Delta coal

CHAIN VALLEY COLLIERY

Consolidation Project

ENVIRONMENTAL IMPACT STATEMENT

SEPTEMBER 2022

umwelt
Environmental & Social
Consultants

CHAIN VALLEY COLLIERY CONSOLIDATION PROJECT

Environmental Impact Statement

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Delta Coal

Project Director: David Holmes
Project Manager: Penelope Williams
Report No. 20170/R03
Date: September 2022

Delta Coal and Umwelt would like to acknowledge the traditional custodians of Lake Macquarie area and pay respect to their cultural heritage, beliefs and continuing relationship with the land.

Delta Coal and Umwelt would also like to acknowledge the post-contact experiences of Aboriginal people who have attachment to the Lake Macquarie area.

We pay our respect to the Elders – past, present and future – for they hold the memories, traditions, culture and hopes of Aboriginal people in the area.

Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
V1	David Holmes	11/11/2021	David Holmes	11/11/2021
V2	David Holmes	16/9/2022	David Holmes	16/9/2022
V3	Penelope Williams	27/9/2022	David Holmes	27/9/2022

Executive Summary

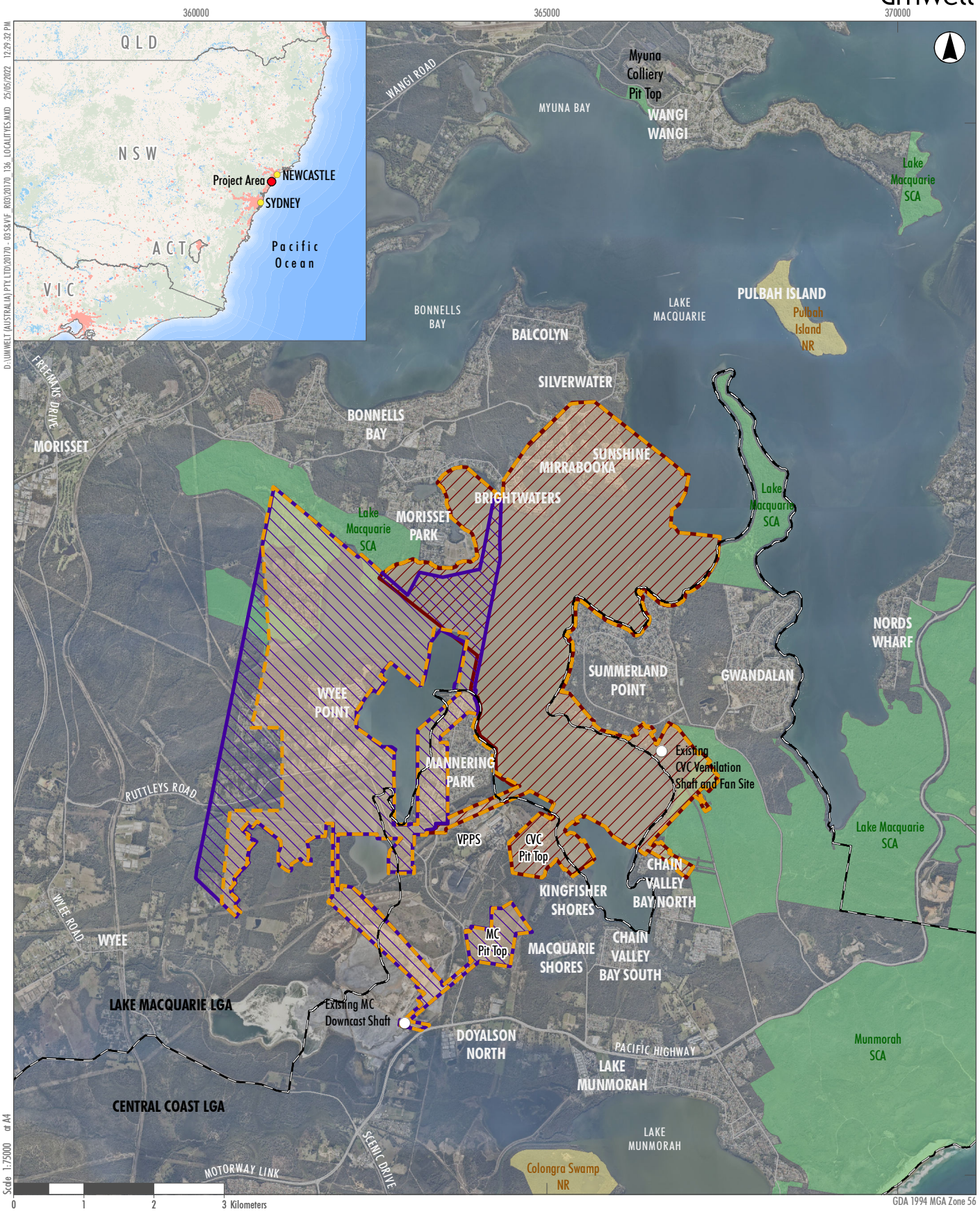
Chain Valley Colliery (CVC) and Mannering Colliery (MC) are underground coal mines, owned and operated by Great Southern Energy Pty Ltd (trading as Delta Coal). Delta Coal is a wholly owned subsidiary of Delta Electricity Pty Ltd. Existing operations are undertaken in accordance with CVC's Development Consent SSD-5465 (as modified), and MC's Project Approval MP 06_0311 (as modified). Both operations are approved to carry out mining operations to 31 December 2027. Delta Coal operates CVC and MC as an integrated operation with access to the underground mining areas by employees at both sites.

The operations are approved to provide coal for both export and for domestic power generation however all product coal from the operations is currently supplied to the Vales Point Power Station (VPPS) which is owned and operated by Delta Electricity Pty Ltd. Coal for the VPPS has both historically and currently been supplied from local and regional coal mines transported via rail, road and overland conveyor including both CVC and MC.

Delta Electricity and Delta Coal are seeking to maximise the use of the Delta Coal assets to supply coal to the VPPS. The Chain Valley Colliery Consolidation Project (the Project) would provide for the consolidation of the existing operations and associated development consent and project approval under a single development consent. The Project would also allow for secondary extraction in the approved MC mining areas located under Lake Macquarie to maintain consistency with the existing CVC consent and provide an extension of the life of mine for an additional two years to 2029 (refer to **Figure E1**). This extension would align the life of mining operations at MC and CVC with the planned operational period of the VPPS.

This Environmental Impact Statement (EIS) has been prepared to assess the environmental and social impacts of the Project and will accompany a State significant development (SSD) application for the Project, under Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

The Project has been designed through a detailed social, economic and environmental risk-based approach that aims to maximise resource extraction efficiency and combine the synergies provided through the use of existing mining infrastructure, whilst seeking to minimise impacts on the environment and surrounding community.



Legend

- Project Area
- Approved CVC Consent Boundary (SSD-5465)
- Approved MC Project Boundary (06_0311)
- Nature Reserve (NR)
- State Conservation Area (SCA)
- Local Government Area Boundary (LGA)

FIGURE E1

Chain Valley Colliery Consolidation Project

Image Source: Nearmap (May 2019) Data source: Delta Coal

The Project will provide ongoing employment opportunities and other economic benefits at a local, regional and State level including:

- Ongoing employment opportunities for the existing Delta Coal workforce.
- Ongoing contribution to the local, regional and State economies.
- Overall net production benefit to NSW of $89 M in NPV terms (in 2022 dollars) with potential additional indirect social benefits to the State of NSW (in NPV terms) estimated to be $85 M (when potential employment benefits are excluded) and $155 M (when employment benefits are included).
- Royalties payable directly to the State of NSW of $36 M (of the overall net production benefit) or $54 M in undiscounted terms.
- Improved efficiencies in the administration and regulation of the combined operations under a single development consent, including a fully integrated mine closure and rehabilitation program.

This EIS includes a detailed assessment of the potential environmental, social and economic outcomes of the Project and identifies the management and mitigation measures that will be implemented. A summary of the key findings of the assessment is provided in the following table:

Aspect	Summary
Subsidence	• The existing subsidence performance measures currently applicable to the CVC mining operations will continue to apply to the CVC and MC operations. • Consistent with existing CVC operations, all Zone B workings (located below Lake Macquarie) will be subject to further approval for secondary extraction in the form of an Extraction Plan to ensure subsidence impacts are appropriately managed. • Subsidence associated with the Project are expected to be imperceptible at all foreshore and land areas.
Noise	• Noise associated with the Project will not increase/change compared to the approved CVC and MC operations. Only the Macquarie Shores Home Village (MSHV) assessment location is predicted to experience marginal to moderate exceedances of the Project Noise Trigger Level (PNTL), however noise is not predicted to exceed the current noise criteria for this assessment location under the MC Consent. Noise impacts at most locations assessed will be lower than currently permitted under the MC or CVC consents. • Maximum LAmax noise levels from the Project are predicted to satisfy the relevant sleep disturbance screening levels at all assessment locations. • Construction activities associated with the Project are minor and will be undertaken within standard construction hours; noise impacts relating to the proposed construction activities are considered unlikely. • Demolition works associated with mine closure activities will be undertaken during standard construction hours and be managed to meet relevant noise criteria. • Existing noise mitigation and management strategies will continue to be implemented as part of the ongoing MC and CVC operations. At CVC prior to replacing the coal handling infrastructure (if required), further engineering work would be completed to design and procure infrastructure that aims to reduce the potential noise impacts on the community. All feasible and reasonable noise mitigation measures identified by the Noise Impact Assessment will be adopted and implemented by Delta Coal.

Aspect	Summary
Air Quality	• The predicted incremental concentrations and deposition rates for all pollutants and averaging periods are below the applicable NSW EPA assessment criteria and VLAMP mitigation and acquisition criteria at all assessment locations. • The predicted cumulative concentrations and deposition rates for all pollutants and averaging periods are below the applicable NSW EPA assessment criteria and VLAMP mitigation and acquisition criteria at all assessment locations. • Air quality impacts associated with the operations would continue to be managed under the existing management controls implemented on site. The existing Air Quality and Greenhouse Gas Management Plan would be reviewed and updated accordingly should the Project be approved.
Groundwater	• The Project does not involve any extension to existing approved mining areas and therefore groundwater impacts are predicted to be largely identical to those of the currently approved operations. Increased groundwater inflows would be expected during secondary extraction activities within Zone B however rates would be expected to be similar to rates observed during the currently approved miniwall mining operations. • The Project Area and immediate surrounds are subject to both active and historical coal mining operations which have impacted the local and regional groundwater system through depressurisation of strata. • The Triassic and Permian groundwater sources are considered to be 'less productive' under the NSW Aquifer Interference Policy (AIP) since the yields are typically less than 5 L/s and/or the groundwater salinity exceeds 1500 mg/L. • No drawdown in the water table is predicted therefore predicted impacts meet the Level 1 minimal impact considerations under the NSW AIP. • As there are no predicted impacts to alluvial groundwater systems or the shallow water table, no impacts are predicted to the baseflow to ephemeral creeks or terrestrial GDEs within the Project Area. • Existing groundwater licences held by Delta Coal are sufficient to cover the predicted groundwater take over the life of the Project. • Groundwater monitoring and management will continue in accordance with the CVC Groundwater Management Plan, which will be revised and updated where required should the Project be approved.
Surface Water	• As there are no material changes to approved surface activities at either the CVC or MC pit top facilities, there are no changes proposed to the existing water management system. • No material change in water quality of discharges relative to the approved operations is expected. • Potential increases in groundwater inflows may occur during secondary extraction activities within Zone B however inflow rates are anticipated to be similar to historical inflow rates during miniwall operations at CVC however dewatering infrastructure will be able to cater for the predicted increase in groundwater volumes and predicted discharge rates are within existing volumes licensed under the CVC and MC Environment Protection Licences (EPLs). • The Project will not have any impacts to baseflow in creeks and no surface water entitlements are required as a result of the Project. • The Project will not have any impact on flooding impacts relative to approved operations. • The site-specific water management plans for CVC and MC will be reviewed, merged and updated should the Project be approved.

Aspect	Summary
Biodiversity	• As there is no surface disturbance due to the Project utilising existing infrastructure, the Project will not have any direct impacts on biodiversity values. • Due to the commitment to negligible levels of subsidence below land areas and seagrass beds, indirect impacts associated with the Project are predicted to be negligible, therefore no biodiversity offsets are required. • Monitoring of seagrass and benthic communities within the approved mining areas below Lake Macquarie will be managed by the Seagrass Management Plan and Benthic Communities Management Plan.
Aboriginal Cultural Heritage	• A comprehensive Aboriginal Cultural Heritage Assessment was completed in consultation with the Registered Aboriginal Parties (RAPs) for the Project. • Due to the commitment to negligible levels of subsidence below land areas, and there being no additional surface disturbance proposed, no impacts to Aboriginal archaeological sites are expected and no additional management and/or mitigation strategies are proposed. • Aboriginal cultural heritage will continue to be managed in accordance with the Delta Coal Heritage Management Plan which will be updated to reflect the consolidation of approved operations should the Project be approved.
Historic Heritage	• The Project does not result in any changes to approved operations which would have in any physical impacts (either direct or indirect) nor any visual impacts to heritage items (both listed and unlisted).
Greenhouse Gas and Energy	• The predicted greenhouse gas emissions associated with the Project have been assessed (including the scope 1, 2 and 3 emissions). The implications of the potential emissions associated with the Project have been assessed against the relevant climate change policies. • Greenhouse gas management practices will be developed and implemented as required through the updates and implementation of the Air Quality and Greenhouse Gas Management Plan.
Traffic and Transport	• A Traffic Impact Assessment (TIA) was prepared by GHD to support the CVC Modification 4 and covered the potential impacts on the local traffic network associated with a range of different employee numbers and an operational timeframe to 2030 (covering the proposed extension of life of operations under the Project). • The Project does not involve any change to the approved operations in terms of traffic impacts other than the extension of life of operations by two years to 2029. • Based on the results of the modelling, no changes to intersection design relative to the currently approved operations are required for the Project. • Traffic management associated with the ongoing operations will continue in accordance with the existing Traffic Management Plan. • The Traffic Management Plan will be reviewed prior to undertaking mine closure works to identify any changes in traffic management required due to decommissioning activities. Any updates to the Traffic Management Plan associated with decommissioning activities will be prepared in consultation with Transport NSW and Central Coast Council.

Aspect	Summary
Waste And Hazard	• The existing waste management practices will continue to be implemented on site. • The Project design and assessment has had regard to potential hazards associated with the Project, in accordance with relevant statutory requirements and guidelines. • Management of bushfire threat will continue to be undertaken across the site consistent with existing management practices.
Economic Impacts	• A detailed economic analysis of the Project has been undertaken which includes consideration of the Project's economic benefits and costs associated with adverse impacts. • Overall, the Project is calculated to provide a net production benefit to NSW of $89 M in NPV terms (in 2021 dollars), excluding potential social benefits. Royalties payable directly to the State of NSW make up $36 M of this calculated net benefit or $54 M in undiscounted terms. • Potential additional indirect social benefits to the State of NSW (in NPV terms) are estimated to be $85 M (when potential employment benefits are excluded) and $155 M (when employment benefits are included). • Net benefits to the region associated with the Project have been estimated using two different local effects methodologies. Under both approaches, economic benefits to the region are predicted to be significant despite the relatively minor extension in project duration and additional coal mined.
Social Impacts	• Extensive stakeholder consultation was undertaken to identify community issues / views of the Project with a range of mechanisms utilised including interviews with key stakeholders, information sessions, face to face and telephone meetings and information sheets delivered to the local community and the surrounding suburbs relevant to the broader Project Area. • The social impacts of the Project have been minimised where possible through project design and the proposed management and enhancement approaches. • Impacts associated with the Project will be largely identical to those of the existing approved operations, however the extension of operations for an additional two years will result in a continuation of existing noise and air quality impacts during this period. These impacts, both perceived and actual are greatest for those living in closest proximity to the CVC and MC Pit Tops, or those who perceive they will be most directly impacted by the development. • Members of the community raised concerns regarding the possibility of subsidence impacts however these concerns were largely associated with the previously proposed Eastern Mining Area extension which no longer forms part of the Consolidation Project. Subsidence impacts will be managed through mine design to meet the current subsidence limits imposed under the CVC Consent. Subsidence associated with the Project are expected to be imperceptible. Any secondary extraction activities within Zone B will be subject to further approval under the Extraction Plan processes prior to being undertaken and this process will have regard to all potential subsidence impacts associated with secondary extraction. • A range of strategies are proposed to minimise the social impacts and maximise associated benefits including continuation of the existing Community Investment Fund. • The Project will provide ongoing benefits for the local and wider communities through ongoing employment, flow on benefits through use of local services, local and regional expenditure, community investment and payment of royalties and taxes.

Aspect	Summary
Rehabilitation	• Consistent with the approved operations rehabilitation requirements associated with the Project relate predominately to the associated surface infrastructure areas. The rehabilitation objectives, strategies and justification for the Project are consistent with that proposed for the approved operations. • Mine closure and decommissioning activities will include building and infrastructure demolition, shaft filling and sealing (including ventilation fan shafts) and land preparation works, including any works associated with managing potential site contamination. • A detailed mine closure plan will be prepared at least one year prior to the planned CVC and MC closure (i.e. by 31 December 2028). • Prior to decommissioning works commencing, the Traffic Management Plan will be reviewed to identify any changed management associated with truck movements associated with demolition and shaft filling and sealing works. • Detailed management and monitoring proposals for the final rehabilitation will be developed as part of the detailed mine closure planning process. The details will be included in both the Rehabilitation Management Plan and Mine Closure Plan (prepared at least one year prior to mine closure). Once closure has commenced, annual rehabilitation monitoring and reporting will be undertaken to assess the overall rehabilitation success. Corrective action will be implemented where results or trends indicate risk of future non-compliance or environmental risk.

The Project has been assessed against the principles of ecologically sustainable development. This assessment has indicated that while the Project, like most large-scale development, will have impacts, these impacts will be largely the same as those of the existing approved operations and do not involve a significant increase in impacts. The assessment therefore concludes that the Project is consistent with the principles of ecologically sustainable development.

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1.0 Introduction

Chain Valley Colliery (CVC) and Mannering Colliery (MC) are underground coal mines located on the southern shore of Lake Macquarie, NSW. The operations are located approximately 60 kilometres (km) south of Newcastle, within the Lake Macquarie and Central Coast local government areas (LGAs) (refer to **Figure 1.1**). Underground mining at both CVC and MC commenced in the 1960s.

The CVC and MC operations are owned and operated by Great Southern Energy Pty Ltd (trading as Delta Coal). In April 2019, Delta Coal acquired Lake Coal's CVC and MC assets. Existing operations are undertaken in accordance with CVC's Development Consent SSD-5465 (as modified), and MC's Major Project Approval MP 06_0311 (as modified), both issued under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

The CVC and MC Pit Top facilities are located at Mannering Park and are located within the Central Coast LGA. Approved mining areas for the operations are located within both the Lake Macquarie and Central Coast LGAs. Delta Coal operates CVC and MC as an integrated operation with access to the underground mining areas by employees from both pit tops. The operations are comprised of pit top facilities at both CVC and MC, and associated ventilation shaft and fan sites to support underground operations (refer to **Section 2.2**). Coal is transported via an existing overland conveyor from MC to Vales Point Power Station (VPPS).

CVC has previously extracted coal from the Wallarah, Great Northern and Fassifern seams while MC has extracted coal from both the Great Northern and the Fassifern seams. Both operations are currently approved to carry out mining operations to 31 December 2027. Approved mining at CVC is currently limited to the Fassifern seam only however mining in both the Fassifern and Great Northern seams is approved at MC.

To the north of the CVC boundary are mining lease areas held by Centennial Myuna Pty Ltd which form part of the adjacent Myuna Colliery. Myuna Colliery is currently owned and operated by Centennial Myuna Pty Ltd.

Sunset Power International Pty Ltd, trading as Delta Electricity, owns and operates the VPPS. VPPS is a coal fired power station located at Mannering Park on the southern extent of Lake Macquarie adjacent to the CVC and MC pit top facilities. VPPS commenced operations in the 1960s and has historically been supplied with coal from local and regional coal mines including CVC and MC. Coal is transported to the VPPS via rail, road or overland conveyor.

The owners of both Delta Coal and Delta Electricity are seeking to maximise the use of the Delta Coal assets to supply coal to the VPPS. The Project is referred to as the Chain Valley Colliery Consolidation Project (the Project) and would provide for the consolidation of the existing operations at CVC and MC under a single development consent under the EP&A Act. The Project would also allow for secondary extraction in the approved MC mining areas located under Lake Macquarie to maintain consistency with the existing CVC consent and provide an extension of the life of mine (LOM) for an additional two years to 31 December 2029. This extension would align the life of mining operations at both MC and CVC with the planned operational period of the VPPS.

1.1 Project Objectives and Key Design Considerations

The following key objectives have guided the refinement of the Project:

- simplify the consent requirements applicable to the CVC and MC operations, to streamline the regulatory requirements for both Delta Coal and the Government regulators
- align the Delta Coal extraction and production rates with the requirements of the VPPS
- provide for secondary extraction in the approved MC mining areas located under Lake Macquarie to maintain consistency with the existing CVC consent
- continue to extract coal in an environmentally responsible manner to minimise project specific and cumulative environmental and social impacts, particularly in relation to subsidence
- utilise existing infrastructure to reduce additional disturbance
- continue the implementation of mitigation and management strategies to reduce environmental and social impacts associated with the Project in order to meet relevant criteria wherever practicable and feasible
- provide continued employment opportunities within the local and regional community.

1.2 Project Summary

The Project has been designed using a multi-disciplinary social, environmental and economic risk-based approach that aims to maximise resource extraction efficiency and the use of existing mining infrastructure, whilst seeking to minimise impacts on the environment and community. The design of the Project includes measures to reduce impacts as an outcome of the environmental and social studies, and through applying the key learnings from the history of mining operations at both CVC and MC.

A fault structure within the current CVC mining area currently imposes operational constraints on accessing coal resources in the western areas of the approved CVC and MC mining areas. The current restrictions on approved mining at MC and CVC to 2027 and the limited volume of coal able to be extracted from the western area during this period do not justify the costs associated with development works needed to access these areas.

The Project would provide for the extension of the life of mine to 31 December 2029. This extension aligns the LOM for the CVC and MC operations with the current operational requirements of the VPPS and the extended LOM justifies the additional capital investment needed to access coal resources in the western area. Based on current mine planning, an estimated approximately 13.4 Mt ROM coal will be extracted over the period 2023 to 2029. While the extension of the life of mine by two years will only increase approved maximum production by 5.6 Mt, the economics associated with mining the approved western areas means approximately 9.5 Mt ROM of additional resources can be extracted over the life of operations relative to current operations which are constrained by the 31 December 2017 consent limit.

The Project would provide the following key benefits:

- align production from the combined operations with the planned life of operations of the VPPS (to the end of 2029)
- provide VPPS with a cost effective and reliable supply of coal for the life of the VPPS operations
- extract an additional approximately 9.5 Mt ROM coal relative to current life of mine planning for approved operations
- providing ongoing employment opportunities for the workforce across the two operations (approximately 390 full time employees (FTE))
- consolidation of the existing Delta consents to streamline regulatory requirements for both Delta Coal and Government regulators
- providing an overall net benefit to NSW of at least $89 M in net present value (NPV) terms
- providing a royalty revenue stream flowing to the NSW Government estimated to be $36 M (NPV) over the life of the Project
- provide for a fully integrated mine closure and rehabilitation program.

1.3 The Proponent

The proponent for the Project is Great Southern Energy Pty Limited, trading as Delta Coal. Great Southern Energy Pty Limited is an 100 % Australian owned company.

Delta Coal owns and operates both the CVC and MC Collieries, refer to **Appendix 1** for Schedule of Land.

1.4 Project Development Application

The Project is identified as State significant development (SSD) under *State Environmental Planning Policy (Planning Systems) 2021* (Planning Systems SEPP). As SSD, the Project requires development consent under Part 4 of the EP&A Act. The new development consent being sought would replace the existing CVC Development Consent SSD-5465 (as modified) and MC Major Project Approval MP 06_0311 (as modified). The Project would operate under the new development consent which would regulate all future mining at both operations and the existing development consents would be surrendered.

The Project Area includes the existing approved CVC and MC consent areas and excludes areas outside the Delta Coal lease areas with only minor adjustments to the boundary, to align with the adjusted MC mining lease boundary (refer to **Figure 1.1**).

The Project Area is limited to subsurface areas below the Lake Macquarie State Conservation Area (excludes areas from the surface to 20 metres (m) below ground level (bgl). In all other areas, the consent extends to the surface.

1.5 EIS Structure

This EIS has been prepared in accordance with the EP&A Act, EP&A Regulation, *State Significant Development Guidelines* (SSD Guidelines) (DPIE, 2021) and the revised Secretary's Environmental Assessment Requirements (SEARs) issued by Department of Planning and Environment (DPE) on 8 March 2022.

A checklist of the SEARs and where they are addressed in the EIS is provided in **Appendix 2**. The specific government agency requirements included as an attachment to the SEARs have also been considered and addressed where relevant, throughout the EIS and the relevant specialist studies. The Statement of Authorship for the EIS is provided in **Appendix 3**.

An overview of the structure of this EIS is provided below.

Executive Summary – provides a brief overview of the Project and the outcomes of the environmental and social assessments.

Section 1.0 Introduction – introduces the Project, outlines the background, provides an overview of the key project objectives and the approval requirements.

Section 2.0 Strategic Context – outlines the project rationale and the site context including an overview of the approved operations.

Section 3.0 Project Description – contains a detailed description of the Project as proposed.

Section 4.0 Statutory Context – summarises the State and Commonwealth statutory context for the approval process and the Project once operational.

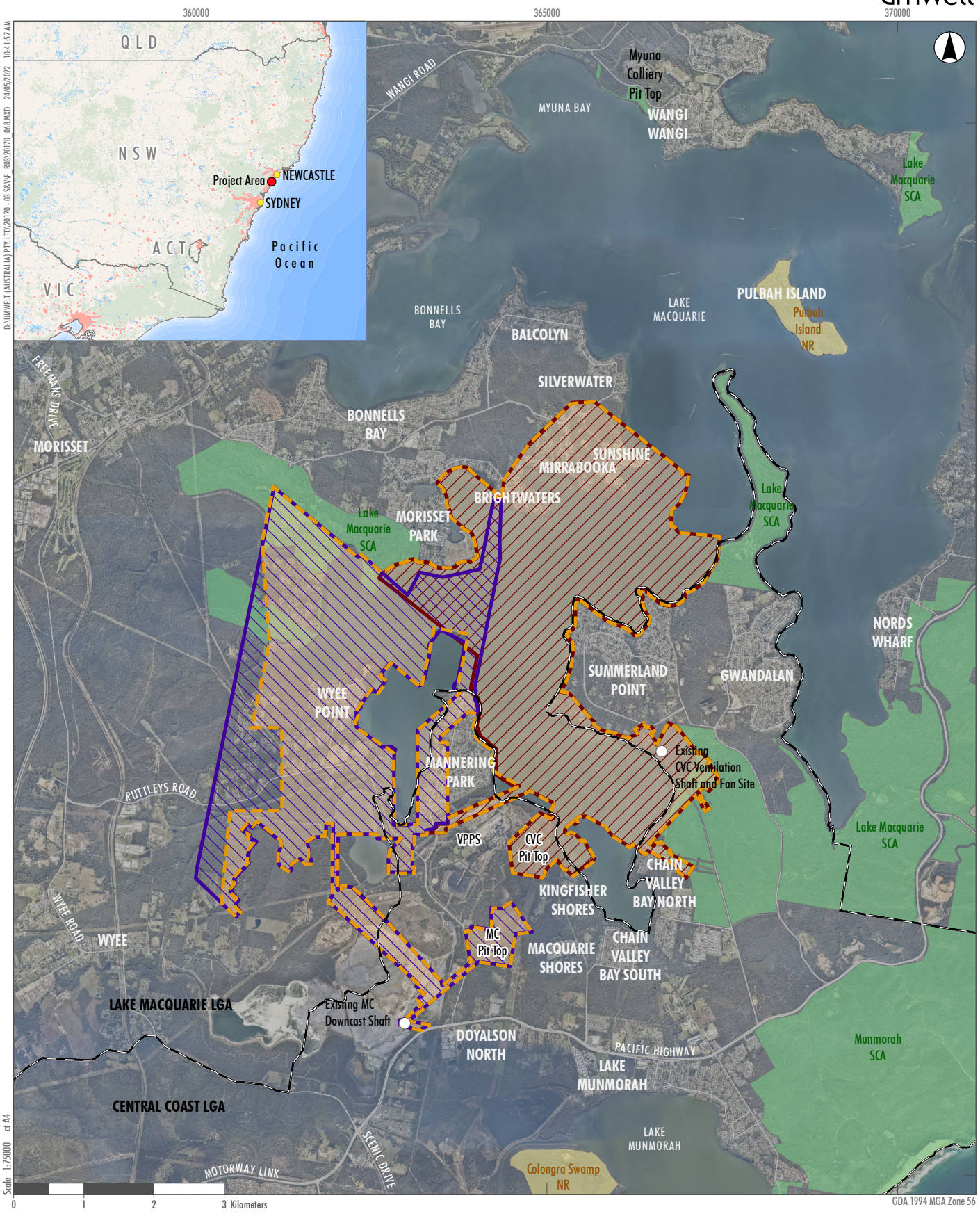
Section 5.0 Engagement – describes the stakeholder consultation program and details the environmental and community issues identified as part of this process for consideration in the EIS.

Section 6.0 Assessment of Impacts – contains a comprehensive analysis and assessment of the key environmental, social and economic issues relevant to the Project, including both Project specific and cumulative impacts.

Section 7.0 Justification – summarises the key conclusions arising from the detailed environmental assessment process.

Section 8.0 References – lists references cited in the EIS.

Section 9.0 Abbreviations – provides a glossary of technical terms to assist with reading and understanding the EIS.



Legend

- Project Area
- CVC Consent Boundary (SSD-5465)
- MC Project Approval Boundary (06_0311)
- Nature Reserve (NR)
- State Conservation Area (SCA)
- Local Government Area Boundary (LGA)

FIGURE 1.1

Project Locality

Image Source: Nearmap (May 2019) Data source: Delta Coal

2.0 Strategic Context

The following sections provide a description of the environmental and social setting for the Project (**Section 2.1**) and details regarding historical mining operations in the area and the currently approved operations at CVC and MC (**Section 2.2**). This section also includes details of the rationale for the Project and alternatives considered in the Project design process (**Section 2.3**).

2.1 Environmental and Social Setting

The following provides an overview of the environmental and social setting of the existing approved operations and the proposed Project.

2.1.1 Geology

The Project Area is located within the Newcastle Coalfields within the northern portion of the Sydney Basin. The stratigraphy of the region is summarised in **Figure 2.1** and consists predominantly of Triassic and Permian strata.

Triassic rocks of the Narrabeen Group outcrop in the vicinity of the Project Area, as shown in **Figure 2.2**. The Narrabeen Group comprises variable sequences of interbedded claystones, siltstones, fine to very-coarse grained sandstones and conglomerates. It includes the Munmorah conglomerate, which is a low permeability sandstone and conglomerate dominated formation (GHD, 2020).

Quaternary alluvial deposits overlay the bedrock in some areas. The main alluvial deposits in the vicinity of the Project Area occur to the west and are associated with Wyee and Pourmalong creeks. The thickness of the sediment beneath the waters of Lake Macquarie ranges from 6 m to 20 m (GeoTerra, 2013).

The Triassic rocks are underlain by the Permian Newcastle Coal Measures, which subcrop to the east and northwest of the Project Area. The strata of the Newcastle Coal Measures gently dip to the south/south-west.

The historical target seams for mining in the areas within and surrounding the Project Area are, from shallowest to deepest, the Wallarah Seam, Great Northern Seam and Fassifern Seam. The depth of cover above the Fassifern Seam within the Project Area ranges from approximately 150 m to 230 m.

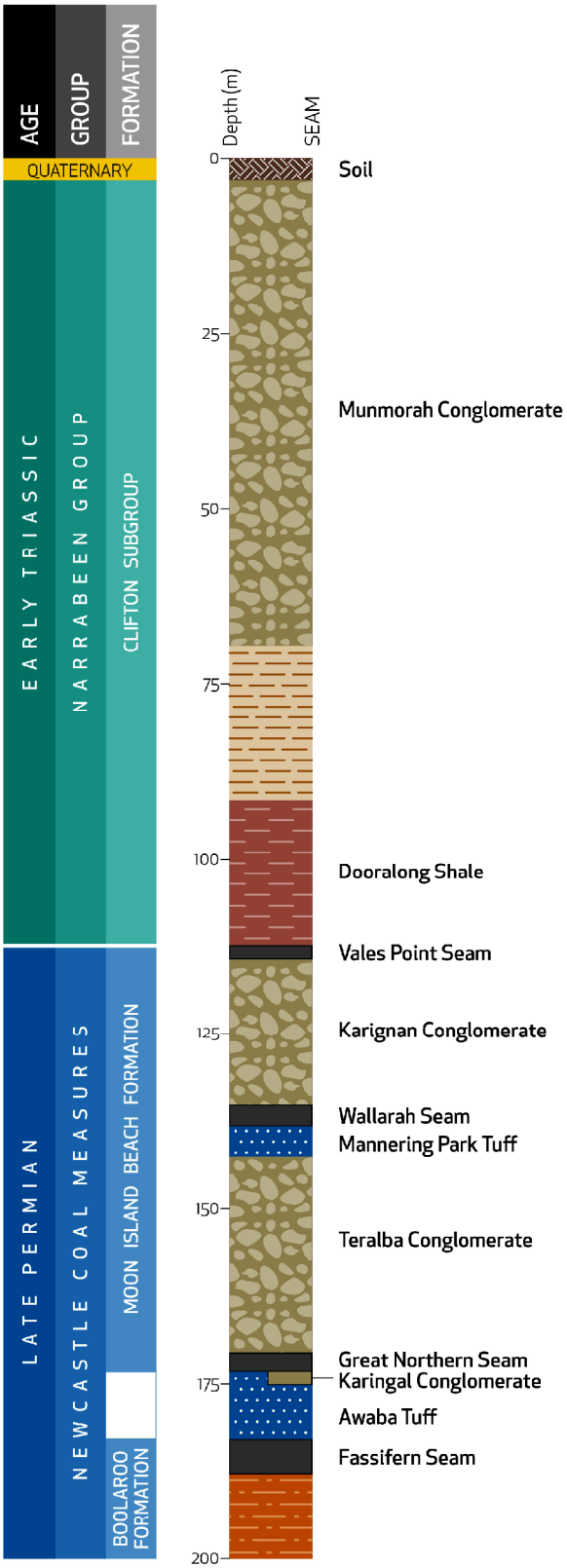
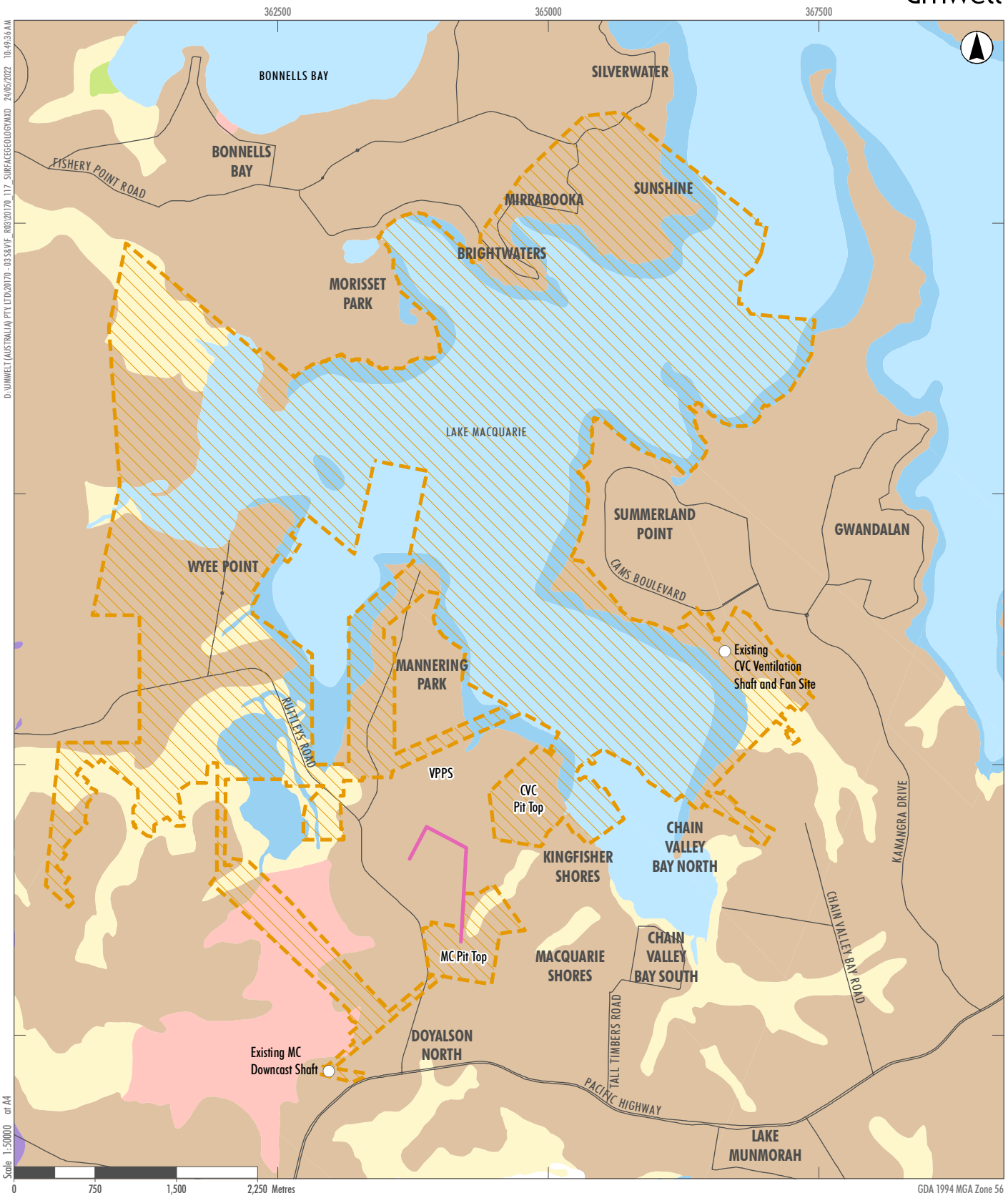


FIGURE 2.1

Stratigraphic Column

Image Source: Delta Coal (2021)



Legend

- Project Area
- Existing VPPS Overland Conveyor

Surface Geology

- Aeolian deposits
- Alluvial sand and gravel
- Anthropogenic deposits
- Coastal deposits- barrier lake facies (subaqueous)
- Coastal deposits- lagoon facies (subaqueous)
- Munmorah Conglomerate
- Tuggerah Formation

FIGURE 2.2

Surface Geology

Data source: Delta Coal (2021), Geology: NSW Government - Mining, Exploration and Geoscience (2015)

2.1.2 Topography and Hydrology

The CVC and MC operations occur mainly within 10 m of sea level, with the topography of the surrounding area ranging from 10 m Australian Height Datum (AHD) to 70-80 m AHD (DPE, 2017) (refer to **Figure 2.3**).

The Project Area is located within the southern catchment area of Lake Macquarie to the south of the Dora Creek catchment. The main creek systems in the vicinity of the Project Area include Wyee Creek, Cobra Creek and Pourmalong Creek to the west, Karignan Creek to the south, Bonny Boy Gully and Tiembula Creek to the east and Postmistress Creek to the north of the Project Area. A number of unnamed tributaries also exist in the vicinity of the Project. Watercourse locations within the Project Area are shown in **Figure 2.3**. In general, creeks are ephemeral upstream of the tidal zone. Within the tidal zone there is permanent water in creeks including Wyee and Pourmalong Creeks.

The CVC and MC Pit Tops are located within the catchment of Swindles Creek which flows to the north into Lake Macquarie adjacent to the CVC Pit Top (refer to **Figure 2.3**). Licensed discharges from both sites flow into Swindles Creek.

A number of estuarine lakes exist to the southeast of the Project Area, including Lake Munmorah and Budgewoi Lake.

2.1.3 Hydrogeology

The groundwater sources in the vicinity of the CVC consent boundary are generally low yielding and predominately within the Quarternary alluvium, marine/estuarine, alluvial/colluvial aquifer system, weathered and/or underlying Triassic and Permian strata with low permeability interburden units, and low to moderately permeable coal seams (GHD, 2020).

The coal seams generally have a low primary or inter-granular porosity and permeability, with bedding planes, joints, fractures and cleating imparting an enhanced secondary permeability.

The Triassic and Permian rock system aquifers and alluvial/colluvial aquifers within the Project Area are classed as 'less productive' under the NSW Aquifer Interference Policy (AIP) based on the groundwater salinity being in excess of 1,500 milligrams per litre (mg/L) and/or bore yields lower than 5 litres per second (L/sec).

Historical and ongoing underground mining in the Permian Coal Measures around Lake Macquarie has created a significant groundwater sink and generated a regional zone of depressurisation within the Permian Coal Measures.

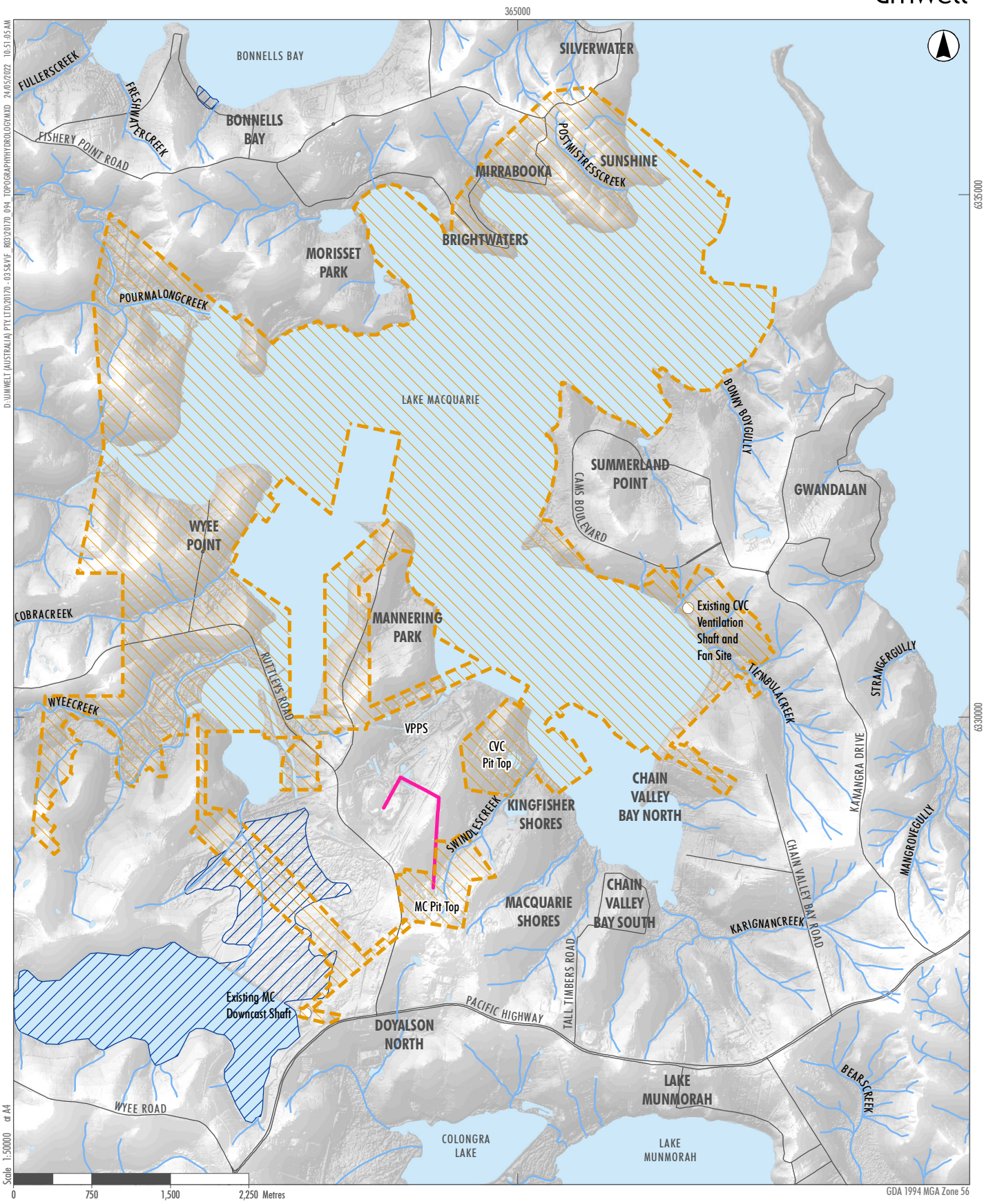


FIGURE 2.3

Topography and Hydrology

Image Source: Nearmap (May 2019) Data source: Delta Coal (2021), NSW DPIE (2018)

2.1.4 Soil Landscapes

The majority of the CVC and MC mining operations occur below Lake Macquarie. Soil profiles of the surrounding land areas are largely comprised of Wyong, Awaba and Doyalson soil landscapes with smaller areas of Gorokan and Tacoma Swamp soil landscapes (refer to **Figure 2.4**). The properties of the main soil landscapes are:

- **Wyong:** Landscape is made up of quaternary sediments (sand, silt gravel and clay), forming generally poorly drained deltaic floodplains and alluvial flats with low fertility, and high limitations for urban development due to high flooding hazard. Small areas of Tacoma Swamp soil landscape occur on the floodplain.
- **Awaba:** Landscape comprises both Munmorah Conglomerate Formation (pebbly sandstone, siltstone varieties and claystone) and Newcastle Coal Measures conglomerate subgroups Moon Island, Boolaroo and Adamstown (sandstone, tuff, siltstone, claystone and black coal conglomerate). Moderately inclined to occur on steep slopes (up to >25 %), with low to very low fertility and moderate limitations for urban development capability due to moderate foundation hazard (though in localised areas of slopes >20 %, mass movement hazards are applicable and therefore severe urban development limitations are present).
- **Doyalson:** Landscape contains the Munmorah Conglomerate Formation (pebbly sandstone, siltstone varieties and claystone), with small areas of quartz sandstone at the base of Tuggerah Formations included. Small areas of Gorokan soil landscape have been included in the southern locations of the Doyalson soil landscape. Urban development capability is moderate, due to generally low foundation hazards with isolated high plasticity areas forming high foundation hazard. Soil fertility of the Doyalson landscape is generally very low.

2.1.5 Biodiversity Values

The Project Area contains two land-based areas that include remnant native vegetation, including the CVC and MC Pit Top areas and the CVC ventilation shaft and fans at Summerland Point. The latter lies within a large bushland block that adjoins vegetated land and the Lake Macquarie State Recreation Area. The pit top areas, though primarily cleared for buildings, laydown and other hardstand areas, coal stockpiles and miscellaneous infrastructure, contain patches of remnant vegetation.

Figure 2.5 shows regional mapping (NSW Department of Primary Industries, 2012) of vegetation communities within and surrounding the Project Area.

Lake Macquarie is a large barrier estuarine lake with an open water area of 115 square kilometres (km^2), an average depth of 7 m and a relatively flat floor characterised by fine soft silt/mud sediments. The Lake is a wave-dominated estuary with a high sediment trapping efficiency, naturally low turbidity and partially mixed circulation where there is likely to be sedimentation (Cardno, 2011).

The benthic communities in the mud basin zone of Lake Macquarie, within which the Project Area is located, are dominated by polycheates and bivalve molluscs, with other benthic organisms present at various times in smaller numbers (The Ecology Lab, 2007; Laxton and Laxton, 2020).

Four species of seagrass occur in Lake Macquarie: eel grass (*Zostera capricorni*); paddle weed (*Halophila ovalis*); *Ruppia* sp.; and strapweed (*Posidonia australis*) which is listed as an endangered species under the NSW *Fisheries Management Act 1994* (FM Act). Seagrass distribution within estuaries is naturally influenced by light penetration, depth, salinity, nutrient status, bed stability, wave energy, estuary type, and the evolutionary stage of the estuary. Light is a major limiting factor for the growth of seagrasses and the effects of shading either by artificial structures or increased turbidity associated with sediment re-suspension are common light reducing factors in estuaries (BioAnalysis 2008). Mapped areas of seagrass within the existing approved CVC and MC mining areas are shown in **Figure 2.5**.

Past records of marine fauna (endangered and non-endangered species) in Lake Macquarie include 232 species of fish, four species of turtle, and various reports of prawns, crabs, jellyfish, sharks, rays, eels and octopus.

2.1.6 Land Ownership

Land within the existing Delta mining leases is predominately privately owned residential land. The Munmorah State Conservation Area lies to the south-east (refer to **Figure 2.6**). Delta Coal and Delta Electricity own the land on which the VPPS and CVC and MC operations are located.

2.1.7 Land Zoning

The Project Area is located within the Lake Macquarie and Central Coast local government areas (LGA). Hence, the *Lake Macquarie Local Environment Plan 2014* (Lake Macquarie LEP) and the *Central Coast Local Environmental Plan 2022* (Central Coast LEP) are relevant to the Project. Relevant land zonings under each of the LEPs are shown in **Figure 2.7.**

Most of the CVC underground mining areas fall within the Lake Macquarie LGA. The mining areas that fall underneath the lake are zoned as W1 – Natural Waterways. The area to the west of Lake Macquarie within the existing MC approval area includes RE1 – Public Recreation, R2 – Low Density Residential, RU4 – Primary Production Small Lots, RU6 – Transition, E1 – National Parks and Nature Reserves, E2 – Environmental Conservation, E4 – Environmental Living, B1 – Neighbourhood Centre, SP2 – Infrastructure and SP3 – Tourist.

The key surface features of the Project including the existing CVC and MC pit top areas and ventilation fans are located within the Central Coast LGA and are subject to the provisions of the Central Coast LEP. The existing pit top areas are on land zoned SP2 – Infrastructure. The existing CVC ventilation shaft and fan site located on the eastern side of Lake Macquarie is zoned C2 – Environmental Conservation, C3 – Environmental Management, RE1 – Public Recreation and W1 – Waterway.

2.1.8 Land Use

The areas surrounding CVC and MC Pit Top facilities are mainly comprised of power generation, industrial development, vegetation and residential land uses. The VPPS is located to the north of the Project area and associated ash dam to the west. The area between the CVC and MC Pit Tops includes the site of the former Newvale Colliery surface facilities which has been rehabilitated.

The closest residential areas to the CVC and MC Pit Top facilities are Macquarie Shores Home Village and the residential areas of Kingfisher Shores and Chain Valley Bay (see **Figure 2.6**). CVC's ventilation fan site is located at Summerland Point, north-east of the CVC Pit Top area to the north of Chain Valley Bay North.

Three over 55 years living villages area located within the Project Area including the Teraglin Lakeshore Lifestyle Community and Vallhalla Lifestyle Community. There are an additional four living villages in proximity to the Project Area including Macquarie Shores Home Village, Parktree Village, Lakeside Leisure Village and Ingenia Lifestyle Village Lake Munmorah.

2.1.9 Infrastructure

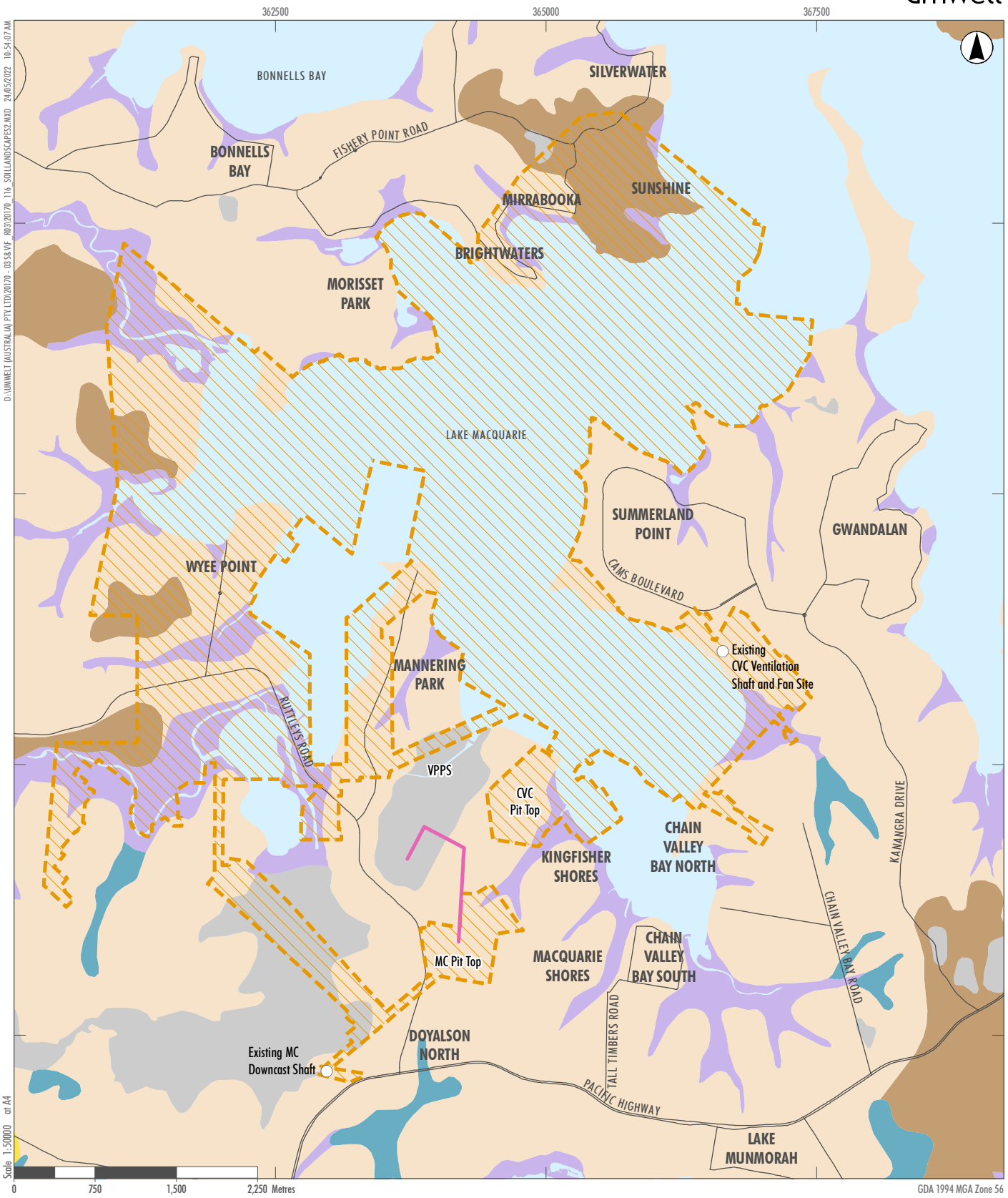
The road network within and surrounding the Project Area is shown in **Figure 2.8**. Access to the CVC and MC infrastructure areas is via Ruttleys Road with MC being accessed directly off Ruttleys Road and CVC accessed via Construction Road which runs between CVC and MC infrastructure areas and the VPPS.

