restrictions.

Table 2.3 Mining tenements

Tenement	Expiry	Depth restrictions
Assessment lease (AL)		
AL 32	04/11/2026	Surface to 900 m
AL 33	04/11/2026	Surface to 900 m
AL 34	04/11/2026	1. Surface to 900 m 2. 20 m below surface to 900 m

Tenement	Expiry	Depth restrictions
Authorisation (AUTH)		
Auth 72	08/03/2027	Surface to 900 m
Consolidated coal lease (CCL)		
(Part) CCL 708 (Liddell)	15/05/2044	Various subleases
CCL 714	30/08/2030	1. 20 m below surface to 50 m below Mt Arthur seam 2. Mines, beds, veins and seams of coal only to 900 m
CCL 755	05/03/2030	1. Surface to 5 m below floor of Vaux seam 2. 15.24 m to 5 m below floor of Vaux seam 3. 20 m to 5 m below floor of Vaux seam
Coal lease (CL)		
CL 327	06/03/2031	1. Surface to 5 m below floor of Vaux seam 2. 20 m below surface to 5 m below floor of Vaux seam
CL 359	21/05/2032	Surface to 20 m
CL 360	29/05/2032	1. Surface to 20 m 2. 5 m to 20 m below surface
CL 398	04/06/2034	Surface to 20 m
CL 584	31/12/2044	1. Surface to 6.1 m 2. Surface to 15.24 m 3. Surface to 30.48 m 4. Strata from 15.24 m to 30.48 m from surface
Consolidated mining lease (CML)		
CML 4	03/06/2033	1. Surface to 15.24 m 2. Surface to 900 m 3. 15.24 m to unlimited depth
Exploration licence (EL)		
EL 5291	28/04/2029	Surface to 900 m
EL 5292	27/04/2028	50 m below Mt Arthur seam to 900 m below surface
EL 5417	23/12/2027	Surface to 900 m
EL 5418	23/12/2028	Surface to 900 m
EL 5606	11/08/2029	1. Surface to 900 m 2. Surface to 5 m below floor of Bayswater seam 3. 5 m below floor of Vaux seam to 5 m below floor of Bayswater seam 4. 5 m below floor of Vaux seam to 900 m
EL 8175	23/09/2026	50 m below floor of MtArthur seam to 900 m
EL 8821	13/02/2031	1. 5 m below Bayswater seam to 900 m 2. Surface to 15.24 m and 5 m below Bayswater seam to 900 m 3. Surface to 900 m
Mining lease (ML)		
ML 1324	19/08/2035	Surface to 5 m below floor of Vaux seam
ML 1337	01/02/2034	Surface to 15.24 m
ML 1359	01/11/2036	Surface to 15.24 m

Tenement	Expiry	Depth restrictions
ML 1406	10/02/2027	15.24 m to unlimited depth
ML 1428	14/04/2040	1. Surface to 900 m 2. Excepts surface to 15.24 m
ML 1465	21/02/2042	Surface to 20 m
ML 1474	23/11/2042	1. Surface to 900 m 2. 5 m below Vaux seam to unlimited depth
ML 1482	19/03/2040	Surface to 900 m
ML 1500	20/12/2043	1. Surface to 5 m 2. Surface to 15.24 m
ML 1526	02/12/2044	Surface to 15.24 m
ML 1560	28/01/2046	1. Surface to 15.24 m 2. Surface to unlimited depth
ML 1589	01/11/2027	1. Surface to unlimited depth 2. Excludes the strata between 5 m below the surface to 5 m below floor of Vaux seam 3. 5 m below floor of Vaux seam to unlimited depth
ML 1622	10/03/2027	Surface to 15.24 m
ML 1634	31/07/2030	Surface to 900 m
ML 1682	16/12/2033	Surface to 20 m
ML 1704	05/12/2035	Surface to 15.24 m
ML 1705	17/12/2035	Surface to 900 m
ML 1706	09/12/2035	Surface to 50 m
ML 1707	09/12/2035	1. Surface to 900 m 2. Surface to 5 m below floor of Bayswater seam
ML 1710	10/03/2027	15.24 m to 20 m above roof of Upper Liddell seam
ML 1732	06/04/2037	Surface to 15.24 m
ML 1734	06/04/2037	Surface to 20 m
ML 1748	05/12/2037	Surface to 20 m
ML 1753	19/04/2038	Surface to 20 m
ML 1810	04/11/2041	Surface to 20 m
ML 1811	04/11/2041	Surface to 900 m
ML 1840	03/11/2043	Surface to 20 m
ML 1841	03/11/2043	Surface to 20 m
ML 1871	15/12/2044	1. Surface to 20 m 2. 15.24 m to 20 m below surface
ML 1867	16/11/2044	Surface to 20 m
ML 1869	15/12/2044	Surface to 15.24 m
ML 1849	16/05/2044	Surface to 15.24 m Surface to 20 m
ML 1870	15/12/2044	Surface to 15.24 m



Source: EMM (2025); Glencore (2025); DCSSS (2024); GA (2009)

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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 environment

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

Mining authority

- 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
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- ML 1682
- ML 1704
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- ML 1706
- ML 1707
- ML 1710
- ML 1732
- ML 1734
- ML 1748
- ML 1753
- ML 1810
- ML 1811
- ML 1840
- ML 1841
- ML 1849
- ML 1867
- ML 1869
- ML 1870
- ML 1871

Mining authorities

HVO Continuation Project
HVO North Public Environment Report
Figure 2.1

EMM creating opportunities

2.2 HVO Complex operations

2.2.1 Overview

Mining at HVO involves the following general sequence:

- vegetation stripping and topsoil removal
- open cut mining to remove the overburden and interburden and coal
- emplacement of overburden and interburden
- coal processing and transportation of coal to the train load out facilities
- overburden shaping and rehabilitation.

Land preparation ahead of mining involves the construction of appropriate erosion and sediment control structures, clearing of vegetation, and the stripping and direct placing on rehabilitation of topsoil or stockpiling of topsoil for rehabilitation of the site. Mining is primarily carried out by shovels and excavators, supported by loaders, dozers, graders, drill rigs, water trucks, other ancillary equipment and a fleet of haul trucks. Overburden and interburden is either free dug or drilled and blasted and removed using a dragline or a combination of shovel/excavator/front end loaders/dozers and placed in trucks for haulage to out of pit emplacements or to backfill areas in the pit.

Mining is currently undertaken in four main areas:

- HVO North:
  - West Pit – progressing in a southerly direction towards Lemington Road
  - Mitchell Pit – progressing in a southerly and easterly direction, also towards Lemington Road.
- HVO South:
  - Cheshunt Pit – progressing in a westerly and southerly direction
  - Riverview Pit – progressing from Cheshunt Pit.

i HVO North summary

The existing HVO North Consent boundary, shown in Figure 2.2, comprises the approved mining areas of West Pit, Mitchell Pit, North Pit and Carrington Pit. In addition, the HVO North Consent boundary contains associated mining infrastructure, notably access tracks, administration buildings, water storage infrastructure, pipelines, workshops, transmission lines, CPPs and associated coal handling infrastructure, including conveyors, load points, stacker and rail loop.

HVO North can extract up to 22 Mtpa of ROM coal until 31 December 2026, comprising the following:

- 12 Mtpa from West Pit/Mitchell Pit
- 10 Mtpa from Carrington Pit.

Mining currently occurs down to the base of the Barrett seam in the West Pit and Mitchell Pit. Mining in the Carrington area previously occurred down to the Bayswater seam. Mining in this area ceased in 2018 to prepare for the commencement of in-pit tailings emplacement, as approved by MOD 6, which started in the Carrington Pit void in 2019. HVO also has approval to extract approximately 17 Mt of ROM coal in the Carrington West Wing area, as approved by MOD 3 and the HVO EPBC Act Approval. Coal extraction in this area has not yet commenced. The North Pit mining area located south of the Carrington Pit was previously operated as an open-cut truck and shovel operation, which commenced in 1979. Coal extraction has ceased in the North Pit, which is now a tailings storage facility (TSF).

The primary mining method at HVO North is truck and shovel, although the use of a dragline is also approved and has been previously utilised. Blasting is allowed 7:00 am to 6:00 pm Monday to Saturday inclusive (except public holidays) up to a maximum of three blasts per day and 12 blasts per week.

ii HVO South summary

The existing HVO South comprises the approved mining areas of Cheshunt Pit, Riverview Pit, South Lemington Pit 1, South Lemington Pit 2, and the Riverview South East Extension (also referred to as the Glider Pit). HVO South can extract up to 20 Mtpa of ROM coal until 24 March 2030. The existing HVO South Approval boundary is illustrated in Figure 2.3. In addition to the noted mining areas, the HVO South Approval boundary contains associated mining infrastructure, notably access tracks, water storage infrastructure, pipelines, administration buildings, workshops and transmission lines.

Mining currently occurs in the Riverview Pit and Cheshunt Pit down to the base of the Bayswater Seam. The main sections of Cheshunt Pit have progressed to the south-west towards Riverview Pit. Strips within Cheshunt Pit have already reached the approved Bayswater seam, with other parts yet to reach this seam as per the currently approved mine plan.

Coal extraction is also approved to the base of the Bowfield and Vaux seams in South Lemington Pit 1 and Pit 2, respectively. Limited mining activities have previously been undertaken in the South Lemington Pit 1 (ceasing in 2001) and the Riverview South East Extension area (also referred to as the Glider Pit); however, the South Lemington Pit 2 area remains undisturbed by mining. The previously mined void in South Lemington Pit 1 is currently used for temporary storage of mine water from HVO and the nearby MTW operation.

Mining is primarily undertaken at HVO South by truck and excavator/shovel. The use of draglines is also approved at HVO South and have been previously utilised to mine overburden. Highwall mining, including continuous highwall mining and auger mining, is also approved in the Riverview Pit, Cheshunt Pit, and South Lemington Pit 2 as shown in Figure 2.3. Highwall and auger mining activities are approved within the Bowfield, Broonie and Bayswater Seams. It is noted that highwall and auger mining was previously approved within the South Lemington Pit 1 area; however, this approval was relinquished under MOD 4.

Blasting at HVO South is allowed 7:00 am to 6:00 pm Monday to Saturday inclusive (except public holidays) to a maximum of three blasts per day and 15 blasts per week.

Source: EMM (2025); Glencore (2025); DCSSS (2024); GA (2009)

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KEY

- Existing HVO North development consent boundary (DA 450-10-2003)
- EPBC 2016/7640

Existing environment

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

HVO North existing operations

HVO Continuation Project
HVO North Public Environment Report
Figure 2.2

EMM creating opportunities

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Source: EMM (2025); Glencore (2025); DCSSS (2024); GA (2009)

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KEY

- Existing HVO South project approval boundary (PA 06_0261)
- EPBC 2016/7640
- EPBC 2016/7641 - not a controlled action
- Highwall mining area
- South Lemington Rail Loop and haul route (approved, not yet constructed)

Exisiting environment

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

HVO South existing operations

HVO Continuation Project
HVO North Public Environment Report
Figure 2.3

EMM creating opportunities

2.2.2 Coal handling and processing

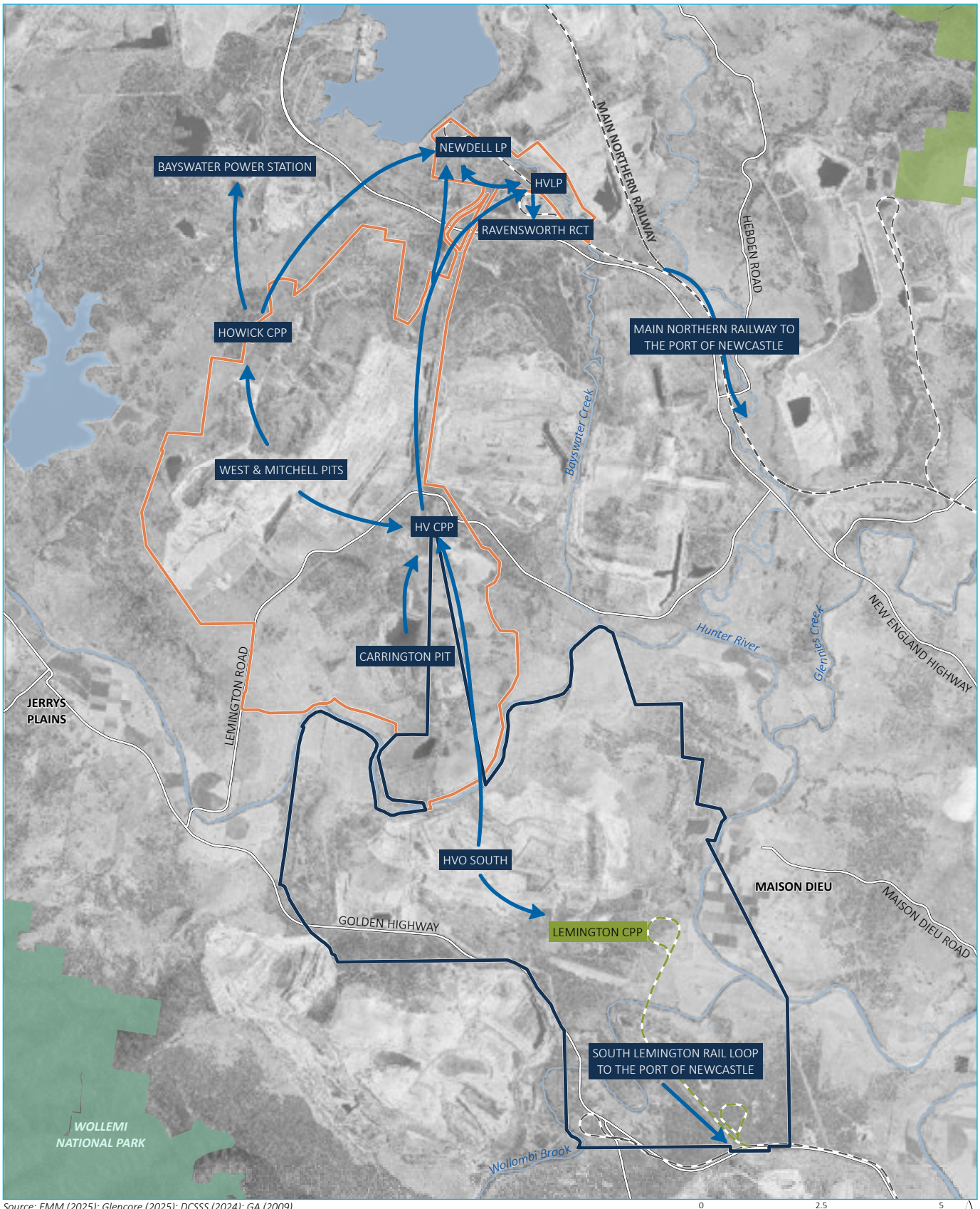
Coal extracted across the HVO Complex is transported via internal haul roads to one of two CPPs; the HVCPP or the HCPP, where it is crushed to size and either processed to remove impurities or bypassed where coal quality is appropriate. Processing produces saleable coal, along with coarse and fine reject materials. Coarse rejects are disposed of in pit, and fine rejects are placed in a TSF. Each CPP site has storage facilities for raw (unprocessed/ROM) coal and processed (saleable/product) coal.

The HVCPP can process up to a total of 20 Mtpa of ROM coal from the HVO Complex, of which only 16 Mtpa can be received from HVO South. The HCPP can process up to 6 Mtpa of ROM coal. Both HVCPP and HCPP utilise standard processing technologies to process ROM coal.

The HVO South Approval authorises the use of the HVCPP and HCPP, and the HVLP and NLP for coal extracted from HVO South.

HVO South has approval to construct and operate the LCPP, trucking of ROM coal from the Riverview and Cheshunt Pits for processing there, and to construct a rail loop off the Wambo rail spur, as shown in Figure 2.3. The construction of this infrastructure has not been required to date.

A coal flow diagram for the HVO Complex is provided in Figure 2.4.



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Source: EMM (2025); Glencore (2025); DCSSS (2024); GA (2009)

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

Existing environment

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

Label format

APPROVED, OPERATIONAL

APPROVED, NOT YET CONSTRUCTED

HVO Complex existing coal flow diagram

HVO Continuation Project
HVO North Public Environment Report
Figure 2.4

EMM creating opportunities

2.2.3 Product transport

Product coal is transported to one of the three loading points on the northern side of the New England Highway (refer to Figure 2.4). Coal from the HVCPP is predominantly transported to the HVLP or NLP by overland conveyor or via truck to the Ravensworth Coal Terminal (RCT), whereas product coal from the HCPP is trucked to the NLP. In the event of an emergency or issue with the overland conveyor, coal can be transported via truck between noted CPPs, LPs and the RCT. After the coal has reached either the HVLP, NLP or RCT, it is transported to the Port of Newcastle by rail.

Product coal can also be transported directly from the HCPP via conveyor to the AGL Bayswater and Liddell power stations. Although it is noted that the Liddell Power Station was closed in April 2023.

2.2.4 Waste rock management

i Overburden

Overburden is approved to be disposed of within all pits and out-of-pit emplacement areas across the HVO Complex. The overburden or interburden is either free dug or drilled and blasted, before being removed using a combination of dragline, shovel, excavator, front end loaders and dozers and placed in trucks for haulage to out of pit emplacement or refill areas in the pit. As part of the integrated operation between HVO North and HVO South, mining waste can be transported to any pit across the complex for emplacement to achieve the approved final landform. All mining waste emplacements are reshaped as required to construct the final landform.

ii Coarse rejects

Coarse rejects from both CPPs are disposed of in pit across the complex. The coarse reject material is transported by truck and buried below the final surface level in overburden emplacements as part of the final landform design. This material has similar properties to overburden in contact with coal seams and is generally saline and alkaline.

iii Fine rejects

Fine rejects (tailings) have been emplaced in various approved 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 HCPP 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. Figure 2.5 shows the TSFs across the complex.

Intermittent deposition of tailings occurs in North Void TSF, Dam 6W TSF and Central TSF as part of ongoing management towards decommissioning. The South East TSF has recently been capped with the sump to be backfilled for closure. Prior to TSFs reaching capacity a detailed closure plan is developed for the individual facility to determine effective closure requirements including capping depth.

2.2.5 Water management

The HVO Complex currently operates under an integrated WMS across HVO North and HVO South, in accordance with the HVO Water Management Plan (WMP). The integrated mine WMS also facilitates approved water transfers with other mining operations (MTW (via the South Lemington Pit 1 Void), Wambo, Liddell Coal Operations (LCO) (via load points (LPs)), and Ravensworth Operations (via the Cumnock Void 3 tailings decant return)). Water to support operations is also sourced from the Hunter River under relevant water access licences (WALs) issued under the NSW *Water Management Act 2000* (WM Act).

Water is managed according to type whether it be mine water, sediment water or clean water. The objectives of the WMS are to minimise raw water usage (including minimising extraction from the Hunter River), impacts to the environment and neighbours, and to provide adequate water to facilitate the processing of coal and dust suppression to ensure interference to mining production is minimised.

Key water management components at the HVO Complex include water storages, licensed discharge points (LDPs), Hunter River pumping stations, groundwater bores for extraction, flood protection levees, clean water diversions, and low permeability barrier walls (LPBW), which have been constructed in the eastern arm of the paleochannel and in the Alluvial Lands. Construction of another LPBW is also approved in the Carrington West Wing area in the western arm of the paleochannel; however, this LPBW has not been constructed due to the Carrington West Wing pit not being mined to date. The diversion of the Unnamed Tributary to the west of Carrington West Wing is also approved; however, similarly to the LPBW, this has not yet been diverted due to mining operations not commencing in the Carrington West Wing.

Table 2.4 provides an overview of the water classifications within the HVO WMS.

Table 2.4 HVO WMS water classification

Water category	Description
Clean	Runoff from undisturbed or completed rehabilitated areas once relinquished.
Sediment	Runoff from disturbed areas (does not include water captured in mining pit areas or runoff from mine infrastructure areas where the water has been in contact with coal). Runoff draining away from pits where overburden stockpile areas have been shaped but without established ground cover.
Mine	Runoff from areas exposed to coal or water used in coal processing or from coal stockpile areas. Runoff draining into pits from the active/unshaped overburden that forms the low wall.

The WMS is designed to:

- minimise water abstraction from the Hunter River to meet water supply deficits (through existing entitlement)
- minimise impacts to the environment and neighbours
- provide adequate water to facilitate the processing of coal and dust suppression to minimise interference with mining production, with preferential use of mine water for coal preparation and dust suppression
- recycle on-site water
- control discharge of water to the environment in accordance with statutes and regulations.

Where possible, surface water is diverted away from disturbed areas at the HVO Complex via clean water diversions to minimise impact to the receiving environment.

Key existing and approved water management components are identified in Figure 2.6.

Water from the HVO Complex is discharged in accordance with Hunter River Salinity Trading Scheme (HRSTS) via four LDPs as shown in Figure 2.6. Excess mine water can be released into the Hunter River via LDPs at mine constructed dams, being Dam 9W (Parnells Dam) and Dam 11N at HVO North, and Dam 15S (Lake James) at HVO South. Discharges are only allowed during high and flood flow periods in the Hunter River as determined by WaterNSW and the water group of the NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW – Water), and in accordance with EPL 640.

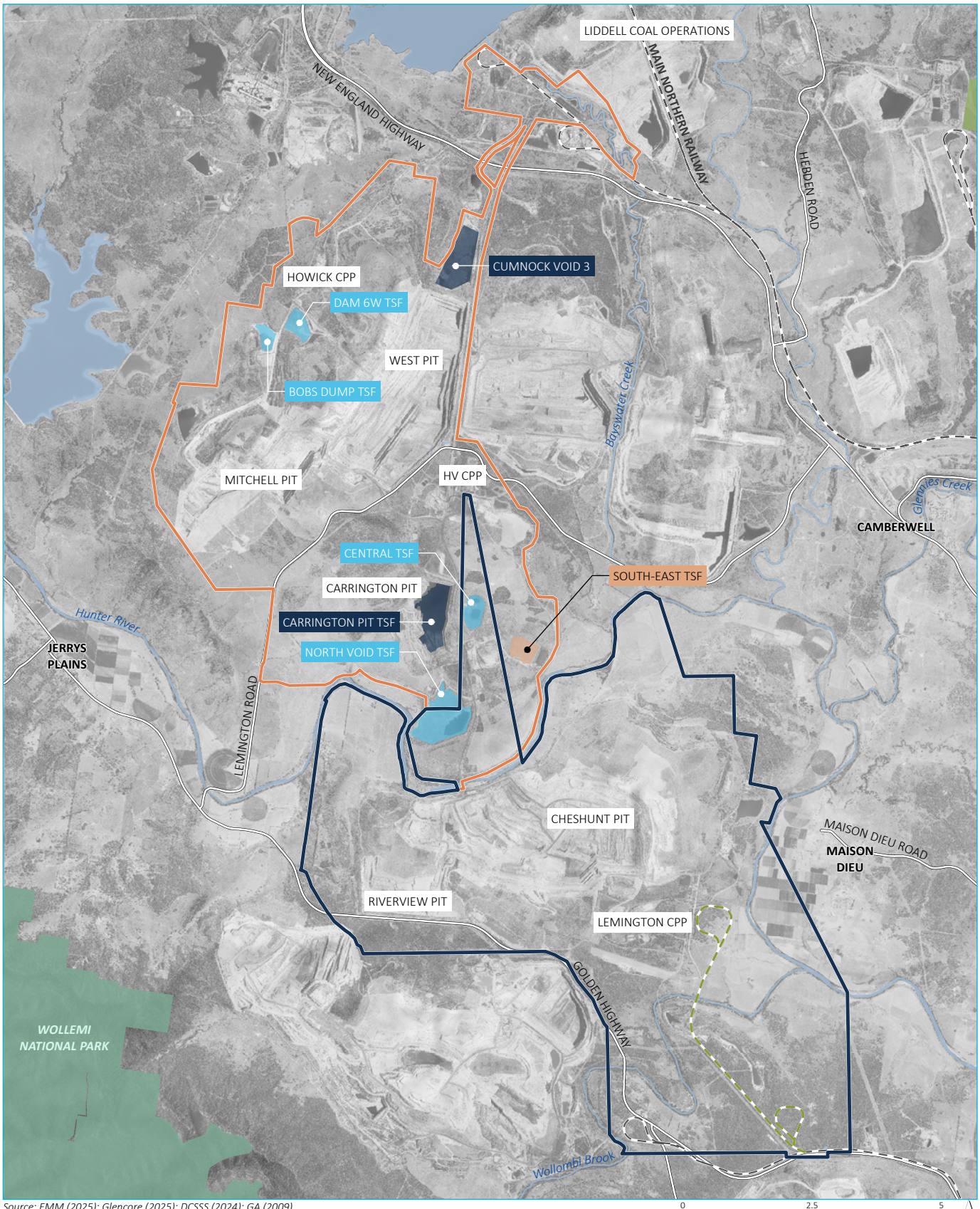
EPL 640 also includes licensed discharge from the Alluvial Lands. This discharge point has specific discharge parameters and is not regulated under the HRSTS. Discharge parameters are in accordance with EPL 640.

2.2.6 Other infrastructure

Other infrastructure necessary to support the mining operation at the HVO Complex includes, but is not limited to, workshops, vehicle washing facilities, bulk oil and fuel storages, explosive magazines, ammonium nitrate storage and ammonium nitrate emulsion manufacturing, explosives storage, water and tailings management infrastructure, storage hoppers and crushers, coal stockpiles, erection pads, bathhouse, general stores, administration offices, and other minor facilities and incidental activities.

2.2.7 Workforce and operating hours

The HVO Complex has approximately 1,500 FTE workers and is a continuous operation, with approval to operate 24 hours per day, seven days per week.



Source: EMM (2025); Glencore (2025); DCSSS (2024); GA (2009)

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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)
- Intermittent tailings deposition as part of decommissionings
- Active tailings storage facility
- Inactive tailings storage facility (capping completed)
- South Lemington Rail Loop (approved, not yet constructed)

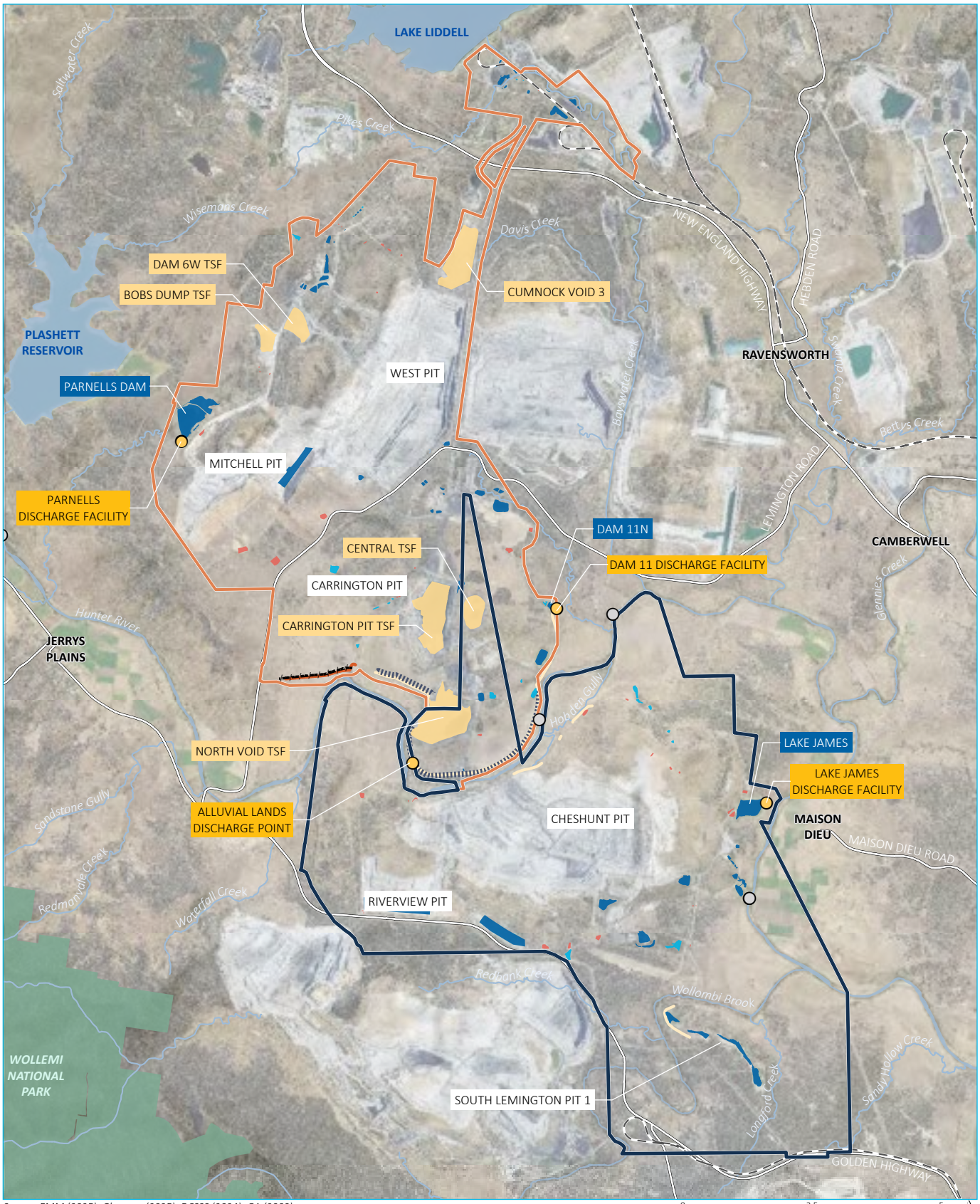
Existing environment

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

Existing tailings storage facilities

HVO Continuation Project
HVO North Public Environment Report
Figure 2.5

EMM creating opportunities



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Source: EMM (2025); Glencore (2025); DCSSS (2024); GA (2009)

0 2.5 5 km

GDA2020 MGA Zone 56

N

KEY

- Existing HVO North development consent boundary (DA 450-10-2003)
- Existing HVO South project approval boundary (PA 06_0261)
- Hunter River pump station
- Licensed discharge facility
- Approved barrier wall (not yet constructed)
- Low permeability barrier wall
- Existing levee
- Levee

Dam water type

- Freshwater
- Saline
- Sediment
- Tailings

Existing environment

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

Existing and approved key water management components

HVO Continuation Project
HVO North Public Environment Report
Figure 2.6

EMM creating opportunities

2.2.8 Rehabilitation and final void

Disturbed areas are progressively rehabilitated across the HVO Complex, with the establishment of a mixture of woodland, grassland and grazing areas as approved in the post mining landform. In accordance with existing approval requirements and the current Rehabilitation Management Plan (RMP), approximately 70% of post mining rehabilitated areas at HVO North are proposed to meet a final land use of grazing, in which native or introduced pasture species will be relied upon to support future economic activities including agricultural enterprises. Native and introduced pasture species will provide some biodiversity values for native fauna species that are able to persist in grazed areas. The remaining approximate 30% will be rehabilitated to woodland communities. This includes overstorey strata to provide habitat and encourage native fauna populations and threatened species that are known to occur, or traverse, in and around HVO. Specifically, within the Carrington West Wing area, as approved under MOD 3, 65 ha of Class II rural land capability and 65 ha of Class III land is to be reinstated, with the Carrington West Wing void to be backfilled and returned to native pasture. In addition, Central Hunter Grey Box Ironbark Woodland is to be established across 4 ha in the Carrington West Wing final landform. Further, an area of at least 0.14 ha of riparian vegetation adjacent to Bayswater Creek must be revegetated to represent the Swamp Oak Floodplain Forest community.

In relation to water management infrastructure, the approved final landform at HVO North includes the reinstatement of the Unnamed Tributary to its original position in the Carrington West Wing area following its diversion to allow mining there (noting this tributary has not yet been diverted). Whilst flood protection levees are removed or incorporated into the final landform, excluding the Alluvial Lands Levee which is approved to remain post mining.

At HVO South, 60–70% of rehabilitation is proposed to achieve a final land use of grazing, with native or introduced pasture. The remaining 30–40% will be rehabilitated to a woodland community. One final void is approved to remain in the Riverview Pit with an equilibrium water level of approximately 30 metres Australian Height Datum (mAHD), estimated to be reached after 300 years. The current approved final landform includes backfilling the other approved mining areas with overburden (i.e. South Lemington Pit 1, South Lemington Pit 2 and the Riverview South East Extension Area) so that only one void remains. South Lemington Pit 1 and South Lemington Pit 2 are to be rehabilitated to final land use outcomes of grazing or woodland.

The Riverview South East Extension Area as approved does not have a designated final land use nor is it identified within the RMP. The mining area is also not all owned by HVO and is within the United Wambo JV approved project area (Development Consent SSD-7142, EPBC 2015-7600).

Four voids are currently approved to remain across the entire complex; three at HVO North and one at HVO South as follows:

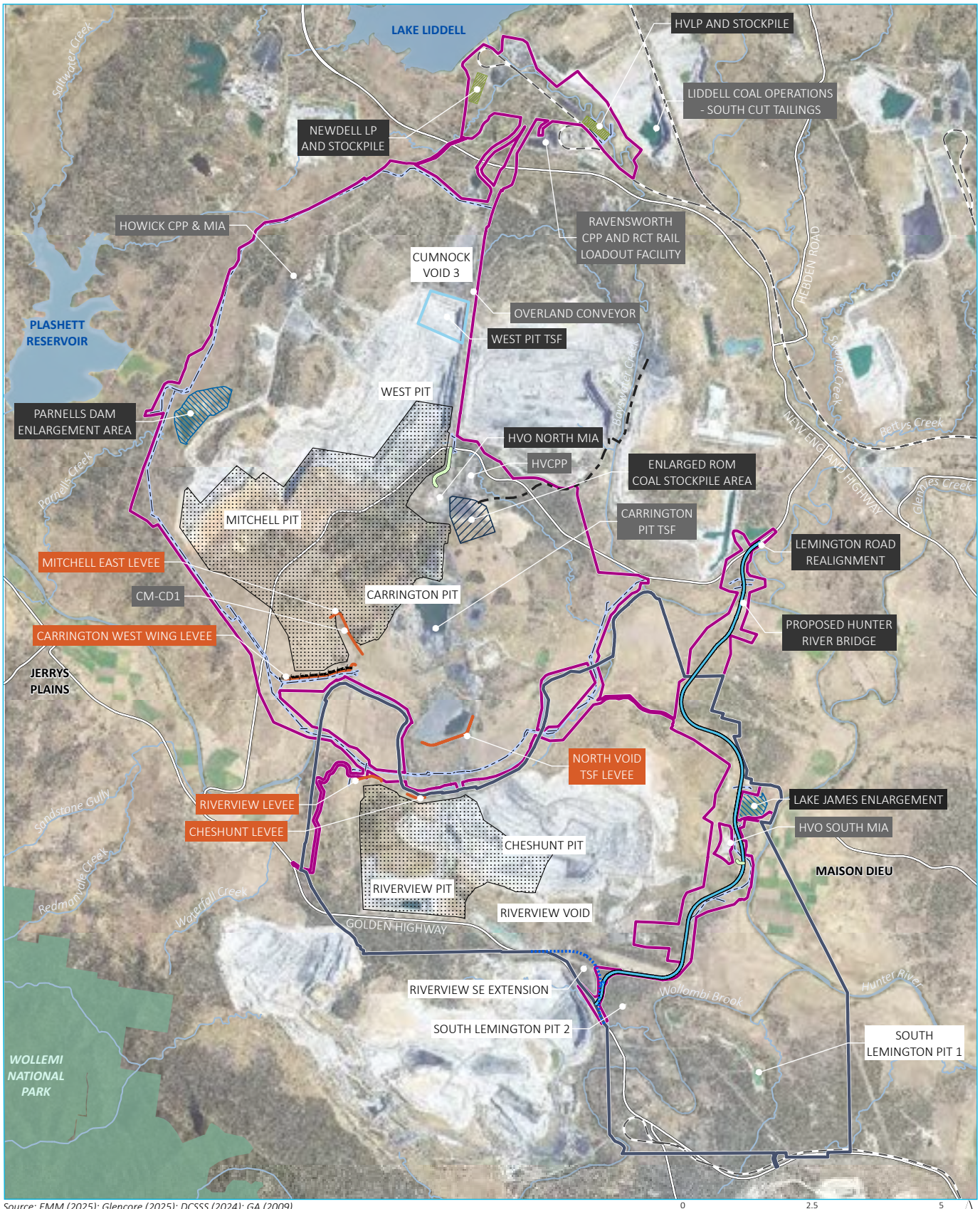
- HVO North:
  - Carrington Pit (evaporative sink)
  - West Pit
  - Mitchell Pit
- HVO South:
  - Riverview Pit.

3 Description of the HVO North Action

3.1 Introduction

The Project comprises the continuation of the life of HVO North and HVO South, from the current approved mining completion dates of 31 December 2026 and 24 March 2030, respectively, to the end of 2045 at HVO North and end of 2042 at HVO South. The continuation of mining across the HVO Complex will increase resource recovery from the existing operation, predominantly by mining through previously mined areas, extracting coal from deeper seams and within existing mining tenements.

The key Project elements are shown conceptually in Figure 3.1 for the HVO Complex. The HVO North Action is described in further detail in Sections 3.3 and 3.4.



Source: EMM (2025); Glencore (2025); DCSSS (2024); GA (2009)

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KEY

- HVO North Action Area
- HVO South Action Area

Proposed HVO continuation project element

- Approved barrier wall (not yet constructed)
- Alternative Golden Highway alignment
- Lemington Road realignment
- Levee
- Mine access road
- Proposed haul route to Ravensworth Operations
- Proposed transmission line relocation
- Dam enlargement
- Mining area
- Product stockpile
- ROM coal stockpile area
- West Pit TSF

Existing environment

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

Label format

- Existing item
- Levee
- Project related item

Project conceptual layout

HVO Continuation Project
HVO North Public Environment Report
Figure 3.1

EMM creating opportunities

3.2 Action Area

The HVO North Action Area is shown in Figure 3.1. The HVO North Action Area aligns with the proposed HVO North development consent boundary detailed in the Amendment Report (EMM 2025a) for the Project.

3.2.1 Domains

Domains are used within this PER to describe and differentiate between the activities that will take place across the Action area. While this draft PER relates to the whole of the HVO North site, there are a number of domains within the Action area in which no further disturbance is proposed. HVO considers it would be appropriate for conditions to be imposed on any EPBC Act approval granted in response to this PER, to limit disturbance in the domains where no further disturbance is proposed.

There are also areas which have already been lawfully disturbed and therefore do not require further assessment in connection with the proposed Action.

The Action area and relevant Domains are described below in Table 3.1 and presented in Figure 3.2. Key factors which have informed the development of Domains include the following:

- Areas that are within the existing approved disturbance area (DA 450-10-2003), but are not forecast to be disturbed by 31 December 2026 (end date of mining under current HVO North consent), have been assessed and where Matters of National Environmental Significance (MNES) have been identified are considered in the HVO North Continuation Project MNES Report (Umwelt 2026a).
- Rehabilitated areas that are proposed to be re-disturbed as part of the HVO North Action have been assessed, and where MNES have been identified, considered in the HVO North Continuation Project MNES Report (Umwelt 2026a).

For completeness, it is noted there have been minor adjustments to the boundaries of some of the Domains shown in Figure 3.2 since the referral of the Action. These minor changes reflect the progression of ongoing mining activities in accordance with existing approvals between the date of the referral and the date of this draft PER.

Table 3.1 Summary of domains within the Action area

Domain	Name	Description	Total area	Assessment approach for referrals	Offset mechanism
1	Active mining area and associated disturbance areas as at 31 December 2026	Areas in a disturbed condition as at the end date for mining under the existing HVO North development consent. The Action includes mining activities within the domain which will continue until the completion of the HVO North development consent.	2,774	No assessment required.	No offset required – areas disturbed under historic approvals.
2a	Rehabilitation as at 31 December 2026 which will not be re-disturbed	Areas of existing rehabilitation not proposed to be disturbed by the HVO North Project, in which approval is sought as part of the Action to undertake general maintenance and land management activities such as water management including erosion control structures and associated infrastructure including communications, pest and weed management, access track service and maintenance of established rehabilitation aligned with the rehabilitation objectives required by NSW approval.	868	No assessment required.	No offset required – no disturbance proposed as part of the activities that will be carried out within this domain. (HVO would accept a condition of approval reflecting this).
2b	Rehabilitation as at 31 December 2026 which will be re-disturbed as part of the action	Areas of rehabilitation proposed to be disturbed from 1 January 2027. This is based on the assumption that mining and rehabilitation activities proposed to be undertaken between lodgement of the referral and 31 December 2026 are completed as forecast.	1,023	Assessed via both field survey and desktop assessment.	If offsets are required for this domain, the proposed offsets will be identified using the BAM calculator in consultation with DCCEEW and DPHI as outlined within the Biodiversity MNES Report (Umwelt 2026a).

Domain	Name	Description	Total area	Assessment approach for referrals	Offset mechanism
3	Biodiversity impact assessment area (BIAA) (as per State DA)	Areas where additional surface disturbance is proposed as part of the HVO Continuation Project and approval is required under the NSW EP&A Act for this disturbance. Area is consistent with the assessment in the State DA. There is currently no approval to disturb in this domain under the NSW EP&A Act or the EPBC Act.	903	Assessed in accordance with the BAM	Offsets will be calculated using the BAM calculator in consultation with DCCEEW and DPHI, as outlined within the Biodiversity MNES Report (Umwelt 2026a).
4	Additional BIAA (surface disturbance requiring additional assessment under the EPBC Act)	Areas not included in other domains which are already approved for disturbance under the existing State approval under the NSW EP&A Act, but will not be disturbed until after 1 January 2027 and will be subject to the new SSD approvals being sought.	403	Assessed in accordance with the BAM	Offsets will be identified using the BAM calculator in consultation with DCCEEW, as outlined in the Biodiversity MNES Report (Umwelt 2026a). This domain overlaps (to some extent) existing EPBC Act approvals of neighbouring mining operations, including: • Ravensworth Operations EPBC 2010/5389 • United Wambo Joint Venture EPBC 2015/7600. These existing and overlapping EPBC Act approvals contain conditions relating to approved impacts and required offsets. HVO will develop a stand-alone staged offset strategy for any MNES in consideration of future disturbance at Ravensworth Operations. In addition, this staged offset strategy will be developed to not rely on prior approvals or offset requirements for United Wambo Joint Venture and hence will enable appropriate biodiversity offset outcomes for any MNES that may be present.
5	Approved for disturbance under NSW EP&A Act, but not seeking approval to disturb under the EPBC Act	Existing State approved disturbance areas which are not proposed to be disturbed as part of the Action. No further assessment of this area is proposed within the referrals.	43	No assessment required.	No offset required – no disturbance proposed (HVO would accept a condition of approval reflecting this).
6	Previously referred under the EPBC Act	Areas previously referred by HVO under the EPBC Act, namely EPBC 2016/7640 and EPBC 2016/7641.	258	No further assessment of this Domain is required	No offsets required – previously determined

3.2.2 Areas

The HVO North BIAA is illustrated in Figure 3.3. A summary of the HVO North BIAA total area to be assessed is provided in Table 3.2.

Table 3.2 HVO North biodiversity impact assessment area

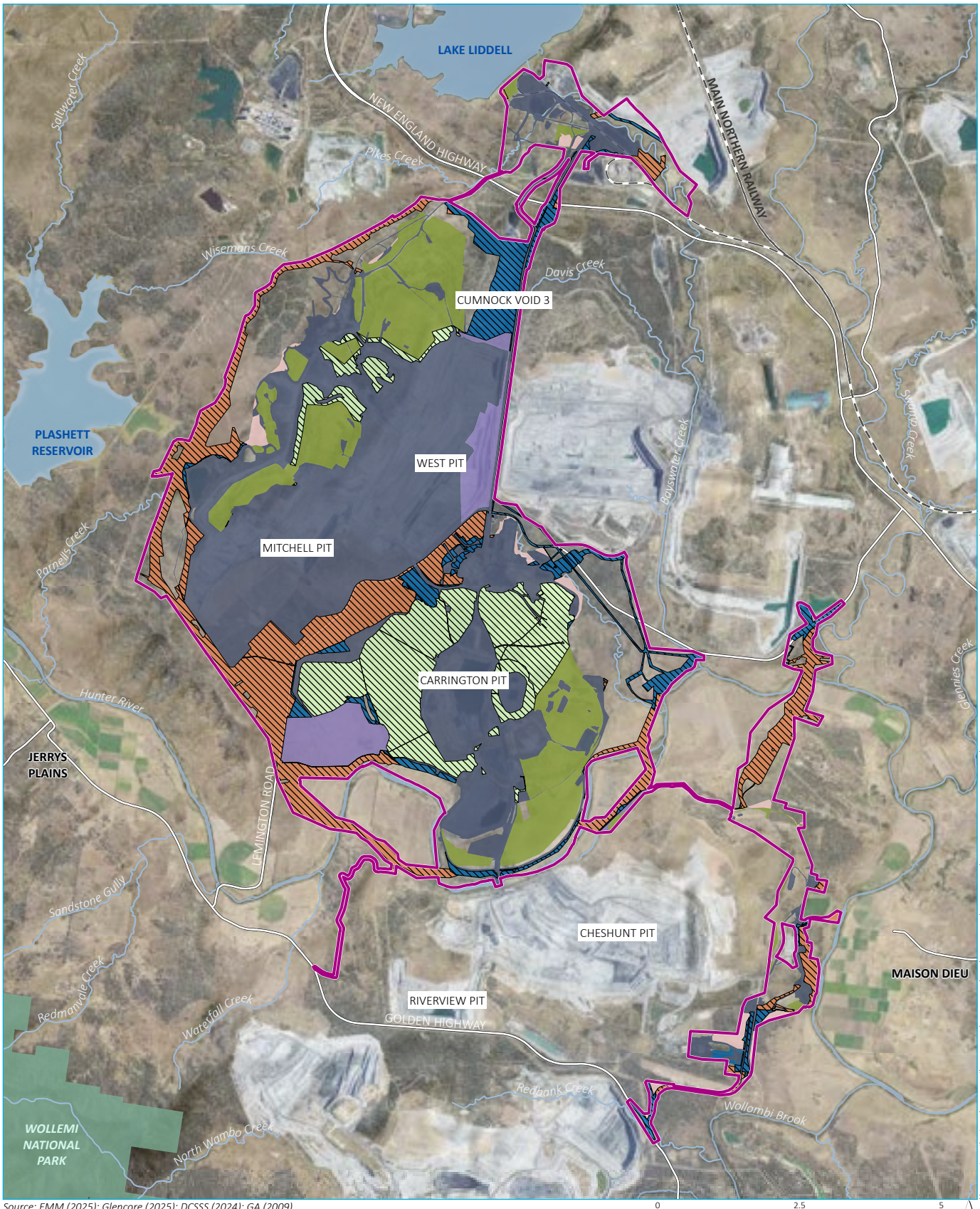
Domain	Description	Area HVO North (ha)
To be disturbed as part of the Action (Biodiversity Impact Assessment Area)		
2b	Areas of rehabilitation proposed to be disturbed from 1 January 2027. This is based on the assumption that mining and rehabilitation activities proposed to be undertaken between lodgement of the referral on 16 April 2025 and 31 December 2026 are completed as forecast.	1,023
3	Areas where additional surface disturbance is proposed and approval is required under the EP&A Act for this disturbance. Area is consistent with the assessment in the State SSD application. There is currently no approval to disturb in this domain under the EP&A Act or the EPBC Act.	903
4	Areas not included in other domains which are already approved for disturbance under the existing State approvals under the EP&A Act, but will not be disturbed prior to 1 January 2027 and will be subject to the new SSD approvals being sought. There is currently no approval for HVO to disturb in this domain under the EPBC Act.	403
Total HVO North BIAA		**2,329**

In summary, the areas applicable to the HVO North Action are:

- Action Area = approximately 7,678 ha
- BIAA = approximately 2,329 ha
- Avoidance Area = approximately 1,405 ha. This area has not been allocated to a Domain on the basis that it is not currently approved for disturbance and is not proposed to be disturbed as part of the proposed Action.

The total disturbance area has been reduced from that originally considered by HVO via an iterative design process, which considered the preliminary outcomes of environmental assessments, particularly biodiversity, to avoid and minimise potential impacts to MNES. It is noted that although the mining area has been reduced from previously proposed with the removal of mining in gas Domain 1, surface disturbance is still proposed in areas beyond the active mining area to facilitate decommissioning and rehabilitation activities necessary to achieve completion and closure criteria. Achieving this outcome involves some areas of re-disturbance to areas previously rehabilitated which is reflected in the BIAA for the proposed Action.

Impact avoidance measures are further described in Section 5.6 and Section 6.6.



Source: EMM (2025); Glencore (2025); DCSSS (2024); GA (2009)

0 2.5 5 km

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KEY

- HVO North Action Area
- HVO North biodiversity impact assessment area
- Domain 1 | Active mining area and associated disturbed areas at 31 December 2026
- Domain 2a | Rehabilitation as at 31 December 2026- not to be re-disturbed
- Domain 2b | Rehabilitation as at 31 December 2026- to be re-disturbed as part of the action
- Domain 3 | BIAA (as per State DA)
- Domain 4 | Additional BIAA (surface disturbance requiring assessment under the EPBC Act only)
- Domain 5 | State approved area but not seeking EPBC Act approval to disturb
- Domain 6 | Prior EPBC Act referral areas

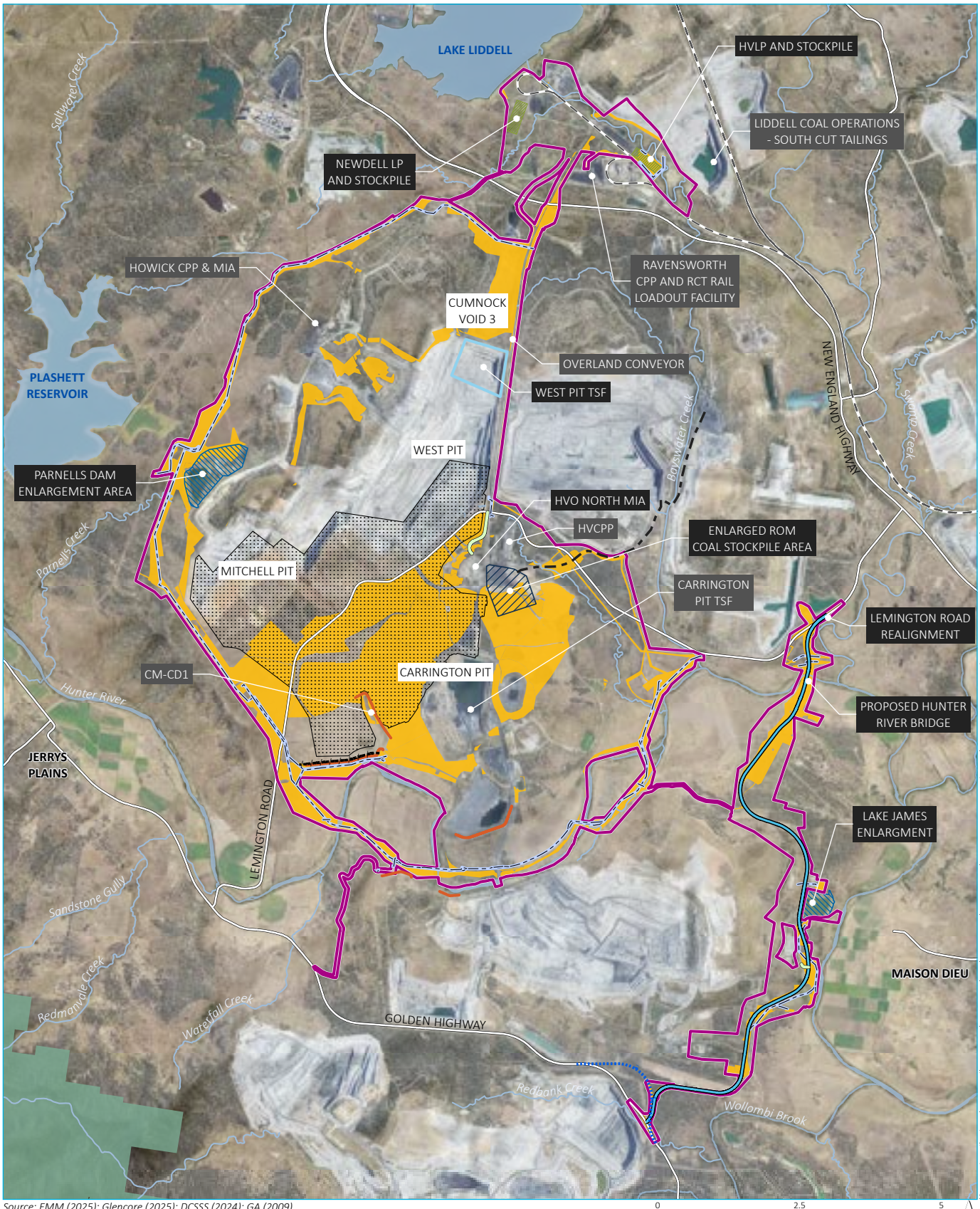
Existing environment

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

Domains – HVO North

HVO Continuation Project
HVO North Public Environment Report
Figure 3.2

EMM creating opportunities



Source: EMM (2025); Glencore (2025); DCSSS (2024); GA (2009)

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KEY

- HVO North Action Area
- HVO North Biodiversity Impact Assessment Area

Proposed HVO continuation project elements

- Lemington Road realignment
- Mine access road
- Approved barrier wall (not yet constructed)
- Alternative Golden Highway alignment
- Levee
- Proposed haul route to Ravensworth Operations
- Proposed transmission line relocation
- Dam enlargement
- Mining area
- Product stockpile
- ROM coal stockpile area
- West Pit TSF

Existing environment

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

Label format

Existing item

Project related item

HVO North BIAA

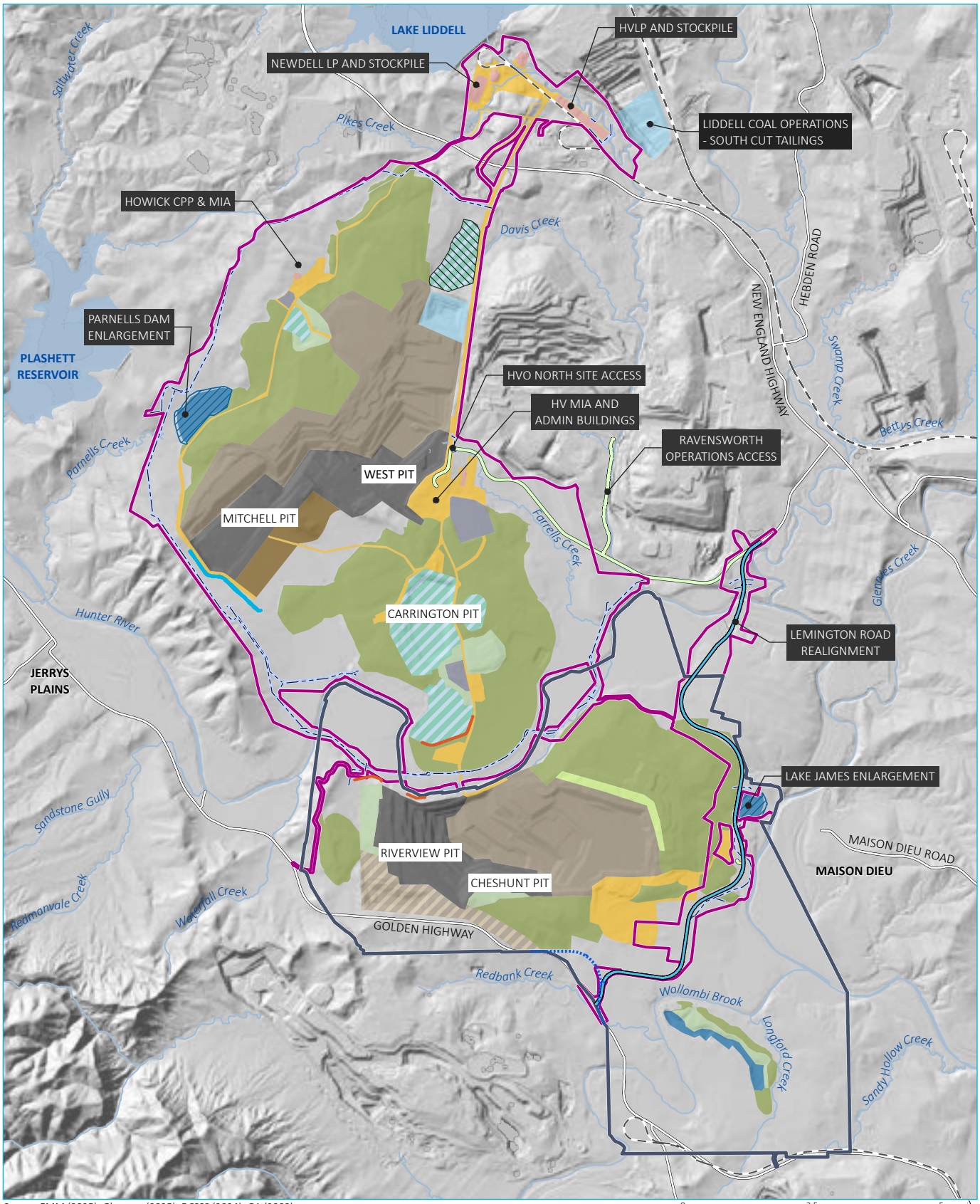
HVO Continuation Project
HVO North Public Environment Report
Figure 3.3

EMM creating opportunities

3.3 Conceptual staging and schedule

Conceptual staged mine plans for the life of the Project are provided for indicative Years 3, 6, 8, 12 and 15 in Figure 3.4 to Figure 3.8. Year 1, or commencement of the Project, will start when any of the construction activities related to the establishment of the required mine support infrastructure commence. For HVO North, this is anticipated to be any works associated with the realignment of Lemington Road and transmission and communication assets. For HVO South, initial activities will include enlargement works of Lake James.

The conceptual mine years presented in Figure 3.4 to Figure 3.8 were chosen as they are considered representative of key mining stages for the Project and to capture the most 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. The conceptual stage plans illustrate the different activities being undertaken during that indicative year, including coal extraction, overburden and tailings emplacement, infrastructure construction and rehabilitation. It should be noted that these conceptual mine stages are indicative only and may be subject to change (due to aspects such as mining rate, market conditions, geology and impacts of weather) within defined production limits identified.



Source: EMM (2025); Glencore (2025); DCSSS (2024); GA (2009)

0 2.5 5 km

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KEY

- HVO North Action Area
- HVO South Action Area
- Alternative Golden Highway alignment
- Lemington Road realignment
- Mine access road
- Proposed transmission line relocation

Water infrastructure

- Clean water drain
- Levee
- Cumnock Void 3 (managed by Ravensworth Operations)
- Dam enlargement

Year 3 indicative mine plan

- Active emplacement area
- Inactive emplacement area
- Active mining area
- Active tailings emplacement area
- Inactive tailings emplacement/capping in progress
- Infrastructure/access
- Preparation area
- Product coal stockpile
- ROM coal stockpile
- Rehabilitation
- Shaping for final landform
- Temporary stabilisation
- Water storage

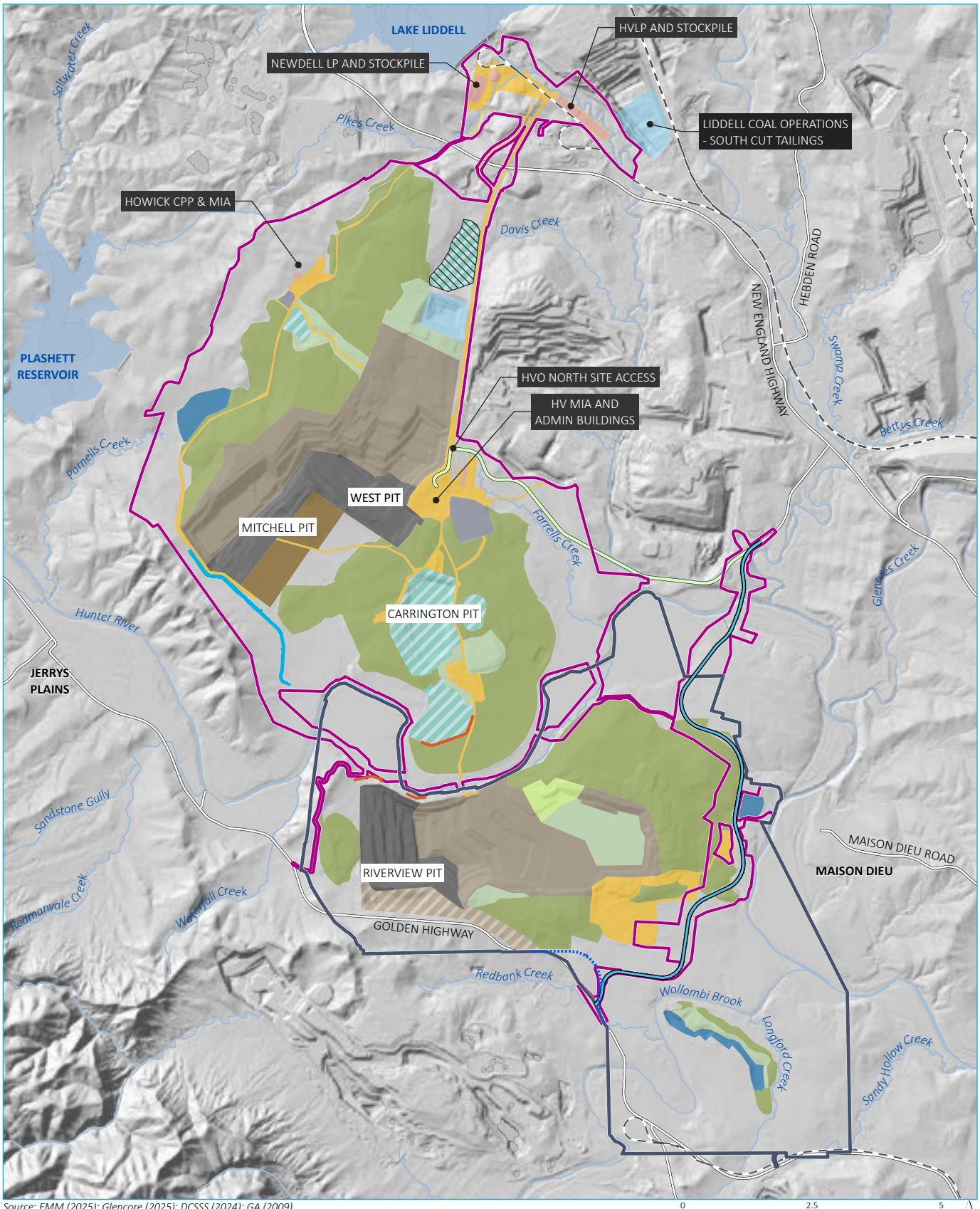
Existing environment

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

Conceptual mine plan- year 3

HVO Continuation Project
HVO North Public Environment Report
Figure 3.4

EMM creating opportunities



Source: EMM (2025); Glencore (2025); DCSSS (2024); GA (2009)

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KEY

- HVO North Action Area
- HVO South Action Area
- Alternative Golden Highway alignment
- Lemington Road realignment
- Mine access road

Water infrastructure

- Clean water drain
- Levee
- Cumnock Void 3 (managed by Ravensworth Operations)

Year 6 indicative mine plan

- Active emplacement area
- Inactive emplacement area
- Active mining area
- Active tailings emplacement area
- Inactive tailings emplacement/capping in progress
- Infrastructure/access
- Preparation area
- Product coal stockpile
- ROM coal stockpile
- Rehabilitation
- Shaping for final landform
- Temporary stabilisation
- Water storage

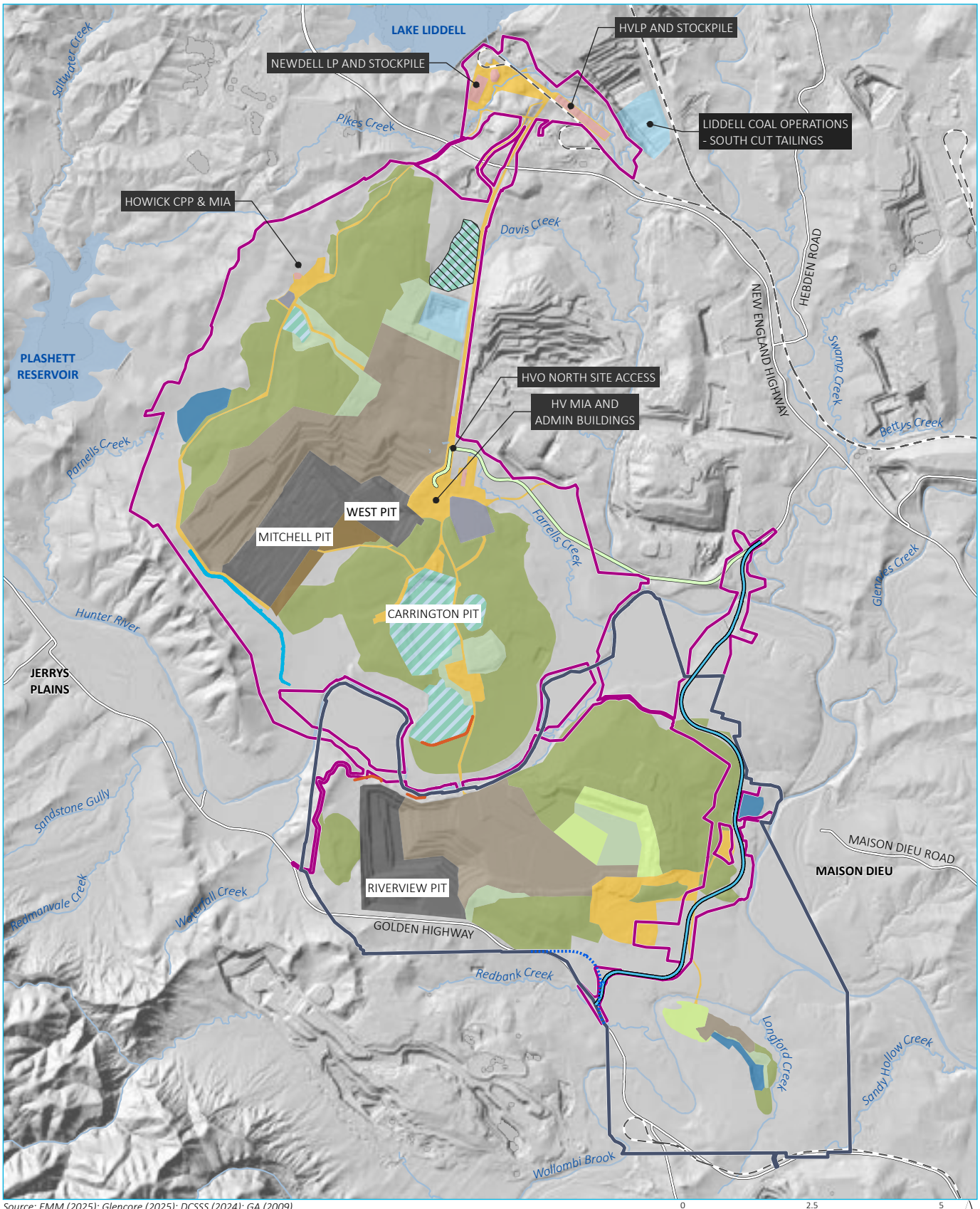
Existing environment

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

Conceptual mine plan- year 6

HVO Continuation Project
HVO North Public Environment Report
Figure 3.5

EMM creating opportunities



Source: EMM (2025); Glencore (2025); DCSSS (2024); GA (2009)

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GDA2020 MGA Zone 56

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KEY

- HVO North Action Area
- HVO South Action Area
- Alternative Golden Highway alignment
- Lemington Road realignment
- Mine access road

Water infrastructure

- Clean water drain
- Levee
- Cumnock Void 3 (managed by Ravensworth Operations)

Year 8 indicative mine plan

- Active emplacement area
- Active mining area
- Active tailings emplacement area
- Inactive tailings emplacement/capping in progress
- Infrastructure/access
- Preparation area
- Product coal stockpile
- ROM coal stockpile
- Rehabilitation
- Shaping for final landform
- Temporary stabilisation
- Water storage

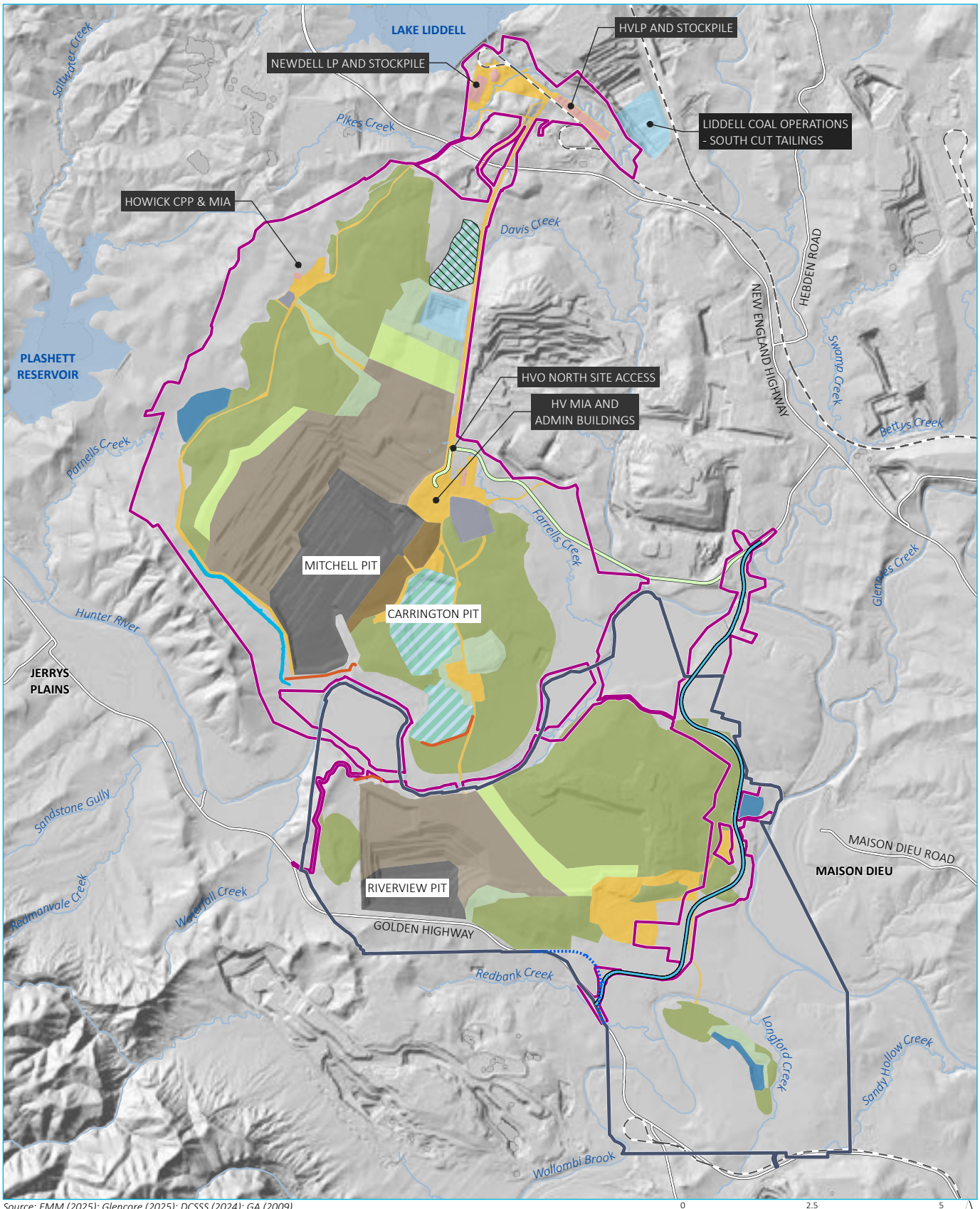
Existing environment

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

Conceptual mine plan- year 8

HVO Continuation Project
HVO North Public Environment Report
Figure 3.6

EMM creating opportunities



Source: EMM (2025); Glencore (2025); DCSSS (2024); GA (2009)

0 2.5 5 km

GDA2020 MGA Zone 56

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KEY

- HVO North Action Area
- HVO South Action Area
- Alternative Golden Highway alignment
- Lemington Road realignment
- Mine access road

Water infrastructure

- Clean water drain
- Levee
- Cumnock Void 3 (managed by Ravensworth Operations)

Year 12 indicative mine plan

- Active emplacement area
- Active mining area
- Active tailings emplacement area
- Inactive tailings emplacement/capping in progress
- Infrastructure/access
- Preparation area
- Product coal stockpile
- ROM coal stockpile
- Rehabilitation
- Shaping for final landform
- Temporary stabilisation
- Water storage

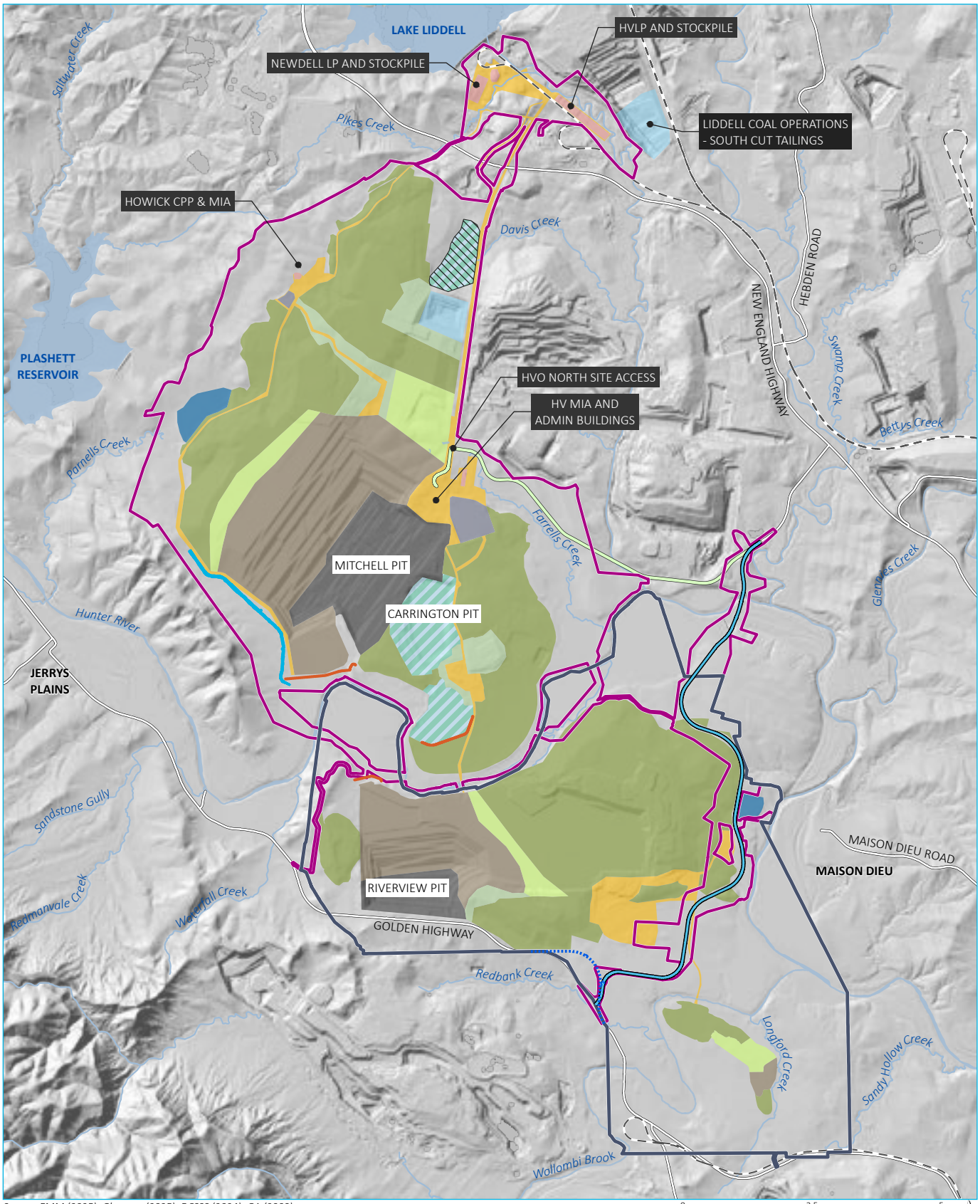
Existing environment

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

Conceptual mine plan- year 12

HVO Continuation Project
HVO North Public Environment Report
Figure 3.7

EMM creating opportunities



Source: EMM (2025); Glencore (2025); DCSSS (2024); GA (2009)

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KEY

- HVO North Action Area
- HVO South Action Area
- Alternative Golden Highway alignment
- Lemington Road realignment
- Mine access road

Water infrastructure

- Clean water drain
- Levee
- Cumnock Void 3 (managed by Ravensworth Operations)

Year 15 indicative mine plan

- Active emplacement area
- Active mining area
- Active tailings emplacement area
- Inactive tailings emplacement/capping in progress
- Infrastructure/access
- Product coal stockpile
- ROM coal stockpile
- Rehabilitation
- Shaping for final landform
- Temporary stabilisation
- Water storage

Existing environment

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

Conceptual mine plan- year 15

HVO Continuation Project
HVO North Public Environment Report
Figure 3.8

EMM creating opportunities

3.4 HVO North Continuation Project

3.4.1 Summary of key elements

The key elements at HVO North for which approval is sought include those activities required to carry out open cut coal mining and processing from 1 January 2027. These are summarised in Table 3.3, and are discussed in more detail in the sections below. Other than as set out below, all activities that are currently approved under the existing HVO North Consent and HVO EPBC Act Approval are intended to continue.

