Chain Valley Colliery Annual Review 2025

Delta Coal

Authors:	Nicholas van Bezouwen – Environment and Community Coordinator
Authorised by:	Kerrie Davis – Manager Health Safety and Environment
Date:	31st March 2026

Chain Valley Colliery – Annual Review (AEMR) 2025

Table 1 - Annual Review title block

Name of operation	Chain Valley Colliery
Name of operator	Delta Power & Energy (Chain Valley) Pty Ltd (trading as Delta Coal)
Project Approval #	SSD 5465
Name of Project Approval holder	Delta Coal
Titles/Mining Leases #	Consolidated Coal Lease 706, Consolidated Coal Lease 707, Mining Lease 1051, Mining Lease 1052, Mining Lease 1308, Mining Lease 1781, Mining Lease 1782, Mining Lease 1783, Mining Lease 1784, Mining Lease 1785, Mining Purposes Lease 1349, Mining Purposes Lease 1389, Mining Purposes Lease 1400, Mining Purposes Lease 337.
Name of holder of mining leases	Chain Valley Colliery - Delta Power & Energy (Chain Valley) Pty Ltd (trading as Delta Coal)
Water License #	WAL41508 / Work Approval 20MW065025
Annual Review start date	1 January 2025
Annual Review end date	31 December 2025
I, Nicholas van Bezouwen, certify that this audit report is a true and accurate record of the compliance status of Chain Valley Colliery for the period 1 January 2025 to 31 December 2025 and that I am authorised to make this statement on behalf of Delta Power & Energy (Chain Valley) Pty Ltd (trading as Delta Coal). *Note.* *a) The Annual Review is an 'environmental audit' for the purposes of section 122B(2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, $1 million and for an individual, $250,000.* *b) The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement—maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications/information/documents—maximum penalty 2 years imprisonment or $22,000, or both).*	
Reporting Officer	Name: **Nicholas van Bezouwen** Title: **Environment and Community Coordinator** Date: **31st March 2026** Signature:

Executive Summary

Below details a summary of the key performance indicators for Chain Valley Colliery.

Indicator	Value
Total full-time employees (at 31 December 2025)	270
ROM coal produced on site (tonnes)	1,069,943
Product coal transported from site via Mannering Colliery (tonnes)	1,069,943
Total ROM coal to export market (million tonnes)	0
Total ROM coal to domestic market (tonnes)	1,069,943
Total Coal Haulage on public roads (tonnes)	0
Total waste disposed (tonnes)	202.6
Total waste recycled (tonnes)	222.5
Waste recycling % achieved (%)	52.3
Potable water consumed (ML)	88.7
Total water discharged from the operation (ML)	2413
Total number of community complaints received	0
Total number of reportable environmental incidents (including approvals non-compliances) for the period	11
Total funding accrued for the Voluntary Planning Agreement with Council in reporting period	$48,766.19
Number of Community Consultative Committee (CCC) meetings undertaken	4
Total Scope 1 greenhouse gas emissions (CO_2 equivalent tonnes) 1st July 2023 – 30th June 2024	459,107

1 Statement of Compliance

Summary of non-compliances (2025 Reporting Period):

The **11** reportable environmental incidents during the reporting period were air quality or water related exceedances. These are summarised in **Table 2** and **Table 3**.

Table 2 - Statement of Compliance

Were all conditions of the relevant approval(s) complied with?	
SSD 5465	No
EPL 1770	No
Consolidated Coal Lease 706, Consolidated Coal Lease 707, Mining Lease 1051, Mining Lease 1052, Mining Lease 1308, Mining Lease 1781, Mining Lease 1782, Mining Lease 1783, Mining Lease 1784, Mining Lease 1785, Mining Purposes Lease 1349, Mining Purposes Lease 1389, Mining Purposes Lease 1400, Mining Purposes Lease 337.	Yes
Water Access Licence 41508 / Work Approval 20MW065025	Yes

Table 3 - Non-compliances for 2024 at Chain Valley Colliery

Date	Relevant Approval	Condition No.	Condition Description (summary)	Compliance Status	Comment	Where addressed in Annual Review
26 March 2025	SSD-5465	Schedule 3, Condition 11	DDG004 – Exceedance of Maximum Monthly Increase Limit	Non-compliant	Attributed to activities unrelated to Chain Valley Colliery.	Section 6.1.1 and Section 11
27 April 2025	EPL 1770	L2.4	EPA Point 27 – Water Quality (Total Suspended Solids)	Non-compliant	109 mg/L, with EPL 1770 stipulating a 50 mg/L limit.	Section 7.4 and Section 11.

Date	Relevant Approval	Condition No.	Condition Description (summary)	Compliance Status	Comment	Where addressed in Annual Review
29 April 2025	SSD-5465	Schedule 3, Condition 11	DDG004 – Exceedance of Maximum Monthly Increase Limit	Non-compliant	Attributed to activities unrelated to Chain Valley Colliery.	Section 6.1.1 and Section 11
18 May 2025	EPL 1770	L2.4	EPA Point 27 – Water Quality (Total Suspended Solids)	Non-compliant	206 mg/L, with EPL 1770 stipulating a 50 mg/L limit.	Section 7.4 and Section 11.
5 June 2025	SSD 5465 EPL 1770	Schedule 3, Condition 7 L5.1	R22 – Exceedance of Q2 Noise Monitoring	Non-compliant	Follow-up monitoring was undertaken during similar noise enhancing conditions. The result was within the limit.	Section 6.7 and Section 11
22 July 2025	SSD-5465	Schedule 3, Condition 11	DDG002 – Exceedance of Maximum Monthly Increase Limit	Non-compliant	Attributed to activities unrelated to Chain Valley Colliery.	Section 6.1.1 and Section 11
25 September 2025	SSD-5465	Schedule 3, Condition 11	DDG004 – Exceedance of Maximum Monthly Increase Limit	Non-compliant	Attributed to activities unrelated to Chain Valley Colliery.	Section 6.1.1 and Section 11
5 November 2025	SSD-5465	Schedule 3, Condition 11	DDG004 – Exceedance of Maximum Monthly Increase Limit	Non-compliant	Attributed to activities unrelated to Chain Valley Colliery.	Section 6.1.1 and Section 11

Date	Relevant Approval	Condition No.	Condition Description (summary)	Compliance Status	Comment	Where addressed in Annual Review
9 December 2025	SSD-5465	Schedule 3, Condition 11	PM2.5 24hr average exceedance.	Non-compliant	Attributed to a regional air quality event caused by nearby bushfires.	Section 6.1.1 and Section 11
16 December 2025	SSD-5465	Schedule 6, Condition 5	Following IEA Submission, review management strategies, plans and programs.	Non-compliance	Review is now required by 30 March 2026.	
19 December 2025	SSD-5465	Schedule 3, Condition 11.	DDG004 – Exceedance of Annual Average Limit	Non-compliant	Attributed to activities unrelated to Chain Valley Colliery.	Section 6.1.1 and Section 11

Compliance status key for Table 3

Risk Level	Colour Code	Description
High	Non-Compliant	Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence
Medium	Non-Compliant	Non-compliance with potential for serious environmental consequences, but is unlikely to occur; or potential for moderate environmental consequences, but is likely to occur
Low	Non-Compliant	Non-compliance with potential for moderate environmental consequences, but is unlikely to occur; or potential for low environmental consequences, but is likely to occur
Administrative non-compliance	Non-Compliant	Non-compliance which does not result in any risk of environmental harm

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2 Introduction

2.1 Background

Chain Valley Colliery (CVC) is an underground coal mine located on the southern end of Lake Macquarie approximately 60 km south of Newcastle, 80 km north of Sydney and adjacent to Vales Point Power Station (VPPS). The pit-top is located 1 km south-east of the township of Mannering Park. The sites locality and approved boundary are shown on **Figure 1**.

CVC operates under Development Consent SSD-5465 which was most recently modified (Modification 4) in August 2021.

Underground mining at CVC commenced in 1962 and since that time has extracted coal from three seams; namely, the Wallarah Seam, the Great Northern Seam and the Fassifern Seam, using a combination of bord and pillar and miniwall mining methods. Current mining activities are within the Fassifern Seam. CVC completed its final planned miniwall in 2021. All mining undertaken in the reporting period was first-workings and partial secondary extraction utilising bord and pillar mining methods.

Delta Coal is currently undertaking the mine closure/rehabilitation process for the Moonee Colliery stockpile area, within intentions to relinquish this holding area to National Parks and Wildlife Services upon completion of rehabilitation.

CVC peaked with a workforce of approximately 380 personnel in the mid 1980's. At the end of the reporting period, CVC had a workforce of 270 personnel.

2.2 Mine Contacts

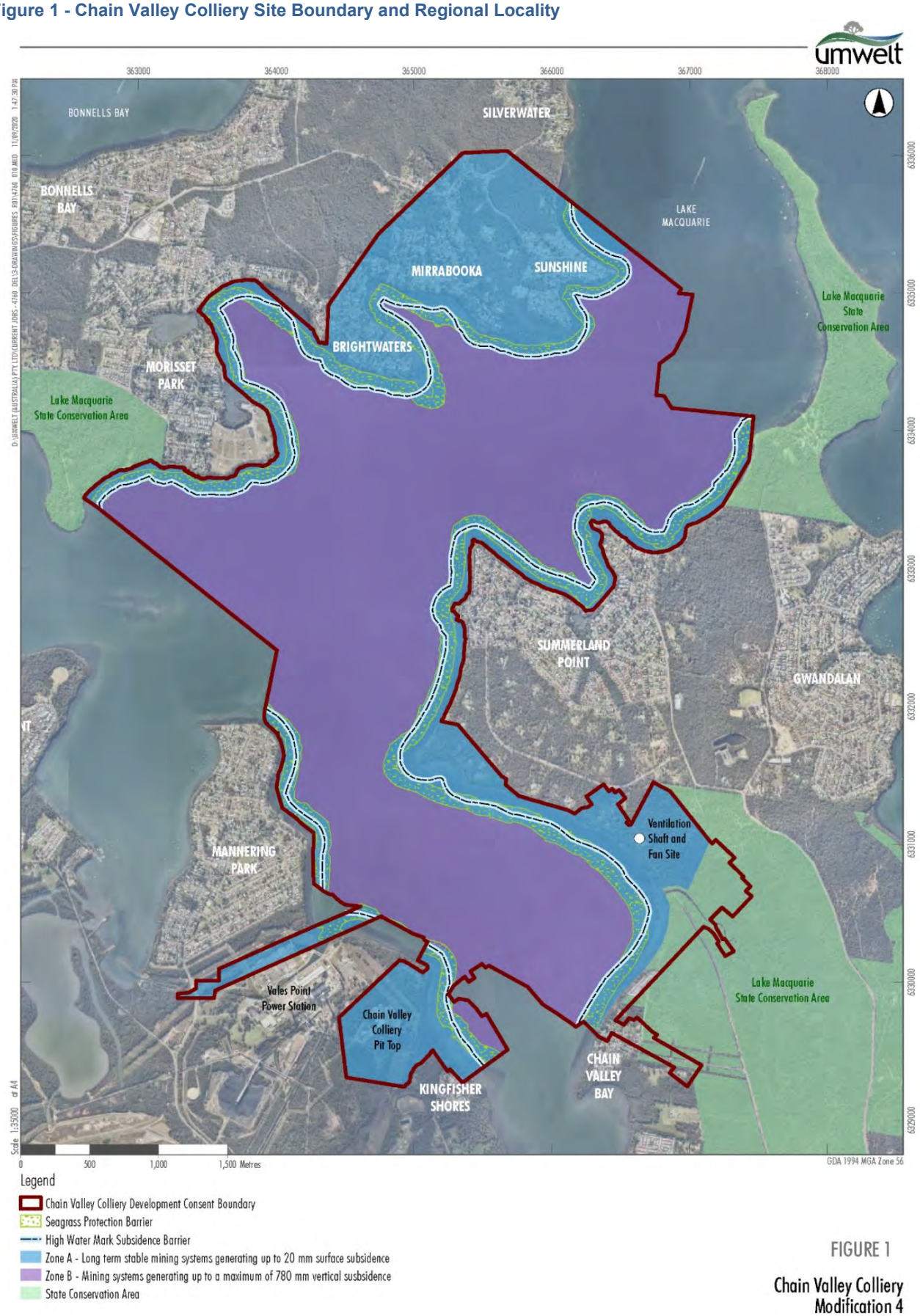
The Colliery contacts as at the end of the reporting period were:

Mine Manager: Joshua Cornford
Telephone:
Email:

Environment and Community Coordinator: Nicholas van Bezouwen
Telephone:
Email:

Postal Address: Delta Coal
P.O Box 7115
Mannering Park NSW 2259

Figure 1 - Chain Valley Colliery Site Boundary and Regional Locality



3 Approvals

This Annual Review has been completed in compliance with Condition 8 of Schedule 6 within SSD-5465. A copy of the modified Development Consent is attached as **Appendix 1**.

3.1 Development Consent SSD-5465

CVC commenced mining operations in 1962 and the mine had been operating under existing use rights until 23 January 2012 at which time major project approval (MP 10_0161) was issued under Section 75J of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The project approval permitted secondary extraction within domains referred to as Domain 1 and Domain 2, along with first workings within an area identified as Parcel A. The approval also permitted the continuation of mining within the Fassifern Seam until 31 December 2016.

The approval was subsequently modified on 30 August 2012, following approval of a Section 75W modification, to permit a revised mine layout associated with the introduction of wider miniwalls within the Domain 1 and 2 areas.

In 2013 the mine lodged an application for the Chain Valley Colliery Mining Extension 1 Project (SSD-5465) under Part 4 of the EP&A Act. The Mining Extension 1 Project sought approval for:

- an extension of the approved extraction area to allow underground mining to continue within the Fassifern Seam;
- the increase of the approved maximum rate of production from 1.2 million tonnes per annum (Mtpa) to 1.5 Mtpa of run-of-mine (ROM) coal;
- an increase in the approved hours for haulage of coal from the Colliery on private roads to Delta Electricity's VPPS;
- minor upgrades and modifications to existing approved infrastructure;
- an extension of the approved mining by a period of approximately 14 years, to 2027; and
- the consolidation of the above with all the operations and environmental activities currently approved under MP10_0161, as modified, within a single development consent.

Development Consent for the Mining Extension 1 Project was subsequently issued under Section 89E of the EP&A Act on 23 December 2013.

On 24 April 2014 a modification (Mod 1) was sought for SSD-5465, which related to the development of an underground linkage between Chain Valley Colliery and Mannering Colliery. Concurrently, a modification (Mod 2) to Mannering Colliery's Project Approval (MP 06_0311) was sought to permit coal to be received from Chain Valley Colliery and transported via existing facilities to VPPS. The modification application was approved on the 27 November 2014.

On the 15 July 2015 an additional modification (Mod 2) was sought for SSD-5465. The Department of Planning and Environment (DP&E) approved the modification on 16 December 2015. The modification approved the following changes to the CVC operations:

- an increase in the maximum rate of ROM coal extraction at the mine from 1.5 Mtpa to 2.1 Mtpa;
- mine design changes, primarily the re-orientation of miniwall panels in the mine's northern area;
- an increase in full-time personnel from approximately 160 to approximately 220; and
- construction of asset protection zones (APZs) around critical infrastructure to protect from bushfires.

In May 2019 a Statement of Environmental Effects was submitted to support an additional modification (Mod 3) being sought for SSD-5465. The Department of Planning, Industry and Environment (DPIE) approved the modification on the 26th June 2020, the modification approved the following changes to the CVC operations:

- the use of alternate bord and pillar mine designs; and
- an extension of allowed operations until 31 December 2027.

On the 25th August 2021 a further modification to SSD-5465 (Mod 4) was approved by the DPIE. The modification approved the following changes to the CVC operations:

- extend the boundary of the Northern Mining Area approved for extraction under the Chain Valley Colliery consent into a mining lease area partially transferred from Centennial Myuna Colliery (Part ML1632 transferred to ML1785); and
- increase the maximum employee numbers permitted at Chain Valley Colliery to approximately 330 full-time equivalent employees.

Delta Coal submitted an Environmental Impact Statement (EIS) in 2022. The purpose of the EIS was to facilitate the consolidation of the Chain Valley Colliery and Mannering Colliery consents, as well as the extension of the life of both mines to 31 December 2029, which reflects the current forecasted VPPS operational timeframe. During the reporting period, the approval was referred to the Independent Planning Commission (IPC) by the Department of Planning, Housing and Infrastructure. In 2026 the IPC will undertake a public hearing and final determination following the hearing.

3.2 Extraction Plans

Delta Coal holds an approved extraction plan to facilitate the mining of Miniwall S5 and pillar extraction in the Northern Mining Area (Miniwall S5 and Northern Pillar Area Extraction Plan), which was approved by the Planning Secretary on 6th April 2021.

An amendment was submitted and approved within the 2025 reporting period to the Miniwall S5 and Northern Pillar Extraction Plan in order to reflect changes in mine layout within the Northern Mining Area (NMA). During the 2025 reporting period, secondary extraction in the form of partial pillar extraction in conjunction with the continuation long-term stable first workings. CVC is approved to undertake pillar extraction within Subsidence

Zone B (beneath Lake Macquarie excluding sea-grass and subsidence protection barriers) in the Northern mining area (up to 780mm of subsidence approved).

3.3 Rehabilitation Management Plan

Throughout the 2025 period, the site operated in accordance with the Rehabilitation Management Plan for Delta Coal (incorporating Chain Valley Colliery, Mannering Colliery and the former Moonee Colliery). In addition to the Rehabilitation Management Plan, Delta Coal operated in accordance with the Rehabilitation Forward Program and approved Rehabilitation Objectives required under Schedule 8A of the Mining Regulations 2021.

3.4 Leases

The surface areas occupied by CVC lie within the Central Coast local government area (LGA). The facilities include the pit top area at Mannering Park and ventilation shaft site at Summerland Point.

All extraction during the reporting period was undertaken within the Lake Macquarie LGA.

The Colliery holdings are shown on **Figure 2** and the applicable mining tenements are listed in **Table 4**.

Table 4 - Mining Tenements

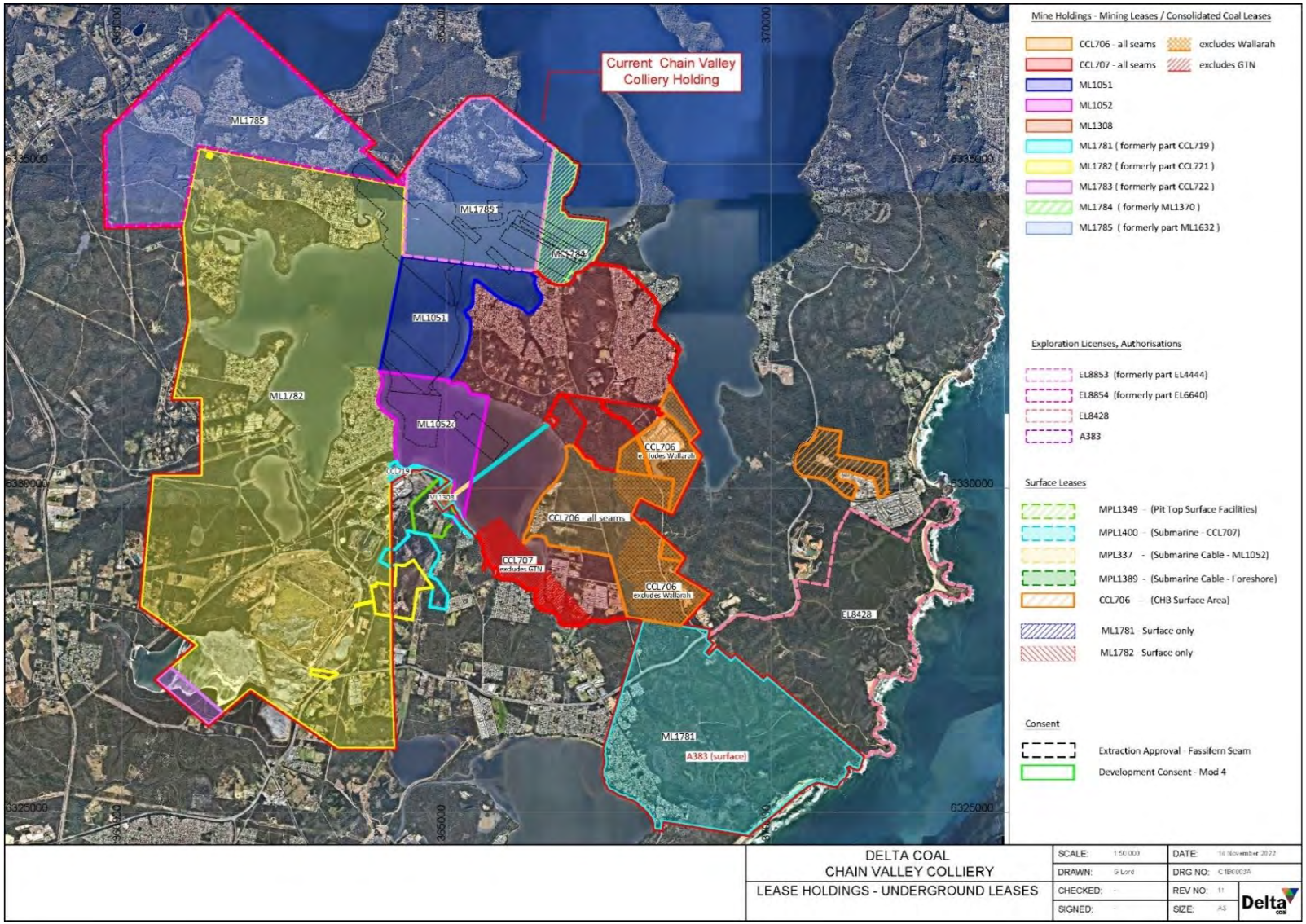
Current Mining tenement	Holder	Grant Date	Renewal date	Lease expiry date	Applicability
EL 8428	Great Southern Energy	7 December 2015	5/12/2025	7 December 2025 (Awaiting approval)	Potential future mine extension area.
EL 8853	Great Southern Energy	31 October 2022		23 October 2026	Exploration lease for ML 1785 area. Current mine area approved under Development Consent SSD-5465.
EL 8854	Great Southern Energy	12 October 2022		23 April 2026	Exploration Lease for ML 1785 area. Potential future mine extension area.
CCL 706	Great Southern Energy	24 January 1990	10 February 2023	29 December 2029	Incorporates historical workings within the Fassifern, Wallarah and Great Northern Seams which are, and would continue to be utilised for passive operational activities.
CCL 707	Great Southern Energy	3 July 1989	1 June 2023	30 December 2029	Incorporates historical workings within the Fassifern, Wallarah and Great Northern seams which are, and would continue to be, utilised for passive operational activities and the Summerland Point ventilation shaft site.

Current Mining tenement	Holder	Grant Date	Renewal date	Lease expiry date	Applicability
ML 1051	Great Southern Energy	7 July 1941	30 January 2023	7 July 2042	Part of the area approved under Development Consent SSD-5465.
ML 1052	Great Southern Energy	7 July 1941	30 January 2023	7 July 2042	Part of the area approved under SSD-5465.
ML 1308	Great Southern Energy	4 May 1965	30 January 2023	4 January 2031	Mining lease for the mine drift entries.
ML1781	Great Southern Energy	22 April 2022		3 July 2031	Partial Transfer from subleased area of CCL719 from Centennial Coal to GSE. Incorporates historic workings within the Wallarah and Great Northern Seams utilised for passive operational activities.
ML 1782	Great Southern Energy	24 January 2022		29 July 2026	Partial Transfer of previous sublease area of CCL721 from Centennial coal to GSE.
ML 1783	Great Southern Energy	22 April 2022		28 June 2028	Partial transfer of previous subleased area of CCL722 from Centennial Coal to GSE.
ML 1784	Great Southern Energy	14 May 2021		7 Mar 2033	Partial Transfer of previous sublease area of ML1370 from Centennial coal to GSE.
ML 1785	Great Southern Energy	14 October 2022		13 October 2043	Partial transfer of previous subleased area of ML1632 from Centennial Coal to GSE.
MPL 337	Great Southern Energy	30 January 1995	30 January 2016	30 January 2037	Mining purposes lease for a portion of the electricity cable on the bed of Chain Valley Bay connecting the pit top switchyard to the ventilation shaft site at Summerland Point.
MPL 1349	Great Southern Energy	5 October 1967	5 October 2008	5 Oct 2028	Mining purposes lease for the Chain Valley pit top area.
MPL 1389	Great Southern Energy	14 May 1970	14 May 2011	14 May 2031	Mining purposes lease for a portion of the electricity cable on the bed of Chain Valley Bay connecting the pit top switchyard to the ventilation shaft site at Summerland Point.
MPL 1400	Great Southern Energy	6 November 1970	6 November 2011	6 Nov 2031	Mining purposes lease for a portion of the electricity cable on the bed of Chain Valley Bay connecting the pit top switchyard to the ventilation fan at Summerland Point.

Blue = Change within the reporting period

It is noted that while the CVC holding boundary incorporates the entirety of the former Mannering Colliery holding, Annual Reviews for the two Collieries remain separate pending consolidation of the consents and this Annual Review relates specifically to the activities occurring within the Development Consent SSD-5465 boundary under the EP&A Act 1979.

Figure 2 - Delta Coal Tenement Holdings



3.5 Licences

Environment Protection Licence (EPL) No. 1770 issued by the Environment Protection Authority (EPA) under the Protection of the Environment Operations Act 1997 covers the activities and premises for CVC.

EPL 1770 also includes the licenced daily discharge volume for mine water from the pit top settling ponds into Lake Macquarie at a maximum rate of 12,161 kL per day. EPL 1770 was last varied on 9-Apr-2025, with the variation reflecting a change in business name from Great Southern Energy Pty Ltd to Delta Power & Energy Pty Ltd.

A copy of EPL 1770 is posted on the Delta Coal website, www.deltapae.com.au or via the EPA website, http://www.environment.nsw.gov.au/licensing/ and is also provided in **Appendix 2**.

Monitoring results obtained in accordance with the license conditions are made available on the Delta Coal website (updated monthly), under the environmental reporting page: https://www.deltapae.com.au/operations/chain-valley-colliery/chain-valley-colliery-environment/environmental-monitoring-reports.

Delta Coal also holds WAL41508 issued under the *Water Act 1912* and permits the extraction of 4443 ML per annum.

4 Operations

4.1 Exploration

There was no surface exploration drilling undertaken during the reporting period.

4.2 Land Preparation

There was no land preparation undertaken during the reporting period, as a result, the surface disturbance footprint remains unchanged.

4.3 Construction/Demolition

No construction or demolition projects were undertaken during the reporting period.

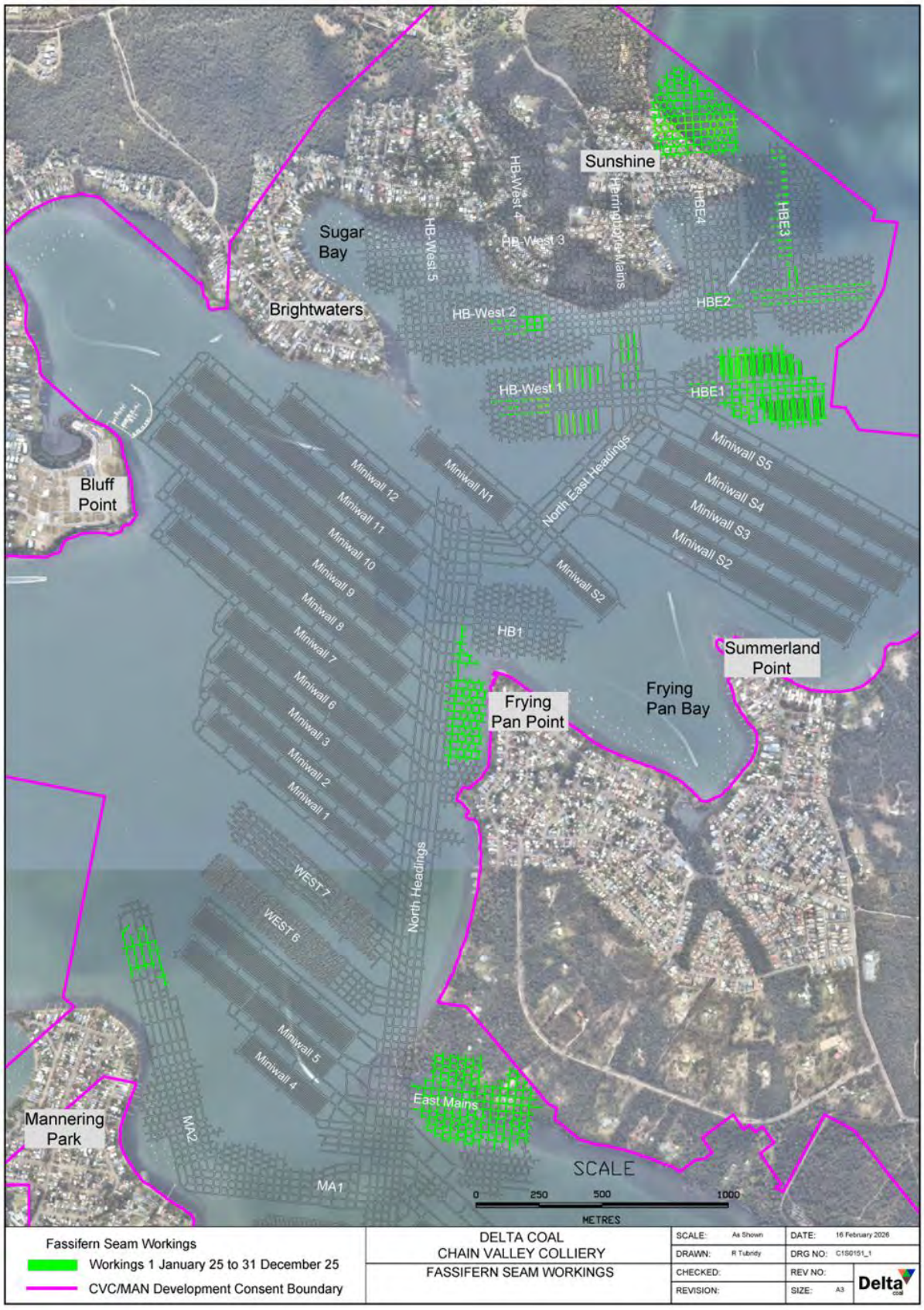
4.4 Mining

In the 2025 reporting period, CVC undertook first workings through bord and pillar mining methods in a herringbone style as well as continued pillar extraction in the northern mining area within subsidence zone B (**Figure 1**).

Total production for 2025 was 1,069,943 tonnes of ROM coal.

CVC's existing underground workings and mining undertaken in the reporting period is shown on **Figure 3**.

Figure 3 - CVC Underground Workings (2025 workings in green)

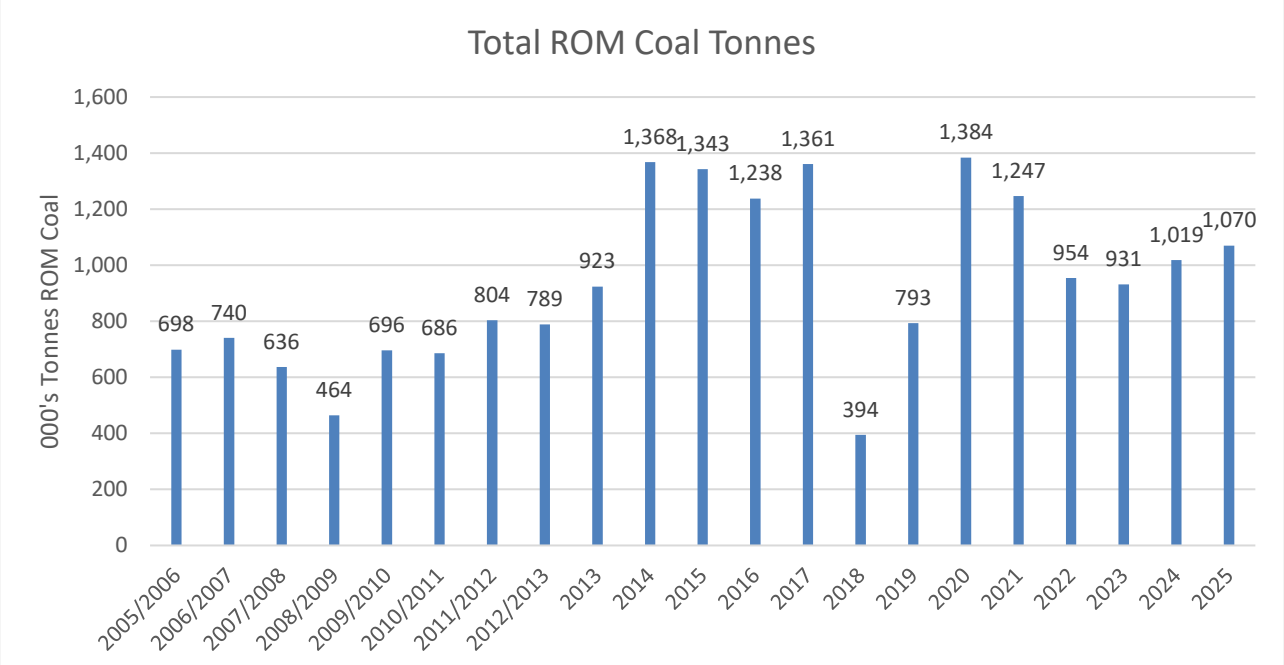


A production summary for the reporting period is provided in **Table 5. Figure 4** shows the past 20 years of annual ROM production. All coal produced was dispatched to VPPS via conveyor from Mannering Colliery. During the reporting period a total of 1,069,943 tonnes was dispatched to VPPS (domestic market). No coal was sold for export in the reporting period.

Table 5 - Production Summary

Material	Approved Limit (Mt)	Previous Reporting Period (Actual)	This Reporting Period (Actual)	Next Reporting Period (Forecast)
Waste Rock / Overburden	n/a	n/a	n/a	n/a
ROM Coal	2.1 Mt	1.02 Mt	1.07 Mt	1.12 Mt
Coarse Reject	n/a	n/a	n/a	n/a
Fine Reject	n/a	n/a	n/a	n/a
Saleable Product (Same as ROM)	2.1 Mt	1.02 Mt	1.07 Mt	1.12 Mt

Figure 4 - Annual ROM Production Levels



4.4.1 Mine Geology

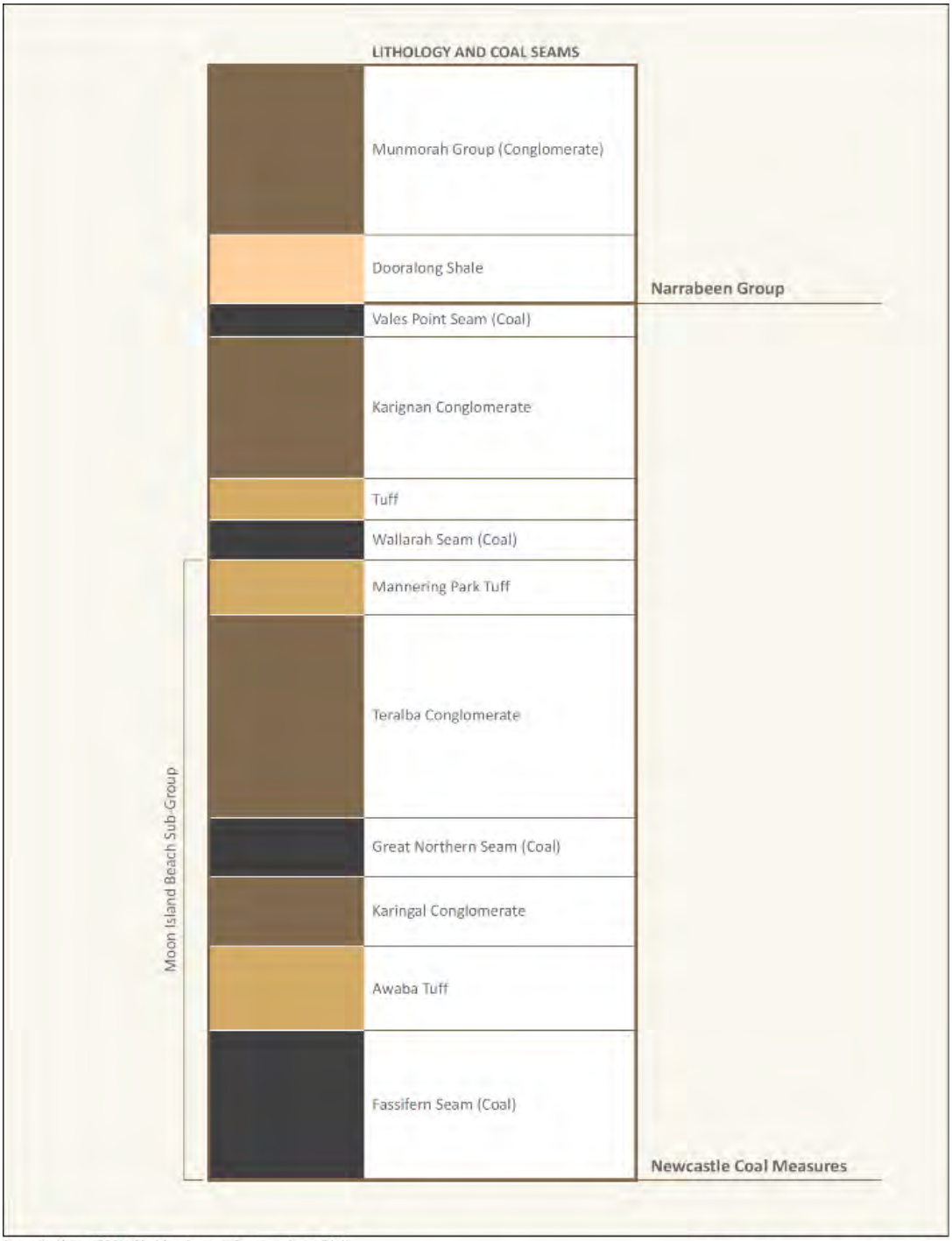
The Fassifern seams have been mined at CVC to produce a raw, crushed thermal coal with low sulphur, which is suitable for both export and domestic markets.

The Fassifern Seam is mined at a depth of approximately 160 to 200 m, approximately 30 m deeper than the Great Northern Seam, which underlies the Wallarah Seam by approximately 30 m also. **Figure 5** shows the typical stratigraphy at CVC including the Wallarah, Great Northern and Fassifern seams.

The Fassifern Seam is overlain by a tuffaceous claystone material which varies in thickness between 20 and 30 metres. The Fassifern Seam measures up to 5 metres in thickness with roadway development carrying a coal roof and floor.

Mining in the Wallarah Seam is complete in the Colliery holding area and mining was discontinued in the late 1990's. There is still some remaining resource within the Great Northern and Fassifern seams. Current operations and approvals only permits mining within the Fassifern Seam.

Figure 5 - Typical Stratigraphy at Chain Valley Colliery



Source: Modified by AECOM (2011) from Seedman Geotechnics Pty Ltd (2010).

Typical stratigraphy at the Site

Chain Valley Colliery Mining Extension I Project - Environmental Impact Statement

4.5 Coal Processing

CVC produces a raw, crushed thermal coal which is suitable for both export and domestic markets. In 2020 Mannering Colliery's above ground rotary breaker was decommissioned. Since the rotary breaker was decommissioned initial crushing and sizing occurs underground before being conveyed to Mannering Colliery pit-top for further sizing and screening in the coal handling and preparation plant (CHPP). Coal is transferred from the CHPP to the Mannering Surface ROM Coal Bin which feeds the YE1 conveyor for transport directly to VPPS. In scenarios where the coal transport to VPPS is limited or offline, coal material can be directed to Mannering Collieries coal stockpile, for later transport to VPPS (still via the YE1 conveyor).

4.6 Waste Management

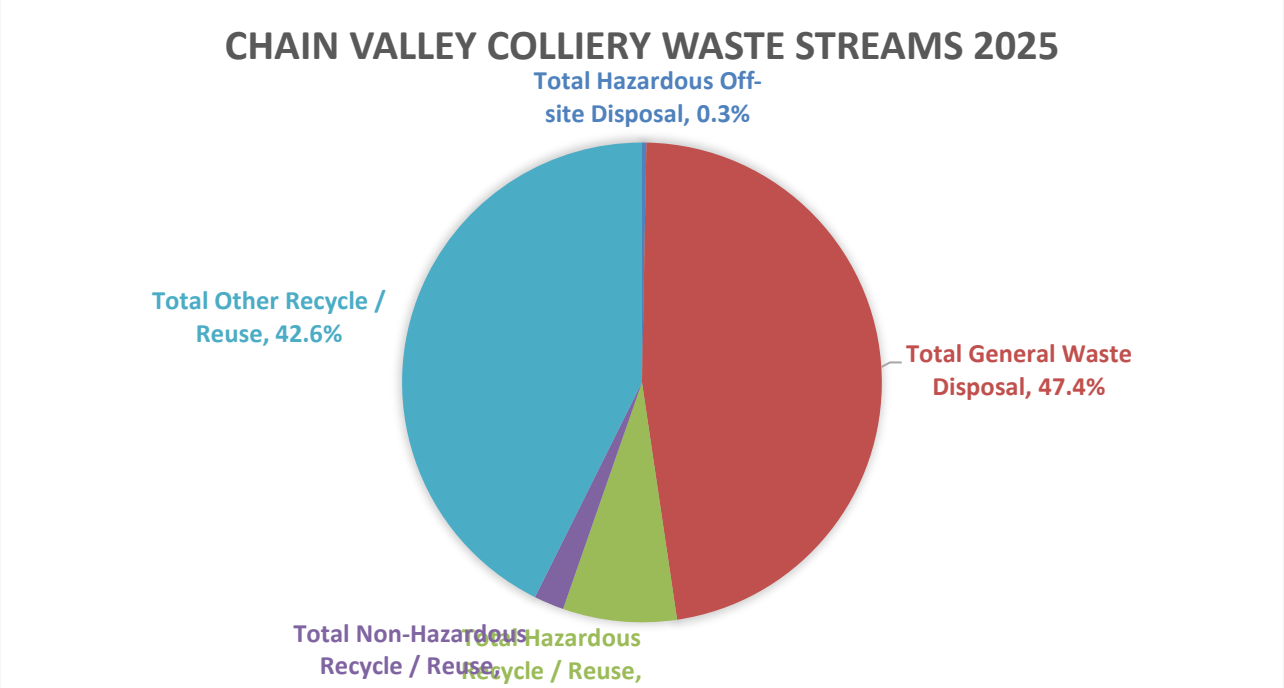
Delta Coal continued to implement a total waste management system for the site during the reporting period. The waste streams currently provided for include:

- General Waste (disposal), 201.3 t (47.4%)
- Other Recycle/Reuse, 181.3 t (42.6%)
- Hazardous Recycle/Reuse, 32.6 t (7.7%)
- Non-Hazardous Recycle/Reuse, 8.6 t (2%)
- Total Hazardous Offsite (disposal), 1.3 t (0.3%)

The total waste management system also involves weekly site inspections by the waste management contractor to facilitate effective waste management and continual improvement along with monthly reporting, with data from key waste streams presented in **Figure 6.**

During the reporting period there was a continued focus on recycling. The total waste management system will continue during the next reporting period. A total of 52.3% of waste collected from the site was recycled.

Figure 6 – Chain Valley Colliery Waste Streams



4.7 Stockpiles

The CVC stockpile does not receive product coal following the linkage of CVC and MC underground. Active control of sediment and erosion is undertaken on the stockpile area footprint.

4.8 Hazardous Materials Management

Bulk storage of hazardous materials and dangerous goods occurs in the stores area adjacent to the workshop. The primary hazardous chemicals storage locations are:

- a 15,900 L above ground diesel tank (not in operation during the reporting period);
- a covered, bunded area for storage of pallets of oils, and bulk fluid containers;
- 31.4 kL self-bunded diesel tank (compliant with both AS1692 and AS1940);
- A 35.1 m^3 self-bunded container for hydrocarbon storage (compliant with AS1940); and
- three 210kg LPG bottles.

There have been no significant changes made to the management of hazardous materials during the 2025reporting period, with exception to the addition of a self-bunded shipping container for hydrocarbon storage (drums and containers).

4.9 Other Infrastructure Management

During 2025, the site's former winder wheel housing was demolished, no other significant changes were made to on-site infrastructure during the 2025 review period.

4.10 Proposed Changes

Forecast changes for CVC that are likely to occur in the next reporting period include:

- Delta Coal is consolidating the CVC and MC approvals under the EP&A Act 1979, an EIS for the project was submitted in 2022, and the project has progressed through consultation phases, with it being referred to the IPC at the end of the 2025 reporting period, with assessment and determination early 2026.
- If the CVC and MC Consent Consolidation Project is approved, request to consolidate EPL 1770 and EPL 191 to one license under the POEO Act 1997.

5 Actions Required from Previous Annual Review

5.1 Actions required from 2024 Annual Review

As detailed in **Table 6**, correspondence was received from DPIE on 28 August 2024, noting that the CVC Annual Return 2025 generally satisfied the reporting requirements of the consent and the Departments *Annual Review Guideline* (October 2015), however it was noted for future Annual Reviews, under the provisions of Schedule 2, Condition 3, of the consent, to include the items in Table 6.

Table 6 - Actions required from 2025 Annual Review

Item	Section	Action	Status
1	6.7	In Table 11, you are required to include the date each non-compliance is reported to NSW Planning and applicable Post Approval number.	Addressed in Section 6.7 – Operational Noise

5.2 Delta Coal Environmental Management System

Environmental management at CVC is structured through the environmental management system based on the company's Environmental Policy. The site risk assessment of environmental aspects at CVC forms the basis of environmental impact mitigation and control and will be reviewed throughout the life of the Colliery.

The Environmental Management Strategy provides the overview of the environmental management system which has been visually presented in **Figure 7**. Modification 3 of SSD-5465 (June 2020) allowed for the combination of some Mannering Colliery and Chain Valley Colliery management plans, at the end of the reporting period the following combined plans were approved:

- Delta Coal Environmental Management Strategy (incorporating Environmental Monitoring Program);
- Delta Coal Noise Management Plan (combining the Mannering Colliery Noise Management Plan and Noise Monitoring Program and CVC Noise Management Plan);
- Delta Coal Air Quality and Greenhouse Gas Management Plan (combining CVC Air Quality Management Plan and Mannering Colliery Air Quality and Greenhouse Gas Management Plan); and
- Delta Coal Heritage Management Plan (combining CVC Heritage Management Plan, Mannering Colliery Aboriginal Cultural Heritage Management Plan and Mannering Colliery Non-indigenous Management Plan).
- Delta Coal Land Management Plan (capturing the requirement of the Mannering Colliery Land Management Plan and includes CVC land management requirements)

Table 7 provides the status of CVC's Environmental Management Plans.

Figure 7 - Environmental Management Strategy Summary

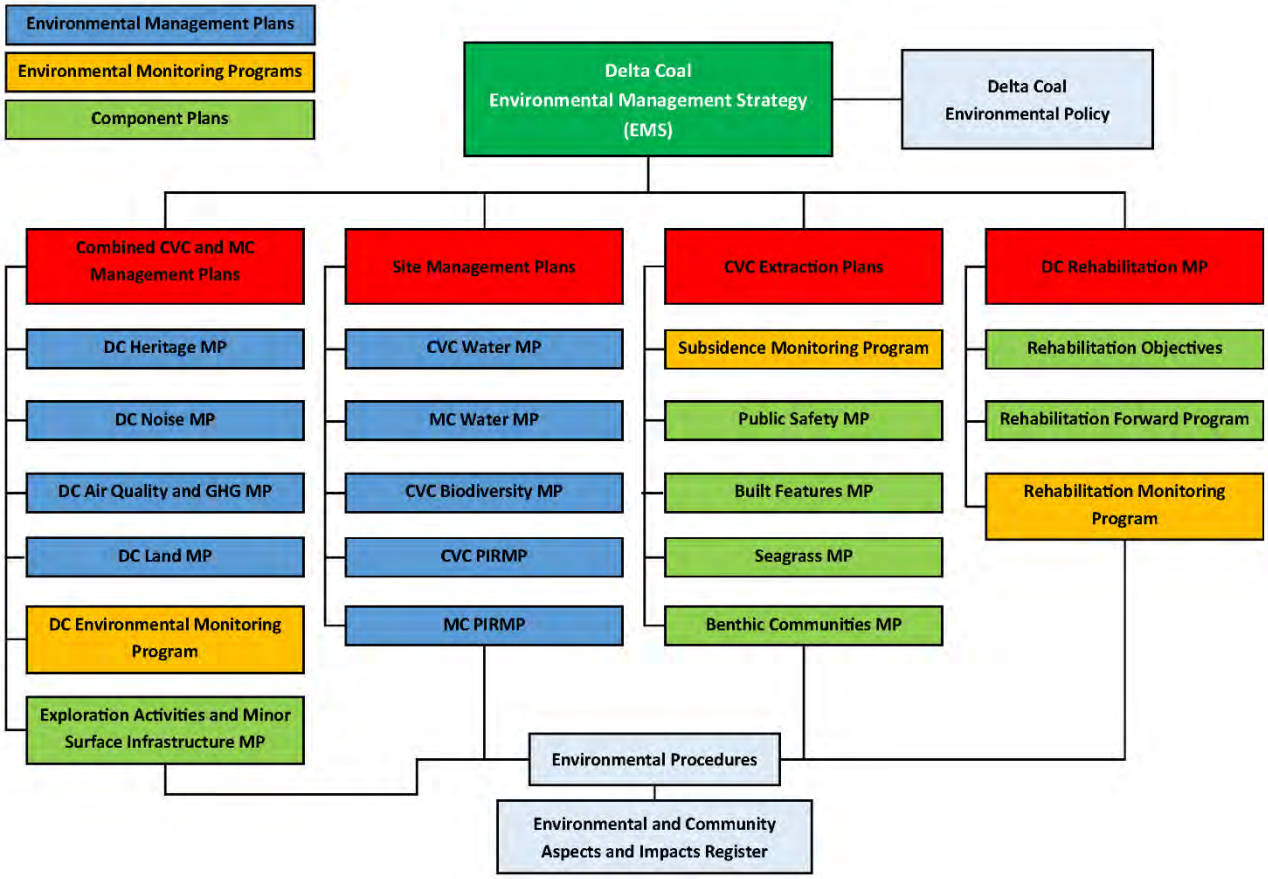


Table 7 - Primary Elements of the Environmental Management System

Document Title	Last Approved / Reviewed	Status
Delta Environment Policy	July 2025	Current
Delta Coal Environmental Management Strategy	July 2024	Current
Delta Coal Environmental Monitoring Program	July 2024	Current - Appended to the combined Delta Coal Environmental Management Strategy
Environmental Aspects and Impacts Register and Risk Assessment	August 2025	Current
CVC Water Management Plan	October 2024	Current
Delta Coal Air Quality and Greenhouse Gas Management Plan	January 2024	Current
Delta Coal Noise Management Plan	April 2022	Current

Document Title	Last Approved / Reviewed	Status
Delta Coal Heritage Management Plan	September 2023	Current
Delta Coal Land Management Plan	Not yet approved	Submitted to DPHI for approval.
Biodiversity Management Plan	April 2023	Current
Road Transport Protocol (Traffic Management Plan) and Coal Haulage Drivers Code of Conduct	Reviewed in 2022, unchanged as CVC does not undertake road coal haulage.	Reviewed in 2022, unchanged as CVC does not undertake road coal haulage.
Seagrass Management Plan	October 2024	Current
Benthic Communities Management Plan	September 2023	Current
Groundwater Management Plan	October 2024	Water Management Plan incl. Groundwater Management Plan approved October 2024.
Built Features Management Plan	April 2021	Approved with Miniwall S5 and NMA Extraction Plan.
Public Safety Management Plan	April 2021	Approved with Miniwall S5 and NMA Extraction Plan.
Rehabilitation Management Plan	November 2023	Current
Rehabilitation Objectives	November 2023	Current
Rehabilitation Forward Program	November 2024	Current
Subsidence Monitoring Program – Northern Mining Area First Workings and Lake Macquarie Extraction	August 2021	Approved with Delta Coal Mining Operations Plan Amendment 2.
Subsidence Monitoring Program – Miniwall S5 and Northern Mining Area Pillar Extraction	November 2020	Reviewed with no changes in the Miniwall S5 and Northern Pillar Area Extraction Plan Amendment 1.
Pollution Incident Response Management Plan (PIRMP)	December 2025	Current
Environmental Inspection Forms	May 2023	Current
Complaints Register	December 2025	Updated monthly on www.deltapae.com.au

6 Environmental Performance

6.1 Air Pollution

6.1.1 Depositional Dust

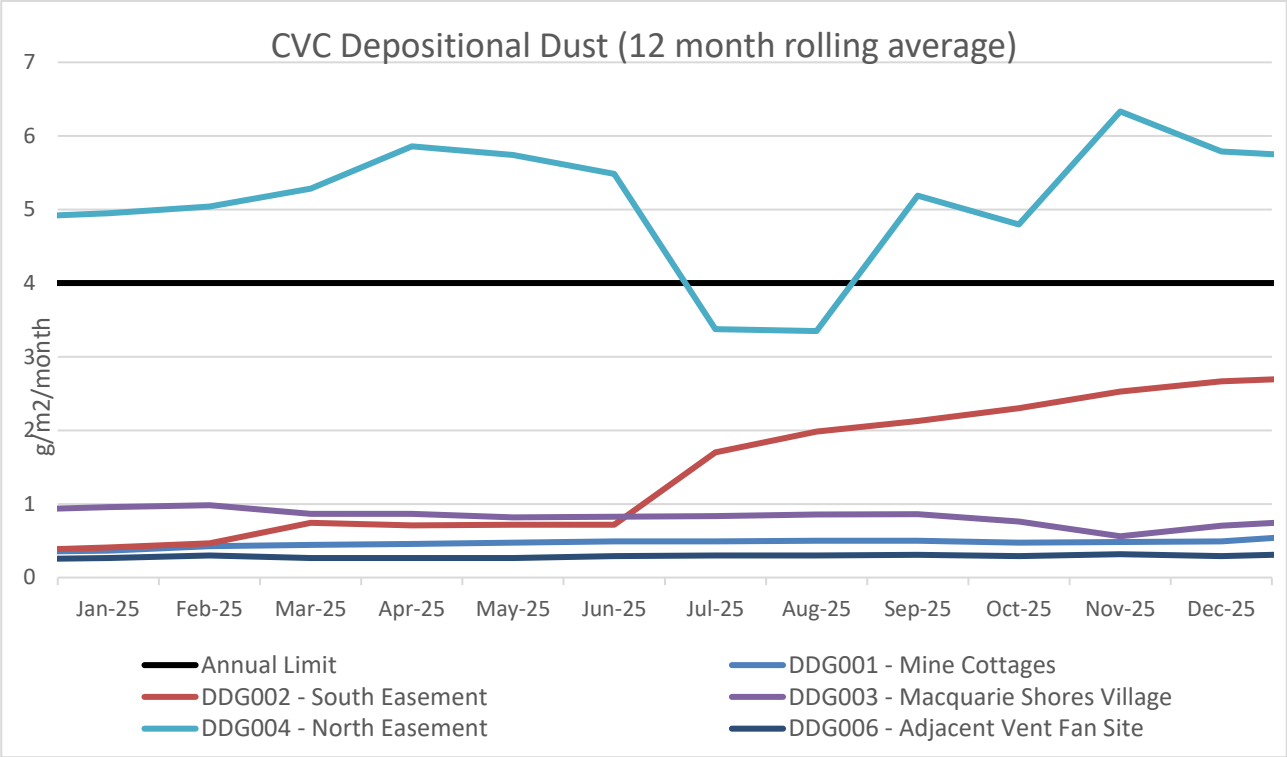
During the reporting period monitoring was undertaken in accordance with the approved Air Quality Management Plan. Depositional dust monitoring results are shown in **Table 8** and the 12 month rolling averages are presented in **Figure 8.**

Table 8 - 2025 CVC Depositional Dust Monitoring

Dep Dust	Limit	DDG001 - Mine Cottages	DDG002 - South Easement	DDG003 - Macquarie Shores	DDG004 - North Easement	DDG006 - Adjacent Vent Site
Month		Insoluble Solids	Insoluble Solids	Insoluble Solids	Insoluble Solids	Insoluble Solids
Jan-25	4	0.70	0.60	0.90	1.70	0.40
Feb-25	4	0.90	0.90	0.70	2.60	0.50
Mar-25	4	0.60	3.90	0.10	3.80	0.10
Apr-25	4	0.50	0.20	0.20	7.40	0.10
May-25	4	0.50	0.30	0.10	1.50	0.10
Jun-25	4	0.50	0.20	0.30	1.30	0.40
Jul-25	4	0.30	12.00	0.20	0.60	0.30
Aug-25	4	0.30	3.80	0.36	0.69	0.20
Sep-25	4	0.10	1.80	0.20	23.20	0.20
Oct-25	4	0.50	2.90	1.00	1.50	0.30
Nov-25	4	0.60	3.20	2.00	24.40	0.50
Dec-25	4	0.40	2.20	2.40	0.80	0.40
2025 AVG	4	0.49	2.67	0.71	5.79	0.29

Notes: 1) For site locations refer **Figure 10.** 2) purple – increase >2g/m^2/month

Figure 8 - CVC 2024 Rolling Annual Average Depositional Dust



During the reporting period, there were five instances where results exceeded the monthly increase limit of 2g/m2/month. The results are shown on **Table 9.** The 12-month rolling average results remained below the annual limit of 4g/m2/month for all gauges with exception to DDG004. Investigation into exceedances determined there was no change in site operations that would contribute to the five elevated monthly samples. CVC will continue monitoring and will undertake further action should the results remain elevated. Notably, the annual average exceedance at DDG004 was observed to be as a result of users within the power-line easement it is located adjacent to.

Table 9 Depositional Dust Exceedances

Sample period	Dust Gauge	Comment
3/02/2025 – 5/03/2025	DDG002	The monthly depositional dust level increased from 0.9 g/m2/month to 3.9 g/m2/month.
5/03/2025 – 4/04/2025	DDG004	The monthly depositional dust level increased from 3.8 g/m2/month to 7.4 g/m2/month.
5/06/2025 – 7/07/2025	DDG002	The monthly depositional dust level increased from 0.2 g/m2/month to 12 g/m2/month.
7/08/2025 – 5/09/2025	DDG004	The monthly depositional dust level increased from 0.69 g/m2/month to 23.2 g/m2/month.
7/10/2025 – 5/11/2025	DDG004	The monthly depositional dust level increased from 1.5 g/m2/month to 24.4 g/m2/month.

Annual averages were similar to the maximum predicted cumulative air quality impacts identified in the EIS (May 2013) as presented in Table 3 of the Air Quality Management Plan. Long term (2012-2024) depositional dust annual average values are shown on **Figure 9**.

Figure 9 - Annual Average Depositional Dust Trend

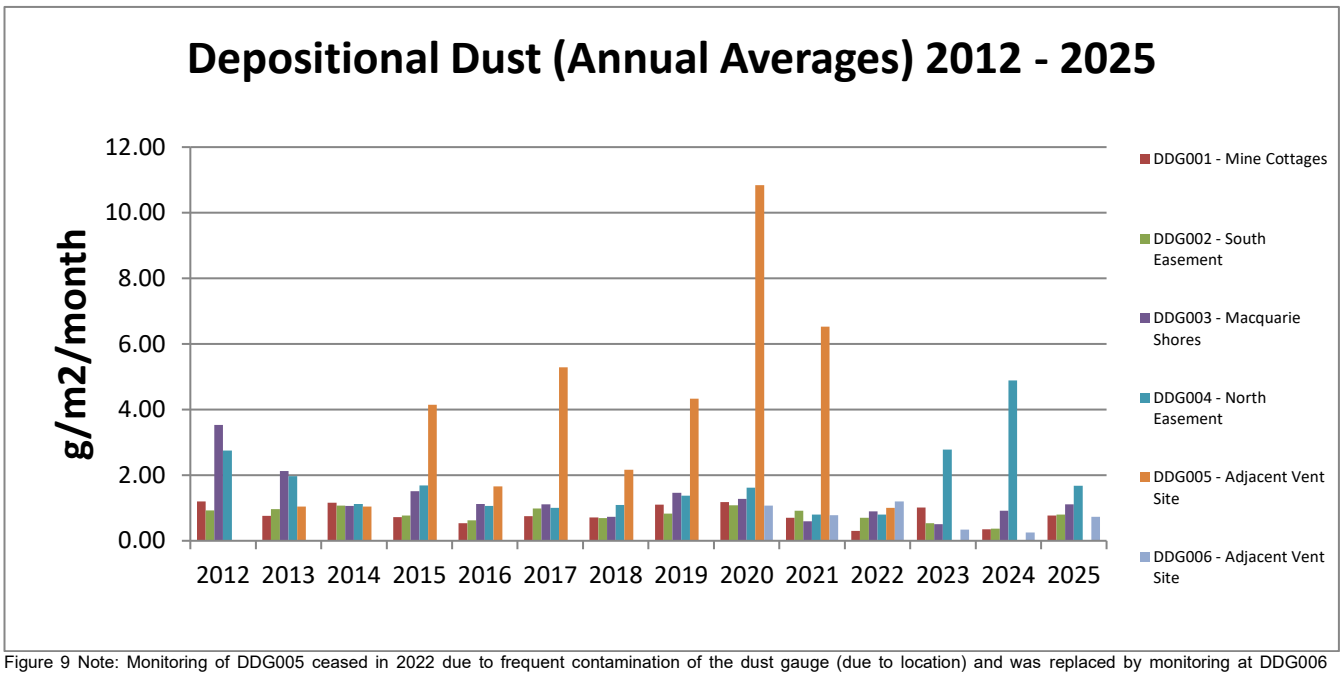


Figure 9 Note: Monitoring of DDG005 ceased in 2022 due to frequent contamination of the dust gauge (due to location) and was replaced by monitoring at DDG006 commencing in 2021 which was considered a more representative location of potential dust emissions from the ventilation fan site.