The Project Area is located adjacent to the VPPS and aspects of the high voltage transmission network pass over the Project Area. Local electricity distribution networks are also located within the Project Area, including over areas approved to be mined. Key aspects of the high voltage network within the Project Area are shown in **Figure 2.8**.

Other surface infrastructure within the Project Area includes:

- potable water reticulation pipeline
- sewerage infrastructure, including sewage treatment facilities (both those operated by Central Coast Council as well as private systems)
- telecommunications infrastructure such as cabling and mobile phone towers.

Key infrastructure features within and close to the Project Area are shown in **Figure 2.8**.



Legend

- Project Area
- Existing VPPS Overland Conveyor

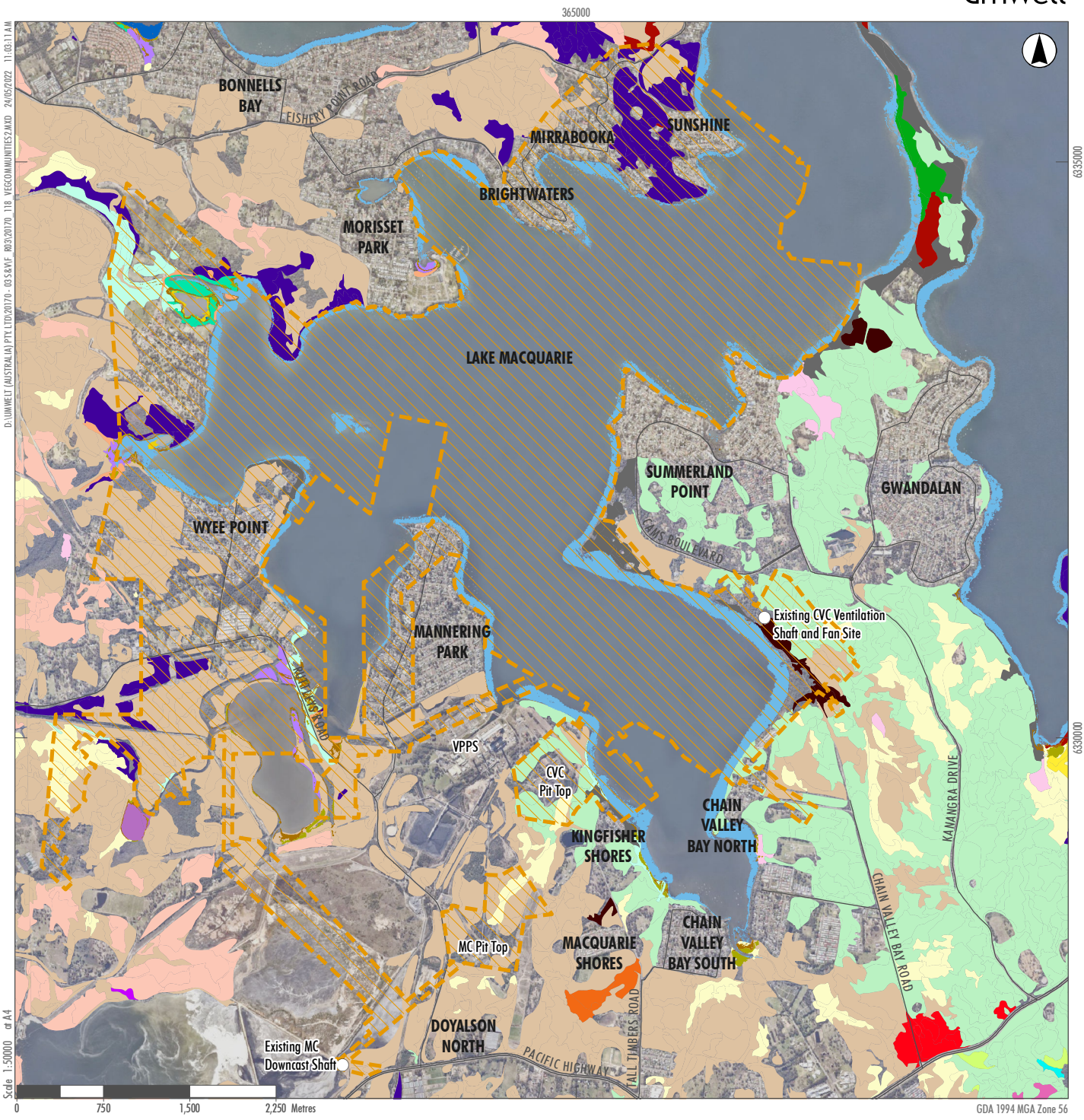
Soil Landscapes

- Awaba
- Disturbed Terrain
- Doyalson
- Gorokan
- Tacoma Swamp
- Wyong

FIGURE 2.4

Soil Landscapes

Data source: Delta Coal (2021), Soils - DPIE (2018)



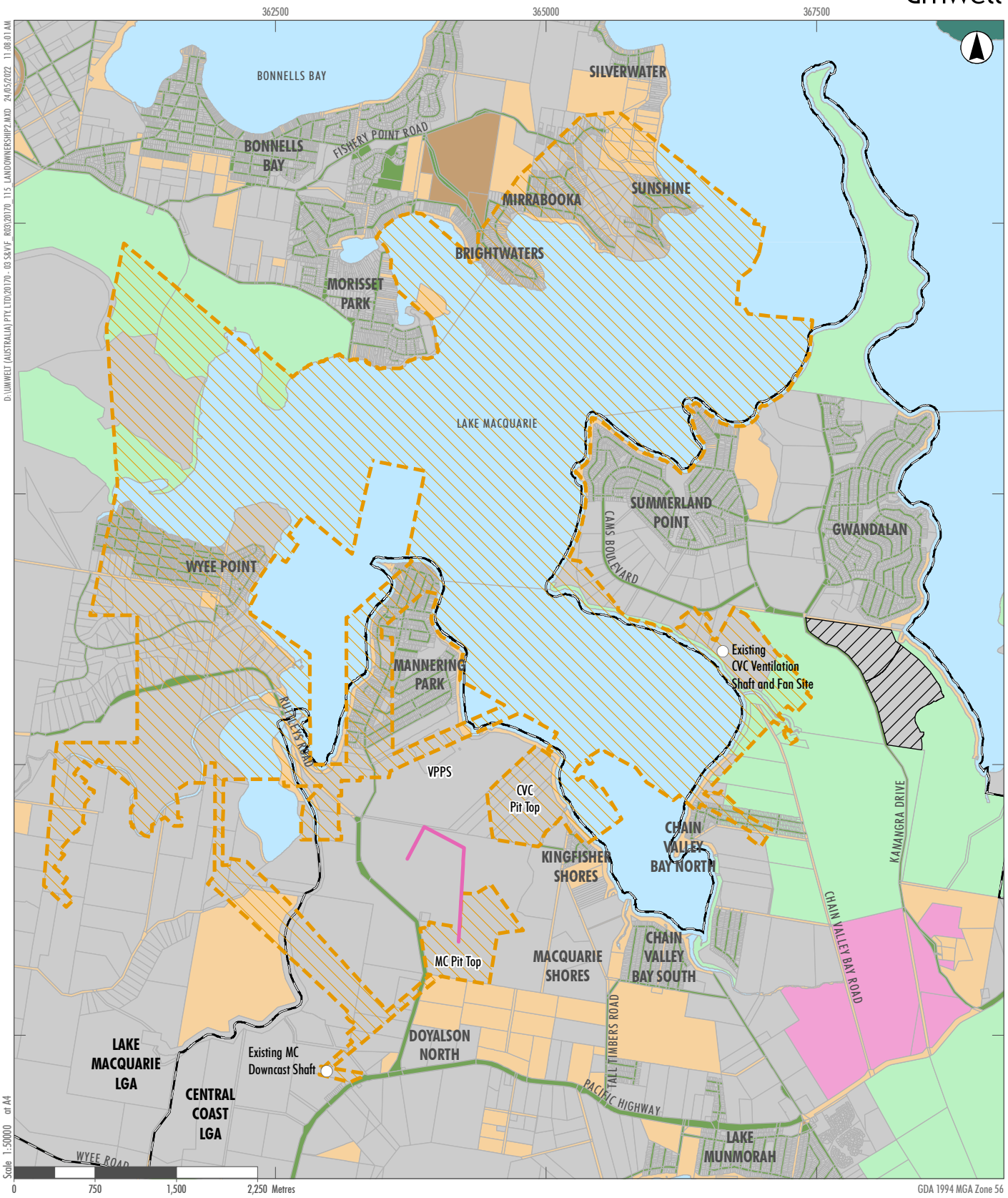
Legend

- Project Area
- Mangrove
- Saltmarsh
- Seagrass - Halophila
- Seagrass - Zostera
- Seagrass - Zostera/Halophila
- Angophora bakeri/ Eucalyptus parramattensis/ Persoonia oblongata heathy woodland of the Howes Valley area
- Angophora costata open forest on coastal lowlands of the Central Coast
- Angophora costata/ Corymbia gummifera/ Eucalyptus capitellata/ Banksia spinulosa heathy open forest of coastal lowlands
- Angophora costata/ Corymbia gummifera/ Eucalyptus haemastoma grass/ shrub woodland on lowlands of the Central Coast
- Angophora costata/ Eucalyptus resinifera/ Eucalyptus robusta/ Melaleuca sieberi heathy swamp woodland of coastal lowlands
- Angophora costata/ Eucalyptus robusta/ Eucalyptus resinifera/ Livistona australis open forest on lowlands of the Central Coast
- Avicennia marina low closed forest
- Banksia ericifolia/ Gleichenia dicarpa wet heath on sandstone ranges of the lower Central Coast
- Banksia oblongifolia/ Hakea teretifolia/ Leptocarpus tenax/ Lepyrodia scariosa wet heath on sandstone ranges of the Central Coast
- Casuarina glauca/ Juncus kraussii/ Baumea juncea swamp forest on coastal lowlands of the Central Coast and Lower North Coast
- Casuarina glauca/ Meleleuca styphelioides/ Carex appressa swamp forest on coastal lowlands of the Central Coast and Lower North Coast
- Corymbia maculata/ Eucalyptus umbra/ Eucalyptus punctata grass/ shrub open forest on Coastal Lowlands of the Central Coast
- Elaeocharis sphacelata freshwater wetland
- Eucalyptus haemastoma/ Corymbia gummifera/ Angophora inopina heathy woodland on lowlands of the Central Coast
- Eucalyptus paniculata/ Eucalyptus umbra/ Eucalyptus tereticornis shrubby open forest on Coastal Lowlands of the Central Coast
- Melaleuca biconvexa/ Eucalyptus robusta/ Livistona australis swamp forest of the Central Coast
- Melaleuca ericifolia/ Baumea juncea swamp shrubland on coastal lowlands of the Central Coast and Lower North Coast
- Melaleuca linariifolia/ Carex appressa shrubland of the Sydney Basin
- Melaleuca nodosa/ Banksia oblongifolia heath on coastal headlands of Central Coast
- Melaleuca quinquenervia/ Casuarina glauca/ Gahnia clarkei swamp forest on coastal lowlands of the Central Coast and Lower North Coast
- Melaleuca uncinata/ Allocasuarina gymnanthera heathy woodland on sandstone outcrops of the Sydney Basin
- Saltmarsh/ Estuarine Complex

FIGURE 2.5

Vegetation Communities and Sea Grass Beds

Image Source: Nearmap (May 2019) Data source: Delta Coal (2021), NSW Department of Primary Industries, NSW Government (2012)



Legend

- Project Area
- Existing VPPS Overland Conveyor
- Local Government Area Boundary (LGA)
- Crangan Bay Development Area

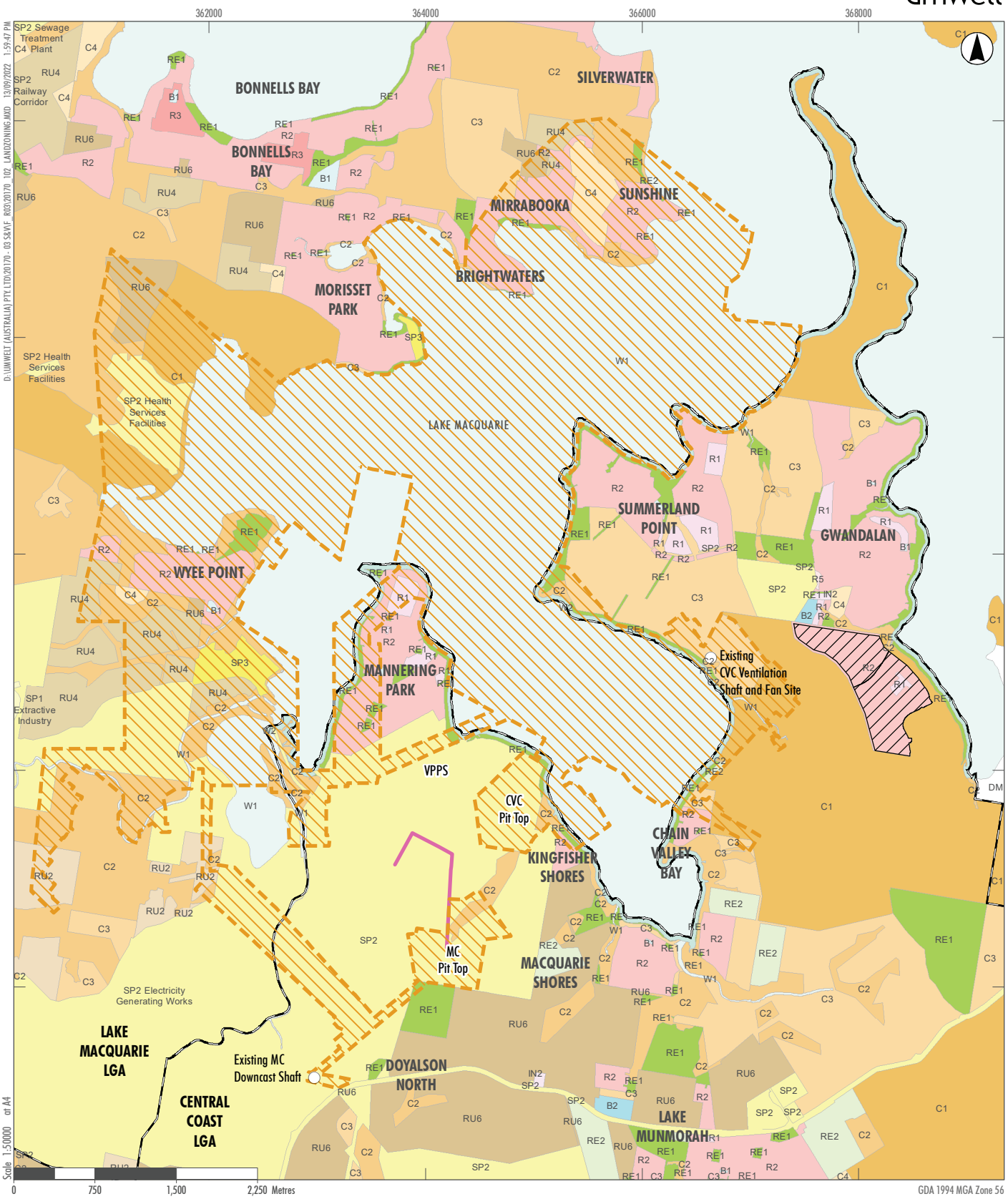
Land Ownership

- Crown
- Water
- Darkinjung Local Aboriginal Land Council
- Private
- Local Government Authority
- NSW Government
- Nature Reserve
- State Conservation Area

FIGURE 2.6

Land Ownership

Data source: Delta Coal (2021), NSW DFSI (2020)



Legend

- Project Area
- Existing VPPS Overland Conveyor
- Local Government Area Boundary (LGA)
- Crangan Bay Development Area

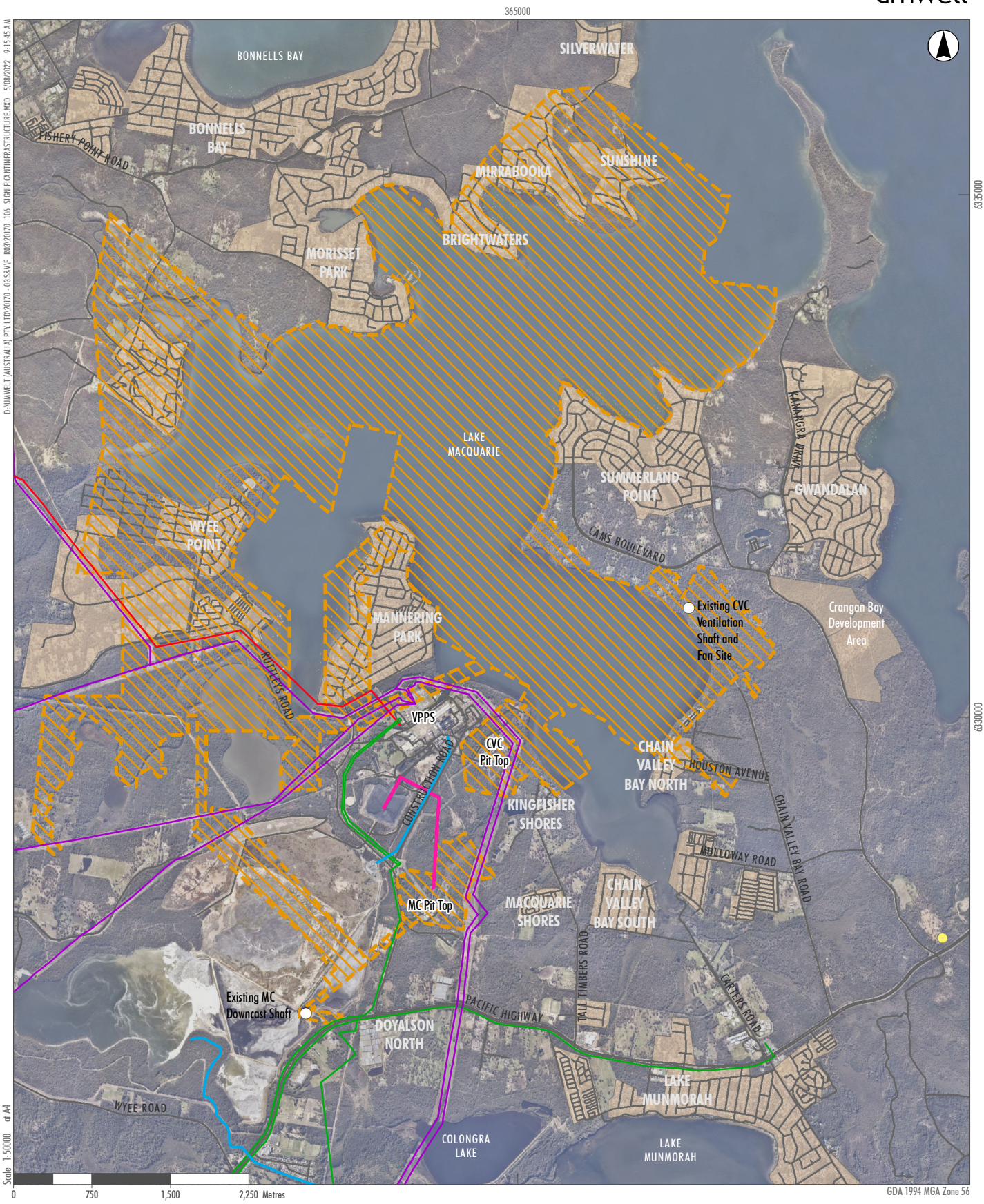
Land Zoning

- C1 National Parks and Nature Reserves
- C2 Environmental Conservation
- C3 Environmental Management
- C4 Environmental Living
- B1 Neighbourhood Centre
- B2 Local Centre
- IN2 Light Industrial
- R1 General Residential
- R2 Low Density Residential
- R3 Medium Density Residential
- R5 Large Lot Residential
- RE1 Public Recreation
- RE2 Private Recreation
- RU2 Rural Landscape
- RU4 Primary Production Small Lots
- RU6 Transition
- SP1 Special Activities
- SP2 Infrastructure
- SP3 Tourist
- W1 Natural Waterways
- W2 Recreational Waterways
- DM Deferred Matter

FIGURE 2.7

Land Zoning

Data source: Delta Coal (2021), State Government of NSW and Department of Planning, Industry and Environment (2022)



Legend

- Project Area
- Existing VPPS Overland Conveyor
- 132kV Powerline
- 330kV Powerline
- 33kV Powerline
- Pipeline
- Water Tank
- Urban Area

FIGURE 2.8

Roads and other Significant Infrastructure

Image Source: Nearmap (May 2019) Data source: Delta Coal

2.2 Approved CVC and MC Operations

Delta Coal holds various mining leases under which operations at CVC and MC are conducted. The leases relevant to each operation are discussed in **Section 2.2.4.3**. A key objective of the Project is to retain all mining within existing mining leases.

The coal seams and overburden layers within the Project Area are well known due to experience gained in mining this geology at the CVC and MC areas, and through an extensive exploration program. The target seams for mining in the areas within and surrounding the Project Area are, from shallowest to deepest, the Wallarah Seam, Great Northern Seam and Fassifern Seam.

To date, mining at CVC has occurred within the Wallarah, Great Northern and Fassifern Seams with mining at MC limited to the Great Northern and Fassifern Seams. Current approved mining activities at CVC occur within the Fassifern Seam only. Active mining is not currently occurring within the approved MC mining area, however mining is approved in both the Fassifern and Great Northern seams. The Project Area spans approximately 3,030 ha with approved mining operations occurring beneath both land areas and Lake Macquarie.

The following sections provide an overview of the historical mining of the area and currently approved operations.

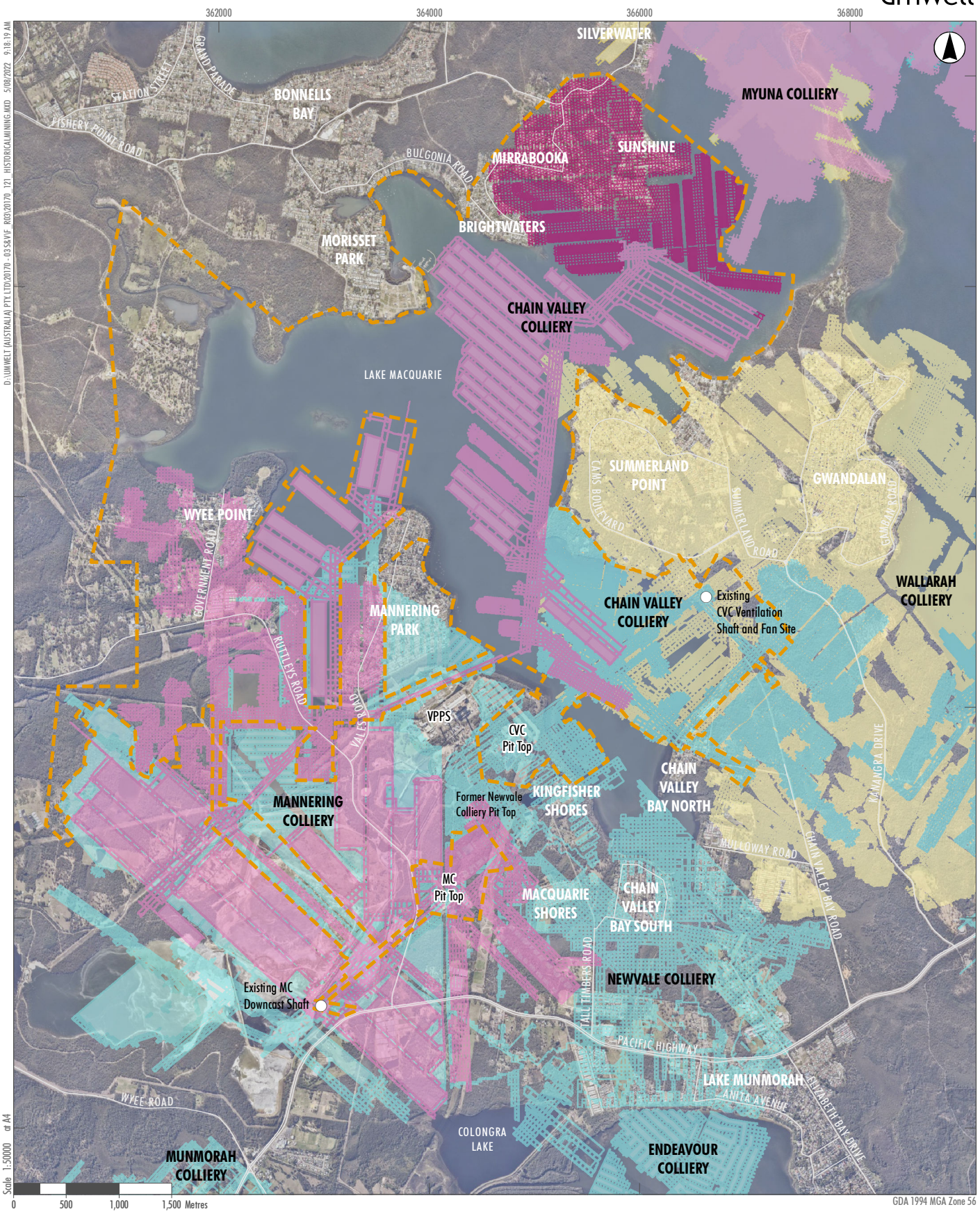
2.2.1 Historical Mining

The local areas within the Lake Macquarie and Central Coast LGAs have a long history of coal mining which has been historically linked to the several power stations located in the Lake Macquarie and Central Coast areas. The area within and surrounding the Project Area has been subject to extensive historical underground mining in the Wallarah, Great Northern and Fassifern Seams. Other mining operations in the general area include Myuna Colliery (still operating), Mandalong Mine (still operating), Wallarah Colliery, Moonee Colliery and Newvale Colliery (closed). The Newvale Colliery pit top was located between the CVC and MC pit top areas and has since been decommissioned and the site rehabilitated.

The approved CVC and MC mining areas include mining below the suburbs of Mannering Park and Wyee to the north-west and parts of Morisset Park, Brightwaters, Sunshine, Mirrabooka and Silverwater to the north. Parts of the suburbs of Chain Valley Bay to the east and Summerland Point and Gwandalan to the north-east have previously been undermined by operations at CVC and Newvale Colliery.

CVC's ventilation fan site is located at Summerland Point, north-east of the CVC Pit Top area to the north of Chain Valley Bay North.

In 1987, Chain Valley Bay South and Chain Valley Bay North (Teragalin Drive and Foreshore) were impacted by unplanned subsidence associated with mining that involved pillar extraction within the Great Northern Seam at Newvale Colliery. Subsidence impacts to surface infrastructure and natural features were significant. **Figure 2.9** shows the location of currently approved mining areas and historical mining in and around the Project area, including mining areas associated with Newvale Colliery.



Legend

- Project Area
- Existing Wallarah Seam Workings
- Existing Great Northern Seam Workings
- Existing Fassifern Seam Workings
- Proposed Fassifern Seam Workings (CVC Consent)

FIGURE 2.9

Historical Mining

Image Source: Nearmap (Sep 2020) Data source: DFSI (2020), Delta Coal (2020)

2.2.2 Chain Valley Colliery

Mining operations at CVC commenced in 1962 and have used a combination of bord and pillar and miniwall mining methods (EMM, 2013). Secondary extraction was undertaken using pillar extraction methods only up until 2011 when secondary extraction at CVC began using the miniwall mining method. Miniwall mining at CVC has been limited to areas below Lake Macquarie and has not occurred under land areas. All secondary extraction mining is now limited to areas below Lake Macquarie. Mining is currently approved to 31 December 2027.

The CVC Consent was granted on 23 December 2013, permitting production of up to 1.5 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal, of which up to 660,000 tonnes per annum (tpa) can be delivered to Newcastle Port for export, and an additional 180,000 tpa can be supplied to domestic customers other than VPPS. The Consent has been modified four times since grant, with the most recent modification approved in August 2021. A summary of the modification history of the CVC Consent is provided in **Table 2.3**.

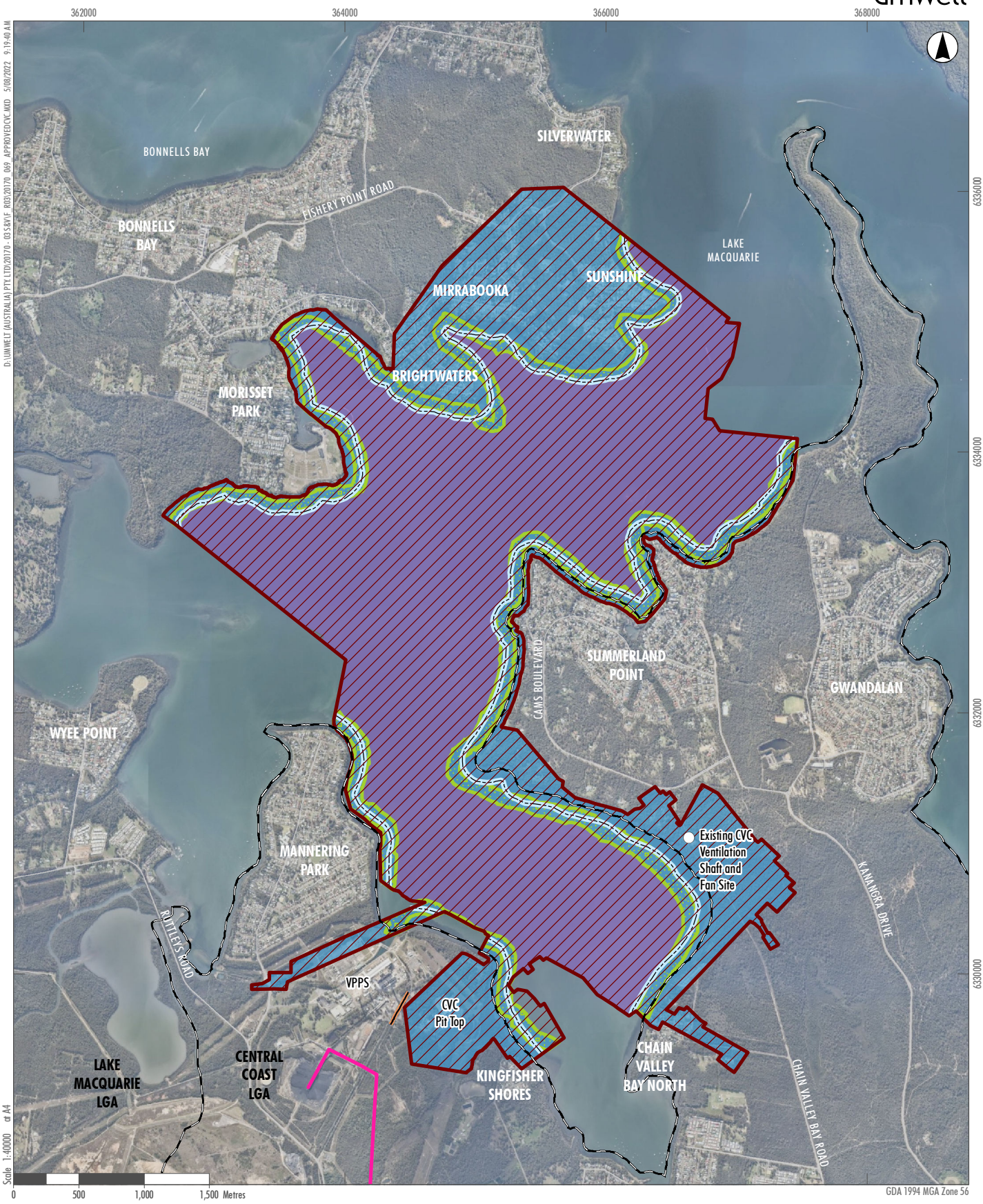
Key Operational Aspects

Key operational aspects at CVC are provided in **Table 2.1**. Key features of the approved operations are shown on **Figure 2.10**.

Table 2.1 Key Approved Operational Aspects of Chain Valley Colliery

Project Component	CVC Approved Operations (if CVC Mod 4 approved)
Project Area	Refer to **Figure 2.10.**
Mine Life	Mining operations are approved until 31 December 2027.
Coal Extraction	Extraction of up to 2.1 Mtpa of ROM coal.
Annual Surface Handling	Up to 1.5 Mtpa ROM coal (all production at CVC beyond the 1.5 Mtpa ROM coal surface cap to be sent to VPPS via MC).
Resource	Fassifern Seam.
Mining Method	Continuous miner (bord and pillar and pillar extraction) and miniwall mining methods. Pillar extraction and miniwall mining only under lake and subject to 20 millimetres (mm) vertical subsidence limits on seagrass beds and foreshore areas.
Underground Mining Areas	Refer to **Figure 2.10**, consistent with Appendix 2 of CVC consent.
Subsidence Limits	Zone A – Maximum of 20 mm. (High Water Mark Subsidence Barrier (HWMSB) and Seagrass Protection Barrier (SPB)). Zone B - Maximum 780 mm. Chain Valley Bay Mining Area (subject to multi-seam feasibility investigation and approval prior to mining).
Mine Infrastructure	Personnel-and-material drifts, ROM coal conveyor drift to MC. Upcast and downcast ventilation shaft and fans. Coal handling facilities for breaking, crushing, sizing and storing product coal. Administration, bathhouse, workshop facilities, surface electrical sub-station, cable belt switch room and electrical haulage rooms, storage sheds, 80,000 and 132,000 litre water tanks, settling and diffusing ponds, coal bins and stockpile area, various other items such as compressors, a weighbridge, water storage and a diesel storage tank. Water management infrastructure. CVC surface infrastructure is shown on **Figure 2.11**.

Project Component	CVC Approved Operations (if CVC Mod 4 approved)
Coal Processing	Screening and ROM coal crushing, no coal rejects are generated.
Product Coal Handling and Transportation	Product coal from CVC Pit Top to VPPS via truck on private roads only (up to 1.5 Mtpa). Transport product coal from approved CVC mining area to MC via the existing underground linkage up 2.1 Mtpa, for subsequent delivery to VPPS via conveyor. A maximum of 660,000 tpa of product coal from CVC Pit Top on public roads to the Port of Newcastle for export. A maximum of 180,000 tpa of product coal from CVC Pit Top on public roads to domestic customers (other than VPPS).
Hours of Operation	24 hours per day, 7 days per week.
Site Access	Existing road access via Construction Road off Ruttleys Road.
Rehabilitation	Surface infrastructure will be decommissioned, and the site rehabilitated following mine closure.
Workforce (Operations)	Up to approximately 330 FTE personnel (employees and contractors) at CVC within an overall CVC/MC workforce of approximately 390.
Water Management	The water management system at CVC Pit Top includes the diversion of clean water runoff around upslope areas of the site, the collection of water from disturbed areas and the discharge of water to Lake Macquarie via Swindles Creek. Further detail on the water management system is provided in **Section 6.5.2.1**.
Water Discharge Requirements	Licensed daily discharge of up to 12.161 ML/day (EPL).
Water Supply and Demand	Potable water utilised for surface facilities and underground operations (160 ML per annum) supplied by Central Coast Council from potable water supply mains.
Exploration	Exploration activities subject to Exploration Activities and Minor Surface Infrastructure Management Plan.



Legend

- CVC Consent Boundary (SSD-5465)
- Existing VPPS Overland Conveyor
- Seagrass Protection Barrier
- High Water Mark Subsidence Barrier
- Zone A - Maximum 20 mm subsidence
- Zone B - Maximum 780 mm susbsidence
- Local Government Area Boundary (LGA)
- Construction Road

FIGURE 2.10

Approved CVC Operations

Image Source: Nearmap (May 2019) Data source: Delta Coal (2021)

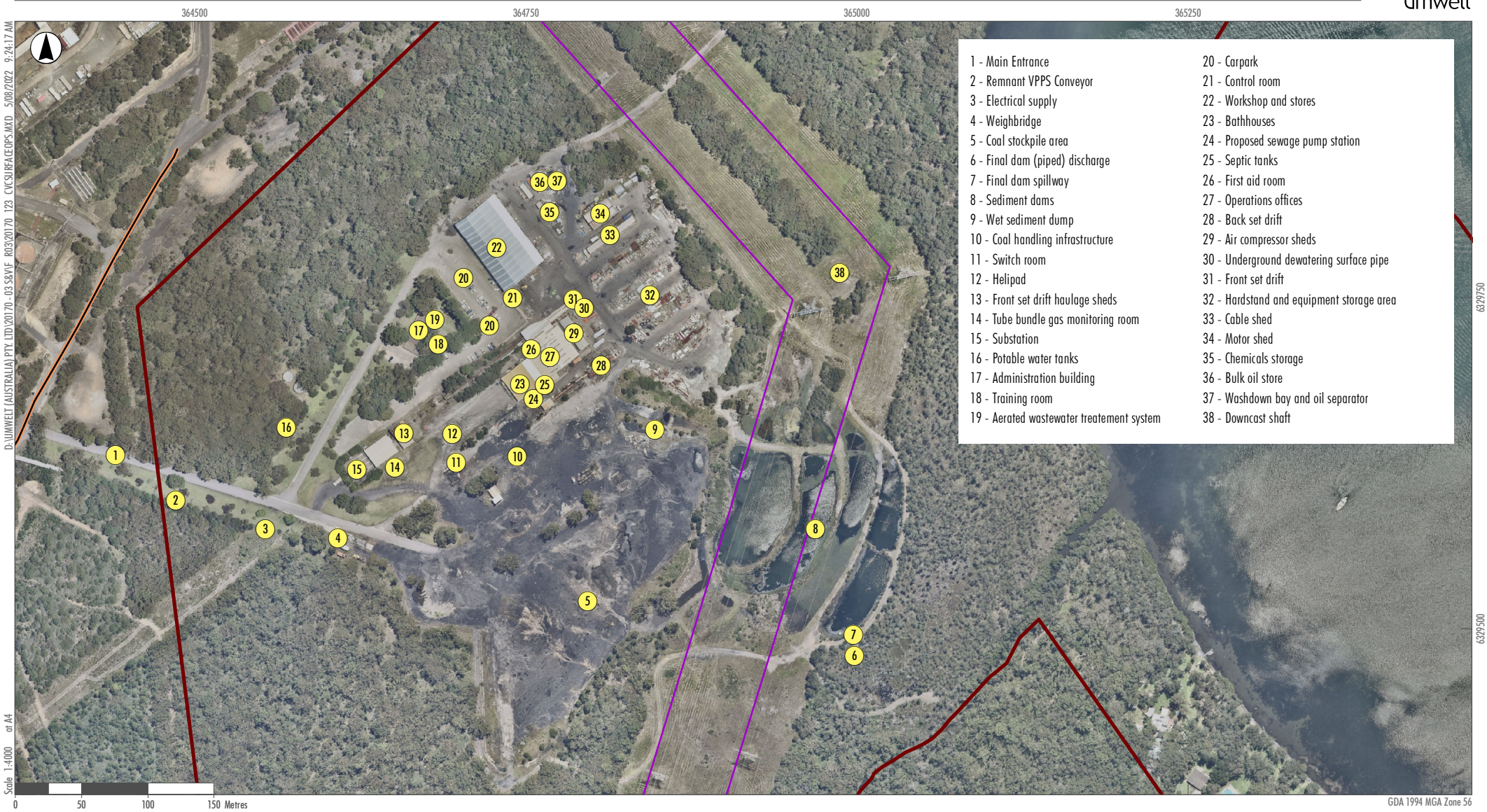


FIGURE 2.11

CVC Surface Operations

Image Source: Nearmap (Dec 2020) Data source: Delta Coal (2021)

2.2.3 Mannering Colliery

MC is an underground coal mine which also began production in the early 1960s in conjunction with the adjacent VPPS. The MC Pit Top is located to the south of the CVC Pit Top (refer to **Figure 2.12**). Extensive mining (first workings and secondary extraction) has taken place in both the Great Northern and Fassifern seams however there is no current extraction within the approved MC mining area. MC has historically only supplied coal to the VPPS.

MC operates pursuant to Project Approval MP 06_0311 granted on 12 March 2008 (MC Project Approval). The MC Project Approval has been modified on five occasions since the original grant. MC is currently approved to carry out mining operations to 31 December 2027.

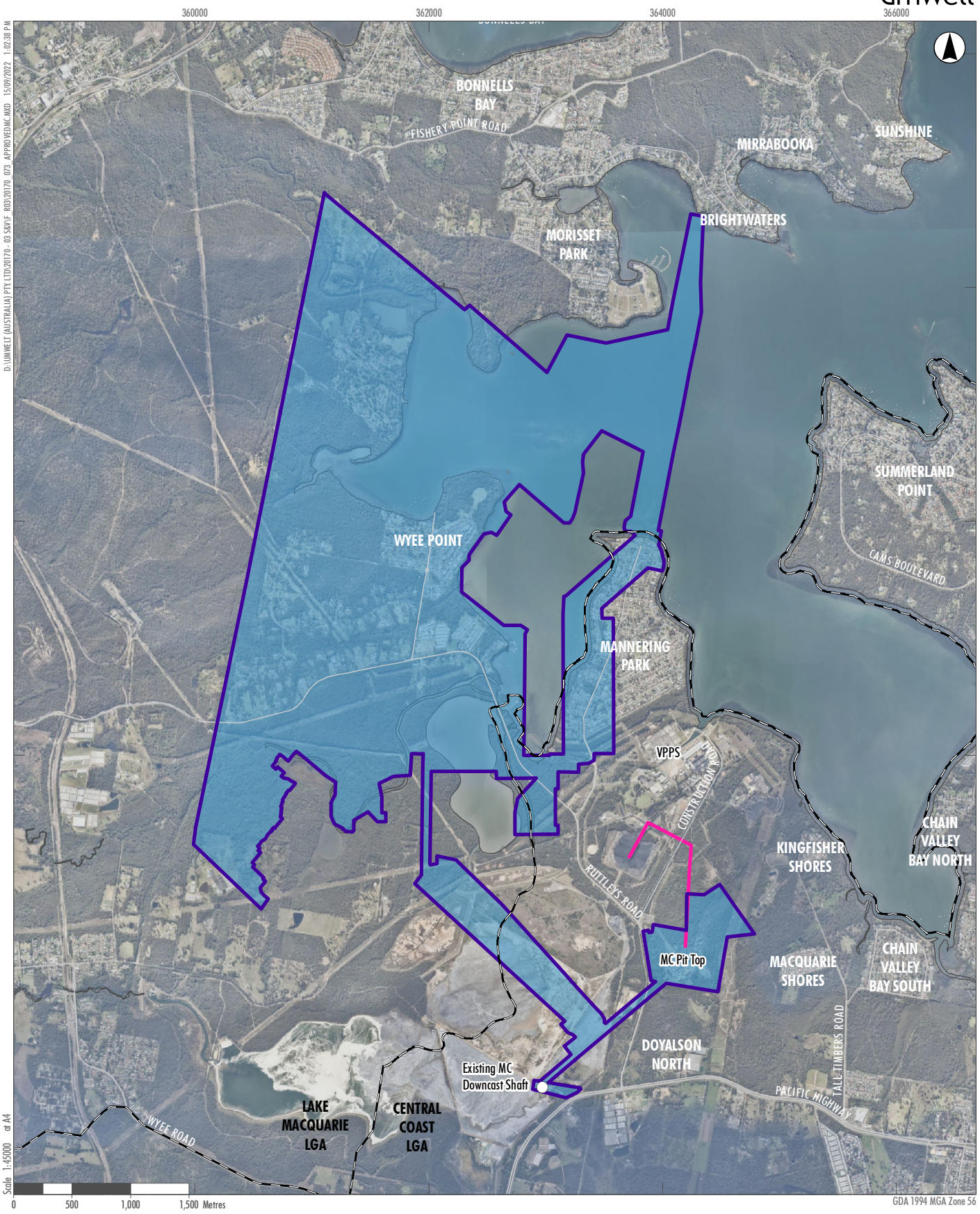
2.2.3.1 Key Operational Aspects

Key operational aspects at CVC are provided in **Table 2.2**. Key features of the existing approved development are shown on **Figure 2.12**.

Table 2.2 Key Operational Aspects of Existing Approved Developments at Mannering Colliery

Project Component	MC Approved Operations
Project Area	Refer to **Figure 2.12.**
Mine Life	Mining operations are approved until 31 December 2027.
Coal Extraction	Extraction of up to 1.1 Mtpa of ROM coal.
Annual Surface Handling	Up to 2.1 Mtpa ROM coal.
Resource	Fassifern and Great Northern seams.
Mining Method	First workings only, including use of a herringbone bord and pillar configuration.
Underground Mining Areas	Refer to **Figure 2.12**, consistent with Appendix 2 of MC Project Approval.
Subsidence Limits	Maximum of 20 mm subsidence.
Mine Infrastructure	Underground coal crushing facility. Upcast and downcast ventilation shaft and fans. Coal handling facilities for breaking, crushing, sizing and storing product coal. Overland conveyor (from MC Pit Top to VPPS). Underground link road to CVC. Administration and workshop facilities. Water management infrastructure. MC surface operations are shown on **Figure 2.13.**
Coal Processing	Screening and ROM coal crushing, no coal rejects are generated. Surface Rotary Breaker decommissioned.
Product Coal Handling and Transportation	Up to 2.1 Mtpa ROM coal via overland conveyor to VPPS.
Water Management	The water management system at MC Pit Top includes the diversion of clean water runoff around the site, the collection of water from disturbed areas, the collection of underground water and the discharge of water to the Lake Macquarie via Swindles Creek. Further detail is provided in **Section 6.5.2.1**.
Water Discharge Requirements	MC has a current licensed daily water discharge of up to 4 ML/day.

Project Component	MC Approved Operations
Water Supply and Demand	Great Southern Energy holds a WAL number 40461 for a share component of 450 ML, issued under the NSW *Water Management Act 2000* (WM Act), under which conditions of water access entitlements at MC is undertaken.
Hours of Operation	24 hours per day, 7 days per week.
Site Access	Existing road access directly from Ruttleys Road.
Rehabilitation	Surface infrastructure will be decommissioned, and the site rehabilitated following mine closure.
Workforce (Operations)	Up to approximately 170 FTE personnel (employees and contractors) within an overall cap of 390 FTE personnel across two operations.
Workforce (Construction)	N/A.
Exploration	Exploration activities subject to Exploration Activities and Minor Surface Infrastructure Management Plan.



Legend

- MC Project Approval Boundary (06_0311)
- Approved Mining Area
- Existing VPPS Overland Conveyor
- Local Government Area Boundary (LGA)

FIGURE 2.12

Approved MC Operations

Image Source: Nearmap (May 2019) Data source: Delta Coal (2021)

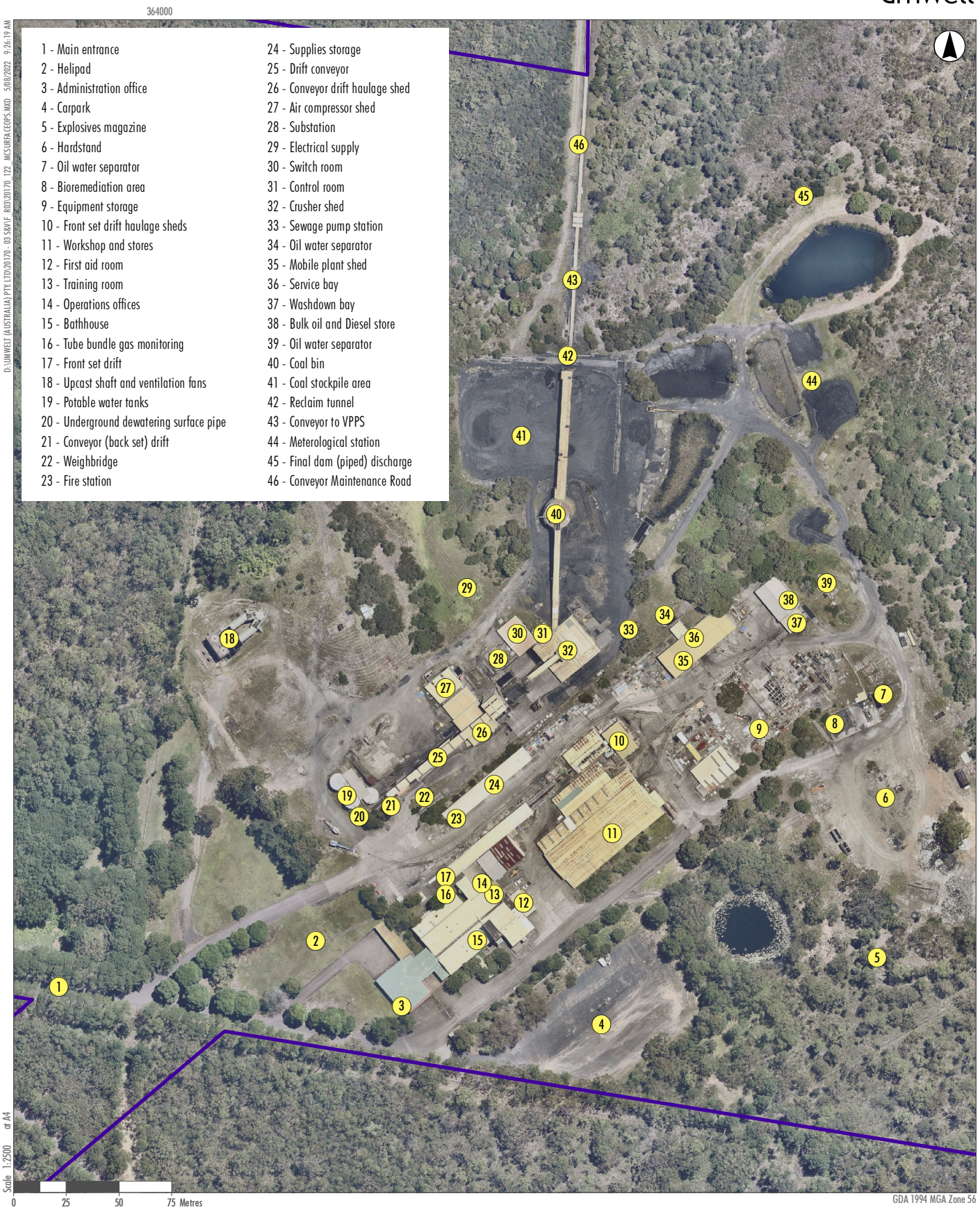


FIGURE 2.13

MC Surface Operations

Image Source: Nearmap (Dec 2020) Data source: Delta Coal (2021)

2.2.4 Existing CVC and MC Approvals

2.2.4.1 Planning Approvals

The status of development consents for the operations at CVC and MC are summarised in **Table 2.3** and **Table 2.4**, respectively.

Table 2.3 CVC Consent and Subsequent Modifications

Reference	Title	Details	Approval Granted	Expiry
SSD-5465	Development Consent	Continuation of mining at CVC.	23/12/2013	31/12/2027
SSD-5465 MOD 1	CVC Modification 1	Construction of an underground linkage between CVC and MC within the Fassifern Seam workings.	27/11/2014	31/12/2027
SSD-5465 MOD 2	CVC Modification 2	Increase coal production from 1.5 to 2.1 Mtpa and reorient miniwall panels in the northern mining area.	16/12/2015	31/12/2027
SSD-5465 MOD 3	CVC Modification 3	Increase transport of coal from CVC to Mannering Colliery via the existing underground linkage from 1.3 to 2.1 Mtpa and allow flexibility to use either miniwall or bord and pillar mining methods throughout the approved mining area.	26/6/2020	31/12/2027
SSD-5465 MOD 4	CVC Modification 4	Extend CVC's mining operations in the Fassifern Seam into an area of the recently purchased Myuna lease holding, and increase the number of personnel reporting to the CVC Pit Top by 110 FTE employees (from approximately 220 to approximately 330 FTE personnel).	5/8/2021*	31/12/2027

**Referred to as July 2021 in the Consolidated Consent document.*

Table 2.4 MC Approval and Subsequent Modifications

Reference	Title	Details	Approval Granted	Expiry
MP 06_0311	Project Approval	Continuation of mining at MC.	12/3/2008	31/3/2018
MP 06_0311 MOD 1	MC Modification 1	Extend underground mining operations within the Fassifern Seam and increase employment to 170 FTE employees.	25/10/2012	31/3/2018
MP 06_0311 MOD 2	MC Modification 2	Development and use of up to four first working headings in the Fassifern Seam to connect MC and CVC. Installation and use of an underground conveyor and ancillary services to enable ROM coal to be transported between CVC and MC. Utilisation of MC existing infrastructure to transport coal between CVC underground to VPPS.	27/11/2014	31/3/2018
MP 06_0311 MOD 3	MC Modification 3	Extension of the life of mine by 4 years (to 30 June 2022). Minor vegetation clearing adjacent to main infrastructure at MC to enable the establishment of Asset Protection Zones for bushfire management. Utilisation of existing infrastructure to handle and transport directly to VPPS via overland conveyor.	16/12/2015	30/6/2020
MP 06_0311 MOD 4	MC Modification 4	Administrative modification to clarify the use of the rotary breaker at MC as part of ongoing operations.	18/8/2016	30/6/2022
MP 06_0311 MOD 5	MC Modification 5	Increase the handling and transport of ROM coal up to the approved extraction rate at CVC (2.1 Mtpa), to be transported directly to VPPS via overland conveyor for domestic power generation. Extension to the life of mine to 31 December 2027.	26/6/2020	31/12/2027

2.2.4.2 Environment Protection Licences

Both CVC and MC operate under separate environment protection licences (EPLs) issued pursuant to the NSW *Protection of the Environment Operations Act 1997* (POEO Act), detailed in **Table 2.5** below.