Table 3.3 HVO North – key Action elements

Project element	Existing approved operations	Summary of changes proposed by the HVO North Action
Mining method	• Open cut mining operation, primarily using truck and excavator/shovel. The use of a dragline is also approved. • Blasting – 7:00 am to 6:00 pm Monday to Saturday inclusive (except public holidays) up to a maximum of 3 blasts per day and 12 blasts per week.	No change.
Resource recovery	• Coal extraction to the base of the Barrett seam in West Pit and Mitchell Pit. • Coal extraction to the base of Bayswater seam in the Carrington area. • Approval to extract up to 498 Mt of ROM coal, comprising 22 Mtpa over 21 years, plus 19 Mt in Carrington Pit (MOD 2) and 17 Mt in Carrington West Wing (MOD 3).	Progression of mining generally as illustrated in the indicative staged mine plans in Figure 3.4 to Figure 3.8. Extraction of the coal resource will comprise: • Coal extraction to the base of the Barrett seam in West, Mitchell and Carrington Pit areas. • Coal extraction to the base of the Bayswater seam in the Carrington West Wing area.
Annual production	Up to 22 Mtpa of ROM coal, comprising: • 12 Mtpa from West Pit • 10 Mtpa from Carrington Pit.	• Up to 22 Mtpa with no separation of extraction limits between West Pit and Carrington Pit. • Propose a HVO Complex limit of 26 Mtpa ROM coal whilst maintaining limits of: – up to 22 Mtpa from HVO North – up to 13 Mtpa from HVO South.
Mine life	Operations are approved until 31 December 2026.	Mining operations at HVO North from 1 January 2027 until 31 December 2045.
Beneficiation	• ROM coal may be transported via internal haul roads to either HVCPP or Howick CPP for processing. • HVCPP is approved to process up to 20 Mtpa ROM coal (not receiving more than 16 Mtpa ROM from HVO South). • Howick CPP is approved to wash up to 6 Mtpa ROM coal. • Both HV and Howick CPP can use flotation to process ROM coal.	• Use of temporary coal stockpiles assembled in new mining areas, prior to processing or transport. • Continued receipt of ROM coal from HVO South via internal haul roads for processing at all CPP facilities approved for HVO North. Construction of a haul road (refer to Figure 3.1) to enable ROM coal to be transported to the neighbouring Ravensworth Operations ROM pad via haul truck until the end of Ravensworth Operations approved mine life.
Management of mining waste – overburden emplacement	• Ability to dispose of overburden within all pits and out-of-pit emplacement areas across HVO. • Maximum overburden emplacement area height of approximately 240 m AHD.	No change. Overburden will continue to be emplaced across HVO. However, the sequence of overburden emplacement has been revised to reflect the extended mine life and additional mining areas (i.e. between Mitchell/West Pit and the Carrington area).

Project element	Existing approved operations	Summary of changes proposed by the HVO North Action
Management of mining waste – coarse reject	Ability to emplace coarse rejects within overburden emplacement areas across HVO.	No change.
Management of mining waste – tailings	• Emplacement of tailings within approved TSFs at HVO and Ravensworth Operations, including Carrington Pit TSF at HVO North, and the Cumnock Void 3 TSF at Ravensworth Operations. Intermittent deposition of tailings occurs in North Void TSF, Dam 6W TSF, Bobs Dump TSF and Central TSF as part of ongoing management towards decommissioning. • Capping and rehabilitation of TSFs following completion of emplacement activities.	The Project includes options for: • additional tailings pipelines and pumps • removal, relocation and/or reprocessing of tailings from historic TSFs as required • emplacement of tailings within the northern extent of West Pit, as shown in Figure 3.10 • emplacement of tailings at approved tailings facilities at LCO. Over the life of HVO, the tailings and reject management strategy will continue to be refined to meet operational needs. This may also include trial or testing facilities in the HVO North Action Area to inform the strategy.
General infrastructure	• HV MIA and Howick MIA. • Maintenance and ancillary infrastructure required to facilitate operations.	• Realignment of a section of Lemington Road from Comleroi Road in the south to the existing Lemington Road in the north, joining the existing road alignment approximately 2.3 km south of the existing New England Highway/Lemington Road intersection. • HVO North access road to be realigned from the existing Lemington Road. • Closure of a small section of Liddell Station Road to accommodate the HVLP product stockpile extension (if constructed), which is not currently accessible to the public. • Realignment of sections of Ausgrid's transmission lines, and AGL transmission lines, as shown in Figure 3.12. • Realignment of internal transmission lines to support mining activities. • Realignment of Telstra telecommunication lines. • HVO North MIA upgrade. • Expansion of the HVO North ROM coal stockpile. • Maintenance and ancillary activities as required to facilitate operations, including the replacement of plant and equipment where required. • Access roads to facilitate service provider access. • Use of demountable/temporary buildings and other ancillary temporary facilities to enable construction activities and mining operations as required. • Access road establishment to an existing mine-owned property east of realigned Lemington Road as shown in Figure 3.11. • Maintenance and ancillary infrastructure required to support construction activities and mining operations within the HVO North Action Area, including communication towers, installation and maintenance of water supply works and works on waterfront land, construction and use of buildings for construction or mining operations, installation of environmental monitoring equipment including piezometers, and explosives storage and transport.

Project element	Existing approved operations	Summary of changes proposed by the HVO North Action
Temporary Hunter River crossings	Construction of temporary crossings of the Hunter River to allow the relocation of mining equipment that is too heavy for the existing bridge.	Approval for the temporary crossing of the Hunter River for heavy equipment will not be retained.
Product transport	• Transport of product coal from HVCPP by overland conveyor and or truck to HVLP or Newdell LP. • Transport of product coal from Howick CPP by overland conveyor to power stations or by truck to HVLP or Newdell LP. • Intermittent haulage of coal between HVCPP, HVLP, Newdell LP and RCT. • In the event of an emergency or issue with coal conveyance infrastructure, coal can be transported via truck between noted CPPs, LPs and the RCT.	Upgrade of product coal infrastructure as follows: • New Newdell product stockpile and upgrade of the existing Newdell train loading facility. These works will include an upgrade of the existing stockpile plus new train loading bin, conveyors and support infrastructure such as access roads, power and communication services. • An extension of the product coal stockpile footprint at the HVLP as shown in Figure 3.1, to increase the total stockpile capacity of the load point. The extension will require the relocation of Ausgrid transmission lines and communication infrastructure in this area and the closure of a portion of Liddell Station Road. • Construction of a haul road to enable ROM coal to be transported to the neighbouring Ravensworth Operations ROM pad via haul truck for processing, from where product coal is then transferred to RCT for transport to market. • Ability to temporarily transport product coal by truck from the Howick CPP to the Liddell stockpile for transport to market via the Liddell coal handling and train loading facilities during upgrades of the Newdell LP.
Water management	• Integrated water management with HVO South. • Water supply works including pumps, bores, diversions and dams. • Water discharges in accordance with the HRSTS. • Transfer of water between HVO South, LCO and Ravensworth Operations. • Existing and approved flood protection levees, including the Alluvial Lands, Carrington, Carrington West Wing and North Pit levees. • Construction of groundwater LPBWs as follows: – LPBW across the eastern arm of the Hunter River paleochannel within 2 years of mining in the Carrington Pit Southern Extension (*constructed*). – Carrington West Wing LPBW prior to undertaking mining within 100 m of the western arm of the Hunter River paleochannel, with an applicable permeability of 1 x 10^{-8} m/s (*not yet constructed*). – Diversion of the Unnamed Tributary to the west of Carrington West Wing.	• Continuation of the ability to transfer water to and from other mining operations where permitted. • Improved flood protection levee for North Pit (up to 1,000 year Annual Exceedance Probability (AEP)). • Improved flood protection for Carrington West Wing levee (up to 1,000 year AEP). • Additional mine/dirty water containment dams as required, as mining progresses. • Clean water diversion as required, as mining progresses, including an extension of the Mitchell clean water diversion (which is a drain that diverts runoff away from mining or disturbed areas and is not a creek diversion). • Parnells Dam enlargement from approximately 1 GL to approximately 4 GL, new spillway, and refurbishment of existing HRSTS discharge facility (no change to EPL/HRSTS approval). • Construction of the Carrington West Wing LPBW prior to mining within 100 m of the remnant western arm of the paleochannel, as per the existing development consent requirement will limit long-term drawdown in the Hunter River alluvium and the potential for seepage from the backfilled mine area to the alluvium. • Establishment of the Mitchell East levee to provide flood protection for the final void in Mitchell Pit. Revised WMS and revised conceptual final landform, as shown in Figure 3.13 and Figure 3.14, respectively.

Project element	Existing approved operations	Summary of changes proposed by the HVO North Action
Rehabilitation	• Progressive rehabilitation, with the establishment of a mixture of pasture and native habitat areas. • Removal of levees and reinstatement of the Unnamed Tributary in the Carrington West Wing area to its original position.	• Incorporation of natural landform design elements to areas of new rehabilitation under the HVO North Action, as outlined in the rehabilitation strategy. • Progressive rehabilitation, with the post mining land use to comprise a mixture of grazing and native habitat areas. • The Alluvial Lands flood levee will be left in place in the final landform. The Carrington and North Void TSF levees will be incorporated into the rehabilitated overburden dump/tailings capping respectively, and so will not be retained as levees. The Carrington West Wing levee will be removed and the Mitchell East levee will be incorporated into the final landform. • Revised final land use domains illustrated on Figure 3.14.
Final void	• Approved final void in Carrington Pit (evaporative sink). • Approved final void in West Pit. • Approved final void in Mitchell Pit. • Carrington West Wing void to be backfilled and returned to pasture.	Two final voids at HVO North consisting of: • Final void associated with the Mitchell Pit. • Final void in Carrington Pit (evaporative sink) as currently approved.
Operational workforce	Up to 1,500 FTE workers (HVO Complex).	No change.
Construction workforce	N/A	Construction activities associated with the Project will create approximately 600 temporary employment opportunities over an approximate five-year period. These construction activities are anticipated to include: • Lemington Road realignment and associated works • transmission line and telecommunications decommissioning and realignment • upgrades to MIAs and relevant access roads • construction of the coal haulage route to Ravensworth Operations • upgrade of the existing Newdell LP train loading facility and construction of a new product coal stockpile or extension of the HVLP product stockpile • Parnells Dam capacity increase, and other WMS works such as levee construction • clean water diversion drains. Construction activities will generally be undertaken within standard construction hours (Monday to Friday 7:00 am to 6:00 pm, Saturday 8:00 am to 1:00 pm, and no work on Sundays or public holidays). However, some out of hours work may be required from time to time.
Hours of operation	Continuous operations, 24 hours per day, seven days per week.	No change. Continuous operations, 24 hours per day, seven days per week.

3.4.2 Mining

i Mining methods and equipment

No changes are proposed to current mining methods and equipment type at HVO North. Truck and shovel will remain the primary mining method supported by ancillary equipment, with the option of also using a dragline from time to time. Retaining approval for the use of the dragline will maintain flexibility as required for extraction and rehabilitation activities to occur in an efficient manner.

The typical mining fleet that will continue to be used for operations at HVO North includes:

- excavators
- shovels
- haul trucks
- dozers
- loaders
- drills
- water carts
- graders.

Fleet numbers and types may vary from time to time throughout the life of the Project. Factors such as technological advances in mining equipment and varying geotechnical properties of the material being mined may require alterations to the composition of the fleet. Where this occurs, noise and dust generating activities will be considered and measures put in place to maintain compliance with conditions of approval and licences.

Ancillary equipment to support mining operations will continue to be relied upon as required, which may include but is not limited to scrapers, backhoes, service trucks, articulated trucks, mobile cranes, rollers, mulchers, front end loaders, generators, crushers, screening/batching plant, water pumps, lighting plants and light vehicles.

ii Extraction rate and mine life

The HVO North Action seeks to maintain the annual extraction rate of 22 Mtpa currently approved under the HVO North Development Consent, while authorising mining operations from 1 January 2027 to 31 December 2045. The HVO North Action seeks to remove the current separate annual extraction limits for different mining areas (i.e. 12 Mt in West/Mitchell Pit and 10 Mt in Carrington Pit).

Upon commencement of the HVO North Action, mining will continue in HVO North, generally in accordance with the indicative staged mine plans presented in Figure 3.4 to Figure 3.8. Mining will continue in the West 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. Coal resources will be extracted down to, and inclusive of, the Barrett seam in West, Mitchell and Carrington Pit areas and the base of the Bayswater seam in the Carrington West Wing area, with the completion of mining occurring before reaching the Carrington Void TSF, as shown in Figure 3.8.

Mining through Lemington Road will result in additional land being mined that was not previously approved to be mined.

In addition to continuation of existing mining activities at HVO North, in Year 1 of the HVO North Action, 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).

Progressive rehabilitation activities will be carried out as mining progresses; however, final rehabilitation activities will be completed following the cessation of mining operations on 31 December 2045.

It is also noted that ongoing exploration drilling within tenement areas will occur throughout the mine life, to obtain further information regarding resources to be mined, as well as geological and geotechnical information relevant to the mining and construction activities that will be undertaken. Drilling may also be undertaken as required for gas and hydrogeological monitoring and investigations. Exploration drilling cuttings and drilling fluids as part of any exploration drilling program associated with a HVO mining tenement may be disposed of within approved tailings facilities.

3.4.3 Coal handling, processing and transport

ROM coal from HVO North will continue to be predominantly processed at the HVCPP and HCPP. ROM coal and product coal flow paths and volumes will generally remain as per current operations, with one addition aimed at increasing flexibility in coal processing with the neighbouring Ravensworth Operations. The HVO North Action seeks to construct a haul road from the HVCPP to the Ravensworth Operations ROM pad, as shown in Figure 3.3 to enable the transport of ROM coal from HVO North to Ravensworth Operations for processing in the Ravensworth CPP and railed through the RCT.

Following processing, product coal will continue to be predominantly transported via rail from the HVLP and NLP facilities to the Port of Newcastle. Where commercial opportunities exist, coal may be transported by rail or conveyor for domestic use. Product coal is also currently hauled from HCPP to NLP which is proposed to continue. As is also currently approved, coal may be intermittently hauled from the HVCPP to the HVLP and between HVLP, NLP and RCT.

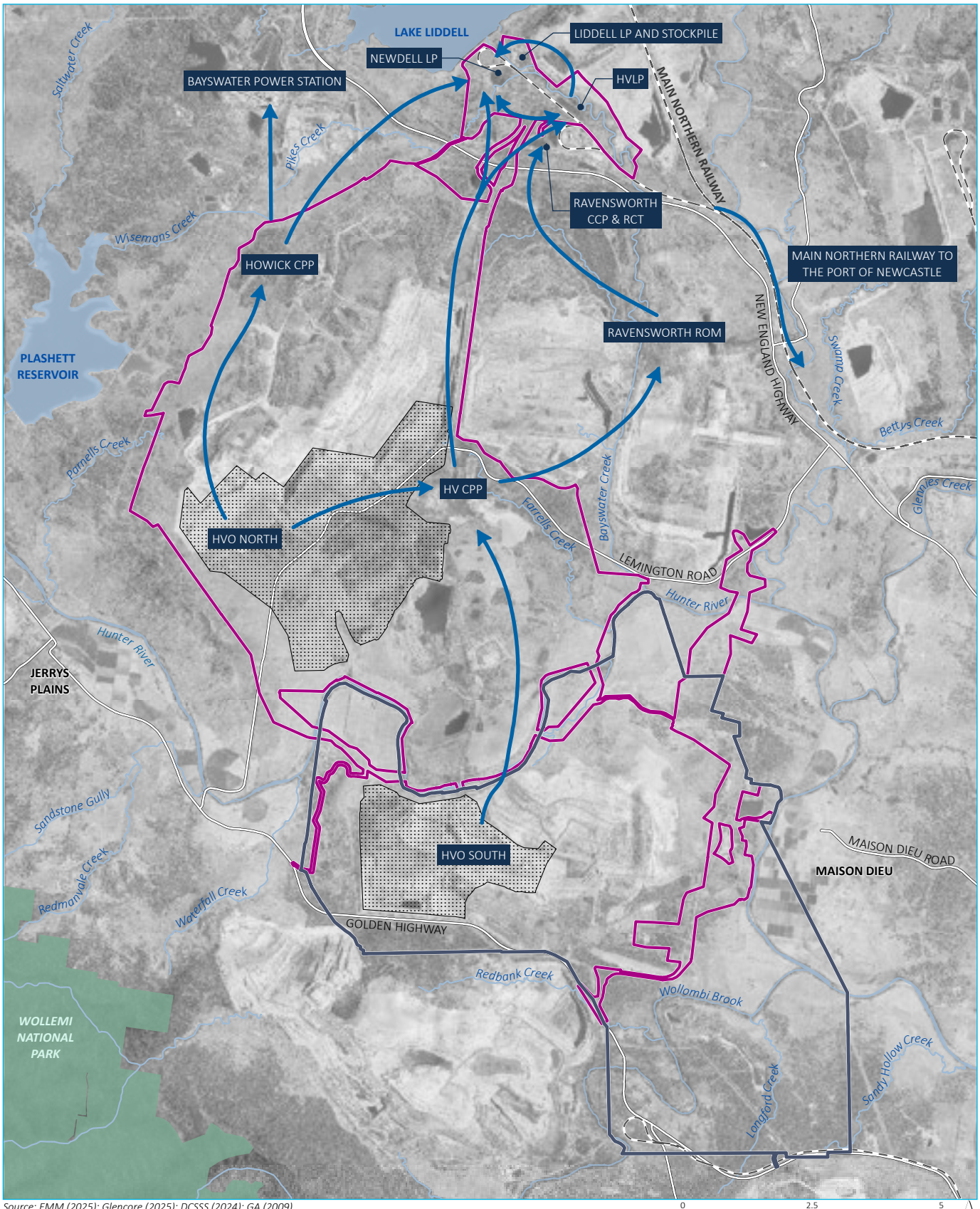
Coal handling infrastructure improvements proposed by the HVO North Action include an expansion of the HVO North ROM coal stockpile, extension of the HVLP product coal stockpile, or the construction of a new product stockpile and train loading facilities at the NLP.

The construction of a new product stockpile and train loading facilities at Newdell will require the demolition of parts of the existing NLP facility. The new facility will involve the construction of a new product coal stockpile and train loading bin and an upgrade of elements of the existing stockpile. Product coal is proposed to be temporarily transported from the Howick CPP by truck to the Liddell stockpile and use the Liddell coal handling and train loading facilities while the Newdell LP is being upgraded.

If the HVLP upgrade is proceeded with, the HVLP product stockpile will be extended as shown in Figure 3.1. The extension will involve the removal of vegetation and topsoil from the extended footprint, establishment of a hard stand base and necessary infrastructure such as conveyors, stackers and reclaimers. The extension will also require the closure of a portion of Liddell Station Road. This portion of road is not currently publicly accessible. In addition, the construction of the HVLP stockpile extension requires the realignment of existing transmission lines as shown in Figure 3.12. Communication lines which interact with the HVLP extension are also required to be realigned.

The expansion of the HVO North ROM coal stockpile, and upgrades to either the HVLP or the NLP will improve coal handling efficiency across the HVO Complex. A coal flow diagram is presented in Figure 3.9, illustrating the proposed movement, handling and transportation of coal across HVO Complex.

From time-to-time additional coal stockpiles may be developed in pit and at the surface facilities to manage market conditions.



Source: EMM (2025); Glencore (2025); DCSSS (2024); GA (2009)

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KEY

- HVO North Action Area
- HVO South Action Area
- Proposed mining area
- Coal flow direction

Existing environment

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

Coal flow diagram

HVO Continuation Project
HVO North Public Environment Report
Figure 3.9

EMM creating opportunities

3.4.4 Tailings and reject management

i Overview

Coarse reject, together with overburden, is currently emplaced within active overburden emplacement areas. Tailings are pumped from CPPs to tailings storage facilities across HVO via a network of pipelines. This approach will generally continue for the Project.

The key aspects of the tailings and reject management strategy throughout the life of the Project at HVO North are:

- continuation of the disposal of coarse reject material with overburden across the HVO Complex
- disposal of tailings as follows:
  - emplacement of tailings in a TSF to be established in the northern extent of West Pit, as shown in Figure 3.10
  - continuation of tailings emplacement in the Carrington Pit TSF and Cumnock Void 3 TSF during the early stages of the Project
  - emplacement of tailings in the South Cut void of LCO.

The Project also involves the recovery of tailings from some existing TSFs in areas that will be mined through as part of the Project. Tailings facilities that are proposed to be mined through will be assessed prior to mining. In addition, decommissioning and rehabilitation of TSFs no longer being used will continue. This may include intermittent deposition of tailings in these TSFs as part of ongoing management towards decommissioning.

Figure 3.10 illustrates the key components of the tailings and reject management strategy for the Project, including the proposed conceptual location of the pipeline to transfer tailings from HVO to LCO's South Cut, the proposed TSF within the northern extent of West Pit and existing TSFs to be decommissioned.

Over the life of HVO, the tailings and reject management strategy will continue to be refined to meet operational needs. This may also include trial or testing facilities in the HVO North Action Area to inform the strategy.

ii West Pit TSF

As noted above, the HVO North Action proposes the establishment of an additional in-pit TSF in the northern extent of West Pit, where tailings will be emplaced until full. A feasibility study of the establishment of the West Pit TSF was undertaken, which included consolidation modelling.

The West Pit TSF will be bounded on two sides by the highwall and end wall which are expected to be practically impermeable. The western and southern walls will comprise overburden emplacements. Tailings will be deposited into West Pit in a manner that meets the following objectives:

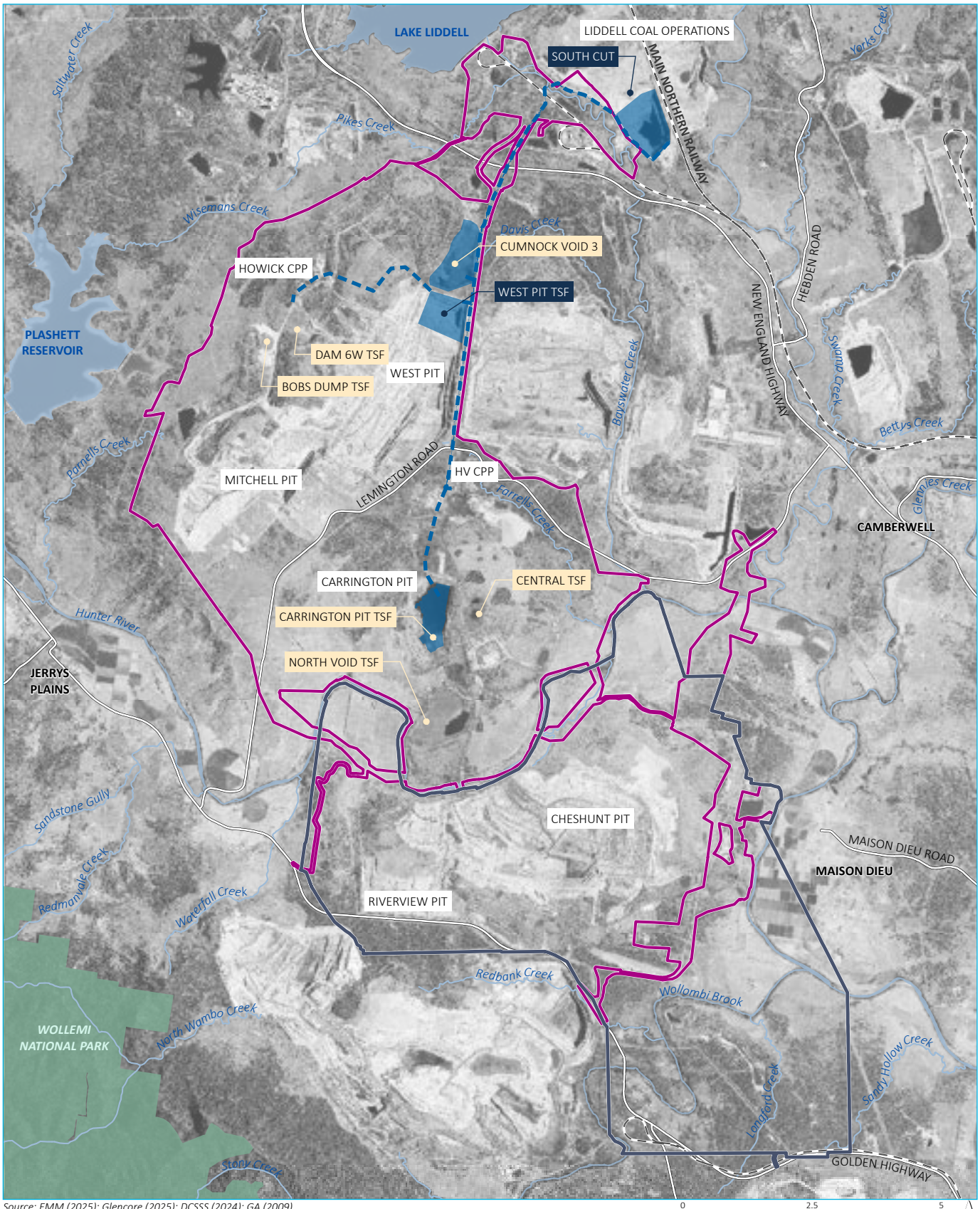
- promotes efficient water recovery from the decant
- recovers as much water as possible for reuse
- provides a seal to the mine spoil to reduce the amount of seepage from the tailings to the spoil.

The TSF in West Pit is anticipated to be relied upon for the life of the HVO North Action.

iii Liddell Coal Operation's South Cut void

Disposal of additional tailings from the Project is proposed in the neighbouring LCO South Cut void, immediately north of the New England Highway and HVO North. The commercial arrangements between HVO and LCO for this activity will be the subject of an agreement between the two mines. LCO's development consent (DA 305-11-01) was modified (MOD 8) to allow the receipt of tailings at LCO from nearby mining operations and for the South Cut void to operate as a multi-user tailings facility. 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 LCO's South Cut void is that it reduces the number of voids in the local area.

The indicative pipeline route to LCO is shown in Figure 3.10. LCO's South Cut void is bounded on three side by highwalls and on the western face by dumped mine spoil. HVO will utilise the LCO void for tailings storage as approved by the LCO consent conditions.



Source: EMM (2025); Glencore (2025); DCSSS (2024); GA (2009)

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KEY

- HVO North Action Area
- HVO South Action Area
- Proposed tailings storage facility
- Conceptual tailings pipeline

Existing environment

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

Label format

- EXISTING ITEM
- PROPOSED ITEM

Tailings storage facilities

HVO Continuation Project
HVO North Public Environment Report
Figure 3.10

EMM creating opportunities

3.4.5 Mine support infrastructure

i Summary of construction activities

A summary of the construction activities required to support the HVO North Action are listed below, generally in the order of construction (noting some will occur concurrently) and are described in more detail in the following sub-sections:

- Lemington Road realignment – Realignment of a section of Lemington Road, construction of a new bridge over the Hunter River, and closure of a portion of the existing road (Figure 3.11).
- Site access – Construction of a new site access road to the HVO North MIA from the road that is currently Lemington Road (Section 3.4.5iii).
- Electricity and telecommunications – Decommissioning and realignment of transmission and telecommunications lines (Figure 3.12).
- MIA upgrades – HVO MIA upgrade (Section 3.4.5v).
- Expand the HVO North ROM coal stockpile to improve coal management.
- Newdell LP and HVLP – Upgrade of the Newdell LP and train loading facility and construction of a new product stockpile at the facility, or an extension to the HVLP product coal stockpile (Section 3.4.3).
- Water management – WMS upgrades (Figure 3.13), including flood protection levees, clean water diversion and enlargement of Parnells Dam.
- Ravensworth Operations haul road – Haul road crossing to Ravensworth Operations including an overpass over the mine access road that is currently Lemington Road.
- Material recovery – Recovery of suitable materials from operational areas, such as gravel, and transported via HVO internal haul roads and public roads to support construction activities, as required.
- Waste disposal – Disposal or re-use of inert construction waste, such as concrete, bitumen and fill. Disposal at an appropriate depth within emplacement areas across the HVO complex and Ravensworth Operations. Construction waste will be transported via HVO internal haul roads and public roads. Re-use on internal roads or hardstand areas.

Construction activities will also require the establishment and use of a range of temporary facilities to support construction, such as demountable buildings, car parking and laydown areas.

Further to the above, other upgrades and installation of infrastructure may be required from time to time, such as, but not limited to, upgrades to CPPs and associated infrastructure, site services (including electricity distribution), and the WMS.

Construction activities will generally be undertaken within standard construction hours (Monday to Friday 7:00 am to 6:00 pm, Saturday 8:00 am to 1:00 pm and no work on Sundays or public holidays). However, some out of hours work may be required from time to time.

The construction program proposed for the Project is scheduled to extend up to five years, and subject to approval it is expected to commence from Year 1 of the Project.

The peak construction activities are anticipated to occur in approximately Year 2 where several works will overlap. This period also represents the peak number of construction workers required on-site.

ii Lemington Road realignment

The current Lemington Road alignment passes between the West/Mitchell Pits and the Carrington area at HVO North. As this area is proposed to be mined, the HVO North Action seeks to realign 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, as shown in Figure 3.11.

The Lemington Road realignment presents an opportunity to improve the accessibility and reliability of the road as the primary access point joining the Golden Highway and New England Highway between Singleton and Muswellbrook. The realigned road includes the construction of a new bridge over the Hunter River (refer to Figure 3.11, which will be constructed to meet the requirements of a 1 in 10 average rainfall intensity (ARI) flood protection design. This design will provide improved accessibility and safety outcomes in comparison to the existing Moses Crossing, which is a low-level bridge across the Hunter River at the southern end of the existing Lemington Road. River level data indicates Moses Crossing has been underwater for a total of more than 26 months since 2010; however, the proposed new bridge would have been accessible throughout the same period.

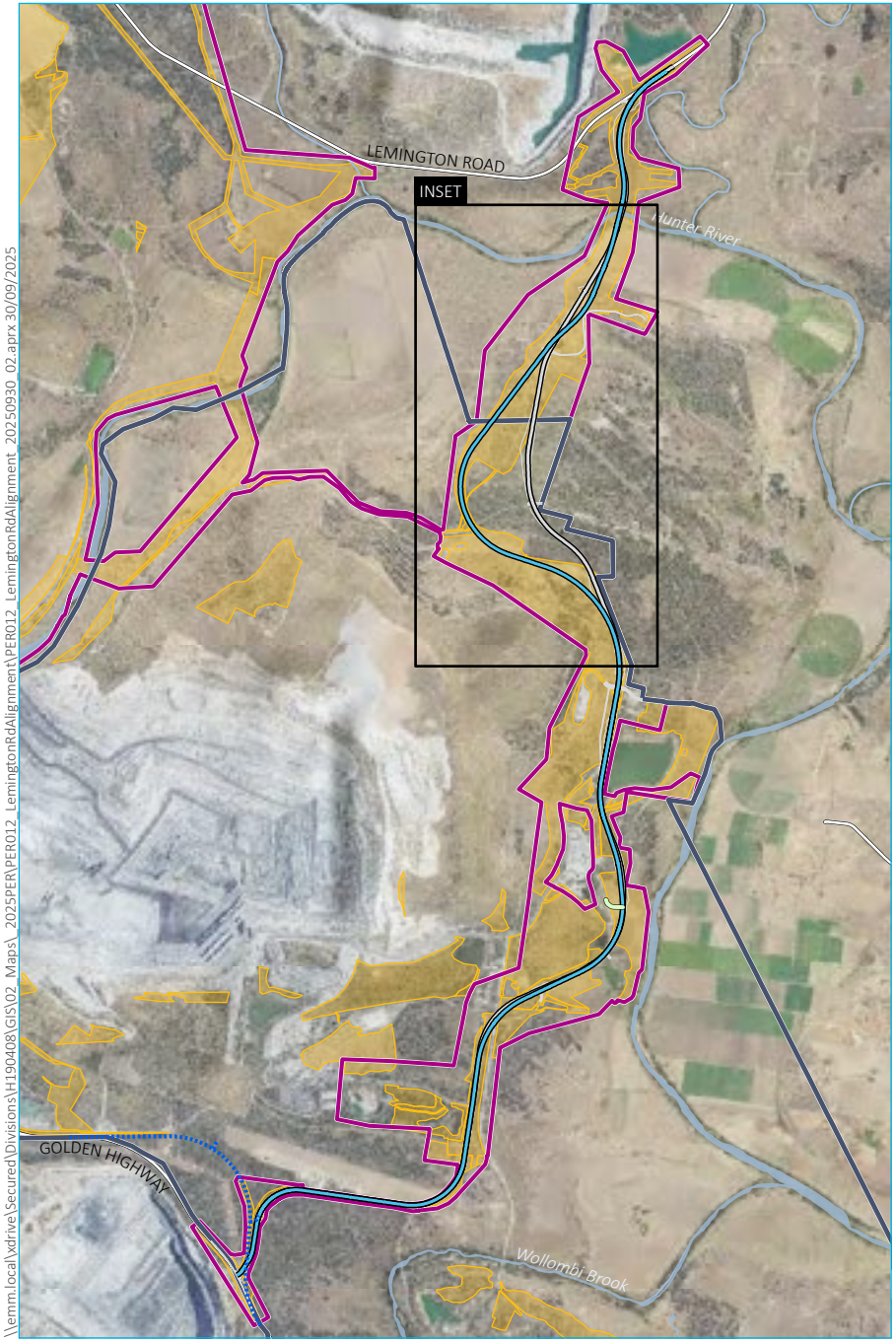
The existing Lemington Road will be kept open and serviceable until the new alignment is completed. Disruption to traffic using the existing road will be minimal and associated with the tie-in works north of the Hunter River and haulage of material over Lemington Road to Ravensworth Operations. Disruption will be scheduled to minimise travel time impacts during the morning and afternoon peak periods. The existing Comleroi Road will be upgraded and widened to the same standard as the rest of Lemington Road. There will be some temporary disruption to Comleroi Road traffic during construction to allow for these works.

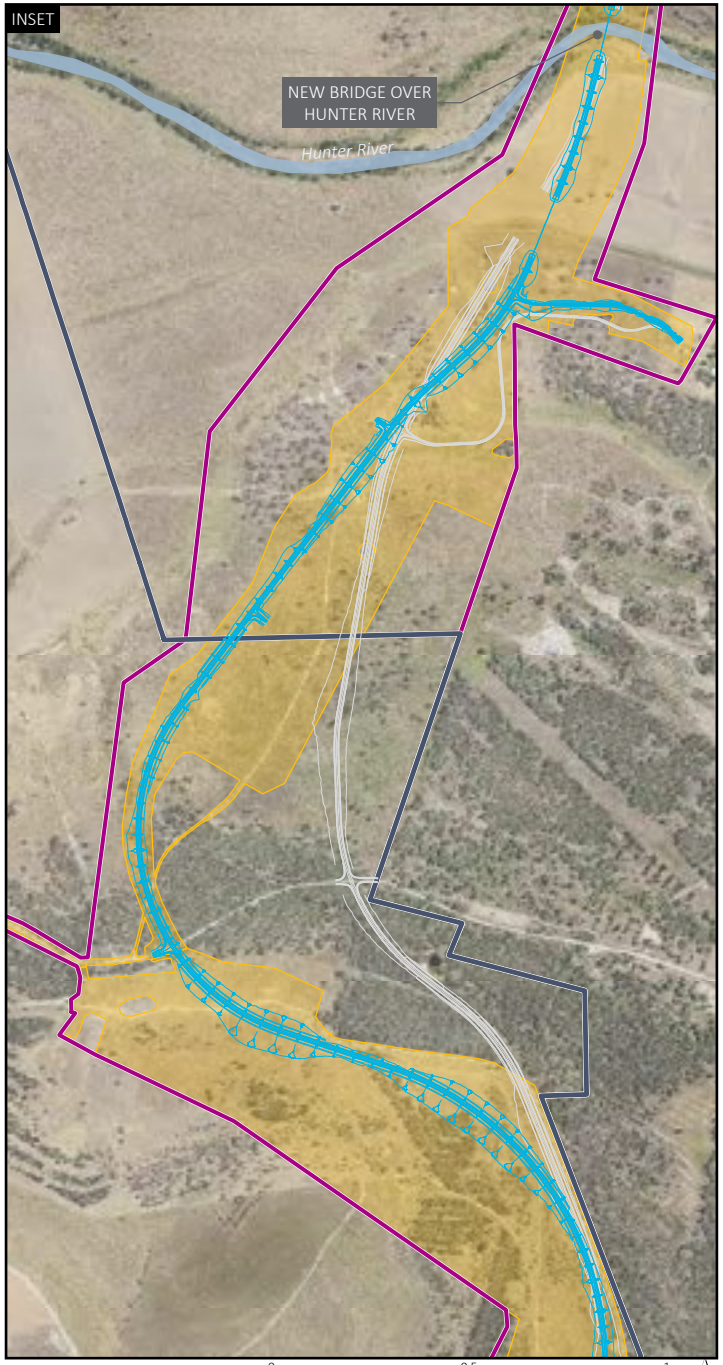
Access to HVO South MIA facilities will be maintained with a new intersection from the proposed Lemington Road. Access to an existing mine-owned property east of the proposed realignment will be provided. The existing Lemington Road from the new tie-in point through to the Ravensworth Operations mine access intersection and the HVO North MIA will be maintained as a private mine access road to the two operations. The intersection with the Golden Highway, including Moses Crossing, will be maintained as service providers require access via the river crossing to their respective assets in the area.

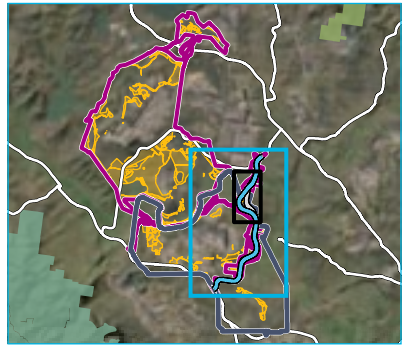
The proposed changes to Lemington Road and the local road network are not anticipated to require changes to the existing New England Highway intersection. The realignment will provide the opportunity to upgrade the intersection at Comleroi Road with the Golden Highway. The intersection design will cater for either the current Golden Highway alignment or the realignment as approved under the United Wambo JV project as necessary.

All works undertaken to either upgrade or construct roads, including the construction of the bridge over the Hunter River, will be undertaken in accordance with contemporary Australian road design standards. The disturbance associated with the road construction includes allowances for associated construction activities required for the development of the new road and areas subject to upgrades, including but not limited to, stockpiles, erosion and sediment control, access tracks, laydown areas, administration facilities, general amenities, temporary construction river crossings, temporary river flow diversions and equipment and workforce parking. Where possible these have been located within the existing and approved disturbance area.

The proposed new alignment of Lemington Road has been carefully considered to avoid areas of environmental sensitivity, including the presence of Warkworth Sands Woodland and Central Hunter Grey Box-Ironbark Woodland, and to minimise the potential for changes to travel time to local road users. Further discussion on the iterative design process to avoid MNES is discussed in Section 5.6.







KEY

- HVO North Action Area
- HVO South Action Area
- HVO North complex biodiversity impact assessment area

Proposed HVO continuation project element

- Amended Lemington Road realignment (centreline)
- Amended Lemington Road realignment (inset)
- EIS Lemington Road alignment (centreline)
- EIS Lemington Road alignment (inset)
- Alternative Golden Highway alignment
- Mine access road

Existing environment

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

Source: EMM (2025); Glencore (2025); DCSSS (2024); GA (2009)

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Lemington Road realignment

HVO Continuation Project
HVO North Public Environment Report
Figure 3.11

EMM
creating opportunities

iii Site access

The progression of mining at HVO North will mine through the existing access road to the HVO North MIA from what is currently Lemington Road. The access road will be moved east of the current location in proximity to the existing HVO North overland conveyor. The access road will be a sealed road suitable for light and heavy vehicle movements, as per the existing access road. As shown in the indicative Project stage plans (Figure 3.4 to Figure 3.8) the access road is required to be relocated early in the Project to avoid interaction with planned mining activities in the West Pit area.

Existing access arrangements to HVO mining infrastructure will be maintained, which includes occasional temporary access via existing minor entrances.

iv Electricity and telecommunications

The Project requires the realignment of a range of electrical transmission lines, communication infrastructure assets and associated services within the proposed mining area to avoid interaction with proposed activities at HVO North. Services to be relocated include, but are not limited to, sections of Ausgrid's 132 kV, 66 kV, 33k V and 11 kV transmission infrastructure, as well as 33 kV transmission lines owned by AGL, and some Telstra owned telecommunication lines. Internal HVO owned electricity and telecommunication infrastructure will also need to be relocated. New maintenance and service accesses to realigned electricity and communication infrastructure will also be established to avoid interaction with mining activities where possible.

As a result of consultation with the infrastructure owners, the transmission and telecommunication infrastructure requiring relocation and not owned by HVO are included as part of the Project, and therefore sit within the HVO Complex BIAA. The realignment works will be completed in agreement with the relative asset owners.

The proposed transmission line realignment paths are illustrated in Figure 3.12. As outlined in Section 5.7.1ii, the extent of disturbance associated with the new transmission lines and associated establishment of easements will be limited to transmission line pole pads and an access road for maintenance along the alignment, as well as vegetation management to maintain safe powerline clearance. The disturbance associated with decommissioning existing transmission line easements will be confined to existing access tracks and cleared areas.

As part of Project planning, the preferred realignments of services to be relocated has been carefully considered to avoid areas of environmental sensitivity as much as possible and to avoid disruption to electricity and communications distribution.

v MIA upgrades

Upgrades are proposed to the HVO North 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.

Upgrades to existing or construction of new infrastructure at the HVO North MIA, as described above, will generally be located within the established HVO North MIA area. These upgrades and relocations are required to:

- improve existing aged facilities
- cater for mine progression
- enable optimisation of infrastructure relative to active mining areas.

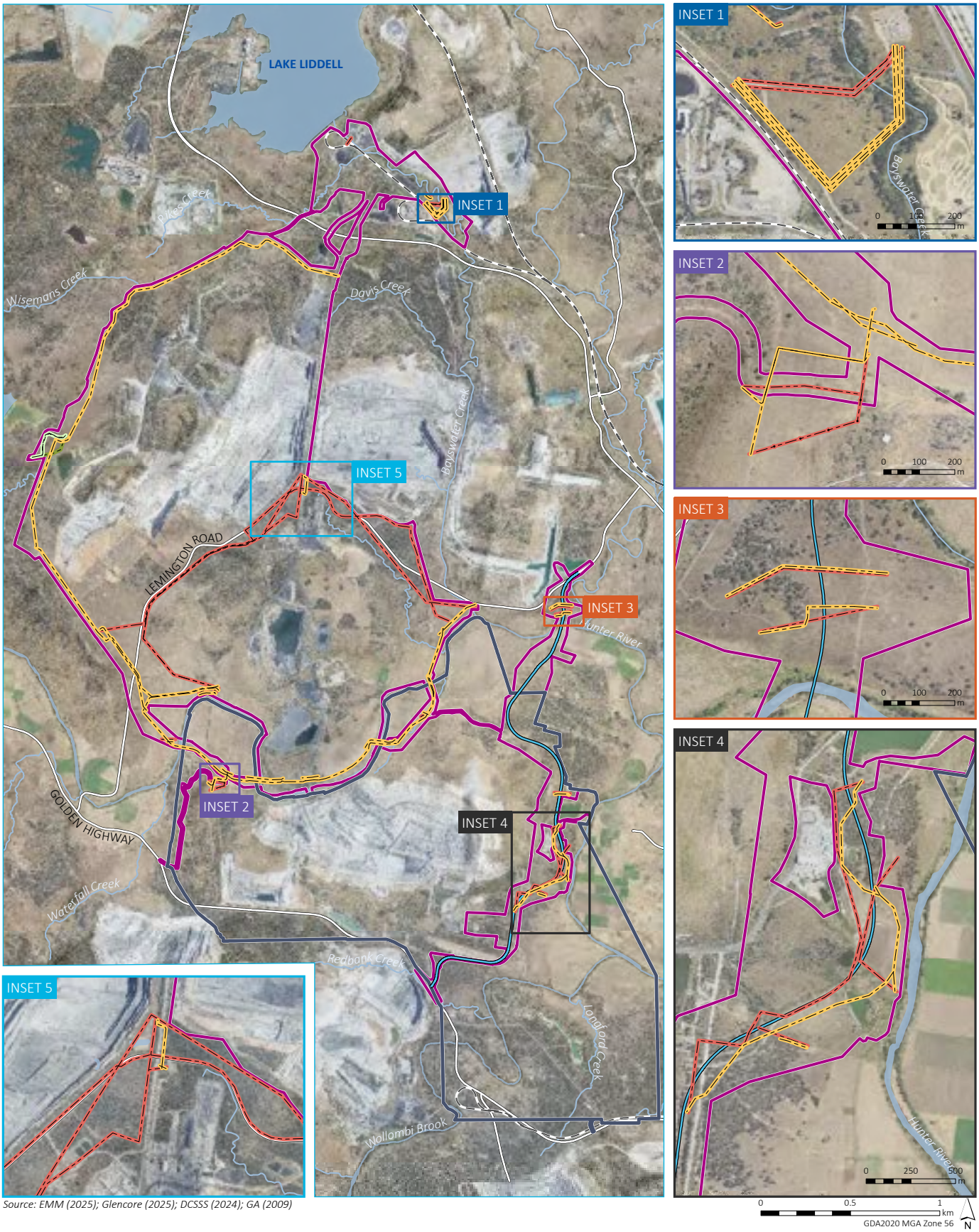
vi Water management

An integrated WMS is in place across HVO North and South. The Project will continue the use of the existing integrated WMS, which includes water transfers to and from surrounding operations, while incorporating the following upgrades to facilitate the Project:

- construction of the North Void TSF flood protection levee up to 0.1% annual exceedance probability (AEP)
- additional mine water/sediment dams as required for progression of mining operations and construction activities
- installation of new groundwater monitoring bores as required to inform ongoing mining operations
- clean water diversions as required, as mining progresses, including the Mitchell clean water diversion (which is a drain that diverts runoff away from mining or disturbed areas and is not a creek diversion)
- increase in the capacity of Parnells Dam from approximately 1 GL to approximately 4 GL, including construction of a new spillway and refurbishment of the existing HRSTS discharge facility
- Carrington West Wing flood protection levee construction (up to 0.1% AEP)
- construction of the Mitchell East levee to provide flood protection to the Mitchell Pit void for the probable maximum flood (PMF) level after mine closure.

The installation and maintenance of water supply works and works on waterfront land will also continue as required to maintain the WMS and associated infrastructure, such as works associated with debris removal around bridge and other instream structures, erosion and sediment control works and monitoring equipment installation and maintenance.

The proposed Project upgrades to the HVO WMS are illustrated in Figure 3.13.



Source: EMM (2025); Glencore (2025); DCSSS (2024); GA (2009)

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KEY

HVO North Action Area
HVO South Action Area
Lemington Road realignment

Electricity transmission line
Ausgrid- new
Ausgrid- to be removed
AGL- new
AGL- to be removed

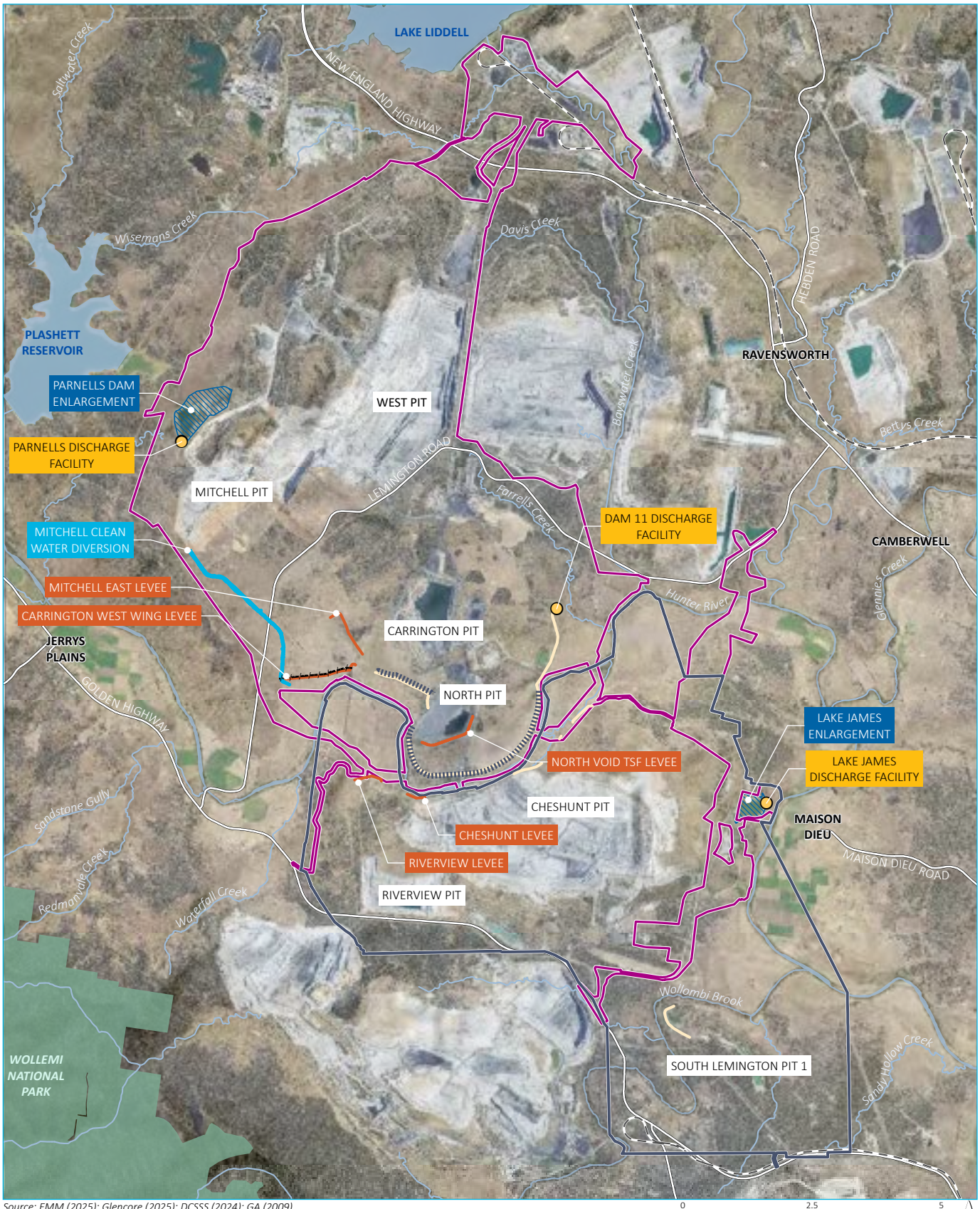
Existing environment
Rail line
Major road
Named watercourse
Named waterbody

Note: transmission lines have been offset for visual purposes

Transmission line and telecommunication realignment

HVO Continuation Project
HVO North Public Environment Report
Figure 3.12

EMM creating opportunities



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Source: EMM (2025); Glencore (2025); DCSSS (2024); GA (2009)

0 2.5 5 km

GDA2020 MGA Zone 56

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KEY

- HVO North Action Area
- HVO South Action Area
- HRSTS discharge facility
- Existing levee
- Existing low permeability barrier wall

Water management infrastructure upgrade

- Approved barrier wall (not yet constructed)
- Clean water diversion
- Levee
- Dam enlargement

Existing environment

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

Water management infrastructure upgrades

HVO Continuation Project
HVO North Public Environment Report
Figure 3.13

EMM creating opportunities

vii Temporary Hunter River crossings

Under the HVO North Consent, HVO has approval for temporary crossings of the Hunter River for equipment too heavy for the existing bridge. As part of the SSD applications for the Project under the EP&A Act, HVO proposes to relinquish this right as part of the Project. This will avoid re-disturbance of approximately 1 ha of land immediately upstream of the existing Hunter River bridge which has been rehabilitated following previous temporary crossing use. The permanent bridge across the Hunter River, which is integral to operations across the HVO Complex, will remain and be maintained throughout the life of the project.

viii Ravensworth Operations haul road

The HVO North Action seeks to construct a haul road from the HVCPP to the Ravensworth Operations ROM pad to enable the transport of ROM coal from HVO North to Ravensworth Operations for processing in the Ravensworth CPP.

The haul road includes an overpass over the existing Lemington Road alignment and will be appropriate for both road registered and off-highway vehicles.

ix Material recovery

Suitable material to support construction activities is known to occur within the mining area of the Project, gravels and other materials are regularly intersected by existing operations. To maximise the beneficial use of these materials, approval is sought to recover and utilise suitable construction materials where available. Materials are proposed to be used in relevant construction activities or as required by ongoing operations.

Material sourced is proposed to be transported where required via internal haul road and public roads.

x Waste disposal

Inert waste produced by HVO, for which a beneficial use or reuse has not been identified, is proposed to be disposed of within appropriate emplacement areas across the complex. Potential waste is anticipated to include concrete, bitumen and inert materials produced by Project construction and operational activities. 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.

Waste material is proposed to be transported where required via internal haul roads and public roads.

As is currently approved, the disposal of tyres within overburden emplacement areas is proposed to continue for the Project. In addition to the disposal of tyres, the Project seeks to include conveyor belt as an approved waste item. In the event it cannot be re-used or recycled, conveyor belt will be disposed of within emplacement areas as required in accordance with current tyre disposal management practices. Drilling waste will also be disposed of within TSFs or voids if required. All other waste streams will be disposed of as required at appropriately licensed facilities.

3.4.6 Rehabilitation and closure

i Rehabilitation and final landform

Advances in rehabilitation techniques and landform technology provide an opportunity for the Project to incorporate improved contemporary natural landform design principles into the proposed final landform of areas to be disturbed by the Project.

Progressive rehabilitation is undertaken at HVO as areas disturbed by mining activities become available, with a mixture of pasture and native habitat (woodland) areas established across mined areas. In accordance with the HVO North Consent and RMP, traditional engineering landform design principles are applied in the construction of final landforms at HVO North. As such, areas of HVO North which have been shaped to the approved final landform include engineered structures to drain water off the landform via contour drains and rock lined chutes.

For the Project, contemporary natural landform design principles will be applied. Areas disturbed by mining activities as a result of the Project will reflect a landform sympathetic to the surrounding landscape and incorporates micro-relief features. The conceptual landform has been designed using landform design software which produces stable final landforms that are relatively 'natural' looking.

Areas which are rehabilitated and do not require disturbance for the Project, or where rehabilitation is largely progressed or currently underway, will be rehabilitated consistent with existing approvals, as re-disturbance of these areas would cause more impacts than benefits relating to bulk material movement. Ongoing monitoring of these areas against established completion criteria will continue under the HVO North Action, as well as general maintenance and land management activities such as erosion control, weed management, access track service and maintenance as required. The proposed final landform for the Project reflects the currently approved final landform in these areas.

Consistent with existing operations, progressive rehabilitation of mined areas will continue throughout the mine life, generally consistent with the indicative staged mine plans presented in Figure 3.4 to Figure 3.8. Rehabilitation will include the decommissioning and removal of infrastructure not required to support the final land use (anticipated to be a mixture of agriculture and native ecosystem), and the reshaping and revegetation of disturbed areas to establish a mixture of native vegetation and open grassland areas with a pit lake associated with the HVO North final voids. Material required to rehabilitate the Cumnock Void 3 TSF is proposed to be sourced from HVO North also in accordance with the indicative stage plans. Further, it is noted temporary stabilisation activities may occur throughout the mine life in discrete areas which may not be subject to final rehabilitation for extended periods of time due to operational constraints. The proposed HVO North final landform is shown in Figure 3.14.

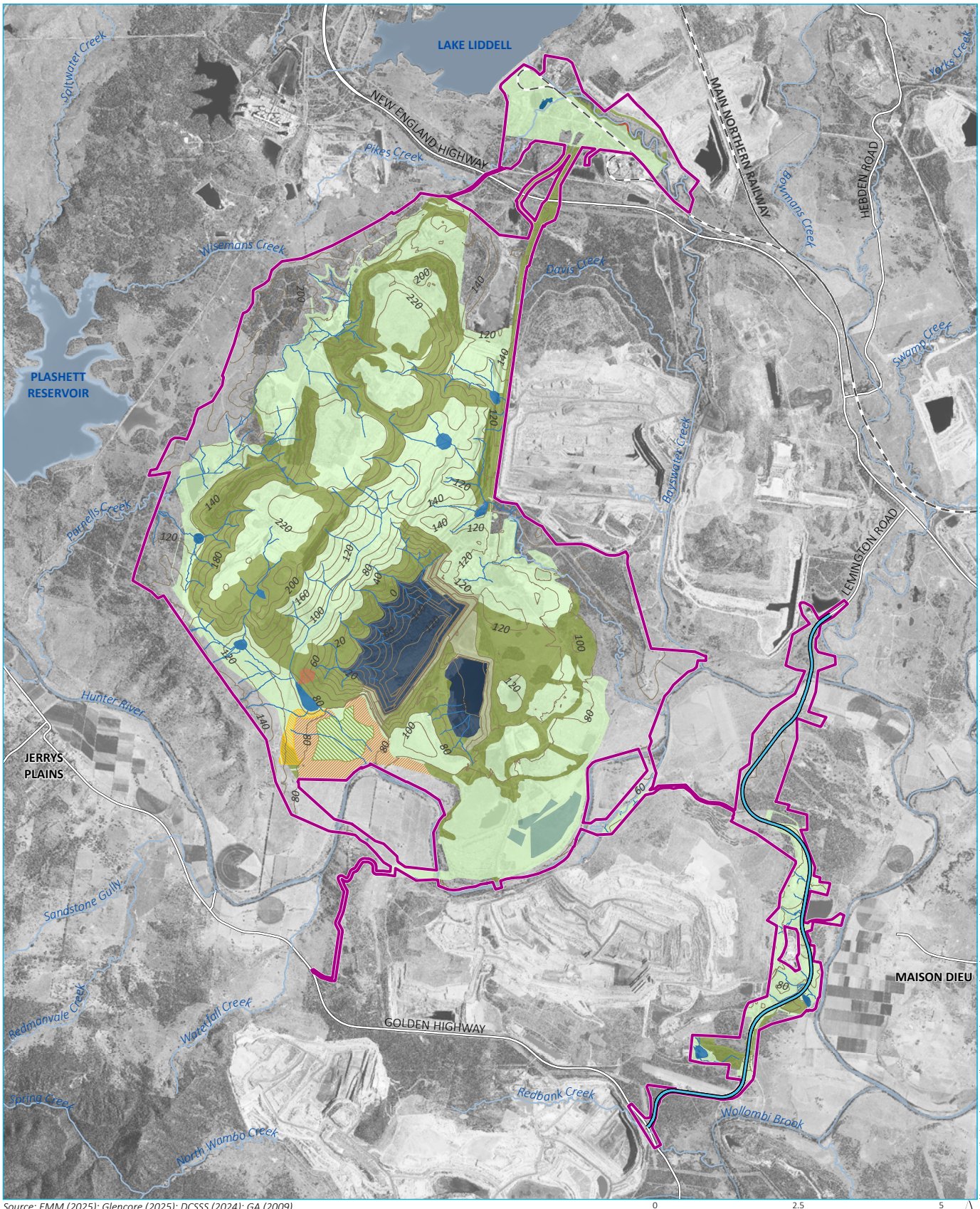
Final rehabilitation and Project closure requirements will ultimately be developed as part of a detailed closure plan, which will be produced prior to planned closure in consideration of input from key government agencies and relevant stakeholders at the time. Further, rehabilitation objectives will be reviewed throughout the life of the Project in response to stakeholder consultation and to maintain consistency with final land use objectives of the regional area as may change over time, for example as currently identified within the *Hunter Regional Plan 2041* (DPE 2021).

ii Final void

The final landform that is currently approved at HVO North includes three final voids, one in West Pit, one in Mitchell Pit and one in Carrington Pit.

The HVO North Action will reduce the number of final voids that will remain post-mining at HVO North, from the three approved to two voids being the Mitchell Pit void and the Carrington void, as shown in Figure 3.14. The final voids are predicted to be long-term sinks in which no water is expected to be released from the void to the receiving environment.

In terms of use, the conceptual rehabilitation and closure strategy for the Project (EMM 2022d) provided as Appendix H to the EIS, identifies the final voids as a pit lake; however, the void has been designed so that other potential beneficial uses of the void have not been precluded. Significant work has been undertaken in determining the number of voids and the location, shape and size of the final voids for which approval is sought, incorporating feedback from stakeholders during stakeholder engagement.



Source: EMM (2025); Glencore (2025); DCSSS (2024); GA (2009)

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KEY

- HVO North Action Area
- Predicted drainage
- Predicted 20 m contour
- Lemington Road realignment

Existing environment

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

Final landform 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

Existing commitments maintained by the Project (indicative location)

Rural land capability

- Class 2- DA 450-10-2003 MOD3
- Class 3- DA 450-10-2003 MOD3
- Class 4- DA 450-10-2003 MOD3

Native ecosystem

- Central Hunter Box-Ironbark Woodland - DA 450-10-2003 MOD3
- Swamp Oak Floodplain Forest - DA 450-10-2003 MOD5

HVO North conceptual final landform

HVO Continuation Project
HVO North Public Environment Report
Figure 3.14

EMM creating opportunities

3.5 Feasible alternatives

To meet Project objectives, detailed studies considering mining options and infrastructure arrangements were carried out as part of the EIS (EMM 2022a). Each of these studies evaluated potential environmental and social impacts to inform the Project design, as described in this chapter, being the preferred Project.

Following the submission of the EIS, a Submissions Report (EMM 2023a) was prepared to respond to the matters raised in the submissions. Since the receipt of submissions on the Project and following ongoing engagement with government agencies and stakeholders, HVO refined the proposed project design, reduced the Project life, avoided coal extraction in Gas Domain 1 at HVO North and reduced the annual production rate. In turn, this has reduced impacts to biodiversity and GHG emissions.

The proposed changes and an assessment of the impacts associated with these changes were documented in the HVO North Amendment Report (EMM 2023b) and the Amendment Report (EMM 2025a).

The following sections summarise the alternative mining options and infrastructure arrangements considered and documented in the EIS and the changes to the Project that were made following the EIS and documented in the HVO North Amendment Report (EMM 2023b) and the Amendment Report (EMM 2025a).

A detailed *Mine Planning Options Report* (MPOR) (HVO 2022a) and *Infrastructure Options and Avoidance Report* (IOAR) (HVO 2022b), available in Appendix G, provides further details regarding options considered as part of the EIS and are discussed below. Alternative mine options

i EIS submission

The preferred Project mine design was chosen as it provides the best balance between reducing environmental and social impacts, through the implementation of appropriate mitigation measures, and optimal resource recovery and financial return. The preferred Project mine design has been continually optimised as further information has been made available via exploration drilling and the completion of environmental and infrastructure studies, and to respond to feedback and advice from government agencies.

Alternative options considered during the development of the preferred Project mine design included the following (noting that the Project is 'Option 1' in the MPOR, hence the alternatives start at Option 2 in the below list):

- Alternative option 2 – No Project – mining ends at the complex as per the HVO North Consent (June 2025).
- Alternative option 3 – Maximise resource recovery – mining in several additional locations around and in addition to the preferred mine design localities.
- Alternative option 4 – No final voids remaining at the end of the preferred mine design.
- Alternative option 5 – Impacting the CM-CD1 Aboriginal cultural heritage site.
- Alternative option 6 – Excluding existing Lemington Road from the mining footprint.
- Alternative option 7 – Underground extraction of target seams.

Further mine plan options that were not considered reasonable and feasible during early stages of the mine planning phase were only developed to a qualitative and/or concept quantitative level and are outlined in the MPOR.

a Alternative option 2 – No Project – mining ends as per HVO North Consent (June 2025)

Not proceeding with the Project would mean the cessation of mining at the HVO Complex at the end of 2026. Currently, the HVO South Approval allows for mining to continue to 24 March 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 on 31 December 2026. This option would therefore forego the approved ROM coal remaining to be extracted at HVO South, as well as the additional approximate 307 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 existing 1,500 FTE HVO workforce.

The current schedule for this option assumes mining progresses as per current operations, with a short ramp down prior to the end of mining by December 2026 and aligns to the economic base case considered in the economic assessment of the Project (EY 2025). It also assumes that the rehabilitation of South Lemington Pit 1 would occur prior to cessation of mining at HVO South to backfill that current void. For the reasons mentioned above, this option was not considered reasonable or feasible and did not meet Project objectives.

b Alternative option 3 – Maximise resource recovery – mining in several additional locations

Coal resources extend throughout the area around the HVO Complex, adjacent to and underlying existing operations and infrastructure, and waterways such as the Hunter River and Wollombi Brook. Various resource recovery options, in addition to the preferred Project mine design, were reviewed as part of the process of determining the maximum resource recovery achievable while maintaining a reasonable and feasible mine plan. A total of six alternative mining locations were considered and are documented in the MPOR.

These options were considered not reasonable and feasible and did not meet Project objectives as outlined in the MPOR, with key considerations summarised below:

- proximity and exposure of the additional mining locations to community receptors, notably the Jerrys Plains locality, and the potential resultant community health and amenity impacts
- proximity to nearby equine critical industry cluster
- proximity to the natural features including the Hunter River and Wollombi Brook
- proximity and potential impacts to high value ecological communities
- interactions with existing infrastructure and required space for infrastructure to support further mining activities
- geotechnical consideration of challenging mining conditions and existing mining infrastructure
- alignment with stakeholder feedback obtained during engagement activities.

c Alternative option 4 – No final voids remaining at end of preferred mine plan

An alternative no-void landform for the EIS preferred mine plan was considered in acknowledgement of stakeholder expectations and government direction including the *Improving Mine Rehabilitation in NSW Discussion Paper* (DPE 2017).

This option considers that the mining voids are progressively backfilled and rehabilitated as soon as practicable as mining progresses, noting that at the cessation of coal extraction the final voids are fully backfilled and rehabilitated. The MPOR provides a detailed analysis of a no final void option, with key considerations summarised below:

- HVO North:
  - Requires the rehandling of approximately 730 million bank cubic metres (Mbcm) of material mined from existing rehabilitated areas to fill the proposed voids at the end of coal extraction to approximately 75 mAHD (to achieve a free-draining surface).
  - Results in the disturbance of approximately 1,100 ha of rehabilitated land established during operations.
  - An approximate 19-year extension of site works would be required post-mining, including prolongation of potential air quality and noise impacts for nearby receptors, and delay in mine site rehabilitation outcomes with no economic return.
  - Remaining remnants of highwalls may be required to be shaped to meet visual amenity and geotechnical stability objectives.
- HVO South:
  - Requires rehandling of approximately 610 Mbcm of material mined from existing rehabilitated areas to fill the proposed void at the end of coal extraction to approximately 70 m AHD (to achieve a free-draining surface).
  - Results in the disturbance of approximately 850 ha of rehabilitated land established during operations.
  - An approximate 12-year extension of site works would be required post-mining, including prolongation of potential air quality and noise impacts for nearby receptors, and delay in mine site rehabilitation outcomes.
  - Remaining remnants of highwalls may be required to be shaped to meet visual amenity and geotechnical stability objectives.

This option was not considered reasonable and feasible and did not best meet Project objectives due to the ongoing noise and dust generation, potential significant removal of established rehabilitation, delays in establishing the final landform and associated land use, and associated costs that significantly affects the Project's viability.

d Alternative option 5 – Mining the area including CM-CD1 heritage site

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. Rather, it has been protected from disturbance by being excluded from mining activities occurring in the vicinity since that time.

As part of the Aboriginal cultural heritage assessment completed for the Project (refer to Appendix N of the EIS (EMM 2022c) and Appendix C of the Submissions Report (EMM 2023c)), investigations of CM-CD1 were completed to determine the archaeological content and age of the deposit. Optically-Stimulated Luminescence (OSL) dating 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 (EMM 2022a).

The area including CM-CD1 was included in an original mine plan considered for the Project, but once the Aboriginal cultural heritage assessment was undertaken and the significance of the area was fully understood, the decision was made to avoid direct impacts to this area. HVO has committed to not disturbing this site as part of the Project.

e Alternative option 6 – Excluding Lemington Road from the mining footprint

No disturbance to the existing Lemington Road alignment was considered as an alternative option, with the existing Lemington Road alignment to remain in place and mining occurring on either side. This option would require an additional crossing of Lemington Road to allow for material to be transported from the southern void to the northern emplacement areas, to reduce coal sterilisation and minimise final voids, leaving only one void to the south-east of the proposed mining area. This option incorporates most of the same constraints as the preferred Project mine plan, with the addition of excluding the existing Lemington Road alignment constraint.

The MPOR provides a detailed analysis of excluding Lemington Road from the proposed mining area at HVO North, with key considerations summarised below:

- approximately 65 Mt of ROM coal would be sterilised with dumping adjacent to both sides of the road to topography and above and the loss of 26 Mt ROM over the life of the mine
- operational constraints as a result of bridges over Lemington Road to transport material to the north side of the road
- potential increased amenity impacts due to the crossing of Lemington Road at or above topography by haul trucks to backfill the northern void
- ongoing impacts to road users due to proximity to mining activities, namely as a result of road closures in response to blasting
- change to the final landform to accommodate not mining through the road
- increased complexity of surface WMSs required in the area.

No disturbance of the existing Lemington Road alignment was not considered reasonable and feasible and did not best meet Project objectives due to the above considerations. Furthermore, the proposed Lemington Road realignment benefits to the community from the upgrade of the road, such as improved flood immunity, would not be realised if the road was not realigned.

It is noted a number of alternative alignments for Lemington Road were investigated by HVO to avoid impacts MNES and sensitive environmental features including sites of Aboriginal cultural significance. Further details on the avoidance measures considered through determining the preferred alignment for Lemington Road is presented in Section 5.6.

f Alternative option 7 – Underground extraction of target seams

As an alternative to the open cut mining method, the extraction of resources in the HVO Action areas using underground mining methods was considered. The benefit of this option is that it would reduce the impact on the surface; however, underground mining is not considered economically viable for resource extraction in the area for the following reasons:

- Coal quality, seam proximity and seam thickness are all significant constraints on minable coal tonnage utilising underground mining methods. Considering a minable ROM coal thickness of greater than 2 m, and sufficient separation in depth between mined seams to maintain geotechnical stability of potential target and coal quality, only a few seams display potential for underground mining. Initial reviews indicate that this would lead to a significant reduction in resource recovery with less than 15% of the minable tonnage identified in the preferred Project mine plan being potentially recoverable.