6.1.2 PM_{10} Monitoring

The real-time air quality monitor was installed in late 2013 within the Mannering Park Wastewater Treatment Plant site. The site is identified as RTD001 with the location shown on **Figure 10**. The real-time monitor measures particulate matter less than 10 microns (µm) in size (PM10).

Data capture from the real time monitor for the 2025 period was 98.1% with 358 days monitored of 365 available days. There was one exceedance of the EPA short-term 24hr average criteria (50 µg/m^3) on 9 December 2025 during the reporting period due to a regional elevated air quality event caused by bushfires.

The annual average criterion (25 µg/m^3) was not exceeded during the 2025 period. Daily results, the rolling average and relevant limits are shown on **Figure 11.**

Daily (24-hour) results ranged from a minimum of 0.1 µg/m^3 to a maximum of 59.4 µg/m^3 during 2025. The 2025 annual average of 24hr PM_{10} results was 14 µg/m^3. The most comparative locations from the EIS where PM_{10} air quality modelling was completed relate to receptors R12 and R15, with cumulative PM_{10} annual average predictions of 22 µg/m^3 and 20 µg/m^3 respectively. The actual location of real time PM_{10} monitoring is in between these two receivers, a result of 14 µg/m^3 is below modelled values.

Monitoring of PM_{10} airborne particulates via the TEOM unit commenced in late December 2013. When comparing the 2025 annual results to the previous year, the data capture rate was slightly decrease to 2025. Data from the commencement of monitoring through to the end of the reporting period is shown on **Figure 12**.

Figure 10 - Delta Coal Air Quality Monitoring Locations

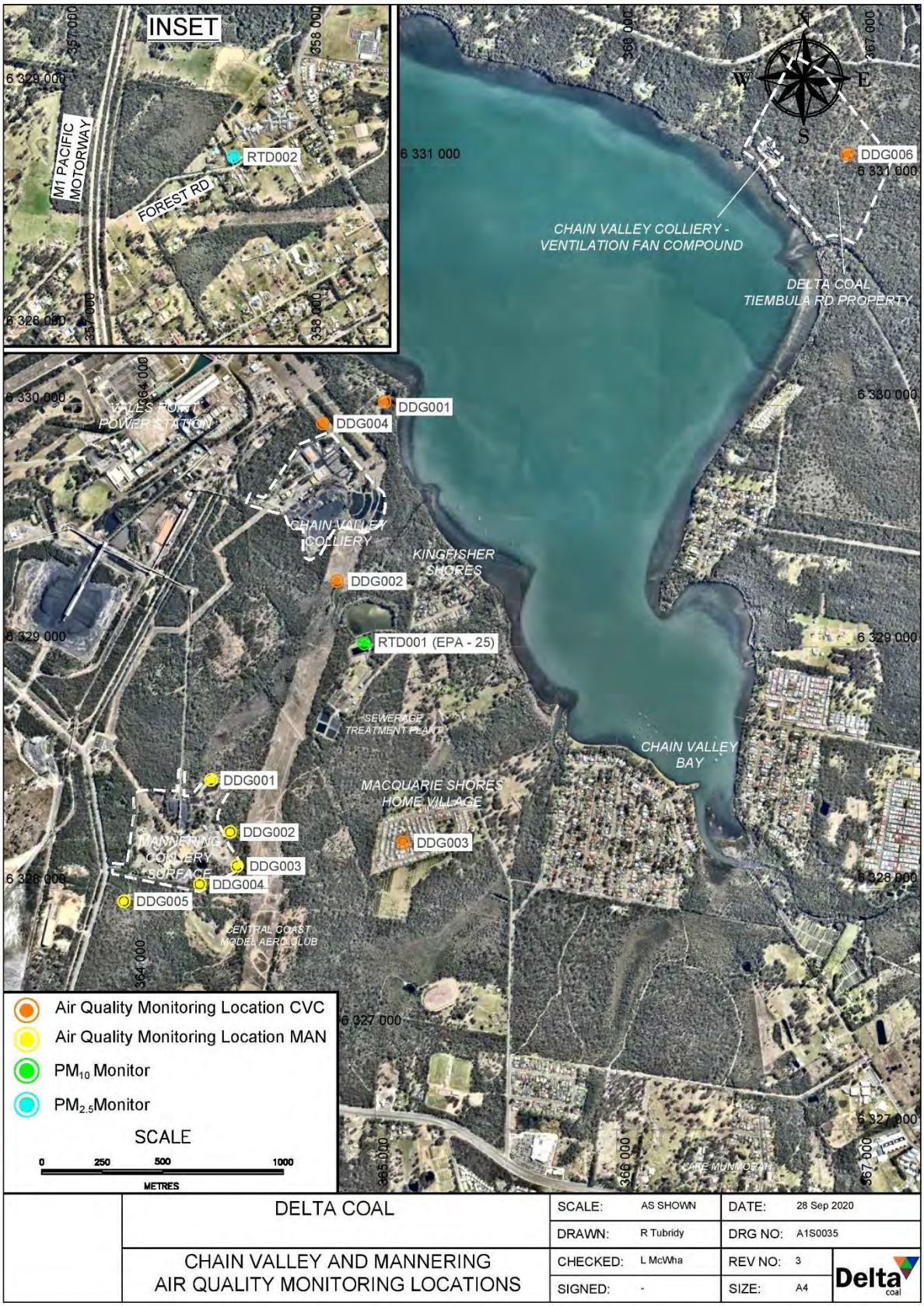


Figure 11 - CVC 2025 PM_{10} Particulate Monitoring

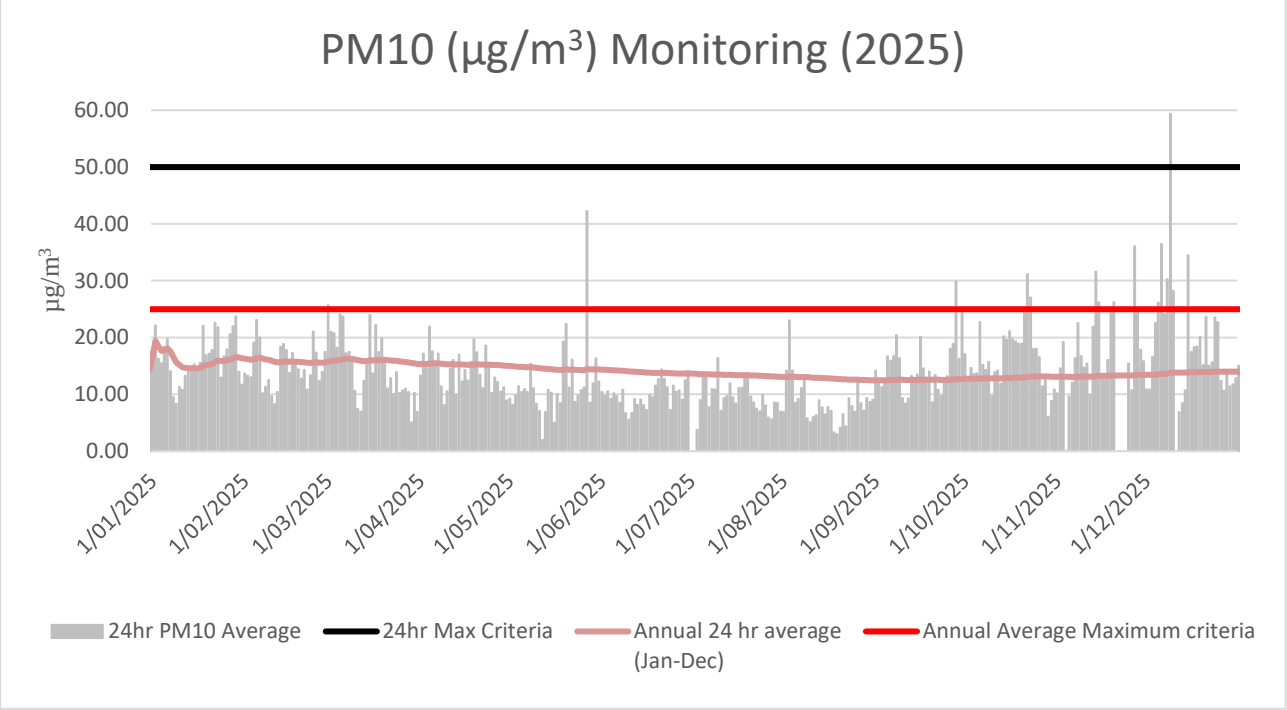
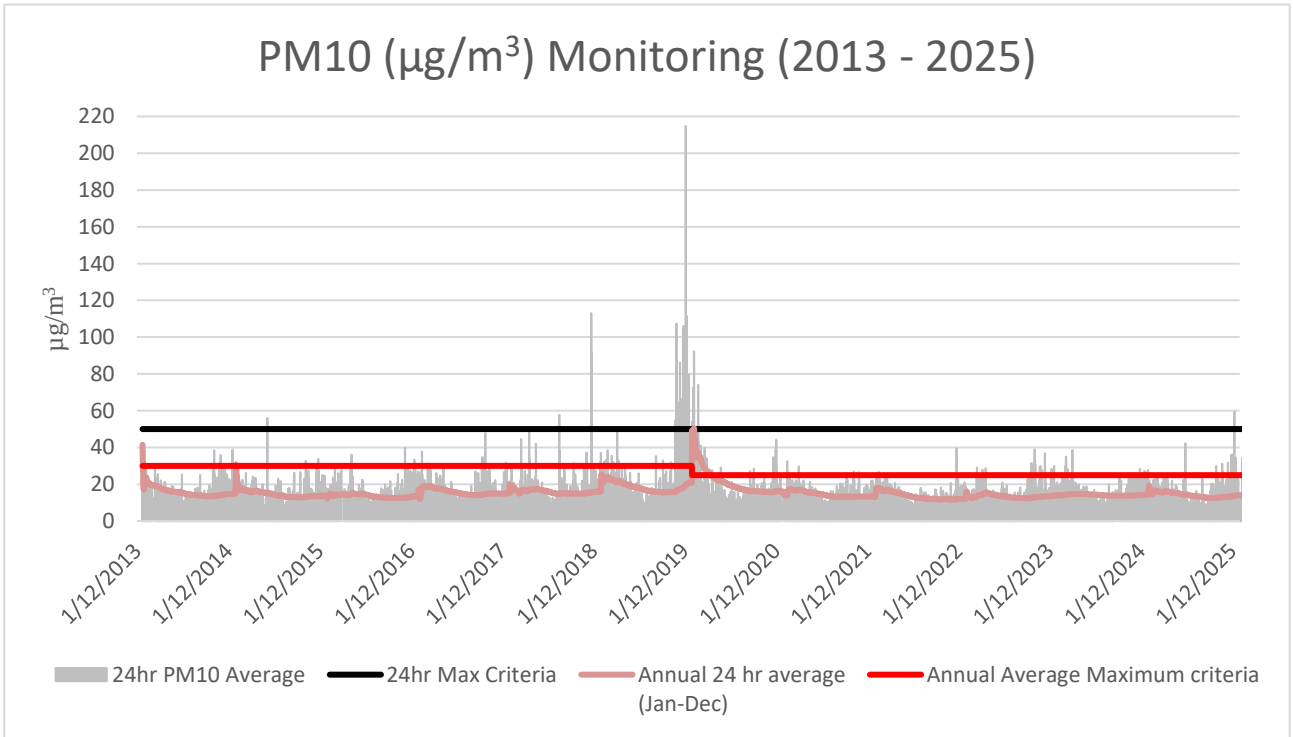


Figure 12 - Long term PM10 data compared against criteria and EIS predictions



In relation to **Figure 12,** note that the apparent yearly spikes in the annual averages are associated with the commencement of a new calendar year when the annual average "resets", and is not reflective of significant air quality changes. Additionally, seasonal variations in concentrations, particularly increases in PM_{10} load

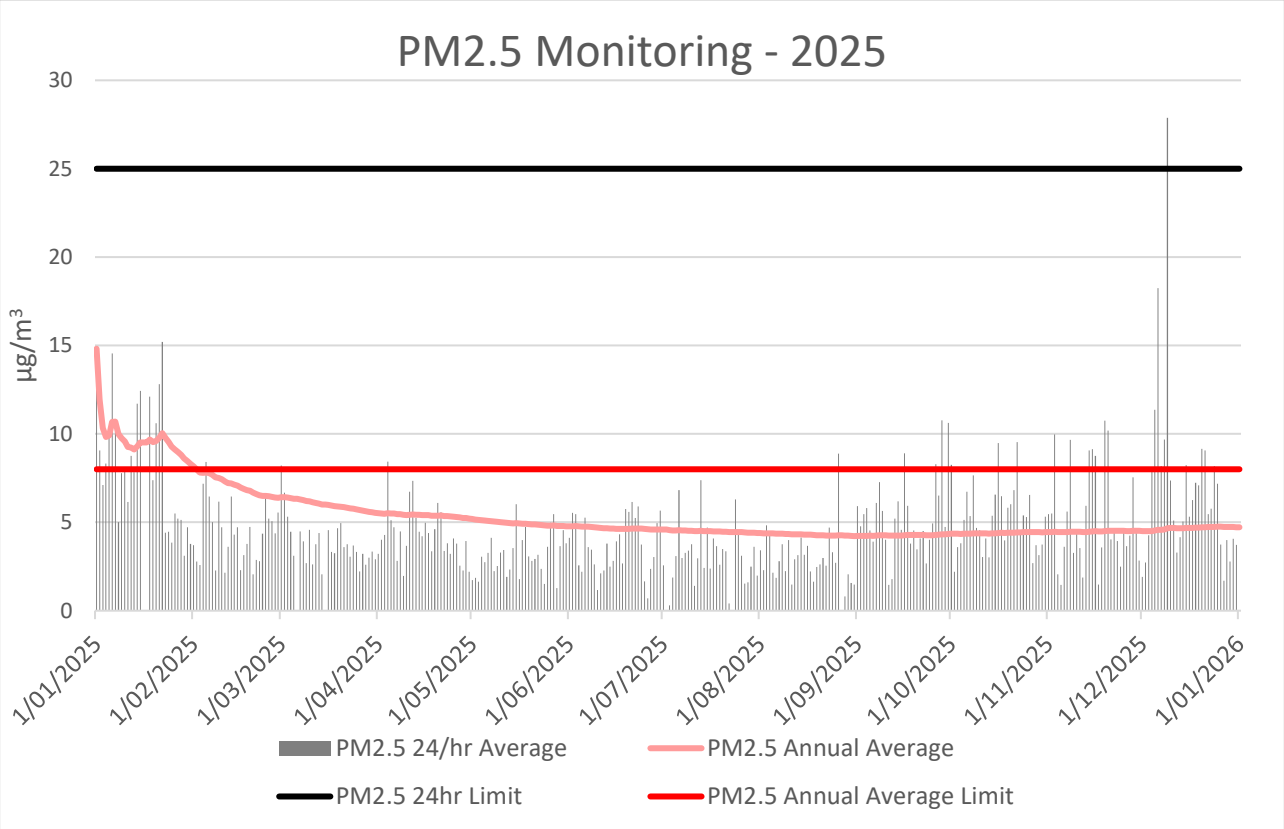
during summer, impacts the long-term data as evident in **Figure 12**. As noted in the linear trend line for the dataset there has been no observable increase or decrease in PM_{10} concentration trends since the commencement of monitoring in December 2013.

The operation of a water cart continued throughout the current reporting period. The water cart operates around the unsealed surface areas, including hardstands, roads, coal stockpile and handling area. There were no complaints received during the reporting period relating to dust.

6.1.3 $PM_{2.5}$

In accordance with Table 3, Condition 11 of Schedule 3 SSD-5465 (as modified), Delta Coal commenced monitoring of $PM_{2.5}$ concentrations following the approval of Modification 3 to SSD-5465 in June 2020. $PM_{2.5}$ monitoring for the 2025 period utilised Delta Electricity's $PM_{2.5}$ TEOM unit at Tingley Road, Wyee as shown on the inset on **Figure 10**. Delta Coal's current arrangement to monitor $PM_{2.5}$ was approved within Delta Coal Air Quality and Greenhouse Gas Management Plan last approved on 21 March 2022. $PM_{2.5}$ concentrations for the 2025 reporting period have been displayed on **Figure 13**.

Figure 13 - CVC PM2.5 Monitoring 2025



The average $PM_{2.5}$ concentration for the period of 1 January 2025 to 31 December 2025 was 4.7 µg/m^3 with 24/hour averages between 0.30 and 27.88 µg/m^3. There was one exceedance of the 24hr $PM_{2.5}$ result of 27.88 µg/m^3 in the 2025 reporting period due to a regional elevated air quality event caused by bushfires, no changes were observed on-site that were considered to have contributed to the exceedance.

The air quality monitoring program, including depositional dust, PM_{10} and $PM_{2.5}$ monitoring will continue into the 2026 reporting period.

6.2 Contaminated Land

There were no significant spills during the reporting period or reports of polluted land.

There is no known contaminated land at CVC, however it is expected that a detailed contamination study, such as an environmental site assessment would be completed at a time closer to mine closure as part of the operational rehabilitation requirements.

6.3 Threatened Flora

6.3.1 Aquatic Flora

Seagrass communities are a major feature of Lake Macquarie, which have the potential to be affected by subsidence as a result of mining activities under the Lake. To ensure protection of the seagrass communities from mining related impacts a Seagrass Protection Barrier was placed around the mapped seagrass communities, with the barrier extending out to the 26.5° angle of draw to the Colliery workings. Only first workings are permitted in the Seagrass Protection Barrier, which will result in negligible subsidence (<20 mm).

Seagrass monitoring occurred during the reporting period in accordance with the 2025 seagrass monitoring report reproduced in **Appendix 3**. Seagrass transect locations are shown in the report.

The discussion from the 2025 annual seagrass monitoring report (Laxton, June 2025) highlighted the following:

- In June 2025 seagrass cover ranged from 30% to 87%. The seagrasses were lightly to heavily fouled with epiphytic algae. These results were consistent with the previous monitoring year, there was a slight increase in bare ground ranged from 10.4% to 20.5% .
- Since 2008 seagrass coverage has been increasing throughout the study area, and percentage cover has been consistent since 2012. This is reflected in the percentage of bare ground observed in the study transects, with bare ground decreasing from:
    - 38.13% in 2011 to 15.7% in 2025 in the Summerland Point, Frying Pan Bay and Sugar Bay region.
    - 13.32% in 2011 to 20.5% in 2025 In the Chain Valley Bay region, this has increased however from 10.71% in 2024, the increase in bare ground is considered to be associated with environmental conditions and not associated with subsidence, noting that no mining was undertaken in the Chain Valley bay region in the 2023 or 2024 or reporting periods.
    - Seagrass cover has been around 90% since 2014 with no change attributed to subsdience in Bardens Bay. However, there was an increase in bare ground from 8.8% in 2023 to 16.3% in 2025.

- In Crangan Bay, bare ground has decreased from 26.98% in 2011 to 10.4% in 2025;

- Seagrass cover was relatively consistent with 2024 monitoring, with minor natural variations as expected when monitoring an ecosystem.
- The study concluded that the June 2025 seagrass monitoring programme shows compliance to the SSD-5465 (MOD 4) Schedule 4, Condition 2 being that seagrass display nil to minor environmental consequences due to underground mining.

Figures 6.1to 6.6 in the June 2025 Seagrass Annual report (**Appendix 3**) details percentage changes in of seagrass coverage in the study area.

6.3.2 Terrestrial Flora

Potential impacts to threatened flora would arise from either impact or clearing of vegetation communities surrounding the pit top and ventilation shaft site which have been classified as the following communities:

Surrounding the pit top area:

- Coastal Open Woodland;
- Swamp Oak Forest; and
- Swamp Sclerophyll Forest.

Surrounding the ventilation shaft site:

- Coastal Open Woodland;
- Grassy Open Woodland and
- Swamp Sclerophyll forest.

Figure 14 and **Figure 15** identify the approximate boundaries of the communities surrounding the surface infrastructure.

A Biodiversity Management Plan was previously completed and approved in 2014. A review and update of management plans, including the CVC Biodiversity Management Plan, was completed in 2023. The latest approved version of this document is available from the Delta Coal website.

Annual biodiversity monitoring was undertaken by Atlantech Pty Ltd in accordance with the Biodiversity Management Plan was continued during the reporting period. Fieldwork was carried out on October 2025. The 2025 annual biodiversity monitoring report is provided as **Appendix 4**.

The annual biodiversity monitoring specifically monitors:

- the Swamp Oak Floodplain Forest condition below the sediment dams;
- Vegetation community condition at the ventilation shaft site;
- weeds (both at the pit top area and ventilation shaft site); and
- feral animal activity.

The monitoring results were assessed against the criteria and triggers within the Biodiversity Management Plan with no trigger levels being reached. Specifically, monitoring of the two established plots within the Swamp Oak Floodplain Forest, recorded a total weighted score of 81.25% in 2025, which is higher than the established trigger value of 60% as well as, the weighted scores in 2022 of 67.8%, 2023 of 77.8% and 2024 of 81.6%. Refer to the Biodiversity Management Plan for details on site attributes and methodology for determining the weighted score.

In 2025 one feral animal species (Cat) was recorded using the presence of scat indicators at the Ventiallation Fan Site however these observed scats were limited in numbers. Feral animal control was not recommended to be undertaken given the limited number of scats and location. Weed monitoring and management is discussed in **Section 6.5**.

Figure 14 - Vegetation Communities around the CVC Pit Top Area

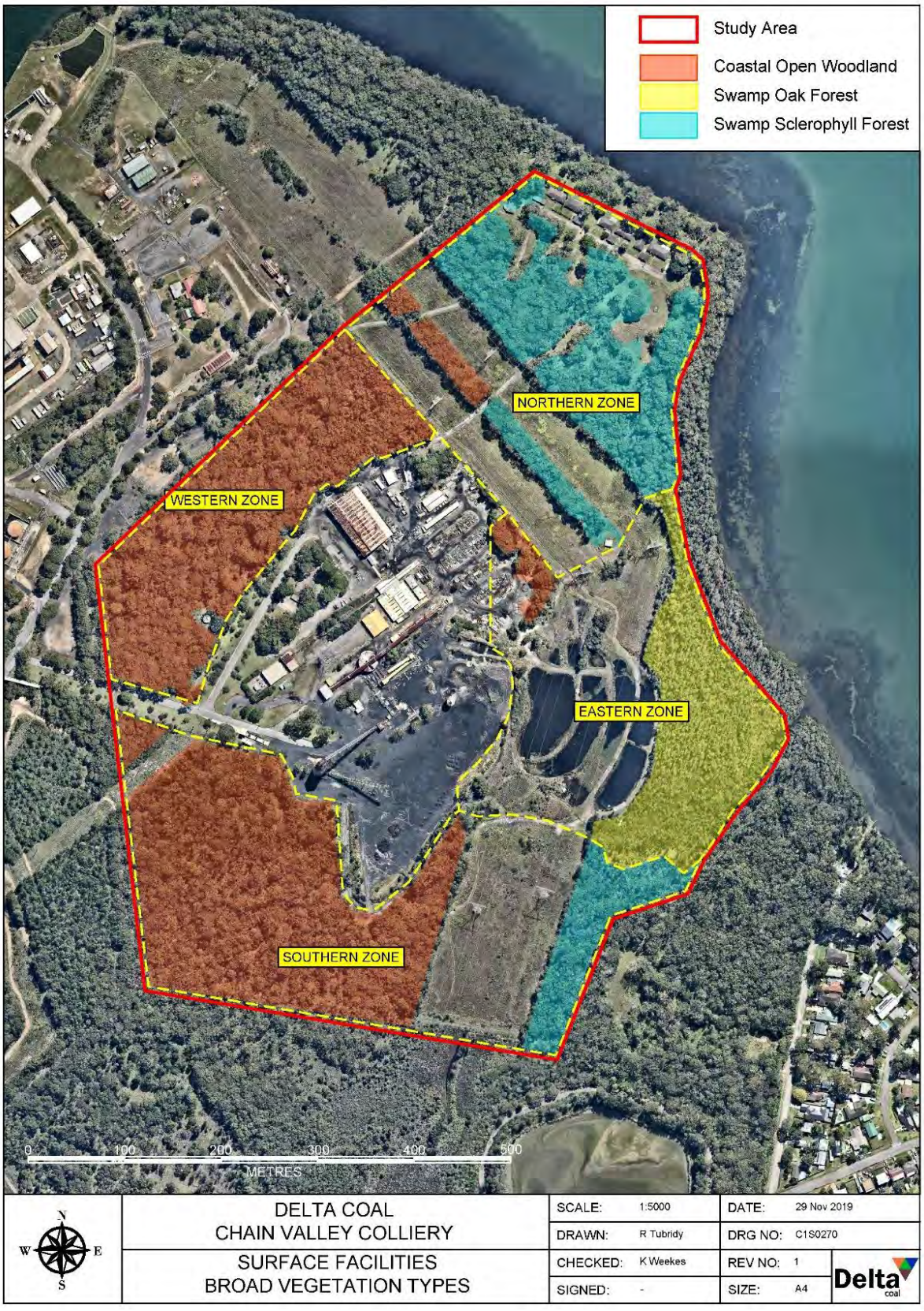


Figure 15 - Vegetation Communities around the Ventilation Shaft Site



6.4 Threatened Fauna

6.4.1 Terrestrial Fauna

No clearing works were undertaken during the reporting period and as a result potential to impact threatened fauna or other native fauna was minimised. The annual biodiversity report for the 2025 reporting period is provided as **Appendix 4**.

6.4.2 Aquatic Fauna

In 2025 Delta Coal undertook annual benthic communities monitoring within the sediment of Lake Macquarie, the survey was completed in May 2025 (autumn) in accordance with the approved Benthic Communities Management Plan. The monitoring undertaken in 2025 sampled 24 benthic stations, benthic sampling locations are shown on **Figure 16**. The May 2025 benthic communities monitoring report are provided in **Appendix 5**.

In 2025 Delta Coal undertook biennial statistical evaluation of benthic communities monitoring data. The benthic communities biennial statistical analysis has been provided as **Appendix 6.** The benthic statistical analysis reviewed monitoring data from 2012-2025 and observed the following:

- Statistical analysis of CVC's benthic monitoring data, did not identify statistical differences between the benthic assemblages evident at sites designated as Impact, Reference and Control.
- From an ecological perspective, the benthic assemblages across the monitoring area fall into several groups (statistically) that do not appear to be a response to CVC operations but were most likely due to subtle environmental variations driven by unknown environmental factors.
- Concluded that the results of statistical analysis of CVC's benthic monitoring data indicate that no exceedance of the Benthic Communities Management Plan subsidence impact performance measure of "minor environmental consequences, including minor changes to species composition and/or distribution" has occurred. Consequently, CVC is not required to implement any additional investigations of benthic communities within the project study area at this time and should continue the monitoring of benthic assemblages.

The Benthic Communities Management Plan was revised and approved in 2023.

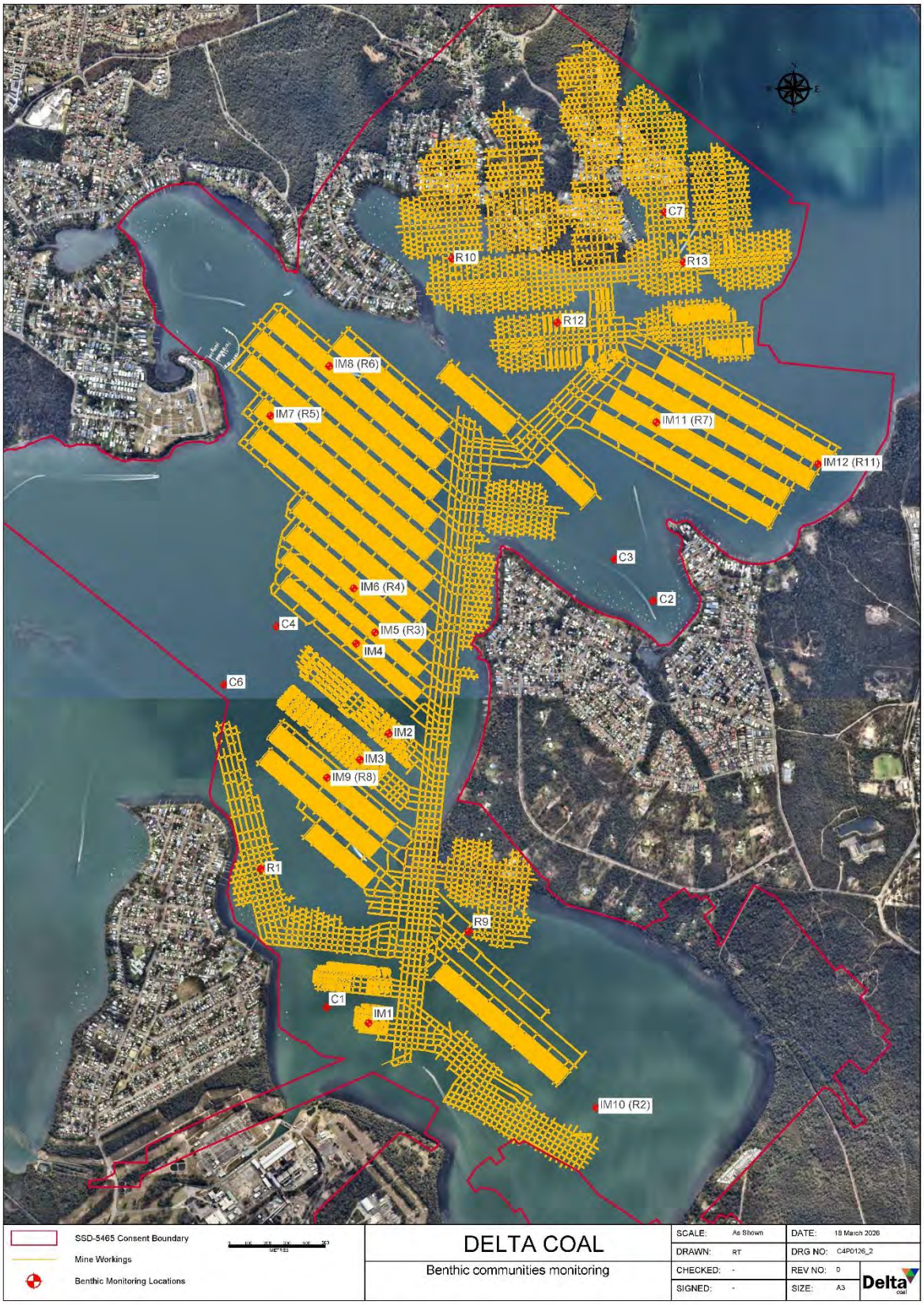
In monitoring undertaken between 2012 and 2025 the mud basins off Summerland Point, in Chain Valley Bay and Bardens Bay, were found to be inhabited by 30 different taxonomic groups. Mollusc *Soletellina*, Polychaete worms and bivalve *Corbula* were the most frequently encountered fauna.

Benthic Community monitoring undertaken in the 2025 reporting period identified the following:

- the same suite of organisms dominated each of the 24 sample stations as in previous years. These were polychaete worms and bivalves.
- In May 2025 a total of 1207 organisms greater than 1mm in size were found, comprising 21 species.

- The Polychaete worms were the most encountered organism. A total of 651 Polychaete worms were recorded during the survey, representing 53.9 percent of the organisms collected.
- The bivalve *Theora lubrica* was the second most commonly encountered organism. A total of 464 Bivalves were collected, 38.4 percent of the organisms collected.
- Also common was Sthenelais petitiboneae, which was recorded a total of 295 times representing 24.4 percent of all organisms counted.
- The results from the May 2025 benthic communities monitoring results show compliance to the Schedule 4 Environmental Conditions - underground mining of SSD5465 - Modification 4 in the Performance Measures table with respect to the Subsidence Impact Performance Measure for Benthic communities which display nil to minor environmental consequences due to underground mining.
- Physical variables such as salinity, conductivity and turbidity of the bottom water had little influence on the species composition of the benthos. Dissolved oxygen concentration, however, can have a major effect on abundance. Major extinction events have occurred in the mud basin of Lake Macquarie. The evidence for this lies in the presence of large numbers of intact but dead bivalve shells entombed in the mud. The cause of extinction events appears to be prolonged dissolved oxygen depletion of bottom water. Prolonged dissolved oxygen depletion of the bottom water was measured during the water quality study conducted by Laxton and Laxton (1983 to 1997) and low dissolved oxygen levels were measured during the March 2020 benthic survey. In May 2025, dissolved oxygen levels of Lake Macquarie ranged from 3.64 mg/L to 4.74 mg/L or 54.2% to 109.5% saturation. Surface waters generally had higher concentrations of dissolved oxygen than the bottom waters.

Figure 16 - Benthic Sampling Locations



6.5 Weed Management

Identification, treatment and ongoing monitoring are the key steps in managing weeds that surround the surface infrastructure areas (pit top area and ventilation shaft site).

During the reporting period Delta Coal engaged a land-care contractor to undertake a weed control campaign across its operational areas. The main weeds targeted included Lantana, Bitou Bush, Crofton Weed and Pampas Grass. See **Appendix 7** for the Weed Action Plan. Delta Coal will be continuing the weed control program in the 2025 reporting period. The 2025 annual biodiversity monitoring report made recommendations for weed control work locations in which will be targeted in the 2026 weed management works.

6.6 Blasting

No surface blasting activities were undertaken during the reporting period at CVC. From time to time, small amounts of explosives are used underground to remove geological intrusions into the coal seam to create overcasts or inter-seam shafts. This blasting is not relevant to environmental impact.

6.7 Operational Noise

Relevant noise criteria from SSD-5465 (Mod 4) and EPL 1770 are provided in **Table 10**. Attended noise monitoring locations are shown on **Figure 17**.

Table 10 - CVC Noise Criteria dB(A)

Location	NMP ID	Day	Evening	Night	
		$LA_{eq(15\ min)}$	$LA_{eq(15\ min)}$	$LA_{eq(15\ min)}$	$LA_{1(1\ min)}$
Location	**NMP ID**	**Day**	**Evening**	**Night**	**Location**
R11 (EPL Point 12)	ATN002	$LA_{eq(15\ min)}$	$LA_{eq(15\ min)}$	$LA_{eq(15\ min)}$	54
R8 (EPL Point 9)	ATN001	38	38	38	R8 (EPL Point 9)
R11 (EPL Point 12)	ATN002	49	49	49	R11 (EPL Point 12)
R12 (EPL Point 13)	R12	49	49	49	R12 (EPL Point 13)
R13 (EPL Point 14)	R13	43	43	43	R13 (EPL Point 14)
R15 (EPL Point 16)	ATN003	36	36	36	R15 (EPL Point 16)
R19 (EPL Point 20)	ATN006	37	37	37	R19 (EPL Point 20)

The long-term noise goals are reproduced in **Table 11**. Mechanisms that will be used to achieve these goals are detailed in Section 2.6 of the Delta Coal Noise Management Plan. It is noted that during the 2024 reporting period Delta Coal submitted a Noise Mitigation Options Assessment for reasonably and feasibly achieving long-term noise goals. Long term noise goals are considered to have been satisfied at R11-13, with the Noise Mitigation Options Assessment focussing on Receiver 22 adjacent the CVC ventilation fan site. At the time of reporting the Noise Mitigation Options Assessment is pending Planning Secretary assessment.

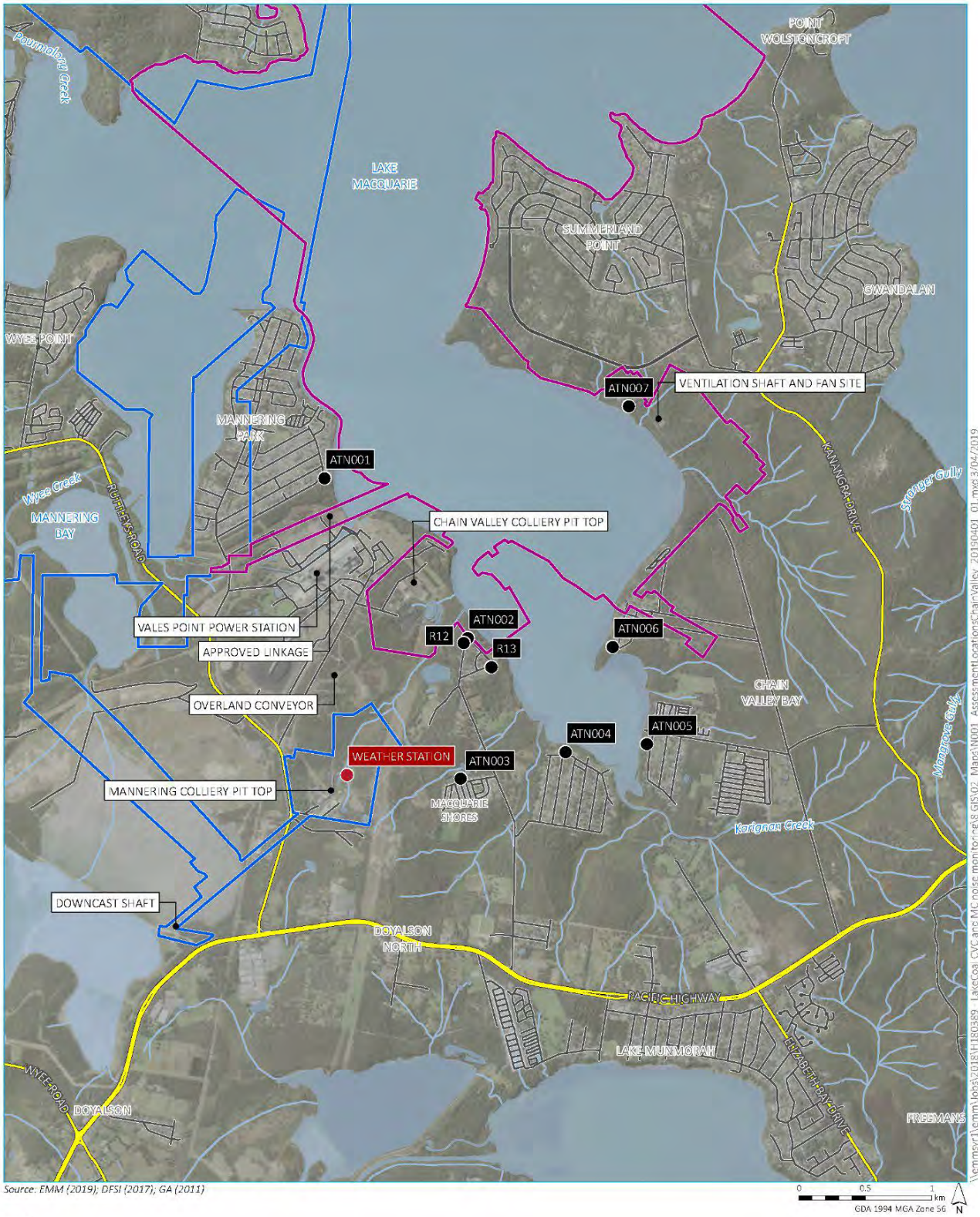
Table 11: CVC Long-term Noise Goals dB(A)

Location	Day	Evening	Night
	$L_{Aeq(15\ min)}$	$L_{Aeq(15\ min)}$	$L_{Aeq(15\ min)}$
R11-13	41	41	41
R22	40	40	40

Attended noise monitoring during the 2025 reporting period was undertaken in accordance with the methodologies described in the approved Delta Coal Noise Management Plan. Attended noise monitoring results for the reporting period are provided in **Appendix 8**.

During the 2025 monitoring period, one noise non-compliance was recorded at monitoring location R22. This exceedance occurred during the Quarter 2 evening monitoring event on 5 June 2025 and was reported under Post-Approval Reference SSD-5465-PA-163. The analysis completed by the noise consultant noted uncertainty around the exact noise source contribution for the evening monitoring at R22 and provided a noise range (41 – 42 dB with a +5 LFN penalty). Follow-up attended noise monitoring was completed at Receiver R22 during similar noise enhancing meteorological conditions within 7 days (on 12 June 2025). The follow-up monitoring recorded 41 dB LAEQ,15 min with a +5 LFN penalty applied (i.e. 46 dB LAEQ,15 min)

Figure 17 - CVC Noise Monitoring Locations



6.8 Visual, Stray Light

The pit top area and ventilation shaft site are not dominant features of the landscape. The pit top area is somewhat overshadowed by the adjacent power station. The ventilation fans were also designed to maintain a relatively low profile, below the surrounding vegetation to ensure amenity and lighting impacts were minimised.

There have been no significant changes to surface lighting during the reporting period and no visual amenity or lighting complaints were received in 2025.

A lighting and visual review was completed in 2019 as per the project approval conditions. A letter was received from DPIE on 17th February 2020 noting that "no lighting complaints have been received by the site in 2018 or 2019. As such, future lighting survey reports are not considered necessary, unless otherwise directed by the Secretary".

In accordance with the relevant Australian standard, no lights are directed offsite or installed to shine above the horizontal. Additionally, the nearest residents to CVC sites are approximately 300 m away.

6.9 Aboriginal Heritage

Chain Valley Colliery has a total of 3 heritage sites registered with AHIMS within the surface footprint. Two midden sites were identified in 2020 during demolition of the former mine cottages, and a known flake site adjacent the CVC pollution control dams. During 2025 no aboriginal heritage sites were identified nor were known sites disturbed, all sites within the surface foot print are fenced off-with high visibility fencing to prevent access or accidental disturbance.

The Delta Coal Heritage Management Plan is was approved in 2023.

6.10 Natural Heritage

There are no sites or items of historic heritage within the pit top area and ventilation shaft site as determined by both the Environmental Assessment completed in 2011 and the Environmental Impact Statement that was prepared to support the Mining Extension 1 Project.

Accordingly, no ongoing monitoring or management actions were required and none have been undertaken within the reporting period.

6.11 Spontaneous Combustion

The R_{70} self-heating rate value recorded for a sample from the middle of the Fassifern Seam is 3.03 ^{o}C/h. This rates the coal as having medium intrinsic spontaneous combustion reactivity for New South Wales conditions. This value is consistent with the rank and type of coal and agrees with previous test results obtained for the Fassifern Seam at CVC. The self-heating rates of the samples from the CVC are significantly lower than coals

from the Hunter Valley, and are also lower than Spring Creek Mine in New Zealand and San Juan Mine in New Mexico.

Moist adiabatic benchmark tests of the samples from CVC indicate that self-heating is controlled by the moisture in the coal and the initial start temperature. Heating development to thermal runaway would take in the order of 48 to 72 days for the middle of the Fassifern Seam, but the top and bottom of the seam show self-heating over a protracted period, before any possible thermal runaway could take place. Similarly, the higher ash content Chain Valley Rider Seam also shows a protracted delay in self-heating due to its lower intrinsic reactivity.

While the laboratory R_{70} analysis of the Fassifern Seam coal at CVC indicates a medium propensity for spontaneous combustion, propensity to spontaneously combust is only one factor in a complex chain of conditions that can create spontaneous combustion in underground coalmines. There have been no known underground spontaneous combustion incidences in the Fassifern Seam at CVC. Accordingly, the risk of spontaneous combustion is considered to be low. Coal stockpiling is kept to a minimum and is managed in such a way as to limit risk of combustion.

Controls in place to mitigate the risk from spontaneous combustion include:

- sealing of extracted panels;
- consideration of spontaneous combustion issues within the mine design and utilisation of an Authority to Mine Permit;
- the development of Trigger Action Response Plans (TARP) for Spontaneous Combustion;
- segregation of extraction panels by an inter panel pillar; and
- monitoring of mine gases using a multipoint tube bundle gas analysis system and a real time gas monitoring system.

There were no incidents of spontaneous combustion at CVC during the reporting period.

6.12 Bushfire

The pit top area contains vegetation which is considered to be bushfire prone land (Category 1) as shown on **Figure 18**. The ventilation shaft area has also been identified as containing Category 1 vegetation as shown on **Figure 29**.

As the project site is not a residential development, there are no strict requirements for fire management, with the exception of preventing fires within the project area and their spread to surrounding land.

To manage bushfire risk Delta Coal have the following management measures in place:

- a high capability for firefighting purposes through the 100 mm diameter mine water reticulation line and the mine Emergency Management System;
- breaks and trails in the vicinity of the pit top area and ventilation shaft site;
- fire hydrants and depots placed in strategic positions around the pit top area; and
- regular training of mine firefighting crews and liaison with local rural firefighting brigades.

Figure 20 shows the approved Asset Protection Zone (APZ) area. The establishment of the APZ's was undertaken during the 2017 reporting period to improve its bushfire protection zones. As detailed in the Biodiversity Management Plan, fire trails and APZ areas are inspected annually prior to the start of the Bushfire Danger Period. This inspection is scheduled via the mines Work Order system.

Figure 18 - Bushfire Prone Land Map for CVC Pit Top Area (Source: Central Coast Council, 2022)



Figure 19 - Bushfire Prone Land Map for Ventilation Shaft Area (Source: Central Coast Council, 2022)



Figure 20 - Chain Valley Colliery Approved APZ's and Fire Trails



EMM

Land management zones
Chain Valley Colliery
Bushfire Management Plan

6.13 Mine Subsidence

The Annual Subsidence Report as required by SSD-5465 (Statement of Commitments) is provided in **Appendix 9** of this report, this section provides a summary of subsidence monitoring at Chain Valley Colliery.

6.13.1 Overview of Mining Progress

Please refer to **Section 4.4** for details of the mining activities undertaken during the 2025 reporting period.

6.13.2 Approvals

During the reporting period Delta Coal undertook its mining activities in accordance with its extraction plan approvals for Miniwall S5 and Northern Mining Area (Amendment 1) .

Amendments to the existing extraction plan were submitted in the period as below:

- Amendment 2 was approved on 10 June 2025.
- Amendment 3 was submitted at the end of the period to be determined early 2026.

6.13.3 Subsidence Surveys

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.

Bathymetric surveys were also undertaken 6-monthly to gauge subsidence levels over the area of secondary extraction undertaken beneath Lake Macquarie and where land-based surveys are not possible.

Delta Coals subsidence monitoring commitments are presented in **Table 12**.

Table 12 - Delta Coal Subsidence Monitoring Commitments

Type of monitoring	Pre-extraction requirements	During extraction requirements	Post extraction requirements
Secondary Extraction			
Bathymetric surveys	Single baseline survey prior to extraction	End of panel (of relevance to S2, S3, S4 and S5) Annual surveys over areas of pillar extraction (not commenced)	Annual for three years unless TARP triggered (as committed in Subsidence Monitoring Program) Six monthly bathymetric scans committed in SSD-5465 Statement of Commitments
Foreshore monitoring	Baseline survey prior to commencement of extraction	Monthly intervals	Annual for three years unless TARP triggered
Pelican Rock Navigation Marker	Baseline RL and tilt measurements	End of panel (of relevance to S2 and S3)	Visual inspection and confirmation from RMS of nil impacts
First Workings			

Type of monitoring	Pre-extraction requirements	During extraction requirements	Post extraction requirements
Terrestrial based subsidence monitoring (foreshore)	Baseline prior to extraction	Annual surveys during extraction unless TARP triggered	Annual surveys ongoing unless TARP triggered
Terrestrial based subsidence monitoring (along main roads in suburbs of Brightwaters, Mirrabooka and Sunshine)	Baseline prior to extraction	Annual surveys during extraction unless TARP triggered	Annual surveys ongoing unless TARP triggered

6.13.4 Performance Measures

Performance measures summarised from SSD-5465 are detailed in **Table 13**.

Table 13 - SSD-5465 Summary of Subsidence Performance Measures

Condition No.	Condition
Schedule 4, Condition 1	The Applicant must ensure that vertical subsidence within the High Water Mark Subsidence Barrier and within seagrass beds is limited to a maximum of 20 millimetres (mm). If at any stage predicted subsidence levels are exceeded within these areas, an ecological monitoring program shall be initiated to assess the impacts to ecological communities and threatened species and if appropriate, offsets are to be provided for any impacts detected.
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, Table 6: Subsidence Impact Performance Measures - Natural and Heritage Features	First Workings under an approved Extraction Plan beneath any feature where performance measures in this table require negligible environmental consequences. They are to remain long term stable and non-subsiding
Schedule 4, Condition 4	The Applicant must ensure that the development does not cause any exceedances of the performance measures in Table 7, to the satisfaction of the Planning Secretary.
Table 7, Schedule 4: Subsidence Impact Performance Measures - Built Features	Trinity Point Marina Development and other built features. They are to remain: • Always safe; • Serviceability should be maintained wherever practicable. Loss of serviceability must be fully compensated; • Damage must be fully compensated.

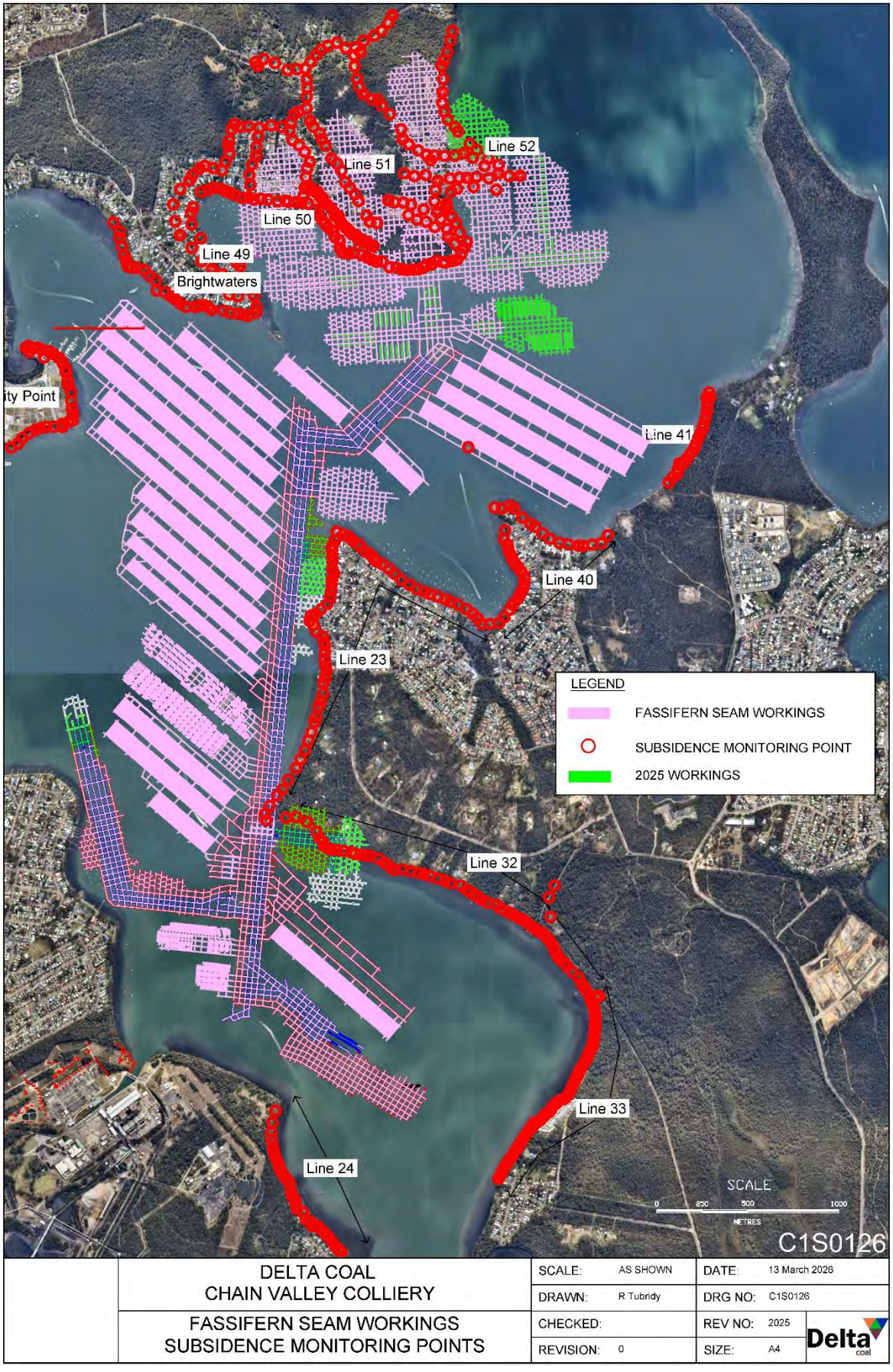
6.13.5 Foreshore Monitoring

Delta Coal completes subsidence monitoring around Trinity Point, Brightwaters, Mirrabooka, Sunshine Frying Pan Bay, Summerland Point, Chain Valley Bay (**Figure 21**). Monitoring points occur along the foreshore at approximately 20 m – 30 m intervals where practicable / achievable with a slightly wider distribution of monitoring points in the Northern Mining Area (50 – 80 m in some areas). The results are issued to the Resources Regulator within 10 days of survey. In addition, observations are made where required to report on visual impacts or changes to public safety risk. A Subsidence Inspection Proforma is completed with each survey. The proforma includes visual inspection of steep slopes, boulder or tree instability, ponding and other potential effects of mine subsidence.

No subsidence attributable to mining operations undertaken in the 2025 reporting period were detected.

subsidence monitoring results are graphically presented in the 2025 Annual Subsidence Report (**Appendix 9**).

Figure 21 - Foreshore Subsidence Monitoring Points



Line 49, 50, 51 and 52

Foreshore monitoring lines 49, 50 and 51 were installed in 2021, for the purpose of monitoring potential subsidence associated with future northern mining area workings. Line 52 was installed in 2022 to cover the foreshore as mining extends to the north. Surveys are carried out over the current mining areas quarterly, with annual surveys over the full grid. Survey results show less than 20mm movement attributable to mining induced subsidence.

Brightwaters Monitoring Line

Monitoring points were installed along the Brightwaters peninsula in June 2016 to monitor the effects of Miniwall 11 and 12 extraction. Survey results show less than 20mm movement attributable to mining induced subsidence. Due to the relative stability (<20mm) of the results over the past nine years, monitoring of this line has now ceased.

Trinity Point

Monitoring points were installed in the Trinity Point area in 2014 for shoreline monitoring during extraction of Miniwalls 7-12 panels. A number of marks have been disturbed or destroyed due to development along the foreshore in the area, this was particularly obvious in the February 2022 survey where only 3 marks where able to be identified, 6 marks were identified in the 2024 annual survey. A few anomalous marks show greater than 20mm movement, but all can be attributed to local disturbance of the mark. These anomalous marks are PWD418, T15, T21 and T23. During 2025 all marks along this foreshore were reestablished and a new baseline survey run, for comparison in future years.

Summerland Point, Lines 23, 32, 40 and 41

The foreshore along Summerland Point has been monitored since 1994, after secondary extraction was undertaken in the Wallarah seam beneath the south-western point (corresponding to mark S63 – 74). Approximately 130-150mm of subsidence was measured (Point S71 – Line 23) since 1994.

Monitoring points along Line 40 were established in 2018 to monitor the shoreline adjacent to Miniwall S1. This line was extended in 2019 as part of the subsidence monitoring program for Miniwalls S2 and S3. Minor ground movement along the line appears seasonal, with most movement limited to <20mm. Point 21 has recorded results of 22 mm over the past few years, given these results met or exceeded the 20mmsubsidence limit Chain Valley Colliery is continuing to monitor the survey line. Note that the 22mm of recorded subsidence is not believed to be all mining induced. Monitoring of Line 40 is undertaken annually.

Line 41 was established in July 2020 to monitor the shoreline adjacent Miniwall S4. Monitoring is undertaken annually, with surveys indicating negligible (<20mm) movement within compliance limits.

Chain Valley Bay, Lines 24 and 33A

Line 24 lies on the western foreshore of Chain Valley Bay. Monitoring results have not identified mining induced vertical movement (< 20mm). Line 24 monitoring points were previously surveyed annually. Monitoring of Line 24 was ceased in 2024 after notifying the Resources Regulator of the intention to stop.

The Line 33 baseline survey was conducted in 1991. Line 33 is underlain with old mine workings in the upper seams and many of the historically monitored subsidence marks have experienced up to 120mm. No additional subsidence movement was detected during the miniwall extraction in CVB. The monitoring indicates compliance to limits with one monitoring location (A63) impacted by surface activities unrelated to the mine site. Three anomalous marks, 62A, 63A & 65A have recorded up to 230mm of movement, which is most likely due to the integrity of the marks on the lake edge. Noting that these results have not changed significantly for over 8 years. No additional subsidence was observed at Line 33A within the reporting period.

Pelican Rock Navigational Marker

As described in CVC's Subsidence Monitoring Program, the Pelican Rock Navigation Marker is expected to be impacted by approximately 90 mm of subsidence from mining within Miniwall panels S2 and S3.

NSW Roads and Maritime Services (RMS) has indicated a functional impact on the marker is likely to occur at 500 mm of subsidence and 5° or 87 mm/m of tilt.

A survey for RL and tilt was conducted on 10 July 2019 by Daly Smith Surveyors prior to mining and measured Pelican Rock Navigation Marker was 1.14 mm Australian Height Datum (AHD) and the navigational pole was vertical.

A final survey was undertaken on 16 June 2023, recording the level at 1.09 mAHD, indicating an impact of 50 mm. Miniwall mining methods were ceased at Chain Valley Colliery in August 2021, with MWS3 completed in July 2020.

Following completion of the June 2023 survey of Pelican Rock navigational marker, Delta Coal contacted Transport for NSW (formerly RMS) in August 2023, seeking confirmation that the navigational marker was deemed still suitable for operation and to confirm monitoring of the marker could cease, provided no further subsidence impacts where anticipated. In 2024, Delta Coal received confirmation from Transport for NSW that Delta Coal was able to cease monitoring of the Pelican Rock navigational marker.

6.13.6 Lake Floor Bathymetric Survey / Scanning

Chain Valley Colliery's Secondary Extraction subsidence monitoring requirements are presented in **Table 14**.

A software error was identified in the hydrographic survey results in the 2023 reporting period, and altered the survey height results by approximately -0.15m. This was a developer error for that particular version (2012) of the software and was corrected by a hotfix sent to all users sometime after. upon discovering this error, Astute surveying upgraded their other projects to correct this error. The surveyor decided to continue using the original project to keep consistency between surveys. Equipment for monitoring was later replaced which adopted the corrected version and ultimately, survey results were 0.15m deeper than actually recorded, impacting subsidence results received by 150mm. This was corrected for in the 2023 and 2024 bathymetric data, but was present in previous surveys (excluding the baseline survey).