Table 2.5 Environment Protection Licences

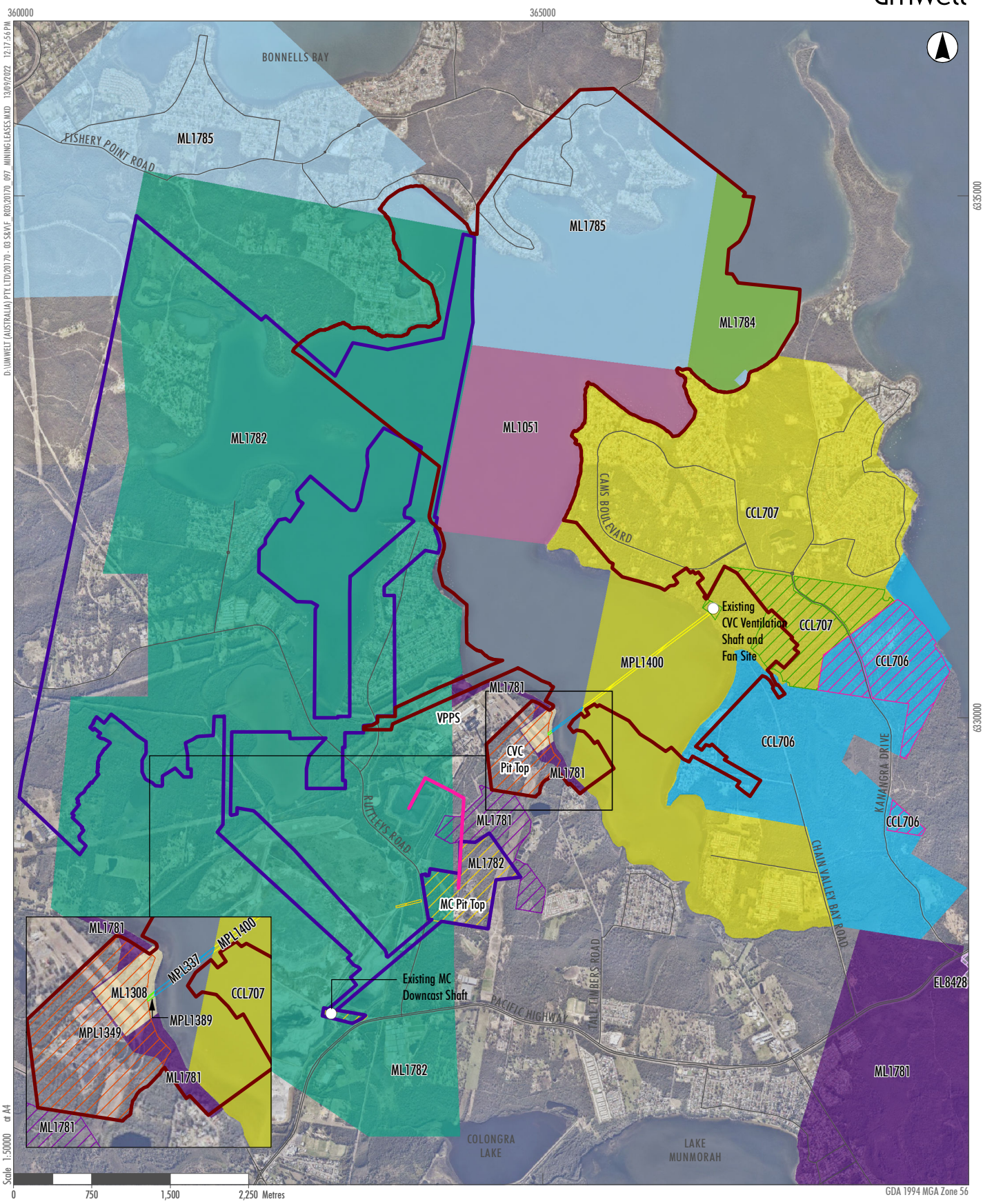
Operation	Environment Protection Licence	Grant/Anniversary Date
CVC	Environment Protection Licence 1770 (EPL 1770)	10 November 2000
MC	Environment Protection Licence 191 (EPL 191)	6 April 2000

2.2.4.3 Mining Authorities

Delta Coal holds various mining leases under which operations at CVC and MC are conducted. **Table 2.6** details the mining leases and exploration licences (collectively referred to as authorities) relevant to each operation. The mining titles are shown on **Figure 2.14**.

Table 2.6 CVC and MC Mining Authorities

Current Mining Tenement	Holder	Grant Date / Renewal Date	Lease Expiry Date
CCL 706	Great Southern Energy	24 January 1990	29 April 2022 (renewal requested)
CCL 707	Great Southern Energy	3 July 1989	30 Dec 2023
EL8428	Great Southern Energy	7 Dec 2015	7 Dec 2025
A383	Great Southern Energy	31 May 2021	21 September 2025
ML 1051	Great Southern Energy	7 July 1941	7 July 2022 (renewal requested)
ML 1052	Great Southern Energy	7 July 1941	7 July 2022 (renewal requested)
ML 1308	Great Southern Energy	4 May 1965	4 May 2022 (renewal requested)
ML 1781	Great Southern Energy	22 April 2022	3 July 2031
ML 1782	Great Southern Energy	24 January 2022	29 July 2026
ML 1783	Great Southern Energy	22 April 2022	28 June 2028
ML 1784	Great Southern Energy	6 July 2021	7 March 2033
ML 1785	Great Southern Energy	28 April 2021	13 Oct 2022
MPL 337	Great Southern Energy	30 January 2016	30 January 2037
MPL 1349	Great Southern Energy	5 Oct 1967	5 Oct 2028
MPL 1389	Great Southern Energy	14 May 1970	14 May 2031
MPL 1400	Great Southern Energy	6 Nov 1970	6 Nov 2031



Legend

- CVC Consent Boundary (SSD-5465)
- MC Project Approval Boundary (06_0311)
- Existing VPPS Overland Conveyor

Lease Areas

- CCL706, Surface Lease
- CCL707, Surface Lease
- ML1781, Surface Lease
- ML1782, Surface Lease
- MPL1349, Surface Lease
- MPL1389, Surface Lease
- MPL1400, Surface Lease
- MPL337, Surface Lease
- CCL706, Underground
- CCL707, Underground
- EL8428, Underground
- ML1781, Underground
- ML1782, Underground
- ML1051, Lease
- ML1308, Lease
- ML1783, Lease
- ML1784, Lease
- ML1785, Lease

FIGURE 2.14

Existing Mining Leases & Exploration Licences

Image Source: Nearmap (May 2019) Data source: Delta Coal

2.2.4.4 Environmental Management

Operations at CVC and MC are currently undertaken in accordance with separate environmental management systems (EMSs) which incorporate a range of environmental management and monitoring plans for each site covering specific issues. The management and monitoring plans were developed to address key environmental issues relevant to the operations and have been prepared to meet the requirements of the relevant development consent, project approval and EPL conditions. The environmental management plans and monitoring programs for CVC and MC are available on the Delta Coal website (https://www.deltacoal.com.au/).

CVC management and monitoring plans include:

- Traffic Management Plan
- Public Safety Management Plan
- Built Features Management Plan
- Rehabilitation Management Plan
- Biodiversity Management Plan
- Benthic Communities Management Plan
- Seagrass Management Plan
- Subsidence Monitoring Program
- Water Management Plan (surface water and groundwater).

Miniwall and other secondary extraction mining operations are also undertaken in accordance with extraction plans which cover specific panels and secondary extraction areas under Lake Macquarie.

MC management and monitoring plans include:

- Land Management Plan
- Rehabilitation Management Plan
- Water Management Plan (surface water and groundwater).

Delta Coal has drafted a single, combined EMS applicable to both the CVC and MC operations, which has been approved by DPE. The following Delta Coal management plans which cover both operations have also been approved and implemented:

- Environmental Monitoring Program
- Noise Management Plan
- Air Quality and Greenhouse Gas Management Plan
- Heritage Management Plan (which includes the management of both Aboriginal cultural heritage and non-indigenous heritage).

As part of its EMS, Delta Coal conducts environmental monitoring and auditing on a regular basis to gauge performance, monitor compliance with regulatory requirements, and to minimise impacts on the surrounding community and the environment. Routine review of environmental performance is provided in both the CVC and MC Annual Reviews (prepared for each consent) and Annual Returns (prepared for each EPL).

In addition, the conditions of the CVC Development Consent and MC Project Approval require Delta Coal to commission an independent environmental audit by the end of February 2022 (and every three years after) The actions and recommendations resulting from this audit have been reviewed and approved by DPE. The results of the independent audits will be made available following completion in 2022.

The Annual Reviews for the operations are available to the public via the Delta Coal website. The plans are reviewed and updated regularly in response to the Annual Review recommendations, environmental monitoring, community concern and other company requirements.

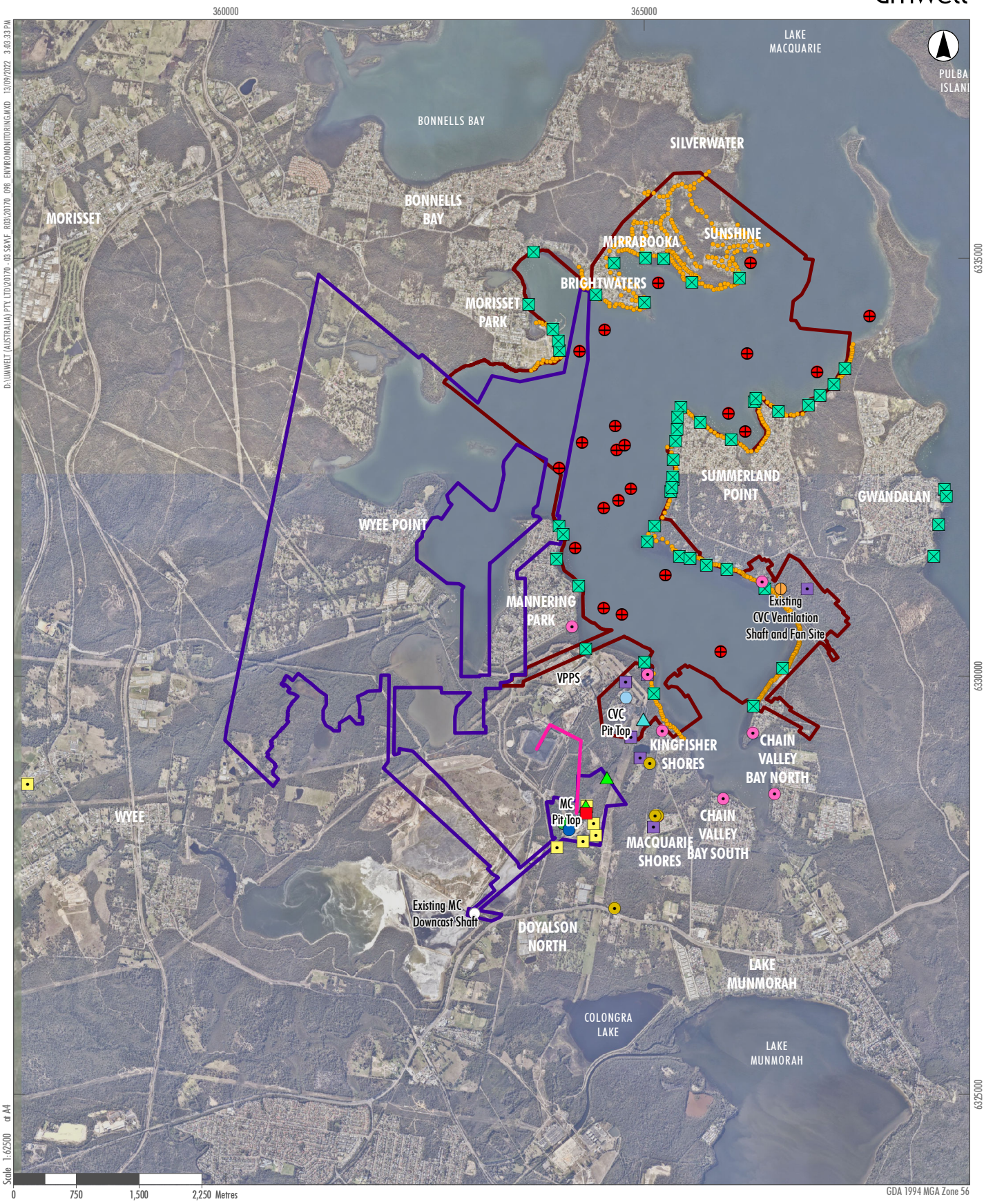
Table 2.7 and **Table 2.8** provide a summary of the existing environmental monitoring network at CVC and MC. The location of key monitoring points is shown in **Figure 2.15**.

Table 2.7 CVC Current Environmental Monitoring Network Overview

Environmental Aspect	Monitoring Scope
Noise	Attended quarterly compliance monitoring at nine representative locations surrounding CVC.
Air Quality	Continuous monitoring of depositional dust at six locations using dust deposition gauges, and particulate matter with a diameter of 2.5 micrometres or less ($PM_{2.5}$) at one location and particulate matter with a diameter of 10 micrometres or less (PM_{10}) at one location using a tapered element oscillating microbalance (TEOM) instrument. Greenhouse gas monitoring from the ventilation shaft.
Benthic Communities	Ongoing seasonal monitoring of benthic species in control and impact sites by conducting species counts, sediment analysis and water quality profiles.
Seagrass	Monitoring of species in control and impact sites by conducting species counts, density, subsidence monitoring and water quality analysis.
Surface Water	Routine surface water quality and volume monitoring undertaken at CVC.
Groundwater	Routine monitoring of groundwater flow discharged from underground workings undertaken at CVC.
Meteorological	Monitoring of conditions undertaken at the meteorological monitoring station at the adjacent MC.
Subsidence	Monitoring of the shoreline is via installation and monitoring of fixed reference marks surveyed at regular intervals. Subsidence monitoring of the lakebed is also proposed via bathymetric survey over the current mining area in order to validate the subsidence prediction model.
Biodiversity	Annual terrestrial monitoring program undertaken in areas surrounding pit top and ventilation shaft area to assess condition of Swamp Oak Forest, vegetation adjacent to infrastructure, and distribution of weeds and feral animals.
Road Haulage	Road haulage tonnages (CVC to public roads and CVC to private roads) monitored weekly.

Table 2.8 MC Current Environmental Monitoring Network Overview

Environmental Aspect	Monitoring Scope
Noise	One continuous directional noise logger and attended monthly compliance monitoring at three representative locations surrounding MC.
Air Quality	Continuous monitoring of depositional dust at five locations using dust deposition gauges, $PM_{2.5}$ at one location and PM_{10} at one location using a TEOM.
Surface Water	Routine surface water quality and volume monitoring undertaken at MC and downstream of MC.
Groundwater	Routine monitoring of groundwater discharged from underground workings undertaken at MC based on discharge from the licensed discharge point at MC.
Meteorological	Monitoring of conditions undertaken at one meteorological monitoring station at MC.



Legend

- CVC Consent Boundary (SSD-5465)
- MC Project Approval Boundary (06_0311)
- Existing VPPS Overland Conveyor
- Subsidence Monitoring Points

MC Monitoring

- Air Quality Monitoring
- Dewatering Point
- Greenhouse Gas Monitoring
- Noise Monitoring
- Meteorological Station
- Water Monitoring

CVC Monitoring

- Air Quality Monitoring
- Dewatering Point
- Greenhouse Gas Monitoring
- Noise Monitoring
- Water Monitoring
- Benthic Monitoring
- Seagrass Monitoring

FIGURE 2.15

Environmental Monitoring Networks

Image Source: Nearmap (May 2019) Data source: Delta Coal

2.3 Strategic and Regional Context

As identified by the NSW Government's 2020 *Strategic Statement on Coal Exploration and Mining in NSW* (NSW Strategic Statement) coal mining is an important industry for NSW, and will continue as such for the next few decades. Coal mining is a significant source of direct and indirect jobs in regional NSW and underpins many local economies.

The NSW Strategic Statement recognises that the use of thermal coal will decline in NSW over the coming decades as aging coal-fired infrastructure is replaced with other forms of energy generation, but also acknowledges the need to support existing industry investment by continuing to consider responsible applications to extend the life of current coal mines during the transition period. As an established operation with access to significant coal reserves beyond the current term of existing approvals, the Project fits within the plan of action proposed in the NSW Strategic Statement for supporting responsible coal production.

As an established underground operation, the proposed consolidation of mining at MC and CVC will also fit within the NSW Strategic Statement's plan for reducing the impact of mining on environmental and social outcomes, particularly in relation to its reduced air and water impacts in comparison to open cut coal mining operations.

The Project also meets the policy aims of *State Environmental Planning Policy (Resources and Energy) 2021* by demonstrating a continued ability to mine the State's resources in an environmentally and socially acceptable manner through the implementation of design features, operational controls and safeguards to minimise adverse effects on the surrounding environment (refer to **Section 6.0** and **Appendix 4**).

The key strategic regional plans that have relevance to the Project, and which have been considered in the environmental assessment are discussed below. In addition, there are a large number of impact-specific guidance documents and policies that have been considered as part of the environmental assessment of the Project, and these are identified and discussed in the relevant impact assessment sections within **Section 6.0**.

2.3.1.1 Central Coast Regional Plan 2036

The Central Coast Regional Plan 2036 is the NSW Government's strategic long term plan for guiding land use planning decisions for the Central Coast until l2036. The Regional Plan sets out four regionally focused goals for the region, being:

- A prosperous Central Coast with more jobs close to home.
- Protect the natural environment and manage the use of agricultural and resource lands.
- Well–connected communities and attractive lifestyles.
- A variety of housing choice to suit needs and lifestyles.

The Regional Plan aims to build a strong economy capable of generating jobs, providing greater housing choice, essential infrastructure, lively centres for shopping, entertainment and dining, and protecting the natural environment. In particular, the intent of the Regional Plan 2036 is to build a future of a healthy natural environment, a flourishing economy and well-connected communities and it outlines the actions, the timeframe and the accountabilities for achieving it.

The Project aligns to the following 'directions' in the Regional Plan:

- Direction 7 – Increase job containment in the region.
- Direction 8 – Recognise the cultural landscape of the Central Coast.
- Direction 10 – Secure the productivity and capacity of resource lands.
- Direction 12 – Protect and manage environmental values.

Directions 7 and 10 are relevant to the Project as they relate to the economic benefits of the Project through development of economic coal resources.

Directions 8 and 12 are addressed through the design of the Project to reduce subsidence and subsidence related impacts and the completion of detailed Aboriginal Cultural Heritage and Historic Heritage Assessments following relevant NSW Government policy, as outlined in **Section 6.7** and **Section 6.8**.

Direction 12 is further addressed through the range of management, mitigation and monitoring measures committed to for the Project as discussed throughout **Section 6.0** and as summarised in **Section 7.0**.

2.3.1.2 Greater Lake Munmorah Structure Plan

The Greater Lake Munmorah Structure Plan (the Structure Plan) was prepared for Central Coast Council as a result of an identified need to accommodate population growth in the north-east of the Central Coast LGA. The Structure Plan was adopted by Council on 3 May 2022.

The Structure Plan is guided by a longer-term vision for the area over the next 30 years, by facilitating growth within Lake Munmorah for the short, medium and long term – whilst still ensuring the orderly development of land. It sets a coherent framework for development, facilitating the future growth and prosperity of suburbs of Lake Munmorah, Doyalson North, Chain Valley Bay and a small area of Crangan Bay, and identifies:

- Appropriate development footprints for new residential and employment land, and any relevant staging requirements.
- Appropriate transport, environmental and open space networks to cater for expected population growth.

It recognises that land use recommendations in the study area will need to account for surface development restrictions and extraction potential of historic and future resource development operations in the adjacent resource areas.

2.4 Project Rationale and Alternatives

Delta Coal currently has approval to supply coal for both domestic and export markets with the majority of approved production at CVC and all of the approved production from MC transferred to VPPS. Due to proximity to VPPS and common ownership, all of the coal produced at CVC and MC is currently supplied to the VPPS. Coal resource from the Fassifern and Great Northern seams mined at CVC and MC is known to have a low sulphur content, making it a preferable supply for power generation.

Delta Coal is seeking to ensure the continuity of coal supply for the VPPS which will reduce reliance on external parties and supply chains. The Project would allow for the extension of the LOM for the combined CVC and MC operations for a further 2 years (end 2029) which will align with the current projected requirements of the VPPS.

Alternatives considered as part of the Project included the scale of the mining area, mining method and not undertaking the Project. An overview of these alternatives is provided below.

2.4.1 Option 1 – Scale of the Mining Area

Proposed mining within all existing Delta Coal mining leases was investigated during the early development of the Project. Proposed mining was investigated to the north-west of the existing CVC mining area (Fassifern Seam) and east and south-east of the existing CVC Mining Area (Great Northern Seam).

The extension of mining to the north-west outside of the approved mining areas has not formed part of the Project as further geological and environmental assessment studies are required and the timeframe for the completion of these studies does not align with the short-term production requirements for Delta Coal.

The extension of CVC workings to the east and south in the Great Northern Seam was investigated and the 'Eastern Mining Area' was initially pursued as part of the Consolidated Project. Mining into this area would have been accessed via existing CVC workings and would have involved mining under fewer residences and less infrastructure than would occur if mining were to progress to the north-west into unmined areas within the Delta Coal mining lease holdings. However, some of these areas have previously been undermined and is in general in much shallower areas. Mining into the previously proposed 'Eastern Mining Area' is no longer being pursued as the ability to access resources in the western and north-western area of the existing approved CVC and MC mining area, in areas that has not been undermined in any other seams, will provide sufficient resources to satisfy the likely demand for coal from CVC and MC to the end of 2029.

Delta Coal is continuing to investigate the potential extension of mining to the north, east and south-east of the Project mining areas should there be a need to continue supply to VPPS beyond the life of the resources within the Project Area. Any such extensions would be subject to a separate approval process.

2.4.2 Option 2 – Mining Method

No change is proposed to mining methods within the approved CVC and MC mining areas. Consistent with existing CVC and MC approvals, no secondary extraction will be undertaken under land areas within the Project Area. This commitment has been maintained to ensure consistency with the existing CVC consent limits on subsidence and to avoid any subsidence impacts to residential areas, surface infrastructure and potentially sensitive ecological environments.

Consistent with the current CVC Consent, the ability to undertake secondary extraction below Lake Macquarie would be maintained in areas where this would not result in more than 20 mm of vertical subsidence impacts to seagrasses, foreshore and land areas. The Project seeks to extend the area where secondary extraction can occur to parts of the approved MC mining areas below Lake Macquarie. This proposed change would be subject to the existing subsidence impact restrictions and performance measures which apply to mining in the CVC subsidence Zone B area including the commitment to negligible subsidence impacts on seagrasses and foreshore areas. This change increases the potential resource recovery in this currently approved mining area below the lake and provides a consistent approach to subsidence limits. As with existing approved operations, an Extraction Plan will be prepared for approval by the Planning prior to any secondary extraction proposed under Lake Macquarie.

2.4.2.1 Consolidation of Pit Top Facilities

Centralising pit top facilities to either CVC or MC has been contemplated and still remains an option. CVC remains the most efficient point of entry for personnel to the active CVC mining areas within the Fassifern Seam. However, the CVC coal handling plant was largely removed in 2020 and, due to the operation's lifespan, the capital expense associated with the installation of new coal handling facilities at CVC may be prohibitive when compared to changes to underground arrangements to allow coal transfer from CVC to MC. MC is currently the most efficient site for handling of coal mined at MC and the current CVC Fassifern Seam mining area due to the existing underground infrastructure currently installed to service mining in the Fassifern Seam. However, the Project would allow the flexibility for Delta Coal to implement changes to operate either the CVC or MC pit top or both concurrently.

2.4.2.2 Coal Transportation

During the development of the Project, alternative coal transportation options were reviewed. This included the existing road transport arrangements for export and domestic coal supply from CVC, conveyor transport from CVC to VPPS and emergency road transport from MC to VPPS (should the conveyor not be available).

The Project initially proposed the construction of a conveyor from CVC to VPPS and internal haul road from MC to VPPS, however these aspects of the Project were subsequently removed during the preparation of the specialist assessments to reduce the associated biodiversity and noise impacts.

The Project seeks to retain the existing approval applicable to the road transport of coal from CVC for export and domestic supply. This approval only applies to a relatively small volume of the overall production 660,000 t (export) and 180,000 t (domestic) per annum. Avoiding road transport of coal would require the construction of a coal conveyor from CVC or MC and rail loading facilities which would have significant capital requirements which would not be feasible given the low volumes of coal approved for export and the relatively short approval period over which this could occur. The construction of conveyor and rail loading facilities would also involve additional disturbance and impacts to vegetation, and additional noise and air quality impacts. The use of conveyor or rail transport for the transport of coal to destinations other than VPPS is therefore not considered to be either reasonable or feasible.

2.4.3 Option 3 – Not Undertaking the Project

As detailed earlier, a key objective of the Project is to provide a cost effective and reliable supply of coal to the VPPS to 2029. Not proceeding with the Project would require VPPS to source additional coal from other sources, beyond the current mine life of 2027 and likely from 2026 based on current LOM planning. Coal sourced from other operations would be less suited to the VPPS operations, which were specifically designed around the use of coal from the Wallarah, Great Northern and Fassifern coal seams. The use of externally sourced coal would require additional rail movements between mines in NSW and the VPPS rail handling facilities. Sourcing coal solely from external suppliers would also expose the VPPS to cost fluctuations and potential supply uncertainty in the event of supply chain disruptions. This could have potentially significant implications for the ability of the VPPS to generate electricity to meet consumer demand and/or have significant price implications for electricity consumers.

The improved operational efficiencies associated with the management of the CVC and MC operations as a single operation, with flexibility in production rates between the two pit tops, significantly reduces supply risks for VPPS. The consolidation of the approvals for the Project also reduces administrative and regulatory processes for both Delta Coal and Government regulators and improves alignment between the operations.

3.0 Project Description

As discussed in **Section 1.0**, the Project seeks the consolidation of the approved mining operations at CVC and MC under a single development consent. The Project also seeks to provide consistency in the approvals relevant to the underground mining operations approved at CVC and MC and allow for secondary extraction in the approved MC mining areas located under Lake Macquarie to maintain consistency with the existing CVC consent. Key conceptual features of the Project are shown in . All mining operations would be undertaken within existing Delta Coal mining lease areas (refer to **Table 2.6**).

Delta Coal would retain the ability to bring coal to the surface at either the CVC or MC Pit Top, retaining the current approved processing rate at CVC of 1.5 Mtpa and increasing the processing rate at MC to 2.8 Mtpa, however applying an overall production cap of 2.8 Mtpa ROM coal to the combined operations. The overall cap is a reduction from the currently approved throughput under the current consents of 3.2 Mtpa.

No changes are proposed to approved coal transport arrangements from the CVC and MC Pit Tops.

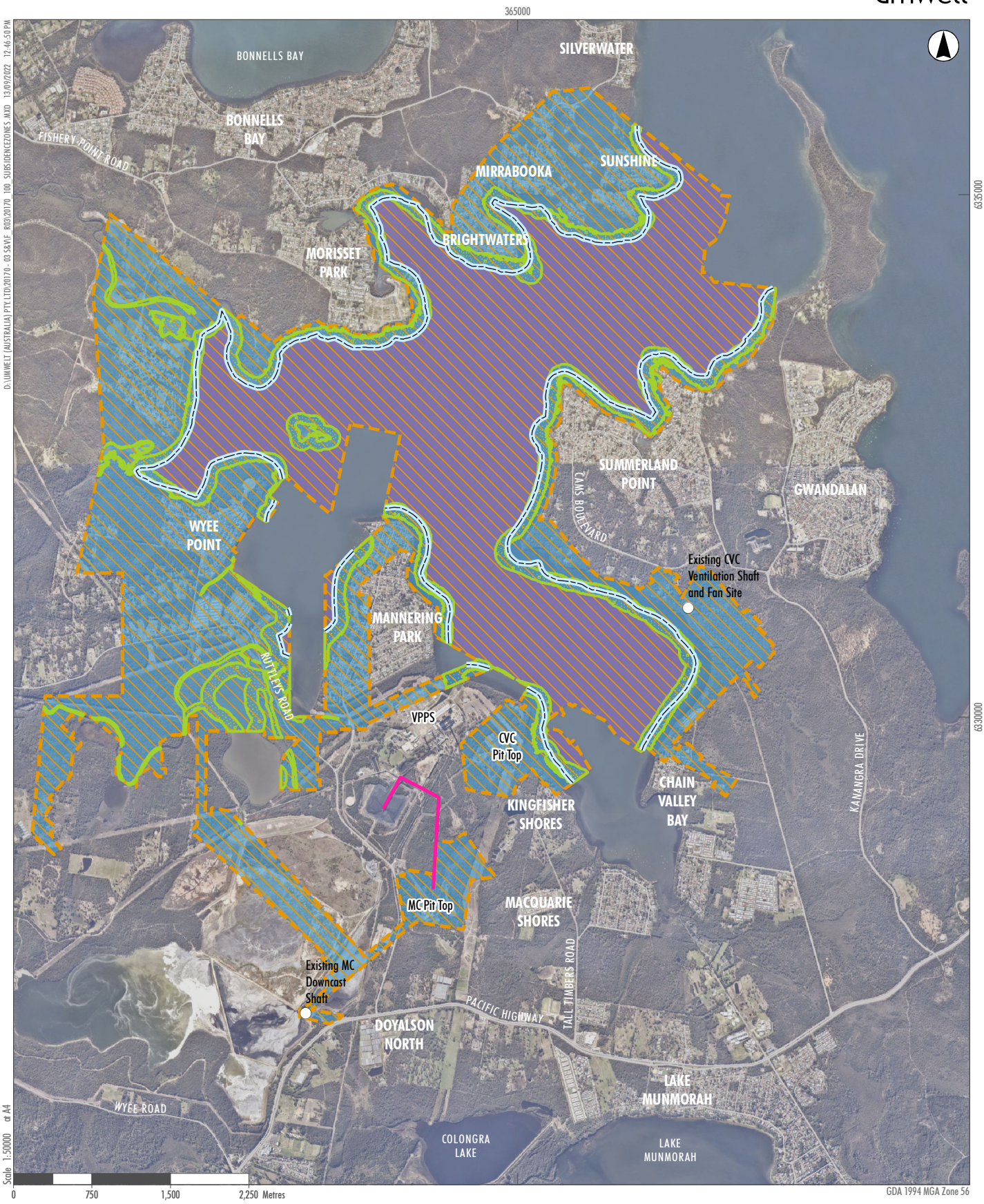
The existing infrastructure at CVC and MC will continue to be utilised, with maintenance and upgrades to surface facilities proposed to support extended LOM and the increase to ROM throughput at MC (refer to **Section 3.5**). Coal handling infrastructure recently demolished at CVC will also be replaced as required.

The Project would extend the life of mining operations at CVC and MC by two years to the end of 2029. No change is proposed to the operational workforce levels across the two operations of approximately 390 FTE employees. Personnel associated with construction activities would be managed within this operational workforce number.

Should the Project be approved, the CVC Development Consent SSD-5465 (as modified), and MC Major Project Approval MP 06_0311 would be surrendered as per Section 4.63(3) of the EP&A Act and replaced with a new development consent. The Project would consolidate the existing approved CVC and MC consent boundaries with minor adjustments to align boundaries with Delta Coal lease areas.

The environmental assessment undertaken to support the preparation of the EIS has specifically focused on the changes proposed to the approved operations without reassessment of the aspects of the approved operations which could continue under the existing approvals. This is discussed further in **Section 6.0**.

Table 3.1 provides an overview of the existing approved CVC and MC operations and key components of the Project.



Legend

- Project Area
- Seagrass Protection Barrier
- Zone A - Maximum 20 mm Subsidence
- Zone B - Maximum 780 mm Subsidence
- High Water Mark Subsidence Barrier
- VPPS Overland Conveyor

FIGURE 3.1

Project Overview

Image Source: Nearmap (May 2019) Data source: Delta Coal

Table 3.1 Overview of Existing Operations and Consolidation Project

Project Component	CVC Approved Operations	MC Approved Operations	Consolidation Project
Project Area	Refer to **Figure 2.10.**	Refer to **Figure 2.12.**	Consolidated Project boundary to align with adjusted MC mining tenement boundary - refer to **Figure 3.1.**
Mine life	Mining operations are approved until 31 December 2027.	Mining operations are approved until 31 December 2027.	Mining operations approved to 31 December 2029.
Annual Coal Extraction	Extraction of up to 2.1 Mtpa of ROM coal.	Extraction of up to 1.1 Mtpa of ROM coal.	Extraction of up to 2.8 Mtpa total from all mining areas.
Annual Surface Handling	Up to 1.5 Mtpa ROM coal (all production at CVC beyond the 1.5 Mtpa ROM coal surface cap to be sent to VPPS via MC).	Up to 2.1 Mtpa ROM coal.	Handling of up to 2.1 Mtpa ROM Coal at MC and up to 1.5 Mtpa at CVC with overall cap of 2.8 Mtpa.
Resource	Fassifern Seam.	Fassifern and Great Northern Seams.	Fassifern and Great Northern Seams.
Mining Method	Continuous miner (bord and pillar and pillar extraction) and miniwall mining methods Pillar extraction and miniwall mining only under Lake Macquarie and subject to 20 mm vertical subsidence limits on seagrass beds and foreshore areas.	First workings only, including use of a herringbone bord and pillar configuration.	No change to existing subsidence approval. First workings only under land areas, foreshore and seagrass beds. Pillar extraction and miniwall mining limited to Fassifern Seam mining areas under Lake Macquarie.
Underground Mining Areas	Refer to **Figure 2.10**, consistent with Appendix 2 CVC Consent. Note – CVC MOD 4 proposes to amend the CVC Consent boundary to include the Northern Mining Area.	Refer to **Figure 2.12,** consistent with Appendix 2 of MC Project Approval.	Consolidation of MC and CVC approved mining areas. Refer to **Figure 3.1.**
Subsidence Commitments	Zone A – Maximum of 20 mm (HWMSB and SPB). Zone B – Maximum 780 mm. Chain Valley Bay Mining Area multi-seam feasibility.	Maximum of 20 mm subsidence.	Zone A – Maximum of 20 mm subsidence. Zone B – Maximum 780 mm. Refer to **Figure 3.1.**
Mine Infrastructure	Personnel-and-material drifts, ROM coal conveyor	Coal crushing facility.	Continued use of existing MC infrastructure.

Project Component	CVC Approved Operations	MC Approved Operations	Consolidation Project
	drift to MC. Upcast and downcast ventilation shaft and fans Coal handling facilities for breaking, crushing, sizing and storing product coal. Administration and workshop facilities. Water management infrastructure.	Upcast and downcast ventilation shaft and fans Coal handling facilities for breaking, crushing, sizing and storing product coal. Overland conveyor (from MC Pit Top to VPPS). Underground link road to CVC. Administration and workshop facilities. Water management infrastructure.	Continued use of CVC infrastructure. Minor upgrades to surface facilities proposed to support extended LOM and the increase to ROM throughput (including water management structures, surface to seam boreholes within the pit top area and use of temporary stockpile areas during emergencies).
Coal Processing	Screening and ROM coal crushing, no coal rejects are generated.	Screening and ROM coal crushing, no coal rejects are generated. Surface Rotary Breaker (decommissioned).	Screening and ROM coal crushing, no coal rejects are generated. ROM coal to be brought to the surface at CVC or MC.
Product Coal Transportation	Product coal from CVC Pit Top to VPPS via truck on private roads only (up to 1.5 Mtpa).	N/A.	Up to 1.5 Mtpa coal transport from CVC to VPPS via internal haul road and sections of privately owned Construction Road (only if MC infrastructure is not available).
	Transport product coal from approved CVC mining area to MC via the existing underground linkage up 2.1 Mtpa, for subsequent delivery to VPPS via conveyor.	Up to 2.1 Mtpa ROM coal via overland conveyor to VPPS.	Up to 2.8 Mtpa product coal transport from MC to VPPS via conveyor.
	A maximum of 660,000 tpa of product coal from CVC Pit Top on public roads to the Port of Newcastle for export.		No change.
	A maximum of 180,000 tpa of product coal from CVC Pit Top on public roads to domestic customers (other than VPPS).		No change.
Hours of Operation	24 hours per day, 7 days per week.	24 hours per day, 7 days per week.	No change.
Site Access	Existing road access via Construction Road off Ruttleys Road.	Existing road access directly from Ruttleys Road.	No change to existing arrangements.

Project Component	CVC Approved Operations	MC Approved Operations	Consolidation Project
Rehabilitation	Surface infrastructure will be decommissioned and the site rehabilitated following mine closure.	Surface infrastructure will be decommissioned and the site rehabilitated following mine closure.	No change.
Workforce (Operations)	Up to 330 FTE personnel at CVC and within an overall CVC/MC workforce of approximately 390.		No change to overall. Approximately 390 FTE personnel across the two operations.
Workforce (Construction)	N/A.	N/A.	Managed within approved operational workforce limits.
Water Discharge Requirements	Licensed daily discharge of up to 12.161 ML/day (EPL).	Licensed daily discharge of up to 4 ML/day (EPL).	No change.
Water Supply and Demand	Potable water utilised for surface facilities and underground operations (160 ML per annum) supplied by Central Coast Council from potable water supply mains.	Potable water utilised for surface facilities and underground operations supplied by Central Coast Council via metered pipeline.	Potable water utilised for surface facilities and underground operations supplied by Central Coast Council.
Exploration	Exploration activities subject to Exploration Activities and Minor Surface Infrastructure Management Plan.	Exploration activities subject to Exploration Activities and Minor Surface Infrastructure Management Plan.	No change.

3.1 Conceptual Mine Plan

The Project will maintain the same mining areas as currently approved under the CVC Consent and MC Project Approval subject to a minor reduction in approved MC Project Approval mining areas to align with Delta Coal mining lease areas and exclusion of the Lake Macquarie State Conservation Area from the consent area.

The approved and proposed mining areas are shown on **Figure 3.1**.

3.2 Mining Methods

Mining methods would remain consistent with those currently in place at CVC:

- bord and pillar mining methods only will be used under all land areas and near shore areas with pillar design to be long term stable (Zone A)
- bord and pillar, pillar extraction and miniwall mining will be used in areas of approved Fassifern Seam mining under Lake Macquarie (Zone B).

The bord and pillar methods used in both Zone A and Zone B (refer to **Figure 3.1**) include different layout variants on this method such as the herringbone layout currently approved at MC and CVC.

3.3 Production Rate

Total ROM production from the Project would be capped at 2.8 Mtpa. This represents a reduction from the currently approved combined ROM production cap of 3.2 Mtpa across the two approved operations.

3.4 Subsidence

The current CVC Consent allows for a 'subsidence management zone' approach to the approved operations, with zones based on current approved subsidence levels and performance measures. The prescribed subsidence limits in these zones are:

- **Zone A:** no more than 20 mm vertical subsidence (i.e. imperceptible subsidence).
- **Zone B:** up to a maximum of 780 mm of vertical subsidence.

The CVC Consent subsidence management zone approach would be carried through to the Project.

All mining under land areas would be limited to bord and pillar mining methods which would be designed to be long term stable with negligible (<20 mm) subsidence impacts (Zone A). Zone A also extends to the foreshore areas to ensure that subsidence impacts do not impact on shoreline areas.

Secondary extraction would be limited to the approved CVC and MC Fassifern Seam mining areas under Lake Macquarie where subsidence impacts are unlikely to have a significant impact on surface features or sensitive marine seagrass areas. Subsidence impacts to seagrass beds in Zone A would be limited to a maximum of 20 mm vertical subsidence consistent with existing CVC Consent limits. The Project would extend the area of permitted secondary extraction activities to parts of the currently approved MC Fassifern Seam mining area below Lake Macquarie. The subsidence commitments in this extended area of proposed secondary extraction are identical to those currently approved in Zone B at CVC. All proposed secondary extraction would be subject to detailed assessment and planning as part of the Extraction Plan process.

Proposed subsidence zones are illustrated on **Figure 3.1**.

3.5 Coal Handling

Total combined handling of ROM coal would be limited to 2.8 Mtpa across both CVC and MC pit tops with the ability to handle up to 1.5 Mtpa at CVC and up to 2.8 Mtpa at MC. This represents a decrease in the overall combined ROM production capacity of 3.2 Mtpa across the two operations currently approved under the CVC Consent (2.1 Mtpa) and MC Project Approval (1.1 Mtpa) but an increase in potential coal handling rates at the MC Pit Top relative to existing approved limits (refer to **Table 3.1**).

Consistent with the approved operations, screening, crushing and sizing of ROM coal will continue to be undertaken at both CVC and MC with no coal rejects to be generated.

3.6 Product Transportation

The Project will continue to utilise the existing approved underground linkage between the approved CVC and MC mining areas to enable coal to be transferred to VPPS via the existing MC Pit Top and conveyor.

The option of upgrading CVC surface facilities to enable increased ROM coal throughput and transfer coal to VPPS via road directly from the CVC Pit Top would be maintained.

The ability to haul up to 600,000 tpa of coal from CVC to the Port of Newcastle and up to 180,000 tpa of coal to other domestic sources by road from the CVC Pit Top would be retained.

All coal transported via road from CVC would be loaded onto trucks via front end loader from product coal stockpile areas consistent with existing approved arrangements at CVC. Coal transportation would continue to be subject to the existing CVC conditions of consent including:

- No laden coal trucks dispatched from the site to public roads outside of the hours of 5:30 am to 5:30 pm, Monday to Friday, and not at all on Saturdays, Sundays or public holidays.
- No more than the following would be dispatched from the site:
    - 660,000 tonnes of product coal in any calendar year to the Port of Newcastle for export
    - 180,000 tonnes of product coal in any calendar year to domestic customers other than VPPS
    - a total of 270 laden coal trucks per day by public roads
    - a total of 32 laden coal trucks per hour

- an average of 16 laden coal trucks per hour by public roads during peak hour periods, calculated monthly, until the intersection of M1 Motorway and Sparks Road Interchange (East Side - unsignalised with stop sign) is upgraded to a signalised intersection.

- Transportation of coal by truck to VPPS will be restricted to between 10:00 pm and 5:30 am and:
  - 16 laden trucks per hour for the Spring and Autumn months
  - zero during Winter months.

3.7 Proposed Infrastructure

Existing infrastructure at CVC and MC would continue to be utilised, with upgrades to surface facilities proposed to support extended LOM and the increase to ROM throughput at MC (including water management structures, surface to seam boreholes within the pit top area and use of temporary stockpile areas during emergencies). Coal handling infrastructure recently demolished at CVC will also be replaced as required.

The Project would not require any increase to existing disturbance areas.

3.8 Site Access

The CVC surface facilities are accessed via Ruttleys Road and Construction Road, a private road which services CVC and VPPS. The MC surface facilities and pit top are accessed directly from Ruttleys Road. The Project does not change these existing access arrangements.

3.9 Hours of Operation

The hours of operation will also be unchanged, continuing at 24 hours, 7 days per week.

3.10 Operational Workforce

The Project will require a total workforce of up to approximately 390 FTE personnel (including contractors), across both operations, which is consistent with total workforce numbers across the existing approved CVC and MC operations.

3.11 Ongoing Exploration Activities

Exploration activities will continue to be undertaken throughout the life of the Project including drilling within the mining authorities to obtain further information regarding the reserves to be mined as well as geological, hydrogeological and geotechnical information relevant to the mining and construction activities that will be undertaken. Additional drill holes to install groundwater and gas monitoring bores may also be required.

Construction, sealing and abandonment of boreholes will be in accordance with relevant standards and guidelines published by the Division of Resources and Geoscience (DRG) and in force at the time.

Surface disturbance associated with exploration and groundwater monitoring activities will be minimised with drilling undertaken on existing disturbed areas where practicable. All exploration and groundwater monitoring boreholes will be undertaken in accordance with relevant requirements and standards under the NSW *Mining Act 1912* (the Mining Act) and the WM Act.

3.12 Rehabilitation

No change is proposed to the current decommissioning and rehabilitation plans for the operations. Following closure, the rehabilitation of the operations will be required under the terms of the mining leases applicable to the Delta Coal operations. Activities required as part of the mine closure activities include:

- removal of fleet and equipment (including ventilation fans)
- demolition of buildings and sheds
- removal and/or capping of carbonaceous material associated with stockpiles
- removal and/or on-site treatment of any contaminated soil material
- decommissioning of water management infrastructure
- removal of cement flooring, foundations (potentially including rock breaking and crushing machinery)
- removal of hardstand areas
- shaft and decline filling and sealing operations
- revegetation of disturbed areas.

Decommissioning works will be generally undertaken during Standard Construction Hours and managed to comply with Construction Noise Criteria (refer to **Section 6.3**).

Truck movements associated with decommissioning operations will include vehicles to remove demolition waste for the site as well as vehicles hauling capping material, fill and concrete to the site for shaft filling activities. Where suitable and approved by the Resources Regulator, onsite demolition material may also be used for shaft and decline filling operations. All truck movements associated with decommissioning activities will be managed within the approved hourly and tonnage export and domestic coal movement restrictions. Truck routes would be managed under a separate Closure Traffic Management Plan developed for the closure operations which would include decommissioning activities associated with the CVC and MC ventilation fans (refer to **Section 6.10**).

Equipment and demolition material removed as part of decommissioning activities will be preferentially sold for future use where appropriate. Waste material will be preferentially recycled or, where this is not feasible or is cost prohibitive, will be disposed of and an appropriately licensed facility. As noted above, where suitable, demolition material may also be used on site for shaft filling activities.

Mine closure and rehabilitation activities will be detailed in the Rehabilitation Plan/Mining Operations Plan (MOP) approved under the Mining Act and undertaken in accordance with relevant consent conditions consistent with existing approved operations.

4.0 Statutory Context

The statutory provisions applying to the Project with respect to environmental assessment and planning approval at Commonwealth, State and local level, and the roles these play in the Project's assessment and determination are outlined in **Table 4.1** below. In addition, reference tables of the relevant statutory requirements for the Project, and where these have been addressed in the EIS, are provided in **Appendix 5**.

Table 4.1 Statutory Requirements

Category	Relevant Statutory Requirements
Power to grant approval **NSW *Environmental Planning and Assessment Act 1979* (EP&A Act)** **and** **NSW *State Environmental Planning Policy (Planning Systems) 2021 (Planning Systems SEPP)***	Section 4.36 of the EP&A Act provides for the declaration of a project as State Significant Development (SSD). Under the EP&A Act, the declaration of a project as SSD can be made by meeting the requirements of a SEPP or by the Minister for Planning and Public Spaces. Clause 5(1)(a) of Schedule 1 of *State Environmental Planning Policy (Planning Systems) 2021* (Planning Systems SEPP) prescribes that development for the purpose of coal mining is declared as SSD and the development application for the Project will be subject to the requirements of Division 4.7 of the EP&A Act. The development application will be lodged with the Planning Secretary of the Department of Planning and Environment (DPE). The Minister for Planning and Homes is the consent authority for SSD projects. Section 4.5(1) of the EP&A Act also provides that the Independent Planning Commission (IPC) is the consent authority for SSD where it is declared to be the consent authority under an EPI. The Minister has issued a general delegation of the consent authority function for SSD projects to the IPC in instances where more than 50 public objections are received on the application, where the applicant has made a reportable political donations disclosure and/or where the local Council objects to the Project.
Permissibility ***State Environmental Planning Policy (Resources and Energy) 2021***	The Lake Macquarie LEP and the Central Coast LEP are relevant to the Project Area (refer to **Section 2.1.7**). Under these LEPs, underground mining is prohibited within some parts of the Project Area, however the permissibility provisions of *State Environmental Planning Policy (Resources and Energy) 2021* (the Resources and Energy SEPP) apply to the Project and override the LEP permissibility provisions to the extent of any inconsistency (section 3.28 of EP&A Act). Clause 7 of the Resources and Energy SEPP permits underground mining to be carried out on any land with consent and therefore the Project is permissible with development consent.
Consistent approvals (section 4.42 of the EP&A Act)	**NSW *Mining Act 1992* (Mining Act)** Under section 380AA of the Mining Act, a DA to mine for coal cannot be made or determined unless the applicant is the holder of an authority that is in force in respect of coal and the land where mining for coal is proposed to be carried out. Delta Coal is the holder (or is in the processes of becoming the holder) of all authorities required for the Project. The requirements of section 380AA will be satisfied at the time the DA is formally lodged. **NSW *Protection of the Environment Operations Act 1997* (POEO Act)** Both CVC and MC operate under separate Environment Protection Licences (EPLs) issued pursuant to the POEO Act. These are: • CVC operation – EPL 1770, granted 10 November 2000. • MC operation – EPL 191, granted 6 April 2000. Should the Project be approved, the EPLs will be varied, consistent with the approved SSD consent.

Category	Relevant Statutory Requirements
	NSW *Roads Act 1993* (Roads Act) The Roads Act sets out the rights of the public, adjoining landowners, opening and closing, classification and the distribution of function in relation to public roads. No changes are proposed to be made to the existing public road network as part of the Project, and as such, no further approval under the Roads Act is required.
Commonwealth approvals	**Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)** Under the EPBC Act, the approval of the Commonwealth Minister for the Environment is required for any action that may have a significant impact on prescribed matters of national environmental significance (MNES). The CVC and MC operations do not currently operate under an EPBC Act approval and no aspect of the existing CVC and MC operations has been referred. The Project will not impact World Heritage Properties or National Heritage Places, Wetlands of International Importance, a Commonwealth marine area or the Great Barrier Reef Marine Park. The Project does not involve a nuclear action. The assessment of the Project's impact on MNES (refer to **Sections 6.5** and **6.6**) found that there is unlikely to be a significant impact on relevant matters of national environmental significance. As such, it is considered that the Project does not require referral to the Commonwealth Minister under the EPBC Act. **Commonwealth *Native Title Act 1993* (NT Act)** The NT Act has potential implications for the granting of mining leases under the Mining Act where native title has not been extinguished within the lease application area. No new mining leases are required for the Project and therefore the NT Act is not directly relevant to the approval process for the Project.
Other legislation	**NSW *Mining Act 1992* (Mining Act)** Under section 5 and 6 of the Mining Act, a mining lease is required to undertake mining operations and certain mining purposes. Delta Coal holds mining leases in relation to all proposed subsurface mining areas within the Project Area and all relevant surface areas where mining purposes are undertaken. No further mining leases are required for the Project. **NSW *Water Management Act 2000* (WM Act)** The Aquifer Interference Policy (AIP) clarifies the requirements for obtaining water licences for aquifer interference activities under NSW water legislation and establishes and objectively defines considerations in assessing and providing advice on whether more than minimal impacts might occur to a key water-dependent asset. The AIP requires that, where mining or any other activity will take water from a source covered by a water sharing plan (WSP), a water access licence is required under the WM Act to account for this loss of water. Great Southern Energy currently holds two water access licences (WALS) issued under the WM Act, under which conditions of water access entitlements at CVC and MC are undertaken. As detailed in **Section 6.5**, the existing licences are adequate for the Project. As SSD the Project does not require 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 as outlined above) under section 91. **NSW *Dams Safety Act 2015* (DS Act)** The objectives of the DS Act are to promote transparency in regulation of dam safety, encourage proper and efficient management of dam safety and ensure that any risks relating to dams are within a level acceptable to the community.

Category	Relevant Statutory Requirements
	The Project does not propose the establishment of any dams. Notwithstanding this, the EIS has considered the Project's potential impacts on any prescribed dams located in the vicinity of the Project Area. As outlined in **Section 6.11.1**, no adverse impacts are expected. **NSW *Workplace Health and Safety (Mines and Petroleum Sites) Act 2013* (WHS Mining Act)** The WHS Mining Act and its regulation (collectively referred to as the WHS Mining Legislation) secure the health, safety and welfare of people in connection with coal operations. The WHS Mining Legislation includes specific requirements for the development of principal hazard management plans which include risks related to subsidence and inrush. While safety focussed, the controls in these management plans have significant cross-over to management measures to be implemented as part of the Extraction Plan processes for second workings which are designed to manage environmental and social impacts associated with subsidence. Delta Coal will continue to operate in accordance with the WHS Mining Legislation and the management measures required under this legislation will be considered as part of the suite of controls applicable to management of impacts associated with the underground mining proposed as part of the Project. **NSW *Environmentally Hazardous Chemicals Act 1985*** Under the *Environmentally Hazardous Chemicals Act 1985* a licence is required for any storage, transport or use of prescribed chemicals. Should such a licence be required under this Act during the life of the Project, Delta Coal or the relevant contractor will obtain a licence prior to the storage, transport or use of prescribed chemicals. **NSW *National Parks and Wildlife Act 1974* (NPW Act)** The objects of the NPW Act relate to conserving the State's natural and cultural heritage; fostering public appreciation, understanding and enjoyment of their State's natural and cultural heritage; and managing any lands reserved for such purposes. Under section 86 of the NPW Act, it is an offence to harm an Aboriginal object, except where authorised by an Aboriginal heritage impact permit issued under section 90 of the Act. As SSD, it is not necessary for the Project to obtain approvals under the provisions of section 90 of NPW Act. An Aboriginal Cultural Heritage Assessment (ACHA) has been completed for the Project (refer to **Appendix 12** and **Section 6.7**). **NSW *Heritage Act 1977* (Heritage Act)** The Heritage Act provides for the identification, registration and protection of items of State heritage significance. Under Part 4 of the Heritage Act, approval is required to undertake a range of activities relating to a listed an item listed on the State Heritage Register. Under Part 6, an excavation permit is required for any activity that is likely to disturb a relic of State or local heritage significance. As SSD, it is not necessary for the Project to obtain approvals under the provisions of the Heritage Act in relation to activities approved under Part 4 of the EP&A Act. However, this does not exempt the Project from requiring heritage assessment, which may identify heritage/archaeological sites and provide recommendations for their management, and the consideration of the provisions of the relevant statutory controls. An assessment of historic heritage has been completed for the Project (refer to **Appendix 13** and **Section 6.8**). **NSW *Crown Land Management Act 2016*** (CLM Act). The CLM Act provides for a consistent approach to management, facilitation of community involvement and future use of Crown land, with consideration of the environmental, social, cultural heritage and economic factors and the spiritual, social and cultural importance of Crown land to Aboriginal people. The Project does not require access to any Crown lands and therefore no further assessment is required.

