

BULLI SEAM OPERATIONS

MODIFICATION 4 VENTILATION AIR METHANE ABATEMENT PROJECT

Modification Report

EXECUTIVE SUMMARY

Illawarra Coal Holdings Pty Ltd (ICH), is the owner and operator of the Appin Mine, which was approved under the Bulli Seam Operations (BSO) Project Approval (MP 08_0150) under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) on 22 December 2011. The Appin Mine is located in the Southern Coalfield of New South Wales (NSW), approximately 25 kilometres north-west of Wollongong.

ICH proposes a modification to the BSO Project Approval (MP 08_0150) (Modification 4 [the Modification]) under Section 4.55(2) of the EP&A Act to allow the development of a regenerative thermal oxidiser to enable greenhouse gas abatement of ventilation air methane at the Appin Mine. This abatement is consistent with NSW and commonwealth greenhouse gas reduction policies.

Greenhouse gas abatement facilitated by the Modification is estimated at approximately 36,000 tonnes carbon dioxide equivalent per year, the equivalent of approximately 8,500 petroleum-powered passenger vehicles driven for one year.

The regenerative thermal oxidiser and associated infrastructure would largely be developed in an area previously cleared and offset for the Appin Ventilation Shaft No. 6 (MP 10_0079) (which was incorporated into MP 08_0150 following the approval of Modification 2).

In consideration of the assessment of impacts in this Modification Report, the Modification would remain substantially the same as the development for which consent was originally granted as defined under Section 4.55(2) of the EP&A Act.

In weighing up the main environmental impacts (costs and benefits) assessed and described in this Modification Report, the Modification is considered to fundamentally align with the interests of the State of NSW, most notably, the Modification's contribution towards achieving NSW interim greenhouse gas emission reduction target of being 50 per cent below 2005 levels by 2030 as outlined in the *NSW Net Zero Plan Stage 1: 2020-2030* (Department of Planning, Industry and Environment, 2020).

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1 INTRODUCTION

The Appin Mine, which is approved under the Bulli Seam Operations (BSO) Project Approval (MP 08_0150), is located in the Southern Coalfield of New South Wales (NSW), approximately 25 kilometres (km) north-west of Wollongong (Figure 1).

The Appin Mine is owned and operated by Illawarra Coal Holdings Pty Ltd (ICH), which is a wholly owned subsidiary of Gear M Illawarra Met Coal Pty Ltd (GM³).

Appin Mine (which consists of the merged Appin West Cliff and Tower Collieries), Cordeaux Colliery and Dendrobium Mine (and associated facilities) are collectively operated by ICH.

The BSO operates in accordance with Project Approval (MP 08_0150) (as modified), which was approved by the Planning Assessment Commission under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) on 22 December 2011.

The BSO Project Approval (MP 08_0150) integrates underground longwall mining operations and associated surface activities from the Appin Mine. These operations utilise longwall mining methods to extract coal from the Bulli Seam, with an approved extraction rate of 10.5 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal until 2041.

ICH is proposing to modify the BSO Project Approval (MP 08_0150) to incorporate the development of a regenerative thermal oxidiser (RTO) to enable further greenhouse gas (GHG) (Modification 4 [the Modification]) abatement of ventilation air methane (VAM). The Modification is being sought under Section 4.55(2) of the EP&A Act.

The Modification infrastructure would be constructed adjacent to the existing Appin Ventilation Shaft No. 6, located near the M31 Hume Motorway, approximately 800 metres (m) east of Douglas Park, in the Wollondilly Local Government Area.

ICH currently manages liberated methane gas from the BSO Project through gas drainage and ventilation air systems. Methane not captured by the gas drainage system is diluted by the underground ventilation system, which exhausts to the atmosphere (i.e. as VAM) via upcast ventilation shafts, contributing to GHG emissions. Following assessment of currently available VAM abatement technologies, RTO has been identified by GM³ as the most suitable abatement technology for the Appin Mine. The RTO would oxidise incoming methane (CH₄) (i.e. within the VAM) into carbon dioxide (CO₂) and water (H₂O), reducing the GHG potential of the VAM.

This Modification Report has been prepared to support the Modification application and has been prepared in consideration of the *State Significant Development Guidelines* (Department of Planning, Industry and Environment [DPIE], 2021a), in particular *State significant development guidelines – preparing a modification report* (DPIE, 2021b).

1.1 APPLICANT DETAILS

The proponent of the Modification is:

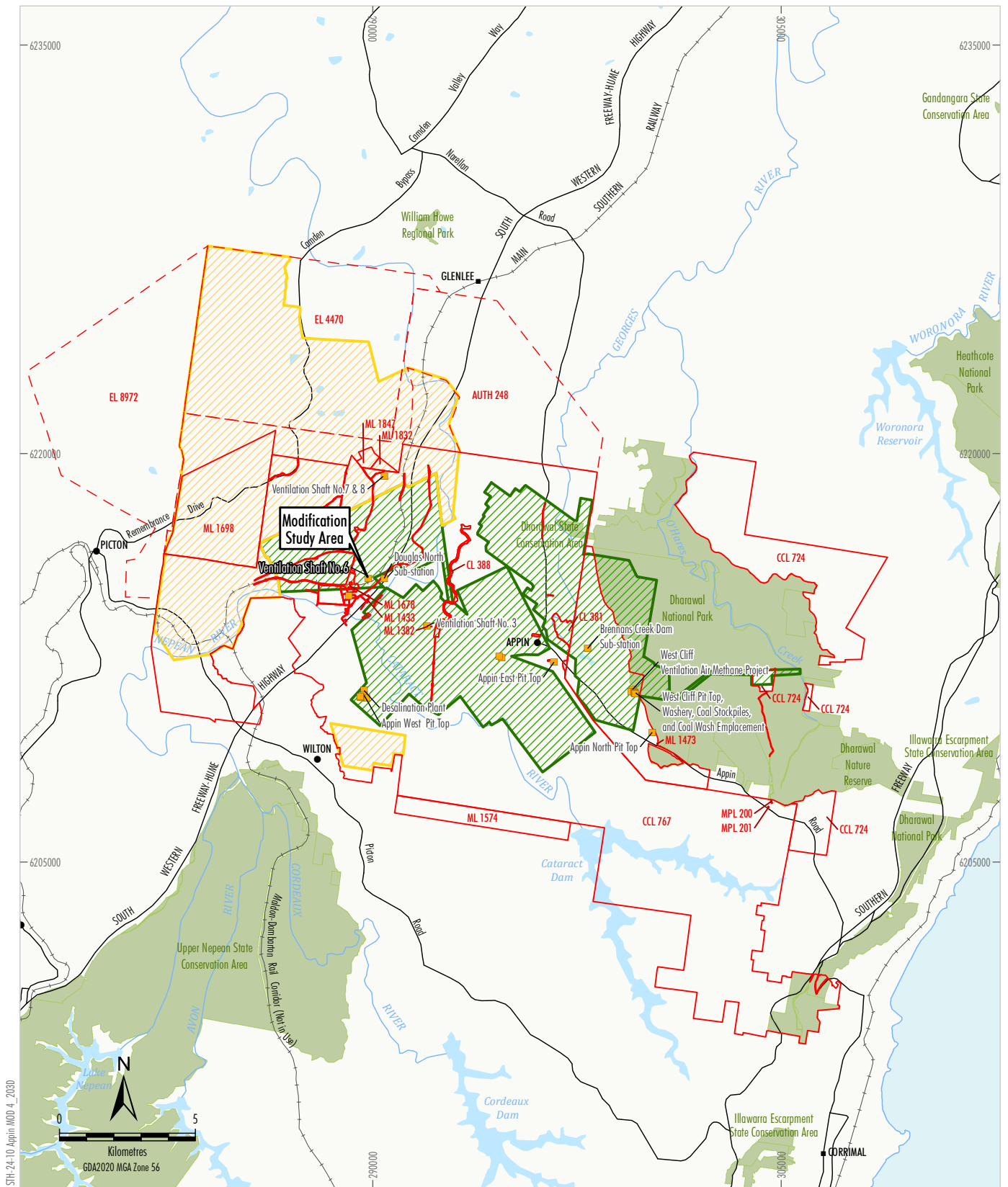
Illawarra Coal Holdings Pty Ltd
PO Box 514
UNANDERRA NSW 2526

Further information on GM³ and its mining operations can be found at:

<https://gm3.au/>

1.2 SUMMARY OF THE BULLI SEAM OPERATIONS PROJECT

The BSO includes the merged Appin and West Cliff Collieries' mining operations and provided for the continuation of coal mining operations until 31 December 2041. Appin Mine underground longwall mining operations transitioned wholly to the Appin Area 9 and Appin Area 7 mining domains following completion of longwall mining activities at West Cliff in early 2016. Mining operations in Appin Area 9 were completed in financial year 2023. The locations of underground mining domains and surface facilities associated with Appin Mine can be seen in Figure 1.



STH-24-10 Appin MOD 4, 2030



- LEGEND**
- Road
 - +— Railway
 - GM³ Surface Facilities
 - ▨ Future Mining Area
 - ▨ Completed Mining Area
 - ▨ Appin Mining Tenement
 - ▨ Mining Lease Boundary
 - ▨ Exploration Licence Boundary

Source: Geoscience Australia (2006); Department of Industry (2018); Department Finance, Services & Innovation (2018)

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**APPIN MINE VENTILATION
METHANE ABATEMENT PROJECT**

Regional Location

Figure 1

Appin Mine is owned and operated by ICH. Appin Colliery (located at Appin) commenced operations in 1962 and Tower Colliery (located at Douglas Park) commenced operation in 1978. The underground infrastructure, roadways, conveyor, and ventilation systems were joined in 2003 to become Appin Mine. The original Appin Colliery Pit Top (now Appin Colliery – East Pit Top) is located adjacent to Appin village, approximately 37 km northwest of Wollongong.

Key areas associated with the current Appin Mine operations include the Appin East, West and Appin North Pit Tops, Ventilation Shaft No.1, No. 2, No. 3, No. 6 (location of the Modification), No. 7 and No. 8, Douglas North and Brennans Creek Dam Sub-station, the West Cliff washery, coal stockpiles and coal wash emplacement and the West Cliff Ventilation Air Methane Project (discussed further in Section 2.1).

1.3 SUMMARY OF MODIFICATIONS ON THE BULLI SEAM OPERATIONS PROJECT

In December 2011, the BSO Project (MP 08_0150) was approved to extract up to 10.5 Mtpa of ROM coal in any financial year. The approval also allowed for the construction and operation of associated infrastructure and facilities.

Prior to that, in May 2011 a separate State Significant Development (MP 10_0079) was approved to allow the development and operation of the Appin Mine No. 6 Ventilation Shaft.

In March 2015, ICH submitted an application to modify the BSO Project Approval (MP 08_0150) to allow additional flexibility in the consent conditions to provide better biodiversity offset outcomes to existing and future offset obligations (Modification 1) and was subsequently approved in April 2015.

In July 2016, ICH lodged an application to allow the optimisation of the underground extraction and utilisation of methane gas from the mine by implementing the Mine Safety Gas Management Project (Modification 2). Modification 2 also proposed to amalgamate the approval requirements for the Appin Ventilation Shaft No. 6 (MP 10_0079) into the BSO Project Approval (MP 08_0150). Modification 2 was approved in October 2016. Accordingly, the Appin Mine Ventilation Shaft No. 6 is now part of MP 08_0150.

In June 2021, ICH lodged an application to allow construction of additional ventilation and mine access infrastructure (Modification 3), which was approved in December 2022.

On 9 August 2024 a modification to the Dendrobium Consent (DA 60-03-2001) and the BSO Project Approval (MP 08_0150) was approved to allow the receipt and processing of third-party ROM Coal at the Dendrobium Coal Processing Plant and the transport of third-party coal wash to the West Cliff Coal Wash Emplacement Area (Modification 5).

On 11 October 2024 the Director Energy and Resource Assessments of the DPHI approved an application to extend blasting hours and increase blasting frequency (from one to two blasts per day per shaft) at the Appin Mine Ventilation and Access (AMVA) Project (Modification 6). The proposed changes allow for optimised blasting approach to facilitate efficient delivery of the AMVA Project, including revised bench blasting methods necessitated by challenging geological conditions.

2 STRATEGIC CONTEXT

2.1 MODIFICATION JUSTIFICATION

Methane is a GHG with a global warming potential approximately 28 times higher than CO₂. The International Energy Agency (2023) reports that coal mine methane emissions in Australia contribute approximately 30 per cent (%) of the country's annual methane emissions.