Table 14 - Chain Valley Colliery Secondary Extraction Subsidence Monitoring Commitments

Secondary Extraction Panel	Approved S_{max}(mm)	Predicted S_{max} (mm)	Measured S_{max} (mm)	Extraction Completion date	Post Extraction Monitoring Commitment
Miniwall S1	780	420	<200	September 2018	Monitoring Completed
Miniwall S2	780	300	200-250	March 2020	Annual for 3 years unless TARP triggered
Miniwall S3	780	300	350-400	July 2020	Annual for 3 years unless TARP triggered
Miniwall S4	780	300	550-600	February 2021	Annual for 3 years unless TARP triggered
Miniwall S5	780	500	400-450	August 2021	Annual for 3 years unless TARP triggered
NMA Pillar Extraction	780	500	n/a	Commenced in Q4 2024.	Annual for 3 years unless TARP triggered

Bathymetric scans undertaken in the 2025 reporting period have been provided in the 2025 Annual Subsidence Monitoring Report (**Appendix 9**):

- Minimal movement for the S2-S5 miniwall area between the previous monitoring (March 2025) and the September 2025 monitoring. Mining of the miniwall blocks was completed in August 2021.
- Pre-extraction surveying of the Northern Pillar Area was completed in September 2024, at the time of the September 2025 bathymetric scan, partial pillar extraction had been completed in panels HBW5, HBW2, HBW1, HBE2 and HBE3. The bathymetric results did not identify vertical ground movement beyond the margin of error for the method being ±200 mm.
- The maximum subsidence of Miniwall S4 triggered level 1 of the Chain Valley Colliery subsidence TARP in 2022, and as such prompted a geotechnical review of the results and underlying workings to ensure on-going stability and compliance to the 0.78m subsidence limit.
- Independent geotechnical review of Miniwall S2-S5 subsidence did not predict a potential exceedance of the 0.78m subsidence limit.

6.14 Hydrocarbon Contamination

Hydrocarbons are managed in accordance with the site Storage of Fuel and Chemical Standard.

Suitable bunding has been installed around all liquid storage areas with an oil separator installed on the wash down sump which treats water prior to transfer of the treated water to the site sediment dams. Spill kits are also located at hydrocarbon storage areas. All waste oil is taken off site by an external licensed waste collection company. A weekly inspection regime is in place to check waste oil levels and arrange disposal on an as required basis.

During the reporting period any contaminated material encountered on site was disposed of at a licensed waste facility by the site's approved waste management contractor.

6.15 Methane Drainage and Greenhouse Gases

Methane levels in the Fassifern seam of approximately 2 – 5 m^3/t is considered a low level for pre or post gas drainage, and as such all methane from the mining operations are ventilated from the via the main fans at Summerland Point.

The methane levels in the return are low enough to ensure operations are not adversely affected by the gas levels.

Methane levels are manageable with the existing ventilation system there are no plans to install pre or post gas drainage infrastructure at this time.

Methane emissions from CVC are reported annually to the Clean Energy Regulator in accordance with the *National Greenhouse and Energy Reporting Act 2007* (NGER Act).

The following summary is made for the for the Financial Year 2024-2025 period (NGER reporting period) CVC emissions:

- CVC emitted approximately 459,107 tonnes of CO_2-e as Scope 1 emissions, which was a improvement on the 2023-2024 year where 497,129 tonnes of CO_2-e as Scope 1 emissions was reported. The primary decrease was associated to a reduction in ventilation emissions resulting from:
    - A decrease in average methane concentration, from 0.42% in 2024-2025 to 0.44% in 2023-2024.
    - A decrease in average annual flow rate from 183 m^3/sec in 2023-2024 to 178 m^3/sec in 2024-2025.
- A comparison can be made to the Environmental Assessment (2013) for SSD-5465, where, emissions predictions were estimated to be approximately 590,000 tonnes of CO2-e per annum. Where-by the 2023-2024 CVC emission total was approximately 100,000 tonnes less.

Greenhouse gas mitigation at the colliery is focussed on reductions in ventilation emissions, contributing approximately 97% of the sites total scope 1 emissions. Mitigation is undertaken in accordance with the sites Air Quality and Greenhouse Gas Management Plan with measures including:

- Sealing of completed miniwall panels to reduce methane emissions from the goaf.
- Fitting of ventilation control devices to herringbone production panels and not ventilating (unless required for safety/inspection purposes) upon completion.
- Transportation of all coal via conveyor.
- Consideration energy efficiency criteria as part of the sites procurement process.

6.16 Public Safety

Public safety is primarily a concern around the surface facilities at CVC being both the pit top area and the ventilation shaft site.

The public safety around the ventilation shaft site is afforded by:

- restricting access to the site by utilising a locked access gate across the access road;
- provision of a security fence around the entire perimeter of the compound, with locked access gates; and
- security monitoring.

In relation to the pit top area, there is one sealed access road into the site which has a set of lockable gates present, which can be closed should the need arise to stop access to the site. These gates may be closed and locked at times of no expected traffic, such as during the night time period but would otherwise remain open for deliveries, employee and authorised visitor access. A security firm is also engaged to undertake scheduled site security checks and remote alarm monitoring and reporting. The security checks are random, but typically undertaken at times of higher unauthorised access risk such as nights, public holidays and weekends.

Public access is monitored and managed during operation of the mine through the standard incident reporting process which includes reporting of unauthorised access.

A visitor login system onsite ensures that authorised visiting members of the public are assigned a site contact and that upon login the site contact is notified immediately by email of the visitors' presence onsite.

A Built Features Management Plan was developed for the Extraction Plan associated with Miniwall S4 as well as the Extraction Plan for Miniwall S5 and Northern Pillar Extraction. This included subsidence monitoring for foreshore infrastructure.

Public safety is also a consideration in the road coal haulage operations; this is discussed in **Section 6.17**.

During the reporting period there were no incidents of injury to the public as a result of Delta Coal's operations.

6.17 Independent Traffic Audit and Coal Haulage

During the reporting period CVC did not undertake any coal haulage and as such was not required to undertake an independent traffic audit.

Delta Coal was not required to complete an independent traffic audit for the 2025 period as no coal haulage was undertaken during the reporting period, Delta Coal submitted a notification to the NSW DPE regarding this on 2 January 2026 and is awaiting acknowledgement from the NSW DPHI.

6.18 Summary of Environmental Performance

In summary, environmental performance during the reporting period for CVC is detailed in **Table 15**.

Table 15 - Environmental Performance

Aspect	Approved criteria/ EIS prediction	Performance during the reporting period	Trend/ key management implications	Implemented/ proposed management actions
Noise	Chapter 9 Noise *(EIS, EMGA Mitchell McLennan 2013)*	Generally in accordance with approved criteria.	Main trend (attended noise monitoring during 2025): Quarterly noise monitoring results from the AR reporting period indicate that CVC is operating within relevant limits and is not the dominant source of environmental noise within the vicinity. VPPS is audible to receivers to the north and the Pacific Highway is also audible from the south. The CVC ventilation fan site is an exception to the above were it is typically audible at ATN007 monitoring location. The EIS predicted that that CVC will operate within acceptable noise limits.	There was one exceedances during 2025 quarterly attended noise monitoring (see **Appendix 8** for results). Noise management will continue to be monitored in an effective manner.
Blasting	n/a	n/a	n/a	n/a
Air Quality	Chapter 10 Quality and Greenhouse Gases *(EIS, EMGA Mitchell McLennan 2013)*	In accordance with approved criteria and EIS predictions	Main trend (depositional dust results 2024): Based on modelling in the EIS, total dust emissions from CVC are expected to be minor, at less than 2 grams/m^2/month. No exceedances of depositional dust limits were attributed to mining operations during the reporting period. The PM10 and PM2.5 results for 2025 reflect CVC's compliance to air quality criteria, remaining minor at most locations for the reporting period.	The air quality monitoring program, in accordance with the approved management plan, was ongoing at the end of the reporting period. Results are detailed in **Section 6.1**. Management of air quality will continue to be monitored in an effective manner.

Aspect	Approved criteria/ EIS prediction	Performance during the reporting period	Trend/ key management implications	Implemented/ proposed management actions
Biodiversity	Chapter 14 Terrestrial Ecology *(EIS, EMGA Mitchell McLennan 2013)*	In accordance with approved criteria and EIS predictions/surveys.	Main trend: Vegetation and habitat values broadly similar to previous years.	The biodiversity monitoring program, in accordance with the approved management plan, was ongoing at the end of the reporting period. See **Appendix 4** for results. Biodiversity will continue to be monitored, with noxious weed control to be continued on-site.
Heritage	Chapter 15 Heritage *(EIS, EMGA Mitchell McLennan 2013)*	No predicted impact on aboriginal or non-aboriginal heritage items was identified in the EIS.	Main Trend: No aboriginal heritage incidents within the reporting period, with 3 identified Aboriginal Heritage sites within CVC pit-top boundaries. All locations are fenced off with restricted public access to prevent disturbance.	Ongoing diligence and monitoring of ground disturbance activities. Heritage Management Plan revised and approved in the reporting period. Ongoing consultation with RAPs, as required.

7 Water Management

7.1 Water Management

7.1.1 Licenced Mine Dewatering

Delta Coal holds a groundwater bore license WAL41508 under the *Water Act, 1912*, which permits the industrial dewatering of groundwater up to volume of 4443 megalitres (ML) per year. The following details groundwater extraction volumes during the reporting period.

During the 2024 reporting period, an average of 6,245.5 kL of mine water was extracted per day from within the mine workings, before being pumped to the CVC surface facilities, where it is discharged into sediment dams, prior to being discharged into Lake Macquarie under NSW Environment Protection Authority (EPA) EPL No.1770 granted under the POEO Act 1997. The daily average has slightly decreased since the previous reporting period when compared with the 2023 daily average of 6703.4 kL (refer to **Section 7.1.4** Water Balance for long term water data).

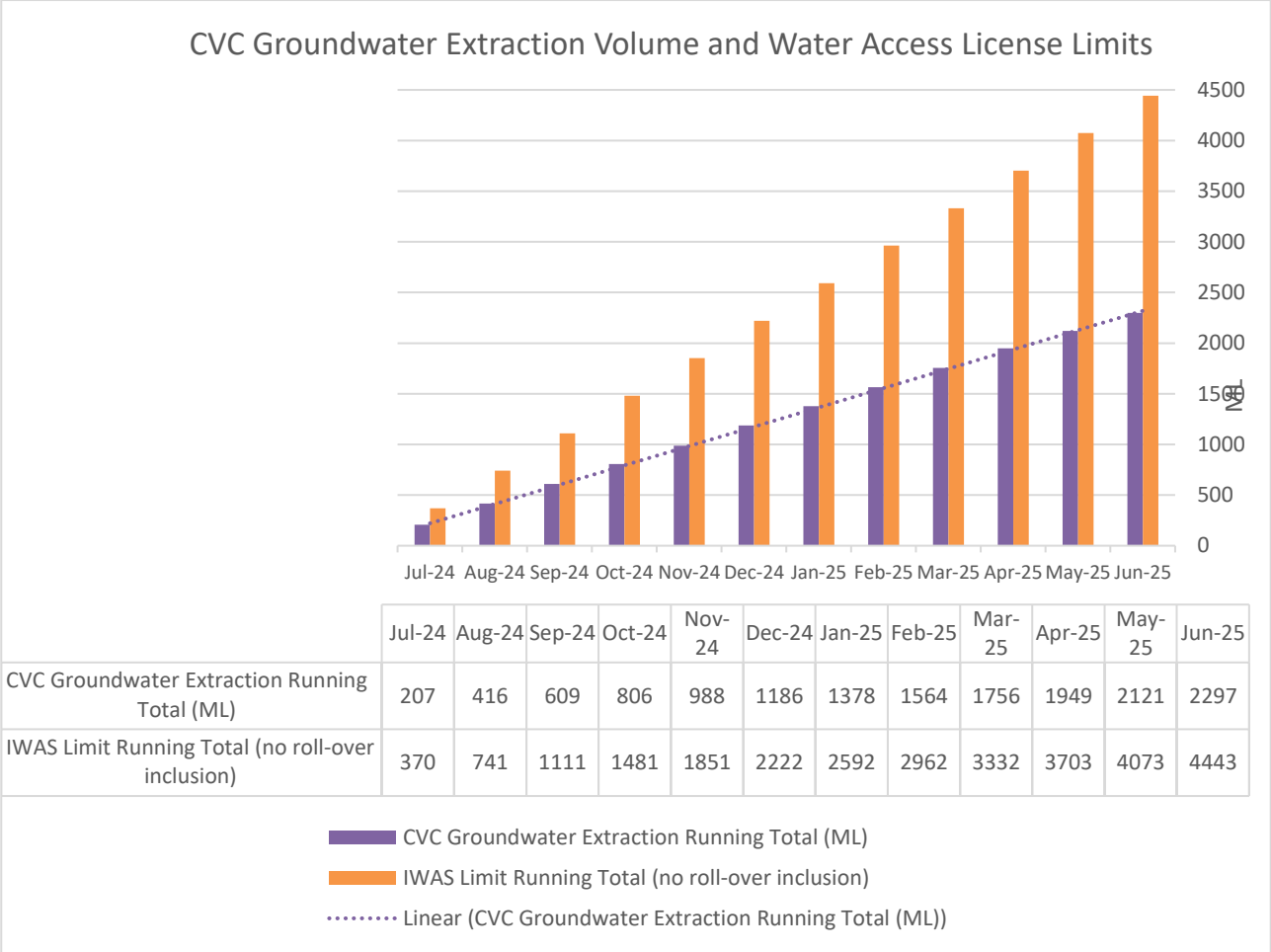
The maximum groundwater extraction on any day during 2025 peaked at 10,505 kL, which reflects the automated control of pumping limits (10.5 ML) implemented on site as committed to by Delta Coal within the Environmental Impact Statement (EIS) for the current mining operations.

Delta Coal operated well within the groundwater extraction limits prescribed by license WAL41508 as shown in **Figure 22**. Groundwater extraction data is summarised in **Table 16**.

Table 16 - CVC Groundwater Extraction, 2025 (Jan-Dec)

Water Access Licence	Water sharing plan, source and management zone (as applicable)	Entitlement	Passive Take / inflows	Active pumping	TOTAL
WAL41508	Sydney Basin North Coast Groundwater Source	4443 ML	N/A	2479 ML	2479 ML

Figure 22 – CVC Groundwater Extraction Volume and Water Access License Limits (WAL reporting period FY24-25)



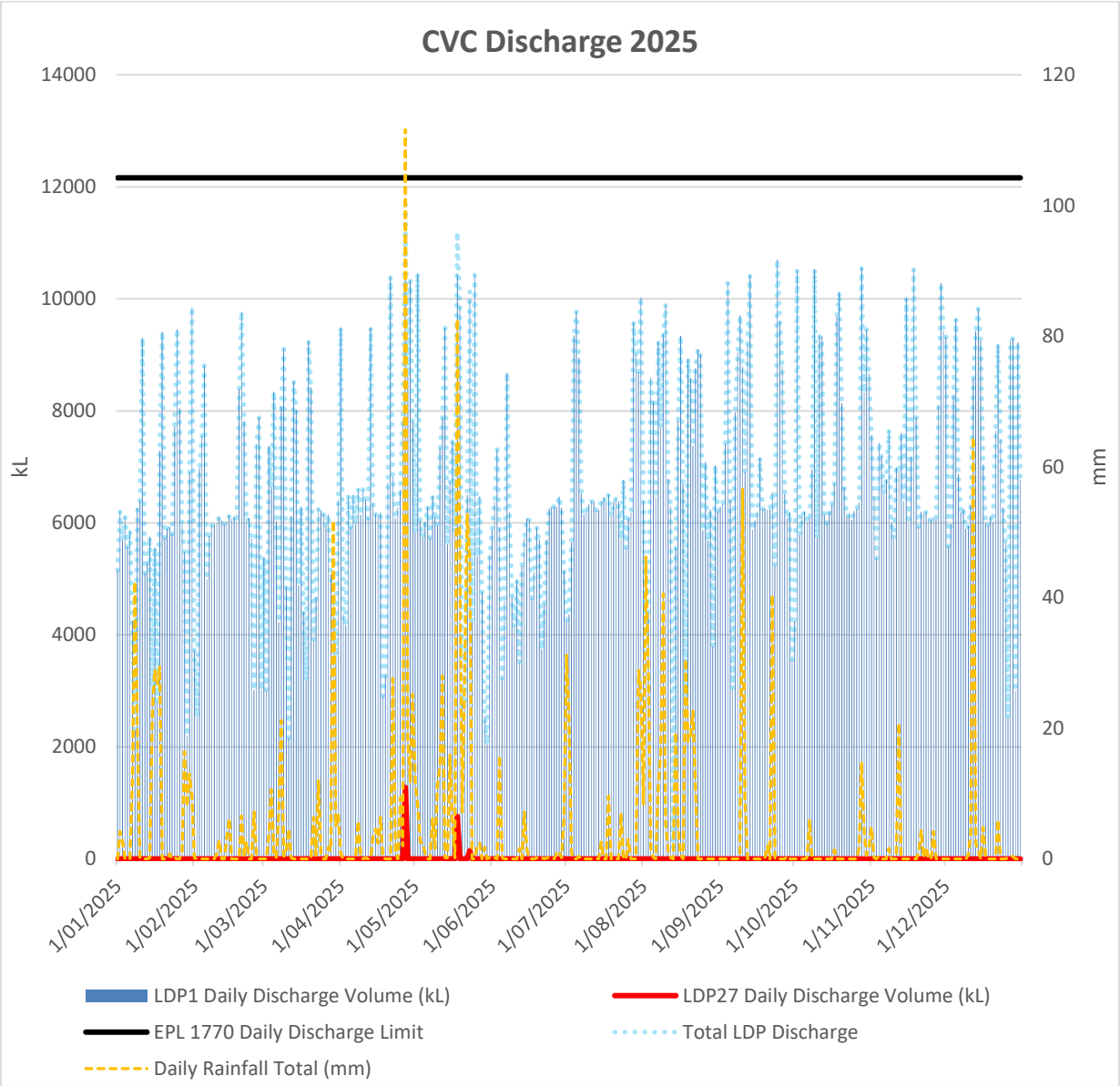
	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Jun-25
CVC Groundwater Extraction Running Total (ML)	207	416	609	806	988	1186	1378	1564	1756	1949	2121	2297
IWAS Limit Running Total (no roll-over inclusion)	370	741	1111	1481	1851	2222	2592	2962	3332	3703	4073	4443

7.1.2 Licenced Discharge under EPL 1770

Delta Coal holds EPL 1770, which licences the discharge of up to 12,161 kL per day from the site. During the 2025 reporting period the daily average discharges were 6,604 kL with a maximum of 11,684 kL and a minimum of 182 kL.

Figure 23 shows the daily discharge volumes over the reporting period. Note that discharge limits applied under EPL 1770 relate to both licenced discharge points 1 and 27 which reflect the low and high (emergency) flow discharge points at the final sediment dam. As shown in **Figure 23**, there were no exceedances of the daily volumetric limit (12,161 kL) during the reporting period. There were three discharges via Point 27 (CVC High Flow Spillway) during the reporting period.

Figure 23 - Chain Valley Colliery, EPA Point 1 and Point 27 Discharge Volume (2025 Period)



Water quality monitoring is required, and undertaken, at the licensed discharge point (EPA Point 1) with sampling undertaken on a monthly basis, Delta Coal also collects water quality samples from additional locations to obtain data from receiving environments, water quality monitoring locations are detailed in **Figure 24**. Results for pH, EC, TSS are compared against the compliance limits specified in EPL 1770 are presented in **Figure 25**, **Figure 26**, **Figure 27** (Point 1) and **Table 17** (Point 27), respectively. Faecal Coliforms was previously included in the monitoring report. Following a licence variation to EPL 1770, issued on 26 November 2024, this requirement has been removed.

Figure 24 - Chain Valley Colliery Water Management Structures

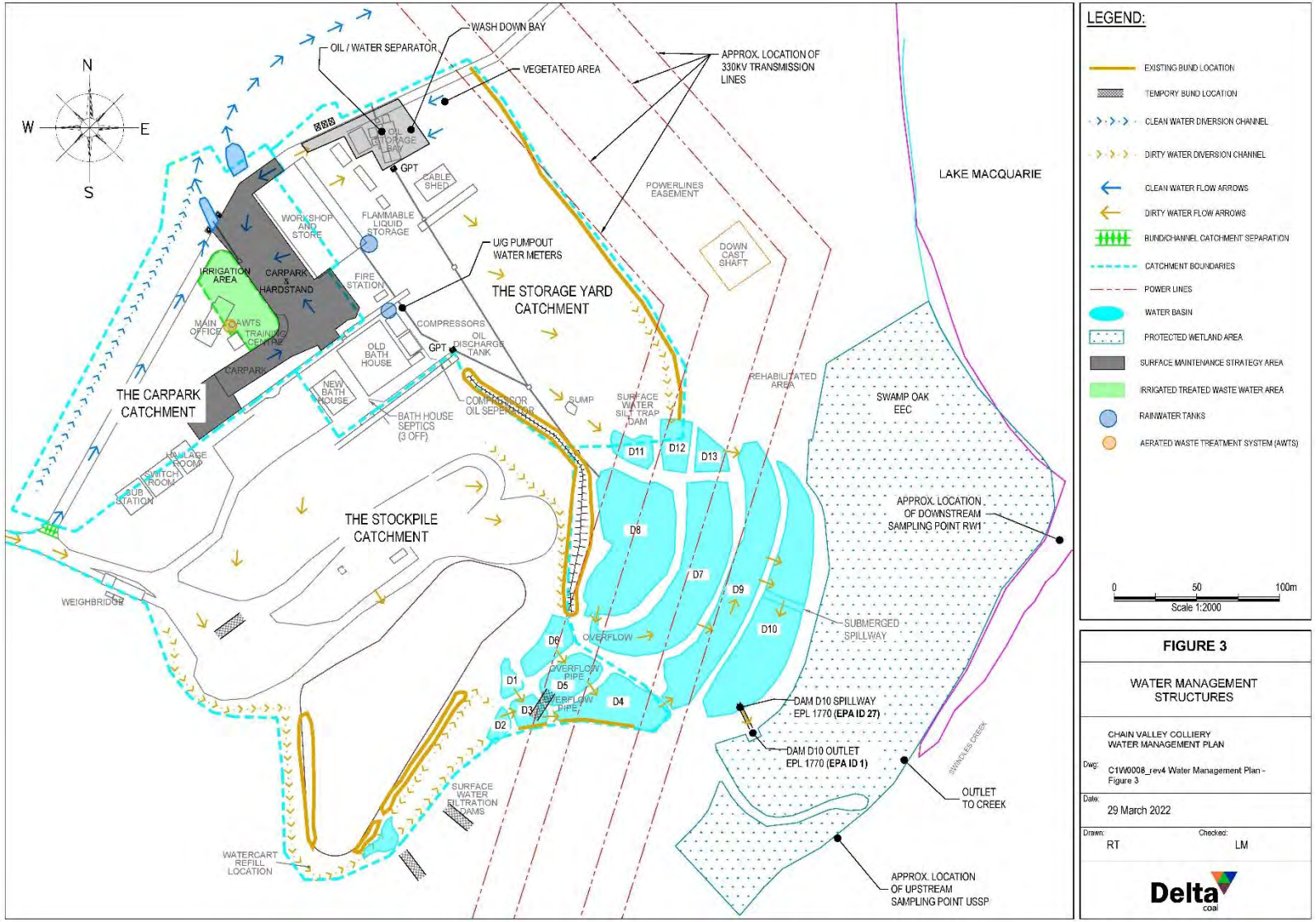


Figure 25 - pH Monitoring Results at EPA Point 1

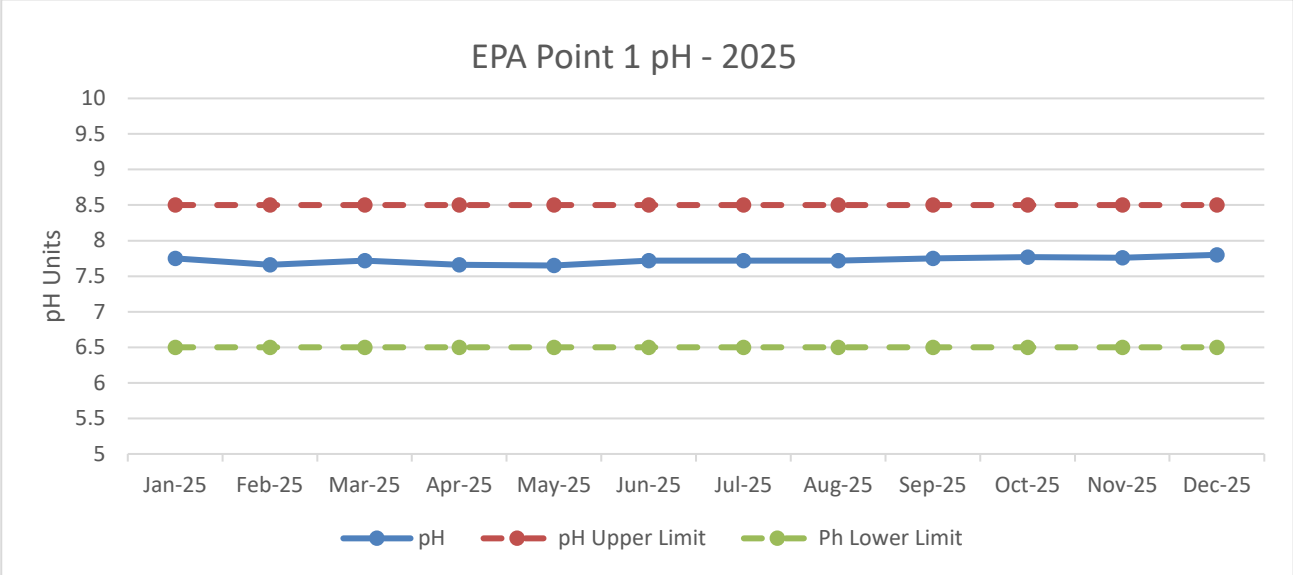


Figure 26 - Electrical Conductivity Monitoring Results at EPA Point 1

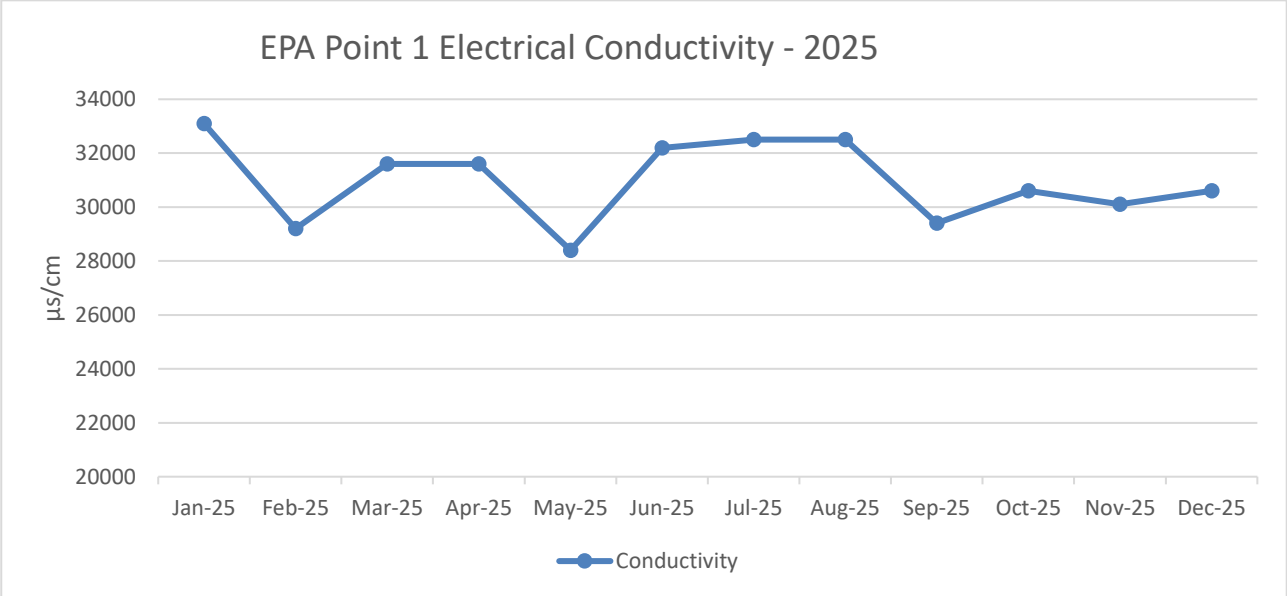
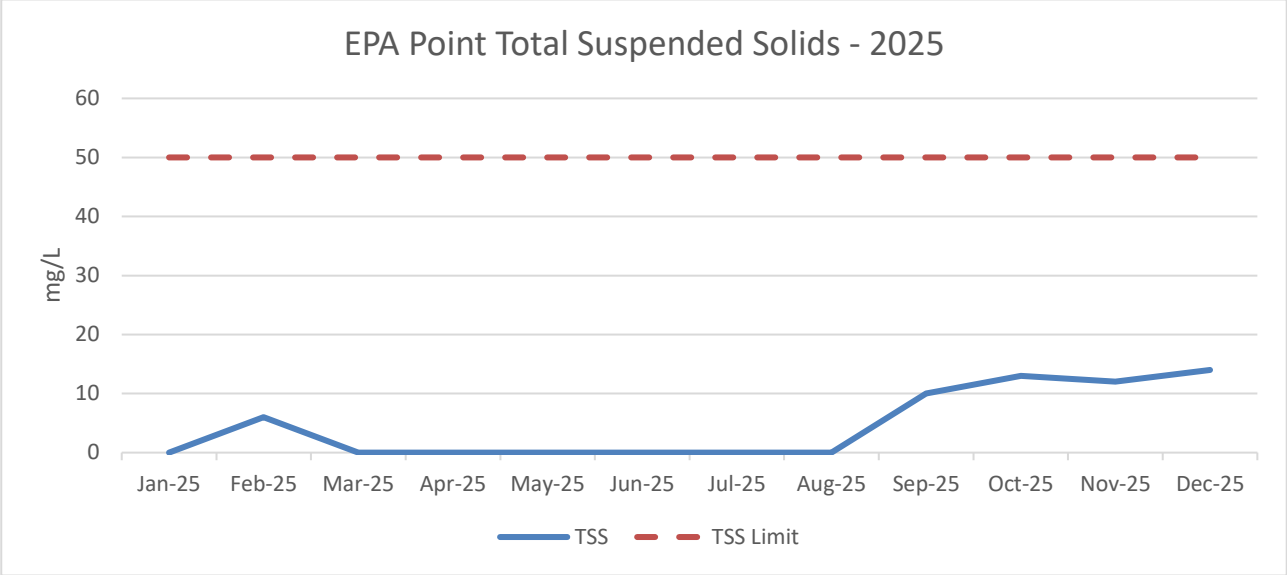


Figure 27 - Total Suspended Solids Monitoring Results at EPA Point 1



Notes: ***1. TSS results that were below the limit of reporting (<5 mg/L) have been reported as 0 mg/L.***

Table 17 - Monitoring Results EPA Point 27 2025

Date	TSS	pH	Conductivity
	mg/L	pH Units	us/cm
Limit	50	6.5 – 8.5	-
27/04/2025	109	7.66	6680
18/05/2025	206	7.7	4780
23/05/2025	33	7.76	1330

7.1.3 Long Term Water Management

To assess any long-term trends in both water quality and quantity, ten years of monthly sampling data (2012 to 2025 inclusive) is presented for pH (**Figure 29**), electrical conductivity (**Figure 30**), total suspended solids (**Figure 31**). Faecal Coliforms was previously included in the monitoring report. Following a licence variation to EPL 1770, issued on 26 November 2024, this requirement has been removed.

The annual average of mine dewatering volumes from 2009 to 2025 is also presented in **Figure 32**. Note that prior to 2013, average mine dewatering volumes were calculated using the EPL 1770 reporting period (April – March), but since this time have reflected the calendar year period consistent with Annual Review requirements.

From the below figures, there are no significant trends in the water quality parameters, with infrequent spikes in total suspended solids concentrations and dips in electrical conductivity.

There is no obvious increase in mine dewatering volumes over the last eight years, however, it is expected that this will occur over time consistent with the groundwater modelling within the Chain Valley Colliery EIS that predicts an increase in groundwater make will occur to an annual average of 10.5 ML/day (at the end of mine life). The current mine dewatering levels are still significantly below this level.

Figure 28 - Long term pH monitoring results at EPA Point 1

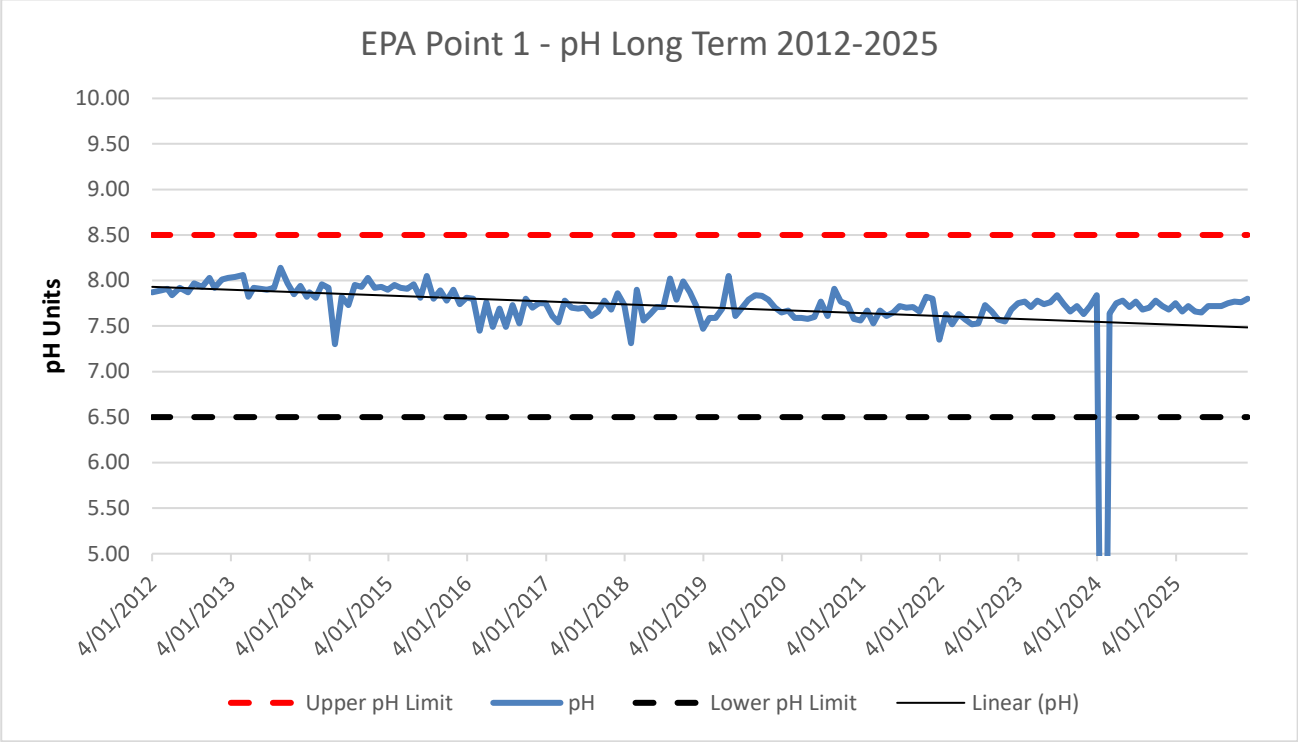


Figure 29 - Long term electrical conductivity monitoring results at EPA Point 1

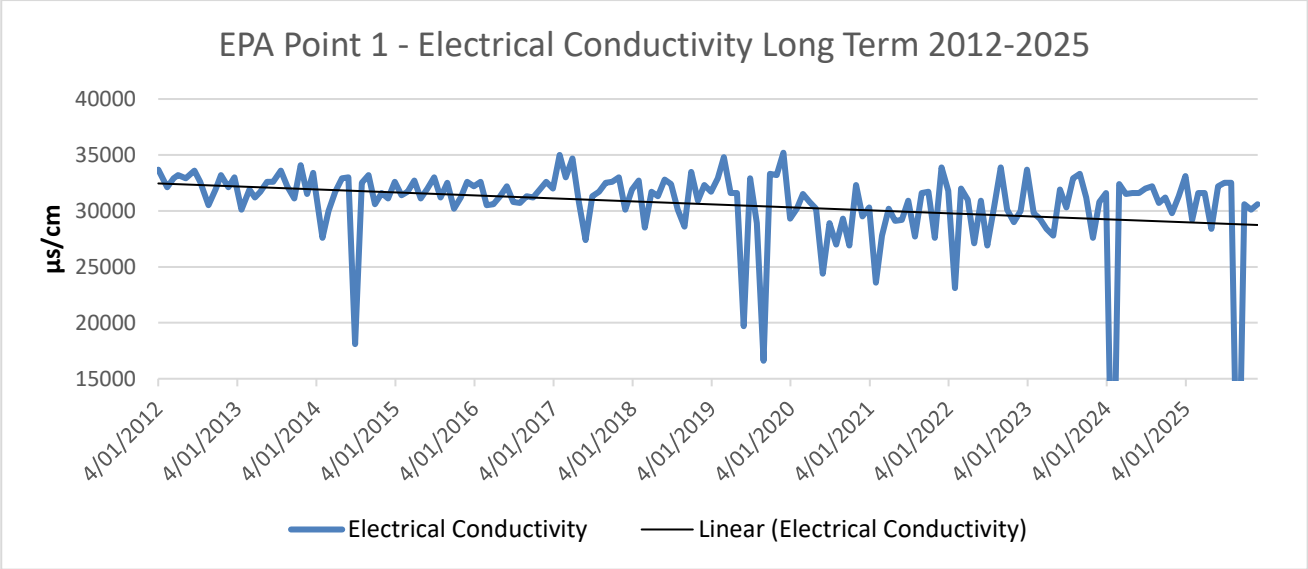


Figure 30 - Long term total suspended solids monitoring results at EPA Point 1

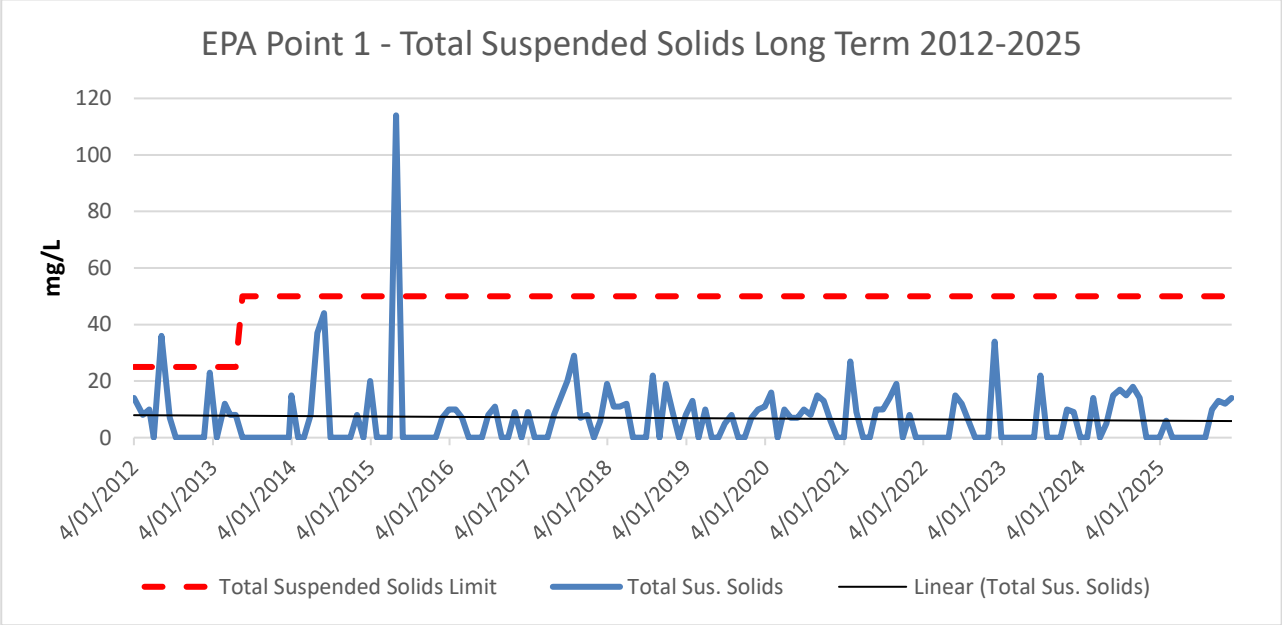
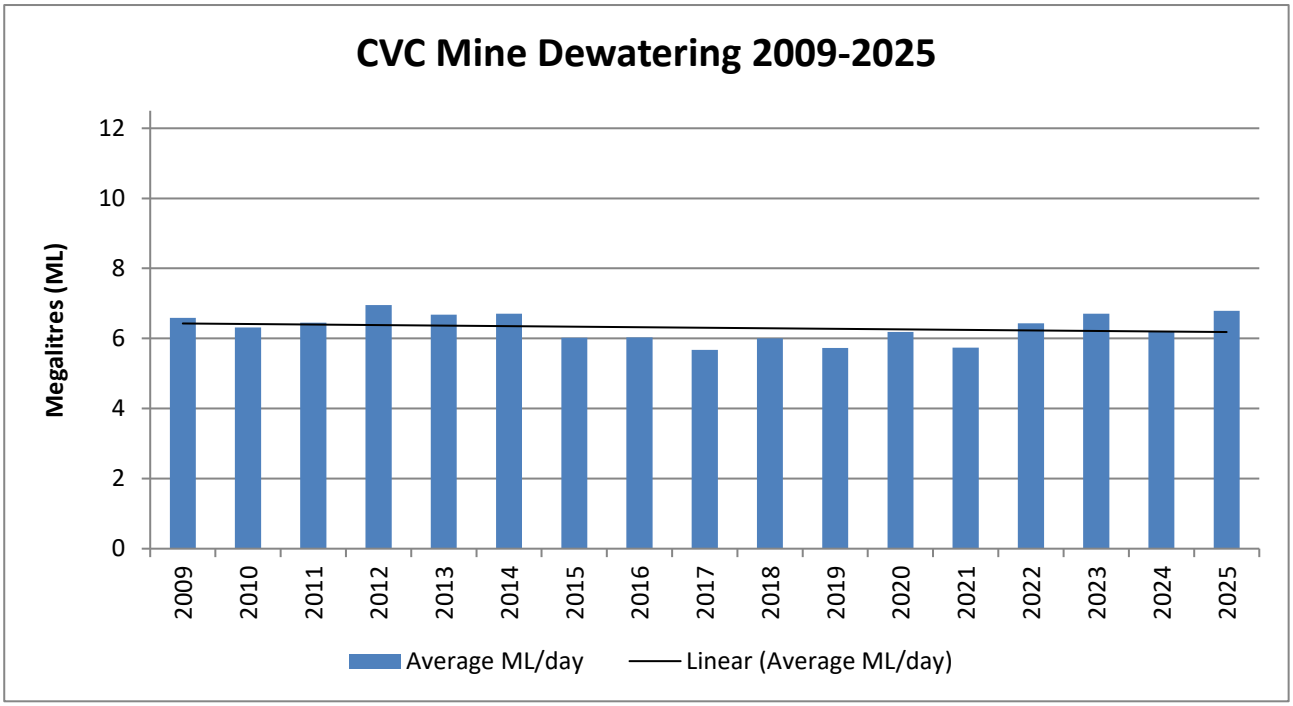


Figure 32 - Long term mine dewatering volumes



7.1.4 Water Balance

A summary of the key water balance model predictions from the EIS compared with actual results over the reporting period are provided in **Table 18**.

Table 18 - Key Water Balance Predictions and Actual Results - 2025

Water Balance Results (from EIS)	2025 Reporting Period Result	Comment
Daily average discharge through the EPA Point 1 of 10.716 ML	Daily annual average discharge of 6.8 ML/day	The water balance used the groundwater model end of mine life groundwater make to ensure model was conservative over the life of the mine. 2025 result is significantly below the water balance prediction but not unexpected due to the assumptions used in the water balance.
Maximum discharge through EPA Point 1 of 30.52 ML/day	Maximum discharge of 11.7 ML/day	The result is significantly lower than the water balance prediction as water balance was conducted using a daily time step model over a 100-year period. A maximum result would not be expected except in the event of a 1:100 ARI rainfall event.
Likelihood of EPA Point 1 volumetric limit exceedance on any given day of 4% (or approximately 15 times per year)	No exceedances of the EPL volumetric limit at EPA Point 1 and EPA Point 27 (combined volume).	Result reflects no major rainfall events in the 2025 period, as well as, improvements made to both the surface and underground water management system subsequent to the EIS modelling.
Average annual rainfall 1206 mm	1734 mm (Mannering Colliery Meteorological Station)	Higher than average annual rainfall with a daily maximum of 112mm.
Potable water use of 161.9 ML/yr	88.7 ML	Significantly less than the EIS prediction due to the cessation of miniwall mining methods. Decrease in potable water use to previous year (95.3 ML). Increase due to the mines ability to switch receiving water to underground between CVC and MC.

7.2 Erosion and Sediment

Mining operations and related activities that have the potential to cause erosion and/or generate sediment and impact on the surrounding catchment areas were unchanged during the reporting period, with exception to the bitumen sealing of the previously unsealed access roads to the mines stores facility, and consist of:

- the exposed areas of the laydown and internal access tracks;
- coal stockpiling area (not utilised for coal storage in 2025 reporting period) and coal handling equipment areas;
- vehicle and equipment movements; and
- erosion of drainage structures.

Water draining from the access road on the western side of the site runs via a number of small drainage channels through dry basins, swales or silt fencing.

The water draining from the hardstand catchment area reports to the pollution control ponds D11, D12 and D13. D13 overflows in to D9 which then flows into D10 prior to being discharged from site via the gravity fed discharge point (EPA Point 1), or, if over-loaded via the concrete spill-way (EPA Point 27). The pollution control ponds (sediment dams) and the location of the monitoring points are show on **Figure 24.**

Runoff from the coal handling and stockpile area is contained by two main drainage channels that surround the stockpile and report to a number of sediment dams below the stockpile. The majority of the runoff from this catchment area reports to D1, D2 and D6. These dams also function as primary settling ponds before discharging into dams further downstream. Both D1 and D2 report to D3 and then into D4 while D6 reports to D5 and then into D4. Once in D4 all the water flows into D9, water from D9 flows into D10 prior to discharge.

7.3 Stream monitoring

Delta Coal undertakes monitoring of stream health, channel flow and riparian vegetation monitoring of Swindles creek (receiving creek of EPA Point 1 and Point 27 discharge). The monitoring inspections involve undertaking a visual assessment and photographs of the creek on a 3-monthly basis to identify any potential instabilities that may form as a result of operations. The results of the visual inspection of watercourse stability are recorded on a pro-forma field inspection sheet.

Monitoring has been undertaken at four locations along the unnamed creek since 2014. There has been no noticeable degradation of stream and riparian health during the reporting period, with inspections undertaken on a quarterly basis in the 2025 reporting period.

7.4 Surface Water Pollution

There were no exceedances of the volumetric limit for EPA Point 1 and EPA Point 27 combined discharge in the reporting period.

During the reporting period there were two separate exceedances of discharge water quality exceeding site water quality limits:

- 27 April 2025 – Exceedance of Total Suspended limit at EPA Point 27 with a result of 109 mg/L exceeding the EPL 1770 limit of 50 mg/L. The spillway flow on 27 April 2025 occurred during a period of intensive rainfall on the day, where a total of 111.6 mm of rainfall was recorded at Delta Coal's weather station for the day. Mine dewatering was ceased for the entirety of the 27 April 2025, subsequently, elevated TSS results were directly related to surface water run-off as a result of high-intensity rainfall. The incident was not considered to have caused material harm to the environment as defined under the POEO Act 1997.
- 18 May 2025 – Exceedance of Total Suspended limit at EPA Point 27 with a result of 206 mg/L exceeding the EPL 1770 limit of 50 mg/L. The spillway flow on 18 May 2025 occurred during a period of intensive rainfall on the day, where a total of 85 mm of rainfall was recorded at Delta Coal's weather station for the day. Mine dewatering was ceased for the entirety of the 18 May 2025, subsequently, elevated TSS results were directly related to surface water run-off as a result of high-intensity rainfall. The incident was not considered to have caused material harm to the environment as defined under the POEO Act 1997.

7.5 Groundwater Pollution

There was no evidence of groundwater pollution detected during the 2025 reporting period, and there has been no groundwater pollution previously identified at CVC.

8 Rehabilitation

8.1 Buildings

There were no changes to the site infrastructure in the 2025 reporting period.

8.2 Rehabilitation of Disturbed Land

There were no significant rehabilitation works on disturbed lands during the reporting period.

Infrastructure pertaining to coal conveyors and ROM coal handling facilities were demolished on site in the previous reporting period (2020). Former mine cottages and the land they occupied adjacent Lake Macquarie were demolished in 2020 with the rehabilitation of the land ongoing within the 2025 reporting period. The area is being rehabilitated to native ecosystem and is currently in the ecosystem and land use sustainability phase of rehabilitation. Active noxious and priority weed management was ongoing in the 2025 reporting period. It is not anticipated that the rehabilitated area will be relinquished from the mining lease. The former mining cottages rehabilitation area was included in annual rehabilitation monitoring and reporting, the 2025 annual rehabilitation monitoring report has been included as **Appendix 14**.

A summary of the rehabilitation statistics for Chain Valley Colliery is provided in **Table 19** and **Table 20**. The Final Landform Plan has been included as **Figure 33**.

Table 19 - Summary of rehabilitation at CVC

		Last period (2024)	This period (2025)	Next period (2026)
A	**Total mine footprint** (managed by Delta Coal)	Approximately 14.70 ha	Approximately 14.70 ha	Approximately 14.70 ha
B	**Total active disturbance**	14.70 ha	14.70 ha	14.70 ha
C	**Land being prepared for rehabilitation**	Nil	nil	Nil
D	**Land under active rehabilitation**	Nil	Nil	Nil
E	**Completed rehabilitation**	Nil	Nil	Approximately 0.69 h. Ongoing land management of former mine cottages

Table 20 - Maintenance activities on rehabilitated land at CVC

	Area Treated (Ha)		
NATURE OF TREATMENT	**This period (2025)**	**Next period (2026)**	**Comment/Control Strategies/Treatment Detail**
Additional erosion control works (drains re-contouring, rock protection)	0	0	No additional works required.
Re-covering (further topsoil, subsoil sealing etc.)	0	0	n/a
Soil treatment (fertiliser, lime, gypsum etc.)	0	0	n/a
Treatment/management (grazing, cropping, slashing etc.)		0	n/a
Re-seeding/replanting (species density, season etc.)		0	n/a
Adversely affected by weeds (type and treatment)	7	7	Ongoing implementation of a weed management program of noxious weeds including but not limited to lantana, bitou bush, asparagus fern and pampas grass, foliar spray, physical removal and poisoning of stems as appropriate.
Feral animal control (additional fencing, trapping, baiting etc.)	0	0	No feral animal control undertaken during the reporting period.

During the 2022 reporting period, Delta Coal aligned its rehabilitation management plan to meet Schedule 8A requirements, as well as submitting a rehabilitation forward program and rehabilitation objectives to the resources regulator. The forward program and revised management plan has been made public on the Delta Coal website and can be accessed at the following link https://www.deltapae.com.au/operations/chain-valley-colliery/chain-valley-colliery-environment/chain-valley-colliery-environmental-management-plans

The Forward Program details the following for the two active rehabilitation areas at CVC:

Former Mining Cottages Area Rehabilitation:

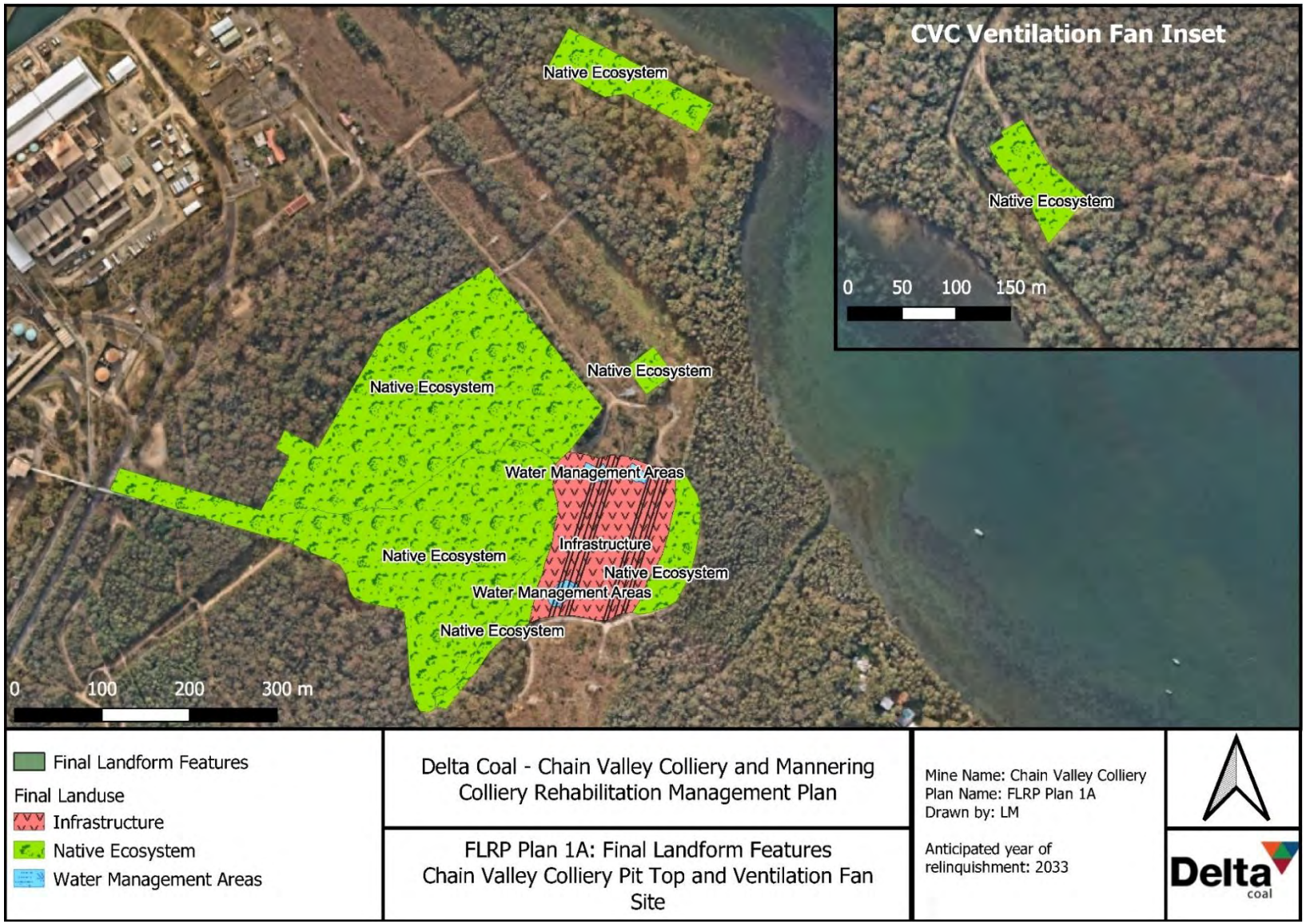
- Ecosystem and Land Use Sustainability phase, Q1 2024 – Q1 2026

Catherine Hill Bay – Possum Gulley Area Rehabilitation:

- Landform Establishment phase, current – Q1 2026
- Growth media development, Q2 2026 – Q4 2026
- Ecosystem and land use sustainability phase – Q1 2027 – Q2 2028
- Relinquishment – date to be confirmed with NPWS and RR

There have been delays in the Catherine Hill Bay – Possum Gulley Area rehabilitation due to additional combustible material being identified and the applications for approvals with key stakeholders to amend earthworks strategies, as well as, shortages in sourcing natural material (VENM) supply. The landform establishment phase has been extended as a result and is anticipated to be completed in Q1 2026.

Figure 31 - Chain Valley Colliery Final Landform Plan - 2025



8.3 Rehabilitation Trials and Research

No rehabilitation trials or research was undertaken during the reporting period.

8.4 Further Development of the Final Rehabilitation Plan

The current Rehabilitation Management Plan was updated in January 2024 following approval of rehabilitation objectives and the progress of rehabilitation phase at the former CVC mine cottages, it was provided to regulators and stakeholders as required by Condition 27, Schedule 3 of SSD-5465. The plan is publicly available on the Delta Coal website.

The proposed final rehabilitation landforms, consistent with both the Rehabilitation Management Plan and Mining Operations Plan is presented as **Figure 33.**

8.5 Post Rehabilitation Land Use(s)

As identified in the current Rehabilitation Management Plan the post mining land uses for CVC is to revegetate the surface facilities areas to a native ecosystem compatible with the surrounding vegetation communities. As the goal is to return the areas of disturbance to a native plant community (or communities) aligned with the surrounding bushland, no introduced species (e.g., *Melaleuca armillaris*, *Pinus radiata* and non-endemic eucalypts) would be used in the revegetation program. The focus of the works would be the use of locally occurring species plant preferentially grown from locally sourced seeds. CVC is on land owned by Delta Electricity who will, therefore, be a key stakeholder in determining the vegetation selection and landform of the area.

Some areas will be revegetated to grassland where this is consistent with the final land use and surrounds. This applies to the areas within existing high voltage power line easements, where the existing grassland vegetation communities are actively managed to ensure they have no impact to the transmission of electricity for the state. Accordingly, a grassland community is both consistent with other areas within the easement and considerate of future management requirements (as the high voltage power lines will remain following mine closure).

Rehabilitation objectives are presented in the Delta Coal Rehabilitation Management Plan (https://www.deltapae.com.au/operations/chain-valley-colliery/chain-valley-colliery-environment/chain-valley-colliery-environmental-management-plans).

8.6 Decommissioning

During mine closure the following actions will be taken with respect to the buildings and structures associated with the mining, preparation and transport of the coal:

- any plant, structures, buildings or conveyors would be preferentially sold and/or relocated for reuse at another mining operation
- the remaining surface conveyor plant, buildings and built structures will be demolished or removed. All demolition is to occur in accordance with AS 2601-2001: The Demolition of Structures (or its latest version at the time)
- concrete pads and footings will be either completely removed or removed to a minimum 1 m below surface levels and disposed of at an appropriate place or recycled, and following removal will be covered with at least 300 mm of growth medium
- roadways not required for access to the mine site or other areas for purposes such as bushfire management will be rehabilitated
- asphalt hardstand will be removed
- all services not required following mine closure will be disconnected and any stored energy dissipated;
- mining related power lines within the domains will be removed
- mining related surface services will be removed
- buried services encountered during civil works will either be completely removed or removed to 300 mm below the final landform level and remain buried. As mentioned above, all services, including buried services will be safely disconnected and have any stored energy dissipated.

These proposed actions could be subject to change during the mine closure process depending on requests by the landowner for infrastructure to be left in accordance with alternative future land use options. Additionally, it is noted that while services will be disconnected to the majority of the site during decommissioning activities, services may remain connected to a portion of the site for beneficial use during the later rehabilitation phases (such as watering tube stock) and subsequently would be disconnected following ecosystem establishment.

The decommissioning phase will also address the following:

- risks associated with any remaining combustible materials. An assessment of combustion risk will be undertaken and specific controls implemented based on report findings
- completion of Environmental Site Assessments, with specific focus on areas around storage tanks, oil storage areas, fuel dispensing locations, service areas, buildings housing powered plant and known locations of hazardous materials
- undertaking any necessary contamination remediation, if required, to ensure the land is suitable for use as buffer land for the Vales Point Power Station. As the lands will not be used as “recreation/public space”, nor is it planned to be used for “commercial/industrial” purposes which are land use scenarios within the *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as*

amended in 2013), it is proposed that a combination of health-based and ecological investigation criteria applicable to either of these classifications will be adopted as the rehabilitation criteria should contamination requiring remediation be identified

- heritage sites, which are not anticipated to be impacted during decommissioning
- asbestos, a hazardous building material register was revised in 2024 for the CVC pit top area.

8.7 Objectives

The rehabilitation objectives below have been compiled from Condition 25 within Schedule 3 of SSD-5465 and are listed in **Table 21**.

Table 21: Rehabilitation objectives

Feature	Objective
Mine site (as a whole of disturbed land and water)	• Safe, stable and non-polluting. • Final land use compatible with surrounding land use.
Surface Infrastructure	• To be decommissioned and removed, unless agreed otherwise with relevant regulatory authority and landowner.
Portals and ventilation shafts	• To be decommissioned and made safe and stable. • Retain habitat for threatened species (e.g. bats), where practicable (Chain Valley pit top facilities only).
Other land affected by the development	• Restore ecosystem function, including maintaining or establishing self-sustaining ecosystems: - local native plant species (unless agreed otherwise with relevant regulatory authority and landowner); and - a landform consistent with the surrounding environment.
Built features damaged by mining operations	• Repair to pre-mining condition or equivalent unless: - the owners agrees otherwise; or - the damage is fully restored, repaired or compensated under the *Mine Subsidence Compensation Act 2017*.
Community	• Ensure public safety. • Minimise the adverse socio-economic effects associated with mine closure.

8.8 Other Infrastructure

There was no other rehabilitation works completed during the reporting period.