Category	Relevant Statutory Requirements
Pre-conditions (refer to Appendix 5 for details)	State Environmental Planning Policy – (Resources and Energy) 2021 Chapter 2 – Mining, Petroleum Production and Extractive Industries. State Environmental Planning Policy (Biodiversity and Conservation) 2021 – Chapter 3 Koala Habitat Protection. State Environmental Planning Policy (Resilience and Hazards) 2021 – Chapter 2 Coastal Management. State Environmental Planning Policy (Resilience and Hazards) 2021 – Chapter 3 Hazardous and Offensive Development. State Environmental Planning Policy (Resilience and Hazards) 2021– Chapter 4 Remediation of Land. State Environmental Planning Policy (Transport and Infrastructure) 2021 – Chapter 2 Infrastructure.
Mandatory matters (refer to Appendix 5 for details)	Section 1.3 EP&A Act. Section 4.15(1) EP&A Act. Section 192 of the EP&A Regulation. Non-discretionary Development Standards for Mining, Part 2.3 Resources and Energy SEPP.

5.0 Engagement

A Social Impact Assessment (SIA) has been undertaken by Umwelt in accordance with the NSW Government guidelines and assessment standards including, but not limited to, the Department of Planning, Industry and Environment's (DPIE) Social Impact Assessment Guidelines (DPIE, 2021).

An overview of the Stakeholder Engagement Program including the identified stakeholders, engagement undertaken, and the outcomes of the consultation process is provided in this section. Further detail is provided in the SIA (refer to **Appendix 17**).

5.1 Stakeholder Engagement Program

As part of the SIA program for the Project, various stakeholders have been identified and involved in the program to date (refer to **Figure 5.1**). The process of identifying relevant stakeholders was informed by review of recent assessment processes for the CVC and MC operations, stakeholders identified for other projects (including the Wallarah No. 2 Project), existing stakeholders associated with the CVC, MC and VPPS operations, and those identified through the development of the social baseline development for the SIA.

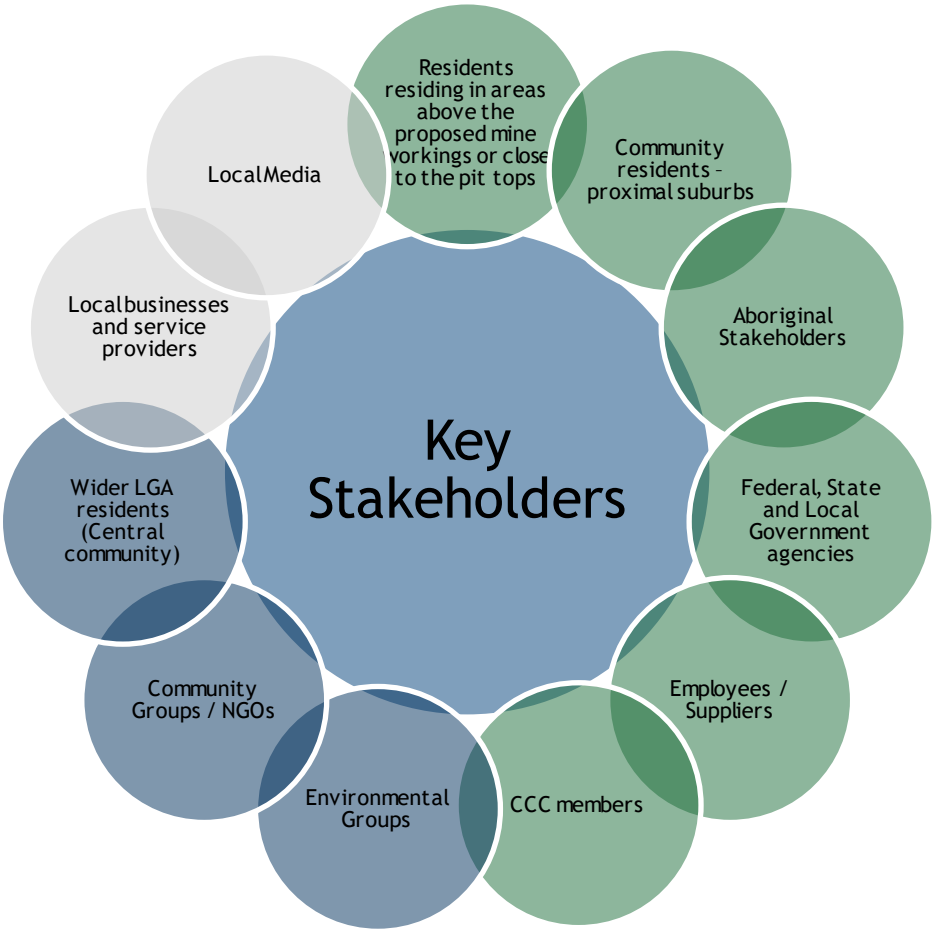


Figure 5.1 Stakeholder Groups

Note: Green represents the highest priority stakeholders, blue represents moderate priority stakeholder and grey represents the lower priority stakeholders.

5.1.1 Community Consultation

Community engagement was undertaken over two main rounds. Round 1 was undertaken to inform the scoping phase of the SIA in identifying perceived issues/impacts to near neighbours and key stakeholders in the Project Area. Round 2 was undertaken to further inform the evaluation and prediction of social impacts, including the development of relevant mitigation and enhancement strategies.

Round 1 engagement took place from November to December 2020, aligning with the scoping phase of the Project. Round 2 engagement took place from August to October 2021. Due to the NSW COVID-19 restrictions and ongoing lockdowns that were occurring at the time of Round 2 engagement, face to face engagement was not possible; instead project information newsletters, telephone and online engagement mechanisms were utilised. The range of mechanisms utilised to obtain the input of various stakeholder groups and are illustrated in **Figure 5.2**. Further detail on the engagement mechanisms utilised for the SIA is provided in **Appendix 17**. A further community information sheet was circulated in July 2022 which included an update of the Consolidation Project including information regarding the removal of the Eastern Mining Area from the Consolidation Project.

It is noted that Stage 1 and 2 consultation included extensive consultation regarding the potential mining of the Eastern Mining Area to the east of the Project Area. While the Consolidation Project no longer includes the mining of the Eastern Mining Area, the findings of the engagement have been considered in the preparation of the EIS.

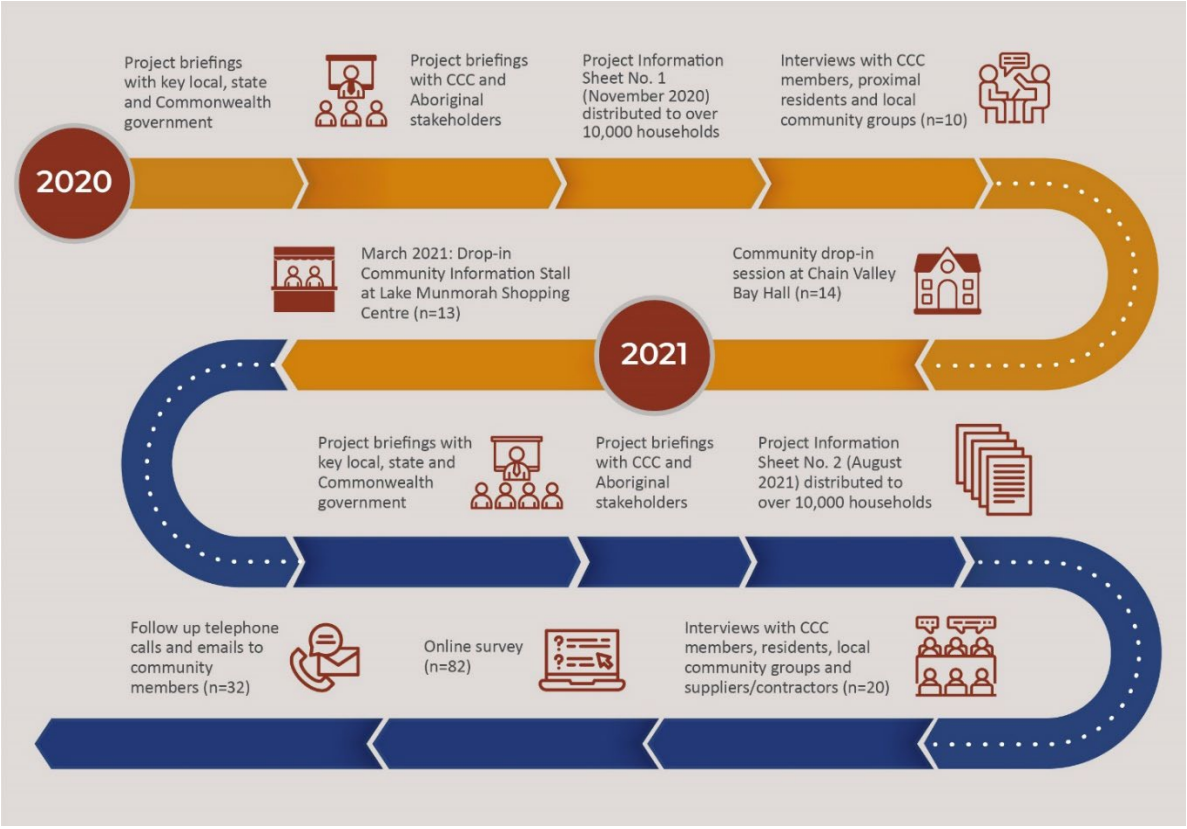


Figure 5.2 Engagement Mechanisms

**Note: Yellow represents Round 1, Blue represents Round 2.*

As outlined in **Table 5.1**, a total of 34 stakeholders participated in Round 1 and 117 participated in Round 2, of which 18 were also participants in the previous Round 1. The majority of respondents who completed the online survey or participated in a SIA interview in Round 2 reside in Chain Valley Bay (41.1 %), followed by Mannering Park (8.4 %); with a further 6% respondents residing in other proximal suburbs. Quantitative and qualitative information collected through the engagement process has been analysed to inform the evaluation of social impacts associated with the Project. An overview of the results of the engagement is provided in **Section 5.2** and further detail provided in **Appendix 17**. **Table 5.1** provides a summary of the number of stakeholders engaged during both rounds of engagement.

Table 5.1 Consultation Statistics

Stakeholder Group	Round 1		Round 2	
	Contacted via (telephone call, email or letter invitation)	Consultations (meetings/ surveys)	Contacted via telephone call, email or letter invitation	Consultations (meetings/ surveys)
Residents in proximity to the pit tops, undermined residents, and residents residing in proximal suburbs	Approx. 1,600 households	5	22	55
Community members	Over 10,000 households received the Information Sheet No. 1	7	Over 10,000 households received Information Sheet No. 2	42 surveys/ telephone interviews held 10 informal telephone discussions/email communications
Lake Munmorah Shopping Centre Stall	-	13 surveys completed	-	
CCC members	7	7	7	7*
Local community groups/NGOs	10	2	14	4*
Environmental groups		-	5	
Local businesses, contractors/suppliers		-	2	1
Aboriginal groups		-	1	-
Total		**34**	**34**	**117**

**Two participants represented both a Local community group/NGO and were members of the CCC – they are counted separately in each category, meaning the total is 2 counts less than the sum of the column.*

5.1.2 Aboriginal Community Engagement

As part of the preparation of the Aboriginal Cultural Heritage Assessment (ACHA) an engagement process has been undertaken with ten Registered Aboriginal Parties (RAPs) who have been part of ongoing consultation processes in relation to approved activities at CVC and MC and the development of the Delta Coal Heritage Management Plan (HMP) since 2012.

Throughout all stages of the assessment process, the RAPs were invited to identify how they would like to participate in the Project's ACHA process, including what cultural information they wanted to share to inform the assessment process, and what information (if any) should remain non-disclosed in the assessment and reporting process (refer to **Section 6.7** and **Appendix 12**).

The RAPs and Darkinjung LALC were also provided with the Project Information Sheets (November 2020 and September 2021).

5.1.3 Agency/Authority Consultation

A summary of the Government agency consultation undertaken to date is included in **Table 5.2**. Consultation with Government agencies has been undertaken through various mechanisms throughout the assessment process to keep agencies informed of progress and outcomes of the Project. No significant issues were raised during consultation with any of the Agencies or Authorities. Consultation included Project briefings, discussion of the scope of the specialist assessments and SEARs requirements and reporting of results of the specialist assessments.

Table 5.2 Consultation with Agencies and Authorities

Agency/Authority	Consultation
Department of Planning and Environment	June 2021 – Scoping meeting February 2022 – Revised Project SEARs meeting
Central Coast Council	November 2020 – meeting – Project Briefing March 2021 – Newsletter September 2021 – Newsletter September 2021 – Offer of meeting
Lake Macquarie Council (LMCC)	November – Newsletter and Project Briefing September 2021 – Newsletter
Resources Regulator (Rehabilitation and Securities Panel – RASP)	March 2021 – RASP meeting
Mining, Exploration and Geoscience (MEG)	January 2021 – Project Briefing Ongoing consultation associated with Darkinjung Planning Proposal and CVC Mod 4
Heritage NSW	November 2020 – Newsletter February 2021 – offer to meet September 2021 – Newsletter
Environment Protection Authority (EPA)	March and September 2021 – Newsletter and offer of meeting
Department of Primary Industries (Fisheries)	February 2021 – Newsletter April 2021 – Project Briefing
NSW Department of Planning, Industry and Environment – Biodiversity Conservation Division	March 2021 – offer of meeting September 2021 – Newsletter

5.2 Stakeholder Issues

The likely and perceived impacts (both positive and negative) associated with the Project, as identified through the engagement program with key stakeholders and the community have been documented in detail in the SIA (refer to **Appendix 17**). The analysis presented in the SIA also draws on previous engagement undertaken by Delta Coal and relevant outcomes of the social baseline study and other projects in the vicinity of the Project Area. A summary of the key social impacts identified during the engagement program are outlined in **Figure 5.3**.

During the Round 2 engagement, participants were asked to rate their level of concern for each of the impacts that were identified during the scoping phase of the SIA. The results are summarised in **Figure 5.4**, with further detail provided in **Appendix 17**. The results indicate social amenity impacts (as a result of experience of dust/poor air quality) and livelihood impacts, resulting from property damage (linked to subsidence), were identified as the top impacts of concern. It is noted that, subsequent to the Stage 2 engagement process, the Eastern Mining Area is no longer proposed and the Project does not result in any changes to approved mining which may impact foreshore or land areas other than the extension of approved mining to 2029.

The analysis of community issues and how these have been addressed through the preparation of the specialist studies and this EIS are discussed further in **Section 6.15** and **Appendix 17**.

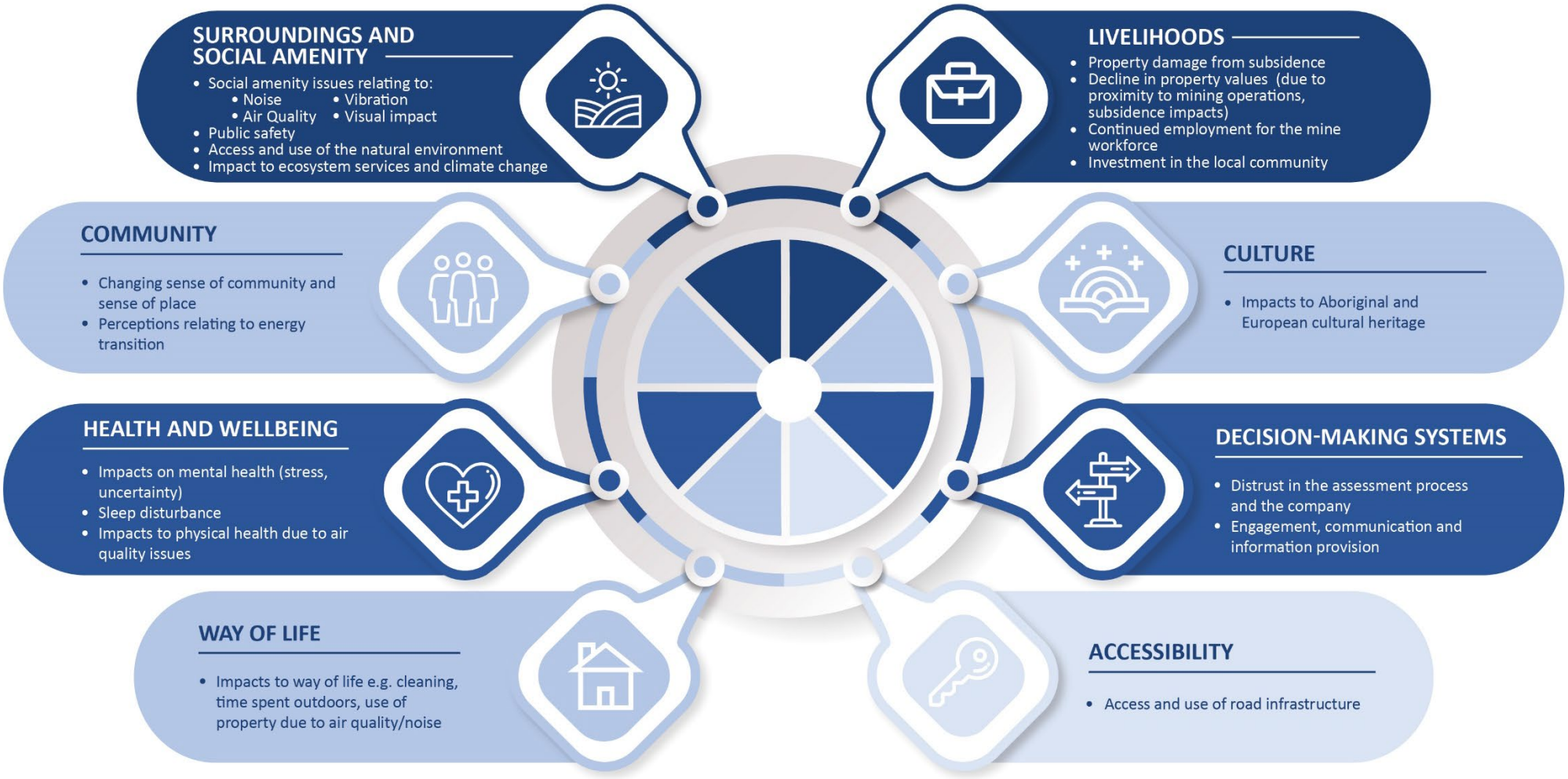


Figure 5.3 Summary of Social Impacts

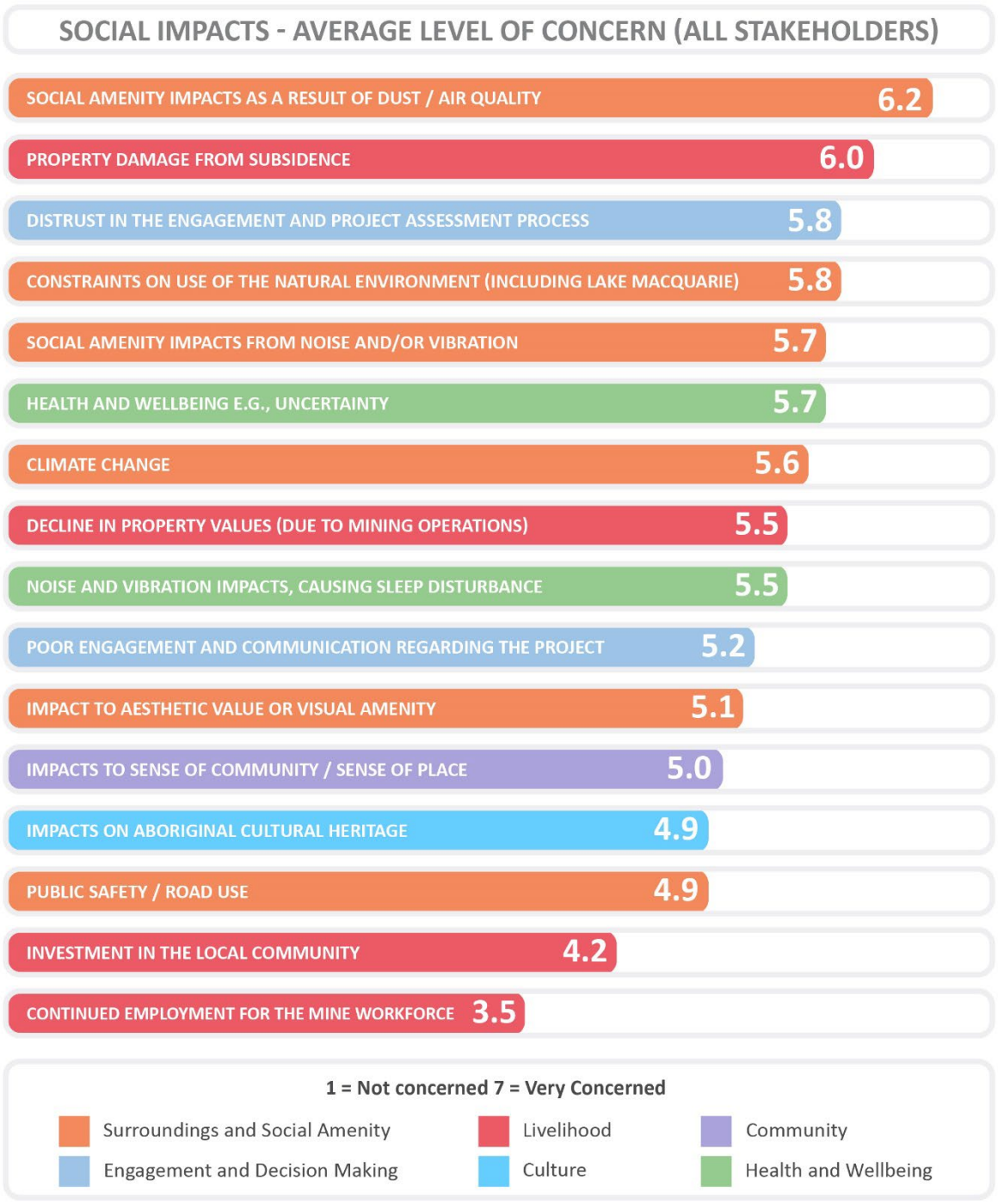


Figure 5.4 Social Impacts – Average Level of Concern

6.0 Assessment of Impacts

6.1 Identification of Key Environmental and Community Issues

The identification of key environmental and community issues for the EIS for the Project is based on:

- the environmental and planning context for the Locality (refer to **Section 1.0** and **Section 4.0**)
- outcomes of the stakeholder engagement process and learnings from the history of operations at CVC and MC
- the SEARs for the Project (refer to **Appendix 2**)
- risk analysis of potential environmental and social impacts associated with the Project (refer to **Section 6.1.1**)
- baseline studies completed as part of the preparation of the EIS (**Section 6.2** to **Section 6.16**).

6.1.1 Preliminary Environmental Risk Analysis

The Scoping Report completed for the Project in March 2021 included an environmental risk analysis to identify the key issues that required detailed assessment as part of this EIS. The preliminary environmental risk analysis was undertaken in general accordance with the principals outlined in *Australian Standard AS/NZS ISO 31000:2009 Risk Management – Principals and guidelines* (Standards Australia, 2009).

The method used for the environmental risk analysis included:

- establishing the context for the risk analysis process
- identifying environmental and community aspects and potential risks
- analysing risks
- evaluating risks to determine the key issues requiring further assessment.

The environmental risk analysis identified numerous issues that required further assessment as part of the EIS. Following the risk matrix, risks are rated as high, medium or low. Based on the risk assessment, the identified key issues included:

- **Subsidence** (medium risk) – specifically the potential for risk to safety and damage to surface infrastructure (refer to **Section 6.2**).
- **Noise** – (medium risk) – specifically the potential for degradation of noise amenity due to cumulative operational noise from the CVC and MC surface infrastructure (refer to **Section 6.3**).
- **Air Quality** – (medium risk) – particularly increased dust associated with increased coal transportation rates (refer to **Section 6.4**).
- **Water resources** – (medium risk) – specifically the potential for impacts to quality, quantity or flooding regime and potential impacts on aquifers (refer to **Section 6.5**).

- **Biodiversity** – (medium risk) specifically the potential impact on native fauna including threated species from previously proposed (and now removed from the Project) surface disturbance activities (refer to **Section 6.6**).

- **Greenhouse gas** – (medium to high risk) – specifically the potential for Scope 1 Fugitive emission of greenhouse gases from continued mining operations (refer to **Section 6.9**).

A detailed assessment of each of the environmental and social aspects identified in the environmental risk analysis as requiring further assessment for the Project is provided throughout the remainder of **Section 6.0**.

The preliminary environmental risk analysis has been revised following completion of the relevant technical assessments and the revision of the Project to exclude the Eastern Mining Area. The environmental risk analysis provided in **Appendix 6** identifies both the preliminary risk rating and provides a revised risk rating that considers the EIS assessment findings and control measures proposed for the Project.

6.2 Subsidence

Potential subsidence related impacts have been identified by the community as one of the key issues of concern in relation to the Project. Subsidence impacts associated with current and historical mining at CVC and MC have not resulted in any significant surface impacts, however, mining in the Great Northern Seam at the former Newvale Colliery resulted in significant adverse impacts in the Chain Valley Bay area in the mid to late 1980s. These historical impacts associated with secondary extraction in the Newvale Colliery have, understandably, elevated the concerns of some residents regarding the potential impacts associated with the secondary extraction under Lake Macquarie.

The Project does not propose any increase in the approved mining area and will not result in any changes to subsidence management commitments in relation to foreshore or land areas. Potential subsidence impacts will be effectively avoided (<20 mm vertical subsidence) under the foreshore and land areas through the use of long term stable bord and pillar mining methods below these areas.

As discussed in **Section 2.2.1**, the current approval boundaries of CVC and MC operations are located in an area with an extensive history of underground mining. This past mining has greatly improved the ability to predict subsidence impacts and inform mine design. Subsidence commitments associated with current CVC Development Consent are proposed to be maintained for the Project.

As discussed in **Section 3.4**. secondary extraction would be limited to the approved CVC and MC mining areas under Lake Macquarie where subsidence impacts are unlikely to have a significant impact on surface features or sensitive marine sea grass areas. The Project will extend the area where secondary extraction activities below Lake Macquarie could occur into parts of the approved MC mining area below Lake Macquarie however, consistent with the current CVC Consent conditions, any secondary extraction within this area would be subject to further detailed assessment as part of the Extraction Plan approval process before it could be undertaken.

6.2.1 Existing Environment

The Project Area supports a range of natural features and built features, including the Lake Macquarie, existing Delta infrastructure, industrial infrastructure, VPPS, private residences, local roads, utilities and services, jetties navigational markers, boat moorings and vegetated land areas.

The mining methods associated with the approved mining areas at CVC and MC include first workings (including the development of roadways) and secondary extraction. Mining is limited to first workings under land, the foreshore and seagrass beds with maximum subsidence of 20 mm. Secondary extraction is undertaken under lake areas only with a maximum subsidence of 780 mm.

Subsidence monitoring includes bathymetric monitoring, fixed foreshore monitoring surveys, remote LiDAR monitoring and visual inspection methods. Subsidence monitoring has not detected any subsidence effects that have led to damage to the natural and built features within the Project Area associated with mining operations carried out pursuant to the current development consents applicable to MC and CVC operations.

Monitoring of subsidence beneath the lake indicates subsidence of up to 500 mm (well within the approved limit of 780 mm associated with secondary extraction) has occurred. Bathymetric monitoring surveys have highlighted some minor elevation changes which appear to be unrelated to mining and may be associated with the movement of sediment as a result of the wave climate in the Lake (Subsidence Monitoring Program, Delta Coal 2020). Surveys undertaken to date have shown that subsidence from the miniwall mining can be monitored with a reasonable level of accuracy and subsidence monitoring will continue in active mining areas and where mining has been completed in accordance with the requirements currently implemented under the CVC subsidence monitoring program.

No changes to approved mining areas under land are proposed as part of the Project and the Project will not result in any changes to approved impacts or management commitments in currently approved mining areas below land. Due to the low levels of approved subsidence in these areas, no impact to existing natural or built surface features are expected. Existing subsidence monitoring requirements would continue as part of the Project.

6.2.2 Previous Mining and Subsidence

Subsidence impacts associated at mining at CVC and MC have not resulted in any significant surface impacts however mining in the Great Northern Seam at the former Newvale Colliery resulted in significant adverse impacts in the Chain Valley Bay area in the mid-late 1980s. The extent of historical mining in this area is shown in **Figure 2.9.**

The extensive mining history in and around Lake Macquarie (including experience from current mining operations) has greatly improved the ability to predict subsidence levels and assisted with developing mine design guidelines to protect against foreshore, seagrass and lakebed impacts. This experience provides a high degree of confidence in both predicting and managing potential subsidence impacts. Furthermore, ongoing routine subsidence monitoring and the nature of the proposed mining methods and ability to observe conditions underground allows adaptive measures such as mine design changes, increased barrier pillars, widening of protection zones, etc. to be undertaken in a timely manner. This assists with mitigating against and minimising the impact of any unforeseen subsidence events.

6.2.3 Subsidence Criteria

6.2.3.1 Existing Criteria and Performance Measures

The approved CVC mine design is based on a number of performance measures currently specified in Conditions 1, 2 and 4 of Schedule 4 of the CVC Development Consent. The key subsidence impact performance measures for the approved CVC operations are presented in **Table 6.1**.

Table 6.1 CVC Subsidence Impact Performance Measures

Aspect	Performance Measures
Vertical Subsidence	
Land Areas	<20 mm vertical subsidence (Zone A).
High Water Mark	<20 mm vertical subsidence (Zone A).
Zone B (excluding seagrass beds)	<780 mm vertical subsidence.
Seagrass Beds	<20 mm vertical subsidence (Zone A and Zone B).
Biodiversity	
Threatened species or endangered populations	Negligible environmental consequences.
Seagrass beds	Negligible environmental consequences including: • negligible change in the size and distribution of seagrass beds • negligible change in the functioning of seagrass beds • negligible change to the composition or distribution of seagrass species within seagrass beds.
Benthic communities	Minor environmental consequences, including minor changes to species composition and/or distribution.
Mine Workings	
First workings under an approved Extraction Plan beneath any feature where performance measures in this table require negligible environmental consequences	To remain long-term stable and non-subsiding (Zone A and Zone B).
Second workings	To be carried out only in accordance with an approved Extraction Plan (Zone B only).
Built Features	
Trinity Point Marina Development Other built features	Always safe. Serviceability should be maintained wherever practicable. Loss of serviceability must be fully compensated. Damage must be fully repaired, replaced or fully compensated.
Public Safety	
Public Safety	Negligible additional risk.

The key control of subsidence impacts under the CVC Consent is the restrictions on the different mining methods permitted in the Zone A and Zone B Areas. These Zones are defined in the current CVC consent as follows:

Zone A: The area shown as Zone A in Figure 1 in Appendix 3 of CVC Consent (refer to **Figure 2.10**) in which long-term stable mining systems generating no more than 20 mm of surface subsidence may be utilised

Zone B: The area shown as Zone B in Figure 1 in Appendix 3 of CVC Consent in which mining systems generating no more than 780 mm of surface subsidence may be utilised.

The existing controls on all mining in the MC Project Approval are broadly consistent with the Zone A controls under the CVC Consent.

The Project does not propose any change to the CVC Consent subsidence impact performance measures which would be extended to all approved and proposed CVC and MC mining areas within the Project Area. The proposed adjustments to the Zone A and Zone B areas associated with the consolidation of the approved mining areas are shown on **Figure 3.1.**

6.2.4 Subsidence Impact Assessment

The extension of Zone B into the currently approved MC mining area below Lake Macquarie provides a consistent approach to managing underground mining operations below lake areas and avoids arbitrary restrictions on mine design which may limit future resource extraction in this area. The subsidence commitments in this extended area of proposed secondary extraction are identical to those currently approved in Zone B at CVC, including a maximum vertical subsidence limit of 20 mm where seagrass beds are present.

As with currently approved operations at MC and CVC, the foreshore zone above all areas of proposed mining would form part of the Zone A mining area with vertical subsidence limited to < 20mm in foreshore areas. Adherence to well understood first workings mining methods that have regard to local geological conditions provides a high degree of risk control effectiveness that provides confidence that a negligible level of subsidence will be achieved. No surface impacts are anticipated at this level of subsidence impact.

As noted above, all secondary extraction in the Zone B Area, including any secondary extraction in the extended Zone B area, will be subject to further detailed assessment of any potential subsidence impacts as part of the Extraction Plan assessment and approval processes.

Consistent with the current conditions in the CVC Consent, any secondary extraction mining methods (that is, any workings which are not designed to be long term stable and/or would involve more than 20mm vertical subsidence) in this extended area will require further approval in the form of an Extraction Plan. The existing Extraction Plan approval process includes a requirement for a detailed assessment of potential subsidence impacts associated with the particular mine plan proposed in this area. The Project would extend the Zone B approval processes to the entirety of the approved mining area under the lake (outside the foreshore protection zone). Subsidence impacts and management within this extended Zone B Area will be broadly consistent with the existing approved CVC Zone B mining area. As a detailed assessment of potential subsidence impacts is required as part of the Extraction Plan approval processes should secondary extraction be proposed in this area in the future, and the Consolidation Project does not propose and changes to currently approved first workings mining methods or areas where these can be undertaken, no additional assessment of subsidence impacts has been undertaken (or is considered to be required) in relation to the extended Zone B or the Zone A areas.

6.2.5 Subsidence Monitoring and Management

Mine design criteria are used to manage subsidence in the design phase of the operation and the predictions are based on the latest pillar design principles, local geological characteristics and results of existing subsidence monitoring data.

While the levels of subsidence from the continuation of approved operations are predicted to remain below levels that would be observed through natural ground movement, routine monitoring is undertaken to identify any unexpected subsidence effects and allow rapid and proactive verification of both initial and final subsidence effects and impacts. The Subsidence Monitoring Program has been prepared to:

- provide data to assist with the management of the risks associated with subsidence
- validates the subsidence predictions
- analyses the relationship between the predicted and resulting subsidence effects and predicted and resulting impacts under the plan and any ensuing environmental consequences
- informs the contingency plan and adaptive management process.

The subsidence monitoring undertaken allows adaptive measures such as mine design changes, increased barrier pillars, widening of protection zones, etc to be undertaken in a timely manner to mitigate against and minimise the impact of any unforeseen exceedances. Areas with increased predicted levels of subsidence (i.e. areas of secondary extraction in Zone B) warrant higher levels of subsidence monitoring than areas where first workings only are proposed.

Under the current CVC Consent, subsidence surveys are required to be undertaken annually as a minimum, with reference monitoring points located on shorelines nearby any mining activities. Shoreline surveys are also undertaken at intervals corresponding with key miniwall retreat milestones (Zone B). Bathymetric surveys are also undertaken each year to gauge subsidence levels over the area of secondary extraction undertaken beneath Lake Macquarie, where land-based surveys are not possible. Consistent with existing practice, post mining subsidence monitoring will be carried out for a period of 3 years in areas of potential impact unless otherwise approved in the subsidence monitoring plan or Extraction Plan.

The subsidence monitoring and management framework for secondary extraction approved under the CVC operations is described in detail in the Extraction Plan for each section of the mine. This includes details for the respective triggers/performance indicators (including actual measured subsidence and inspections for environmental impact). These management plans also include specific information regarding the subsidence monitoring requirements (including baseline monitoring), remediation and adaptive management techniques and contingency plans. All of these are then summarised in the Subsidence Management Trigger Action Response Plan (TARP) which aims to consolidate all subsidence management requirements into a central focus point, triggering a response or set of responses commensurate with the nature of the measurement or the impact that has been identified. The relevant subsidence monitoring and management measures under approved Extraction Plans will be continued for the Project.

A subsidence monitoring plan will be revised providing a unified approach to subsidence monitoring and relevant adaptive management measures across the two operations in the event of higher than predicted subsidence impacts. The Plan will be reviewed annually and, where considered to be warranted based on a review of existing monitoring and planning mining operations, updates may include changes to monitoring frequency, methods and/or duration.

6.3 Noise

Noise impacts associated with the existing operations and the VPPS have been a key issue for many residents in the Chain Valley Bay area, particularly the Macquarie Shores Home Village (MSHV). While the VPPS is the dominant noise source in the area (EMM, 2021), past noise impacts associated with coal handling at MC and CVC have been an issue for nearby residents and Delta Coal has made a number of significant changes to operations at MC (in particular) to mitigate noise impacts.

Due to the history of the CVC and MC operations, the existing CVC Consent and MC Project Approval assign different noise criteria to different receivers. The Project provides an opportunity to rationalise assessment criteria to simplify regulatory processes and community expectations in relation to the operations.

A Noise Impact Assessment (NIA) has been prepared by EMM Consulting Pty Ltd (EMM) to assess the noise impacts associated with the Project. In accordance with the SEARs, the NIA addresses noise impacts including construction, operational and cumulative impacts of the Project and other existing and approved mining projects in the locality. In addition, the assessment describes the existing noise environment and identifies the sources of potential impacts whilst proposing mitigation strategies to effectively reduce noise and vibration emissions. Consistent with the requirements of the SEARs, the NIA has been prepared in accordance with the following policies and guidelines:

- NSW Environment Protection Authority (EPA) 2017, Noise Policy for Industry (NPfI).
- NSW Department of Environment and Climate Change (DECC) 2009, Interim Construction Noise Guideline.
- NSW Department of Environment, Climate Change and Water (DECCW) 2011, Road Noise Policy).
- DPIE 2018, Voluntary Land Acquisition and Mitigation Policy (VLAMP).

A summary of the key findings of the NIA is provided in this section and the full report is provided in **Appendix 7**.

6.3.1 Existing Operations

6.3.1.1 Existing Noise Sources

CVC Operations

Surface operations at CVC currently consist of activities associated with:

- the haulage of material and personnel to/from underground (e.g. drift)
- the workshop and storage yard facilities (e.g. forklift)
- water management (e.g. pumps)
- mine ventilation (e.g. ventilation fans) and
- other necessary equipment (e.g. air compressors).

Surface operations at CVC do not currently include handling, transfer or transport of coal however these activities are approved under the current consent and have been considered in the setting of existing noise criteria.

A review of the monitoring data from Q1 (March) 2020 and Q1 (March) 2021 indicated noise emissions from CVC operations were generally inaudible at most monitoring locations during the day, evening and night periods. Where CVC noise emissions were audible, it was generally isolated short events often associated with specific aspects of the surface operations (pit lift winch and/or the use of the forklift). The exception was at monitoring location ATN007 (representative of R22), where noise from the CVC ventilation fans (CVC vent fans) located at Summerland Point was audible. However, at ATN007, both the LAeq,15min and LA1,1min noise contributions from the CVC vent fans satisfied the relevant limits under the existing CVC consent.

MC Operations

Surface operations at MC currently consist of activities associated with:

- the haulage of material and personnel to/from underground (e.g. drift)
- the haulage of coal from underground (e.g. coal conveyor drift)
- the handling facilities for breaking, crushing, sizing and storing of coal (e.g. Coal Handling and Preparation Plant (CHPP))
- the use of earth-moving equipment to manage the coal stockpile (e.g. FEL)
- the overland conveyor system to VPPS
- maintenance in the workshop facilities (e.g. forklift)
- water management (e.g. pumps)
- mine ventilation (e.g. ventilation fans) and
- other necessary equipment (e.g. air compressors).

A review of the MC monthly monitoring results from operator-attended noise monitoring undertaken between June 2020 and May 2022 indicated noise emissions from MC surface operations was generally inaudible at monitoring location RA1 (Doyalson North on the Pacific Highway), audible during approximately half the surveys undertaken at RA2 (MSHV) and audible during one quarter of surveys at RA3 near Kingfisher Shores). It is noted that following Modification 5 to the MC Project Approval in June 2020, noise mitigation works were undertaken at MC. As a result of these works, noise emissions from MC approved surface operations have decreased. Observations by operator-attended noise monitoring surveys undertaken subsequently at all MC compliance noise monitoring locations have indicated a potential noise reduction.

The locations of the monitoring points are shown in **Figure 6.1**.

6.3.1.2 Existing Criteria

As noted above, the CVC Development Consent and MC Project Approval contain separate noise requirements for each site.

The CVC operational noise criteria are set out in Condition 7 of Schedule 3 of the CVC Consent and are reproduced in **Table 6.2.** The CVC Consent also includes long-term noise goals for receivers R11-R13 and R22 which are identified in Condition 8 of Schedule 3. Noting that these long-term noise goals are not strict noise limits, however the CVC consent required best endeavours to achieve these goals over the long term. These long-term noise goals are shown in these in **Table 6.2**. The EPL noise criteria reflect the noise criteria prescribed by Condition 7 of Schedule 3.

Table 6.2 CVC Consent Criteria

Receiver	Day LAeq,15min, dB	Evening LAeq,15min, dB	Night LAeq,15min, dB	Night LA1,1min, dB
R8	38	38	38	45
R11	49 (41)	49 (41)	49 (41)	54
R12	49 (41)	49 (41)	49 (41)	53
R13	43 (41)	43 (41)	43 (41)	49
R15	36	36	36	45
R19	37	37	37	45
R22	46 (40)	46 (40)	46 (40)	46 (40)
All other privately-owned land	35	35	35	45

The MC operational noise criteria are set out in Condition 2 of Schedule 3 of the CVC Consent and are reproduced in **Table 6.3**. Noise limits are not specified under the MC EPL.

Table 6.3 MC Consent Criteria

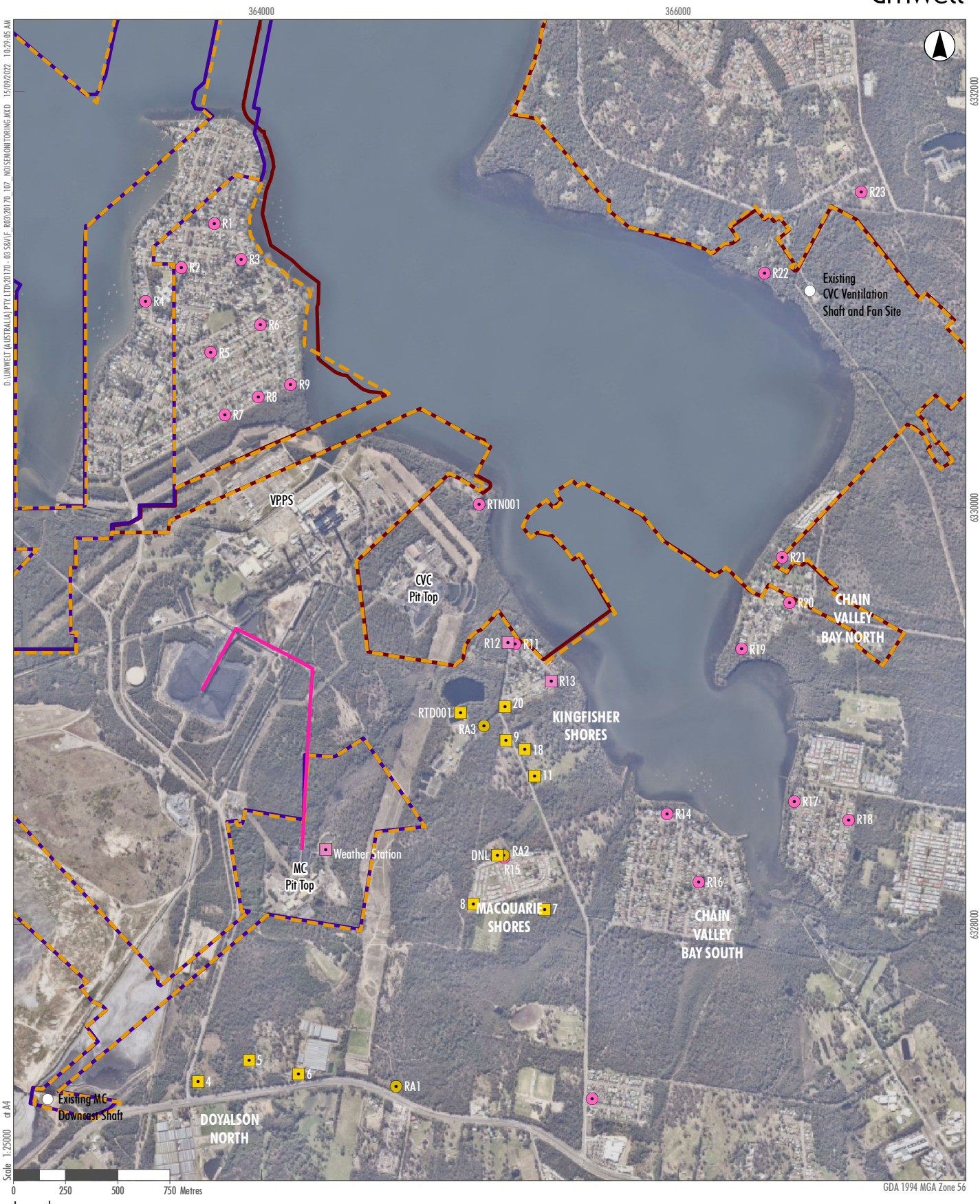
Receiver	Day LAeq,15min, dB	Evening LAeq,15min, dB	Night LAeq,15min, dB	Night LA1,1min, dB
4 – di Rocco	40	36	36	46
5 – Keighran	40	39	39	49
6 – Swan	40	37	37	47
7 – Druitt	40	35	35	45
8 – MSHV1	42	42	42	47
9 – Jeans	40	37	37	47
11 – Jeans	40	36	36	46
18 – Jeans	40	36	36	46
20 – Knight	40	36	36	46
All other privately-owned residences	40	36	36	46

Notes: [1] *This location is also represented by assessment location R15 under the CVC Consent.*

The locations of the receivers identified in the CVC and MC Consent conditions are shown in **Figure 6.1**.

6.3.2 Existing Management Practices

Noise emissions from CVC approved operations are currently managed in accordance with the approved Delta Coal Noise Management Plan (2022). This includes quarterly operator attended noise monitoring at nine locations representative of potentially most affected residential assessment locations. The locations of attended monitoring points are shown in **Figure 6.1**.



Legend

- Project Area
- CVC Consent Boundary (SSD-5465)
- MC Project Approval Boundary (06_0311)
- Existing VPPS Overland Conveyor
- Chain Valley Colliery Receiver Location
- Mannering Colliery Receiver Location
- Chain Valley Colliery Attended Monitoring Location
- Mannering Colliery Attended Monitoring Location

FIGURE 6.1

Noise Monitoring and Assessment Locations

Image Source: Nearmap (May 2019) Data source: Delta Coal

6.3.3 Assessment Methodology

As discussed above, approved operations at CVC and MC are currently regulated separately and, as such, the CVC Development Consent and MC Project Approval contain separate noise requirements, including different noise limits at sensitive residential receivers. These receiver locations are shown in **Figure 6.1**.

The receiver locations considered in the NIA (referred to as assessment locations in the NIA) are considered representative of the nearest and potentially most affected residential receivers in each direction from each area of surface operations, and hence have been adopted for the Project, refer to **Table 6.4**. The receiver numbering from each of the MC and CVC consents has been retained for the purpose of the assessment due to the need to compare existing limits with project noise trigger levels (PNTLs) and predicted impacts from the modelled combined operations. While receivers R15 (CVC Consent) and 8 (MC Project Approval) have been modelled separately, these locations are both considered to be representative of the MSHV as a whole and not just the specific locations assessed.

6.3.3.1 Approach to Setting Project Noise Trigger Levels and Project Noise Limits

The NPfI documents the procedures to be used to assess the noise from industrial noise sources scheduled under the POEO Act. The first step in the application of the NPfI involves determining the project noise trigger levels (PNTL) for the development.

PNTLs are location specific and different areas around a particular project can (and generally do) have different PNTLs depending on the background noise environment. Under the NPfI, the PNTL for a specific location is set based on the most stringent of the project intrusiveness noise level or project amenity noise level. This ensures that intrusive noise is limited, and the amenity of the land use is protected. The aim of the project intrusiveness noise level (PINL) is to protect against significant changes in noise levels, while the aim of the project amenity noise level (PANLs) is to protect against cumulative noise impacts from industry thereby protecting the amenity for particular land uses.

A PNTL is not a noise criterion but, rather, is a benchmark against which impacts associated with a proposed development can be assessed. Section 6.1 of the NPfI states that:

> *The project noise trigger levels should not be applied as mandatory noise limits. The project noise trigger level is the level used to assess noise impact and drive the process of assessing all feasible and reasonable control measures.*

Put another way, a Project is considered to meet the objectives of the NPfI if it can meet the PNTL(s) when assessed in accordance with the NPfI. An exceedance of the PNTL at specific locations will require additional consideration of all reasonable and feasible mitigation measures to bring noise levels below the PNTLs.

Where noise emissions from the existing site exceed the PNTLs as defined in the NPfI, the relevant regulatory authorities and proponent will determine achievable noise limits for the site through negotiation and discussion with relevant stakeholders, as required. This process has regard to reasonable and feasible noise mitigation measures that can be implemented and the particular circumstances (including approval history) of the Project and receiver locations.

The process for applying the NPfI to existing sites is outlined in Section 6.1.1 of the NPfI and is discussed in detail in the NIA (refer **Appendix 7**). is summarised as follows as applicable to the Project:

> *Undertake an initial evaluation, including whether approvals/licences include noise limits and whether they are being met.*
>
> *Establish relevant PNTLs, in accordance with the NPfI, to establish a benchmark level to assess the need to consider noise mitigation.*
>
> *Measure/predict the noise levels produced by the source in question, having regard to meteorological effects such as wind and temperature inversions. Compare the measured/predicted noise level with the PNTLs.*
>
> *Where the PNTLs are exceeded, assess feasible and reasonable noise mitigation strategies.*
>
> *Develop and refine achievable noise limits that will become long-term noise goals for the site. This may involve interaction between the regulator and proponent as well as consultation with the community. Regulators and operators need to consider the technical practicalities and cost of noise reduction measures, and how long it will take to implement these measures, along with the environmental consequences of exceeding the PNTLs.*
>
> *Monitor compliance with the agreed noise limits, and review and amend the noise performance of the site as required.*

The methodology associated with the setting of PNTLs is discussed in further detail in the NIA (refer **Appendix 7**).

Due to the past and ongoing concerns of residents in relation to noise impacts (discussed further in **Section 5.0** and **Appendix 17**), Delta Coal has endeavoured to design the Project such that noise impacts from the operations either meet the PNTL established under NPfI or, where an exceedance of the PNTL is predicted, impacts do not exceed the current noise criteria for the operations.

6.3.3.2 Understanding the Existing Acoustic Environment

The setting of the PINLs for assessment purposes requires an understanding of ambient noise levels. To establish current ambient and background noise levels unattended noise monitoring was completed by EMM in accordance with the NPfI at three locations surrounding the CVC and MC Pit Tops in February 2021. The three noise loggers were in place from 8 to 19 February 2021 and were programmed to record statistical noise level indices continuously in 15-minute intervals. An additional location where ambient noise levels have been previously measured in May 2015 to inform the Noise Impact Assessment for the MC Modification 3 has also been adopted for the NIA. The four monitoring locations, the areas they are representative of, and a brief description of the existing environment is set out below:

- L1 – Macquarie Shores Home Village (MSHV) (representative of assessment locations 7,8, R15) – typically dominated by VPPS, distant traffic, MC operations and local resident activity. It is noted that previous attended compliance and long-term monitoring has shown higher baseline noise levels for this location. Such fluctuations are likely due to operating conditions of the Delta power station, other industrial operations and prevailing weather (e.g. wind directions) during sampling.

- L2 – Kingfisher Shores (representative of assessment locations 9, 11, 18, 20, R8, R9, R11, R12 and R13) – dominated by operation of VPPS, local and distant traffic and local residential activity.
- L3 – Chain Valley Bay (representative of assessment locations R5, R6, R14, R17 and R19) – dominated by operation of VPPS, local and distant traffic, local residential activity and natural sounds (e.g. wind in foliage, birds and insects).
- L4 – Pacific Highway (representative of assessment locations 4, 5 and 6) – dominated by traffic on Pacific Highway, activity associated with operation of the nearby service station and operation of VPPS.

PINLs are set based on the ambient noise level monitoring undertaken and are set based on the 10th percentile (i.e the lowest 10 %) of measured LA90 statistical noise levels measured in accordance with the NPfI[1].

As noted earlier, PANLs are used to protect against cumulative noise impacts from industry thereby protecting the amenity for particular land uses. PANLs for specific land uses are set by the NPfI based on the land use categorisation of a particular area rather than measured noise levels. Residences in proximity to the CVC and MC surface operations have been split into two NPfl amenity categories NPfI 'suburban' or 'urban'.

Suburban – an area that has local traffic with characteristically intermittent traffic flows or with some limited commerce or industry. This area often has evening ambient noise levels defined by the natural environment and human activity.

Urban – an area with an acoustical environment that is dominated by 'urban hum' or industrial source noise (the combination of many different unidentifiable sounds e.g. traffic and/or industrial related sources).

All residences were characterised as being 'Urban' except for the Chain Valley Bay receivers R5, R6, R14, R17 and R19 which have been characterised as being 'Suburban' due to the reduced industrial influence in this area.

6.3.3.3 Project Noise Trigger Levels

The PINLs and PANLs and the resulting PNTLS for each identified assessment location are outlined in **Table 6.4**.

1 Due to a power failure at the L3 Chain Valley Bay noise logger location, only 4 to 5 days of continuous data was collected. In such cases, it is accepted practice to adopt the lowest measured LA90 statistical noise levels in setting the PINL for this location.