The Appin Mine gas drainage program currently captures gas from the coal seams pre- and post-mining, however, some residual gases, including methane, enter the underground mine ventilation system and must be released to the atmosphere as VAM to maintain safety underground. While VAM typically occurs in low concentrations (i.e. 0.15% to 0.5%), the high volume of air that flows through the ventilation system results in significant emissions. It is estimated that 90% of total Scope 1 emissions from the Appin Mine is VAM.

To respond to Australia's climate commitments, including NSW GHG reduction targets of at least 50% below 2005 levels by 2030, net zero emissions by 2050 and the Global Methane Pledge (30% methane emissions reduction below 2020 levels by 2030), the coal mining industry in Australia will need to reduce VAM emissions.

In addition, the NSW Environment Protection Authority (EPA) expects facilities with Environment Protection Licenses to make a fair and reasonable contribution in achieving NSW economy-wide GHG emissions reduction targets as outlined in the *Climate Change (Net Zero Future) Act 2023* (EPA, 2024).

ICH has a long history of VAM abatement innovation, dating back to 2007 with the construction and operation of the West Cliff Ventilation Air Methane Project unit at West Cliff, which was operational until 2016 (Figure 1).

Since 2013, ICH has been working in partnership with Australia's national science agency, the Commonwealth Scientific and Industrial Research Organisation (CSIRO), to develop new VAM abatement technologies that can be deployed at operating mine sites. ICH has supported CSIRO through the development of successful pilot plants installed and tested at West Cliff. These successful trials supported the application to Coal Innovation NSW to access a funding grant up to \$15 million to further progress a design into a full-scale demonstration plant. ICH was successful in this application process in November 2021.

After assessment of currently available VAM abatement technologies, RTO has been identified as the most suitable GHG abatement technology for the Appin Mine at the site of Appin Ventilation Shaft No. 6. The RTO oxidises (i.e. destructs) the low levels of methane within the VAM into CO₂ and water. GHG abatement associated with this Modification is estimated at approximately 36,000 tonnes of carbon dioxide equivalent per year (t CO₂-e/year), the equivalent of approximately 8,500 petroleum-powered passenger vehicles driven for 1 year.

An initial Scoping Letter was lodged on 7 November 2022 under the title 'MOD 4 – VAMMIT Demonstration Plant'. VAM abatement was originally proposed at Appin Mine Ventilation Shaft No. 2, however, after further analysis of ventilation gas forecasts (volume and composition), ICH has determined that the current proposal at the Appin Ventilation Shaft No. 6 would result in more reliable methane abatement and so VAM abatement at the No. 2 shaft is no longer proposed as part of this Modification Application.

The Modification would serve as a significant case study for the industry, showcasing the practical application of VAM abatement for fugitive emissions from underground coal mines. The successful implementation and outcomes of this Modification would provide valuable insights and data that would be used to inform future VAM abatement projects (which would be subject to separate approvals). By demonstrating the feasibility and effectiveness of these abatement technologies, this Modification would guide the development of best practices, inform regulatory frameworks, and encourage broader adoption of similar initiatives across the industry, contributing to overall emission reduction efforts.

2.2 GREENHOUSE GAS ABATEMENT CONTEXT

As the Modification would facilitate approximately 36,000 t CO₂-e/year of GHG abatement, the key Commonwealth and state GHG policies are outlined below.

2.2.1 Paris Agreement

Australia's Nationally Determined Contribution (NDC) under the *Paris Agreement* (United Nations Framework Convention on Climate Change, 2015) identifies a GHG reduction target of 43% below 2005 levels by 2030 (Australian Government Department of Industry, Science, Energy and Resources, 2022). The NDC also:

- adopts a multi-year emissions budget from 2021 to 2030;
- re-affirms the commitment to achieve net zero emissions by 2050; and
- refers to a substantial and rigorous suite of new policies across the economy to drive the transition to net zero.

2.2.2 NSW Net Zero Plan Stage 1: 2020-2030

The *NSW Net Zero Plan Stage 1: 2020-2030* (DPIE, 2020) provides the foundational framework for NSW to reach net zero emissions by 2050, and acknowledges the importance of limiting fugitive emissions from coal mining.

The *NSW Climate Change (Net Zero Future) Act 2023* legislates whole-of-government action to deliver on the 'net zero emissions by 2050' target, including establishment of a Net Zero Commission to monitor, report and advise on progress.

The NSW Government is aligning its 2030 emissions reduction objectives to the projections reported in the *Net Zero Plan Stage 1: 2020-30 Implementation Update* (DPIE, 2021c) which aims to reduce emissions by 50% below 2005 levels by 2030, and the *Net Zero Plan Implementation Update 2022* (Office of Energy and Climate Change, 2022) which aims to reduce emissions by 70% below 2005 levels by 2035.

2.2.3 Safeguard Mechanism

The Commonwealth Government's Safeguard Mechanism applies to large industrial facilities that emit more than 100,000 t CO₂-e/year, which includes the existing BSO Project.

From Financial Year 2024, the reformed Safeguard Mechanism requires existing Safeguard facilities to reduce their 'baseline' emissions intensity by a facility-specific ratio between the default 4.9% per year emissions intensity reduction and facility-specific emissions intensity to Financial Year 2030 (e.g. Safeguard facilities with a high facility-specific emissions intensity will have to reduce emissions more aggressively compared to facilities with low emissions intensity).

The Modification would have represented an approximate 1.9% reduction in Appin Mine's emissions in financial year 2023 if it were operating and as such the Modification aligns the BSO Projects Scope 1 emissions intensity with its obligations under the Safeguard Mechanism.

3 DESCRIPTION OF THE MODIFICATION

3.1 OVERVIEW

The Modification would be constructed adjacent to the existing Appin Ventilation Shaft No. 6, located near the M31 Hume Motorway, approximately 800 m east of Douglas Park, in the Wollondilly Local Government Area (Lot 37/DP8738, Lot 1/DP576136, Lot A/DP421246, Lot 2/DP 576136).

The Modification would involve (Figure 2):

- Construction and operation of an RTO to enable abatement of VAM from the BSO Project at the site of the existing Appin Ventilation Shaft No. 6 (Plates 1 and 2).
- Installation of ancillary infrastructure, such as a control room, blower, valves, water supply tanks, power supply, switchroom, services facility, liquid petroleum gas tank/gas drainage system and borehole, fire water pipe network and communications infrastructure.



Plate 1: Existing concrete hard stand before embankment drops down to proposed RTO site.

- Site preparation, including minor vegetation clearing and earthworks associated with installation of underground gas pipelines and general construction laydown area.

Larger scale figures of the proposed RTO and associated ancillary infrastructure and the supplementary gas system is provided in Figure 3 and 4 respectively.

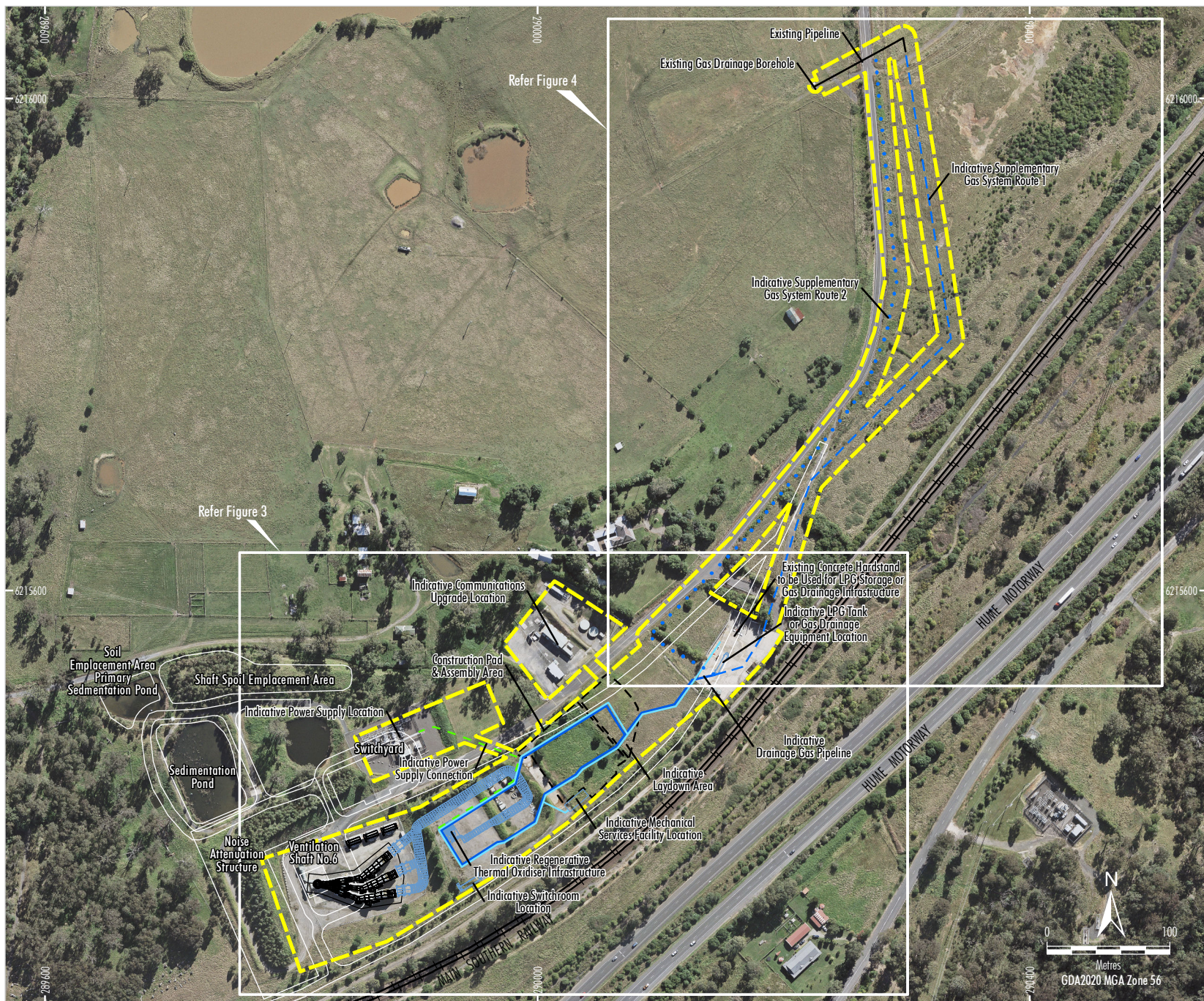
The Modification would involve no change to:

- Approved longwall mining extent or rate.
- Mine life, employment numbers, mining activities or other surface activities associated with the approved Appin Mine.
- The quantity of gas required to be managed for the approved Appin Mine.
- Groundwater take associated with the underground mine.

To date, the BSO Project Approval (MP 08_0150) has been modified on five occasions. Table 1 provides a summary comparison of the approved BSO Project (as modified) and the Modification.



Plate 2: Foreground of existing fan site (which is located just beyond the trees).