9 Community

9.1 Community Complaints

There were no community complaints received during the reporting period.

A copy of the Complaints Register is provided on the Delta Coal website. This register includes:

- the date and time of the complaint;
- the method by which the complaint was made;
- any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
- the nature of the complaint;
- the action taken in relation to the complaint, including any follow-up contact with the complainant; and
- if no action was taken, the reasons why no action was taken.

The Annual total complaints and complaints by subject type trends are **Figure 34** and **Figure 35**.

Figure 32 - Total community complaints by year

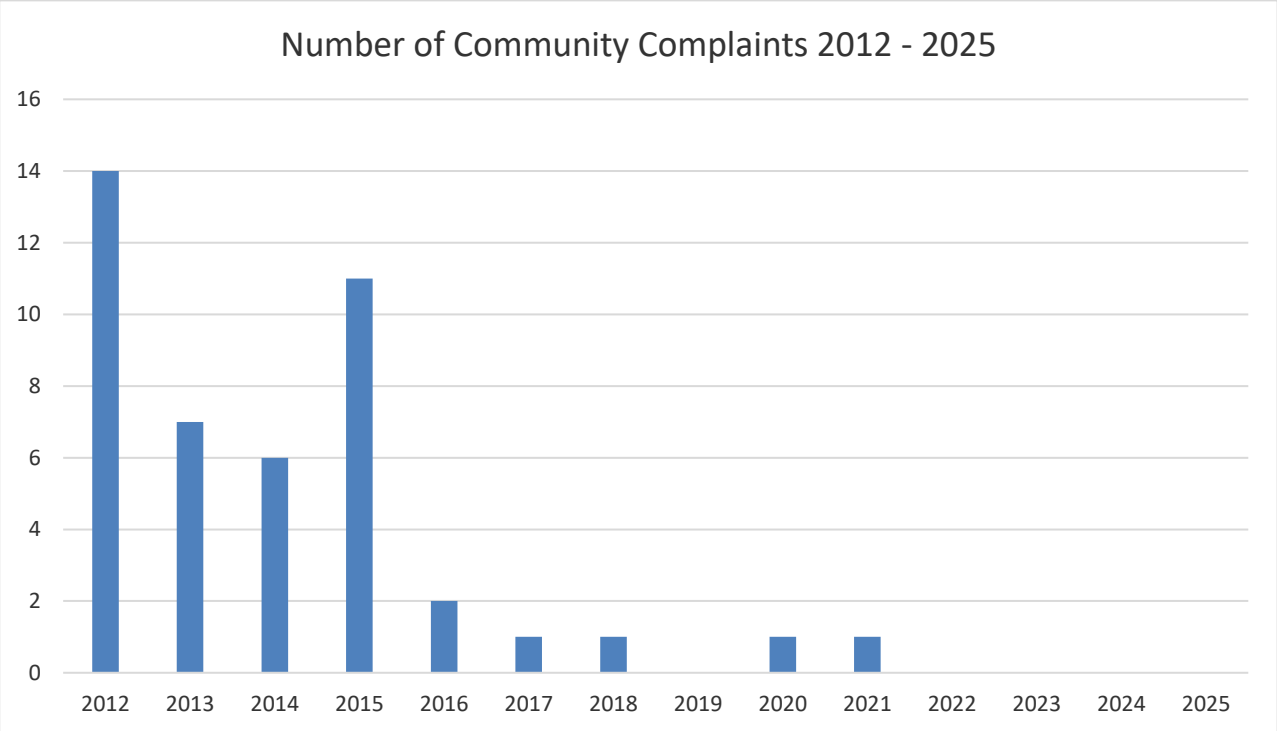
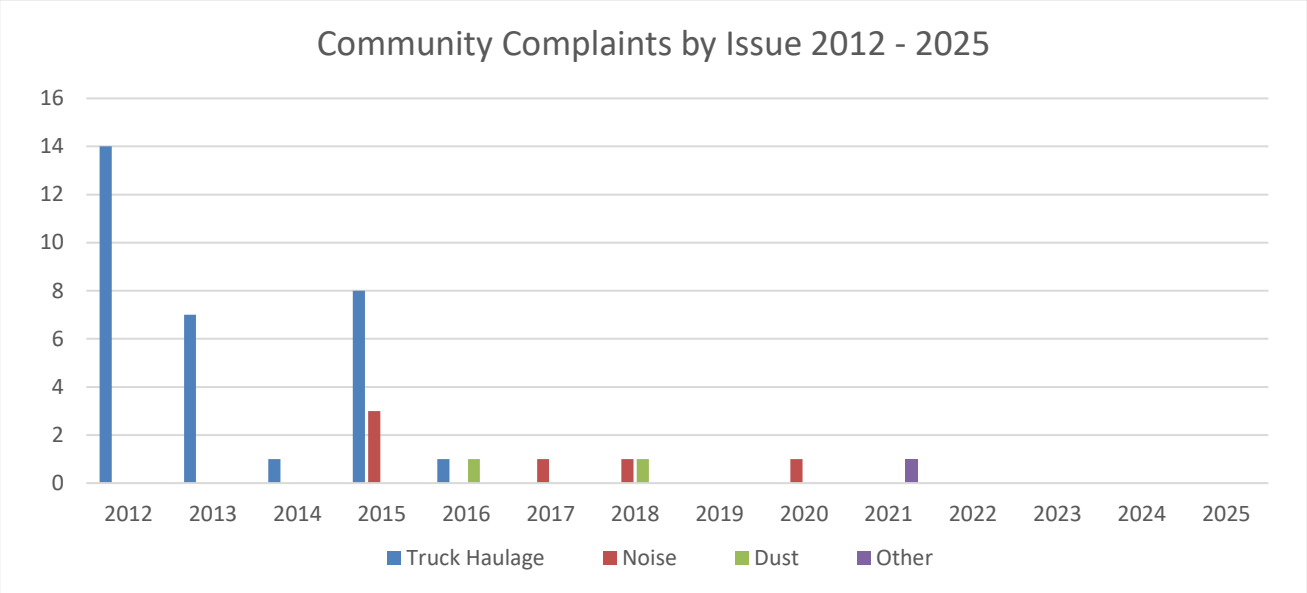


Figure 335 - Annual Community Complaints by Issue



9.2 Community Liaison

The Chain Valley Colliery and Mannering Colliery combined Community Consultative Committee (CCC) continued to operate in accordance with the *Community Consultative Committee Guideline* (June 2023) during the reporting period.

There were four CCC meetings held during the reporting period on the 19 February 2025, 14 May 2025, 20 August 2025 and 12 November 2025. Minutes for each of the committee meetings are available on the Delta Coal website https://www.deltapae.com.au/operations/chain-valley-colliery/community-consultation.

In addition, the Delta Coal website was updated on a monthly basis with monitoring data, management plans, reports, audits and complaint details among other items.

The community hotline number (**1800 687 260**) also remained in place during the reporting period and is displayed prominently and permanently on the website.

9.3 Voluntary Planning Agreement

A Voluntary Planning Agreement (VPA) with Central Coast Council was successfully established during 2017. Following extensive consultation with Central Coast Council, the Community Advisory Panel was established and met to plan and coordinate the framework for the VPA funding. The Chain Valley Colliery VPA fund was launched during September 2017 via the Council grants and sponsorship scheme.

The Delta Coal Community funding program was established as a joint initiative between Delta Coal and Central Coast Council to provide funding for organisations to deliver projects that improve community infrastructure and services in the following communities:

- Summerland Point

- Gwandalan
- Chain Valley Bay; and
- Mannering Park.

The VPA is subject to indexation and in the 2024-2025 Financial Year was $0.0478 per tonne of ROM coal sold, which started at $0.035 in 2013. In the 2024-2025 Financial Year, Delta Coal generated and paid $48,766.19 to the Central Coast Council, Voluntary Planning Agreement.

9.4 Community Support / Engagement

Delta Coal is committed to supporting and engaging with the local communities which surround its operations. While Delta Coal provides a monetary offsets associated with its VPA under its operating approvals, Delta Coal also supports the local community through a variety of additional avenues. This support is provided through in kind support, cash donations, staff time, and charitable donations.

10 Independent Audit

An independent environmental audit (IEA) was undertaken by Onward Consulting in 2025 for the period from 12 April 2022 until 16 April 2025 .

The IEA report and action plan was submitted to DPHI on 16 July 2025 and accepted on 29 August 2025. The IEA is provided in **Appendix 10** and a current IEA Action Plan is provided as **Appendix 11**.

10.1 Key Audit Outcomes

Recommendations with respect to the annual review are summarised in **Table 22**.

Table 22 - Actions required from IEA with regard to the Annual Review

Item	Issue / Observation	Action	Status
Action 1	Monitoring Results	Report on LDP1 and LDP27 monitoring and sample results in the monthly environmental reports and Annual Reviews. If no discharge or sampling occurs, a note on this would be appropriate for consistency and improved environmental monitoring.	See Section 7.1.2

10.2 Action Plan

The IEA Action Plan has been included in **Appendix 11**.

10.3 Future Audit

The next Independent Environmental Compliance Audit is scheduled to commence in 2028

An updated table of compliance with the 2025 Independent Environmental Audit will be completed as part of that audit.

11 Incidents and non-compliances during the reporting period

All non-compliances, exceedance, and reportable incidents relating to the site's licences and approvals are summarised below in **Table 23**.

Table 23 - Summary of reportable incidents/non-compliances for 2025t

Date	Description of Incident	Approval / Condition / Clause	Actions taken to address incident
26 March 2025	Exceedance of depositional dust maximum monthly increase (2g/m2/month) at DDG002. The monthly depositional dust level increase from 0.9 g/m2/month to 3.9 g/m2/month	SSD-5465 - Schedule 3, Condition 11	The exceedance was reported to the NSW DPHI. Delta Coal will continue to undertake dust mitigation measures in line with the approved Air Quality and Greenhouse Gas Management Plan for the site.
27 April 2025	Sampling at EPA Point 27 recorded a concentration of Total Suspended Solids of 109 mg/L, with EPL 1770 stipulating a 50 mg/L limit. The exceedance occurred during a high intensity rainfall event..	EPL 1770 – L2.4	The exceedance was reported to the NSW EPA and NSW DPHI. Actions from the incident include: • Desilting of the initial settling dam in 2025. • Install an additional silt curtain.
29 April 2025	Exceedance of depositional dust maximum monthly increase (2g/m2/month) at DDG004. The monthly depositional dust level increased from 3.8 g/m2/month to 7.4 g/m2/month	SSD-5465 - Schedule 3, Condition 11	The exceedance was reported to the NSW DPHI. Inspections were undertaken of the dust gauge location, identifying active use of the access track and a large gravel laydown pad adjacent. A review of site operations did not identify relevant changes that would impact depositional dust generation from the site. Delta Coal will continue to undertake dust mitigation measures in line with the approved Air Quality and Greenhouse Gas Management Plan for the site.
18 May 2025	Sampling at EPA Point 27 recorded a concentration of Total Suspended Solids of 206 mg/L, with EPL 1770 stipulating a 50 mg/L limit. The exceedance occurred during a high intensity rainfall event..	EPL 1770 – L2.4	The exceedance was reported to the NSW EPA and NSW DPHI. The non-compliance was considered to be directly related to the NSW East Coast severe weather event. Actions from the incident include: • Desilting of the initial settling dam in 2025.

Date	Description of Incident	Approval / Condition / Clause	Actions taken to address incident
			• Install an additional silt curtain.
5 June 2025	Noise monitoring at R22 for the Q2 noise monitoring period identified a LAeq (15 min) result of 46-47 dB(A) (41 – 42 dB with a +5 LFN penalty), with a limit imposed at the location of 46 dB(A).	SSD 5465 - Schedule 3, Condition 7 EPL 1770 - L5.1	The exceedance was reported to the NSW Department of Planning, Housing and Infrastructure (DPHI) and NSW Environmental Protection Authority. At the time of the monitoring, a non-compliance to noise limits was not clear, post analysis of the monitoring results was required due to uncertainty on dominant noise sources and low-frequency noise (LFN) penalties to be applied to the monitoring results. Follow-up monitoring was undertaken on 12 June 2025 at R22 during similar noise enchancing meteorogolical conditions. The follow-up monitoring recorded 41 dB LAEQ,15 min with a +5 LFN penalty applied (i.e. 46 dB LAEQ,15 min) Following the noise exceedance: -The affected landowner at R22 was notified. -Replace the identified malfunctioning bearing within the ventilation fan installation. -Complete cleaning of the ventilation fan inlet silencers, scheduled for 19th June 2025.
22 July 2025	There was an exceedance to the maximum total increase in deposited dust level (increase greater than 2 g/m2/month) at DDG002 for the sampling period between 5 June 2025 and 7 July 2025. The monthly depositional dust level increased from 0.2 g/m2/month to 12 g/m2/month.	SSD-5465 - Schedule 3, Condition 11	The exceedance was reported to the NSW DPHI. Inspections were undertaken of the dust gauge location, identifying active use of the access track adjacent to the dust gauge. A review of site operations did not identify relevant changes that would impact depositional dust generation from the site. Delta Coal will continue to undertake dust mitigation measures in line with the approved Air Quality and Greenhouse Gas Management Plan for the site.
25 September 2025	There was an exceedance to the maximum total increase in deposited dust level (increase greater than 2 g/m2/month) at DDG004 for the sampling period	SSD-5465 - Schedule 3, Condition 11	The exceedance was reported to the NSW DPHI. Inspections were undertaken of the dust gauge location, identifying active

Date	Description of Incident	Approval / Condition / Clause	Actions taken to address incident
	between 7 August 2025 and 5 September 2025. The monthly depositional dust level increased from 0.6 g/m2/month to 23.2 g/m2/month.		use of the access track and unsealed gravel pad adjacent. A review of site operations did not identify relevant changes that would impact depositional dust generation from the site. Delta Coal will continue to undertake dust mitigation measures in line with the approved Air Quality and Greenhouse Gas Management Plan for the site.
5 November 2025	There was an exceedance to the maximum total increase in deposited dust level (increase greater than 2 g/m2/month) at DDG004 for the sampling period between 7 August 2025 and 5 September 2025. The monthly depositional dust level increased from 0.6 g/m2/month to 23.2 g/m2/month.	SSD-5465 - Schedule 3, Condition 11	The exceedance was reported to the NSW DPHI. Inspections were undertaken of the dust gauge location, identifying active use of the access track and unsealed gravel pad adjacent. A review of site operations did not identify relevant changes that would impact depositional dust generation from the site. Delta Coal will continue to undertake dust mitigation measures in line with the approved Air Quality and Greenhouse Gas Management Plan for the site.
9 December 2025	Exceedance of 24-hour average PM2.5 limit at the Wyee PM2.5 monitor (RTD002) during a regional air quality event due to bushfires. The 24-hour average was 27.9 µg/m3 against the limit of 25 µg/m3.	SSD-5465 - Schedule 3, Condition 11	The exceedance was reported to the NSW DPHI. Based on the investigation findings, Delta Coal did not attribute the 24-hour PM2.5 concentration of 27.8µg/m³ recorded on 9 December 2025 to its operations. The elevated value is considered to have resulted from nearby bushfires, which have impacted regional air quality.
16 December 2025	Following the submission of the Independent Environmental Audit. A review of the suitability of existing strategies, plans and programs is required within three months, this was not completed due to unforeseen circumstances.	SSD-5465 - Schedule 6, Condition 5	The non-compliance was reported to the NSW Department of Planning, Housing and Infrastructure (DPHI). Review is now required by 30 March 2026.

Date	Description of Incident	Approval / Condition / Clause	Actions taken to address incident
19 December 2025	There was an exceedance to the annual average depositional dust level (increase greater than 4 g/m2/month annual average). The annual average value of insoluble matter recorded for DDG004 for the period of 2 December 2024 to 5 December 2025 was 5.79 g/m2/month.	SSD-5465 - Schedule 3, Condition 11	The exceedance was reported to the NSW Department of Planning, Housing and Infrastructure (DPHI). For the 2025 period depositional dust gauge, DDG004, was considered to have been frequently exposed to contamination unrelated to CVCs mining activities

12 Activities to be Completed in the Next Reporting Period

12.1 Activities that were Proposed for 2024 Reporting period

A summary of the activities that were proposed to be undertaken during the 2024 reporting period and current status is provided in **Table 24.**

Table 24: Status Update to 2024 Proposed Activities

Activity Proposed in 2024 Annual Report	Status Update	31 December 2025 update, percentage complete
Ongoing monthly weed management in 2025 period Revision of weed action plan with site-wide mapping of to guide weed management activities on-site.	Weed management was undertaken for the sites pit-top areas on a monthly basis throughout the 2025 period. Noxious weed control works were completed by a suitably qualified and trained contractor. While weed mapping was completed in the 2025 annual biodiversity monitoring, the weed action plan was not revised in the period.	Ongoing. 80 %
De-silting works to commence on CVC sedimentation dams.	Completed desilting of dam D8 utilising an amphibious dredge that could work within the Transgrid 11kv powerline easement requirements	Ongoing. 100%.
Progression of CVC Consolidation Approval (consolidating approvals for CVC and MC under one State Significant Development) through the Independent Planning Commission.	The approval project at the end of the 2025 reporting period was referred to the Independent Planning Commission and was awaiting public hearing and determination in early 2026.	Ongoing 90%

12.2 Activities Proposed to be Completed in 2026 Reporting Period

Table 25 - Activities Proposed for the 2026 Period

Proposed Activities for 2026
Ongoing weed management in accordance with the Weed Action Plan.
Progression of CVC Consolidation Approval (consolidating approvals for CVC and MC under one State Significant Development) through the Independent Planning Commission.
Implementation of IEA Action Plan

13 References

Documents used in the preparation of this report are detailed in **Table 26**.

Table 26: References

Reference	Title
Legislation and Regulations	Development consent SSD-5465 (as modified) Environment Protection Licence (EPL) 1770 *Mining Act 1992* *Protection of the Environment Operations Act, 1997*
External documents	AECOM, 2011 – *Environmental Assessment Chain Valley Colliery Domains 1 & 2 Continuation Project*. Prepared for LakeCoal Pty Ltd. EMGA Mitchell McLennan, 2013 – *Environmental Impact Statement, Chain Valley Colliery Mining Extension 1 Project.* Prepared for LakeCoal Pty Ltd. Atlantech Pty Ltd (October 2024) Biodiversity Monitoring 2024 Chain Valley Colliery. Laxton, E., 2024 – *Seagrass Survey of Chain Valley Bay, Summerland Point and Crangan Bay, Lake Macquarie, NSW (Results for 2008 to 2024)* Laxton, E. 2024 – *Lake Macquarie Benthos Survey Results No. 24 (March 2024)* NSW DPIE (June 2023) *Community Consultative Committee Guidelines* Total Earth Care Pty Ltd (January 2020) Weed Action Plan Chain Valley Colliery, Mannering Colliery and Summerland Point Ventilation Shaft. Total Earth Care Pty Ltd (August 2020) Weed Action Plan – Addendum 1, Chain Valley Colliery, Mannering Colliery and Summerland Point Ventilation Shaft.

14 Acronyms / Definitions

AEMR Annual Environmental Management Report, now known as the Annual Review

Annual Review The annual environmental report compiled for CVC, the Annual Review also fulfills the requirement for an Annual Environmental Report or an Annual Environmental Management Report required by mining leases.

CCC Community Consultative Committee

CVC Chain Valley Colliery

DP&E Department of Planning & Environment (former)

DPIE Department of Planning, Industry and Environment

EA Environmental Assessment

EMS Environmental Management System

EPA NSW Environment Protection Authority

EP&A Act *Environmental Planning and Assessment Act 1979*

EPL Environmental Protection License
kL Kilolitre

EPA Point 1 Licenced Discharge Point 1 (per EPL 1770)

MC Mannering Colliery

NGER National Greenhouse and Energy Reporting

NSW New South Wales

OEH NSW Office of Environment and Heritage

PM_{10} Particulate matter less than 10 microns in size

POEO Act *Protection of the Environment Operations Act 1997*

ROM Run of mine

Secretary Secretary of the Department, or nominee

TEOM Tapered element oscillating microbalance

t - CO_2-e Tonnes of carbon dioxide equivalent

The website The website of Delta Coal - Chain Valley Colliery, which is www.deltacoal.com.au

MP10_0161 Project approval MP 10_0161, as modified, issued under Section 75J of the Environmental Planning and Assessment Act 1979 for the Chain Valley Colliery Domains 1 & 2 Continuation Project.

SSD 5465	Development Consent SSD 5465, as modified, issued under Section 89E of the Environmental Planning and Assessment Act 1979 for the Chain Valley Colliery Mining Extension 1 Project.
VPPS	Vales Point Power Station
WCJV	Wallarah Coal Joint Venture

15 Appendices

Appendix 1: Development Consent SSD-5465

Development Consent

Section 89E of the *Environmental Planning & Assessment Act 1979*

As delegate of the Minister for Planning and Infrastructure, I approve the development application referred to in Schedule 1, subject to the conditions in Schedules 2 to 6.

These conditions are required to:

- prevent, minimise, and/or offset adverse environmental impacts;
- set standards and performance measures for acceptable environmental performance;
- require regular monitoring and reporting; and
- provide for the ongoing environmental management of the development.

Chris Wilson
Executive Director
Development Assessment Systems and Approvals

Sydney 2013

SCHEDULE 1

Application Number:	SSD-5465
Applicant:	Great Southern Energy Pty Limited
Consent Authority:	Minister for Planning and Infrastructure
Land:	See Appendix 1
Development:	Chain Valley Extension Project

Red type represents November 2014 Modification (SSD_5465 MOD 1)
Blue type represents December 2015 Modification (SSD_5465 MOD 2)
Green type represents June 2020 Modification (SSD-5465 MOD 3)
Purple type represents July 2021 Modification (SSD-5465 MOD 4)

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DEFINITIONS

Aboriginal Object / Place	Has the same meaning as the definition of the term in section 5 of the NP&W Act
Adaptive management	Adaptive management includes monitoring subsidence impacts and subsidence effects and, based on the results, modifying the mining plan as mining proceeds to ensure that the effects, impacts and/or associated environmental consequences remain within predicted and designated ranges and in compliance with the conditions of this consent
Affected Councils	LMCC and/or CC Council
Annual Review	The review required by Condition 4 of Schedule 6
Applicant	Great Southern Energy Pty Limited, or any person carrying out development under this consent
Approved mine plan	The mine plan shown in Appendix 3, as varied by any Extraction Plan approved under this consent
APZs	The asset protection zones shown in Appendix 7A
BCA	Building Code of Australia
BCD	Biodiversity and Conservation Division within the Department
BMP	Biodiversity Management Plan
Built features	Any building or work erected or constructed on land or water, and includes dwellings and infrastructure such as any formed road, street, path, walk, marina or driveway; any pipeline, water, sewer, telephone, gas or other service main
Calendar Year	A period of 12 months from 1 January to 31 December
CCC	Community Consultative Committee
CC Council	Central Coast Council
Coal haulage route	The route proposed in the EIS for haulage of coal by trucks between the site and the Port of Newcastle (as shown in Appendix 5)
Conditions of this consent	Conditions contained in Schedules 2 to 6 inclusive
Construction	The demolition of buildings or works, carrying out of works and erection of buildings covered by this consent
Day	The period from 7am to 6pm on Monday to Saturday, and 8am to 6pm on Sundays and Public Holidays
Delta Electricity	Delta Electricity, or subsequent owners of the Vales Point Power Station
Department	Department of Planning, Industry and Environment
Development	The development described in the EIS, as amended by the SEE (Mod 1), SEE (Mod 2) and SEE (Mod 3)
DPIE Crown Lands	Crown Lands Group within the Department
DPIE Water	Water Group within the Department
EIS	Environmental Impact Statement titled '*Chain Valley Colliery Mining Extension 1 Project*' dated 28 May 2013, as modified by the response to submissions, titled '*Chain Valley Colliery Mining Extension 1 Project* Response to Submissions', dated August 2013, and the letter by EMM to the Applicant, dated 29 October 2013
Endangered population	As defined under the *Fisheries Management Act 1994*
Environment	Includes all aspects of the surroundings of humans, whether affecting any human as an individual or in his or her social groupings
Environmental consequences	The environmental consequences of subsidence impacts, including: damage to built features; loss of surface water flows to the subsurface; loss of standing pools; slope changes to streams; adverse water quality impacts; development of iron bacterial mats; landslides; damage to Aboriginal heritage sites; impacts on aquatic ecology; and ponding.
EPA	NSW Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
EPL	Environment Protection Licence issued under the POEO Act
Evening	The period from 6pm to 10pm
Feasible	Means what is possible and practicable in the circumstances
First Workings	The extraction of coal from underground workings by bord and pillar mining methods (including herringbone pattern workings) and from main headings, gateroads and cut-throughs and the like, provided that such workings are long-term stable and do not generate more than 20 mm of vertical subsidence at the surface
Fisheries NSW	Fisheries Branch of the Primary Industries Group within the Department
Ha	Hectare
Heritage Item	An Aboriginal object, an Aboriginal place, or a place, building, work, relic, moveable object, tree or precinct of heritage significance, that is listed under any of the following: • the State Heritage Register under the *Heritage Act 1977*; • a state agency heritage and conservation register under section170 of the *Heritage Act 1977;*

	• a Local Environmental Plan under the EP&A Act; • the World Heritage List; • the National Heritage List or Commonwealth Heritage List under the EPBC Act; or • anything identified as a heritage item under the conditions of this consent.
High Water Mark Subsidence Barrier	The area of land defined: a) on the surface by the highwater level of Lake Macquarie and a point 2.44 metres in elevation above that highwater level; and b) in the seam, where it is intersected by lines: • drawn landwards from all points 2.44 metres elevation above the highwater level of Lake Macquarie; and • drawn lakewards from the highwater level of Lake Macquarie, at an angle of 35 degrees from the vertical.
Incident	An occurrence or set of circumstances that causes or threatens to cause material harm that may or may not be or cause a non-compliance
Land	Has the same meaning as the definition of the term in section 1.4 of the EP&A Act, except where the term is used in the noise and air quality conditions in Schedules 3 and 5 of this consent where it is defined to mean the whole of a lot, or contiguous lots owned by the same landowner, in a current plan registered at NSW Land Registry Services at the date of this consent
LMCC	Lake Macquarie City Council
Material harm	Is harm to the environment that: • involves actual or potential harm to the health or safety of human beings or to the environment that is not trivial; or • results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding $10,000, (such loss includes the reasonable costs and expenses that would be incurred in taking all reasonable and practicable measures to prevent, mitigate or make good harm to the environment)
MEG	Regional NSW – Mining, Exploration and Geoscience
Minimise	Implement all reasonable and feasible mitigation measures to reduce the impacts of the development
Mining operations	The carrying out of underground mining, including the extraction, processing, stockpiling and transportation of coal on the site and the emplacement of coarse/fine reject material resulting from underground mining
Minister	Minister for Planning and Public Spaces, or delegate
Minor	Not very large, important or serious
Mitigation	Activities associated with reducing the impacts of the development
Modification 1	The modification to the development as described in SEE (Mod 1)
Modification 2	The modification to the development as described in SEE (Mod 2)
Modification 3	The modification to the development as described in SEE (Mod 3)
Modification 4	The modification to the development as described in SEE (Mod 4)
NCC	Newcastle City Council
Negligible	Small and unimportant, such as to be not worth considering
Night	The period from 10pm to 7am on Monday to Saturday, and 10pm to 8am on Sundays and Public Holidays
Non-compliance	An occurrence, set of circumstances or development that is in breach of this consent
NP&W Act	*National Parks and Wildlife Act 1974*
Peak hour periods	7 am to 9 am and 4:30 pm to 6 pm weekdays
Planning Secretary	Planning Secretary under the EP&A Act, or nominee
POEO Act	*Protection of the Environment Operations Act 1997*
Privately-owned land	Land that is not owned by a public agency, Delta Electricity (or its subsidiary) or a mining company (or its subsidiary)
Public infrastructure	Linear and related infrastructure that provides services to the general public such as roads, railways, water supply, drainage, sewerage, gas supply, electricity, telephone, telecommunications, etc.
Reasonable	Reasonable relates to the application of judgement in arriving at a decision, taking into account: mitigation benefits, cost of mitigation versus benefits provided, community views and the nature and extent of potential improvements
Reasonable costs	The costs agreed between the Department and the Applicant for obtaining independent experts to review the adequacy of any aspects of the Extraction Plan, or where such costs cannot be agreed, the costs determined by a dispute resolution process
Registered Aboriginal Parties	As described in the *National Parks and Wildlife Regulation 2009*
Rehabilitation	The restoration of land disturbed by a development to a good condition, to ensure it is safe, stable and non-polluting
Remediation	Activities associated with partially or fully repairing or rehabilitating the impacts of the

	development or controlling the environmental consequences of this impact
RFS	NSW Rural Fire Service
Road Maintenance Agreement	The document prepared by McCullough Robertson Lawyers and titled '*Road Maintenance Agreement*', signed by CC Council on 1 July 2013 and by LakeCoal on 5 July 2013
ROM	Run-of-mine
RR	Regional NSW - Resources Regulator
SA NSW	Subsidence Advisory NSW
Safe, serviceable & repairable	Safe means no danger to users who are present; serviceable means available for its intended use; and repairable means damaged components can be repaired economically
Second Workings	Extraction of coal by longwall, miniwall, pillar extraction, pillar splitting or pillar reduction methods, and inclusive of any first workings methods that would generate more than 20 mm of vertical subsidence at the surface
SEE Mod 1	Statement of Environmental Effects titled *'Chain Valley Colliery – Modification 1, Statement of Environmental Effects, Section 96 Modification to SSD-5465'* dated April 2014, as modified by the associated Response to Submissions dated 15 September 2014.
SEE Mod 2	Statement of Environmental Effects titled *'Chain Valley Colliery – Modification 2, Statement of Environmental Effects, Section 96 Modification to SSD-5465'* dated 29 June 2015, including the associated Response to Submissions dated 16 September 2015.
SEE (Mod 3)	Statement of Environmental Effects titled '*Statement of Environmental Effects, Chain Valley Colliery – Modification 3*', dated May 2019, prepared by EMM Consulting, including the associated Response to Submissions dated August 2019 and prepared by EMM Consulting
SEE (Mod 4)	Statement of Environmental Effects titled "*Statement of Environmental Effects, Chain Valley Colliery Modification 4*" dated November 2020, prepared by Umwelt Consulting, including the associated Response to Submissions, dated April 2021 and prepared by Umwelt Consulting.
Site	All land within the Development Area (see Appendices 1 and 2)
SPB	Seagrass Protection Barrier is the area of land defined by: (a) on the surface by the extent of the seagrass beds; and (b) in the seam, where the seam is intersected by the lines drawn: • landwards from the landwards boundary of the seagrass beds; and • lakewards from the lakewards boundary of the seagrass beds, at an angle of 26.5 degrees from the vertical as illustrated in Figure 1A in Appendix 3
Statement of commitments	The Applicant's commitments in Appendix 9
Subsidence	The totality of subsidence effects, subsidence impacts and environmental consequences of subsidence impacts
Subsidence effects	Deformation of the ground mass due to mining, including all mining-induced ground movements, such as vertical and horizontal displacement, tilt, strain and curvature
Subsidence impacts	Physical changes to the ground and its surface caused by subsidence effects, including tensile and shear cracking of the rock mass, localised buckling of strata caused by valley closure and upsidence and surface depressions or troughs
Subsidence Zone A	The area shown as Zone A in Figure 1 in Appendix 3 in which long-term stable mining systems generating no more than 20 mm of surface subsidence may be utilised
Subsidence Zone B	The area shown as Zone B in Figure 1 in Appendix 3 in which mining systems generating no more than 780 mm of surface subsidence may be utilised
Surface facilities sites	The Chain Valley Colliery surface facilities site; the Summerland Point ventilation shaft site; and any other site subject to existing or proposed surface disturbance associated with the development
TfNSW	Transport for NSW
Threatened Species	As defined under the *Threatened Species Conservation Act 1995* and the *Environment Protection and Biodiversity Conservation Act 1999*

SCHEDULE 2
ADMINISTRATIVE CONDITIONS

OBLIGATION TO MINIMISE HARM TO THE ENVIRONMENT

1. In addition to meeting the specific performance measures and criteria established under this consent, the Applicant must implement all reasonable and feasible measures to prevent, and if prevention is not reasonable and feasible, minimise, any material harm to the environment that may result from the construction and operation of the development, and any rehabilitation required under this consent.

TERMS OF CONSENT

2. The development may only be carried out:
   (a) in compliance with the conditions of this consent;
   (b) in accordance with the statement of commitments in Appendix 9;
   (c) in accordance with the Subsidence Zones in Appendix 3;
   (d) in accordance with all written directions of the Planning Secretary; and
   (e) generally in accordance with the EIS, SEE (Mod 1), SEE (Mod 2), SEE (Mod 3) and SEE (Mod 4).

3. Consistent with the requirements in this consent, the Planning Secretary may make written directions to the Applicant in relation to:
   (a) the content of any strategy, study, system, plan, program, review, audit, notification, report or correspondence submitted under or otherwise made in relation to this consent, including those that are required to be, and have been, approved by the Planning Secretary; and
   (b) the implementation of any actions or measures contained in any such document referred to in condition 3(a).

4. The conditions of this consent and directions of the Planning Secretary prevail to the extent of any inconsistency, ambiguity or conflict between them and a document/s listed in condition 2(e). In the event of an inconsistency, ambiguity or conflict between any of the document/s listed in condition 2(e), the most recent document prevails to the extent of the inconsistency, ambiguity or conflict.

LIMITS ON CONSENT

Mining Operations

5. The Applicant may carry out mining operations on the site until 31 December 2027.

   Note: Under this consent, the Applicant is required to rehabilitate the site and perform additional undertakings to the satisfaction of either the Planning Secretary or the RR. Consequently, this consent will continue to apply in all other respects other than the right to conduct mining operations until the rehabilitation of the site and these additional undertakings have been carried out satisfactorily.

Coal Extraction

6. The Applicant must not extract more than 2.1 million tonnes of ROM coal from the site in any calendar year.

Coal Transport – Public Roads

7. The Applicant must ensure that no laden coal trucks are 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.

8. The Applicant must not dispatch from the site more than:
   (a) 660,000 tonnes of product coal in any calendar year to the Port of Newcastle for export;
   (b) 180,000 tonnes of product coal in any calendar year to domestic customers other than Vales Point Power Station;
   (c) a total of 270 laden coal trucks per day by public roads;
   (d) a total of 32 laden coal trucks per hour; and
   (e) 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.

Coal Transport – Vales Point Power Station

9. The Applicant must ensure that only private roads are used for the transport of coal by truck to Vales Point Power Station, except in an emergency. In an emergency, product coal may be transported by public roads,

with the prior written approval of the Planning Secretary, and subject to any restrictions that the Planning Secretary may impose.

10. The Applicant must restrict the transport of coal by truck to the Vales Point Power Station between 10 pm and 5:30 am to:
    (a) 16 laden trucks per hour for the Spring and Autumn months; and
    (b) zero during Winter months.

PLANNING AGREEMENT

11. Within 12 months of the date of this consent, unless otherwise agreed by the Planning Secretary, the Applicant must enter into a planning agreement with the CC Council in accordance with Division 6 of Part 4 of the EP&A Act that provides for payment to the CC Council for community enhancement purposes.

    The agreement must include provision for those matters set out in condition 12 below.

    If there is any dispute between the Applicant and CC Council relating to the preparation or implementation of the planning agreement, then either party may refer the matter to the Planning Secretary for resolution.

COMMUNITY ENHANCEMENT

12. The Applicant must pay CC Council $0.035 for each tonne of product coal produced by the development for the purposes of improving public infrastructure and providing community projects for the communities of Summerland Point, Gwandalan, Chain Valley Bay and Mannering Park. Payments from the approval date of project approval 10_0161 must be:
    (a) made by the end of March, for coal produced in the previous calendar year;
    (b) made for each year that coal is produced by the colliery; and
    (c) subject to indexation in accordance with the Australian Bureau of Statistics Consumer Price Index.

13. Deleted.

14. Deleted.

STRUCTURAL ADEQUACY

15. The Applicant must ensure that all new buildings and structures, and any alterations or additions to existing buildings and structure, that are part of the development are constructed in accordance with:
    (a) the relevant requirements of the BCA; and
    (b) any additional requirements of the SA NSW where the building or structure is located on land within declared Mine Subsidence Districts.

Notes:

- *Under Part 8 of the EP&A Act, the Applicant is required to obtain construction and occupation certificates for the proposed building works;*
- *Part 8 of the EP&A Regulation sets out the requirements for the certification of the development; and*
- *Under section 21 of the Coal Mine Subsidence Compensation Act 2017, the Applicant is required to obtain the SA NSW's approval before constructing any improvements in a Mine Subsidence District.*

DEMOLITION

16. The Applicant must ensure that all demolition work is carried out in accordance with *Australian Standard AS 2601-2001: The Demolition of Structures,* or its latest version.

OPERATION OF PLANT AND EQUIPMENT

17. All plant and equipment used on site, or to monitor the performance of the development must be:
    (a) maintained in a proper and efficient condition; and
    (b) operated in a proper and efficient manner.

18. Deleted

ROAD MAINTENANCE CONTRIBUTION

19. The Applicant must pay Road Maintenance Fees to CC Council in accordance with its Road Maintenance Agreement with CC Council.

COMMUNITY CONSULTATIVE COMMITTEE

20. A Community Consultative Committee (CCC) must continue to operate for the development in accordance with the Department's *Community Consultative Committee Guidelines: State Significant Projects (2019)*. The CCC must continue to operate during the life of the development, or other timeframe agreed by the Planning Secretary.

Notes:

- *The CCC is an advisory committee only.*
- *In accordance with the Guidelines, the Committee should comprise an independent chair and appropriate representation from the Applicant, Affected Councils and the local community.*

21. With the approval of the Planning Secretary, the Applicant may combine the CCC required by this consent with any similar CCC required by a consent or approval for any adjoining mine subject to common, shared or related ownership or management.

EVIDENCE OF CONSULTATION

22. Where conditions of this consent require consultation with an identified party, the Applicant must:
    (a) consult with the relevant party prior to submitting the subject document;
    (b) provide details of the consultation undertaken including:
        i. the outcome of that consultation, matters resolved and unresolved; and
        ii. details of any disagreement remaining between the party consulted and the Applicant and how the Applicant has addressed the matters not resolved.

STAGING, COMBINING AND UPDATING STRATEGIES, PLANS OR PROGRAMS

23. With the approval of the Planning Secretary, the Applicant may:
    (a) prepare and submit any strategy, plan or program required by this consent on a staged basis (if a clear description is provided as to the specific stage and scope of the development to which the strategy, plan or program applies, the relationship of the stage to any future stages and the trigger for updating the strategy, plan or program);
    (b) combine any strategy, plan or program required by this consent (if a clear relationship is demonstrated between the strategies, plans or programs that are proposed to be combined);
    (c) update any strategy, plan or program required by this consent (to ensure the strategies, plans and programs required under this consent are updated on a regular basis and incorporate additional measures or amendments to improve the environmental performance of the development); and
    (d) combine any strategy, plan or program required by this consent with any similar strategy, plan or program required by an adjoining mining consent or approval, in common ownership or management.

24. If the Planning Secretary agrees, a strategy, plan or program may be staged or updated without consultation being undertaken with all parties required to be consulted in the relevant condition in this consent.

25. If the Planning Secretary agrees, a strategy, plan or program may be staged without addressing particular requirements of the relevant condition of this consent if those requirements are not applicable to the particular stage.

APPLICATION OF EXISTING STRATEGIES, PLANS OR PROGRAMS

26. The Applicant must continue to apply existing management strategies, plans or monitoring programs approved prior to the approval of Modification 3, until the approval of a similar plan, strategy or program following the approval of Modification 3.

PROTECTION OF PUBLIC INFRASTRUCTURE

27. Unless the Applicant and the applicable authority agree otherwise, the Applicant must:

    (a) repair, or pay the full costs associated with repairing, any public infrastructure[a] that is damaged by carrying out the development; and
    (b) relocate, or pay the full costs associated with relocating, any public infrastructure[a] that needs to be relocated as a result of the development.

[a] *This condition does not apply to any damage to roads caused as a result of general road usage or to damage that has been compensated under the Mining Act 1992.*

COMPLIANCE

28. The Applicant must ensure that all of its employees, contractors (and their sub-contractors) are made aware of, and are instructed to comply with, the conditions of this consent relevant to activities they carry out in respect of the development.

APPLICABILITY OF GUIDELINES

29. References in the conditions of this consent to any guideline, protocol, Australian Standard or policy are to such guidelines, protocols, Standards or policies in the form they are in as at the date of inclusion (or later update) in the condition.

30. However, consistent with the conditions of this consent and without altering any limits or criteria in this consent, the Planning Secretary may, in respect of ongoing monitoring and management obligations, agree to or require compliance with an updated or revised version of such a guideline, protocol, Standard or policy, or a replacement of them.

SCHEDULE 3
ENVIRONMENTAL CONDITIONS – GENERAL

TRANSPORT

Monitoring of Coal Transport

1. The Applicant must:
   (a) keep accurate records of the amount of coal transported from the site (on a weekly basis); and
   (b) make these records publicly available on its website at the end of each calendar quarter.

Road Works

2. The Applicant must upgrade the Ruttleys Road and Construction Road intersection within 6 months of the date of this consent, unless the Planning Secretary directs otherwise, by:
   (a) installing additional signage on and adjacent to Construction Road prior to the intersection;
   (b) repairing the surface of Construction Road as required and ensuring the edge seal of the left turn lane is of sufficient width to accommodate coal trucks;
   (c) installing or replacing "Stop" signs in accordance with Austroads guidelines;
   (d) repainting road line markings and raised pavements associated with this intersection; and
   (e) installing barriers to prevent trucks parking on the gravel area adjacent to the intersection and the electricity substation located in the vicinity of this intersection.

   The design and construction of these works must be undertaken in consultation with, and to the relevant satisfaction of, CC Council, TfNSW and Delta Electricity and to the satisfaction of the Planning Secretary.

Road Transport Protocol

3. The Applicant must prepare a Road Transport Protocol to the satisfaction of the Planning Secretary. This protocol must:
   (a) be prepared in consultation with TfNSW, NCC, CC Council and CCC and submitted to the Planning Secretary for approval within 6 months of the date of this consent;
   (b) describe the designated haulage routes to be used (as shown in Appendix 5); the maximum number of road movements proposed and the haulage hours permitted under this consent;
   (c) include a Traffic Management Plan, which includes:
      - procedures to ensure that drivers adhere to the designated haulage routes;
      - measures to maximise the use of a low frequency (regular) trucking schedule rather than an intermittently-high frequency (campaign) trucking schedule, especially during the morning peak hour;
      - contingency plans to apply when (for example) the designated haulage route is disrupted, including procedures for notifying relevant agencies and affected communities of the need to implement such contingency plans;
      - procedures to ensure that all haulage vehicles associated with the development are clearly distinguishable as Chain Valley Colliery coal haulage trucks;
      - details of procedures for receiving and addressing complaints from the community concerning traffic issues associated with truck movements to and from the site;
      - measures to ensure that the provisions of the Traffic Management Plan are implemented, eg driver training in the heavy vehicle driver's Code of Conduct and contractual agreements with heavy vehicle operators; and
      - procedures for ensuring compliance with and enforcement of the heavy vehicle driver's Code of Conduct;
   (d) include a Code of Conduct for heavy vehicle drivers that addresses:
      - travelling speeds;
      - instructions to avoid grouping or convoying of trucks;
      - instructions to drivers not to overtake each other on the haulage route, as far as practicable, and to maintain appropriate distances between vehicles;
      - instruction to drivers to adhere to the designated haulage routes;
      - instruction to drivers to be properly safety conscious and to strictly obey all traffic regulations; and
      - appropriate penalties for infringements of the Code.

   The Applicant must implement the approved Road Transport Protocol as approved from time to time by the Planning Secretary.

Independent Traffic Audit

4. Prior to 31 March 2014, and every 12 months thereafter for each calendar year in which coal haulage from the site is undertaken utilising public roads, unless the Planning Secretary directs otherwise, the Applicant must commission a suitably qualified person, whose appointment has been approved by the Planning Secretary at least one month prior to undertaking the audit, to conduct an Independent Traffic Audit of the development. This audit must:
   (a) be undertaken without prior notice to the Applicant, and in consultation with TfNSW, NCC, CC Council and the CCC;
   (b) assess the impact of the development on the performance and safety of the road network, including a review of:
      - haulage records;
      - accident records on the haulage route, infringements relating to the code of conduct and any incidents involving haulage vehicles;
      - community complaints register; and
   (c) assess the effectiveness of the Road Transport Protocol; and, if necessary, recommend measures to reduce or mitigate any adverse (or potentially adverse) impacts.

5. Within 1 month of receiving the audit report, or as otherwise agreed by the Planning Secretary, the Applicant must submit a copy of the report to the Planning Secretary, with a detailed response to any of the recommendations contained in the audit report, including a timetable for the implementation of any measures proposed to address the recommendations in the audit report.

   A summary of the audit report must be included in the Annual Review.

Alternative Coal Transport Options

6. Prior to 31 December 2014, and every three years thereafter, the Applicant must prepare and submit to the Planning Secretary for approval, a study of the reasonable and feasible options to reduce or eliminate the use of public roads to transport coal from the development, unless otherwise agreed by the Planning Secretary. The assessment must include:
   (a) an analysis of the capital, construction and operating costs of the alternative transport options; and
   (b) quantified social and environmental impacts associated with road and rail transport.

NOISE

Noise Impact Assessment Criteria

7. The Applicant must ensure that the noise generated by the development at any residence on privately-owned land does not exceed the criteria for the location in Table 1 nearest to that residence.

Table 1: Noise Criteria dB(A)

Location	Day	Evening	Night	
	$L_{Aeq(15\ min)}$	$L_{Aeq(15\ min)}$	$L_{Aeq(15\ min)}$	$L_{A1(1\ min)}$
R8	38	38	38	45
R11	49	49	49	54
R12	49	49	49	53
R13	43	43	43	49
R15	36	36	36	45
R19	37	37	37	45
R22	46	46	46	46
all other privately-owned land	35	35	35	45

Notes:
- *To interpret the locations referred to in Table 1, see Appendix 6 and the EIS; and*
- *Noise generated by the development is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy. Appendix 8 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.*

However, these criteria do not apply if the Applicant has a written agreement with the relevant landowner to exceed the noise criteria, and the Applicant has advised the Department in writing of the terms of this agreement.

Operating Conditions

8. The Applicant must:
   (a) implement best management practice, including all reasonable and feasible noise mitigation measures, to minimise the construction, operational and transport noise generated by the development;
   (b) regularly assess the noise monitoring and meteorological data and relocate, modify, and/or stop operations on site to ensure compliance with the relevant conditions of this consent;
   (c) minimise the noise impacts of the development during meteorological conditions under which the noise limits in this consent do not apply (see Appendix 8);
   (d) use its best endeavours to achieve the long-term noise goals in Table 2, where reasonable and feasible, and report on progress towards achieving these goals in each Annual Review;
   (e) carry out a comprehensive noise audit of the development in conjunction with each independent environmental audit; and
   (f) prepare an action plan to implement any additional reasonable and feasible onsite noise mitigation measures identified by each audit;
   to the satisfaction of the Planning Secretary.

Table 2: Long-term Noise Goals dB(A)

Location	***Day***	***Evening***	***Night***
	$L_{Aeq(15\ min)}$	$L_{Aeq(15\ min)}$	$L_{Aeq(15\ min)}$
R11 – R13	41	41	41
R22	40	40	40

Notes:
- *To interpret the locations referred to in Table 2, see Appendix 6 and the EIS; and*
- *Noise generated by the development is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy. Appendix 8 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.*

Noise Management Plan

9. The Applicant must prepare a Noise Management Plan for the development to the satisfaction of the Planning Secretary. This plan must:
   (a) be prepared in consultation with the EPA and submitted to the Planning Secretary for approval within 4 months of the date of this consent, unless otherwise agreed by the Planning Secretary;
   (b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this consent;
   (c) describe the proposed noise management system in detail including the mitigation measures that would be implemented to minimise noise during construction and operations, including on and off site road noise generated by vehicles associated with the development; and
   (d) include a monitoring program that:
      - uses attended monitoring to evaluate the compliance of the development against the noise criteria in this consent;
      - evaluates and reports on:
        - the effectiveness of the on-site noise management system; and
        - compliance against the noise operating conditions; and
      - defines what constitutes a noise incident, and includes a protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents.

The Applicant must implement the Noise Management Plan as approved by the Planning Secretary.

AIR QUALITY

Odour

10. The Applicant must ensure that no offensive odours are emitted from the site, as defined under the POEO Act.

Air Quality Criteria

11. The Applicant must ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the development do not cause exceedances of the criteria listed in Table 3 at any residence on privately-owned land.

Table 3: Air quality criteria

Pollutant	***Averaging period***	***Criterion***	
Particulate matter < 2.5 µm ($PM_{2.5}$)	Annual	[a, c] 8 µg/m^3	
	24 hour	[b] 25 µg/m^3	
Particulate matter < 10 µm (PM_{10})	Annual	[a, c] 25 µg/m^3	
	24 hour	[b] 50 µg/m^3	
Total suspended particulate (TSP) matter	Annual	[a, c] 90 µg/m^3	
[d] Deposited dust	Annual	[b] 2 g/m^2/month	[a] 4 g/m^2/month

Notes:
[a] *Total impact (i.e. incremental increase in concentrations due to the development plus background concentrations due to all other sources).*
[b] *Incremental impact (i.e. incremental increase in concentrations due to the development on its own).*
[c] *Excludes extraordinary events such as bushfires, prescribed burning, dust storms, fire incidents or any other activity agreed by the Planning Secretary.*
[d] *Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method.*

11A. The air quality criteria in Table 3 do not apply if the Applicant has an agreement with the owner/s of the relevant residence or land to exceed the air quality criteria, and the Applicant has advised the Department in writing of the terms of this agreement.

Operating Conditions

12. The Applicant must:
(a) implement best practice air quality management at the site, including all reasonable and feasible measures to minimise the off-site odour, fume and dust emissions generated by the development;
(b) implement best practice management to minimise the risk of spontaneous combustion and related emissions;
(c) implement all reasonable and feasible measures to minimise the release of greenhouse gas emissions from the site;
(d) operate an air quality management system on site to ensure compliance with the relevant conditions of this consent;
(e) minimise the air quality impacts of the development during adverse meteorological conditions and extraordinary events (see note c to Table 3 above);
(f) regularly assess the air quality monitoring data, and modify operations on site to ensure compliance with the relevant conditions of this consent,
to the satisfaction of the Planning Secretary.

Air Quality Management Plan

13. The Applicant must prepare an Air Quality Management Plan for the development to the satisfaction of the Planning Secretary. This plan must:
    (a) be prepared in consultation with the EPA, and submitted to the Planning Secretary for approval within 6 months of the date of this consent;
    (b) describe the measures that would be implemented to ensure compliance with the relevant air quality criteria and operating conditions of this consent;
    (c) describe the measures that would be implemented to minimise the release of greenhouse gas emissions from the site;
    (d) describe the proposed on-site air quality management system; and
    (e) include an air quality monitoring program that:
    - is capable of evaluating the operating conditions of this consent;
    - evaluates and reports on:
        - the effectiveness of the air quality management system; and
        - compliance against the air quality operating conditions;
    - defines what constitutes an air quality incident and includes a protocol for identifying and notifying the Department and relevant stakeholders of any air quality incidents.

The Applicant must implement the Air Quality Management Plan as approved by the Planning Secretary.

METEOROLOGICAL MONITORING

14. During the life of the development, the Applicant must ensure that there is a suitable meteorological station operating in the vicinity of the site that:
    (a) complies with the requirements in the *Approved Methods for Sampling of Air Pollutants in New South* Wales guideline; and
    (b) is capable of continuous real-time measurement of temperature lapse rate in accordance with the NSW Industrial Noise Policy, unless a suitable alternative is approved by the Planning Secretary following consultation with the EPA.

SOIL & WATER

Note: Under the Water Act 1912 and/or the Water Management Act 2000, the Applicant is required to obtain the necessary water licences for the development.

Water Supply

15. The Applicant must ensure that it has sufficient water for all stages of the development, and if necessary, adjust the scale of mining operations to match its available water supply, to the satisfaction of the Planning Secretary.

Water Pollution

16. Unless an EPL authorises otherwise, the Applicant must comply with Section 120 of the POEO Act.

Sewage Management

17. The Applicant must manage sewage generated by the development in accordance with the requirements of an EPL.

Water Management Plan

18. The Applicant must prepare a Water Management Plan for the surface facilities sites to the satisfaction of the Planning Secretary. This plan must be prepared in consultation with DPIE Water and EPA, by suitably qualified and experienced persons whose appointment has been endorsed by the Planning Secretary and submitted to the Planning Secretary for approval within 6 months of the date of this consent. This plan must include:
    (a) a comprehensive water balance for the development that includes details of:
    - sources and security of water supply;
    - water make in the underground workings;
    - water transfers from the underground operations to the surface;
    - water use; and
    - any water discharges;
    (b) management plans for the surface facilities sites, that include:
    - a detailed description of water management systems for each site, including:
        - clean water diversion systems;

- erosion and sediment controls; and
- any water storages;

• measures to minimise potable water use and to reuse and recycle water;
• measures to manage acid sulphate soils, if encountered;
• activities that would involve ground disturbance at the site; and
• monitoring and reporting procedures.

(c) a Surface Water Management Plan which:
- includes baseline data on surface water flows and quality of Swindles Creek;
- details surface water impact assessment criteria, including trigger levels for investigating any potentially adverse impacts on surface water resources or surface water quality;
- provides a program to monitor:
  - surface water discharges;
  - surface water flows and quality; and
  - channel stability;

(d) a Ground Water Monitoring Program which includes a program to:
- monitor and report groundwater inflows to underground workings;
- predict, manage and monitor impacts to nearby groundwater bores on privately-owned land that may be impacted by the development; and

(e) a detailed review of surface water management at the site, with particular reference to the water storages within the dirty water management system, to:
- determine whether the capacity, integrity, retention time and management of the dirty water storages (particularly the final Pollution Control Dam) are sufficient to ensure that water discharged from the site meets the EPL limits and surface water impact assessment criteria within the Surface Water Management Plan; and
- propose any appropriate changes to the surface water management system.

The Applicant must implement the Water Management Plan as approved by the Planning Secretary.

Note: The Planning Secretary may require the Applicant to implement upgrades and other changes identified under paragraph (e), in accordance with condition 3 of Schedule 2.

BIODIVERSITY

Biodiversity Enhancement Strategy

19. The Applicant must implement a Biodiversity Enhancement Strategy as described in the EIS and summarised in Table 4, in consultation with BCD, and to the satisfaction of the Planning Secretary.

Table 4: *Summary of the Biodiversity Enhancement Strategy*

Area	***Offset Type***	***Minimum Size/Amount***
Biodiversity Enhancement Area	Enhancement and restoration measures, including weed and rubbish removal, return of natural hydrological regime and regeneration with native endemic species.	3 ha (in total) of Swamp Sclerophyll Floodplain Forest and Swamp Oak Floodplain Forest endangered ecological communities within the surface facilities sites

Note: To identify the Biodiversity Enhancement Area referred to in Table 4 see the applicable figures in Appendix 7.

The Applicant must implement its preferred option of the three options set out in new dot point 1 of the Terrestrial Ecology section of its Statement of Commitments by 1 December 2016, following consultation with BCD and to the satisfaction of the Planning Secretary.

Biodiversity Management Plan

20. The Applicant must prepare a Biodiversity Management Plan for the surface facilities sites, for all areas that are not, or will not, be subject to condition 7 of schedule 4, to the satisfaction of the Planning Secretary. This plan must:

(a) be prepared by a suitably qualified person approved by the Planning Secretary; in consultation with BCD, and submitted to the Planning Secretary within 6 months of the date of this consent;

(b) establish baseline data for the existing habitat in the Biodiversity Enhancement Area and elsewhere on the site;

(c) describe the short, medium, and long term measures that would be implemented to:
• manage the impacts of clearing vegetation;

- manage the remnant vegetation and habitat in the Biodiversity Enhancement Area and elsewhere on the site; and
- implement the Biodiversity Enhancement Strategy, including detailed performance and completion criteria;

(d) include a program to monitor and report on the effectiveness of these measures, and progress against the detailed performance and completion criteria;

(e) identify the potential risks to the successful implementation of the Biodiversity Enhancement Strategy, and the contingency measures that would be implemented to mitigate these risks; and

(f) include details of who would be responsible for monitoring, reviewing, and implementing the plan.

The Applicant must implement the Biodiversity Management Plan as approved by the Planning Secretary.

20A. Within 3 months of the approval of MOD 2, the Applicant must revise the Biodiversity Management Plan to incorporate the measures required to implement its commitments described in new dot point 2 of the Terrestrial Ecology section of its Statement of Commitments, and submit it to the Planning Secretary for approval.

HERITAGE

Protection of Aboriginal Heritage

21. The Applicant must ensure that the development does not cause any direct or indirect impact on any identified heritage item located outside the approved disturbance area, beyond those predicted in the documents listed in condition 2(e) of Schedule 2.

Heritage Management Plan

21A. The Applicant must prepare a Heritage Management Plan for the development to the satisfaction of the Planning Secretary. This Plan must:

(a) be prepared by suitably qualified and experienced persons whose appointment has been endorsed by the Planning Secretary;

(b) be prepared in consultation with BCD and Registered Aboriginal Parties;

(c) include consideration of the Aboriginal and non-Aboriginal cultural context and significance of the site;

(d) describe the procedures and management measures to be implemented on the site or within any offset area to:

i. ensure all workers receive suitable Aboriginal cultural heritage inductions prior to carrying out any activities which may cause impacts to Aboriginal objects or Aboriginal places, and that suitable records are kept of these inductions;

ii. protect, monitor and manage identified non-Aboriginal heritage, Aboriginal objects and Aboriginal places (including any proposed archaeological investigations of potential subsurface objects and salvage of objects within the approved disturbance area) in accordance with the commitments made in the document/s listed in condition 2(e) of Schedule 2 and including the ongoing monitoring of site 45-7-0189 at Summerland Point;

iii. protect non-Aboriginal heritage, Aboriginal objects and Aboriginal places located outside the approved disturbance area from impacts of the development;

iv. manage the discovery of suspected human remains and any new Aboriginal objects or Aboriginal places, including provisions for burials, over the life of the development;

v. maintain and manage reasonable access for relevant Aboriginal stakeholders to Aboriginal objects and Aboriginal places (outside of the approved disturbance area); and

vi. facilitate ongoing consultation and involvement of Registered Aboriginal Parties in the conservation and management of Aboriginal cultural heritage on the site; and

(e) include a strategy for the care, control and storage of Aboriginal objects salvaged on site, both during the life of the development and in the long term.

The Applicant must implement the Heritage Management Plan approved by the Planning Secretary.

VISUAL

Visual Amenity and Lighting

22. The Applicant must:

(a) minimise visual impacts, and particularly the off-site lighting impacts, of the Surface facilities sites;

(b) take all reasonable and feasible measures to further mitigate off-site lighting impacts from the development; and

(c) ensure that all external lighting associated on site complies with *Australian Standard AS4282 (INT) 1995 – Control of Obtrusive Effects of Outdoor Lighting,*

to the satisfaction of the Planning Secretary.

WASTE

23. The Applicant must:
(a) minimise and monitor the waste generated by the development;
(b) ensure that the waste generated by the development is appropriately stored, handled and disposed of; and
(c) report on waste management and minimisation in the Annual Review,

to the satisfaction of the Planning Secretary.

BUSHFIRE MANAGEMENT

24. The Applicant must:
(a) ensure that the development is suitably equipped to respond to any fires on site; and
(b) assist the Rural Fire Service and emergency services as much as possible if there is a fire in the vicinity of the Surface facilities sites.

REHABILITATION

Rehabilitation Objectives

25. The Applicant must rehabilitate the site in accordance with the conditions imposed on the mining lease(s) associated with the development under the *Mining Act 1992*. This rehabilitation must be generally consistent with the proposed rehabilitation strategy described in the EIS, and comply with the objectives in Table 5.

Table 5: Rehabilitation Objectives

Feature	***Objective***
Mine site (as a whole)	• Safe, stable and non-polluting. • Final land use compatible with surrounding land uses.
Surface infrastructure	• To be decommissioned and removed, unless the RR agrees otherwise.
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 the RR agrees otherwise); and - 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 *Coal Mine Subsidence Compensation Act 2017*.
Community	• Ensure public safety. • Minimise the adverse socio-economic effects associated with mine closure.