- The presence of regional geological features such as the faulting to the west of HVO North associated with the Muswellbrook anticline, the Hunter Valley Dyke and the Hunter Valley Fault Zone which transects HVO North to the south, and Lemington dyke and numerous faults that influence HVO South would also constrain underground mining.

- There is a high capital cost associated with the establishment of an underground mine and the coal tonnes available for recovery within the resource area are insufficient to ensure the economic viability of the operation.

- Whilst mining does not occur from the surface, there are still potential surface subsidence impacts that could influence existing drainage lines and shallow alluvial aquifers. Additionally, subsidence could impose additional stresses on surface infrastructure such as Lemington Road.

- There would be reduced employment opportunities associated with this option, including reduced length of employment due to limited suitable mining reserves. Changes to mining processes would mean either hiring a new workforce or retraining the existing workforce with a new set of skills required for an underground mining operation.

- Multiple final voids would still remain at cessation of mining following the transition from open cut to underground mining.

For the above financial and technical reasons, underground mining extraction across the resource area was not considered reasonable and feasible and did not best meet Project objectives.

ii Post EIS submission

The HVO North Consent was modified (MOD 8) on 24 April 2024 which approved an extension of time to authorise the continuation of mining for an additional 18 months until 31 December 2026 under the existing approvals.

As stated in Section 1.1.1, in response to an information request following the submission of the Submission Report (EMM 2023a) the RFI, HVO completed a detailed review of the Project and amended the SSD applications for the Project, which includes, amongst other things, the removal of coal extraction in gas Domain 1. The Amendment Report (EMM 2025a) was lodged with DPHI in August 2025.

The Project design has been developed iteratively over a number of years. It has been progressively refined in response to submissions on the original Project described in the EIS (EMM 2022a), as well as to reflect evolving legislation and policy on GHGs. Approval under both the EP&A Act and the EPBC Act is now being sought for this updated design.

Key aspects where the principles of avoidance and impact minimisation with regard to mine design include:

- reduced the project mine plan to avoid coal extraction within gas Domain 1 at HVO North and reduced the total ROM coal to be extracted across both HVO North and HVO South. The proposed amendments, when compared to the original Project presented in the EIS, will result in a reduction of the total ROM coal extraction by approximately 220 Mt. When compared to the original Project, this will result in a:
  - ~31% reduction in diesel emissions over the life of the Project
  - ~55% reduction in fugitive emissions over the life of the Project, including an approximate ~89% reduction in fugitive emissions from 2040 onwards
  - ~43% reduction in total Scope 1 emissions over the life of the Project.

3.5.2 Alternative infrastructure options

i EIS submission

Infrastructure requirements for the HVO North Action were evaluated against the objectives of achieving maximum efficiency and using existing and approved infrastructure where possible (including integrating the coal handling and preparation capacity at nearby Ravensworth Operations facilities) to minimise the need for the construction of new facilities.

New infrastructure proposed for the Project, described earlier in this chapter, was designed in consideration of avoiding key site constraints such as cultural heritage and biodiversity constraints, to achieve minimal impacts where reasonable and feasible.

Key alternative infrastructure options considered during the development of the HVO North Action are summarised below and discussed in further detail within the IOAR:

- realignment path of Lemington Road
- product coal stockpile and train loading facility upgrades
- improvements to the HVO North MIA.

Further infrastructure options that were not considered reasonable and feasible and did not meet Project objectives during early stages of project planning were developed to a qualitative and/or concept quantitative level only and are outlined in the IOAR.

a Realignment path of Lemington Road

The existing Lemington Road 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 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, as shown in Figure 3.11.

The Lemington Road realignment presents an opportunity to improve the accessibility and reliability of the road as the primary access point joining the Golden Highway and New England Highway between Singleton and Muswellbrook. The realigned road includes the construction of a new bridge over the Hunter River (refer to Figure 3.11), which will be constructed to meet the requirements of a 1 in 10 ARI flood protection design. This design will provide improved accessibility and safety outcomes in comparison to the existing Moses Crossing, which is a low-level bridge across the Hunter River at the southern end of the existing Lemington Road.

Alternative routes considered for the Lemington Road realignment, and justification of the preferred path, are documented in the IOAR and summarised below:

- Alternative Option 1 – Lemington Road realignment south of HVO North:
    - This realignment option would involve the realignment of Lemington Road south of HVO North but north of the Hunter River. It would not require the construction of new intersections with the New England Highway or Golden Highway nor a bridge over the Hunter River; however, safe separation between the public traffic, mining operations and the Hunter River would be difficult to implement. Mining would be highly visible from the relocated section of Lemington Road. In addition, this alignment is also partly located over an area of rehabilitated mine overburden, which could present challenging geotechnical conditions and associated potential construction difficulties. As such, this option was not considered reasonable and feasible and did not best meet Project objectives.
- Alternative Option 2 – Pikes Gully Road Extension:
    - This realignment option involves upgrade and extension of the existing Pikes Gully Road along the western side of the HVO Complex and construction of a new Hunter River crossing and Golden Highway intersection in the vicinity of Jerrys Plains. Currently, the land which would be relied upon to facilitate this option between the Hunter River and the Golden Highway intersection is privately owned. This option would rely upon the purchase of private land, and the location of an intersection with the Golden Highway would increase traffic movements in the vicinity of Jerrys Plains Village and the surrounding equine industry.
    - In addition, given the large proportion of the road users who access Lemington Road from the east, this alignment would not be seen as desirable due to the increase in travel times. It would also result in an increase in through traffic in Jerrys Plains. As such, this option was not considered reasonable and feasible and did not best meet Project objectives.
- Alternative Option 3 – Close Lemington Road:
    - Approximately 8% of road users rely on Lemington Road to travel between the New England and Golden Highways as a through road (refer to Appendix R of the EIS (EMM 2022a)), providing a thoroughfare for the community of Jerry Plains to access the north of Singleton. HVO considered that the closure of Lemington Road was not preferred given the use of the road by users as a connection between the two Highways. Notwithstanding this, Lemington Road is subject to significant closure periods due to the flooding of Moses Crossing, and in 2023 was closed for more than 8 consecutive months, from February to October, following damage to the pavement after sustained rainfall.

The preferred Lemington Road realignment proposed by the Project and discussed in Section 3.4.5ii, provides the following benefits when compared to alternative options considered:

- the existing New England Highway intersections are not required to be upgraded, reducing impact to local road users along key regional NSW highways
- there will be minimal interaction with the proposed or potential future mining operations
- it provides significant flood immunity compared to the existing Moses Crossing over the Hunter River crossing

- there will be minimal travel time impacts between the Golden Highway and the New England Highway for local residents of Jerrys Plains
- there will be a reduced visual exposure to the proposed mine workings along the realigned road when compared to the existing Lemington Road alignment and alternative options considered.

b Product stockpile and train loading facility upgrades

Rather than progressing the design of new coal handling and processing facilities for the Project, the primary objective of the CPP design process was to utilise existing facilities where possible, and to re-evaluate the implementation of facilities already approved but not yet constructed. This approach to maximise the efficiency of the existing facilities was driven by the objectives of achieving maximum operational efficiencies and reduced capital and operating costs.

The Project, as described in this chapter, seeks to increase the stockpile capacity of the HVLP and NLP and stockpile, and upgrade the existing train loading infrastructure at Newdell (noting that while approval is sought for upgrades to both the HVLP and NLP, only one will be constructed). This option has been selected as it is the most cost-effective option that minimises disturbance and interaction with existing infrastructure. It can also readily receive product coal from both the HVCPP and HCPP.

Alternatives considered are summarised below and discussed in detail in the IOAR.

- Additional stockpile capacity at HVCPP or HCPP:
  - both the HVCPP and HCPP have product stockpiles, albeit of limited capacity. An option considered was increasing the size of either or both of these two facilities. This option is not considered reasonable or feasible for the following reasons:
    - the product stockpile should ideally be situated close to the train load out facility to maximise blending opportunities and minimise operational delay impacts from long overland conveyors during actual train loading operations
    - upgrading the HVCPP and HCPP would incur significant capital costs in comparison to proposed improvements to the HVLP and NLP options.

c Improvements to the HVO North MIA

The existing HVO North MIA will be upgraded to include a new workshop suitable for ultra-class haul trucks and incorporate modern maintenance facilities. The upgrade will also include administration offices, bath house extension and carparking to more appropriately manage and modernise the existing facilities. It will also assist in the transition in workforce away from the Howick MIA facility as mining in HVO North progresses further south-east.

The option to upgrade the HVO North MIA was identified as the most appropriate location for the following reasons:

- it is already the principal HVO facility and works are achievable with minimal additional disturbance
- the HVO North MIA and HVCPP combined are centrally located without near neighbours and close to mining operations, minimising potential impact to sensitive receivers
- as mining progress further south, upgrading and or refurbishment of the Howick MIA represents an impractical long term solution.

ii Post EIS submission

Post submission of the EIS, the proposed realignment of Lemington Road has been refined to avoid areas of environmental sensitivity, including the presence of Warkworth Sands Woodland of the Hunter Valley CEEC and identified Aboriginal cultural heritage items. Avoidance measures are documented in the HVO North Amendment Report (EMM 2023b) and Amendment Report (EMM 2025a), and which forms part of the HVO North Action allows for the complete avoidance of direct impacts to Warkworth Sands Woodland of the Hunter Valley CEEC at HVO North compared to the alignment presented in the EIS. The direct impacts of the HVO North Action on the Warkworth Sands Woodland of the Hunter Valley CEEC as a result of the realignment of Lemington Road have therefore been reduced from 5.2 ha (as presented in the EIS) to zero.

The Lemington Road alignment presented in both the referral of the HVO North Action in September 2023 and in the EIS (EMM 2022a) would have resulted in the impact to Aboriginal cultural heritage sites HVOCP TR213-AS1 (AHIMS 37-3-1626) (Test Excavation Area 12) and two scarred trees of Aboriginal cultural heritage origin, TR212-ST1 (AHIMS 37-3-1629) and TR216-ST1 (AHIMS 37-3-1635). The amended Lemington Road realignment corridor will avoid approximately 2.78 ha of HVOCP TR213-AS1 that was previously proposed for impact (equivalent to around 18%). Several of the discrete higher density locales of cultural materials within Test Excavation Area 12 will also now be avoided. The amended Lemington Road alignment also avoids both of the culturally modified trees, and both TR212-ST1 and TR216-ST1 will now be unaffected by the HVO North Action. As such, no impacts to scarred trees of Aboriginal cultural heritage origin are anticipated as a result of the HVO North Action.

4 Existing environment

4.1 Introduction

This chapter provides a general overview and description of the existing environment of the HVO North Action Area and surrounds.

4.2 Climate

The regional climate of the HVO North Action Area is characterised by hot summers and mild dry winters. Temperatures range from a maximum average of 32.1°C in January, down to a minimum average of 4.3°C in July and August (Singleton STP Bureau of Meteorology (BOM) station No. 061397, 2022).

Rainfall data collected from collected from two BOM stations (Singleton Defence AWS and Bulga Down Town) are presented in Figure 4.1. Rainfall was well below the long-term average of 695 millimetres (mm) in 2017, 2018 and 2019, coinciding with drought, but exceeded the long-term average in 2020, 2021 and 2022. Rainfall was near the long-term average in 2024.

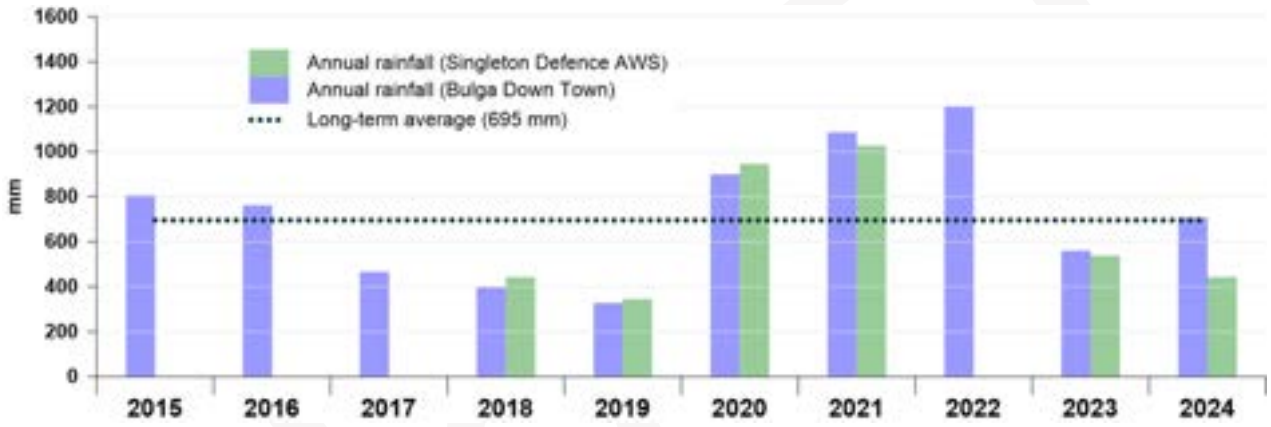


Figure 4.1 Annual rainfall

4.3 Topography

The topography of the HVO North Action Area is characterised by an undulating hillslope, gently sloping alluvial plains associated with stream floodplains and large areas of manmade disturbance to the natural topography due to coal mining.

Much of the HVO North Action Area is disturbed and/or rehabilitated (reshaped and revegetated) terrain. Remnant areas of natural topography within the HVO North Action Area predominantly comprises low to moderate gradient slopes with very occasional steep gradients. Natural local relief typically ranges from 60 to 150 mAHD, and down to approximately 50 mAHD along the Hunter River.

4.4 Land use

Following European settlement of the Hunter Valley in the 1820s, the landscape has been subjected to a range of different modifying activities including extensive logging and clearing, agricultural cultivation, pastoral grazing, residential developments, and mining (Turner 1985).

Land uses within and immediately surrounding the HVO North Action Area primarily include mining operations, power generation, agricultural land, and rural residential land holdings.

4.5 Geology

4.5.1 Overview

The HVO North Action Area is located within the Hunter Coalfield towards the north-eastern margins of the Permian and Triassic Sydney Basin. The basin formed in the Late Carboniferous – Early Permian due to igneous rifting and crustal thinning, which resulted in the deposition of Permian and Triassic aged sedimentary sequences.

HVO extracts coal seams within the Late Permian aged Jerrys Plains and Vane Subgroups of the Wittingham Coal Measures. The two subgroups are separated by the Archerfield Sandstone and comprise stratified sequences of economic coal seams and interburden primarily consisting of sandstone, siltstone, tuffaceous mudstone and conglomerate. Coal seams from the two groups are mined extensively throughout the Hunter Valley.

The main geological units present within the HVO North Action Area are summarised in Table 4.1 and illustrated on Figure 4.2.

Table 4.1 Summary of main geological units in the HVO North Action Area

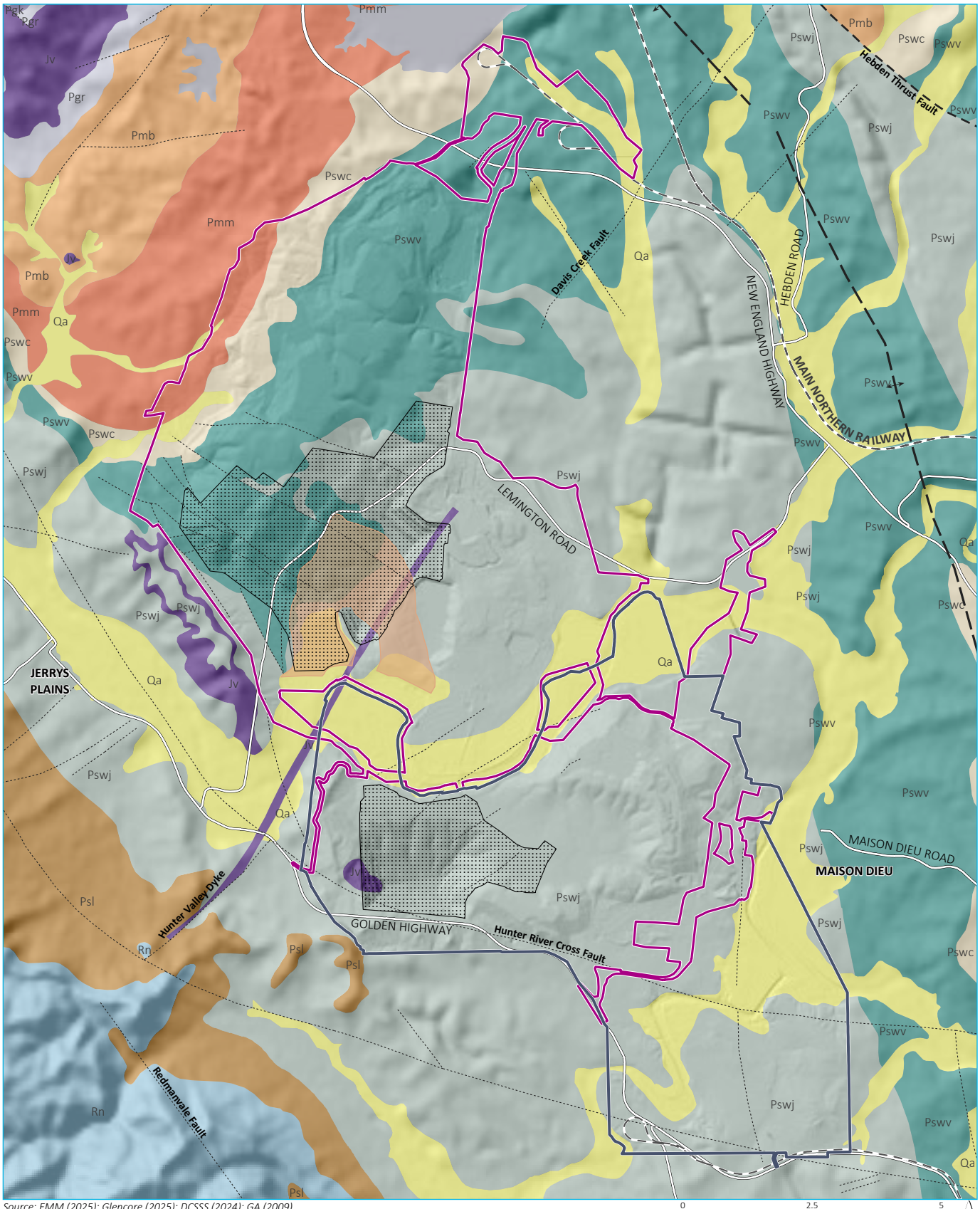
Geological unit	Description
Quaternary/Tertiary alluvium	The Quaternary alluvium occurring along the Hunter River and Wollombi Brook floodplains contains two main depositional units, a surficial fine-grained sediment (clay, silt and sand) overlying a coarser basal material (sand and gravel). The alluvial sediments are generally confined to the current course of the Hunter River and some tributaries near the confluence with the Hunter River.
Paleochannel alluvium	An ancient river meander carved into the Permian sediments at HVO and infilled with alluvial sediments forming a paleochannel to the north of the Hunter River near Carrington Pit. The paleochannel was formed during the Tertiary period and consists of silt, sand and gravel. The depositional environment for the unconsolidated paleochannel alluvium was characterised by frequent flooding and resulting deposition of gravelly sandy material with silts and clays. Colluvial deposits are also present from hill slope runoff and sheet wash from surrounding hard rock (MER 2010). The alluvium thickness varies and ranges from 11 to 18 m, pinching out at the channel perimeter. The bottom 3 to 6 m generally comprises fine to coarse gravel contained within a silty-clayey matrix that is overlain by clay 2 to 8 m in thickness. This clay is overlain by relatively thin surficial sands, silts, clays and loams (MER 2010).
Aeolian deposits	Cenozoic dune sands and associated high level sand deposits mapped in the state geology dataset is locally referred to as 'Warkworth Sands' in the HVO North Action Area. The feldspathic quartz aeolian sands are approximately 3 m (1 to 6 m) thick and form a thin capping on the underlying Permian bedrock. The fine-grained sands overlie a low permeability base of residual clay associated with the underlying strata (AGE 2022).
Permian Wittingham Coal Measures • Jerrys Plains subgroup • Vane subgroup	The Permian strata, underlying the Quaternary alluvium, comprise sequences of coal seams separated by layers of sandstone, siltstone, tuffs and conglomerate and are generally referred to as overburden and interburden in the context of mining. In the HVO North Action Area, the regular layered sedimentary sequence dips gently to the south-east. The Jerrys Plains subgroup outcrops in HVO North, gradually thickens from its outcrop towards the south and is up to 300 m thick at HVO South. It is underlain by the Archerfield Sandstone consisting of a massive light brown or honey coloured well-sorted quartz lithic sandstone which marks the change into the underlying Vane subgroup. Mining at both HVO North and HVO South has intersected the Jerrys Plains subgroup. The Vane subgroup comprises six coal seams with the Lemington seam at the top and the Hebden seam at the base. The interburden consists of sandstone and siltstone. Mining at the Mitchell /West Pit at HVO North is currently approved to mine to the base of the Barrett seam. The HVO North Action proposes to extend mining to the base of the Barrett seam in the Carrington area.

4.5.2 Structural geology

In the Hunter Coalfield, a group of small thrust faults running parallel to subparallel to the Hunter-Mooki thrust fault and a series of northerly trending folds displaces the Permian sequences. The HVO North Action Area is incised by a series of faults that trend in a north-west to south-east direction.

The main mapped structures across the HVO Complex are:

- the Hunter River Cross Fault: little is documented on the fault, but historical information suggests it is narrow with a maximum displacement of approximately 10 m
- the Muswellbrook Anticline (west of the HVO Complex)
- the Bayswater Syncline north-west of Singleton (north and east of the HVO Complex)
- the Hunter Valley Dyke: a north-east trending volcanic intrusion adjacent to the Carrington Pit. The dyke is likely to exhibit lower permeability due to its thickness (greater than 40 m) and localised alteration of geology, but also localised fracturing which enhances groundwater storage
- the 'Block Fault Zone': a zone of faults north-east of the HVO North Action Area up to 250 m to 300 m wide with typical fault displacements of less than 12 m
- the Davis Creek Fault that strikes in a north-east orientation adjacent to the Ravensworth Operations east of HVO North and continues through to LCO. At LCO there were observations of distinct groundwater pressure differences on either side of the fault structure. The fault is therefore thought to act as a barrier to groundwater flow (AGE 2022)
- other regional geological landforms within the broader regional setting.



Source: EMM (2025); Glencore (2025); DCSSS (2024); GA (2009)

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KEY

HVO North Action Area
HVO South Action Area
Pre-mining paleochannel extent
Mining area

Geological feature
Anticline
Thrust fault
Fault

Geology - Hunter coalfield 100K
Qa - Quaternary Alluvium
Jv - Jurassic Volcanics
Rn - Narrabeen Group
Psl - Wollombi Coal Measures
Pswj - Wittingham Coal Measures, Jerrys Plains Subgroup
Pswv - Archerfield sandstone, Vane Subgroup
Pswc - Wittingham Coal Measures, Saltwater Creek Formation
Pmm - Maitland Group, Mulbring Siltstone
Pmb - Maitland Group, Branxton Formation
Pgr - Greta Coal Measures, Rowan Formation
Pgk - Greta Coal Measures, Skeletar Formation
Water

Existing environment
Rail line
Major road

Geological setting

HVO Continuation Project
HVO North Public Environment Report
Figure 4.2

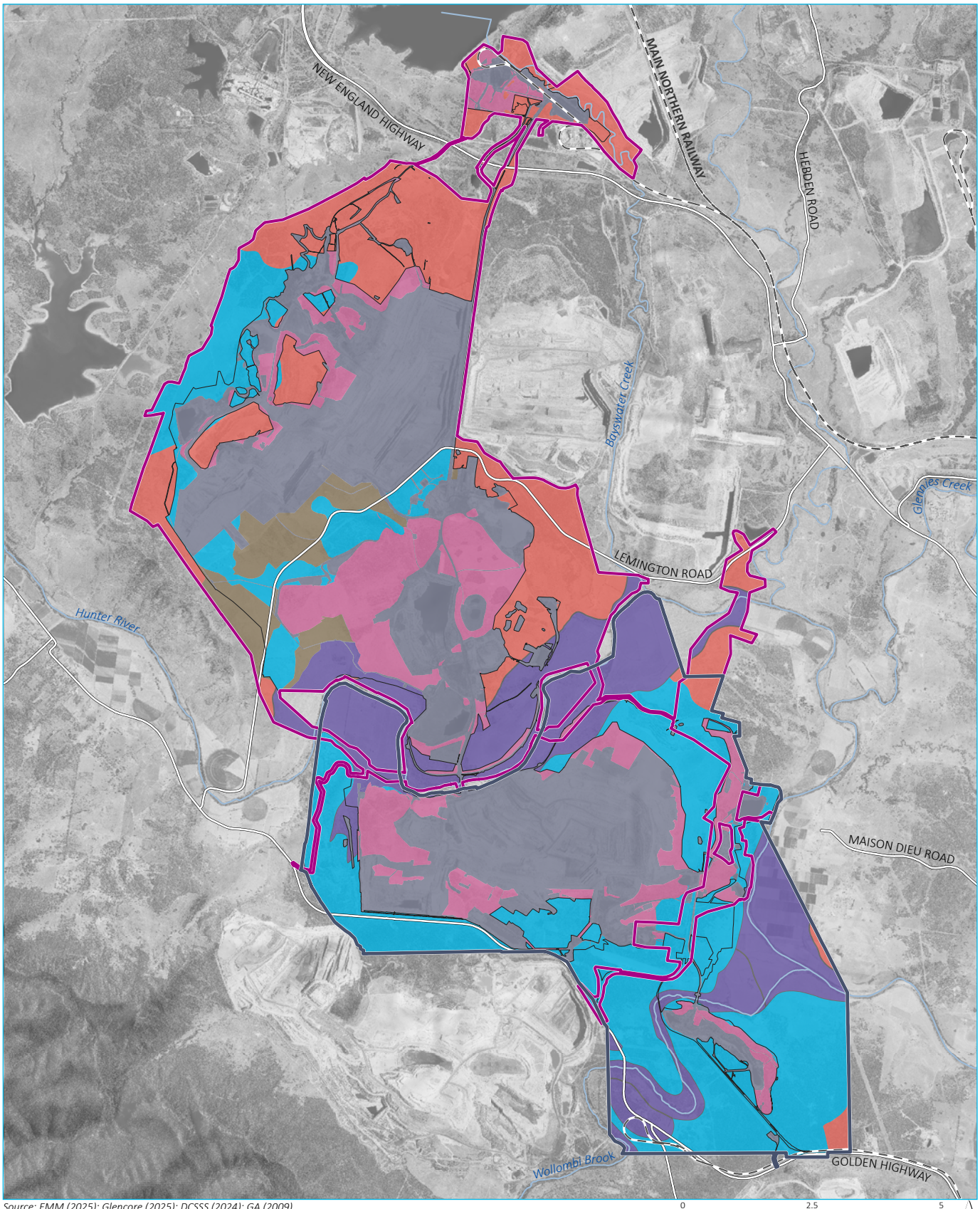
EMM creating opportunities

4.6 Soils

HVO is located within the Soil and Land Resources of the Hunter Region 1:100,000 Sheet (DPIE 2020a). The HVO Complex has been extensively disturbed by human activity, and the features of the original landscape have been extensively modified. Six soil landscape units have been mapped as occurring within the undisturbed areas of the HVO Complex and include:

- Donalds Gully soil landscape
- Ravensworth soil landscape
- Singleton soil landscape
- Branxton soil landscape
- Foy Brook soil landscape
- Dochra soil landscape.

Mapped soil landscapes across the HVO North Action Area are illustrated on Figure 4.3.



Source: EMM (2025); Glencore (2025); DCSSS (2024); GA (2009)

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KEY

- HVO North Action Area
- HVO South Action Area

Existing environment

- Rail line
- Major road
- Named watercourse
- Soil study area

Soil unit

- Soil unit 1: sodosol
- Soil unit 2: dermosol/vertosol complex
- Soil unit 3: alluvial soils
- Soil unit 4: natric kurosols

Disturbed soil

- Current disturbance
- Spolic anthroposol

Soil landscapes

HVO Continuation Project
HVO North Public Environment Report
Figure 4.3

EMM creating opportunities

4.7 Hydrological and hydrogeological setting

The Project involves continued operations within portions of catchments that are currently or have been historically subject to approved mining and its associated impacts. HVO is within the Hunter River Basin catchment and is drained by the Hunter River, Wollombi Brook and minor tributary drainage channels (refer Figure 4.4). The Hunter River is a regulated river, regulated by releases from Glenbawn Dam upstream of HVO and Glennies Creek Dam further downstream. The Hunter River flows in an easterly direction between the HVO North and HVO South operational areas, then flowing south towards Singleton.

Other minor watercourses in the vicinity of the HVO North Action area include Farrells Creek, Parnells Creek, Pikes Creek and Bayswater Creek. These drainage lines are ephemeral, flowing after rainfall events.

The Hunter River catchment has undergone extensive modification in the HVO North Action Area. It is generally considered as having low to medium instream value. There are some medium and high value areas, particularly in the upper regions of the regulated river. The regulated river has generally low diversity and no vital habitat value. The sub-catchments of the Hunter River are generally considered as under medium or high environmental stress. They have relatively poor bank condition, bed condition and riparian vegetation (DPI Water 2017). The aquatic ecology surveys completed for both the HVO North Action and the HVO South Action, found that the Hunter River and its tributaries are considered as having poor ecological value in the HVO North and South Action Areas (ELA 2022).

The Hunter River supports a variety of uses including irrigation, town water supply, mining and power generation. Downstream of the HVO Complex, the town of Singleton relies on the river for its industries and water supply.

Landholders also access water through basic landholder rights and/or through WALs.

In addition to environmental, social and economic value, the Hunter River also has cultural value for Aboriginal people.

The main hydrogeological units within the HVO North Action Area can be defined as follows, based on the geological units and their ability to store and transmit water:

- alluvial aquifers, occurring along the major creeks and rivers, mainly the Hunter River, and the paleochannel, forming shallow unconfined aquifers in the HVO North Action Area
- Permian groundwater systems:
    - thin and variably permeable weathered rock at the surface (regolith). They generally do not form aquifers due to limited saturated thickness
    - non coal interburden aquitards
    - low to moderately permeable coal seam aquifers, generally confined.

The main groundwater bearing unit is the Quaternary alluvium, with less productive groundwater occurring within coal seams of the Permian Coal Measures.

Water receptors include:

- downstream water users accessing surface water via WALs and basic landholder rights
- third-party landholder bores located upstream and downstream of the HVO Complex, typically installed in the alluvium

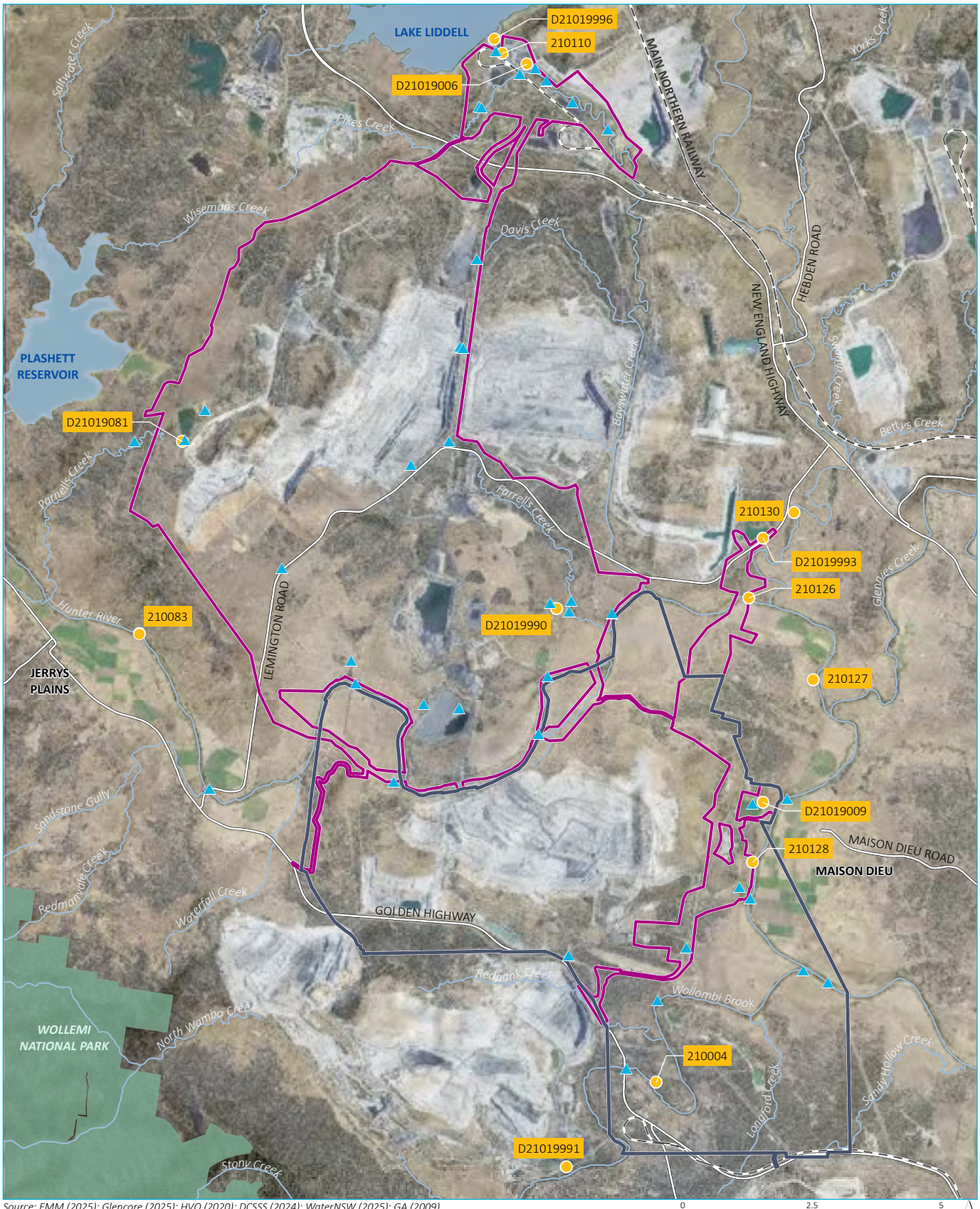
- ecosystems that potentially rely on surface water and/or groundwater:
    - river red gum stands that opportunistically access shallow groundwater recharged by leakage from the Hunter River and Wollombi Brook, and rely on flooding for germination
    - stygofauna occurring principally in alluvial sediments along the Hunter River and its tributaries
    - aquatic ecosystems
    - Central Hunter Ironbark Grassy Woodland (in the Hunter River riparian zone), which conforms (or partially conforms) to the Central Hunter Valley Eucalypt Forest and Woodland CEEC.

Vegetation associated with the Central Hunter Valley Eucalypt Forest and Woodland CEEC occur in areas where the watertable is greater than 20 m below ground level and are therefore unlikely to access groundwater.

The ecological surveys conducted for the Project observed that all vegetation stands were in low to moderate condition. In addition, the aquatic ecosystems surveyed as part of the aquatic ecology and GDE assessment (ELA 2025) are considered to be in poor ecological condition, based on the macroinvertebrate community and water quality (the ecological condition of the Hunter River is classed as poor to moderate). Macroinvertebrate communities were dominated by taxa that are robust and tolerant of pollution and poor environmental conditions.

The location of identified water receptors is presented in Figure 4.5.

Further details on the surface water and groundwater environment potentially impacted by the HVO North Action is presented in Appendix E.



Source: EMM (2025); Glencore (2025); HVO (2020); DCSSS (2024); WaterNSW (2025); GA (2009)

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KEY

- HVO North Action Area
- HVO South Action Area
- HVO surface water monitoring location
- Stream flow gauge

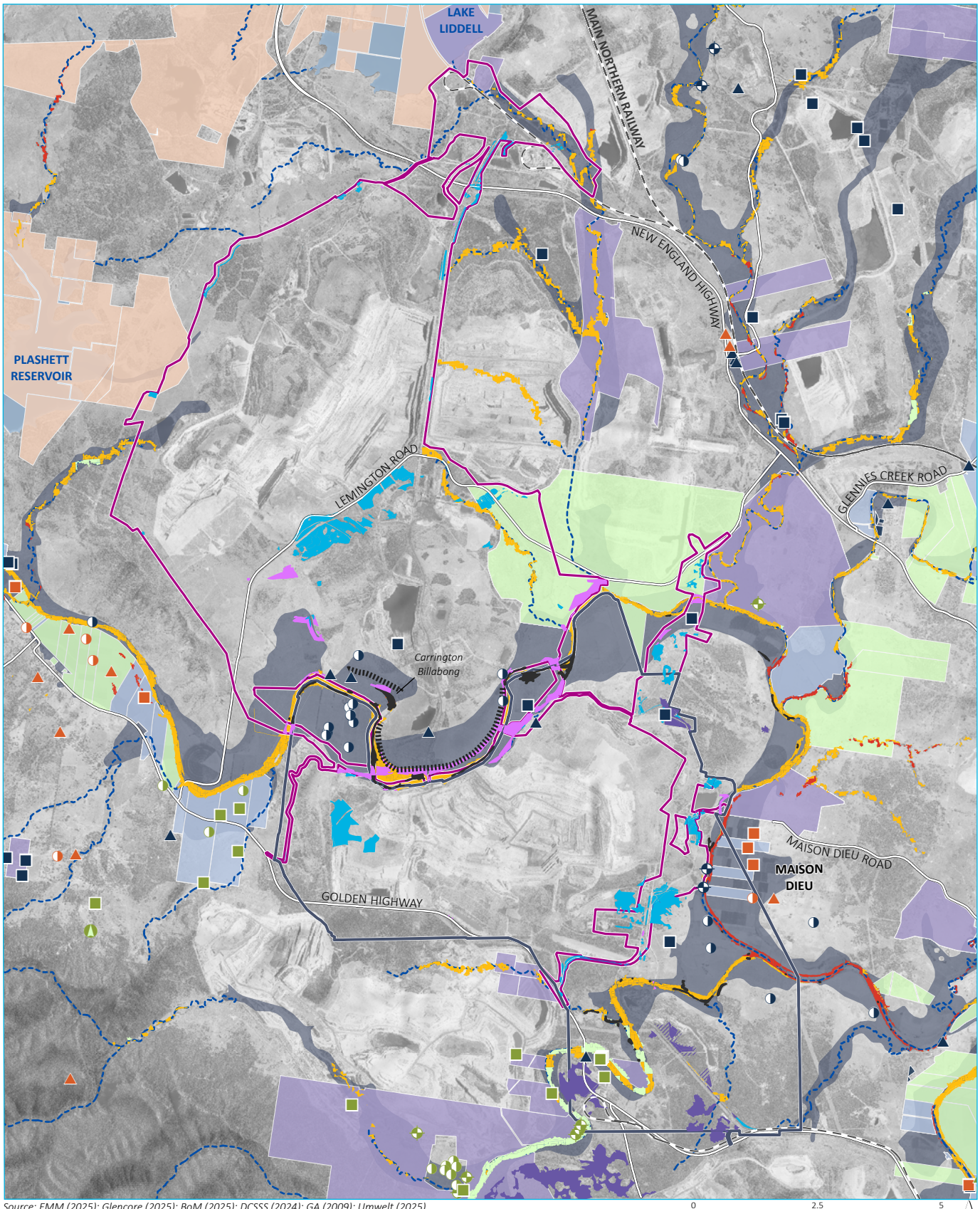
Existing environment

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

Surface water context

HVO Continuation Project
HVO North Public Environment Report
Figure 4.4

EMM creating opportunities



Source: EMM (2025); Glencore (2025); BoM (2025); DCSSS (2024); GA (2009); Umwelt (2025)

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KEY

- HVO North Action Area
- HVO South Action Area
- Alluvial extent (state mapping)
- Existing low permeability barrier wall

Groundwater Dependent Ecosystem (GDE) probability (BOM GDE Atlas)

- High
- Medium
- Low

Owner

- Glencore
- Private
- Other mine

Bore type

- Commercial and industrial
- Irrigation
- Stock and domestic
- Unknown
- Water supply

Plant community type (PCT) (Umwelt, 2025)

- PCT 4089 | Namoi-Upper Hunter River Red Gum Forest
- River Red Gum (HVO, 2025)

EPBC Act vegetation (Umwelt, 2025)

- Central Hunter Valley Eucalypt Forest and Woodland CEEC
- Warkworth Sands Woodland of the Hunter Valley CEEC
- Possible Warkworth Sands Woodland of the Hunter Valley CEEC

Other water access user

- Domestic and stock
- Local water utility
- Major utility
- Regulated river
- Supplementary water
- Unregulated river

Existing environment

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

Water receptors

HVO Continuation Project
HVO North Public Environmental Report
Figure 4.5

EMM creating opportunities

4.8 Existing water management

4.8.1 Water management system

The HVO Complex currently operates under an integrated WMS across HVO North and South, in accordance with the approved WMP. The integrated mine WMS also facilitates approved water transfers with other mining operations (MTW via the South Lemington Pit 1 Void), Wambo, LCO (via LPs), and Ravensworth Operations (via the Cumnock Void 3 tailings decant return)). Water to support operations is also sourced from the Hunter River under relevant WALs held by HVO.

The existing WMS for the HVO Complex consists of a network of infrastructure (dams, pipelines, contour banks) to control the movement of water around the HVO Complex. Water is shared between HVO South and HVO North via pipelines across the Hunter River bridge. HVO uses sufficient water storage capacity to minimise against drought and flood interruptions and prevent off site discharge except in accordance with EPL 640.

HVO holds a water licence to access water from the decommissioned Lemington underground mine workings via the Lemington underground bore ('LUG bore'). The bore can supply water to both HVO and the neighbouring MTW mining operation.

The surface water monitoring program, under the WMP, includes monitoring surface water quality at a number of locations both upstream and downstream of the HVO Complex. The WMP monitors compliance with State approval conditions and contains mechanisms to minimise impacts to surface water resources.

Key existing water management components are identified in Figure 2.6.

4.8.2 Discharge of excess water

HVO holds approval to release water from the complex via LDPs into the Hunter River under EPL 640 and the HRSTS. Discharges are only allowed during high and flood flow periods in the Hunter River.

EPL 640 also includes licensed discharge from the Alluvial Lands. This discharge point has specific discharge parameters and is not regulated under the HRSTS. Discharge parameters are in accordance with EPL 640.

The HRSTS operates to minimise the impact of saline water discharges from industry on the Hunter River. This is done by allowing saline water to be discharged only at times of high flow or flood, when it is diluted by the Hunter River. When the river is in low flow, no discharges are allowed. The objective of the scheme is to manage saline water discharges to minimise impacts on irrigation, other water uses, and on the aquatic ecosystems of the Hunter River catchment.

4.9 Biodiversity

The HVO North Action Area has been largely cleared of intact native vegetation as a result of a long history of use for both agriculture and mining operations. The HVO North Action Area is generally highly disturbed, primarily comprising mining operations and mining related infrastructure, which includes existing open cut pits, coal handling infrastructure, water management infrastructure and tailings storage facilities, as well as rehabilitated mining areas.

Similar land use patterns occur in the vicinity of the HVO North Action Area, with the area surrounded by agricultural land and coal mining operations, with small and scattered patches of native vegetation.

The most significant intact vegetation occurring in the wider locality of the HVO North Action Area is within Wollemi National Park (NP), which is part of the Greater Blue Mountains World Heritage Area and located approximately 2.8 km to the south-west at the nearest point to the HVO North BIAA. The Wollemi NP represents a significant refuge area between remnant patches of vegetation in the central Hunter Valley.

Ravensworth State Forest is also located in the wider locality, approximately 6.7 km to the north-east at the nearest point to the HVO North BIAA. The vegetation in Wollemi NP and Ravensworth State Forest is important for functionality as a fauna refuge in an otherwise widely cleared landscape.

The Hunter River, which broadly divides the HVO North and HVO South Action Areas, provides a narrow corridor across the landscape for fauna that utilise riparian vegetation as movement habitat.

4.9.1 Flora

Flora species within the HVO North Action Area have been recorded from two major vascular plant classes, being ferns and flowering plants and includes trees, shrubs, forbs, grasses, sedges, rushes, reeds, ferns, lithophytes, epiphytes, mistletoes, vines and twiners. The HVO North Action Area is made up of areas of native or exotic grasslands and woodlands previously cleared and disturbed for agricultural and mining purposes.

The extant woodland is regrowth vegetation dominated by Box-ironbark and/or Bull Oak (*Allocasuarina luehmannii*) associations. Riparian zones are generally dominated by either River Red Gum (*Eucalyptus camuldulensis*), Yellow Box (*Eucalyptus melliodora*) or River Oak (*Casuarina cunninghamiana*).

Commonly recorded native grass and forb species include Common Couch (*Cynodon dactylon*), Weeping Grass (*Microlaena stipoides* var. *stipoides*) *Enteropogon acicularis*, Red Grass (*Bothriochloa decipiens*), Climbing Saltbush (*Einadia nutans*), Common Everlasting (*Chrysocephalum apiculatum*), Common Woodruff (*Asperula conferta*) and Purple Wiregrass (*Aristida ramosa*). The mid and shrub layers are usually sparse and commonly contain native species such as Ruby Saltbush (*Enchylaena tomentosa*), Coffee Bush (*Breynia oblongifolia*), Native Olive (*Notelaea microcarpa* var. *microcarpa*) or Blackthorn (*Bursaria spinosa*). Common overstorey species include Narrow-leaved Ironbark (*Eucalyptus crebra*), Bull oak (*Allocasuarina luehmannii*) and Rough-Barked Apple (*Angophora floribunda*).

Further information on EPBC Act listed ecological communities and flora species present within the HVO North Action Area is presented in Chapter 5.

4.9.2 Fauna

A wide range of fauna species have been recorded within and surrounding the HVO North Action Area as part of ecological surveys.

The HVO North Action Area contains fauna habitats generally restricted to grasslands and remnant wooded vegetation or rehabilitated areas. Areas of open grassland provide a foraging resource for macropods and a hunting resource for owls and micro-bats.

Small mammals such as *Antechinus* sp. and reptile species such as striped legless lizard are provided foraging habitat as well as refuge habitat within the grass layers. Occasional isolated paddock trees and fragmented woodlands function as corridors for mobile species, particularly those willing to cross expanses of cleared land, such as the Spotted-tailed Quoll (*Dasyurus maculatus maculatus*). Commonly recorded native species include Eastern Grey Kangaroo (*Macropus giganteus*), Red-necked Wallaby (*Macropus rufogriseus*) Australian Magpie (*Gymnorhina tibicen*), Sulphur-crested Cockatoo (*Cacatua galerita*), Noisy Miner (*Manorina melanocephala*), Common Brush-tailed Possum (*Trichosurus vulpecula*), Eastern Long-necked Turtle (*Chelodina longicollis*), Common Eastern Froglet (*Crinia signifera*), Broad-palmed Frog (*Litoria latopalmata*) and Spotted Grass Frog (*Limnodynastes tasmaniensis*). In addition to the native species, a number of pest species are commonly recorded and include rabbit (*Oryctolagus cuniculus*), fox (*Vulpes vulpes*) and feral pig (*Sus scrofa*).

Further information on EPBC Act listed fauna species present within the HVO North Action Area is presented in Chapter 5.

4.10 Heritage

4.10.1 Aboriginal heritage

The HVO North Action Area is on the traditional lands of the Wonnarua people (sometimes called Wanaruah, Wanarruwa and by other variations), who occupied an area of over 3,000 square kilometres (km^2) including the Hunter River and all its tributaries from near Maitland to the apex of the Liverpool Ranges.

No Aboriginal heritage places listed on either the National or Commonwealth heritage lists are within the HVO North Action Area.

A large number of Aboriginal sites were identified surrounding the HVO North Action Area via a search of the NSW Aboriginal Heritage Impact Management System (AHIMS) database, with a total of 1,786 previously recorded Aboriginal sites within a ~183 km^2 search area centred on the HVO Complex.

There are currently no native title claims over the HVO North Action Area.

4.10.2 Historic heritage

A review of statutory registers was completed as part of the preparation of the Historic Heritage assessment prepared to support the EIS (EMM 2022a). Statutory registers reviewed as a part of this assessment include:

- World Heritage List – managed under the EPBC Act
- National Heritage List – managed under the EPBC Act
- Commonwealth Heritage List – managed under the EPBC Act
- State Heritage Register – managed under Part 3A of the NSW *Heritage Act 1977* (Heritage Act)
- Section 170 Heritage and Conservation Register – managed under section 170 of the Heritage Act
- Schedule 5 of the *Singleton Local Environment Plan 2013* (Singelton LEP) and Muswellbrook *Local Environment Plan 2009* (Muswellbrook LEP)
- State Heritage Inventory (SHI), which was cross-checked with Schedule 5 of the Singleton LEP and Muswellbrook LEP and the section 170 Heritage and Conservation. The SHI is not a single statutory register, but a central collection of locally listed statutory heritage items maintained by Heritage NSW.

A search of the heritage registers revealed that the mapped area of a single heritage-listed item, the Archerfield Homestead and Outbuildings, is within the HVO North Action Area. No impacts on the buildings are predicted as a result of the HVO North Action.

The State Heritage listed Former Chain of Ponds (Inn and Outbuildings) (SHR Listing No. 00242, Singleton LEP Item No. I34) (Chain of Ponds Inn) is within the HVO North Action Area; however, no impacts on this site are predicted as a result of the HVO North Action.

No world heritage properties or places listed on the National Heritage Register were identified within or in the vicinity of the HVO North Action Area and no impacts to world heritage properties or places listed on the National Heritage Register as a result of the HVO North Action are predicted.

5 Matters of national environmental significance – biodiversity

5.1 Introduction

A HVO North Continuation Project biodiversity MNES assessment (Umwelt 2026a) (herein referred to as the biodiversity MNES report) has been prepared to support this draft PER and is provided as Appendix D.

For the purposes of the biodiversity MNES report and this draft PER, a HVO North BIAA has been defined for the HVO North Action as detailed in Section 3.2.1.

5.2 Desktop analysis

In preparing the biodiversity MNES report, a review of previous documents and reports relevant to the HVO Complex BIAA was undertaken. This included regional vegetation mapping reports, site-specific monitoring surveys, ecological surveys undertaken within and in the vicinity of the HVO Complex BIAA and also relevant ecological database searches. The information obtained was used to inform survey design and assist in the assessment of potentially occurring threatened and migratory species and threatened ecological communities (TECs) within the HVO North BIAA.

Prior to field surveys, digital imagery (aerial photographs) of the HVO Complex BIAA and surrounds were viewed to identify spatial patterns in vegetation, land use and landscape features. This informed field survey design of the HVO Complex BIAA.

5.3 Survey effort

The HVO North and HVO South BIAAs were surveyed as a whole due to the common features, adjacent footprint areas and parallel assessment timeframes. This section outlines the surveys undertaken across the HVO Complex BIAA; however, the assessment outcomes and results in subsequent sections are focused on the HVO North BIAA only.

Biodiversity surveys were undertaken in accordance with the NSW Biodiversity Assessment Method (BAM) and included:

- vegetation integrity plot surveys
- rapid vegetation assessment
- vegetation and TEC delineation
- threatened species surveys.

5.3.1 Floristic and vegetation surveys

A total of 134 vegetation integrity plots were conducted across the HVO Complex BIAA over 32 survey days in March, June, August, September and October 2020, April 2021, May 2023 and December 2023, February and March 2025. Plot data was collected in accordance with requirements under the BAM.

Rapid assessments were also completed at 168 locations across the HVO Complex BIAA during the field surveys. An additional 160 rapid assessments were completed in the wider locality.

Targeted surveys of mine rehabilitation were undertaken during May 2023 with an additional 1,341 vegetation notes completed that document the floristic composition and condition of mine rehabilitation.

The data from the rapid assessments were primarily used to aid in the delineation and refinement of vegetation mapping.

5.3.2 Vegetation mapping and TEC delineation

Vegetation mapping was undertaken using best-practice techniques to delineate vegetation communities across the HVO Complex BIAA. Vegetation communities identified in the HVO Complex BIAA were compared to TECs listed under the EPBC Act and an assessment of similarity with the Threatened Species Scientific Committee (TSSC) listing and conservation advice and/or policy statements.

5.3.3 Threatened species surveys

Surveys were undertaken for the threatened species considered to have reasonable potential to occur in the HVO Complex BIAA based on database reviews, including the EPBC Act Protected Matters Search Tool (PMST) (DCCEEW 2024a) and NSW BioNet Atlas (DPE 2025a). Surveys included species-specific surveys and on-ground searches in suitable habitat throughout the HVO Complex BIAA.

Habitat assessments were undertaken across the HVO Complex BIAA in June and August 2019, March 2020, May, August, September, October and November 2023, and March 2025 to identify potential habitat for threatened species.

5.4 Assessment outcomes

5.4.1 Vegetation and habitat in the BIAA

Surveys of the HVO North BIAA identified five plant community types (PCTs) across 19 condition zones as outlined in Table 5.1. PCTs mapped across the HVO North BIAA are illustrated on Figure 5.1.

Table 5.1 PCTs and vegetation zones

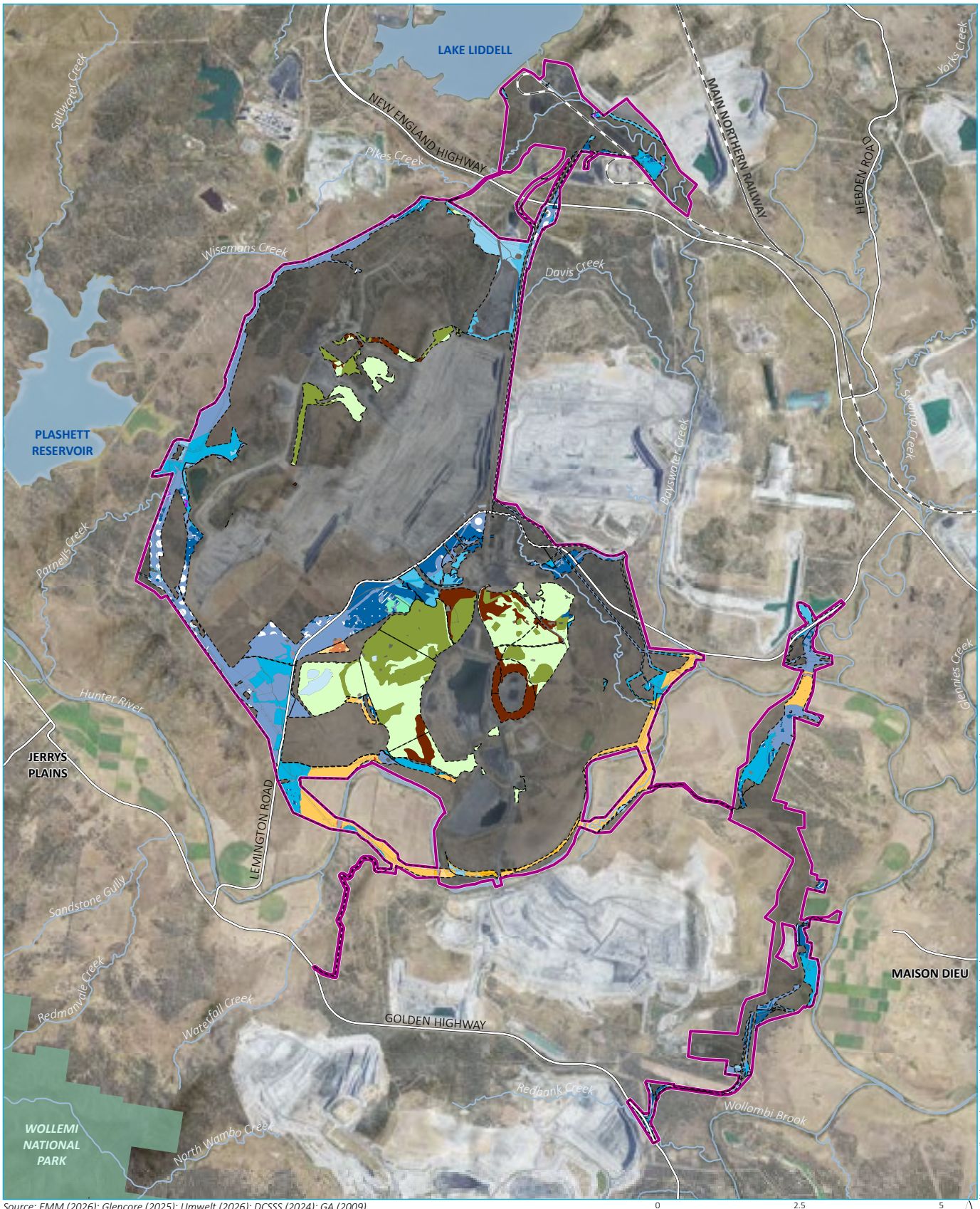
PCT	Vegetation zone and condition	Area (ha)
3431 – Central Hunter Ironbark Grassy Woodland	Moderate	100.0
	Thinned Woodland	11.3
	Woodland with Exotic Understorey	16.3
	Plantation	47.4
	Scattered Regeneration	65.0
	Cooba Woodland	62.0
	Bulloak Variant	38.0
	White Box/Grey Box Variant	1.6
	Poor Condition Derived Native Grassland	257.1
	Exotic Grassland	158.5
	Mine Rehabilitation (conforming to a PCT)	14.9
	TOTAL for PCT 3431	**772.1**
3485 – Central Hunter Slaty Gum Grassy Forest	Moderate	7.3
	TOTAL for PCT 3485	**7.3**

PCT	Vegetation zone and condition	Area (ha)
4015 – Central Hunter Riparian Forest	Moderate	3.4
	TOTAL for PCT 4015	**3.4**
4081 – North-west River Oak-River Red Gum Forest	Moderate	1.8
	TOTAL for PCT 4081	**1.8**
4089 – Namoi-Upper Hunter River Red Gum Forest	Moderate	5.1
	Low to Moderate	1.5
	Cooba Woodland	0.1
	Derived Native Grassland	5.1
	Exotic Grassland	79.3
	TOTAL for PCT 4089	**91.1**
Total native vegetation		**875.7**

Table 5.2 outlines the extent of mine rehabilitation vegetation across the HVO North BIAA that do not conform to a PCT under the NSW PCT classification.

Table 5.2 Mine rehabilitation in the HVO North BIAA

Mine rehabilitation type		Area (ha)
Mine rehabilitation – Plantation		297.3
Mine rehabilitation – Cooba Woodland		178.7
Mine rehabilitation – Exotic Grassland		518.0
	Total	**994.0**



Source: EMM (2026); Glencore (2025); Umwelt (2026); DCSSS (2024); GA (2009)

0 2.5 5 km

GDA2020 MGA Zone 56

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KEY

- HVO North Action Area
- HVO North Biodiversity Impact Assessment Area

Plant community type

- Cleared
- Mine rehabilitation- cooba woodland
- Mine rehabilitation- exotic grassland
- Mine rehabilitation- plantation

PCT 3431 | Central Hunter Ironbark Grassy Woodland

- Mine Rehabilitation
- Plantation
- Cooba woodland
- Exotic grassland
- Moderate
- Poor condition derived native grassland
- Scattered regeneration
- Thinned woodland
- Woodland with exotic understorey
- Bulloak variant
- White box variant

PCT 3485 | Hunter Valley Footslopes Slaty Gum Forest

- Moderate

PCT 4015 | Central Hunter Riparian Forest

- Moderate

PCT 4081 | Northwest River Oak-River Red Gum Forest

- Moderate

PCT 4089 | Namoi-Upper Hunter River Red Gum Forest

- Cooba woodland
- Derived native grassland
- Exotic grassland
- Low to moderate
- Moderate

Existing environment

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

Plant community types in HVO North BIAA

HVO Continuation Project
HVO North Public Environment Report
Figure 5.1

EMM creating opportunities

5.4.2 Likelihood of occurrence

Based on the desktop analysis and surveys completed over the HVO North BIAA, a range of threatened ecological communities, threatened species and terrestrial migratory species listed under the EPBC Act are known to occur, or considered to have the potential to occur on the basis of habitat modelling within the HVO North BIAA, including:

Critically endangered or endangered ecological communities:

- Central Hunter Valley Eucalypt Forest and Woodland CEEC
- White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC

Critically endangered and endangered species:

- Swift Parrot (Lathamus discolor)
- Regent Honeyeater (*Anthochaera phrygia*)
- Large-eared Pied Bat (*Chalinolobus dwyeri*)
- Spotted-tailed Quoll (*Dasyurus maculatus maculatus*)
- Hunter Valley Delma (*Delma vescolineata*)

Vulnerable species:

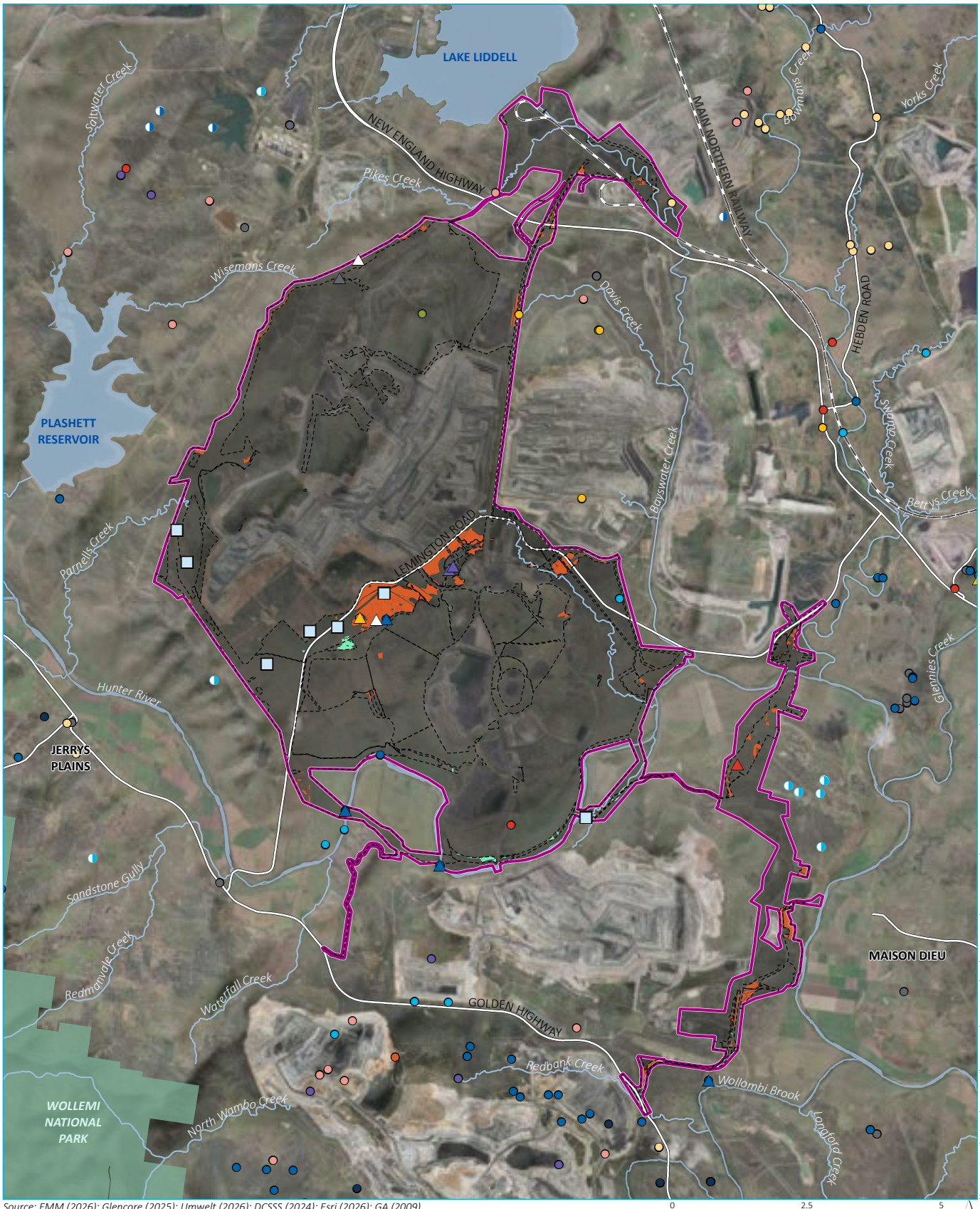
- Grey-headed Flying-fox (*Pteropus poliocephalus*)
- White-throated Needletail (*Hirundapus caudacutus*)
- Brown Treecreeper (south-eastern) (*Climacteris picumnus victoriae*)
- Latham's Snipe (*Gallinago hardwickii*)

Migratory Species Listed under International Conventions

- Latham's Snipe (*Gallinago hardwickii*)
- White-throated Needletail (*Hirundapus caudacutus*)
- Rufous Fantail (*Rhipidura rufifrons*).

While marginal habitat for the three migratory species is available, habitats within the HVO North BIAA for migratory species listed under international conventions is not considered to meet the criteria, and important habitat is not likely to occur.

A description of these EPBC Act ecological communities and species and an analysis of their potential to occur within the HVO North BIAA is presented in the sections below. MNES recorded in and around the HVO North BIAA is illustrated on Figure 5.2.



Source: EMM (2026); Glencore (2025); Umwelt (2026); DCSSS (2024); Esri (2026); GA (2009)

0 2.5 5 km

GDA2020 MGA Zone 56

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KEY

- HVO North Action Area
- HVO North Biodiversity Impact Assessment Area
- Central Hunter Valley Eucalypt Forest and Woodland CEEC
- White Box- Yellow Box- Blakely's Red Gum Grassy Woodlands and Derived Native Grassland CEEC

Umwelt species record

- Large-eared Pied Bat
- Spotted-tailed Quoll
- Grey-headed Flying Fox
- Lathams Snipe
- White-throated Needletail
- Swift Parrot
- Hunter Valley *Delma*

Atlas species record

- *Eucalyptus glaucina*
- *Ozothamnus tesselatus*
- Brown Treecreeper (eastern subspecies)
- Brush-tailed Rock-wallaby
- Diamond Firetail
- Green and Golden Bell Frog
- Grey-headed Flying-fox
- Koala
- Large-eared Pied Bat
- New Holland Mouse
- Regent Honeyeater
- South-eastern Glossy Black-Cockatoo
- South-eastern Hooded Robin
- Spotted-tailed Quoll

Existing environment

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

MNES recorded in and around the HVO North BIAA

HVO Continuation Project
HVO North Public Environment Report
Figure 5.2

EMM creating opportunities

5.4.3 Critically endangered or endangered ecological communities

i Central Hunter Valley Eucalypt Forest and Woodland CEEC

Central Hunter Valley Eucalypt Forest and Woodland CEEC occurs in the Hunter Valley region on soils derived from Permian sedimentary bedrock (TSSC 2015). Typically, it is characterised as a eucalypt woodland and open forest, with a shrub layer of variable density and/or a grassy ground layer. Across its range, one or more of a complex of four eucalypt tree species, namely spotted gum (*Corymbia maculata*), narrow-leaved ironbark (*Eucalyptus crebra*), slaty gum (*Eucalyptus dawsonii*) or grey box (*Eucalyptus moluccana*) dominate the canopy (TSSC 2015).

Targeted surveys to map Central Hunter Valley Eucalypt Forest and Woodland CEEC were undertaken in March, June, August and September 2020, April 2021, September 2023, and February and March 2025 in accordance with the sampling protocols and with consideration to the key diagnostic characteristics and condition thresholds provided in the Approved Conservation Advice (TSSC 2015).

Two PCTs were found to conform (or partially conform) to the Central Hunter Valley Eucalypt Forest and Woodland CEEC in the HVO North BIAA. The vegetation communities and condition zones that conform to Central Hunter Valley Eucalypt Forest and Woodland CEEC and the approximate area of each is outlined in Table 5.3.

Table 5.3 Central Hunter Valley Eucalypt Forest and Woodland CEEC occurring in PCTs in the HVO North BIAA

PCT	Condition	Area (ha)
3431 – Central Hunter Ironbark Grassy Woodland	Moderate	100.0
	Thinned Woodland	11.3
	Plantation	1.3
	Bulloak Variant	21.4
	White Box Variant	1.6
	Scattered Regeneration^	1.9
	Cooba Woodland^	1.0
	Poor Condition DNG^	5.6
	Mine Rehabilitation*	14.9
3485 – Hunter Valley Footslopes Slaty Gum Forest	Moderate	7.3
Total		**166.3**

Notes: ^Derived components of the Central Hunter Valley Eucalypt Forest and Woodland CEEC.

*Mine rehabilitation within Category 1 Land in Domains 2b.

ii White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC

The White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC (Box-Gum Woodland CEEC) includes woodlands dominated by White Box (*Eucalyptus albens*), Yellow Box (*E. melliodora*) or Blakely's Red Gum (*E. blakelyi*) and grasslands previously containing an overstorey dominated by these species (TSSC 2006). The species-rich understorey typically contains native tussock grasses, herbs and scattered shrubs. The ecological community is known to occur along the western slopes and tablelands of the Great Dividing Range from central Victoria, through NSW, to southern Queensland (TSSC 2006).

Targeted surveys to map Box-Gum Woodland CEEC were undertaken in May, June, August and September 2020, and in May 2023 in accordance with the sampling protocols and with consideration to the key diagnostic characteristics and condition thresholds provided in the EPBC Act Policy Statement (DEH 2006).

One PCT was found to conform to the Box-Gum Woodland CEEC in the HVO North BIAA. The vegetation community and its condition zone that conform to the Box-Gum Woodland CEEC and its approximate area is outlined in Table 5.5.

Table 5.4 White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC occurring in PCTs in the HVO North BIAA

PCT	Condition	Area (ha)
4089 – Namoi Upper Hunter River Red Forest	Moderate	4.8
Total		**4.8**

5.4.4 Critically endangered and endangered species

i Swift Parrot (*Lathamus discolor*)

The Swift Parrot occurs as a single population that migrates annually from breeding grounds in Tasmania to the winter foraging grounds on the coastal plains and slope woodlands of mainland eastern Australia (Saunders and Tzaros 2011).

The Swift Parrot does not breed on mainland Australia, and as such the HVO North BIAA only represents potential foraging habitat for this species. The HVO North BIAA would be considered to form part of a regional dispersal route close to important winter foraging areas in the lower Hunter Valley. This species may make use of the open forest and woodland habitats of the HVO North BIAA, particularly where there are prolific flowering eucalypts as this species is likely to move throughout the area in response to mass flowering events. A flock of up to five Swift Parrots were identified utilising Grey Box (*Eucalyptus moluccanna*) at the HVO site offices near the HVO North Action area during winter bird surveys conducted in August 2025.

The Spotted Gum (*Corymbia maculata*) occurring in the HVO North BIAA is associated primarily with mine rehabilitation and has been planted. It is reasonably young and less likely to produce mass flowering foraging resources than the mature habitats in nearby Wollemi National Park or Ravensworth State Forest. The Yellow Box (*Eucalyptus melliodora*) within the HVO North BIAA have the potential to produce mass flowering events; however, the total area is relatively small when compared to nearby foraging habitat in Wollemi National Park and Ravensworth State Forest.

The *Central Hunter Valley Eucalypt Forest and Woodland CEEC Policy Statement* (DoEE 2016) states that this CEEC can be valuable as a "source of winter-flowering eucalypts for transient threatened species such as Regent Honeyeater (*Anthochaera phrygia*) and Swift Parrot (*Lathamus discolor*)". While this community occurs in the HVO North BIAA, without the suitable winter foraging species, this habitat would be considered marginal and temporary habitat between higher quality foraging areas.

Table 5.5 outlines the associated PCTs within the HVO North BIAA for the species as per the BAM and the relevant condition zones that would be considered potential habitat.

Table 5.5 Swift Parrot associated PCTs and suitable condition zones in the HVO North BIAA

PCT	Condition zone	Foraging resources as per recovery plan	Area (ha)
3431	Moderate	-	100.0
	Plantation	*Corymbia maculata*	47.4
	Thinned Woodland	-	11.3
	Woodland with Exotic Understorey	-	16.3
	Mine Rehabilitation	*Corymbia maculata*	14.9
	White Box Grey Box Variant	*Eucalyptus albens x moluccana*	1.6
3485	Moderate	-	7.3
4089	Moderate	*Eucalyptus melliodora*	5.1
	Low to Moderate	-	1.5
Total habitat with foraging resources (as per recovery plan)			**69.0**
Other associated PCTs/condition zones			**136.4**
Area within important habitat mapping			**0**
TOTAL			**205.4**

ii Regent Honeyeater (*Anthochaera phrygia*)

The regent honeyeater comprises a single population, with some exchange of individuals between regularly used areas (DoE 2016). The population of regent honeyeater has not been recorded within the HVO North BIAA, however, four records ranging from 1987 to 2002 occur in the nearby locality. This species may make use of the open forest and woodland habitats of the HVO North BIAA, particularly where there are prolific flowering eucalypts as this species is likely to move throughout the area in response to mass flowering events. No regent honeyeaters were identified utilising the HVO North BIAA during the winter bird surveys conducted in June and August 2019 or July 2020.

The Spotted Gum (*Corymbia maculata*) occurring in the HVO North BIAA has been planted and is reasonably young and less likely to produce mass flowering foraging resources than the mature habitats in nearby Wollemi National Park or Ravensworth State Forest. The Yellow Box (*Eucalyptus melliodora*) within the HVO North BIAA have the potential to produce mass flowering events; however, the total area is relatively small when compared to nearby foraging habitat in Wollemi National Park and Ravensworth State Forest. Mistletoe species (*Amyema miquelii*) was found to occur in one vegetation plot in PCT 3431 Thinned Woodland in the HVO North BIAA.

The *Central Hunter Valley Eucalypt Forest and Woodland CEEC Policy Statement* (DoEE 2016) states that this CEEC can be valuable as a "source of winter-flowering eucalypts for transient threatened species such as Regent Honeyeater (*Anthochaera phrygia*) and Swift Parrot (*Lathamus discolor*)". While this community occurs in the HVO North BIAA, without the suitable winter foraging species, this habitat would be considered marginal and temporary habitat between higher quality foraging areas.

Table 5.6 outlines the associated PCTs for the species as per the BAM and the relevant condition zones that would be considered potential habitat.