- LEGEND**
- Railway
 - Existing/Approved Development
 - Approved Development Consent Site Layout
 - Existing Ventilation Shaft Infrastructure
 - Appin Ventilation Shaft No. 6 Modification
 - Modification Study Area
 - Indicative General Arrangement
 - Indicative Fire Water Pipe Network
 - Indicative Power Supply Connection
 - Indicative LPG or Supplementary Gas System
 - Indicative Supplementary Gas System Route 1
 - Indicative Supplementary Gas System Route 2
 - Indicative Laydown Area

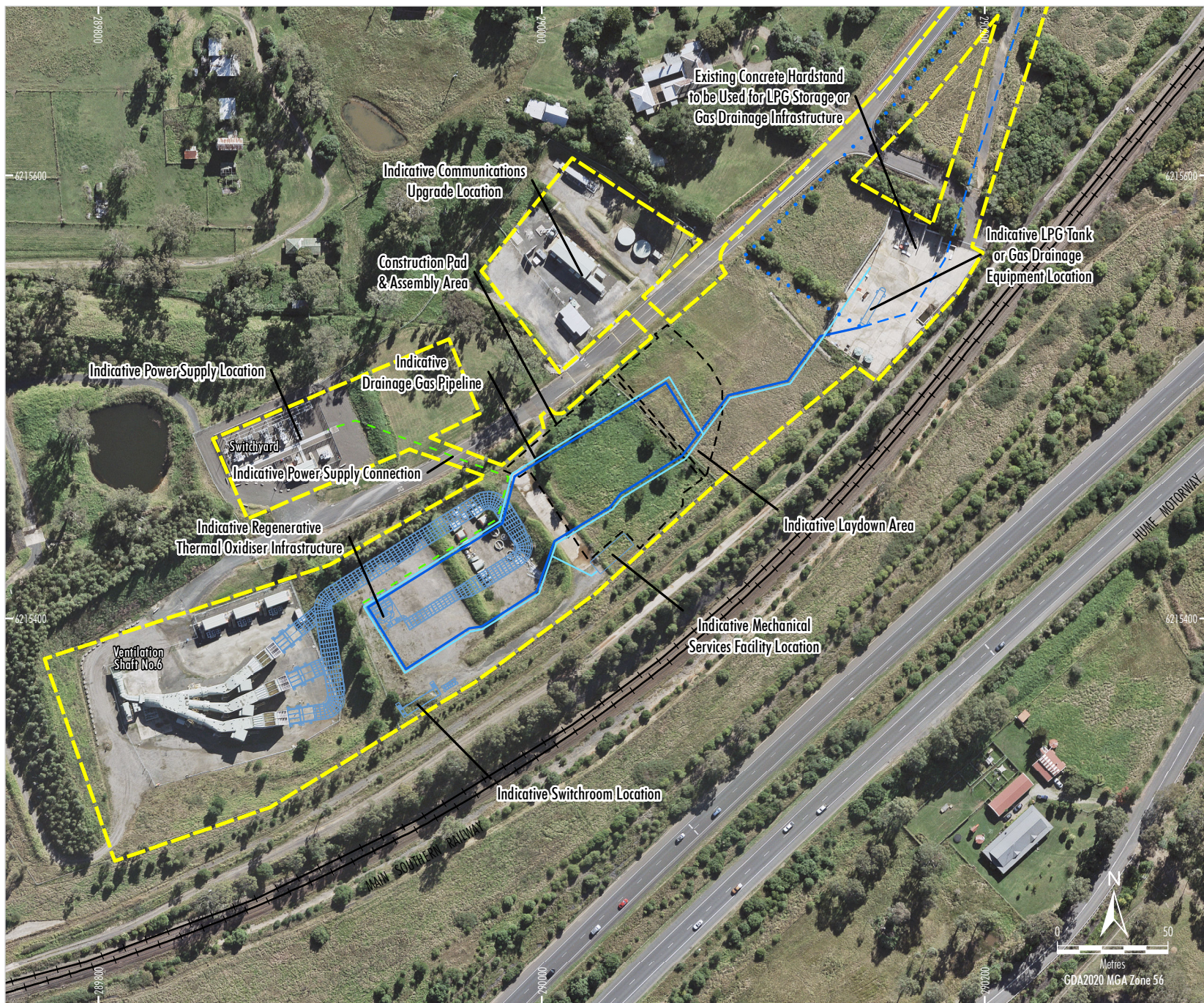
Source: BHP Billiton (2010); Cardno (2010); GM3 (2025); NSW Spatial Services (2024)
Aerial: NSW Public Imagery (2024)

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APPIN MINE VENTILATION
METHANE ABATEMENT PROJECT

General Arrangement

Figure 2



- LEGEND**
- Railway
 - Appin Ventilation Shaft No. 6 Modification
 - Modification Study Area
 - Indicative General Arrangement
 - Indicative Fire Water Pipe Network
 - Indicative Power Supply Connection
 - Indicative LPG or Supplementary Gas System
 - Indicative Supplementary Gas System Route 1
 - Indicative Supplementary Gas System Route 2
 - Indicative Laydown Area

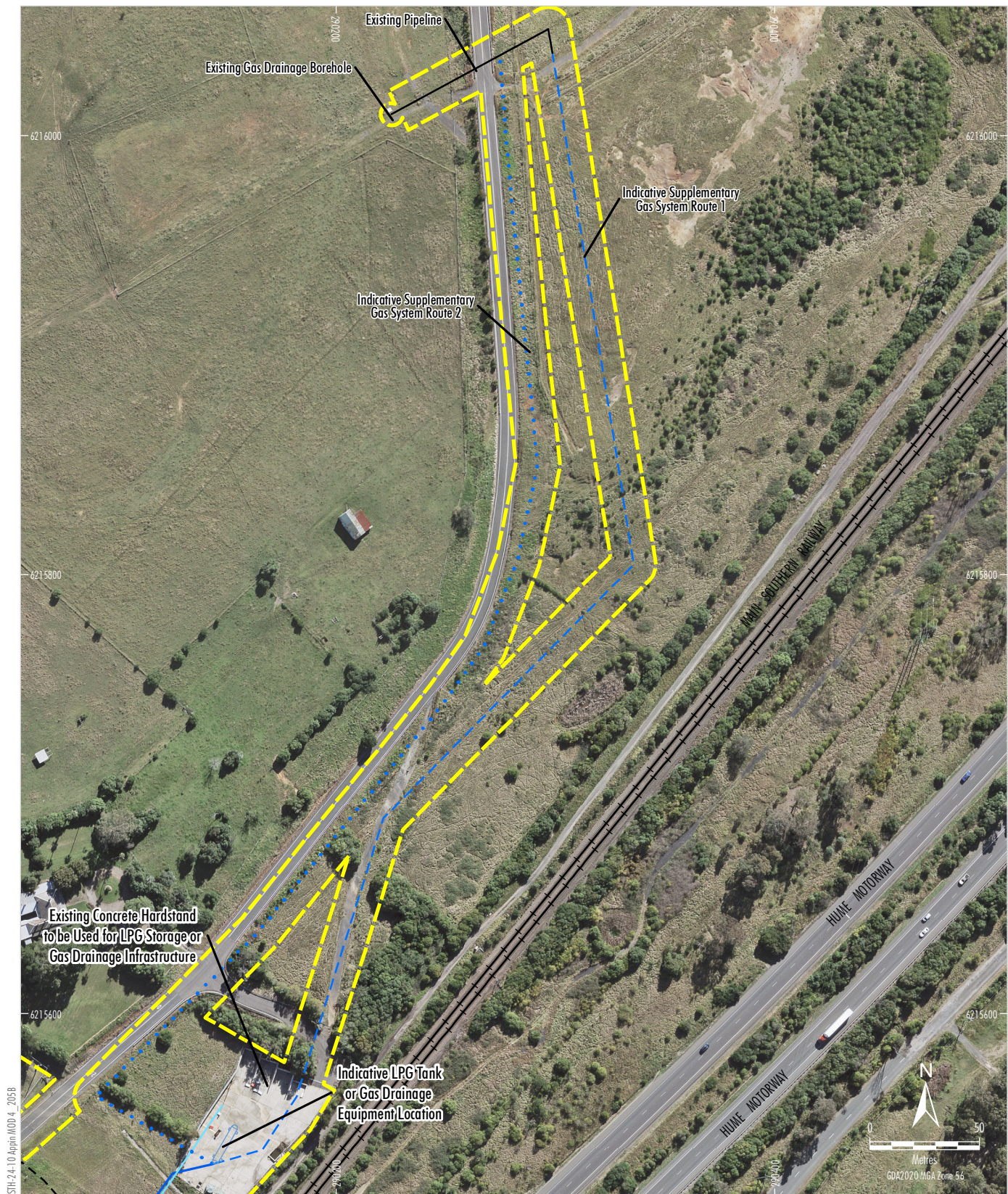
Source: BHP Billiton (2010); Cardno (2010); GM3 (2025); NSW Spatial Services (2024)
Aerial: NSW Public Imagery (2024)

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**APPIN MINE VENTILATION
METHANE ABATEMENT PROJECT**

General Arrangement - RTO

Figure 3



Source: BHP Billiton (2010); Cardno (2010); GM3 (2025); NSW Spatial Services (2024)
Aerial: NSW Public Imagery (2024)

- LEGEND**
- +— Railway
 - Existing Ventilation Shaft Infrastructure
 - Appin Ventilation Shaft No. 6 Modification
 - Modification Study Area
 - Indicative General Arrangement
 - Indicative Fire Water Pipe Network
 - Indicative LPG or Supplementary Gas System
 - — — Indicative Supplementary Gas System Route 1
 - • • • Indicative Supplementary Gas System Route 2
 - — — Indicative Laydown Area

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**APPIN MINE VENTILATION
METHANE ABATEMENT PROJECT**

**General Arrangement
Supplementary Gas System**

Figure 4

Table 1
Comparison of the Approved BSO Project and the Modification

Project Component	Approved BSO Project (MP 08_0150) (as modified)	BSO Project (MP 08_0150) (as modified) Incorporating this Modification
Mining Methods	Conventional longwall mining techniques.	No change.
ROM Coal Production	Up to 10.5 million tonnes of ROM coal can be extracted from the site in any financial year.	No change.
Operational Mine Life	Mining operations can be carried out until 31 December 2041.	No change.
ROM coal handling and transport	Up to 9.3 million tonnes of product coal can be transported from the site in any financial year.	No change.
Hours of Operation	<p>Mining operations and mine ventilation activities can be undertaken 24 hours a day, seven days a week.</p> <p>Construction and operating hours for Appin Ventilation Shaft No. 6 will be undertaken in accordance with Table 1A of the Project Approval (08_0150).</p>	<p>No change to operational hours.</p> <p>Construction activities associated with the Modification would occur between 7.00 am to 6.00 pm, Monday to Saturday. No work on Sunday or Public Holidays is proposed.</p>
Project Area	All land to which the BSO Project application applies, including the longwall mining domains and the surface facilities sites, as listed in Appendix 1 and shown in Appendix 4 of the Project Approval (08_0150).	Minor augmentations to the approved layout of the Appin Mine Ventilation Shaft No. 6 site.
Electricity Supply	Power is supplied from various electrical infrastructure across the BSO Project area including the Douglas Park substation site.	<p>Construction and operational power is anticipated to be supplied by existing and new electrical infrastructure at the Appin Ventilation Shaft No. 6.</p> <p>Power consumption would increase by approximately 200 kilowatts.</p>
Water Supply	Water supply and management for the BSO Project comes from a variety of sources as detailed in the Appin Mine Water Management Plan.	<p>No change to operational mine water supply.</p> <p>Construction phase: Water would be delivered to the site via water trucks.</p> <p>Operational phase: A permanent water supply is proposed to be established from the existing water management system during the construction phase. Operations would require approximately 20 kilolitres of water per annum.</p>
Employment	At full development the BSO Project would employ in the order of 1,170 people.	<p>No change to operational employment.</p> <p>A short-term construction workforce of 20 to 30 personnel over a 12-month period would be required for the Modification.</p>
Traffic	Traffic is managed in accordance with the Appin Mine Traffic Management Plan.	No change, the current road infrastructure is capable of accommodating deliveries of all components for the Modification.

3.1.1 Regenerative Thermal Oxidiser

The general arrangement of the RTO and ancillary infrastructure required for the Modification is provided in Figure 3. The RTO would measure approximately 45 m in length, 20 m in width, and 10 m in height. Ancillary infrastructure, including the mechanical services shed and switchroom, would be approximately 35 m long, 20 m wide, and 5 m high. Potential impacts on visual amenity is discussed in Section 6.6.

An RTO is a unit used for the efficient and effective destruction of methane and other volatile organic compounds in a ventilation gas stream. VAM from the Appin Ventilation Shaft No. 6 would be captured and undergo an oxidation reaction, where methane within the VAM oxidises into CO₂ and water.

The RTO would extract mine exhaust ventilation air via a bespoke design whereby the Appin Ventilation Shaft No. 6 would continue to provide the required ventilation for the mine while simultaneously supplying the required VAM stream to the RTO.

The pipeline linking the RTO and VAM stream has been designed with mine safety and future scalability in mind, potentially allowing for the integration of additional RTO units (which would be subject to separate approvals). The RTO operates on a regenerative cycle where it completes the following processes (Environment Protection Authority Victoria, 2019):

1. **Pre-heating:** VAM enters the RTO and is directed into a packed bed filled with a ceramic media where it is pre-heated. The packed beds provide a large surface area to facilitate efficient heat transfer.
2. **Oxidisation:** The pre-heated VAM enters a chamber where it is heated to a set-point between 800 to 1,100 degrees Celsius (°C) and undergoes oxidation, producing CO₂ and water.
3. **Heat Capture:** The resulting CO₂, water, and any unreacted methane pass through a second packed bed filled with ceramic media, where heat is captured.
4. **Flow Reversal:** The VAM flow is periodically reversed between the two packed beds, maintaining high thermal efficiency through continuous regeneration of the ceramic media.

The RTO unit would be monitored through application of relevant sensors and controlled by a control room located on-site.

Block flow diagrams of the RTO in steady state operations and in start-up operations (i.e. when the supplementary gas system is utilised) are provided in Figure 5a and 5b respectively. The diagrams provide an estimate of the inputs and operating parameters for the Modification. Output stream characteristics is provided in Section 6.1 and Appendix A.

The Modification would not generate additional waste streams, other than small amounts of water and vented VAM vapour stream as a result of the RTO.