Notes:

- *These rehabilitation objectives apply to all subsidence impacts and environmental consequences caused by underground mining taking place after the granting of project approval MP 10_0161, and to all development surface infrastructure that is part of the development, whether constructed prior to or following the date of this consent.*
- *Rehabilitation of subsidence impacts and environmental consequences caused by mining which took place prior to the date of project approval (MP 10_0161) may be subject to the requirements of other approvals (eg under a mining lease or a Subsidence Management Plan approval).*

Progressive Rehabilitation

26. The Applicant must carry out the rehabilitation of the site progressively, that is, as soon as reasonably practicable following disturbance.

Rehabilitation Management Plan

27. The Applicant must prepare a Rehabilitation Management Plan for the development, in accordance with the conditions imposed on the mining lease(s) associated with the development under the *Mining Act 1992*. This plan must:

(a) be prepared in consultation with BCD, DPIE Water, CC Council, LMCC and the CCC;
(b) be submitted to the RR within 12 months of the date of approval of this development consent;
(c) be prepared in accordance with any relevant RR guideline and be consistent with the rehabilitation objectives in the EIS and in Table 5;
(d) describe how the performance of the rehabilitation would be monitored and assessed against the objectives in Table 5;
(e) describe the process whereby additional measures would be identified and implemented to ensure the rehabilitation objectives are achieved;
(f) provide for detailed mine closure planning, including measures to minimise socio-economic effects due to mine closure, to be conducted prior to the site being placed on care and maintenance; and
(g) be integrated with the other management plans required under this consent.

Note: The Rehabilitation Management Plan should address all land impacted by the development whether prior to, or following, the date of this consent.

EXPLORATION ACTIVITIES AND SURFACE INFRASTRUCTURE

Exploration Activities and Minor Surface Infrastructure Management Plan

28. Prior to carrying out exploration activities on the site under this consent that would cause temporary surface disturbance, or exploration activities within the waters or lake bed of Lake Macquarie, or the construction and/or upgrade of minor surface infrastructure on the site, the Applicant must prepare an Exploration Activities and Minor Surface Infrastructure Management Plan for the development to the satisfaction of the Planning Secretary. This Plan must:
    (a) be prepared by a suitably qualified and experienced person/s whose appointment has been endorsed by the Planning Secretary;
    (b) be prepared in consultation with MEG, NSW Maritime Division of TfNSW, NSW Fisheries and BCD;
    (c) include a description of the measures to be implemented for:
        i. managing exploration activities;
        ii. managing construction and operation of minor surface infrastructure and associated access tracks;
        iii. consulting with and if necessary compensating affected landowners;
        iv. assessing noise, air quality, traffic, biodiversity, heritage, public safety and other impacts;
        v. beneficial re-use or flaring of drained hydrocarbon gases, wherever practicable;
        vi. avoiding significant impacts and minimisation of impacts generally;
        vii. avoiding or minimising impacts on threatened species, populations or their habitats and EECs;
        viii. minimising clearance and disturbance of native vegetation (including seagrasses);
        ix. minimising and managing erosion and sedimentation; and
        x. rehabilitating disturbed areas.

    The Applicant must implement the Exploration Activities and Minor Surface Infrastructure Management Plan as approved by the Planning Secretary.

SCHEDULE 4
ENVIRONMENTAL CONDITIONS – UNDERGROUND MINING

SUBSIDENCE

1. The Applicant must ensure that vertical subsidence within the High Water Mark Subsidence Barrier and within seagrass beds is limited to a maximum of 20 millimetres (mm). If at any stage predicted subsidence levels are exceeded within these areas, an ecological monitoring program shall be initiated to assess the impacts to ecological communities and threatened species and if appropriate, offsets are to be provided for any impacts detected.

Performance Measures – Natural Environment

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.

Table 6: Subsidence Impact Performance Measures – Natural and Heritage Features

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; and • *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.
Second workings	To be carried out only in accordance with an approved Extraction Plan.

Notes:

- *The Applicant will be required to define more detailed performance indicators (including impact assessment criteria) for each of these performance measures in the various management plans that are required under this consent (see Condition 7 below).*
- *Measurement and/or monitoring of compliance with performance measures and performance indicators is to be undertaken using generally accepted methods that are appropriate to the environment and circumstances in which the feature or characteristic is located. These methods are to be fully described in the relevant management plans. In the event of a dispute over the appropriateness of proposed methods, the Planning Secretary will be the final arbiter.*
- *The requirements of this condition only apply to the impacts and consequences of mining operations, construction or demolition undertaken following the date of approval of this consent.*

Offsets

3. If the Applicant exceeds the performance measures in Table 6 and the Planning Secretary determines that:
   (a) it is not reasonable or feasible to remediate the impact or environmental consequence; or
   (b) the remediation measures implemented by the Applicant have failed to satisfactorily remediate the impact or environmental consequence;
   then the Applicant must provide a suitable offset to compensate for the impact or environmental consequence to the satisfaction of the Planning Secretary.

   Note: Any offset required under this condition must be proportionate with the significance of the impact or environmental consequence.

Performance Measures – Built Features

4. The Applicant must ensure that the development does not cause any exceedances of the performance measures in Table 7, to the satisfaction of the Planning Secretary.

Table 7: Subsidence Impact Performance Measures – Built Features

Built Features	***Performance Measure***
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.

Notes:

- *The Applicant will be required to define more detailed performance indicators for each of these performance measures in Built Features Management Plans or a Public Safety Management Plan (see Condition 7 below).*
- *Measurement and/or monitoring of compliance with performance measures and performance indicators is to be undertaken using generally accepted methods that are appropriate to the environment and circumstances in which the feature or characteristic is located. These methods are to be fully described in the relevant management plans. In the event of a dispute over the appropriateness of proposed methods, the Planning Secretary will be the final arbiter.*
- *The requirements of this condition only apply to the impacts and consequences of mining operations undertaken following the date of this development consent.*
- *Requirements regarding safety or serviceability do not preclude preventative actions or mitigation being taken prior to or during mining in order to achieve or maintain these outcomes.*
- *Requirements under this condition may be met by measures undertaken in accordance with the Coal Mine Subsidence Compensation Act 2017.*

5. Any dispute between the Applicant and the owner of any built feature over the interpretation, application or implementation of the subsidence performance measures in Table 7 is to be settled by the Planning Secretary, following consultation with the SA NSW and MEG. Any decision by the Planning Secretary shall be final and not subject to further dispute resolution under this consent.

Multi-Seam Mining Feasibility Investigation

6. Prior to the submission of an Extraction Plan related to the Chain Valley Bay mining area as shown in Appendix 3, the Applicant must prepare a detailed Multi-Seam Mining Feasibility Investigation to the satisfaction of the Planning Secretary. This plan must:
   (a) be prepared in consultation with MEG by suitably qualified and experienced persons whose appointment has been endorsed by the Planning Secretary;
   (b) assess the extent of the soft claystone floor/roof conditions within former workings in the Great Northern and Wallarah Seams;
   (c) assess the stability of remnant coal pillars within former workings in the Great Northern and Wallarah Seams;
   (d) give particular consideration to the risks of irregular subsidence, pillar run and long-term subsidence leading to subsidence outside of the predicted angle of draw;
   (e) include revised multi-seam subsidence predictions for the proposed second workings; and
   (f) recommend final design of the second workings and any necessary adaptive management measures.

Extraction Plan

7. The Applicant must prepare an Extraction Plan for all second workings on site, to the satisfaction of the Planning Secretary. Each Extraction Plan must:
   (a) be prepared by suitably qualified and experienced persons whose appointment has been endorsed by the Planning Secretary;
   (b) be approved by the Planning Secretary before the Applicant carries out any second workings covered by the plan;
   (c) include detailed plans of existing and proposed first and second workings and any associated surface development, including any applicable adaptive management measures;
   (d) include detailed performance indicators for each of the performance measures in Tables 6 and 7;
   (e) provide revised predictions of the potential subsidence effects, subsidence impacts and environmental consequences of the proposed second workings, incorporating any relevant information obtained since this consent;
   (f) describe the measures that would be implemented to ensure compliance with the performance measures in Tables 6 and 7, and manage or remediate any impacts and/or environmental consequences;
   (g) include a Built Features Management Plan, which has been prepared in consultation with RR and the owners of affected public infrastructure, to manage the potential subsidence impacts and/or environmental consequences of the proposed second workings, and which

- addresses in appropriate detail all items of public infrastructure and all classes of other built features;
- has been prepared following appropriate consultation with the owner/s of potentially affected feature/s;
- recommends appropriate remedial measures and includes commitments to mitigate, repair, replace or compensate all predicted impacts on potentially affected built features in a timely manner; and;

(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 lake bed 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; and
- updating the model every 2 years using the most recent monitoring and survey data;

(i) include a Seagrass 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 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;

(j) include a Public Safety Management Plan, which has been prepared in consultation with RR, to ensure public safety;

(k) include a Subsidence Monitoring Program which has been prepared in consultation with RR, 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; and
- informs the contingency plan and adaptive management process;

(l) include a contingency plan that expressly provides for adaptive management where monitoring indicates that there has been an exceedance of any performance measure in Tables 6 and 7, or where any such exceedance appears likely;

(m) include appropriate revisions to the Rehabilitation Management Plan required under Condition 27 of Schedule 3; and

(n) include a program to collect sufficient baseline data for future Extraction Plans.

The Applicant must implement the Extraction Plan as approved by the Planning Secretary.

8. The Applicant must ensure that the management plans required under conditions 7(g)-(j) above include:
(a) an assessment of the potential environmental consequences of the Extraction Plan, incorporating any relevant information that has been obtained since this consent; and
(b) a detailed description of the measures that would be implemented to remediate predicted impacts.

First Workings

9. The Applicant may carry out first workings within Subsidence Zones A and B as shown in Appendix 3, other than in accordance with an approved Extraction Plan, provided that the first workings are designed to remain stable and non-subsiding in the long-term and do not generate more than 20 mm of vertical subsidence at the surface, except insofar as they may be impacted by approved second workings.

***Note**: The intent of this condition is to ensure that first workings are built to geotechnical and engineering standards sufficient to ensure long-term stability, with negligible direct subsidence impacts.*

9A. Within 3 months of the approval of MOD 1, the Applicant must produce and subsequently implement a Built Features Management Plan that considers surface infrastructure potentially affected by the first workings of the Underground Linkage between Chain Valley Colliery and Mannering Colliery, including WCS's MP01 sewer rising main, TransGrid's electricity transmission assets and infrastructure associated with the Vales Point Power Station, to the satisfaction of the Planning Secretary.

Payment of Reasonable Costs

10. The Applicant must pay all reasonable costs incurred by the Department to engage suitably qualified, experienced and independent experts to review the adequacy of any aspect of an Extraction Plan.

SCHEDULE 5
ADDITIONAL PROCEDURES

NOTIFICATION OF LANDOWNERS

1. As soon as practicable after obtaining monitoring results showing:
   (a) an exceedance of any relevant criteria in Schedule 3, the Applicant must notify affected landowners in writing of the exceedance, and provide regular monitoring results to each affected landowner until the development is again complying with the relevant criteria; and
   (b) an exceedance of any relevant air quality criteria in Schedule 3, the Applicant must send a copy of the NSW Health fact sheet entitled "Mine Dust and You" (*NSW Health, 2017*) (as may be updated from time to time) to the affected landowners and/or existing tenants of the land (including the tenants of any mine-owned land).

INDEPENDENT REVIEW

2. If an owner of privately-owned land considers the development to be exceeding the relevant criteria in Schedule 3, then he/she may ask the Planning Secretary in writing for an independent review of the impacts of the development on his/her land.

   If the Planning Secretary is satisfied that an independent review is warranted, then within 2 months of the Planning Secretary's decision the Applicant must:
   (a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Planning Secretary, to:
      - consult with the landowner to determine his/her concerns;
      - conduct monitoring to determine whether the development is complying with the relevant criteria in Schedule 3; and
      - if the development is not complying with these criteria then identify the measures that could be implemented to ensure compliance with the relevant criteria; and
   (b) give the Planning Secretary and landowner a copy of the independent review.

SCHEDULE 6
ENVIRONMENTAL MANAGEMENT, REPORTING AND AUDITING

ENVIRONMENTAL MANAGEMENT

Environmental Management Strategy

1. The Applicant must prepare an Environmental Management Strategy for the development to the satisfaction of the Planning Secretary. This strategy must:
   (a) provide the strategic framework for environmental management of the development;
   (b) identify the statutory approvals that apply to the development;
   (c) set out the role, responsibility, authority and accountability of all key personnel involved in the environmental management of the development;
   (d) set out the procedures to be implemented to:
   - keep the local community and relevant agencies informed about the operation and environmental performance of the development;
   - receive record, handle and respond to complaints;
   - resolve any disputes that may arise during the course of the development;
   - respond to any non-compliance and any incident;
   - respond to emergencies; and

   (e) include:
   - references to any strategies, plans and programs approved under the conditions of this consent; and
   - a clear plan depicting all the monitoring to be carried out under the conditions of this consent.

   The Applicant must implement the Environmental Management Strategy as approved by the Planning Secretary.

Adaptive Management

2. The Applicant must assess and manage development-related risks to ensure that there are no exceedances of the criteria and performance measures in this consent. Any exceedance of these criteria or performance measures constitutes a breach of this consent and may be subject to penalty or offence provisions under the EP&A Act or EP&A Regulation.

   Where any exceedance of these criteria or performance measures has occurred, the Applicant must, at the earliest opportunity:
   (a) take all reasonable and feasible steps to ensure that the exceedance ceases and does not recur;
   (b) consider all reasonable and feasible options for remediation (where relevant) and submit a report to the Department describing those options and any preferred remediation measures or other course of action; and
   (c) implement reasonable remediation measures as directed by the Planning Secretary.

Management Plan Requirements

3. Management plans required under this consent must be prepared in accordance with relevant guidelines, and include:
   (a) a summary of relevant background or baseline data;
   (b) details of:
   - the relevant statutory requirements (including any relevant approval, licence or lease conditions);
   - any relevant limits or performance measures and criteria; and
   - the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;

   (c) any relevant commitments or recommendations identified in the document/s listed in condition 2(e) of Schedule 2;
   (d) a description of the measures to be implemented to comply with the relevant statutory requirements, limits, or performance measures and criteria;
   (e) a program to monitor and report on the:
   - impacts and environmental performance of the development; and
   - effectiveness of the management measures set out pursuant to condition 2(e) of Schedule 2;

   (f) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;
   (g) a program to investigate and implement ways to improve the environmental performance of the development over time;
   (h) a protocol for managing and reporting any:
   - incident, non-compliance or exceedance of any impact assessment criterion or performance criterion;

- complaint; or
- failure to comply with other statutory requirements;

(i) public sources of information and data to assist stakeholders in understanding environmental impacts of the development; and

(j) a protocol for periodic review of the plan.

Note: *The Planning Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans.*

4. The Applicant must ensure that management plans prepared for the development are consistent with the conditions of this consent and any EPL issued for the site.

REVISION OF STRATEGIES, PLANS AND PROGRAMS

5. Within three months of:

(a) the submission of an incident report under condition 6;

(b) the submission of an Annual Review under condition 8;

(c) the submission of an Independent Environmental Audit under condition 9; or

(d) the approval of any modification of the conditions of this consent (unless the conditions require otherwise),

the suitability of existing strategies, plans and programs required under this consent must be reviewed by the Applicant.

If necessary, to either improve the environmental performance of the development, cater for a modification or comply with a direction, the strategies, plans and programs required under this consent must be revised, to the satisfaction of the Planning Secretary. Where revisions are required, the revised document must be submitted to the Planning Secretary for approval within six weeks of the review.

Note: *This is to ensure strategies, plans and programs are updated on a regular basis and to incorporate any recommended measures to improve the environmental performance of the development.:*

REPORTING AND AUDITING

Incident Notification

6. The Applicant must immediately notify the Department and any other relevant agencies immediately after it becomes aware of an incident. The notification must be in writing via the Department's Major Projects website and identify the development (including the development application number and name) and set out the location and nature of the incident.

Non-Compliance Notification

7. Within seven days of becoming aware of a non-compliance, the Applicant must notify the Department of the non-compliance. The notification must be in writing via the Department's Major Projects website and identify the development (including the development application number and name), set out the condition of this consent that the development is non-compliant with, why it does not comply and the reasons for the non-compliance (if known) and what actions have been, or will be, undertaken to address the non-compliance.

Note*: A non-compliance which has been notified as an incident does not need to also be notified as a non-compliance.*

Annual Review

8. By the end of March in each year after the commencement of the development, or other timeframe agreed by the Planning Secretary, a report must be submitted to the Department reviewing the environmental performance of the development, to the satisfaction of the Planning Secretary. This review must:

(a) describe the development (including any rehabilitation) that was carried out in the previous calendar year, and the development that is proposed to be carried out over the current calendar year;

(b) include a comprehensive review of the monitoring results and complaints records of the development over the previous calendar year, including a comparison of these results against the:
- relevant statutory requirements, limits or performance measures/criteria;
- requirements of any plan or program required under this consent;
- monitoring results of previous years; and
- relevant predictions in the document/s listed in condition 2(e) of Schedule 2;

(c) identify any non-compliance or incident which occurred in the previous calendar year, and describe what actions were (or are being) taken to rectify the non-compliance and avoid reoccurrence;

(d) evaluate and report on:
- the effectiveness of the noise and air quality management systems; and
- compliance with the performance measures, criteria and operating conditions of this consent;

(e) identify any trends in the monitoring data over the life of the development;

(f) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and

(g) describe what measures will be implemented over the next calendar year to improve the environmental performance of the development.

Copies of the Annual Review must be submitted to the Affected Councils and made available to the CCC and any interested person upon request.

Independent Environmental Audit

9. By the end of February 2022, and every three years after, unless the Planning Secretary directs otherwise, the Applicant must commission and pay the full cost of an Independent Environmental Audit of the development. The audit must:
   (a) led by a suitably qualified, experienced and independent auditor whose appointment has been endorsed by the Planning Secretary;
   (b) be led and conducted by a suitably qualified, experienced and independent team of experts (including any be expert in field/s specified by the Planning Secretary) whose appointment has been endorsed by the Planning Secretary;
   (c) be carried out in consultation with the relevant agencies and the CCC;
   (d) assess the environmental performance of the development and whether it is complying with the relevant requirements in this consent, water licences and mining leases for the development (including any assessment, strategy, plan or program required under these approvals);
   (e) review the adequacy of any approved strategy, plan or program required under the abovementioned approvals and this consent;
   (f) recommend appropriate measures or actions to improve the environmental performance of the development and any assessment, strategy, plan or program required under the abovementioned approvals and this consent; and
   (g) be conducted and reported to the satisfaction of the Planning Secretary.

10. Within three months of commencing an Independent Environmental Audit, or other timeframe agreed by the Planning Secretary, the Applicant must submit a copy of the audit report to the Planning Secretary, and any other NSW agency that requests it, together with its response to any recommendations contained in the audit report, and a timetable for the implementation of the recommendations. The recommendations must be implemented to the satisfaction of the Planning Secretary.

Monitoring and Environmental Audits

11. Any condition of this consent that requires the carrying out of monitoring or an environmental audit, whether directly or by way of a plan, strategy or program, is taken to be a condition requiring monitoring or an environmental audit under Division 9.4 of Part 9 of the EP&A Act. This includes conditions in respect of incident notification, reporting and response, non-compliance notification, compliance report and independent audit.

    For the purposes of the condition, as set out in the EP&A Act, “monitoring” is monitoring of the development to provide data on compliance with the consent or on the environmental impact of the development, and an “environmental audit” is a periodic or particular documented evaluation of the development to provide information on compliance with the consent or the environmental management or impact of the development.

12. Noise and/or air quality monitoring under this consent may be undertaken at suitable representative monitoring locations instead of at privately-owned residences or other locations listed in Schedule 3, providing that these representative monitoring locations are set out in the respective management plan/s.

ACCESS TO INFORMATION

13. Until the completion of all rehabilitation required under this consent, the Applicant must:
   (a) make the following information and documents (as they are obtained, approved or as otherwise stipulated within the conditions of this consent) publicly available on its website:
      - the documents referred to in condition 2(e) of Schedule 2 of this consent;
      - all current statutory approvals for the development;
      - all approved strategies, plans and programs required under the conditions of this consent;
      - the proposed staging plans for the development if the construction, operation or decommissioning of the development is to be staged;
      - minutes of CCC meetings;
      - regular reporting on the environmental performance of the development in accordance with the reporting requirements in any plans or programs approved under the conditions of this consent;
      - a comprehensive summary of the monitoring results of the development, reported in accordance with the specifications in any conditions of this consent, or any approved plans and programs;
      - a summary of the current progress of the development;
      - contact details to enquire about the development or to make a complaint;

- a complaints register, updated monthly;
- the Annual Reviews of the development;
- audit reports prepared as part of any Independent Environmental Audit of the development and the Applicant's response to the recommendations in any audit report; and
- any other matter required by the Planning Secretary; and

(b) keep such information up to date, to the satisfaction of the Planning Secretary.

APPENDIX 1
SCHEDULE OF LAND

Notes:	
1.	All proposed secondary extraction for the Project (Mining Extension 1) is to occur under Lake Macquarie.
2.	The surface facilities for the Colliery are limited to “pit top area” adjacent to Vales Point Power Station, and the “ventilation shaft site” at Summerland Point.
3.	Refer to Figure 1 of Appendix 2 for the Site.

Project Related Surface Facilities				
Pit Top Area			Ventilation shaft site	
Lot	Deposited Plan		Lot	Deposited Plan
A	379918		1	226133
B	379918			
C	349733			
A	187570			
1B	339441			

All other areas within the Site				
Lot	Deposited Plan		Lot	Deposited Plan
7339	1167067		20	708344
7330	1148105		19	708344
593	727722		18	708344
594	727722		17	708344
D	349733		34	714879
1	410653		33	714879
23	708344		32	714879
21	708344		31	714879
2	1043151		64	31306
426	755266		65	31306
427	755266		66	31306
136	755266		67	31306
2	515214		68	31306
1	515214		69	31306
1	214300		70	31306
2	214300		71	31306
167	755266		72	31306
1	388154		73	31306
144	661695		74	31306
19	25593		75	31306
20	25593		76	31306
21	25593		77	31306
22	25593		78	31306
23	25593		79	31306
24	25593		139	31306
25	25593		140	31306
26	25593		141	31306
27	25593		142	31306
58	31306		143	31306
59	31306		144	31306
60	31306		145	31306
61	31306		146	31306
62	31306		147	31306
63	31306		148	31306
149	31306		175	31306
150	31306		176	31306
151	31306		177	31306
152	31306		178	31306
153	31306		179	31306
154	31306		180	31306

155	31306		181	31306
156	31306		187	31306
157	31306		188	31306
158	31306		189	31306
159	31306		190	31306
160	31306		191	31306
161	31306		192	31306
162	31306		193	31306
163	31306		194	31306
164	31306		195	31306
165	31306		238	31306
166	31306		239	31306
167	31306		240	31306
168	31306		241	31306
169	31306		242	31306
170	31306		46	31322
171	31306		47	31322
172	31306		48	31322
173	31306		78	31322
174	31306		4	981106
243	31306		3	981104
244	31306		11	13120
245	31306		12	13120
246	31306		13	13120
247	31306		14	13120
248	31306		15	13120
249	31306		16	13120
250	31306		17	13120
251	31306		18	13120
252	31306		19	13120
253	31306		20	13120
254	31306		21	13120
255	31306		22	13120
256	31306		23	13120
257	31306		24	13120
258	31306		60	13120
259	31306		30	13123
37	31322		31	13123
38	31322		A	368634
39	31322		100	1065718
40	31322		102	1065718
41	31322		20	1113256
42	31322		7329	1148149
43	31322		5	981103
44	31322		9	13120
45	31322		100	713777
32	13123		25	13120
33	13123		26	13120
34	13123		27	13120
35	13123		28	13120
36	13123		29	13120
37	13123		1	1221849
38	13123		2	1221849
39	13123		3	1221849
40	13123		4	1074358
41	13123			93941
168	13123			93945
182	31306		10	1235493
183	31306		11	1235493
184	31306		9	1235493
185	31306		189	8055
186	31306		252	8055

78	13123		186	8055
119	13123		127	13123
103	13123		47	13120
15	13123		2	806513
2	204202		135	8055
105	13123		117	8055
122	13123		2	551787
109	13123		45	15556
6	519261		71	15556
1	621171		100	790729
2	1013763		1	551787
111	13123		69	27749
69	13123		87	8055
13	13123		39	15556
3	250973		76	15556
124	13123		202	8055
23	13123		104	8055
802	1038413		197	8055
721	537942		101	790729
116	13123		53	27749
191	880592		49	27749
126	13123		254	8055
131	13123		81	8055
822	588493		199	8055
3	621171		138	8055
772	619779		41	15556
7	13120		12	15556
91	880881		44	27749
45	13120		25	27749
41	872109		54	15556
3	13120		126	8055
99	13123		1482	562711
42	872109		52	15556
37	13120		208	8055
2	621171		113	8055
39	13120		70	27749
49	13120		56	27749
153	17367		24	15556
773	619779		228	8055
771	619779		88	8055
112	13123		132	8055
82	13123		60	15556
43	13123		17	28068
141	13123		56	13123
120	13123		20	13123
108	13123		76	13123
5	981103		72	13123
66	13123		152	17367
14	28068		5	519261
106	13123		205	1017819
45	13123		92	13123
50	13123		522	543408
3	981104		80	13123
1	542486		521	543408
44	13123		30	13120

862	557889		83	13123
2	542486		34	13120
75	13123		36	13120
49	13123		351	840188
73	13123		32	13120
56	13120		101	558722
58	13120		8	524374
147	13123		102	558722
1	806513		86	13123
35	13120		821	588493
43	13120		6	13120
5	13120		2	579042
42	13120		2	270423
8	13120		6	270423
1	13120		1	270423
33	13120		4	270423
31	13120		1	1107356
46	13120		2	1107356
18	527120		1691	1110053
145	13123		1693	1110053
55	13120		1692	1110053
54	13120		2144	1124129
9	13120		7311	1141467
28	13120		7306	1146817
2	13120		101	1165194
450	818534		154	17367
3	579042		5	270423
48	13120		42	1073017
44	13120		60	1074161
84	13123		872	733417
29	13120		51	27749
52	13120		103	15556
100	713777		11	13123
4	13120		12	13123
1	579042		21	13123
51	13120		43	1073017
146	13123		41	1073017
38	13120		61	1074161
155	17367		63	1074161
57	13120		62	1074161
50	13120		3	270423
7	524374		1	1088536
861	557889		202	1093288
40	13120		201	1093288
144	13123		139	8055
911	747550		14	538780
53	13120		46	15556
912	747550		113	15556
352	840188		21	1029069
41	13120		119	8055
4	981106		230	8055
13	15556		25	15556
260	8055		211	8055
124	8055		112	8055
38	27749		142	8055

157	8055		227	8055
48	15556		28	15556
27	27749		109	15556
198	8055		142	15556
195	8055		223	8055
782	1060935		77	15556
812	816616		215	8055
32	15556		2	375836
155	8055		31	27749
134	8055		43	15556
130	8055		59	27749
75	15556		224	8055
15	15556		53	15556
3	15556		107	8055
256	8055		117	15556
26	27749		88	15556
51	15556		202	1020262
232	8055		236	8055
205	8055		19	15556
164	8055		1	250973
10	15556		47	27749
128	8055		115	8055
136	8055		89	8055
86	15556		106	8055
201	843074		35	27749
38	15556		133	8055
1	561577		34	27749
833	598304		154	8055
235	8055		42	27749
112	15556		72	15556
220	8055		21	15556
40	27749		207	8055
65	15556		98	8055
225	8055		127	8055
125	8055		120	8055
65	27749		48	27749
226	8055		101	15556
194	8055		101	8055
192	8055		234	8055
57	15556		33	524726
209	8055		832	598304
36	15556		156	8055
2061	1011261		191	1046133
121	8055		111	8055
147	8055		42	15556
115	15556		237	8055
871	733417		219	8055
47	15556		57	27749
39	27749		34	15556
40	15556		222	8055
52	27749		196	8055
28	27749		3	375836
97	8055		212	8055
200	843074		811	816616
67	27749		73	15556

58	15556		90	8055
23	15556		26	15556
120	15556		28	13123
129	13123		25	13123
1	505798		24	13123
18	28068		36	13123
10	13123		31	13123
155	13123		94	13123
97	13123		35	13123
8	13123		26	13123
113	13123		30	13123
41	13123		38	13123
118	13123		29	13123
39	13123		168	13123
801	1038413		27	13123
85	13123		37	13123
167	13123		185	15556
55	13123		134	15556
81	13123		102	844302
128	13123		136	15556
91	13123		139	15556
40	13123		125	15556
107	13123		101	844302
203	1020262		137	15556
79	13123		131	859693
15	28068		126	15556
70	13123		187	15556
100	13123		6	251160
95	13123		3	13123
148	13123		55	17367
63	13123		95	17367
5	250973		2	13123
11	15556		77	17367
22	27749		116	17367
64	27749		79	15556
16	15556		66	17367
55	27749		140	15556
103	8055		132	859693
88	13123		2	634668
631	872639		130	15556
110	8055		123	15556
200	8055		206	15556
99	8055		128	15556
109	8055		135	15556
106	15556		124	15556
140	8055		186	15556
56	15556		127	15556
2	28068		179	15556
4	13123		201	700345
46	654032		158	17367
123	17367		163	17367
140	13123		49	17367
3	251160		147	17367
159	13123		149	17367
138	13123		142	852383

80	17367		92	17367
4	251160		94	17367
394	755242		72	17367
398	755242		164	17367
396	755242		58	17367
25	17367		64	17367
67	17367		43	17367
5	251160		76	17367
65	17367		139	17367
93	17367		97	17367
96	17367		11	17367
21	17367		14	17367
106	17367		150	17367
151	854877		145A	17367
162	17367		78	17367
82	17367		115	17367
126	17367		140	17367
118	17367		131	17367
57	17367		107	17367
89	17367		129	17367
122	17367		1	251160
164	13123		52	17367
10	17367		133	17367
63	17367		53	17367
146	17367		166	13123
36	17367		388	755242
120	17367		390	755242
113	17367		389	755242
142	17367		68	17367
41	17367		125	17367
137	17367		38	17367
117	17367		143	17367
152	854877		141	852383
98	17367		160	13123
121	17367		75	17367
151	17367		161	13123
119	17367		114	17367
B	365476		71	17367
128	17367		132	17367
5	13123		163	13123
99	17367		56	17367
165	17367		166	17367
61	17367		159	17367
135	17367		104	17367
165	13123		42	17367
7	1228566		79	17367
6	1228566		1572	1043970
5	1228566		10	1071069
4	1228566		3991	1136246
3	1228566		7322	1141840
2	1228566		243	8055
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8	1228566		172	8055
4	28068		2	803077
71	13123		3	568311

74	13123		242	8055
59	13120		244	8055
1001	1253581		179	8055
1002	1253581		250	8055
99	15556		185	8055
1	1185308		180	8055
2	1185308		183	8055
249	8055		93	13123
240	8055		152	13123
178	8055		192	880592
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C	25385		4	250973
191	8055		87	13123
B	25385		157	13123
245	8055		51	13123
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78	8055		9	13123
173	8055		77	13123
176	8055		149	13123
76	8055		19	13123
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4	568311		46	13123
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1	551113		218	8055
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7309	1141468		14	15556
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722	537942		54	27749
5	1074358		105	8055
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10	28068		58	27749
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154	13123		50	27749
47	13123		61	15556
98	13123		233	8055
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125	13123		43	27749
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14	13123		46	27749
3	28068		17	15556
151	13123		60	27749
110	13123		41	27749
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117	13123		36	27749
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APPENDIX 2
DEVELOPMENT AREA

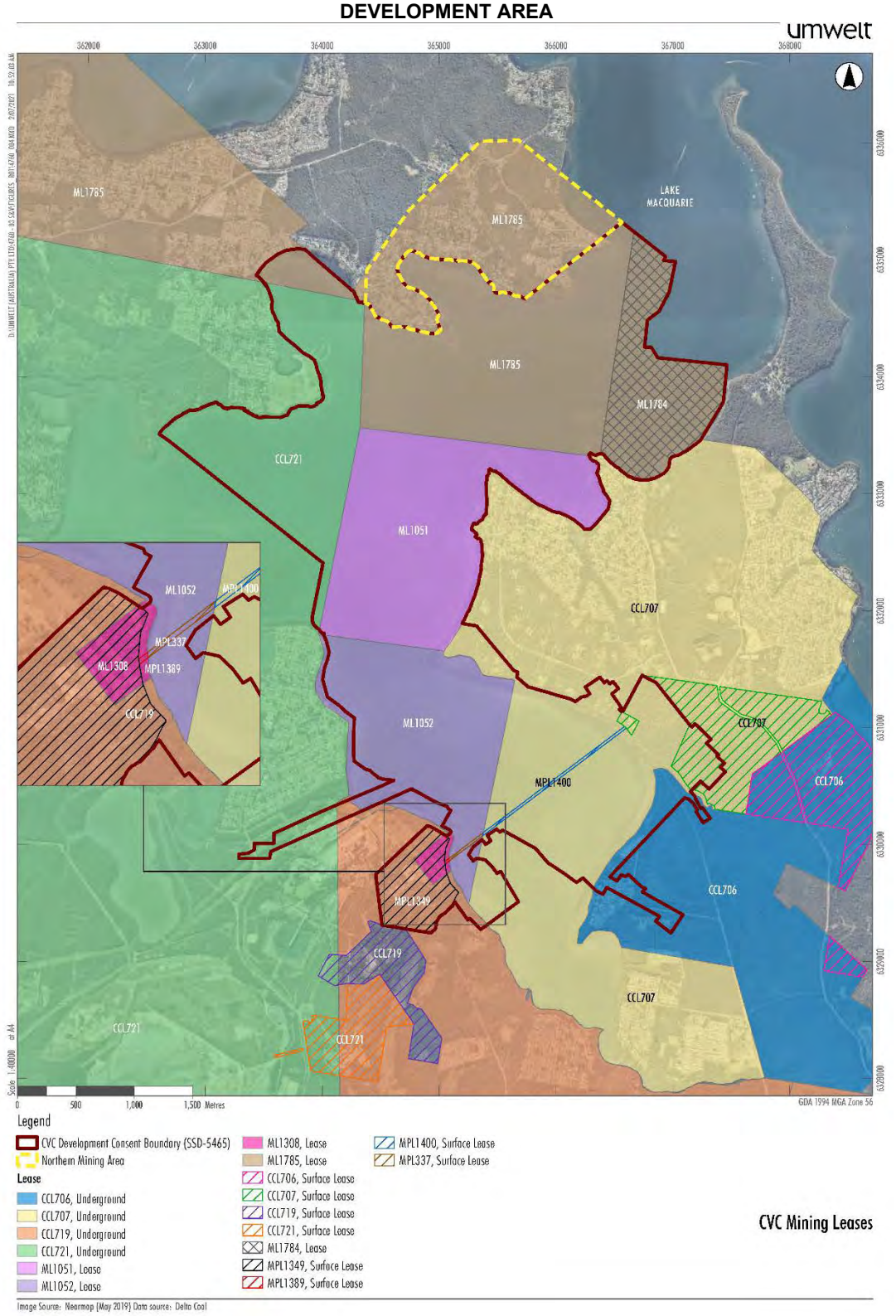


Figure 1: *Chain Valley Extension Project – Development Application Area and Lease Plan (The Site)*

APPENDIX 3
DEVELOPMENT LAYOUT

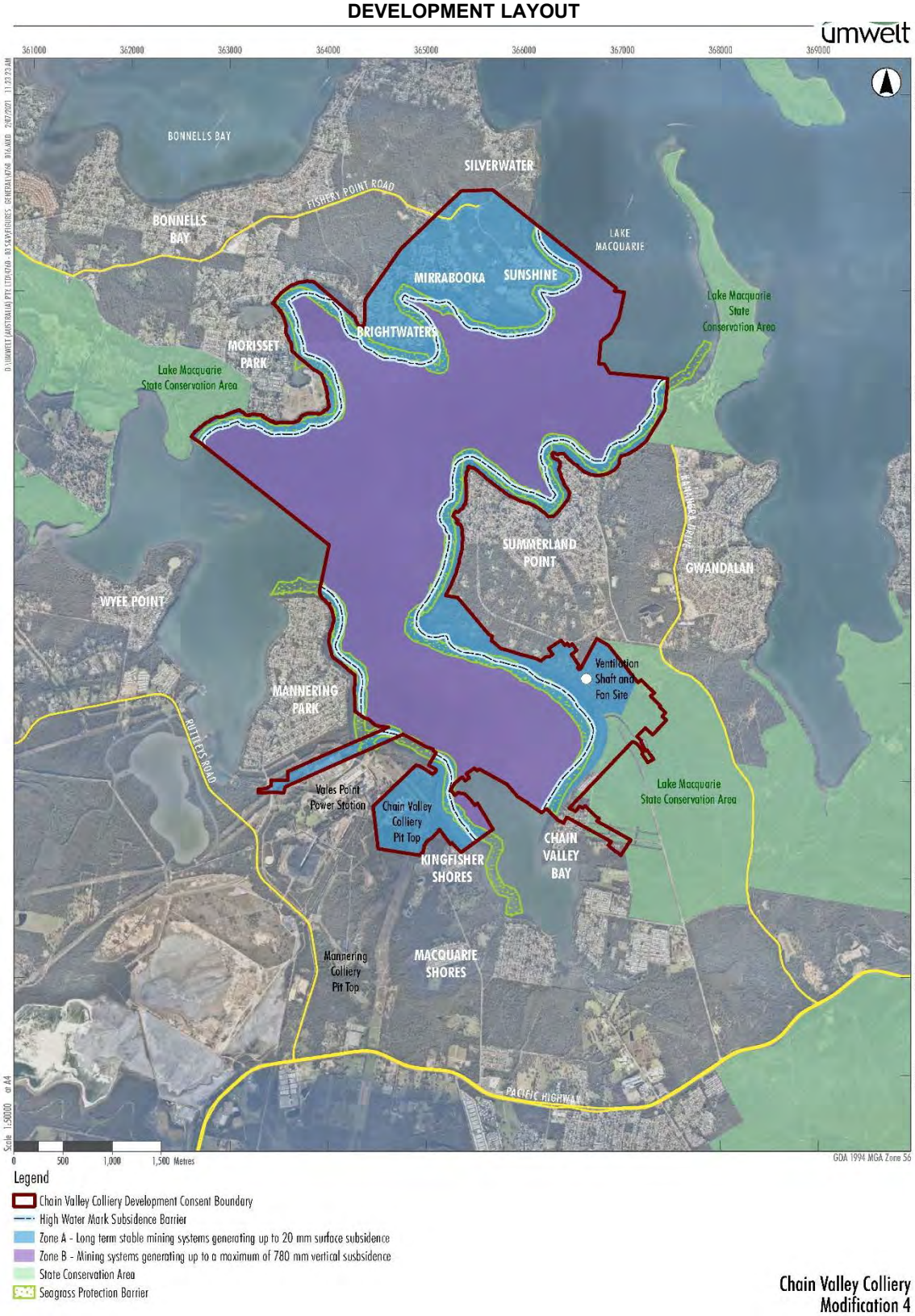


Figure 1: *Mining Areas Subsidence Management Zones*

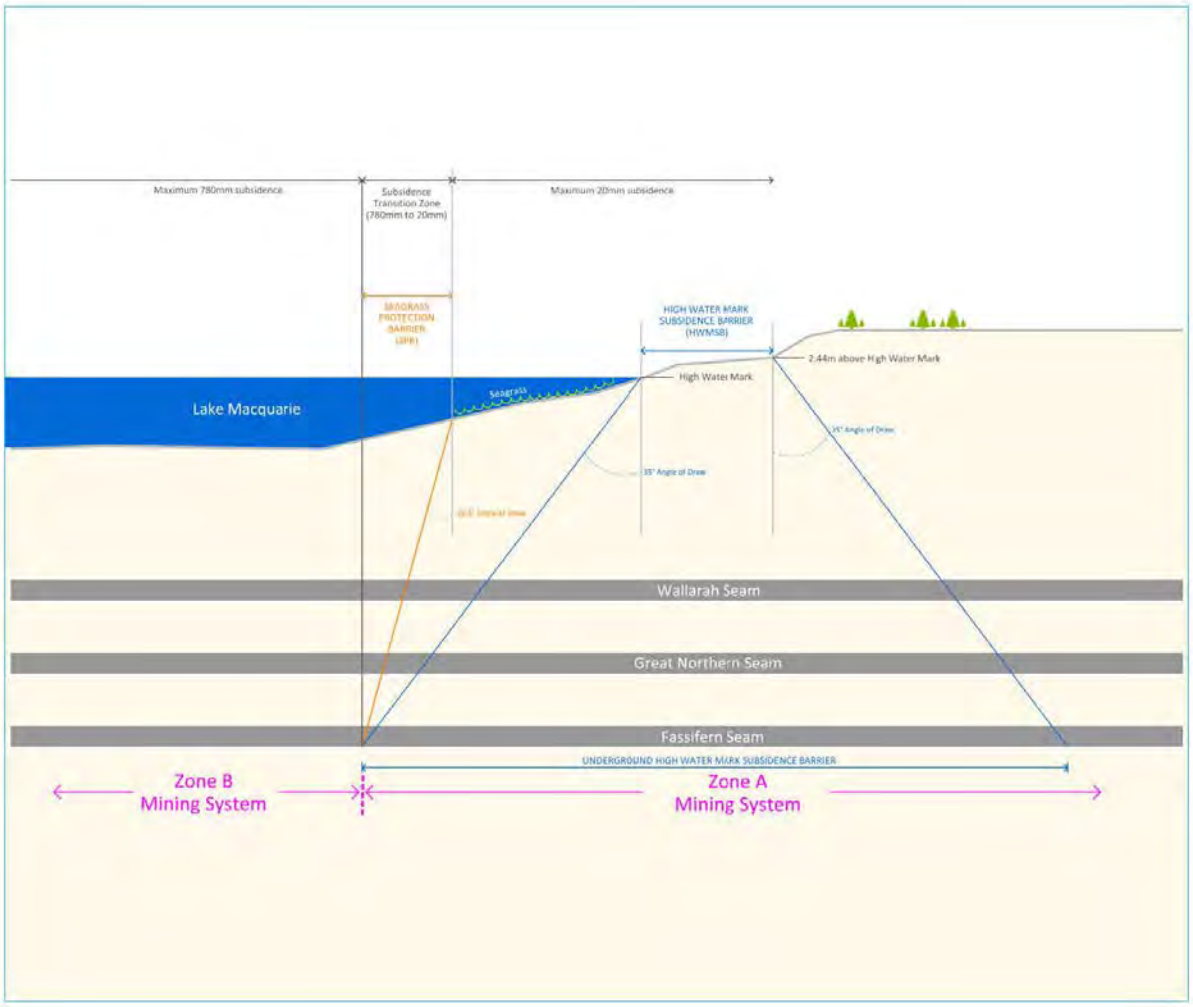


Figure 1A: *High Water Mark Subsidence Barrier and Seagrass Protection Barrier*

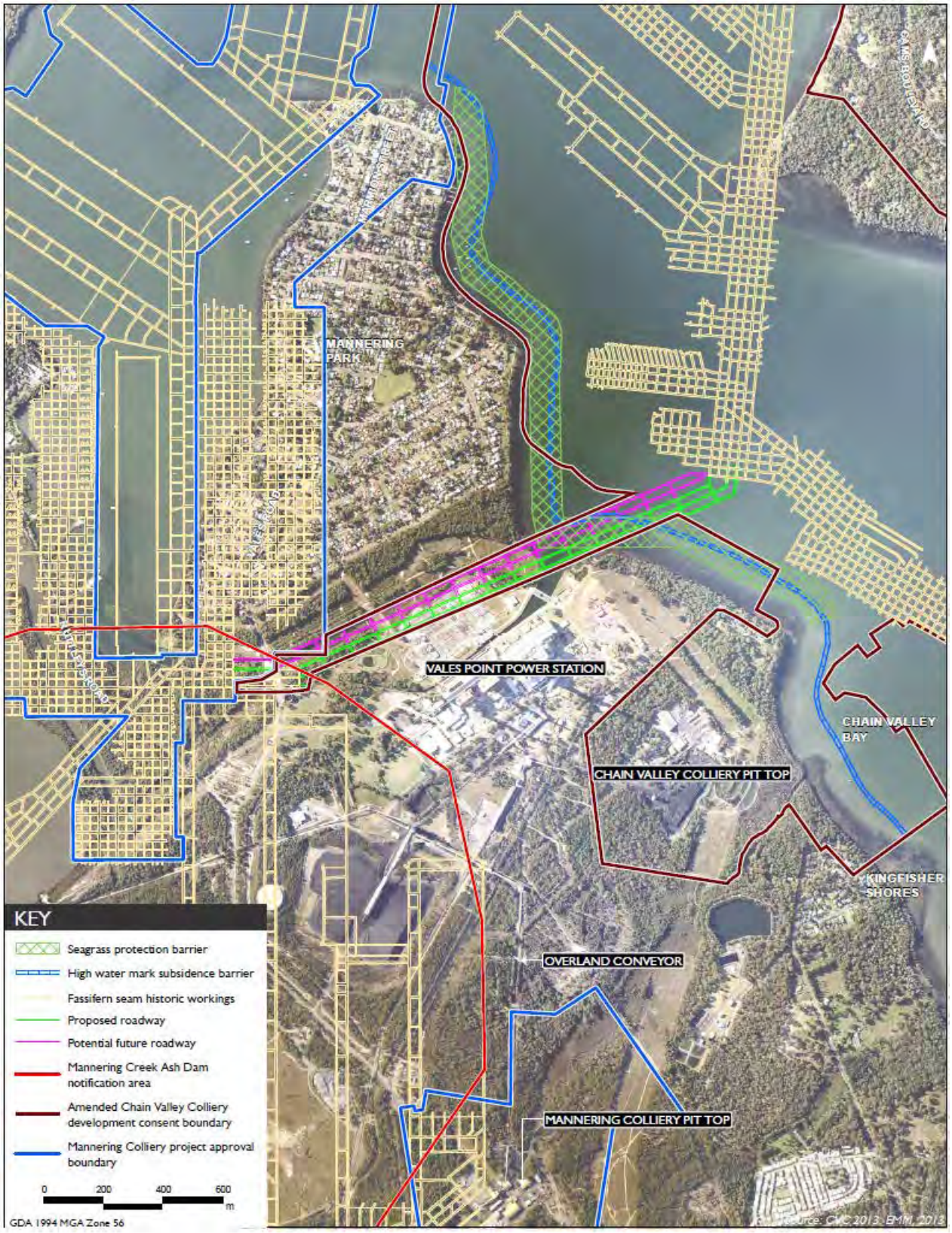


Figure 2: *Location of the underground linkage to Mannering Colliery*

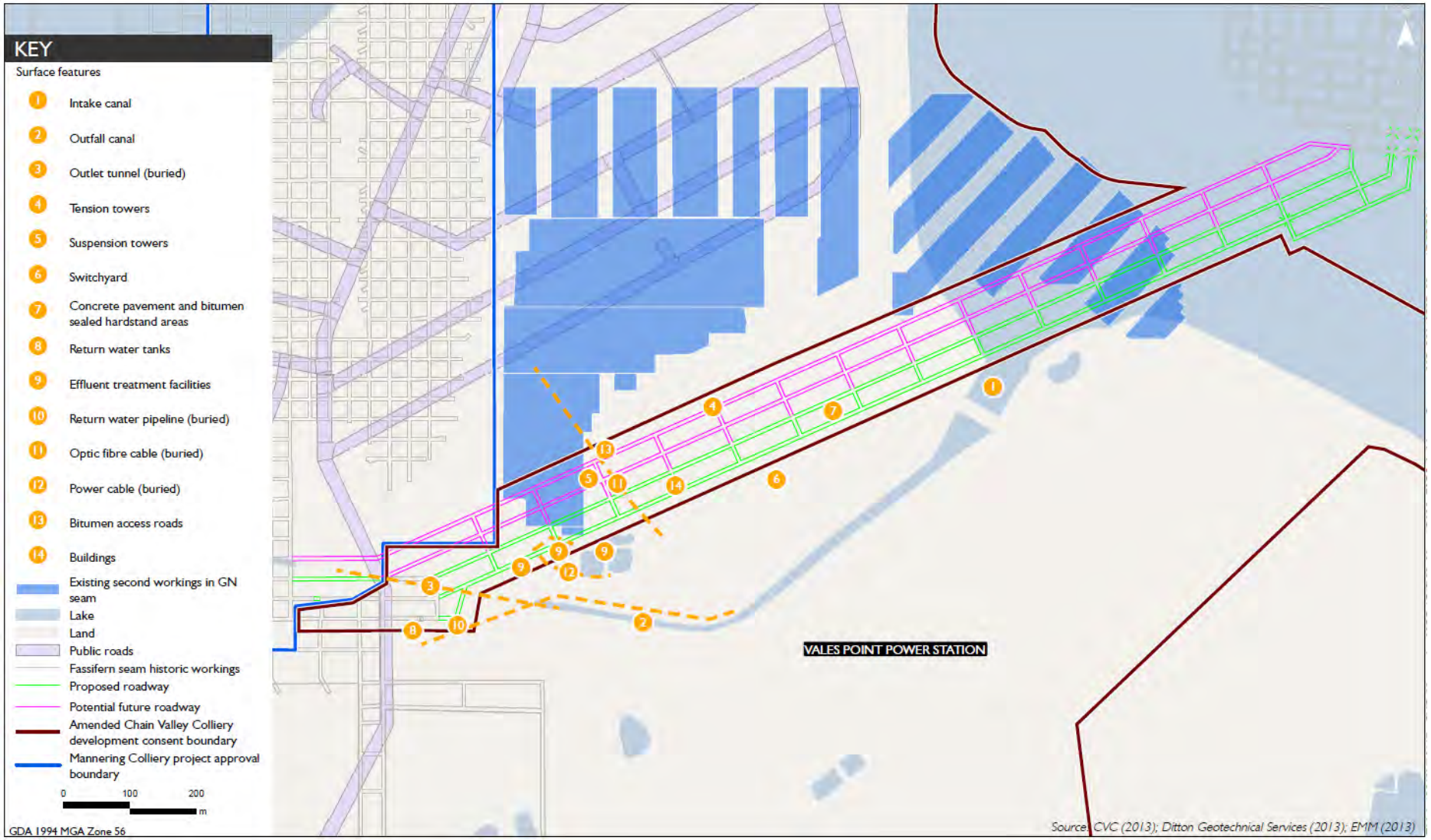


Figure 3: *Location of the underground linkage and surface infrastructure*

APPENDIX 4
KEY SURFACE FACILITIES

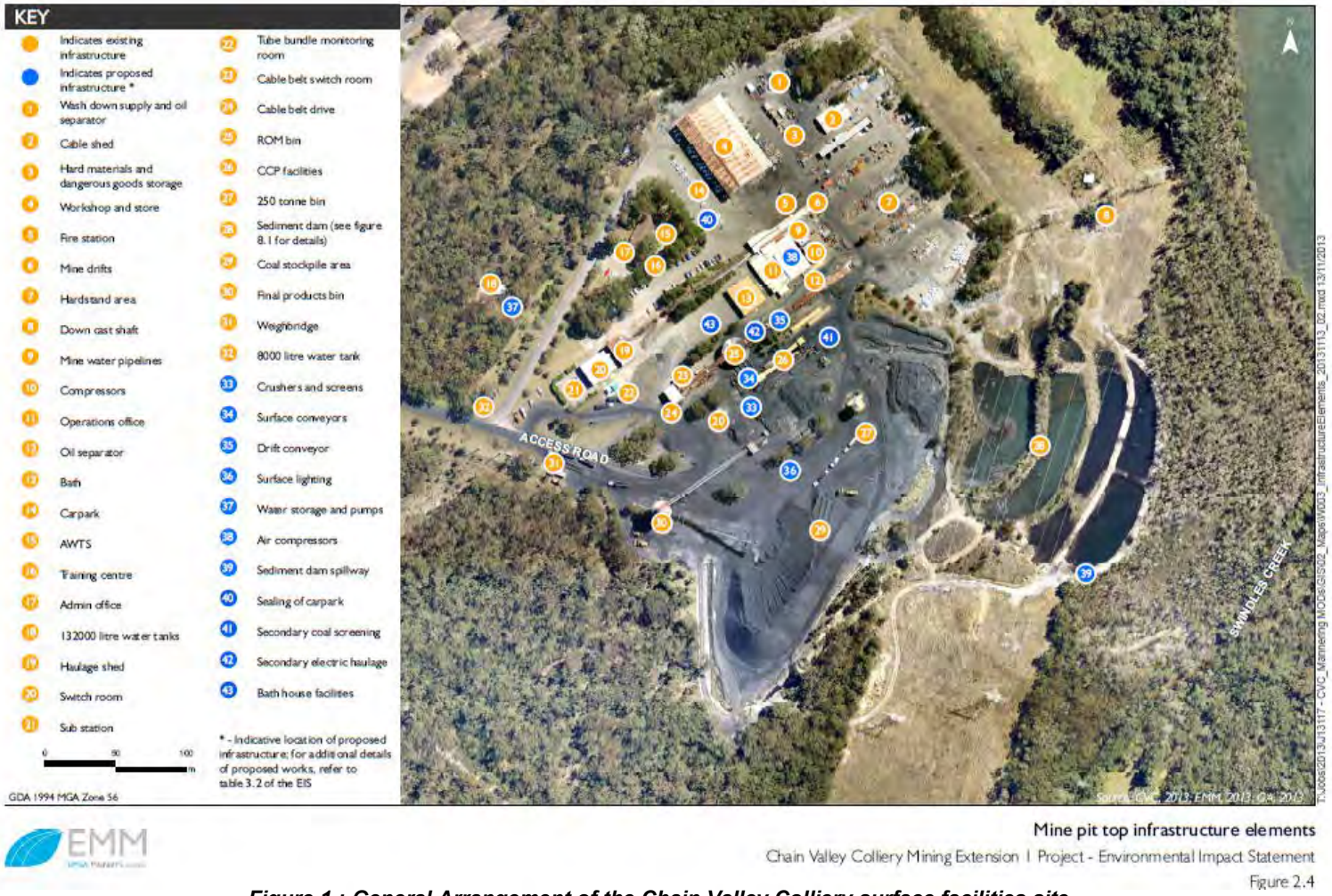


Figure 1 : General Arrangement of the Chain Valley Colliery surface facilities site

APPENDIX 5
COAL HAULAGE ROUTE – PUBLIC ROADS

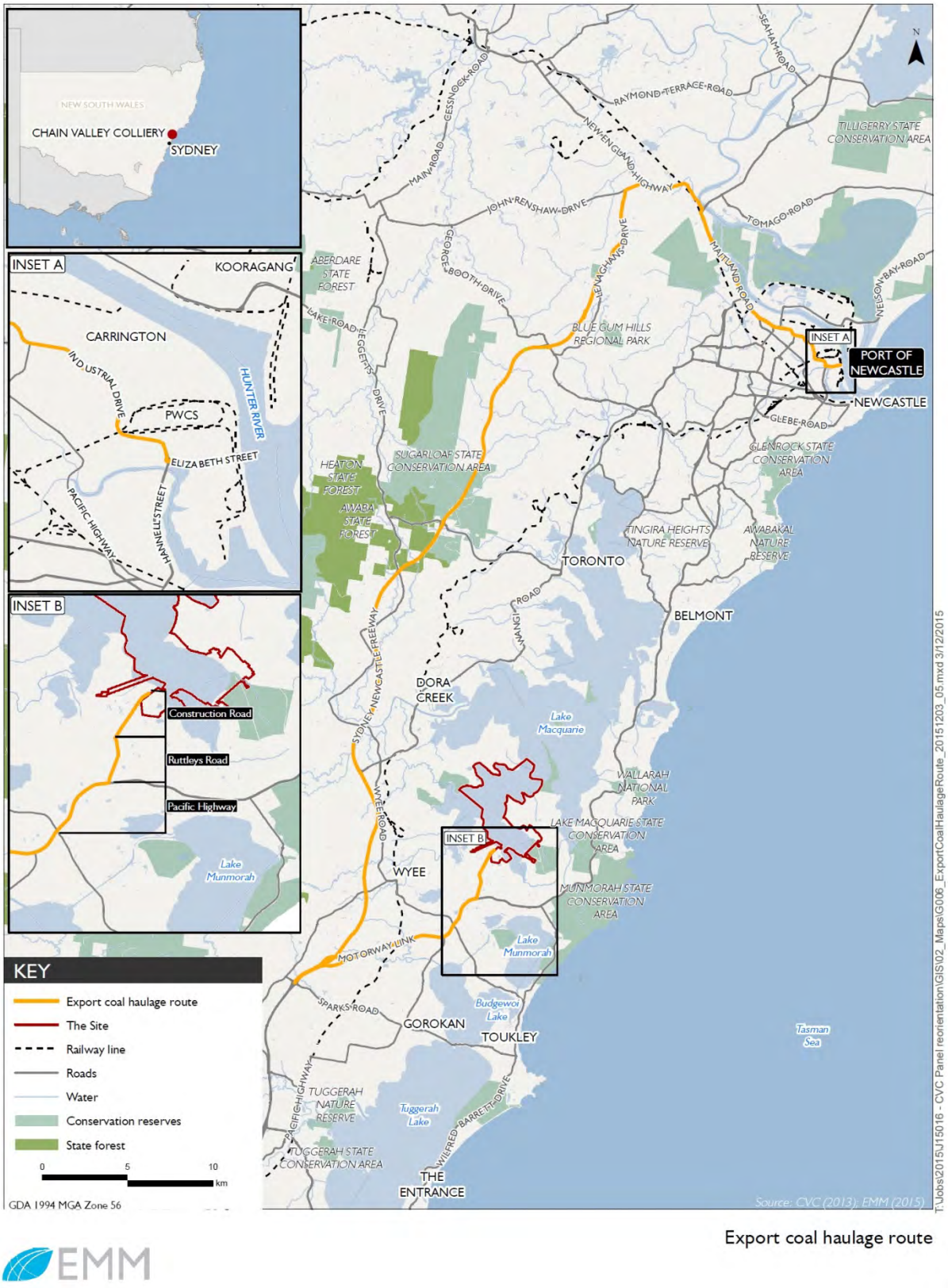


Figure 1: Export Coal Haulage Route

APPENDIX 6
NOISE RECEIVER LOCATIONS

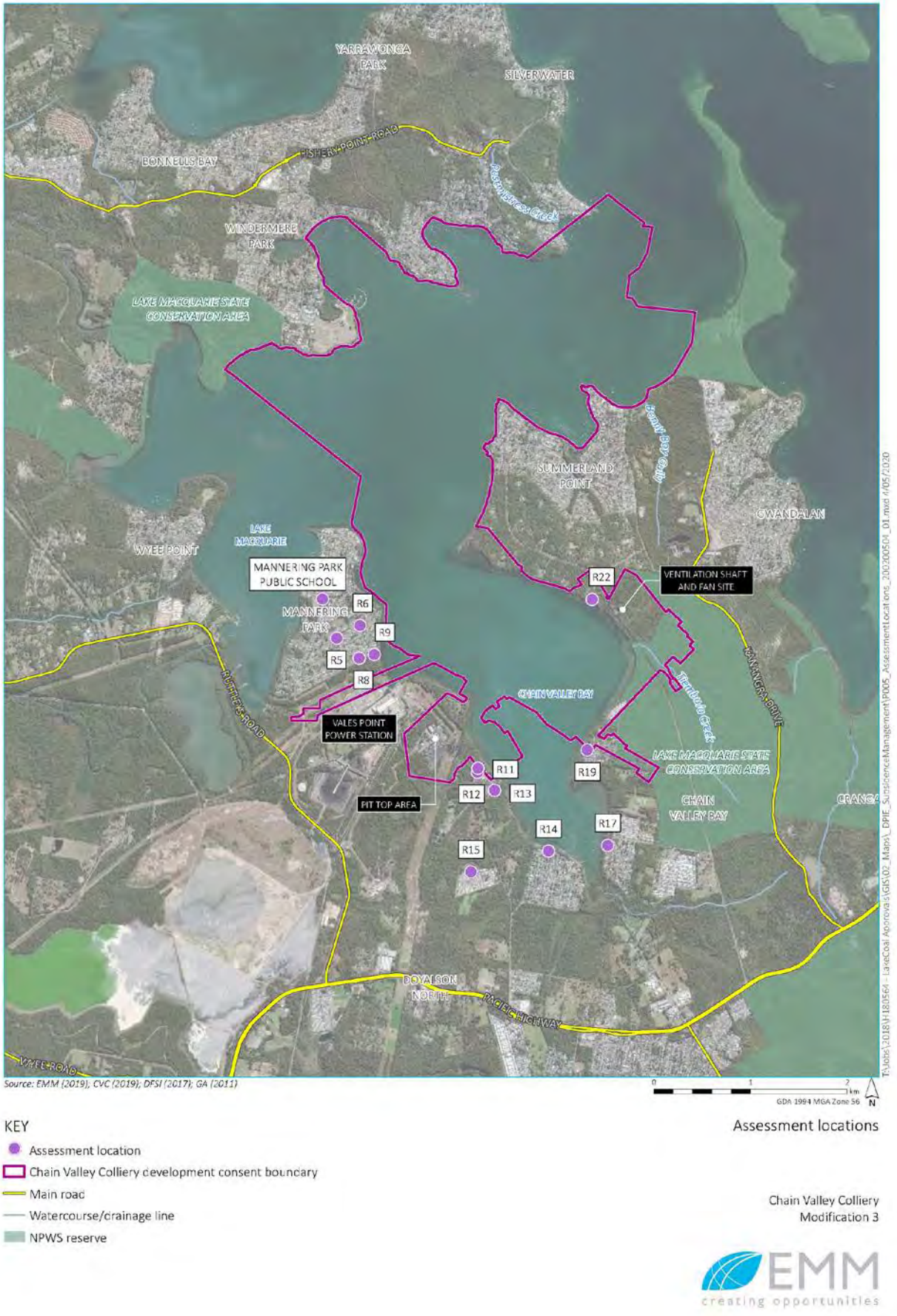


Figure 1: *Noise Receiver Locations*

APPENDIX 7
BIODIVERSITY ENHANCEMENT AREA



Figure 1: *Location of the Biodiversity Enhancement Area, shown in red and orange hatching*

APPENDIX 7A
ASSET PROTECTION ZONES



Figure 1. *Location of asset protection zones*

APPENDIX 8
NOISE COMPLIANCE ASSESSMENT

Applicable Meteorological Conditions

1. The noise criteria in Table 1 of the conditions are to apply under all meteorological conditions except the following:
   (a) during periods of rain or hail;
   (b) average wind speed at microphone height exceeds 5 m/s;
   (c) wind speeds greater than 3 m/s measured at 10 m above ground level; or
   (d) temperature inversion conditions greater than 3°C/100 m.