Table 6.4 PNTLs for All Assessment Locations CVC and MC

Assessment Locations	PINLs, LAeq, 15min, dB				PANLs, LAeq, 15min, dB				PNTLs, LAeq, 15min, dB			
	Day	Evening	Night	MSHV	Day	Evening	Night	MSHV	Day	Evening	Night	MSHV
7, 8, R15	41	37	35	41	58	48	43	N/A	41	37	35	41
9, 11, 18, 20, R8, R9, R11, R12, R13	45	44	44	45	58	48	43	N/A	45	44	43	45
R5, R6, R14, R17, R19	40	37	37	39	53	43	38	N/A	40	37	37	39
4, 5, 6	47	47	39	47	58	48	43	N/A	47	47	39	47

Note: Day: 7 am to 6 pm Monday to Saturday; 8 am to 6 pm Sundays and public holidays; Evening: 6 pm to 10 pm; Night: 10 pm to 7 am Monday to Saturday and 10 pm to 8 am Sundays and public holidays; MS = morning shoulder: Monday to Friday 5:30 am to 7 am.

Figure 6.2 illustrates common noise levels of different situations to assist in understanding the nature of impacts the predicted Project impacts and relevant assessment criteria.

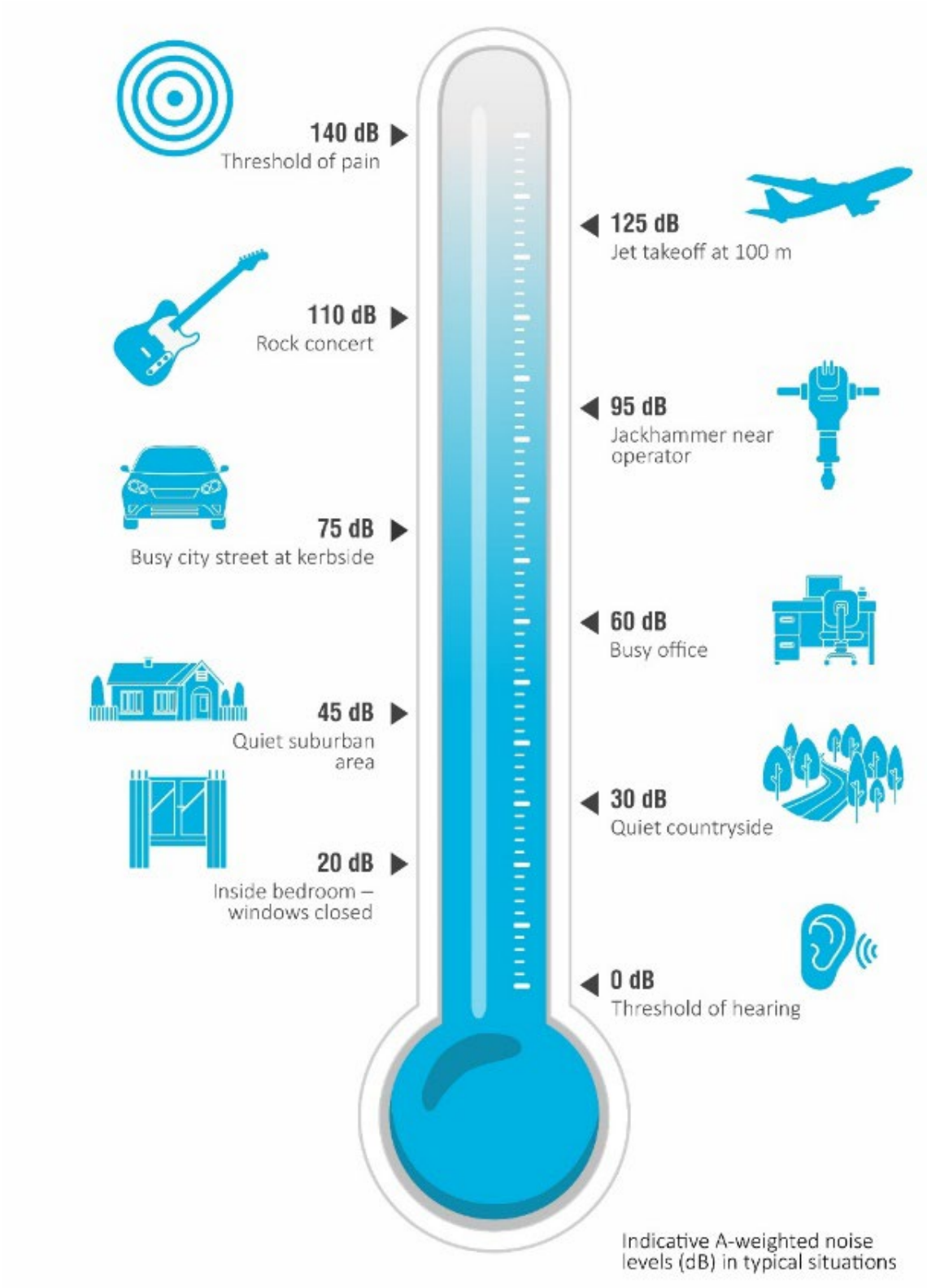


Figure 6.2 Common Noise Levels

6.3.3.4 Sleep Disturbance

The CVC and MC pit tops will continue to operate during the night period (10 pm–7 am including the morning shoulder period 5 am–7 am) and therefore, in accordance with the NPfI, the potential for sleep disturbance from the Project has been assessed.

The difficulty in establishing an absolute noise level criterion that would correlate to an acceptable level to prevent sleep disturbance is acknowledged by relevant governing authorities.

The NPfI suggests the following screening criteria for residential receivers:

- $L_{Aeq,15min}$ 40 dB or the prevailing RBL plus 5 dB (whichever is the greater); and/or
- L_{Amax} 52 dB or the prevailing RBL plus 15 dB (whichever is the greater).

The screening criteria do not represent absolute limits, nor do they indicate that sleep disturbance is likely to occur as a result of the activities being assessed. Rather where one of the screening criteria is exceeded, a detailed maximum noise level event assessment should be undertaken. This assessment would consider factors such as the maximum noise level, the extent to which the maximum noise level exceeds the RBL, and the number of times this happens during the night period.

Sleep disturbance screening levels for the assessment locations are provided in **Table 6.5**.

Table 6.5 Sleep Disturbance Screening Levels

Assessment Locations	Measured RBLs (dB)		Sleep Disturbance Levels (dB)			
			$L_{Aeq,15min}$[1]		L_{Amax}[2]	
	Night	Morning Shoulder	Night	Morning Shoulder	Night	Morning Shoulder
4, 5, 6	34	45	40	50	52	60
7, 8, R15	30	36	40	41	52	52
9, 11, 18, 20, R8, R9, R11, R12, R13	40	41	45	46	55	56
R5, R6, R14, R17, R19	34	34	40	40	52	52

Notes: [1] *Whichever is greater between $L_{Aeq,15min}$ 40 dB or RBL plus 5 dB.*
[2] *Whichever is greater between L_{Amax} 52 dB or RBL plus 15 dB.*
Night: 10 pm to 7 am Monday to Saturday and 10 pm to 8 am Sundays and public holidays.
Morning shoulder: Monday to Friday 5:30 am to 7 am.

6.3.3.5 Road Traffic Noise

As discussed in **Section 3.0**, the Project does not change any aspects of the approved operations that would result in increased road traffic volumes and routes on public roads, therefore noise impacts associated with road traffic have not been considered in the NIA for the Project.

6.3.3.6 Construction Noise

Noise generated by proposed construction of minor infrastructure at the CVC surface operations (upgrade/replacement of demolished infrastructure), and installation of surface to seam boreholes, has been assessed in accordance with the Interim Construction Noise Guideline (ICNG) (DECC, 2009). A quantitative assessment was undertaken using the same modelling approach as adopted for the operational noise assessment. Noise sources and associated sound power levels are summarized in Table 9.1 of the NIA (refer to **Appendix 7**).

Proposed construction works are expected to be completed within three months, during ICNG standard hours:

- Monday to Friday from 7.00 am to 6.00 pm.
- Saturdays from 8.00 am to 1.00 pm.
- No work on Sundays or public holidays.

The construction noise management levels adopted for the Project are outlined in **Table 6.6** for standard construction hours. These noise levels are based on adopted day RBLs (refer to **Table 6.6**) in accordance with the ICNG.

Table 6.6 Construction NMLs for Standard Hours

Assessment Locations	Day RBL, dB	Standard Hours NML, LAeq,15min (dB)
4, 5, 6	42	52 (RBL +10 dB)
7, 8, R15	36	46 (RBL +10 dB)
9, 11, 18, 20, R8, R9, R11, R12, R13	40	50 (RBL +10 dB)
R5, R6, R14, R17, R19	35	45 (RBL +10 dB)

6.3.3.7 Construction and Operational Vibration

Vibration from operational activity is not expected to change as a result of the Project, relative to the approved operations. The main potential source of vibration from the operations would be from truck movements and/or front-end loaders operating at the CVC and MC pit tops. However, vibration levels are expected to be below levels that could cause disturbance to sensitive residential receivers. Given the construction works would be only minor in nature and there is no change to the surface operations as part of the Project, a detailed assessment of vibration impacts has not been included in the NIA.

6.3.4 Operational Noise Assessment

6.3.4.1 Overview

Noise modelling was based on three-dimensional digitised ground contours of the surrounding land and relevant surface infrastructure. The model displays the daily operations of the MC and CVC surface operations, with plant and equipment placed at various locations and heights, representing realistic scenarios. Noise predictions were carried out using the 'iNoise' software which calculates total noise levels at relevant assessment locations from the concurrent operation of multiple noise sources.

During certain meteorological conditions, noise levels from a site at receivers may increase or decrease compared to calm conditions. Therefore, the modelling adopted stability category F temperature inversion with 2 m/s wind speed (source-to-receiver) for the most critical night period representing the worst-case scenario. In addition, operational noise generated by the CVC and MC surface operations was provided by Delta Coal, which included detailed descriptions of the existing and proposed operations.

Three operating scenarios were modelled:

- CVC operating alone with surface operations reflecting 1.5 Mtpa throughput and road haulage of 1.5 Mtpa to VPPS (this modelling scenario included all road haulage impacts from CVC to the VPPS stockpile and return truck movements).
- MC operating at full proposed operational capacity of 2.8 Mt with coal haulage via conveyor to VPPS.
- combined operation of CVC and MC with CVC operating at 1.5 Mtpa throughput and road haulage of 1.5 Mtpa to VPPS and MC processing 1.3 Mtpa with coal transferred to VPPS via conveyor.

It is noted that the worst-case noise impacts associated with MC operating at 1.5 Mtpa and 2.8 Mtpa are effectively identical and the combined modelling scenario is the first two scenarios operating concurrently and not an independent modelling of a MC scenario operating at a reduced production rate.

Appendix 7 includes further detail regarding modelling set up and assumptions.

6.3.4.2 Impact Assessment CVC Alone

Noise levels from the approved and proposed CVC surface operations were predicted during the day, evening, night and morning shoulder periods and compared to existing noise limits. The comparison showed $L_{Aeq,15min}$ noise levels from the approved and proposed CVC operations are predicted to satisfy the existing noise limits at most assessment locations. The exception is at assessment location 9, where the $L_{Aeq,15min}$ noise level is predicted to negligibly exceed the existing noise limit (by 1 dB) during the night period and worst-case noise-enhancing meteorological conditions (stability category F and 2 m/s wind speed).

6.3.4.3 Impact Assessment MC alone

Noise levels from the MC operations were predicted during the day, evening, night and morning shoulder periods and compared to existing noise limits. The comparison showed that $L_{Aeq,15min}$ noise levels from the MC surface operations are predicted to satisfy the existing noise limits at most assessment locations. The exceptions are at assessment locations 4 and 7, where the $L_{Aeq,15min}$ noise level is predicted to negligibly exceed the existing noise limit (by 1 dB) during the night period and worst-case noise-enhancing meteorological conditions (stability category F and 2 m/s wind speed).

6.3.4.4 Impact Assessment Combined Operations

Noise levels from the combined (CVC and MC) operations were also predicted at all assessment locations during the day, evening, night and morning shoulder periods and compared to the PNTLs. This operating scenario is considered to represent the worst-case noise conditions at all receivers. The relevant noise contours for the worst-case predicted noise levels from the combined operations scenario for the day, night and morning shoulder periods are shown on **Figure 6.3, Figure 6.4** and **Figure 6.5** respectively.

Legend

- Project Area
- Existing VPPS Overland Conveyor
- Mannering Colliery Noise Monitoring
- Chain Valley Colliery Noise Monitoring

Day Period Noise Level Contour

- 35 dB(A)
- 40 dB(A)
- 45 dB(A)
- 50 dB(A)

FIGURE 6.3

Predicted Worst Case Noise Levels (Day)

Image Source: Nearmap (May 2019) Data source: Delta Coal (2021); EMM Consulting (2021)

Legend

- Project Area
- Existing VPPS Overland Conveyor
- CVC Noise Monitoring
- MC Noise Monitoring Locations

Night Period (Worst Case) Noise Level Contour

- 35 dB(A)
- 40 dB(A)
- 45 dB(A)
- 50 dB(A)

FIGURE 6.4

Predicted Worst Case Noise Levels (Night)

Image Source: Nearmap (May 2019) Data source: Delta Coal (2021); EMM Consulting (2021)

Legend

- Project Area
- CVC Consent Boundary (SSD-5465)
- MC Project Approval Boundary (06_0311)
- Existing VPPS Overland Conveyor
- CVC Noise Monitoring
- MC Noise Monitoring Locations

Morning Shoulder Period Noise Level Contour

- 35 dB(A)
- 40 dB(A)
- 45 dB(A)
- 50 dB(A)

FIGURE 6.5

Predicted Worst Case Noise Levels (Morning Shoulder Period)

Image Source: Nearmap (May 2019) Data source: Delta Coal (2021); EMM Consulting (2021)

Table 6.7 compares predicted noise impacts to both existing criteria and the PNTLs. Shaded cells in the existing consent criteria reflect the 'any other residence' criteria under the relevant consent. In the predictions, a 'negligible', 'marginal' or 'moderate' exceedance of the PNTL as per the NPfI is shown as bold, bold underlined or bold shaded, respectively.

The comparison showed that $L_{Aeq,15min}$ noise levels from the combined operations are predicted to satisfy the PNTLs at most assessment locations. The exceptions are at assessment locations R11, R12, R15, 7 and 8 where the LAeq,15min noise levels are predicted to exceed the PNTLs during the morning shoulder period, evening period and/or night period. With the exception of receiver 7, where there is a predicted exceedance of the relevant PNTL, the predicted noise impacts are within the existing MC Consent or CVC Consent criteria. The predicted exceedance of the existing MC and CVC criteria at receiver 7 is in the order of 1–2dB and is therefore considered to be negligible in that this level of increase is unlikely to be distinguishable from existing approved levels.

Residual noise impacts may exist where the best-achievable noise level from a development remains above the PNTLs. The NPfI requires demonstration that noise levels from new industry will not contribute to existing industrial noise such that the recommended amenity noise level (RANLs) are exceeded. The significance of residual noise impacts at the relevant assessment locations where the PNTL is predicted to be exceeded are summarised below:

Morning shoulder period:

- PNTL is negligibly exceeded (by 1-2 dB) at assessment location R11.

Evening period:

- PNTL is negligibly exceeded (by 1-2 dB) at assessment locations R15 and 8 (MSHV).

Night period:

- PNTL is marginally exceeded (by 3-5 dB and <RANL) at assessment locations R15 and 8 (MSHV).
- Predicted noise levels at R15 and 8 meet existing MC night time criteria of 42 dB.

Night period (worst-case stability category F and 2 m/s wind speed):

- PNTL is moderately exceeded (by >5 dB and <RANL) at assessment location 8 (MSHV).
- PNTL is marginally exceeded (by 3-5 dB and <RANL) at assessment location R15 (MSHV).
- Predicted noise levels at 8 and R15 meet existing MC night-time criteria of 42 dB.
- PNTL is negligibly exceeded (by 1-2 dB) at assessment locations R11, R12 and 7.
- Predicted noise levels at R11 and R12 meet existing CVC night-time criteria of 49 dB.
- Predicted noise levels at 7 exceed the existing MC night-time criteria for this location of 35 dB by 2 dB but are within the existing criteria for the adjacent MSHV (receiver 8) under the MC Project Approval.

As the PNTLs are predicted to be exceeded at some assessment locations, an assessment of reasonable and feasible mitigation measures was undertaken in accordance with the NPfI for the assessment of noise emissions from existing industrial sites.

The main operational noise sources at CVC and MC contributing to offsite noise levels are the existing MC drift haulage shed and CHPP, and the CVC coal handling infrastructure (sizers and screen). Preliminary mitigation options targeting these noise sources have been considered and where relevant adopted in the noise modelling (refer to **Appendix 7** for further detail), noting the additional investigations would also be undertaken during initial works should the Project be approved. The NIA indicates that all feasible and reasonable noise mitigation measures identified have been adopted in the noise modelling (enclosed CVC sizers and screen) and will be implemented by Delta Coal. The implementation of all noise mitigation measures proposed will include significant operational planning, engineering design and, in some cases significant capital investment.

6.3.4.5 Cumulative Impacts

Cumulative industrial noise has been considered as other industries are present in the area (e.g. VPPS). To limit continuing increases in noise levels from application of the intrusiveness level alone, the ambient noise level within an area from all industrial noise sources combined should remain below the RANL specified in Table 2.2 of the NPfI where feasible and reasonable. The recommended amenity noise levels represent the objective for total industrial noise at a receiver location, whereas the project amenity noise level represents the objective for noise from a single industrial development at a receiver location. Consistent with the NPfI, the PANL (set at $L_{Aeq,15min}$)) is the RANL $L_{Aeq,period}$ +3 dB as per the NPfI. This approach assumes that a receiver can be impacted by up to three or four individual industrial sites (or noise sources) and still remain below the RANL. The PANLs for each receiver location are set out in **Table 6.4**.

The Project's predicted noise impacts are lower than the PANL at all receiver locations with the exception of receivers R11 and R12, which are predicted to exceed the PANL by up to 2 dB during the night-time period. Although the cumulative noise (inclusive of noise from VPPS and future CVC/MC) at R11/R12 is likely to be above the RANL, the predicted noise levels from the Project (and the proposed operational noise limits) for these locations are 4dB below the current noise criteria applicable to these receivers under the CVC Consent alone. Noise from proposed CVC/MC operations is therefore predicted to have lower cumulative noise impacts relative to the operations currently 'approved' under the CVC consent.

Table 6.7 Predicted Noise Impacts Relative to Existing Criteria and PNTLs, LAeq,15 min (dB)

ID	CVC Consent Criteria				MC Consent Criteria				PNTLs				Predicted Noise Impacts – Combined				
	Day	MS[2]	Eve.	Night	Day	MS[2]	Eve.	Night	Day	MS[2]	Eve.	Night	Day	MS	Eve.	Night	Night (WC[1])
R5	35	35	35	35	40	36	36	36	40	39	37	37	29	30	29	29	31
R6	35	35	35	35	40	36	36	36	40	39	37	37	30	31	29	29	32
R8	38	38	38	38	40	36	36	36	45	45	44	43[3]	34	35	34	34	37
R9	35	35	35	35	40	36	36	36	45	45	44	43[3]	34	35	34	34	37
R11	49 (41)[5]	49 (41)[5]	49 (41)[5]	49 (41)[5]	40	36	36	36	45	45	44	43[3]	45	**46**	42	42	**45**
R12	49 (41)[5]	49 (41)[5]	49 (41)[5]	49 (41)[5]	40	36	36	36	45	45	44	43[3]	45	45	42	42	**45**
R13	43 (41)[5]	43 (41)[5]	43 (41)[5]	43 (41)[5]	40	36	36	36	45	45	44	43[3]	39	40	39	39	41
R14	35	35	35	35	40	36	36	36	40	39	37	37	33	34	32	32	35
R15[6]	36	36	36	36	42[6]	42[6]	42[6]	42[6]	41	40	37	35	37	38	**38**	**38**	**40**
R17	35	35	35	35	40	36	36	36	40	39	37	37	29	31	30	30	32
R19	37	37	37	37	40	36	36	36	40	39	37	37	33	35	32	32	35
R22[7]	46	46	46	46	40	36	36	36	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
4	35	35	35	35	40	36	36	36	47	47	47	39	33	34	34	34	37
5	35	35	35	35	40	39	39	39	47	47	47	39	34	34	34	34	37
6	35	35	35	35	40	37	37	37	47	47	47	39	32	34	33	33	36
7	35	35	35	35	40	35	35	35	41	41	37	35	34	35	34	34	**37**
8	36	36	36	36	42	42	42	42	41	41	37	35	39	39	**39**	**39**	**42**
9	35	35	35	35	40	37	37	37	45	45	44	43[3]	41	41	38	38	41
11	35	35	35	35	40	36	36	36	45	45	44	43[3]	35	36	35	35	38
18	35	35	35	35	40	36	36	36	45	45	44	43[3]	37	38	37	37	40
20	35	35	35	35	40	36	36	36	45	45	44	43[3]	42	42	40	40	43

Notes: [1] *Based on future combined CVC and MC operations predictions shown in Table 8.5 of the NIA. The predicted level is shown in brackets where above the relevant PNTL.*

[2] *Existing noise limits for the night period have been assumed for the morning shoulder period.*

[3] *Adopted PNTL is the PANL.*

[4] *Adjusted so proposed noise limits for the morning shoulder, evening and night periods are not higher than the proposed noise limit for the day period.*

[5] *Long-term noise goals.*

[6] *Representative of MSHV based on worst-case assessment location for either CVC or MC operations.*

[7] *Adjacent to the CVC ventilation fan site at Summerland Point. Existing industrial noise at this location will not change as a result of the Project.*

[8] *Day: 7 am to 6 pm Monday to Saturday; 8 am to 6 pm Sundays and public holidays. Evening: 6 pm to 10 pm. Night: 10 pm to 7 am Monday to Saturday and 10 pm to 8 am Sundays and public holidays. Morning shoulder: Monday to Friday 5:30 am to 7 am.*

Sleep Disturbance

Consideration has been given to likely maximum noise level events from the Project during night operations (including operations proposed during the morning shoulder period). Both CVC and MC are approved to operate 24 hours per day, 7 days a week. It is noted that night operations at MC will not change as a result of the Project when compared to existing approved operations. Nonetheless, maximum noise levels from both CVC and MC proposed night operations (including operations proposed during the morning shoulder period) were assessed at assessment locations in accordance with the NPfI.

Maximum $L_{Aeq,15min}$ noise levels from the Project are predicted to satisfy the relevant sleep disturbance screening levels at most assessment locations other than receiver 8 (MSHV), where the $L_{Aeq,15min}$ noise level is predicted to negligibly (by 2 dB) exceed the $L_{Aeq,15min}$ sleep disturbance screening level during the night period and worst-case noise-enhancing meteorological conditions (stability category F and 2 m/s wind speed). Maximum L_{Amax} noise levels from the Project are predicted to satisfy the relevant sleep disturbance screening levels at all assessment locations, including receiver 8. As per the NPfI, the maximum L_{Amax} noise levels from the Project were considered and are predicted to satisfy the relevant sleep disturbance screening levels at all assessment locations therefore a detailed assessment of maximum L_{Amax} noise level events is not required. Further detail is provided in **Appendix 7**.

Proposed Operational Noise Limits

Existing limits, PNTLs and predicted (achievable) noise levels for the combined CVC and MC were used to develop the proposed noise limits for the Project. Current noise limits for each assessment location of CVC and MC were also considered where the PNTL could not be achieved. A summary of the proposed noise limits for each assessment location is shown in **Table 6.8**. These locations are considered representative of the nearest and potentially most affected residences in each direction from the CVC or MC surface operations. To streamline compliance and maintain the commitment to not increase noise impacts above currently approved operations, all residences within the MSHV will maintain the existing MC criteria.

Table 6.8 Proposed Operational Noise Limits

Assessment Locations	Proposed Operational Noise Limits ($L_{Aeq,15min}$, dB)			
	Day	MS	Evening	Night
R5, R6	40	39	37	37
R8, R9	40	40	40	40
R11, R12	46	46	45	45
R13, 9, 11, 18, 20	45	45	44	43
R14, R17, R19	40	39	37	37
MSHV (R15 and 8)	42	42	42	42
R22	46	46	46	46
4,5,6	40	40	40	39
7	41	41	37	37

Notes: Day: 7 am to 6 pm Monday to Saturday; 8 am to 6 pm Sundays and public holidays. Evening: 6 pm to 10 pm. Night: 10 pm to 7 am Monday to Saturday and 10 pm to 8 am Sundays and public holidays. Morning shoulder: Monday to Friday 5:30 am to 7 am.

The noise criteria proposed in **Table 6.8** include consideration of all feasible and reasonable mitigation measures (e.g. mitigation of proposed CVC coal handling infrastructure) and identification of residual noise impacts (best-achievable noise levels) from the Project in accordance with the NPfI.

6.3.5 Construction Noise Assessment

The construction noise assessment utilised quantitative modelling of noise to predict the potential noise levels generated by the construction of minor infrastructure at the CVC surface operations (upgrade/replacement of demolished infrastructure) and water management infrastructure.

Construction noise levels are predicted to satisfy the relevant noise management levels at all assessment locations during standard construction hours. Given that the predictions assume simultaneous operation of plant and equipment at the nearest locations to the relevant assessment locations, it is likely that actual construction noise levels will be lower than those predicted for the majority of the construction phase. Therefore, noise impacts relating to the proposed construction activities are considered unlikely.

6.3.6 Assessment Against Voluntary Land Acquisition and Mitigation Policy

The VLAMP (DPE, 2018) outlines how acquisition and mitigation rights are assigned to landholders to address noise and air quality impacts from state significant mining, petroleum and extractive industry developments.

With minimal changes proposed to the existing approved operations at CVC and MC, the NIA demonstrated that noise from the Project is predicted to be lower or relatively the same as approved operational noise at all assessment locations. Further, the implementation of feasible and reasonable mitigation measures is predicted to result in a reduction in the number of privately-owned residential properties categorised as experiencing significant, moderate or marginal residual noise impacts from CVC and MC compared to approved operations. Furthermore, the characterisation of a residual noise impact of up to 2 dB above the PNTL is considered negligible as stated in the NPfI and VLAMP.

Therefore, voluntary mitigation or voluntary land acquisition rights do not apply to the Project as per the VLAMP.

6.3.7 Noise Management and Mitigation

Existing noise mitigation and management strategies will continue to be implemented as part of the ongoing MC and CVC operations. At CVC prior to replacing the coal handling infrastructure (if required), further engineering work would be completed to design and procure infrastructure that incorporates source controls to reduce the potential noise impacts on the community. Areas that have been initially identified for consideration in this regard are as follows:

- sizing and screening infrastructure – mitigated and designed to minimise noise emissions
- coal stockpile area – designed to minimise noise emissions
- coal bins – designed to minimise noise emissions.

All feasible and reasonable noise mitigation measures identified by the NIA will be adopted and implemented by Delta Coal. Mitigation measures and strategies are detailed in **Appendix 4**.

6.4 Air Quality

An assessment of the existing and potential impacts to air quality for the Project has been undertaken by EMM (EMM, 2021b). The Air Quality Impact Assessment (AQIA) has been prepared to address the relevant SEARs detailed in **Appendix 2** and in general accordance with the guidelines specified by the NSW Environment Protection Authority (EPA) in the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (NSW EPA, 2017) (Approved Methods for Modelling).

The AQIA documents the air quality of the existing environment assessing the pollutants relative to the Project, cumulative impacts resulting from the Project and management and mitigation strategies to effectively reduce impacts to air quality.

A summary of the key findings of the AQIA is provided in this section and the full report is provided in **Appendix 8**.

6.4.1 Assessment Criteria

The impact assessment criteria are designed to maintain ambient air quality that allows for the adequate protection of human health and well-being. The assessment focuses on emissions and impacts from particulate matter (TSP, PM_{10} and $PM_{2.5}$) primarily originating from conveying and transfer of coal, coal sizing and screening, front end loaders pushing coal, hauling coal, and wind erosion of exposed areas. The Project may include some minor construction activities which have the potential to generate dust emissions but given the likely short timeframe (minor water management and coal processing infrastructure upgrades) and small-scale of the construction activities (which are approved under existing consents), this has not been assessed further.

In addition, outflow air from upcast ventilation shafts has potential to cause odour impacts. Although ventilation operations are not expected to change relative to approved operations, and there is no history of complaints in regard to odour from residences surrounding the ventilation shafts, odour emissions have also been quantified and assessed for completeness.

Gaseous combustion emissions from mining equipment do not generally result in significant off-site concentrations and are unlikely to compromise ambient air quality goals. Accordingly, with the exception of particulate matter, combustion emissions were not quantitatively assessed.

The NSW EPA's impact assessment criteria for particulate matter as presented in the Approved Methods for Modelling is shown in **Table 6.9**. The assessment criteria for PM_{10} and $PM_{2.5}$ are consistent with the *National Environment Protection (Ambient Air Quality) Measure* (AAQ NEPM) national reporting standards (DoE 2016).

Table 6.9 Impact Assessment Criteria for Particulate Matter

PM metric	Averaging period	Impact assessment criterion
TSP	Annual	90 µg/m^3
PM_{10}	24 hours	50 µg/m^3
	Annual	25 µg/m^3
$PM_{2.5}$	24 hours	25 µg/m^3
	Annual	8 µg/m^3
Dust deposition	Annual	2 g/m^2/month (increment only)
		4 g/m^2/month (cumulative)

Notes: µg/m^3: micrograms per cubic metre; g/m2/month: gram per square metre per month.
Source: Approved Methods for Modelling (NSW EPA 2017).

Assessment criteria for pollutants were applied at the nearest existing or likely future off-site sensitive receptor and compared against the 100th percentile (e.g. the highest) dispersion modelling prediction in the case of 24-hour impacts. Both the incremental (assessed Project impacts only) and cumulative (Project including background) impacts were assessed. Cumulative impacts also require consideration of existing ambient background concentrations of pollutants.

6.4.2 Existing Air Quality Environment

6.4.2.1 Air Quality Monitoring Network

Delta Coal maintains an air quality monitoring network, with closest monitoring equipment to MC and CVC including:

- one Tapered Element Oscillating Microbalance (TEOM) measuring PM_{10} concentrations daily located in between MC and CVC
- five dust deposition gauges for recording monthly dust deposition rates.

There are no stations monitoring TSP concentrations in the vicinity of MC or CVC.

The closest meteorological station to MC and CVC is the Delta-owned Mannering Automatic Weather Station (AWS) located approximately 70 m north-east of MC and 1 km south-west of CVC. Delta also owns and operates the 'Wyee' Air Quality Monitoring Station (AQMS) located approximately 6.7 km west of MC and 7 km south-west of CVC.

Delta Electricity also operates a beta-attenuation monitor (BAM) measuring $PM_{2.5}$ concentrations daily which is located in Wyee. This monitoring point is part of the Delta Coal air quality monitoring network (as approved and implemented under the Delta Coal Air Quality and Greenhouse Gas Management Plan) and fulfils Delta Coal's PM2.5 monitoring requirement.

The locations of the monitoring equipment in relation to CVC and MC are shown in **Figure 2.15**.

The nearest representative sensitive receptors to the MC and CVC pit tops have also been identified for the purpose of assessing potential air quality impacts from the Project. Their locations are shown in **Figure 6.6**.

6.4.2.2 Existing Environment

The AQIA includes a detailed review of the existing air quality data (2016-2020) from the CVC and MC air quality monitoring network. Aside from emissions generated by MC and CVC, the local airshed will also be influenced by:

- neighbouring emission sources, such as the VPPS and associated ash dams
- wind generated dust from exposed areas
- dust entrainment and tailpipe emissions from vehicle movements along unsealed and sealed roads
- seasonal emissions from household wood heaters and
- long-range transport of fine particles into the region.

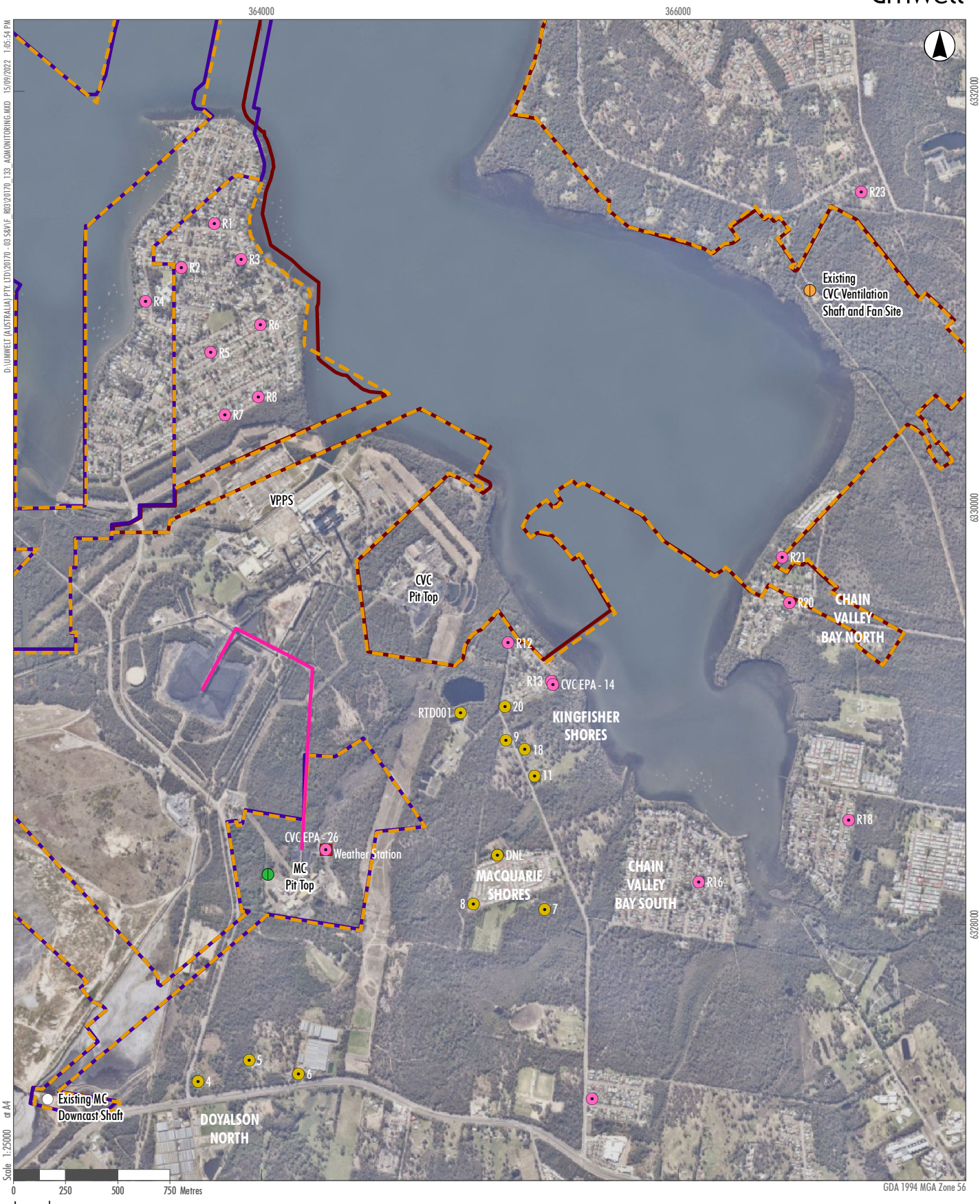
It is considered that all of the above emission sources are accounted for in the monitoring data analysed in the assessment.

Due to state-wide extreme drought conditions and a high frequency of days influenced by smoke from major bushfires and hazard reduction burn events, 2019 and 2020 were not considered representative of background air quality levels of the local area. The 2018 data set was selected due to being most complete and recent, providing clearer perspective of the existing environment. Air quality levels in the local airshed monitored by the Delta Coal and Delta Electricity monitoring network can be summarised as follows:

- 24-hour PM_{10} concentration – 6.13 to 112.9 µg/m^3
- annual average PM_{10} concentration – 16.1 µg/m^3
- 24-hour $PM_{2.5}$ concentration – 0. to 30.9 µg/m^3
- annual average $PM_{2.5}$ concentration – 6.1 µg/m^3
- annual average TSP concentration – 40.3 µg/m^3 (representing a PM_{10}:TSP ratio of 0.4 using the Delta Coal RTD001 TEOM 2018 dataset)
- annual average dust deposition – 0.8 g/m^2/month.

The wind patterns in autumn and winter are very similar displaying dominant southerly winds. The wind patterns in spring and summer are very similar displaying dominant north-easterly winds. Average wind speed during the day in 2018 was 1.4 m/s compared to 2.2 m/s at night-time, south-easterlies are more prominent at night-time.

The AQIA (refer to **Appendix 8**) contains a detailed review of all monitoring data over the 2016–2020 period analysed.



Legend

- Project Area
- CVC Consent Boundary (SSD-5465)
- MC Project Approval Boundary (06_0311)
- Existing VPPS Overland Conveyor
- Chain Valley Colliery Receiver Location
- Mannering Colliery Receiver Location

MC Monitoring

- Greenhouse Gas Monitoring
- Meteorological Station

CVC Monitoring

- Greenhouse Gas Monitoring

FIGURE 6.6

Air Quality Assessment Locations

Image Source: Nearmap (May 2019) Data source: Delta Coal; EMM Consulting (2021)

6.4.3 Emissions Inventory

Two emission scenarios were developed to quantify particulate matter and odour impacts from the Project:

- **Scenario 1 –** extraction at the maximum approved rate of 2.8 Mt from MC.
- **Scenario 2** – MC operating at an extraction rate of 1.3 Mt simultaneously with CVC operating at an extraction rate of 1.5 Mt (for a total maximum approved rate of 2.8 Mt).

Fugitive dust sources associated with the Project were quantified for three size fractions – TSP, PM_{10} and $PM_{2.5}$. Activities were modelled for all hours of the day except for hauling from CVC to VPPS (5.30 am to 5.30 pm).

Particulate matter control measures were also taken into consideration. Analysis of the different activities associated with each scenario showed material handling being the most significant source of particulate matter emissions from MC's operations with the next highest being the upcast ventilation outlets. In comparison to CVC the most significant sources of particulate matter were associated with hauling and material handling. For further detail regarding the activities used in development of the emissions inventory, see **Appendix 8**.

6.4.4 Air Dispersion and Modelling

Dispersion modelling in the AQIA used the CALPUFF modelling system, which is commonly used where non-steady state conditions may occur (e.g. complex terrain or coastal locations) or when calm wind conditions are important (e.g. for odour assessment). In addition to the 23 individual assessment locations (refer to **Figure 6.6**), air pollutant concentrations were predicted over a 5 km (x axis) by 6 km domain (y axis) with 200 m resolution.

- The 2018 meteorological dataset was also adopted for the modelling period given the data availability and consistency.

6.4.4.1 Incremental Results

The worst case predicted incremental TSP, PM_{10}, $PM_{2.5}$, and dust deposition levels of the two modelled operating scenarios (refer to **Section 6.4.3**) are presented in **Figure 6.7** to **Figure 6.12** for each pollutant criterion. The predicted incremental concentrations and deposition rates at each of the modelled receiver locations are set out in Table 6.1 and 6.2 of the AQIA (refer to **Appendix 8**).

The predicted concentrations and deposition rates for all pollutants and averaging periods are below the applicable NSW EPA assessment criteria and VLAMP mitigation and acquisition criteria at all assessment locations.

6.4.4.2 Cumulative Results

Cumulative impacts at each assessment location were assessed using 24-hour average PM_{10} and $PM_{2.5}$ concentrations and annual average concentrations. Predicted cumulative TSP, PM_{10}, $PM_{2.5}$, and dust deposition levels from the Project's proposed scenarios were analysed for each of the assessment locations. The predicted cumulative concentration and deposition rates are set out in Table 6.3 and 6.4 of the AQIA (refer to **Appendix 8**).

The predicted cumulative concentrations and deposition rates for all pollutants and averaging periods are below the applicable NSW EPA assessment criteria and VLAMP mitigation and acquisition criteria at all assessment locations.

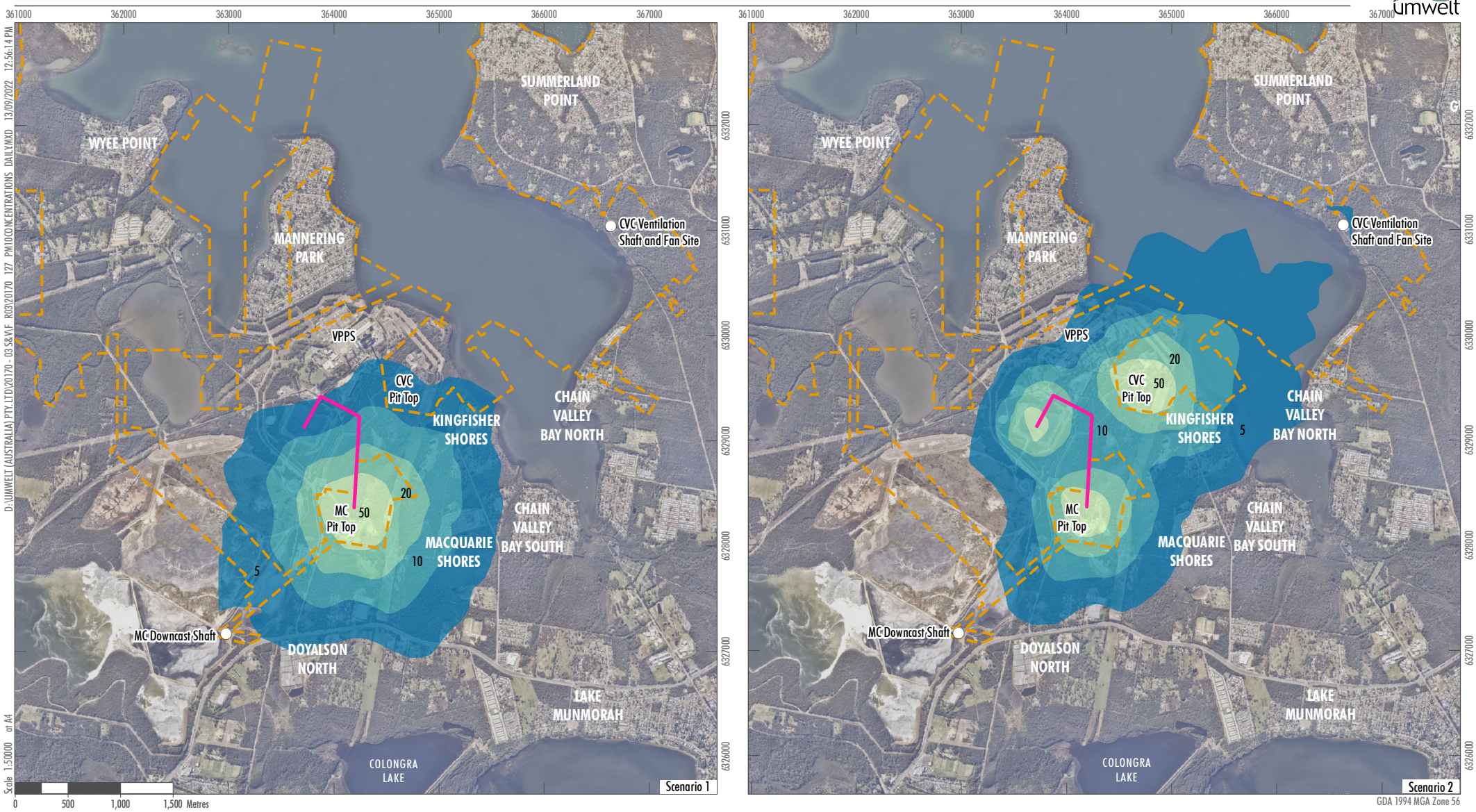
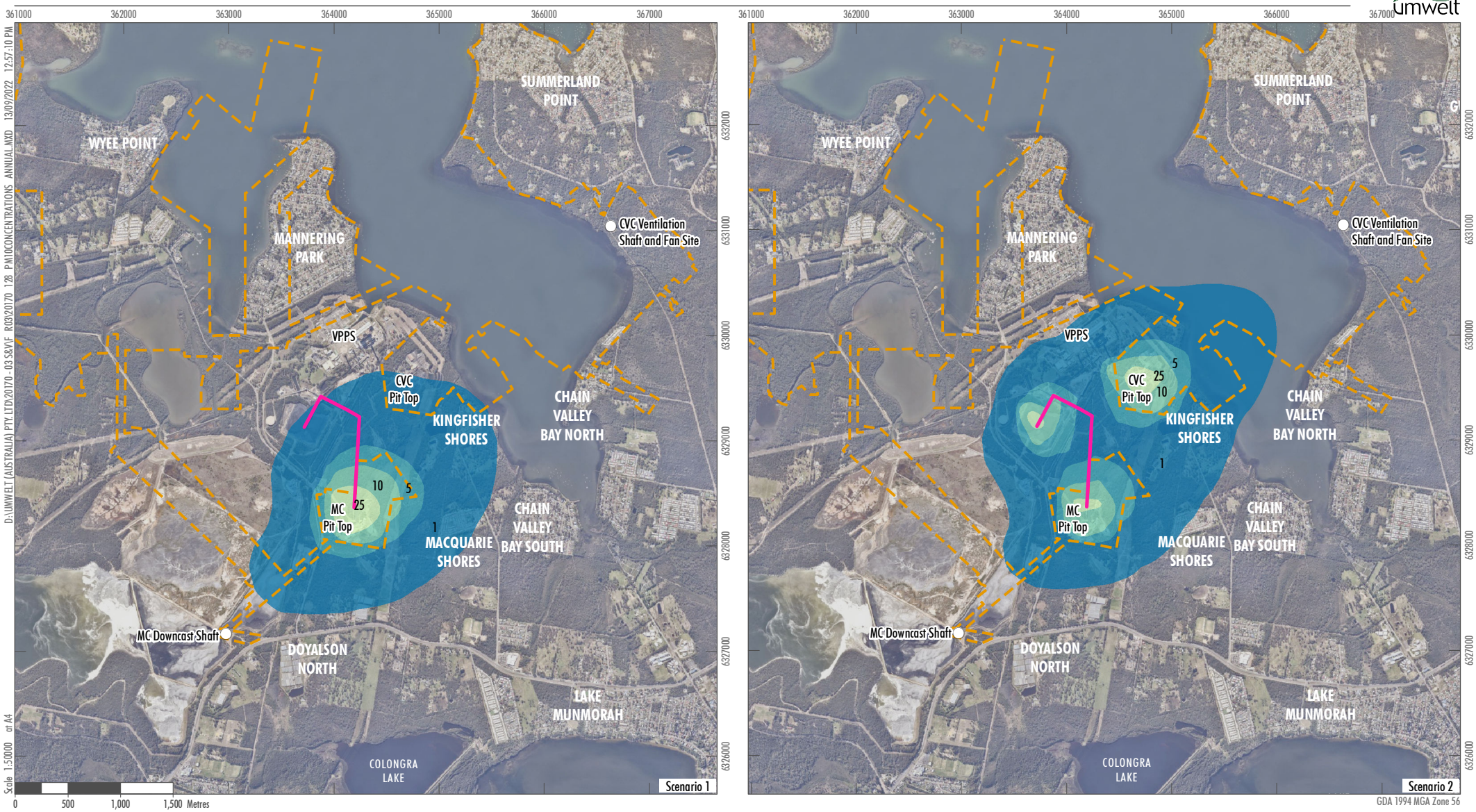


FIGURE 6.7

Maximum Predicted Incremental 24-hour Average PM10 Concentrations (|µg/m3)

Image Source: Nearmap (2021) Data source: Delta Coal (2021); EMM Consulting (2021)



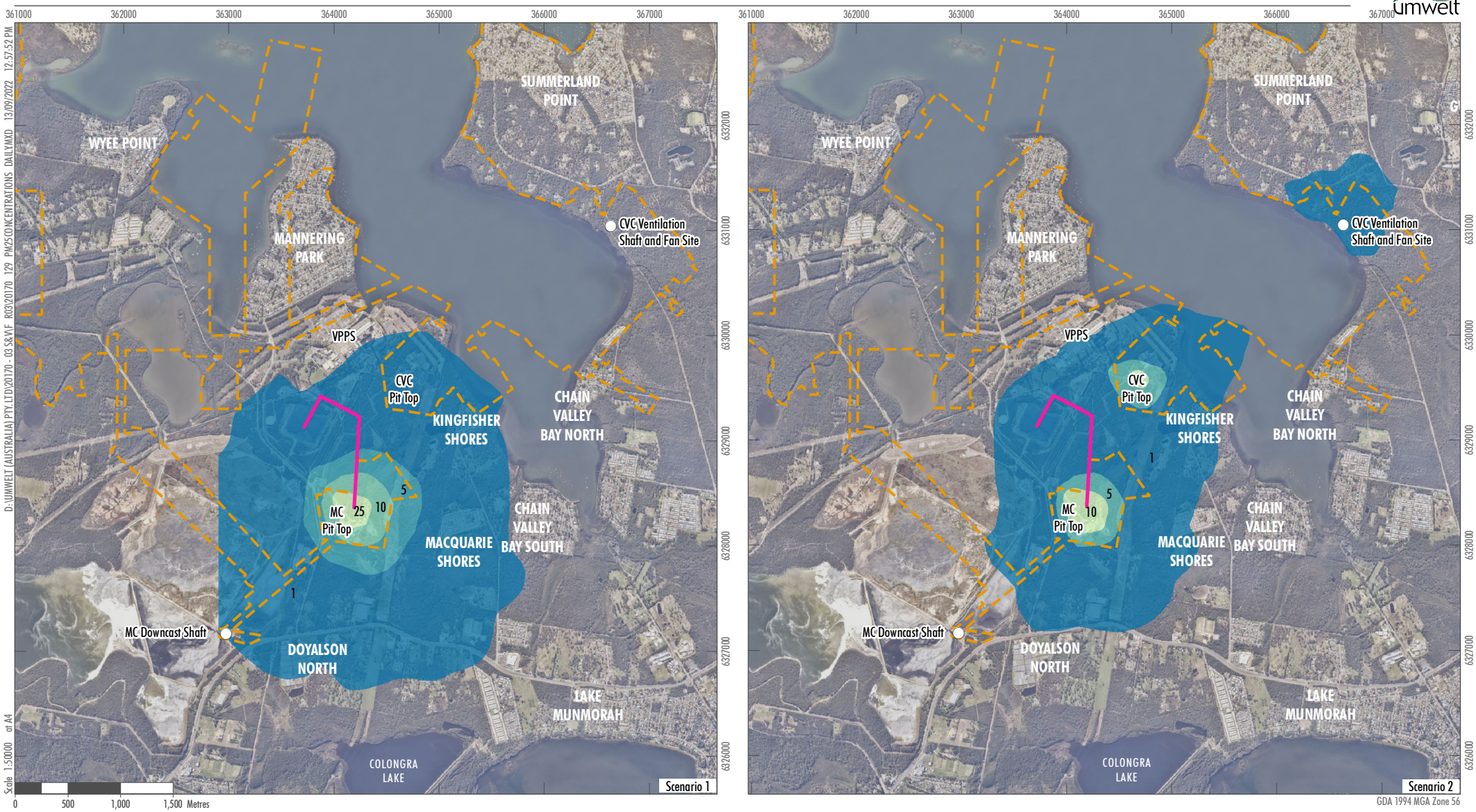
D:\UMWELT (AUSTRALIA) PTY LTD\20170 - 03 S&V\F R03\20170 128 PM10CONCENTRATIONS ANNUAL.MXD 13/09/2022 12:57:10 PM

Scale 1:50000 at A4

FIGURE 6.8

Predicted Incremental Annual Average PM10 Concentrations (|µg/m3)

Image Source: Nearmap (2021) Data source: Delta Coal (2021); EMM Consulting (2021)



Legend

- Project Area
- Existing VPPS Overland Conveyor

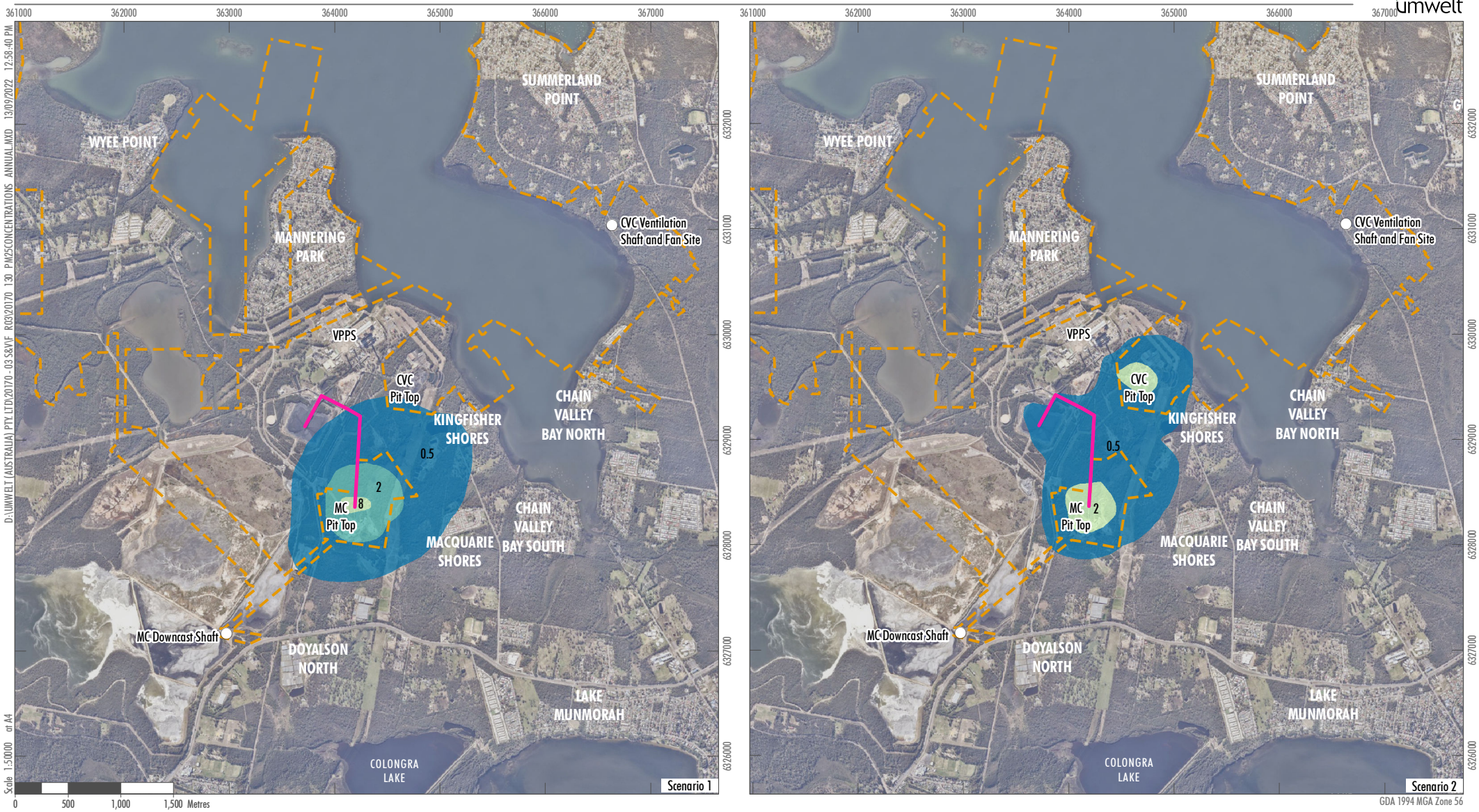
Maximum Predicted 24-Average $PM_{2.5}$ Concentrations (µg/m³)