Table 5.6 Regent honeyeater associated PCTs and suitable condition zones in the HVO North BIAA

PCT	Condition zone	Foraging resources as per recovery plan	Area (ha)
3431	Moderate	-	100.0
	Plantation	*Corymbia maculata*	47.4
	Thinned Woodland	*Amyema miquelii*	11.3
	Woodland with Exotic Understorey	-	16.3
	Mine Rehabilitation	*Corymbia maculata* *Eucalyptus albens*	14.9
	White Box Grey Box Variant	*Eucalyptus albens x moluccana*	1.6
3485	Moderate	-	7.3
4081	Moderate	-	1.8
4089	Moderate	*Eucalyptus melliodora*	5.1
	Low to Moderate	-	1.5
Total habitat with foraging resources (as per recovery plan)			**80.3**
Other associated PCTs/condition zones			**126.9**
Area within important habitat mapping			**0**
TOTAL			**207.2**

iii Spotted-tailed Quoll (*Dasyurus maculatus maculatus*)

The Spotted-tailed Quoll was recorded during targeted surveys on one remote camera within the HVO North BIAA. The camera recorded the spotted-tailed quoll over two nights, on 9 and 24 June 2020 within Bull oak forest located 200 m south-east of Lemington Road, and approximately 2.7 km north of the Hunter River. Two recent (2018) records of the spotted-tailed quoll occur approximately 8.5 km to the west of the HVO North BIAA along the Golden Highway (DPE 2024a). An individual was recorded in January 2022 along Glennies Creek following monitoring at Ashton Coal Mine approximately 3 km east of the HVO North BIAA (Umwelt 2024).

The species is known to occur frequently around the Mt Owen Complex to the north of HVO where den sites have also been recorded.

The species is only infrequently recorded south of the Hunter River between the Hunter River and Wollemi National Park and any records in this locality (Warkworth and Jerrys Plains) are likely individuals moving occasionally to the valley floor from higher quality connected habitats in the national park. The species was recorded in 2013 in vegetation at the United Coal Mine and a record from 2019 occurs near Jerrys Plains. The Hunter River may serve as a geographical barrier between the regional population associated with the southern and western footslopes of the Barrington Tops with records south of the Hunter River likely individuals moving from the Wollemi National Park. Both populations are likely to constitute a population as defined above.

Table 5.7 outlines the associated PCTs for the species as per the BAM and the relevant condition zones that would be considered potential habitat, being predominantly woodland and forest habitat and riparian movement habitat.

Table 5.7 Spotted-tailed Quoll associated PCTs and suitable condition zones in the HVO North BIAA

PCT	Condition zone	Area (ha)
3431	Moderate	100.0
	Plantation	47.4
	Thinned Woodland	11.3
	Cooba Woodland	62.0
	Woodland with Exotic Understorey	16.3
	Bulloak Variant	38.0
	White Box Grey Box Variant	1.6
	Mine Rehabilitation	14.9
3485	Moderate	7.3
4015	Moderate	3.4
4089	Moderate	5.1
	Low to Moderate	1.5
	Cooba Woodland	0.1
Total woodland and forest habitat		**298.8**
Total riparian movement habitat		**10.1**
Total denning habitat		**0.0**

iv Large-eared Pied Bat (*Chalinolobus dwyeri*)

Numerous records of the Large-eared Pied Bat occur in the locality, ranging from 1999 to 2015 (Forest Fauna Surveys 2021, DPE 2024). The species was recorded using echolocation surveys within and immediately adjacent the HVO North BIAA in March 2020. Species calls were identified as 'definite' in two locations in riparian vegetation along the Hunter River, and one 'probable' call was recorded near a dam between Comleroi Road and Wollombi Brook. All woodland and forest vegetation within the HVO North BIAA is expected to provide potential foraging habitat for this species, however no roosting habitat for this cave-roosting species has been identified.

Table 5.8 outlines the associated PCTs for the species as per the BAM and the relevant condition zones that would be considered potential foraging habitat only.

Table 5.8 Large-eared Pied Bat associated PCTs and suitable condition zones in the HVO North BIAA

PCT	Condition zone	Area (ha)
3431	Moderate	100.0
	Plantation	47.4
	Thinned Woodland	11.3
	Woodland with Exotic Understorey	16.3
	White Box Grey Box Variant	1.6
	Bull oak Variant	38.0

PCT	Condition zone	Area (ha)
3485	Moderate	7.3
4089	Moderate	5.1
	Low to Moderate	1.5
Total potential woodland and forest foraging habitat		**228.5**
Confirmed roosting/breeding habitat		**0.0**

v Hunter Valley Delma (*Delma vescolineata*)

The Hunter Valley Delma (*Delma vescolineata*) has only recently been described as a separate species, as it was previously thought to be a subpopulation of the striped legless lizard (*Delma impar*). There is limited information available regarding the ecology of the Hunter Valley Delma specifically, with most of the species' ecological characteristics being assumed to be similar to the closely related striped legless lizard (DCCEEW 2024b).

The sites where the species has been detected include rehabilitated mine sites and pastoral land used for cattle grazing. It has not been identified to occur in any protected areas (DCCEEW 2024b).

The Hunter Valley Delma is known almost entirely from a 25 km wide (60 km^2 area) corridor in the Hunter Valley NSW, between Maitland and Muswellbrook. Limited information is available regarding the species' dispersal capabilities. It has been observed crossing roads during the day and sheltering under cow pats in otherwise featureless agricultural land, which suggests it has capacity to disperse across disturbed environments. As such, it is considered likely that the occurrence of the species in the Hunter Valley is likely to comprise a single connected subpopulation (DCCEEW 2024b).

A further specimen has been identified from the Liverpool plains, approximately 80 km north-west of Muswellbrook. It is not clear whether the records within the Hunter Valley and the Liverpool Plains are connected, or whether they are from separate subpopulations (DCCEEW 2024b).

The HVO North BIAA provides habitat in the form of native grassland, and sparse canopy grassy woodlands aligning broadly with the habitat vegetative preference of *Delma vescolineata.* The species may occur in degraded habitats in mine rehabilitation (pending survey results).

Table 5.9 outlines the associated PCTs for the *Delma vescolineata* as per the BAM and the relevant condition zones that would be considered potential foraging habitat. It also identifies whether *Delma vescolineata* was identified during targeted surveys in each zone.

Table 5.9 Hunter Valley Delma associated PCTs and suitable habitat condition zones in the HVO North BIAA

PCT	Condition zone	Recorded in habitat?	Area (ha)
3431	Poor Condition Derived Native Grassland	Yes	230.5
	Scattered Regeneration	Yes	59.9
	Thinned Woodland	Yes	10.7
4089	Derived Native Grassland	Yes	4.4
Total remnant habitat			**305.5**

PCT	Condition zone	Recorded in habitat?	Area (ha)
N/A - Mine rehabilitation	Exotic Grassland	TBD	518.0
	Cooba Woodland	TBD	178.7
	Plantation	TBD	297.3
Total potential mine rehabilitation habitat			**994.0**

5.4.5 Vulnerable species

i Grey-headed Flying-fox (*Pteropus poliocephalus*)

The Grey-headed Flying-fox has been previously recorded in several locations near the HVO North BIAA, with the closest and most recent (2019) occurring in woodland near the Golden Highway. Several thousand individuals of the Grey-headed Flying-fox were recorded during surveys in the nearby Mt Owen Complex in 2016; however, no roost sites were recorded. No Grey-headed Flying-foxes camp sites (breeding habitat) have been identified within the HVO North BIAA and are not expected to occur.

Table 5.10 outlines the associated PCTs for the species as per the BAM and the relevant condition zones that would be considered potential foraging habitat only.

Table 5.10 Grey-headed flying-fox associated PCTs and suitable condition zones in the North BIAA

PCT	Condition zone	Area (ha)
3431	Moderate	100.0
	Plantation	47.4
	Thinned Woodland	11.3
	Woodland with Exotic Understorey	16.3
	White Box Grey Box Variant	1.6
	Bulloak Variant	38.0
	Mine Rehabilitation	14.9
3485	Moderate	7.3
4089	Moderate	5.1
	Low to Moderate	1.5
Total foraging habitat		**243.4**
Total breeding camps		**0.0**

ii White-throated Needletail (*Hirundapus caudacutus*)

The White-throated Needletail is widespread in eastern and south-eastern Australia as part of their non-breeding territory. In eastern Australia, it is recorded in all coastal regions of Queensland and NSW, extending inland to the western slopes of the Great Divide and occasionally onto the adjacent inland plains. The species is almost exclusively aerial, from heights of less than 1 m up to more than 1,000 m above the ground. White-throated Needletails almost always forage aerially, at heights up to 'cloud level', above a wide variety of habitats ranging from heavily treed forests to open habitats, such as farmland, heathland or mudflats.

The species occurrence in the Hunter Valley does not represent a population near the limit of the species range, a key source population for breeding or dispersal or necessary for genetic diversity. Therefore, it is unlikely that an important population of white-throated needletail occurs in the HVO North BIAA.

Table 5.11 outlines the associated PCTs for the species as per the BAM and the relevant condition zones that would be considered potential habitat.

Table 5.11 White-throated Needletail associated PCTs and suitable condition zones in the HVO North BIAA

PCT	Condition zone	Area (ha)
3431	Moderate	100.0
	Plantation	47.4
	Thinned Woodland	11.3
	Woodland with Exotic Understorey	16.3
	Bulloak Variant	38.0
	Mine Rehabilitation	14.9
	White Box Grey Box Variant	1.6
3485	Moderate	7.3
4015	Moderate	3.4
4081	Moderate	1.8
4089	Moderate	5.0
	Low to Moderate	1.5
Total woodland and forest habitat		**248.5**
Total breeding habitat		**0.0**

iii Brown Treecreeper (south-eastern) (*Climacteris picumnus victoriae*)

The BRown Treecreeper (south-eastern) is widespread through south-eastern Australia, with its range extending from the Grampians in Victoria to the Bunya Mountains in Queensland, and extending west as far as Corowa, Wagga Wagga, Temora, Dubbo, Forbes and Inverell. Intergrades of the arid zone subspecies are likely to occur west of the dividing range.

There are no recorded occurrences of the Brown Treecreeper (south-eastern) within the HVO North BIAA. There are five records of the subspecies within 700 m of the HVO North BIAA two on the banks of the Hunter River recorded in 2018, two adjacent to the Golden Highway recorded in 2004 and one to the east recorded in 2014. Due to the absence of records of the species within the HVO North BIAA, the HVO North BIAA is not considered to contain an important population of this species.

Table 5.12 outlines the associated PCTs for the species as per the BAM and the relevant condition zones that would be considered potential habitat.

Table 5.12 Brown Treecreeper (south-eastern) associated PCTs and suitable condition zones in the HVO North BIAA

PCT	Condition zone	Area (ha)
3431	Moderate	100.0
	Plantation	47.4
	Thinned Woodland	11.3
	Woodland with Exotic Understorey	16.3
	Mine Rehabilitation	14.9
	White Box Grey Box Variant	1.6
3485	Moderate	7.3
4089	Moderate	5.1
	Low to Moderate	1.5
Total woodland and forest habitat		**205.4**

iv Latham's Snipe

Latham's Snipe is a migratory species which breeds in Japan and eastern Russia, and visits Australia during its non-breeding season. It typically arrives in northern Australia in late July to early August, then moves southwards along the coastline to south-eastern Australia between August and November. Few (if any) individuals of the species remain in northern Australia during summer. The species then departs from south-eastern Australia by late February to early March, travelling along the coast to northern Queensland, from where it departs by mid-April to its breeding grounds.

The species is known to occur in the locality. It has occasionally recorded during annual monitoring surveys of the nearby Mount Owen Complex. Previous records in the locality also occur at Lake Liddell in the north and near Wollombi Brook near Warkworth in the south. The HVO North BIAA contains areas of potential dam habitat for the species and small sections of the Hunter River.

It is recognised that available habitat within the HVO North BIAA is of marginal quality for the species, consisting of dam habitat and sections of the Hunter River. It lacks habitat features favoured by the species, including low dense vegetation for roosting and shallow water for foraging. The HVO North BIAA does not contain habitat critical to the survival of the species.

Further, habitat critical to the survival of the species is not present in the wider locality adjacent to the HVO North BIAA. While Latham's Snipe has been recorded in the locality, records of the species are for less than 18 individuals.

Overall, the HVO North BIAA does not provide important habitat, nor does it support and ecologically significant proportion of the population, of any of the migratory species predicted to occur by the protected matters database.

Table 5.13 outlines aquatic habitat for the species. Latham's Snipe is an ecosystem credit species under the BAM and any offsetting requirements are captured under the ecosystem credit assessment.

Table 5.13 Latham's Snipe aquatic habitat in the HVO North BIAA

Habitat type	Condition zone	Area (ha)
Waterbodies	Dams	7.9
Total aquatic habitat		**7.9**

5.4.6 Listed migratory species

The following migratory species are considered in the biodiversity MNES report:

- Latham's Snipe (*Gallinago hardwickii*)
- White-throated Needletail (*Hirundapus caudacutus*)
- Rufous Fantail (*Rhipidura rufifrons*).

The HVO North BIAA contain small areas of potential dam habitat and sections of the Hunter River which may be utilised by Latham's Snipe. The White-throated Needletail and Fork-tailed Swift are almost exclusively aerial species often recorded above wooded areas, some of which occur in the HVO North BIAA. While the Rufous fantail is known to occur in moist, dense habitats including rainforest and mangroves, woodland habitat within the HVO North BIAA may provide movement corridors for this species.

An area of important habitat is defined as:

- habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or
- habitat utilised by a migratory species which is at the limit of the species range, and/or
- habitat within an area where the species is declining.

The habitats within the HVO North BIAA for migratory species listed under international conventions are not considered to meet the criteria listed above, and important habitat is not likely to occur. Further, while each of the three species has been recorded in the wider locality surrounding the HVO Complex BIAAs, the BIAAs and adjacent areas have not been recorded to support an ecologically significant proportion of any of the three migratory species.

5.5 Biodiversity impact assessment

5.5.1 Impacts to listed threatened species, migratory species and communities

The HVO North Action will result in residual direct impacts on biodiversity values. Direct impacts include the loss of native vegetation and fauna habitats as a result of clearance works and subsequent mining activity. The HVO North Action is anticipated to have a significant impact on one CEEC, the Central Hunter Valley Eucalypt Forest and Woodland CEEC, and two fauna species, Hunter Valley Delma (*Delma vescolineata*) and Swift Parrot (*Lathamus discolor*). No other listed threatened species or communities will be significantly impacted by the HVO North Action.

Indirect impacts are those that occur when the HVO North Action affects native vegetation and threatened species habitat beyond the HVO North BIAA in an indirect manner. Some indirect impacts associated with the HVO North Action that have the potential to impact on biodiversity features in the locality include:

- drawdown impacts on surrounding groundwater dependent ecosystems (GDEs)
- rubbish dumping along the re-aligned Lemington Road
- edge effects (weeds and other disturbances) reducing the viability of surrounding habitats
- cumulative impacts of the Project for biodiversity in the wider locality
- fugitive light emissions, noise and dust impacts into surrounding habitats.

Table 5.14 outlines the potential for indirect impacts on biodiversity as a result of the HVO North Action.

The HVO North Action will contribute to global GHG concentrations, and therefore to anthropogenic climate change. The Actions contribution to global GHG concentrations, is proportionately very small. With respect to climate change impacts on the locality, this contribution is not sufficient to materially affect the extent or timing of climate change impacts in the local region, which are largely driven by global cumulative emissions.

As detailed in Appendix H, the HVO North Action's contribution to climate change will not be a substantial cause of any indirect consequences to EPBC Act listed threatened species and communities and, for the reasons set out in that document, climate change related impacts on listed threatened species and communities are not 'impacts' of the Action, as that term is defined in the EPBC Act.

There are no uncertain impacts predicted to occur as a result of the HVO North Action. It is considered that the potential impacts associated with the HVO North Action are well known particularly noting the history of mining and similar operations in the Hunter Valley.

Table 5.15 provides a summary of the nature and quantum of direct and indirect impacts on the MNES assessed. A detailed assessment of potential direct and indirect impacts to biodiversity MNES is presented in the biodiversity MNES report provided as Appendix D which includes detailed consideration to relevant international conventions, threat abatement plans and recovery plans.

Table 5.14 Assessment of indirect impacts

Potential indirect impact	Potentially impacted biodiversity features	Nature, extent, timing and duration of impact	Consequences
Drawdown impacts on surrounding groundwater dependent ecosystems	All native vegetation communities and habitat. Warkworth Sands Woodland of the Hunter Valley CEEC. Central Hunter Valley Eucalypt Forest and Woodland CEEC.	**Nature:** Groundwater modelling (EMM 2026c) predicts potential incremental drawdown (i.e. drawdown related to the Project) in only small parts of the Hunter River alluvial aquifer. Potential for drawdown in the alluvium along the main channel of the Hunter River is largely buffered from drawdown by low permeability barrier walls installed along sections of the aquifer (at the HVO North pit boundaries) and because infiltration from the Hunter River is a dominant recharge source to the aquifer and flows are regulated by releases from Glenbawn Dam. As a result, impacts to this aquifer ecosystem and the river red gum populations due to the Project are predicted to be minor or negligible. Approved Conservation Advice states that the soil that supports Warkworth Sands Woodland of the Hunter Valley CEEC is "rapidly drained and has a low available water-holding capacity" and that the EEC "probably extracts groundwater from the underlying shallow aquifer and hence is at risk from activities that impact the sand sheet". Groundwater monitoring and associated studies indicate these vegetation communities may access groundwater associated with an ephemeral perched watertable that is replenished during high rainfall periods. **Extent:** As outlined in the Water Resources Impact Assessment Report (EMM 2026b) no significant impact from groundwater drawdown impacts is predicted to occur. **Timing:** Construction and operation. **Duration:** Long-term.	Potential decline in health of other GDEs in the locality. However, a significant impact is not considered likely (EMM 2026b, ELA 2025). Drawdown impacts are not predicted for areas of Warkworth Sands Woodland of the Hunter Valley CEEC.

Potential indirect impact	Potentially impacted biodiversity features	Nature, extent, timing and duration of impact	Consequences
Rubbish dumping along the re-aligned Lemington Road	All threatened fauna species in the locality. Warkworth Sands Woodland of the Hunter Valley CEEC. Central Hunter Valley Eucalypt Forest and Woodland CEEC.	**Nature:** The realignment of Lemington Road will be located to along the eastern side of the HVO Complex, linking back to the Golden Highway near Warkworth. The establishment of the new Lemington Road corridor will introduce road traffic and human access to an area not previously subject to regular vehicle movements. It is likely that this will introduce road side rubbish and litter to surrounding habitats. **Extent:** The Lemington Road realignment will introduce 12.1 km of new road. This will traverse adjacent to Warkworth Sands Woodland of the Hunter Valley CEEC and through areas identified as Central Hunter Valley Eucalypt Forest and Woodland CEEC. The extent of litter damage to surrounding lands is variable across the country depending on the location, use of the road and proximate amenities. National litter monitoring usually extends 10 m from the roads' edge, however rubbish dumping along the existing Lemington Road is considered to be minimal and not known to be a significant problem. The risk is expected to be low for the realigned road. **Timing:** Operation. **Duration:** Long-term.	Injury or death of threatened species through entanglement or ingestion of litter. Reduction in threatened species and TEC resilience in the locality due to damage to vegetation and habitat condition.
Edge effects (weeds and other disturbances) reducing the viability of surrounding habitats	All adjacent plant communities and locally-occurring threatened species.	**Nature**: Edge effects occur in lands adjoining direct disturbances and can involve weed invasion, feral animal encroachment, restrictions in animal movements and can ultimately alter the species assemblage of a community. Clearing, thinning of vegetation and the creation of tracks have the ability to assist the establishment and spread of feral fauna species, as well as invasive weed species. **Extent**: The majority of edge effects is likely to be captured in the proposed HVO North BIAA, as the footprint allows for buffers around the actual area subject to direct impacts. Mitigation measures are proposed to acknowledge potential edge effects into surrounding sensitive receptors. **Timing**: Construction and operation. **Duration**: During vegetation clearing and creation of new tracks.	Reduction in threatened species and TEC resilience in the locality due to damage to vegetation and habitat condition. Further fragmentation of already small patches of intact vegetation and habitats.

Potential indirect impact	Potentially impacted biodiversity features	Nature, extent, timing and duration of impact	Consequences
Cumulative impacts of the Project for biodiversity in the wider locality	All locally-occurring plant communities and threatened species.	**Nature:** The HVO North BIAA is situated in a landscape that is characterised by agricultural land and mining land. The history of land clearing, agriculture and mining development has resulted in an incremental loss of vegetation and fauna habitat surrounding the HVO North BIAA, and within the Hunter Valley more generally. The Project will remove vegetation and further increase fragmentation and isolation of habitats in the vicinity of the Project, and thus contribute to cumulative habitat loss and vegetation clearance in the locality. **Extent:** The Project will result in a loss of approximately 375.6 ha of native woodland and forest vegetation in a highly fragmented and disturbed landscape. Since mining commenced, the HVO Complex is expected to have cleared over 7,100 ha of land and other recently approved projects in the locality contribute to the removal of native habitats such as United Wambo Open Cut (approx. 530 ha), Mount Pleasant Optimisation Project (approx. 475 ha) and Warkworth Continued Operations Project (approx. 700 ha). **Timing**: Construction and operation. **Duration:** Medium-term (proposed rehabilitation strategy will restore habitats and connectivity in the locality in the long-term).	Reduction in threatened species and plant community resilience in the locality due to fragmentation and isolation of patches of intact vegetation and habitats. Loss of fauna refuges in an already highly cleared landscape.

Potential indirect impact	Potentially impacted biodiversity features	Nature, extent, timing and duration of impact	Consequences
Fugitive light emissions, noise and dust impacts into surrounding habitats	All locally-occurring plant communities and threatened species.	**Nature**: Fugitive light emissions resulting from the construction and operation of the Project may result in adverse impacts on adjacent habitats and fauna species, such as reduction in the navigational signal ability for some nocturnal animals and delaying bats from emerging from roost access points and shortening the amount of time available to them for foraging. Construction and operational noise impacts have the potential to adversely impact native species such as noise disturbing the roosting and foraging behaviour of fauna species and noise reducing the occupancy of areas of suitable habitat. Construction and operational dust impacts have the potential to adversely impact native species during ground disturbing works, including blasting. Potential impacts include dust covering vegetation thereby potentially reducing vegetation health and growth. **Extent:** The Noise Impact Assessment (EMM 2025b) shows the indicative maximum envelope 40db $L_{Aeq,\ 15\ min}$ noise contours for the Project which represents the maximum envelope predicted for all stages, and all time periods. The Air Quality Impact Assessment (Airen 2025) shows days above 25 µg/m^3 $PM_{2.5}$ (increment) contour in relation to particle/dust impacts relating solely to the HVO Project. The HVO North Action is located in a highly fragmented and disturbed landscape subject to current extensive mining areas, indirect impacts such as fugitive light emissions, air quality and noise/vibration associated with mining will not be substantially altered in the locality as a result of the Project (EMM 2025b and Airen 2025). The Project is a continuation of mining operations at the HVO Complex, and predominantly includes mining of area subject to previous mining. This has occurred, and will continue to occur, in not near intact vegetation and habitats. **Timing:** Construction and operation. **Duration:** Long-term.	Reduction in threatened species and plant community resilience in the locality. Disruption of faunal behaviours and health.

Table 5.15 Summary of impact assessment for HVO North MNES

EPBC Act entity	Nature and consequence of impact (direct and indirect)	Duration of impact (e.g. construction operation, life of Action)	Quantum of impact	Unknown, unpredictable or irreversible impacts	Consequence of impact at local, state and national scale	Level of impact (is an offset required?)
Central Hunter Valley Eucalypt Forest and Woodland CEEC	Vegetation clearing within the HVO North BIAA for mining, surface infrastructure, road and transmission line alignments. Potential Indirect Impact on vegetation due to edge effects, cumulative impacts and minor impacts from fugitive light emissions, noise and dust impacts into surrounding habitats.	During construction and operational phases.	Direct impact: approximately **166.3 ha.** Indirect impact: likely minimal – managed through the biodiversity management plan (BMP).	There are no uncertain or unpredictable impacts likely to occur. It is considered that the potential impacts associated with the HVO North Action are well known, particularly noting the history of mining and similar operations in the Hunter Valley. HVO has an existing Integrated Biodiversity Management Plan which includes a risk framework and adaptive management measures to ensure successful implementation of management measures and actions if new information is available or changed circumstances arise	Impact is likely significant at the local and regional scale due to the removal of up to 166.3 ha of this community and potential indirect impacts, including fragmentation and edge effects.	In accordance with the BAM, offsetting would require **4,824 ecosystem credits** (associated with PCTs consistent with the CEEC), following like-for-like offsetting rules.

EPBC Act entity	Nature and consequence of impact (direct and indirect)	Duration of impact (e.g. construction operation, life of Action)	Quantum of impact	Unknown, unpredictable or irreversible impacts	Consequence of impact at local, state and national scale	Level of impact (is an offset required?)
White Box – Yellow Box – Blakely's Red Gum Grassy Woodland Derived Native Grassland CEEC	Vegetation clearing within the HVO North BIAA for mining, surface infrastructure, road and transmission line alignments. Potential Indirect Impact on vegetation due to edge effects, cumulative impacts and minor impacts from fugitive light emissions, noise and dust impacts into surrounding habitats.	During construction and operational phases.	Direct impact: approximately **4.8 ha.** Indirect impact: likely minimal – managed through BMP.	There are no uncertain or unpredictable impacts likely to occur. It is considered that the potential impacts associated with the HVO North Action are well known, particularly noting the history of mining and similar operations in the Hunter Valley. HVO has an existing Integrated Biodiversity Management Plan which includes a risk framework and adaptive management measures to ensure successful implementation of management measures and actions if new information is available or changed circumstances arise.	Impact is unlikely significant at the state or national scale due to the removal of a very small highly fragmented and degraded area (approximately 4.8 ha) of this community in the HVO North BIAA in relation to the estimated extent of the CEEC in NSW and Australia.	In accordance with the BAM, offsetting would require **202 ecosystem credits** (associated with PCTs consistent with the CEEC), following like-for-like offsetting rules.

EPBC Act entity	Nature and consequence of impact (direct and indirect)	Duration of impact (e.g. construction operation, life of Action)	Quantum of impact	Unknown, unpredictable or irreversible impacts	Consequence of impact at local, state and national scale	Level of impact (is an offset required?)
Swift Parrot (*Lathamus discolor*)	Vegetation clearing within the HVO North BIAA for mining, surface infrastructure, road and transmission line alignments. Potential Indirect Impact on vegetation due to edge effects, cumulative impacts and minor impacts from fugitive light emissions, noise and dust impacts into surrounding habitats.	Reduction in potential foraging habitat would occur during construction and operational phases.	Direct impact key feed trees and foraging habitat (PCT 3431): **69 ha.** Direct impacts on other associated PCT habitat: **136.4 ha.** Direct impacts on Important Habitat mapped by DPHI: **0 ha.** Indirect impact on woodland foraging habitat (likely to be negligible).	There are no uncertain or unpredictable impacts likely to occur. It is considered that the potential impacts associated with the HVO North Action are well known, particularly noting the history of mining and similar operations in the Hunter Valley. HVO has an existing Integrated Biodiversity Management Plan which includes a risk framework and adaptive management measures to ensure successful implementation of management measures and actions if new information is available or changed circumstances arise.	Impact is significant at local scale, but not considered to be significant at a state or national scale. While the HVO North Action will remove a substantial area of suitable foraging habitat for the species, the wider Hunter Valley and east coast of NSW provides extensive winter foraging habitat for the species and no breeding habitat will be impacted as part of the Action.	Under the BAM, no species credits would be required as the Important Areas map for the Swift Parrot does not intersect with the HVO North BIAA. However, **5,801 ecosystem credits** relating to associated PCT foraging habitat for the species will be required as part of the offset obligation under the BAM.

EPBC Act entity	Nature and consequence of impact (direct and indirect)	Duration of impact (e.g. construction operation, life of Action)	Quantum of impact	Unknown, unpredictable or irreversible impacts	Consequence of impact at local, state and national scale	Level of impact (is an offset required?)
Regent Honeyeater (*Anthochaera phrygia*)	Vegetation clearing within the HVO North BIAA for mining, surface infrastructure, road and transmission line alignments. Potential Indirect Impact on vegetation due to edge effects, cumulative impacts and minor impacts from fugitive light emissions, noise and dust impacts into surrounding habitats.	Reduction in potential foraging habitat would occur during construction and operational phases.	Direct impact native woodland foraging resources: **80.0 ha.** Direct impacts on other associated PCT habitat: **126.9 ha.** Direct impacts on Important Habitat mapped by DPHI: **0 ha.** Indirect impact on woodland foraging habitat (likely to be negligible).	There are no uncertain or unpredictable impacts likely to occur. It is considered that the potential impacts associated with the HVO North Action are well known, particularly noting the history of mining and similar operations in the Hunter Valley. HVO has an existing Integrated Biodiversity Management Plan which includes a risk framework and adaptive management measures to ensure successful implementation of management measures and actions if new information is available or changed circumstances arise.	Although the HVO North BIAA provides potential foraging habitat for this species, the site is not known to support the species. Impact is unlikely significant at local, state or national scale.	Under the BAM, no species credits are required as the Important Areas map for the regent honeyeater does not intersect with the HVO North BIAA. However, **5,840 ecosystem credits** relating to associated PCT foraging habitat for the species will be required as part of the offset obligation under the BAM.

EPBC Act entity	Nature and consequence of impact (direct and indirect)	Duration of impact (e.g. construction operation, life of Action)	Quantum of impact	Unknown, unpredictable or irreversible impacts	Consequence of impact at local, state and national scale	Level of impact (is an offset required?)
Spotted-tailed Quoll (*Dasyurus maculatus maculatus*)	Vegetation clearing within HVO North BIAA for mining, surface infrastructure, road and transmission line alignments. Potential Indirect Impact on vegetation due to edge effects, cumulative impacts and minor impacts from fugitive light emissions, noise and dust impacts into surrounding habitats.	Reduction in potential foraging habitat would occur during construction and operational phases.	Direct impact native woodland and riparian habitat: **308.9 ha.** Indirect impact on woodland and forest foraging habitat (likely to be negligible.	There are no uncertain or unpredictable impacts likely to occur. It is considered that the potential impacts associated with the HVO North Action are well known, particularly noting the history of mining and similar operations in the Hunter Valley. HVO has an existing Integrated Biodiversity Management Plan which includes a risk framework and adaptive management measures to ensure successful implementation of management measures and actions if new information is available or changed circumstances arise.	Impact is unlikely significant for the Barington Tops (southern and western footslopes) population or Wollemi National Park population at the local, state or national scale. While the HVO North Action will impact known dispersal and foraging habitat for the species, the HVO North BIAA does not contain areas of large patches of forest with adequate denning resources and relatively high densities of medium-sizes mammalian prey.	**8,176 ecosystem credits** relating to associated PCT habitat for the species will be required as part of the offset obligation under the BAM.

EPBC Act entity	Nature and consequence of impact (direct and indirect)	Duration of impact (e.g. construction operation, life of Action)	Quantum of impact	Unknown, unpredictable or irreversible impacts	Consequence of impact at local, state and national scale	Level of impact (is an offset required?)
Large-eared Pied Bat (*Chalinolobus dwyeri*)	Clearing of foraging habitat within HVO North BIAA for mining, surface infrastructure, road and transmission line alignments. Potential Indirect Impact on vegetation due to edge effects, cumulative impacts and minor impacts from fugitive light emissions, noise and dust impacts into surrounding habitats. Indirect impacts (subsidence) unlikely to cause any observable change in potential foraging habitats.	Reduction in potential foraging habitat would occur during construction and operational phases.	Direct impact to potential woodland and forest foraging habitat: **228.5 ha.** Direct impact to any cliffline or escarpment habitat that could be used as roosting or breeding habitat: **0 ha.** Indirect impact on woodland and forest foraging habitat (likely to be negligible).	There are no uncertain or unpredictable impacts likely to occur. It is considered that the potential impacts associated with the HVO North Action are well known, particularly noting the history of mining and similar operations in the Hunter Valley. HVO has an existing Integrated Biodiversity Management Plan which includes a risk framework and adaptive management measures to ensure successful implementation of management measures and actions if new information is available or changed circumstances arise.	The HVO North Action is unlikely to result in a significant impact on the large-eared pied bat at a local or regional scale due to the lack of suitable roosting and cliffline habitat in the HVO North BIAA.	In accordance with the BAM, there is no requirement for offset species credits for the large-eared pied-bat as there are no areas of breeding/roosting confirmed in the HVO North BIAA. **6,120 ecosystem credits** relating to associated foraging habitat for the species will be required as part of the HVO North Action offset obligation under the BAM.

EPBC Act entity	Nature and consequence of impact (direct and indirect)	Duration of impact (e.g. construction operation, life of Action)	Quantum of impact	Unknown, unpredictable or irreversible impacts	Consequence of impact at local, state and national scale	Level of impact (is an offset required?)
Hunter Valley Delma (*Delma vescolineata*)	Reduction in habitat due to vegetation clearing within HVO North BIAA for mining, surface infrastructure, and transmission line alignments. Potential Indirect Impact on foraging habitat due to edge effects, cumulative impacts and minor impacts from fugitive light emissions, noise and dust impacts into surrounding habitats.	Reduction in habitat would occur during construction and operational phases.	Direct Impacts on known remnant habitat: **305.5 ha.** Indirect Impact on foraging habitat (likely to be negligible.	Potential impacts are currently unknown in areas of Category 1 – Exempt Land containing mine rehabilitation (**994.0 ha**). HVO has an existing Integrated Biodiversity Management Plan which includes a risk framework and adaptive management measures to ensure successful implementation of management measures and actions if new information is available or changed circumstances arise.	The HVO North Action is likely to result in a significant impact on *Delma vescolineata* due to the removal of 305.5 ha of remnant native grassland and open woodland habitat and 994 ha of potential mine rehabilitation habitat confirmed to be occupied by the species.	**3,601 species credits** relating to associated PCT habitat for the species will be required as part of the HVO North Action offset obligation under the BAM. Pending the outcomes of the tile surveys in mine rehabilitation, HVO will liaise with the Commonwealth DCCEEW in relation to a suitable offset arrangement for impacts relating to this potential habitat for the Hunter Valley Delma.

EPBC Act entity	Nature and consequence of impact (direct and indirect)	Duration of impact (e.g. construction operation, life of Action)	Quantum of impact	Unknown, unpredictable or irreversible impacts	Consequence of impact at local, state and national scale	Level of impact (is an offset required?)
Grey-headed Flying-fox (*Pteropus poliocephalus*)	Local reduction in foraging habitat due to vegetation clearing within HVO North BIAA for mining, surface infrastructure, road and transmission line alignments. Potential Indirect Impact on vegetation due to edge effects, cumulative impacts and minor impacts from fugitive light emissions, noise and dust impacts into surrounding habitats.	Reduction in potential foraging habitat would occur during construction and operational phases.	Direct impacts on potential foraging habitat: **243.4 ha.** Indirect impact on foraging habitat (likely to be negligible.	There are no uncertain or unpredictable impacts likely to occur. It is considered that the potential impacts associated with the HVO North Action are well known, particularly noting the history of mining and similar operations in the Hunter Valley. HVO has an existing Integrated Biodiversity Management Plan which includes a risk framework and adaptive management measures to ensure successful implementation of management measures and actions if new information is available or changed circumstances arise.	The impact is unlikely significant at a local, state and national scale due to the lack of records of species, lack of breeding camps, wider habitat extent and disturbed nature of the potential foraging habitat within the HVO North BIAA.	In accordance with the BAM and the Bat Survey Guidelines (DPIE 2021), there is no requirement for offsetting species credits for the Grey-headed flying-fox as there are no areas of breeding/roosting confirmed in the HVO North BIAA. However, **6,588 ecosystem credits** relating to associated PCT foraging habitat for the species will be required as part of the offset obligation under the BAM.

EPBC Act entity	Nature and consequence of impact (direct and indirect)	Duration of impact (e.g. construction operation, life of Action)	Quantum of impact	Unknown, unpredictable or irreversible impacts	Consequence of impact at local, state and national scale	Level of impact (is an offset required?)
White-throated Needletail (*Hirundapus caudacutus*)	Potential local reduction in foraging and nesting habitat due to vegetation clearing within HVO North BIAA for mining, surface infrastructure, road and transmission line alignments. Potential Indirect Impact on foraging and nesting habitat due to edge effects, cumulative impacts and minor impacts from fugitive light emissions, noise and dust impacts into surrounding habitats.	Reduction in potential foraging and nesting habitat would occur during construction and operational phases.	Direct impact to foraging habitat: **248.5 ha.** Indirect impact to foraging habitat (likely to be negligible.	There are no uncertain or unpredictable impacts likely to occur. It is considered that the potential impacts associated with the HVO North Action are well known, particularly noting the history of mining and similar operations in the Hunter Valley. HVO has an existing Integrated Biodiversity Management Plan which includes a risk framework and adaptive management measures to ensure successful implementation of management measures and actions if new information is available or changed circumstances arise.	Impact is unlikely significant at the local and regional scale due to the lack of records of the species within the HVO North BIAA and wider region.	In accordance with the BAM, offsetting would require **6,734 ecosystem credits** (associated PCTs), following like-for-like offsetting rules.

EPBC Act entity	Nature and consequence of impact (direct and indirect)	Duration of impact (e.g. construction operation, life of Action)	Quantum of impact	Unknown, unpredictable or irreversible impacts	Consequence of impact at local, state and national scale	Level of impact (is an offset required?)
Brown Treecreeper (South-eastern) (*Climacteris picumnus victoriae*)	Potential local reduction in foraging and nesting habitat due to vegetation clearing within HVO North BIAA for mining, surface infrastructure, road and transmission line alignments. Potential Indirect Impact on foraging and nesting habitat due to edge effects, cumulative impacts and minor impacts from fugitive light emissions, noise and dust impacts into surrounding habitats.	Reduction in potential foraging and breeding habitat would occur during construction and operational phases.	Direct impact native woodland and forest habitat: **205.4 ha.** Indirect impact on woodland and forest habitat (likely to be negligible).	There are no uncertain or unpredictable impacts likely to occur. It is considered that the potential impacts associated with the HVO North Action are well known, particularly noting the history of mining and similar operations in the Hunter Valley. HVO has an existing Integrated Biodiversity Management Plan which includes a risk framework and adaptive management measures to ensure successful implementation of management measures and actions if new information is available or changed circumstances arise.	Impact is unlikely significant at the local, state or national scale due to the lack of records of the species within the HVO North BIAA and wider region.	**5,801 ecosystem credits** relating to associated PCT habitat for the species will be required as part of the offset obligation under the BAM.

EPBC Act entity	Nature and consequence of impact (direct and indirect)	Duration of impact (e.g. construction operation, life of Action)	Quantum of impact	Unknown, unpredictable or irreversible impacts	Consequence of impact at local, state and national scale	Level of impact (is an offset required?)
Latham's Snipe (*Gallinago hardwickii*)	Potential local reduction in aquatic habitat due to clearing within the HVO North BIAA for mining, surface infrastructure, road and transmission line alignments. Potential Indirect Impact on aquatic habitat due to edge effects, cumulative impacts and minor impacts from fugitive light emissions, noise and dust impacts into surrounding habitats.	Reduction in habitat would occur during construction and operational phases.	Direct Impact native woodland and forest habitat: **7.9 ha** Indirect Impact on woodland and forest habitat (likely to be negligible).	There are no uncertain or unpredictable impacts likely to occur. It is considered that the potential impacts associated with the HVO North Action are well known, particularly noting the history of mining and similar operations in the Hunter Valley. HVO has an existing Integrated Biodiversity Management Plan which includes a risk framework and adaptive management measures to ensure successful implementation of management measures and actions if new information is available or changed circumstances arise.	Impact is unlikely significant at the local, state or national scale.	No species or ecosystem credits are applicable to this species.

EPBC Act entity	Nature and consequence of impact (direct and indirect)	Duration of impact (e.g. construction operation, life of Action)	Quantum of impact	Unknown, unpredictable or irreversible impacts	Consequence of impact at local, state and national scale	Level of impact (is an offset required?)
Migratory species listed under international conventions including: • Latham's Snipe (*Gallinago hardwickii*) • White-throated Needletail (*Hirundapus caudacutus*) • Rufous Fantail (*Rhipidura rufifrons*).	The HVO North BIAA is not considered to comprise important habitat for any of the identified migratory species and therefore the HVO North Action is not likely to directly or indirectly: • substantially modify or destroy important migratory species habitat, and/or • disrupt the lifecycle of an ecologically significant proportion of the population of a migratory species, and/or • result in an invasive species that is harmful to migratory species becoming established within the BIAA.	Reduction in potential foraging and breeding habitat would occur during construction and operational phases.	Direct impact native woodland and forest habitat: approximately **248.5 ha.** Indirect impact on woodland and forest habitat (likely to be negligible).	There are no uncertain or unpredictable impacts likely to occur. It is considered that the potential impacts associated with the HVO North Action are well known, particularly noting the history of mining and similar operations in the Hunter Valley. HVO has an existing Integrated Biodiversity Management Plan which includes a risk framework and adaptive management measures to ensure successful implementation of management measures and actions if new information is available or changed circumstances arise.	Impact is unlikely significant at the local, state or national scale for any migratory species listed under the EPBC Act or international conventions.	**6,734 ecosystem credits** relating to associated PCT habitat for these species will be required as part of the offset obligation under the BAM.

5.6 International conventions

Australia is party to several international conventions including the:

- Convention on Biological Diversity (CBD)
- Convention on Conservation of Nature in the South Pacific (Apia Convention)
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Actions that cause avoidable biodiversity loss, weaken protected areas or threatened species protections, or permit unlawful trade of wildlife would be inconsistent with Australia's obligations under the CBD, the Apia Convention and CITES. The Action is not considered to be inconsistent with these international conventions as discussed further below.

5.6.1 Convention on Biological Diversity (CBD)

Under the CBD, Australia is required to:

- conserve biological diversity, including ecosystems, species and genetic diversity
- ensure sustainable use of biodiversity components so that ecological processes are maintained while allowing ongoing use
- promote fair and equitable sharing of benefits arising from the use of genetic resources, including through access and benefit-sharing arrangements.

Australia would act inconsistently with the CBD where actions undermine conservation, sustainable use, or integration of biodiversity into decision-making. Approving developments that cause avoidable or unmitigated biodiversity loss, without credible offsets or strategic justification, is likely to be inconsistent with CBD obligations.

The Action has sought to avoid the highest quality biodiversity on the site and is proposing to offset in accordance with the BAM, which has been endorsed by the Commonwealth. While the Action does result in impacts on biodiversity, it is considered that it is not inconsistent with the requirements of the CBD.

5.6.2 Convention on Conservation of Nature in the South Pacific (Apia Convention)

Under the Apia Convention, Australia has committed to:

- establish and maintain protected areas (national parks and reserves) to safeguard representative ecosystems, significant landscapes, and areas of scientific, cultural or aesthetic value
- avoid reduction of protected areas unless subject to full investigation and justification, and ensure such areas are not subject to commercial exploitation
- prohibit or strictly control hunting, capture or collection of protected species within designated protected areas.

Approving developments that encroach on or weaken protected areas, without demonstrable conservation justification, would be inconsistent with the Apia Convention. The Action does not propose to impact or weaken protected areas (such as National Parks or Reserves) and therefore is not inconsistent with the Apia Convention.

5.6.3 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

CITES requires parties to:

- give domestic legal effect to the Convention
- designate management and scientific authorities to assess trade impacts, issue permits and make non-detriment findings
- enforce compliance, including border controls, inspections, seizures and penalties for illegal wildlife trade, supported by the Australian Border Force and Federal Police.

Australia gives domestic legal effect to the Convention through the operations of the EPBC Act. Contraventions generally arise from failures in wildlife trade control, permitting, or enforcement. The Action does not promote and will not result in unlawful wildlife trade and is therefore not inconsistent with CITES.

5.7 Biodiversity impact avoidance, management and offsets

HVO has sought to avoid and minimise potential impacts on biodiversity values through Project design. This included targeted avoidance and minimisation of disturbance of key high conservation value vegetation communities and fauna habitats through designing the Project to maximise use of existing mining facilities and existing and approved disturbance areas, reducing the mining footprint and relocating infrastructure where possible, and implementing a range of biodiversity mitigation measures. The EIS includes a mine plans options and infrastructure options assessment report (Appendix G) that provides a comprehensive overview of the mine and broader project planning process that has been implemented for the Project.

HVO undertook a detailed biodiversity constraints study as part of the Project's pre-feasibility assessment to guide the development and detailed design of the Project. Through this process alternative mining options were considered, and HVO has sought to minimise the biodiversity impacts associated with the Project whilst maximising the economic resource recovery.

Following submission of the EIS to DPHI, the Project implemented additional changes to further reduce the impact associated with the Lemington Road realignment so that impacts to Warkworth Sands Woodland of the Hunter Valley CEEC and other native forest and woodland are avoided and minimised where possible.

The sections below summarise the Project's strategy to avoid and minimise impacts on biodiversity and then offset the residual impacts relevant to the HVO North Action.

5.7.1 Avoidance

The continuation of mining across the HVO Complex is proposed to be predominantly undertaken through previously mined and disturbed areas, and areas previously approved to be disturbed. While this approach provides significant resource recovery largely through the extraction of coal from deeper seams and mining efficiency advantages it also provides improved final landform outcomes and minimises impacts on remnant vegetation and higher quality habitat in the locality.

HVO has sought to avoid and minimise potential impacts on the ecological values of the HVO North BIAA throughout the Project planning process. The preferred Project mine and infrastructure design was chosen as they provide the best balance between optimal resource recovery and financial return, and reducing environmental and social impacts, through the implementation of appropriate mitigation measures.

Key MNES features avoided through design and refinement are detailed in the sections below.

i Lemington road realignment

The proposed alignment of Lemington Road was carefully considered to avoid or minimise impacts to areas of environmental sensitivity, in particular Warkworth Sands Woodland of the Hunter Valley CEEC and NSW-listed Central Hunter Grey Box – Ironbark Woodland Endangered Ecological community (EEC). Following public exhibition of the EIS (EMM 2022a) and submission of the EPBC Referral, HVO revised the portion of the proposed Lemington Road realignment that traversed areas of 'known' Warkworth Sands Woodland of the Hunter Valley CEEC further to the west, where the depth of potential aeolian sandy substrate varies and floristic characteristics appear to favour box-ironbark woodland associations.

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 of the Hunter Valley CEEC
- adopting an alignment further away from existing biodiversity offset areas where Warkworth Sands Woodland of the Hunter Valley CEEC is present
- further minimising the HVO North BIAA footprint of the proposed road corridor through remnant vegetation utilising areas of existing disturbance or rehabilitation areas at HVO
- maintaining the already established principal design requirements.

Table 5.16 outlines the key biodiversity features avoided by the proposed alignment.

Table 5.16 Impacts avoided following Lemington Road realignment design refinement

Biodiversity feature	Area (ha) avoided^
Native forest and woodland habitat	25.4
Native and exotic grasslands	19.2
EPBC Act-listed features	
Warkworth Sands Woodland of the Hunter Valley CEEC	9.8
Central Hunter Valley Eucalypt Forest and Woodland CEEC	5.7

Note: ^ Areas not cumulative.

ii Electricity and telecommunications realignment path

The HVO North Action requires the realignment of several transmission lines, as well as some telecommunication lines. New access points to realigned electricity and communication infrastructure will also be established to avoid interaction with mining activities where possible. As part of the Project design phase, the preferred realignment path of this infrastructure was carefully considered to avoid areas of higher quality vegetation and habitats, and to provide for maximum vegetation and habitat retention, wherever possible.

The extent of disturbance associated with transmission line realignment will be limited to transmission line pole pads and an access road for maintenance along the alignment, as well as vegetation management to maintain safe transmission line clearance. While the biodiversity MNES report (Appendix D) considers the impacts of the proposed alignment path and proposed locations of maintenance tracks, pole pads and transmission line paths, these are currently indicative designs only. While the final footprint of the easement is unlikely to change, some flexibility within the wider additional disturbance boundary may be required.

Table 5.17 outlines the areas avoided within the proposed easement corridors.

Table 5.17 Impacts avoided following transmission line design refinement

Biodiversity feature	Area (ha) avoided
Native forest and woodland habitat	22
Native and exotic grasslands	163
EPBC Act-listed features	
Central Hunter Valley Eucalypt Forest and Woodland CEEC	4.8

5.7.2 Biodiversity impact mitigation measures

HVO has committed to the design and implementation of a comprehensive biodiversity mitigation strategy to mitigate the unavoidable impacts of the HVO North Action. The following specific control measures, are considered to be integral to the mitigation of impacts on the biodiversity features of the HVO North BIAA:

- salvage of suitable biodiversity features, including habitat resources (e.g. hollow logs, tree hollows, fallen timber and rocks/boulders) and material for mine rehabilitation (e.g. seed collection and topsoil collection)
- a pre-clearing procedure to minimise the potential for impacts on native fauna species (focusing on threatened species) as a result of the clearing of hollow bearing trees
- weed management
- pest animal control
- pathogen management
- fencing and access control
- bushfire management
- erosion and sedimentation control
- providing appropriate environmental management measures as part of the mining operations to minimise the potential for indirect impacts.

Should the Project be approved, HVO will review and revise the existing approved HVO Integrated Biodiversity Management Plan in accordance with any additional development consent and EPBC Act approval requirements.

i Salvage of biodiversity features

Salvaged habitat resources include tree hollows, fallen timber and rocks/boulders provide foraging and refuge habitat for a number of key threatened species, particularly insectivorous woodland birds and terrestrial mammal species. The microclimates provided around fallen timber and rocks/boulders can assist in the establishment of flora species and the decomposing woody material from fallen timber can assist in soil conditioning.

The relocation of salvaged habitat resources is proposed for rehabilitation areas according to the HVO Integrated Biodiversity Management Plan. The use of these materials is dependent upon availability and opportunities for safe and practical collection and reuse. Where salvaged materials are to be used, they would be implemented in a way that is consistent with rehabilitation completion criteria. This will increase habitat complexity for fauna species sooner than when they would naturally develop. Key actions, outcomes, timing and responsibility for implementing this mitigation measure is summarised in Table 5.18.

Table 5.18 Salvage of biodiversity features

Action	Outcome	Timing	Responsibility
Salvage of suitable biodiversity features – timber, rocks, topsoil, mulch	Minimise impacts to fauna species. Minimise the clearance of fauna habitat.	During clearance works	HVO
Installation of salvaged features in rehabilitation zones	Increase habitat complexity for fauna and flora species in rehabilitation zones.	Operation	
Monitoring and adaptive management strategies	Document key learnings and improve or alter actions throughout the HVO North Action to target best practice. Early identification and rectification of any issues with current actions or approaches.	Construction and operation	

ii Pre-clearance and tree-felling

Pre-clearance surveys and tree-felling supervision recommendations will be implemented to minimise the potential for impacts on native fauna species (including threatened species) as a result of the clearing of hollow-bearing trees. Key actions, outcomes, timing and responsibility for implementing this mitigation measure is summarised in Table 5.19.

Table 5.19 Pre-clearance and tree felling

Action	Outcome	Timing	Responsibility
Pre-clearance surveys	Identification of potential translocation opportunities.	Construction and operation	HVO
Tree felling process and supervision	Minimisation of potential harm, injury and death of fauna occupying habitat. Identification and salvage of habitat features.	During clearance works	
Monitoring and adaptive management strategies	Document key learnings and improve or alter actions throughout the HVO North Action to target best practice. Early identification and rectification of any issues with current actions or approaches.	Construction and operation	

a Pre-clearance surveys

Pre-clearance surveys are to be undertaken prior to tree felling works, be undertaken by suitably qualified and experienced person and include:

- the demarcation of areas approved for clearing to reduce risk of accidental clearing
- habitat resources and habitat trees should be identified and marked

- the potential presence of threatened flora and fauna species, endangered populations and TECs should be identified
- the identification of threatened species or habitat features that are suitable for translocation or salvage. This includes native plant species containing seed for collection and propagation purposes and habitat features to be used in habitat augmentation
- disturbance activities should be targeted to specific times of the year to minimise impacts to threatened species usage of habitat features for breeding and roosting, where practicable.

b Tree-felling

Tree felling will be completed as close to the completion of pre-clearance surveys as practicable. Tree felling supervision will be undertaken after pre-clearance surveys have identified potential habitat features.

The tree-felling process will include the following:

Prior to felling habitat trees:

- Removal of non-habitat trees/vegetation as close to the habitat tree felling date as possible in order to create disturbance to discourage fauna usage of the habitat trees.
- Shaking of habitat trees (with heavy machinery) as appropriate to encourage fauna to abandon trees.

On the day of felling habitat trees:

- All habitat trees will be subject to a visual ground inspection to survey for threatened species.
- Trees previously identified as containing fauna will be shaken and then felled, providing no threatened species are identified.
- The lowering of hollow-bearing trees will be done as gently as possible with heavy machinery.
- If a threatened species is identified in a habitat tree on the day of felling, the supervising person is to advise the most appropriate method to minimise potential harm. This may include leaving the tree overnight, further shaking to encourage the animal to vacate the tree, gradual removal of branches to discourage ongoing use, soft-felling of the tree with the animal in the tree, or measures to capture and relocate the animal to secure habitats.
- Uninjured animals should be released on the day of capture into nearby suitable secure habitat and should not be held for extended periods of time.
- Injured animals will be taken to the nearest veterinary clinic or wildlife carer as soon as possible for assessment and treatment.
- Felled trees are to be rolled where appropriate so that the number of hollows blocked against the ground is minimised.
- All felled habitat trees should remain in place for a least one night to allow any remaining fauna to escape.
- Habitat features identified for translocation or salvage operations should be extracted and stored appropriately.

iii Weed management

The presence of weed species has the potential to be an impediment to revegetation and regeneration activities and native vegetation regeneration. In addition, the presence of weed species has the potential to decrease the value of vegetation for native species, particularly threatened species.

Existing weed management controls as specified in the HVO Integrated Biodiversity Management Plan will be applied to the HVO North Action Area. Key actions, outcomes, timing and responsibility for implementing this mitigation measure is summarised in Table 5.20.

Table 5.20 Weed management

Action	Outcome	Timing	Responsibility
Weed management actions	Minimisation of Weeds of National Significance (WoNS), priority weeds under NSW *Biosecurity Act 2015* and/or environmental weeds in the HVO North BIAA. Minimisation of weed spread from and into the wider locality.	Construction Operation	HVO
Monitoring and adaptive management strategies	Identification of emerging weed infestations. Identification of successful or otherwise weed management techniques. Adaptive management recommendations to target best practice and improvements.	Post completion of management actions	

iv Pest animal control

Introduced fauna species such as deer, foxes, rabbits, pigs, wild dogs and feral cats could change in distribution and abundance as future areas are cleared, mined and then rehabilitated. Clearing, thinning of vegetation and the creation of tracks through existing dense vegetation could assist the penetration of introduced fauna species such as pigs, cats and foxes, and allow them to establish in new areas.

Pest and feral animal control will be undertaken in accordance with current mine practices and as outlined in the HVO Integrated Biodiversity Management Plan. Key actions, outcomes, timing and responsibility for implementing this mitigation measure is summarised in Table 5.21.

Table 5.21 Pest and animal control

Action	Outcome	Timing	Responsibility
Pest animal control actions	Management and reduction of pest animal species.	Construction Operation	HVO
Monitoring and adaptive management strategies	Identification of emerging pest invasion. Identification of successful or otherwise pest animal management techniques. Adaptive management recommendations to target best practice and improvements.	Post completion of management actions	

v Pathogen management

It is important to reduce the risks of introducing pathogens (*Phytophthora cinnamomi*, myrtle rust and chytrid fungus) into new areas in NSW, especially those with susceptible threatened species and threatened ecological communities. Basic hygiene procedures (in accordance with the *Hygiene guidelines – Protocols to protect priority biodiversity areas in NSW from Phytophthora cinnamomi, myrtle rust, amphibian chytrid fungus and invasive plants* (DPIE 2020b)) can include checking, cleaning and drying equipment, vehicles, footwear and tools of soil materials prior to entering and leaving the site. Key actions, outcomes, timing and responsibility for implementing this mitigation measure is summarised in Table 5.22.

Table 5.22 Pathogen management

Action	Outcome	Timing	Responsibility
Pathogen management actions – checking, cleaning and drying equipment, vehicles, footwear and tools, following frog handling procedures as per HVO Vegetation Clearance Plan.	Management and reduction of pathogens impacting biodiversity.	Operation	HVO
Monitoring and adaptive management strategies	Identification of emerging pathogen issues. Identification of successful or otherwise pathogen management techniques. Adaptive management recommendations to target best practice and improvements.	Post completion of management actions	

vi Fencing and access control

Access control is an important feature in protecting and demarcating areas outside the HVO North BIAA from vehicle access, human access and accidental disturbance. Measures include:

- appropriate fencing and signposting of areas to prevent the uncontrolled entry of people, accidental disturbance and to minimise vehicular and human traffic
- clear and visible signage is to be appropriately located to inform the workforce and others of the restricted access or otherwise of areas outside the HVO North BIAA
- locking of gates to prevent unwanted vehicle, person access and disturbance.

Key actions, outcomes, timing and responsibility for implementing this mitigation measure is summarised in Table 5.23.

Table 5.23 Fencing and access control

Action	Outcome	Timing	Responsibility
Demarcation of impact footprints	Ensuring the extent of clearance is understood and visible. Minimisation of unnecessary and accidental impacts to surrounding vegetation and habitats. Ensuring impact thresholds identified for the HVO North Action are not compromised.	Construction and operation	HVO
Monitoring and adaptive management strategies	Document key learnings and improve or alter actions throughout the HVO North Action to target best practice. Early identification and rectification of any issues with current actions or approaches.	Construction and operation	

vii Bushfire management

The vegetation that will be retained within areas adjoining the HVO North BIAA will require appropriate bushfire management to protect life and property, while supporting appropriate conditions for the significant ecological features identified. This will be achieved through the implementation of a range of measures, including:

- maintaining a suitably equipped response to any fires on site and assisting the Rural Fire Service and emergency services on site in the event of a fire within the HVO North Action Area
- where permitted, appropriate grazing management regimes to reduce ground fuel loads and fuel hazard reduction burns
- maintaining strategically positioned fire breaks and access roads.

Bushfire management measures are detailed in the HVO Bushfire Management Plan. Key actions, outcomes, timing and responsibility for implementing this mitigation measure is summarised in Table 5.24.

Table 5.24 Bushfire management

Action	Outcome	Timing	Responsibility
Bushfire management actions – maintain equipment, management of fuel loads, maintenance of fire breaks and access roads	Protect life and property, while supporting appropriate conditions for the existing ecological features.	Construction and operation	HVO
Monitoring and adaptive management strategies	Document key learnings and improve or alter actions throughout the HVO North Action to ensure best practice. Early identification and rectification of any fire, fuel load issues with current actions or approaches.	Construction and operation	

viii Erosion and sediment control

Erosion and sediment control is critical to the long-term stability of the land surface and downstream water quality, with the main objective being to protect soil resources and maintain local water course quality. The HVO Integrated Biodiversity Management Plan outlines the requirements for erosion and sediment control that will be implemented for the HVO North Action, including:

- where possible, clean water diversion structures are employed to divert clean water away from the active mining areas
- a Ground Disturbance Permit (GDP) is required for disturbance activities
- prior to disturbance, appropriate erosion and sediment controls will be established
- where ground conditions allow, erosion and sediment controls will be designed generally in accordance with the *Managing Urban Stormwater: soils and construction* (Volume 1 – Mines and Quarries) (Blue Book) (Landcom 2004)
- areas will be rehabilitated and stabilised as soon as possible following disturbance.

Key actions, outcomes, timing and responsibility for implementing this mitigation measure is summarised in Table 5.25.

Table 5.25 Erosion and sediment control

Action	Outcome	Timing	Responsibility
Erosion and sedimentation control measures	Minimise sediment pollution. Minimise erosion of soils. Minimise impacts to waterways and habitats.	Construction and operation	HVO
Monitoring and adaptive management strategies	Document key learnings and improve or alter actions throughout the HVO North Action to ensure best practice. Early identification and rectification of any erosion issues with current actions or approaches.	Construction and operation	

ix Other environmental management measures

Appropriate environmental management measures will be used as part of the mining operations to minimise the potential for indirect impacts, including:

- appropriate lighting controls to minimise impacts will continue to be implemented as part of the HVO North Action as necessary (providing that these actions do not compromise site safety issues). This is proposed to include the use of unidirectional light techniques, the use of shielding fittings to limit the spill of light and directing lights downwards. There is not expected to be any substantial change to lighting impacts on adjacent habitats given that the HVO North Action is part of an existing operation with existing impacts
- blasting and noise control systems to minimise noise impacts will continue to be implemented as part of the HVO North Action. There is not expected to be any substantial change to noise impacts on adjacent habitats given that the HVO North Action is part of an existing operation with existing impacts
- dust suppression measures to minimise impacts to the surrounding landscape will continue to be implemented at HVO. In regard to potential impacts on biodiversity, there will be no substantial change to dust impacts given that the HVO North Action is part of an already existing operation with existing impacts. Similar levels of impact would be expected for the HVO North Action, particularly given the increased focus by regulators on reducing dust impacts associated with mining and other operations, and given that the HVO North Action is not proposing an increase in the approved annual ROM coal production rate
- wildlife warning signs and 'Injured Native Wildlife' signs will be installed in likely high impact locations as a reminder to take care when driving.

5.7.3 Biodiversity offset strategy

i Overview

A comprehensive biodiversity offset strategy will be developed for the Project in accordance with relevant NSW State legislation and/or policies, currently being assessed under the BAM in accordance with the BC Act.

The NSW and Commonwealth governments agree that endorsement of the NSW Biodiversity Offset Scheme (BOS) to avoid, minimise and offset biodiversity impacts on both NSW and Commonwealth listed entities provides for the best biodiversity and streamlining outcomes. The Commonwealth government supports the use of the BAM as the underpinning methodology for calculating biodiversity credit requirements.

The BOS has requirements for retiring like-for-like credits or funding conservation actions that directly benefit the species or community impacted, and these meet the Commonwealth government's offsetting requirements. The BOS also allows for variation rules to be used after reasonable steps have been taken to source like-for-like credits. NSW amended the NSW Biodiversity Conservation Regulation 2017 (BC Regulation) so the variation rules do not apply to offsets required for Commonwealth listed entities for controlled actions. If the NSW approval requires biodiversity offsets for NSW only listed entities, proponents will still be able to use the variation rules for these.

To meet offsets required for Commonwealth listed entities for controlled actions under the BOS, proponents retain the ability to:

- retire biodiversity credits based on the like-for-like provisions in the BC Regulation
- fund biodiversity conservation actions that are listed in the Ancillary rules: Biodiversity conservation actions and directly benefit the threatened entity impacted

- pay into the Biodiversity Conservation Fund (BCF), noting it is the proponent's responsibility to notify the Biodiversity Conservation Trust that their payment is for a controlled action.

ii Biodiversity credit summary

Table 5.26 and

Table 5.27 outlines the ecosystem credits associated with the MNES considered to have the potential to be impacted by the HVO North Action. No species-credit requirements have been generated as a result of the HVO North Action.

Table 5.28 provides a summary of the credits required for both the HVO North and HVO South Actions and the HVO Complex as a whole.

Table 5.26 HVO North BIAA vegetation zones requiring offset and ecosystem credits

PCT	Vegetation zone and condition	Area (ha)	Credits		
			Domain 3	Domain 2b	Domain 4
3431 – Central Hunter Ironbark Grassy Woodland	Moderate	100.0	1,876	54	1,219
	Thinned Woodland	11.3	254	0	57
	Woodland with Exotic Understorey	16.3	38	0	185
	Plantation	47.4	51	0	998
	Scattered Regeneration	65.0	967	0	510
	Cooba Woodland	62.0	291	0	1,187
	Bulloak Variant	38.0	677	0	110
	White Box/Grey Box Variant	1.6	0	0	34
	Poor Condition Derived Native Grassland	257.1	0	0	0
	Exotic Grassland	158.5	0	0	0
	Mine Rehabilitation (conforming to a PCT)	14.9	0	468	0
	TOTAL for PCT 3431	**772.1**	**4,154**	**522**	**4,300**
3485 – Central Hunter Slaty Gum Grassy Forest	Moderate	7.3	313	0	11
	TOTAL for PCT 3485	**7.3**	**313**	**0**	**11**
4015 – Central Hunter Riparian Forest	Moderate	3.4	65	0	42
	TOTAL for PCT 4015	**3.4**	**65**	**0**	**42**
4081 – North-west River Oak-River Red Gum Forest	Moderate	1.8	39	0	0
	TOTAL for PCT 4081	**1.8**	**39**	**0**	**0**

PCT	Vegetation zone and condition	Area (ha)	Credits		
			Domain 3	Domain 2b	Domain 4
4089 – Namoi-Upper Hunter River Red Gum Forest	Moderate	5.1	33	0	209
	Low to Moderate	1.5	2	0	29
	Cooba Woodland	0.1	3	0	0
	Derived Native Grassland	5.1	9	0	14
	Exotic Grassland	79.3	0	0	0
	TOTAL for PCT 4089	**91.1**	**47**	**0**	**265**
Total native vegetation requiring ecosystem credits		**875.7**	**4,618**	**522**	**4,618**

Table 5.27 HVO North BIAA ecosystem credits and impact areas associated with MNES

Species/TEC	Total impact area (ha)	Total credits
Likely significant impact		
Central Hunter Valley Eucalypt Forest and Woodland CEEC	166.3	4,824
Hunter Valley delma^*	305.5	3,601
Swift Parrot	205.4	5,801
Unlikely significant impact		
White Box – Yellow Box – Blakely's Red Gum Grassy Woodland Derived Native Grassland CEEC	4.8	202
Regent honeyeater	207.2	5,840
Spotted-tailed quoll	308.9	8,176
Large-eared pied bat	228.5	6,120
Grey-headed flying-fox	243.4	6,588
White-throated needletail	248.5	6,734
Brown treecreeper	205.4	5,801
Latham's snipe	7.9	N/A

Notes: credits in this table are not cumulative and credits assigned to EPBC-listed species are captured through the ecosystem credit component (i.e. vegetation offsets) of the offsetting obligations.

^ Species generates species credits only and ecosystem credits are not relevant to this species.

* Credits for Domains 3 and Domain 4 only

Table 5.28 HVO North and HVO South ecosystem credits and impact areas associated with MNES

Species/TEC	HVO North		HVO South		HVO Complex	
	Total impact area (ha)	Total credits	Total impact area (ha)	Total credits*	Total impact area (ha)	Total credits*
Likely significant impact						
Central Hunter Valley Eucalypt Forest and Woodland CEEC	166.3	4,824	45.7	1,431	212	6,255
Hunter Valley Delma^	305.5	3,601	13.0	198	318.5	3,799
Swift Parrot	205.4	5,801	57.5	1,508	262.9	7,309
Unlikely significant impact						
White Box – Yellow Box – Blakely's Red Gum Grassy Woodland Derived Native Grassland CEEC	4.8	202	-	-	4.8	202
Regent honeyeater	207.2	5,840	57.5	1,508	264.7	7,348
Spotted-tailed Quoll	309.6	8,176	66.7	1,731	376.3	9,907
Large-eared Pied Bat	228.5	6,120	9.2	265	237.7	6,385
Grey-headed Flying-fox	243.4	6,588	57.5	1,508	300.9	8,096
White-throated Needletail	248.5	6,734	57.5	1,508	306	8,242
Brown Treecreeper	205.4	5,801	57.5	1,508	262.9	7,309
Latham's Snipe	7.9	N/A	-	-	7.9	N/A

Notes: * Not accumulative.

^ Species credits consistent with species habitat polygons prepared under the BDAR (Umwelt 2026b).

iii Additional offsets for Hunter Valley Delma (*Delma vescolineata*) in mine rehabilitation

Mine rehabilitation that is Category 1 – Exempt Land under the LLS Act may provide additional habitat for the Hunter Valley Delma to that assessed under the BAM. Surveys are currently ongoing to determine the extent of habitat occupation in these areas. The species was previously recorded relatively consistently across the remnant native grasslands in the wider BIAA during survey efforts for the State assessment. Targeted fauna surveys were not initially conducted in Category 1 mine rehabilitation areas, as per the requirements of the BAM, however consultation with the Commonwealth DCCEEW indicated that the mine rehabilitation would be considered potential habitat unless it could be demonstrated otherwise.

The Commonwealth DCCEEW has stated that, it would be expected that these impacts would require a credit obligation. However, prescribed impacts (under the BAM) are impacts on biodiversity not readily calculated through the generation of biodiversity credits (e.g. non-native vegetation – where a PCT cannot be assigned).

As outlined in Section 4.5.11 of the BAM Operational Manual Stage 2 (DPE 2023):

> Prescribed impacts are particularly difficult to quantify, as they are often uncertain, related habitat features that generally cannot be readily replaced or offset, or occur beyond the subject land. Consequently, the BAM does not provide a method for calculating the biodiversity credits to offset a prescribed impact.

The Manual also states that:

> It is best practice for the assessor and proponent to propose compensatory measures such as additional biodiversity credits or conservation measures to compensate for any residual prescribed impacts. The biodiversity credits proposed to offset residual prescribed impacts are additional to the baseline credits required for offsetting direct impacts, and will not be part of the credit report generated by the BAM-C.

The application of the BAM-C for calculating species credits for Hunter Valley Delma in mine rehabilitation areas is likely to overstate the biodiversity values that would need to be offset in respect of the species. The vegetation integrity (VI) score in the BAM-C is directly linked to the floristic diversity in a vegetation zone. In the mine rehabilitation – plantation zones, the seed and seedling mix in these areas can be highly diverse with a range of native, but not locally endemic, species and, as a result, the VI score in these areas is often higher than the remnant vegetation in the locality. High VI scores drive higher credit outcomes which result in unbalanced outcomes for disturbance specialist species like the Hunter Valley Delma, where offsets would be most likely sought in grassland areas with lower VI scores and fewer credits generated.

In addition, under the 2025 amendments to the BC Regulation, the option for major mining proponents to meet a credit obligation through a commitment to ecological mine site rehabilitation was removed. Therefore, any future mine rehabilitation cannot be formally used to offset the species in a like-for-like manner. Existing mine rehabilitation may be established as a Stewardship Site; however, existing land management requirements and unrelinquished rehabilitation could render the land ineligible.

Pending the outcomes of the tile surveys in mine rehabilitation, HVO will liaise with the Commonwealth DCCEEW in relation to a suitable offset arrangement for impacts relating to this potential prescribed impact for the Hunter Valley Delma. This could include measures, or a combination of measures, such as:

- development of a pre-clearance and translocation program for Hunter Valley Delma in mine rehabilitation habitats
- augmentation (tile placement) and temporary protection of mine rehabilitation land not proposed for disturbance as part of the Action to allow for species movement during construction and operation
- land-based offsets secured under a Biodiversity Stewardship Agreement
- funding of a research project or post-graduate study to improve the understanding of the species extent, population dynamics and/or habitat preferences in the Hunter Valley
- retire biodiversity credits based on the like for like provisions in the BC Regulation
- fund biodiversity conservation actions that are listed in the Ancillary rules: Biodiversity conservation actions and directly benefit the threatened entity impacted
- pay into the Biodiversity Conservation Fund (BCF), noting it is the proponent's responsibility to notify the Biodiversity Conservation Trust that their payment is for a controlled action.

iv Offset strategy for Swift Parrot (*Lathamus discolor*)

The HVO North Action is expected to impact 205.4 ha of habitat within the HVO North BIAA. While the habitats of the HVO North BIAA have previously been considered to provide potential foraging habitat for the species, the species was subsequently recorded in August 2025 foraging in flowering Eucalypts surrounding the HVO carpark (HV Services car park HVO North). Surveys within the wider HVO North BIAA, did not record occupation of the species during the same survey period.

Under the BAM, the Swift Parrot (*Lathamus discolor*) is a species assessed through the application of Important Habitat Mapping published by the NSW DCCEEW. Areas containing Important Habitat drives species-credit obligations for impacts and the generation of credits at Stewardship Sites. Under the BAM, no surveys are required to be undertaken. Despite this, HVO elected to undertake targeted winter bird surveys in June and August 2019, July 2020, August 2023, June and August 2025 to address the potential for the species to occur in the locality.

At the time of writing, the closest Important Habitat Mapping for the Swift Parrot occurs around Broke within the Singleton Army Base and around Branxton in the Lower Hunter. No areas within the HVO North BIAA is mapped as Important Habitat. Therefore, no species-credit species have been generated for the species.

However, under the BAM, the habitat for the Swift Parrot can be offset using ecosystem credits in accordance with the like-for-like offsetting rules, which includes strict requirements for offsetting, including securing credits:

- for the same threatened ecological community, or for non-threatened vegetation communities the same vegetation class
- occurring in the same or an adjoining IBRA subregion as the impacted site, or in any subregion that is within 100 kms of the outer edge of the impacted site
- that contains hollow bearing trees, if the impacted vegetation contains hollow bearing trees.

This will ensure that the ecosystem credit offsets secured for the HVO North Action will provide the same habitats for the species within the species known winter foraging range in NSW. 5801 ecosystem credits have been calculated to be required for suitable habitats for the Swift Parrot for the HVO North Action, which will be made up of:

- 5,558 credits conforming to:
  - *Central Hunter Eucalypt Forest and Woodland CEEC* under the EPBC Act, or
  - *Central Hunter Grey Box-Ironbark Woodland EEC* under the BC Act.
- 243 credits associated with PCT4089, conforming to:
  - *White Box-Yellow Box-Blakely's Red Gum Woodland and Derived Native Grassland CEEC* under the EPBC Act
  - *Hunter Floodplain Red Gum Woodland EEC* under the BC Act, or
  - vegetation class Inland Riverine Forests (greater than or equal to 90% cleared).