Determination of Meteorological Conditions

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions must be that recorded by the meteorological station described in condition 14 of schedule 3.

Compliance Monitoring

3. Attended monitoring is to be used to evaluate compliance with the relevant conditions of this consent.

4. This monitoring must be carried out at least 4 times in each calendar year (ie at least once every 3 months), unless the Planning Secretary directs otherwise.

5. Unless otherwise agreed with the Planning Secretary, this monitoring is to be carried out in accordance with the relevant requirements for reviewing performance set out in the *NSW Industrial Noise Policy* (as amended from time to time), in particular the requirements relating to:
   (a) monitoring locations for the collection of representative noise data;
   (b) meteorological conditions during which collection of noise data is not appropriate;
   (c) equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and
   (d) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration.

APPENDIX 9
STATEMENT OF COMMITMENTS

Item	Commitment
Groundwater	In addition to the management and mitigation measures undertaken at the Colliery for groundwater as described in the WMP, the following commitments specific to the Proposal will be undertaken. Some commitments are already undertaken under the WMP. Great Southern Energy Pty Limited will: • assess whether abnormal or significant groundwater inflow changes occur in the active panels; • maintain the water flow monitoring appliances used to measure pumped water volumes to and from the Colliery in good working order; • maintain and plot records of daily total Colliery water pumping and annually communicate an interpretation of the findings within the Annual Review. A copy of the Annual Review will be supplied to DPIE Water; • measure water levels and quality within private bores, where access is possible, in relevant areas to assess if any adverse effects occur due to subsidence from the Proposal; and • develop groundwater assessment criteria and triggers, response protocols and contingency measures. Although it is not anticipated that private bore yields would be impacted due to subsidence, should such a situated arise, Great Southern Energy Pty Limited would provide an alternative water supply until the impacted bore recovers. Any monitored or reported adverse impacts on the yield, saturated thickness or quality of a private registered bore will be investigated by Great Southern Energy Pty Limited. In the event of a groundwater level drop of over 2 m for a period of two months or more, a notable increase in iron hydroxide, or an adverse change in salinity as a consequence of subsidence, Great Southern Energy Pty Limited will enter into negotiations with the affected landowners and SA NSW with the intent of formulating an agreement which provides for one, or a combination of: • re-establishment of saturated thickness in the affected bore(s) through bore deepening; • establishment of additional bores to provide a yield at least equivalent to the affected bore prior to mining; • provision of access to alternative sources of water; and/or • compensation to reflect increased water extraction costs (eg. due to lowering pumps or installation of additional or alternative pumping equipment).
Surface water	Management and monitoring of surface water will continue to be undertaken in accordance with the Colliery's WMP, which will be reviewed and updated as required to include the commitments made below. Great Southern Energy Pty Limited will: • update the WMP to include any changes as a result of all modifications; • limit the main underground pumps to a maximum pump out rate of 10.5 ML/day within 12 months of approval; • request an amendment of EPL1770 to include a condition on the daily discharge volume limit stating that "Exceedance of the volume limit for Point 1 is permitted only if the discharge from Point 1 occurs solely as a result of rainfall at the premises exceeding 10 mm during the 24 hours immediately prior to commencement of the discharge"; • undertake daily measurements of discharge volumes and report publicly on a monthly basis via Great Southern Energy Pty Limited's website; • continue collection of baseline water quality data to aid in the development of appropriate discharge water quality trigger values; • engage suitably qualified expert to conduct an assessment of the metals contained within discharge water in accordance with the ANZECC water quality guidelines and provide this assessment to the EPA by 31 December 2013; • investigate water saving measures to minimise the amount of potable water required from CC Council for Colliery operations; • quantify the groundwater storage capacity in the Great Northern and Wallarah Seams; • continue effluent monitoring regime of receiving soils from the AWTS in accordance with the parameters and testing frequencies identified in the Colliery's WMP. The

	results of this monitoring program will be reviewed by a suitably qualified expert and used to determine the appropriateness of the existing irrigation area to receive this effluent; • develop a program to monitor creek line channel stability and the health of riparian vegetation within Swindles Creek. Monitoring will be undertaken in accordance with Section 8.5.2 of the Surface Water Impact Assessment (EIS Appendix E) and incorporated into the Colliery's WMP or Biodiversity Management Plan; and • record monitoring data in accordance with the Colliery's WMP and EPL 1770. Monitoring data will be interpreted as it is received to ensure appropriate operational guidance on monitoring water quality within desired parameters. Results of water quality monitoring will be reported in the Annual Review and made available to the CCC, as well as CC Council and LMCC.
Noise	Management and monitoring of noise will continue to be undertaken in accordance with the Colliery's NMP, which will be reviewed and updated as required to include the commitments made below. Great Southern Energy Pty Limited will: • continue attended compliance monitoring on site which will be used to identify potential hot spots and primary noise sources; • continue real-time noise monitoring alerts to site personnel to enable implementation of any required rapid noise management initiatives; • manage potential non-compliance through a noise complaint handling and response system, including the identification of responsible sources to enable targeted remedial action; • assess if further noise mitigation options for the ventilation fans are reasonable and feasible following the receipt of attenuation proposals; and • discuss potential management measures or agreement options with the landowner at 275 Cams Boulevard, following receipt of proposals from acoustics specialists. In addition to the above, Great Southern Energy Pty Limited is committed to the progressive implementation of feasible measures to target long-term noise goals which are designed to reduce noise emissions from the Colliery. Long-term options for investigation include: • modification to belt/movement alarms; • investigation of surface conveyer and coal preparation equipment, to determine if noise reductions are possible; • identifying sound attenuation options for the surface bulldozer and front-end loader; • strategic placement of acoustic barriers; • attenuation for the surface screener/shaker; • installation of quiet rollers for surface conveyor belts; • acoustic treatments around compressors; and • the use of a conveyor stacker for product coal stockpiling.
Air Quality and greenhouse gases	Management and monitoring of air quality and greenhouse gases will continue to be undertaken in accordance with the Colliery's AQGHGMP, which will be reviewed and updated as required to include the commitments made below Great Southern Energy Pty Limited will: • investigate the use of a stacker to replace hauling between current conveyor system and stockpiles; • undertake GHG monitoring comprising measurement of carbon dioxide and methane at the ventilation shaft and fan sites; and • record and report annual diesel, oil, grease, acetylene and electricity use to fulfil National Greenhouse and Energy Reporting Scheme requirements.
Traffic and transport	Management and monitoring of traffic and transport will continue to be undertaken in accordance with the Colliery's RTP. In addition, Great Southern Energy Pty Limited will continue to investigate alternative options for transporting export coal to the Port of Newcastle, specifically the preferred rail transport option, requiring the construction of a private haul road to the VPPS coal unloading facility and associated infrastructure upgrades. In addition, Great Southern Energy Pty Limited will investigate options to reduce peak hour traffic would be investigated including potentially limiting the peak hourly volumes of the Colliery truck traffic which would be permitted to travel via this intersection should the Colliery not be using rail transport for export coal by five years from the granting of development consent. Alternatively, a pro-rata financial contribution to the cost of installing traffic signals at the southbound intersection of the F3 and Sparks Road interchange could be made commensurate with the percentage of Colliery generated traffic using the intersection.
Subsidence	Management and monitoring of subsidence will continue to be undertaken in accordance with the Colliery's SMP or Extraction Plans, which will be reviewed and

	updated as required to include the commitments made below. Great Southern Energy Pty Limited will: • provide raw subsidence survey data to BCD within 7 days of completion; • undertake six-monthly bathymetric surveys of the lake bed to determine actual subsidence and undertake a comparison with predicted levels. Should measured subsidence significantly exceed predicted levels, Great Southern Energy Pty Limited will review future secondary extraction designs to limit future impacts to acceptable levels; • install a new foreshore survey line above the first and second workings panels where the underground linkage passes beneath them and possibly extending from the foreshore to the point of connection with the MC workings; • inspect existing conditions in the Fassifern Seam and undertake geotechnical and geological mapping in the roadways proximate to the proposed linkage in both CVC and MC workings; • complete representative borehole core drilling and sampling of the Fassifern Seam floor at the start and finishing ends of the underground linkage and where the headings pass beneath the SPB. Development below the foreshore will be limited to two headings only until floor conditions can be confirmed; • develop infrastructure monitoring and management plans in consultation with infrastructure owners and other relevant stakeholders; • re-establish and re-survey Survey Line 24; • install a suitable survey line at the starting end above Great Northern Seam first workings to provide early warning monitoring data for the tension towers and switchyard structures; • monitor tension and suspension towers and switchyard conductor suspension frames directly above the panels, foreshore and adjacent inlet canal wall; • ensure that a monitoring and management plan for the MP01 sewer rising main is in place prior to commencement of mining that may impact CC Council's infrastructure; and • complete an annual subsidence report and make this report publicly available on the Colliery's website.
Marine ecology	Management and monitoring of marine ecology will continue to be undertaken in accordance with the Colliery's BCMP and SGMP, which will be reviewed and updated as required to include the commitments made below. Great Southern Energy Pty Limited will • revise the BCMP to include the sampling locations in the assessment of the Proposal; • undertake annual benthic surveys for the Site, or as required under the BCMP; • commission additional independent sampling and analysis to validate results obtained during monitoring, and review future panel design if impacts due to subsidence are determined to be moderate or greater; • revise the SGMP to include the transect locations utilised in the assessment of the Proposal; • continue annual seagrass surveys/monitoring; • continue six-monthly subsidence surveys (bathymetric surveys) and land-based surveys; • include results from the BCMP and SGMP within the Colliery's Annual Review; and • make the Annual Review and annual subsidence surveys available on the Colliery's website.

Terrestrial ecology	In addition to the management and mitigation measures undertaken at the Colliery for terrestrial ecology as described in the BMP, the following commitments specific to the Proposal will be undertaken. Some commitments are already undertaken under the BMP. Great Southern Energy Pty Limited will:
	• investigate one of the following options in consultation with BCD to offset the biodiversity impacts arising from the proposed modification:
	  o provide $10,000 of funding, which is equivalent to the biodiversity being lost (i.e. 5 credits x $2,000 per credit) to existing environmental programs at the site which benefits the Swamp Sclerophyll EEC; or
	  o consult with BCD to identify a suitable conservation program and provide $10,000 of funding; or
	  o purchase and retire 5 credits on the Biobanking register.
	• update the BMP to include the following:
	  o the completion of pre-disturbance surveys in the survey area for Black-eyed Susan, Leafless Tongue Orchid and Variable Midge Orchid during their flowering periods (July to December, November to February and September to October, respectively);

	o pre-disturbance surveys by an ecologist to determine the important components of vegetation communities and fauna habitats that should be preferentially retained in the APZs; o installation of delineation fencing around threatened flora populations (if found) to ensure their protection during development and maintenance of the APZs; o condition monitoring for threatened flora populations (if found); o retention of hollow-bearing trees in the APZs, where possible, with details to be included in a hollow tree register; o installation of nest boxes (or salvaged hollows) within the APZs under the supervision of a suitably qualified ecologist or wildlife carer to replace hollows where hollow-bearing trees cannot be retained; o measures for APZ maintenance that include weed control; o clearing of hollow-bearing trees (if required) under the supervision of a suitably qualified ecologist; o any injured fauna would be taken to the nearest veterinary hospital for treatment before release; and o relocation of suitable hollow-bearing felled trees adjacent to the APZs to create additional fauna habitat; • undertake the design of the dam embankment and spillway works in consultation with an ecologist to minimise potential impacts on the Swamp Oak Floodplain Forest EEC; • ensure pre-clearing surveys are undertaken by an ecologist to minimise the potential impact to fauna and significant vegetation prior to clearing works being undertaken within the embankment and spillway area; • clearly delineate the clearing footprint and cordon off surrounding vegetation as a 'no go' zone during works to the dam embankment and spillway; • minimise disturbance areas where possible by ensuring all stockpiling of materials, parking of machinery etc, is undertaken in previously cleared areas; • ensure that, wherever possible, dead standing timber and fallen timber will be avoided by any clearing works, or if required to be removed, be relocated into suitable habitat areas nearby; • ensure all equipment used for the earthworks associated with the dam embankment and spillway will be cleaned of excess soil potentially containing pathogens and weed seeds prior to entering the Site; • install sediment fencing surrounding the proposed earthwork areas, in accordance with a site-specific erosion and sediment control plan for the works; • ensure that in the event that sedimentation dam water is released from Dam 10 prior to the works being undertaken, it will be undertaken in a controlled manner over a number of days to ensure that the release does not result in significant erosion and sedimentation to the Swamp Oak Floodplain Forest; • continue the management and monitoring of flora and fauna in accordance with the BMP for the life of the mine, including: - the condition and composition of the Swamp Oak Floodplain Forest area; - the condition of vegetation adjacent to the ventilation shaft and fans; - the location and distribution of weed infestations; and - the abundance and distribution of feral animal use. • noxious weeds will be removed and continually controlled from the pit top area, allowing for natural regeneration of vegetation; • weed invasion will be monitored as part of the Colliery's BMP; and • the condition of the EEC areas will be monitored through the Colliery's BMP.
Heritage	Management and monitoring of heritage will continue to be undertaken in accordance with the Colliery's HMP, which will be reviewed and updated as required to include the commitments made below. Great Southern Energy Pty Limited will: • review and revise the HMP to remove site #45-7-0154 and incorporate any other changes as a result of the proposed modification; • update the HMP following approval of the Proposal to include the extended area to which it relates; • ensure that should unanticipated Aboriginal or historic heritage artefacts be found during dam embankment and diversion works, work will cease and the site assessed by an archaeologist; and • ensure that in the unlikely event that skeletal remains are found during dam embankment and diversion works, work will cease immediately in the area and the NSW Police Coroner called to determine if the material is of Aboriginal origin. BCD and relevant Aboriginal community stakeholders will be notified if the remains are positively identified as being of Aboriginal origin to determine their appropriate

	management prior to works recommencing.
Wastes	Management and monitoring of waste will continue to be undertaken in accordance with the Colliery's Waste Management Standard. In addition, Great Southern Energy Pty Limited will continue to try and improve its waste volumes and waste management practices in line with its objective for 60% of all wastes generated at the Colliery (excluding wastewater) to be recyclable or reusable.
Hazards	Management and monitoring of hazards will continue in accordance with the Colliery's existing hazard management measures. Periodic review of the effectiveness of existing measures will occur in accordance with the Colliery's safety management system and additional measures implemented as warranted.
Visual	Management and monitoring of visual impacts will continue to be undertaken in accordance with the Colliery's existing commitment. In addition, Great Southern Energy Pty Limited will: ensure additional surface lighting at the Colliery complies with *AS4282 (INT) 1995 – Control of Obtrusive Effects of Outdoor Lighting.*
Soil	Management and monitoring of soils will continue to be undertaken in accordance with the Colliery's WMP, which will be reviewed and updated as required to include the commitments made below. Great Southern Energy Pty Limited will: • prevent disturbance of ASS where practicable during any construction activities; • prepare an ASSMP where there is potential that ASS will be disturbed; • test and handle any ASS disturbed in accordance with the ASSMP and treat or dispose of to an appropriately licensed facility; • limit the area of any disturbance at the surface infrastructure sites and period of exposure; • implement site management procedures such as watering of disturbed areas and unsecured stockpiles; • ensure relevant licences and management plans are in place for the correct storage and handling of hydrocarbons; • maintain suitable bunding around all hazardous liquid storage areas; • maintain oil separation facilities on the wash down sump for the treatment of oily water; and • remove all waste oil from site and dispose via a licensed external waste collection company.
Rehabilitation and mine closure	Rehabilitation will be undertaken in accordance with the Colliery's RMP and the MOP in force at the time. Detailed management and monitoring proposals for final rehabilitation will be included within a Mine Closure Plan to be prepared at least two years prior to cessation of mining activities.
Economic	Great Southern Energy Pty Limited will contribute $0.035/t of coal from the Colliery into a dedicated community fund to improve public infrastructure and for the provision of community projects in the surrounding communities of Chain Valley Bay, Mannering Park, Summerland Point and Gwandalan.
Social	Great Southern Energy Pty Limited will continue to implement management measures and monitoring programs to prevent or minimise negative impacts and enhance positive impacts in accordance with its Environment and Community Policy. Great Southern Energy Pty Limited will: • maintain open and constructive communication with affected individuals and groups; • participate in the CCC; • provide environmental monitoring data and other relevant information in a timely manner via the Great Southern Energy Pty Limited website; • be responsive to community issues and actual and/or perceived impacts from the Colliery's activities; • work in partnership with stakeholders to address community needs; • ensure effective management of Great Southern Energy Pty Limited's social impacts; • liaise regularly with relevant government agencies and councils; • provide regular Colliery updates with landowners and local residents through the CCC; • continue payments, throughout the life of the Proposal, to the community fund established; and • consider individual sponsorship opportunities throughout the life of the Proposal.
Other	Great Southern Energy Pty Limited will commit to only carrying out mining operations consistent with the development consent granted pursuant to this Proposal.

Modification 3 Commitments	Great Southern Energy Pty Limited will undertake environmental management incorporating the requirements of any modification and in accordance with the existing environmental management processes of the various approvals, licences and management plans that apply to the development. Great Southern Energy Pty Limited will apply to the EPA to vary EPL 1770 to reflect the corresponding development consent tonnage limits within EPL 1770's Mining for Coal and Coal Works activities tonnage ranges. Great Southern Energy Pty Limited will commission and undertake detailed geotechnical assessments by a suitably qualified geotechnical engineer as part of the company's detailed mine plan design process.

Appendix 2: EPL 1770

Environment Protection Licence

Licence - 1770

Licence Details	
Number:	1770
Anniversary Date:	01-April

Licensee

DELTA POWER & ENERGY (CHAIN VALLEY) PTY LTD

PO BOX 7115

MANNERING PARK NSW 2259

Premises

CHAIN VALLEY COLLIERY

CONSTRUCTION ROAD

CHAIN VALLEY BAY NSW 2259

Scheduled Activity

Coal works

Mining for coal

Fee Based Activity	Scale
Coal works	> 2000000-5000000 T annual handing capacity
Mining for coal	> 2000000-3500000 T annual production capacity

Contact Us

NSW EPA

6 Parramatta Square

10 Darcy Street

PARRAMATTA NSW 2150

Phone: 131 555

Email: info@epa.nsw.gov.au

Locked Bag 5022

PARRAMATTA NSW 2124

Environment Protection Licence

Licence - 1770

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Information about this licence

Dictionary

A definition of terms used in the licence can be found in the dictionary at the end of this licence.

Responsibilities of licensee

Separate to the requirements of this licence, general obligations of licensees are set out in the Protection of the Environment Operations Act 1997 ("the Act") and the Regulations made under the Act. These include obligations to:

- ensure persons associated with you comply with this licence, as set out in section 64 of the Act;
- control the pollution of waters and the pollution of air (see for example sections 120 - 132 of the Act);
- report incidents causing or threatening material environmental harm to the environment, as set out in Part 5.7 of the Act.

Variation of licence conditions

The licence holder can apply to vary the conditions of this licence. An application form for this purpose is available from the EPA.

The EPA may also vary the conditions of the licence at any time by written notice without an application being made.

Where a licence has been granted in relation to development which was assessed under the Environmental Planning and Assessment Act 1979 in accordance with the procedures applying to integrated development, the EPA may not impose conditions which are inconsistent with the development consent conditions until the licence is first reviewed under Part 3.6 of the Act.

Duration of licence

This licence will remain in force until the licence is surrendered by the licence holder or until it is suspended or revoked by the EPA or the Minister. A licence may only be surrendered with the written approval of the EPA.

Licence review

The Act requires that the EPA review your licence at least every 5 years after the issue of the licence, as set out in Part 3.6 and Schedule 5 of the Act. You will receive advance notice of the licence review.

Fees and annual return to be sent to the EPA

For each licence fee period you must pay:

- an administrative fee; and
- a load-based fee (if applicable).

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The EPA publication “A Guide to Licensing” contains information about how to calculate your licence fees. The licence requires that an Annual Return, comprising a Statement of Compliance and a summary of any monitoring required by the licence (including the recording of complaints), be submitted to the EPA. The Annual Return must be submitted within 60 days after the end of each reporting period. See condition R1 regarding the Annual Return reporting requirements.

Usually the licence fee period is the same as the reporting period.

Transfer of licence

The licence holder can apply to transfer the licence to another person. An application form for this purpose is available from the EPA.

Public register and access to monitoring data

Part 9.5 of the Act requires the EPA to keep a public register of details and decisions of the EPA in relation to, for example:

- licence applications;
- licence conditions and variations;
- statements of compliance;
- load based licensing information; and
- load reduction agreements.

Under s320 of the Act application can be made to the EPA for access to monitoring data which has been submitted to the EPA by licensees.

This licence is issued to:

DELTA POWER & ENERGY (CHAIN VALLEY) PTY LTD
PO BOX 7115
MANNERING PARK NSW 2259

subject to the conditions which follow.

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1 Administrative Conditions

A1 What the licence authorises and regulates

A1.1 This licence authorises the carrying out of the scheduled activities listed below at the premises specified in A2. The activities are listed according to their scheduled activity classification, fee-based activity classification and the scale of the operation.

Unless otherwise further restricted by a condition of this licence, the scale at which the activity is carried out must not exceed the maximum scale specified in this condition.

Scheduled Activity	Fee Based Activity	Scale
Coal works	Coal works	> 2000000 - 5000000 T annual handing capacity
Mining for coal	Mining for coal	> 2000000 - 3500000 T annual production capacity

A1.2 The licensee must not extract by mining activities more than 2.1 million tonnes of ROM coal from the premises in any calendar year in line with Development Consent SSD5465 MOD 4.

A2 Premises or plant to which this licence applies

A2.1 The licence applies to the following premises:

Premises Details
CHAIN VALLEY COLLIERY
CONSTRUCTION ROAD
CHAIN VALLEY BAY
NSW 2259
THE LICENSED PREMISES IS AS MARKED AND DEFINED IN THE PLANS TITLED "EPL 1770 BOUNDARIES AND MONITORING POINTS" "EPL 1770 UNDERGROUND BOUNDARY", AND "EPL 1770 SURFACE BOUNDARY" DATED 24 OCTOBER 2024 AND SHAPE FILES PROVIDED IN DOC24/771631-3.

A3 Information supplied to the EPA

A3.1 Works and activities must be carried out in accordance with the proposal contained in the licence application, except as expressly provided by a condition of this licence.

In this condition the reference to "the licence application" includes a reference to:
a) the applications for any licences (including former pollution control approvals) which this licence replaces

under the Protection of the Environment Operations (Savings and Transitional) Regulation 1998; and
b) the licence information form provided by the licensee to the EPA to assist the EPA in connection with the issuing of this licence.

2 Discharges to Air and Water and Applications to Land

P1 Location of monitoring/discharge points and areas

P1.1 The following points referred to in the table below are identified in this licence for the purposes of monitoring and/or the setting of limits for the emission of pollutants to the air from the point.

Air

EPA identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description
25	Air Monitoring Point Particulate Matter PM10		TEOM Monitor located on the site of the Mannering Park Sewage Treatment Plant, shown as "Point 25" on the plan titled "EPL 1770 Boundaries and Monitoring Points" Submitted to the EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3).

P1.2 The following utilisation areas referred to in the table below are identified in this licence for the purposes of the monitoring and/or the setting of limits for any application of solids or liquids to the utilisation area.

P1.3 The following points referred to in the table are identified in this licence for the purposes of the monitoring and/or the setting of limits for discharges of pollutants to water from the point.

Water and land

EPA Identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description
1	Discharge to waters Discharge quality and volume monitoring	Discharge to waters Discharge quality and volume monitoring	Discharge to waters and monitoring from final settlement pond, gravity fed discharge pipe, shown as "Point 1" on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to the EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3).

27	Discharge to waters Discharge quality and volume monitoring	Discharge to waters Discharge quality and volume monitoring	Discharge to waters via dam spillway from final settlement pond adjacent to Point 1, shown as "Point 27" on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to the EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3).

P1.4 The following points referred to in the table below are identified in this licence for the purposes of weather and/or noise monitoring and/or setting limits for the emission of noise from the premises.

Noise/Weather

EPA identification no.	Type of monitoring point	Location description
9	Noise monitoring	Noise monitoring site, shown as "Point 9", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). Located at 109 Griffith Street, MANNERING PARK, 2259. Identified as R8 in Development Consent SSD-5465 (MOD 4) submitted to the EPA and dated 12 August 2021 (EPA Ref: DOC21/691135-1).
12	Noise monitoring	Noise monitoring site, shown as "Point 12", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). Located at 35 Lakeshore Avenue, KINGFISHER SHORES, 2259. Identified as R11 in Development Consent SSD-5465 (MOD 4) submitted to the EPA and dated 12 August 2021 (EPA Ref: DOC21/691135-1).
13	Noise monitoring	Noise monitoring site, shown as "Point 13", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). Located at 20 Lakeshore Avenue, KINGFISHER SHORES, 2259. Identified as R12 in Development Consent SSD-5465 (MOD 4) submitted to the EPA and dated 12 August 2021 (EPA Ref: DOC21/691135-1).

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14	Noise monitoring	Noise monitoring site, shown as "Point 14", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to the EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). Located at 33 Karoola Avenue, KINGFISHER SHORES, 2259. Identified as R13 in Development Consent SSD-5465 (MOD 4) submitted to the EPA and dated 12 August 2021 (EPA Ref: DOC21/691135-1).
16	Noise monitoring	Noise monitoring site, shown as "Point 16", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to the EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). Located at 150 Tall Timbers Road, DOYALSON NORTH, 2262. Identified as R15 in Development Consent SSD-5465 (MOD 4) submitted to the EPA and dated 12 August 2021 (EPA Ref: DOC21/691135-1).
20	Noise monitoring	Noise monitoring site, shown as "Point 20", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to the EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). Located at 2 Sunset Parade, CHAIN VALLEY BAY, 2259. Identified as R19 in Development Consent SSD-5465 (MOD 4) submitted to the EPA and dated 12 August 2021 (EPA Ref: DOC21/691135-1).
23	Noise monitoring	Noise monitoring site, shown as "Point 23", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to the EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). Located at 275 Cams Boulevard, SUMMERLAND POINT, 2259. Identified as R22 in Development Consent SSD-5465 (MOD 4) submitted to the EPA and dated 12 August 2021 (EPA Ref: DOC21/691135-1).
26	Meteorological Station	Meteorological monitoring site, shown as "Point 26", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to the EPA and dated 24 October 2024 (DOC24/771631-3) and 11 August 2021 (DOC21/691135). Located at Mannering Colliery (Ruttleys Road), DOYALSON NORTH, 2259.

3 Limit Conditions

L1 Pollution of waters

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L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Concentration limits

L2.1 For each monitoring/discharge point or utilisation area specified in the table/s below (by a point number), the concentration of a pollutant discharged at that point, or applied to that area, must not exceed the concentration limits specified for that pollutant in the table.

L2.2 Where a pH quality limit is specified in the table, the specified percentage of samples must be within the specified ranges.

L2.3 To avoid any doubt, this condition does not authorise the pollution of waters by any pollutant other than those specified in the table\s.

L2.4 Water and/or Land Concentration Limits

POINT 1,27

Pollutant	Units of Measure	50 percentile concentration limit	90 percentile concentration limit	3DGM concentration limit	100 percentile concentration limit
Oil and Grease	milligrams per litre				10
pH	pH				6.5-8.5
Total suspended solids	milligrams per litre				50

L3 Volume and mass limits

L3.1 For each discharge point or utilisation area specified below (by a point number), the volume/mass of:
a) liquids discharged to water; or;
b) solids or liquids applied to the area;
must not exceed the volume/mass limit specified for that discharge point or area.

Point	Unit of Measure	Volume/Mass Limit
1	kilolitres per day	12161
27	kilolitres per day	12161

L3.2 The volumetric daily discharge limit for the premises is the combined discharge measured at EPA discharge

points 1 and 27 and must not exceed 12161 kilolitres per day.

L4 Waste

L4.1 The licensee must not cause, permit or allow any waste to be received at the premises, except the wastes expressly referred to in the column titled “Waste” and meeting the definition, if any, in the column titled “Description” in the table below.
Any waste received at the premises must only be used for the activities referred to in relation to that waste in the column titled “Activity” in the table below.
Any waste received at the premises is subject to those limits or conditions, if any, referred to in relation to that waste contained in the column titled “Other Limits” in the table below.
This condition does not limit any other conditions in this licence.

Code	Waste	Description	Activity	Other Limits
NA	General or Specific exempted waste	Waste that meets all the conditions of a resource exemption under Clause 92 of the Protection of the Environment Operations (Waste) Regulation 2014.	As specified in each particular resource recovery exemption	NA

L5 Noise limits

L5.1 Noise generated at the premises that is measured at each noise monitoring point established under this licence must not exceed the noise levels specified in Column 4 of the table below for that point during the corresponding time periods specified in Column 1 when measured using the corresponding measurement parameters listed in Column 2.

POINT 12

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	49
Evening	Evening-LAeq (15 minute)	-	49
Night	Night-LAeq (15 minute)	-	49
Night	Night-LA1 (1 minute)	-	54

POINT 13

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	49
Evening	Evening-LAeq (15 minute)	-	49

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Night	Night-LAeq (15 minute)	-	49
Night	Night-LA1 (1 minute)	-	53

POINT 14

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	43
Evening	Evening-LAeq (15 minute)	-	43
Night	Night-LAeq (15 minute)	-	43
Night	Night-LA1 (1 minute)	-	49

POINT 16

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	36
Evening	Evening-LAeq (15 minute)	-	36
Night	Night-LAeq (15 minute)	-	36
Night	Night-LA1 (1 minute)	-	45

POINT 20

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	37
Evening	Evening-LAeq (15 minute)	-	37
Night	Night-LAeq (15 minute)	-	37
Night	Night-LA1 (1 minute)	-	45

POINT 23

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	46
Evening	Evening-LAeq (15 minute)	-	46
Night	Night-LAeq (15 minute)	-	46
Night	Night-LA1 (1 minute)	-	46

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POINT 9

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	38
Evening	Evening-LAeq (15 minute)	-	38
Night	Night-LAeq (15 minute)	-	38
Night	Night-LA1 (1 minute)	-	45

L5.2 The licensee must ensure that noise generated on the premises does not exceed:

a) 35 LAeq(15min) during the day, evening or night at any privately owned land nearest to the residence apart from those receivers identified in Condition 5.1; and
b) 45 LA1(1min) during the night at any privately owned land nearest to the residence apart from those receivers identified in Condition 5.1.

Note: The licensee may provide to the EPA written evidence of any agreement with a landholder which is subject to the above noise limits. The written evidence may be submitted with a licence variation to remove the landholder from the above tables.

L5.3 For the purpose of condition L5.1 and condition L5.2:
(a) Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sunday and public holidays;
(b) Evening is defined as the period 6pm to 10pm, and
(c) Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sunday and public holidays.

L5.4 The noise limits set out in condition L5.1 and condition L5.2 apply under all meterorological conditions except for any one of the following:
(a) Wind speeds greater than 3 metres/second at 10 metres above ground level; or
(b) Stability category F temperature inversion conditions and wind speeds greater than 2 metres/second at 10 metres above ground level; or
(c) Stability category G temperature inversion conditions.
(d) Or as defined under the NSW EPA Noise Policy for Industry 2017.

L5.5 For the purpose of condition L5.4:
(a) the meteorological data to be used for determining meteorological conditions is the data recorded at the meteorological station identified in this licence as EPA Identification Point 26.
(b) Stability category temperature inversion conditions are to be determined in accordance with the NSW EPA Noise Policy for Industry 2017.

Note: The weather station must be designed, commissioned and operated in a manner to obtain the necessary parameters required under the above condition.

L5.6 For the purpose of determining the noise generated at the premises the licensee must use a Class 1 or Class 2 noise monitoring device as defined by AS IEC61672.1 and AS IEC61672.2-2004, or other noise monitoring equipment accepted by the EPA in writing.

L5.7 To determine compliance:

1. With the $L_{Aeq(15\ min)}$ noise limits in condition L5.1 and condition L5.2, the licensee must locate noise monitoring equipment;

(a) within 30 metres of a dwelling facade (but not closer than 3 metres) where any dwelling on the property is situated more then 30 metres from the property boundary that is closest to the premises;

(b) approximately on the boundary where any dwelling is situated 30 metres or less from the property boundary that is closest to the premises, or, where applicable,

(c) within approximately 50 metres if the boundary of a national park or nature reserve.

2. With the LA1(1 minute) noise limits in condition L5.1 and L5.2, the noise monitoring equipment must be located within 1 metre of a dwelling facade.

3. With the noise limits in condition L5.1 and condition L5.2, the noise monitoring equipment must be located;

(a) at the most affected point at a location where there is no dwelling at the location, or

(b) at the most affected point within an area at a location prescribed by conditions L5.7 1(a) or L5.7 1(b).

L5.8 A non-compliance of condition L5.1 or condition L5.2 will still occur where noise generated from the premises in excess of the appropriate limit is measured;
a) at a location other than an area prescribed by conditions L5.7 1(a) and L5.7 1(b), and /or
b) at a point other than the most affected point at a location.

L5.9 For the purposes of determining the noise generated at the premises all applicable modification factors as described in the NSW EPA Noise Policy for Industry 2017 must be applied, as appropriate, to the noise levels measured by the noise monitoring equipment.

4 Operating Conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.
This includes:
a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

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O2 Maintenance of plant and equipment

O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:
a) must be maintained in a proper and efficient condition; and
b) must be operated in a proper and efficient manner.

O3 Dust

O3.1 The premises must be maintained in a condition which minimises or prevents the emission of dust on or from the premises.

O3.2 Activities occurring in or on the premises must be carried out in a manner that will minimise the generation of wind-blown or traffic generated dust.

O3.3 All trafficable areas, coal stockpile(s) and storage areas, and vehicle manoeuvring areas in or on the premises must be maintained, at all times, in a condition that will minimise the generation of dust.

O3.4 All vehicles transporting coal from the premises must be covered immediately after loading to prevent wind blown emissions and spillage.

Note: Vehicles transporting coal on the private haul road from Chain Valley Colliery to Vales Point Power station are exempt from covering their load if surface coal moisture is above 8%.

O3.5 Activities occuring in or on the premises must be carried out in a manner that will minimise the tracking of dust from the premises.

O4 Emergency response

Note: The licensee must maintain, and implement as necessary, a current Pollution Incident Response Management Plan (PIRMP) for the premises. The PIRMP must be developed in accordance with the requirements in Part 5.7A of the *Protection of the Environment Operations* (POEO) Act 1997 and POEO Regulations. The licensee must keep the incident response plan on the premises at all times. The incident response plan must document systems and procedures to deal with all types of incidents (e.g. spills, explosions or fire) that may occur at the premises or that may be associated with activities that occur at the premises and which are likely to cause harm to the environment. The PIRMP must be tested annually or following a pollution incident.

O5 Processes and management

Bunding

O5.1 All above ground tanks containing material that is likely to cause environmental harm must be bunded or have an alternative spill containment system in place.

O5.2 Bunds must:
a) have walls and floors constructed of impervious materials;
b) be of sufficient capacity to contain 110% of the volume of the tank (or 110% volume of the largest tank

where a group of tanks are installed);
c) have floors graded to a collection sump; and
d) not have a drain valve incorporated in the bund structure, or be constructed and operated in a manner that achieves the same environmental outcome.

O6 Waste management

O6.1 The licensee must ensure that any liquid and/or non liquid waste generated and/or stored at the premises is assessed in accordance with the EPA Waste Classification Guidelines as in force from time to time.

O6.2 The licensee must ensure that waste identified for recycling is stored separately from other waste.

5 Monitoring and Recording Conditions

M1 Monitoring records

M1.1 The results of any monitoring required to be conducted by this licence or a load calculation protocol must be recorded and retained as set out in this condition.

M1.2 All records required to be kept by this licence must be:
a) in a legible form, or in a form that can readily be reduced to a legible form;
b) kept for at least 4 years after the monitoring or event to which they relate took place; and
c) produced in a legible form to any authorised officer of the EPA who asks to see them.

M1.3 The following records must be kept in respect of any samples required to be collected for the purposes of this licence:
a) the date(s) on which the sample was taken;
b) the time(s) at which the sample was collected;
c) the point at which the sample was taken; and
d) the name of the person who collected the sample.

M2 Requirement to monitor concentration of pollutants discharged

M2.1 For each monitoring/discharge point or utilisation area specified below (by a point number), the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The licensee must use the sampling method, units of measure, and sample at the frequency, specified opposite in the other columns:

M2.2 Air Monitoring Requirements

POINT 25

Pollutant	Units of measure	Frequency	Sampling Method
Particulate matter	micrograms per cubic metre	Continuous	AM-22

M2.3 Water and/ or Land Monitoring Requirements

POINT 1

Pollutant	Units of measure	Frequency	Sampling Method
Biochemical oxygen demand	milligrams per litre	Once a month (min. of 4 weeks)	Grab sample
Oil and Grease	milligrams per litre	Once a month (min. of 4 weeks)	Grab sample
pH	pH	Once a month (min. of 4 weeks)	Grab sample
Total suspended solids	milligrams per litre	Once a month (min. of 4 weeks)	Grab sample

POINT 27

Pollutant	Units of measure	Frequency	Sampling Method
Oil and Grease	milligrams per litre	Daily during any discharge	Grab sample
pH	pH	Daily during any discharge	Grab sample
Total suspended solids	milligrams per litre	Daily during any discharge	Grab sample

M3 Testing methods - concentration limits

M3.1 Monitoring for the concentration of a pollutant emitted to the air required to be conducted by this licence must be done in accordance with:
a) any methodology which is required by or under the Act to be used for the testing of the concentration of the pollutant; or
b) if no such requirement is imposed by or under the Act, any methodology which a condition of this licence requires to be used for that testing; or
c) if no such requirement is imposed by or under the Act or by a condition of this licence, any methodology approved in writing by the EPA for the purposes of that testing prior to the testing taking place.

Note: The *Protection of the Environment Operations (Clean Air) Regulation 2022* requires testing for certain purposes to be conducted in accordance with test methods contained in the publication "Approved Methods for the Sampling and Analysis of Air Pollutants in NSW".

M3.2 Subject to any express provision to the contrary in this licence, monitoring for the concentration of a pollutant discharged to waters or applied to a utilisation area must be done in accordance with the Approved Methods Publication unless another method has been approved by the EPA in writing before any tests are conducted.

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M4 Environmental monitoring

Requirement to monitor noise

M4.1 To determine compliance with condition L5.1, attended noise monitoring must be undertaken in accordance with conditions L5.7 and L5.8, and

(a) at each one of the locations listed in condition L5.1;
(b) occur quarterly within the reporting period of the Environment Protection Licence with at least 2 months between monitoring periods;
(c) occur during each day, evening and night period as defined in the NSW Industrial Noise Policy (EPA 2000) for a minimum of 15 minutes for three of the quarters;
(d) the night time 15 minute attended monitoring in accordance with c) must be undertaken between the hours of 1am and 4am;
(e) the night time LA1 (1 min) attended monitoring in accordance with c) must be undertaken between the hours of 1am and 4am;
(f) one quarterly monitoring must occur during each day, evening and night period as defined in the NSW EPA Noise Policy for Industry 2017 for a minimum of 1.5 hours during the day; 30 minutes during the evening; and 1 hours during the night, and
(g) each quarterly monitoring must be undertaken on a different day(s) of the week not including Saturdays, Sundays and public holidays; and
(h) these monitoring conditions take effect in the 2015 Reporting period.

Note: The intention of this condition is that quarterly monitoring be undertaken at each sensitive receiver. That at each sensitive receiver monitoring is undertaken over a range of different days excluding weekends and public holidays during the reporting period so as to be representative of operating hours. That night time 15 minute attended monitoring and the LA1 (1min) monitoring for three of the quarters be undertaken at worst case being the most stable atmospheric conditions and when noise would be most intrusive to sleep. All of the sensitive receivers do not have to be monitored on the same day, evening and night for sub condition f.

M5 Weather monitoring

M5.1 At the point(s) identified below, the licensee must monitor (by sampling and obtaining results by analysis) the parameters specified in Column 1 of the table below, using the corresponding sampling method, units of measure, averaging period and sampling frequency, specified opposite in the Columns 2, 3, 4 and 5 respectively.

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POINT 26

Parameter	Sampling method	Units of measure	Averaging period	Frequency
Rainfall	AM-4	millimetres	24 hours	Continuous
Wind Direction at 10 metres	AM-2 & AM-4	Degrees	1 hour	Continuous
Wind Speed	AM-2 & AM-4	metres per second	1 hour	Continuous
Temperature at 10 metres	AM-4	degrees Celsius	1 hour	Continuous
Sigma theta	AM-2 & AM-4	Degrees	15 minutes	Continuous
Relative humidity	AM-4	percent	1 hour	Continuous

M5.2 The licensee may use the Vales Point Power Station Meteorological Station to determine compliance with condition M5.1, provided the licensee has authority from Sunset Power International Pty Ltd to access meteorological data at all times.

M6 Recording of pollution complaints

M6.1 The licensee must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies.

M6.2 The record must include details of the following:
a) the date and time of the complaint;
b) the method by which the complaint was made;
c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
d) the nature of the complaint;
e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and
f) if no action was taken by the licensee, the reasons why no action was taken.

M6.3 The record of a complaint must be kept for at least 4 years after the complaint was made.

M6.4 The record must be produced to any authorised officer of the EPA who asks to see them.

M7 Telephone complaints line

M7.1 The licensee must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.

M7.2 The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.

M7.3 The preceding two conditions do not apply until 3 months after: the date of the issue of this licence.

M7.4 The licensee must notify the EPA with contact details of personnel capable of a timely response to emergencies or any other exigent circumstances.
(a) the nominated contact must be available at all times.
(b) contact details must include a telephone number and must be current.
(c) such notification must be made within 14 days of receiving this licence.

M8 Requirement to monitor volume or mass

M8.1 For each discharge point or utilisation area specified below, the licensee must monitor:
a) the volume of liquids discharged to water or applied to the area;
b) the mass of solids applied to the area;
c) the mass of pollutants emitted to the air;
at the frequency and using the method and units of measure, specified below.

POINT 1

Frequency	Unit of Measure	Sampling Method
Continuous during discharge	kilolitres per day	In line instrumentation

POINT 27

Frequency	Unit of Measure	Sampling Method
Continuous during discharge	kilolitres per day	In line instrumentation

6 Reporting Conditions

R1 Annual return documents

R1.1 The licensee must complete and supply to the EPA an Annual Return in the approved form comprising:

1. a Statement of Compliance,
2. a Monitoring and Complaints Summary,
3. a Statement of Compliance - Licence Conditions,
4. a Statement of Compliance - Load based Fee,
5. a Statement of Compliance - Requirement to Prepare Pollution Incident Response Management Plan,
6. a Statement of Compliance - Requirement to Publish Pollution Monitoring Data; and
7. a Statement of Compliance - Environmental Management Systems and Practices.

At the end of each reporting period, the EPA will provide to the licensee notification that the Annual Return is due.

R1.2 An Annual Return must be prepared in respect of each reporting period, except as provided below.

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Note: The term "reporting period" is defined in the dictionary at the end of this licence. Do not complete the Annual Return until after the end of the reporting period.

R1.3 Where this licence is transferred from the licensee to a new licensee:
a) the transferring licensee must prepare an Annual Return for the period commencing on the first day of the reporting period and ending on the date the application for the transfer of the licence to the new licensee is granted; and
b) the new licensee must prepare an Annual Return for the period commencing on the date the application for the transfer of the licence is granted and ending on the last day of the reporting period.

Note: An application to transfer a licence must be made in the approved form for this purpose.

R1.4 Where this licence is surrendered by the licensee or revoked by the EPA or Minister, the licensee must prepare an Annual Return in respect of the period commencing on the first day of the reporting period and ending on:
a) in relation to the surrender of a licence - the date when notice in writing of approval of the surrender is given; or
b) in relation to the revocation of the licence - the date from which notice revoking the licence operates.

R1.5 The Annual Return for the reporting period must be supplied to the EPA via eConnect *EPA* or by registered post not later than 60 days after the end of each reporting period or in the case of a transferring licence not later than 60 days after the date the transfer was granted (the 'due date').

R1.6 The licensee must retain a copy of the Annual Return supplied to the EPA for a period of at least 4 years after the Annual Return was due to be supplied to the EPA.

R1.7 Within the Annual Return, the Statements of Compliance must be certified and the Monitoring and Complaints Summary must be signed by:
a) the licence holder; or
b) by a person approved in writing by the EPA to sign on behalf of the licence holder.

R2 Notification of environmental harm

Note: The licensee or its employees must notify all relevant authorities of incidents causing or threatening material harm to the environment immediately after the person becomes aware of the incident in accordance with the requirements of Part 5.7 of the Act.

R2.1 Notifications must be made by telephoning the Environment Line service on 131 555.

R2.2 The licensee must provide written details of the notification to the EPA within 7 days of the date on which they became aware of the incident.

R3 Written report

R3.1 Where an authorised officer of the EPA suspects on reasonable grounds that:
a) where this licence applies to premises, an event has occurred at the premises; or
b) where this licence applies to vehicles or mobile plant, an event has occurred in connection with the carrying out of the activities authorised by this licence, and the event has caused, is causing or is likely to cause

material harm to the environment (whether the harm occurs on or off premises to which the licence applies), the authorised officer may request a written report of the event.

R3.2 The licensee must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request.

R3.3 The request may require a report which includes any or all of the following information:
a) the cause, time and duration of the event;
b) the type, volume and concentration of every pollutant discharged as a result of the event;
c) the name, address and business hours telephone number of employees or agents of the licensee, or a specified class of them, who witnessed the event;
d) the name, address and business hours telephone number of every other person (of whom the licensee is aware) who witnessed the event, unless the licensee has been unable to obtain that information after making reasonable effort;
e) action taken by the licensee in relation to the event, including any follow-up contact with any complainants;
f) details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and
g) any other relevant matters.

R3.4 The EPA may make a written request for further details in relation to any of the above matters if it is not satisfied with the report provided by the licensee. The licensee must provide such further details to the EPA within the time specified in the request.

R4 Other reporting conditions

Noise Monitoring Report

R4.1 The licensee must submit to the EPA a noise compliance assessment report at the end of each reporting period. The report must be submitted with the Environment Protection Licence Annual Return. The report must be prepared by a suitably qualified and experienced acoustical consultant which:

(a) details the noise monitoring undertaken in accordance with condition M4;
(b) assesses compliance with noise limits presented in condition L5.1 and condition 5.2; and
(c) outlines any management actions taken within the monitoring period to address any exceedences of limits contained in condition L5.1 and condition L5.2.

Note: The licensee must provide the EPA with one report, but this report may be a combination of the monitoring undertaken by the licensee as part of their quarterly monitoring program as required by the Project Approval SSD-5456 and must include LA1(1min).

7 General Conditions

G1 Copy of licence kept at the premises or plant

G1.1 A copy of this licence must be kept at the premises to which the licence applies.

G1.2 The licence must be produced to any authorised officer of the EPA who asks to see it.

Environment Protection Licence

G1.3 The licence must be available for inspection by any employee or agent of the licensee working at the premises.

G2 Contact number for incidents and responsible employees

G2.1 The licensee must operate 24-hour telephone contact lines for the purpose of enabling the EPA to directly contact one or more representatives of the licensee who can:
a) respond at all times to incidents relating to the premises; and
b) contact the licensee's senior employees or agents authorised at all times to:
i) speak on behalf of the licensee; and
ii) provide any information or document required under this licence.

G2.2 The licensee is to inform the EPA in writing of the appointment of any subsequent contact persons, or changes to the person's contact details as soon as practicable and in any event within fourteen days of the appointment or change.

G3 Other general conditions

G3.1 **Completed Programs**

Program	Description	Completed Date
Coal Mine Particulate Matter Control Best Practice	Requires licensee to conduct a site specific Best Management Practice (BMP) determination to identify ways to reduce particle emissions.	28-September-2012
Assessment of Potential Impacts of Metals in wastewater	The licensee must conduct an assessment of metals detected in wastewater discharges from the mine in accordance with the ANZECC water quality guidelines. To obtain a greater understanding of the type and concentration of metals discharged in mine water and entering the receiving waters. To limit the concentration of metals discharged in mine water within ANZECC guidelines.	23-October-2013
Air Quality Monitoring	The licensee must evaluate best locations and install monitoring devices as defined in Project Approval MP10_0161 under the Environent Planning & Assessment Act 1979.	31-December-2013
PRP4 - Upgrade to Clean and Dirty Water Management System	The licensee must review and upgrade separation of the Clean and Dirty Water Management System and review and upgrade bunding.	14-August-2015
PRP5 - Remediation of Dam Wall and Spillway formalisation	The licensee must design and remediate the dam wall on the final control pond and formalise a spillway to prevent dam seepage and to ensure that volumetric discharge can be monitored	27-February-2015

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PRP 6 Upgrade to Sewage Treatment Systems	Assessment of options for improved disinfection of effluent from STP on licenced premises.	06-January-2015
PRP7 Sewage Treatment System Concept Design	Provide the EPA with a Concept Design and Timetable for Implementation of Upgrade to the Sewage Treatment System	19-February-2016
PRP 8 - Connection of Bathouse Wastewater to Sewer	Connection of Bathhouse to Central Coast Council Sewer.	14-July-2023
PRP 9 - Office Area Wastewater Sytem Upgrades to Best Practice	Office area wastewater treatment system upgrade to best practice.	27-July-2023

Environment Protection Licence

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Dictionary

General Dictionary

3DGM [in relation to a concentration limit]	Means the three day geometric mean, which is calculated by multiplying the results of the analysis of three samples collected on consecutive days and then taking the cubed root of that amount. Where one or more of the samples is zero or below the detection limit for the analysis, then 1 or the detection limit respectively should be used in place of those samples
Act	Means the Protection of the Environment Operations Act 1997
activity	Means a scheduled or non-scheduled activity within the meaning of the Protection of the Environment Operations Act 1997
actual load	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
AM	Together with a number, means an ambient air monitoring method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.
AMG	Australian Map Grid
anniversary date	The anniversary date is the anniversary each year of the date of issue of the licence. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
annual return	Is defined in R1.1
Approved Methods Publication	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
assessable pollutants	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
BOD	Means biochemical oxygen demand
CEM	Together with a number, means a continuous emission monitoring method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.
COD	Means chemical oxygen demand
composite sample	Unless otherwise specifically approved in writing by the EPA, a sample consisting of 24 individual samples collected at hourly intervals and each having an equivalent volume.
cond.	Means conductivity
environment	Has the same meaning as in the Protection of the Environment Operations Act 1997
environment protection legislation	Has the same meaning as in the Protection of the Environment Administration Act 1991
EPA	Means Environment Protection Authority of New South Wales.
fee-based activity classification	Means the numbered short descriptions in Schedule 1 of the Protection of the Environment Operations (General) Regulation 2009.
general solid waste (non-putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997

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flow weighted composite sample	Means a sample whose composites are sized in proportion to the flow at each composites time of collection.
general solid waste (putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environmen t Operations Act 1997
grab sample	Means a single sample taken at a point at a single time
hazardous waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
licensee	Means the licence holder describe d at the front of this licence
load calculation protocol	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
local authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
material harm	Has the same meaning as in section 147 Protection of the Environment Operations Act 1997
MBAS	Means methylene blue active substances
Minister	Means the Minister administering the Protection of the Environment Operations Act 1997
mobile plant	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
motor vehicle	Has the same meaning as in the Protection of the Environment Operations Act 1997
O&G	Means oil and grease
percentile [in relation to a concentration limit of a sample]	Means that percentage [eg.50%] of the number of samples taken that must meet the concentration limit specified in the licence for that pollutant over a specified period of time. In this licence, the specified period of time is the Reporting Period unless otherwise stated in this licence.
plant	Includes all plant within the meaning of the Protection of the Environment Operations Act 1997 as well as motor vehicles.
pollution of waters [or water pollution]	Has the same meaning as in the Protection of the Environment Operations Act 1997
premises	Means the premises described in condition A2.1
public authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
regional office	Means the relevant EPA office referred to in the Contacting the EPA document accompanying this licence
reporting period	For the purposes of this licence, the reporting period means the period of 12 months after the issue of the licence, and each subsequent period of 12 mo nths. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
restricted solid waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
scheduled activity	Means an activity listed in Schedule 1 of the Protection of the Environment Operations Act 1997
special waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
TM	Together with a number, means a test method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.

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TSP	Means total suspended particles
TSS	Means total suspended solids
Type 1 substance	Means the elements antimony, arsenic, cadmium, lead or mercury or any compound containing one or more of those elements
Type 2 substance	Means the elements beryllium, chromium, cobalt, manganese, nickel, selenium, tin or vanadium or any compound containing one or more of those elements
utilisation area	Means any area shown as a utilisation area on a map submitted with the application for this licence
waste	Has the same meaning as in the Protection of the Environment Operations Act 1997
waste type	Means liquid, restricted solid waste, general solid waste (putrescible), general solid waste (non-putrescible), special waste or hazardous waste
Wellhead	Has the same meaning as in Schedule 1 to the Protection of the Environment Operations (General) Regulation 2021.

Ms Debbie Maddison

Environment Protection Authority

(By Delegation)

Date of this edition: 10-November-2000

Environment Protection Licence

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End Notes

1	Licence varied by notice 1008662, issued on 24-Oct-2001, which came into effect on 24-Oct-2001.
2	Licence transferred through application 141163, approved on 24-Apr-2002, which came into effect on 20-Apr-2002.
3	Licence varied by notice 1026573, issued on 16-Apr-2003, which came into effect on 11-May-2003.
4	Condition A1.3 Not applicable varied by notice issued on <issue date> which came into effect on <effective date>
5	Licence varied by notice 1104492, issued on 11-Dec-2009, which came into effect on 11-Dec-2009.
6	Licence varied by notice 1502571 issued on 21-Dec-2011
7	Licence varied by notice 1504446 issued on 15-Apr-2013
8	Licence varied by notice 1516485 issued on 20-Aug-2013
9	Licence varied by notice 1519380 issued on 26-Sep-2014
10	Licence varied by notice 1527706 issued on 15-May-2015
11	Licence varied by notice 1535160 issued on 30-Oct-2015
12	Licence varied by notice 1540199 issued on 08-Jun-2016
13	Licence transferred through application 1578021 approved on 01-Apr-2019 , which came into effect on 02-Apr-2019
14	Licence varied by notice 1593319 issued on 30-Sep-2021
15	Licence varied by notice 1616944 issued on 24-Feb-2022
16	Licence varied by notice 1621580 issued on 10-Aug-2022
17	Licence varied by notice 1626724 issued on 01-Mar-2023
18	Licence varied by notice 1629248 issued on 05-Jun-2023
19	Licence varied by notice 1633178 issued on 24-Oct-2023
20	Licence varied by notice 1643378 issued on 26-Nov-2024
21	Licence format updated on 09-Apr-2025

Appendix 3: Seagrass Monitoring Report (2025)

DELTA POWER and ENERGY

Annual seagrass survey of Chain Valley Bay, Summerland Point, Bardens Bay and Crangan Bay, Lake Macquarie, NSW



by Dr Emma Laxton

June 2025

J.H. & E.S. Laxton - Environmental Consultants P/L

1. Executive Summary

Seagrass monitoring is a requirement of Development Consent SSD-5465. The extraction plan prepared by Delta Power and Energy was designed to ensure there will be negligible changes in the size, distribution and functioning of seagrass beds, and negligible changes to the composition or distribution of seagrass species within the seagrass beds. The seagrass survey was conducted on 6th, 12th, 16th and 17th June 2025. Fifty-three transects were photographed, six control transects located along Crangan Bay and Frying Pan Bay and 47 impact transects off Chain Valley Bay, Summerland, Bardens Bay and Sugar Bay, Lake Macquarie.

Zostera capricorni has two growth forms in Lake Macquarie, namely short and long leaf growth forms. During the June 2025 survey, the average leaf lengths of *Zostera capricorni* were less than 100 mm at twelve transects, between 100 mm and 300 mm at 36 transects, and had leaf lengths greater than 300 mm at five transects. The average leaf length of *Zostera capricorni* was 175.4 mm off Chain Valley Bay, 124.2 mm off the northern shore of Summerland Point and Frying Pan Bay, 176.4 mm off the western shore of Summerland Point, 220 mm along Sugar Bay and 183.1 mm off Bardens Bay. The average length of *Zostera capricorni* off Crangan Bay was 85.8 mm.

Seagrasses provide a substrate for algae, which can have positive and negative effects depending on the extent of fouling. In the June 2025 survey, 48 of the 53 transects had seagrasses that were lightly fouled by algae, four transects had light to moderate fouling, and one transect had some seagrasses that were heavily fouled. The algae were either growing on the seagrasses or had formed thin mats on top of the seagrasses. The condition of the seagrasses in the study area were in fair to good condition at the time of sampling.

Two species of seagrass were identified in the study area, *Zostera capricorni* and *Halophila ovalis*. *Zostera capricorni* was found along the length of the transects. *Halophila ovalis* was found predominantly in shallower waters and nestled amongst less dense patches of *Zostera capricorni*. In June 2025, the average total seagrass coverage was 78.7% along Chain Valley Bay, 83.7% along the northern shore of Summerland Point and Frying Pan Bay, 83.8% along the western shore of Summerland Point, and 81.5% along Bardens Bay. Sugar Bay and Sunshine had an average total seagrass coverage of 87.1%, and the total average seagrass coverage off Crangan Bay was 87.1%. The transects with the lowest coverage of seagrass were E14 (30.3%), E6 (52.5%), L1 (65.8%) and E5 (68%).

Six species of alga were recorded in the study area, namely *Cystoseira trinodis* (synonym

Cystophyllum onustum), *Sargassum sp, Codium fragile*, *Corallina officinalis*, *Caulerpa taxifolia* and free-floating sea lettuce (Ulvaceae). *Codium fragile* and *Caulerpa taxifolia* did not occur commonly within the transects. The highest percentage cover of *Cystoseira trinodis* ranged from 1.9% at E1 to 5.2% at E6.