Whilst most of the water released via the vaporisation of methane would be vented as vapour, small amounts of liquid water would be produced at start-up and during colder humid weather during operations. This water would be stored in a tank and trucked off-site for disposal at a suitable GM³ site or third-party facility.

The VAM waste stream would not require further management, as the processed VAM would be vented to the atmosphere, consistent with current approved practices of the Appin Ventilation Shaft No. 6.

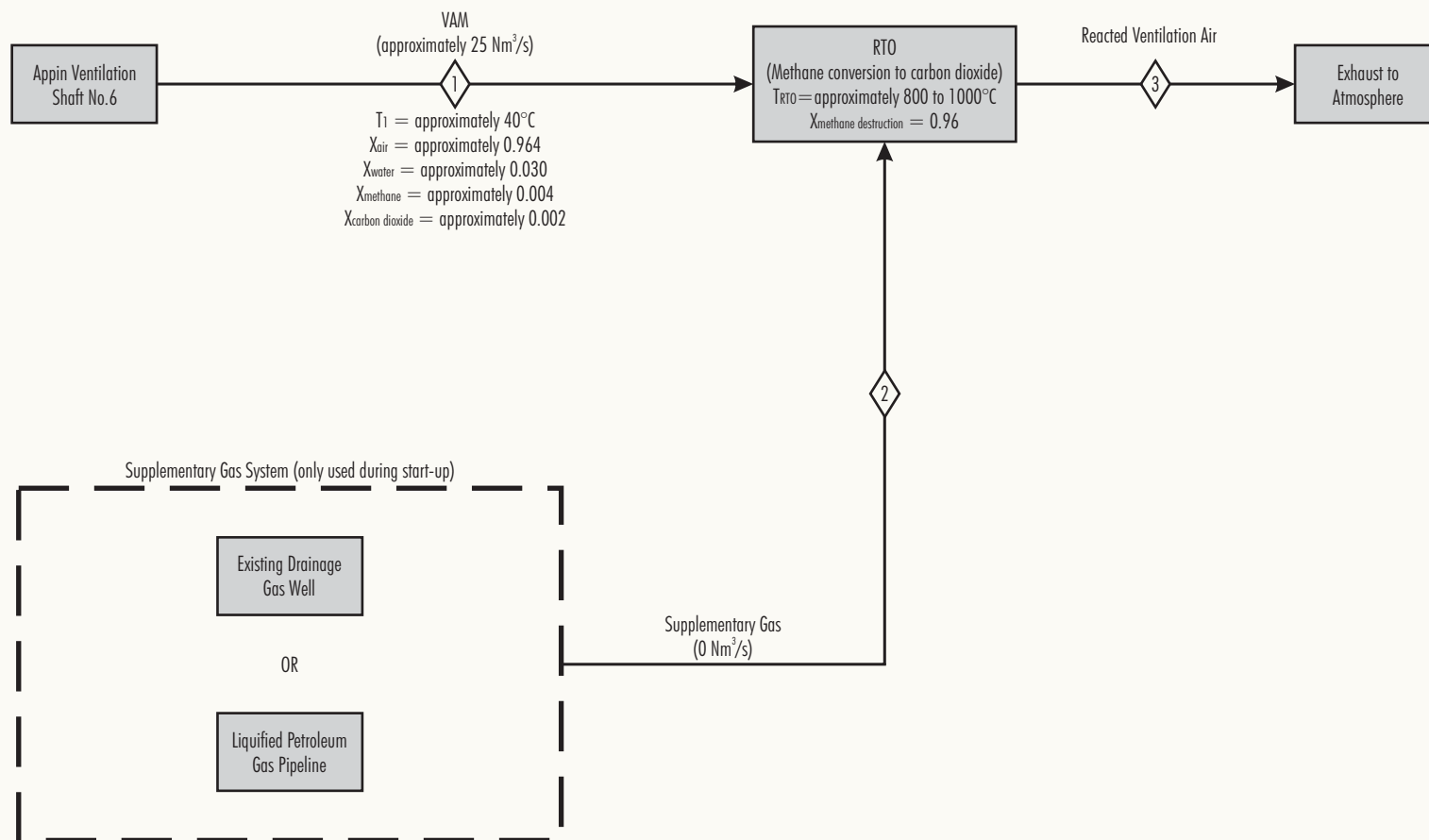
The flowrate of VAM into the RTO unit would be controlled through a safe duct system where methane concentration of the VAM is continuously monitored and the flowrate is adjusted accordingly (within gas from the gas drainage system), allowing for the minimum 0.3% methane concentration required by the RTO unit to be maintained. This facilitates continuous operation of the RTO unit and increases methane abatement potential.

3.1.2 Supplementary Gas System

The general arrangement of the supplementary gas system required for the Modification to be used during system start-up is provided in Figure 4.

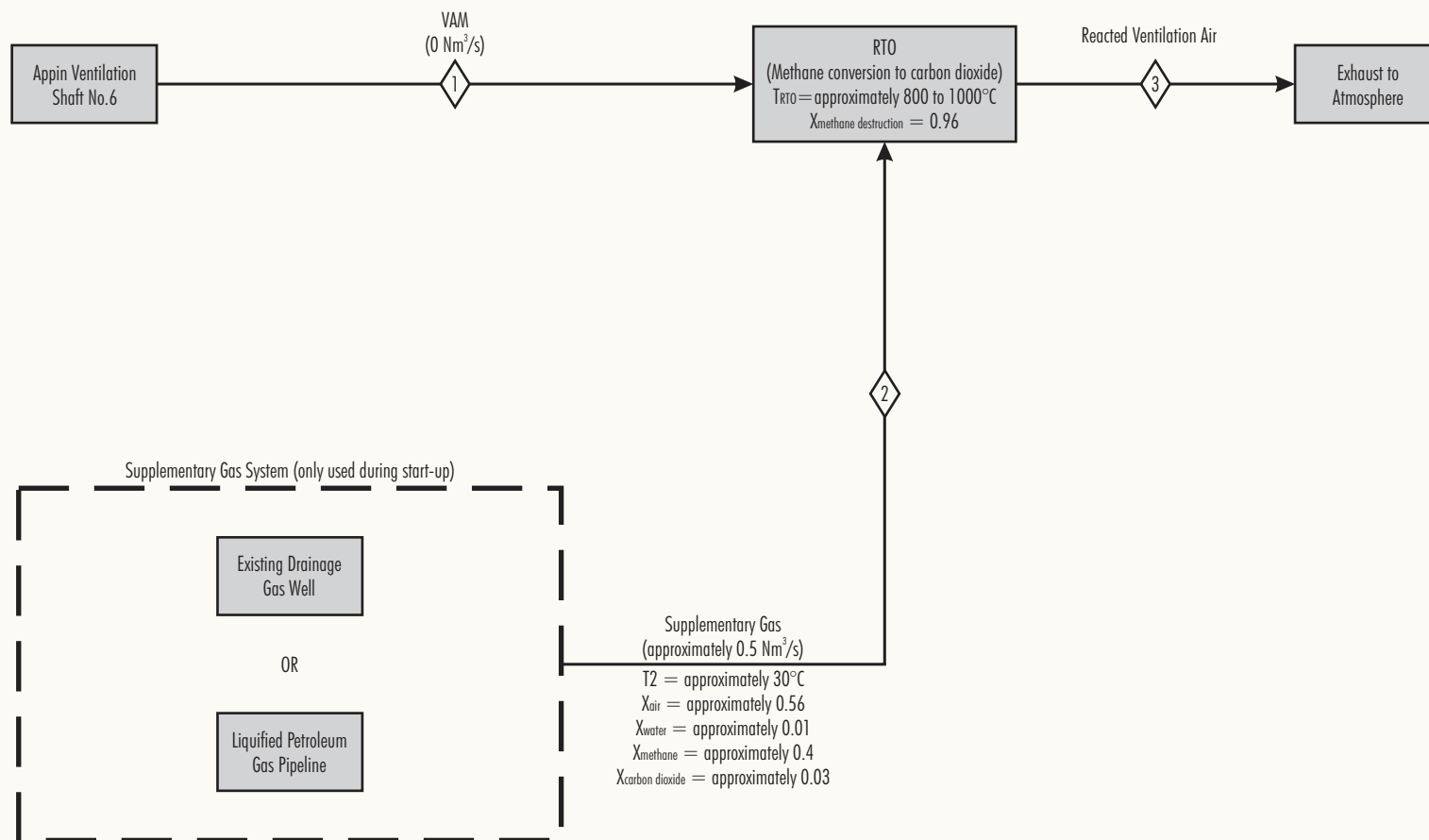
There may be a requirement to utilise a supplementary gas system to maintain the minimum 0.3% methane concentration (as described above). The indicative supplementary gas pipeline would connect the RTO to an existing pipeline and borehole, which were constructed during previous mine ventilation programs.

Two indicative supplementary gas system routes are proposed for the Modification (Figure 4). Route 1 would be constructed entirely underground, while Route 2 would comprise a predominantly aboveground pipeline, except for a short section that would be installed via underboring beneath a road. Only one of these routes would be selected and constructed as part of the Modification once further engineering assessment has been conducted.



GM³
 APPIN MINE VENTILATION
 METHANE ABATEMENT PROJECT
 Modification Process Flow Diagram
 Steady State

Figure 5a



Alternatively, a 2.5 tonne liquefied petroleum gas tank (located above ground) with a connecting pipeline to the RTO could be used as supplementary gas supply to the RTO in place of the drainage gas system, pending further design and feasibility studies (Figure 4). From preliminary investigation, it is expected that the underground drainage gas system would provide enough enrichment to the RTO unit to allow operation. The liquefied petroleum gas pipeline is considered a secondary option.

Both options are considered in the hazard assessment for the Modification (Section 6.6).

3.2 CONSTRUCTION ACTIVITIES

Construction of the RTO and ancillary infrastructure would occur in three phases as indicatively described in Table 2.

3.3 REGENERATIVE THERMAL OXIDISER USE PROFILE

Under normal steady-state conditions (i.e. operating conditions), the RTO primarily operates using VAM supplied by Appin Ventilation Shaft No.6, with additional gas added by the installed gas supplement system (i.e. gas supplied from the existing gas drainage borehole or liquid petroleum gas tank) as needed.

During the start-up procedure, a start-up damper opens to draw in atmospheric air for approximately eight minutes, allowing the RTO to stabilise and reach steady-state conditions. This procedure would occur approximately 20 times per annum to facilitate maintenance activities on the system as required. Maintenance activities are expected to take approximately one day each. Therefore, the RTO is anticipated to be offline for around 20 days per year. The RTO would remain operational for the remaining approximately 345 days annually.

3.4 WORKFORCE AND CONSTRUCTION AND OPERATIONAL HOURS

An additional short-term workforce of 20 to 30 personnel would be required for construction of the RTO and ancillary infrastructure over an approximate 12-month period. The base construction roster would be 7.00 am to 6.00 pm; Monday to Saturday. No work on Sunday or Public Holidays is proposed.

To facilitate construction activities, heavy vehicle traffic movements would be required. Heavy vehicle access to the site would be sporadic during construction and would generally include:

- excavators;
- compactors;
- agitators;
- construction cranes of various sizes;
- medium vehicles; and
- delivery trucks including flat top semi-trailers.

Heavy vehicle movements would generally occur during daylight hours. Some movements may need to be undertaken outside construction hours during periods of low demand to minimise safety impacts and inconvenience to motorists (e.g. the delivery of oversize plant/structures). This would be subject to consultation with the relevant road authority.

No additional employment is required during the operation of the RTO as maintenance and monitoring tasks would be undertaken by existing Appin Mine employees and/or contractors. Once constructed, operation of the RTO would occur 24 hours per day, 7 days per week.

Table 2
Indicative Description of Construction Phases

Phase	Description	Typical Fleet Items	Estimated Period ¹
Site Establishment	Initial vegetation clearance, earthworks and site preparation phase.	Excavator, compactor, medium vehicles (e.g. agitators), light vehicles.	4 months
Mobilisation	Infrequent delivery of materials and fabricated plant.	Delivery vehicles, medium vehicles (e.g. forklift, cranes), light vehicles.	2 months
Plant Construction	Installation of surface infrastructure, services, and auxiliary infrastructure.	Delivery vehicles, medium construction vehicles (e.g. forklifts etc), construction cranes of various sizes, agitators, light vehicles.	12 months

Source: Spoke Acoustics Pty Ltd (Spoke Acoustics) (2025).

¹ Periods would be concurrent at times, in total construction activities are expected to take approximately 12 months.

4 STATUTORY CONTEXT

This section outlines the statutory requirements relevant to the assessment of the Modification, in accordance with the *State significant development guidelines – preparing a modification report* (DPIE, 2021b).