- 1
- 5
- 10
- 25

FIGURE 6.9

Maximum Predicted Incremental 24-hour Average PM2.5 Concentrations (|µg/m3)

Image Source: Nearmap (2021) Data source: Delta Coal (2021); EMM Consulting (2021)



Legend

- Project Area
- Existing VPPS Overland Conveyor

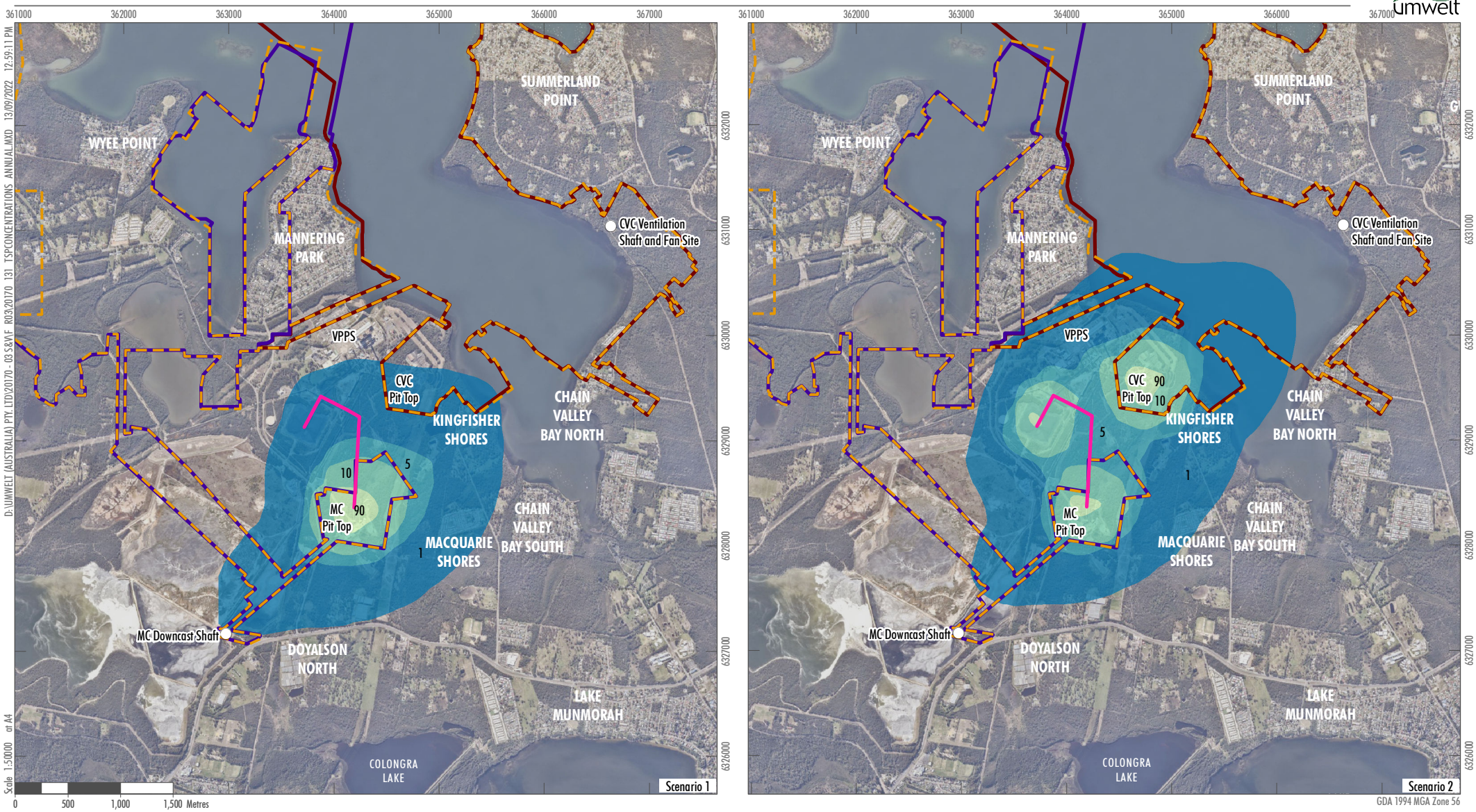
Predicted Annual Average $PM_{2.5}$ Concentrations (µg/m³)

- 0.5
- 2
- 8

FIGURE 6.10

Predicted Incremental Annual Average PM2.5 Concentrations (|µg/m3)

Image Source: Nearmap (2021) Data source: Delta Coal (2021); EMM Consulting (2021)



Legend

- Project Area
- MC Project Approval Boundary (06_0311)
- CVC Consent Boundary (SSD-5465)
- Existing VPPS Overland Conveyor

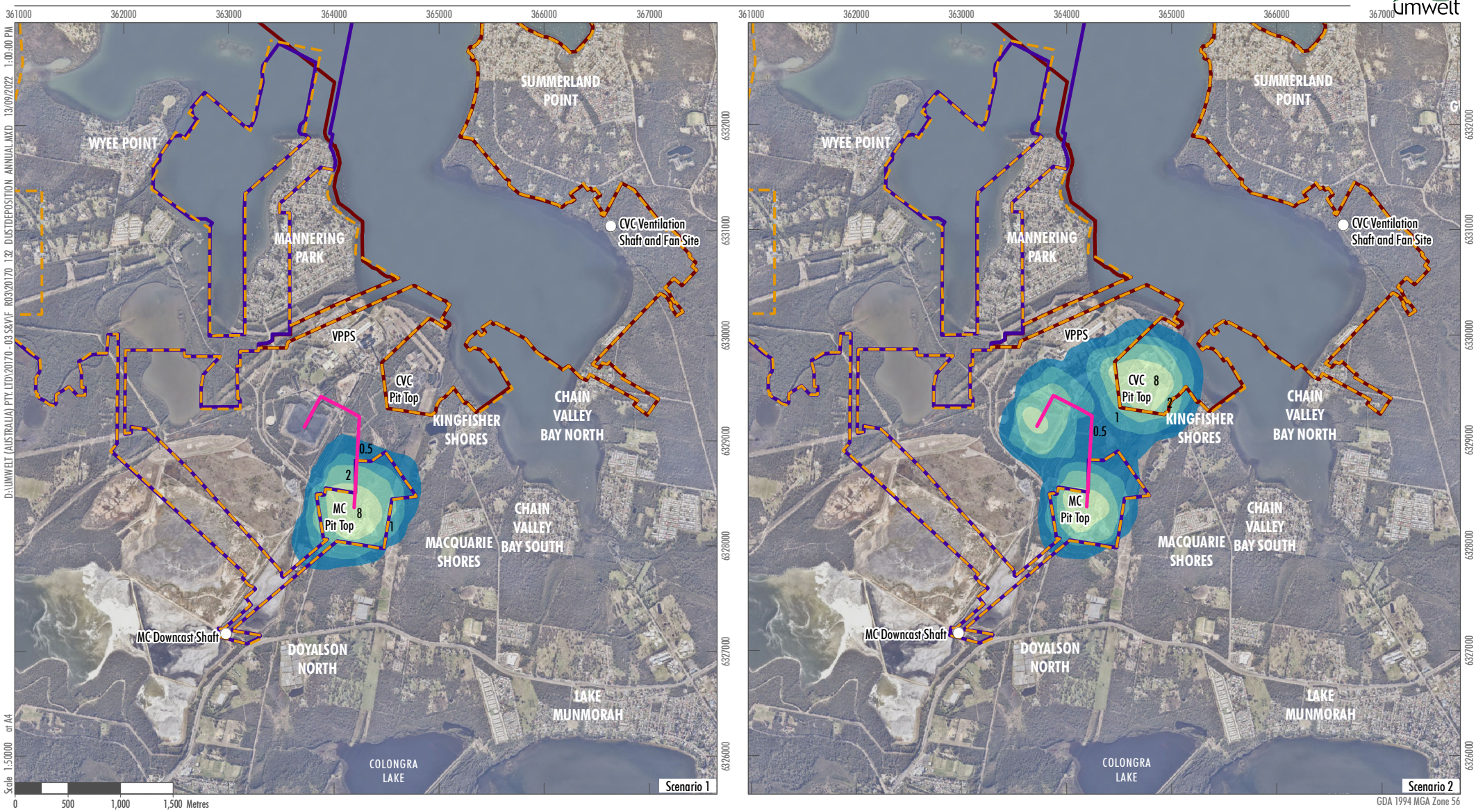
Predicted Annual Average TSP Concentrations (µg/m³)

- 1
- 5
- 10
- 90

FIGURE 6.11

Predicted Incremental Annual Average TSP Concentrations (|µ3/m3)

Image Source: Nearmap (2021) Data source: Delta Coal (2021); EMM Consulting (2021)



Legend

- Project Area
- MC Project Approval Boundary (06_0311)
- CVC Consent Boundary (SSD-5465)
- Existing VPPS Overland Conveyor

Predicted Annual Average Dust Deposition Levels (g/m²/month)

- 0.5
- 1
- 2
- 8

FIGURE 6.12

Predicted Incremental Annual Average Dust Deposition Levels (g/m2/month)

Image Source: Nearmap (2021) Data source: Delta Coal (2021); EMM Consulting (2021)

6.4.5 Voluntary Land Acquisition and Mitigation Policy

The VLAMP (refer to **Table 6.10**) sets out the NSW Government's policy regarding relevant development consent conditions for State significant mining developments where air quality impacts exceed specific criteria at privately owned sensitive receptors. Where relevant criteria in the VLAMP are exceeded at privately owned sensitive receptors, affected property owners are afforded a right to request management measures to be implemented at their property to mitigate the impacts under the conditions of the respective development consent. These property owners may also have the right to voluntarily request the proponent of the development to acquire their property under the terms set out in the development consent. VLAMP mitigation and acquisition criteria is presented in **Table 6.10**.

Table 6.10 VLAMP Mitigation and Acquisition Criteria

Pollutant	Averaging period	Mitigation criterion	Impact type
PM_{10}	24 hour	50 µg/m^{3**}	Human health
	Annual	25 µg/m^{3*}	Human health
$PM_{2.5}$	24 hour	25 µg/m^{3**}	Human health
	Annual	8 µg/m^{3*}	Human health
TSP	Annual	90 µg/m^{3*}	Human health
Deposited Dust	Annual	2 g/m^2/month**	Amenity
		4 g/m^2/month*	

*Note: * cumulative impact (project + background).*
*** incremental impact (project only) with zero allowable exceedances of the criteria over the life of the development.*

The predicted concentrations and deposition rates (incremental and cumulative) are all below the relevant VLAMP mitigation and acquisition criteria at all modelled receiver locations under both modelled operating scenarios.

6.4.6 Air Quality Management and Mitigation

To manage potential particulate matter emissions associated with the Project, a range of best practice dust mitigation measures are currently and will continue to be employed. These include the use of water carts and sprays, conveyor systems, enclosed conveyor transfer point, watering of exposed areas and stockpiles, and using chemical suppressants on unpaved roads. MC and CVC already operate under a combined Air Quality and Greenhouse Gas Management Plan which would be reviewed and updated accordingly should the Project be approved.

6.5 Water Resources

The Project will interact with both surface and groundwater. The effective management of water resources was therefore a key consideration in project planning and the environmental assessment processes.

6.5.1 Groundwater

A Groundwater Impact Assessment (GWIA) has been undertaken by GHD (refer to **Appendix 9**) in accordance with the SEARs for Project, which require the identification of any potential impacts to groundwater quantity and quality, aquifers, watercourses, riparian land, water-related infrastructure and water users as a result of the Project. The GWIA was also subject to Peer Review, undertaken by Hydro Algorithmics (refer to Appendix A of the GWIA). The assessment also identifies licensing requirements and/or approvals needed under the NSW *Water Act 1912* and/or the WM Act and demonstrates that operations would be undertaken in accordance with the relevant WSP.

A summary of the key findings of the GWIA is provided in this section and the full report is provided in **Appendix 9**.

6.5.1.1 Existing Environment

The Project Area lies in the southern part of the Lake Macquarie Catchment, south of the Dora Creek Catchment and geologically within the Newcastle Coalfield in the northern portion of the Sydney Basin. The stratigraphy of the region surrounding the Project Area predominantly consists of Triassic and Permian strata.

Groundwater Sources

Groundwater sources in the vicinity of the Project Area are generally low yielding and predominantly within the Quaternary alluvium, weathered and/or fractured sandstone and coal seams. These groundwater sources would be classified as 'less productive', in accordance with the NSW AIP, as yields are generally less than 5 L/s and/or the total dissolved solids (TDS) concentration is typically greater than 1500 mg/L (due to the close proximity to Lake Macquarie).

Alluvium

The alluvium within and in the vicinity of the Project Area forms an unconfined shallow aquifer. Water extraction from within the alluvium is managed under the *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009*. The groundwater flow within the alluvium generally reflects the topography with flow directing towards Lake Macquarie. Previous studies have suggested that alluvium within the Project Area is thin and therefore has no significant water storage or transmitting ability. Alluvial groundwater would be expected to provide baseflow to local ephemeral creeks when groundwater levels are above the base of the creek. However, the water table to the east of the Project Area is expected to already be impacted by historical mining at the former Wallarah and Moonee Collieries and therefore provide minimal baseflow to creeks under existing conditions.

Fractured and Porous Rock

The porous and fractured rock groundwater sources underlying the Project Area generally occur within weathered rock (Triassic) and coal seams (Permian). They are managed under the *Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016*. Groundwater tends to flow laterally along sedimentary layers since the vertical hydraulic conductivity is usually at least one order of magnitude lower than the horizontal hydraulic conductivity due to the interbedding of low permeability strata. Active and historical underground coal mining at CVC, MC and other sites have caused some depressurisation of fractured and porous rock groundwater sources in the vicinity of the Project Area.

Groundwater Use

Within a 5 km radius of the Project Area, a total of 64 registered bores were identified through the Australian Groundwater Explorer (BOM, 2019a) and WaterNSW (2020) databases. The majority of these bores are shallow, having been installed at a depth of less than 20 m. Overall the search suggests that groundwater use in the vicinity of the project is limited with reported groundwater yields being less than 1 L/s.

Groundwater Dependent Ecosystems

There are no high priority GDEs, listed in the relevant Water Sharing Plans (WSPs), within the area potentially impacted by the Project. Lake Macquarie is identified as a moderate potential aquatic GDE. High, moderate and low potential terrestrial GDEs were identified within and adjacent to the Project area.

Historical and Active Mining Operations

The Project Area and immediate surrounds are subject to both active and historical coal mining operations. These operations have all impacted the local and regional groundwater system through depressurisation of strata surrounding these workings and, where mining has ceased, the recovery of groundwater as these workings become flooded through groundwater inflows.

The former Wallarah Colliery and Moonee Colliery are located immediately east of the Project Area, with the former Newvale and Endeavour Collieries located immediately east and south-east of the Project Area. Mining within the Great Northern Seam has occurred previously within these former operations with historical Fassifern Seam workings also existing at the Newvale Colliery. The cessation of dewatering within these former underground mining areas was considered in conceptual groundwater modelling.

Currently there are four mining operations that are active within and adjacent to the Project Area which include the CVC, MC (within the Project Area), Myuna Colliery and Mandalong Colliery (adjacent to the Project Area). At CVC, all historic and active workings within all three seams (Wallarah, Great Northern and Fassifern Seams) are currently dewatered. The MC is also undergoing dewatering in the Great Northern and Fassifern Seam.

Myuna Colliery overlaps the northern boundary of the Project Area, where it currently undergoes dewatering in all three seams (Wallarah, Great Northern and Fassifern Seams).

Mandalong Mine is located west of MC and currently mines the Great Northern Seam up gradient of the Project Area.

6.5.1.2 Existing Groundwater Management and Monitoring

Existing Groundwater Management

Groundwater at CVC and MC is managed in accordance with the CVC Groundwater Management Plan (GeoTerra, 2019) and MC Water Management Plan (Delta Coal, 2020) respectively. The plans outline groundwater level, quantity and quality monitoring requirements and identify trigger values and the actions and responses to be adopted should the triggers be exceeded.

Delta Coal currently holds two Water Access Licences (WALs) 41508 and WAL 40461 for the annual extraction of 4,443 ML at CVC and 450 ML at MC respectively from the Sydney Basin North Coast Groundwater Source.

Existing Groundwater Monitoring

Actual groundwater inflows to underground workings are difficult to monitor. Instead, the rate of inflow is interpreted from water balance models which take into consideration the volume of water pumped from underground workings and the amount of water pumped into the workings.

Under the MC Water Management Plan daily metering is undertaken for groundwater extracted from underground workings, while water quality sampling is scheduled on a quarterly basis prior to discharge. No other groundwater monitoring is undertaken at MC. There is currently no active mining occurring within MC, so the volume of water pumped underground at MC is minimal.

CVC undertakes daily metering of total underground mine water input and output while water quality sampling is undertaken on occasion.

The CVC Groundwater Management Plan identifies a number of private bores for inclusion in the groundwater level and quality monitoring program. Obtaining access to these bores for monitoring purposes has proven difficult.

Baseline Monitoring Results

Monthly underground water management data for CVC and MC recorded between July 2018 and April 2022 were reviewed in the GWIA.

Total groundwater inflows to CVC's underground dewatering dams ranged from 3.7 to 16.8 ML/day over the period, with an average of 6.7 ML/day. Total groundwater inflow to CVC in 2019 was 3,129 ML, well below the CVC WAL of 4,443 ML. On an annual basis, average groundwater inflow to the Fassifern Seam ranged from 0.5 ML/day in 2019 to 1.4 ML/day in 2020. The increase in groundwater inflow from 2019 to 2020 of 0.9 ML/day may be attributable to secondary extraction, however there is no consistent correlation between secondary extraction and increased groundwater inflow to support this. In particular, the most recent miniwall extraction at CVC occurred in August 2021 and groundwater inflow was steady over that period.

Data available for MC showed the rate of dewatering the underground workings over the assessment period ranged from 0.1 to 1.3 ML/day, with an average of 0.7 ML/day. Inflows to MC are less than at CVC since there are no workings within the shallower Wallarah Seam at MC and no active extraction within the MC approved mining area during this period. Total annual groundwater inflow to MC (represented by dewatering rates) also remained below the MC WAL volume over this period.

In comparison, total groundwater inflow to Myuna (including all three seams) ranged between 4 and 5 ML/day between 2014 and 2018 (GHD, 2019).

Groundwater monitored within the CVC underground workings indicates that groundwater inflow is brackish to saline in subsided areas of the Great Northern Seam workings (11,800–28,200 mg/L) with a pH between 7.30 and 7.76 (GeoTerra, 2019). Seepage from a dyke at the northern end of the current Fassifern Seam workings was reported to have brackish salinity (2,390 mg/L) and a pH of 8.63. (GeoTerra, 2019). The lower salinity groundwater inflow to the Fassifern Seam indicates the absence of hydraulic connection between Lake Macquarie and the Fassifern Seam.

Further detail in relation to baseline groundwater inflows, levels and quality are outlined in the GWIA (refer to **Appendix 9**).

6.5.1.3 Groundwater Assessment

A conceptual groundwater model was developed to identify and compare the key hydrogeological processes and their interactions for the existing mining and the proposed mining scenarios. It included surface water and groundwater systems, flow paths, recharge and discharge processes and the interaction between each component. Numerical modelling was not considered to be required due to the minimal changes proposed to underground mining operations relative to currently approved operations.
The appropriateness of this assessment methodology and use on qualitative assessment methods only is supported by the Peer Review undertaken by Dr Noel Merrick.

Inputs to the groundwater system throughout the Project area include rainfall recharge to alluvium and weathered rock, and leakage from Lake Macquarie and permanent streams. The main outputs from the groundwater system include evapotranspiration, baseflow to water gaining streams, outflow to Lake Macquarie and Ocean, and inflow to mine workings. Pumping from landholder bores was considered to be negligible in the vicinity of the Project area due to the limited groundwater use.

Alluvial groundwater flow generally reflects topography and discharges to connected surface waterways or infiltrates to the regional porous and fractured rock groundwater system. Alluvial groundwater levels often respond to rainfall. Groundwater within the porous and fractured rock system generally flows east from areas of seam subcrop to the west and north of the Project area towards Lake Macquarie. Lateral flow dominates over vertical flow through the strata unless mining creates a hydraulic gradient towards the mine workings.

Operations under the proposed mining scenario are essentially the same as for approved conditions, other than the ability to undertake secondary workings within the extended Zone B Area in the Fassifern Seam at MC (currently approved for first workings only). The proposed secondary workings would be similar to previous secondary extraction at CVC and would only take place under Lake Macquarie.

Potential impacts to groundwater from the Project (including the extension of the secondary extraction to the approved MC mining areas below Lake Macquarie) are likely to be consistent with historical operations. Any increase in groundwater inflow as a result of secondary workings at MC is likely to be temporary and originate from storage within the porous and fractured rock groundwater source only. As for the existing Fassifern Seam workings at CVC, it is not anticipated that there will be direct connectivity between the areas of secondary extraction within the Fassifern Seam at MC and Lake Macquarie. It is noted that historical miniwall mining at MC in the Fassifern Seam adjacent to the approved MC mining areas would be expected to have had some historical depressurisation effects on this strata.

6.5.1.4 Impact Assessment

Groundwater impacts from the Project were predicted in a semi quantitative manner, based on analysis of previous underground water flow data and in consideration of the conceptual groundwater model.

Key conclusions from the impact assessment are summarised as follows:

- Groundwater inflows to the combined CVC and MC mine workings are predicted to be consistent with approved conditions and average appropriately 6.7 ML/day. Should there be secondary extraction within the Fassifern Seam at MC, this may result in a minor and temporary increase in groundwater inflow to approximately 7.6 ML/day (2,774 ML/year). This peak inflow is well below the current combined groundwater licence allocation held by CVC and MC of 4,893 ML/year.

- The Project would result in an additional two years of mine dewatering at CVC and MC. Average and peak groundwater inflow into mine workings over these additional two years are assumed to be 6.7 and 7.6 ML/day respectively.

- No drawdown of the water table is expected as a result of the Project. It follows therefore that any perched groundwater that may exist above the Project area is also unlikely to be impacted by the Project, and it is unlikely that there would be a reduction in baseflow to ephemeral creeks above the Project area as a result of the Project.

- The proposed mining is predicted to not result in additional leakage from Lake Macquarie to the underlying fractured and porous rock groundwater sources compared to approved conditions. The take of groundwater into the mine workings will be from the existing storage within the fractured and porous rock. Therefore, it is predicted that groundwater salinity will not increase as a result of the Project.

- Inflows of higher salinity water into the historical Wallarah and GNS workings at CVC and other operations may result in an increase in salinity relative to historical or pre-mining conditions however this is an impact associated with those historical operations and any additional contribution from the Project (due to the slightly extended period of dewatering) would be negligible.

- No high priority GDEs listed in the relevant WSPs occur within the Project area. Proposed mining is predicted to not impact GDEs within the Project area, including high potential terrestrial GDEs in the vicinity of the area.

- Mining within the Fassifern Seam is predicted to result in some groundwater depressurisation, predominantly within Permian strata, and it is predicted that the Project will not result in drawdown of greater than 2 m at any registered bore.

- The Project is not predicted to have any material impacts on post mining groundwater recovery relative to approved operations.

- Predicted impacts have been assessed in accordance with the NSW AIP, which requires that potential impacts on groundwater sources, including their users and GDEs, be assessed against minimal impact considerations, outlined in Table 1 of the AIP. Overall, the level of impact to the water table, water pressure and groundwater quality are considered to meet the Level 1 minimal impact considerations under the NSW AIP and are therefore considered to be acceptable.

6.5.1.5 Groundwater Management and Monitoring

All groundwater impacts attributable to the Project have been assessed to meet the Level 1 impact considerations of the NSW AIP. Therefore, ongoing measures should focus on monitoring, where possible, to validate the groundwater model predictions and provide observation data for further refinement of the conceptual model. It is noted that secondary workings would be subject to further assessment and approval under the existing Extraction Plan process before they can be undertaken. This assessment process would include updated groundwater impact predictions using the existing numerical groundwater model developed for CVC Modification 4.

Groundwater monitoring will continue in accordance with the CVC Groundwater Management Plan and MC Water Management Plan, which would be revised and updated where required to reflect the Project and to cover both CVC and MC ongoing operations. Ongoing monitoring would include the continued daily metering of dewatering volumes from underground workings.

Groundwater monitoring data would continue to be reviewed annually as part of the Annual Review process for CVC and MC. Should monitoring results be inconsistent with the conceptual model, it would also be reviewed and updated where appropriate as part of the Annual Review process.

6.5.2 Surface Water and Water Balance

An assessment of the potential impacts to surface water has been undertaken by GHD. The Surface Water Impact Assessment (SWIA) was undertaken in accordance with the SEARs for Project (refer to **Appendix 2**).

A summary of the key findings of the SWIA is provided in this section and the full report is provided in **Appendix 10**.

6.5.2.1 Water Management

The CVC and MC Pit Tops are located in the catchment of Swindles Creek. The headwaters of Swindles Creek are essentially formed by the MC Pit Top and discharge to Lake Macquarie shortly downstream of the CVC Pit Top. It is noted that the SWIA identified that the catchments surrounding the Project Area are considered to be 'slightly to moderately disturbed' systems, as the waterways have been adversely affected by human activities by a small to measurable degree.

The licensed discharge points (LDPs) for CVC and MC have discharged into Swindles Creek since approximately 1963, with the discharge from the MC LDP essentially forming its headwaters.

The water management system onsite at CVC and MC is generally comprised of clean and dirty surface, potable, waste and underground elements. Sources of water at the surface sites include potable water supply, rainfall, runoff and groundwater inflow into the underground mine workings.

The water management system at CVC and MC Pit Tops primarily focuses on erosion and sediment control. Water management demands for underground operations include machinery washdown, oil water separator system, effluent management train, operation of the pollution control dams and staff amenities.

The existing water management system is consistent with the requirements of Managing Urban Stormwater: Soils and Construction – Volume 2E (DECC, 2008) for storage and sizing, with storage capacity of dams being sufficient to meet a 90th percentile rainfall event. Discharge of water is managed to minimise water stored on site to ensure capacity during rainfall events.

Delta Coal has site-specific water management objectives including:

- maximise the separation of clean and dirty surface water systems
- manage water discharge from the sites, in terms of volume and quality, to a level that is acceptable for environmental management and community expectations
- minimise water discharges from the premises by maximising, where practicable, opportunities for the reuse and recycling of water on site
- manage discharge to natural waterways in accordance with the relevant EPL conditions.

As there are no material changes to approved surface activities at either the CVC or MC Pit Top facilities, there are no changes proposed to the existing water management system at CVC or MC. A schematic of the overall water management system at CVC and MC is provided in **Figure 6.13**. The catchments and clean/dirty water drainage components within the CVC and MC surface infrastructure areas are shown in **Figure 6.14** and **Figure 6.15**.

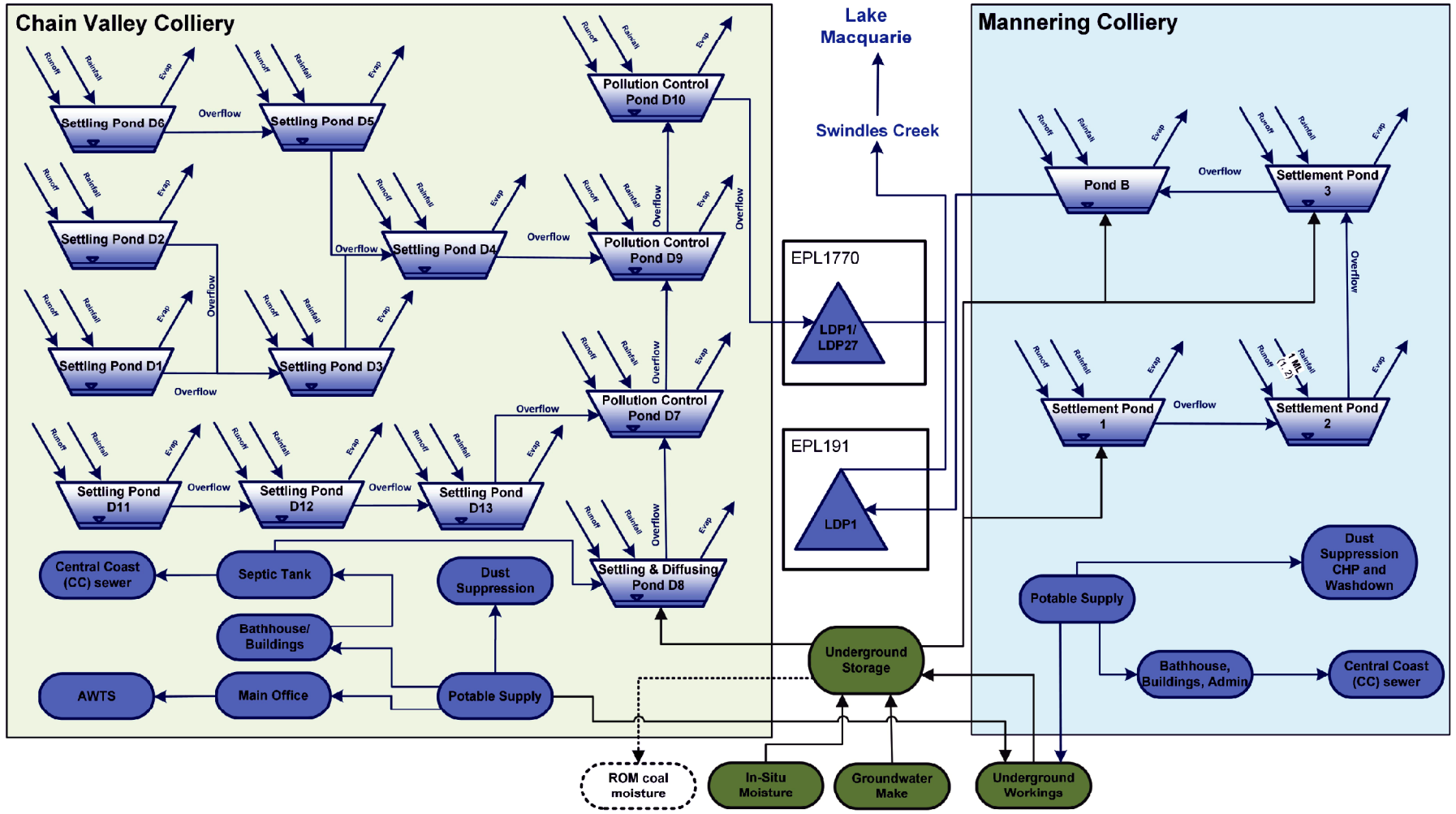


FIGURE 6.13

CVC and MC Water Management Schematic

Image Source: GHD (2021)

Legend

- Project Area
- CVC Consent Boundary (SSD-5465)
- CVC Water Management Catchment Areas
- Monitoring Locations
- Clean Water Flow
- Dirty Water Flow

FIGURE 6.14

CVC – Water Management System

Image Source: Nearmap (2021) Data source: Delta Coal (2021); GHD (2021)

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Scale 1:4000 at A4

FIGURE 6.15

MC – Water Management System

Image Source: Nearmap (2021) Data source: Delta Coal (2021); GHD (2021)

6.5.2.2 Environment Protection Licences

CVC and MC currently hold EPL 1770 and EPL 191 respectively, which include requirements to monitor dust, water quality and the quantity and quality of water discharges. CVC and MC are licensed to discharge water under EPL 1770 and EPL 191, subject to water quality limits, through the following LDPs:

EPL 1770

- LDP001 – Main discharge point of surface water, mine water make and site runoff into Lake Macquarie via Swindles Creek.
- LDP027 – Discharge of surface water runoff through spillway which discharges during significant rainfall events.
- LDP001 and LDP027 combined are licensed to discharge up to 12.161 ML/day of water from CVC.

EPL 191

- LDP001 – Main discharge point of surface water, mine water make and site runoff into Lake Macquarie via Swindles Creek. Discharge rate limit is up to 4.0 ML/day.

The proposed water management system would continue to utilise the existing LDPs at CVC Pit Top (under EPL 1170) and MC Pit Top (under EPL 191). No additional LDPs are proposed for the Project.

6.5.2.3 Existing Water Quality Monitoring

Surface water quality monitoring is currently undertaken in accordance with the CVC Water Management Plan, and MC Water Management Plan, at LDPs and upstream and downstream in creeks where surface water is discharged (refer to **Figure 2.15**).

All surface water monitoring locations shown in **Figure 2.15** are monitored monthly by grab sample for the analytes set out in **Table 6.11**. This includes Swindles Creek monitoring locations, at the location of the discharge point, as well as upstream and downstream.

Table 6.11 Surface Water Monitoring Details

Site	Monitoring Location		Analytes
CVC	LDP001	CVC Licensed Discharge Point	pH, total suspended solids (TSS), biochemical oxygen demand (BOD), faecal coliforms, Enterococci, oil and grease, electrical conductivity (EC), total nitrogen, total phosphorus, Anionic surfactants (MBAS). Aluminium (dissolved), Arsenic (dissolved), Arsenic (total), Beryllium, (dissolved), Cadmium (dissolved), Chromium (dissolved), Cobalt (dissolved), Copper (dissolved), Lead (dissolved), Mercury (dissolved), Molybdenum (dissolved), Nickel (dissolved), Nickel (total), Selenium (dissolved), Silver (dissolved), Vanadium (dissolved), Zinc (dissolved).
	OTC	Outlet where discharge water enters Swindles Creek	
	USSP	Upstream reference location on Swindles Creek	
	RW1	Downstream reference location on Swindles Creek	

Site	Monitoring Location		Analytes
MC	EPL 191	Licensed Discharge Point Pond B overflow	Aluminium (dissolved), Aluminium (total), Antimony, Arsenic (dissolved), Arsenic (total), Barium, Beryllium, (dissolved), Beryllium (total), Boron, Cadmium (dissolved), Cadmium (total), Calcium, Chromium (dissolved), Chromium (total), Cobalt (dissolved), Cobalt (total), Conductivity, Copper (dissolved), Copper (total), Iron, Lead (dissolved), Lead (total), Lithium, Magnesium, Manganese (dissolved), Manganese (total), Mercury (dissolved), Mercury (total), Molybdenum (dissolved), Molybdenum (total), Nickel (dissolved), Nickel (total), Nitrogen (ammonia), Oil and Grease, pH, Phosphorus, Potassium, Selenium (dissolved), Selenium (total), Silica, Silver (dissolved), Silver (total), Sulfur, Tin, Titanium, Total suspended solids, Vanadium (dissolved), Vanadium (total), Zinc (dissolved), Zinc (total).
	MC Down stream	Downstream reference location on an unnamed creek	

Detailed parameters of existing Swindles Creek water quality trends, including site specific guideline values (SSGVs), biological content and physiochemical and nutrient concentrations, are detailed in the SWIA (refer to **Appendix 10**). Overall, the SWIA indicates that the surface water monitoring results within Swindles Creek are consistent with a modified estuarine environment that has likely existed since discharges commenced around 1963.

6.5.2.4 Impact Assessment

Water Management

As part of the Project, underground water will continue to be managed by water transfers within the underground workings and discharge to Swindles Creek via the LDPs, and the overall surface water management layout of the CVC Pit Top and MC Pit Top will remain unchanged.

Potable water will continue to be serviced by the existing connections to Central Coast Council's reticulated potable water system, and there are not expected to be any appreciable increases in potable water usage as a result of the Project.

Site Water and Salt Balance

A site water and salt balance was completed to support the SWIA (refer to Appendix C of the SWIA in **Appendix 10**). The combined operations were modelled as a semi-distributed mass balance which considered the water management system, and incorporated collated data and operational processes from various sources. Sources of water at the surface sites considered in the model include potable water supply, rainfall, runoff and groundwater inflow into the underground mine workings.

The Project has the potential to increase the volume and frequency of water and salt discharged from the LDPs due to the potential for increased volumes of groundwater intercepted relative to approved conditions, however this would depend on the timing and rate of extraction and mining methods. The discharged water quantity and quality are expected to remain within licensed limits and not increase the typical salinity of discharges. The additional two years of licensed discharges from CVC LDP001 and MC LDP001 to Swindles Creek due to the extended life of operations would result in a corresponding continuation of water flow and quality impacts that would be comparable to impacts under existing approved conditions.

The Project is not expected to have any impact on the security of water supply for these operations.

Surface Water Quality

The intercepted groundwater is expected to have similar water quality to that currently extracted under approved conditions and the receiving water body of Lake Macquarie. Inorganic nitrogen compounds and dissolved metals exceeding guideline values would likely have a greater pollutant mass load discharging into Swindles Creek via CVC LDP001 and MC LDP001, however concentrations, and therefore the level of ecotoxicity, are expected to remain similar to existing approved operations.

Flooding

Potential impacts from flooding will likely remain as per existing approved conditions, given the:

- unchanged overall surface water management layout of the CVC and MC Pit Tops
- introduction of only minor sediment control infrastructure related to LOM process upgrades
- negligible terrain changes associated with predicted vertical subsidence impacts of <20 mm.

Cumulative Impacts

No potential cumulative surface water impacts have been identified as part of the SWIA.

Water Licensing

Groundwater modelling indicates that the Project will not have any incremental drawdown impacts on the shallow water table and there will be no impacts to baseflow in creeks. Therefore, there are no surface water entitlements required as a result of the Project.

The Project does not involve any changes to the volume of intercepted surface flows relative to existing operations. Surface water storages that form part of the water management system at CVC and MC are exempt from consideration under water access licensing and harvestable rights, as they are dams solely for the capture, containment and recirculation of drainage, consistent with best management practice to prevent the contamination of a water source.

Environment Protection Licences

As noted above, no additional LDPs are required for the Project.

The Project has the potential to result in a minor increase in the volume of intercepted groundwater that requires dewatering and discharge compared to existing conditions. Based on the results of the water balance modelling (detailed in the SWIA, **Appendix 10**), the predicted levels of discharge from CVC and MC remain within the currently approved combined volumetric discharge limits at CVC Pit Top and MC Pit Top.

Water quality from discharges associated with Proposed Operations is expected to be similar to those of the existing and approved operations and within existing EPL criteria.

6.5.2.5 Surface Water Management and Monitoring

Existing surface water management strategies will continue to be implemented as part of the ongoing MC and CVC operations.

Should the Project be approved the site-specific Water Management Plans for CVC and MC would be reviewed, merged and updated.

The existing flow monitoring program undertaken at CVC and MC would continue, in particular the continued monitoring of discharges (via CVC LDP001, CVC LDP027 and MC LDP001) and extractions from the underground workings. Water quality monitoring at the existing CVC and MC Swindles Creek monitoring points (refer to **Table 6.11**) will continue to be monitored during construction activities and operation of the Project.

The water quality parameters recommended to be monitored over the Project life at the established sites are to include those listed in in **Table 6.12** below. Although exceedance of guideline values has likely being ongoing for decades due to the modified hydrology of Swindles Creek, monitoring would enable potentially adverse changes during the life of the Project to be detected.

Table 6.12 Swindles Creek Water Quality Monitoring

Category	Parameter	Frequency
Physiochemical	EC, pH, TSS, turbidity	Monthly
Major ions	Alkalinity, chloride, sulfate, calcium, magnesium, sodium, potassium	Quarterly
Metals (dissolved)	Aluminium, cadmium, chromium, cobalt, copper, iron, manganese, nickel, zinc	Quarterly
Nutrients	Ammonia, nitrite and nitrate, TKN, total nitrogen, total phosphorus	Quarterly

The site-specific guideline values derived in Section 7 of the SWIA for Swindles Creek would be incorporated as triggers in the consolidated Water Management Plan for the Project and revised as necessary.

The water and salt balance model would also be reviewed and revised annually, and include consideration of proposed mining areas, rates of extraction and mining methods. As discussed in **Section 6.5.1.5**, any proposed secondary extraction would also require review of potential groundwater impacts as part of the Extraction Plan approval processes. The water and salt balance model would be reviewed if groundwater inflow predictions associated with any proposed secondary extraction indicate inflow rates inconsistent with the most recent operational water balance modelling. The average predicted water balance for the Project would be included in the consolidated Water Management Plan and the results for each year reported in the Annual Review for the Project.

6.6 Biodiversity

The Project does not involve any additional surface disturbance activities, nor are any surface activities considered likely to have any additional impacts on surrounding terrestrial biodiversity values relative to approved operations. Predicted discharges to Swindles Creek during the life of the Project are predicted to be consistent with those of the currently approved operations and are also considered unlikely to have any materially different impacts on the aquatic biodiversity values in Swindles Creek relative to existing approved operations.

The Biodiversity Assessment for the Project (undertaken by EMM Consulting) has therefore focused on impacts to seagrass and benthic communities given the only potentially material changes to approved operations in terms of biodiversity impacts is the extension of the Zone B subsidence area to parts of the approved MC mining area below Lake Macquarie. A summary of the key findings is provided in this section and the full report is provided in **Appendix 11**.

6.6.1 Assessment Approach

The Biodiversity Assessment included a desktop review of information relating to seagrass and benthic community monitoring conducted by CVC. The purpose of the review was to understand the monitoring and impact mitigation/avoidance measures that have been undertaken throughout the history of CVC and MC operations, to allow for assessment of current impacts to seagrass and benthic communities, and to identify any potential issues.

6.6.2 Seagrass

6.6.2.1 Existing Condition

Seagrasses within Lake Macquarie have been studied for various reasons over the past several decades (e.g. fisheries management and impact assessments relating to power stations, mining, marina development etc.). Baseline data was collected by Laxton and Laxton (2008) on behalf of Lake Coal for the Chain Valley Colliery Domains 1 & 2 Continuation Project Environmental Assessment in July 2008 and all transects were re-surveyed in June 2010. In summary, Laxton and Laxton found the following trends from 2007 to 2010 (AECOM 2011):

- seagrass grows generally in a continuous belt around the foreshore of Lake Macquarie to a water depth of 2 m
- the dominant seagrass species found in the Project Area is *Zostera Capricornia* with two variants, short leaved and long leaved occurring
- *Halophila ovalis* was found in the Project Area only in surveys conducted in 2010
- seagrass growth was always denser nearer the shore, becoming patchy and sparse at greater depths
- seagrass leaves were often heavily fouled (encrusted) with algae (the brown alga *Ectocarpus* sp. was reported in 2007)
- the degree of fouling of seagrass foliage ranged from light to heavy in 2008 and in 2010 was light throughout the locality
- macroalgae observed in the Project Area included *Sargassum* sp., and *Hormosira banksii* (Neptune's necklace)
- substantial changes in seagrass cover were found between 2008 and 2010 surveys, including decreases in cover of approximately 47 % in two of 22 transects.

The seagrass communities within the entirety of the Project Area have been previously mapped and the majority of the seagrass beds appear to extend to depths around 2 to 2.5 m.

Additionally the latest Seagrass Monitoring reported in the Annual Review 2021 noted the following:

In June 2021 seagrass cover ranged from 91 to 100 percent (increase from 75–100 % in 2020). The health and condition of the seagrasses were fair, with most seagrasses either lightly to moderately fouled with epiphytic algae and since 2008 seagrass coverage has been increasing throughout the area monitored.

6.6.2.2 Potential Impacts

Seagrass is naturally influenced by light penetration, depth, salinity, nutrient status, bed stability, wave energy, estuary type and the evolutionary stage of the estuary. Light is a major limiting factor for the growth of seagrasses and the effects of shading either by artificial structures or increased turbidity associated with sediment re-suspension are common light reducing factors in estuaries. Seagrasses are also known to be relatively itinerant (i.e. exhibit increases and decreases in both abundance and distribution over time) (AECOM 2011).

If mining subsidence was to occur beneath the seagrass beds, it could be expected that the lower areas of the seagrass beds would potentially retreat with increased depth as a result of reduced light available for photosynthesis. However, as discussed in **Section 3.4**. secondary extraction would be limited to the approved CVC and MC mining areas under Lake Macquarie where subsidence impacts are unlikely to have a significant impact on surface features or sensitive seagrass areas.

Annual seagrass surveys have discovered large and unexplained changes in seagrass cover which were unrelated to underground coal mining, as no mining had impacted seagrass beds since commencement of monitoring. The precise reasons for these longer-term changes in seagrass distribution are not always obvious but may be related to changes in water transparency, salinity, nutrient concentrations and the proliferation of epiphytic algae. Migration of sediment may also change the distribution of seagrasses over time. It is also thought that the cessation of commercial fishing in Lake Macquarie has positively contributed to the regrowth of seagrass beds (Delta Coal 2020a).

6.6.2.3 Management Measures

To satisfy the requirements of the CVC Development Consent SSD-5465 (Modification 3) Delta Coal has prepared and implemented a Seagrass Management Plan to safeguard the seagrass beds that line the shoreline of Lake Macquarie. Requirements identified in the development consent are shown in **Table 6.13**.

Table 6.13 SSD-5465 Seagrass Requirements

Schedule/Condition	Requirement
Schedule 4, Condition 2	The Applicant must ensure that the development does not cause any exceedance of the performance measures in Table 6 to the satisfaction of the Planning Secretary.
Schedule 4, Condition 7(i)	Include a Seagrass Management Plan, which has been prepared in consultation with Biodiversity Conservation Division (BCD), Lake Macquarie City Council (LMCC), and Department of Primary Industries (DPI) Fisheries, which provides for the management of the potential impacts and/or environmental consequences of the proposed second workings on seagrass beds, and which includes: • a program of ongoing monitoring of seagrasses in both control and impact sites; and • a program to predict and manage subsidence impacts and environmental consequences to seagrass beds to ensure the performance measures in Table 6 are met.

The Subsidence Impact Performance Measures for seagrass beds (taken from Table 6 of SSD-5465) are negligible environmental consequences including:

- negligible change in the size and distribution of seagrass beds
- negligible change in the functioning of seagrass beds
- negligible change to the composition or distribution of seagrass species within seagrass beds.

An essential component of the Seagrass Management Plan is the Seagrass Protection Barrier. The surface expression of the Seagrass Protection Barrier effectively extends to a vertical projection of a line corresponding to the surveyed boundary of the seagrass. This boundary, in turn, generally lies approximately 2 m below the low tide mark where seagrass communities are commonly found (refer to **Figure 6.16**). This barrier was established to protect seagrass beds around Lake Macquarie within the Lake Coal Lease areas (AECOM 2011).

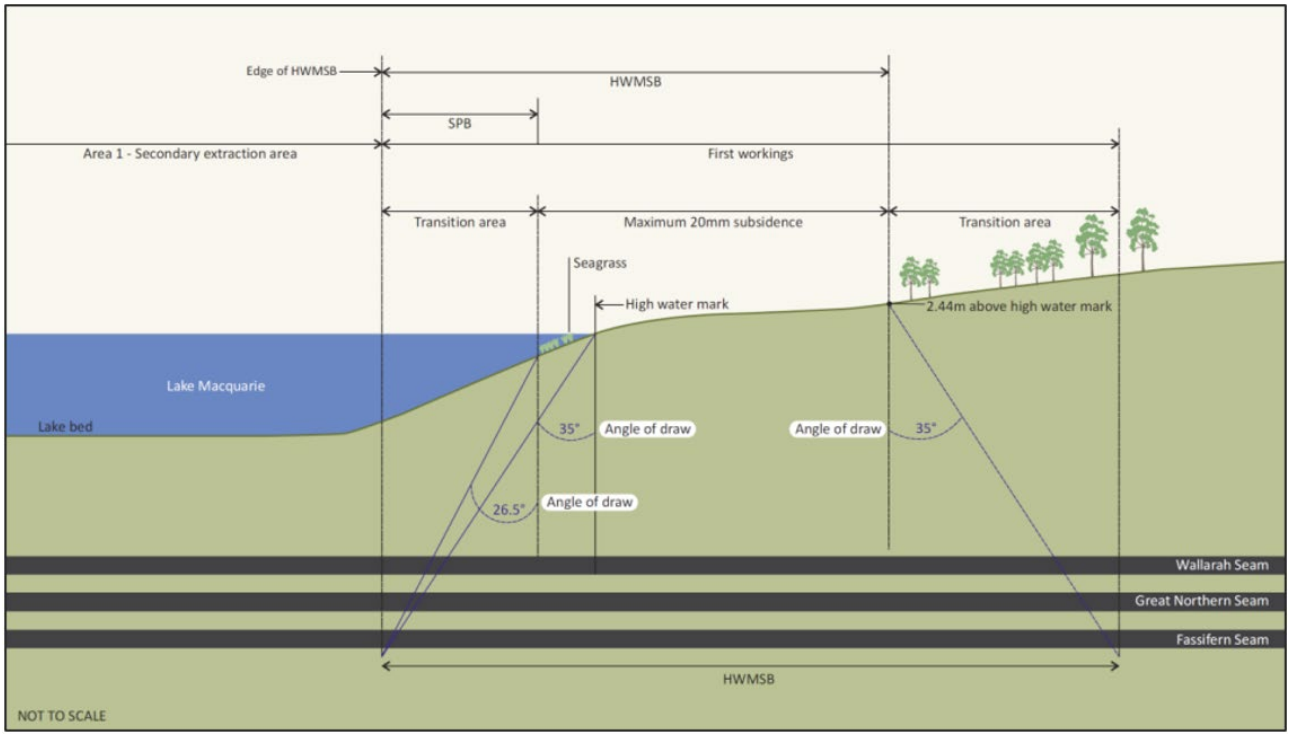


Figure 6.16 High-Water Mark Subsidence Barrier (Delta Coal 2020)

Within the Seagrass Protection Barrier area, subsidence is restricted to less than 20 mm (Zone A). This ensures that any impacts associated with mining operations are negligible. No secondary extraction is being undertaken beneath seagrass beds, and this will continue under the Project.

The Seagrass Management Plan prepared in line with the requirements of SSD-5465 aims to monitor and report on any changes in seagrass communities over time. As part of the plan, a monitoring program across 50 sites was established, comprising physical surveys to detect any vertical movement that could be attributable to mine subsidence.

EMM recommended that annual monitoring of seagrass in line with the Seagrass Management Plan is continued, with ongoing analysis to continue to provide an informed assessment of the suitability and adequateness of mitigation measures. The Seagrass Management Plan will be reviewed following each monitoring period and updates may include an increase and/or decrease in monitoring sites and monitoring frequency[2]. If seagrass loss is identified across any of the existing monitoring sites and determined to be the result of direct subsidence, the Seagrass Management Plan commits to remediation strategies to replace an equal area of any loss incurred.

6.6.3 Benthic Communities

6.6.3.1 Existing Condition

Based on contour mapping of Lake Macquarie and Delta Coal hydrographic surveys, it was identified that the approved mining operations largely occur beneath areas of the lake at water depths between 4 and 6 m. This represents the general lake depths where subsidence is proposed and under which mining activities have been, will be or are proposed to occur.

Both benthic species diversity and abundance are recorded as part of the six-monthly seasonal (autumn and spring) benthic communities monitoring program, which commenced in 2012. Data from the 22 monitoring sites within the mining lease measured dominant species, abundance and diversity of communities. No clear links to location or impact type were identified, other than natural environmental fluctuations in water quality, benthic substrate composition and natural depth intervals influencing the communities.

6.6.3.2 Potential Impacts

As a result of the six-monthly monitoring program, a large amount of data was able to be analysed, indicating there have not been any significant changes occurring to the benthic communities in the existing Zone A and B subsidence areas.

6.6.3.3 Management Measures

To satisfy the requirements of the CVC Development Consent SSD-5465 (Modification 3) Delta Coal has prepared and implemented a Benthic Communities Management Plan. Requirements identified as part of the existing CVC Consent are shown in **Table 6.13**.

[2] If monitoring within areas no longer likely to be impacted by future mining operations indicates negligible levels of adverse impact over the monitoring period post mining for a period of three years, ongoing monitoring of those areas is not considered to be warranted.

Table 6.14 SSD-5465 Benthic Communities Requirements

Schedule/Condition	Requirement
Schedule 4, Condition 2	The Applicant must ensure that the development does not cause any exceedance of the performance measures in Table 6 to the satisfaction of the Planning Secretary.
Schedule 4, Condition 7(h)	Include a Benthic Communities Management Plan, which has been prepared in consultation with BCD, LMCC and DPI Fisheries, which provides for the management of the potential impacts and/or environmental consequences of the proposed second workings on benthic communities, and which includes: • surveys of the lakebed to enable contours to be produced and changes in depth following subsidence to be accurately measured • benthic species surveys within the area subject to second workings, as well as control sites outside the area subject to second workings (at similar depths) to establish baseline data on species number and composition within the communities • a program of ongoing seasonal monitoring of benthic species in both control and impact sites • development of a model to predict likely impact of increased depth and associated subsidence impacts and effects, including but not limited to light reduction and sediment disturbance, on benthic species number and benthic communities' composition, incorporating the monitoring and survey data collected • updating the model every two years using the most recent monitoring and survey data.