As a general rule, a Stewardship Site can generate approximately 4-6 species credits per hectare. Based on the calculations for the HVO North BIAA, it is expected that an estimate of between 1,000–1,500 ha in offsets would be required to secure the ecosystem credits associated with habitat for the Swift Parrot. This would either be secured through land-based offsets established by HVO, credits purchased on existing Stewardship Sites or payment into the Biodiversity Conservation Fund which is used to secure strategically located credits in a like-for-like manner for Commonwealth offsets.

v Offset requirements by stage

HVO proposes to stage the retirement of credits as clearing of the HVO North BIAA occurs. The stages of the HVO North Action are summarised in Table 5.29.

Table 5.29 HVO North Action biodiversity offset stages

Timing	Description	NSW and Commonwealth stages	Commonwealth stages
Prior to Commencement	Areas required for initial construction, mining and ancillary disturbance.	Stage 1	
		N/A	Stage A
Prior to the upgrade of HVLP	Areas associated with the upgrade of the HVLP.	Stage 2	
As required but anticipated from Year 7	Areas required for later stages of construction, mining and ancillary disturbance.	N/A	Stage B
Prior to the construction of haul road to Ravensworth Operations	Areas associated with the construction of the ROM coal haul road to Ravensworth Operations (if constructed).	N/A	Stage C – Haul Road Stage C – Haul Road (Ravensworth Operations Impact)
Required late in mine life	Areas required for later mining, ancillary and mine closure disturbance.	N/A	Stage D

Table 5.30 outlines the credit requirement for the relevant stages of the HVO North Action.

Table 5.30 Staged credit requirements – HVO North Action

Biodiversity feature	Commencement		HVLP	Mining / ancillary	Haul Road		Mining/ancillary /mine closure
	Stage 1	Stage A	Stage 2	Stage B	Stage C - Haul Road	Stage C - Haul Road – Ravensworth Operations Impact	Stage D
Commonwealth TECs							
Central Hunter Valley Eucalypt Forest and Woodland CEEC	2945	1455	36	25	215	101	47
White Box-Yellow Box-Blakely's Red Gum Woodland and Derived Native Grassland CEEC	33	169	0	0	0	0	0
Non-EPBC listed PCTs*							
PCT 3431 – Central Hunter Ironbark Grassy Woodland	1,484	2,896	2	0	94	0	0
PCT 4015 – Central Hunter Swamp Oak Riparian Forest	53	42	12	0	0	0	0
PCT 4081 – North-west River Oak-River Red Gum Forest	39	0	0	0	0	0	0
PCT 4089 – Namoi-Upper Hunter River Red Gum Forest	13	96	0	0	0	0	0
Total ecosystem credits	**4,567**	**4,657**	**50**	**25**	**310**	**101**	**47**
Species-credit species							
Hunter Valley delma	2,559	937	8	0	32	65	0
Total species credits	**2,559**	**937**	**8**	**0**	**32**	**65**	**0**

Note: *Offsets required for MNES habitat components.

5.8 Conclusion

Measures to avoid and minimise impacts to native vegetation and threatened species habitat were considered during the initial design stages of the Project and reviewed following receipt of public and agency submissions on the EIS (EMM 2022a), resulting in avoidance of significant biodiversity values and minimisation of impacts on other areas of native vegetation.

Targeted avoidance and minimisation measures include:

- 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 subsequent to submission of the referral for the HVO North Action to remove all direct impacts to Warkworth Sands Woodland of the Hunter Valley CEEC
- careful consideration of proposed transmission line easement alignments 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.

Following the implementation of all avoidance measures, the following MNES are likely to be significantly impacted as a result of the HVO North Action:

- 166.3 ha of Central Hunter Valley Eucalypt Forest and Woodland CEEC
- 305.5 ha of Hunter Valley delma (*Delma vescolineata*) habitat
- 205.4 ha of Swift Parrot (*Lathamus discolor*) habitat.

The biodiversity ecosystem credits that will be required to offset the impacts of the HVO North Action are summarised in Table 5.31. Offsets comprise ecosystem credits required to meet NSW biodiversity offset obligations, including credits for habitat associated with EPBC-listed species that were determined unlikely to be significantly impacted.

Table 5.31 HVO North Action biodiversity offset credits

Species/TEC	Credit requirements
Likely significant impact	
Central Hunter Valley Eucalypt Forest and Woodland CEEC	4,824
Hunter Valley Delma (*Delma vescolineata*)^	3,601
Swift Parrot (*Lathamus discolor*)	5,801
Unlikely significant impact	
White Box – Yellow Box – Blakely's Red Gum Grassy Woodland Derived Native Grassland CEEC	202
Regent Honeyeater	5,840
Spotted-tailed Quoll	8,176
Large-eared Pied Bat	6,120
Grey-headed Flying-fox	6,588

Species/TEC	Credit requirements
White-throated Needletail	6,734
Brown Treecreeper	5,801
Latham's Snipe	N/A

Note: ^ Species credits consistent with species habitat polygons prepared under the BDAR (Umwelt 2026b).

HVO has been actively securing biodiversity credits for the Project, focusing on the requirements of the early stages of the Project (Stages 1 and A). At the time of writing, HVO is substantially progressed in securing biodiversity credits on the biodiversity credit market to enable the commencement of the Project. Where required, credits have been sought that conform to Central Hunter Valley Eucalypt Forest and Woodland CEEC to ensure the like-for-like requirements of the Commonwealth are satisfied.

6 Matters of national environmental significance – water resources

6.1 Introduction

To support this draft PER, a water resources impact assessment (EMM 2026b) has been prepared and provided as Appendix B. The water resources impact assessment provides an assessment of the potential impacts of the Project on water resources including water-dependent assets. The water resources impact assessment is an overarching report documenting and summarising the findings of the different water-related technical assessments conducted for the Project, including:

- the *Groundwater Modelling Report* (GMR) prepared by EMM (EMM 2026c)
- *Surface Water Impact Assessment* (SWIA) prepared by Engeny Water Management (Engeny 2026a)
- *Aquatic Ecology and* GDEs Assessment prepared by Eco Logical Australia (ELA 2025)
- *Geochemical Assessment* prepared by Environmental Geochemistry International Pty Ltd (EGi 2022a).

These technical reports are provided as appendices to the water resources impact assessment, which have been conducted with consideration of the *Significant Impact Guidelines 1.3: Coal seam gas and large coal mining developments – impacts on water resources* (DCCEEW 2022). The key outcomes from the water resources impact assessment are summarised in the sections below.

6.2 Assessment approach

6.2.1 Overview

As described in Section 1.1, while HVO North and HVO South are separated by the Hunter River, they are operated as one complex with fully integrated environmental management systems, including an integrated WMS. For this reason, the water resource models developed for the Project (e.g. water balance model and groundwater model) consider the HVO Complex as a whole.

Notwithstanding, the incremental impacts of the HVO North Action are reported where possible. In general, impacts are presented for the HVO Complex with discussion provided on the HVO North Action and HVO South Action where appropriate.

6.2.2 Groundwater

A regional numerical groundwater model was developed using MODFLOW-USG to predict the potential impact of the Project on the groundwater regime. Groundwater modelling for the Project builds upon many previous groundwater modelling efforts in the region, reflecting the extensive and ongoing mining in the region surrounding the HVO Complex.

The HVO regional groundwater model was originally designed and history-matched by AGE in 2022 and reported as part of the EIS (EMM 2022a, AGE 2022). The general model design, including domain, geometry, and most boundary conditions are largely the same as reported by AGE (2022) as the conceptual understanding is unchanged. Modifications have been made to represent the revised HVO mine plan, as well as updates to approved mines in the model domain since 2022. The current model version (supporting the Project) is based on that developed by AGE (2022) and incorporates updates to the model parameterisation and simulated mining activities associated with the Project.

The groundwater model:

- simulates the main hydrogeological units in the HVO Complex and surrounding area
- was conducted in accordance with:
    - the *Australian Groundwater Modelling Guidelines* (Barnett et al 2012)
    - IESC explanatory notes including:
        - uncertainty analysis for groundwater modelling (Middlemis and Peeters 2018, and Peeters and Middlemis 2023)
        - characterisation and modelling of geological faults (Murray and Power 2021)
- was history-matched to measured data from approximately 1970 to July 2024, using available groundwater elevation monitoring data at the HVO Complex and neighbouring mines, with history-matching effort focused on replicating the key regional trend of depressurisation within the Permian strata adjacent to mining areas, and limited drawdown observed in the alluvial aquifers.

The groundwater model was used to predict incremental and cumulative changes to the groundwater resources due to the Project by comparing outcomes from the modelled approved operations and the Project. Current approved mining within the region (i.e. non-HVO) was included to account for cumulative effects.

The following model scenarios were developed and run to calculate incremental (Project-induced) and cumulative effects:

1. "Baseline" – approved operations within the region, with all mining deactivated at the end of 2009 (to align with the commencement of the statutory water sharing plan(s)), providing a 'null' scenario for quantification of cumulative effects.
2. "Approved" – currently approved operations at HVO North and HVO South, and approved and foreseeable operations within the region.
3. "Proposed" – approved and foreseeable operations within the region as well as the proposed mine plans associated with the Project.

Climate stresses are consistent between the scenarios.

Predictive uncertainty analysis was undertaken in accordance with current best practice guidance (Peeters and Middlemis 2023). The three model scenarios were run with a 500-realisation parameter ensemble to provide probabilistic predictions. Of these, 414 realisations successfully converged through the prediction and recovery period.

Peer review of the groundwater modelling for the Project has been conducted by Christopher Strachotta of Klohn Crippen Berger (KCB).

6.2.3 Surface water

A quantitative water balance model (conducted using GoldSim), streamflow modelling, flood modelling and water quality evaluation have been conducted for the Project.

i Water balance modelling

The water balance used for the assessment was based on the current calibrated operational water balance model maintained by the site. The operational water balance model is used to forecast site water inventories to assist in water infrastructure design as well as managing water deficits and surpluses.

The water balance model is calibrated to various observed data sets, has been reviewed and updated as part of the operational water management plans prepared for the site, and has been peer reviewed as part of the SWIA.

The current calibrated operational water balance model is also used by HVO to report water statistics in accordance with the Minerals Council of Australia Water Accounting Framework (WAF).

As noted in the SWIA (Annexure A of Appendix E), the water balance modelling was based on 121 years of rainfall data, extracted from the SILO data set. All 121 years of data are used for forecasting the potential range of responses of the site WMS using a Monte Carlo approach, by starting each model realisation at every year of the 121 years of rainfall data, looping the data set as required. This allows for a range of climate scenarios and season variability to be modelled to estimate the resilience of the proposed WMS to extreme conditions (i.e. historical flood and drought sequences).

The water balance modelling was undertaken for the full operational period of the Project, from mining year 1 through to 2045 for HVO North and 2042 for HVO South.

Peer review of the water balance modelling was conducted by Ian Rowbottom of EMM.

ii Streamflow modelling

Historical streamflow analysis was undertaken by Engeny (2026a) using publicly available gauging data collected by WaterNSW. However, streamflow monitoring is only undertaken on the Hunter River and Wollombi Brook. Streamflow at ephemeral watercourses within the HVO Complex were assessed using an Australian Water Balance Model (AWBM). The assessment of impacts on the flow regimes was based on flow sequencing analysis for the Hunter River and relevant tributaries. The analysis identified periods of low and zero flow.

Lowering of the watertable due to the HVO North Action and HVO South Action has the potential to result in changes in groundwater discharge (baseflow) and/or increased leakage from surface water to groundwater, thereby potentially changing streamflow. The streamflow assessment was informed by estimated changes in surface water-groundwater interaction, predicted by the groundwater modelling (EMM 2026b) and summarised in Section 6.6.3.

Peer review of the streamflow modelling was conducted by Ian Rowbottom of EMM.

iii Surface water quality

The water balance model was used to conduct a mixing water quality assessment downstream of the HVO Complex to evaluate the potential impact of licensed discharges under the HRSTS. This calculation included observed water quality concentrations in the Hunter River upstream of the HVO Complex, which includes water quality effects from upstream mining discharges and other activities (and therefore considers cumulative impacts).

iv Flood modelling

In 2022, Engeny developed and calibrated a flood model (TUFLOW hydraulic model) of the Hunter River to assess the potential impact of the Project on the flood regime. The flooding impact assessment adopted the methods recommended in *Australian Rainfall and Runoff 2019* (Ball et al 2019).

Calibration of the flood model included calibration to the rating table for the Liddell gauge (210083) and validated for the June 2007 flood event at seven available streamflow gauging stations, including the Liddell gauge.

Due to the nature of the Hunter River streamflow and influence of Glenbawn Dam, the adopted methodology used flood frequency analysis. Given the adopted methodology, it was not possible to estimate the Probable Maximum Flood (PMF) using Probable Maximum Precipitation (PMP) methodology. An alternative approach was adopted to estimate an Extreme Flood deemed to be the maximum flood likely to occur by scaling the 1% AEP design flood. The Extreme Flood for the HVO flood model has been defined as ratio of 4 (i.e. multiplying the 1% AEP by a factor of 4). This approach is consistent with other studies in the area.

Peer review of the flood modelling approach, inputs, calibration and outputs was undertaken by Barry Rodgers at BMT. Following exhibition of the EIS, NSW Government requested Torrent Consulting undertake an additional peer review of the flood modelling and assessment in 2024.

The outcomes of the peer reviews found that the approach to modelling is in accordance with industry standards and meets the requirements of the NSW Government assessment requirements.

6.2.4 Aquatic ecology and GDE assessment

The aquatic ecology and GDE impact assessment conducted by ELA for the Project is based on the outcomes of groundwater modelling (EMM 2026b), streamflow impact assessment and surface water quality assessment (Engeny 2026b), completed to support the HVO Amendment Report (EMM 2025a) which is broadly consistent with findings of the SWIA and GMR completed to support the PERs. To inform the impact assessment and characterise the ecological environment, ELA conducted desktop analysis and field surveys in 2020 and 2022.

ELA (2025) conducted a risk assessment based on the ecological value, potential impact and risk magnitude of the Project on aquatic ecology, aquifer ecosystems and GDEs. The risk assessment was also used to identify management and mitigation measures.

6.2.5 Final void

i Pit lake recovery and water quality

The final void hydrology and salinity assessment for each final void was undertaken by Engeny (2026a) as part of the SWIA using GoldSim software. A final void water and salt balance model simulates inflows to the final voids (i.e. rainfall runoff, direct rainfall, seepage from backfilled areas and groundwater inflow from host rock) and outflows (i.e. evaporation).

The water and salt balance model used predictions of groundwater flux and pit lake level relationship from the groundwater model (EMM 2026c) and groundwater salinity observations from the geochemistry assessment (Egi 2022a). Based on the geochemical assessment (EGi 2022a), runoff and seepage from overburden is not expected to be acidic and should not contain significant metals concentrations. Therefore, long-term salinity is expected to be the main issue for pit lake water quality.

6.2.6 Climate change

The potential effects of climate change have been considered for:

- groundwater modelling of long-term effects
- performance of the operational WMS (through water balance modelling)
- flooding
- pit lake recovery.

Further discussion is provided within the water resources impact assessment.

6.2.7 Cumulative impacts

HVO is in an area where the surface water and groundwater environment has been highly modified by historical mining, industrial and agricultural activities over the past 70 years or so. Due to the dynamic nature of the regional hydrogeology, ongoing impacts associated with approved and historic mining will continue to affect groundwater levels and pressures, and connected surface water resources, irrespective of whether the Project occurs. Due to the minor changes to disturbance footprints as a result of the HVO North Action and HVO South Action, removal of coal extraction from Riverview South East Extension and South Lemington Pit 1 and 2 from the mine plan, and mainly restricting continued mining to deeper seams in previously mined areas, the potential incremental impact of the Project on water resources and water-dependent assets is expected to be minor.

Cumulative impacts are more relevant for groundwater resources and water-dependent assets, including the predicted cumulative change in groundwater levels in the alluvium due to historical approved and proposed mining in the HVO North Action Area and HVO South Action Area, which has the potential to affect receptors.

From a surface water perspective, as the Hunter River is a regulated system, the main potential cumulative impact pathway is related to changes in baseflow or river leakage through changes in groundwater levels. As such, the potential cumulative impact on streamflow has been informed by the groundwater modelling. The potential cumulative impact of licensed water discharge on the Hunter River water quality has been considered as part of the SWIA.

6.3 Surface water impact assessment

6.3.1 Introduction

Due to the integrated nature of the HVO Complex WMS, aspects of the SWIA have generally been considered together (for the HVO North Action and HVO South Action).

The following sections are a summary of the SWIA; further discussion is available in Appendix E.

6.3.2 Water management system performance

Water balance model results indicate that average inflows to the WMS are dominated by rainfall runoff (58% of the total inflow) while groundwater inflow is only a small contributor (5% of the total inflow). Hunter River extraction via HVO's existing high security WALs represents the main water source (10% of the total inflow on average). Even in very dry years, where the Project will have greater demand from the Hunter Regulated River, the water demand can be met via HVO's existing WAL entitlements.

The majority of water used on site is for coal processing (44% on average) and dust suppression (22% on average). Discharge via the HRSTS represents approximately 15% of the average outflows over the life of the Project.

The proposed WMS for the Project is predicted to maintain a sufficient water supply for the operation and discharge capacity to prevent flooding of operational areas of the mine, operating in accordance with existing EPL conditions. During very wet years (95th percentile) the Project utilises more than the average allowable discharge potential but still well below the release limits.

The WMS includes measures to control overflows from all water storages. For mine water storages, these overflows would typically be either into another storage/dam, or into a mining pit. In addition, mine water storages are designed and operated to safely manage the stormwater runoff generated by the 1% AEP 24-hour design storm event. Therefore, runoff generated from mining areas during rainfall events are expected to be contained on site, thereby minimising the risk of overflows and potential impacts to the environment.

The water balance model is used as a tool to identify risks to operational water management. HVO has appropriate management measures (including triggers) to avoid, minimise and manage risk of spills from the WMS to the environment.

Further discussion on potential overflows from the WMS is provided in Annexure B of Appendix E.

6.3.3 Streamflow impacts

The streamflow assessment (Engeny 2026a) indicates there will be minimal to no changes to the annual flow and average duration of dry periods for Hunter River and most of its tributaries. Only three ephemeral watercourses were found to have changes of 1% or more due to the Project:

- Unnamed Tributary 1 at HVO North: the average duration of dry periods within the representative "dry" year increased from 155 days to 163 days (5% increase) during operations, due to extending mining between the Mitchell Pit and Carrington Pit.
- Farrells Creek at HVO North: the average duration of dry periods within the representative "dry" year increased from 156 days to 159 days (2% increase) during operations.
- Bayswater Creek: the average duration of dry periods within the representative "dry" year increased from 144 days to 145 days (1% increase) during operations.

The predicted change in streamflow is negligible for the Hunter River and Wollombi Brook and minor for the ephemeral tributaries. Potential impacts on surface water downstream users, including basic landholder users will be negligible.

6.3.4 Surface water quality

i Overview

This section considers the following potential mechanisms for changes to surface water quality due to the Project:

- Overflow from the WMS during excess rainfall events: as discussed above, the WMS has been designed to control overflows from all water storages and runoff during large rainfall events are predicted to be contained on site. Therefore, the main potential for discharges from the HVO Complex to change surface water quality is through use of the HRSTS, which is discussed below.
- Construction of the new Lemington Road bridge at the Hunter River.
- Water discharge under HVO's existing HRSTS and EPL requirements.

ii Construction of new Lemington Road bridge at the Hunter River

There is the potential for increased erosion and sedimentation to the Hunter River during construction of new Hunter River bridge as part of Lemington Road realignment. This will be managed by the implementation of erosion and sediment control measures by the construction contractor in accordance with Blue Book Volumes 1 and 2 (Landcom 2004, DECC 2006) and HVO's Erosion and Sediment Control Protocol. Prior to construction, an Erosion and Sediment Control Plan will be developed to establish and maintain erosion and sediment control measures for the duration of works. This would typically include:

- upslope diversion drains to keep clean water runoff from flowing into active construction areas
- downslope measures, including sediment filter fences, or catch drains and sediment basins (where practical and/or required) to manage sediment-laden runoff generated by the construction activities

- monitoring and inspection requirements of erosion and sediment control devices
- staging plan for the installation (and removal) of any erosion and sediment controls tailored to the progression of construction.

When designed and implemented correctly, the potential for increased erosion and sedimentation to the Hunter River as well as potential impacts to the downstream water quality due to construction activities are expected to be minimal.

iii Licensed water discharge

All discharges from the HVO Complex are expected to occur under the HRSTS and existing EPL conditions. Under the HRSTS, releases can only occur during periods of high streamflow. The water balance model predicts the Project will, on average, utilise 19% to 52% of the average total allowable discharge opportunities during operations. The Project does not fully utilise the average allowable discharge opportunity as the operating rules established in the water balance model prevent releases from occurring when there are low inventories on site (Engeny 2026a).

The water balance modelling predicts that 78% of the time that release occur, flow in the Hunter River will be 100 times greater than the estimated median discharge volume. On 96% of release days, flow in the Hunter River is predicted to be 80 times greater than the calculated discharge volume.

Engeny (2026a) calculated the potential change to water quality in the Hunter River due to licensed discharge via the HRSTS, using the conservative dilution ratio of 80:1 (Hunter River flow 80 times larger than discharge volume). This calculation included observed water quality concentrations in the Hunter River upstream of the HVO Complex, which includes water quality effects from upstream mining discharges and other activities.

Following mixing, water quality concentrations in the Hunter River are generally predicted to remain below the observed 80th percentile background concentrations. The exceptions are listed in Table 6.1.

All mixed concentrations are predicted to remain below the 95th percentile background concentrations indicating that the expected water quality is within the existing natural range of the Hunter River.

Therefore, discharge under the HRSTS is not expected to have an adverse effect on surface water quality or social and environmental values.

Every 10 years a statutory review of the HRSTS is conducted, with the last being conducted between 2013 and 2016. The next review of the scheme is to be completed by 2026. Although the focus of the HRSTS is on managing salinity within the river, the 2013 *Hunter Catchment Salinity Assessment* (EPA) also considered how different analytes might have an influence on the ecological health of the river.

Table 6.1 Estimated change in water quality concentrations due to HRSTS discharge following mixing (Engeny 2026a)

Analyte	Mixed concentration (mg/L)[1]	Hunter River upstream 80th percentile concentration (mg/L)	Percent change relative to Hunter River upstream 80th percentile
TDS (mg/L)	544.8	531.2	2.6%
Potassium (K) (mg/L)	5.1	5.0	2.5%
Magnesium (Mg) (mg/L)	51.5	51.4	0.3%
Sodium (Na) (mg/L)	88.2	83.2	6.0%
Sulfate (SO_4) (mg/L)	46.3	42.4	9.2%

Analyte	Mixed concentration (mg/L)[1]	Hunter River upstream 80th percentile concentration (mg/L)	Percent change relative to Hunter River upstream 80th percentile
Total Alkalinity (mg/L)	261.1	259.2	0.7%
Bicarbonate Alkalinity (mg/L)	259.7	259.4	0.1%
Carbonate Alkalinity (mg/L)	1.8	1.0	81.5%

Notes: 1. 50th percentile release water

6.3.5 Flooding assessment

Key outcomes from the flood modelling (Engeny 2026a) are summarised in the sections below.

i Impacts to mine infrastructure

The flood modelling predicts the following flood immunity of key mine infrastructure:

- 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. During the later years of operations, HVO North will be exposed to a risk of flood ingress during Extreme Events (defined as four times the 1% AEP) via overtopping of the Carrington West Wing Levee.
- The final voids will have flood immunity up to and including the Extreme Event.

ii Impacts to public infrastructure

The main public infrastructure in the vicinity of the HVO Complex prone to flooding impacts is Lemington Road. Currently, Lemington Road at Moses Crossing becomes inundated during events smaller than 10% AEP and has been closed for an average of 60 days per year since 2010. The proposed realignment and new Hunter River bridge crossing of Lemington Road will significantly improve the flood immunity of this road adjacent to the Hunter River. The new Hunter River crossing will exceed 10% AEP flood immunity during the Project and post closure.

iii Impacts to third-party properties

The flood modelling indicates minor flooding impacts to properties not owned by the HVO JV partners. The Project is predicted to result in minor additional flood level changes ranging between 20 to 50 mm, but generally less than 30 mm, at 15 properties (being contiguous landholdings) not owned by the HVO JV. The impact is predicted to be minor, as the properties are already subject to flooding, and the maximum modelled change in flood affected area is estimated to be 0.15% of the total property for any individual property. In addition, the predicted change in flooding will not have an impact on the use of the land (agricultural (grazing and cropping) or Crown land).

iv Flood hazard and emergency management

There are no broad scale changes to flood hazard categories forecast due to the Project. Small changes in road inundation durations are predicted; however, the small changes are not expected to have an impact on use of the land or public safety or emergency management. Overall, there is a significant benefit to the local community through improved immunity of and access to the realigned Lemington Road.

v Climate change predictions

The 0.5% and 0.2% AEP design flood events are typically used as proxies for climate change. These proxies were validated using the Climate Futures Tool (CSIRO 2015).

A comparison of the flood extents between these events indicates that there is generally little difference in flood extent for the Hunter River in the vicinity of the Project for the climate change scenarios. The design event adopted for Project flood protection levees (0.1% AEP) exceeds the magnitude of events shown in the climate change assessment with additional freeboard allowance.

6.3.6 Channel stability

Predicted velocity impacts are generally localised around Project infrastructure (e.g. levees, Lemington Road realignment and new bridges). The magnitude of velocities in areas of impact generally remain within the existing ranges experienced and remain a low likelihood of causing scour (<2 metres per second (m/s)). No significant change to flood velocities is predicted on properties not owned by the HVO JV partners.

Regarding the new Hunter River bridge associated with Lemington Road realignment: attenuation of water behind the proposed new bridge is predicted by the flood model, which directs additional flows from the primary channel towards the flood breakout channel. The predicted change (0.4 m in the 10% AEP event) is localised and occurs within approximately 2 km of the bridge in the 10% AEP event (on mine-owned land).

At the Carrington West Wing levee (approved under the HVO North Consent at HVO North (designed up to 1% AEP)): the predicted velocity changes under the 5% AEP event (which is the most frequent event causing flood flows in the area) are unlikely to change the existing geomorphic regime, and would occur under the current approved design of the levee. Adjacent to the levee, the maximum velocity increase is approximately 1.5 m/s, which can be readily managed through incorporation of scour protection in the detailed design of the levee.

6.4 Groundwater impact assessment

6.4.1 Introduction

The potential impact of the Project on the groundwater regime has been assessed from an incremental (comparison between approved and proposed) and cumulative perspective (estimating the effects of historic approved, the Project and other planned mining activities).

To support the PERs, groundwater modelling has been undertaken to reflect the changes to the mine plan. The groundwater modelling uses the model developed by AGE (2022) and incorporates updates to the model parameterisation and simulated mining activities associated with the Project. The groundwater modelling for the Project builds upon many previous groundwater modelling efforts in the region, reflecting the extensive and ongoing mining in the region surrounding the HVO Complex.

The full results of the groundwater modelling approach and results are provided in the GMR (Annexure A to the WRIA).

6.4.2 Alluvial and watertable drawdown

i Incremental drawdown

Figure 6.1 shows the proportional likelihood of incremental drawdown in the alluvium exceeding 0.2 m irrespective of time. The 0.2 m threshold was chosen for the alluvium given it hosts ecological receptors (terrestrial GDEs and stygofauna).

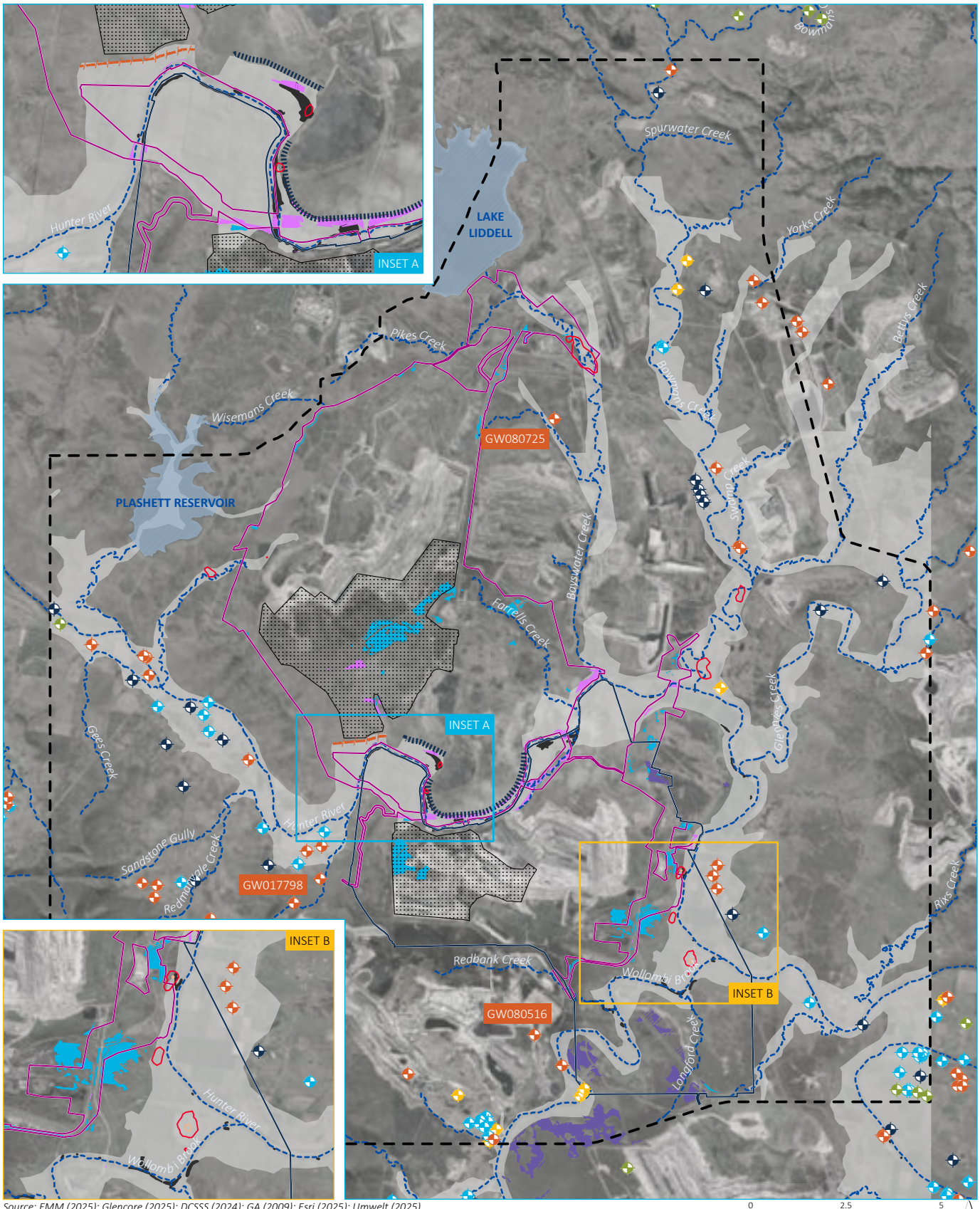
There is negligible incremental drawdown predicted across the groundwater study area, with small pockets where it is predicted that drawdown greater than 0.2 m is 'very unlikely' in the vicinity of the east and north-east of the Lemington Road realignment.

The Project is unlikely to cause additional significant impacts to the alluvium groundwater beyond what is currently approved.

Figure 6.2 shows the proportional likelihood of incremental drawdown in the watertable exceeding 2 m irrespective of time. The 2 m threshold was chosen for the watertable as this is the NSW *Aquifer Interference Policy 2012* (AIP) minimum impact threshold for third-party water supply bores, which may also be present outside of the alluvium.

Relative to the HVO North Action area, two bores were identified as having 'likely' or 'very likely' likelihood of watertable drawdown exceeding 2 m. However, one is a dewatering bore at Ravensworth Operations, owned by Glencore (GW080725) and the second is a stock bore on Wambo mine -owned land (GW017798).

The Project is not predicted to have a significant drawdown impact at third-party water supply bores.



Source: EMM (2025); Glencore (2025); DCSSS (2024); GA (2009); Esri (2025); Umwelt (2025)

0 2.5 5 km

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KEY

- HVO North Action Area
- HVO South Action Area
- Mining area
- Model domain
- Alluvial extent (modelled)
- Low permeability barrier wall
- Carrington West Wing LPBW

Existing environment

- Named watercourse
- Named waterbody

Likelihood of exceeding 0.2m drawdown

- Unlikely
- Very unlikely

Bore type

- Water supply
- Commercial and industrial
- Irrigation
- Stock and domestic
- Unknown

Plant community type (PCT) (Umwelt, 2025)

- PCT 4089 | Namoi-Upper Hunter River Red Gum Forest
- River Red Gum (HVO, 2025)

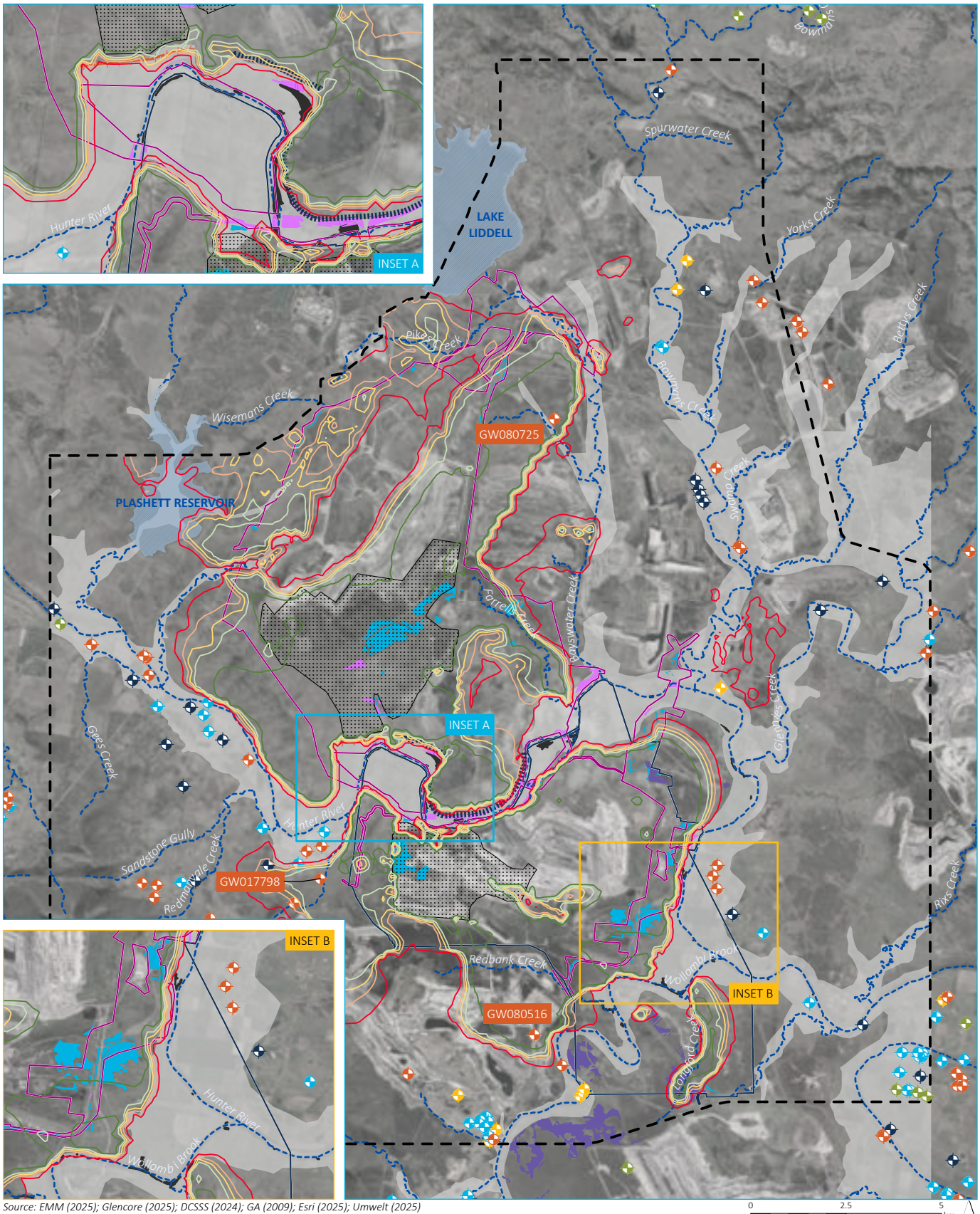
EPBC Act vegetation (Umwelt, 2025)

- Central Hunter Valley Eucalypt Forest and Woodland CEEC
- Warkworth Sands Woodland of the Hunter Valley CEEC
- Possible Warkworth Sands Woodland of the Hunter Valley CEEC

Proportional likelihood of exceeding 0.2 m incremental drawdown in alluvium irrespective of time

HVO Continuation Project
HVO North Public Environmental Report
Figure 6.1

EMM creating opportunities



Source: EMM (2025); Glencore (2025); DCSSS (2024); GA (2009); Esri (2025); Umwelt (2025)

0 2.5 5 km

GDA2020 MGA Zone 56

N

KEY

HVO North Action Area
HVO South Action Area
Mining area
Model domain
Alluvial extent (modelled)
Low permeability barrier wall
Carrington West Wing LPBW

Existing environment

Named watercourse
Named waterbody

Likelihood of exceeding 2m drawdown

Very likely
Likely
As likely as not
Unlikely
Very unlikely

Plant community type (PCT) (Umwelt, 2025)

PCT 4089 | Namoi-Upper Hunter River Red Gum Forest
River Red Gum (HVO, 2025)

EPBC Act vegetation (Umwelt, 2025)

Central Hunter Valley Eucalypt Forest and Woodland CEEC
Warkworth Sands Woodland of the Hunter Valley CEEC
Possible Warkworth Sands Woodland of the Hunter Valley CEEC

Bore type

Water supply
Commercial and industrial
Irrigation
Stock and domestic
Unknown

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Proportional likelihood of exceeding 2 m incremental drawdown in the watertable irrespective of time

HVO Continuation Project
HVO North Public Environmental Report
Figure 6.2

EMM creating opportunities

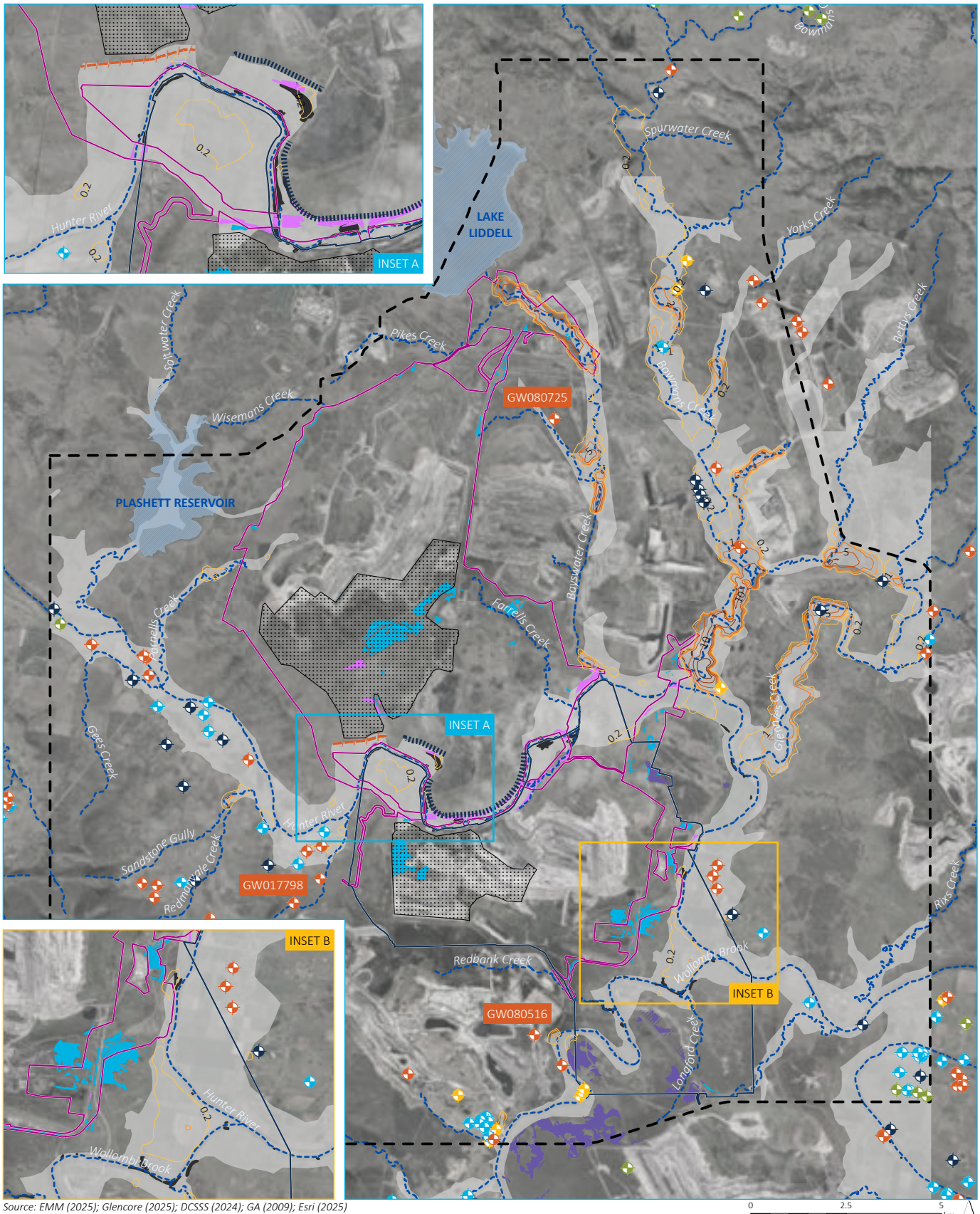
ii Cumulative drawdown

To meet the requirements of the AIP, the predicted cumulative drawdown was calculated by comparing the results of the updated model scenario (i.e. the Project) to a baseline scenario where simulated mining ceases after 2009 (which is when the Hunter Unregulated and Alluvial water sharing plan (WSP)), effectively allowing groundwater levels to recover in this baseline 2009 scenario. This represents a limitation in the groundwater modelling and the requirements of the AIP to estimate cumulative drawdown effects "post-WSP".

Figure 6.3 shows the maximum predicted cumulative drawdown in the alluvium irrespective of time (50th percentile, where it is as likely as not for cumulative drawdowns to be larger than the values predicted). This figure shows the drawdown predicted to occur due to the cumulative effect of historical approved and proposed mining at the HVO Complex and at other mining operations in the study area.

In and around the Project itself, the cumulative maximum drawdown predicted in the Hunter River alluvium (less than 0.2 m, Figure 6.3) south of the Carrington Pit is due to depressurisation of the Permian hydrostratigraphy and an associated downward vertical gradient between the alluvial watertable and the Permian potentiometric surface. The depressurisation is related to mining at HVO North and HVO South.

In the Wollombi Brook alluvium, a maximum cumulative drawdown of up to 1 m is predicted in the area above the historical Lemington underground mine (Figure 6.3). The coal seams intersected by Lemington underground mine subcrop under parts of the Wollombi Brook alluvium. Drawdown is predicted due to downward vertical gradients associated with historical mining and the simulated continued use of Lemington underground as a water storage for operational water use for the MTW mining operation (as approved). The drawdown is a cumulative impact and not due to the HVO North or HVO South Actions.



Source: EMM (2025); Glencore (2025); DCSSS (2024); GA (2009); Esri (2025)

0 2.5 5 km

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KEY

- HVO North Action Area
- HVO South Action Area
- Mining area
- Model domain
- Alluvial extent (modelled)
- Low permeability barrier wall
- Carrington West Wing LPBW

Existing environment

- Named watercourse
- Named waterbody

Modelled drawdown (m)

- 0.2
- 1
- 2
- 5
- 10
- 20

Plant community type (PCT) (Umwelt, 2025)

- PCT 4089 | Namoi-Upper Hunter River Red Gum Forest
- River Red Gum (HVO, 2025)

EPBC Act vegetation (Umwelt, 2025)

- Central Hunter Valley Eucalypt Forest and Woodland CEEC
- Warkworth Sands Woodland of the Hunter Valley CEEC
- Possible Warkworth Sands Woodland of the Hunter Valley CEEC

Bore type

- Water supply
- Commercial and industrial
- Irrigation
- Stock and domestic
- Unknown

Maximum predicted cumulative drawdown in alluvium irrespective of time (P50)

HVO Continuation Project
HVO North Public Environmental Report
Figure 6.3

EMM creating opportunities

6.4.3 Groundwater inflows

The groundwater model has been used to predict annual volumes of groundwater intercepted by mining at HVO North and HVO South.

The median predicted inflow volume is predicted to peak at approximately 3,400 megalitres per year (ML/yr) in 2039, which is below HVO's existing water licence entitlement in the Permian. The volume reduces when mining ceases at HVO South. Post mining, the groundwater model predicts the evaporative pumping effect of the pit lakes will stabilise at between about 1,600 ML/yr and 2,100 ML/yr and is within the entitlement held by HVO.

6.4.4 Groundwater quality

The Project has the potential for groundwater quality changes as a result of the following:

- Exposure of acid sulphate soils: The Soil and Land Resources Assessment Report (Appendix P to the EIS; Minesoils 2022) assessed the potential risk associated with acid sulphate soils. The HVO North Action Area does not contain any of the five acid sulphate classes listed on the NSW Acid Sulphate Soil Planning Map. Based on the land elevation and distance from the coast, in conjunction with existing mapping for NSW, the potential for acid sulphate soils is considered a very low risk. Further, there is no evidence of acid sulphate soils indicators such as soil gleying, odour, marine sediments and organic materials recorded as part of the soils survey. As such, acid sulphate soils are not considered further.

- Potential production of acid rock drainage and metalloid leachate during operations has been considered as part of the Geochemistry Assessment (EGi 2022a). The potential for acid rock drainage or metal leachate is low as most rejects generated by mining at the HVO Complex are likely to be non-acid forming (NAF). Although 15% of the rejects samples tested were potential acid forming (PAF), the thorough intermingling of rejects and overburden, and the excess acid neutralising capacity in the overburden, suggests that these bulk fill zones are unlikely to result in any significant acid rock drainage issues or effects on rehabilitation. Existing waste management practices will continue, which monitoring shows to be effective, where water quality within the mine water system is generally neutral to alkaline, and salinity up to 5,170 mg/L TDS.

- Seepage from backfilled emplacement areas to the alluvial watertable and Hunter River: The potential for seepage from mining areas backfilled dry emplacement areas to the alluvial watertable and Hunter River has been considered in this report using outcomes from the groundwater model, site observations and geochemical characteristics reported by EGi (2022a). There is no proposed change to waste management and pit backfill at HVO South or HVO North from the existing approved operation (including EPBC Approval). During mining, the floor of the pits will be deep and intercepted groundwater will be actively managed as part of the mine WMS. This will result in depressurisation of the Permian strata and development of a steep hydraulic gradient towards the pit areas. Therefore, the active mining areas will be groundwater sinks. Groundwater monitoring shows that groundwater levels in the rehabilitated Alluvial Lands area (at HVO North) are lower than the Hunter River alluvium, supporting the conceptual understanding and modelling results that the potential for the watertable in the backfilled pit areas to rise to a similar or higher elevation than the alluvium is unlikely. Therefore, the knowledge from existing mining operations and model predictions indicates potential for seepage to migrate towards the Hunter River alluvium is also very unlikely.

- Potential seepage from mine water dams to alluvium: HVO has been operating (and will continue to operate) the mine WMS in accordance with the approved water management plan, which includes segregating waters of different water quality (where practical). Seepage losses from out of pit storages and open cut pits are expected to be minor. In addition, potential seepage from the upgraded dams (including Parnells Dam) will be managed by an embankment filter, cut-off design and treatment of batters within the storages. Based on historical monitoring (including at dams in the mine WMS and bores in alluvium downgradient from existing dams), water management measures and proposed design, potential impacts to alluvial groundwater quality are expected to be minor. This is discussed further in Appendix E.

- Changes to groundwater salinity (e.g. freshening) in the Hunter River alluvial aquifer has been informed by observations from ongoing monitoring at the existing operation and consideration of change in groundwater flow directions predicted by groundwater modelling. The mechanism for local changes to groundwater salinity in the Hunter River alluvium (due to mining at HVO) relates to construction of the currently approved (but not yet constructed) Carrington West Wing LPBW across the western arm of the remnant paleochannel. The mine plan currently approved under the HVO North Consent includes mining coal below alluvium in the Carrington West Wing area. The proposed disturbance and removal of alluvial material in this area (for the HVO North Action) is consistent with the mine plan currently approved under the HVO North Consent. Monitoring in the Carrington Pit alluvium and Alluvial Lands remnant alluvium, shows salinity has been relatively stable, freshening slightly (but remaining within historical observed ranges) in some areas during periods of high rainfall and streamflow, such as that observed in 2020–2022. Based on current and historical measured groundwater salinity in the Carrington West Wing alluvial area and monitoring conducted in the Carrington Pit and Alluvial Lands alluvial areas, the potential for changes to alluvial groundwater salinity due to the HVO North Action is expected to be unlikely.

6.4.5 Potential impacts on water dependent ecosystems

i Groundwater dependent vegetation

This section is informed by surveys, discussions and technical assessment by ELA (2025), EMM (2026b) and Umwelt (2026a).

The following vegetation have been identified as potentially groundwater dependent vegetation in the study area:

- River red gum stands at Carrington Billabong, and along the Hunter River and Wollombi Brook, which also rely on river flooding for germination

- Central Hunter Valley Eucalypt Forest and Woodland CEEC which is discussed further below.

Vegetation surveys undertaken by Umwelt (2026a) identified that PCT 3431 – Central Hunter Ironbark Grassy Woodland conforms (or partially conforms) to the Central Hunter Valley Eucalypt Forest and Woodland CEEC at the HVO Complex. The Central Hunter Valley Eucalypt Forest and Woodland CEEC occurs in the Hunter Valley region on soils derived from Permian sedimentary bedrock.

Where the Central Hunter Valley Eucalypt Forest and Woodland CEEC is mapped (and outside the direct disturbance area) the depth to the watertable is greater than 20 m below ground level and therefore the vegetation stands are unlikely to access groundwater in these areas. The only pathway for impact on the Central Hunter Valley Eucalypt Forest and Woodland CEEC is due to ground disturbance rather than watertable drawdown.

Groundwater modelling predicts minor incremental drawdown in the Hunter River alluvium near the riparian river red gum stands (Figure 6.1) with drawdown greater than 0.2 m considered very unlikely and no dewatering of the alluvium is predicted. Potential downward gradient from the alluvial watertable to the Permian is buffered by the leakage from the Hunter River, which has controlled flow through releases from Glenbawn Dam.

Up to 0.2 m of cumulative alluvial drawdown (P50) is predicted in the Carrington Billabong and river red gum vegetation area (Figure 6.3). In the Wollombi Brook alluvium area, the predicted maximum cumulative alluvial drawdown ranges from 0.2 to 1 m (Figure 6.3).

Cumulative groundwater drawdown is predicted in an area of mapped Central Hunter Valley Eucalypt Forest and Woodland CEEC along Pikes Creek to the north (Figure 6.3); however, this is in the disturbance footprint for the HVLP and stockpile. Therefore, cumulative groundwater drawdown impacts do not apply as the vegetation is located within the Biodiversity Impact Assessment Area.

During periods of drawdown, river red gums and Central Hunter Ironbark Grassy Woodland vegetation 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. Therefore, river red gum stands will continue to rely on flooding for germination.

The river red gum community of the Hunter Valley is considered a threatened population under the NSW BC Act, but at HVO it is highly disturbed so is classified as having a moderate ecological value (using the GDE Assessment Guidelines). The Aquatic Ecology and GDE Assessment (ELA 2025) demonstrates that the predicted variation in the watertable will not prevent the long-term viability of the ecosystem and no significant impact on groundwater dependent vegetation is expected due to the Project.

ii Aquifer ecological communities

There is a good understanding of the stygofauna presence in the Hunter River (and tributary) alluvium due to many years of research and surveys. The Hunter River alluvium in the HVO North Action Area is a stygofauna habitat and hosts diverse stygofauna communities. As such, it is considered High Ecological Value. The stygofauna taxa within the HVO North Action Area are also known to be widespread throughout the Hunter Valley (ELA 2025).

a Potential drawdown impacts

The groundwater model predicts minor additional drawdown near the Carrington Billabong (very unlikely for alluvial drawdown to exceed 0.2 m (Figure 6.1). The cause of the drawdown relates to downward vertical gradients between the alluvial watertable and Permian potentiometric surface and extended mining period (compared to what is currently approved under the HVO North Consent).

The alluvial aquifer is predicted to remain saturated as downward leakage of water through the bed of the Hunter River will maintain aquifer saturation. Therefore, impacts from the HVO North Action on stygofauna communities are predicted to be minor.

The western arm of the paleochannel will be mined during the excavation of Carrington West Wing as part of approved operations. This will have an impact on the local stygofauna community in the paleochannel, as they will not be able to migrate out of the impact area prior to excavation. However, this impact is already approved as part of Carrington West Wing extension (MER 2010).

The risk to the stygofauna community associated with the HVO North Action is low because there will be no additional excavation in the alluvium beyond what is approved under the existing HVO North Consent. The cumulative impact (including that associated with the approved mine plan) to the stygofauna community in the paleochannel is high and is categorised in the GDE Risk Matrix as C (High Ecological Value, High Risk; ELA (2025)).

The aquatic ecology and GDE assessment demonstrates that the predicted watertable drawdown will not prevent the long-term viability of the ecosystem in the Hunter River alluvium in the HVO North Action Area, outside of the mining area. Therefore, it is predicted that the HVO North Action will not have a significant impact on stygofauna communities.

b Potential impacts from changing salinity

Historical monitoring shows the groundwater salinity of the Hunter River alluvium ranges from approximately 117 µS/cm to greater than 15,000 µS/cm. Hancock and Boulton (2008) note that the optimal salinity range for stygofauna is less than 5,000 µS/cm; however, stygofauna surveys at HVO has recorded stygofauna at bores with salinity up to 9,400 µS/cm, indicating stygofauna can tolerate higher salinities.

The mechanism for local changes to groundwater salinity in the Hunter River alluvium (due to mining at HVO) relates to construction of the currently approved (but not yet constructed) Carrington West Wing LPBW across the western arm of the remnant paleochannel. Monitoring at bores in the Hunter River alluvium near the Carrington barrier wall and Alluvial Lands barrier wall, shows salinity has been relatively stable since barrier wall installation, freshening slightly in some areas during periods of high rainfall and streamflow (but remaining within historical observed ranges).

Based on current and historical measured groundwater salinity in the Carrington West Wing alluvial area and monitoring conducted in the Carrington Pit and Alluvial Lands alluvial areas, the potential for changes to alluvial groundwater salinity due to the HVO North Action is expected to be unlikely. In addition, stygofauna has been collected from bores in the Hunter River alluvium where salinities range from approximately 800 to 9,400 µS/cm. Although the HVO North Action is unlikely to result in changes to alluvial salinity in the undisturbed alluvium, any potential changes will not have a detrimental impact on stygofauna communities given the large observed tolerance range to local groundwater salinity.

The HVO North Action is not expected to have a significant impact on stygofauna communities.

6.4.6 Aquatic ecology

Some species of fish living in the Hunter River require access to estuarine reaches to spawn. Such species of fish could be impacted if river levels reduce to an extent where this migration is impaired for long periods of time. Flow in the Hunter Regulated River is maintained and dominated by releases from Glenbawn Dam and inflow from tributaries, rather than from contribution from groundwater. The results of the streamflow analysis show minor to negligible change in streamflow and duration of dry days due to the HVO North Action.

The findings of the aquatic ecology and GDE assessment is that there will be no additional impact to aquatic ecology in the Hunter River, and only minor impacts to the aquatic ecology in the Hunter River tributaries due to the HVO North Action.

6.5 Final void assessment

6.5.1 Introduction

When the final landform is achieved, all operations will be complete, and the disturbance areas will be rehabilitated. The final landform will result in two voids at HVO North and a single void at HVO South.

In comparison to the approved operation, at HVO North there is a reduction from three final voids (at West Pit, Mitchell Pit and Carrington Pit) to two voids (Mitchell Pit and Carrington Pit).

The voids have been designed to remain long-term sinks. Drainage systems will be established on rehabilitated overburden emplacement areas, as well as around the perimeter of the final voids to divert upstream catchment runoff away from the final voids and to downstream watercourses. As such, the final landform design minimises capture of surface water and thereby limits long-term impacts on streamflow.

Table 6.2 provides a comparison of the catchment areas of the approved final voids at HVO North and the catchment areas of the proposed (indicative) final voids. It shows the proposed final landform will result in an increase in catchment area reporting to the HVO North final voids, in comparison to the current approved final landform. However, an overall decrease in catchment area reporting to the voids across the HVO Complex will occur due to a reduction in catchment area reporting to the HVO South final void.

Table 6.2 Comparison of approved and proposed (indicative) final void catchment areas

Proposed void	Approved void	Catchment area of approved void (ha)	Catchment area of proposed void (ha)	Change in catchment area (ha)
HVO North	West Pit	497 [1]	706	+55
	Mitchell Pit	154 [2]		
	Carrington Pit	120 [3]	324	+204
	Combined total	**771**	**1,030**	**+259**

Notes: 1. HVO North West Pit EIS (MER 2003)

2. Calculated

3. HVO North Mod 3 (Carrington West Wing) (MER 2010).

6.5.2 Final pit lake recovery

Given the proximity of the HVO North and HVO South voids to each other and the likely groundwater connection through the Permian between the voids, the final void hydrology and salinity modelling used inputs from the groundwater model where both voids were simulated on the same scenario. The results of the final void hydrology and salinity modelling base case (i.e. most likely scenario) are presented for HVO North (Mitchell Pit) and Carrington Pit in Figure 6.4 and Figure 6.5, respectively.

The HVO North Void (Mitchell Pit Void) pit lake level is predicted to reach an equilibrium level of approximately -18 metres Australian Height Datum (mAHD) after approximately 600 years, which results in a freeboard of approximately 100 m. For the Carrington Pit Void the model predicted a long-term pit lake level of approximately 42 mAHD (within 100 years post closure), resulting in a freeboard of approximately 14 m.

Consistent with existing approved operation, the HVO North Void will act as a strong sink, stronger than the current approved voids at HVO North.

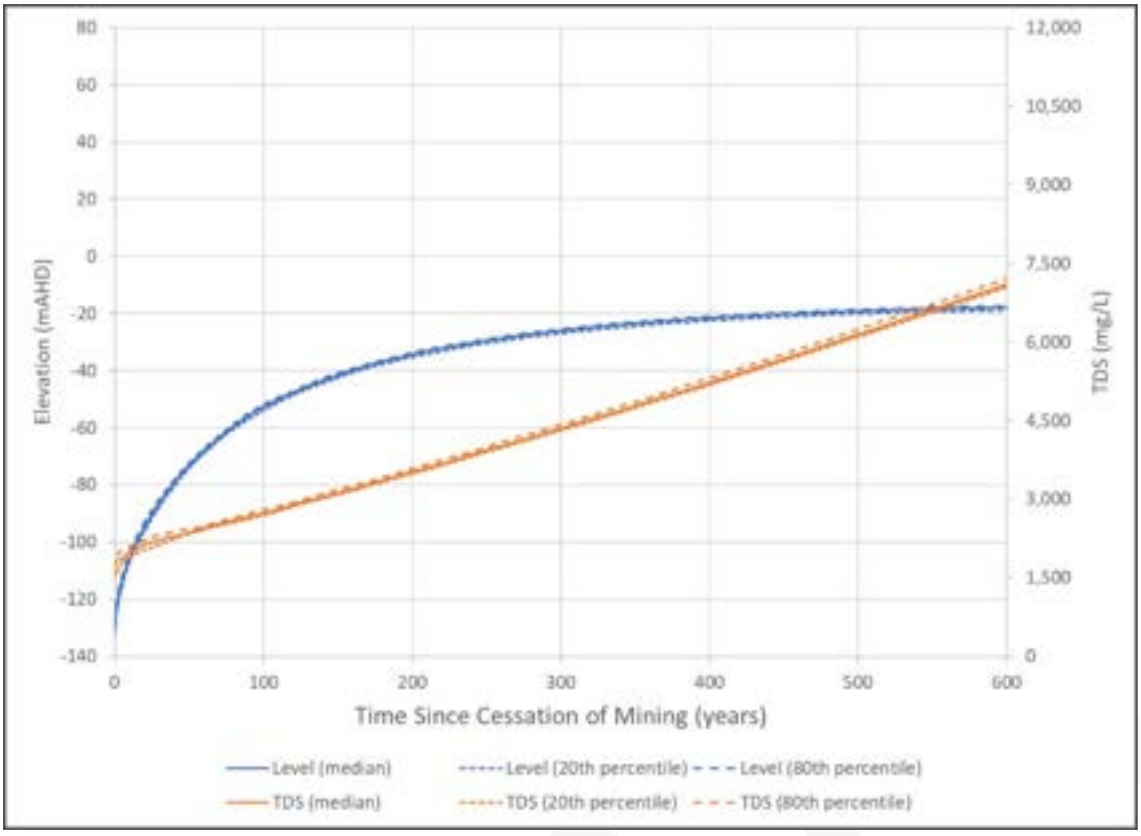


Figure 6.4 **HVO North – North Void pit lake recovery and salinity (Engeny 2026a)**

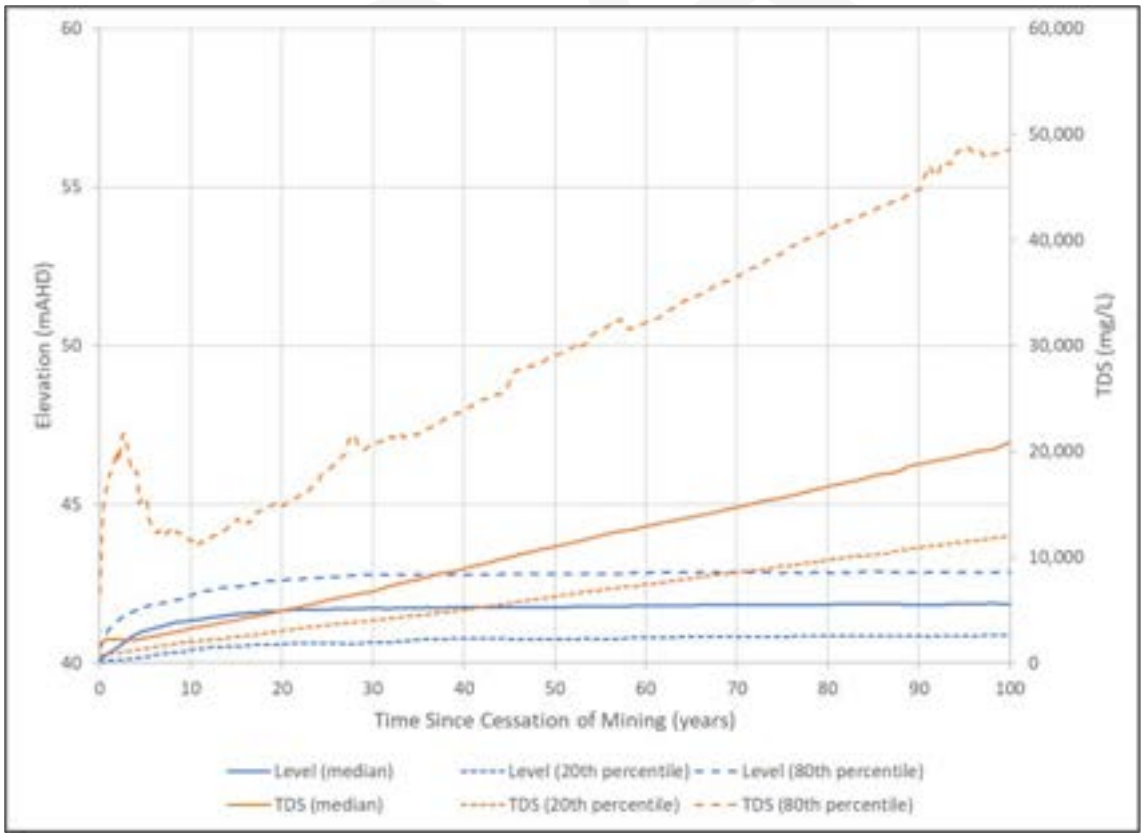


Figure 6.5 **HVO North – Carrington Pit Void pit lake recovery and salinity (Engeny 2026a)**

6.5.3 Post closure groundwater levels and flow direction

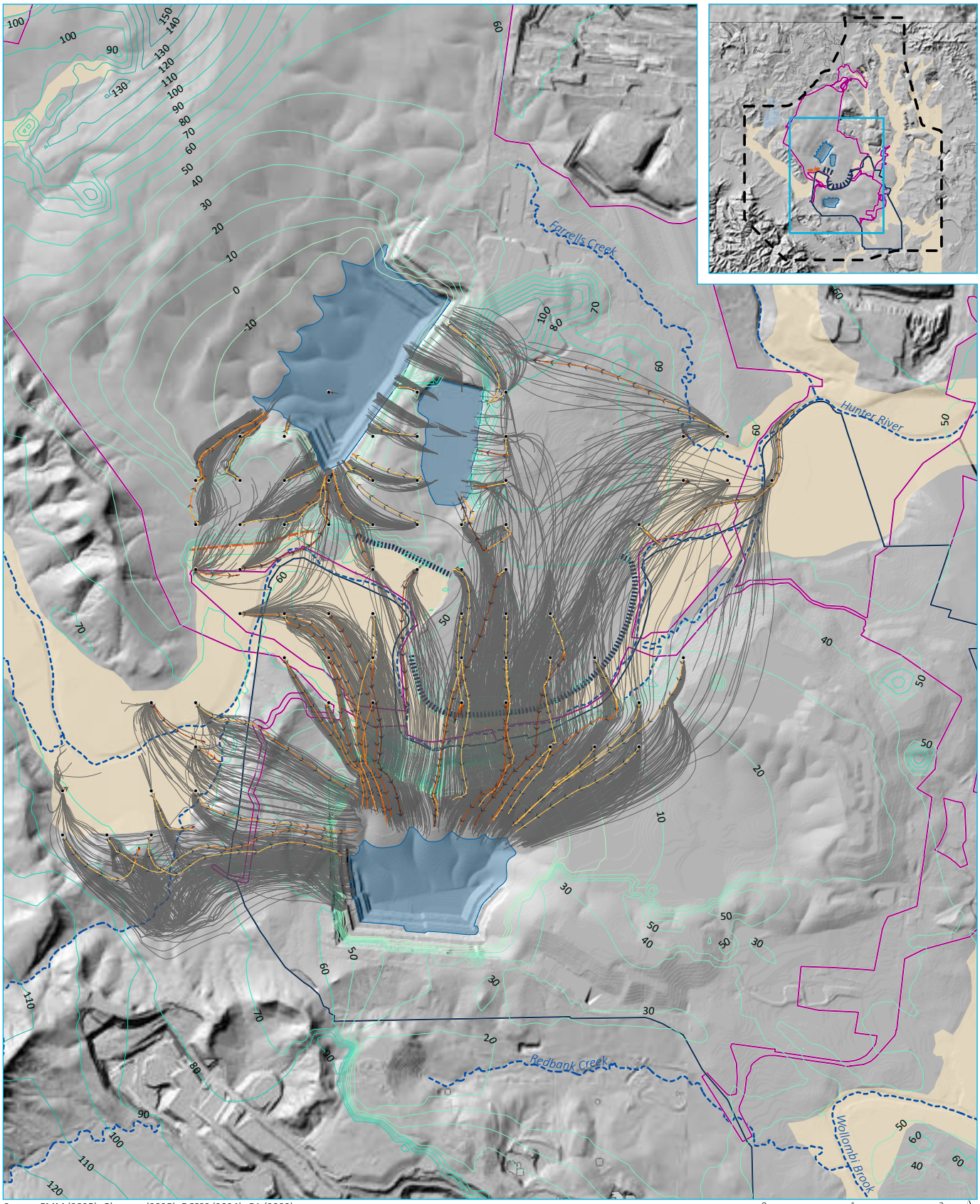
The groundwater model (EMM 2026c) predicted recovery within the groundwater flow regime over a period of 1,000 years, simulating the pit lake recovery predicted by the final void hydrology model (Engeny 2026a).

The groundwater model was used to predict groundwater flow movement over time (particle tracking), focusing on:

- watertable recovery and groundwater flow direction in backfilled emplacement areas to evaluate the potential for groundwater to seep from these backfilled areas towards the alluvium and Hunter River
- the watertable in the Hunter River alluvium to evaluate groundwater flow direction and interaction with the voids long-term.

The simulated watertable at 1,000 years after closure and tracking of groundwater flow is presented in Figure 6.6 (noting that the groundwater movement is lateral / horizontal and vertical).

The groundwater modelling results confirm the conceptual understanding that the HVO North Void (Mitchell Void) and HVO South Void will act as regional groundwater sinks, with groundwater flow directions towards the pit lakes.



Source: EMM (2025); Glencore (2025); DCSSS (2024); GA (2009)

0 1 2 km

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N

KEY

- HVO North Action Area
- HVO South Action Area
- Model domain
- Alluvial extent (modelled)
- Long-term pit lake
- Carrington West Wing LPBW
- Low permeability barrier wall
- Particle tracking (ensemble)
- Direction of travel
- Particle starting location

Year 2996 modelled watertable (mAHD)

- <-100
- -100 to-50
- -50 to 0
- 0 to 50
- 50 to 75
- 75 to 100
- 100 to 125
- 125 to 150
- 150 to 200
- > 200

Base realisation particle travel time (years)

- < 100
- 100 to 250
- 250 to 500
- 500 to 750
- 750 to 1000
- 1000 to 1500
- > 1500

Existing environment

- Named watercourse
- Named waterbody

Post mining watertable and particle tracking

HVO Continuation Project
HVO North Public Environmental Report
Figure 6.6

EMM creating opportunities

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6.5.4 Potential impacts on water-dependent assets

Due to the significant depth of the final voids, the groundwater flux is predicted to remain into the voids and the lakes will act as groundwater sinks with no risk of overflows to the surface environment.

Given the depth and change from three voids to two voids, the HVO North voids will act as stronger sinks than the currently approved voids.

Post mining, potential alluvial drawdown is not predicted to have a significant impact on GDEs or surface water due to existing and approved LPBWs (as per the existing HVO North Consent), ongoing long-term water licensing requirement from HVO's entitlements (to offset potential streamflow losses), and continued ongoing recharge to the alluvium from the Hunter Regulated River. River red gums and other 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 stands will continue to rely on flooding for germination.

The surface water, groundwater, aquatic ecology and GDE assessments demonstrate the proposed final voids are not predicted to have a significant impact on water resources and water-dependent assets.

6.5.5 Water quality

i Overview

To meet the Project objectives to balance economic, environmental and social benefits, the landform has been designed to minimise the catchment reporting to the proposed voids. The runoff area contributing to the voids is sufficiently small so that evaporation dominates, and the voids remain as strong long-term groundwater sinks.

After mining, the pit lake water will concentrate salts and become more saline over time due to evaporative losses. The following summarises the outcomes of the predicted lake chemistry at 1,000 years after mining from hydrogeochemical pit lake modelling completed by EGi (2022b) and Engeny's pit lake modelling (Engeny 2026b):

- the pit lake will be alkaline and brackish
- the salinity (TDS) will range from 3,000 to 9,000 mg/L
- the dominant soluble salts will be sulphate, chloride and sodium
- there could also be slightly elevated concentrations (i.e. 0.1 to 1 mg/L) of some elements, including aluminium, boron, barium, manganese, nickel, selenium, and zinc, but other environmentally important metals and metalloids are predicted to occur at trace concentrations only.

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).

ii Potential water quality impacts

The predicted increasing salinity will not pose a risk to highly connected surface water sources, shallow groundwater or associated receptors, as:

- there is negligible risk of spilling from the pit lakes to the surface water environment
- the pit lake level will remain below the base of the alluvium and base of weathering
- the voids will remain permanent sinks, creating a hydraulic gradient from the backfilled mine areas towards the void.

The findings of the surface water and groundwater assessments demonstrate the potential impact of the HVO North Action on water quality is not significant and the HVO North Action is not predicted to impact the environmental, social and cultural value of the alluvial groundwater or connected surface water sources.

6.5.6 Climate change

The results of the final void hydrology model climate change scenarios suggest that in all but one of the climate change scenarios, the pit lake levels are predicted to be lower than in the base case and the salinity (TDS) is generally higher. The exception is the "RCP8.5 Higher" scenario that predicts higher pit lake levels and lower salinity in all final voids. Even in this scenario, the final voids are predicted to remain groundwater sinks.

A climate change groundwater model scenario was also conducted as part of the groundwater modelling (EMM 2026c), simulating a scalar decrease to recharge and increase to potential evapotranspiration for the predictive period, representing a conservative "RCP8.5 Climate" scenario. The outcomes of the modelling show little difference in alluvial drawdown.

6.6 Water resource impact avoidance and management

6.6.1 Avoidance

The HVO North Action considers a design that avoids and minimises impacts to water resources and water dependent assets, including:

- realignment of Lemington Road and improving flood immunity at the new proposed Hunter River crossing
- establishment of the Mitchell East Levee to provide flood protection for the main HVO North final void
- mainly limiting disturbance to previously disturbed or approved areas, thereby avoiding disturbing new catchments
- construction of the Carrington West Wing LPBW prior to mining within 100 m of the remnant western arm of the paleochannel (as approved under the HVO North Consent)
- continued operation of the existing WMS, including preferential use of sediment-laden and mine water over extraction from the Hunter River
- operating in accordance with the requirements of EPL 640 and WALs.

6.6.2 Appropriateness of the Carrington West Wing LPBW as a mitigation measure

As noted by Timms et al (2013), low permeability barriers are being used across Australia and internationally to limit impacts of open cut mining on sensitive water resources (such as a creek or river).