The percentage of bare ground or area not occupied by seagrass has increased throughout the study area since 2024. The average percentage of bare ground along the transects located off Chain Valley Bay was 20.5%. Along the northern shore of Summerland Point and Frying Pan Bay the average percentage of bare ground was 15.7%. The average percentage of bare ground or area not occupied by seagrasses was 16% along the western shore of Summerland Point, 16.3% along Bardens Bay, and 12.6% along Sugar Bay and Sunshine. The average percentage of bare ground along the transects off Crangan Bay was 10.4%.

Seagrass cover has decreased throughout the study area. Comparisons between the annual seagrass surveys of 2024 and 2025 show a decrease in percentage cover of seagrasses at thirteen out of sixteen transects in Chain Valley Bay, seven out of nine transects along the northern shore of Summerland Point and Frying Pan Bay, six out of nine transects off the western shore of Summerland Point, five out of seven transects in Bardens Bay, and three out of six transects along Sugar Bay and Sunshine. There was a slight decrease in percentage cover of seagrasses at all four transects in Crangan Bay. Factors that are causing the decline in seagrass coverage include deposition of sediment on seagrass beds, presence of mussels within the transects, and the scouring of seagrass beds by boat hulls and anchors.

In June 2025, there was no evidence that underground mining activities were impacting the composition of seagrass species in the study area. The composition of seagrass species growing within the transects was consistent with the composition of seagrass species recorded during the seagrass surveys of 2023 and 2024.

At the time of the survey, there was no evidence that underground mining activities were having an impact on the size and distribution of seagrass species in the study area. The size and distribution of seagrass beds had not changed significantly since 2024. An exception to this was transect E14 where sea floor sand had been deposited on the seagrass beds decreasing the length of the transect.

The physical characteristics of the waters above the seagrass beds in the study area were measured at the time of the survey. Water temperature ranged from 15.66^{o}C to 19.13^{o}C, with a mean water temperature of 17.62^{o}C. Conductivity ranged from 40.52 mS/cm to 46.95 mS/cm.

Mean conductivity was 44.23 mS/cm. Salinity ranged from 25.88 ppt to 30.50 ppt. Mean salinity was 28.54 ppt. pH ranged from 7.57 to 7.95, mean pH was 7.78. Dissolved oxygen (% saturation) ranged from 68.0% to 101.2%. Average dissolved oxygen was 87.4% saturation. Oxidation reduction potential ranged from 389 mV to 565 mV with an average of 443 mV. Turbidity ranged from 2.4 NTU to 19.8 NTU, with a mean of 5.75 NTU.

Rainfall in the months preceding the survey of June 2025 was 66.8 mm, 38.2 mm, 137.6 mm, 228 mm and 448 mm for January, February, March, April and May 2025 respectively (Cooranbong Lake Macquarie AWS No. 061412). By 12th June a further 6.4 mm had fallen in the catchment. The influx of freshwater into Lake Macquarie has reduced the salinity of Lake Macquarie from an average of 37.16 ppt in June 2023, 34.39 ppt in September 2024, 31.32 ppt in May 2025 and 28.54 ppt in June 2025.

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3. Introduction

Lake Macquarie is the largest saline lake in New South Wales. It lies on the Central Coast between Sydney and Newcastle within the local government areas of Central Coast Council and Lake Macquarie Council. Lake Macquarie has a catchment of 700 square kilometers and a water surface area of 125 square kilometers (Bell & Edwards, 1980). The average depth of the lake is 8 metres (26 ft), with a maximum depth of 15 metres (49 ft). The lake has a permanent entrance to coastal waters at Swansea, and a shore length of approximately 174 kilometres.

Lake Macquarie contains approximately ten percent of the total area of seagrass beds in NSW (DPI 2007). Four species of seagrass occur in the lake, namely *Zostera capricorni* (eelgrass), *Halophila ovalis* (paddle weed), *Posidonia australis* and *Ruppia. Posidonia australis* is listed as an endangered species under the Fisheries Management Act, 1994.

The catchment of Lake Macquarie is largely rural with large areas of bushland and grazing land. The shoreline of Lake Macquarie is heavily urbanized, especially the eastern, western and northern shorelines. The region has a relatively long history of coal mining and power generation, with mining occurring since the late 1800s and the first power station at Lake Macquarie commencing operations in 1958.

Chain Valley Colliery is situated on the southern shores of Lake Macquarie near Mannering Park, NSW. The mine has been operating since 1963. Mining is continuing within the Chain Valley Coal Lease Area using the miniwall method. Prior to mining, there were three economically viable seams in the lease area, namely the Wallarah seam (not mined since 1997), the Great Northern seam, and the Fassifern seam. In 2018 Chain Valley Colliery went into voluntary receivership and was taken over by Great Southern Energy Pty Ltd (trading as Delta Coal) to provide coal for Vales Point Power Station.

Delta Power and Energy P/L is currently mining the Fassifern Seam beneath Lake Macquarie. To protect the lake foreshore, a protection zone has been established as part of the Extraction Plan. This zone, known as the High Water Mark (HWM) Subsidence Barrier, was calculated using a 35° angle of draw from the depth of mining. The zone is approximately 130 meters wide (Figure 1.1).

J.H. & E.S. Laxton – Environmental Consultants P/L was engaged to assess the potential effects of underground mining on seagrasses in Lake Macquarie. The mine is currently undertaking first workings. Ongoing monitoring of seagrasses is a requirement of Development Consent SSD-5465 (Modification 3), Schedule 4, Condition 7(i) and Schedule 4, Table 8, which states:

"7. The Applicant must prepare an Extraction Plan for all second workings on site, to the satisfaction of the Planning Secretary. Each Extraction Plan must:

(i) Include a Seagrass 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 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 8 are met."

The subsidence impact performance measures relevant to seagrass beds contained in Table 8 are as follows:

- "Negligible environmental consequences including:
  - Negligible change in the size and distribution of seagrass beds;
  - Negligible change in the functioning of seagrass beds; and
  - Negligible change to the composition of distribution of seagrass species within seagrass beds."

The annual seagrass survey was conducted on the 6th, 12th, 16th and 17th June 2025.

4. Methods

Fifty-three transects were photographed in June 2025. At each transect the following procedure was carried out:

- A GPS unit was used to locate the inner and outer extent of the seagrass beds.
- A weighted line was used to measure water depth.
- A water quality profile from surface to bottom was measured using a calibrated Yeo-Kal 618 Water Quality Analyser. Water temperature, conductivity, salinity, pH, ORP, dissolved oxygen, turbidity and depth were measured. Each line of data was stored in the memory of the machine.
- Leaf length of *Zostera capricorni* was measured in the field. Leaves were selected randomly along the transect and measured with a ruler. Leaf length was recorded. This

method was adopted to reduce damage to the seagrass and prevent any negative impacts on the seagrass beds.

- A GoPro video camera was used to video the seagrass beds from the outer extent to the inner extent.

In the laboratory, the video was examined by viewing still frames approximately every 0.5m along the transect. The following information was recorded:

- The transect number and the date the video was taken.
- The percentage areas occupied by the following plants in each still photograph:
  - (a) % area occupied by long leaved seagrass *Zostera capricorni*;
  - (b) % area occupied by short leaved seagrass *Zostera capricorni*;
  - (c) % area occupied by the small seagrass *Halophila ovalis*;
  - (d) degree of fouling of the seagrass leaves by algae (0=light fouling, 1=moderate fouling, 2=heavy fouling);
  - (e) % area occupied by the large brown alga *Cystoseira trinodis*;
  - (f) % area occupied by the green alga *Codium fragile* or *Codium mamillosum*;
  - (g) % area occupied by filamentous and thallous algae (green, red or brown algae);
  - (h) % area occupied by the invasive alga *Caulerpa taxifolia*;
  - (i) % area of uncolonised ground (bare ground, no macroscopic epibenthos).

5. Monitoring Points

Figure 5.1 shows the CVC SSD-5465 Consent Boundary and the location of the seagrass transects photographed during the June (Winter) 2025 survey. Transects were located in Bardens Bay, Sugar Bay, off Sunshine, Frying Pan Bay, Summerland Point, Chain Valley Bay and Crangan Bay. Fifty-three transects were photographed:

- Transects C1 to C4 are established control stations in Crangan Bay
- Transects E1 to E16 are established experimental transects in Chain Valley Bay and Summerland Point
- Transects T1 to T8 are established experimental transects along Summerland Point
- Transect L1 was established in Chain Valley Bay in 2015 and is in vicinity of Vales Point Power Station

- Transects A1 to A6 are establised experimental stations in Bardens Bay. They were first surveyed in 2014
- Transects C5 to C6 were established in 2018
- Transects F1 to F7 are established experimental transects along Summerland Point, established in 2018, and
- Transects S1 to S6 are established experimental transects in Sugar Bay, also established in 2018.
- Transects S7 to S9 were established in July 2024 off Sunshine.



Figure 5.1 Locations of seagrass monitoring transects, Lake Macquarie

6. Results

A. Leaf length

In Lake Macquarie, due to environmental factors, *Zostera capricorni* has either short leaf (Plate A.2) or long leaf growth form (Plate A.5). At the time of survey, the average leaf lengths of *Zostera capricorni* were less than 100 mm at twelve transects, between 100 mm and 300 mm at 36 transects, and had leaf lengths greater than 300 mm at five transects.

The average leaf length of *Zostera capricorni* off Chain Valley Bay was 175.4 mm, with averages ranging from 122.7 mm at transect E12 to 312.8 mm at transect E16. The average length of *Zostera capricorni* off the northern shore of Summerland Point and Frying Pan Bay was 124.2 mm, with averages ranging from 29.5 mm at transect F6 to 278.8 mm at F2. The average length of *Zostera capricorni* off the western shore of Summerland Point was 176.4 mm, with averages ranging from 83.7 mm at T2 to 292.6 mm at T5. The average leaf length of *Zostera capricorni* along Sugar Bay was 220 mm, with averages ranging from 53.4 mm at S8 to >400 mm at transects S1, S2 and S3. The average leaf length of *Zostera capricorni* along Bardens Bay was 183.1 mm, with averages ranging from 104.4 mm at A6 to 266.9 mm at A4. The average length of *Zostera capricorni* off Crangan Bay was 85.8 mm, with averages from 70.5 mm at transect C1 to 98.6 mm at C4 (Table 6A.1).

The short-leaf growth form of *Zostera capricorni* is likely an adaptation to sea and weather conditions. The seagrass beds in the study area are subjected to frequent moderate wind and wave action. Wind and wave action has the potential to cause physical damage to the plants, especially those with very long leaves in shallow waters and unprotected environments. Short-leaved *Zostera capricorni* seem better adapted to these weather conditions.

The sediments in the water column following rainfall events and the redistribution of sand from the sea floor due to strong currents, wind and wave action can result in the deposition of sediments onto seagrass beds. Seagrasses, especially those with a short-leaf growth form, are at risk of being smothered under these conditions which can reduce the extent and percentage cover of seagrasses.

Rainfall, wind and wave action can also increase water turbidity. Water turbidity reduces light penetration and can cause stress to the seagrasses by affecting photosynthesis. Short-leaved seagrasses that are normally closer to shore may be better adapted to periodic high turbidity.

Table 6A.1 Average leaf length in millimeters of *Zostera capricorni*, June 2025

Chain Valley Bay

	E1	E2	E3	E4	L1	E5	E6	E8	E9
Average leaf length (mm)	208.3	130.2	252.5	149.7	288.4	124.9	185.2	228.4	184.4

	E10	E11	E12	E13	E14	E15	E16	Average
Average leaf length (mm)	148.2	185.3	122.7	171.7	150.0	137.0	312.8	**175.4**

Northern Shore Summerland Point and Frying Pan Bay

	C5	C6	F1	F2	F3	F4	F5	F6	F7	Average
Average leaf length (mm)	160.0	138.1	220.3	278.8	108.6	105.3	41.7	29.5	**35.6**	**124.2**

Western Shore Summerland Point

	E7	T1	T2	T3	T4	T5	T6	T7	T8	Average
Average leaf length (mm)	148.4	110.0	83.7	92.9	136.9	292.6	181.0	211.32	331.1	**176.4**

Sugar Bay

	S1	S2	S3	S4	S5	S6	S7	S8	S9	Average
Average leaf length (mm)	>400	>400	>400	107.1	195.0	86.4	279.0	53.4	59.5	**220.0**

Bardens Bay

	A1	A2	A3	A4	A5	A6	Average
Average leaf length (mm)	209.7	211.0	192.9	266.9	113.9	104.4	**183.1**

Crangan Bay

	C1	C2	C3	C4	Average
Average leaf length (mm)	70.5	85	98.6	88.9	**85.8**

B. Fouling

Seagrasses provide a substrate for algae, which can have positive and negative effects on the seagrasses depending on the extent of fouling. In this study, fouling is described as Light (Level 0), Moderate (Level 1) or Heavy (Level 2) (Plates A.2- A.7, Appendix A).

In June 2025, 48 of the 53 transects had seagrasses that were lightly fouled by algae. Four transects had light to moderate fouling (L1, E15, E16 and S9) and one transect (F2) had some seagrasses that were heavily fouled (Appendix C).

The condition of the seagrasses in the study area were in fair to good condition at the time of sampling. Some seagrasses (L1, E6) showed signs of stress due to poor water clarity, turbidity and wave action.

C. Coverage

In June 2025, two species of seagrass were identified in the study area, *Zostera capricorni* and *Halophila ovalis* (Plate A.1). *Zostera capricorni* was found along the length of the transects. *Halophila ovalis* was found predominantly in shallower waters and nestled amongst less dense patches of *Zostera capricorni*. The findings were as follows:

- Chain Valley Bay had slightly lower percentage coverage of total seagrass compared to the other regions at the time of the survey. The transects with the lowest coverage of seagrass were E14 (30.3%), E6 (52.5%), L1 (65.8%) and E5 (68%).
    - The average total seagrass coverage along Chain Valley Bay was 78.7%, with ranges from 30.3% at E14 to 94.0% at E3 (Table 6C.1).
    - The average total seagrass coverage along the northern shore of Summerland Point and Frying Pan Bay was 83.7%, with ranges from 71.9% at F5 to 93.4% at F3 (Table 6C.2).
    - Along the western shore of Summerland Point the average total seagrass coverage was 83.8%, with ranges from 78.0% at T2 to 90.8% at T7 (Table 6C.3).
    - The average total seagrass coverage along Bardens Bay was 81.5%, with ranges in percentage cover from 69.3% at A1 to 91.5% at A3 (Table 6C.4).
    - Sugar Bay and Sunshine had an average total seagrass coverage of 87.1%, with ranges from 71.4% at S6 and 96.3% at S1 (Table 6C.5).
    - The total average seagrass coverage off Crangan Bay was 87.1%, with ranges from 77.2% at C1 to 91.5% at C2 (Table 6C.6).

- At the time of the survey, Chain Valley Bay had the lowest percentage coverage of *Zostera capricorni* compared to the other regions.
    - The average coverage of *Zostera capricorni* along Chain Valley Bay was 76.0%, with the lowest coverages of *Zostera* at E14 (26.4%) and E6 (48.9%) and the highest coverages of *Zostera capricorni* at transects E9 (93.7%), E2 (92.9%) and E8 (90.4%) (Table 6C.1).
    - The average percentage coverage of *Zostera capricorni* along the northern shore of Summerland Point and Frying Pan Bay was 82.4%, with ranges from 70.4% at transect F5 to 91.4% at transect F1 (Table 6C.2).
    - Along the western shore of Summerland Point the average coverage of *Zostera* was 82.2%, with the lowest coverage at transects T2 (76.1%), T1 (76.8%) and T5 (78.5%) and the highest coverage of *Zostera* at T7 (90.1%), T8 (87.8%) and T4 (86.9%) (Table 6C.3).
    - Along Bardens Bay the average coverage of *Zostera capricorni* was 78.5%, with ranges from 67.1% at transect A6 to 91.5% at transect A3 (Table 6C.4).

- Sugar Bay and Sunshine had an average coverage of *Zostera capricornia* of 84.5%. The lowest percentage cover was at S6 (68.9%) and the highest was at S1 (96.2%) (Table 6C.5).
- At the time of the survey, the average coverage of *Zostera* was 84.9% at Crangan Bay, with the lowest percentage cover at C1 (72.1%) and the highest at C2 (90.8%) (Table 6C.6).

- *Halophila* was found growing close to shore throughout the study area. The transects with the highest percentage coverage of *Halophila ovalis* were E4 (19.6%), A6 (8.8%), S9 (7.6%), A5 (6.8%), T1 (5.5%) and S2 (5.4%).

- Six species of alga were recorded within the transects during the June 2025 survey, namely *Cystoseira trinodis* (synonym *Cystophyllum onustum*), *Sargassum sp*, *Codium fragile*, *Corallina officinalis*, *Caulerpa taxifolia* and free-floating sea lettuce (Ulvaceae). The invasive marine algae *Caulerpa taxifolia*, *Codium fragile* and Ulva were rarely encountered during this survey.
  - The transects with the highest percentages of *Cystoseira trinodis* were C1 (5.2%), E4 (4.6%), F2 (2.0%) and E1 (1.9%).
  - *Codium* was observed within transect E9 only.
  - The transects with the highest percentage coverage of other algal species (predominantly *Sargassum*) were E12 (3.2%), A2 (2.1%) and A1 (1.8%) (Table 6C.1).

- The percentage of bare ground or area not occupied by seagrass has increased throughout the study area since 2024 (Appendix C, Table C.2).
  - The average percentage of bare ground along the transects located off Chain Valley Bay was 20.5%. The highest percentages of bare ground were located at transects E14 (69.7%), L1 (34.1), E15 (22.9%) and E16 (16.2%) (Table 6C.1).
  - Along the northern shore of Summerland Point and Frying Pan Bay the average percentage of bare ground was 15.7%. The highest percentages of bare ground were at transects F5 (28.1%), F7 (20.7%), F2 (19.5%), F4 (19.3%) and C6 (19.0%) (Table 6C.2).
  - Along the western shore of Summerland Point the average percentage of bare ground or area not occupied by seagrasses was 16%. The transects with the highest

percentage of bare ground were T2 (21.7%), T5 (20.7%), E7 (19.1%), T6 (18.7%) and T1 (16.6%) (Table 6C.3).

- The average percentage of bare ground along Bardens Bay was 16.3%, with the highest percentage of bare ground at transects A1 (23.6%), A6 (22.5%), A5 (18.7%) and A2 (13.5%) (Table 6C.4).
- Along Sugar Bay and Sunshine the average percentage of bare ground was 12.6%. The transects with the highest percentage of bare ground were S6 (27.6%), S5 (20.2%), S7 (20.1%) and S9 (19.6%) (Table 6C.5).
- The average percentage of bare ground along the transects off Crangan Bay was 10.4%. Transects C1 and C3 had the highest percentages of bare ground, 14.0% and 10.0% respectively (Table 6C.6).

Table 6C.1 Average percent area cover of substratum by seagrasses and algae – Chain Valley Bay

Percent Area	E1	E2	E3	E4	L1	E5	E6	E8	E9
Seagrasses									
Zostera	78.5	82.1	92.9	66.2	62.8	67.0	48.9	90.4	93.7
Halophila	4.7	1.3	1.1	19.6	3.0	1.0	3.6	1.1	0.5
Total	**83.2**	**83.5**	**94.0**	**85.8**	**65.8**	**68.0**	**52.5**	**91.5**	**94.2**
Algae									
Cystoseira	1.9	0.8	0.0	4.6	0.1	0.1	0.2	0.0	0.7
Codium	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	**1.9**	**0.8**	**0.0**	**4.6**	**0.1**	**0.1**	**0.2**	**0.0**	**0.8**
Bare ground	**14.9**	**15.8**	**6.0**	**9.6**	**34.1**	**31.9**	**47.2**	**8.5**	**5.0**

Percent Area	E10	E11	E12	E13	E14	E15	E16	Average
Seagrasses								
Zostera	89.2	91.1	81.3	86.0	26.4	75.4	83.6	76.0

Halophila	0.6	0.0	1.5	0.5	3.9	1.5	0.1	2.8
Total	**89.8**	**90.8**	**82.8**	**86.5**	**30.3**	**77.0**	**83.7**	**78.7**
Algae								
Cystoseira	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.5
Codium	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	3.2	0.0	0.0	0.0	0.0	0.2
Total	**0.0**	**0.0**	**3.2**	**0.1**	**0.0**	**0.1**	**0.1**	**0.8**
Bare ground	**10.2**	**9.2**	**14.0**	**13.5**	**69.7**	**22.9**	**16.2**	**20.5**

Table 6C.2 Average percent area cover of substratum by seagrasses and algae - northern shore Summerland Point and Frying Pan Bay

Percent Area	**C5**	**C6**	**F1**	**F2**	**F3**	**F4**	**F5**	**F6**	**F7**	**Average**
Seagrasses										
Zostera	91.1	78.8	91.4	78.3	92.7	79.7	70.4	85.0	74.3	82.4
Halophila	0.6	0.0	0.2	0.1	0.7	1.0	1.4	2.5	4.9	1.3
Total	**91.7**	**78.8**	**91.6**	**78.4**	**93.4**	**80.7**	**71.9**	**87.5**	**79.3**	**83.7**
Algae										
Cystoseira	0.0	1.2	0.1	2.0	0.0	0.0	0.0	0.0	0.0	0.4
Codium	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other algae	0.0	1.0	0.0	0.1	0.7	0.0	0.0	0.0	0.0	0.2
Total	**0.0**	**2.2**	**0.1**	**2.1**	**0.7**	**0.0**	**0.0**	**0.0**	**0.0**	**0.6**
Bare ground	**8.3**	**19.0**	**8.3**	**19.5**	**5.9**	**19.3**	**28.1**	**12.5**	**20.7**	**15.7**

Table 6C.3 Average percent area cover of substratum by seagrasses and algae - western shore Summerland Point

Percent Area	E7	T1	T2	T3	T4	T5	T6	T7	T8	Average
Seagrasses										
Zostera	79.6	76.8	76.1	84.8	86.9	78.5	79.6	90.1	87.8	82.2
Halophila	1.3	5.5	1.9	0.6	0.8	0.7	1.8	0.7	0.8	1.6
Total	**80.9**	**82.3**	**78.0**	**85.4**	**87.6**	**79.1**	**81.3**	**90.8**	**88.6**	**83.8**
Algae										
Cystoseira	0.0	0.3	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.1
Codium	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Total	**0.0**	**1.0**	**0.2**	**0.0**	**0.1**	**0.1**	**0.0**	**0.0**	**0.0**	**0.2**
Bare ground	**19.1**	**16.6**	**21.7**	**14.6**	**12.2**	**20.7**	**18.7**	**9.2**	**11.4**	**16.0**

Table 6C.4 Average percent area cover of substratum by seagrasses and algae – Bardens Bay

Percent Area	A1	A2	A3	A4	A5	A6	Average
Seagrasses							
Zostera	69.2	83.3	91.5	86.2	73.8	67.1	78.5
Halophila	0.1	0.0	0.0	2.2	6.8	8.8	3.0
Total	**69.3**	**83.3**	**91.5**	**88.3**	**80.6**	**75.8**	**81.5**
Algae							
Cystoseira	5.2	1.0	0.4	0.0	0.5	1.6	1.5
Codium	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	1.8	2.1	0.3	0.0	0.2	0.1	0.8
Total	**7.1**	**3.2**	**0.7**	**0.0**	**0.7**	**1.6**	**2.2**
Bare ground	**23.6**	**13.5**	**7.8**	**11.7**	**18.7**	**22.5**	**16.3**

Table 6C.5 Average percent area cover of substratum by seagrasses and algae – Sugar Bay and Sunshine

Percent Area	S1	S2	S3	S4	S5	S6	S7	S8	S9	Average
Seagrasses										
Zostera	96.2	89.0	95.0	90.8	77.7	68.9	77.7	91.9	73.3	**84.5**
Halophila	0.1	5.4	0.2	0.3	1.9	2.7	2.1	3.4	7.6	2.6
Total	**96.3**	**94.4**	**95.2**	**91.1**	**79.6**	**71.4**	**79.9**	**95.3**	**80.4**	**87.1**
Algae										
Cystoseira	0.9	0.0	0.0	0.0	0.1	0.7	0.0	0.1	0.0	0.2
Codium	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.4	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.1
Total	**1.3**	**0.0**	**0.0**	**0.0**	**0.1**	**1.0**	**0.0**	**0.1**	**0.0**	**0.3**
Bare ground	**2.4**	**5.6**	**4.8**	**8.9**	**20.2**	**27.6**	**20.1**	**4.6**	**19.6**	**12.6**

Table 6C.6 Average percent area cover of substratum by seagrasses and algae – Crangan Bay

Percent Area	C1	C2	C3	C4	Average
Seagrasses					
Zostera	72.1	90.8	88.5	88.2	84.9
Halophila	5.1	0.7	1.4	1.4	2.2
Total	**77.2**	**91.5**	**89.9**	**89.6**	**87.1**
Algae					
Cystoseira	8.5	0.7	0.1	0.5	2.5
Codium	0.0	0.0	0.0	0.0	0.0
Other	0.3	0.0	0.0	0.0	0.1
Total	**8.8**	**0.7**	**0.1**	**0.5**	**2.5**
Bare ground	**14.0**	**7.7**	**10.0**	**9.9**	**10.4**

Figures 6C.1 to 6C.6 show annual changes in percentage cover of seagrasses in the study area. Numerical values are presented in Appendix C. Seagrass cover has decreased throughout the study area. Comparisons between the annual seagrass surveys of 2024 and 2025 show a decrease in percentage cover of seagrasses at:

- Thirteen out of sixteen transects in Chain Valley Bay (Figure 6C.1).
- Seven out of nine transects along the northern shore of Summerland Point and Frying Pan (Figure 6C.2).
- Six out of nine transects off the western shore of Summerland Point (Figure 6C.3).
- Five out of seven transects in Bardens Bay (Figure 6C.4).
- Three out of six transects along Sugar Bay and Sunshine (Figure 6C.5); and
- There was a slight decrease in percentage cover of seagrasses at all four transects in Crangan Bay (Figure 6C.6).

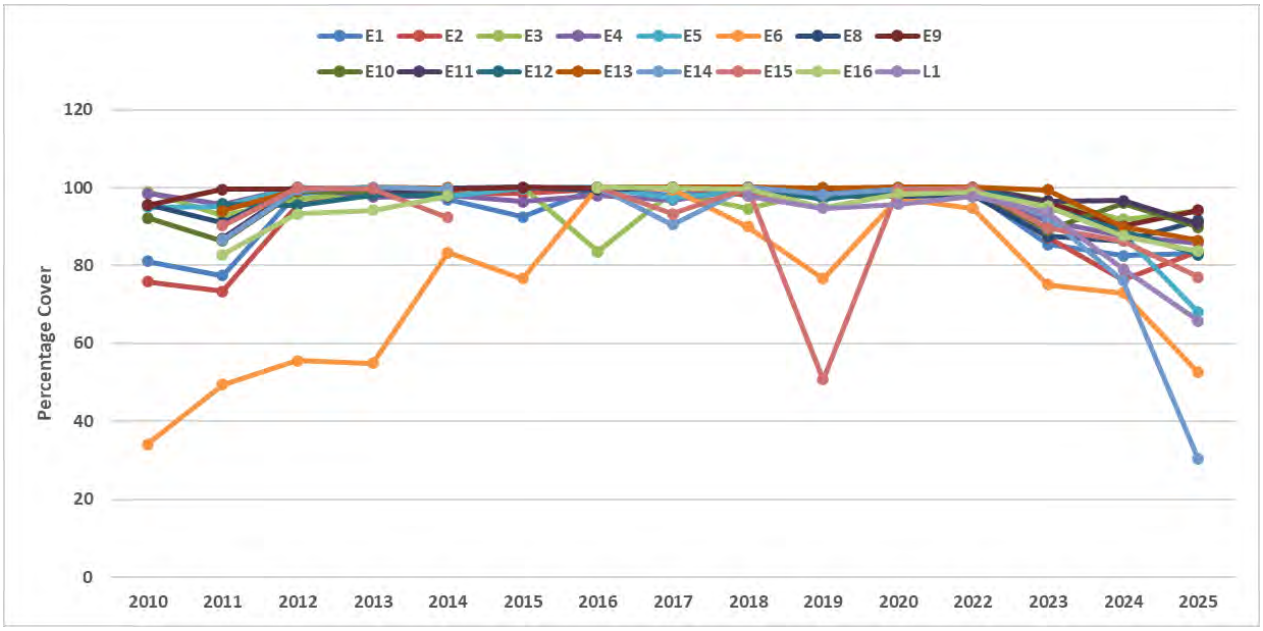


Figure 6C.1 Changes in percentage cover of seagrasses along Chain Valley Bay (2010-2025)

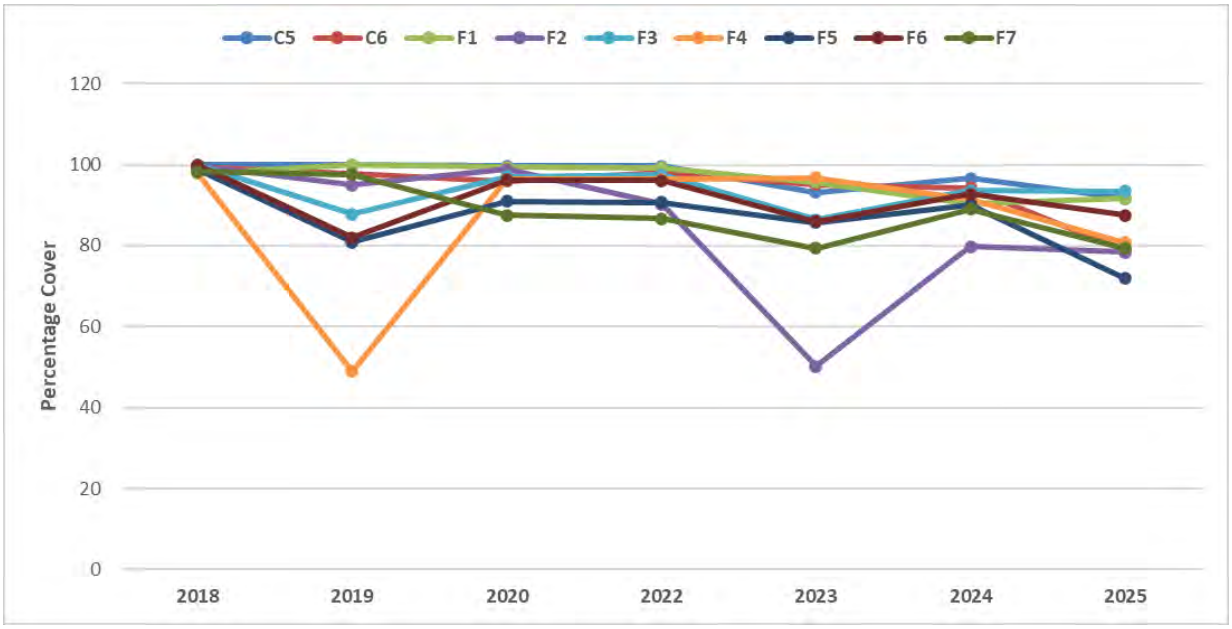


Figure 6C.2 Changes in percentage cover of seagrasses along northern shore Summerland Point and Frying Pan Bay (2018-2025)

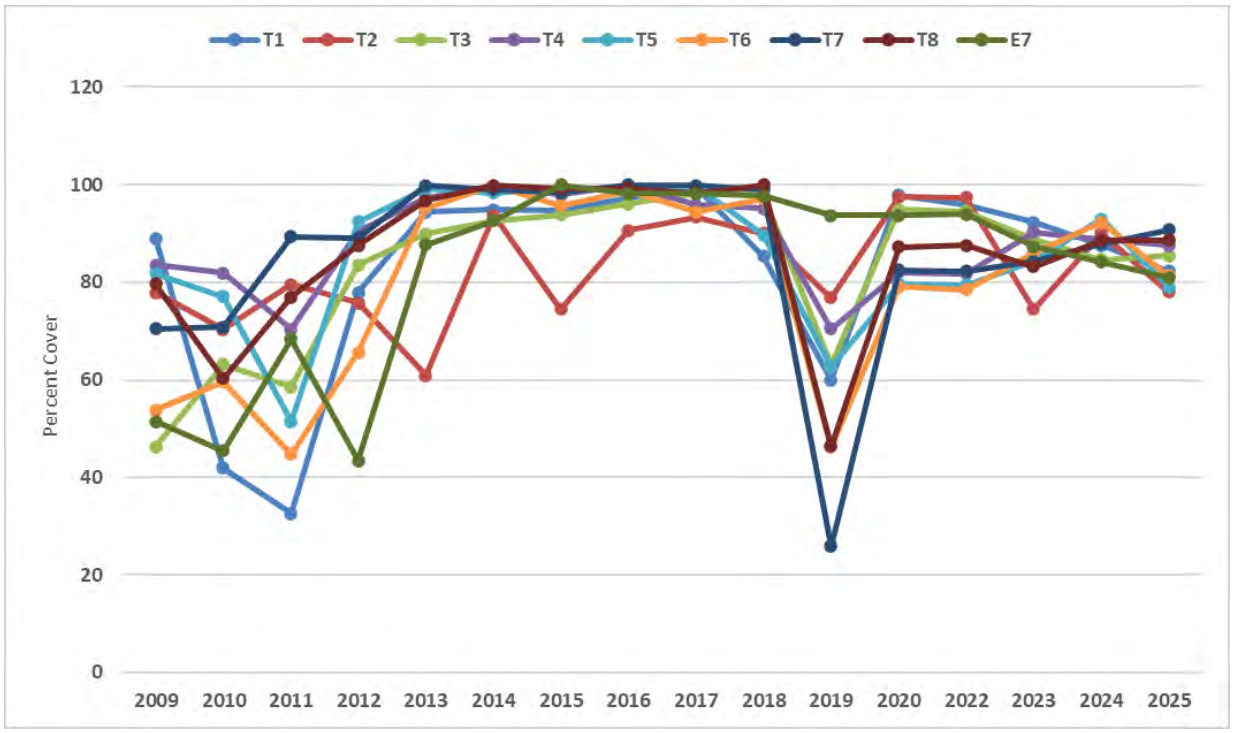


Figure 6C.3 Changes in percentage cover of seagrasses along western shore Summerland Point (2009-2025)

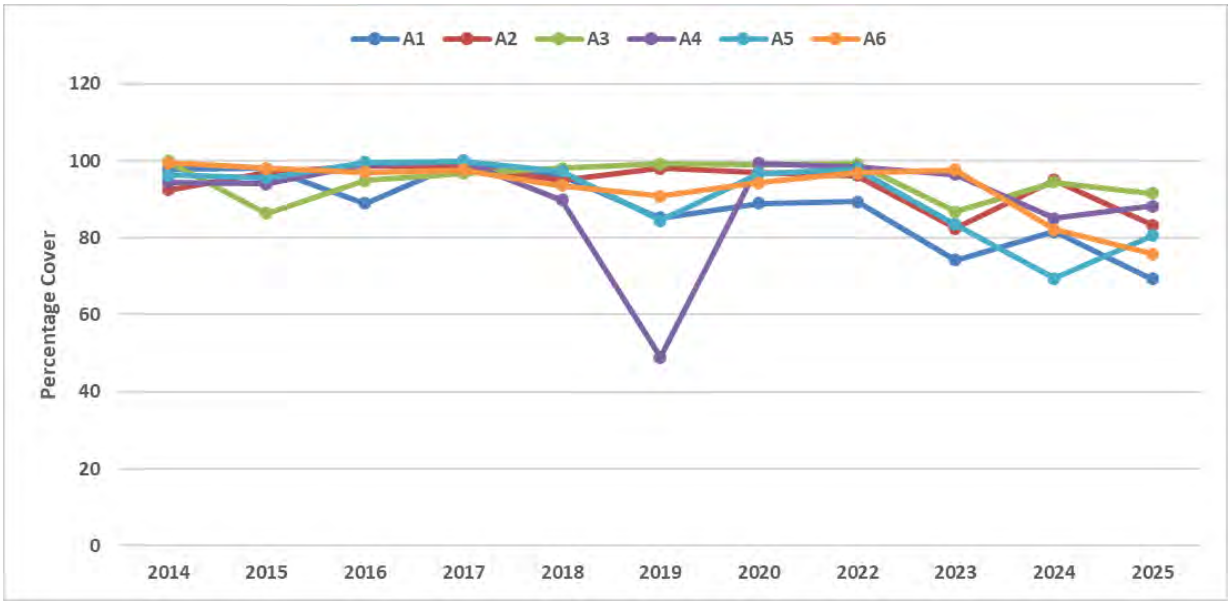


Figure 6C.4 Changes in percentage cover of seagrasses along Bardens Bay (2014-2025)

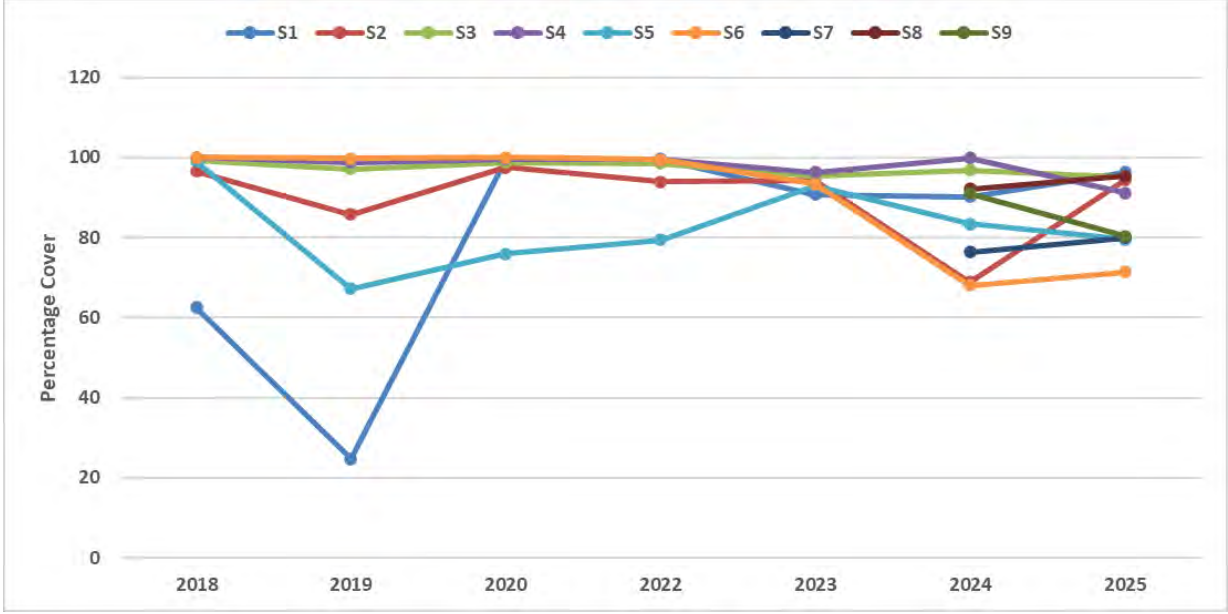


Figure 6C.5 Changes in percentage cover of seagrasses along western shore Sugar Bay and Sunshine (2018-2025)

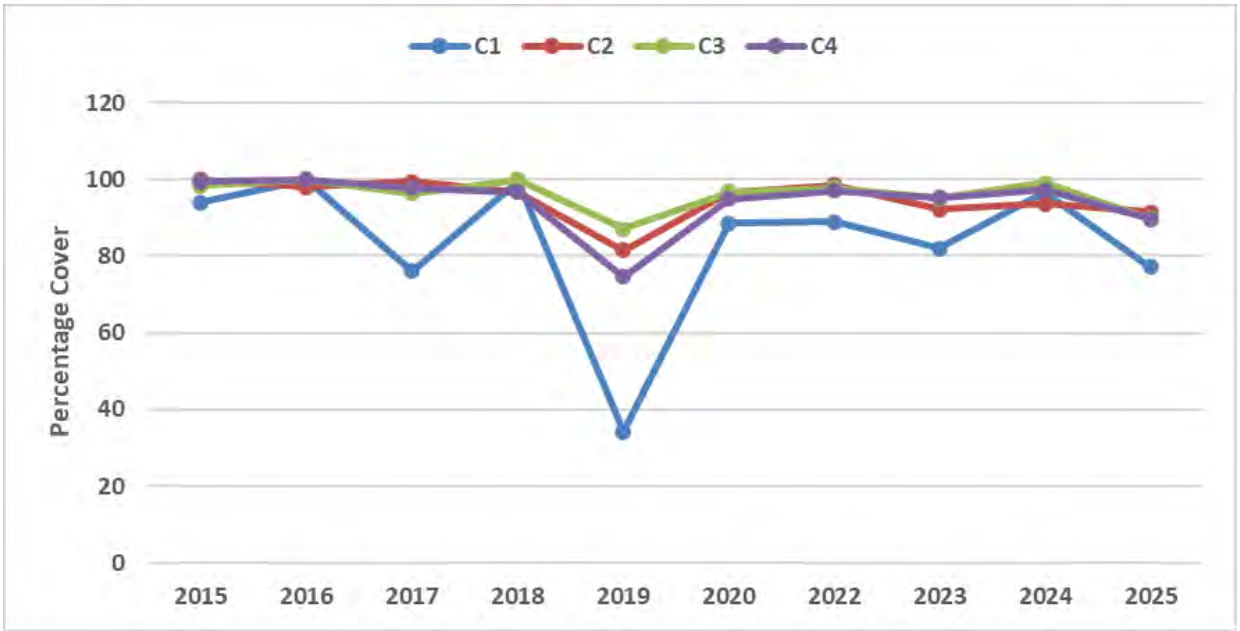


Figure 6C.6 Changes in percentage cover of seagrasses along Crangan Bay (2015-2025)

Factors that can result in a decline in seagrass coverage include:

- Deposition of fine sediment on seagrass beds due to prolonged wind and wave action and rainfall events (Plate 6C.1). Seagrasses being covered by sediment and being smothered were observed at Transects E1, E2, E4, E5, E6, E16, T1, A5, F4, F7, S6, S7 and L1 during the June 2025 survey. Direct sedimentation effects are recognized as the major threat to seagrass growth and survival. Tolerance to burial varies amongst species, however studies have shown that fine sands and muds (<250μm) have the strongest suppression effects (Benham et al., 2019). Shoot density declines significantly at burial depths of 5-7.5 mm in a mesocosm setting, with very low levels of growth observed above 10 mm or greater (Benham et al., 2019). At the time of the survey, weather conditions were also causing sand redistribution, affecting the outer extents of some seagrass beds (Transects E14, E5 and E6).
- The presence of mussels amongst the seagrass beds (Plate 6C.2). At the time of survey mussel clumps were observed at transects E1, E2, E3, E4, T1, T2, T3, T4, T5, A1, A2, A6, F2, S5, S6, C1, C5 and C6. Whilst an important part of the ecological community, the

presence of mussels does have the effect of reducing the percentage cover of *Zostera capricorni* along those transects.

- Increased boating activity. During weekends and school and public holidays, boating activities on Lake Macquarie tend to increase. This often has a negative impact on seagrasses. Beaches become staging areas where various watercraft such as canoes, kayaks and small outboard motor vessels are launched or disembarked. Anchors and the hulls of vessels plow the seagrass beds reducing seagrass cover. Damage to seagrass beds caused by boating activities were observed at transects E1, E5, E16, C1, S1, S2, S3, and S7 during the June 2025 survey.
- Decline in salinity concentrations in Lake Macquarie from an average of 37.16 ppt in June 2023 to 28.54 ppt in June 2025. Heavy continuous rain can cause sudden stress reactions in seagrasses followed by slow recovery. A decrease in salinity is a stress factor that induces physiological responses and alters quantifiable features of seagrass population structure, biomass, morphometry and productivity (Chollett et al., 2007). Reduced salinity can cause seagrass leaves to die and seagrass beds to reduce their total biomass through defoliation. Mats of severed seagrass leaves were observed at transect E16 and T2. This may be evidence of seagrass response to reductions in the concentration of salinity in Lake Macquarie due to frequent rainfall events.
- Increase in percentage cover of filamentous algae (Plate 6C.4). Mats of free-floating filamentous algae have been observed in previous surveys. These mats can cover underlying seagrasses and bare ground, affecting the statistics. Thick filamentous algal mats can also have the additional capacity of reducing the ability of underlying seagrasses to photosynthesize. This could result in an actual decrease in seagrass coverage along these transects. Thick mats of filamentous algae were not present along the seagrass transects during the June 2025 survey.
- Increase in percentage cover of *Cystoseira trinodis* and *Sargassum*. During the June 2024 survey, an increase in percentage cover of *Cystoseira* was recorded at several transects including E1, E2, E4 and E5. Whilst an important part of the ecological community, the presence of algae does have the effect of reducing the percentage cover of *Zostera capricorni* along those transects. High percentage cover of algae was not a factor in this survey.

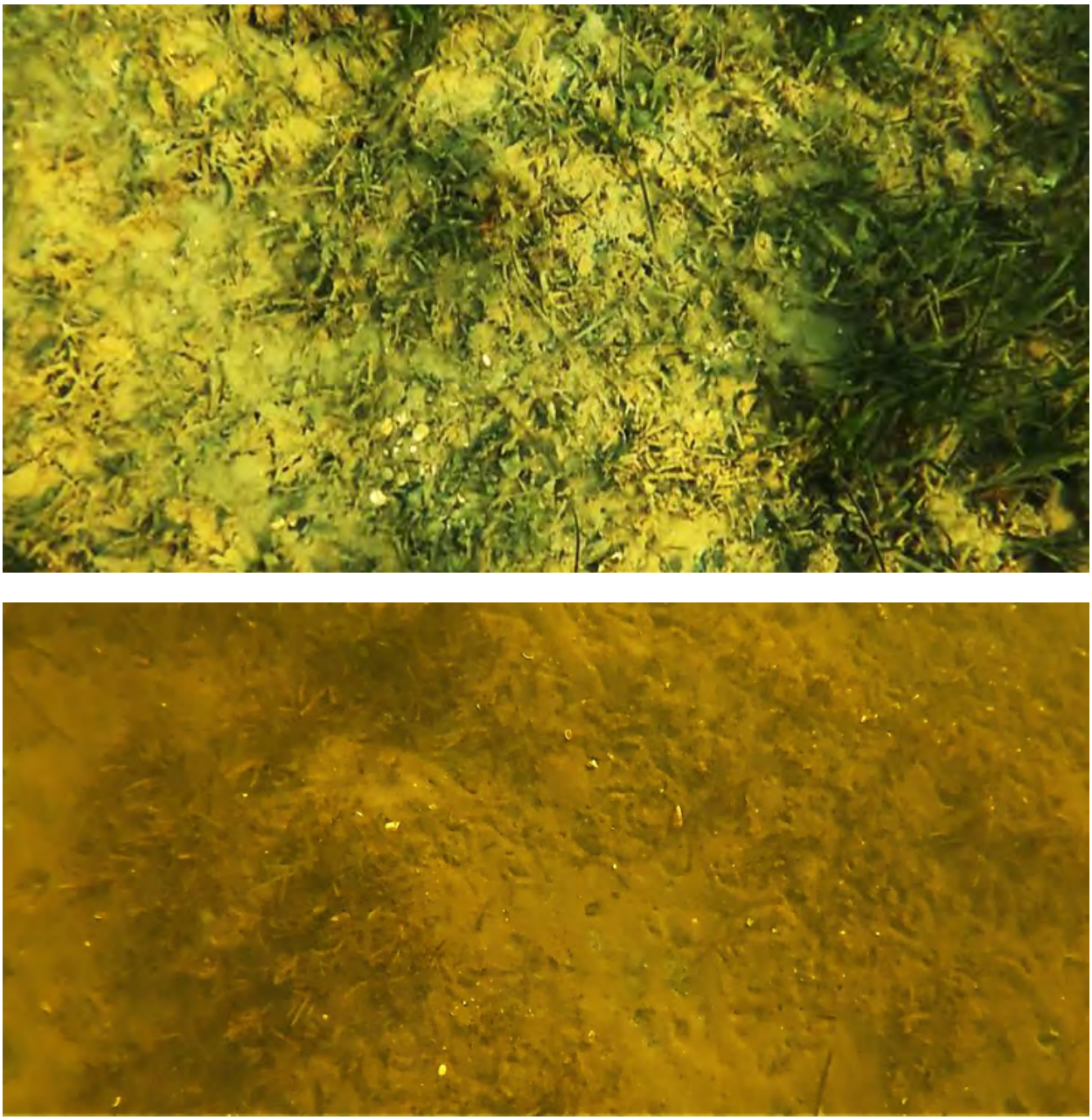


Plate 6C.1 *Zostera capricorni* covered by fine sediment and being suppressed following strong winds (Transect S6 above, Transect E14 below – Seagrass survey 2025)

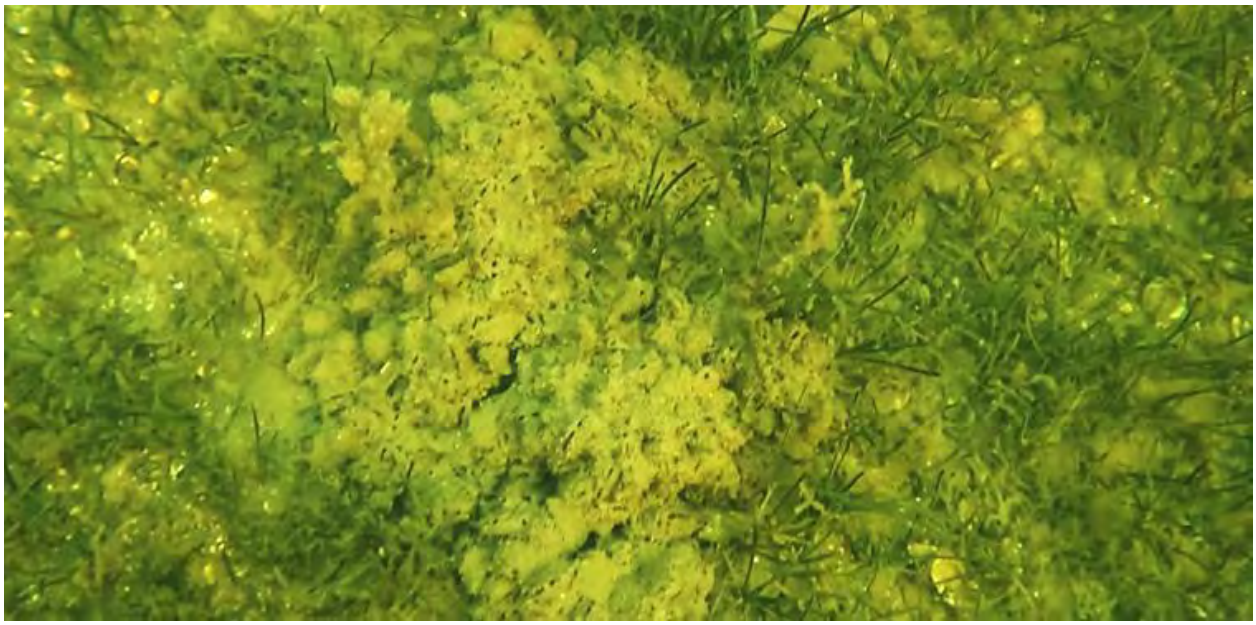


Plate 6C.2 Presence of mussels amongst the seagrass beds (Transect S6 – 2025)



Plate 6C.3 Seagrass bed damaged by boating activities (Transect T6 - 2025)

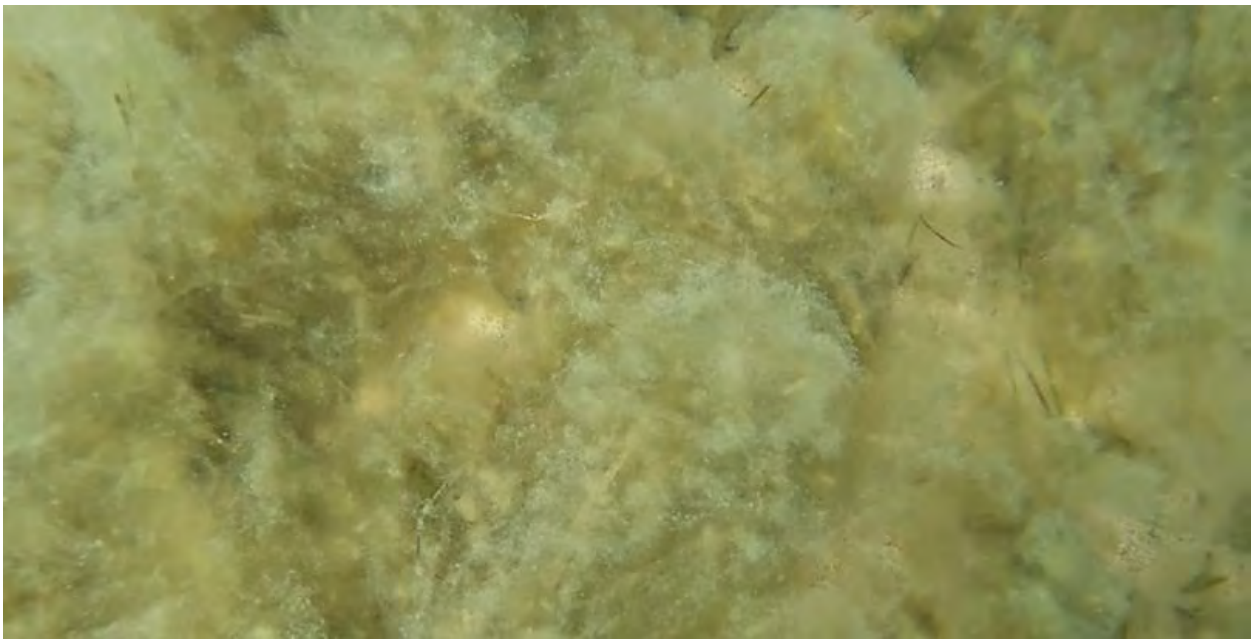


Plate 6C.4 Filamentous algal mats covering underlying seagrasses (Cams Wharf 2024)

D. Composition of seagrass beds

In June 2025, there was no evidence that underground mining activities were impacting the composition of seagrass species in the study area. The composition and distribution of seagrass species growing within the transects were consistent with previous seagrass surveys conducted from 2023 to 2024 (Figures 6D.1 and 6D.6). The percentage cover of *Zostera capricorni* and *Halophila ovalis* within each transect and region did not vary greatly over time.