Attachment 1 includes a statutory compliance table for the Modification which identifies the relevant statutory requirements and the sections in this Modification Report that address these requirements.

4.1 NEW SOUTH WALES ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

The BSO Project was approved under Section 75J, Part 3A of the EP&A Act on 22 December 2011 and subsequently declared State Significant Development under clause 6 of Schedule 2 of the *NSW Environmental Planning and Assessment (Savings, Transitional and Other Provisions) Regulation 2017* via Government Gazette on 23 November 2018 for the purposes of future modifications. As such, the proposed modification of the BSO Project Approval (MP 08_0150) is governed by Section 4.55(2) of the EP&A Act. Section 4.55(2) relevantly states:

4.55 Modifications of consents - generally

...

- (2) **Other modifications** A consent authority may, on application being made by the applicant or any other person entitled to act on a consent granted by the consent authority and subject to and in accordance with the regulations, modify the consent if -

- (a) it is satisfied that the development to which the consent as modified relates is the same or substantially the same development as the development for which consent was originally granted and before that consent as originally granted was modified (if at all), and

- (b) it has consulted with the relevant Minister, public authority or approval body (within the meaning of Division 4.8) in respect of a condition imposed as a requirement of a concurrence to the consent or in accordance with the general terms of an approval proposed to be granted by the approval body and that Minister, authority or body has not, within 21 days after being consulted, objected to the modification of that consent, and
- (c) it has notified the application in accordance with -
- (i) the regulations, if the regulations so require, or
- (ii) a development control plan, if the consent authority is a council that has made a development control plan that requires the notification or advertising of applications for modification of a development consent, and
- (d) it has considered any submissions made concerning the proposed modification within the period prescribed by the regulations or provided by the development control plan, as the case may be.

Clause 3BA(6) of Schedule 2 of the *Environmental Planning and Assessment (Savings, Transitional and Other Provisions) Regulation 2017* relevantly provides:

(3BA) Winding-up of transitional Part 3A modification provisions on cut-off date of 1 March 2018 and other provisions relation to modifications

...

- (6) In the application of section 4.55 (1A) or (2) or 4.56 (1) of the Act to the following development, the consent authority need only be satisfied that the development to which the consent as modified relates is substantially the same development as the development authorised by the consent (as last modified under section 75W -

- (a) *development that was previously a transitional Part 3A project and whose approval was modified under section 75W,*

The consent authority is, therefore, required to satisfy itself that the BSO Project Approval (MP 08_0150) as modified would result in the BSO Project remaining “substantially the same” development as was last modified under Section 75W of the EP&A Act. The relevant threshold is whether the proposed Modification is substantially the same development as the development approved by the BSO Project Approval as approved at the time of Mod 2 being granted on 28 October 2016 (i.e. inclusive of Modifications 1 and 2, Mod 2 being the last modification of the BSO Project Approval pursuant to Section 75W).

A comparative analysis that outlines the approved BSO Project components and the key components of the Modification is provided in Table 1. The BSO Project as modified would demonstrably remain a large coal mine project that retains the key elements approved under BSO Project Approval as last modified by Mod 2 (MP 08_0150).

Accordingly, the consent authority can be satisfied that the BSO Project as modified would remain “substantially the same” development as the development authorised by the consent (as last modified under Section 75W).

4.1.1 Objects of the NSW Environmental Planning and Assessment Act 1979

Section 1.3 of the EP&A Act describes the objects of the EP&A Act:

- (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,*

...

- (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),*

...

- (i) *to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State,*
- (j) *to provide increased opportunity for community participation in environmental planning and assessment.*

The Modification is considered to be generally consistent with the objects of the EP&A Act, as it:

- would continue to involve the orderly economic use and development of land at the Appin Mine;
- would facilitate ecologically sustainable development, as it would reduce Scope 1 GHG emissions, with no material change to the current environmental impacts and no increase in the duration of existing impacts of the BSO Project;
- proposes very minor new surface development areas and therefore potential impacts on biodiversity and Aboriginal cultural heritage items as a result of the Modification would be minimised; and
- would be developed in a manner that incorporates community engagement, with a range of stakeholders consulted through the preparation of this Modification Report (Section 5).

4.1.2 Evaluation under Section 4.15(1) of the Environmental Planning and Assessment Act 1979

In evaluating the Modification, under Section 4.15(1) of the EP&A Act, the consent authority is to take into consideration such of the specified matters as are of relevance to the development subject of the Modification application, including:

- (1) **Matters for consideration—general** In determining a development application, a consent authority is to take into consideration such of the following matters as are of relevance to the development the subject of the development application—
- (a) the provisions of—
 - (i) any environmental planning instrument, and
 - (ii) any proposed instrument that is or has been the subject of public consultation under this Act and that has been notified to the consent authority (unless the Planning Secretary has notified the consent authority that the making of the proposed instrument has been deferred indefinitely or has not been approved), and
 - (iii) any development control plan, and
 - (iiia) any planning agreement that has been entered into under section 7.4, or any draft planning agreement that a developer has offered to enter into under section 7.4, and
 - (iv) the regulations (to the extent that they prescribe matters for the purposes of this paragraph),
 - ...
 - that apply to the land to which the development application relates,

- (b) the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality,
- (c) the suitability of the site for the development,
- (d) any submissions made in accordance with this Act or the regulations,
- (e) the public interest.

While this is a requirement of the consent authority, this Modification Report has been prepared to generally address the requirements of Section 4.15(1) of the EP&A Act as described in Table 3.

Table 3
Section 4.15(1) of the EP&A Act Matters for Consideration – General

Matter	Indication of How the Matter is Addressed
<p>(a) the provisions of—</p> <p>(i) any environmental planning instrument, and</p> <p>(ii) any proposed instrument that is or has been the subject of public consultation under this Act and that has been notified to the consent authority (unless the Planning Secretary has notified the consent authority that the making of the proposed instrument has been deferred indefinitely or has not been approved), and</p> <p>(iii) any development control plan, and</p> <p>(iiia) any planning agreement that has been entered into under section 7.4, or any draft planning agreement that a developer has offered to enter into under section 7.4, and</p> <p>(iv) the regulations (to the extent that they prescribe matters for the purposes of this paragraph),</p> <p>...</p> <p>that apply to the land to which the development application relates,</p>	<ul style="list-style-type: none"> Detail on potential Modification requirements under the key environmental planning instruments is included in the statutory compliance table provided in Attachment 1. The proposed Modification will not be inconsistent with the aims of the zone objectives under the LEP and is permissible on the site by application of the <i>State Environmental Planning Policy (Resources and Energy) 2021</i>. Clause 2.10 of the <i>NSW State Environmental Planning Policy (Planning Systems) 2021</i> states that development control plans do not apply to State Significant Developments, such as the Modification. This Modifications Report confirms that ICH would continue to make contributions for community enhancement in accordance with the requirements of BSO Project Approval (MP 08_0150). This Modification Report has been prepared in consideration of the relevant provisions of the EP&A Regulation.
<p>(b) the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality,</p>	<ul style="list-style-type: none"> A description of the existing environment, an assessment of the potential environmental impacts associated with the Modification, and a description of the potential measures to avoid, mitigate, rehabilitate, remediate, monitor and/or offset the potential impacts of the Modification are described in Section 6 of this Modification Report and Appendices A to F.
<p>(c) the suitability of the site for the development,</p>	<ul style="list-style-type: none"> The site is a suitable location for the development of the regenerative thermal oxidiser and associated infrastructure. The Modification seeks to locate the regenerative thermal oxidiser and associated infrastructure within the previously cleared and offset area of the approved Appin Ventilation Shaft No. 6 project boundary to be proximal to the approved underground longwall workings and to minimise impacts on the environment and surrounding communities. The Modification will not significantly alter the current or proposed future land use of the site or surrounding properties.
<p>(d) any submissions made in accordance with this Act or the regulations,</p>	<ul style="list-style-type: none"> Following exhibition of the Modification Report, ICH will prepare a Submissions Report addressing submissions received regarding the Modification.
<p>(e) the public interest.</p>	<ul style="list-style-type: none"> Consideration of whether, on evaluation, the Modification is considered to be in the public interest is provided in Section 7 of this Modification Report.

4.2 COMMONWEALTH ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

The Appin Mine received approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 1 April 2011 (EPBC 2010/5722) and 15 May 2012 (EPBC 2010/5350). The Modification would not, and is not likely to, have a significant impact on Matters of National Environmental Significance for the following reasons:

- The Modification is located within the assessment area noted in EPBC 2010/5722 and has been previously cleared as part of Ventilation Shaft No. 6 development works.
- The Modification would not, and is not likely to, have a significant impact on listed threatened species and ecological communities and/or migratory species.
- The Modification would not, and is not likely to, have a significant impact on wetlands of international importance.
- The Modification would not, and is not likely to, have a significant impact on World Heritage properties or National heritage places.
- The Modification would not, and is not likely to, impact the Great Barrier Reef Marine Park and/or Commonwealth marine areas.
- The Modification is not a nuclear action.
- The Modification is properly characterised as “associated infrastructure” or a “proposed modification that does not involve the extraction of coal” neither of which trigger the approval requirement in Section 24D of the EPBC Act based on the *Significant impact guidelines 1.3: Coal seam gas and large coal mining developments — impacts on water resources* (Department of Climate Change, Energy, the Environment and Water, 2022).
- The Modification would not, and is not likely to, have a significant impact on water resources.

ICH therefore considers that no further approval under the EPBC Act is required.

4.3 OTHER RELEVANT NSW LEGISLATION

4.3.1 Water Management Act 2000

The *Water Management Act 2000* contains provisions for the licensing, allocation, capture and use of water resources in NSW.

Under the *Water Management Act 2000*, water sharing plans establish rules for sharing water between different users and between the various environmental sources (namely rivers or aquifers).

The Modification would not change peak water licensing, supply sources and storage requirements for the BSO Project.

ICH would continue to obtain and hold licences required under the *Water Management Act 2000* for licensable take.

4.3.2 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* provides the legislative framework for biodiversity conservation in NSW.

As described in Section 6.7, with reference to Section 7.17(2)(c) of the *Biodiversity Conservation Act 2016* and clause 1.4 of the *Biodiversity Conservation Regulation 2017*, the Modification would not increase impacts on biodiversity values associated with the approved Appin Mine Ventilation Shaft No. 6 and therefore, it is considered that a BDAR is not required for the Modification. Further discussion and justification of this is provided in Section 6.7.

4.3.3 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* contains provisions for the establishment, preservation and management of National parks, historic sites and Aboriginal cultural heritage in NSW.

Section 4.41 of the EP&A Act outlines authorisations that are not required for a State Significant Development authorised by a development consent under Division 4.7 of Part 4 of the EP&A Act. An Aboriginal cultural heritage impact permit under Section 90 of the *National Parks and Wildlife Act 1974* is not required for State Significant Development, including the BSO Project. Therefore, an Aboriginal Heritage Impact Permit is not required for the Modification.

An Aboriginal Objects Due Diligence Assessment has been undertaken for the Modification by Regal Heritage (2024) to assess the potential impacts of the Modification on Aboriginal cultural heritage (Appendix C).

4.3.4 Mining Act 1992

The objects of the *Mining Act 1992* are to encourage and facilitate the discovery and development of mineral resources in NSW, having regard to the need to encourage ecologically sustainable development.

The Modification would be wholly within existing mining leases (i.e. Consolidated Coal Lease 767) (Figure 1). Therefore, there is no need for the amendment or variation of the existing authorities or the issue of new authorities under the *Mining Act 1992*.

ICH would revise the approved Rehabilitation Management Plan (or equivalent) to incorporate the Modification.

4.3.5 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* and the NSW *Protection of the Environment Operations (General) Regulation 2009* set out the general obligations for environmental protection for industry in NSW, which is regulated by the NSW EPA.

Operations approved as part of the BSO Project are currently undertaken in accordance with existing Environment Protection Licence (EPL) 2504 issued under the *Protection of the Environment Operations Act 1997*.

It is not anticipated that any changes to EPL 2504 would be required as a result of the Modification.

5 ENGAGEMENT

ICH has consulted with government agencies and relevant stakeholders during the preparation of this Modification Report. Key objectives of the engagement undertaken for the Modification was to:

- engage with key stakeholders about the Modification;
- seek input from key stakeholders on elements of the Modification; and
- continue the ongoing dialogue between ICH and key stakeholders regarding the development of the BSO Project.

A summary of consultation with key stakeholders is provided below. Consultation would continue during both the public exhibition of this Modification Report and the assessment of the Modification application.