Timms et al (2013) conducted a study on LPBWs used in mining across Australia and internationally, including the different types of barrier wall types, design and construction. The study lists the importance of the following:

- Characterisation of site conditions: Extensive drilling and hydrogeological characterisation of the paleochannel area has been conducted as part of earlier investigations and assessments (MER 2003, 2010). Additional drilling will be conducted to install additional monitoring bores, as agreed and approved by relevant NSW Government agencies (discussed further below).

- Design considerations, considering preferential pathways such as through fractured and weathered rock; hydraulic, geomorphic and seismic stability; risk from blasting; and the bentonite/grout/clay/slurry mix. The aspects will be considered as part of the LPBW design, also meeting the requirements of the NSW Government and as listed in the existing HVO North Consent.

- Construction, with consideration of Australian Standard 3798-2007 and site-specific quality assurance and quality control measures.

- Testing and monitoring (before, during and after construction), including consideration of maintenance, and possibly repair, that may be required through the mine life, and post closure of the site. This is discussed further below.

HVO has successfully constructed two LPBWs at the HVO Complex (Alluvial Lands in 1996 and Carrington Pit in 2010) in accordance with design requirements by the NSW Government, with design and construction by appropriately qualified and experienced engineers.

The existing HVO North Consent lists specific design requirements for the Carrington West Wing LPBW. Consistent with the approaches for the Carrington and Alluvial Lands LPBWs, the Carrington West Wing LPBW will be conservatively designed, through consultation with relevant NSW Government agencies, and constructed to meet the consent requirements.

Historical monitoring in the Carrington Pit alluvium and Alluvial Lands remnant alluvium (near the existing LPBWs), shows groundwater levels and salinity have been relatively stable, except following high rainfall and/or streamflow events when levels fluctuate due to infiltration or interaction with the Hunter River. There is no indication of deterioration of either LPBW.

The proposed Carrington West Wing LPBW is an accepted, industry standard, engineered mitigation approach.

The following sections discuss the proposed monitoring and management plans associated with the Carrington West Wing LPBW, and other management and monitoring strategies.

6.6.3 Management strategies

i Water management strategy

During operations, water will continue to be managed in accordance with the existing water management objectives to minimise fresh water usage, impacts on the environment and neighbours to the HVO Complex, and interference to mining production.

This will be achieved through the Project design features, including:

- minimising clean water take via through the construction of the Mitchell clean water diversion

- extension of existing WMS including the construction of flood levees to provide flood protection to mine workings during operations and immunity up to and including the Extreme Event for the residual pit lakes at closure, including the North Void TSF Levee 2 (southern levee).

Design of the WMS components will, during the detailed design stages, consider future increases in rainfall intensities associated with climate change. Any changes to government guidance will be incorporated, as required, into detail designs for construction of new WMS components as well as augmentation/management changes for existing WMS components.

Post mining, a key objective of the closure WMS is to limit runoff to the voids. Drainage lines will be compatible with the surrounding drainage network and will direct upstream catchment runoff towards downstream watercourses, including the Hunter River.

In addition, the Carrington West Wing Levee will be decommissioned and incorporated into the final landform at closure to reinstate floodplain storage in this area.

Mitchell East Levee will be established/incorporated into the final landform to provide flood protection for the HVO North Void.

As part of closure planning, HVO will also undertake further detailed analysis and hydrogeochemical modelling to evaluate the final void water quality and any actions that could improve final void water quality (e.g. post mining beneficial uses).

ii Mine material management

HVO has developed a geochemical sampling program, which involves the continued retrieval and analysis of cores from across the HVO Complex. It is anticipated that all key lithological units (including coal seams) will be identified and analysed as part of this ongoing sampling and analysis campaign. However, until this is complete a conservative approach that assumes a classification of PAF for all coal seam materials is being implemented, and the material managed accordingly.

The following provides a summary of the water-related recommendations in the geochemical assessment (EGi 2022a):

- Operational blending of NAF and PAF overburden/interburden together with the excess alkaline leachate from NAF materials prevent acid rock drainage and water quality impacts from PAF materials for the bulk of the waste rock dumps.
- Continued monitoring of the mine water system for indicators of acid mine drainage.
- Tailings will be deposited either below the base of weathering and alluvium, if present, or a seepage assessment will be undertaken to prevent the seepage to water resources and overtopping prior to depositing above the base of weathering. In addition, tailings areas will be capped and designed to be free draining, limiting the potential for water ponding.

Overall, with the above management strategies implemented, the Project is expected to present a low risk with respect to acid rock drainage and metal leaching. The key focus of materials management will be to exclude any potentially problematic materials from the near surface region of overburden/interburden dumps and TSF capping layers, and control upward migration of salts to prevent impacts on rehabilitation. This will be readily achievable given the overall low proportion of problematic materials.

iii Erosion and sediment control measures

All sediment dams are sized based on the HVO Erosion and Sediment Control Protocol and *Managing Urban Stormwater: Soils and Construction* (Blue Book) (Landcom 2004).

Consistent with existing management and mitigation measures, HVO will implement erosion and sediment control measures:

- during construction, and design of scour protection measures during detailed design phase
- where works are within the areas defined as waterfront land (i.e. the bed of a watercourse and the land on each side within 40 m of the bank), to minimise the impact of the works on the watercourse and adjoining land.

During operations, erosion and sediment control will continue to be undertaken in accordance with the Erosion and Sediment Control Plan which forms part of the WMP.

iv River red gum health monitoring and management

Mitigation measures for the river red gum stands at the Carrington Billabong and along the Hunter River are given in detail in the *River Red Gum Rehabilitation and Restoration Strategy*. Restoration and rehabilitation strategies will be continued and adapted as required over the life of the Project. Current controls focus on terrestrial aspects of the river red gum communities, rather than on groundwater, and include the following:

- Fencing and stock access control: establish and maintain fencing to exclude stock and support the expansion of the vegetation over time.
- Passive regeneration: passive regeneration actions will be carried out to support the natural recruitment of river red gum stands. This includes removal of stock, restriction of access by stock, vehicles and people, weeding and control of feral animals.
- Assisted revegetation: assisted regeneration is necessary to establish a diverse, native understorey and groundcover in the river red gum vegetated area. This includes supplementary planting of native grasses, forbs and shrubs tubestock and seeds. It may also include ripping the soil and weed control.
- Weed and pest control: implementation of an appropriate weed and pest control program, with selection of targeted species informed by the results of ecological monitoring.
- Ecological Monitoring: design and implement an updated ecological monitoring program that will assess the success of the rehabilitation and restoration strategy going forward, as well as inform ongoing management actions.

6.6.4 Management plans

i Water management plan

Following approval of the Project, if granted, the WMP would be updated to address the new NSW and Commonwealth approval conditions in consultation with the relevant NSW Government and Commonwealth agencies. The updated WMP would 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 LPBW
- 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.

Trigger Action Response Plans (TARPs) which define contingency plans and remedial measures, will be reviewed as part of the update to the approved WMP.

Performance criteria are detailed in the approved WMP, and HVO has developed the following performance indicators to initiate site specific investigations regarding groundwater levels and quality:

- Professional judgement determines that the single deviation or a developing trend could result in environmental harm.
- Three consecutive measurements of EC, pH or groundwater level exceed trigger values.

The primary objective of trigger levels is to provide an early indication of potential impacts to receptors and initiate a management response. They are not intended to be an instrument to assess 'compliance' and should not be used in this capacity (ANZG 2018).

The outcomes of the investigation are reported in the Annual Review.

ii Low permeability barrier monitoring and management plan

In accordance with condition 25 of the existing HVO North Consent, HVO will develop a low permeability barrier monitoring and management plan (LPBMMP) following Project approval, if granted, and in consultation with NSW Government.

The LPBMMP would include the following:

- Identification and design of dedicated groundwater monitoring bores in the area shown on Figure 6.7 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 LPBW.
- Additional monitoring requirements to inform stability and effectiveness of the LPBW following construction.
- Identification and design of piezometers to be installed downstream of the Carrington West Wing LPBW during construction.
- Summary of the Carrington West Wing LPBW 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 LPBW 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 GDEs (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 LPBW area will be reviewed as baseline data is collected (ahead of mining in the remnant paleochannel). 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.

6.6.5 Monitoring program

i Water take

HVO is committed to comply with the rules of the applicable WSPs, Acts, regulations and associated policies. Methods for measuring and metering water take will be included in the updated WMP for the Project. This will include for example, commitment to continue to meter pumped transfer between storages and pumped volumes from the open cut pits. Where interception of water cannot be practically metered, HVO will use monitoring data and modelling to predict and report take.

ii Surface water quality

HVO has a comprehensive existing water quality monitoring program in accordance with the approved WMP. This program is suitable for ongoing use to monitor the performance of the WMS and initiate investigations and corrective actions if required.

The surface water monitoring program covers all three water category areas within the HVO Complex (i.e. clean, sediment and mine water systems). The program will continue in accordance with the approved WMP. Following approval of the Project, HVO will implement increased frequency of comprehensive analysis from annually to six monthly for all sites.

As documented in the WMP, HVO uses the following performance indicators to initiate site specific investigations regarding surface water quality:

- professional judgement to determine that the single deviation or a developing trend could result in environmental harm
- three consecutive measurements of EC or pH exceed trigger values
- one measurement of TSS exceeds the trigger value.

A summary of the surface water monitoring results will continue to be provided in the HVO Annual Review, as required under the development consents. In addition, any significant findings regarding the implementation of the WMP will be reported in the Annual Review and will document reviews and feedback relating to the maintenance and performance of the WMS.

iii Groundwater

HVO has an established substantial groundwater monitoring network to monitor groundwater levels/pressures and quality at the HVO Complex as detailed in the WMP). The WMP describes groundwater monitoring requirements for evaluating:

- water take from water sources
- effectiveness of the LPBWs
- impacts on privately-owned bores

- impacts on water-dependent assets
- seepage/leachate from water storages
- Alluvial Lands area management
- validation of the groundwater model.

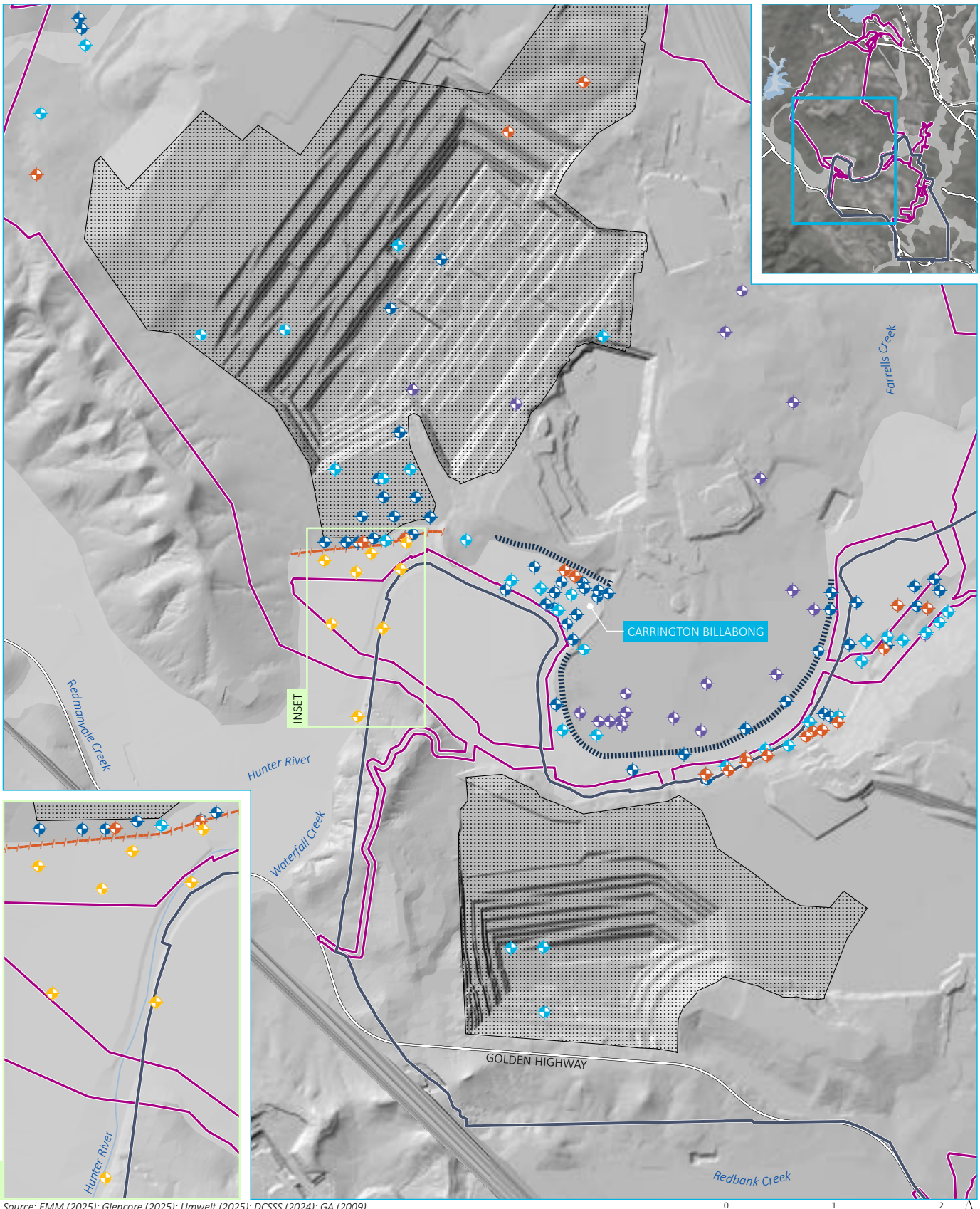
Additional monitoring bores (to augment the existing monitoring network) will be installed in the Hunter River alluvium south of the Carrington West Wing LPBW to monitor for potential impacts in this area (Figure 6.7). The bores will be installed approximately one year prior to mining commences in the remnant paleochannel to allow collection of background groundwater level trends prior to the effects of mining.

Further discussion on groundwater monitoring is provided in Appendix E.

iv Stygofauna monitoring

Prior to mining commencing in the western arm of the paleochannel at HVO North, HVO will conduct additional stygofauna sampling at the proposed additional groundwater monitoring bores shown in Figure 6.7 and at existing groundwater monitoring within the Hunter River alluvium, in the Carrington West Wing area. This will allow collection of additional baseline data, both within the impact area and upstream of impact areas.

A stygofauna monitoring program will be incorporated into the groundwater monitoring program, which will be described in the updated WMP that will be developed through consultation and with approval from relevant government authorities.



Source: EMM (2025); Glencore (2025); Umwelt (2025); DCSSS (2024); GA (2009)

0 1 2 km

GDA2020 MGA Zone 56

N

KEY

- HVO North Action Area
- HVO South Action Area
- Mining area
- Alluvial extent (modelled)
- Existing low permeability barrier wall
- Carrington West Wing LPBW

Existing environment

- Rail line
- Major road
- Named watercourse
- Proposed monitoring bore

Existing groundwater monitoring location (HVO)

Lithology

- Alluvium
- Spoil
- Regolith

Permian

- Coal seam
- Interburden

Proposed additional groundwater monitoring – Carrington West Wing area

HVO Continuation Project
HVO North Public Environmental Report
Figure 6.7

EMM creating opportunities

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6.6.6 Groundwater model validation

Continuous improvements to the groundwater 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 based on evaluation of groundwater monitoring data and findings of impact verification.

6.7 Conclusion

The water impact assessments for the Project, including groundwater, surface water, aquatic ecology and GDE studies, considered potential impacts on water resources and water-dependent assets that could result from the Project during operations and after closure.

We acknowledge that sections 24D and 24E of the EPBC Act are controlling provisions of the Action. However, the further detailed assessments that have been carried out for the purposes of the PER, in addition to the avoidance and mitigation measures considered as part of this PER has enabled conclusions to be drawn that the Action will not in fact have a significant impact on any water resource.

The assessments show the Project can operate within and meet the requirements of the water regulatory framework. Key results are summarised below.

6.7.1 Surface water impacts

The potential impact of the Project on surface water resources and aquatic ecology is insignificant. The key outcomes of the SWIA and aquatic ecology assessment are summarised as follows:

- Impacts on Hunter River and Wollombi Brook streamflow will be negligible.
- Minor changes in streamflow are predicted for three ephemeral watercourses during operations. The predicted change in streamflow will have a minor impact on the number of dry days, as many of these ephemeral watercourses are dry (on average) for more than half of the year under current conditions. Post mining, potential streamflow impacts are expected to be negligible.
- Potential impacts on surface water downstream users will be negligible as no changes in streamflow regimes are predicted in the Hunter River, given it is a regulated system and HVO hold sufficient entitlement for the predicted reduction in streamflow due to the Project.
- No impacts are predicted on the aquatic ecology of the Hunter River, particularly as flow will be mitigated through regulated releases from Glenbawn Dam, and only minor impacts to the aquatic ecology in the tributaries to the Hunter River are expected.
- The proposed WMS for the Project is predicted to maintain a sufficient water supply for the operation and discharge capacity to preventing flooding of operational areas of the mine.

- Potential impacts on surface water quality are expected to be minimal and will continue to be mitigated through an appropriately sized, designed and operated WMS, including release from sediment dams in accordance with their design and discharge of mine water in accordance with approved EPL requirement. Modelling indicates that the impact of approved HRSTS discharges will have a negligible impact on water quality. Concentrations of key analytes are predicted to remain within the existing ranges observed in the Hunter River.

- The flood modelling for the Project indicates no impact on the use of the land (grazing and cropping or Crown land).

- The proposed realignment of Lemington Road will significantly improve flood immunity of this road adjacent to the Hunter River.

- The Project is not predicted to change the flood hazard categories, or have an impact on use of the land, public safety or emergency management.

- Changes in velocity are presented to be localised around Project infrastructure and will remain within the existing ranges experienced, with a low likelihood of causing scour.

6.7.2 Groundwater impacts

Key outcomes of the groundwater impact assessment and GDE assessment are summarised as follows:

- Potential groundwater level drawdown impacts at third-party water supply bores are predicted to be negligible.

- The proposed HVO North Action and HVO South Action are predicted to result in minor increased drawdown in the alluvial aquifer(s), as mining will largely occur in areas previously mined or approved for mining under the existing approvals (e.g. Carrington West Wing area). In addition, construction of the approved (but not yet constructed) Carrington West Wing LPBW will be an effective mitigation measure to limit 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. In addition, a LPBMMP will be developed, including development of TARPs, identifying mitigation measures to manage potential unexpected effects.

- Minimal drawdown (less than 0.2 m) is predicted in the Hunter River alluvium near mapped river red gum stands in the Carrington Billabong and dewatering will not occur. This predicted drawdown will be buffered by leakage through the riverbed. Therefore, no significant impact in ecological receptors is predicted.

- The potential for acid rock drainage or metal leachate is low as the majority of rejects generated by mining at the HVO Complex are likely to be NAF. Thorough intermingling of rejects and overburden, and the excess acid neutralising capacity in the overburden, suggests that emplacement areas are unlikely to result in any significant acid rock drainage issues or effects on rehabilitation.

- The potential for seepage from backfilled mining areas to the alluvial watertable and Hunter River is very unlikely because:

    - there is no proposed change to waste management and pit backfill at HVO South or HVO North from the existing approved operation

    - during mining, the floor of the pit will be deep and intercepted groundwater will be actively managed as part of the mine WMS, resulting in depressurisation of the Permian strata and development of a steep hydraulic gradient towards the pit area. Therefore, the active mining areas will be groundwater sinks

- groundwater monitoring shows that groundwater levels in the rehabilitated Alluvial Lands area (at HVO North) are lower than the Hunter River alluvium, supporting the conceptual understanding and modelling results that the potential for the watertable in the backfilled pit areas to rise to a similar or higher elevation than the alluvium is unlikely.

- Seepage losses from out of pit storages and open cut pits are expected to be minor. In addition, potential seepage from the upgraded dams (including Parnells Dam) will be managed by an embankment filter, cut-off design and treatment of batters within the storages.

- Potential for seepage from tailings areas to alluvial (or other shallow) groundwater systems is unlikely, as tailings will be stored in pit areas and the main voids will act as groundwater sinks.

- No changes to the environmental, community and cultural values are predicted.

6.7.3 Final void

Key outcomes of the final void assessment are as follows:

- the predicted long-term watertable and pit lake level will be depressed, with groundwater flow directions towards the HVO North Void and HVO South Void

- 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, 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 long-term pit lake levels are 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 to the environment is negligible

- the Project is predicted to have a negligible impact on Hunter River flow and flooding regime post mining

- the Hunter River alluvium is predicted to remain saturated due to the strong hydraulic connection with the Hunter River.

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 stands will continue to rely on flooding for germination.

The potential post mining impacts of the Project on water resources is not significant.

7 Rehabilitation and closure

7.1 Introduction

The rehabilitation objectives of the HVO North Action is to create safe, stable, and non-polluting post mining landforms consistent with agreed post mining land uses, which are proposed to be biodiversity/habitat areas and agriculture, consistent with current approvals. However, given the location of HVO and the proposed post mining landforms, several alternate future land uses may be suitable at the time of closure, including but not limited to intensive agriculture, electricity transmission, pumped hydro energy generation, solar energy generation, wind energy generation and battery energy storage.

Should the Project be approved, the existing RMP will be updated and submitted to the NSW Resources Regulator. Final rehabilitation and Project closure requirements will ultimately be formulated in consultation with key government agencies and other relevant stakeholders, to be undertaken during the detailed closure planning phase.

7.2 Rehabilitation principles and objectives

The Project does not propose to change the overarching rehabilitation and closure objectives currently approved for HVO, which is to restore the land to a combination of grazing and native ecosystem woodland 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 proportion of land rehabilitated to native ecosystem across the final landform for the Project will be greater than is currently approved, due to the adoption of revised geomorphic landform designs for the overburden emplacements. These landforms are designed to be stable in the long-term, without relying on constructed surface flow drainage control structures that require ongoing maintenance to ensure durability into the future. This design process incorporates a higher drainage density in the final landform to accommodate surface runoff, resulting in a smaller proportion of the surface remaining at flat or low slope gradients, and therefore a smaller proportion of the final landform is suitable for grazing land use purposes.

The rehabilitation objectives for the Project are set out in Closure and rehabilitation objectives.

Table 7.1 Closure and rehabilitation objectives

Aspect	Objective
Mine site (as a whole)	• Safe, stable and non-polluting • Landforms designed to incorporate micro-relief and integrate with existing rehabilitated landforms and surrounding natural landforms • Constructed landforms that maximise surface water drainage to the natural environment (excluding final void catchments) • Minimise visual impact of final landforms as far as is reasonable and feasible
Voids	• Minimise water inflows to prevent risk of discharge to surface waters • Minimise to the greatest extent practicable the safety risk to humans, stock and fauna
Native woodland habitat	• Establish self-sustaining native woodland ecosystems characteristic of vegetation communities found in the HVO North Action Area • Establish native woodland corridors to link remnant native vegetation and biodiversity offset areas
Grazing	• Reinstate target and mandated land and soil capability classes • Rehabilitate grassland areas so that they can support sustainable grazing activities

Aspect	Objective
Clean water diversion channel(s)	• Engineered to be hydraulically and geomorphologically stable • Incorporate erosion control measures based on natural channel design principles • Revegetate with suitable native species and establish areas of self-sustaining riparian habitat
Surface infrastructure	• To be decommissioned and removed, unless agreed otherwise as part of the detailed closure planning process
Community	• Ensure public safety • Minimise direct adverse socio-economic effects of mine closure via community and workforce consultation and updates throughout the life of Project and leading up to closure to allow adequate time for transition planning

7.3 Final land use

7.3.1 Approved land uses

Approved post mining land uses for the existing operations include:

- grazing
- cropping on the Hunter River alluvial flats
- biodiversity and habitat
- water storages and evaporative sinks in the final voids.

The proposed final land uses for the Project will carry forward the approved final land uses for HVO North and South, identified above. The existing and proposed woodland areas will create corridors that link remnant vegetation areas and biodiversity offset areas to create regional corridors consistent with the intent of the Synoptic Plan (Neil 1999).

7.3.2 Proposed final land use domains

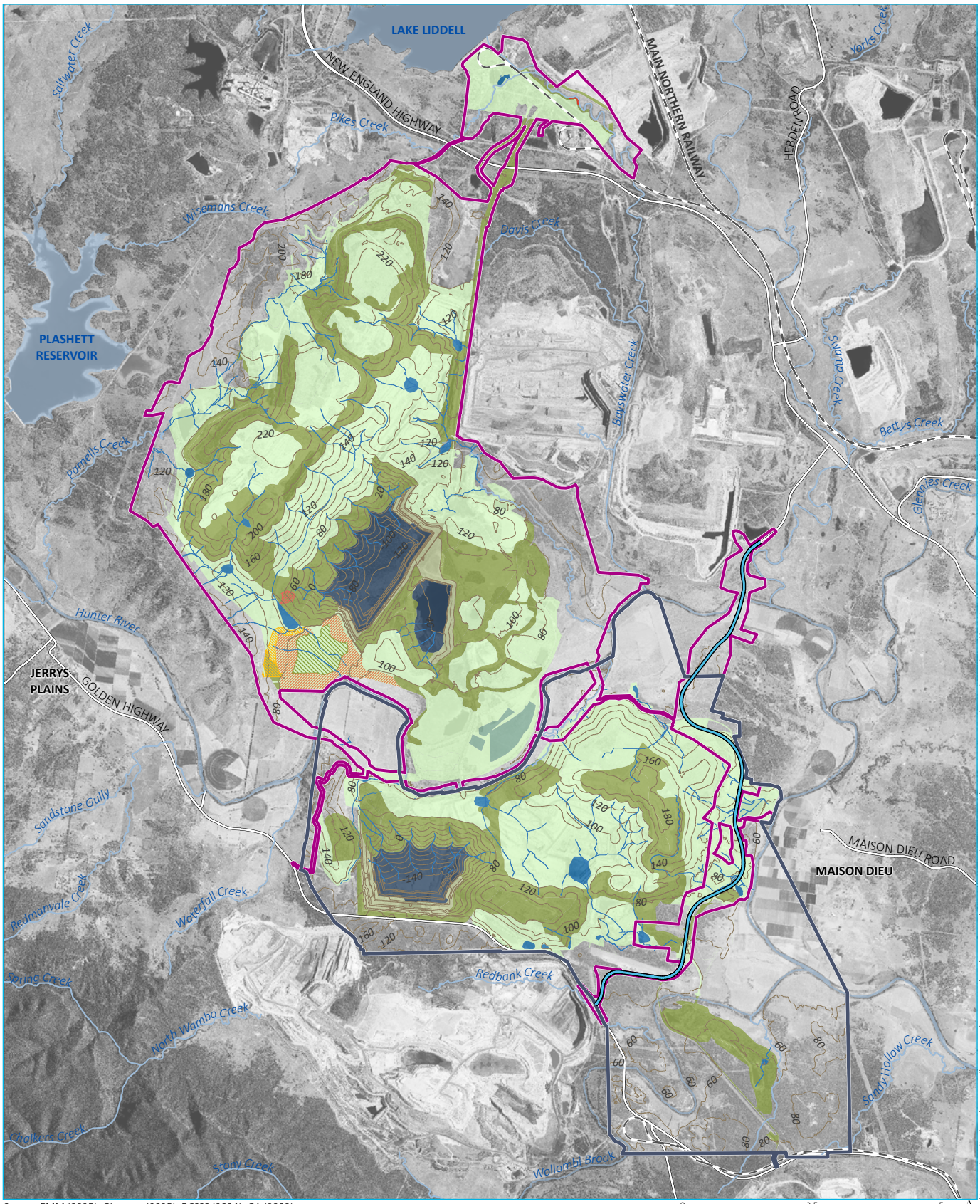
Table 7.2 and Figure 7.1 detail the proposed conceptual final land use domains for the Project.

Table 7.2 Final land use domains

Domain code	Final land use domain	Domain information
A	Native ecosystem – woodland and riparian vegetation communities depending on position in the landscape	Areas of native ecosystem will be established to provide woodland habitat and to provide wildlife corridor linkages to other areas of habitat rehabilitation in adjoining mines, or areas of remnant habitat in adjoining non mined land. It is anticipated that native ecosystem habitat rehabilitation will be fenced to exclude grazing particularly on the steeper slopes such as the void highwalls and low walls, although some stock corridors and farm machinery access will be required through these areas for stock and land management. Carefully managed short 'crash' grazing will be able to be permitted in some native woodland habitat rehabilitation areas to manage fire risk fuel loads. The percent of native vegetation to be established for the Project is approximately 40%.

Domain code	Final land use domain	Domain information
		Currently approved rehabilitation focuses on establishing between approximately 30% to 40% native vegetation across the HVO Complex. At HVO North, approximately 37% of land is proposed to be rehabilitated to native vegetation, whereas at HVO South the area of land proposed to be rehabilitated to native vegetation is approximately 45%. These proportions differ slightly from the currently approved native vegetation areas (being 30% at HVO North and 30% to 40% at HVO South); however, this is due to the newly designed final landform incorporating natural landform design principles with higher drainage density, reducing the area suitable for agricultural land use. Native woodland habitat rehabilitation will focus on the establishment of the structurally dominant species representative of PCT 3431 *Central Hunter Ironbark Grassy Woodland* as this PCT is considered appropriate given the elevation, slope and aspect of the proposed final landforms. Existing HVO North commitments to rehabilitate specific areas representative of Swamp Oak Floodplain Forest and Central Hunter Box-Ironbark Woodland, are proposed to be continued under the Project.
B	Agriculture – grazing	The remaining areas of land will be rehabilitated with native and introduced pasture species to facilitate cattle grazing consistent with historical and surrounding agricultural practices. Suitable stocking rate for these areas would be determined to ensure these areas are appropriately managed. Pastures will be a combination of native and introduced species consistent with pasture rehabilitation undertaken on site with Land and Soil Capability (LSC) classes ranging from 4 to 6 depending on soil depth, stoniness, slope and chemical limitations. Previously approved rehabilitation focused on establishing between approximately 60 to 70% grazing land across the HVO Complex. The Project will establish grazing land across approximately 60% of rehabilitated areas across the HVO Complex (including Domains B and subdomain Kb), comprising approximately 63% of rehabilitated land at HVO North and approximately 55% at HVO South. It is noted that clean water diversion and levees which are incorporated into the post mining final landform, shown in Figure 7.1, are proposed to be rehabilitated as to support the final land use of grazing.
G	Water storages	This domain includes water storages to be established to supply water to the final land use. Figure 7.1 shows conceptual locations of water storages established on drainage lines established in the final landform which will initially be used to control runoff water quality by retaining sediment until adequate vegetation cover is established. When the vegetation cover criteria have been met the dams will be inspected, and sediment removed (if required) and dam sizes adjusted, or if necessary, removed, to suit the final land use, with regard to catchment harvesting water licence requirements at the time of closure. This domain includes any dams that will be converted to water dams for future grazing or habitat purposes. Major water storages Lake James and Parnells Dam will be decommissioned and mine related infrastructure removed. Stock water and habitat dams may be constructed as replacement water supplies to support final land use purposes.
J	Pit lake	Three pit lakes, commonly referred to as final voids, will remain post mining, two at HVO North and one at HVO South, which is one less than currently approved. The pit lakes will be permanent water bodies functioning as groundwater sinks (EMM 2025a). Final void levels achieving equilibrium are predicted to occur several hundred years after cessation of mining and evaporation causing all final voids to act as groundwater sinks. Median long-term pit lake levels for the voids are as follows: • HVO South void: -29.7 mAHD (110 m freeboard) • HVO North void: -17.8 mAHD (100 m freeboard) • Carrington void: 41.8 mAHD (14 m freeboard). The three pit lakes shown on Figure 7.1 will occupy approximately 325 ha at HVO North and approximately 162 ha at HVO South (subject to future refinements of the final landform).

Domain code	Final land use domain	Domain information
Sub domain Ka	Other – native ecosystem – partial vegetation on highwall benches	Approximately 112 ha at HVO North and 73 ha at HVO South of final highwall will be revegetated to achieve partial revegetation on highwall benches with appropriate native habitat species. This revegetation will provide some habitat values and will assist to soften the geometric visual form of the highwalls. This is defined as a separate domain due to the revegetation methods and completion criteria being different to other native vegetation establishment areas in Domain A. Total areas reported for native vegetation calculations include Domain Ka, as it is native vegetation.
Sub domain Kb	Other – agriculture – grazing alluvial land	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. Following mining, HVO successfully rehabilitated 63 ha of Class I and Class II agricultural land, in accordance with the former rural land classification scheme (Cunningham et al, 1988). This 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. The remaining 102 ha was rehabilitated to Class IV grazing land in accordance with the consent requirements.



Source: EMM (2025); Glencore (2025); DCSSS (2024); GA (2009)

0 2.5 5 km

GDA2020 MGA Zone 56

N

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KEY

- HVO North Action Area
- HVO South Action Area
- Predicted drainage
- Predicted 20 m contour
- Lemington Road realignment

Existing environment

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

Final landform 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

Existing commitments maintained by the Project (indicative location)

Rural land capability

- Class 2- DA 450-10-2003 MOD3
- Class 3- DA 450-10-2003 MOD3
- Class 4- DA 450-10-2003 MOD3

Native ecosystem

- Central Hunter Box-Ironbark Woodland - DA 450-10-2003 MOD3
- Swamp Oak Floodplain Forest - DA 450-10-2003 MOD5

Conceptual final land use domains

HVO Continuation Project
HVO North Public Environment Report
Figure 7.1

EMM creating opportunities

7.4 Rehabilitation management and mitigation

A risk review process has been adopted for the Project to identify and consider the management of rehabilitation risks for the site. Key risks identified and analysed include soil types and erodibility, spoil erodibility and erosion hazard mitigation, spoil geochemistry, weed control, pest management and bush fire risk.

7.4.1 Soil management

The following soil stripping and management procedures have been informed by those processes currently undertaken across the HVO Complex. These recommendations will be incorporated into the RMP which will be developed and revised periodically throughout the life of the Project, and may include updates and revisions of these recommendations as required.

i Soil stripping procedures and soil stockpile management

Soil resources at HVO are stripped and retained for rehabilitation purposes. Topsoil is preferentially direct placed on rehabilitation, and where it cannot be direct placed, stockpiled for future use. Soil stripping and management measures currently employed at HVO include:

- characterisation of the suitability of material for rehabilitation works is conducted prior to stripping or from stockpiles
- stripping and stockpiling soil resources selectively and managed according to their suitability for rehabilitation purposes
- stripping sufficient volumes of topsoil and appropriate subsoil for rehabilitation purposes
- progressive rehabilitation of final landforms as soon as practical after completion of landforms
- stripping and storing soil resources in such a manner that their long-term viability is maintained.

The general protocol for management of stockpiled soil includes soil handling measures that optimise the retention of soil characteristics (in terms of nutrients and microorganisms) favourable to plant growth. The protocol includes:

- preferentially located away from active mining areas, watercourses and are placed on areas of flat topography or along the contour to minimise erosion
- leaving the surface of the completed soil stockpiles in a roughened condition to help promote water infiltration and minimise erosion prior to vegetation establishment
- deep ripping soil stockpiles with gypsum (or other relevant ameliorants) and seeding to maintain soil organic matter levels, soil structure and microbial activity
- installing signposts for all soil stockpiles
- recording details of all soil stockpiles on a site database which includes the location and volume of each stockpile.

Long-term topsoil stockpiles will continue to be constructed up to 3 m in height with slopes at a maximum acceptable angle to resist erosion. Subsoil stockpiles vary in height as determined by storage volumes and available space within approved disturbance areas.

A detailed soil stockpile inventory is maintained to track soil resource accounting. The inventory is regularly updated to reflect soil treatment measures and soil usage.

ii Soil amelioration and management

A summary of the proposed soil amelioration methods is provided below.

a Treatment of soil stockpiles

Stockpiles are sown with a cover crop to help maintain topsoil viability and minimise erosion and weed infestation if not being reused for prolonged periods. Prior to recovery of from a stockpile occurring an assessment of existing and historic vegetation is undertaken to assess the need for topsoil scalping, or other specific weed mitigation.

b Treatment of soil/spoil on rehabilitation areas

Soil re-application activities include:

- spreading topsoil
- applying gypsum, other ameliorants and/or fertiliser at rates determined by soil testing and the proposed revegetation strategy
- incorporation via contour ripping or scarification.

7.4.2 Vegetation establishment

i Species selection

Revegetation of the final landforms will include either:

- native and introduced pasture species, or
- cover crops and native species depending on its position in the landform.

The revegetation approaches will continue to be informed by the results of rehabilitation inspections and rehabilitation monitoring. Based on these results, the HVO rehabilitation program (including revegetation species lists for each final land use domain) will be refined.

ii Seed collection

Native vegetation areas utilise locally sourced native seed species. Seed mixes assembled to achieve desired diversity and structure targets. Where possible, seed may also be collected at the time of vegetation clearance activities.

Pasture seed mixes are selected to match the intended land use. This typically involves both exotic and some native pasture species suitable to a rotational grazing program.

iii Revegetation methods

Revegetation at HVO will continue to use a combination of direct seeding and tubestock planting where required.

7.4.3 Fauna and habitat enhancement measures

As detailed in the RMP, where practicable, vegetation clearance operations will be managed to maximise the re-use of cleared vegetative material and habitat resources/features. Habitat resources/features such as logs and hollows will be clearly marked (with flagging tape or similar) for salvage/relocation in the rehabilitation program (or for use within biodiversity offset areas).

Vegetative material unsuitable for the rehabilitation program or for habitat enhancement may be mulched or in some cases retained and used in rehabilitation to provide soil surface cover and rill interruption on steep slopes.

7.4.4 Erosion and sediment control

The key erosion risks for the Project are:

- erodible dispersible overburden, subsoils and topsoils
- long and steep slopes
- numerous unlined and lined drainage lines on rehabilitated overburden landforms.

Erosion and sediment control management and mitigation measures are described in the approved Erosion and Sediment Control Plan which will be revised following approval to address the constraints posed by the geomorphic landforms.

Disturbed areas within the HVO North Action Area will report to sediment dams such that any eroded sediments will be contained (up to and including the design storm event). Contained water is re-used on site.

The sediment dams will be maintained on site until runoff meets the nominated water quality criteria.

Dispersive soils are managed in accordance with the methodologies described in Section 7.4.1 that includes gypsum treatment.

Progressive rehabilitation of disturbed areas is undertaken to reduce the area and duration of exposure to water and wind erosion.

The adoption of geomorphic designed overburden dumps requires some modification to erosion and sediment control practices currently used on rehabilitated landforms at HVO. On steep slopes where 70% or greater soil surface cover cannot be achieved it may be necessary to use rocky materials to protect the slopes from the shear stresses of overland flow.

7.4.5 Post-closure maintenance

i Rehabilitation monitoring

Rehabilitation monitoring will continue to be undertaken using analogue sites and Landscape Function Analysis (LFA) to assess rehabilitation progress and success as detailed in the RMP. Annual rehabilitation reports are prepared, and a summary of these reports are included in the Annual Review.

Data obtained from the analogue sites provides a range of values from replicated examples of similar vegetation communities. Rehabilitation areas are compared to reference sites that best represent the final land use, vegetation community and management conditions they will be subjected to.

This approach allows the recognition of the dynamic nature of ecosystems therefore rehabilitation sites are monitored simultaneously to the reference sites over time to account for changes in:

- seasonal variations
- climatic conditions
- management practices
- unexpected disturbance events such bushfire.

To demonstrate rehabilitation success or succession toward rehabilitation success, specific indicators have been developed to equal values obtained from the reference site under the same set of conditions or demonstrate a positive trend towards target values.

Rehabilitation monitoring informs areas requiring maintenance and helps identify and address deviations from the expected outcomes. Rehabilitated areas are assessed against performance indicators and regularly inspected for the following aspects:

- evidence of any erosion or sedimentation
- success of initial establishment cover
- natural regeneration of improved pasture
- weed infestation (primarily noxious weeds, but also where rehabilitation areas are dominated by other weeds)
- integrity of diversion drains, waterways and sediment control structures
- general stability of the rehabilitation areas.

Where rehabilitation criteria have not been met, maintenance works will be undertaken in accordance with a TARP.

ii Weed management

The presence of weed species has the potential to have a major impact on revegetation outcomes. Additionally, any significant weed species within the surrounding land has the potential to impact on the success of the rehabilitated areas. Weed management will be an important component of rehabilitation activities.

The spread of declared noxious weeds (and other invasive weeds that could impact revegetation success and/or plants that are undesirable to grazing stock) will be managed across the HVO North Action Area through a series of control measures, including:

- herbicide spraying, scalping topsoil or other methods including use of fire
- post-mining use of rehabilitated areas for grazing, with associated management practices
- rehabilitation inspections to identify potential weed infestations.

iii Access

Access tracks may be required to facilitate the revegetation and ongoing maintenance of the Project. These tracks will be kept to a practical minimum and will be designated prior to the completion of the Project.

iv Public safety

Controls will be implemented to minimise the potential for impacts on public safety and may include maintenance of fencing and warning signs around areas that have the potential to cause harm that are accessible to the public including bunding and fencing of the crest of the high wall.

7.4.6 Completion criteria

Rehabilitation completion criteria are used as the basis for assessing when rehabilitation of the Project is complete. Indicators are measured against the criteria.

Indicative rehabilitation criteria for the Project have been developed with the current knowledge of rehabilitation practices and success at HVO and in similar environments.

The rehabilitation criteria need to demonstrate that the rehabilitation objective has been achieved. 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. Refined criteria will be submitted and confirmed with each RMP renewal provided to the Resource Regulator.

8 Other requirements

8.1 Other approvals and conditions

8.1.1 Environmental Planning and Assessment Act 1979

The EP&A Act and the NSW Environmental Planning and Assessment Regulation 2021 (EP&A Regulation) form the statutory framework for planning approval and environmental assessment in NSW. Implementation of the EP&A Act and EP&A Regulation is the responsibility of the NSW Minister for Planning and Public Spaces, statutory authorities and local councils. It contains two parts that impose requirements for planning approvals:

- Part 4 which provides for control of 'development' that requires development consent from the relevant consent authority. A division of Part 4 (Division 4.7) provides for control of SSD where the IPC or the Minister for Planning and Public Spaces is the consent authority.
- Part 5 which provides for control of 'activities' by public authorities that do not require approval or development consent under Part 4.

The requirement for development consent is set out in environmental planning instruments (EPIs) which includes State environmental planning policies (SEPPs) or local environmental plans (LEPs).

Section 4.36(2) of the EP&A Act states that:

> ... State environmental planning policy may declare any development, or any class or description of development, to be State significant development.

Schedule 1 of the *State Environmental Planning Policy (Planning Systems) 2021* (the Planning Systems SEPP) identifies what constitutes SSD, with one form being development for the purpose of coal mining.

Schedule 1 of the Planning Systems SEPP includes the following development:

> **5 Mining**
>
> (1) Development for the purpose of mining that –
>
> (a) is coal or mineral sands mining, or
>
> (b) is in an environmentally sensitive area of State significance, or
>
> (c) has a capital investment value of more than $30 million.
>
> ...

As the Project is of a kind described within Schedule 1 of the Planning Systems SEPP (i.e. coal mining), it meets the requirements for SSD.

Under section 4.5(a) of the EP&A Act, the IPC or the Minister for Planning and Public Spaces is the consent authority for SSD. It states:

> For the purposes of this Act, the consent authority is as follows—
>
> (a) in the case of State significant development—the Independent Planning Commission (if the development is of a kind for which the Commission is declared the consent authority by an environmental planning instrument) or the Minister (if the development is not of that kind),

Section 2.7(1) of the Planning Systems SEPP states:

(1) The Independent Planning Commission is declared, under section 4.5(a) of the Act, to be the consent authority for any of the following development that is State significant development unless the application to carry out the development is made by or on behalf of a public authority or unless the development is declared to be State significant infrastructure related development under subsection (2)—

(a) development in respect of which the council of the area in which the development is to be carried out has duly made a submission by way of objection under the mandatory requirements for community participation in Schedule 1 to the Act,

(b) development in respect of which at least 50 submissions (other than from a council) have duly been made by way of objection under the mandatory requirements for community participation in Schedule 1 to the Act,

(c) development the subject of a development application made by a person who has disclosed a reportable political donation under section 10.4 to the Act in connection with the development application.

A DA for SSD (or SSD application) must be accompanied by an EIS, prepared in accordance with the EP&A Regulation. Before preparing an EIS, an applicant must request Secretary's environmental assessment requirements (SEARs) (also known as terms of reference or guidelines) which specify what must be addressed in an EIS. The SEARs for the Project were issued on 11 March 2021.

The EIS (EMM 2022a) was prepared in accordance with the EP&A Regulation and SEARs and lodged in December 2022 and placed on public exhibition for a period from Monday 30 January 2023 through to Monday 27 February 2023.

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 council (Singleton Council and Muswellbrook Shire Council) provided advice on the Project. Most 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 8.1.

Table 8.1 Submissions summary – HVO Continuation Project EIS

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 were considered unique submissions for the purposes of section 2.7(6) of the Planning Systems SEPP. As such, the consent authority under the EP&A Act for the Project is the IPC.

On 3 March 2023, DPHI requested that HVO prepare a written response to the issues raised in the submissions received during the public exhibition of the EIS. Accordingly, the Submissions Report (EMM 2023a) was prepared to respond to the matters raised in the submissions. It was prepared in accordance with section 59(2) of the EP&A Regulation.

Since the receipt of submissions on the Project and following ongoing engagement with government agencies and stakeholders, HVO refined the proposed project design, reduced the Project life, avoided coal extraction in gas Domain 1 at HVO North and reduced the annual production rate. In turn, this has reduced impacts to biodiversity and GHG emissions.

The Amendment Report (EMM 2025a) was subsequently prepared and submitted to address these changes. The Amendment Report (EMM 2025a) was placed on public exhibition for three weeks commencing 5 September 2025 and concluding 25 September 2025. The Amendment Submissions Report (EMM 2025e) was then prepared to analyse the submissions which are summarised in Table 8.2.

Table 8.2 Submissions summary – Amendment Report (EMM 2025a)

Submission source	Support	Comment	Advice	Object	Total
Government agencies	-	-	6	-	**6**
Councils	-	-	1	-	**1**
Organisations	22	2	-	17	**41**
Public	1,176	4	-	102	**1,282**
Public authorities	-	-	1	-	**1**
Total	**1,198**	**6**	**8**	**119**	**1,331**

The proposed changes and an assessment of the impacts associated with these changes were documented in the HVO North Amendment Report (EMM 2023b) and the Amendment Report (2025a). The Project described in the Amendment Report (2025a) is the same as the HVO North Action described in this draft PER.

A copy of these reports can be found at:

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

At the time of preparation of this draft PER, the EIS (EMM 2022a), Submissions Report (EMM 2023a), HVO North Amendment Report (EMM 2023b), Amendment Report (EMM 2025a) and Amendment Submissions Report (2025e) are being assessed by DPHI.

Section 4.15 of the EP&A Act outlines the matters that a consent authority must take into consideration when determining development applications. These matters are:

- the provisions of EPIs (including draft instruments), development control plans, planning agreements, and the EP&A Regulations
- the likely impacts of the development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality
- the suitability of the site for the development
- any submissions made on the development
- the public interest.

Section 1.3 of the EP&A Act also outlines a range of objects that must be considered when a consent authority making decisions under the EP&A Act. The objects of most relevance to the consent authority's decision on whether or not to approve the project are found in section 1.3(a), (b), (c), (e) and (f). They are:

(a) to promote 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,

(b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,

(c) to promote the orderly and economic use and development of land

(d) …

(e) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats

(f) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).

DPHI will undertake its assessment of the Project with consideration to sections 4.15 and 1.3 of the EP&A Act. Following its assessment, DPHI will provide an assessment report to the IPC who will then make its determination on the Project. DPHI is also likely to provide the IPC with recommended conditions of consent which the Commission can use if it approves the Project.

The IPC, as the consent authority for the Project under the EP&A Act, will be required to make its determination with consideration to sections 4.15 and 1.3 of the Act.

It should be noted that the assessments of SSD under Part 4 of the EP&A Act by DPHI are accredited under section 45 of the EPBC Act through a bilateral agreement between the Commonwealth and NSW. Under this agreement, the Commonwealth Minister for the Environment can use the NSW process to inform an assessment of the impacts of any eligible action.

The assessment bilateral agreement was first executed in 2015. In 2017, NSW introduced the NSW *Biodiversity Conservation Act 2016* (BC Act) and made a number of amendments to the EP&A Act. In March 2020, the NSW and Commonwealth governments signed Amending Agreement No. 1 in response to these changes to NSW legislation, updating the 2015 assessment bilateral agreement.

Through Amending Agreement No. 1, the Commonwealth Government has endorsed the NSW *Biodiversity Offset Scheme* (BOS). This includes the:

- BAM
- biodiversity credit system
- offset rules set out in the BC Regulation.

While the Project is not being assessed under the assessment bilateral agreement, the agreement itself indicates that assessments of SSD undertaken by DPHI under the EP&A Act and BC Act meet the requirements of assessments of actions under the EPBC Act.

8.1.2 Required approvals

This section identifies other approvals that are required to carry out the Project and explains why they are required. These approvals are outlined in Table 8.3 and have been grouped into the following categories:

- Consistent approvals: which are approvals that cannot be refused and must be substantially consistent with the development consents for the Project (if granted by the IPC) in accordance with section 4.42 of the EP&A Act.
- Other approvals: approvals that are not expressly integrated into the DA process for SSD under the EP&A Act.
- Approvals not required: approvals that would be required if the Project was not SSD as per section 4.41 of the EP&A Act.

Table 8.3 Approvals and licences required

Approval	Requirement
Consistent approvals	
Approval under section 22 of the NSW *Coal Mine Subsidence Compensation Act 2017*[1]	The Project is majority located within the Patrick Plains mine subsidence district. Approval under section 22 will be sought for new and upgraded infrastructure proposed under the Project where applicable.
A ML under the NSW *Mining Act 1992* (Mining Act)	Additional conversion of existing ELs to MLs will be required to enable the Project. At HVO North, the Project involves the extraction of coal from deeper seams (i.e. down to the Barrett seam) beneath areas that have been predominantly previously mined. Despite the upper seams of these areas being previously mined, the deeper seams are covered by ELs as existing MLs do not extend to the depth of the Barrett seam across the entire proposed mining area. Therefore, application for new MLs over these ELs will be required at depth in some areas. In addition, a small area that is within the proposed mining area (between the Mitchell Pit and the Carrington area) is within a surface EL and therefore a new ML to the required depth will be required to cover this area. At HVO South, the Project involves a small change to the approved footprint to straighten the highwall, and in doing so, steps outside the area covered by an existing ML into an area covered by an EL. A new ML will also be required at HVO South to cover this small area. A site verification certificate (SVC – 12575722) was issued on 14 May 2021 for these areas, as required by the EP&A Regulation. Further to this, the surface water impact assessment prepared for the Project (which includes an updated WMS for the Project, refer to Appendix E), identified the need for an additional clean water diversion and sediment dam 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 MLs and the area covered by SVC – 12575722. The clean water diversion is an ancillary mining activity for the purposes of section 6 of the Mining Act. Therefore, it must be authorised by a mining lease or via a condition included in an adjoining ML. HVO holds adjoining MLs to where these works will occur (ML 1428 and ML 1634); therefore, it is proposed that a condition be added to these MLs authorising the clean water diversion works on the land adjoining them or a new ML for ancillary mining activities obtained. In addition, the Project seeks to extend the existing product coal stockpile at the HVLP at HVO North beyond the currently approved extent. The area in which the extension is proposed is not covered by a surface ML, and therefore a second SVC was applied for and issued for this area (SVC – 41389276) on 30 June 2022.

[1] Section 4.42(1b) of the EP&A Act refers to approval under section 15 of the NSW *Mine Subsidence Compensation Act 1961*. However, this legislation was repealed in 2017 by the NSW *Coal Mine Subsidence Compensation Act 2017*.

Approval	Requirement
Environment protection licence under section 3 of the NSW POEO Act	The HVO Complex currently operates under one EPL (EPL 640). EPL 640 will be varied as required if the Project is approved.
Consent under section 138 of the NSW *Roads Act 1993* (Roads Act)	A consent is required under section 138 to work on or above a road or to connect a road to a classified road. Approval from Singleton Council as the appropriate road authority will be required for the Lemington Road realignment and works on Liddell Station Road.
Other approvals	
Approvals under Part 2 and Part 4 of the Roads Act	Approval will be required for realignment (closure and reopening) of Lemington Road and the closure of part of Liddell Station Road to enable the extension of the HVLP product coal stockpile.
Aquifer interference approval under section 91 of the WM Act	The requirement to obtain an aquifer interference approval under section 91(3) of the WM Act is triggered only when a proclamation has been made under section 88A that the particular type of approval is required. To date, no proclamation has been made specifying that an aquifer interference approval is required in any part of NSW. In the meantime, the AIP sets the policy with respect to aquifer interference.
Water access licences under the WM Act	HVO holds a number of water access licences (WALs) under the Water Sharing Plan (WSP) for the Hunter Regulated River Water Source 2016, the WSP for the Hunter Unregulated and Alluvial Water Sources 2009 and the WSP for the North Coast Fractured and Porous Rock Groundwater Sources 2016. HVO holds considerable water entitlement in the relevant surface water and groundwater sources in the Project area, which is sufficient to account for the predicted takes in most water sources. During operations, the small predicted peak indirect groundwater (alluvial) take from the Jerrys Water Source (4 ML/yr) of the North Coast Groundwater WSP exceeds HVO's entitlement. Prior to the take occurring, HVO will either apply to convert sufficient existing unregulated river entitlements to aquifer entitlements or purchase entitlement via the open market to account for the small predicted indirect groundwater take in the Jerrys Water Source. For catchment runoff captured by dams and diversions, HVO is seeking an amendment of the NSW *Water Management Regulation 2020* (WM Regulation) hydroline to reflect the historical and approved WMS, including approved stream diversions, and to have any residual licensing liability for captured rainfall runoff based on this amended drainage configuration. The licensing pathway is discussed in Appendix I of the Amendment Report (EMM 2025a), and demonstrates there is a legitimate water licensing pathway for the Project. During the closure period, take associated with runoff captured from storages on non-minor streams within the Jerry Water Source (Jerrys management zone) during the transition period that exceeds HVO's existing entitlement will be sourced from the open market (including trade, in accordance with the WSP rules). There is adequate share entitlement within the Jerrys Water Source for the predicted take. At closure, the predicted peak indirect groundwater (alluvial) take from the Jerrys Water Source (26 ML/yr) exceeds HVO's entitlement. Prior to the take occurring, HVO will either apply to convert sufficient existing unregulated river entitlements to aquifer entitlements or purchase entitlement via the open market. As part of detailed closure planning which would be developed within five years of cessation of mining, licensing requirements will be reviewed in consultation with the NSW Government. Prior to the take occurring, HVO will purchase any additional entitlement required via the open market (including trade, in accordance with water sharing plan rules).
Commonwealth *Native Title Act 1993*	There are no Native Title claims currently over the HVO North Action Area. Native Title has been demonstrated to have been extinguished in all locations where HVO intends to undertake development (which if on areas where Native Title had not been extinguished could be considered to be a future act) as part of the Project, except for the HVLP product coal stockpile extension area option. Further investigations are being undertaken on this parcel of land to confirm extinguishment of Native Title, and the approach for suitable tenure over this parcel of land.

Approval	Requirement
Approvals under Part 4 and Part 5 of the NSW *Crown Land Management Act 2016* (CLM Act)	There are a number of Crown land parcels and roads within the HVO North Action Area. An appropriate authorisation will be obtained under the CLM Act to enable the occupation and use of the identified Crown land and roads.
Approvals not required	
A permit under section 201, 205 or 219 of the NSW *Fisheries Management Act 1994* (FM Act)	For SSD, permits are not required under the FM Act. Notwithstanding this, the Project's impacts on threatened species, populations or communities listed under the FM Act were assessed and described in Chapter 14 and Appendix L of the EIS (EMM 2022a) and Section 6.5 and Appendix J of the Amendment Report (EMM 2025a).
Approval under Part 4 of the NSW *Heritage Act 1977*	The Project's impacts on historic heritage items were assessed and described in Chapter 16 and Appendix O of the EIS (EMM 2022a).
An Aboriginal heritage impact permit under section 90 of the NSW *National parks and Wildlife Act 1974*	The Project's impacts on Aboriginal cultural heritage were assessed and described in Chapter 15 and an ACHA contained in Appendix N of the EIS. An addendum to the ACHA is provided in Appendix C of the Submissions Report (EMM 2023a). An additional report was prepared as part of the Amendment Report (EMM 2025a) attached as Appendix K.
A water use approval under section 89, a water management work approval under section 90 or an activity approval (other than an aquifer interference approval) under section 91 of the WM Act	The Project's impacts on water resources are assessed and described in Chapter 12 and Appendix K of the EIS (EMM 2022a), Section 6.5 and Appendix I of the Amendment Report (EMM 2025a), and in Chapter 6 of this report.

8.2 Monitoring, enforcement and review procedures

8.2.1 Environmental policy and management framework

The HVO Complex is managed under the *HVO Environmental Management System* (EMS) to facilitate compliance with environmental standards and legislative requirements. The EMS has been developed generally in accordance with ISO 14001. The EMS forms a framework for managing all environmental and community aspects, impacts and performance of the mining operations.

The objectives of the EMS are to:

- provide an overarching framework for the environmental management and monitoring of activities undertaken at HVO North and HVO South, which incorporates the principles of continuous improvement
- maintain compliance with:
  - the HVO EPBC Act Approval
  - the HVO North Consent
  - the HVO South Approval
  - other approvals (e.g. EPL 640, MLs, water licences and management plans).

The EMS sets out the procedures for periodic review and, where necessary, revision of the document so that it is maintained to reflect current mining operations to the satisfaction of the Secretary of DPHI.

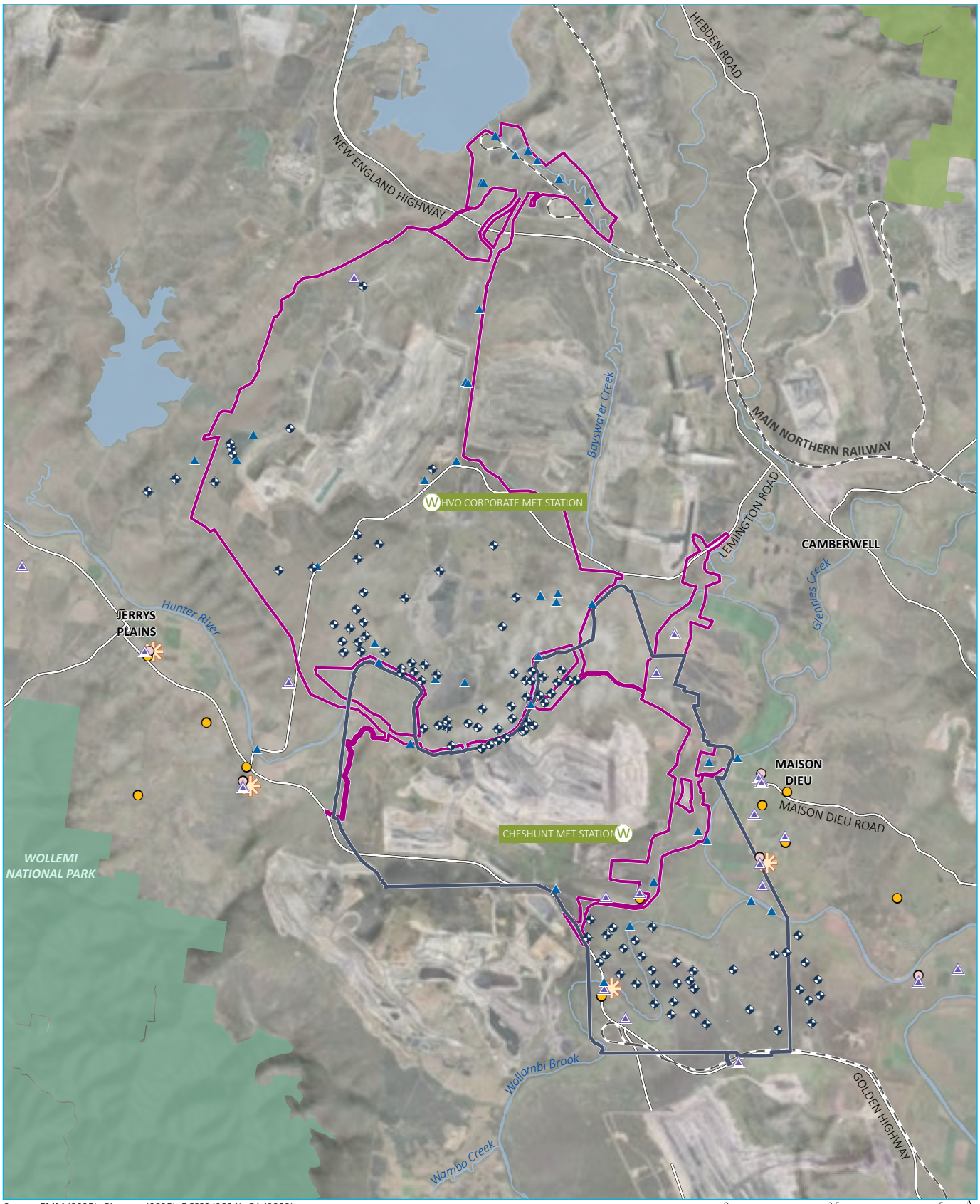
The EMS relies upon an environmental policy, risk register, objectives and targets, a series of management plans, a monitoring program and environmental standards and procedures. The effectiveness of the system has been demonstrated through audits, which have resulted in environmental improvement across the complex. The EMS is subject to an independent compliance audit every three years, undertaken by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Secretary of DPHI. The audits assess the environmental performance of the operation and determine the complex's compliance with the requirements of the HVO North Consent, the HVO South Approval, the HVO EPBC Act Approval, EPL, MLs and any other relevant approvals.

As per existing policies and procedures, an extensive air quality, noise, vibration and surface and groundwater monitoring network supports environmental management at HVO, as shown in Figure 8.1. Two real-time meteorological stations have been installed and are referred to as the HVO Corporate and the Cheshunt meteorological stations.

An annual review is produced each calendar year in accordance with the existing HVO North Consent and HVO South Approval conditions. The annual review documents the operations environmental performance with respect to the relevant monitoring requirements and is made available to the community via the HVO website.

HVO has an established Community Consultive Committee (CCC) comprising community representatives. The HVO CCC meet and are engaged to discuss HVO's mining operations and environmental performance. Community and stakeholder engagement completed for the Project is outlined in Chapter 9.

Should the Project be approved, the EMS will be reviewed and updated to reflect the specific conditions of the approvals under the EP&A Act and EPBC Act and incorporate the outcomes and commitments from various environmental assessments prepared to support the Project. The existing plans can be found at the link: https://www.hvo.com.au/documents/.



Source: EMM (2025); Glencore (2025); DCSSS (2024); GA (2009)

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GDA2020 MGA Zone 56

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KEY

- HVO North Action Area
- HVO South Action Area

Existing environment

- Rail line
- Major road
- Named watercourse
- Named waterbody
- NPWS reserve
- Air quality monitoring location
- Weather monitoring location
- Surface water monitoring location
- Groundwater monitoring location
- Noise monitoring location- real time
- Noise monitoring location- attended
- Blast monitoring location

NOTE: Overlapping symbols have a slight offset applied

HVO Complex environmental monitoring network

HVO Continuation Project
HVO North Public Environment Report
Figure 8.1

EMM creating opportunities

8.2.2 Enforcement

HVO will be obligated to comply with all conditions outlined in the approvals under the EP&A Act and EPBC Act, if granted. In NSW, the enforcement of compliance with development consent conditions and regulatory requirements for mining projects in NSW is governed by a robust regulatory framework under the EP&A Act, Mining Act and POEO Act. These regulatory frameworks empower regulatory authorities including DPHI, EPA and the Resources Regulator to oversee mining activities and enforce compliance. A number of tools are available to these regulatory authorities including the following:

- Monitoring and inspections: Regulatory agencies conduct regular inspections to assess compliance with development consent conditions and regulatory standards. These inspections may include site visits, audits, and reviews of monitoring reports. By monitoring key aspects such as air and water quality, noise levels, rehabilitation efforts, and adherence to environmental management plans, regulators can identify any deviations from approved conditions and take appropriate enforcement actions.

- Compliance audits and investigations: In addition to routine inspections, compliance audits and investigations are conducted to ensure that mining companies are meeting their obligations. Compliance audits involve a systematic review of a mining operation's records, procedures, and practices to assess compliance with regulatory requirements. If potential non-compliance is identified or complaints are received from stakeholders, regulatory agencies may initiate investigations to gather evidence and determine the extent of the violation. These investigations may involve interviews, site examinations, and data analysis to inform any enforcement actions.

- Enforcement actions: When instances of non-compliance are identified, regulatory authorities have a range of enforcement actions at its disposal to compel companies to rectify violations and prevent further harm. These actions may include issuing warnings, compliance notices, and penalty notices for minor breaches. For more serious or persistent breaches, regulatory agencies may impose fines, enforce remediation measures, or initiate legal proceedings. The severity of enforcement actions depends on the nature and scale of the non-compliance, with penalties designed to deter future violations and protect the environment and community interests.

8.3 Environmental record

HVO is committed to maintaining responsible environmental management practices that meet or exceed industry best practice. Environmental management is an integral part of every stage of the mining process to ensure that environmental impacts are minimised.

As previously stated, HVO has an EMS in place for its existing mining operation. The EMS provides a risk based platform on which relevant environment and community controls, procedures, and management plans have been established and are regularly reviewed. The EMS covers the design, development, production, maintenance and rehabilitation of the operation and its infrastructure. The EMS is structured to ensure that the company adopts a continuous improvement approach to environmental management issues at the site and implement best practice environmental management. The EMS also ensures that all activities at the operation are controlled, so that HVO either prevents or minimises any environmental impacts associated with the operation.

Under its EMS, HVO has developed a number of environmental management and monitoring plans which provide guidance for minimising the impacts of its operations. Where relevant, these existing plans will be updated and applied to the new activities that form the proposed action. The existing plans can be found at the link: https://www.hvo.com.au/documents/

HVO has not been convicted of any offences or had any approvals under environmental protection legislation or other relevant legislation, revoked or suspended in the five years immediately prior to when the referrals for HVO North and South were lodged.

8.4 Economic and social matters

8.4.1 Economics

An economic impact assessment (EIA) (EY 2025) has been prepared for the Project and is included in Appendix F. The EIA is based on the economic assessment framework set out in the *Guidelines for the economic assessment of mining and coal seam gas proposals* (DPIE 2015) (the Guidelines) and the methods outlined in the *Technical Notes supporting the Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals* (DPIE 2018).

Consistent with the Guidelines, the EIA includes a cost benefit analysis (CBA) and a local effects analysis (LEA). The CBA provides an estimate of the net benefits of the Project to NSW, and the LEA is based on analysis for the Lower Hunter region (as defined by the Australian Bureau of Statistics SA3 10601 region).

i Cost benefit analysis

a Methodology

Consistent with the Guidelines, the CBA is based on determining the net direct and indirect benefits and subtracting the indirect costs of the Project, and comparing this against the scenario where the Project does not occur (i.e. the baseline scenario).

To define the baseline scenario, it is noted that the existing approval for mining operations at HVO North ceases on 31 December 2026 while the HVO South Approval allows mining until 24 March 2030. However, HVO South is currently dependent on HVO North for coal processing and transport. Therefore, the baseline for the EIA considers that both mines cease operations at the end of the currently approved HVO North mine life in 2026. As such, the economic benefits and costs associated with extraction of coal up to December 2026 across the complex have been included in the baseline, and therefore excluded for the purposes of assessing the incremental net benefits of the Project.

The direct benefits of the Project are a function of the profitability of the Project which, in turn, depends on the prevailing coal price (discussed further in Section 8.4.1ii). The indirect benefits of the Project are related to the linkages that the Project has to the NSW economy through both the labour market and suppliers. The indirect costs of the Project are related to the costs borne by the NSW community through the generation of externalities by the Project.

The CBA also includes the estimated impact of meeting HVO's obligations under the Commonwealth Government's Safeguard Mechanism, including by using carbon offsets to reduce the Project's net GHG emissions. It also includes further voluntary reductions in net GHG emissions to meet the more stringent NSW GHG emissions reduction targets under the NZF Act. To estimate the potential impacts of meeting both the Safeguard Mechanism obligations and the additional voluntary contribution towards NSW emission reduction targets on the economic benefits of HVO, the analysis is based on the following assumptions:

- The HVO Complex will be required to reduce its net emissions intensity as a designated large facility, in accordance with the Safeguard Mechanism and will make voluntary additional contributions towards the NSW emissions reduction targets including by using offsets to reduce the Project's net GHG emissions.
- The Scope 1 emissions of the Project are as reported in the Amendment Report (EMM 2025a), which are based on the continuation of existing practices to minimise diesel consumption and unabated open-cut fugitive emissions, and hence are considered conservative/higher estimate as they do not reflect emerging technologies which may be able to be used in the future.

- The forecast Scope 1 emission intensity results in GHG emissions from HVO exceeding its declining baseline (i.e. as per the Safeguard Mechanism) each year. Therefore, the full cost of the required reduction in emissions will be incurred by HVO (roughly 5.6 Mt $CO_{2\text{-}e}$ over the Project lifetime for the Safeguard Mechanism along with a further approximate 1.5 Mt $CO_{2\text{-}e}$ of emissions reduction through the voluntary surrender of additional Australian carbon credit units (ACCUs) and/or Safeguard Mechanism credits (SMCs) towards the NSW Governments targets as set out in the NZF Act).

- The price of the required carbon offsets has been costed, in real terms, at $81 per tonne, and escalated at a further 2% per annum in real terms, noting that this measure is inherently conservative and was adopted to examine the Project's cost and benefits through pessimistic assumptions.

b HVO Complex results

As a complex, the Project is estimated to produce a net benefit of $5,692.4 million in NPV terms to NSW. If the individual mine sites are considered separately, the net benefit to NSW from HVO North (i.e. the HVO North Action the subject of this report) is $3,719.5 million, while HVO South is $2,023.5 million. The results of the CBA are summarised in Table 8.4.

Table 8.4 Cost benefit analysis – HVO Complex

	HVO Complex ($million)	HVO North ($million)	HVO South ($million)
Direct benefits	$2,768.1	$1,706.7	$935.6
Indirect benefits	$2,941.9	$2,024.0	$1,094.4
Incremental indirect costs	$17.6	$11.2	$6.5
Net benefits	**$5,692.4**	**$3,719.5**	**$2,023.5**

Note: NPV in 2025 Australian dollars based on a 7% real discount rate.

As shown in Table 8.4, the estimated total net benefit of the Project in NPV terms comprises:

- $2,768.1 million in direct benefits

- $2,941.9 million indirect benefits

- $17.6 million in incremental indirect costs (comprising costs associated with GHG emissions, traffic and transport costs related to the realignment of Lemington Road, and loss of surplus to other industries).

The breakdown of these costs is presented in Table 8.5.

Table 8.5 Estimated net benefits of the Project

Benefits	NPV ($million)	Costs	NPV ($million)
Direct benefits		**Direct costs**	
Net producer surplus attributed to NSW	-	Safeguard Mechanism and voluntary additional ACCU purchases^	$347.5
Royalties, payroll tax and Council rates	$2,395.2		
Company income tax apportioned to NSW	$372.9		
Total direct benefits	**$2,768.1**	**Total direct costs**	**$347.5**

Benefits	NPV ($million)	Costs	NPV ($million)
Indirect benefits		**Indirect costs**	
Net economic benefit to landholders	-	Air quality impact^^	-
Net economic benefit to NSW workers	$1,158.4	GHG emissions	$3.8
Net economic benefit to NSW suppliers	$1,783.5	Noise impact^^	-
		Traffic and transport impact	$0.7
		Net public infrastructure cost	-
		Surface water impact^^	-
		Groundwater impact^^	-
		Biodiversity impact^^	$59.2
		Loss of surplus to other industries	$13.1
		Visual amenity impact^^	-
		Historical heritage ^^	-
		Aboriginal cultural heritage ^^	-
Total indirect benefits	**$2,941.9**	**Indirect costs**	**$91.4**
Total economic benefit of the Project	**$5,710.0**	**Total incremental cost of the Project**	**$17.6**
NPV of the Project	**$5,692.4**		

Notes: ^ Refer to Section 8.4.1ia
^^ Management and mitigation costs are included in the operating and capital costs and types of impact are outlined in Section 2.7 of the EIA (EY 2025, refer to Appendix F), and discussed below this table. Also note that the quoted biodiversity offset cost is the estimated cost associated with meeting the offset obligations under the BC Act.

As shown in Table 8.5, the indirect costs to NSW associated with the Project due to the predicted scope 1 and scope 2 GHG emissions have been estimated at $3.8 million in NPV terms. The costs arising from Project GHG emissions have been derived based on the average yearly emissions multiplied by the carbon price of a tonne of CO_2-e (based on the US EPA social cost of carbon) over the life of the Project.

The impacts of GHG emissions are global in nature, and as a result, apportioning all the costs of climate change impacts associated with the Project to NSW overstates the cost of these impacts to NSW. To estimate the impacts on NSW, a component of the total global costs is apportioned to NSW. The approach adopted is to apportion the global GHG costs using the ratio of the NSW population to the global population.

On a global basis, the total estimated GHG cost is $3,445.9 million in NPV terms. Attributing the GHG costs based on the NSW population, consistent with the Guidelines, results in an attributed GHG cost of $3.8 million to NSW in NPV terms.

As a result of the implementation of the Safeguard Mechanism, a portion of the Project's broader GHG emission costs have been internalised by HVO, at $348 million in NPV terms for the HVO Complex.

In relation to traffic and transport costs, the indirect costs identified for the Project are associated with mitigation measures required during construction, and the change in travel time for vehicles travelling on the realigned Lemington Road compared with travelling along the current alignment.

To mitigate the residual biodiversity impacts of the Project, HVO will implement a biodiversity offset strategy to satisfy the NSW biodiversity offset requirements (refer to Section 5.6 of this report); the costs of which have been estimated at $59.2 million for the Project.