The Subsidence Impact Performance Measures for benthic communities (taken from Table 6 of SSD-5465) are 'minor environmental consequences, including minor changes to species composition and/or distribution'.

Based on the review of the Benthic Communities Management Plan and statistical analysis of previous monitoring, EMM recommended that the benthic communities monitoring program within the existing Zone A and Zone B subsidence areas be changed from six-monthly to annually, and restricted to Zone B areas only, given the lack of change in the dataset over time. Preferred timing for the annual monitoring is late summer to early autumn allowing for maximum detection of changes in these communities (EMM 2020). As with seagrass monitoring, the Benthic Communities Management Plan will be reviewed following each monitoring period and updates may include an increase and/or decrease in monitoring sites and monitoring frequency[3].

6.6.4 Biodiversity Offsets

As the Project does not involve any additional surface disturbance, direct and indirect impacts are predicted to be negligible, therefore no biodiversity offsets are required.

Existing biodiversity offset commitments made by Delta Coal under the CVC and MC consents will continue to apply to the ongoing operations.

[3] If monitoring within areas no longer likely to be impacted by future mining operations indicates negligible levels of adverse impact over the monitoring period post mining for a period of three years (in areas of secondary extraction) and one year in areas mined only by first workings where subsidence impacts <150mm have been observed ongoing monitoring of those areas is not considered to be warranted.

6.7 Aboriginal Cultural Heritage

The Project Area is located within the traditional homelands of the Awabakal people and Guringai people, whose history extends from the present day back many thousands of years. Parts of the Project Area are also within the modern-day Darkinjung LALC boundary.

An Aboriginal Cultural Heritage Assessment (ACHA) has been prepared by Umwelt, in accordance with the SEARs for the Project and in collaboration with the Registered Aboriginal Parties (RAPs) to assess the Aboriginal heritage values (cultural and archaeological) of the Project Area and surrounds. As the originally proposed project included the extension of mining into the Eastern Mining Area, the studies for the ACHA included a survey of the Eastern Mining Area. As the Project no longer includes mining within the Eastern Mining Area and does not involve any changes to approved mining or surface disturbance activities which would impact land or foreshore areas, the Project is not predicted to have any additional impacts to Aboriginal sites relative to existing approved operations. Notwithstanding, the ACHA includes full consideration of the Project's potential impacts on both archaeological and cultural values and documents the results of the survey of the Eastern Mining Area to improve overall understanding of this area.
A summary of the key findings of the ACHA is provided in this section and the full report is provided in **Appendix 12**.

6.7.1 Assessment Approach

The ACHA was prepared to satisfy the requirements of the:

- SEARs for the Project (refer to **Appendix 2**).
- National Parks and Wildlife Act 1974 (NPW Act).
- National Parks and Wildlife Regulation 2009 (NPW Regulation).
- principles of The Burra Charter (Australia ICOMOS 2013).
- Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DEC 2005).
- Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (DECCW 2010).
- key elements of the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH 2011).
- Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW (DECCW 2010).

The approach taken emphasised that Aboriginal people are the primary determinants of the cultural significance of their heritage and the ACHA was prepared to ensure that the information provided by Registered Aboriginal Parties (RAPs) was documented and presented in a manner that informs decision making on the management of Aboriginal cultural heritage within the Project Area, whilst ensuring that the required archaeological information is also appropriately documented.

6.7.1.1 Consultation Process

The ACHA process involved consultation with ten RAPs who have been part of an active consultation process in relation to approved activities at CVC and MC and the development of the Delta Coal Heritage Management Plan (HMP) since 2012. Due this this ongoing engagement with MC and CVC, these existing RAPs have been the focus of consultation for the Project.

This consultation was undertaken in accordance with all relevant requirements and to the satisfaction of the regulatory authorities based on telephone correspondence with a representative of Heritage NSW between 1 and 4 February 2021. Consultation with the RAPs identified in the HMP has been consistent and ongoing. The RAPs for this assessment are:

- Awabakal Traditional Owners Aboriginal Corporation (ATOAC).
- Awabakal Descendants Traditional Owners Aboriginal Corporation (ADTOAC).
- Bahtabah Local Aboriginal Land Council (BLALC).
- Darkinjung Local Aboriginal Land Council (DLALC).
- Biriban Local Aboriginal Land Council (BILALC).
- Daniella Chedzey.
- Cacatua Culture Consultants.
- Guringai Tribal Link Aboriginal Corporation (GTLAC).
- Wonn 1 Contracting.
- Yula - Punaal Aboriginal Education and Healing Centre.

Full details of the consultation process undertaken in relation to the ACHA are contained in **Appendix 12**.

6.7.1.2 Previous Aboriginal Heritage Studies

An extensive history of Aboriginal cultural heritage and archaeological assessments exists for the Project Area and immediate surrounds, particularly in association with the existing CVC and MC operations. This body of research has identified numerous archaeological sites and provides a broad understanding of archaeological site patterning at local and regional levels.

The ACHA provides an overview of the extensive history of past archaeological research undertaken within the Project Area, a summary of key information on investigation type and area, and number of recorded archaeological sites.

Searches of the Aboriginal Heritage Information Management System (AHIMS) register identified 257 previously recorded Aboriginal archaeological sites within the wider search area surrounding the Project Area with 35 sites identified within the Project Area.

Of the 35 previously recorded sites within the Project Area, 24 sites are registered as containing shell (some associated with stone artefacts), 5 sites are modified trees, 3 sites are stone artefacts, one site is listed as a grinding groove site, one potential archaeological deposit (PAD) and one burial associated with a modified tree (described as being a repatriation location at Woods Point/Bird Cage Point in Morisset). These sites are generally clustered around the lake shore, with some AHIMS site coordinates plotting within the lake itself, likely reflecting minor site recording errors.

A detailed field survey strategy (outlined in **Section 6.7.2**) was undertaken as part of the ACHA process to re-assess the status and condition of these existing sites and survey a representative sample of landforms present within the Project Area.

6.7.1.3 Cultural Heritage Values

Over the course of previous assessments undertaken in the local area, representatives of the Awabakal and Guringai people have identified that the landscape including the current Project Area forms a 'unique part of the Cultural Heritage and Cultural landscape of the Awabakal and Guringai People'. Similarly, the Biraban LALC have identified that the archaeological evidence within the wider Project Area is of significance to Aboriginal people and culture, along with the associated cultural landscapes (refer to **Appendix 12** for further detail).

As part of previous assessments of portions of the current Project Area, the following information regarding social or cultural value was provided:

- 'Responses received from ADTOAC define the significance of land within the Project area as more than the physical presence of Aboriginal sites, although this visual evidence allows a connection to Aboriginal people's ancestors and cultural heritage. The area itself "is a contributing part of what makes us (Aboriginal people) who we are" and cannot be defined as something tangible. It is the feeling of an area and the connection Aboriginal people have with it.' (AECOM 2011b).
- Responses received from ADTOAC define the Project area as highly significant and forms a "*part of the land that facilitates and completes the landscape that echoes with the ethos of Aboriginal cultural heritage*". The "residual" evidence of Aboriginal people's occupation of the landscape is held in high regard and considered a cultural reminder that unites Aboriginal people with their country and spirituality. (AECOM 2011b).

In relation to the current assessment, RAP representatives who participated in the survey identified that Lake Macquarie and associated watercourses are key resources within the area and have high cultural value for both their natural aspects and their association with archaeological evidence. Maintaining the foreshore areas that fall within the impact area and limiting the potential for direct impacts to occur to sites recorded in association with the foreshore was seen as very important to ensure protection of natural and cultural values.

Outside of the immediate foreshore area and associated watercourses, the Aboriginal party representatives indicated general agreement with the assessment of low archaeological potential within the impact area, based on their environmental context and the extent to which they had previously been surveyed.

6.7.2 Aboriginal Cultural Heritage Impact Assessment

An Aboriginal Cultural Heritage Assessment (ACHA) was prepared in accordance with the SEARs in order to assess potential impacts associated with the previously proposed eastern mining area. Following completion of the ACHA (originally dated July 2021) the proposed eastern mining area was removed from the Project and there will be no impact within this area as part of the Project. While there will be no impact associated with the area, the details of the survey, the survey findings and outcomes and the significance assessment have been reported in the ACHA (refer to **Appendix 12**).

In total, four Aboriginal archaeological sites are present within the previously proposed Eastern Mining Area including two scarred trees, and a shell midden site, an artefact scatter, refer to **Appendix 12** for further detail. Given the proposed eastern mining area has been removed from the Project, these sites will not be impacted

The Project does not involve any changes to surface areas within the Project Area relative to existing approved operations that would result in any additional impact to Aboriginal Cultural Heritage. Accordingly, the Projects potential direct and indirect impacts in the broader Project Area will remain unchanged from those of the existing operations.

During consultation associated with the preparation of the ACHA the Registered Aboriginal Parties (RAPs) did not identify any additional cultural management measures in relation to the Project relative to those already contained in the existing Delta Coal Heritage Management Plan (2021).

6.7.3 Aboriginal Cultural Heritage Management and Mitigation Measures

As no impacts to Aboriginal archaeological sites have been identified beyond those already considered and assessed for existing operations, no additional management and/or mitigation strategies are proposed. The operations will continue to be managed in accordance with the Delta Coal Heritage Management Plan 2021.

6.8 Historic Heritage

An assessment of the potential impacts of the Project on historic heritage values has been undertaken by Umwelt. This assessment has been undertaken in accordance with the SEARs for the Project (refer to **Appendix 2**), which require the identification of any historic heritage within the vicinity of the Project Area and the assessment of the likelihood and significance of any potential impacts. The assessment has considered the 'Project Area' being the entire area intended to be encompassed by the consolidated Development Consent.

A summary of the key findings of the Historic Heritage Assessment (HHA) is provided in this section and the full report is provided in **Appendix 13**.

6.8.1 Historical Context

The history of the area within which the Project is located has been well documented within a range of previous historical heritage assessments and local history resources. As such, the historical overview presented in the HHA was sourced directly from previous assessments. A full description of the historical context of the Project Area is included in **Appendix 13** with a summary provided below.

The documented history of the surrounding region indicates that Awabakal country generally extended south from the Hunter River to Norah Head and Wyong and extended west to include the coastal bordering ranges (Umwelt, 2022). Different Aboriginal tribes were linked to specific areas, but it is recognised that '*the natives here are connected in a kind of circle extending to the Hawkesbury and Port Stephens*' (Threlkeld 1825 in Gunson 1974).

The European discovery of Lake Macquarie was directly linked to the quest for coal in the early 1800s. Coal mining in the Lake Macquarie area has involved the working of the Newcastle coal measures, principally the upper seams of the Wallarah, Great Northern and Fassifern and the deeper Victoria Tunnel, Dudley and Borehole seams. The operation of coal mines has contributed greatly to the urban structure and character of Lake Macquarie. Apart from those supplying the power stations, most of the mines have now closed, however, the collieries created wealth and generated income well beyond the boundaries of Lake Macquarie; many have a place in the broader spectrum of New South Wales and Australian histories.

Additional collieries were developed in the 1960s in conjunction with VPPS with the primary purpose of supplying the new power station. Examples were Wyee State Mine (now known as Manning Colliery), Chain Valley and Newvale. These mines initially worked the Wallarah and Great Northern seams. Transport to the power station was provided by overland conveyor systems.

In addition to coal mining, quarrying has also played an important theme in the history of Lake Macquarie. A number of gravel quarries opened at Teralba in the mid-1880s to provide fill and ballast for railway construction, with quarrying continuing in that area. The NSW Government Railways also operated gravel quarries at Fassifern between 1898 and 1940, while Lake Macquarie City Council established a similar quarry at Mirrabooka. Sand and gravel pits, as well as a sandstone quarry operated at Caves Beach.

6.8.2 Identification of Historic Heritage Items

To identify if any historical heritage items were located within or in the immediate vicinity of the Project Area, desktop searches of relevant heritage inventories and databases were conducted including:

- Australian Heritage Database (including Commonwealth and National Heritage Lists and the Register of National Estate (RNE)
- State Heritage Register (SHR) and State Heritage Inventory
- s170 Heritage and Conservation Registers
- relevant Local Environmental Plans (LEPs).

A review of available background information and previous heritage assessments that have been conducted in the area was also undertaken.

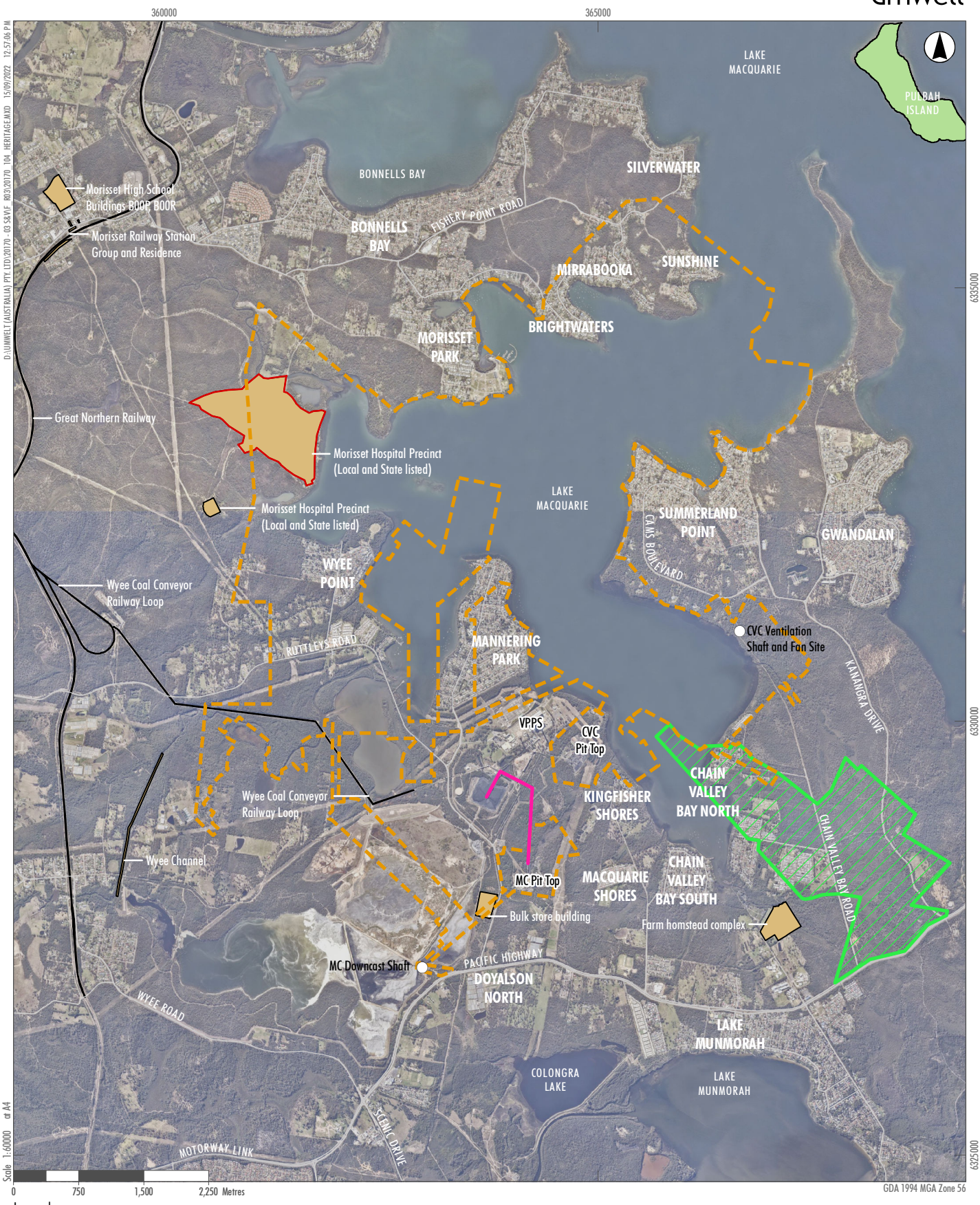
No listed heritage items or previously identified potential (unlisted) heritage items were identified within the Project Area. However, several listed and potential (unlisted) heritage items were identified within or in close proximity to the wider Project Area and are included in **Table 6.14** below and shown in **Figure 6.17**.

Table 6.15 Listed Heritage Items and Items of Potential Heritage Significance

Item Name	Listing and Significance	Distance to Project Area and Impact Area
Morisset Hospital Precinct (and associated buildings)	Item 118 on the Lake Macquarie Local Environmental Plan (LEP) 2014. Item 00827 on the State Heritage Register (SHR). Encompasses multiple s170 Heritage and Conservation Area listings.	Partially within the Project Area.
Bulk Store Building (also known as Eaton's Bulk Store)	Item I154 on the Central Coast LEP 2022.	Partially within the Project Area.
Wyee Coal Conveyor Railway Loop	Item 225 on the Lake Macquarie LEP 2014.	Partially within the Project Area.
Farm Homestead Complex	Item I124 on the Central Coast LEP 2022.	Outside the Project Area.
Wyee Channel	Item 226 on the Lake Macquarie LEP 2014.	Outside the Project Area.
Morisset High School - Buildings B00P and B00R	Listed on the NSW Department of Education s170 Heritage and Conservation Register.	Outside the Project Area.
Morisset Railway Station Group and Residences	Listed on the NSW Transport for NSW s170 Heritage and Conservation Register.	Outside the Project Area.
Vales Point Power Station	Identified in Scobie 2010. Not heritage listed.	Outside the Project Area.

In addition to these identified sites, a historical heritage site survey was undertaken on 10 April 2021. The purpose of this additional day of survey was to undertake targeted inspections of listed and previously identified potential (unlisted) historical heritage items within the wider Project Area and the previously proposed Eastern Mining Area, and to inspect built structures throughout the wider impact area.

Based on field surveys and visual inspections, no new potential historical heritage items, elements or sites were identified to be of potential historic heritage significance.



Legend

- Project Area
- Existing VPPS Overland Conveyor
- Survey Area
- Item - General
- Item - Landscape
- State Listed Heritage Site

FIGURE 6.17

Historic Heritage Items

Image Source: Nearmap (May 2019) Data source: Delta Coal (2021)

6.8.3 Assessment

No new potential historic heritage items, elements or sites were identified. This includes consideration of potentially significant views and vistas, potentially significant landscape elements, including vegetation, trees and gardens, or potentially archaeologically significant areas or relics. However, there are a number of listed and potential (unlisted) heritage items known to be present within the wider Project Area.

There is no proposed change to approved mining methods below land areas where heritage sites may be present. Moreover, the Project does not involve any surface disturbance. The long-term subsidence associated with the proposed first workings in areas approved for mining below land areas is expected to be a maximum 20 mm. Given the low level of predicted subsidence, it is not anticipated that the proposed workings will result in any visual expression of mining activities at or above ground level. The proposed works will therefore not be visible in any way, including from heritage items (listed or unlisted) located in the vicinity. These levels of subsidence are similarly not likely to have material impacts on heritage structures.

As such, the Project will not result in any physical impacts (either direct or indirect) nor any visual impacts to heritage items (both listed and unlisted) located partially within or in the vicinity of the Project Area.

6.8.4 Management and Mitigation

The key management measure to be implemented is the mine design itself, which is specifically designed to avoid subsidence related impacts.

Based on the findings of the HHA, no further assessment, investigation or recording of historic heritage within the Project Area is proposed.

In accordance with best practice, the preventative management measures detailed in the existing Delta Coal Heritage Management Plan (2021) would be implemented as part of the Project. These measures include:

- An unexpected finds protocol, included in Section 5.2 of the Delta Coal Heritage Management Plan (2021), will be followed in the event that any unexpected historical archaeological material or any buildings, sites or structures of potential heritage significance are identified.
- Relevant employees, contractors and subcontractors will be made aware of their obligations and requirements in relation to the relevant provisions of the *Heritage Act 1977*. This information will be most effectively provided within mandatory site inductions provided to employees, contractors and sub-contractors working on the Project in accordance with Section 7.5.1 of the Delta Coal Heritage Management Plan (2021).

6.9 Greenhouse Gas and Energy

A detailed Greenhouse Gas and Energy Assessment (GHGEA) was prepared by Umwelt. The GHGEA considers the greenhouse gas (GHG) emissions associated with the Approved Operations as part of the EIS process for the Project and to address the requirements of the Secretary's Environmental Assessment Requirements (SEARs).

The scope of the GHGEA was limited to calculating Scope 1 emissions (primarily from the combustion of diesel and release of fugitive emissions as part of the operation phase), Scope 2 emissions (electricity use) and Scope 3 emissions (indirect emissions that occur downstream generated by third parties during product transport and use). Scope 2 and 3 emissions have been included in the GHGEA to demonstrate the potential upstream and downstream impacts of the Project. All Scope 2 and 3 emissions identified in the GHGEA are attributable to, and may be reported by, other sectors. While the Project has limited control over Scope 3 emissions, Scope 2 emissions can be mitigated through improved energy efficiency of the operations. The GHGEA includes a calculation of the energy efficiency of the Project relative to other operations.

A summary of the key findings of the GHGEA is provided in this section and the full report is provided in **Appendix 14**.

6.9.1 Methodology

The GHGEA framework is based on the methodologies and emission factors contained in the National Greenhouse Accounts (NGA) Factors 2021 (DISER 2021) (the NGA Factors). The assessment framework also incorporates the principles of The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (WRI/WBCSD 2004) (the GHG Protocol).

The GHG Protocol provides an internationally accepted approach to greenhouse gas accounting. The GHG Protocol provides guidance on setting reporting boundaries, defining emission sources and dealing with issues such as data quality and materiality.

Scope 1 and 2 emissions were calculated based on the methodologies and emission factors contained in the NGA Factors 2021 (DISER 2021). Scope 3 emissions associated with product transport were calculated based on emission factors contained in the National GHG Inventory: Analysis of Recent Trends and GHG Indicators (AGO 2007). Consistent with the National Inventory Report, ventilation fugitive emissions were forecast using an implied emissions factor, which was derived from site specific National Greenhouse and Energy Reporting data.

6.9.2 Emission and Energy Assessment Results

6.9.2.1 Energy Use

Both the Planned and Export Scenarios are forecast to require approximately 1,627 GJ of energy from diesel and grid electricity (1,149,874 GJ additional to Approved projected operational conditions). Energy use by underground coal mines in Australia averages between 140–490 Mega joules (MJ)/product tonne (Energetics 2009). The forecast energy use intensity associated with the Planned Scenario is approximately 121 MJ/product tonne.

The Project is expected to be very energy efficient, as the high quality ROM coal only requires a simple processing stage, and produces very low rates of waste material. The Project will operate without washing, separation and dewatering processes, which reduces the energy demands of the preparation plant, and the energy demands associated with emplacing tailings and reject materials.

The energy use assumptions used in this assessment are higher than those used for the CVC Modification 4 greenhouse gas assessment (Umwelt 2020). Since 2020, Delta Coal has increased its underground ventilation capacity by approximately 10 %. The increase in ventilation load has increased electricity use intensity across Delta Coal's operations.

6.9.2.2 Greenhouse Gas emissions

The Project has been designed to supply coal to the VPPS, however, the Project will retain approval to transport coal (via road) to other domestic power stations, and export coal from Newcastle Port. The GHGEA has calculated the potential GHG emissions for these two scenarios:

- planned scenario – suppling 100 % of ROM coal directly to the VPPS
- export scenario – exporting up to 660 ktpa to Newcastle Port with remainder of ROM coal transported to VPPS.

The Assessment has assessed both the Project's total predicted greenhouse gas emissions over the period 2023 to 2029 as well as conservatively calculated incremental emissions relative to approved operations which are based on current life-of-mine scheduling rather than approved production rates[4]. This approach assumes that total coal production over the life of the Project would be approximately 13.4 Mt ROM coal with additional ROM coal production relative to current production estimates under being approximately 9.5 Mt ROM coal.

The Projects total estimated GHG emissions associated with the planned scenario are summarised in .

Table 6.16 Summary of Total Greenhouse Gas Emissions for the Planned Scenario

Stage	Scope	Source	Source Totals (t CO_2-e)	Scope Totals (t CO_2-e)
Operation	Scope 1 (Direct)	Diesel use	15,931	4,938,154
		Fugitive emissions (historical mining)	3,607,439	
		Fugitive Emissions (ROM Coal)	1,314,784	
	Scope 2 (Indirect)	Electricity	313,536	313,536
	Scope 3 (Indirect)	Product use	32,704,831	33,335,340
		Domestic product transport	15,719	
		Export product transport	0	
		Associated with energy extraction and distribution	584,580	
Operational greenhouse gas emissions associated with the Planned Scenario				**38,587,031**

The Planned Scenario is forecast to generate an additional approximately 1,971,372 t CO_2-e Scope 1 emissions over the life of the Project relative to existing approved operations with the primary contributions coming from fugitive emissions associated with emissions in extracted ROM coal (1,030,697 t CO2-e) and legacy emissions from historical mining which are unrelated to the ROM production rate (929,413 t CO2-e).

Scope 3 emissions associated with the additional combustion of coal from the Project will generate and additional approximately 23,157,149 t CO_2-e relative to the Approved Operations. It is noted however that

[4] 'Additional emissions attributable to the Project assume extraction of ROM coal under Approved scenario ceases in 2025 rather than the approved consent date of 2027. Legacy emissions are assumed to continue for an additional 2 years relative to approved operations.

these Scope 3 emissions are associated with the combustion of coal at the VPPS and these emissions would be generated irrespective of the source of coal with potentially higher emissions if the coal is sourced elsewhere due to the additional emissions associated with coal transport relative to those expected from the adjacent CVC and MC operations.

The export scenario yielded similar levels of GHG emissions to the 'planned scenario' (refer **Table 6.17**).

Table 6.17 Summary of Total operational greenhouse gas emissions for the Export Scenario

Stage	Scope	Source	Source Totals (t CO_2-e)	Scope Totals (t CO_2-e)
Operation	Scope 1 (Direct)	Diesel use	15,931	4,938,154
		Fugitive emissions	3,607,439	
		Post mining emissions	1,314,784	
	Scope 2 (Indirect)	Electricity	313,536	313,536
	Scope 3 (Indirect)	Product use	32,704,831	33,335,340
		Domestic product transport	15,719	
		Export product transport	0	
		Associated with energy extraction and distribution	584,580	
Operational greenhouse gas emissions associated with the Export Scenario				38,587,031

Scope 1 and 2 emissions remain unaffected as operations continue to be the unchanged in comparison to the planned scenario. The total GHG emissions generated by the export scenario is predicted to be approximately 33,335,340 t CO_2e with Scope 3 emissions accounting for 86.4 % of total emissions. In summary, there is little difference between emissions associated with each scenario with the primary difference being the additional Scope 3 emissions associated with the transport of coal to export destinations.

6.9.3 Impact Assessment

The forecast energy use intensity associated with the additional coal generated by the Project is approximately 121 MJ/product tonne. This is considered low relative to energy use at other underground coal mines in Australia which averages between 140–490 Mega joules (MJ)/product tonne (Energetics 2009).

The Project is expected to be very energy efficient, as the high quality ROM coal only requires a simple processing stage, and produces very low rates of waste material. The Project will operate without washing, separation and dewatering processes, which reduces the energy demands of the preparation plant, and the energy demands associated with emplacing tailings and reject materials.

The GHG emissions generated by the Project have the potential to impact the physical environment and the emission reduction objectives of State, National and International governing bodies.

The primary impact of GHG emissions to the environment is the accumulation of carbon in 'carbon sinks'. This is a major driver of global warming, sea level and climate change. According to the Clean Air Regulator the Project could potentially be classed as a large emission source. The Project has the potential to produce approximately 4,938,154 t CO_2-e Scope 1 emissions over the period 2022 to 2029 and generate up to approximately 790,000 t CO_2-e Scope 1 emissions per annum.

The recently elected Labor Government has promised to increase Australia's commitment under the Paris Agreement to reducing greenhouse gas emissions by 43 %, on 2005 levels, by 2030 (Australia Labor Party, 2022). Scope 1 and 2 emissions associated with the extended life of the Project are forecast to occur between 2023 and 2029. Scope 1 and 2 emissions associated with the Project may contribute towards Australia's future national mitigation task and may shape the mitigation priorities for the 2025-2030 NDC. The Australian Government has announced a commitment to a net zero emissions by 2050. While the Australian Government is yet to announce whether this changes the 2030 targets, it is noted that the Project will cease operations in 2029 and will not affect Australia's ability to meet the 2050 Net Zero Target. The Project will supply the VPPS. Irrespective of whether the project proceeds, the VPPS will require the supply of coal from domestic coal sources and similar levels of Scope 1 and 2 emissions associated with the extraction of coal from sources other than CVC and MC would also be expected from those alternative sources. Accordingly, the supply of coal from the Project is considered to have negligible impacts on Australia's overall projected greenhouse gas emissions and policy objectives.

The NSW Government has structured its greenhouse gas reduction target to align with the Paris Agreement. The NSW Net Zero Plan states that mining in NSW will continue to be an important part of the economy, and action on climate change must not undermine mining businesses, jobs and communities. Plans for Stage 2 (2030–2040) and Stage 3 (2040–2050) will be developed over the next 20 years and incorporate technology and strategies beyond current planning horizons. Scope 1 and 2 emissions associated with the Project may contribute towards NSW's 2030 mitigation task and may shape the mitigation priorities for the 2030-2040 Net Zero Plan. The Project is consistent with the NSW Net Zero Plan.

Scope 3 emissions are also mitigated through the close proximity of the operations to the primary customer, VPPS. Given the Project's direct linkages to the VPPS and the planned cessation of mining operations in 2029, the Project is consistent with the NSW Net Zero Plan.

6.10 Traffic and Transport

The Project does not involve any change to traffic or transport activities of the approved operations other than the extension of the life of mining by two years to 2029.

A Traffic Impact Assessment (TIA) was prepared by GHD (GHD, 2020) to support the CVC Modification 4 and covered the potential impacts on the local traffic network associated with a range of different employee numbers using CVC as the primary facility for employees at the combined operations. The employee assessment scenarios and timeframe covered by the GHD 2020 report also cover the proposed employee arrangements for the Project and the extended operating period to 2029. The modelling in the assessment extends to 2030 which would also cover the closure period.

The outcomes of the assessment are summarised in the following sections, with the GHD 2020 report attached as **Appendix 15**.

6.10.1 Existing Traffic Conditions

As detailed in **Section 3.6**, the Project will continue to transport coal subject to the existing CVC conditions of consent including:

- No laden coal trucks dispatched from the site to public roads outside of the hours of 5:30 am to 5:30 pm, Monday to Friday, and not at all on Saturdays, Sundays or public holidays.
- No more than the following would be dispatched from the site:
    - 660,000 tonnes of product coal in any calendar year to the Port of Newcastle for export
    - 180,000 tonnes of product coal in any calendar year to domestic customers other than VPPS
    - a total of 270 laden coal trucks per day by public roads
    - a total of 32 laden coal trucks per hour
    - an average of 16 laden coal trucks per hour by public roads during peak hour periods, calculated monthly, until the intersection of M1 Motorway and Sparks Road Interchange (East Side – unsignalised with stop sign) is upgraded to a signalised intersection.

Key roads in proximity to CVC and MC are Ruttleys Road, Construction Road and the MC Access Road. Ruttleys Road is a local road classified under the NSW *Roads Act 1993* typically carrying between 50 and 4,000 vehicles per day. It consists of a single traffic lane in each direction with bicycle logos placed on each side, connecting the Pacific Highway to Wyee Road. Ruttleys Road is identified as part of an approved B-double route.

Construction Road is classified as a local road and intersects with Ruttleys Road providing direct access to CVC and maintenance access to VPPS. MC Access Road (un-marked road) also intersects Ruttleys Road providing access to MC. Between 2014 and 2018 ten crashes have been recorded along Ruttleys Road, none of which occurred at the intersections under consideration.

Existing traffic conditions in proximity to MC and CVC were observed during 15-minute intervals at peak periods on Monday 22 June 2020 and Saturday 20 June 2020 at the following intersections:

- Ruttleys Road and Construction Road.
- Construction Road and CVC site access.
- Ruttleys Road and MC access road.
- Intersection traffic modelling was undertaken using SIDRA 8 to calculate the level of delay and provide a Level of Service (LoS) rating, which indicates the relative performance of traffic movements within the intersection. Modelling of the current intersection performance based on survey data showed all intersections working in good operation with a LoS of 'A' across all peak periods (AM Peak, PM Peak and Saturday Peak).

6.10.2 Impact Assessment

The TIA forecast traffic conditions to 2030 which covers the proposed extended mine life. Using SIDRA modelling and assuming a conservative linear annual growth rate of 2.1 %, impacts to 2030 traffic volumes were assessed in relation to the 2020 traffic survey volumes. Maximum approved export and domestic coal truck movements were also included in the assessment to model a worst-case scenario. A total of 32 coal trucks entering and exiting the CVC onto Ruttleys Road via Construction Road were assumed in each peak hour of analysis.

Three different scenarios were modelled ranging from low to high. The high growth scenario accounted for a total of 450 full time staff members across both sites and 32 coal trucks entering and exiting CVC each hour. This high growth scenario more than covers the currently contemplated employee numbers at CVC and would include short term fluctuations in employee numbers that may be required for construction, maintenance and post closure rehabilitation activities. The intersection modelling analysis indicated that all intersections are expected to continue to operate with a LoS 'A' out to 2030, even under the high employee number scenario. Results of the high growth scenario are shown in **Table 6.18**.

Table 6.18 Intersection Performance (2030): High Growth Scenario

Intersection	AM Peak		PM Peak		Saturday Peak	
	Average Delay (sec)	LoS	Average Delay (sec)	LoS	Average Delay (sec)	LoS
Ruttleys Road and Construction Road						
Ruttleys Road (east)	1.9	A	0.9	A	2.1	A
Construction Road	16.9	B	16.2	B	13.7	A
Ruttleys Road (west)	0.7	A	0.1	A	0.4	A
All vehicles	**2.5**	**A**	**2.8**	**A**	**2.7**	**A**
Construction Road and CVC site access						
Construction Road (south)	6.8	A	7.8	A	7.2	A
Site Access	8.3	A	7.3	A	8.3	A
Construction Road (north)	3.5	A	3.5	A	3.5	A
All vehicles	**7.2**	**B**	**7.3**	**A**	**7.6**	**A**
Ruttleys Road and MC site access						
Ruttleys Road (south)	0.3	A	0.1	A	0.1	A
MC Access Road	9.3	A	13.4	A	4.8	A
Ruttleys Road (north)	0.2	A	0.1	A	0.1	A
All vehicles	**0.4**	**A**	**0.2**	**A**	**0.2**	**A**

Based on the results of the modelling, no changes to intersection design or additional traffic management measures are required for the Project, relative to the currently approved operations. Traffic management associated with the Project would continue in accordance with the existing Traffic Management Plan.

While the specific employee and truck numbers required for mine closure activities following the cessation of mining at CVC are not known, the modelling indicates that employee numbers and truck movements consistent with those modelled can be readily accommodated by the existing intersections.

A separate Traffic Management Plan will be developed for closure operations which will include consideration of truck and employee movements and times to ensure intersection performance is not adversely affected. Truck and employee movements associated with closure activities will be managed within the vehicle movements modelled above.

6.11 Public Safety and Health

The SEARs for the Project require an assessment of the likely risks to public safety, paying particular attention to potential bushfire risks, interactions with nearby prescribed dams and the handling and use of any dangerous goods. Also required is a health risk assessment that considers the adverse effects from human exposure to acute and cumulative project related environmental hazards, in accordance with Environmental Health Risk Assessment: Guidelines for assessing human health risk from environmental hazards (enHealth, 2012).

To identify potential adverse impacts on public safety, including health, a risk-based assessment approach was utilised during the environmental assessment scoping phase and throughout preparation of this EIS. If a potential risk to public safety or human health was identified, further detailed assessment was completed as part of this EIS. The detailed assessment of each potential risk has been undertaken in accordance with relevant legislation and guidelines, and by appropriately qualified specialists. Where relevant, potential risks to public safety or human health have been assessed against accepted safety or health-based assessment criteria established by the NSW Government. Where relevant criteria are predicted to be met or where NSW Government policy stipulates mitigation measures that are to be implemented, no further detailed health risk assessment was determined to be required. This screening of public safety and health risks was undertaken with consideration of the tiered assessment approach outlined in the above guidelines.

The identified risks to public safety and health, and a summary of the key assessment findings relevant to the identified risk, are provided in **Table 6.19**.

Table 6.19 Identified Risks to Public Safety and Associated Assessment Findings

Issue	Description of Risk to Public Safety or Health	Relevant Assessment	Summary of Key Findings
Air Quality	Human exposure to particulates (PM_{10} and $PM_{2.5}$).	**Section 6.4** **Appendix 8**	The predicted concentrations and deposition rates for all air pollutants and averaging periods are below the applicable NSW EPA assessment criteria and VLAMP mitigation and acquisition criteria at all assessment locations.
Noise	Human exposure to noise during construction.	**Section 6.3.5** **Appendix 7**	Noise impacts relating to the minor proposed construction activities are considered unlikely.
	Human exposure to acute and cumulative impact of noise during operation.	**Section 6.3.4** **Appendix 7**	Noise levels from combined CVC and MC operations will be either within with the PNTLs established under the NSW NPfI and/or existing MC or CVC consent criteria at all but one location. Residence 7 is predicted to experience noise levels up to 2dB above the current criteria and PNTL during the night period and worst-case noise-enhancing meteorological conditions (stability category F and 2 m/s wind speed). These predicted levels however remain below the currently permitted cumulative impacts from both operations under current consent conditions. The NIA indicates that all feasible and reasonable noise mitigation measures identified have been adopted in the noise modelling (enclosed CVC sizers and screen) and will be implemented by Delta Coal. Ongoing compliance monitoring will be undertaken to assess compliance with the proposed operational noise limits and additional measures implemented if non-compliances are detected.
	Human exposure to low frequency noise causing annoyance.	**Appendix 7**	The NIA includes consideration of relevant modifying factor adjustments associated with low frequency noise levels.
	Sleep disturbance from transient noises often with tonal characteristics.	**Section 6.3.4** **Appendix 7**	Noise levels associated with the Project are predicted to satisfy the relevant sleep disturbance screening levels at most assessment locations (with the exception location 8 (MSHV), where the LAeq,15min noise level is predicted to negligibly (by 2 dB) exceed the $L_{Aeq,15min}$ sleep disturbance screening level during the night period and worst-case noise-enhancing meteorological conditions (stability category F and 2 m/s wind speed). The L_{AMAX} screening levels were not exceeded at any location. A 2 dB change in noise levels in the environment is generally not perceptible by the human ear and therefore sleep disturbance impacts from the Project are unlikely at assessment location 8 (MSHV). It is also noted that the predicted $L_{Aeq,15min}$ level of 42 dB at this location is within the current night time noise criteria for this location under the MC Consent.

Issue	Description of Risk to Public Safety or Health	Relevant Assessment	Summary of Key Findings
Water Contamination	Contamination of drinking water and health risks associated with human exposure.	**Section 6.5.2** **Appendix 10**	No impacts to downstream surface water users or groundwater quality are predicted. Water from the site will continue to be discharged into an estuarine environment which is not used for drinking water. No impacts to water quality in watercourses and associated with underground mining are predicted.
	Contamination of surface water and health risks associated with human exposure.	**Section 6.5.2** **Appendix 10**	See above. No material change in water quality of discharges relative to the approved operations is expected. Similar exceedances of the water quality Default Guideline Values (naturally elevated concentrations of aluminium, iron and zinc associated with the geology) to those observed under existing (long term) conditions are expected. No impacts to water quality in watercourses and associated with underground mining are predicted.
	Contamination of groundwater and health risks associated with human exposure.	**Section 6.5.1** **Appendix 9**	The GWIA has not predicted any impacts to groundwater quality as a result of the Project and therefore there is negligible risk of contamination of groundwater such that human health impacts could occur.
Bushfire	Direct and indirect health risks associated with bushfire including risk to life.	**Section 6.11.2**	Parts of the land surrounding the existing surface infrastructure associated with the approved CVC and MC operations are identified as bushfire prone land. Bushfire risks associated with the approved operations are currently managed in accordance with relevant management and mitigation measures which will be reviewed and updated accordingly should the Project be approved to prevent direct and indirect health risks associated with bushfire.
Contaminated Land	Health related risks from human exposure to contaminated land.	**Section 6.16**	The Project Area does not contain any areas of known contamination that may cause a significant risk of harm to human health or the environment. As with all activities that involve earthworks and mining, activities carried out as part of the Project have the potential to cause contamination if not properly managed. Consistent with the approach currently implemented associated with the approved operations, controls will be put in place to manage this risk as part of the Project including appropriate chemical handling and storage procedures, appropriate waste management systems, spill and emergency response procedures and equipment, and regular inspection and reporting processes.

Issue	Description of Risk to Public Safety or Health	Relevant Assessment	Summary of Key Findings
Dangerous Goods	Health risks associated with the storage, handling and disposal of dangerous goods.	N/A	The types and quantities of goods used and stored on site do not exceed the relevant thresholds to require a preliminary risk screening. No change is expected to occur in relation to the type, quantity and storage of dangerous goods as a result of the Project. No potential impacts to off-site land users are expected to occur.
Waste	Health risks associated with the handling and disposal of waste including hazardous waste.	**Section 6.12**	Delta Coal currently manages waste generated by the CVC and MC operations in accordance with the relevant management and mitigation strategies. Waste is appropriately sorted and stored on site prior to being transported off site by licensed waste management contractors. All licensed waste management contractors are required to have appropriate controls in place to manage risks in accordance with NSW Government guidelines. With these controls in place and considering the nature of hazardous wastes associated with the Project, the risk to human health associated with waste is expected to be low.
Social	Health risks associated with impact to the social wellbeing of the community including social equity issues such as employment.	**Section 6.15** **Appendix 17**	The Project will allow the continued employment of the local workforce and procurement through local contractors/suppliers. Delta Coal will continue to contribute to the Delta Coal Community Fund for the Project life to facilitate investment opportunities in the local area, and has committed to the development of a fit for purpose Social Impact Management Plan.

6.11.1 Prescribed Dams

The NSW *Dams Safety Act 2015* requires that Dam Safety NSW ensure that any risks that may arise in relation to dams (including any risks to public safety and to environmental and economic assets) are of a level that is acceptable to the community. Dams Safety NSW may, by order published in the Gazette, declare a dam or proposed dam to be a declared dam for the purposes of this Act. No new dams are proposed to be constructed as part of the Project.

The Vales Point Ash Dam is a declared dam under the *Dams Safety Act 2015.* The Vales Point Ash Dam is located outside of the Project Area and will not be undermined as part of the approved operations. The continuation of the approved mining activities at CVC and MC will not impact the Vales Point Ash Dam.

6.11.2 Bushfire

The SEARs for the Project (refer to **Appendix 2**) require an assessment of the likely risks to public safety including bushfire. Part of the land within the Project Area surrounding the existing CVC and MC Pit Tops is identified as bushfire prone land. Where vegetation is present, there is a risk that bushfires could occur in or near CVC and MC. Bushfires can create potential damage to the Project's assets and infrastructure in addition to hazards to human life. To ensure the safety and protection of Delta Coal's assets and employees, fire protection zones are utilised around sites at most risk, such as the MC Pit Top, ventilation fan site, and CVC Pit Top.

Bushfire risk is currently managed in accordance with the *NSW Rural Fire Service Planning for Bush Fire Protection Guidelines 2019* under existing MC Land Management Plan and the CVC Biodiversity Management Plan. No material changes to surface infrastructure or vegetation are proposed for the Project, therefore the existing bushfire management measures will continue to apply to the ongoing operations with relevant management plans to be reviewed and updated should the Project be approved.

6.11.2.1 Bushfire Management

Asset Protection Zone (APZ)

An APZ is the land surrounding infrastructure or built assets that is managed to separate the infrastructure from the bushfire hazard. APZs are utilised around surface facilities within the CVC and MC pit top areas. All APZs have been determined according to the *NSW Rural Fire Service Planning for Bush Fire Protection Guidelines 2019*. The APZs around the CVC and MC pit tops range from 10 m to 25 m with a 20 m APZ for the CVC ventilation fan. APZs are routinely landscaped to minimise fuel loads, and ensure separation distances between infrastructure and vegetation are maintained.

Surrounding the MC and CVC pit tops is an extensive array of fire trails providing access for emergency services in the event of a bushfire. An access road is also maintained towards the ventilation facility to assist emergency services with entry. In instances where access is limited, a 4 m wide fire trail is included within the APZ to allow access for firefighting vehicles. All fire trails are inspected annually prior to the bushfire danger period in accordance with the relevant management plans.

Water Supply

There are numerous water access points currently situated around the CVC and MC Pit Tops including water tanks and a distribution system (100 mm diameter water reticulation line). In addition, fire hydrants, fire reels and depots are strategically located around both pit top areas to ensure a rapid response in the event of a fire. The existing water management system includes dams that can also be utilised for firefighting if required.

Emergency Response

CVC and MC currently operate in accordance with an emergency response plan developed in consultation with the Rural Fire Service, the emergency response plan would be reviewed and updated accordingly should the Project be approved.

6.12 Waste Management

6.12.1 Operational Waste Management

The Project does not involve any material changes to operations that would result in any change to either the types or volumes of waste generated by operations on an annual basis. The possible exception to this is the generation of additional waste associated with the reinstallation of coal handling infrastructure at CVC, however it is noted that the replacement of this equipment is currently permitted under the existing consent. The Project will extend the life of operations by 2 years which will increase the overall volume of waste material generated.

6.12.1.1 Current Waste Management Practices

Operational waste at CVC and MC is currently managed and processed by an external, appropriately licensed contractor. The external contractor is engaged to monitor, and record types, volumes and weights of waste removed from CVC and MC. Waste is collected on a regular basis and either recycled or disposed offsite at a licensed facility. In combination, on-site there are a number of strategies utilised that form part of the waste management process at CVC and MC which include:

- waste inspections
- routine maintenance of plant and equipment
- storage of chemicals and oils in bunded areas.

Spill kits, booms and absorbents are also available onsite if required to mitigate and manage spills preventing contamination of waste. The waste management process used for the CVC and MC will continue to be used throughout the Project.

Delta Coal captures coal fines by sediment dams, sumps and other sediment control devices which are then recovered and re-incorporated to the final product coal, further reducing waste and another potential waste stream.

Through implementing a total waste management system, CVC and MC are continually improving the rates of recycling whilst decreasing waste to landfill.

6.12.1.2 Waste Streams

The existing operations of CVC and MC produce similar waste streams, with general waste being the biggest contributor across both sites. Major waste streams include:

- scrap metal
- oily water
- comingled recycling
- empty oil drums.

To reduce further waste streams from occurring, waste management strategies are implemented at both CVC and MC.

Between 2016 and 2020 CVC and MC combined have recycled on average approximately 40.54 % of total waste per year (92.68 tonnes). These rates are expected to continue and be unaffected by the Project.

6.12.1.3 Waste Management and Mitigation Strategies

Delta Coal will continue to implement the current waste management strategies applicable to the approved operations should the Project be approved.

6.12.2 Mine Closure Waste Management

Infrastructure removed as part of decommissioning activities will be preferentially sold for future use where appropriate. Waste material will be preferentially recycled or, where this is not feasible or is cost prohibitive, disposal will be managed by a suitably qualified contractor at an appropriately licensed facility. Where suitable, some demolition material may be used for shaft filling operations rather than offsite disposal.

6.13 Visual Amenity

The CVC and MC pit tops are characterised by industrial infrastructure and only minor changes to existing infrastructure areas are proposed as part of the Project.

There is unlikely to be any impact to visual amenity as a result of the Project, relative to existing approved operations.

6.14 Economic Impacts

An assessment of the potential economic impacts of the Project has been undertaken by Gillespie Economics (refer to **Appendix 16**). This assessment has been prepared in accordance with the SEARs for the Project (refer to **Appendix 2**), and includes a cost benefit analysis, local effects analysis and a supplementary local effect analysis of the Project.

6.14.1 Cost Benefit Analysis

A cost benefit analysis (CBA) was undertaken to determine the incremental economic benefits and costs of the Project relative to the "base case" (e.g. operations cease in 2027). The CBA was undertaken in accordance with the *Guidelines for the economic assessment of mining and coal seam gas proposals and NSW Government (2018) Technical Notes supporting the Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals* to measure the net benefits of the Project contributing towards the NSW community and local region within which the Project is located.

The incremental economic benefits and costs of the Project are outlined in **Table 6.20**. It is estimated the Project would have a net production benefit to NSW of $89 M (net present value (NPV)) at 7 % discount rate).

Table 6.20 Potential Economic Benefits and Costs of the Project

Category	Costs	Benefits
Net production benefits	• Opportunity costs of capital equipment in 2025. • Opportunity cost of land in 2025. • Development costs including labour, capital equipment, sustaining capital, and any acquisition costs for impacted properties and biodiversity offsets. • Operating costs, including administration, mining, processing, transportation, labour and mitigation, offsetting and compensation measures. • Incremental rehabilitation and decommissioning costs.	• Value of coal. • Residual value of capital and land at the cessation of the Project.
Potential environmental, social and cultural impacts	• Surface water impacts. • Groundwater impacts. • Air quality impacts. • Noise and vibration impacts. • Ecology and biodiversity impacts. • Aboriginal heritage impacts. • Historic heritage impacts. • Traffic and transport impacts. • Visual amenity impacts. • Greenhouse gas generation. • Net public infrastructure costs. • Loss of surplus to other industries.	• Wage benefits to employment. • Non-market benefits of employment. • Economic benefits to existing landholders. • Economic benefits to suppliers.

Additional royalties associated with the additional coal mined by the Project (relative to the base case), have been quantified as being $54 M (undiscounted) over the life of the project. Royalties represent $36 M of the calculated $89 M net production benefits to NSW in NPV terms.

It is noted adverse uncompensated environmental, social and cultural impacts of the Project have been minimised through project design and mitigation, offset and compensation measures. These measures have already been incorporated into the estimate of net production. Costs that have been quantified include the economic cost of greenhouse gas emissions attributable to the State and opportunity cost associated with retaining groundwater licences for an additional two years however these (and other costs) are considered minor compared to the estimated production benefit.

There may also be potential for some market and non-market benefits of employment provided by the Project. Overall, the Project is estimated to have net social benefits to NSW of $85 M (when potential employment benefits are excluded) and $155 M (when potential employment benefits are included).

6.14.2 Local Effects Analysis

A local effects analysis (LEA) measures the impacts of the Project in its locality as required by section 4.15 of the EP&A Act. Due to the Project area expanding over two LGAs, the Lake Macquarie LGA and Central Coast LGA were defined as the 'locality' for this analysis.

The Project will provide an average annual operational workforce of 297 per year over the life of the Project, with 68 % (202) sourced from the locality. Under the strict LEA assumptions of full regional employment i.e. in the absence of the Project these people would be employed elsewhere in the local area, the Project provides an increase in regional wages equivalent of $10 M which is equivalent to 101 net mining jobs. Non labour expenditure in the local area is estimated at $38 M per annum.

The main potential residual impacts to the local area after mitigation, compensation and offsets relate to the extended duration of noise impacts on adjoining residents due to the extension of the life of mining operations. However, Delta Coal would continue to implement all reasonable and feasible strategies to reduce such impacts.

6.14.3 Supplementary Local Effects Analysis

The supplementary LEA, using (Input-Output) IO analysis, relaxes the restrictive assumptions of the LEA and allows for divergence from full employment; job chains effects; and in-migration of labour to the region.

Using this approach, the Project operation is estimated to make up to the following contribution to the regional economy:

- $263 M in annual direct and indirect regional output or business turnover
- $140 M in annual direct and indirect regional value-added
- $50 M in annual direct and indirect household income
- 627 direct and indirect jobs.

The actual regional impact of the Project operation is likely to lie between that assessed in the LEA and the Supplementary LEA.

6.14.4 Summary of Economic Benefits

Overall, the Project is calculated to provide a net production benefit to NSW of $89 M in NPV terms (2022) excluding potential social benefits. Royalties payable directly to the State of NSW make up $36 M of this calculated net benefit or $54 M in undiscounted terms.

Potential additional indirect social benefits to the State of NSW (in NPV terms) are estimated to be $85 M (when potential employment benefits are excluded) and $155 M (when employment benefits are included).

Net benefits to the region associated with the Project have been estimated using two different local effects methodologies. Under both approaches, economic benefits to the region are predicted to be significant despite the relatively minor extension in project duration and additional coal mined.

6.15 Social

This Social Impact Assessment (SIA) Report has been prepared in accordance with the NSW Government's *Social Impact Assessment Guideline* (DPE 2021), as part of the environmental impact assessment process. A SIA, informed by community and stakeholder engagement, affords opportunities to effectively identify, integrate and address social impacts within the detailed Project planning, design, and assessment phase.

As is the case with any type of change, some individuals or groups within the community may benefit, while others may experience negative impacts. If negative impacts are predicted, it is the role of the SIA to determine how such impacts may be mitigated to reduce the degree of disruption to those affected. If positive impacts are predicted, the aim of the SIA is to maximise these opportunities and identify how they might be further enhanced.

As discussed in **Section 5.1**, engagement with the community has been a key component of the SIA program and has involved nearby neighbours and other stakeholders in the scoping of project issues and identification of strategies to address (negative) and enhance (positive) impacts. This engagement program has been guided by a stakeholder engagement program, involving consultation with a broad range of stakeholders for the Project EIS and SIA.

The outcomes of the SIA are summarised in the following sections with the full SIA report contained in **Appendix 17**.

6.15.1 Methodology

Consistent with the SIA guideline requirements, the SIA process involved three key phases including scoping, impact prediction/assessment and impact management. Engagement is a key component affording input from near neighbours and local and regional stakeholders in the SIA program.

According to the SIA Guideline, social impacts can be grouped, and may involve impacts and changes as a result of a project to people's way of life, community, accessibility, culture, health and wellbeing, surroundings, livelihoods, and decision-making systems.