5.1 DEPARTMENT OF PLANNING, HOUSING AND INFRASTRUCTURE

ICH has engaged the Department of Planning, Housing and Infrastructure (DPHI) in multiple rounds of consultation regarding the proposed Modification:

- ICH began consultations with DPHI on the proposed Modification on 6 June 2024, presenting a draft Scoping Letter, outlining:
 - overview of the Modification;
 - proposed approval pathway; and
 - proposed scope of the environmental assessment.
- The Amended Scoping Letter was revised based on feedback from DPHI and lodged on 7 June 2024, replacing the initial Scoping Letter that had been lodged on 7 November 2022.
- On 12 July 2024, DPHI provided a response to the Amended Scoping Letter, determining that the suitable planning pathway for the modification should be under Section 4.55(2) of the EP&A Act instead of Section 4.55(1A) (as presented in the Amended Scoping Letter).
- The Modification Report was revised based on a request for additional information from DPHI which required additional information on the following:
 - modification description;
 - hazards;

- visual;
- traffic; and
- biodiversity.

This Modification Report reflects this request for additional information and considers the Modification under Section 4.55(2) of the EP&A Act.

5.2 GOVERNMENT AGENCIES

ICH provided a briefing letter to the following agencies/council in September 2024 to provide an overview of the Modification and the supporting environmental assessments undertaken:

- Biodiversity, Conservation and Science;
- Heritage NSW;
- Environment Protection Authority;
- NSW Mining, Exploration and Geoscience; and
- Wollondilly Shire Council.

No comments were received from these agencies/council.

Additionally, the Wollondilly Shire Mayor and CEO were updated on the Modification on the 21 August 2024.

5.3 COMMUNITY CONSULTATIVE COMMITTEE

The Appin Mine Community Consultative Committee (CCC) was established in accordance with the BSO Project Approvals (MP 08_0150) and has been held since 2014.

The CCC provides a mechanism for ongoing communication between ICH and representatives of the local community, including an independent chairperson, councillors from the Wollondilly Shire Council, residents who reside in the Douglas Park, Menangle and Appin townships and community members.

A letter and fact sheet were distributed to the Appin Mine CCC on 12 June 2024. ICH conducted briefings with the CCC on 13 June and 21 August 2024.

Meeting minutes for the CCCs are publicly available on the GM³ website.

5.4 LOCAL COMMUNITY

ICH notified the local community (i.e. approximately 460 residences of Douglas Park) of the Modification and of a community information session via a newsletter distributed on the 14 June 2024. The community information session was held at the Douglas Park Community Centre on the 27 June 2024.

6 ASSESSMENT OF IMPACTS

ICH has prepared this Modification Report to address the key potential environmental impacts of the Modification. The Modification Report includes:

- a description of the approved and modified BSO Project;
- a description of the strategic and statutory context of the Modification;

- a summary of the stakeholder engagement undertaken for the Modification; and
- an assessment of the potential environmental impacts of the Modification, including comparison with approved potential environmental impacts of the BSO Project.

The key environmental matters identified are summarised in Table 4 and addressed in this section.

Table 4
Summary of Key Potential Environmental Matters/Impacts

Environmental Aspect	Key Potential Environmental Issues/Impacts	Report Section
Air Quality	<ul style="list-style-type: none"> ■ Limited potential for impact on air quality standards at all sensitive receptors. 	Appendix A, Section 6.1
Noise and Vibration	<ul style="list-style-type: none"> ■ Limited operational noise impact, meeting trigger levels during operation, with minor exceedances of construction noise management levels during brief periods of maximum construction activities (e.g. rock breakers). 	Appendix B, Section 6.2
Aboriginal Cultural Heritage	<ul style="list-style-type: none"> ■ Limited impact on Aboriginal cultural heritage sites, due to the absence of any artefacts. 	Appendix C, Section 6.3
GHG	<ul style="list-style-type: none"> ■ The Modification would result in significant reduction to Scope 1 GHG emissions (36,000 t CO₂-e/year). 	Appendix D, Section 6.4
Visual	<ul style="list-style-type: none"> ■ Limited visual impact due to existing vegetation screens and terrain features. 	Appendix E, Section 6.5
Hazards	<ul style="list-style-type: none"> ■ Limited potential for hazardous events during construction and operations in the presence of controls. 	Appendix F, Section 6.6
Biodiversity	<ul style="list-style-type: none"> ■ Negligible impact on biodiversity values, as the Modification would be conducted on previously cleared and rehabilitated land with no significant disturbance to threatened species, vegetation abundance, habitat connectivity, or water sustainability. 	Section 6.7
Social and economics	<ul style="list-style-type: none"> ■ Limited employment impact, providing short-term jobs for 20 to 30 construction workers for approximately 12 months. 	Section 6.8
Road transport	<ul style="list-style-type: none"> ■ Limited traffic impact during the construction and operational phases. 	Section 6.9

6.1 AIR QUALITY

An air quality assessment was undertaken by GHD Pty Ltd (2024a) with consideration to the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (EPA Approved Methods) (EPA, 2022) and is provided in Appendix A. The sensitive receptors used in the air quality assessment are outlined in Table 5 and shown in Plate 3.

The air quality assessment was prepared based on the following assumed design parameters (GHD, 2024a):

- Existing ventilation shaft discharge design parameters:
 - vent discharge flowrate assumed to be 325 meters cubed per second (m³/s);
 - vent height of 2 m;
 - vent stack diameter of 7 m; and

Table 5
Sensitive Receptors

Receptor	Description	Ownership
R01	Mountbatten House 3	Owned by ICH
R02	Mountbatten House 2	
R03	Mountbatten House	
R04	125 Moreton Park Road	
R05	20 Moreton Park Road	Privately owned
R06	2 Moreton Park Street	
R07	1 Railway Parade	
R08	Appin Mine Ventilation Shaft No. 6	
R09	16 Duggan Street	
R10	Douglas Park Public School	
R11	89 Camden Road	

Source: GHD (2024a).

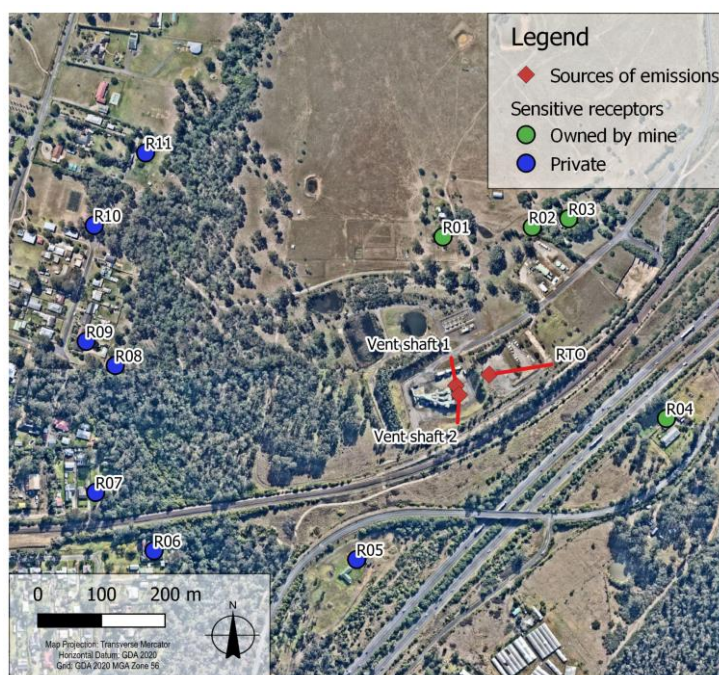


Plate 3: Sensitive receptors used in the Air Quality Impact Assessment (blue and green points highlight privately owned receptors and ICH owned receptors, respectively) (GHD, 2024a).

- a vent discharge particulate matter with an equivalent aerodynamic diameter of 10 micrometres or less (PM₁₀) discharge of 2 milligrams per cubic metre (mg/m³) was conservatively assumed based on existing monitoring data of the site, no other air pollutants are expected.
- RTO discharge design parameters:
 - RTO discharge flowrate assumed to be 25 m³/s;
 - RTO vent height of 10 m;
 - RTO vent stack diameter of 1.5 m;
 - A RTO vent PM₁₀ discharge concentration of 2 mg/m³; and
 - RTO oxides of nitrogen (NO_x) and carbon monoxide (CO) discharge concentrations were based on assumptions adopted in the Appin Vammit Project Air Quality Impact Assessment (SoundIN, 2023) for ‘startup’ which were higher than ‘normal operations’. Adoption of the highest pollutant discharge concentrations (i.e. the emissions during startup) is considered conservative as it considers potential worst case operations of the RTO and accounts for all potential operating scenarios.

It should be noted that the implementation of the RTO would divert/reduce air flow from the existing vent shafts, and therefore emissions are expected to decrease from the vent shafts. This has not been incorporated into the air quality assessment to conservatively assume a worst case scenario (GHD, 2024a). A summary of the air quality emissions modelled is provided in Table 6.

Table 6
Air Quality Pollutant Concentrations

Source	Particulate Matter (mg/m ³)	Oxides of Nitrogen (mg/m ³)	Carbon Monoxide (mg/m ³)
RTO	2	191	232

Source: GHD (2024a).

The air quality assessment predicted compliance with assessment criteria outlined in the EPA Approved Methods (EPA, 2022) for both the existing site operations and cumulatively with the Modification at all sensitive receptors for all assessed air pollutants (i.e. particulate matter, nitrogen dioxide and carbon monoxide) (GHD, 2024a).

6.2 NOISE AND VIBRATION

6.2.1 Operational Noise

A Noise and Vibration Assessment was undertaken by Spoke Acoustics (2025) in accordance with the NSW EPA’s *Noise Policy for Industry* (2017) (NPfI) and is provided in Appendix B. Nearby representative receivers used for the assessment are outlined in Table 5 and shown in Plate 3.

The most stringent of the intrusiveness and amenity criteria under the NPfI were set by Spoke Acoustics (2025) as the Modification’s trigger level unless the receiver meets the requirements for high traffic amenity criteria (i.e. 20 Moreton Park Road [R05]).

Spoke Acoustics (2025) concluded that the Modification would operate in accordance with the NPfI trigger noise levels at all receivers under normal operations.

As previously discussed in Section 3.3, the RTO is expected to undergo approximately 20 startup procedures annually, each lasting approximately eight minutes. During these startups, noise levels are expected to increase by approximately 4 decibels compared to normal operational levels.

If feasible, additional fan silencing would allow the startup period to occur 24 hours per day. Alternatively, if fan silencing is not feasible, the startup procedure would only be undertaken during the daytime and evening periods when noise thresholds are less stringent and ambient noise levels are higher (Spoke Acoustics, 2025).

6.2.2 Construction Noise and Vibration

The construction works are generally to be conducted within standard construction time periods and use typical construction plant items. This would minimise noise and vibration impacts associated with construction.

Construction noise levels for the Project were predicted to generally comply with the Noise Management Levels (NMLs) outlined in the NSW EPA’s *Interim Construction Noise Guideline* (ICNG) (2009).

The supplementary gas pipeline construction component is similarly anticipated to comply with the ICNG criteria because as it progresses further north, the distance to sensitive noise receivers increases, reducing potential noise impacts.

However, prominent noise levels were modelled to occur during short periods of time where higher intensity construction activities occur (i.e. when rock breakers and earthworks are proposed to occur simultaneously).

Construction noise levels at the worst-case receivers (i.e. R06, R07, R09 and R11) were predicted to marginally exceed the NMLs by up to 3 decibels (Spoke Acoustics, 2025). These noise levels would only occur for a short period of time when both rock breaking and earthworks occur simultaneously and is therefore considered by Spoke Acoustics to be negligible. All construction noise impacts are within the highly noise affected limit in the ICNG.

6.3 ABORIGINAL HERITAGE

An Aboriginal Objects Due Diligence Assessment was conducted in accordance with the *NSW Minerals Industry Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (Department of Environment, Climate Change and Water, 2010) by Regal Heritage (2025) and is provided in Appendix C. No Aboriginal objects or areas of potential archaeological deposit were identified as part of the assessment.

A desktop assessment concluded that the proposed development footprint of the RTO falls within the disturbed footprint of Appin Mine Ventilation Shaft No. 6 and a cleared area to the east, no field assessment was required of this section of the Study Area.

A site survey was undertaken by Regal Heritage to assess the location of the supplementary gas system due to its proximity to previously recorded AHIMS recorded sites.

The site survey confirmed that the proposed location of the indicative supplementary gas system was heavily disturbed during the previous works associated with the Appin Mine Ventilation Shaft No. 6 and its access road and that no Aboriginal objects are likely to be present within the proposed development footprint.

Regal Heritage (2025) states that where the assessment does not indicate that there are (or are likely to be) Aboriginal objects the Proponent (i.e. ICH) can proceed with caution with their proposed activities with the following recommendations:

- All site workers and contractors should be inducted to the area and informed of their obligations under the *National Parks and Wildlife Act 1974*.