The costs of implementing mitigation measures associated with other residual impacts of the Project (air quality, noise, visual amenity, surface water, groundwater and heritage) have been included in the operational expenditure for the Project.

Finally, the loss of surplus identified as a result of the Project ($13.1 million) is the potential loss of surplus to the agricultural industry, due to the temporary removal of land from agricultural use.

The individual CBA results for HVO North Action and HVO South Action are summarised in the sections below.

c HVO North results

The results for HVO North are summarised in Table 8.6. If operated on its own, the CBA found HVO North would provide a net benefit to NSW of $3,719.5 million in NPV terms. This comprises $1,706.7 million and $2,024.0 million in direct and indirect benefits respectively and estimated incremental indirect costs of $11.2 million in NPV terms.

Table 8.6 Cost benefit analysis – HVO North

Benefit	NPV (million)	Costs	NPV (million)
Direct benefits		**Direct costs**	
Net producer surplus attributed to NSW	-	Safeguard Mechanism and voluntary additional ACCU purchases^	$80.3
Royalties, payroll tax and Council rates	$1,548.1		-
Company income tax apportioned to NSW	$158.6		-
Total direct benefits	**$1,706.7**	**Total direct costs**	**$80.3**
Indirect benefits		**Indirect costs**	
Net economic benefit to landholders	-	Air quality impact^^	-
Net economic benefit to NSW workers	$676.4	GHG emissions^^	$1.7
Net economic benefit to NSW suppliers	$1,347.5	Noise impact^^	-
		Traffic and transport impact	$0.7
		Net public infrastructure cost	-
		Surface water impact^^	-
		Groundwater impact^^	-
		Biodiversity impact^^	$51.7
		Loss of surplus to other industries	$8.7
		Visual amenity impact^^	-

Benefit	NPV (million)	Costs	NPV (million)
		Historical heritage^^	-
		Aboriginal cultural heritage^^	-
Total indirect benefits	**$2,024.0**	**Indirect costs^^**	**$70.2**
Total economic benefit of Project	**$3,730.7**	**Total incremental cost of Project**	**$11.2**
NPV of Project – ($m)	**$3,719.5**		

Notes: ^ Refer to Section 8.4.1ia
^^ Management and mitigation costs are included in the operating and capital costs.

d HVO South results

The results for HVO South are summarised in Table 8.7. If operated on its own, the CBA found HVO South would provide a net benefit to NSW of $2,023.5 million in NPV terms. This comprising $935.6 million and $1,094.4 million in direct and indirect benefits respectively and estimated incremental indirect costs of $6.5 million in NPV terms.

Table 8.7 Cost benefit analysis – HVO South

Benefit	NPV (million)	Costs	NPV (million)
Direct benefits		**Direct costs**	
Net producer surplus attributed to NSW	-	Safeguard Mechanism and voluntary additional ACCU purchases^	$267.2
Royalties, payroll tax and Council rates	$837.3		-
Company income tax apportioned to NSW	$98.3		-
Total direct benefits	**$935.6**	**Total direct costs**	**$267.2**
Indirect benefits		**Indirect costs**	
Net economic benefit to landholders	-	Air quality impact^^	-
Net economic benefit to NSW workers	$412.1	GHG emissions^^	$2.1
Net economic benefit to NSW suppliers	$682.3	Noise impact^^	-
		Traffic and Transport impact	-
		Net public infrastructure cost	-
		Surface water impact^^	-
		Groundwater impact^^	-
		Biodiversity impact^^	$7.5
		Loss of surplus to other industries	$4.4
		Visual amenity impact^^	-
		Historical heritage^^	-
		Aboriginal cultural heritage^^	-

Benefit	NPV (million)	Costs	NPV (million)
Total indirect benefits	**$1,094.4**	**Indirect costs**	**$21.3**
Total economic benefit of Project	**$2,030.0**	**Total incremental cost of Project**	**$6.5**
NPV of Project – ($m)	**$2,023.5**		

Notes: ^ Refer to Section 8.4.1ia
^^ Management and mitigation costs are included in the operating and capital costs.

e Sensitivity analysis

A systematic sensitivity analysis of the estimated net benefits of the Project was undertaken as part of the EIA, consistent with the Guidelines. This sensitivity analysis shows that the estimated net benefits are robust in the sense that they remain strongly positive after testing all key assumptions underpinning the analysis.

In isolation, the estimated net benefit of the Project is most sensitive to the coal price assumptions underpinning the analysis, but even assuming coal prices are 25% lower than under the central case assumptions, the net benefits to NSW of the Project are estimated to be $4,785.7 million, representing a 15.9% decrease from the central estimate. The lower bound, or pessimistic case, estimate of net benefits, which takes the combined assumptions around coal prices, capital expenditure, operational expenditure as well as worker, environmental impacts and supplier benefits, yields an estimated net benefit of $4,432.2 million in NPV terms. The upper bound, or optimistic case, estimate, based on the combined optimistic assumptions, is $6,768.9 million in NPV terms.

Note: ^ NPV in 2025 Australian dollars based on a 7% real discount rate. Indirect costs have been included in the figure.

Figure 8.2 Systematic sensitivity analyses of the results of the CBA to key assumptions (NPV $ million^)

Given the timeframe of the Project mining (2027 to 2045) the potential net benefits are sensitive to the discount rate used for the analysis. Under central case assumptions, the proposed development is expected to generate $5,692.4 million of potential net benefit using a 7% discount rate. Using a 4% discount rate increases the potential net benefit to $7,378.0 million; conversely a 10% discount decreases the potential net benefit to $4,514.5 million.

ii Local effects analysis

Consistent with the Guidelines, the LEA uses a similar framework to the CBA but is focussed on the net economic impacts to the local community. The Guidelines refer to the local area as being consistent with the relevant SA3 as defined by the ABS. For the Project the Lower Hunter SA3 area is used in the LEA.

The majority of the HVO North Action Area is in the north-west Lower Hunter on the border between the Lower Hunter and Upper Hunter SA3. HVO South is situated completely in Lower Hunter, whereas a small portion of HVO North is situated in Upper Hunter. As a result, it is conservatively assumed that the majority of local effects of the Project are attributed to the Lower Hunter SA3 region.

However, given the Project's central location between Muswellbrook and Singleton, it is not unreasonable to assume that many of the benefits that accrue to the Lower Hunter region could also accrue to the neighbouring Upper Hunter region nearby, noting that the majority of the workforce comes from Singleton compared to Muswellbrook.

Given the nature of mining operations, it is also acknowledged that many of the inputs may be supplied from the broader NSW region. It is expected though, based on current operations, that only a proportion of the inputs will be supplied from the Lower Hunter region and some of the workforce is sourced from the wider region. As a result, the Project will generate economic benefits to a broader region; for example, due to supplies that are sourced from the wider Upper Hunter region, Newcastle and some of the surrounding regional communities situated near the Project.

Underpinning the LEA are the assumptions that:

- local rates, of $31.5 million in NPV terms are paid to local council under the Project case
- no net producer surplus accrues to the region (conservative assumption)
- no company income tax accrues to the Lower Hunter SA3 region (conservative assumption)
- based on information provided by HVO, 75% of the Project workforce comes from the SA3 region.

The LEA found that the Project will deliver an estimated net benefit of $1,778.1 million to the Lower Hunter region in NPV terms. Table 8.8 summarises the net benefit of the HVO Complex, as well as the estimated net benefit of HVO North Action and HVO South Action, if they were to be operated as separate mine sites.

Table 8.8 Net benefits to the LEA for HVO North, HVO South and the HVO Complex

Benefits	HVO Complex (million*)	HVO North (million*)	HVO South (million*)
Direct benefits			
Net producer surplus attributed to Low Hunter	-	-	-
Royalties, payroll tax and Council rates	$72.1	$54.5	$16.3
Company income tax apportioned to NSW	-	-	-
Total direct benefits	**$72.1**	**$54.5**	**$16.3**
Indirect benefits			
Net economic benefit to landholders	-	-	-
Net economic benefit to NSW workers	$990.9	$617.8	$378.6
Net economic benefit to NSW suppliers	$790.3	$597.1	$302.4

Benefits	HVO Complex (million*)	HVO North (million*)	HVO South (million*)
Total indirect benefits	**$1,781.2**	**$1,215.0**	**$680.9**
Total Project economic benefit	**$1,853.3**	**$1,269.5**	**$697.3**
Indirect costs	**$75.2**	**$61.8**	**$14.0**
NPV of Project – ($m)	**$1,778.1**	**$1,207.7**	**$683.3**

Note: *NPV in 2025 Australian dollars based on a 7% real discount rate.

The net benefit is driven by:

- Benefits to local workers of $990.9 million in NPV terms for the HVO Complex, and $617.8 million and $378.6 million for HVO North and HVO South respectively. It is assumed that the proportion of workers sourced from the Lower Hunter region would remain consistent at the complex level, and between HVO North and HVO South. It is estimated that around 75% of the workforce expected for the Project is sourced from the Lower Hunter region.

- Benefits to local suppliers of $790.3 million in NPV terms for the HVO Complex, and $597.1 million and $302.4 million for HVO North and HVO South respectively. These estimates are based on the assumption that 37% of the inputs to production are from the region. It is also assumed that the proportion of inputs that are sourced from the local region would remain constant at the complex level and between HVO North and HVO South.

- Payment of local council rates of $72.1 million in NPV terms over the life of the Project, which comprises the estimated land tax and payments to the Singleton Council. For HVO North and HVO South, the total payments to council are estimated to be $54.5 million and $16.3 million in NPV terms.

A sensitivity analysis was also conducted for the LEA, which demonstrated that the estimated local effects are robust, with a lower bound estimate of net benefits to the Lower Hunter region of $1,636.3 million and upper bound estimate of $1,810.0 million in NPV terms for the Project.

iii Summary and conclusion

The results of the EIA indicate that overall, the Project is expected to generate significant net benefits and is also expected to generate increased economic activity and employment within the NSW community.

The estimated net benefit of the Project is $5,692.4 million in NPV terms (using a 7% discount rate). The net benefit is most sensitive to the coal price assumption used in the CBA; however, the sensitivity analysis demonstrated that even with the most pessimistic assumptions around coal prices, capital expenditure, operational expenditure, worker and supplier benefits as well as indirect costs, the net benefits to NSW will remain significant at $4,432.2 million in NPV terms.

Given the relatively long timeframe of the Project, the net benefits are also sensitive to the discount rate used for the analysis. Again, the results remain strongly positive when tested under different discount rates. The NPV of the estimated net benefits to NSW range from between $4,514.5 million and $7,378.0 million under real discount rates of 10% and 4%, respectively.

The LEA considered the costs and benefits of the Project on residents of the Lower Hunter region and found that the Project is expected to deliver a net benefit to the region of $1,778.1 million.

Given the significant net benefits of the Project as demonstrated by the outcomes of the EIA, the Project is desirable and justified from an economic efficiency perspective.

8.4.2 Social

i Introduction

This section provides a summary of the social impact assessment (SIA) prepared for the EIS (EMM 2022c) and the Amendment Report (EMM 2025a) prepared for the Project. The SIAs were prepared in accordance with relevant government assessment requirements, guidelines and policies, and in consultation with the responsible government agencies, including:

- the *Social Impact Assessment Guideline for State Significant Projects* (SIA Guideline 2023) (DPIE 2023a)
- the *Technical Supplement: Social Impact Assessment Guideline for State Significant Projects* (SIA Technical Supplement 2023) (DPIE 2023b)
- the *Cumulative Impact Assessment Guidelines for State Significant Projects* (DPE 2022a)
- the *State Significant Development Guideline – Preparing an Amendment Report* (DPE 2022b).

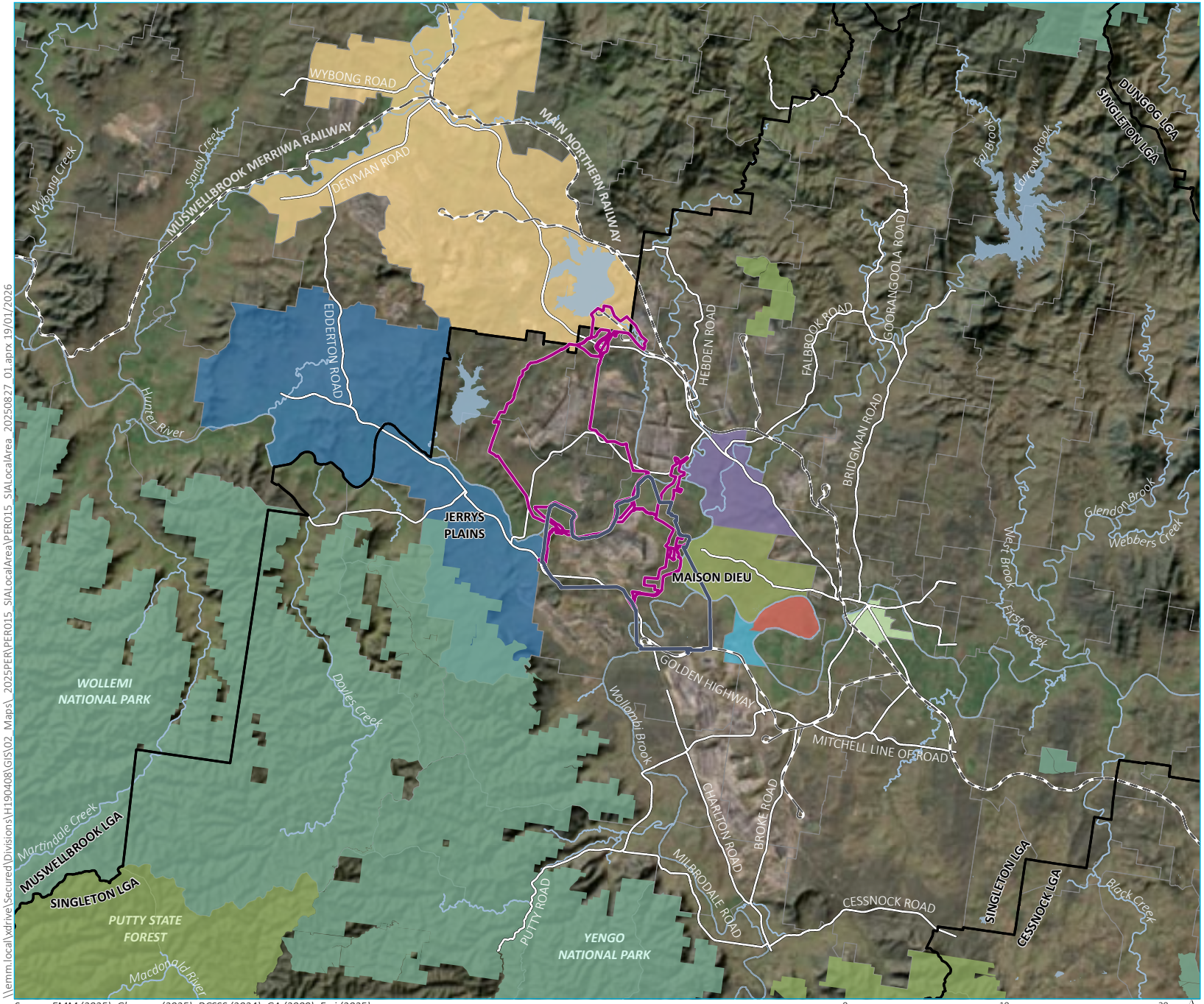
Given that HVO is operated as a complex, the SIAs considered the impacts and benefits of the HVO Complex as a whole, as summarised in this section.

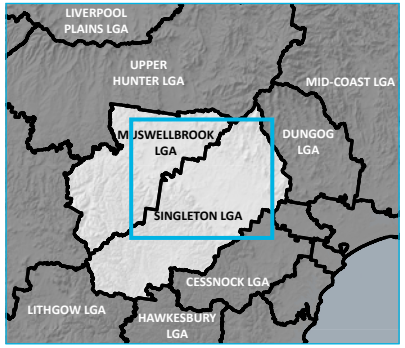
ii Existing environment

A Town Resource Cluster (TRC) analysis was undertaken to examine social and economic linkages between the Project and key towns across the broader region. To inform the TRC analysis, eight localities were identified as resource centres which may experience social and economic effects associated with the Project such as employment, Project workforce expenditure and participation within the local community and suppliers' business expenditure. The localities identified as resource centres were Singleton, Maitland, Cessnock, Muswellbrook, Lake Macquarie, Newcastle, Scone and Port Stephens.

While the impacts and benefits of the Project will be experienced locally, direct and indirect impacts (both positive and negative) may be farther reaching. In accordance with the SIA Guideline (DPIE 2023a), the SIA adopted a local study area (refer to Figure 8.3) along with a regional study area set within a broader social area of reference (refer to Figure 8.4).

Baseline information used to identify key existing social conditions, including access to housing, social services, health and wellbeing, employment and economic livelihoods, was obtained for the local, regional and reference areas and presented as the social baseline.





KEY

- HVO North Action Area
- HVO South Action Area

ABS SA2 area

- Muswellbrook
- Singleton

SSC (State suburb)

- Jerrys Plains
- Masion Dieu
- Camberwell
- Gouldsville
- Long Point
- Local government area
- Suburb boundary

Existing environment

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

SIA local area

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Source: EMM (2025); Glencore (2025); DCSSS (2024); GA (2009); Esri (2025)

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GDA2020 MGA Zone 56

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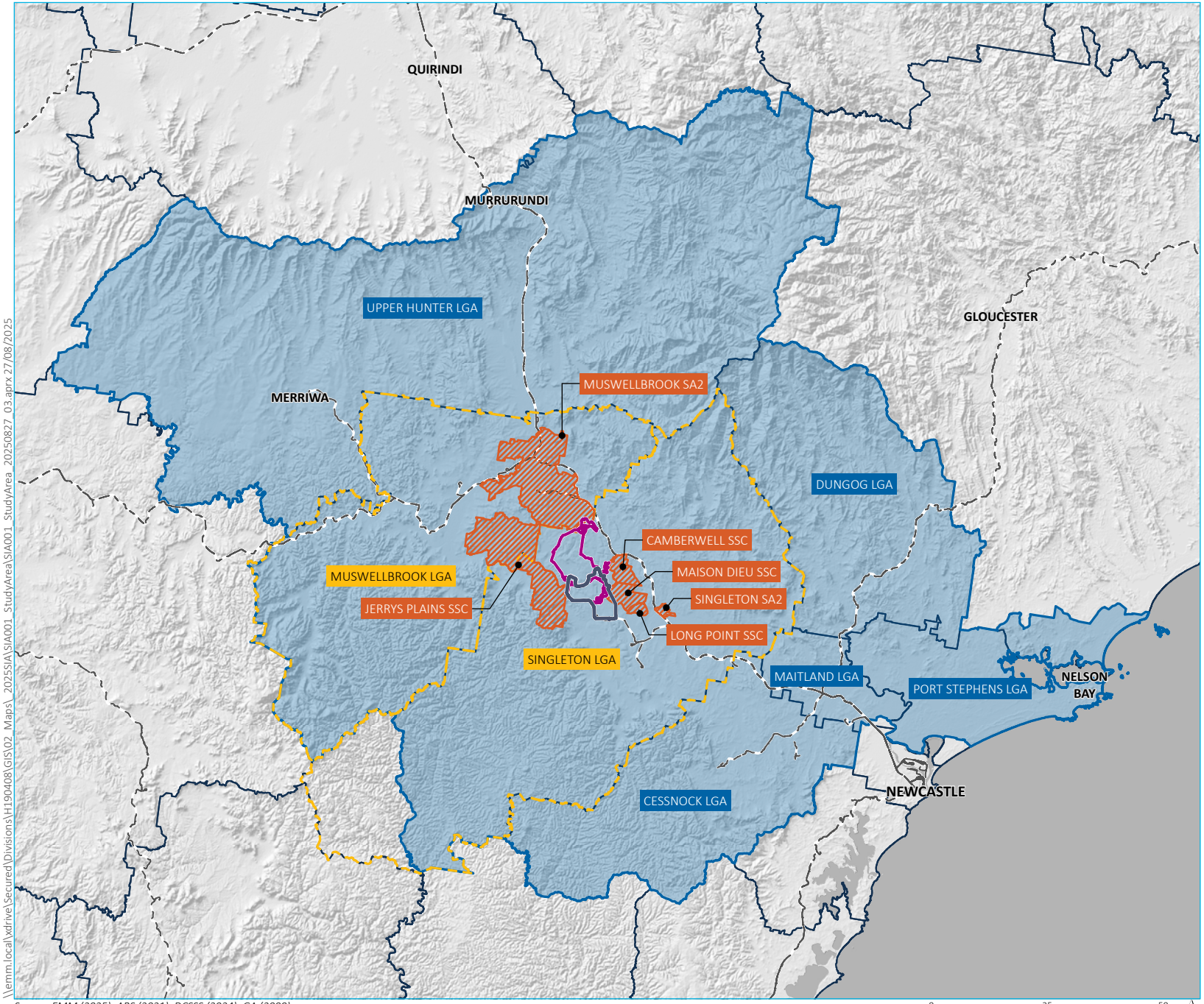
HVO Continuation Project
HVO North Public Environment Report
Figure 8.3

EMM creating opportunities



KEY

- HVO North Action Area
- HVO South Action Area
- Local area
- Regional area
- Area of reference
- LGA boundary

Existing environment

- Rail line

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Source: EMM (2025); ABS (2021); DCSSS (2024); GA (2009)

SIA social locality

HVO Continuation Project
HVO North Public Environment Report
Figure 8.4

EMM
creating opportunities

iii SIA engagement

Extensive engagement with a variety of stakeholders was undertake during the EIS engagement phase for the Project (as described further in Chapter 9). Feedback from stakeholders and the broader community has been varied and includes both positive and negative views on a range of topics including traffic and transport impacts, mine rehabilitation and final landform, visual amenity, noise impacts and air quality concerns, and benefits for the local economy.

Particular engagement was undertaken specifically to inform the SIA for the EIS. This consisted of:

- in-depth interviews with the near neighbours and landholders, local community members, local government key stakeholders and service providers (conducted via face-to-face, telephone and videoconference)
- a community survey (administered online)
- workforce and supplier surveys (administered online)
- consultation with Aboriginal stakeholders (conducted face to face via workshops and telephone).

All consultation activities sought to understand how participants viewed their community, including identified values, strengths and vulnerabilities, and identify how the Project may impact on their community including the key issues or potential impacts, and opportunities or potential benefits.

iv Social impacts and benefits

a Methodology

The methodology for the SIAs followed that set out in the NSW government's SIA Guideline (DPIE 2023b). They were informed by best practice guidance and standards set out by the International Association for Impact Assessment (IAIA) and International Finance Corporation (IFC).

Figure 8.5 illustrates the phases of the SIA methodology which was adopted based on the applicable requirements and standards.

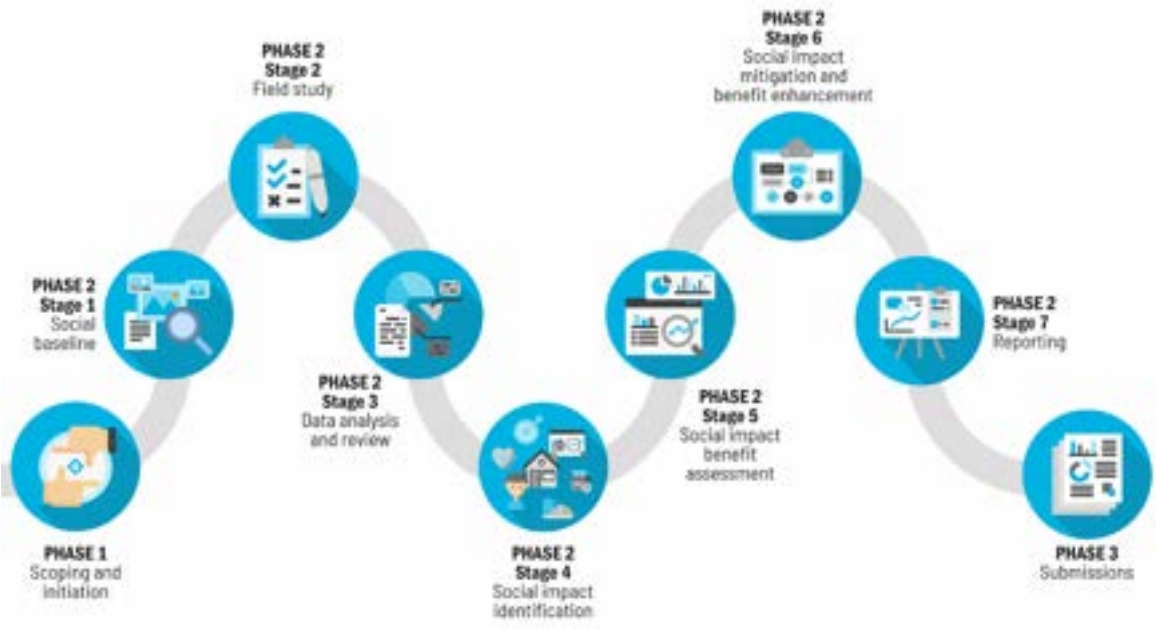

Figure 8.5 Phases of the SIA methodology

With a clear understanding of the scope of the Project, social baseline, and input from the field studies, suitably qualified social scientists identified the Project's potential social impacts. This analysis informed the social risk assessment (approach to Stage 4).

Identification of the Project's potential social impacts and benefits was completed through several complementary approaches, helping to triangulate the findings and confirm their accuracy. These approaches included:

- consideration of environmental impacts – review of similar Projects in the area, as well as available academic and Grey literature to identify potential impacts
- consideration of local plans and policies – findings from the review aided to contextualise and understand the local priorities as well as to identify local values
- consideration of the existing social environment – demographic and social analysis in the form of a social baseline study
- consideration of feedback generated through stakeholder engagement including findings from SIA field studies along with broader engagement undertaken for the Project
- findings from other technical studies were reviewed and potential social impacts defined
- consideration of cumulative impacts – review of documentation from other existing and proposed projects in the study area.

The social risk assessment stage assessed each of the social impacts identified to predict the nature and scale of potential social impacts during construction and operation of the Project. A social risk approach was adopted to assess the consequence and likelihood of potential positive and negative social impacts with and without mitigation. The social risk assessment matrix, including the assessment framework used for the assessment, is provided in the SIA Guideline Technical Supplement (DPE 2023c).

The following data and information have been used to identify the potential social impacts and their associated risks:

- data collected as part of the social baseline analysis including the findings from SIA field study and EIS engagement activities
- academic research
- relevant previously conducted SIAs
- relevant government and agency reports.

b Key social impacts

A summary of the Project's social impacts which have an assessed residual significance of medium or higher are presented in Table 8.9. No mitigated social impacts rated as a high risk have been identified for the Project, with all potential impacts ranked as medium or low. The full assessment of potential impacts is provided in Chapter 6 of the EIS SIA and Chapter 7 of the Amendment SIA.

Table 8.9 Key social impacts

Impact/challenge	Significance (mitigated)
Impact of continued traffic congestion and road delays – construction	**Low**
Construction activities for the Project predominantly involve upgrades to a number of existing facilities and the realignment of Lemington Road. The peak construction workforce requirement is anticipated to be around 600 workers. The estimated peak number of construction related truck movements would occur towards the end of Year 2, where up to 1,072 truck movements (combined inbound and outbound) are forecasted. Light vehicle traffic generation includes a conservative assumption that all workers (peak of 600) would travel individually by car, arriving/departing across a two-hour period in the morning and afternoon peak periods. Whilst the additional traffic generated by Project construction is relatively small, it represents an incremental increase on a road network already operating under pressure. The traffic impact assessment concluded that appropriate treatments were warranted to mitigate traffic impacts associated with construction.	
Impacts due to continued generation of dust and diminished air quality	**Medium**
Continued generation of dust and exposure to diminished air quality was a key concern raised by stakeholders. Dust generation in the construction phase will largely be associated with works on the realignment of Lemington Road and has the potential to increase overall dust emissions in the early phase of the Project. This increase is not predicted to be of a magnitude that will change air quality outcomes for nearby neighbours. During continued operations modelling undertaken for the air quality assessment (Airen 2025) found that total suspended particulates (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 (particulate matter with a diameter of 10 micrometres or less (PM_{10}) and particulate matter with a diameter of 2.5 micrometres or less ($PM_{2.5}$)), 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, and the potential for exceedances is expected to be successfully managed using existing management measures, as demonstrated by HVO's air quality compliance history and reported in the Annual Environmental Reviews. The assessment found that the Project may contribute to an exceedance of the NSW Government's *Voluntary Land Acquisition and Mitigation Policy* criteria for annual average PM_{10} and $PM_{2.5}$ at one property – Receptor 121 (in Maison Dieu). This receptor already has mitigation rights for air quality and noise under the HVO South Approval. Separate to the properties who are afforded mitigation rights, HVO currently operates a near neighbour amenity resource program, which is a voluntary commitment to offer water tank cleaning or supply of water filters to neighbours that request such a service. HVO proposes to replace this program with a more structured program, in which the eligibility to partake in the program will be communicated to all residents within 4 km of the proposed mining area.	
Impact on community cohesion due to divergent opinions on the Project	**Medium**
Differing community values and opinions around economic, social and environmental impacts and benefits of the Project have the potential to create community dis-harmony. Construction and operation of the Project will support further coal extraction as a resource for energy production. Climate change is an indirect impact of coal resource extraction and consumption through GHG emissions. While the Project forms a small piece of the puzzle when it comes to climate change, this matter is of high importance to the broader Australian community. GHG emission mitigation is a key consideration in the development of the mine plan. For example, reducing fuel usage by mobile plant and equipment (which represents nearly half of estimated direct GHG emissions emissions) is an objective of mine planning and good practice. At a broader business level, both Yancoal and Glencore (as the JV partners of HVO) have announced commitments relating to GHG emissions from their operations, supporting the transition to a low carbon future. HVO will regularly review and update GHG minimisation measures, including consideration of electricity efficiency and source and fuel efficiency measures where reasonable and feasible. The HVO Air Quality and Greenhouse Gas Management Plan will also be updated to incorporate the Project, subject to conditions of any development consent, and this plan will be made publicly available through the HVO website.	

Impact/challenge	Significance (mitigated)
Impact on an increased housing demand impacting rental affordability and availability	**Medium**

During construction phase up to 180 construction workers may require accommodation 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.

The influx of up to 180 construction workers 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. Effective mitigation of this impact requires a planned approach to workforce accommodation to avoid negative impacts on the rental market in the local and regional area. Mitigations which serve to avoid negative impacts on the capacity and affordability of the local rental market include:

- where possible, prioritisation of short-term accommodation rather than rental accommodation to meet construction workforce requirements
- maximising the number of workers with applicable skills able to be sourced from within a one-hour commute from the Project site
- engagement with local councils on planned construction timeframes in consideration of local community and tourism events that also attract people to the local area.

Impacts from noise and vibration	**Medium**

Impacts on the health and wellbeing of nearby residents due to noise and vibration generated by construction and operational activities was raised as a concern by multiple stakeholders.

Development of the Project design has been an iterative one, undertaken in conjunction with the noise assessment and in response to submissions received, in which all reasonable and feasible mitigation measures have been considered in accordance with the NPfI (EPA 2017) to minimise noise impacts on sensitive receptors. These measures include progressive attenuation of the mining fleet, haul route selection to minimise exposure of significant noise generating mobile fleet, construction of a roadside bund on the exposed side of the haul road from the Mitchell Pit towards the Howick CPP, and equipment shutdowns during enhancing meteorological conditions. With all of these measures considered, achievable noise levels have been developed for HVO in accordance with the NPfI, which are proposed as the noise criteria for the Project.

In relation to ongoing operations, the design of the Project has been an iterative one, taking into account outcomes of the NIA and involved an extensive investigation into reasonable and feasible measures that could be included in the Project design to reduce residual noise levels at nearby residences. With these measures implemented, the assessment found that:

- 30 receptors (equivalent to 24 landholders) are predicted to experience a marginal impact due to the Project, of which:
  - 13 receptors will be entitled to voluntary mitigation rights
  - eight already have existing rights under current HVO approvals
- 17 receptors in the village of Jerrys Plains do not qualify for mitigation as per Section 4.2 of the NPfI.
- 12 receptors that already have mitigation rights in accordance with the HVO South 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.

The blast impact assessment conducted for the Project concluded that exposure to vibration and airblast overpressure can be effectively managed via existing blast management practices on site and through the application of reduced charge masses where required for private residential receptors in Maison Dieu and Jerrys Plains. An additional four blast monitors will be deployed by HVO to ensure effective monitoring and management of blasting activities.

Impact of continued anxiety about potential effects on water quality	**Medium**

The Project will generate dust through proposed construction activities and due to mining operations. Feedback received from local residents included concerns about potential effects on water quality and the continued anxiety about potential effects on water quality in the surrounding area. More specifically, the community raised concerns about the possibility of dust entering privately-owned water tanks, or in other ground water sources, and hence impacting the quality of available drinking water.

To ease anxiety about potential dust related impact on water tanks, HVO will Implement a more structured water tank inspection and cleaning service for all privately owned 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.

Impact/challenge	Significance (mitigated)
Impact on land management and pest control	**Medium**
Several near neighbours reported issues with pest animals including dogs, foxes and pigs which were potentially contributed to by adjoining HVO managed land. Pest and feral animal control measures will be undertaken during construction and operation in accordance with current mine practices and as outlined in the HVO Integrated Biodiversity Management Plan. Successful pest control programs rely on coordination with other mine sites and landholders. The community perception of the problem is ongoing, which suggests that more coordination and community consultation and engagement is required to manage the perception of the issue.	

c Key social benefits

A summary of the Project's social benefits which have an assessed residual significance of medium or higher are presented in Table 8.10. A number of social benefits have been identified with a very high or high benefit rating. The full assessment of potential benefits is provided in Chapter 6 of the SIA (EMM 2022d).

Table 8.10 Key social benefits

Impact/challenge	Enhanced benefit
Benefit of the realigned Lemington Road and new bridge over the Hunter River	**Very high**
Stakeholders recognised the potential benefits of improved road conditions delivered through the realigned Lemington Road and construction of a new bridge over the Hunter River. The realignment of Lemington Road will deliver improved road conditions and decrease travel time by approximately 9–10 minutes if travelling to/from the east of Comleroi Road/New England Highway alignment (i.e. travelling from Bulga or Mount Thorley). However, there will be a minor increase in travel time by about 2 minutes 20 seconds to 2 minutes 40 seconds if travelling to/from communities west of the current Lemington Road alignment such as Jerrys Plains to Singleton, when travelling at the posted speed of 85 to 95 km/hr, respectively. The new bridge over the Hunter River will substantially improve flood resilience. The current crossing has been underwater for a combined total of more than eight months since 2010. The improved design of the proposed new bridge would have kept Lemington Road clear of flooding for all of these rainfall events. The new Lemington Road alignment will therefore provide a more reliable access between the New England Highway and Golden Highway and will accommodate most flood events, thereby improving access for the community.	
Benefit of the Project contributing to ongoing stability of the local population	**Very high**
The continuation of the current HVO operational workforce will contribute to population stability, which provides certainty in planning and delivering social infrastructure and services. Such population stability also maintains community social cohesion with social networks and social capital being preserved. To further enhance the benefits of workforce and population stability there is an opportunity for HVO to take a coordinated and planned approach to mine closure. As per the *Integrated Mine Closure: Good practice guide*, it is a requirement that a full assessment of social impacts is undertaken well before the cessation of operations. This will enable HVO to further understand and manage the impacts on the community of operational closure, further minimising population change impacts on the local and regional provision of social infrastructure and services. Such planning would involve consultation with local and regional stakeholders and would explore potential legacy benefits for the community.	
Benefit of continued royalty payments to the NSW state government	**High**
The Minerals Council of Australia (2021) identified that between 2010–2011 and 2019–2020, the minerals sector (including coal) contributed $238.8 billion in taxes and royalties to federal, state and territory governments – $132.8 billion in tax and $106 billion in royalties. The EIA undertaken for the Project (EY 2025) found the total estimated net benefit of the Project to NSW will be $5,692.4 million in NPV terms, comprising $2,768.1 million in direct benefits created from the operation of the Project, $2,941.9 million in indirect benefits and an estimated at $17.6 million in indirect costs. The direct benefits of the Project include $2,395.2 million in royalty payments, payroll taxes and council rates. In the regional area, coal mining royalties make a significant contribution to delivery of infrastructure and services. In future years, state government planning for royalty allocation is anticipated to deliver this funding to impacted communities more directly and with additional transparency. While the Project has no control over how royalties are allocated, some interview respondents expressed the desire for a clearer line of sight on how royalties benefit impacted communities.	

Impact/challenge	Enhanced benefit
Benefit related to community grants and sponsorship	**High**
Participants in research conducted to inform the SIA discussed the benefits related to HVO community grants and sponsorship and noted the Project would allow the continuation of such support for local community groups. HVO has provided more than $700,000 in funding to around 150 projects since 2018. Possible enhancement of the community grants and sponsorships programs may be achieved through partnerships to deliver funding to support community capacity building and future transition planning. The strategic targeting of grant investment may also lead to improvements for communities experiencing extreme social disadvantage in the region. The ACHA prepared for the Project (EMM 2022c) and the ACHA Addendum (EMM 2023b) discusses social enhancement strategies which will be implemented for the Project, and include: • to assist in Closing the Gap HVO will consider a program to assist in increasing job readiness and work experience for local Aboriginal people. The program will initially run for the first 5 years of the operations and may be continued following an implementation review • as part of the development of the Social Impact Management Plan (SIMP) for the Project, HVO will liaise further with the Aboriginal Community to define an appropriate location and a frequency where briefings could be held on the HVO procurement processes to enable Aboriginal suppliers to be able to tender for work • as part of the SIMP for the Project, HVO will develop 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.	
Benefit of rehabilitation, future land use and ongoing land management	**High**
The Project will enable improved rehabilitation outcomes for the HVO Complex through contemporising the proposed final landform for areas to be disturbed by the Project, incorporating natural design landform features. Stakeholders noted that rehabilitation and final landform was a key positive outcome of the continuation of the Project. Future rehabilitation will occur in accordance with an updated Rehabilitation Management Plan. Should the Project not proceed, existing development approvals for the site would continue to apply.	
Benefit of the continued opportunities for local employment and training opportunities – construction and operation	**High**
Construction of the Project 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. Employment providers in the region reported construction jobs presented an opportunity for local jobseekers to gain meaningful employment. There was reported optimism that the Project would provide employment and training opportunities for young people and contribute to an improvement in the retention of young people in the area. The operation of the Project has an opportunity to provide long term employment and training for the existing workforce and new employees where natural attrition and retirement occur. The EIA (EY 2025) estimated the total wages paid to the workforce as a result of the Project will be $2,395.2 million in NPV terms. Workforce contributions to the regional economy would be substantially reduced should job losses occur and the current workforce either leave the region to find employment, stay in the region but are unable to find employment or have their incomes reduced. It is also noted that 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.	
Benefit of the continuation of procurement opportunities for local businesses – construction and operation	**High**
The Project will continue to provide commercial opportunities for local contractors, local businesses and suppliers during the construction and operation phase. An analysis of current supply chains undertaken as part of the preparation of the SIA indicated HVO had procured goods and services worth approximately $315 million from approximately 400 businesses across the Hunter Valley and greater Newcastle region. In 2023, HVO procured goods and services worth approximately $1 billion from approximately 788 businesses. The Project will generate benefits to local suppliers of an estimated $900.6 million in NPV terms. The Project is expected to confer a net benefit on the Lower Hunter SA3 region of $1,910.6 million in NPV terms. This includes potential opportunities for businesses to participate in the Project supply chain.	

Impact/challenge	Enhanced benefit
Benefit of allowing more time for transition planning	**High**

The Project will deliver an additional 19 years of mining at HVO North, and a further 12 years of mining at HVO South, beyond that currently approved. The Project will secure continued support for local businesses and employment of up to 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.

Effective transition planning is reliant on the Project's preparation and implementation of a workforce and business stakeholder transition plan and, particularly around commercial and business opportunities.

d Cumulative impacts

A summary of the potential cumulative impacts during the Project's construction phase and operation phase is given below in Table 8.11 and Table 8.12, respectively.

Table 8.11 Key cumulative impacts – construction

Impact/challenge
Construction workforce demands
Total cumulative construction labour equates to a peak of 6,066 construction workers in 2027. This includes 600 construction workers for the amendment and 5,466 construction workers for other projects. The contribution of the Project to estimated peak cumulative construction demand in 2027 is approximately 11.3%. These number account for the nation-wide transition to renewables, which is prominent throughout the Hunter region due to the progression of the Hunter-Central Coast Renewable Energy Zone, which spans from Muswellbrook to Newcastle. In Singleton and Muswellbrook, there are currently 20 proposed or approved non-resource projects which will contribute to cumulative construction demand, of which 17 are renewable energy generation or storage and two are transmission projects.
Employment and population change
It was conservatively estimated that up to 30% of the cumulative construction workforce would need to be sourced from outside the region and area of reference. Using this measurement, the temporary influx of the peak cumulative construction workforce would result in approximately 1,774 workers. This would result in a 4.3% increase to the regional population and a 0.5% increase to the area of reference. This is based on the assumption 'worst case' which is unlikely due to the geographic disbursement and potential construction delays of proposed projects. Although there has been an increase in construction workforce demand due to cumulative projects, the contribution of the amendment regarding construction workforce remains unchanged.
Competition for labour
The cumulative demand for up to 6,066 construction workers between 2027-2029 could affect existing businesses and initiatives which require similar skills. The majority of construction workforce demand is derived from non-resource projects. As such, it is unlikely that labour demand will affect the amendment due to differing skill requirements across industries. This is based on the assumption that non-resource projects such as renewable energy technologies and transmission infrastructure will require a large number of specialised workers such as electrical and mechanical engineers. Therefore, it is unlikely that demand for skilled workers will overlap significantly between the resource and non-resource construction industries.

Impact/challenge
Housing and accommodation
The availability of rental and short-term accommodation in the local and regional study areas is constrained. Construction labour sourced from outside of a distance of a 1 hour commute each way may require accommodation which may place further strain on the availability of rental housing and short-term accommodation. Cumulative demand for accommodation of temporary construction could have: • an impact on low-income and vulnerable groups in the regional area who seek access to affordable rental housing • accessibility impacts on vulnerable groups needing access to short-term emergency accommodation through specialist homelessness providers relying on hotels, motels, etc • an impact on the growing tourism industry by reducing access to short-term accommodation for visitors to the region, particularly visitors attending for key regional events • impacts on service workers (people not employed by the mining industry) who seek affordable housing. The cumulative concern most frequently raised by stakeholders related to housing and accommodation. Representatives from both Singleton Council and Muswellbrook Shire Council noted that the local area had limited capacity to absorb the housing demand generated by construction projects given the multiple developments in the area. Both councils highlighted that demand for temporary accommodation in the regional area is set to only increase given the multiple construction phases occurring over the next 5 years. Cumulative impacts on both rental housing and short-term accommodation were identified as critical issues during consultation with both councils and a number of service providers. Commitments to local hiring, provision of training and apprenticeship opportunities for local workers, and partnerships with local employment and training services could reduce the need for outsourcing of workers. The number of projects in the regional area suggests a long-term pipeline (possibly upwards of 10 years) of construction work opportunities in the regional area. With industry collaboration there is an opportunity to draw a larger permanent resident construction workforce to the regional area. This would have a positive effect on accommodation demand as workers may seek to buy in the regional area and relocate permanently if there is a clear pathway forward for long-term employment. Encouraging a larger permanent construction workforce in the regional area would benefit long term sustainability of these communities and the services and facilities they provide, as well as supporting long term economic benefits for business operators.
Traffic
There are a number of non-resource projects in the regional area that are anticipated to have overlapping construction phases and thus have a cumulative impact on traffic congestion and potentially on road safety. While the Singleton Bypass project is likely to be completed in 2026, specific projects to note in regard to cumulative traffic impacts in close proximity to the Project include the Hunter Transmission Project and Maison Dieu Solar Farm.
Social infrastructure
Prolonged demand on social infrastructure is not anticipated; however, health services such as general practitioners and emergency services will likely experience temporary elevated demand with multiple construction phases occurring within a 5-year period. It is assumed that at least 70% of construction workforces will have their place of residence within the broader area of reference. The social baseline suggests that social infrastructure in the area of reference can support greater demand; however, locally and regional, services may be placed under strain. Beneficially, local socio-economic growth (temporary or permanent) associated with projects and development can justify increased funding for the provision of services.
Amenity
Potential cumulative impacts to regional amenity may occur due to the number of Projects in the region, as well as the proximity of projects to residential areas and towns. A key issue raised by stakeholders was the impact on amenity caused by noise and dust from mining operations throughout the local and regional area. The air quality and noise impacts of the Project during construction in the context of surrounding developments have been considered in the air quality and noise impact assessments undertaken for the Project (refer to Appendix H and I of the EIS (EMM 2022a) respectively, and the Amendment report (EMM 2025a)). With respect to air quality, construction emissions, largely from the construction of the Lemington Road realignment, have the potential to increase the overall dust emissions in the early phase of the Project (that is, the first two to three years) but these increases are not predicted to be of a magnitude that will change the air quality outcomes for privately owned sensitive receptors. Nevertheless, appropriate management and monitoring will need to continue during the construction activities.

Table 8.12 Key cumulative impacts – operation

Impact/challenge
Operational workforce demands
Peaking in 2027, the cumulative labour demand equals approximately 10,565 operational workers. This includes 1,500 operation workers for the Project, and 9,065 workers required for other projects. Approximately 8,867 of cumulative demand will stem from resource project operations in 2027, with a further 198 for non-resource projects. The operational workforce for non-resource projects is expected to peak in 2029, with 432 workers. Labour demand is projected to lower over the next ten years to 6,219 in 2035 with 93.1% of the workforce share in resource projects. Due to the low operational workforce demand for non-resource projects, mine projects are expected to contribute to greater workforce demand. It is expected that 432 workers will be required for the operation of non-resource projects in 2035, or 6.9% of total cumulative demand.
Employment and population change
There are a number of mines that have recently closed or are closing in the regional area in the period up until around 2030. This includes This includes Liddell Coal Operations, Integra Underground, and Muswellbrook Coal. The remainder of coal mines are scheduled to close leading up to 2050. The Future Jobs and Investment Authorities Issues paper noted that the impacts of a decline in coal mining in the Hunter region will likely be concentrated between 2030 and 2040 with most coal mines and power stations expected to close during this time (Department of Regional NSW 2024). Mining workers make up the largest proportion of workers in the regional area, with 3,751 mine workers in Muswellbrook LGA and a further 6,817 in the Singleton LGA, totalling approximately 35.4% of all jobs in the sub- regional area (REMPLAN 2025).
Housing and accommodation
Many resource projects in the regional area are continuations of current operations, with non-resource projects having significantly smaller operational workforces. It is not anticipated that the operational workforces for these projects will significantly change the demand for housing and accommodation. The housing market in the regional area is connected to mining project activity, with a large proportion of dwellings being associated with mines in the area, either directly or indirectly. With mine closures occurring over the next 25 years with associated job losses, the property market may be adversely impacted by declining property values. This would affect homeowners and investors. However, declining property prices also has a positive impact for low-income and vulnerable people in being able to access the private housing market.
Social infrastructure
The continued stability of job provision that the Project would provide is beneficial in a cumulative scenario of multiple mine closures over the next 10 years. It will help to ensure planned and well managed demand and service delivery whilst the region begins its transition away from mining.
Amenity
The cumulative amenity concerns most frequently raised by stakeholders related to the effects of dust, visual and noise. Multiple projects near each other can result in cumulative amenity impacts that impact the way a landscape and environment is experienced. Cumulative amenity impacts can arise from the presence of similar Projects that may have a low impact individually, but when experienced together, can have a significant amenity impact on the local and regional environment. **Air quality** Whilst the current conditions of air quality experienced by local residents will continue in the short term, the cumulative impact of dust and diminished air quality should decrease over time as other mines in the region cease operations. Effective rehabilitation of mine sites will play an important role in the improvement of air quality. **Visual** A number of viewpoints of HVO will continue to experience cumulative visual amenity impacts (i.e. concurrent views of multiple open cut mining operations). Each of the mining and industrial developments are well-established features of the visual landscape surrounding the HVO North Action Area and are predicted to close prior to the completion of the Project. Therefore, the visual landscape surrounding the HVO North Action Area will undergo significant (positive) change over the life of the Project.

Impact/challenge
Noise and vibration As other mines in the local area close (thus ceasing their noise impacts), the Project's proportional contribution to cumulative noise impacts will increase. Cumulative noise impacts have been assessed and considered by the Noise Impact Assessment (EMM 2025b) prepared for the Project, and voluntary mitigation rights will be afforded to properties as triggered by the VLAMP. Notably, HVO will continue to offer voluntary mitigation rights to all residences that currently hold them around the complex, despite these rights not being triggered by predicted noise levels associated with the Project at all of these properties. It is also noted that several residences already hold voluntary mitigation and acquisition rights with numerous mines in the area. In relation to blasting, the risks associated with different open cut operations acting simultaneously can be effectively managed via the implementation of appropriate protocols (Enviro Strata Consulting 2022). There is a well-developed system of notification and interaction with the adjacent mines already in place.
Decision making systems
Concerns regarding community cohesion, climate change and sustainable production and consumption Progressive closure of coal mines in the region will reduce social pressure associated with mining practices contributing to climate change, though it will not resolve existing climate change impacts such as the increased frequency of extreme weather events. Social discourse on climate change and responsibility for sustainable production and consumption will continue to evolve over the coming decades. **Access to and use of local environments which have sustained biodiversity and ecological health** The Biodiversity MNES Report (Appendix D) identifies that cumulative impacts to biodiversity will only occur in the medium term, as it is expected that the proposed rehabilitation strategies will restore habitats and connectivity in the locality in the long-term. Therefore, it is not expected that access to biologically diverse environments will be impeded for future generations, though existing generations will and are experiencing the impact of fragmented environments. Chapter 7 describes the rehabilitation benefits in the long-term outcomes as a result of the Project. In the interim, mine closures and rehabilitation will be occurring, likely providing a progressive improvement in the region's biodiversity and improved community access to the benefits offered by these large rehabilitated areas. **Impacts to access and quality of places of local social and cultural significance** The ACHA (EMM 2023c) and Aboriginal heritage advice report (EMM 2025c) prepared for the Project identifies that, while a number of Aboriginal cultural heritage sites are within the HVO North BIAA, the investigations of the HVO North Action Area have contributed to the archaeological and scientific understanding of the region. Registered Aboriginal parties (RAPs) engaged to participate in the ACHA have also expressed a desire to place any salvaged artefacts from the Project in a keeping place accessible to the Aboriginal community, creating a new 'Aboriginal place' which would form an important continuation and re-imagining of cultural heritage of the region for future generations. The Project has also been designed to continue avoidance of the significant cultural heritage site, CM-CD1, and two scarred trees along the Lemington Road realignment in HVO North. These proposed management measures are anticipated to provide opportunities the local Aboriginal community to maintain a cultural connection with the landscape by having continued access to sites of high significance and will help to achieve intergenerational equity by allowing retention of cultural materials for cultural and educational purposes. Discussions between HVO and the RAPs facilitated the identification of a number of initiatives across key Closing the Gap themes including health, education, business, finance, employment, culture, and community. **Equity in economic opportunity** Other than HVO, the Mount Pleasant Optimisation Project is anticipated to be the only remaining resource sector (coal) Project past 2042 and will only offer 1,670 jobs. AGL has also closed or announced the planned closure of its two power stations in the Hunter Valley, both of which are in close proximity to HVO; Liddell closed in April 2023, and Bayswater will close between 2030 and 2033. This will result in further pressure and job competition as local workers transition to alternate employment. The Government's position around transition planning for the region is principally to secure alternate employment in similar sectors, particularly focusing on renewable energy. Of particular concern is securing equity in employment opportunities for mature people, particularly given the possible need for skills transitioning. Of note with respect to Indigenous participation in the workforce, renewables and government projects are now required to deliver Indigenous Participation Plans under the First Nations Guidelines for the NSW Electricity Infrastructure Roadmap (DPHI 2025). While the broader planning context of transitioning to renewables may improve cumulative employment equity for indigenous employment in the region, this is reliant on realisation of planned transition outcomes for the region. Furthermore, management of transition opportunities for mature employees is particularly important, as this is not enabled under existing structures and the proposed transitions to "new" industries. Within the cumulative context of regional employment, the Project will contribute to intergenerational equity within the region as it adds further defined provision of employment and training opportunities, and a structure within which transition planning and related upskilling can occur over the Project lifetime. A defined workforce management plan is critical to defining need, setting Project responsibilities and providing clear outcomes for the workforce within the context of regional transition from mining.

v Summary and conclusion

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. Accordingly, the SIAs examined a local study area along with a regional study area set within a broader social area of reference.

The local study area includes the communities which directly surround HVO, being Jerrys Plains, Maison Dieu, Camberwell, Long Point, Gouldsville and Camberwell, along with the two key nearby townships of Singleton and Muswellbrook. The communities of the local study area are likely to experience direct social impacts associated with the Project including residential amenity, traffic, demands on social infrastructure and services, housing and accommodation, and community health and wellbeing.

Economic activity in the local area is dominated by coal mining, employing 22.2% of the people in the local area. Mining is the leading industry sector with respect to employment share in the local area followed by healthcare and social assistance (9.3%), and the retail trade sector (8.2%). Agriculture is also an important industry and accounts for the largest proportion of registered business.

No mitigated social impacts rated as a high risk have been identified for the Project, with all potential impacts ranked as medium or low. The key social impacts identified 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. A number of social benefits have also been identified with a very high or high benefit rating, including the realignment of Lemington Road and the improved, safer road conditions and accessibility this will deliver to the community, ongoing employment and stability of the local population, continued royalty payments to the State government, ongoing provision of community grants, improved rehabilitation outcomes, continuation of procurement opportunities for local businesses, and the benefit of allowing more time for transition planning in the Hunter Valley through the ongoing provision of jobs and flow on benefits.

Key mitigation measures to mitigate the potential social impacts include the implementation of a tank inspection and cleaning program, for which all private residences within 4 km of the proposed mining area will be eligible, the entering into a Voluntary Planning Agreement (VPA) with both Muswellbrook Shire Council and Singleton Council, and the development of a funding framework to enable funding of programs and projects that align with Closing the Gap initiatives, to the value of $1,000,000 over the first 10 years of the Project.

These mitigation measures, including the funding framework described, will be detailed in a SIMP to be developed for the Project.

8.5 Information sources

To ensure the environmental, social, and economic impacts and benefits of the Project are adequately understood, a number of assessments have been completed drawing on a significant body of historical information from within and surrounding the HVO North Action Area. All assessments completed for the Project have been undertaken in accordance with relevant policies and standards, integrating up-to-date baseline data in order to provide an adequate level of uncertainty in impact predictions.

In relation to specific environmental aspects, the groundwater model developed for the Project was independently peer reviewed to ensure the model was fit for purpose, and to provide enhanced reliability in model outcomes and impact predictions to groundwater resources and environmental receptors. A peer review was also undertaken of the flood model by BMT, which was undertaken at key stages throughout the model development and assessment, to again ensure the model was fit for purpose and to provide an adequate assessment of the potential flooding impacts of the Project.

To adequately understand the Project impacts to biodiversity matters and MNES, biodiversity surveys using contemporary survey methodologies in accordance with contemporary NSW and Commonwealth guidelines were completed over the HVO North Action Area, and the biodiversity assessment of the Project completed by an accredited BAM assessor. There are no uncertain biodiversity impacts predicted to occur as a result of the HVO North Action. It is considered that the potential impacts associated with the HVO North Action are therefore well known due to the comprehensive survey of the BIAA, and particularly noting the history of mining and similar operations in the Hunter Valley.

The approach undertaken with all assessments demonstrate that there is a high level of certainty in predicted impacts from the Project to the receiving environment, providing a high level of confidence to the decision maker when assessing and determining the Project. A detailed list of documents relied on to support this draft PER is presented in the reference list.

9 Consultation

9.1 Introduction

HVO has been part of the local community since operations commenced in 1949. A range of engagement mechanisms have been used to consult with neighbouring property owners, the local community, Federal, State and local government, regulators, service providers, local community groups, Aboriginal groups and HVO CCC members.

This chapter provides an overview of community and stakeholder engagement activities carried out during the assessment and determination process for the Project, including during the preparation of the EIS (EMM 2022a), Submissions Report (EMM 2023a), HVO North Amendment Report (EMM 2023b), Amendment Report (EMM 2025b) and Amendment Submission Report (EMM 2025e) to support the assessment process under the EP&A Act and the preparation of the referrals and this draft PER to support the assessment process under the EPBC Act. It also provides an overview of proposed future engagement activities.

This chapter provides a summary of community views in relation to the Project, as understood by the data and information gathered from the consultation undertaken, including data received from submissions made by the community during the public exhibition of the EIS (EMM 2022a) and Amendment Report (EMM 2025a). Appendix B also provides further detail on specific consultation activities undertaken relating to the Project.

9.2 Strategic communication approach

To deliver meaningful engagement that considered the needs of all stakeholders, a Communication and Stakeholder Engagement Strategy (CSES) was prepared. The CSES was prepared in accordance with the *Undertaking Engagement Guidelines for State Significant Projects November 2021* (SSD Engagement Guidelines 2021) (DPIE 2021), which require proactive and ongoing engagement across all project phases to:

- provide a better understanding of the Project and potential impacts, issues and benefits
- be able to consider responses to issues as a part of design, development and delivery of the Project
- help ensure engagement is undertaken at appropriate times throughout the life cycle of the Project.

The CSES identified objectives for the engagement process, Project stakeholders, and established communication channels, tools and activities mapped out for the duration of the planning and approval processes for the Project.

The strategic approach to communication and engagement was underpinned by a proactive issues-management approach, open and transparent two-way communication processes, and responsiveness to the communication needs and expectations of key stakeholders and the broader community.

9.2.1 International Association of Public Participation Spectrum of Engagement

The strategic communication and engagement approach considered the *International Association of Public Participations'* (IAP2) Core Values and Spectrum of Public Participation (i.e. inform, consult, involve, collaborate) as part of analysing the identified Project stakeholders, and selecting the most appropriate communication tools and activities. The IAP2 Spectrum of Public Participation is shown in Figure 9.1.

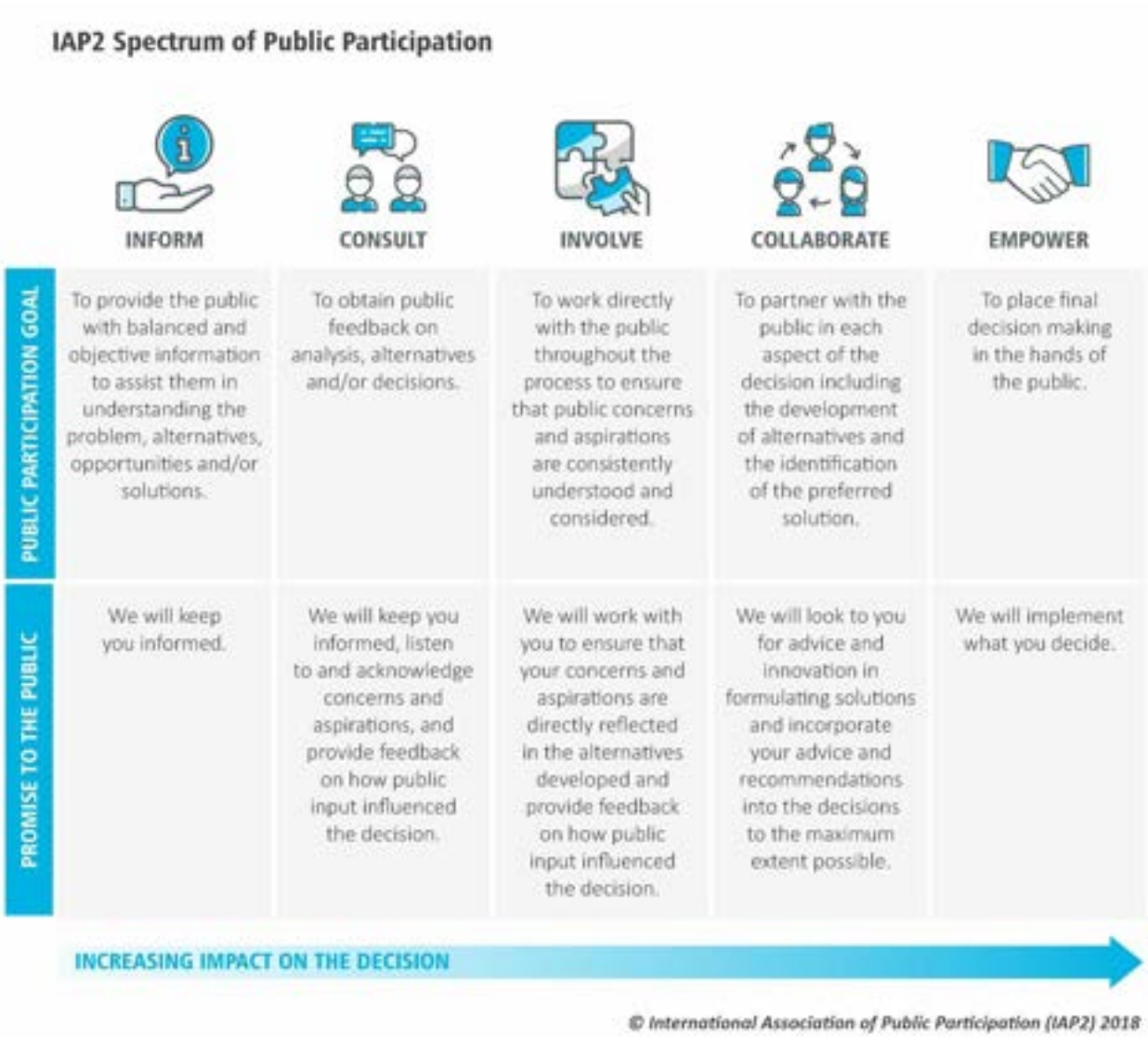

Figure 9.1 IAP2 Spectrum of Public Participation

9.2.2 Communication and engagement objectives

The objectives of the communication and engagement program are to:

- afford meaningful involvement of key stakeholders in the Project, by disseminating information on the Project, as well as gathering feedback to inform Project design and relevant technical studies
- build and strengthen relationships between key stakeholders and HVO
- provide internal and external stakeholder confidence that the design of the Project has been carefully considered, and that the environmental, social and economic impacts and benefits of the Project have been comprehensively assessed in accordance with relevant legislation and guidelines.

9.2.3 Stakeholder engagement during the COVID-19 pandemic

Stakeholder engagement for the Project was undertaken, in part, during the COVID-19 pandemic. Accordingly, the CSES was updated in 2020 in response to the COVID-19 pandemic, to ensure consultation could continue in a meaningful way, while adhering to government restrictions. Alternatives to in-person interactions were sought to ensure Project stakeholders remained informed and able to provide feedback. As COVID-19 restrictions eased in NSW, a hybrid engagement approach was adopted, that maintained stakeholder options for in-person and virtual meetings. In the engagement overview below in Table 9.4, 'in-person' meetings include online virtual meetings.

9.3 Stakeholder identification

In accordance with the principles of the IAP2 Core Values and Spectrum of Engagement, Project stakeholders and potentially impacted communities were identified using the existing HVO operational stakeholder list. Identified Project stakeholders were assessed and classified according to the anticipated levels of Project impact and their levels of interest and potential influence on project delivery outcomes. Existing knowledge of stakeholder issues from the operation of the current mine was also taken into account in designing in the Project.

Table 9.1 outlines stakeholder assessment criteria and categories.

Table 9.1 Stakeholder assessment and classification criteria and levels

Details	Level 1	Level 2	Level 3	Level 4
Project impacts on the stakeholder	High impact	Low impact	High impact	Low impact
Stakeholder levels of interest/influence on project decision-making/ outcomes	High interest/influence	High interest/influence	Low/medium interest/ influence	Low interest/influence

Table 9.2 provides an overview of key stakeholders and their level of engagement, based on the IAP2 Core Values and Spectrum of Engagement.

Table 9.2 Project stakeholder list and engagement level

Classification	Stakeholder group	Stakeholder name	IAP2 Spectrum Level of Engagement
1	Federal regulatory authorities	• Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Inform Consult
1	State regulatory authorities	• DPHI • NSW DEECCW – Conservation Programs, Heritage and Regulation (CPHR) • NSW DEECCW - Water • DPHI – Energy and Industry Committee • Heritage NSW • Mining, Exploration and Geoscience Department of Regional NSW • Rehabilitation and Securities Panel (RASP) of the NSW Resources Regulator • NSW EPA • Transport for New South Wales (TfNSW) • Subsidence Advisory NSW	Inform Consult

Classification	Stakeholder group	Stakeholder name	IAP2 Spectrum Level of Engagement
2	Local government	• Singleton Council • Muswellbrook Shire Council	Inform Consult
2	Elected representatives	• Federal: – Hon Joel Fitzgibbon MP, Member for Hunter, NSW (up to May 2022) – Mr Dan Repacholi MP, Member for Hunter, NSW (May 2022 – present)	Inform
		• State: – Mr Michael Johnsen MP, Member for Upper Hunter (up to May 2021) – Mr David Layzell MP, Member for Upper Hunter	Inform
		• Local: – Mayor Sue Moore, Singleton Council – Mayor Steve Reynolds, Muswellbrook Shire Council.	Inform Consult
2	Government organisations	• NSW Health • NSW Crown Lands • Hunter Local Land Services • NSW Rural Fire Service • NSW DPI – Agriculture • NSW DPI – Fisheries • EnergyCo	Inform Consult
2	Utility providers	• Ausgrid • AGL • Telstra • TransGrid	Inform Consult
1	RAPs	• AGA Services • Aliera French Trading • Bawurra Consultants • Cacatua General Services • Corroboree Aboriginal Corporation • Culturally Aware • DFTV Enterprises • Didge Ngunawal Clan • Devine Diggers Aboriginal Cultural Consultants • Gomery Cultural Consultants • Gunjeewong Cultural Heritage Corporation • HTO Group • Hunter Valley Aboriginal Corporation • Hunter Valley Cultural Services • Jarban and Mugrebea • Jumbunna Traffic Management Group Pty Ltd • Kauwul trading as Wonn 1 • Kevin Taggart • Lower Hunter Aboriginal Incorporated • Murra Bidgee Mullangari Aboriginal Corporation • Plains Clans of the Wonnarua People	Inform Consult Involve

Classification	Stakeholder group	Stakeholder name	IAP2 Spectrum Level of Engagement
		• Rhonda Griffiths • Ungooroo Aboriginal Corporation • Ungooroo Cultural and Community Services Inc • Upper Hunter Wonnarua Council Incorporated • Wallangan Cultural Services • Wanaruah Aboriginal Custodians Corporation • Wanaruah Local Aboriginal Lands Council • Wattaka Wonnarua Cultural Consultants Services • Widescope Indigenous Group Pty. Ltd. • Wonnarua Culture and Heritage • Wonnarua Elders Council Inc. • Wonnarua Nation Aboriginal Corporation	
1	HVO CCC	• All members of the HVO CCC	Inform Consult
1	Directly impacted landholders	• Landholders within existing and predicted acquisition zone as defined within the NSW Government's *Voluntary Land Acquisition and Mitigation Policy For State Significant Mining, Petroleum and Extractive Industry Developments* (VLAMP) (NSW Government 2018) • Landholders within existing and predicted mitigation zone as defined within the VLAMP	Inform Consult
2	Nearby landowners	Residences and businesses of: • Jerrys Plains • Maison Dieu • Camberwell • Gouldsville • Long Point	Inform Consult
2	Broader community	• Residents and businesses of Muswellbrook and Singleton	Inform
1	Recreation groups	• Hunter Valley Gliding Club • Singleton Clay Target Club	Inform
2	Industry groups	• NSW Minerals Council • Muswellbrook Chamber of Commerce and Industry • Business Singleton	Inform Consult
1	HVO workforce	• Existing HVO workforce	Inform Consult Involve

9.4 Engagement tools and reach

A variety of two-way communication tools were activated for the engagement, as part of promoting inclusive, transparent, structured and meaningful engagement for all stakeholders. The tools were designed to provide information about the Project and encourage feedback consistent with the SSD Engagement Guidelines 2021 (DPIE 2021).

Table 9.3 provides an overview of the communication tools used, their purpose and timing.

Table 9.3 Summary of key engagement tools

Tool	Summary	Timing
Website	Provides regular project updates, links to key project documents, and details opportunities for participation	Ongoing from September 2020
Email address	All project materials contained the email address details to provide access to the Project Approvals Manager and/or the Environment and Community Manager	Ongoing from September 2020
Phone	All project materials contained the contact details to provide access to the Project Approvals Manager and/or the Environment and Community Manager	Ongoing from September 2020
Project update briefings	Briefings provided an opportunity for stakeholders to meet with the Project team to express concerns, provide feedback and receive updates	Ongoing/as required
Community (drop-in) Information Sessions	In-person, drop-in community information sessions were offered as an opportunity for community members and stakeholders to receive updates, ask questions and provide verbal or written feedback to the Project team	November 2020 December 2020 March 2022 April 2022 February 2023 November 2023 April 2024 October 2024 February 2025 April 2025 September 2025 February 2026 March 2026
Aboriginal cultural heritage consultation meetings and workshop	Consultation meetings with RAPs in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010). Further to the requirements of the noted guideline a workshop was held in an effort to facilitate discussions between HVO and the RAPs to identify specific programs or initiatives for meaningful mitigation of the Project's heritage impacts, that would contribute towards Closing the Gap. An email was sent to all RAPs in February 2023 to advise RAPs the EIS was on public exhibition. Consultation with RAPs continued throughout the preparation of the Submissions Report, HVO North Amendment Report and Amendment Report.	Consult Meeting 1 – November 2020 Consult Meeting 2 – February 2021 Workshop – May 2021 Consult Meeting 3 – September 2022 Email in February 2023 advising of public exhibition Update Letter in July 2023 Email on 28 April 2025 providing notice of HVO North MOD 8 determination Copy of the Aboriginal Heritage Advice Report prepared for the Amendment report provided – July 2025.
Newsletters	Newsletters provided key information on the Project, Project updates and details of upcoming activities. Project newsletters are delivered via letter box drop to the local community and published on the Project website.	Ongoing from September 2020

Stakeholder engagement and interaction was logged using HVO's existing stakeholder management platform, to record and monitor key Project issues and themes, which have been addressed in the EIS (EMM 2022a) and this draft PER.

9.5 Engagement carried out

9.5.1 Government agencies and regulators

Table 9.4 provides a summary of the consultation activities undertaken with regulators and government agencies using the engagement tools and shown in Table 9.3.

Table 9.4 Engagement overview – Government agencies

Stakeholder/group	Method of engagement	Purpose of engagement
Federal government agency DCCEEW	Correspondence and meetings	• EPBC Act referral briefings • EPBC Act assessment process discussions • PER guidelines discussions
State government agency		
DPHI	Correspondence, meetings and site visits	• Site visits • Project briefings on key technical matters: – Project updates and amendments – SVC – final void, final landform and alternatives – noise assessment outcomes – ACHA and consultation – proposed approach to Commonwealth referrals and assessment process – overview of assessments proposed to inform the EIS (EMM 2022a) and Amendment Report (EMM 2023b) – requirements for Submissions Report (EMM 2023a) – biodiversity impacts and offset strategy – GHG emissions – assessment approach to Category 1 Exempt Land • Ongoing engagement and response to information requests throughout the assessment phase of the Project i.e. Response to Submissions, HVO North Amendment Report and the Amendment Report
NSW DEECCW – Water	Meetings	• Meetings to discuss preliminary outcomes of assessment on Carrington West Wing barrier wall • Project update and water impact assessment outcomes meeting • Review and comment on EIS (EMM 2022a) • Meeting to discuss matters raised in their submission on EIS (EMM 2022a) and approach to responding to matters in Submission Report (EMM 2023a)

Stakeholder/group	Method of engagement	Purpose of engagement
TfNSW	Meetings and correspondence	• Project briefings and discussions on: – realignment of Lemington Road – baseline data and traffic growth rate assumptions in the traffic assessment – traffic assessment outcomes for EIS (EMM 2022a) • Review and comment on EIS
NSW EPA	Meetings and correspondence	• Project briefings • Establish approach to the noise impact assessment for EIS • Briefings on the outcomes of the noise and air quality assessments for EIS • Correspondence to confirm the approach to addressing the assessment requirements relating to contamination for EIS • Review and comment on EIS • Meeting to discuss matters raised in their submission on EIS and approach to responding to matters in Submission Report (EMM 2023a) • Meeting to provide an overview of proposed amendments as part of Amendment Report (EMM 2025a) • Meeting to discuss the approach to responding to matters in Amendment Submissions Report (EMM 2025e)
CPHR	Correspondence and meetings	• Briefing and correspondence relating to Category 1 Exempt Land mapping • Project briefing on BDAR assessment outcomes and offset strategy for EIS (EMM 2022a) • Review and comment on EIS • Meeting to discuss matters raised in their submission on EIS and approach to responding to matters in Submission Report (EMM 2023a) • Project briefing on revised BDAR assessment outcomes for Amendment Report (EMM 2023b) • Meeting with CPHR to discuss Category 1 Exempt Land matters
Heritage NSW	Correspondence and meetings	• Project update – ACHA methodology for EIS (EMM 2022a outlined and RAP details provided • Consultation relating to the methodology for test excavations • Overview of ACHA consultation and study outcomes for EIS • Review and comment on EIS • Meeting to discuss matters raised in their submission on EIS and approach to responding to matters in Submission Report (EMM 2023a) • Briefing on outcomes of an addendum to ACHA for Submissions Report

Stakeholder/group	Method of engagement	Purpose of engagement
Mining, Exploration and Geoscience Department	Meetings and site visit	• Resources and economic assessment meeting and site visit • Review and comment on EIS (EMM 2022a) • Meeting to provide an overview of proposed amendments as part of Amendment Report (EMM 2025a)
Resources Regulator	Meeting	• Project update – Mine design and geotechnical investigations • Project update correspondence • Review and comment on EIS (EMM 2022a) • Provision of resource and reserve schedules
DPHI – Energy and Industry Committee	Meeting	• Project introduction and overview
• NSW Health • NSW Rural Fire Service • Hunter Local Land Services • Primary Industries Group (inclusive of Fisheries and Agriculture) • NSW Crown Lands	Correspondence	• Project briefing and relevant assessment outcomes • Review and comment on EIS (EMM 2022a)
Subsidence Advisory	Correspondence and meeting	• Project briefing and discussion on the realignment of Lemington Road • Review and comment on EIS (EMM 2022a)
Local government • Singleton Council: – Mayor and Councillors – Council Staff • Muswellbrook Shire Council: – Mayor and Councillors – Council Staff	Correspondence and meetings	• Project updates • Invitation to/attendance at HVO CCC meetings • Discussion regarding the proposed Lemington Road realignment design • Meetings to discuss/negotiate terms of planning agreements • Review and comment on EIS (EMM 2022a) • Meetings to discuss matters raised in submissions on EIS and approach to responding to matters in Submission Report (EMM 2023a) • Meetings to discuss amendments to Lemington Road design presented in the Amendment Report (EMM 2023b) • Meeting to provide an overview of proposed amendments as part of Amendment Report (EMM 2025a)
• Elected Representatives (Federal) • Elected Representatives (State)	Correspondence and meetings	• Project introduction and briefings

9.5.2 Community stakeholders

Table 9.5 provides a summary of the consultation activities undertaken with regulators and government agencies using the engagement tools and shown in Table 9.3.