Monitoring and evaluation are also key components of the SIA process, to identify any unanticipated impacts that may arise as a result of the project in the future, and to monitor social impacts, should the project proceed.

6.15.2 Social Profiling

A baseline social profile gathers knowledge from both primary and secondary data sources to increase understanding of the existing social environment in which a project is proposed. The social profile is an important component of the SIA and provides a foundation from which social impacts associated with the Project development may be assessed and predicted.

Profiling provides a comprehensive summary of the key characteristics of the people of a community or area potentially impacted by a project and is concerned with developing a detailed understanding of the social and economic context of potentially affected communities. The revised SIA Guideline emphasises that the social baseline should be tailored to the specific project context and include meaningful data to inform the SIA. The baseline should also include analysis of any relevant data trends and provide a benchmark from which potential impacts can be assessed, and any change monitored.

The social profile relevant to the Project includes the following components:

- geographic scope – identification of the communities of interest and key stakeholders relevant to the current assessment
- governance – outline of relevant governance structures at local, State and Commonwealth levels
- historical context – review of the history of local communities, including their culture and values, and previous experiences with underground mining
- community capital/assets – assessment of areas of vulnerability and resilience across the communities of interest
- key community values, issues and concerns – documentation of current community issues in the Central Coast and Lake Macquarie LGAs and the broader region, as identified in key planning documents, regional studies and the local media
- development context and response to change – assessment of development issues within the communities of interest and the response of local landholders and community residents to this change.

The social baseline profile developed for the Project has been targeted to focus on the Project's social locality or social area of influence. The focus of the profiling has been those communities proximal to the Project Area, including those residents in areas above the proposed mine workings and/or close to the existing CVC and MC pit tops suburbs. This includes Chain Valley Bay, Mannering Park, Kingfisher Shores and Doyalson North. Also included are those communities in the locality of Delta Coal's other existing mining leases in Lake Munmorah, Catherine Hill Bay, and the surrounding communities of Gwandalan and Summerland Point. More broadly the profile also considerers the wider Central Coast LGA and Lake Macquarie LGA.

As previously discussed, although the Project Area and surrounds have been subject to extensive historical mining operations, the area also supports natural assets including Lake Macquarie, Lake Macquarie SCA (approx. 650 ha) and Munmorah SCA (approximately 1,563 ha). These areas are popular recreation sites and key attractions for residents and visitors to the area.

The social profile highlighted a number of key strengths and vulnerabilities that are particularly relevant to the social impacts associated with the Project:

- rich in natural capital, including national parks and reserves, lakes, and minerals (including coal); however, has the potential to cause conflict given differing land uses
- an older median age than the NSW average
- a higher than state average proportion of Indigenous population
- lower levels of education across communities
- mining has been historically significant in the economic and community development of the area, however this is changing
- improvements in infrastructure, transport and housing have made the area more affordable and desirable for different demographics including older populations who are no longer in the workforce or who may be reaching retirement age; as well as families attracted by the lower housing costs and the ability to commute outside of the area for work
- housing is affordable and the population has lower median household incomes
- there is a strong sense of community, as a result of low mobility and strong community connections and networks (also identified by participants in the stakeholder engagement process)
- additional community infrastructure is required to cope with the growing population.

6.15.3 Social Impact Evaluation and Management

The social impacts and benefits identified through the stakeholder engagement program are summarised in **Section 5.2**. The SIA includes an assessment and ranking of the social impacts identified in relation to the Project, with the aim of assessing the anticipated changes to the current baseline social environment as a result of the Project proceeding. Prioritising impacts in this integrated manner ensures that appropriate assessment and mitigation strategies can be developed that not only address impacts that may require more technical management, but also those impacts that are perceived by stakeholders as of high risk/ importance/concern. These perceived concerns are just as important to manage as they have the potential to result in elevated levels of community concerns, complaints and grievances if not addressed appropriately.

In order to prioritise the identified social impacts, a risk-based framework has been adopted, consistent with the SIA Guideline (DPE 2021). A social significance matrix (refer to **Appendix 17**) was used to determine an overall evaluation of the social impact as 'low', 'medium', 'high' or 'very high'.

In line with this process, the SIA assessed the technical and perceived social impacts (positive and negative consequences) that may be experienced by stakeholders due to anticipated impacts/changes associated with the Project. These were then categorised in line with the Social Impact Categories and characteristics outlined in the SIA Guideline (2021) and then further defined within impact themes and sub-impact issues. A summary of social impacts is provided in **Table 6.21** with each social impact theme discussed in detail in **Appendix 17**.

Table 6.21 Evaluation of Social Impacts

Social Impact theme	Project Aspect	Social Impact description	Duration	Extent/Affected parties	Perceived significance (Level of concern/interest)	Significance rating[5] L	M	S	Project refinements/management measures	Residual impact significance
Livelihood	Underground mining causing subsidence impacts	Property damage and potential financial loss	Project life	Residents residing in proximity to the pit top operations Community residents – proximal suburbs	Medium	E	1	L-	The Project proposes mining within the approved CVC and MC mining areas only. Projects impacts will remain broadly consistent with those of the existing approved operations. Provision of ongoing Subsidence Monitoring outcomes.	Low
	Presence of the operation and operational impacts (including visual, noise, dust)	Declining property values due to the presence of mining	Project life	Community residents – proximal suburbs	High	D	2	L-	Project impacts will remain broadly consistent with those of the existing approved operations. Ongoing contribution to Community Fund. Engagement with proximal residents regarding potential impacts.	Low
	Presence of the project	Continued employment of the mine workforce and flow on expenditure impacts Continued procurement of local suppliers/contractors	Project life (additional 2 years)	Employees, contractors and suppliers	High (+)	A	3	H+	Continued employment of local workforce and procurement of contractors/suppliers.	Low
				Local businesses	Medium (+)	B	2	M+		Low
				Wider LGA communities	Medium (+)	B	2	M+		Low
		Continued investment in the local community resulting in improvement to community infrastructure and services	Project life	Community residents – proximal suburbs	Medium (+)	B	3	H+	Continued investment in the Delta Coal Community Fund for the project life.	Low
				Community groups/NGOs	High (+)	B	3	H+		Low
				Wider LGA communities	Medium (+)	C	2	M+		Low
Surroundings and social amenity	Ongoing Underground and Pit top operations Conveyor used to transport coal to VPPS	Social amenity impacts due to operational noise and vibration	Project Life	Residents residing in the Macquarie Shores Home Village	High	B	3	H-	Implementation of reasonable and feasible noise mitigation strategies and provision of noise monitoring data to proximal residents. Continuation of the 24/7 community complaints line. Continue to publish noise monitoring data on the company website.	Medium
				Community residents – proximal suburbs	High	D	2	L-		Low
				Wider LGA communities	Low	E	1	L-		Low
	Ongoing Underground and Pit top operations Conveyor used to transport coal to VPPS	Social amenity impacts from dust from pit top operations Impacts to way of life (e.g., increased cleaning, reduced time spent outdoors, altered use of private property) Cumulative dust impacts from surrounding industries	Project life	Residents residing in proximity to the pit top operations	High	B	2	M-	Continue to implement on site management measures to reduce dust including water carts and sprays, enclosed conveyor systems and transfer points, watering of exposed areas and stockpiles, and chemical suppressants on unpaved roads.	Low
				Community residents – proximal suburbs	High	C	2	M-		Low
				Wider LGA communities	Medium	D	2	L-		Low
	Pit top surface infrastructure	Impact to aesthetic value or visual amenity	Project life	Residents residing in proximity to the pit top operations	High	E	1	L-	Progressive rehabilitation where available.	Low
				Community residents – proximal suburbs	High	E	1	L-		Low
				Wider LGA communities	Medium	E	1	L-		Low
	Product haulage by road	Public safety, road use (increased road traffic)	Project life	Community residents – proximal suburbs	High	D	3	M-	Continued implementation of the existing Traffic Management Plan. Limit product haulage by public road.	Low
				Road users	High	D	3	M-		Low

[5] L = Likelihood (A: Almost Certain, B: Likely, C:Possible, D: Unlikely, E: Very Unlikely); M = Magnitude (1: Minimal, 2: Minor, 3: Moderate, 4: Major, 5: Transformational); S = Significance rating (L: Low, M: Medium, H: High, VH: Very High)

Social Impact theme	Project Aspect	Social Impact description	Duration	Extent/Affected parties	Perceived significance (Level of	Significance rating[5]			Project refinements/management measures	Residual impact
	Presence of the Project	Access and use of the natural environment (Lake Macquarie) due to a subsidence event	Ongoing	Community residents – proximal suburbs	High	D	2	L-	Continued implementation of the relevant plans including Extraction Plans, Seagrass Management Plans, Water Management Plan and Subsidence monitoring program.	Low
				Wider LGA communities	High	D	2	L-		Low
	Presence of the Project and continued supply of coal to VPPS	Continued risk to the environment for current and future generations - climate change	Ongoing	Wider LGA communities	Low	C	2	M-	Burning of higher quality coal somewhat reduces greenhouse gas emissions. Consolidation Project will reduce transport costs associated with alternate supply of coal to VPPS.	High
	Presence of the Project Supply of coal to VPPS	Community conflict because of opposing views/perspectives on use of coal in energy production	Ongoing	Wider LGA communities	High	B	2	M-	Delta Coal's Future transitional planning strategy.	High
	Rehabilitation	Enhance environmental and social values for surrounding communities, post mining through improved rehabilitation	Ongoing	Community residents – proximal suburbs	High	B	3	H+	Engagement of key stakeholders and community residents in closure planning.	Low
				Wider LGA communities	High	B	2	M+		Low
Health and wellbeing	Presence of the Project and operational impacts	Impact to mental health as a result of Project continuation (e.g. uncertainty, stress and anxiety)	Project life	Residents residing in areas above the proposed mine workings	High	C	2	M-	Publish environmental monitoring results on website.	Low
				Residents close to the pit top	High	C	2	M-		Low
				Community residents – proximal suburbs	High	C	1	L-		Low
				Wider LGA communities	Medium	D	1	L-		Low
		Noise and vibration causing sleep disturbance	Project life	Residents residing in areas above the continued mine workings	High	D	2	M-	Implementation of noise mitigation strategies and provision of noise monitoring data to proximal residents. Works to improve noise impacts at Macquarie Shore Home Village (ceased use of tracked dozer on MC coal stockpile, removed Rotary Breaker at MC pit top, enclosure works at MC pit top coal handling plant, installed real-time noise monitor). Continuation of the 24/7 community complaints line. Continue to publish noise monitoring data on the company website.	Low
				Residents close to the pit top	High	C	2	M-		Medium
				Community residents – proximal suburbs	High	D	2	L-		Low
		Impact to physical health from exposure to dust Contribution to cumulative air quality impacts on health	Project life	Residents residing in areas above the continued mine workings	High	C	1	L-	Continue to implement on site management measures to reduce dust including water carts and sprays, conveyor systems, enclosed conveyor transfer point, watering of exposed areas and stockpiles, and chemical suppressants on unpaved roads.	Low
				Residents close to the pit top	High	C	2	M-		Low
				Community residents – proximal suburbs	High	C	1	L-		Low
				Wider LGA communities	Medium	D	1	L-		Low
Community and Culture	Subsidence	Impacts to Aboriginal and European cultural heritage	Ongoing	Aboriginal community	High	D	2	L-	Ongoing implementation of the Delta Coal Heritage Management Plan. Ongoing engagement with local Aboriginal stakeholders.	Low

Social Impact theme	Project Aspect	Social Impact description	Duration	Extent/Affected parties	Perceived significance (Level of	Significance rating[5]			Project refinements/management measures	Residual impact
	Presence of the Project	Impacts to sense of community and sense of place	Ongoing	Community residents – proximal suburbs	High	D	1	L-	Development of a fit for purpose Social Impact Management Plan including an update to Stakeholder Engagement Strategy that addresses community information requirements and preferences for engagement. Continued contribution to the Community Fund to facilitate investment opportunities in the local area.	Low
Engagement and decision making	Engagement process	Distrust in the assessment process and the company	Project life	Residents residing in areas above the approved mine workings	High	C	2	M-	Impact monitoring data and detail of management strategies included on the website. Development of a fit for purpose Social Impact Management Plan including an update to Stakeholder Engagement Strategy that addresses information requirements and engagement preferences. Continued contribution to the Community Fund. Regular newsletters distributed to the community and available on the website. Continuation of the 24/7 community complaints line.	Low
				Residents close to the pit top	High	C	2	M-		Low
				Community residents – proximal suburbs	High	C	2	M-		Low
		Opportunity to participate and have a voice in the assessment process	Project life	Residents residing in areas above the approved mine workings	High	C	2	M-	Development of a fit for purpose Social Impact Management Plan including an update to Stakeholder Engagement Strategy Continued contribution to the Community Fund.	Low
				Residents residing in proximity to the pit top	High	C	2	M-		Low
				Community residents – proximal suburbs	High	C	2	M-		Low

6.15.4 Recommendations and Management Strategies

Table 6.22 outlines the recommended management and enhancement strategies to address social impacts in relation to the Project.

While the management strategies focus on the mitigation of negative social impacts, strategies to enhance positive social impacts in relation to the Project, particularly in the local community and surrounding area where the Project is located, are also presented where they have been identified. The strategies proposed also include measures to address any impacts that are of 'high' concern to potentially affected people and groups, but which are not considered significant from a technical perspective. It is also acknowledged that there are a range of other management and mitigation strategies proposed in this EIS that will also assist in this regard.

Table 6.22 Recommended Management Strategies

Impacts Addressed	Recommended Strategy
Engagement and decision making	Development of a fit for purpose Social Impact Management Plan including an update to Stakeholder Engagement Strategy, with key objectives: • focus current engagement activities within the community on issues of key concern to the community, (as identified through the SIA consultation program) • track and monitor community issues and perceptions of the operation over time and evaluate the success of strategies to manage and/or enhance social impacts • ensure community members in proximity to the approved mining areas are informed of mining activities • provide access to monitoring data and detail of management strategies to reduce impacts.
Community	Continue investment in the Community Fund: • ensure targeted investment in proximal areas • an open and transparent application process.
Climate change/ intergenerational equity **Livelihoods**	Develop post mine closure transition plan including: • rehabilitation of disturbed areas • mine workforce transition program, involving retraining.

6.16 Rehabilitation and Final Land use

The SEARs require a detailed description and analysis of the final landform, post mining land use options, rehabilitation objectives/strategies and mine closure (refer to **Appendix 2**). No change is proposed to the existing rehabilitation and final land use plan currently implemented for the approved CVC and MC operations. Indicative activities associated with decommissioning works are set out in **Section 3.12**.

6.16.1 Mine Closure Planning

A detailed mine closure plan will be prepared at least two years prior to the CVC and MC closure (i.e. by 31 December 2028). The comprehensive plan will entail the physical rehabilitation of both collieries and the decommissioning and removal of surface infrastructure. The plan will also handle socio-economic and community engagement issues. Should certain events occur and result in temporary closure of either CVC or MC, a risk assessment will be triggered with actions being included within a care and maintenance plan. The plan will remain operational until CVC and MC resumes mining operations or closure occurs.

Maintenance and management requirements will be developed as part of the mine closure process. During rehabilitation, a detailed Groundwater Impact Assessment will be undertaken to identify any post-mining impacts and determine required mitigation/management measures. Suitable water management structures will also be retained post-mining for ecological and/or water supply purposes. Services such as electricity, water and communications that are no longer required will be disconnected.

6.16.2 Final Rehabilitation Design Objectives and Criteria

The rehabilitation objectives, strategies and justification for the Project are consistent with that proposed for the approved operations. As the CVC and MC operations are underground in nature, the rehabilitation requirements relate predominately to the associated surface infrastructure areas.

The primary objectives for the rehabilitation of the site is to rehabilitate the site to a final land use that is compatible with surrounding land uses. The land is currently zoned SP2 Infrastructure. If an appropriate industrial land use is identified for the site as part of the closure planning process the rehabilitation of the existing infrastructure areas will facilitate the ongoing use of the land for these purposes. It is noted that further development consent would be required for any alternate industrial uses of the site. However, should a post-mining land use not be identified, the site will be rehabilitated to be consistent or compatible with the surrounding vegetation communities. Areas such as the MC Pit Top and majority of CVC Pit Top will be restored to native bushland except for the high voltage transmission line easement, located at the CVC Pit Top. This area will be rehabilitated to a native grassland community only.

The Project proposes minor additional surface infrastructure within the existing surface CVC infrastructure area only. Surface infrastructure will be decommissioned, and the areas rehabilitated following mine closure. These proposed changes do not affect the proposed final land uses identified above.

All rehabilitation activities will be consistent with current processes and procedures outlined in the existing CVC Consent, Rehabilitation Management Plans and MOP. The current rehabilitation objectives and completion criteria are outlined in the MOP and cover the post-mining land use for each relevant domain. Should the Project be approved the relevant Rehabilitation Management Plans and MOP would be reviewed and updated accordingly, and all relevant criteria updated as required.

The current rehabilitation objectives and criteria applicable to the CVC surface infrastructure will be applied to all infrastructure associated with the Project, as outlined in **Table 6.23** and **Table 6.24**.

Table 6.23 Rehabilitation Objectives

Feature	Objective
Mine site (as a whole)	Safe, stable and non-polluting. Final land use that is compatible with surrounding land uses.
Surface infrastructure	To be decommissioned and removed, unless otherwise agreed with relevant authorities during mine closure planning.
Portals and ventilation shafts	To be decommissioned and made safe and stable. Retain habitat for threatened species (eg bats), where practicable.
Other land affected by the development	Restore ecosystem function, including maintaining or establishing self-sustaining ecosystems comprised of; • local native plant species (unless otherwise during closure planning) • a landform consistent with the surrounding environment.
Built features damaged by mining operations	Repair to pre-mining condition or equivalent unless: • the owner agrees otherwise; or • the damage is fully restored, repaired or compensated under the NSW *Mine Subsidence Compensation Act 1961*.
Community	Ensure public safety. Minimise the adverse socio-economic effects associated with mine closure.

Table 6.24 Completion Criteria

Phase	Objective	Completion Criteria	Performance Measures
Decommissioning	No risk to public safety – All plant and equipment removed.	All mining related plant and equipment removed from site (unless approved to remain).	Visual inspection. Photos to document works to be included within Closure Report.
	No risk to public safety – All buildings and Structures removed.	Buildings and structures removed (unless approved to remain).	Visual inspection. Photos to document works to be included within Closure Report.

Phase	Objective	Completion Criteria	Performance Measures
	No risk to public safety – All underground Infrastructure (protruding above ground surface) removed.	Visible surface components of buried infrastructure removed (unless approved to remain).	Visual inspection. Photos to document works to be included within Closure Report.
	No risk to public safety – Access to former workings prevented.	All surface entries to mine are sealed in accordance with MDG 6001 (*Guidelines for the Permanent Filling and Capping of Surface Entries to Coal Seams*).	Engineer provides certification that bulkheads constructed in accordance with the required design. Copy of certification to be included within Closure Report. As constructed drawings are provided with closure report.
	No risk to public safety – All borehole connectivity to former workings sealed.	All boreholes to the mine are sealed in accordance with relevant guidelines.	Closure report includes evidence that sealing. has been completed in accordance with relevant guidelines.
	Non-polluting – clean-up of potential/actual contamination.	Hydrocarbons less than assessment criteria. Heavy metals less than assessment criteria. No asbestos remains (unless bonded within buildings approved to remain).	Environmental Site Assessment report completed and appended to closure report that confirms levels of contamination is below acceptable levels.
Landform establishment	Slopes are stable.	Re-profiled areas are stable with slopes not exceeding 10°.	No evidence of slumping of slopes. Survey pick up of rehabilitated site confirms no slopes exceed 10°. Final landform survey detail included within closure report.
	Growth medium replacement to permit vegetation establishment.	Depth - ≥ 0.1 m.	Sampling/testing regime following placement and spreading of material to confirm depths. Revegetation becomes established.
	Land use compatible with surrounds.	Majority of established rehabilitation species are present in surrounding communities.	Visual inspection Photos to be included within Closure Report.

Phase	Objective	Completion Criteria	Performance Measures
Landform establishment (surface water)	Mine water discharges discontinued.	No discharge of underground mine water/water impacted by mining operations.	Discharge water flow monitoring and reporting. Pipes that deliver water from underground to surface are disconnected EPL surrendered.
	Appropriate management of surface water.	Diversion channels/drains to remain are stable and non-eroding. Remaining dams are stable and non-eroding.	Visual inspection. Photos to document dams/drains non-eroding. Photos included within Closure Report.
	Non-polluting.	Not contributing excess sediment load to downstream watercourses.	Surface water monitoring and reporting for upstream and downstream locations as required.
Ecosystem/land Use establishment	Establishment of vegetation communities.	Clear trend of increasing species diversity.	Monitoring and comparison to adjacent control sites. Details of monitoring included within Closure Report.
		Number of weeds species and surface area cover ≤ adjacent control sites.	Monitoring and comparison to adjacent control sites. Details of monitoring included within Closure Report.
		Self-propagation in revegetated areas.	Visual inspection and photos of species self-propagation. Photos included within Closure Report.
Sustainable ecosystem/land use	Landform generally blends. in with surrounding landscape and is stable.	Absence of gullies >300 mm wide or deep and gullies stable.	Monitoring and details of monitoring included within Closure Report.
		Landscape function analysis (or other methodology) shows continued ecosystem function improvements.	Monitoring and details of monitoring included within Closure Report.
	Weed invasion Adequately controlled by ecosystem.	Stable or reducing weed presence (i.e. weed presence not increasing).	Monitoring and comparison to adjacent control sites and/or prior monitoring. Details of monitoring included within Closure Report.

6.16.3 Rehabilitation Commitments

Over the course of the Project, areas disturbed by past mining activities that are no longer required for operational purposes will progressively be revegetated. However, opportunities for progressive rehabilitation will be limited where disturbed areas are required for ongoing operational activities. Where land is not required for operational purposes, it will be rehabilitated consistent or compatible with the surrounding vegetation communities and future land use. Revegetation will focus on the use of plant material grown from locally sourced species or, if possible, seed collection and propagation from the surrounding vegetation for use in rehabilitation activities. Areas such as the MC Pit Top and majority of CVC Pit Tops will be restored to native bushland except for the high voltage transmission line easement, located at the CVC Pit Top. This area will be rehabilitated to a grassland community only.

During the rehabilitation program the existing water management system and sediment dams will be retained only until primary earthworks and initial vegetation are completed. Water management structures will be assessed with respect to their ecological function and water supply value. This assessment will determine if the structures remain or not. If not, these structures will be filled and capped where appropriate. Water quality will continue to be monitored at the LDP in accordance with the EPL. However, at a point in closure, likely after the groundwater pumping ceases and the majority of water management structures are rehabilitated, the EPL would be surrendered.

At the time of rehabilitation services such as electricity, water, and communications both above and underground at CVC and MC will also be disconnected. Above infrastructure will be removed from site while underground structures such as cables and pipes e.g. Central Coast Water Supply will be terminated at each end and buried. All areas where structures are removed will be decommissioned and rehabilitated to ensure public safety. Roadways that are not required for access to the mine site or other purposes such as bushfire management will also be rehabilitated. Due to the limited area being disturbed at both MC and CVC major rehabilitation trials or research programs are not expected to be necessary.

6.16.4 Rehabilitation Monitoring and Reporting

In July 2019, a Rehabilitation Monitoring Program was developed and submitted to DPE Resources Regulator for the CVC and MC operations. The program details the vegetation monitoring program (VMP), the conducted baseline monitoring and methods proposed to assess compliance with the rehabilitation objectives including but not limited to:

- decommissioning of infrastructure
- landform
- public safety of all rehabilitated areas
- socio-economic effects of closure.

Detailed management and monitoring proposals for final rehabilitation will be formulated closer to the time that the rehabilitation works will be required. The details will be included in both the Rehabilitation Management Plan and Mine Closure Plan (prepared at least two years prior to mine closure). Once closure has commenced, annual rehabilitation monitoring and reporting will be undertaken to assess the overall rehabilitation success. Corrective action will be implemented where results or trends indicate risk of future non-compliance or environmental risk.

7.0 Justification

This section provides a conclusion to the EIS. It includes discussion of the justification for the Project, taking into consideration the associated environmental and social impacts and the suitability of the site, to assist the consent authority to determine whether or not the Project is in the public interest.

7.1 Environmental, Social and Economic Impacts

As detailed in **Section 1.0** and **Section 3.0**, the Project is, in essence, a continuation of the existing approved operations at CVC and MC for an additional two years to align production from the CVC and MC operations with the projected life of the VPPS.

As detailed in **Section 6.0**, the environmental, social and economic impacts of the Project have been identified and are the subject of a detailed assessment based on:

- assessment of the environmental and social setting of the Project Area
- engagement with local community and other relevant stakeholders
- focused consultation with key government agencies
- application of the principles of ecologically sustainable development, including the precautionary principle, inter-generational equity and conservation of biological diversity and ecological integrity
- expert technical assessment.

The key issues identified, including those required by the SEARs, were the subject of extensive specialist assessment of the potential impacts of the Project on the existing environment. The results of these assessments are detailed in **Section 6.0** and the appendices to this EIS. **Table 7.1** provides a summary of the key outcomes of the environment and social impact assessments associated with the Project.

Table 7.1 Key Outcomes of the Environmental Assessments

Aspect	Summary
Subsidence	• The existing subsidence performance measures currently applicable to the CVC mining operations will continue to apply to the CVC and MC operations. • Consistent with existing CVC operations, all Zone B workings (located below Lake Macquarie) will be subject to further approval in the form of an Extraction Plan to ensure subsidence impacts are appropriately managed. • Subsidence associated with the Project are expected to be imperceptible at all foreshore and land areas.
Noise	• Noise associated with the Project will not increase/change compared to the approved CVC and MC operations. Only the Macquarie Shores Home Village (MSHV) assessment location is predicted to experience marginal to moderate exceedances of the Project Noise Trigger Level (PNTL), however noise is not predicted to exceed the current noise criteria for this assessment location under the MC Consent. Noise impacts at most locations assessed will be lower than currently permitted under the MC or CVC consents. • Maximum LAmax noise levels from the Project are predicted to satisfy the relevant sleep disturbance screening levels at all assessment locations. • Construction activities associated with the Project are minor and will be undertaken within standard construction hours; noise impacts relating to the proposed construction activities are considered unlikely. • Demolition works associated with mine closure activities will be undertaken during standard construction hours and be managed to meet relevant noise criteria. • Existing noise mitigation and management strategies will continue to be implemented as part of the ongoing MC and CVC operations. At CVC prior to replacing the coal handling infrastructure (if required), further engineering work would be completed to design and procure infrastructure that aims to reduce the potential noise impacts on the community. All feasible and reasonable noise mitigation measures identified by the Noise Impact Assessment will be adopted and implemented by Delta Coal.
Air Quality	• The predicted incremental concentrations and deposition rates for all pollutants and averaging periods are below the applicable NSW EPA assessment criteria and VLAMP mitigation and acquisition criteria at all assessment locations. • The predicted cumulative concentrations and deposition rates for all pollutants and averaging periods are below the applicable NSW EPA assessment criteria and VLAMP mitigation and acquisition criteria at all assessment locations. • Air quality impacts associated with the operations would continue to be managed under the existing management controls implemented on site under the combined Air Quality and Greenhouse Gas Management Plan covering both the CVC and MC which will be reviewed and updated accordingly should the Project be approved.
Groundwater	• The Project does not involve any extension to existing approved mining areas and therefore groundwater impacts are predicted to be largely identical to those of the currently approved operations. Increased groundwater inflows would be expected during secondary extraction activities within Zone B however rates would be expected to be similar to rates observed during the currently approved miniwall mining operations. • The Project Area and immediate surrounds are subject to both active and historical coal mining operations which have impacted the local and regional groundwater system through depressurisation of strata.

Aspect	Summary
	• The Triassic and Permian groundwater sources are considered to be 'less productive' under the NSW Aquifer Interference Policy (AIP) since the yields are typically less than 5 L/s and/or the groundwater salinity exceeds 1,500 mg/L. • No drawdown in the water table is predicted therefore predicted impacts meet the Level 1 minimal impact considerations under the NSW AIP. • As there are no predicted impacts to alluvial groundwater systems or the shallow water table, no impacts are predicted to the baseflow to ephemeral creeks or terrestrial GDEs within the Project Area. • Existing groundwater licences held by Delta Coal are sufficient to cover the predicted groundwater take over the life of the Project. • Groundwater monitoring and management will continue in accordance with the CVC Groundwater Management Plan, which will be revised and updated where required should the Project be approved.
Surface Water	• As there are no material changes to approved surface activities at either the CVC or MC pit top facilities, there are no changes proposed to the existing water management system. • No material change in water quality of discharges relative to the approved operations is expected. • Potential increases in groundwater inflows may occur during secondary extraction activities within Zone B however inflow rates are anticipated to be similar to historical inflow rates during miniwall operations at CVC however dewatering infrastructure will be able to cater for the predicted increase in groundwater volumes and predicted discharge rates are within existing volumes licensed under the CVC and MC Environment Protection Licences (EPLs). • The Project will not have any impacts to baseflow in creeks and no surface water entitlements are required as a result of the Project. • The Project will not have any impact on flooding impacts relative to approved operations. • The site-specific water management plans for CVC and MC will be reviewed, merged and updated should the Project be approved.
Biodiversity	• As there is no surface disturbance due to the Project utilising existing infrastructure, the Project will not have any direct impacts on biodiversity values. • Due to the commitment to negligible levels of subsidence below land areas and seagrass beds, indirect impacts associated with the Project are predicted to be negligible, therefore no biodiversity offsets are required. • Monitoring of seagrass and benthic communities within the approved mining areas below Lake Macquarie will be managed by an updated Seagrass Management Plan and Benthic Communities Management Plan.
Aboriginal Cultural Heritage	• A comprehensive Aboriginal Cultural Heritage Assessment was completed in consultation with the Registered Aboriginal Parties (RAPs) for the Project. • Due to the commitment to negligible levels of subsidence below land areas, and there being no additional surface disturbance proposed, no impacts to Aboriginal archaeological sites are expected and no additional management and/or mitigation strategies are proposed. • Aboriginal cultural heritage will continue to be managed in accordance with the Delta Coal Heritage Management Plan.

Aspect	Summary
Historic Heritage	• The Project does not result in any changes to approved operations which would have in any physical impacts (either direct or indirect) nor any visual impacts to heritage items (both listed and unlisted).
Greenhouse Gas and Energy	• The predicted greenhouse gas emissions associated with the Project have been assessed (including the scope 1, 2 and 3 emissions). The implications of the potential emissions associated with the Project have been assessed against the relevant climate change policies. • Greenhouse gas management practices will be developed and implemented as required through the updates and implementation of the Air Quality and Greenhouse Gas Management Plan.
Traffic and Transport	• A Traffic Impact Assessment (TIA) was prepared by GHD to support the CVC Modification 4 and covered the potential impacts on the local traffic network associated with a range of different employee numbers and an operational timeframe to 2030 (covering the proposed extension of life of operations under the Project). • The Project does not involve any change to the approved operations in terms of traffic impacts other than the extension of life of operations by two years to 2029. • Based on the results of the modelling, no changes to intersection design relative to the currently approved operations are required for the Project. • Traffic management associated with the ongoing operations will continue in accordance with the existing Traffic Management Plan. • The Traffic Management Plan will be reviewed prior to undertaking mine closure works to identify any changes in traffic management required due to decommissioning activities. Any updates to the Traffic Management Plan associated with decommissioning activities will be prepared in consultation with Transport NSW and Central Coast Council.
Waste And Hazard	• The existing waste management practices will continue to be implemented on site. • The Project design and assessment has had regard to potential hazards associated with the Project, in accordance with relevant statutory requirements and guidelines. • Management of bushfire threat will continue to be undertaken across the site consistent with existing management practices.
Economic Impacts	• A detailed economic analysis of the Project has been undertaken which includes consideration of the Project's economic benefits and costs associated with adverse impacts. • Overall, the Project is calculated to provide a net production benefit to NSW of $89 M in NPV terms ($2022), excluding potential social benefits. Royalties payable directly to the State of NSW make up $36 M of this calculated net benefit or $54 M in undiscounted terms. • Potential additional indirect social benefits to the State of NSW (in NPV terms) are estimated to be between $85 M (when potential employment benefits are excluded) and $155 M (when employment benefits are included). • Net benefits to the region associated with the Project have been estimated using two different local effects methodologies. Under both approaches, economic benefits to the region are predicted to be significant despite the relatively minor extension in project duration and additional coal mined.

Aspect	Summary
Social Impacts	• Extensive stakeholder consultation was undertaken to identify community issues / views of the Project with a range of mechanisms utilised including interviews with key stakeholders, information sessions, face to face and telephone meetings and information sheets delivered to the local community and the surrounding suburbs relevant to the broader Project Area. • The social impacts of the Project have been minimised where possible through project design and the proposed management and enhancement approaches. • Impacts associated with the Project will be largely identical to those of the existing approved operations, however the extension of operations for an additional two years will result in a continuation of existing noise and air quality impacts during this period. These impacts, both perceived and actual are greatest for those living in closest proximity to the CVC and MC Pit Tops, or those who perceive they will be most directly impacted by the development. • Members of the community raised concerns regarding the possibility of subsidence impacts however these concerns were largely associated with the previously proposed Eastern Mining Area extension which no longer forms part of the Consolidation Project. Subsidence impacts will be managed through mine design to meet the current subsidence limits imposed under the CVC Consent. Subsidence associated with the Project are expected to be imperceptible. Any secondary extraction activities within Zone B will be subject to further approval under the Extraction Plan processes prior to being undertaken and this process will have regard to all potential subsidence impacts associated with secondary extraction. • A range of strategies are proposed to minimise the social impacts and maximise associated benefits including continuation of the existing Community Investment Fund. • The Project will provide ongoing benefits for the local and wider communities through ongoing employment, flow on benefits through use of local services, local and regional expenditure, community investment and payment of royalties and taxes.
Rehabilitation	• Consistent with the approved operations rehabilitation requirements associated with the Project relate predominately to the associated surface infrastructure areas. The rehabilitation objectives, strategies and justification for the Project are consistent with that proposed for the approved operations. • Mine closure and decommissioning activities will include building and infrastructure demolition, shaft filling and sealing (including ventilation fan shafts) and land preparation works, including any works associated with managing potential site contamination. • A detailed mine closure plan will be prepared at least two years prior to the planned CVC and MC closure (i.e. by 31 December 2028). • Prior to decommissioning works commencing, the Traffic Management Plan will be reviewed to identify any changed management associated with truck movements associated with demolition and shaft filling and sealing works. • Detailed management and monitoring proposals for the final rehabilitation will be developed as part of the detailed mine closure planning process. The details will be included in both the Rehabilitation Management Plan and Mine Closure Plan (prepared at least two years prior to mine closure). Once closure has commenced, annual rehabilitation monitoring and reporting will be undertaken to assess the overall rehabilitation success. Corrective action will be implemented where results or trends indicate risk of future non-compliance or environmental risk.

7.2 Justification for the Project

The Project is a logical business decision for Delta Coal, aligning the existing Delta Assets in order to provide for a local secure coal supply that aligns with the current operational requirements of the VPPS. While the Delta Coal operations will not meet all of the VPPS demand, the ability to obtain a large percentage of VPPS coal via a local, reliable and cost-effective supply reduces VPPS's exposure to price fluctuations and supply chain restrictions. This in turn assists VPPS in supplying reliable and cost-effective electricity generation to NSW.

Due to the current constraints on life of mine at CVC and MC, current mine planning indicates that it would be uneconomic to continue operations at CVC and MC beyond 2025 due to capital expenses associated with accessing resources in the Western part of the approved reserves. This is primarily due to not being able to recoup capital costs associated with development works during the shorter period of approved operations. However, the two-year extension of approved life of operations (to the end of 2029) and the ability to undertake selected secondary extraction in the proposed extended Zone B area enables sufficient resources to be extracted to justify the cost of capital works associated with accessing this area.

Should the Project not be approved, VPPS would be required to source all coal from at least 2028 onwards (and likely from 2026) from other sources.

Coal sourced from other operations would be less suited to the design specifications of the VPPS operations which were specifically designed around the use of coal from the Wallarah, Great Northern and Fassifern coal seams. The use of externally sourced coal would require additional rail movements between mines in NSW and the VPPS rail handling facilities. This would also expose the VPPS to cost fluctuations and potential supply uncertainty in the event of supply chain disruptions. The transport and handling of externally sourced coal also involved additional noise and air quality impacts.

The improved operational efficiencies associated with the management of the CVC and MC operations as a single operation, extended life of operations aligning with the planned VPPS operating life and ability to manage production rates between the two pit tops significantly reduces supply risks for VPPS.

The consolidation of the approvals for the Project also reduces administrative and regulatory processes for both Delta Coal and Government Regulators and improves alignment between the operations. Additionally, the review and consolidation of the existing CVC and MC consents would provide a single contemporised approval that clarifies Delta Coals regulatory obligations to the community.

All mining under land areas will be limited to bord and pillar mining methods which would be designed to be long term stable with negligible (<20 mm) subsidence impacts (Zone A). Zone A also extends to the foreshore areas to ensure that subsidence impacts do not impact on shoreline areas and seagrass beds. All subsidence limits currently applied under the CVC Consent will be applied to the Project. The mine design developed by Delta Coal includes specific design objectives to be incorporated into the final mine plan which would ensure that the identified subsidence criteria can be achieved. The consideration of design elements to be implemented into the mine design are based on the findings from the Subsidence Impact Assessment which included feedback from the peer review process.

All other impacts associated with the Project are consistent with the impacts associated with the Approved Operations.

The Project will also provide an additional two years of employment for up to 390 full-time positions, plus the associated flow-on jobs and economic benefits to the region. The Project is calculated to provide a net production benefit to NSW of $89 M in NPV terms ($2022) with potential additional indirect social benefits to the State of NSW (in NPV terms) estimated to be between $85 M (when potential employment benefits are excluded) and $155 M (when employment benefits are included).

7.2.1 Suitability of the Site

The Project relates to an existing mining operation in an area with a long history of coal mining which has been historically linked to the several power stations located in the Lake Macquarie and Central Coast area. The area within and surrounding the Project Area has been subject to extensive historical underground mining in the Wallarah, Great Northern and Fassifern Seams.

Delta Coal holds various mining leases under which operations at CVC and MC are conducted and a key objective of the Project was retaining all proposed mining within existing mining leases. The coal seams and overburden layers within the Project Area are well known due to experience gained in mining this geology at the CVC and MC areas, and through an extensive exploration program. To date, mining at CVC has occurred within the Wallarah, Great Northern and Fassifern Seams with mining at MC limited to the Great Northern and Fassifern Seams. Current approved mining activities at CVC occur within the Fassifern Seam only.

The Project aims to maximise resource extraction efficiency from within the Delta Coal lease holdings through the use of existing mining infrastructure, whilst seeking to minimise impacts on the environment and community. The design of the Project includes measures to avoid or manage impacts through a conservative mine design and through applying the key learnings from the history of mining operations at both CVC and MC.

The Project would align the LOM for the CVC and MC operations with the current operational requirements of the VPPS (to 2029), securing local coal supply security to the VPPS. This is achieved with negligible additional environmental impacts relative to the approved operations due to the proposed mining methods.

7.3 Ecologically Sustainable Development

An objective of the EP&A Act is to encourage ecologically sustainable development (ESD) within NSW. This section provides an assessment of the Project in relation to the principles of ESD.

To justify the Project with regard to the principles of ESD, the benefits of the Project in an environmental and socio-economic context should outweigh any negative impacts. The principles of ESD encompass the following:

- the precautionary principle
- inter-generational equity
- conservation of biological diversity, and
- valuation and pricing of resources.

Essentially, ESD requires that current and future generations should live in an environment that is of the same or improved quality than the one that is inherited.

7.3.1 The Precautionary Principle

Section 193 of the EP&A Regulation defines the precautionary principle as:

> *… if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.*
>
> *In the application of the precautionary principle, public and private decisions should be guided by:*
>
> *(a) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and*
>
> *(b) an assessment of the risk-weighted consequences of various options.*

In order to achieve a level of scientific certainty in relation to the potential impacts associated with the Project, this EIS has undertaken an extensive evaluation of all the key components of the Project. Detailed assessment of all key issues and necessary management procedures has been conducted and is comprehensively documented in this EIS.

The preparation of this EIS has involved a detailed analysis of the existing environment (refer to **Section 2.0** and **Section 6.0**), and the use of engineering and scientific modelling to assess and determine potential impacts as a result of the Project. These models have been calibrated using data gathered from the existing mining operation (e.g. subsidence, noise, air, ground and surface water) to ensure the models are robust and appropriately characterise the Project, allowing the impacts to be predicted and evaluated.

The decision-making process for the design, impact assessment and development of management processes has been transparent in the following respects:

- Government authorities, landholders potentially affected by the Project, the local community, the Aboriginal community and other stakeholders were extensively consulted during EIS preparation (refer to **Section 5.0** and **Appendix 17**). This enabled comment and discussion regarding potential environmental impacts and proposed environmental management procedures.

- The community has been comprehensively engaged throughout the development and assessment of the Project through a range of mechanisms including face to face meetings, presentations and community newsletters to inform Project design and proposed management of key issues (refer to **Section 5.0** and **Appendix 17**), which provided stakeholders with both information and the opportunity to influence Project outcomes.

The EIS has been undertaken on the basis of the best available scientific information about the Project Area and has been informed by site specific survey, monitoring, modelling and environmental and social assessment. Where uncertainty in the data used for the assessment has been identified, a conservative worst-case analysis has been undertaken and/or sensitivity analysis undertaken to assess a range of potential impact scenarios. Contingency measures have also been identified to manage areas of identified uncertainty. Extensive management and mitigation measures will be implemented, including monitoring programs to measure predicted against actual impacts of the Project (refer to **Appendix 4**), so that contingency measures, if required, can be implemented in a timely and pro-active manner. As noted earlier the existing operations and the management practices implemented provide a high degree of confidence in both impact predictions and the need for, and the likely success of, proposed management and mitigation measures.

Delta Coal will update and implement the existing EMS, which seeks to implement best practice management. The Project will incorporate the practices currently implemented and demonstrated to be effective and the existing management plans will be revised to incorporate any additional controls outlined in this EIS.

An auditing and review process will be an integral component of the ongoing management strategy for the CVC and MC operations providing for verification of project performance by independent auditors and relevant government agencies. The Project will implement an independent auditing and verification process consistent with relevant requirements.

7.3.2 Intergenerational Equity

The EP&A Regulation defines the principal of intergenerational equity as:

> *'that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.'*

Intergenerational equity refers to equality between generations. It requires that the needs and requirements of today's generations do not compromise the needs and requirements of future generations in terms of health, biodiversity and productivity.

The objectives of the Project are included in **Section 1.1** and with regard to intergenerational equity they include:

- optimise coal extraction within existing Delta Coal leases in an environmentally responsible manner to minimise project specific and cumulative environmental and social impacts, particularly in relation to subsidence
- simplify the consent requirements applicable to the CVC and MC operations, to streamline the regulatory requirements for both Delta Coal and the Government Regulators
- utilise existing infrastructure and equipment reducing the environmental impacts associated with constructing new infrastructure
- alignment of the Delta Coal extraction and production rates with the requirements of the VPPS
- continue the implementation of mitigation and management strategies to reduce environmental and social impacts associated with the Project in order to meet relevant criteria wherever practicable and feasible.

Although the Project would provide for an extended mine life and associated extension of associated impacts, this extension is only for an additional two years on the approximately 60 years that the mines have been in operation. The Project is not predicted to increase any associated impacts relative to the approved operations (including noise and air quality impacts).

Greenhouse gas emissions associated with coal combustion, and the established links to climate change, are likely to generate environmental impacts across generations. The Project's predicted impacts associated with greenhouse gas emissions are further discussed in **Section 6.9**. Irrespective of future policy options, the demand for coal from VPPS is predicted to remain throughout the expected life (to 2029) and would be sourced elsewhere if not provided by the VPPS. In this regard, the additional greenhouse gas emissions associated with the additional two years of proposed operation are considered to be negligible as similar emissions would be associated with obtaining the coal used at VPPS from other sources. The nominal closure date of VPPS in 2029 is consistent with the Strategic Statement on Coal Exploration and Mining in NSW and NSW Government's planned transition away from coal towards other, lower greenhouse gas intensive energy sources under the NSW Net Zero Plan. The Project is also consistent with the Commonwealth Government's commitment to net zero emissions by 2050.

A range of environmental management and mitigation measures (summarised in **Appendix 4**) will continue to be applied or have been developed and evaluated to minimise the impact on the environment as far as practicable. The design of the Project and commitment to the management of environmental issues as outlined in this EIS will maintain the health, diversity and productivity of the environment for future generations. The Project will also make a significant contribution to maintaining services in the community through the direct and flow on effects of workforce and operational expenditure and through development contributions in accordance with the EP&A Act.

7.3.3 Conservation and Biological Diversity

The EP&A Regulation identifies that the principle of conservation of biological diversity and ecological integrity should be a fundamental consideration in the decision-making process. The conservation of biological diversity refers to the maintenance of species richness, ecosystem diversity and health and the links and processes between them. All environmental components, ecosystems and habitat values potentially affected by the Project are described in this EIS (refer **Section 6.6**) and measures to ameliorate any negative impacts are outlined in **Appendix 4**.

As the Project does not involve any additional surface disturbance and indirect impacts on both terrestrial and aquatic ecosystems are predicted to be negligible, the principle of Conservation of Biological Diversity is considered to be satisfied.

7.3.4 Valuation and Pricing of Resources

The goal of improved valuation of natural capital has been included in Agenda 21 of Australia's Intergovernmental Agreement on the Environment. The principle has been defined in the EP&A Regulation as:

> *'that environmental factors should be included in the valuation of assets and services, such as:*
>
> *(i) polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,*
>
> *(ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,*
>
> *(iii) environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems'*

The Project's impacts on air quality are predicted to meet all relevant NSW Government air quality criteria which is set having regard to various factors, including the potential health impacts associated with air quality pollution. Similarly, noise impacts from the Project are predicted to meet the assessment criteria established under the NSW Noise Policy for Industry or, where this is not possible, will be no higher than that permitted by the existing approved consents for the CVC and MC operations. The exception is a single property where predicted impacts are considered to constitute a negligible exceedance of the PNTLs.

All groundwater take associated with the Project is within existing licensing allocations which are set based on efficient resource valuation principles.

Surface water is managed on site and discharged from licensed discharge points as per the requirements of the existing EPL. The existing dewatering infrastructure will be able to cater for the predicted increase in groundwater volumes which is within existing licensing volumes.

The Project also optimises the valuation and pricing of the coal resources by:

- optimising use of the existing coal processing and transportation facilities to process and transport coal to VPPS
- maximising the efficient extraction of the coal resource and avoiding the isolation and sterilisation of coal through effective mine planning, and
- providing continuity of coal supply for the VPPS and reducing reliance on external parties and supply chains.

The Economic Assessment of the Project (refer to **Appendix 16**) considers all relevant externality costs.

7.4 Conclusion

As outlined in **Section 7.3**, the Project has been assessed against the principles of ecologically sustainable development as required by the EP&A Act. This assessment has indicated that the Project is consistent with the principles of ecologically sustainable development.

The Economic Assessment (refer to **Appendix 16**) describes a range of positive benefits at a local, regional and State level that will result from the Project. These benefits include:

- ongoing employment of opportunities for the existing Delta Coal workforce
- ongoing contribution to the local, regional and State economies
- overall net production benefit to NSW of $89 M in NPV terms ($2022) with potential additional indirect social benefits to the State of NSW (in NPV terms) estimated to be between $85 M (when potential employment benefits are excluded) and $155 M (when employment benefits are included)
- royalties payable directly to the State of NSW of $36 M (of the overall net production benefit) or $54 M in undiscounted terms.

Net benefits to the region associated with the Project have been estimated using two different local effects methodologies. Under both approaches, economic benefits to the region are predicted to be significant despite the relatively minor extension in project duration and additional coal mined.

The cost benefit analysis undertaken for the Project assessed the Project as having a significant net economic benefit when all external and internal costs were considered, including environmental and social externality costs. Given the net benefit and the implementation of the management and mitigation measures proposed by Delta Coal, it is considered the Project would result in a net benefit to the NSW community.

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9.0 Abbreviations

Abbreviation	Meaning
ABWM	Australian Water Balance Model
ACHA	Aboriginal Cultural Heritage assessment
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
AIP	Aquifer Interference Policy
ANZG	Australian and New Zealand Guidelines
APZ	Asset Protection Zone
ADTOAC	Awabakal Descendants Traditional Owners Aboriginal Corporation
BAM	Biodiversity Assessment Method
BC Act	*Biodiversity Conservation Act 2016* (NSW)
BCD	Biodiversity and Conservation Division
BCMP	Benthic Communities Management Plan
BDAR	Biodiversity Development Assessment Report
bgl	Below ground level
Biodiversity and Conservation SEPP	State Environmental Planning Policy (Biodiversity and Conservation) 2021
BOD	Biochemical oxygen demand
BSAL	Biophysical Strategic Agricultural Land
CBA	Cost Benefit Analysis
CIC land	Critical Industry Cluster Land
CLM Act	*Crown Land Management Act 2016* (NSW)
CMPL	Centennial Myuna Pty Ltd
CMSC Act	*Coal Mine Subsidence Compensation Act 2017* (NSW)
CVC	Chain Valley Colliery
Darkinjung LALC	Darkinjung Local Aboriginal Land Council
DAWE	Department of Agriculture, Water and the Environment
DECC	NSW Department of Environment and Climate Change
DECCW	NSW Department of Environment, Climate Change and Water
DGVs	Default guideline values
DLALC	Darkinjung Local Aboriginal Land Council
DPE	Department of Planning and Environment
DRG	Division of Resources and Geoscience
DS Act	*Dams Safety Act 2015* (NSW)
EC	Electrical Conductivity
EEC	Endangered Ecological Community

Abbreviation	Meaning
EIS	Environmental Impact Statement
EMMA	Eastern Mining Area
EMSs	Environmental Management Systems
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EP&A Reg	Environmental Planning and Assessment Regulation 2000 (NSW)
EPA	Environment Protection Authority
EPBC	Environmental Protection and Biodiversity Conservation Act 1999
EPL	Environment Protection Licence
ESD	Ecologically Sustainable Development
FELs	Front-end loaders
FM Act	*Fisheries Management Act 1994* (NSW)
FTE	Full-time Employee
GDE	Groundwater Dependent Ecosystem
GHG	Greenhouse Gas
GHGEA	Greenhouse Gas and Energy Assessment
GIA	Ground Impact Assessment
GSV	Ground Surface Visibility
HHA	Historical Heritage Assessment
HMP	Delta Coal Heritage Management Plan
HWMSB	High Water Mark Subsidence Barrier
IBRA	Interim Biogeographic Regionalisation of Australia
ICNG	Interim Construction Noise Guideline
IPA	Inner Protection Zone
km	Kilometre
km^2	Square kilometres
L/sec	Litres per second
Lake Macquarie LEP	Lake Macquarie Local Environmental Plan 2014
LDP	Licence Discharge Point
LEA	Local Effect Analysis
LEP	Local Environmental Plan
LGA	Local Government Area
LOM	Life of Mine
LoS	Level of Service
m	Metres
mm	Millimetres
M	Millions
MBAS	Anionic Surfactants

Abbreviation	Meaning
MC	Mannering Colliery
MC Project Approval	Project Approval MP 06_0311
mg/L	Milligrams per litre
MJ/product tonne	Mega joules per product tonne
ML/day	Mega litres per day
MINES	Matters of Prescribed National Environmental Significance
MOP	Mine Operation Plan
Mt	Million tonnes
Mtpa	Million tonnes per annum
NGA	National Greenhouse Accounts
NIA	Noise Impact Assessment
Niger Act	*National Greenhouse and Energy Reporting Act 2007* (Commonwealth)
NMLS	Noise Management Levels
NPfI	Noise Policy for Industry
NPV	Net present value
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
NT Act	*Native Title Act 1993* (Commonwealth)
OEH	Office of Environment and Heritage
OPA	Outer Protection Area
PAD	Potential Archaeological Deposit
PCT	Plant Community Type
PEA	Preliminary Environmental Assessment
Planning Systems SEPP	State Environmental Planning Policy (Planning Systems) 2021
PNTLs	Project Noise Trigger Levels
POEO Act	*Protection of the Environment Operations Act 1997* (NSW)
RAPs	Registered Aboriginal Parties
Resilience and Hazards SEPP	State Environmental Planning Policy (Resilience and Hazards) 2021
RNE	Register of National Estate
Roads Act	*Roads Act 1993* (NSW)
ROM	Run of Mine (unprocessed)
SCA	State Conservation Area
SEARs	Secretary's Environmental Assessment Requirements
SEPPs	State Environmental Planning Policies
SGBP	Sea Grass Protection Barrier
SIA	Social Impact Assessment
SRLUPs	Strategic Regional Land Use Plans
SSD	State Significant Developments

Abbreviation	Meaning
SSGVs	Site-specific guideline values
SWIA	Surface Water Impact Assessment
TARP	Trigger Action Response Plan
TECs	Threatened Ecological Communities
The GHG Protocol	The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (WRI/WBCSD 2004)
The Structure Plan	Draft Greater Lake Munmorah Structure Plan
TIA	Traffic Impact Assessment
tpa	Tonnes per annum
Transport and Infrastructure SEPP	State Environmental Planning Policy (Transport and Infrastructure) 2021
TSS	Total Suspended Solids
UEP	Underground expansion project
VLAMP	Voluntary Land Acquisition and Mitigation Policy (2018)
VMP	Vegetation Mapping Program
VPPS	Vales Point Power Station
WAL	Water Access Licence
WHS Mining Act	*Workplace Health and Safety (Mines and Petroleum Sites) Act 2013* (NSW)
WM Act	*Water Management Act 2000* (NSW)
WMP	Water Management Plan
WSP	Water Sharing Plan
Central Coast LEP	Central Coast Local Environmental Plan 2022

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