- In the unlikely event that any Aboriginal object is found, temporary fencing must be placed around the object with a buffer of at least 10 m. An appropriately qualified archaeologist should be engaged to assess the finding. Should the object be determined to be an Aboriginal object Heritage NSW must be informed and an Aboriginal Site Recording Form submitted to the Aboriginal Heritage Information Management System in accordance with S89A of the *National Parks and Wildlife Act 1974*. Works should not proceed until advice is received from Heritage NSW.
- In the unlikely event that suspected human remains are encountered during construction, all work in the area that may cause further impact must cease immediately and:
 - the location, including a 10 m buffer should be secured using barrier fencing to avoid further disturbance;
 - the NSW Police must be contacted immediately;
 - no further action is to be undertaken until the NSW Police provide advice that it is safe to do so;
 - if skeletal remains are identified as being Aboriginal, the proponent or their agent must contact Heritage NSW via the Environment Line on 131 555, and representatives of the Tharawal Local Aboriginal Land Council; and
 - no works are to continue until Heritage NSW provides notification to the Proponent (i.e. ICH) or their Agent.

Regal Heritage (2025) concluded that due to the disturbed nature of the Modification area, it is unlikely that Aboriginal objects or potential archaeological deposits are present and as a result no further investigations and impact assessments are required for the Modification area.

6.4 GREENHOUSE GAS

The Modification would result in the oxidation of pre-and post-drainage VAM from Appin Ventilation Shaft No. 6, converting the air and methane into CO₂ and water.

A GHG Emissions Estimate Report was undertaken by GHD Pty Ltd (2024b) to estimate the abatement provided by the Modification and this is provided in Appendix D. It was estimated the Modification would capture approximately 4% of the VAM emitted at the Appin Ventilation Shaft No. 6 with an overall GHG abatement of approximately 36,000 t CO₂-e/year (GHD Pty Ltd, 2024b), the equivalent of approximately 8,500 petroleum-powered passenger vehicles driven for one year. The Modification would therefore reduce Scope 1 GHG emissions relative to the approved BSO Project.

6.5 VISUAL

A screening visual impact assessment was undertaken by GHD Pty Ltd (2025) to assess how the Modification would impact the visual landscape from key surrounding premises and is provided in Appendix E.

The Modification Study Area is located adjacent to the M31 Hume Motorway, approximately 800 m east of Douglas Park, in the Wollondilly Local Government Area and is located at the site of the Appin Ventilation Shaft No. 6.

The existing Appin Ventilation Shaft No. 6 consists of three extraction fans, three low profile discharge ducts, a substation to provide power from the grid and a smaller emergency diesel powered fan to enable the mine to be evacuated in case of a power failure.

Visual impacts for the Modification are considered negligible given the Modification is:

- located within a natural depression (i.e. impacts are mitigated by existing terrain);
- supported by an existing landscape designed to improve the effectiveness of the visual bund;
- contained between existing vegetation screening associated with the revegetated/rehabilitated landform of the Appin Ventilation Shaft No. 6 and mature vegetation located along Harris Creek; and
- designed so the RTO and ancillary infrastructure would be approximately similar height to the existing infrastructure found at the Appin Ventilation Shaft No. 6.

A preliminary isometric view of the Modification is provided in Plate 4.



Plate 4: Indicative isometric view of the Modification¹ (GHD, 2025).

The plant is proposed to be painted in Colorbond Pale Eucalypt (or similar), consistent with existing infrastructure. This colour would aid in blending the Modification infrastructure with the surrounding vegetation, further reducing the visibility of the Modification infrastructure.

GHD Pty Ltd (2025) concludes the Modification would be hidden or obscured by vegetation or terrain features and would not impact visual amenity.

6.6 HAZARD ANALYSIS

A Preliminary Hazard Analysis (PHA) was conducted in accordance with the general principles of risk evaluation and assessment outlined in the NSW Department of Planning and Infrastructure (DPI) (now Department of Planning, Housing & [DPHI]) *Assessment Guideline: Multi-level Risk Assessment* (DPI, 2011) and has been documented in general accordance with the NSW Department of Planning (now DPHI) *Hazardous Industry Planning Advisory Paper No 6: Hazard Analysis* (Department of Planning, 2011).

Attachment 2 presents a qualitative assessment of risks associated with the construction and operation of the Modification. The assessment particularly evaluates the off-site risks of fixed installations to the people, their property and the environment arising from atypical and abnormal hazardous events and conditions.

Hazard treatment measures were proposed, where required, to produce a tolerable level of risk in accordance with the risk acceptance criteria. The Level 1 assessment conducted was justified, as the PHA demonstrates a societal risk in the negligible zone and there are no potential scenarios with significant off-site consequences in accordance with Multi-level Risk Assessment (DPI, 2011).

¹ Well-established existing tree screens and existing vegetation have not been included in the isometric model and would further reduce the visibility of Modification infrastructure.

A preliminary risk screening in accordance with Chapter 3 of the *State Environmental Planning Policy (Resilience and Hazards) 2021* (Resilience and Hazards SEPP) was undertaken by Sherpa Consulting Pty Ltd (Sherpa) and is provided in Appendix F.

The NSW Department of Planning *Hazardous and Offensive Development Application Guidelines – Applying SEPP 33* (2011), was used to undertake the preliminary risk screening.

The objective of the preliminary risk screening was to determine whether the Modification is considered ‘potentially hazardous’ in the context of the Resilience and Hazards SEPP.

The primary findings of the preliminary risk screening are as follows (Sherpa, 2025):

- The storage and transport of dangerous goods for the Modification do not exceed the relevant risk screening thresholds.
- A review of ‘other risk’ factors listed in Appendix 2 of *Hazardous and Offensive Development Application Guidelines – Applying SEPP 33* (NSW Department of Planning, 2011) did not identify any additional risks.
- Consideration of potentially hazardous industries listed in Appendix 3 of *Hazardous and Offensive Development Application Guidelines – Applying SEPP 33* (NSW Department of Planning, 2011) did not identify any additional sources of offsite risks.

Sherpa (2025) concluded the Modification is not considered ‘potentially hazardous’ within the meaning of Resilience and Hazards SEPP and does not require further assessment.

6.7 BIODIVERSITY REVIEW

The Modification area has been previously cleared by ICH as part of the development of the Appin Ventilation Shaft No. 6, however, there has been some minor landscape plantings and other site rehabilitation pasture areas that would be impacted by the Modification.

ICH has aimed to avoid and minimise environmental impacts from the Modification through detailed design and siting of the Modification infrastructure. In particular, the RTO, gas drainage borehole, power supply and sections of indicative pipelines/cables are located largely on previously disturbed lands (e.g. concrete hard stand).

Earthworks associated with the Modification would primarily occur within the indicative laydown area shown in Figure 3. This area, comprising a construction pad and assembly zone, totals approximately 0.54 ha. Vegetation within the indicative laydown area would be cleared and levelled to facilitate construction and equipment assembly.

Other sections of indicative pipeline and cables would traverse areas rehabilitated to native pasture and other native vegetation planted (e.g. *Casuarina* spp.)

Two indicative supplementary gas system routes are proposed for the Modification (Figure 4), however only one of these routes would be constructed as part of the Modification.

Figures 6a and 6b indicatively show the surface disturbance associated with the Modification, depending on whether Supplementary Gas System Route 1 or Route 2 is selected for implementation, herein these routes are referred to as Option 1 and Option 2. Disturbance areas have been categorised as either assumed native vegetation or currently disturbed land.

Minor surface disturbance would occur in areas rehabilitated to native vegetation during construction of the pipeline between the RTO and Appin Ventilation Shaft No.6, the supplementary gas pipeline (indicative 6 m corridor, should the gas pipeline be required) (Section 3.2.1), power supply connection and fire water pipe network.

Option 1 would result in the disturbance of approximately 1.20 hectares (ha) of native vegetation (including plantings) and approximately 1.03 ha of native vegetation (pasture), cumulatively impacting approximately 2.23 ha of native vegetation.

Option 2 would result in the disturbance of approximately 1.23 ha of native vegetation (including plantings) and approximately 1.03 ha of native vegetation (pasture), cumulatively impacting approximately 2.26 ha of native vegetation.

6.7.2 Biodiversity Value Consideration

Biodiversity values require consideration in accordance with Section 7.17(2)(c) of the *Biodiversity Conservation Act 2016*, which states:

- (c) *however a further biodiversity development assessment report is not required to be submitted if the authority or person determining the application for modification (or determining the environmental assessment requirements for the application) is satisfied that the modification will not increase the impact on biodiversity values,*

Clause 1.4 of the *Biodiversity Conservation Regulation 2017* provides a description of the biodiversity values requiring consideration. Table 7 provides the biodiversity value and associated considerations for the Modification.

Accordingly, with reference to Section 7.17(2)(c) of the *Biodiversity Conservation Act 2016* and the *Threatened Species Test Significance Guidelines* (Office of Environment and Heritage, 2018), no Biodiversity Development Assessment Report is required for the Modification as the Modification would not increase impact on the biodiversity values of the Study Area.

6.7.3 Approved Bulli Seam Operation Project Clearing Limit

The minor vegetation clearing activities that would be undertaken for the Modification would be conducted using the approved clearing limit of 37 ha allowed for surface disturbance activities for the BSO Project (MP 08_0150), as outlined in the *Bulli Seam Operations Environmental Assessment* (BHP Billiton Pty Ltd, 2009):

In addition to clearing for the Stage 4 Coal Wash Emplacement, it is estimated that the Project would involve approximately 37 ha of other vegetation clearance activities primarily associated with ongoing surface exploration activities, the upgrade and extension of surface infrastructure (e.g. gas wells and service boreholes), access tracks, environmental monitoring and management activities (e.g. installation of monitoring equipment), potential stream restoration activities and other localised Project-related surface activities. The specific locations of these vegetation clearance activities would be detailed in the relevant Extraction Plans as required by the DoP.

The proposed vegetation clearance (and subsequent rehabilitation) would be progressive over the life of the mine. As a result, at any one time some small areas (i.e. outside of the Stage 4 Coal Wash Emplacement area), of the order of 4 ha, are likely to be disturbed, while other areas would be in various stages of rehabilitation. Vegetation mapping indicates that there is approximately 9,845 ha of native vegetation within the Project extent of longwall mining area (Appendix E).

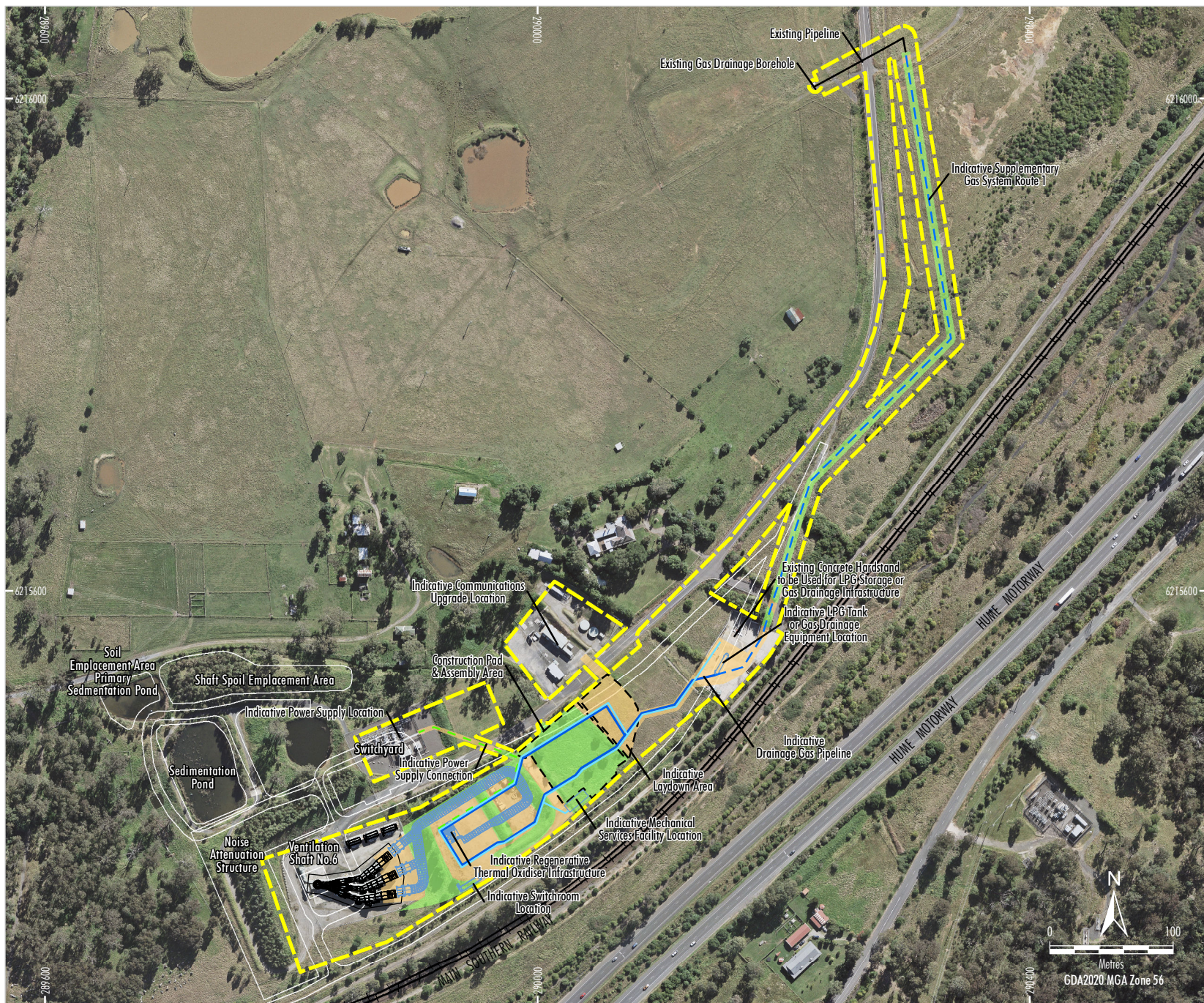
Given the flexibility of locating the surface activities described above (excluding the Stage 4 Coal Wash Emplacement), proposed surface disturbance sites would be located to avoid impacts to threatened flora species, where practicable. Clearing of EECs would also be avoided apart from some minor clearing in the widely distributed Shale/Sandstone Transition Forest EEC and the Moist Shale Woodland in the Sydney Basin Bioregion EEC (mapped as p2 – Cumberland Shale Sandstone Transition Forest and p514 – Cumberland Moist Shale Woodland, respectively on Figures 5-13 to 5-17) in which clearing would be kept to a maximum of 9 ha and 3 ha respectively. Additional measures to minimise impacts to these two EECs are described in Section 5.8.3