Table 9.5 Community engagement overview

Stakeholder/group	Methods of engagement	Purpose of engagement
HVO CCC	• Ordinary meetings (quarterly) • Project update email (monthly)	• Project update presentations • Provide an opportunity to receive feedback
Hunter Valley Gliding Club	• Correspondence and meetings	• Project briefings • Overview of relevant assessment outcomes
Directly impacted landowners and nearby/adjacent landowners: • Jerrys Plains • Maison Dieu • Camberwell • Gouldsville • Long Point	• Project newsletters • Project website • Community information sessions	• Project progress update • Outcomes of scoping phase community consultation update • Opportunity to provide feedback/advice about two-way communication channels • Invitation to attend community information sessions • Overview of environmental assessment outcomes • Review and comment on EIS
Impacted landowners: • Jerrys Plains • Maison Dieu	• Phone call • Letter/email • Land owner specific information sheets • One on one meetings	• Provision of property specific information sheets for directly impacted land owners • Project progress update • Overview of environmental assessment outcomes • Briefing concerning changes to or updated mitigation/acquisition rights • Opportunity to provide feedback/advice about two-way communication channels • Review and comment on EIS
RAPs Total: 33	• Project updates (written) • Project newsletters • Project website • Consultation meetings • Workshop • Distribution of Project materials for consideration and feedback • Fieldwork	• Update about Project progress • Notification of Project proposal and registration of interest • Presentation of information about the Project • Gathering information about cultural significance and values • Review of draft ACHA • Provision of links to EIS and ACHA • Update on addendum to ACHA

9.5.3 Community and stakeholder views

i Views prior to publication of EIS

A summary of the key findings on the Project that emerged from community engagement carried out prior to preparation of the EIS (EMM 2022a), is provided in Table 9.6.

Stakeholder and community views regarding the Project were garnered through established knowledge in regard to community views and concerns as result of HVO being an established operation and the ongoing consultation and engagement activities specific to the Project as described above.

Feedback from stakeholders and the broader community was varied and includes both positive and negative views on a range of topics. Community views can be grouped into themes, as shown in Figure 9.2.

Figure 9.2 Engagement outcome themes prior to EIS (EMM 2022a)

Table 9.6 Community and stakeholder views prior to EIS (EMM 2022a)

Key themes	Stakeholder group raising concern	How the project addressed this issue
Traffic and transport impacts • Lemington Road realignment • potential travel time delays associated with the Lemington Road realignment • loss of amenity between Jerrys Plains and Singleton • flood immunity at the Hunter River crossing • construction and connectivity issues with broader road network • potential to impact on biodiversity and cultural heritage sites • visual and noise impacts to stakeholders located in Maison Dieu	• State regulatory authorities • Local government • Elected representatives • Government/ regulators • RAPs • Utility providers • Directly impacted landholders • Nearby landholders	• Early community feedback about the Lemington Road realignment, resulted in a strong trend of Jerrys Plains residents holding concerns about loss of amenity between Jerrys Plains and Singleton, travel time and flood immunity. • Mining at HVO North will progress through the existing Lemington Road alignment. The realignment of Lemington Road will improve the accessibility and reliability of the road as the primary access point between the Golden Highway and the New England Highway. • Alternative designs of the Lemington Road realignment considered community feedback, minimising travel time delays to road users, flood immunity and avoiding impacts on areas of high ecological value (i.e. Warkworth Sands Woodland of the Hunter Valley CEEC). • The construction of a new bridge over the Hunter River will meet the requirements of a one-in-ten-year flood protection design, which will improve accessibility and safety of the crossing, compared to the existing Moses Crossing low level bridge, which is often exceeded following heavy rainfall. • Construction of road upgrades, including the Hunter River crossing are to be undertaken in consultation with TfNSW, Singleton Council and local residents. • Construction of the road is to largely occur offline, as such impacts to road users is minimised. • Tree screening proposed as part of the Project to mitigate potential visual impacts to Maison Dieu residents and local road users. • Stakeholders were kept up to date with the design as it evolved, via newsletters, meetings and at community information sessions.
Air quality • increased dust • emissions and climate change • health impacts • impacts to dwellings and associated infrastructure	• State regulatory authorities • Elected representatives • Government/ regulators • Directly impacted landholders	• During consultation, nearby landowners raised concerns about poor air quality, as a result of the proposed Project, including: – coal dust causing property damage (i.e. to dwellings, solar panels, water tanks and vehicles) – risks to health, as a result of poor air quality. • Modelling results concluded that operational dust emissions due to ongoing mining activities are not expected to cause adverse air quality impacts at nearby privately-owned residential sensitive receptors. With the exception of, two private receptors that are eligible for voluntary acquisition rights under the VLMAP as criteria are exceeded on more than 25% of their property. These receptors currently have mitigation rights from HVO, with one receptor also holding acquisition rights under a neighboring mine development consent.

Key themes	Stakeholder group raising concern	How the project addressed this issue
		• Nearby landowners were contacted by HVO via letters/emails and meetings regarding any proposed changes in mitigation rights. Mitigation measures will be offered in accordance with the conditions of consent, if granted, with each affected landowner post project approval. • Stakeholders have been further advised of the following management and mitigation measures, via newsletters, meetings and community information sessions: – an Air Quality Management Plan will continue to be implemented to manage dust – a Blast Management Plan will continue to be implemented to manage post blast fumes – separate to the properties who are already afforded air quality mitigation rights, HVO currently operates a near neighbour amenity resource program, which is a voluntary commitment to offer water tank cleaning or supply of water filters to neighbours that request such a service. HVO proposes to replace this program with a more structured program whereby private residences within 4 km of the proposed mining area will be eligible for tank inspections and cleaning and installation of first flush filter systems for residential water tanks and domestic taps.
Noise impacts • mitigations for properties where noise levels exceed criteria • increase in noise levels	• State regulatory authorities • Elected representatives • Government/ regulators • Directly impacted landholders	• Noise impacts as a result of the Project and cumulative noise impacts with other nearby mining operations. Specifically, nearby landholders have indicated that the noise from blasting and heavy vehicles is especially noticeable. • Nearby landowners have been generally accepting of the noise associated with nearby mining operations. Stakeholders have been advised of the following proposed noise mitigation and management measures: – Nearby landowners were contacted by HVO via letters/emails and meetings regarding any proposed changes in mitigation rights. Mitigation measures will be negotiated with each affected landowner post project approval. • HVO has further committed to the following on site noise management measures: – a Noise Management Plan will continue to be implemented and updated to manage potential noise impacts associated with the Project, key mitigation measures include: ▪ commitment to best-in-class 400 t and 600 t excavator replacement schedule ▪ permanent noise bund in the north-west corner of Mitchell Pit ▪ construction activities restricted to the standard construction hours (Monday to Friday 7:00 am to 6:00 pm, Saturday 8:00 am to 1:00 pm and no work on Sundays or public holidays). However, some out of hours work may be required from time to time. As described in the Noise Impact Assessment for the Project (Appendix I to the EIS), if this occurs, activities will be managed such that operational noise criteria are met. • Community consultation will be undertaken prior to the commencement and during construction with all potentially impacted stakeholders regarding the nature of works to be carried out, the duration of the works, as well as contact details for issues and complaints.

Key themes	Stakeholder group raising concern	How the project addressed this issue
Mine rehabilitation and final landform • appearance of final landform • use for final void • progressive rehabilitation of mined lands • land use for rehabilitated land • opportunity for RAP participation in rehabilitation works	• Federal regulatory authorities • State regulatory authorities • Local government • Elected representatives • Government/ regulators • Directly impacted landholders • Nearby landholders • RAPs	• During early consultation, community and stakeholders were generally accepting of the mine rehabilitation and final landform plans presented. • Stakeholders have been advised via meetings, newsletters and community information sessions that: – the site will be progressively rehabilitated, ensuring that the site is safe, stable and non-polluting – the final landform will be rehabilitated in a way that is sympathetic to surrounding landscape – rehabilitation of the land will involve a combination of grassland and woodland vegetation, and habitat corridors. • Consistent with existing operations, land will be progressively rehabilitated as land is no longer required for mining activities. • Mine planning investigated various options regarding the final void, with the preferred option that best met project objectives being a reduction of the existing approved voids at HVO North from three voids to a single void. • Natural landform design principles have been incorporated into the mine design such that the final landform will be integrated into the surrounding landscape providing for an improved outcome compared to the existing approved final landform. • Future land uses considered are: – grazing – intensive agricultural practices on the Hunter River alluvial flats – biodiversity and habitat – water storages within the final voids. • 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 solar farms and battery energy storage systems, pumped hydro energy storage systems, water storage for various uses such as irrigation, energy or industrial use, or a range of industrial uses of mining infrastructure areas including industrial buildings, access roads, rail loop, etc. • During consultation with RAPs, feedback about potential impacts to the existing landscape and sympathetic rehabilitation was raised. RAPs also advised that they would welcome the opportunity to be involved in re-vegetation of the site, as part of ongoing employment opportunities and to maintain connection to Country. • Opportunities for RAPs to have continued involvement in re-vegetation of the site will be addressed as part of the Social Impact Management Plan and Aboriginal Cultural Heritage Management Plan.
Visual amenity • height of overburden dumps during operation • viewpoints at Jerrys Plains and Maison Dieu to be considered as part of the Visual Impact Assessment	• State regulatory authorities • Local government • Directly impacted landholders • Nearby landholders	• During early consultation, residents of Jerrys Plains, Maison Dieu and Long Point indicated that they were concerned about operations encroaching further towards their properties, resulting in a loss of visual amenity and light disturbance. • Stakeholders have been advised via newsletters and community information sessions that: – a visual impact assessment was undertaken and it determined that Project elements may be visible to varying degrees based on the distance between private properties and HVO, existing view types and context, variable elevation and undulation in the landscape, and the presence of vegetation – there will be a low or negligible magnitude of change in views as a result of the Project. Significant visual impacts are not predicted as a result of the Project.

Key themes	Stakeholder group raising concern	How the project addressed this issue
Human health • cumulative impacts of the project, and nearby mines, on human health	• Directly impacted landholders • Nearby landholders • NSW Health	• Stakeholders have raised concerns regarding potential impacts to human health as a result of the Project. Stakeholders have been advised via in-person meetings, newsletters and community information sessions that where relevant, potential risks to human health have been assessed against accepted safety or health-based assessment criteria established by the NSW Government. Where relevant, criteria is predicted to be met, or where NSW Government policy stipulates, mitigation measures are to be implemented (e.g. imposition of voluntary acquisition clauses in any development consent). • Risk to human health as a result of the Project will continue to be monitored. Results of HVO monitoring programs will continue to be provided to the community and stakeholders, as per the conditions of the development consent.
Local economy • maintaining a strong economy is noted as being a priority for government, HVO workforce, HVO suppliers and the local community	• Local government • Elected representatives • Community groups • Nearby landholders	• Stakeholders have consistently provided feedback about the economic benefits of the Project, indicating the positive flow on from employment, community grants and other benefits provided by HVO. • The results of the EIA (refer to Section 8.4) indicate that overall, the Project is expected to generate significant net benefits and is also expected to generate increased economic activity and employment within the NSW community. • The estimated net benefit of the Project to NSW is $7,836.2 million in NPV terms (refer Section 8.4). The LEA considered the costs and benefits of the Project on residents of the Lower Hunter region and found that the Project is expected to deliver a net benefit to the region of $2,181.8 million. • The Project is projected to provide significant positive economy-wide impacts to both the local region of Lower Hunter and to NSW.
Biodiversity • Impacts to the Warkworth Sands Woodland of the Hunter Valley CEEC to be avoided, as well as other identified threatened ecological communities (TECs)	• Federal regulatory authorities • State regulatory authorities • CCC	• During ecological field surveys, areas of ecological significance, including Warkworth Sands Woodland of the Hunter Valley CEEC, were identified. This information was used in the Project design process to target avoidance of impacts to this and other known TECs wherever possible. HVO redesigned the Project to largely avoid Warkworth Sands Woodland of the Hunter Valley CEEC. • Stakeholders were provided advice via meetings and community information sessions, that in addition to the avoidance of Warkworth Sands Woodland of the Hunter Valley CEEC, a Biodiversity Offset Strategy will be developed.

Key themes	Stakeholder group raising concern	How the project addressed this issue
Cumulative impacts • Consideration to localised cumulative impacts of mining	• Federal regulatory authorities • State regulatory authorities • Local government • Elected representatives • Government/ regulators • Utility providers • Directly impacted landholders	• Consultation with landowners at Jerrys Plains and Maison Dieu raised concerns about the impacts of not only HVO, but other nearby mining operations, advising that they felt like mining is moving closer to them from all directions. • Stakeholders were advised that the Project does not seek to mine any closer to the Jerrys Plans and Maison Dieu then currently approved. • Nearby landowners have also raised concerns about cumulative air quality and noise impacts. Extensive noise and air quality studies were carried out to inform the Project design to avoid and minimise emissions received at nearby residences. These studies considered cumulative contributions and impacts from surrounding mining operations. • The Project was developed in consultation with nearby mining operations, as part of understanding and managing cumulative impacts.

ii Aboriginal cultural heritage assessment

Consultation with Aboriginal stakeholders in relation to the Project has been undertaken in accordance with the processes and methods outlined in the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010), as well as more activities between HVO and the RAPs which enabled the identification of a number of initiatives across key Closing the Gap themes.

Overall, the Project has been liaising with 33 RAPs since September 2020.

In addition to consultation requirements outlined in the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010,* HVO facilitated a two-day social and cultural mitigation workshop held on 25 and 26 May 2021. The overarching goal of the workshop was to facilitate discussions between HVO and the RAPs to identify specific programs or initiatives for meaningful mitigation of the Project's heritage impacts, that would contribute towards Closing the Gap. Initiatives across eight key Closing the Gap themes including health, education, business, financial, employment, cultural, and community were raised. Initiatives raised are considered within the ACHA that accompanied the EIS (EMM 2022a).

Consultation with RAPs has continued since the submission of the EIS and has included Project updates.

iii Views on EIS

Following the public exhibition of the EIS (EMM 2022a), a total of 1,047 submissions were received by DPHI 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. Most 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 9.7.

a Origin of submissions

Submissions originated from 45 different LGAs. 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 LGAs in which the Project is situated, or immediately adjoining, and include the LGAs 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 HVO North Action 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.

b Categorisation of issues

Matters raised in the submissions from organisations and individuals were classified as one of the following five broad categories:

- 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 matters raised in submissions on the EIS (EMM 2022a) from individuals and organisations is provided in Table 9.7. Many submissions raised multiple matters resulting in there being more issues captured than the number of submissions received.

Table 9.7 Categorisation of issues raised on original Project

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
	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

Category	Sub-category	Objection	Support/comment
		No. of submissions matter raised	No. of submissions matter raised
	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**

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.

Impacts of GHG 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).

Figure 9.3 illustrates the range of issues raised in supporting and objecting submissions.

Responses to the submissions made on the EIS (EMM 2022a) are provided in the Submissions Report (EMM 2023a).

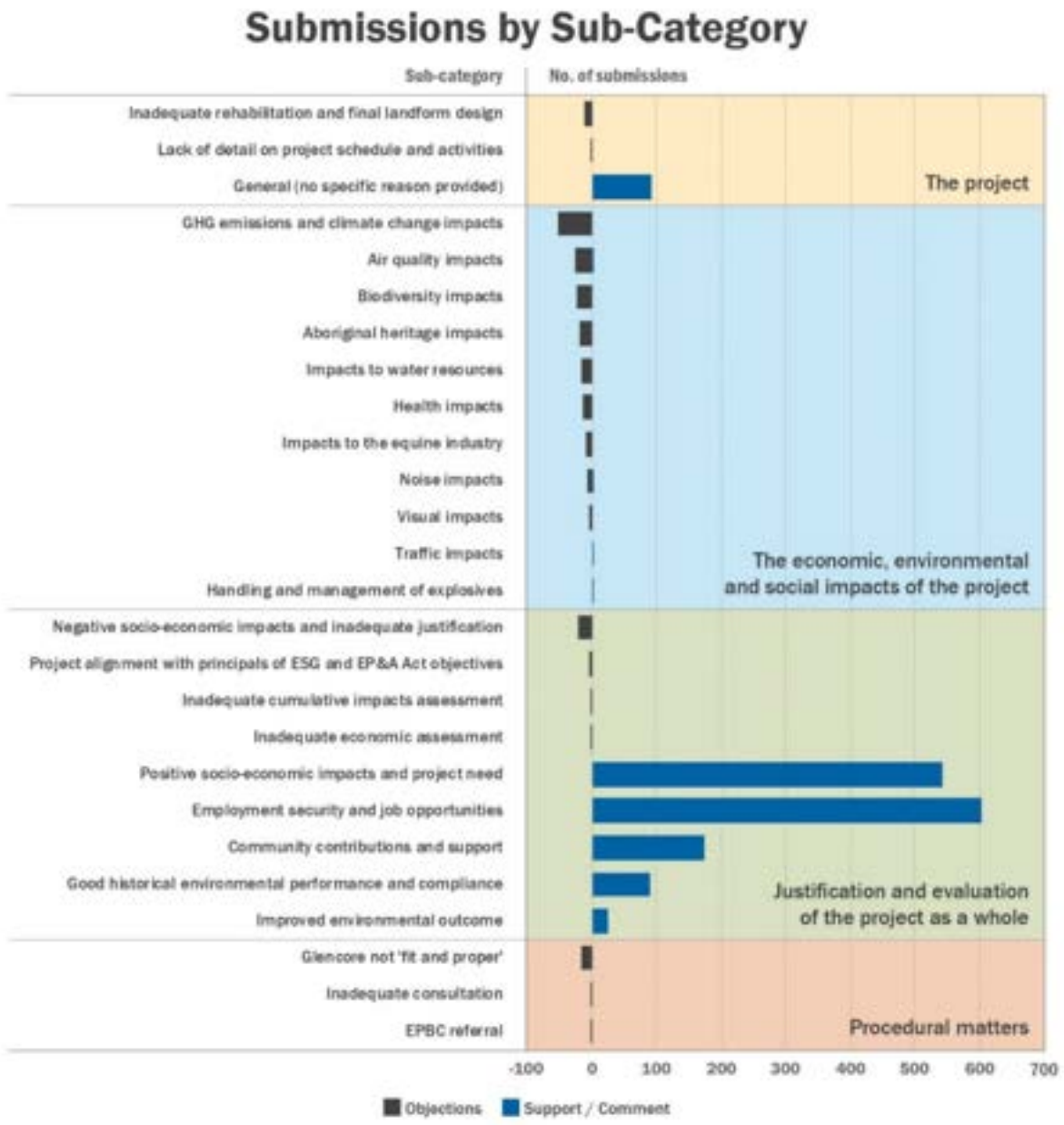

Figure 9.3 Issues raised in submissions

iv Views on the Amendment Report (EMM 2025a)

Following the public exhibition of the Amendment Report (EMM 2025a), 1,717 individual submissions were received from the public and organisations across the two SSD applications of which 1,323 were assessed as unique. In addition, six government agency submissions, one public authority submission and one local council submission were received providing advice on the amended Project. The majority of submissions from the public and organisations (91%) were in support of the amended Project. This is consistent with submissions received during public exhibition of the EIS (2022a), where 91% of the 1,047 submissions received were in support of the Project.

a Origin of submissions

Submissions for the amended Project originated from 49 different LGAs. Submissions of support originated from 29 different LGAs, with objection submissions originating from 36 different LGAs.

The majority of public submissions (73%) were from the local or regional LGAs in which the Project is situated, or immediately adjoining, and include the LGAs of Singleton (285), Maitland (264), Cessnock (271) and Muswellbrook (113). Over 98% of submissions from these LGAs were in support of the Project and 1.8% of these submissions objected to the Project.

Of the objections by individuals, (13 of 102) originated from the Singleton LGA, representing 13% of objections received, 12 (12%) were from the Newcastle LGA, and 10 (10%) were from the Inner West LGA. Exactly half of the objections received (51) were from within LGAs located within 100 km from the Project area and half were received from outside the 100 km.

b Categorisation of issues

A summary of matters raised in submissions from individuals and organisations is provided in Table 9.8. Many submissions raised multiple matters resulting in there being more issues captured than the number of submissions received.

Table 9.8 Categorisation of matters raised on amended Project

Category	Sub-category	No. of submissions matter raised		
		Objection	Comment	Support
Environmental, social or economic impacts of the Project				
GHG/climate change	Concerns about the approval of the coal mine's continuation due to climate change impacts	100	-	-
	Inadequate assessment of GHG emissions	37	1	-
	Concerns about the amended Project's direct emissions and its impact on emission reduction targets	34	2	-
Agriculture, land and soil	Concerns about the amended Project's impact on land and water	58	-	-
Groundwater	Concerns about the amended Project's impact on groundwater drawdown	33	-	-
	Concerns about the amended Project's impact on groundwater water quality	17	-	-
Air quality	Air quality impacts exceedances	13	-	-
	Health impacts of air pollution	7	1	-
Social and economic	Overstated economic benefits	12	5	-
	Concerns about the economic impacts of climate change	10	-	-
	Level of local and regional support and economic contributions to the local, regional and state economies	-	-	758
Land use	Concerns about land use conflict	6	-	-
Biodiversity	Biodiversity impacts	5	-	-
	Aquatic ecology impacts	1	-	-

Category	Sub-category	No. of submissions matter raised		
		Objection	Comment	Support
Noise	Noise and blasting concerns	4	-	-
Surface water	Concerns about salinity in pit lakes	3	-	-
	Concerns about flooding impacts	2	-	-
	Water discharges impacting aquatic ecosystems and waterways	1	-	-
Visual	Concerns about visual impacts	3	-	-
	The mine is visual a reminder of the land's history/industry	-	-	1
Rehabilitation and closure	Concerns about not meeting rehabilitation obligations	2	-	-
	Successful rehabilitation completed to-date and improved rehabilitation outcomes from the Project	-	-	34
Stakeholder engagement	Lack of community notifications	1	-	-
	Significant level of engagement undertaken	-	-	16
Traffic	Improvement to the local road network and road safety	-	-	15
Aboriginal cultural heritage	Aboriginal cultural heritage impacts	1	-	-
	Benefits to the Aboriginal community	-	-	2
Environmental outcomes	The amended Project will result in improved environmental outcomes to environmental aspects including surface water and air quality and represents a reduction in greenhouse gas emissions to what was originally proposed	-	-	102
The Project				
Project design	Concerns about the scale length of approval for the amended Project	9	-	-
	Support for the amended Project as it is an existing mine, does not increase production rates, and utilises existing infrastructure	-	-	39
Project justification				
General justification and evaluation of the project	There is a need to transition to renewable energy	22	1	-
	Objection to the amended Project's impact on the Hunter Valley	10	-	-
	Concerns about the impact of continued mining on the labour market and the need for skills transition	6	1	-
	Lack of assessment of coal demand	4	-	-
	Reference to outdated Strategic Statement for Coal mining	2	-	-
	Employment security and job opportunities	-	1	890
	Continued need for coal and a reliable power source to support the transition to renewable energy	-	-	122
	Good historical environmental performance and compliance	-	-	104

Category	Sub-category	No. of submissions matter raised		
		Objection	Comment	Support
	Submissions providing general support for the amended Project	-	-	131
Beyond the scope of the Project				
Not Project related	Poor environmental management	3	-	-

Consistent with the submissions on the EIS (EMM 2022a), sustained job security and employment opportunities were frequently cited across individual and organisation submissions of support, identified in 890 submissions received. Other key reasons identified for supporting the amended Project included:

- the positive socio-economic impacts and benefits the amended Project would have on the local, regional, and state economies, including the amended 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 (758 submissions)
- continued need for coal and a reliable power source to support the transition to renewable energy (122 submissions)
- good historical environmental performance and compliance (104 submissions)
- improved environmental outcomes as a result of the amended Project (102 submissions).

A total of 131 submissions stated no specific issues or reasons for supporting the amended Project.

Concerns about the approval of the coal mine's continuation due to climate change impacts was the most frequently raised matter in objections from organisations and the public, collectively raised in 100 submissions. Other commonly raised key matters in public submissions include:

- concerns about the amended Project's impact on land and water (58 submissions)
- inadequate assessment of GHG emissions (37 submissions)
- concerns about the project's direct emissions and its impact on emission reduction targets (34 submissions)
- concerns about the project's impact on groundwater drawdown (33 submissions)
- there is a need to transition to renewable energy (22 submissions).

Responses to the submissions made on the Amendment Report (EMM 2025a) are provided in the Amendment Submissions Report (EMM 2025e).

9.6 Future engagement

Engagement with key stakeholders will continue through the approvals process for the Project, including the processes under the EP&A and EPBC Acts. This includes:

- ongoing consultation with councils, government agencies and utility providers relating to project planning and design integrations
- ongoing consultation with other agencies as required to address issues matters as they arise during the assessment phase

- ongoing consultation with directly affected landowners and nearby neighbours, with the provision of Project updates via email, website, newsletters, and further information sessions.

Once the approvals processes have been completed under both the EP&A and EPBC Acts, the outcomes will be communicated with the local community and relevant stakeholders, including:

- determination outcomes, communicated via the website and newsletter
- targeted stakeholder briefings and meetings.

9.6.1 Continued operational engagement

HVO will continue its existing operational community and stakeholder engagement initiatives, in line with the current practices. If development consent is granted for the Project, HVO will develop a SIMP, ensuring that all consultation commitments are upheld, throughout the construction and operation of the Project. Figure 9.4 shows existing consultation initiatives at HVO.

Figure 9.4 Operational consultation initiatives

9.6.2 Enquiry management

The existing HVO enquiry management system will remain active, during the assessment stages under the EP&A and EPBC Acts and following determination should the Project be approved. Enquiries are registered to maintain an accurate record of stakeholder interactions and ensure that requests for information are closed out. The system involves:

- steps to receive, manage and take appropriate action in relation to community enquiries and complaints
- preparing verbal and written responses describing what action will be taken, and providing this response to the complainant within agreed timeframes.

10 Summary of mitigation measures

A summary of all proposed mitigation, management and monitoring commitments for the Action is presented in Table 10.1.

Table 10.1 Summary of all mitigation, management and monitoring commitments

ID	Mitigation, management and monitoring commitments
Greenhouse gas	
GHG1	HVO will conduct a trial of gas pre-drainage in areas identified with higher potential, to investigate the feasibility and effectiveness of gas pre-drainage. The design of the trial will be developed in consultation with relevant stakeholders to the satisfaction of the Planning Secretary and be provided within two years of commencement of the Project.
GHG2	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.
GHG3	A greenhouse gas management plan will be developed to reflect the amended Project and will include an action plan (updated every 3 years) for investigating and implementing all reasonable and feasible abatement measures to minimise GHG emissions.
GHG4	To meet the requirements of the Safeguard Mechanism, HVO will implement abatement activities identified by mitigation measure, or purchase carbon offsets such as Australian carbon credit units (ACCUs) or Safeguard Mechanism credit units (SMCs), whichever is cost effective and practical at the time.
GHG5	HVO will make additional voluntary contribution towards the NSW emission-reduction targets to reflect consideration of the *Climate Change (Net Zero Future) Act 2023* (NZF Act). With this in mind, HVO proposes that the emissions of the Project are aligned, so far as practicable, with the NZF Act emission-reduction targets, including by using offsets to reduce the Amended Project's net GHG emissions where it is not feasible to avoid, reduce or substitute emissions.
Air quality	
AQ1	Air quality will continue to be managed and monitored as per the HVO Air Quality Management Plan (AQMP), which will be updated to reflect the Project. The AQMP will detail the monitoring and management controls to be implemented to manage air quality impacts associated with the Project including ongoing implementation of the proactive and reactive management protocols and include control measures for managing other air quality aspects such as blast fume and spontaneous combustion.
AQ2	Reactive air quality management will continue to assess the need to modify the activities in response to the following triggers: • visual conditions, such as excessive visible dust, identified through the use of cameras as well as visual observations • meteorological conditions, such as dry, strong wind conditions • ambient air quality conditions (that is, elevated short-term PM_{10} concentrations, observed through air quality monitoring results) • a Trigger Action Response Plan (TARP) process will be implemented, and dust levels investigated when the TARP process is enacted to identify likely sources of dust.
AQ3	Proactive air quality management measures will include daily forecasts, alerting operations of the potential requirement to modify mining activities, as appropriate, to minimise or avoid the potential dust impacts.
AQ4	It is anticipated that receptor 121 will be afforded voluntary air quality acquisition rights as a result of the Project in accordance with the NSW Voluntary Land Acquisition and Mitigation Policy (VLAMP).
AQ5	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.
AQ6	The program 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 will continue to be implemented.

ID	Mitigation, management and monitoring commitments
AQ7	A site-specific blast management plan will be implemented during operations, including key fume management actions, such as defining the potential risk zone based upon weather patterns and obtaining permissions to fire based on an assessment of real-time weather conditions.
AQ8	Mitigation measures to manage diesel combustion emissions include: • servicing all machinery in accordance with original equipment manufacturer recommendations for maintenance • targeting the maintenance to ensure, as far as reasonably practical, equipment remains fit for purpose over its whole life cycle.
Noise	
NOS1	Noise will continue to be managed and monitored as per the HVO Noise Management Plan, which will be updated to reflect the Project. The management plan will describe aspects such as: • Best practice noise management measures to be implemented across the site. • Noise monitoring. • Triggers for the modification of equipment operation during periods of elevated noise. A review of both real-time and attended compliance monitoring locations will be undertaken within 12 months of the commencement of the Project, to ensure the monitoring network provides adequate coverage of the Project area, and the existing Noise Management Plan will be updated accordingly.
NOS2	A review of both real-time and attended compliance monitoring locations will be undertaken within 12 months of the commencement of the Project, to ensure the monitoring network provides adequate coverage of the Project area, and the existing Noise Management Plan will be updated accordingly.
NOS3	HVO will develop and implement a Construction Environmental Management Plan (CEMP), or equivalent, which will be prepared prior to the commencement of any construction activities. The CEMP will include the identification of feasible and reasonable noise mitigation measures relevant to the construction aspects for implementation during construction activities.
NOS4	HVO should apply all feasible and reasonable work practices to meet the 'noise affected' level and should schedule construction works within standard construction hours where practical.
NOS5	Various levels (height options) will be provided for overburden emplacement to allow shielded emplacement to occur deeper in the mining area during adverse meteorological conditions.
NOS6	Haul route alignments within the mining area will maximise the available topographical shielding provided by the mine design, where practical.
NOS7	The remaining fleet of large mining equipment will be progressively attenuated and Best Available Technology Economically Achievable (BATEA) sound power levels will be implemented, where reasonable and feasible, for significant noise generating mobile equipment.
NOS8	Dozers will be restricted if deemed to be a primary source of noise during periods of meteorological enhancement.
NOS9	Restricting operation of exposed drills during periods of meteorological enhancement, if required.
NOS10	An 8 m high roadside bund will be constructed on the exposed side of the haul road from the HVO Mitchell Pit towards the Howick CPP for approximately 900 m.
NOS11	The following receptors are anticipated to be afforded voluntary noise mitigation rights in accordance with the VLAMP as a result of the amended Project: • HVO North: 326, 328, 330, 437, 487 • HVO South: 121, 160, 161, 162, 256, 258, 261, 497. The following 12 receptors hold existing noise mitigation rights under the current HVO South project approval, and will be offered to maintain their rights, despite not being required to by the Project: • 120, 122, 123, 163, 244, 245, 246, 247, 260, 308, 311, 317.

ID	Mitigation, management and monitoring commitments
Blasting	
BLA1	Blasting and vibration will continue to be managed and monitored as per the HVO Blasting Management Plan (BMP), which will be updated to reflect the Project. The BMP will describe aspects such as: • blasting times and frequency • pre-blast assessment protocol • road closure protocols • notification protocols • blast model review and optimisation • blast and vibration monitoring.
BLA2	Blasting will be undertaken: • between the hours of 7am and 6pm, Monday to Saturday • no blasts on Sundays or public holidays • up to 3 blasts per day and 12 blasts per week at HVO North • up to 3 blasts per day and 15 blasts per week at HVO South.
BLA3	When blasting within 1,500 m of the heritage sites the Great Lodge, Carrington Homestead and Wandewoi Homestead, blast design measures will be carried out to meet applicable ground vibration criteria.
BLA4	Increased blast control measures will be employed when blasting within the identified sections of HVO North and HVO South (shown in Figures 11.3, 11.4 and 11.5 of the EIS (EMM 2022a)) to manage relevant overpressure and vibration levels below applicable limits for public infrastructure, private residences and heritage items.
BLA5	The existing blast monitoring system will continue to be utilised for the Project. An additional three monitoring units will be installed at different stages of the amended Project and one portable monitor will be used as follows: • one monitor at a location representative of identified private residences in Jerrys Plains • one monitor at a location representative of the Great Lodge (heritage site) • one monitor at a location representative of the Oaklands Homestead and associated structures • one portable monitor positioned at a location representative of the closest heritage site (Carrington or Wandewoi Homestead) to the active blasting area Timing for the commencement of additional blast monitoring will be detailed in the BMP.
Water resources	
WAT1	The HVO Water Management Plan will be updated to include the Project, and will describe aspects such as: • erosion and sediment control measures • water sharing arrangements with neighbouring mines • methods for measuring and estimating water take (where practical), which will be reviewed for compliance with the NSW *Non-Urban Water Metering Policy* • tailings management • groundwater model review and validation • groundwater and surface water monitoring, including review and adaptive management procedures • trigger action response plans, including trigger action response plans for unexpected changes in surface and groundwater results.
WAT2	The Carrington West Wing Levee will be monitored during operational life of the Project, particularly following large flood events (5% AEP or larger) to identify signs of instability and potential corrective action.
WAT3	The frequency of comprehensive surface water quality analysis will be increased from an annual basis to six monthly.

ID	Mitigation, management and monitoring commitments
WAT4	Improved flood protection levees will be implemented as follows: HVO North: • North Pit levee - up to 0.1% Annual Exceedance Probability (AEP) • Carrington West Wing levee - up to 0.1% AEP. HVO South: • Cheshunt levee - up to 0.1% AEP • Riverview levee - up to the Extreme Flood Event (defined as four times the 1% AEP).
WAT5	Consistent with the methodology used for the Carrington Pit LPBW, the Carrington West Wing LPBW will be constructed prior to mining within 100 m of the connected remnant western arm of the paleochannel. The Carrington West Wing LPBW will be designed to achieve a permeability of 1 x 10^{-8} m/s.
WAT6	Additional monitoring bores will be installed within the zone of predicted short-term incremental drawdown, approximately one year prior to mining recommencing in the remnant paleochannel. A network of eight nested monitoring bores are proposed and will be included in the updated water management plan.
WAT7	Piezometers will be installed within the Carrington West Wing LPBW, consistent with the approach used for the Carrington Pit LPBW. The purpose of the piezometers will be to monitor for changes in salinity and pressure.
WAT8	A LPBW monitoring and management plan will be prepared in consultation with NSW DCCEEW Water Group (which will include assigned trigger levels and a response plan for trigger level exceedance and deviations from predictions).
WAT9	The Carrington West Wing levee will be decommissioned at closure to reinstate floodplain storage in this area.
WAT10	HVO will secure additional water entitlement that may be needed during operations and during closure in accordance with the amended Project water licensing strategy.
Biodiversity	
BIO1	Biodiversity will continue to be managed as per the Biodiversity Management Plan, which will be updated to reflect the Project. The management plan 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.
BIO2	Wildlife warning signs such as 'Injured Native Wildlife' signs will be installed in likely high impact locations along the realigned Lemington Road.
BIO3	Measures will be implemented to protect the river red gum populations located within the River Red Gum Additional Disturbance Area during construction of the realigned transmission lines in this area.
BIO4	River red gum health monitoring will continue, in accordance with the River Red Gum Rehabilitation and Restoration Strategy, which will be updated for the Project. This will include a change in classification for the River Red Gum Additional Disturbance Area from a 'low priority' to a 'priority site'.
BIO5	A biodiversity offset strategy will be developed for the Project based on the credits required to be retired to offset the impacts of the Project and the options available under the BC Act and BC Regulation including: • Land based offsets (HVO will retire the required number and class of credits determined in accordance with the BDAR and the offset rules in the BC Regulation through the establishment of new stewardship sites (and the subsequent retirement of credits) or by retiring credits from existing stewardship sites). • Purchasing credits from the market. • Paying into the Biodiversity Conservation Fund.
BIO6	An Ecological Restoration Plan (ERP) will be developed for the Hunter Floodplain Red Gum Woodland Endangered Ecological Community (EEC). The plan will provide a framework for the management of the vegetation community during and post-development of the Project, within the Project disturbance area. The ERP will be developed prior to the disturbance of the noted EEC and be included within the existing Integrated Biodiversity Management Plan. The ERP will include management actions to inform specific weed control, re-establishment of vegetation, security/protection measures and a trigger response plan for the continued improvement of the EEC.

ID	Mitigation, management and monitoring commitments
Aboriginal cultural heritage	
ACH1	Direct impacts to Aboriginal cultural heritage site CM-CD1 (AHIMS Site 37-2-1877) will continue to be avoided.
ACH2	Direct impacts will be avoided 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.
ACH3	A consolidated Aboriginal Cultural Heritage Management Plan (including HVO North and HVO South) will be developed for the Project in consultation with RAPs and Heritage NSW. This will include: • mitigation and management measures for identified Aboriginal heritage sites • unexpected finds protocols • consultation.
ACH4	HVO will provide assistance to RAPs to connect with family and Country to facilitate the transfer of knowledge and culture to younger generations. The form of this assistance will be developed in consultation with these groups and documented with the revised Aboriginal Cultural Heritage Management Plan (ACHMP).
Historic heritage	
HH1	A Historic Heritage Management Plan (HHMP) will be prepared for the Project, which will include the historic heritage items identified in the historic heritage study area, and will include: • a description of the condition and significance assessment of identified items • management measures and guidelines for the protection and conservation of each item • an unanticipated finds protocol.
HH2	Archival recording in the form of digital photography will be undertaken to capture the pre-development state prior to disturbance of the remnant stockyards and remnant foundations at HVO North.
HH3	Realigned transmission line structures will be sited so that no direct impacts occur to the remnant foundations identified at HVO North.
HH4	An assessment of significance will be prepared for the Great Lodge at HVO South.
Traffic and transport	
TT1	A Traffic Management Plan will be developed for the Project and will include: • measures to be implemented to minimise interruption to the local road network during construction activities, and ensure the safe ingress and egress of construction vehicles • liaison with relevant road authorities and local school and bus providers.
TT2	To manage intersection performance affected by increased demand by construction traffic: • Lemington Road/New England Highway – minimise outbound construction truck movements during the AM peak period (6.00 am–7.00 am) • Old New England Highway/New England Highway – the primary access will be via the Liddell Station Road access, so that the Old New England Highway is used as a secondary access only.
TT3	The new portion of Lemington Road will be constructed and complete prior to the closure of the existing alignment. Other than managed traffic control during the tie-in work, the construction of the new alignment will not restrict access or use of the existing Lemington Road.
Visual amenity	
VA1	As part of detailed design, HVO will investigate the feasibility of planting vegetation adjacent to the realigned Lemington Road to provide an effective visual screen and reduce views of the road from residences and local roads.
Rehabilitation and closure	
RC1	The Rehabilitation Management Plan will be updated for the Project.
RC2	The final landform in areas disturbed by the Project will incorporate natural design elements generally in accordance with the conceptual design presented in this EIS.

ID	Mitigation, management and monitoring commitments
RC3	The final land use across rehabilitated areas of the site will include a combination of grazing and native woodland ecosystem land uses, or as determined as part of detailed closure planning processes.
RC4	A detailed closure plan will be developed within five years of cessation of mining.
RC5	Rehabilitation monitoring will be undertaken using analogue sites and landscape function analysis to assess rehabilitation progress and success, as detailed in the Rehabilitation Management Plan.
Social	
SOC1	A Social Impact Management Plan (SIMP) will be developed for the Project which will include a monitoring and management framework.
SOC2	HVO will continue to administer the community grants program which invests in programs, events and services that promote community cohesion, connectedness and support.
SOC3	As part of the development of the SIMP, HVO will develop a funding framework to enable funding of programs and projects that align with Closing the Gap initiatives, including job readiness programs, assistance relating to tendering for work at HVO by Aboriginal suppliers, and a commitment of $1,000,000 over the first 10 years of the Project. These initiatives will be developed as part of the preparation of the SIMP, which will also outline the proposed implementation plan.
Hazards, public safety, and health	
HCH1	Implementation of the site hydrocarbon practices and Pollution Incident Response Management Plan (PIRMP).

11 Conclusion

11.1 Introduction

This chapter provides a justification and evaluation for the Project as a whole, having regard to its economic, environmental and social impacts, the objectives of the EP&A Act and EPBC Act and the principles of ESD.

11.2 Project design

The development of the Project design for which approval is sought has been an iterative one developed over several years to avoid and minimise environmental impacts. Detailed design studies considering both mining options and infrastructure arrangements were carried out, and each of these studies evaluated potential environmental and social impacts to inform the Project design as results from studies became available and in response to the outcomes of stakeholder engagement. The Project has therefore been developed to avoid and minimise impacts where reasonable and feasible to do so. Key aspects where the principles of avoidance and minimisation through design have been adopted for the HVO North Action are:

- Design changes:
    - Reduced the project mine plan to avoid coal extraction within gas Domain 1 and reduced the total ROM coal to be extracted across the HVO Complex. The proposed amendments will result in a reduction of the total ROM coal extraction by approximately 220 Mt and a:
        - ~31% reduction in diesel emissions over the life of the Project
        - ~55% reduction in fugitive emissions over the life of the Project, including an approximate ~89% reduction in fugitive emissions from 2040 onwards
        - ~43% reduction in total Scope 1 emissions over the life of the Project.
- CM-CD1: The proposed mining area of one of the early mine plans considered for the Project included the disturbance of this Aboriginal heritage site. However, once test excavation and subject analysis was completed and the high significance of CM-CD1 was understood, HVO committed to continue the avoidance of this site and the proposed mine plan was changed to avoid the area.
- Lemington Road realignment:
    - Biodiversity – Additional engineering design was undertaken following early prefeasibility design works, with the objective of modifying the road design to avoid areas of high biodiversity value identified by ecologists conducting the biodiversity assessment for the Project. Further design was undertaken following receipts of public and agency submissions on the EIS (EMM 2022a), with the objective of modifying the road design to avoid areas of high biodiversity value. In total, the refinement of the road design resulted in the cumulative avoidance of 9.8 ha of the Warkworth Sands Woodland of the Hunter Valley CEEC and 5.7 ha of the Central Hunter Valley Eucalypt Forest and Woodland CEEC. This has resulted in total avoidance of the Warkworth Sands Woodland of the Hunter Valley CEEC within the HVO North BIAA.

- Aboriginal heritage – The proposed alignment of Lemington Road presented in the EIS (EMM 2022a) would have resulted in the complete loss of HVOCP TR213-AS1 (37-3-1626) (Test Excavation Area 12) and the associated culturally modified trees: TR212-ST1 (37-3-1629) and TR216-ST1 (37-3-1635). The amended Lemington Road realignment corridor has resulted in the avoidance of approximately 2.78 ha of HVOCP TR213-AS1 that was previously proposed for impact (equivalent to around 18%), being a partial impact in place of total as proposed in the EIS (EMM 2022a). Several of the discrete higher density locales of cultural materials within Test Excavation Area 12 have also been avoided through these re-designs. The re-design has also ensured the retention of both the culturally modified trees, and both TR212-ST1 and TR216-ST1 will now be unaffected by the Project. As such, no impacts to culturally modified trees are anticipated as a result of the Project.

- Transmission line realignment:

  - Biodiversity – Early designs prepared in the pre-feasibility stage for the Ausgrid 132 kV transmission line interacted with Central Hunter Valley Eucalypt Forest and Woodland CEEC. Changes to the proposed alignment were made to avoid 4.8 ha of Central Hunter Valley Eucalypt Forest and Woodland CEEC.

  - Aboriginal heritage – Direct impact to a culturally modified tree (TR178-ST1) will be avoided by siting of transmission line structures.

  - Historic heritage – Direct impacts to the historic remnant foundations identified at HVO North will be avoided by sighting of transmissions line structures away from this heritage item.

11.3 Project objectives and need

The primary objective of the Action is to efficiently and economically recover remaining coal reserves within existing mining tenements and predominantly within existing and approved disturbance areas at HVO North, 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 to the base of the Barrett seam in West, Mitchell and Carrington Pit areas and the base of the Bayswater seam in the Carrington West Wing area in HVO North, within existing mining tenements, using mostly existing or already approved infrastructure and minimising further disturbance
- provide ongoing employment opportunities for up to 1,500 FTE workforce across the complex well beyond the life of the current planning approvals under which the HVO 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 where areas disturbed by mining activities as a result of the Project will reflect a landform that is sympathetic to the surrounding landscape

- maintain the maximum annual ROM coal extraction rate at HVO North at up to 22 Mtpa
- continue the ongoing contribution to the local, regional, and State economies from a well-established mining operation.

11.4 Consistency with the strategic context

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. This includes alignment with the NSW Government's coal policy, *NSW Coal Industry 2026–50* (NSW Government 2026), which recognises the continuing role of the coal industry in supporting regional economies, employment, energy security and export markets during the transition to a lower-emissions economy. The policy expressly contemplates extensions of existing mining operations where proposals are assessed under the applicable statutory framework and environmental impacts can be effectively managed. As an extension of an existing operation, the Project is consistent with that policy approach.

Current national and NSW policy, including *NSW Coal Industry 2026–50*, also recognises the ongoing demand for coal, particularly in the Asian export market (which is the current key market for HVO) and its importance to the NSW and Australian economy (NSW Government 2026, IPC 2022a and IPC 2022b).

At a Commonwealth level, the 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 North and 2042 at HVO South) 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 Safeguard Mechanism. The Safeguard Mechanism applies to 219 designated large facilities as defined by the *National Greenhouse and Energy Reporting Act 2007*. 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. Further, HVO voluntarily commits to achieving a baseline with a reduction rate consistent with NSW NZF Act targets, to support NSW's overall GHG reduction objectives.

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 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 2024 World Energy Outlook 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 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.

The *International Energy Outlook 2023* also identifies that while renewable energy is growing the fastest as a share of the primary energy consumption across all cases it modelled, the demand for coal in 2050 is predicted to still be at a similar level in terms of tonnes of coal, to demand now, under all scenarios.

11.5 Compliance with statutory requirements

An assessment of the consistency of the Project with the objects of the EPBC and EP&A Acts is provided in Table 11.1 The objects of the EP&A Act are those that were in force when the SSD applications for the Project were lodged.

Table 11.1 Project's consistency with the objects of the EPBC and EP&A Acts

Object	Consistency with the Project
EPBC Act	
To provide for the protection of the environment, especially those aspects of the environment that are matters of national environmental significance.	Measures to avoid and minimise impacts to native vegetation and threatened species habitat were considered during the initial design stages of the Project and reviewed following receipt of public and agency submissions on the EIS (EMM 2022a), resulting in avoidance of significant biodiversity values and minimisation of impacts on other areas of native vegetation. The HVO North Action has avoided impacts to 9.8 ha of Warkworth Sands Woodland of the Hunter Valley CEEC (resulting in complete avoidance of this community at HVO North) and 17.5 ha of impacts to the Central Hunter Valley Eucalypt Forest and Woodland CEEC. All unavoidable impacts will be offset in accordance with NSW Government biodiversity offset scheme. With the mitigation and management measures in place, the potential impact of the HVO North Action on surface and groundwater resources and aquatic ecology has been assessed to be insignificant. Key outcomes of the GIA and GDE assessment are summarised as follows: • Potential groundwater level drawdown impacts at third-party water supply bores is very unlikely to negligible. • Construction of the approved (but not yet constructed) Carrington West Wing LPBW will limit 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. • Minimal drawdown (less than 0.2 m) is predicted in the Hunter River alluvium near mapped river red gum stands in the Carrington Billabong and widespread dewatering will not occur. This predicted drawdown will be buffered by leakage through the riverbed. Therefore, no significant impact in ecological receptors is predicted. • No additional drawdown in the Wollombi Brook alluvium is predicted. In contrast, the avoidance measure of removing mining in the Riverview South East Extension and 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).
To promote ecologically sustainable development through the conservation and ecologically sustainable use of natural resources.	The Commonwealth's *National Strategy for Ecologically Sustainable Development* (Australian Government 1992) defines ESD as 'using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased'. Conservation of ecological resources would be achieved through avoiding valuable areas (as far as practicable), while progressive rehabilitation and establishing offsets would enhance biodiversity. Consideration of the Project against the principles of ESD as defined by the EPBC Act is provided in Table 11.5.
To promote the conservation of biodiversity.	As stated above, with the implementation of mitigation measures and the implementation of biodiversity offsets, biodiversity values in the surrounding region and the viability of threatened species and communities that are impacted by the Project would be maintained or improved over the medium to short term.

Object	Consistency with the Project
To provide for the protection and conservation of heritage.	**Aboriginal Heritage** • 279 extant Aboriginal sites and places have been documented within the Project disturbance area (which is a combination of the existing and approved disturbance area at HVO, and the additional disturbance area associated with the Project). Of these: – 11 sites have been assessed as having high significance – 16 sites have been assessed as having moderate significance – the remaining 252 sites are considered to be of low/low-moderate significance. • Following an iterative design process the Project has avoided impacts to: – 9 sites assessed as having high significance – 7 sites assessed as having moderate significance – 66 sites assessed as having low significance. • Consequently, the Project will have an adverse impact on: – 2 sites (artefact scatters with archaeological deposit) assessed as having high significance – 10 sites assessed as having moderate significance – 187 sites assessed as having low/low-moderate significance. • Management and mitigation measures will include the cultural collection of surface stone artefacts and/or the passive/active avoidance of sites not proposed to be adversely affected. • Archaeological investigative and salvage excavations will be implemented focussing on nine identified sites with high artefact densities and/or containing stratified cultural deposits, and where these sites are proposed for impact. A consolidated HVO North and HVO South ACHMP will be prepared in consultation with the RAPs and Heritage NSW, to guide the mitigation and management of sites in the Project area. **Historic heritage** HVO North Action Area: • One unlisted item assessed as having local contributory significance, remnant stockyards, will be directly impacted by the Project at HVO North. Mitigation measures comprising archival recording are proposed for this item. No other historic heritage item will be directly impacted by the HVO North Action. • While the proposed realigned Lemington Road corridor at HVO North intersects with a portion of the mapped area related to the locally listed Archerfield, no physical items of heritage significance associated with the Archerfield Homestead and Outbuildings are within the Lemington Road alignment, and no direct impacts will occur. • The State listed Chain of Ponds Inn is within the HVO North Action Area. However, this item is outside the disturbance area for the Project and is more than 5 km from the proposed mining area. Therefore, Project related impacts are not predicted to occur to the Chain of Ponds Inn. HVO South Action Area: • No direct impacts will occur to historic heritage items. • The Dog Leg Fence, an ungazetted item but assessed as potential State significance, is located within the HVO South Action Area; however, it is not within the HVO South BIAA. No direct impacts will occur due to the HVO South Action and blasting activities are not proposed to occur any closer then currently approved. • The Great Lodge, an ungazetted item but assessed as potentially State significant, has been identified within the HVO South Action Area; however, it is outside of the HVO Project disturbance area. No direct impacts will therefore occur because of the Project, and the blasting assessment found that potential impacts to the Great Lodge can be managed effectively via appropriate blast design. Given the nature of the item's condition, monitoring and further assessment to determine significance will be undertaken.

Object	Consistency with the Project
To promote a co-operative approach to the protection and management of the environment involving governments, the community, land-holders and indigenous peoples.	All relevant stakeholders that have an interest in the Project, including Commonwealth, State and local government agencies, the community, and local indigenous people or RAPs, have been engaged prior to, and during the preparation of this draft PER. Thus, there has been substantial opportunity for involvement in a co-operative approach to the protection and management of the environment' as part of the development of avoidance, mitigation and offsetting measures. This stakeholder involvement would continue during the assessment phase of this draft PER, and as well during the preparation and implementation of the mitigation and offsetting measures for the Project.
To assist in the co-operative implementation of Australia's international environmental responsibilities.	This objective is not considered to be relevant to the Project.
To recognise the role of indigenous people in the conservation and ecologically sustainable use of Australia's biodiversity.	This objective is not considered to be relevant to the Project.
To promote the use of indigenous peoples' knowledge of biodiversity with the involvement of, and in co-operation with, the owners of the knowledge.	Currently there is no link between Indigenous people and the conservation of biodiversity in and immediately surrounding the HVO North Action Area. Representatives from the local Aboriginal community were involved in the Aboriginal cultural heritage assessment. They will also be involved in Aboriginal cultural heritage mitigation and management measures proposed for the HVO North Action Area including participation in sub-surface investigations. Ongoing engagement with the Aboriginal community will occur throughout the life of the Project.
EP&A Act	
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 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 and social benefits documented in the EIS would not be realised.
To facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment.	The economic, environmental and social context of the Project and its potential have been described in various environmental impact assessments such as the EIS (EMM 2022a), Submissions Report (EMM 2023a), HVO North Amendment Report (EMM 2023b), Amendment Report (EMM 2025a) and this PER to allow informed consideration of these aspects in determining whether it should be approved. Consideration of the Project against the principles of ESD is provided in Table 11.5.
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 PER, 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.	This objective is 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 and reviewed following the results of stakeholder engagement, resulting in avoidance of significant biodiversity values and minimisation of impacts on other areas of native vegetation. Significantly, as part of the Project, there will now be no impacts to the Warkworth Sands Woodland EEC across the Project.

Object	Consistency with the Project
To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	Avoidance of Aboriginal cultural heritage values have been a key aspect of the Project refinement process, with the Project specifically designed to avoid CM-CD1 and culturally modified trees: TR212-ST1 (37-3-1629), TR216-ST1 (37-3-1635) and TR178-ST1 (37-3-1628).
To promote good design and amenity of the built environment.	This objective is not directly relevant to the Project.
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, built infrastructure at HVO 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 9, a wide range of State government agencies and the two local councils have been consulted regarding the Project.
To provide increased opportunity for community participation in environmental planning and assessment.	As described in Chapter 9, a range of engagement activities have been undertaken to inform the community about the Project and to seek community (and other stakeholder) feedback.

11.6 Consideration of community views

Consultation conducted for the Project is described in Chapter 9 of this draft PER. Feedback from the community has been both positive and negative on a range of topics.

During the public exhibition of the EIS (EMM 2022a), a total of 1,060 submissions were received by DPHI from government agencies, councils, public authorities, organisations, and individuals. The majority of the submissions received (91%) were in support of the Project.

The Amendment Report (EMM 2025a) was also publicly exhibited, with a total of 1,331 submissions were received by DPHI from government agencies, councils, public authorities, organisations, and individuals. The majority of submissions from the public and organisations (91%) were in support of the amended Project which is consistent with the submission received in support of the EIS.

Most stakeholders recognised the benefits of the Project. In particular, stakeholders acknowledged the Project as a source of local employment, particularly in reference to the established workforce. Stakeholders were also interested in understanding how the benefits of the Project could be shared within the community.

Some concerns were raised by community stakeholders regarding the associated environmental impacts and the ongoing reliance of coal both nationally and internationally.

With regard to the EIS, 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 11.2.

Table 11.2 Submissions summary – EIS (EMM 2022a)

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**

Notes *of the 72 objecting submissions, 67 are considered unique submissions for the purposes of section 2.7(6) of the Planning Systems SEPP.

For the Amendment Report (EMM 2025a), a summary of the submissions received following public exhibition is outlined in Table 11.3.

Table 11.3 Submissions summary – Amendment Report (EMM 2025a)

Submission source	Support	Comment	Advice	Object	Total
Government agencies	-	-	6	-	**6**
Councils	-	-	1	-	**1**
Organisations	22	2	-	17	**41**
Public	1,176	4	-	102	**1,282**
Public authorities	-	-	1	-	**1**
Total	**1,198**	**6**	**8**	**119**	**1,331**

11.7 Summary of Project impacts

11.7.1 Environmental

The potential impacts to the biophysical environment, relevant to MNES, as result of the Action are summarised in Table 11.4.

Table 11.4 Summary of environmental impacts to MNES

Environmental aspect	Key findings
Water resources	Key outcomes of the SWIA are summarised as follows: • Impacts on Hunter River and Wollombi Brook streamflow will be negligible. • Minor changes in streamflow are predicted for three ephemeral watercourses during operations. The predicted change in streamflow will have a minor impact on the number of dry days, as many of these ephemeral watercourses are dry (on average) for more than half of the year under current conditions. Post mining, potential streamflow impacts are expected to be negligible. • Potential impacts on surface water downstream users will be negligible as no changes in streamflow regimes are predicted in the Hunter River, given it is a regulated system and HVO hold sufficient entitlement for the predicted reduction in streamflow due to the Project. • The proposed WMS for the Project is predicted to maintain a sufficient water supply for the operation and discharge capacity to preventing flooding of operational areas of the mine. • Potential impacts on surface water quality are expected to be minimal and will continue to be mitigated through an appropriately sized, designed and operated WMS, including release from sediment dams in accordance with their design and discharge of mine water in accordance with approved EPL requirement. Modelling indicates that the impact of approved HRSTS discharges will have a negligible impact on water quality. Concentrations of key analytes are predicted to remain within the existing ranges observed in the Hunter River. • The flood modelling for the Project indicates no impact on the use of the land (grazing and cropping or Crown land). • The proposed realignment of Lemington Road will significantly improve flood immunity of this road adjacent to the Hunter River. • The Project is not predicted to change the flood hazard categories, or have an impact on use of the land, public safety or emergency management. • Changes in velocity are presented to be localised around Project infrastructure and will remain within the existing ranges experienced, with a low likelihood of causing scour. The potential impact of the Project on surface water resources and aquatic ecology is insignificant. Key outcomes of the GIA and GDE assessment are summarised as follows: • Potential groundwater level drawdown impacts at third-party water supply bores is very unlikely to negligible. • The proposed HVO North Action and HVO South Action are predicted to result in minor increased drawdown in the alluvial aquifer(s), as mining will largely occur in areas previously mined or approved for mining under the existing approvals (e.g. Carrington West Wing area). In addition, construction of the approved (but not yet constructed) Carrington West Wing LPBW will be an effective mitigation measure to limit 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. In addition, a LPBMMP will be developed, including development of TARPs, identifying mitigation measures to manage potential unexpected effects. • Minimal drawdown (less than 0.2 m) is predicted in the Hunter River alluvium near mapped river red gum stands in the Carrington Billabong and dewatering will not occur. This predicted drawdown will be buffered by leakage through the riverbed. Therefore, no significant impact in ecological receptors is predicted. • The potential for acid rock drainage or metal leachate is low as the majority of rejects generated by mining at the HVO Complex are likely to be NAF. Thorough intermingling of rejects and overburden, and the excess acid neutralising capacity in the overburden, suggests that emplacement areas are unlikely to result in any significant acid rock drainage issues or effects on rehabilitation. • The potential for seepage from backfilled mining areas to the alluvial watertable and Hunter River is very unlikely because: – there is no proposed change to waste management and pit backfill at HVO South or HVO North from the existing approved operation – during mining, the floor of the pit will be deep and intercepted groundwater will be actively managed as part of the mine WMS, resulting in depressurisation of the Permian strata and development of a steep hydraulic gradient towards the pit area. Therefore, the active mining areas will be groundwater sinks

Environmental aspect	Key findings
	– groundwater monitoring shows that groundwater levels in the rehabilitated Alluvial Lands area (at HVO North) are lower than the Hunter River alluvium, supporting the conceptual understanding and modelling results that the potential for the watertable in the backfilled pit areas to rise to a similar or higher elevation than the alluvium is unlikely. • Seepage losses from out of pit storages and open cut pits are expected to be minor. In addition, potential seepage from the upgraded dams (including Parnells Dam) will be managed by an embankment filter, cut-off design and treatment of batters within the storages. • Potential for seepage from tailings areas to alluvial (or other shallow) groundwater systems is unlikely, as tailings will be stored in pit areas and the main voids will act as groundwater sinks. • No changes to the environmental, community and cultural values are predicted.
Biodiversity	• The landscape within and surrounding the HVO North Action Area is characterised by extensive historical clearing for agricultural, mining and rural development. • Targeted avoidance and minimisation measures were implemented to reduce the HVO North Action's impact on areas of higher value vegetation and habitat, including MNES. Avoidance measures include: – 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 remove all direct impacts to Warkworth Sands Woodland of the Hunter Valley CEEC – careful consideration of proposed transmission line easement alignments 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. • The HVO North Action has avoided impacts to 9.8 ha of Warkworth Sands Woodland of the Hunter Valley CEEC and 17.5 ha of impacts to the Central Hunter Valley Eucalypt Forest and Woodland CEEC. All unavoidable impacts will be offset in accordance with NSW Government biodiversity offset scheme. • Following the application of avoidance measures, the following MNES are likely to be significantly impacted as a result of the HVO North Action: – 166.3 ha of Central Hunter Valley Eucalypt Forest and Woodland CEEC – 305.5 ha of Hunter Valley delma habitat – 205.4 ha of Swift Parrot habitat. • The following biodiversity ecosystem credits are required to be retired to offset the impacts of the HVO North Action: – Central Hunter Valley Eucalypt Forest and Woodland CEEC (4,824) – Hunter Valley delma (3,601) – Swift Parrot (5,801) – White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC (202) – Regent honeyeater (5,840) – Spotted-tailed quoll (8,176) – Large-eared pied bat (6,120) – Grey-headed flying-fox (6,588) – White-throated needletail (6,734) – Brown treecreeper (5,801). • It is HVO's intention that the offset strategy for the HVO North Action will focus on purchasing credits on the market or through the Biodiversity Conservation Fund. • HVO proposes to stage the retirement of credits as clearing of the HVO North BIAA occurs.

Environmental aspect	Key findings
Aquatic ecology	• No impacts are predicted on the aquatic ecology of the Hunter River, particularly as flow will be mitigated through regulated releases from Glenbawn Dam, and only minor impacts to the aquatic ecology in the tributaries to the Hunter River are expected. • Potential alluvial drawdown is not predicted to have a significant impact on GDEs or surface water due to existing and approved LPBWs (as per the existing HVO North Consent), ongoing long-term water licensing requirement from HVO's entitlements (to offset potential streamflow losses), and continued ongoing recharge to the alluvium from the Hunter Regulated River. • River red gums 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. • Stygofauna was collected during sampling, and most came from the paleochannel aquifer north of the Hunter River and west of the existing mine. This area is already planned for excavation as part of the approved Carrington West Wing pit for HVO North. However, the regional impact is likely to be minor as all taxa collected from the paleochannel were also collected at other locations along the Hunter River and within the Hunter Valley.

i Ecologically sustainable development

The Commonwealth's *National Strategy for Ecologically Sustainable Development* (Australian Government 1992) defines ESD as 'using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased'. Based on this, the principles of ESD are provided in section 3A of the EPBC Act. This states:

> The following principles are principles of ecologically sustainable development:
>
> (a) decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations;
>
> (b) 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;
>
> (c) the principle of inter-generational equity—that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations;
>
> (d) the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making;
>
> (e) improved valuation, pricing and incentive mechanisms should be promoted.

Table 11.5 evaluates the principles of ESD against the Project.

Table 11.5 Evaluation of ESD principles

Principles	Evaluation against the Project
Decision making	During the preparation of the EIS (EMM 2022a) and this draft PER, the potential short-term and long term environmental, social, cultural and economic impacts of the Project have been assessed by technical experts in a number of areas. These experts have responded to submissions from the community and advice from government agencies in a Submissions Report (EMM 2023b) following exhibition of the EIS. The outcomes of each of these studies and responses to submissions and advice are available for decision makers to make an informed decision on the merits of the Project.
Precautionary principle	The precautionary principle holds that where there are threats of serious or irreversible environmental damage, a lack of full scientific certainty should not be used as a reason for postponing measures to prevent such damage. 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 across the HVO Complex, particularly with respect to: • greenhouse gas emissions through the avoidance of coal extraction in gas Domain 1 • Warkworth Sands Woodland of the Hunter Valley CEEC • Aboriginal heritage site CM-CD1 • noise and visual amenity impacts to sensitive receptors, notable the Jerrys Plains locality, associated with mining north-west of Mitchell Pit • Aboriginal heritage items and biodiversity features associated with the Lemington Road realignment, transmission line realignment, and Lemington CPP and associated rail loop • historic heritage items associated with the transmission line realignment. A biodiversity offset strategy will also be implemented . With respect to GHG and potential impacts of climate change, HVO has committed to making additional, voluntary contribution towards emission-reduction targets to reflect consideration of the NZF Act. HVO will therefore implement a net emissions decline rate for the Project that is more ambitious than the Safeguard Mechanism requirements, involving: • a reduction of 5.9% per year from financial year commencing 1 July 2023 to financial year commencing 1 July 2029 • a reduction of 4.0% per year from financial year commencing 1 July 2030 to financial year commencing 1 July 2034 • a reduction of 2.58% per financial year thereafter. The Project's contribution to global GHG concentrations, and therefore to anthropogenic climate change, is proportionately very small. With respect to climate change impacts on the locality, this contribution is not sufficient to materially affect the extent or timing of climate change impacts in the local region, which are largely driven by global cumulative emissions. 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 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 addresses the precautionary principle because there will be no serious or irreversible environmental damage.
Inter-generational equity	Inter-generational equity is the concept that the present generation should ensure the health, diversity and productivity of the environment is 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 voids, significant parts of 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 4,818 ha which is a net increase from the baseline area of land use for agriculture.

Principles	Evaluation against the Project
	Some impacts to biodiversity will occur through the disturbance of native vegetation and habitat for species listed under the EPBC and BC Acts. However, an offset strategy has been developed and will be implemented. The WMS 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 Project will contribute to global GHG emissions. However, this contribution will be very small as a proportion of global GHG emissions and is not sufficient to materially affect the extent or timing of climate change impacts in the locality, which are driven by global cumulative emissions. It is also not possible to conclude that the Project's GHG emissions will lead to a net increase in global emissions, and therefore contribute to an increase in global temperatures, as this outcome is dependent on multiple factors external to the Project. The mitigation measures outlined in Appendix C of the Amendment Report (EMM 2025a) 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.
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, including amending the Lemington Road design at HVO North Action and removing approval for the construction and operation of the LCPP and associated rail facilities at HVO South to avoid all direct impacts to Warkworth Sands Woodland EEC.
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 assessment summarised in Section 11.7.3, 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.

11.7.2 Social

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 Project, with all potential impacts ranked as medium or low. 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 were all ranked as either 'low' or 'medium' and include:

- 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
- impact on perceived safety due to realignment of Lemington Road.

A range of mitigation measures are proposed to effectively minimise these residual 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
- 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.

In addition to these identified benefits, 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
- HVO will liaise further 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.

11.7.3 Economic

The Project is justified economically due to the significant 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 Project for NSW is estimated at $5,692.4 million in NPV terms (a reduction of $2,143.8 million from the original Project), comprising the following:

- direct benefits of $2,768.1 million (NPV), comprising:
  - royalties, payroll tax and council rates of $2,395.2 million
  - company income tax apportioned to NSW of $372.9 million

- indirect benefits of $2,941 million (NPV), comprising:
    - net economic benefit to NSW workers of $1,158.4 million
    - net economic benefit to NSW suppliers of $1,783.5 million
- incremental indirect costs of $17.6 million, noting this value is considered conservative given the reduction in GHG gas emission.

A number of flow-on effects will occur as a result of the Project's capital and operating expenditure, and ongoing employment opportunities, which will benefit the regional economy.

The Project will deliver an estimated net benefit of $1,778.1 million to the Lower Hunter region (SA3) in NPV terms, comprising:

- royalties, payroll tax and council rates of $72.1 million
- net economic benefit to NSW workers of $990.9 million
- net economic benefit to NSW suppliers of $780.3 million
- indirect costs $75.2 million.

Given the significant net benefits of the Project, it is desirable and justified from an economic efficiency perspective.

11.8 Conclusion

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 facilitate the efficient extraction of this high-quality coal resource, via mining through existing tenements and predominantly within existing or previously approved disturbance areas.

Numerous technical investigations have been carried out to support this draft PER. 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 HVO North Action Area, gained over a very long history of mining at HVO and further reviewed in acknowledgement of stakeholder engagement and feedback.

The HVO North Action and the broader Project represent a brownfield mining proposal that aligns with the strategic direction and policy objectives at a local, state and national level. It will provide ongoing employment opportunities for up to 1,500 workers and will deliver significant economic benefits to the State and local region.

Abbreviations

Term	Definition
AHIMS	Aboriginal Heritage Impact Management System
AEP	Annual Exceedance Probability
AL	Assessment Lease
ACCUs	Australian carbon credit units
ARI	average rainfall intensity
BAM	Biodiversity Assessment Method
BC Act	*Biodiversity Conservation Act 2016*
BCF	Biodiversity Conservation Fund
BC Regulation	Biodiversity Conservation Regulation 2017
BIAA	Biodiversity Impact Assessment Area
BOS	Biodiversity Offsets Scheme
BOM	Bureau of Meteorology
CM-CD1	Carrington Mine - Colluvial Deposit 1
CC Act	*Climate Change (Net Zero Future) Act 2023*
CPP	coal preparation plant
CL	Coal Lease
CSES	Communication and Stakeholder Engagement Strategy
CCC	Community Consultive Committee
CCL	Consolidated Coal Lease
CML	Consolidated Mining Lease
CBA	Cost Benefit Analysis
CEEC	critically endangered ecological community
Commonwealth DCCEEW	Department of Climate Change, Energy, the Environment and Water (Commonwealth)
NSW DCCEEW	Department of Climate Change, Energy, the Environment and Water (NSW)
DPHI	Department of Planning, Housing and Infrastructure
DA	development application
ESD	ecological sustainable development
EEC	endangered ecological community
EPBC Act	*Environment Protection and Biodiversity Conservation Act* 1999
EPBC Regulations	*Environment Protection and Biodiversity Conservation Regulations 2000*
EPL	environment protection licence
EIS	environmental impact statement

Term	Description
EMS	Environmental Management System
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2021*
EPI	environmental planning instrument
EL	exploration licence
FTE	full time equivalent
GL	gigalitres
GDP	Ground Disturbance Permit
GDE	groundwater dependent ecosystems
GIA	Groundwater Impact Assessment
ha	hectare
HCPP	Howick Coal Preparation Plant
HRSTS	Hunter River Salinity Trading Scheme
HVCPP	Hunter Valley Coal Preparation Plant
HVLP	Hunter Valley Load Point
HVO	Hunter Valley Operations
IPC	Independent Planning Commission
IOAR	Infrastructure Options and Avoidance Report
IAIA	International Association for Impact Assessment
JV	Joint Venture
Km	kilometre
ktpa	kilotonnes per annum
LFA	Landscape Function Analysis
LCPP	Lemington Coal Preparation Plant
LTC	level temperature conductivity
LCO	Liddell Coal Operations
LDP	licensed discharge points
LP	load point
LEA	Local Effects Analysis
LEP	local environment plan
LGA	Local government area
LPBW	low permeability barrier wall
LPBMMP	low permeability barrier monitoring and management plan

Term	Description
MNES	matters of national environmental significance
ML	megalitres
ML/day	megalitres per day
Mm	millimetre
Mbcm	million bank cubic metres
Mt	million tonnes
Mtpa	million tonnes per annum
MIA	mine infrastructure area
MPOR	Mine Planning Options Report
ML	mining lease
NP	National Park
NPV	net present value
NSW	New South Wales
NLP	Newdell Load Point
NAF	non-acid forming
OSL	Optically-Stimulated Luminescence
PCT	plant community type
PAF	potential acid forming
PMF	Probable Maximum Flood
PMP	Probable Maximum Precipitation
PMST	Protected Matters Search Tool
POEO Act	*Protection of the Environment Operations Act 1997*
PER	public environment report
RCT	Ravensworth Coal Terminal
RMP	Rehabilitation Management Plan
RASP	Rehabilitation and Securities Panel
ROM	run of-mine
SMCs	Safeguard Mechanism credits
SEARs	Secretary's environmental assessment requirements
SRMS	scaled root mean square
SAII	serious and irreversible impact
SIA	social impact assessment
SEPP	state environmental planning policy

Term	Description
Planning Systems SEPP	*State Environmental Planning Policy (Planning Systems) 2021*
SHI	State Heritage Inventory
SSD	State significant development
SWIA	Surface Water Impact Assessment
TSF	tailings storage facility
TECs	threatened ecological communities
TSSC	Threatened Species Scientific Committee
tph	Tonnes per hour
TSP	total suspended particulates
TRC	Town Resource Cluster
TARP	Trigger, Action, Response Plan
WAL	water access licence
WM Act	*Water Management Act 2000*
WMP	Water Management Plan
WMS	water management system

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