Option 1 and Option 2 of the Modification would result in the disturbance of approximately 2.23 and 2.26 ha, respectively.

In accordance with the approved Appin Mine Biodiversity Management Plan, disturbance associated with clearing activities under the approved BSO project clearing limit are recorded in the Permit to Disturb Register to ensure vegetation clearing limits are not exceeded.

Approximately 2.47 ha of vegetation has been cleared of the approved 37 ha. The clearing to date has been undertaken for small projects such as (but not limited to) surface infrastructure upgrades, exploration, survey and environmental monitoring.

On this basis, sufficient surplus of the original 37 ha exists to accommodate the 2.23 or 2.26 ha of minor disturbance caused by the Modification and would not exceed clearing limits associated with the Cumberland Shale Sandstone Transition Forest and Cumberland Moist Shale Woodland (i.e. 9 and 3 ha respectively).





- LEGEND**
- Railway
 - Approved Development Consent Site Layout
 - Existing Ventilation Shaft Infrastructure
 - Appin Ventilation Shaft No. 6 Modification
 - Modification Study Area
 - Indicative General Arrangement
 - Indicative Fire Water Pipe Network
 - Indicative Power Supply Connection
 - Indicative LPG or Supplementary Gas System
 - Indicative Supplementary Gas System Route 2
 - Indicative Laydown Area
 - Indicative Native Vegetation Disturbance
 - Disturbance within Disturbed Areas

Source: BHP Billiton (2010); Cardno (2010); GM3 (2025); NSW Spatial Services (2024)
Aerial: NSW Public Imagery (2024)

GM³
a mining and metals company

APPIN MINE VENTILATION METHANE ABATEMENT PROJECT

Indicative Surface Disturbance
for the Modification - Route 2

Figure 6b

Table 7
Biodiversity Values Consideration

Biodiversity Value	Modification Consideration
<i>(a) threatened species abundance—being the occurrence and abundance of threatened species or threatened ecological communities, or their habitat, at a particular site,</i>	<p>The Modification would largely be located on previously cleared land (i.e. on a concrete hardstand) for the Appin Ventilation Shaft No. 6 Project.</p> <p>The Appin Ventilation Shaft No. 6 Project has been cleared and offset in accordance with the approved Appin Mine Ventilation Shaft 6 Biodiversity Offset Strategy (Document ID: APNMP0109 Version 2.0) (South32, 2020) as required by Project Approval (MP 08_0150) Schedule 4, Condition 36. Given the Modifications' minor vegetation disturbance of approximately 2.23 or 2.26 ha of native vegetation, it is considered that impact to threatened ecological communities would not occur.</p>
<i>(b) vegetation abundance—being the occurrence and abundance of vegetation at a particular site,</i>	Vegetation abundance within and surrounding the Modification can be seen in Plates 1 and 2. The Modification Study Area comprises of a concrete hardstand and a revegetated/rehabilitated area containing small trees/shrubs and pastures. Given the Modification would largely be located on previously cleared land (i.e. on a concrete hardstand), it is considered vegetation abundance would not be impacted.
<i>(c) habitat connectivity—being the degree to which a particular site connects different areas of habitat of threatened species to facilitate the movement of those species across their range,</i>	Given the unlikely presence of threatened species and minor vegetation disturbance, it is considered habitat connectivity would not be impacted.
<i>(d) threatened species movement—being the degree to which a particular site contributes to the movement of threatened species to maintain their lifecycle,</i>	Given the unlikely presence of threatened species and minor vegetation disturbance, it is considered the movement of threatened species would not be impacted.
<i>(e) flight path integrity—being the degree to which the flight paths of protected animals over a particular site are free from interference,</i>	Given the height of the RTO and ancillary infrastructure (i.e. comparable to the height of existing Appin Ventilation Shaft No. 6 infrastructure) and the unlikely presence of threatened species, flight path integrity would not be impacted.
<i>(f) water sustainability—being the degree to which water quality, water bodies and hydrological processes sustain threatened species and threatened ecological communities at a particular site.</i>	Given there are no water bodies in the vicinity of the Modification and that the proposed construction and operation activities do not involve the disturbance of surface water or groundwater, water sustainability would not be impacted.

6.8 SOCIAL AND ECONOMIC

The Modification would provide work to a short-term construction workforce of 20 to 30 personnel over an approximately 12-month period while the RTO and ancillary infrastructure is constructed. The Modification would also demonstrate the applicability of VAM abatement to underground operations and the results of the Modification would be used to inform future VAM abatement projects.

6.9 ROAD TRANSPORT

Traffic movements for the Modification would consist of up to approximately 20 to 30 construction workers accessing the site via light vehicles, predominantly for day shift only. ICH would encourage carpooling of these workers wherever possible to reduce traffic movements on the local road network.

In addition, a number of heavy vehicle deliveries would be required, including oversize vehicle movements to deliver equipment to site. These movements would occur only during daylight hours, unless safety requirements dictated a night time movement.

Transport routes for both heavy and light vehicles accessing the site during construction and operations would occur via Hume Highway, Picton Road and Menangle Road from the south, to and from the site.

The Appin Ventilation Shaft No.6 access road is a stop sign controlled T junction intersection with a channelised right treatment/right lane turn on Menangle Road.

This access road and intersection was previously upgraded to provide safe access to Appin Ventilation Shaft No.6 in accordance with Condition 26A of Schedule 4 of the Project Approval (MP 08_0150). The intersection was constructed in accordance with the relevant guidelines for sightlines and for safe speed up and slow down distances.

A Traffic Assessment Report was conducted for the AMVA Project and found that Menangle Road south of Camden Road had an average weekday (5 day) of 3940 vehicles per day, with 13% being heavy vehicles (heavy vehicles were classed as Austroads 3-12 vehicle classification) (Transport & Urban Planning Pty Ltd, 2021).

As the Modification would not increase operational employment, potential road transport impacts would be limited to the construction phase.

Over the construction period (Table 2), the Modification would increase traffic volumes using the road network as follows (GHD Pty Ltd, 2025):

- Approximately 5,900 two-way light vehicle trips over the plant construction phase (i.e. a 12 month period), or an average of approximately 23 two-way vehicle trips per weekday on Menangle Road, south of the Appin Ventilation Shaft No.6 access road; and
- Approximately 150 two-way heavy vehicle trips over the mobilisation construction phase (i.e. a two month period) or an average of approximately three two-way vehicle trips per weekday on Menangle Road, south of the Appin Ventilation Shaft No.6 access road.

A worst-case scenario in weekday volume increase due to the Modification would occur during the mobilisation construction phase and would represent approximately a 0.65% increase in total (i.e. light and heavy vehicles) weekday traffic volume in Menangle Road, south of the Appin Ventilation Shaft No.6 access road.

The number of trips generated would be well within the day-to-day variations in traffic on the public roads, and do not raise any concerns regarding the capacity or efficiency of the public roads.

It is anticipated that the maximum heavy vehicle required for the Modification would be a five-axle semitrailer (i.e. <19 m in length and <42.5 tonne carrying capacity) and a 300-tonne mobile crane (GHD Pty Ltd, 2025).

It is noted that the site access has been designed for heavy vehicle delivery and the construction workforce associated with the Modification would be lower than the workforce for the Appin Ventilation Shaft No.6 construction periods.

Overall, given the main construction period is limited to approximately 12 months, with the movements occurring during daytime hours, generally limited in volume, potential traffic impacts during the construction phase are considered to be minor.

Notwithstanding, all oversized and/or overmass vehicles would be subject to a route survey before travel and be undertaken with relevant permits (if required).

As noted in Section 3, there would be no increase in ongoing operational employment due to the Modification.

6.10 OTHER IMPACTS

Construction of short-term sediment control measures (i.e. sediment traps, sediment fences, etc.) would be undertaken to manage sediment runoff during construction activities. Providing that erosion and sediment control measures are implemented, managed and monitored in accordance with best practice guidelines, it is expected that the Modification would have the same impact on water quality as the existing approved development.

As noted in Section 3.1.1, the RTO would not produce any other waste streams except for the reacted ventilation air and small amounts of condensed water vapour. This water would be stored in a tank and trucked off-site for disposal at a suitable GM³ site or third-party facility.

7 EVALUATION OF MERITS

ICH has a longstanding history of VAM abatement technology innovation and has identified the opportunity to construct and operate an RTO and relevant ancillary infrastructure at the site of the existing Appin Ventilation Shaft No. 6 to abate approximately 36,000 t CO₂-e/year, the equivalent of approximately 8,500 petroleum-powered passenger vehicles driven for one year.

The Modification would assist ICH to achieve decarbonisation of its operations while contributing to the State of NSW interim objective of being 50% below 2005 levels by 2030 (DPIE, 2020). Outcomes of this Modification would also be used to inform future methane abatement projects (which would be subject to separate approvals).

The modified BSO Project would be substantially the same as the existing/approved BSO Project. The BSO Project would continue to comply with existing criteria, performance measures and limits described in the BSO Project Approval (MP 08_0150). ICH would operate the modified BSO Project in accordance with existing environmental management plans and environmental monitoring programs, with minor revisions as necessary to incorporate the Modification.

The Modification Report concludes that the Modification is of minimal environmental impact (Section 6).

In weighing up the main environmental impacts (costs and benefits) associated with the proposal as assessed and described in this Modification Report, the Modification is, on balance, considered to be in the public interest of the State of NSW.

8 REFERENCES

- Australian Government Department of Industry, Science, Energy and Resources (2022) *Australia's Nationally Determined Contribution Communication 2022*
- BHP Billiton Pty Ltd (2009) *Bulli Seam Operations Environmental Assessment*
- Department of Climate Change, Energy, the Environment and Water (2022) *Significant impact guidelines 1.3: Coal seam gas and large coal mining developments – impacts on water resources*
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- Department of Planning (2011) *Hazardous Industry Planning Advisory Paper No 6: Hazard Analysis*
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- Environment Protection Authority (NSW) (2009) *Interim Construction Noise Guideline*
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- GHD Pty Ltd (2025) *Design of Modification*. Prepared for GM3
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- SoundIN (2023) *Appin Vammit Project Air Quality Impact Assessment*
- Spoke Acoustics Pty Ltd (2025) *Ventilation Air Methane Abatement Modification – Noise and Vibration Assessment*
- Transport & Urban Planning Pty Ltd (2021) *South32 Illawarra Metallurgical Coal Appin Mine Ventilation and Access Project Menangle Traffic Assessment Report*
- United Nations Framework Convention on Climate Change (2015) *Paris Agreement*