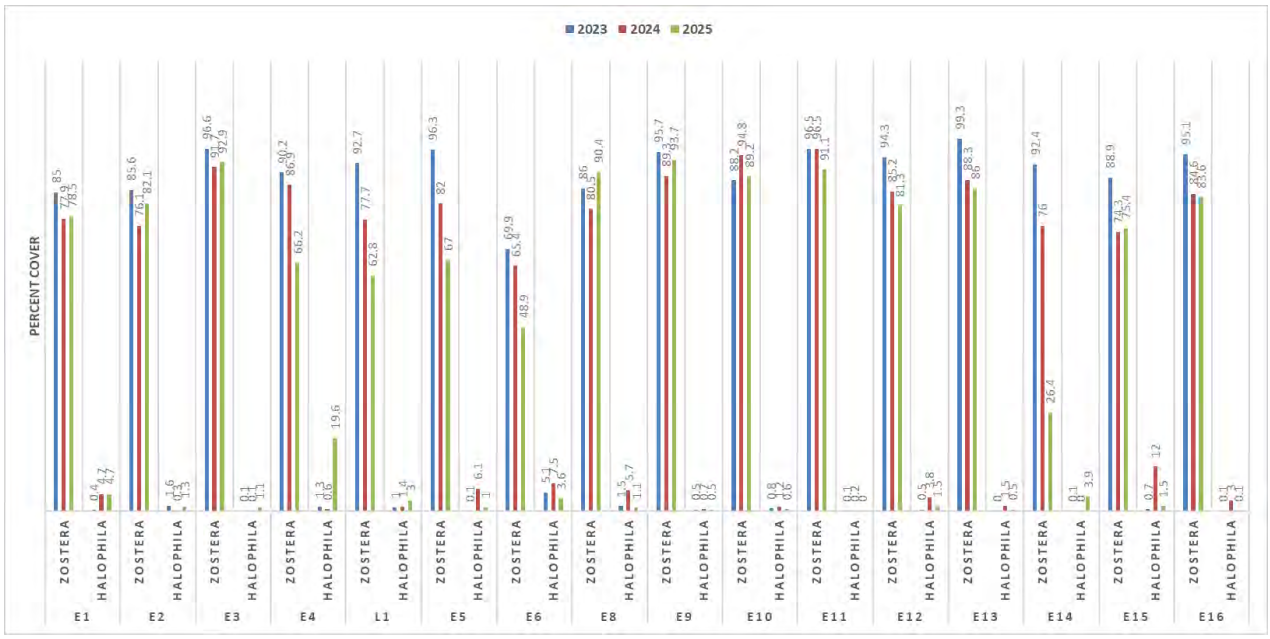


Figure 6D.1 Changes in percentage cover of *Zostera capricorni* and *Halophila ovalis* along Chain Valley Bay (2023-2025) – Impact Transects

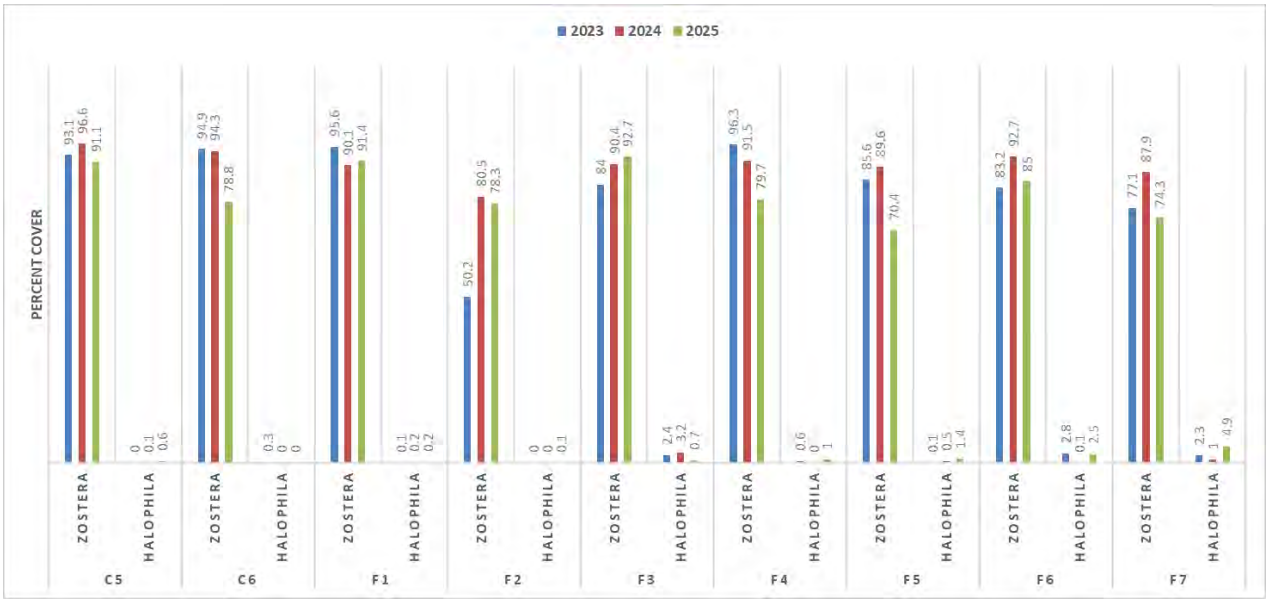


Figure 6D.2 Changes in percentage cover of *Zostera capricorni* and *Halophila ovalis* along the northern shore of Summerland Point and Frying Pan Bay (2023-2025) – Control and Impact Transects

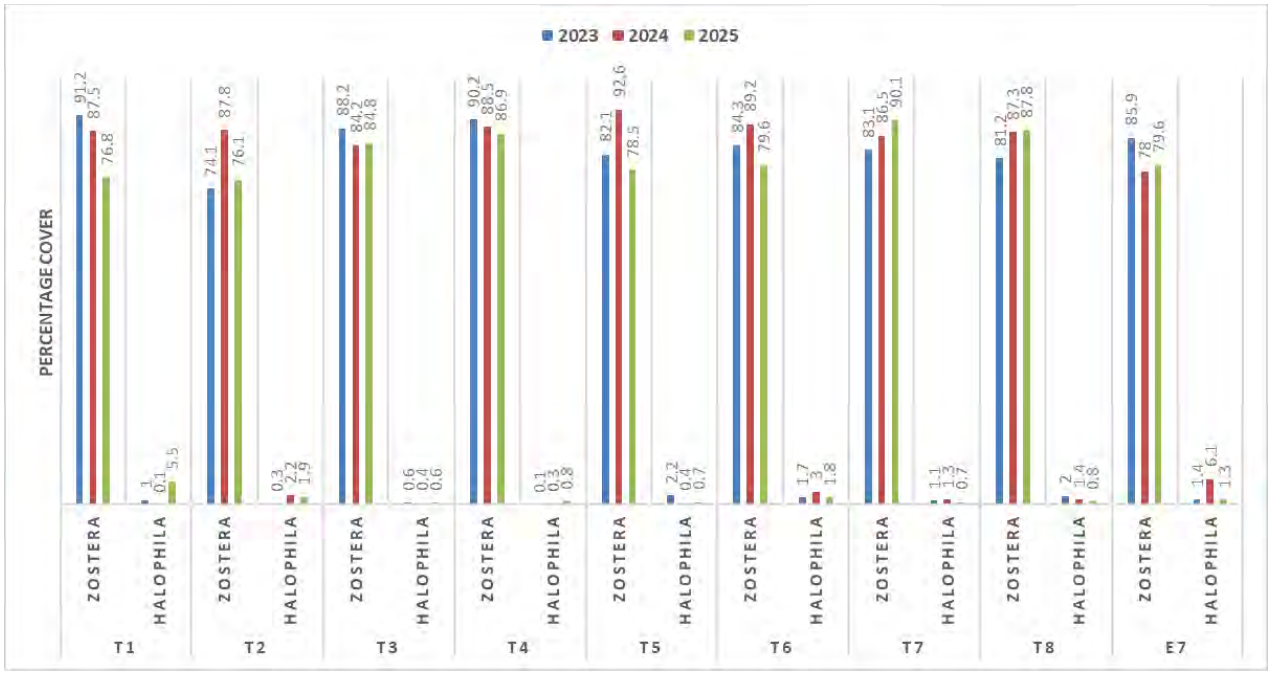


Figure 6D.3 Changes in percentage cover of *Zostera capricorni* and *Halophila ovalis* along the western shore of Summerland Point (2023-2025) – Impact Transects

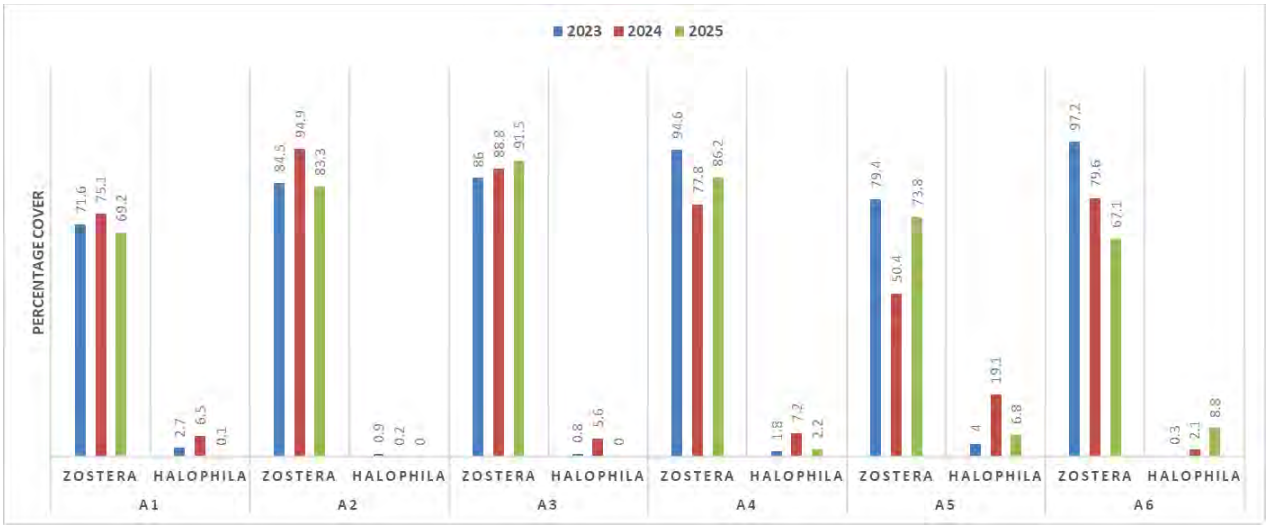


Figure 6D.4 Changes in percentage cover of *Zostera capricorni* and *Halophila ovalis* along Bardens Bay (2023-2025) – Impact Transects

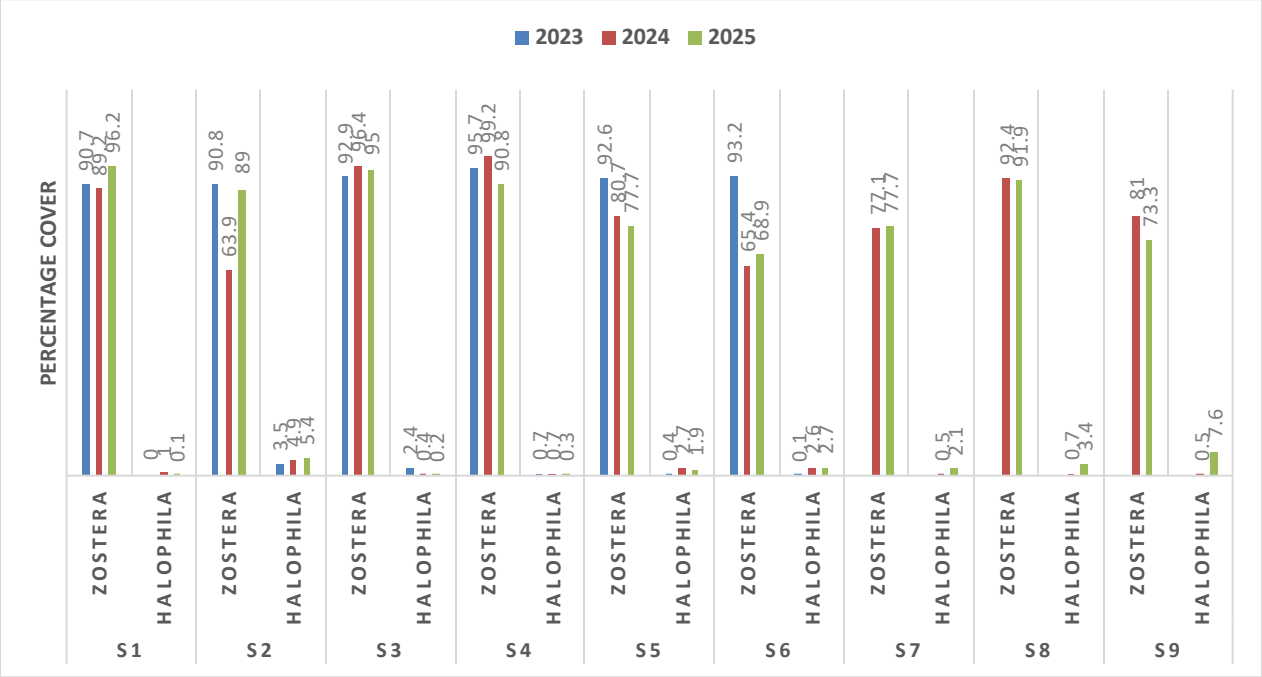


Figure 6D.5 Changes in percentage cover of *Zostera capricorni* and *Halophila ovalis* along Sugar Bay and Sunshine (2023-2025) – Impact Transects

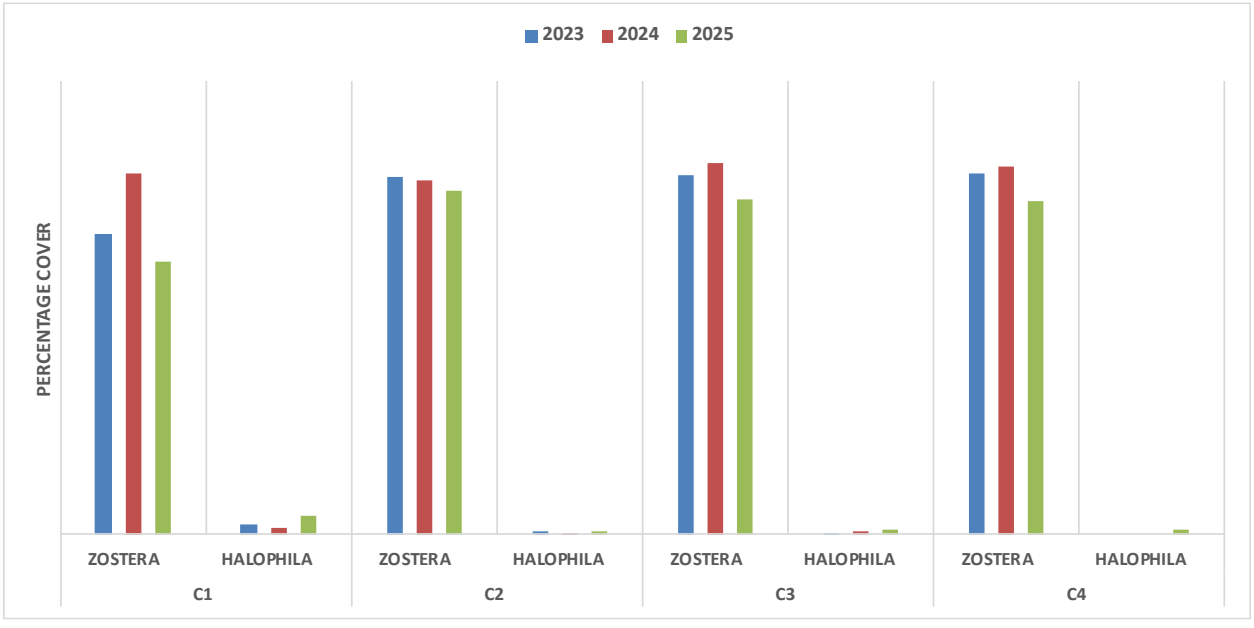


Figure 6D.6 Changes in percentage cover of *Zostera capricorni* and *Halophila ovalis* along Crangan Bay (2023-2025) – Control Transects

E. Seagrass Extents

Table 6E.1 provides the location of the inner and outer edge of each seagrass transect by eastings and northings using GDA2020 datum. It also shows the approximate length of each transect. At the time of the survey, there was no evidence that mining operations were having a deleterious effect on the size, distribution and extent of seagrasses along the transects.

The average length of the transects were approximately 69m off Chain Valley Bay, 60m along the northern shore of Summerland Point and Frying Pan Bay, 40m along the western shore of Summerland Point, 27m along Bardens Bay, and 55m along Sugar Bay and Sunshine. The average length of the transects in Crangan Bay was approximately 39m. The transects with the longest lengths were E9 (153m), F2 (130m) and S4 (105m), and the transects with the shortest lengths were C1, C2 and C6 (approximately 13m).

At the time of the survey there were minimal differences to the extent of seagrass beds in the study area. An exception to this was transect E14 where sea floor sand had been deposited on the seagrass beds decreasing the length of the transect.

Table 6E.1 Coordinates of inner and outer ends of seagrass transects in Chain Valley Bay

Transect No.	Easting	Northing	Transect No.	Easting	Northing	Transect Length (m)
E1 inner	363985	6331796	**E1 outer**	364031	6331812	77.14
E2 inner	364035	6331701	**E2 outer**	364076	6331716	75.00
E3 inner	363953	6331404	**E3 outer**	364027	6331417	75.09
E4 inner	364220	6331078	**E4 outer**	364259	6331122	59.30
L1 inner	364292	6330367	**L1 outer**	364304	6330399	20.00
E5 inner	365005	6330163	**E5 outer**	365034	6330225	67.45
E6 inner	365118	6329788	**E6 outer**	365174	6329802	57.97
E8 inner	365128	6331795	**E8 outer**	365096	6331811	35.36
E9 inner	365040	6331607	**E9 outer**	364913	6331523	152.68
E10 inner	365422	6331427	**E10 outer**	365394	6331361	71.01
E11 inner	365554	6331410	**E11 outer**	365524	6331343	73.21
E12 inner	365749	6331328	**E12 outer**	365735	6331284	46.22
E13 inner	365990	6331278	**E13 outer**	365970	6331190	89.54
E14 inner	366447	6331046	**E14 outer**	366397	6331018	77.14

E15 inner	366657	6330098	**E15 outer**	366610	6330167	82.85
E16 inner	366310	6329644	**E16 outer**	366272	6329666	44.26

Table 6E.2 Coordinates of inner and outer ends of seagrass transects off northern shore Summerland Point and Frying Pan Bay

Transect No.	Easting	Northing	Transect No.	Easting	Northing	Transect Length (m)
C5 inner	365676	6333038	C5 outer	365702	6333084	41.57
C6 inner	366045	6332831	C6 outer	366058	6332870	13.67
F1 inner	366320	6333281	F1 outer	366285	6333249	47.11
F2 inner	366342	6333330	F2 outer	366290	6333450	130.55
F3 inner	366611	6333163	F3 outer	366621	6333228	65.64
F4 inner	366968	6333242	F4 outer	366918	6333285	65.04
F5 inner	367106	6333361	F5 outer	367068	6333421	70.46
F6 inner	367271	6333493	F6 outer	367202	6333522	74.81
F7 inner	367402	6333682	F7 outer	367374	6333694	30.47

Table 6E.3 Coordinates of inner and outer ends of seagrass transects along western shore Summerland Point

Transect No.	Easting	Northing	Transect No.	Easting	Northing	Transect Length (m)
E7 inner	385350	6332350	**E7 outer**	365297	6332344	52.44
T1 inner	365439	6333217	**T1 outer**	365442	6333264	47.48
T2 inner	365402	6333100	**T2 outer**	365388	6333100	14.39
T3 inner	365400	6332951	**T3 outer**	365384	6332949	16.32
T4 inner	365377	6332816	**T4 outer**	365357	6332831	25.14
T5 inner	365350	6332990	**T5 outer**	365309	6332575	49.14
T6 inner	365347	6332380	**T6 outer**	365300	6332337	63.53
T7 inner	365320	6332207	**T7 outer**	365267	6332206	52.90
T8 inner	365336	6332262	**T8 outer**	365295	6332270	42.36

Table 6E.4 Coordinates of inner and outer ends of seagrass transects in Bardens Bay.

Transect No.	Easting	Northing	Transect No.	Easting	Northing	Transect Length (m)
A1 inner	364006	6333892	A1 outer	364048	6333899	42.60
A2 inner	363979	6334006	A2 outer	364002	6334013	24.00
A3 inner	363918	6334157	A3 outer	363927	6334165	34.80
A4 inner	363633	6334426	A4 outer	363660	6334425	26.30

A5 inner	363686	6335068	A5 outer	363688	6335049	18.30
A6 inner	364434	6334566	A6 outer	364422	6334560	13.70

Table 6E.5 Coordinates of inner and outer ends of seagrass transects in Sugar Bay and off Sunshine.

Transect No.	Easting	Northing	Transect No.	Easting	Northing	Transect Length (m)
S1 inner	365009	6334470.41	S1 outer	365077	6334481	69.64
S2 inner	364642	6334943.57	S2 outer	364673	6334939	31.46
S3 inner	365017	6335008.93	S3 outer	365041	6334932	79.98
S4 inner	365235	6334992.86	S4 outer	365217	6334889	105.05
S5 inner	365575	6334709.08	S5 outer	365569	6334693	16.60
S6 inner	366161	6334766.00	S6 outer	366224	6334762	27.67
S7 inner	366076	6334917.00	S7 outer	366098	6334931	14.86
S8 inner	366061	6335422.00	S8 outer	366110	6335465	54.86
S9 inner	366035	6335723.00	S9 outer	366093	6335724	66.67

Table 6E.6 Coordinates of inner and outer ends of seagrass transects in Crangan Bay.

Transect No.	Easting	Northing	Transect No.	Easting	Northing	Transect Length (m)
C1 Inner	368596	6332235	C1 Outer	368616	6332250	13.64
C2 Inner	368619	6332147	C2 Outer	368658	6332151	13.84
C3 Inner	368524	6331811	C3 Outer	368538	6331806	90.91
C4 Inner	368467	6331435	C4 Outer	368486	6331421	37.50

F. Water Quality

The physical characteristics of the waters above the seagrass beds were measured on 6th and 12th June 2025 at each transect using a calibrated Yeo-Kal 618RU Analyser. Units of measurement were Temperature (Temp) - degrees Celsius; Conductivity (Cond) - mS/cm; Salinity (Sal) - parts per thousand; pH; Dissolved Oxygen - % saturation and mg/L; Oxidization Reduction Potential (ORP) – mV and Turbidity (Turb) - NTU.

The physical characteristics of the water at each transect are shown in Appendix B and were as follows:

- Water Temperature ranged from 15.66°C at C1 to 19.13°C at A5. Mean water temperature was 17.62°C.
- Conductivity ranged from 40.52 mS/cm at F4 to 46.95 mS/cm at A3. Mean conductivity was 44.23 mS/cm.
- Salinity ranged from 25.88 ppt at F4 to 30.50 ppt at A3. Mean salinity was 28.54 ppt.
- pH ranged from 7.57 at Transect A3 to 7.95 at Transect F4. Mean pH was 7.78.
- Dissolved oxygen (% saturation) ranged from 68.0% at E2 to 101.2% at C1. Mean dissolved oxygen was 87.4% saturation.
- ORP ranged from 389 mV at E1 and MSG7 to 565 mV at S9. Mean ORP was 443 mV.
- Turbidity ranged from 2.4 NTU at T4 to 19.8 NTU at S1. Mean turbidity was 5.75 NTU.

Table 6F.1 Physical characteristics of waters above seagrass transects, Lake Macquarie – 2025

Chain Valley Bay

Station	Temperature °C	Conductivity mS/cm	Salinity ppt	pH	Dissolved Oxygen % sat	Dissolved Oxygen mg/L	ORP mV	Turbidity NTU
E1	15.98	41.93	26.89	7.92	81.8	6.89	389	6.6
E2	18.64	46.68	30.3	7.67	68.0	5.31	398	5.4
E3	17.46	45.31	29.31	7.73	73.7	5.92	411	4.2
E4	18.15	45.9	29.74	7.66	70.5	5.57	421	4.1
L1	17.79	46.68	30.30	7.64	71.4	5.66	432	3.2
E5	16.84	43.36	27.91	7.85	87.3	7.16	432	3.0
E6	17.35	45.97	29.78	7.58	71.6	5.75	434	3.2
E8	16.97	43.44	27.96	7.88	91.4	7.48	434	4.9
E9	17.78	44.65	28.83	7.78	87.8	7.03	435	4.3
E10	18.13	46.02	29.82	7.66	81.7	6.46	437	4.9
E11	18.09	45.46	29.42	7.79	88.7	7.04	437	5.7
E12	18.18	45.97	29.79	7.66	80.3	6.34	439	5.1

E13	17.84	45.86	29.71	7.68	80.0	6.36	439	5.8
E14	17.25	45.32	29.31	7.71	82.8	6.68	440	4.1
E15	16.48	43.67	28.13	7.86	90.7	7.48	440	3.1
E16	16.55	43.86	28.26	7.82	85.3	7.02	436	3.6
Average	**17.44**	**45.03**	**29.11**	**80.44**	**6.48**	**7.74**	**428**	**4.62**
Min	**15.98**	**41.93**	**26.89**	**67.80**	**5.33**	**7.58**	**389**	**3.00**
Max	**18.30**	**46.68**	**30.30**	**91.40**	**7.48**	**7.92**	**440**	**6.80**

Northern Shore Summerland Point and Frying Pan Bay

Station	Temperature °C	Conductivity mS/cm	Salinity ppt	pH	Dissolved Oxygen % sat	Dissolved Oxygen mg/L	ORP mV	Turbidity NTU
C5	17.28	41.40	26.51	7.93	96.9	7.94	431	6.3
C6	16.98	41.16	26.34	7.93	96.2	7.94	432	4.6
F1	16.76	41.13	26.32	7.95	95.7	7.93	433	4.5
F2	17.22	41.08	26.28	7.93	95.8	7.87	431	4.9
F3	17.20	40.92	26.17	7.95	97.2	8.00	433	6.6
F4	16.67	40.52	25.88	7.95	95.4	7.94	434	4.6
F5	17.52	40.95	26.19	7.94	98.7	8.07	435	5.3
F6	17.56	41.25	26.40	7.92	99.2	8.09	435	4.9
F7	17.75	41.34	26.46	7.92	98.9	8.04	436	5.8
Average	**17.22**	**41.08**	**26.28**	**7.94**	**97.11**	**7.98**	**433**	**5.28**
Min	**16.67**	**40.52**	**25.88**	**7.92**	**95.40**	**7.87**	**431**	**4.50**
Max	**17.75**	**41.40**	**26.51**	**7.95**	**99.20**	**8.09**	**436**	**6.60**

Western Shore Summerland Point

Station	Temperature °C	Conductivity mS/cm	Salinity ppt	pH	Dissolved Oxygen % sat	Dissolved Oxygen mg/L	ORP mV	Turbidity NTU
E7	17.80	44.80	28.94	7.77	85.4	6.83	431	3.8
T1	17.49	42.08	26.99	7.86	93.5	7.61	431	5.2
T2	18.53	45.87	29.71	7.68	80.4	6.31	432	4.9

T3	18.54	45.98	29.79	7.67	80.5	6.31	431	5.5
T4	18.03	44.17	28.49	7.78	87.0	6.95	430	2.4
T5	17.62	44.87	28.99	7.77	86.1	6.91	432	5.6
T6	17.87	44.29	28.58	7.79	87.0	6.97	430	3.6
T7	17.71	44.67	28.85	7.88	91.5	7.33	430	3.8
T8	17.79	45.25	29.27	7.75	85.3	6.81	433	4.3
Average	**17.93**	**44.66**	**28.85**	**7.77**	**86.30**	**6.89**	**431**	**4.34**
Min	**17.49**	**42.08**	**26.99**	**7.67**	**80.40**	**6.31**	**430**	**2.40**
Max	**18.54**	**45.98**	**29.79**	**7.88**	**93.50**	**7.61**	**433**	**5.60**

Bardens Bay

Station	Temperature °C	Conductivity mS/cm	Salinity ppt	pH	Dissolved Oxygen % sat	Dissolved Oxygen mg/L	ORP mV	Turbidity NTU
A1	18.77	46.28	30.01	7.60	78.3	6.10	444	7.5
A2	18.59	46.41	30.10	7.61	77.8	6.08	444	13.1
A3	18.91	46.95	30.50	7.57	80.6	6.25	443	9.7
A4	18.56	46.20	29.95	7.65	86.3	6.76	443	8.6
A5	19.13	46.47	30.15	7.63	77.4	5.99	444	10.7
A6	19.11	46.55	30.21	7.58	73.1	5.66	442	6.2
Average	**18.85**	**46.48**	**30.15**	**7.61**	**78.92**	**6.14**	**443**	**9.30**
Min	**18.56**	**46.20**	**29.95**	**7.57**	**73.10**	**5.66**	**442**	**6.20**
Max	**19.13**	**46.95**	**30.50**	**7.65**	**86.30**	**6.76**	**444**	**13.10**

Sugar Bay and Sunshine

Station	Temperature °C	Conductivity mS/cm	Salinity ppt	pH	Dissolved Oxygen % sat	Dissolved Oxygen mg/L	ORP mV	Turbidity NTU
S1	18.15	44.06	28.41	7.87	98.2	7.82	441	19.8
S2	18.76	46.32	30.04	7.60	77.0	6.00	443	7.9
S3	18.07	45.46	29.42	7.7	83.5	6.62	442	8.9
S4	18.27	45.52	29.46	7.68	80.8	6.38	442	8.0

S5	18.12	44.4	28.65	7.83	92.6	7.37	440	5.8
S6	18.03	44.14	28.47	7.82	90.2	7.20	440	4.6
S7	17.31	41.47	26.56	7.95	100.6	8.24	438	4.5
S8	18.11	42.87	27.56	7.86	95.8	7.68	439	7.5
S9	15.93	45.09	29.15	7.82	96.1	7.96	565	4.7
Average	**18.11**	**44.34**	**28.56**	**7.79**	**89.72**	**7.15**	**441**	**8.06**
Min	**17.31**	**41.47**	**26.56**	**7.60**	**77.00**	**6.00**	**438**	**4.50**
Max	**18.76**	**46.32**	**30.04**	**7.95**	**100.6**	**8.24**	**443**	**19.80**

Crangan Bay

	Temperature °C	Conductivity mS/cm	Salinity ppt	pH	Dissolved Oxygen % sat	Dissolved Oxygen mg/L	ORP mV	Turbidity NTU
C1	15.66	43.66	28.12	7.86	101.0	8.47	532	4.7
C2	16.54	43.98	28.35	7.78	97.8	8.05	524	4.7
C3	16.26	43.44	27.96	7.80	100.3	8.31	519	5.8
C4	15.98	43.13	27.74	7.81	101.2	8.45	517	4.4
Average	**16.11**	**43.55**	**28.04**	**7.81**	**100.1**	**8.32**	**523**	**4.9**
Min	**15.66**	**43.13**	**27.74**	**7.78**	**97.80**	**8.05**	**517**	**4.4**
Max	**16.54**	**43.98**	**28.35**	**7.86**	**101.2**	**8.47**	**532**	**5.8**

All Stations

	Temperature °C	Conductivity mS/cm	Salinity ppt	pH	Dissolved Oxygen % sat	Dissolved Oxygen mg/L	ORP mV	Turbidity NTU
Average	17.62	44.23	28.54	7.78	87.40	7.05	443	5.75
Min	15.66	40.52	25.88	7.57	68.00	5.31	389	2.40
Max	19.13	46.95	30.50	7.95	101.20	8.47	565	19.80
Stdev	0.85	1.91	1.37	0.12	9.22	0.86	30.98	2.81

Rainfall in the months preceding the survey of June 2025 was 66.8 mm, 38.2 mm, 137.6 mm, 228 mm and 448 mm for January, February, March, April and May 2025 respectively (Cooranbong Lake Macquarie AWS No. 061412). By 12th June a further 6.4 mm had fallen in the catchment. The influx of freshwater into Lake Macquarie has reduced the salinity of Lake Macquarie from an

average of 37.16 ppt in June 2023, 34.39 ppt in September 2024, 31.32 ppt in May 2025 and 28.54 ppt in June 2025.

7. Discussion

Seagrasses perform several vital functions within marine ecosystems. They are a primary source of food for grazing animals like green sea turtles (*Chelonia mydas*) and dugong (Arthur et al. 2009; Preen, A. and Marsh, H. 1995). They provide habitat and nursery areas for a wide range of marine life (Jackson, E.L. *et al.* 2001; Waycott, M. *et al.* 2005), and they offer shelter from harsh environmental conditions and refuge from predators. Seagrasses can improve water quality by stabilizing sediments, filtering nutrients, and removing pollutants and contaminants from the water (Moore 2004). They help protect the coastal environment by reducing wave energy and currents, acting as a buffer against storm surges and other extreme weather events, and stabilize and reduce erosion of riverbanks during periods of flooding. Seagrasses are important carbon sinks, absorbing and storing carbon dioxide from the atmosphere (Duarte *et al.* 2010). They contribute to climate change mitigation by reducing atmospheric carbon levels. Seagrass carbon can also be exported to adjacent beaches or even the deep sea, providing long-term storage.

Seagrass meadows provide vital biodiversity and ecosystem services, including food production, coastal protection, and water quality regulation. Seagrass meadows support a diverse range of marine life. They are crucial for maintaining biodiversity and the health and resilience of coastal ecosystems.

During the seagrass survey conducted in June 2025, the seagrasses in the study area comprised two species of seagrass, *Zostera capricorni* and *Halophila ovalis*, and six species of alga. These plants supported a healthy ecosystem. Observations included:

- Groups of Ctenophora or comb jellies and jelly fish feeding on zooplankton in the water column (e.g. E6, T3, T5, T7, F7).
- The presence of small to large clumps of *Trichomya hirsuta* or hairy mussels that were often covered with epiphytic algae and provided habitat for organisms such as crabs and brittle stars (e.g. E4, T5, A2, F2, C1).
- The presence of *Pinna bicolor* (razor clams) and *Saccostrea glomerata* (oysters) along the transects (e.g. E5, T1, T3, F2, C2, C4).

- Schools of tailer, some small bream (*Girella tricuspidata*) and a flathead foraging for food (e.g. S6, E9).
- Schools of smaller fish hunting close to the shoreline (e.g. E6, E7, E8, F3, F4).
- Thousands of glassy prawns swimming through the water column (e.g. A6 and S7).
- One very large Bull Ray (T4).
- Polychaetes and gastropods inhabiting the sandy seafloor (e.g. S7, S8, S9, L1).

8. Conclusion and Compliance Table

The results from the June 2025 seagrass survey show compliance to Schedule 4 Environmental Conditions – Underground mining Performance Measures with respect to effects of Subsidence on Seagrass beds which display nil to minor environmental consequences due to underground mining.

The Environmental Subsidence Impact Performance Measures for Seagrass beds are listed in the table below:

Feature	Requirement	Compliance Status
Threatened species, populations or their habitats and endangered ecological communities.	Negligible impact or environmental consequences.	Yes
Seagrass beds	Negligible environmental consequences including: • *Negligible* change in the size and distribution of seagrass beds • *Negligible change* in the functioning of seagrass beds; and • *Negligible* change to the composition or distribution of seagrass species within seagrass beds	Yes

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Appendices

A. Background Information

i. Factors affecting depth of water in Lake Macquarie

The bathymetric chart (**Figure A1**) of Lake Macquarie shows water depths relative to AHD throughout the year 1997. The actual water depth above the lakebed varied greatly, between 0 and 1.3m above AHD over the year.

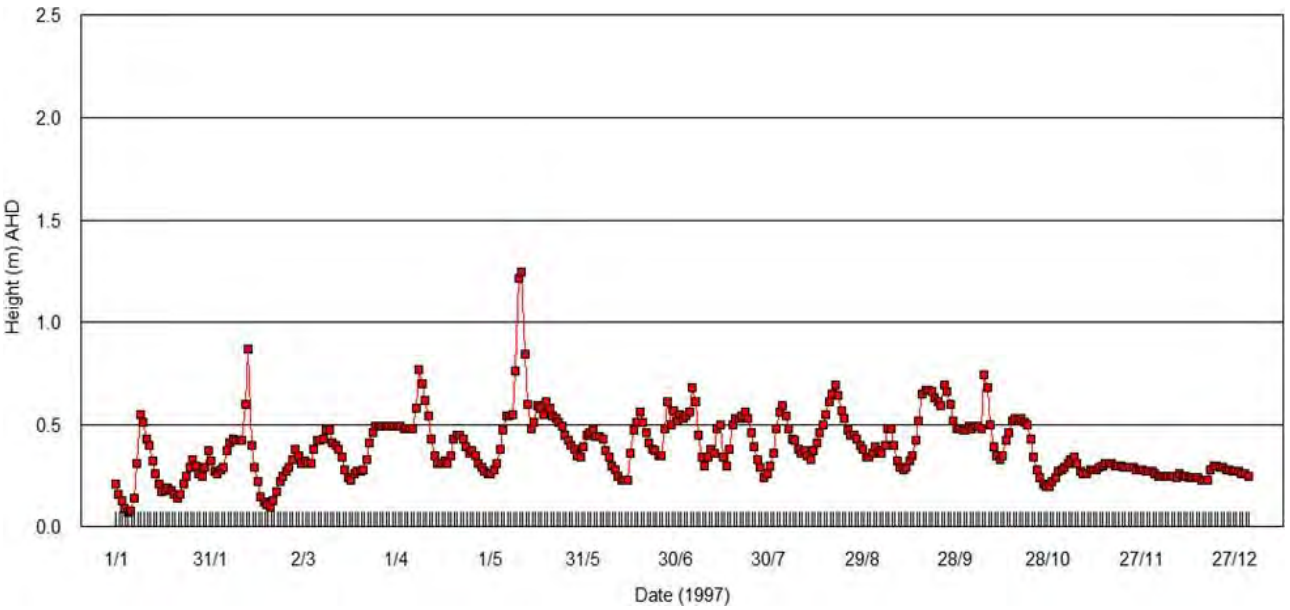


Figure A1 Water level changes in a coastal lagoon with an entrance open to coastal waters.

Water depths in coastal saline lakes with an open entrance to coastal waters vary due to combinations of the following factors:

- The body of Lake Macquarie is subject to tidal influence. The height of the tidal prism at

Swansea Head may reach almost 2m (during spring tides) but by the time the body of the lake is reached, the tidal prism has been reduced to around 0.05m.

- The height of coastal waters and coastal lakes are influenced by changes in atmospheric pressure. The Tasman Sea acts as a huge barometer. When the atmospheric pressure is high the sea surface is depressed. This causes water to drain from Lake Macquarie causing the depth of water in the body of the lake to decrease. When the atmospheric pressure over the Tasman Sea is low, the surface of the sea bulges upwards. This raising of sea level causes water to flow into Lake Macquarie, increasing the water depth.

- Low pressure systems in the Tasman Sea almost always generate strong winds and coastal rainfall. The strong winds cause large swells to form that impact the coast. Wave setup at the entrance to Lake Macquarie causes the water level in the lake to rise as large volumes of seawater enter the system.

- Rainfall during a period of low atmospheric pressure causes runoff into catchment rivers and streams to increase. When this extra water reaches the body of Lake Macquarie, the water level rises in proportion to the runoff volume. This water is prevented from exiting the lake by wave setup at the entrance and the state of the tide. Under these circumstances, the level of the lake may rise to heights of a meter or more above AHD.

ii. Factors affecting the presence of seagrasses in Lake Macquarie

Seagrasses and algae are confined to the shallow waters around the perimeter of Lake Macquarie (Laxton, 2007). In Chain Valley Bay, Bardens Bay and off Summerland Point, seagrasses and benthic algae generally grow between 0 and -1.89m below AHD.

Seagrass distribution within estuaries is influenced by light penetration, water depth, salinity, water temperature, 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).

Photosynthetically Active Radiation (PAR) changes were measured off Wyee Point in 1983 by J.H. & E.S. Laxton – Environmental Consultants P/L. It was found that only 14% of the light present at the surface reached a depth of 2.0m below the surface. By 6m below the surface only between 2% and 4% of PAR remained. Seagrasses and algae barely survived at 14% of the surface radiation. At 6m below the surface, they were not able to grow (Figure 3.1).

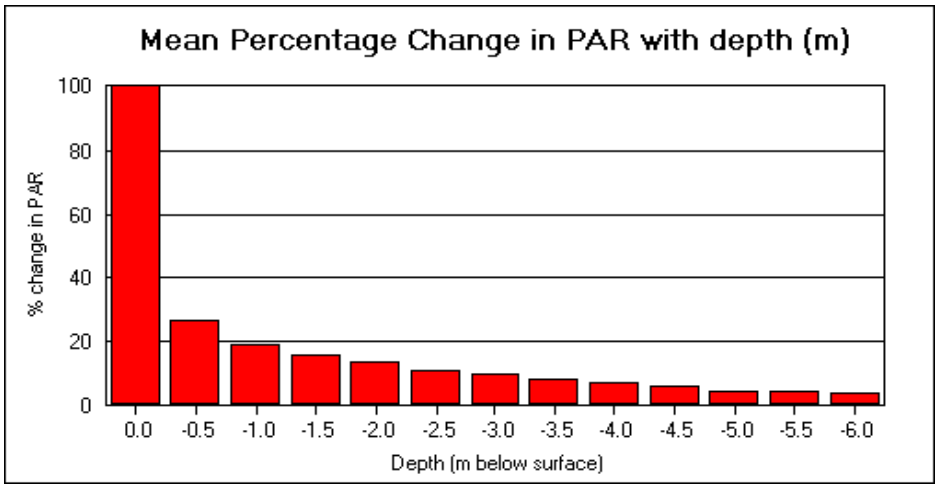


Figure A2 Mean percentage changes in PAR with depth at Wyee Point over 12 months

iii. Seagrasses and algae found in Lake Macquarie

Plate A1 provides information about the seagrasses and alga found in Lake Macquarie, NSW. Four seagrass species and ten species of algae have been identified in the Lake Macquarie area.

Plate A1 Seagrasses and algae found in Lake Macquarie



Order: Potamogetonales
Family: Zosteraceae
Species: *Zostera capricorni*

Remarks: *Zostera capricorni* is a species of eelgrass native to the seacoasts of New Guinea, Queensland, New South Wales, Victoria, South Australia, Norfolk Island and the North Island of New Zealand. It was first discovered at Moreton Bay in Queensland in 1875.



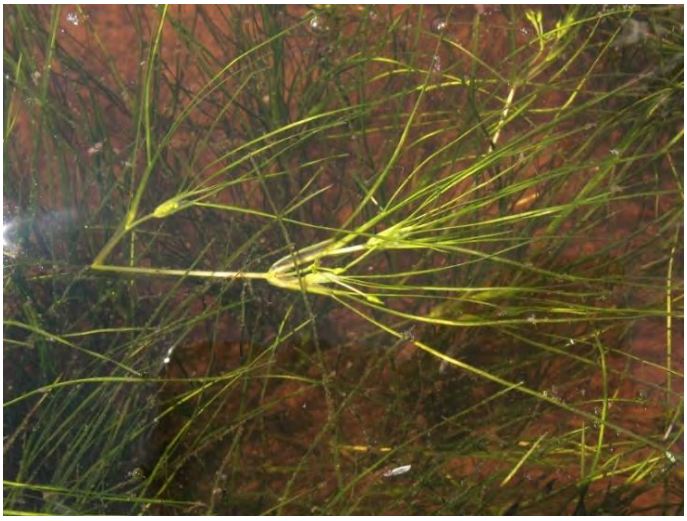
Order: Hydrocharitales
Family: Hydrocharitaceae
Species: *Halophila ovalis*

Remarks: *Halophila ovalis* commonly known as paddle weed, spoon grass or dugong grass, is a seagrass in the family Hydrocharitaceae. It is a small herbaceous plant that occurs in seabeds and other saltwater environments in the Indo-Pacific.



Order: Alismatales
Family: Posidoniaceae
Species: *Posidonia australis*

Remarks: Large, bright green, strap-like leaves that can grow to over 80 cm long. The leaves are usually 6-14 mm wide with rounded ends. Can be found in large meadows at shallow depths in estuaries, coastal lakes and sheltered coastal waters. Listed as an endangered species and population under the Fisheries Management Act 1994. Meadows currently limited to Port Hacking, Botany Bay, Sydney Harbour, Pittwater, Brisbane Waters, Lake Macquarie.



Order: Alismatales
Family: Ruppiaceae
Species: *Ruppia sp*

Remarks: Commonly known as widgeon grass. Thread-thin grasslike annual or perennial herb which grows from a rhizome anchored shallowly in the wet substrate, It produces a long narrow straight or loosely coiled inflorescence tipped with two tiny flowers. The plant often self-pollinates, but the flowers also release pollen that reaches other plants as it floats away on bubbles. Grows in brackish water bodies such as marshes. Does not grow well in turbid water or low oxygen substrates.



Phylum: Phaeophyta
Class: Phaeophyceae
Order: Fucales
Family: Hormosiraceae
Species: *Hormosira banksii*

Remarks: *Hormosira banksii*, also known as Neptune's necklace, Neptune's pearls, sea grapes, or bubbleweed is a species of brown alga native to Australia and New Zealand. It is abundant on low-energy rocky reefs at midtide levels, where it outcompetes other algal species due to its high tolerance to desiccation.



Order: Fucales
Family: Sargassaceae
Genus: *Sargassum sp*

Remarks: *Sargassum* is a genus of brown macroalgae in the order Fucales. Numerous species are distributed throughout the temperate and tropical oceans of the world, where they generally inhabit shallow water and coral reefs, and the genus is widely known for its planktonic species.



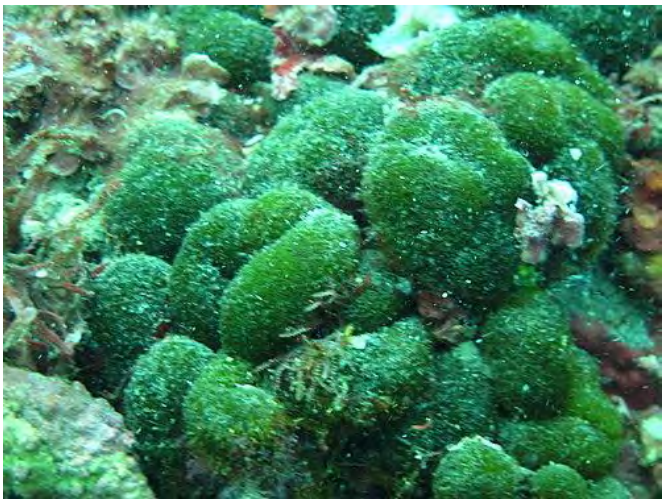
Order: Fucales
Family: Cystoseiraceae
Species: *Cystoseira trinodis*
Synonym: *Cystophyllum onustum*

Remarks: A macroalgae widespread in Australia and the Indo-Pacific region. The plants vary considerably in size and form, with tall thin plants up to 1.5m high in very sheltered and estuarine waters, or more compact thicker-stemmed plants up to 30cm high in oceanic reef pools. Characterised by small peg-like projections on the lower parts of the main branches.



Order: Bryopsidales
Family: Codiaceae
Species: *Codium fragile*

Remarks: Green alga. The cylindrical, forked, dark green fronds of *C. fragile* grow to 30 cm long. When the plant is under water, fine hairs can be seen over the surface of the branches. This is a species of temperate regions, found sub-tidally and in intertidal pools often on rough coasts. Small red algae are often found growing on *C. fragile*, giving a pink colour to the fronds.



Order: Bryopsidales
Family: Codiaceae
Species: *Codium mamillosum*

Remarks: Green alga. Found along the coast of New South Wales. It is typically found in areas with moderate wave action, from low tidal zones to a depth of 40m. It has a medium green, globose (round) thallus, attached to a tuft of rhizoids.



Order: Bryopsidales
Family: Caulerpaceae
Species: *Caulerpa taxifolia*

Remarks: Fast growing marine alga native to tropical Australia and the South Pacific that is colonizing areas outside its range, including NSW waterways. *Caulerpa* is an aquatic pest that is extremely difficult to eradicate once established. The flattened feather-like fronds are bright green in colour and 3-25cm in length.



Filamentous algae

Remarks: Filamentous algae are colonies of microscopic plants that link together to form threads or mesh-like filaments. These primitive plants normally grow on the surface of hard objects or other substrates under the water but they can break loose and form floating mats.



Class: Ulvophyceae
Order: Ulvales
Family: Ulvaceae

Remarks: Ulvaceae is a widely distributed family of thin green algae having either a flat or a hollow tubular thallus. Commonly called sea lettuce. Attached or free floating. Cells with parietal, laminate or cup-shaped chloroplasts with 1-4 pyrenoids.



Class: Phaeophyceae
Order: Ectocarpales
Family: Scytosiphonaceae
Genus: *Colpomenia*

Remarks: Genus of brown macroalgae which grows as a baglike or globular algae attached to hard substrates in the intertidal zone.



Class: Florideophyceae
Order: Corallinales
Family: Corallinaceae
Genus: *Corallina officinalis*

Remarks: Species of feather-like Corrallina. Occurs commonly in tidal pools and on lower intertidal rock surfaces. It forms calcium carbonate deposits within its cells which serve to strengthen the thalus. These white deposits cause the seaweed to appear pink in colour.

iv Growth form of *Zostera capricorni* and extent of fouling by epiphytic algae

The following plates show the various growth characteristics of the seagrass *Zostera capricorni* in regard to leaf length. In Lake Macquarie, due to environmental factors, *Z. capricorni* either has short leaf (Plate A.2) or long leaf growth (Plate A.5).

The seagrass also provides a substrate for algae, which can have positive and negative effects on the seagrass depending on the extent of fouling. In this study, fouling is described as Light (Level 0), Moderate (Level 1) or Heavy (Level 2) (Plates A.2- A.7).



Plate A.2 Short leaved sea grass with no fouling



Plate A.3 Short leaved seagrass with low fouling



Plate A.4 Short leaved seagrass with heavy fouling

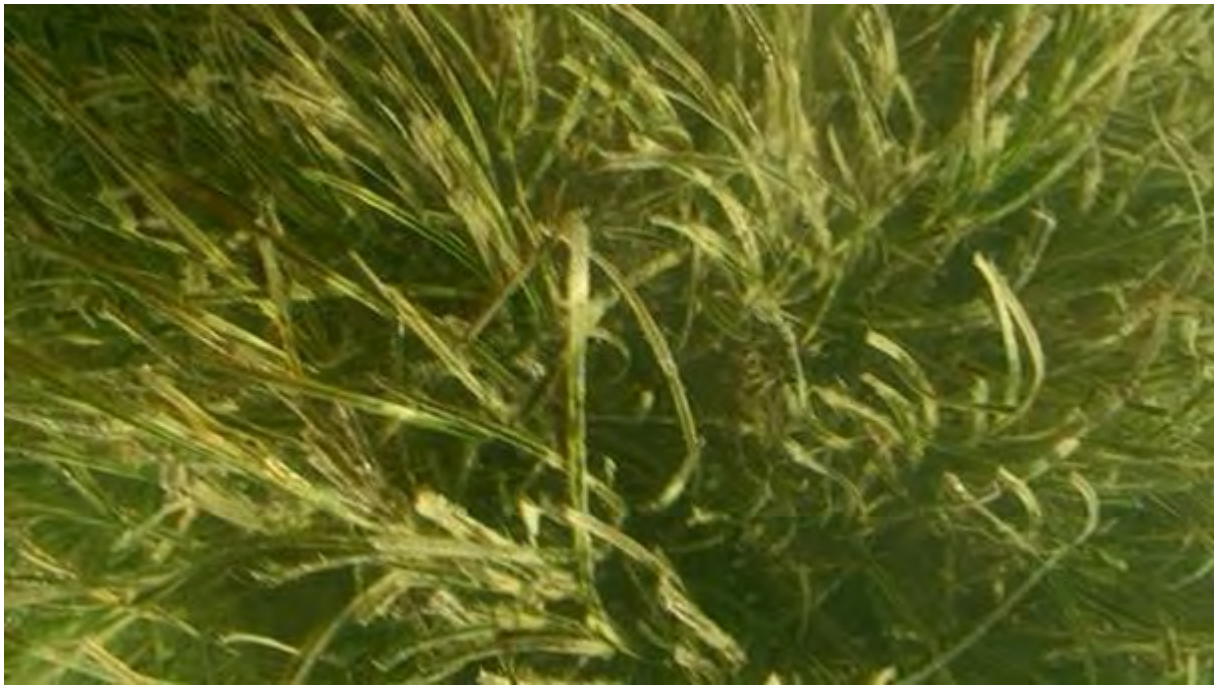


Plate A.5 Long leaved seagrass with light fouling



Plate A.6 Long leaved seagrass with moderate fouling

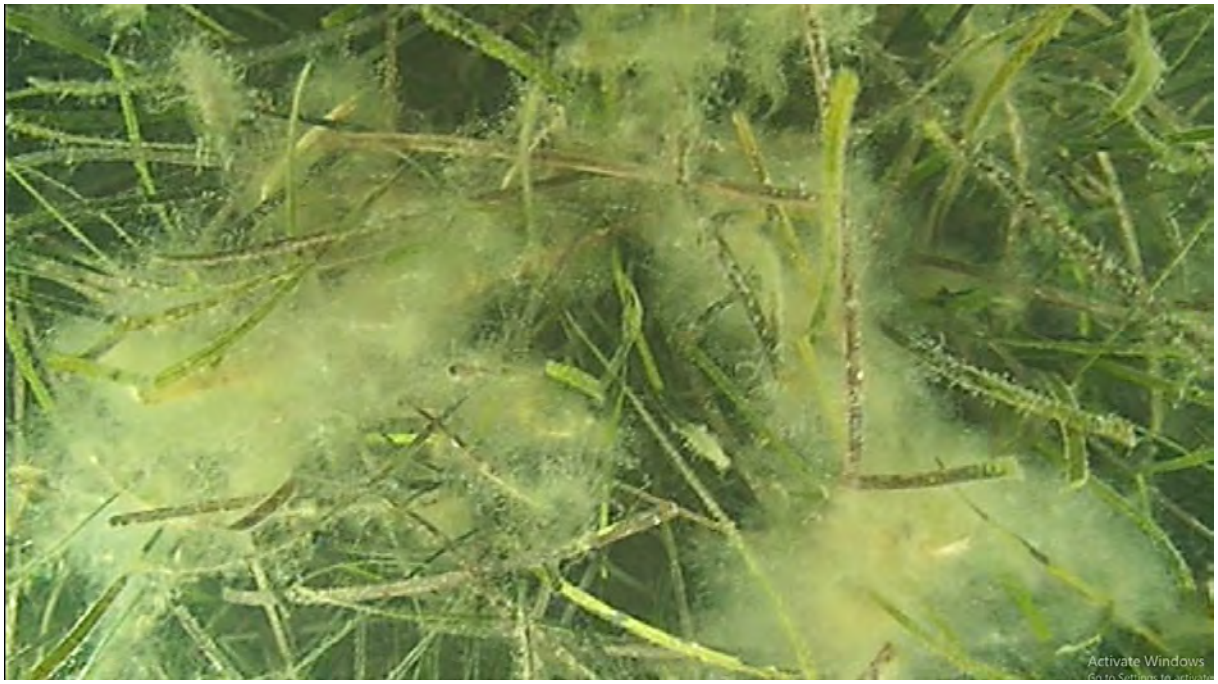


Plate A.7 Long leaved seagrass with heavy fouling



Plate A.8 Algae, *Halophila* and bare ground

B. Water Quality Data

Northern Shore Summerland Point and Frying Pan Bay

C5									
Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	17.28	41.39	3.4	7.91	26.5	96.5	7.91	430
6/06/2025	0.5	17.27	41.38	3.9	7.92	26.49	96.6	7.92	431
6/06/2025	1.0	17.26	41.39	4.8	7.92	26.5	96.9	7.95	431
6/06/2025	1.5	17.28	41.4	6.3	7.93	26.51	96.9	7.94	431
Average		**17.27**	**41.39**	**4.60**	**7.92**	**26.50**	**96.73**	**7.93**	**430.75**
Stdev		**0.01**	**0.01**	**1.27**	**0.01**	**0.01**	**0.21**	**0.02**	**0.50**
Minimum		**17.26**	**41.38**	**3.4**	**7.91**	**26.49**	**96.5**	**7.91**	**430**
Maximum		**17.28**	**41.4**	**6.3**	**7.93**	**26.51**	**96.9**	**7.95**	**431**

C6

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	17.07	40.85	1.6	7.97	26.12	99.1	8.18	430
6/06/2025	0.5	17.07	40.86	2.6	7.97	26.13	99.1	8.18	431
6/06/2025	1.0	17.05	40.9	3.3	7.96	26.15	98.2	8.1	431
6/06/2025	1.5	16.98	41.16	4.6	7.93	26.34	96.2	7.94	432
6/06/2025	2.0	16.95	41.22	7.5	7.92	26.38	93.7	7.74	432
6/06/2025	2.5	16.95	41.07	7.4	7.92	26.27	93.6	7.74	432
6/06/2025	3.0	16.99	41.29	15	7.93	26.43	94.3	7.78	433
Average		**17.01**	**41.05**	**6.00**	**7.94**	**26.26**	**96.31**	**7.95**	**431.57**
Stdev		**0.05**	**0.18**	**4.57**	**0.02**	**0.13**	**2.49**	**0.20**	**0.98**
Minimum		**16.95**	**40.85**	**1.6**	**7.92**	**26.12**	**93.6**	**7.74**	**430**
Maximum		**17.07**	**41.29**	**15**	**7.97**	**26.43**	**99.1**	**8.18**	**433**

F1

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	16.77	41.14	4.4	7.93	26.32	94.0	7.79	432
6/06/2025	0.5	16.78	41.13	2.6	7.94	26.32	94.9	7.87	432
6/06/2025	1.0	16.77	41.13	3.8	7.94	26.32	95.9	7.95	433
6/06/2025	1.5	16.76	41.13	4.5	7.95	26.32	95.7	7.93	433
6/06/2025	2.0	16.81	41.18	5.7	7.94	26.35	94.9	7.86	433
6/06/2025	2.5	16.78	41.14	7.4	7.95	26.32	94.8	7.86	434
Average		**16.78**	**41.14**	**4.73**	**7.94**	**26.33**	**95.03**	**7.88**	**432.83**
Stdev		**0.02**	**0.02**	**1.65**	**0.01**	**0.01**	**0.69**	**0.06**	**0.75**
Minimum		**16.76**	**41.13**	**2.6**	**7.93**	**26.32**	**94**	**7.79**	**432**
Maximum		**16.81**	**41.18**	**7.4**	**7.95**	**26.35**	**95.9**	**7.95**	**434**

F2

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	17.20	41.03	10.2	7.92	26.24	94.9	7.80	430
6/06/2025	0.5	17.20	41.02	3.4	7.92	26.24	95.3	7.84	431
6/06/2025	1.0	17.20	41.06	4.0	7.93	26.26	95.9	7.88	431
6/06/2025	1.5	17.22	41.08	4.9	7.93	26.28	95.8	7.87	431
6/06/2025	2.0	17.30	41.26	5.7	7.91	26.41	95.4	7.83	432
6/06/2025	2.5	17.39	44.4	6.7	7.77	28.65	91.1	7.36	435
6/06/2025	3.0	17.74	45.08	9.0	7.75	29.14	82.0	6.55	435
Average		**17.32**	**42.13**	**6.27**	**7.88**	**27.03**	**92.91**	**7.59**	**432.14**
Stdev		**0.20**	**1.79**	**2.54**	**0.08**	**1.28**	**5.09**	**0.49**	**2.04**
Minimum		**17.2**	**41.02**	**3.4**	**7.75**	**26.24**	**82**	**6.55**	**430**
Maximum		**17.74**	**45.08**	**10.2**	**7.93**	**29.14**	**95.9**	**7.88**	**435**

F3

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	17.20	40.93	4.9	7.93	26.17	96.1	7.90	432
6/06/2025	0.5	17.20	40.92	3.0	7.94	26.17	96.5	7.94	433
6/06/2025	1.0	17.20	40.92	3.9	7.94	26.17	96.7	7.96	433
6/06/2025	1.5	17.20	40.92	6.6	7.95	26.17	97.2	8.00	433
Average		**17.20**	**40.92**	**4.60**	**7.94**	**26.17**	**96.63**	**7.95**	**432.75**
Stdev		**0.00**	**0.00**	**1.54**	**0.01**	**0.00**	**0.46**	**0.04**	**0.50**
Minimum		**17.2**	**40.92**	**3**	**7.93**	**26.17**	**96.1**	**7.9**	**432**
Maximum		**17.2**	**40.93**	**6.6**	**7.95**	**26.17**	**97.2**	**8**	**433**

F4

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	16.68	40.53	1.3	7.94	25.89	94.8	7.90	433
6/06/2025	0.5	16.67	40.53	2.4	7.94	25.89	95.1	7.92	433
6/06/2025	1.0	16.67	40.54	3.5	7.95	25.89	95.1	7.92	434
6/06/2025	1.5	16.67	40.52	4.6	7.95	25.88	95.4	7.94	434
6/06/2025	2.0	16.67	40.52	5.5	7.95	25.88	95.3	7.94	434
6/06/2025	2.5	16.67	40.53	7.9	7.96	25.89	95.2	7.93	434
6/06/2025	3.0	16.67	40.53	8.0	7.96	25.89	95.1	7.92	434
Average		**16.67**	**40.53**	**4.74**	**7.95**	**25.89**	**95.14**	**7.92**	**433.71**
Stdev		**0.00**	**0.01**	**2.58**	**0.01**	**0.00**	**0.19**	**0.01**	**0.49**
Minimum		**16.67**	**40.52**	**1.3**	**7.94**	**25.88**	**94.8**	**7.9**	**433**
Maximum		**16.68**	**40.54**	**8**	**7.96**	**25.89**	**95.4**	**7.94**	**434**

F5

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	17.48	40.90	2.8	7.93	26.15	97.5	7.98	434
6/06/2025	0.5	17.49	40.92	3.8	7.94	26.17	98.4	8.05	434
6/06/2025	1.0	17.5	40.90	4.5	7.94	26.15	98.6	8.07	435
6/06/2025	1.5	17.52	40.95	5.3	7.94	26.19	98.7	8.07	435
6/06/2025	2.0	17.51	40.93	5.9	7.94	26.18	98.9	8.09	435
6/06/2025	2.5	17.52	40.94	7.6	7.95	26.18	99.8	8.16	435
6/06/2025	3.0	17.52	40.93	9.6	7.95	26.18	100	8.17	435
Average		**17.51**	**40.92**	**5.64**	**7.94**	**26.17**	**98.84**	**8.08**	**434.71**
Stdev		**0.02**	**0.02**	**2.33**	**0.01**	**0.02**	**0.85**	**0.07**	**0.49**
Minimum		**17.48**	**40.9**	**2.8**	**7.93**	**26.15**	**97.5**	**7.98**	**434**
Maximum		**17.52**	**40.95**	**9.6**	**7.95**	**26.19**	**100**	**8.17**	**435**

F6

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	17.56	41.25	2.5	7.91	26.4	98.1	8.00	434
6/06/2025	0.5	17.55	41.24	3.1	7.91	26.39	98.7	8.06	435
6/06/2025	1.0	17.56	41.24	3.8	7.92	26.39	98.9	8.07	435
6/06/2025	1.5	17.56	41.25	4.9	7.92	26.4	99.2	8.09	435
6/06/2025	2.0	17.57	41.24	5.6	7.92	26.39	99.2	8.09	436
6/06/2025	2.5	17.57	41.25	6.2	7.92	26.4	99.6	8.12	436
6/06/2025	3.0	17.57	41.26	7.6	7.93	26.4	99.6	8.13	436
Average		**17.56**	**41.25**	**4.81**	**7.92**	**26.40**	**99.04**	**8.08**	**435.29**
Stdev		**0.01**	**0.01**	**1.81**	**0.01**	**0.01**	**0.53**	**0.04**	**0.76**
Minimum		**17.55**	**41.24**	**2.5**	**7.91**	**26.39**	**98.1**	**8**	**434**
Maximum		**17.57**	**41.26**	**7.6**	**7.93**	**26.4**	**99.6**	**8.13**	**436**

F7

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	17.75	41.35	4	7.91	26.47	97.4	7.91	434
6/06/2025	0.5	17.74	41.35	3.7	7.91	26.47	98	7.97	435
6/06/2025	1.0	17.74	41.34	4.6	7.91	26.47	98.4	7.99	435
6/06/2025	1.5	17.75	41.34	5.8	7.92	26.46	98.9	8.04	436
6/06/2025	2.0	17.74	41.33	6.5	7.92	26.46	99	8.05	436
6/06/2025	2.5	17.76	41.33	7.7	7.92	26.46	99.6	8.09	436
Average		**17.75**	**41.34**	**5.38**	**7.92**	**26.47**	**98.55**	**8.01**	**435.33**
Stdev		**0.01**	**0.01**	**1.56**	**0.01**	**0.01**	**0.78**	**0.06**	**0.82**
Minimum		**17.74**	**41.33**	**3.7**	**7.91**	**26.46**	**97.4**	**7.91**	**434**
Maximum		**17.76**	**41.35**	**7.7**	**7.92**	**26.47**	**99.6**	**8.09**	**436**

Western Shore Summerland Point

E7

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	16.84	43.63	1.6	7.81	28.10	87.2	7.14	428
6/06/2025	0.5	16.84	43.65	1.7	7.81	28.11	87.5	7.17	430
6/06/2025	1.0	17.67	44.41	2.9	7.78	28.66	85.9	6.90	430
6/06/2025	1.5	17.8	44.8	3.8	7.77	28.94	85.4	6.83	431
6/06/2025	2.0	17.82	44.84	4.5	7.77	28.97	85.2	6.81	431
6/06/2025	2.5	17.82	44.85	4.9	7.77	28.97	85.3	6.81	431
Average		**17.47**	**44.36**	**3.23**	**7.79**	**28.63**	**86.08**	**6.94**	**430.17**
Stdev		**0.49**	**0.58**	**1.40**	**0.02**	**0.42**	**1.01**	**0.17**	**1.17**
Minimum		**16.84**	**43.63**	**1.6**	**7.77**	**28.1**	**85.2**	**6.81**	**428**
Maximum		**17.82**	**44.85**	**4.9**	**7.81**	**28.97**	**87.5**	**7.17**	**431**

T1

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	17.29	41.41	1.6	7.9	26.52	95.7	7.84	428
6/06/2025	0.5	17.29	41.4	3.0	7.91	26.51	96.1	7.87	429
6/06/2025	1.0	17.3	41.47	4.0	7.91	26.55	96.3	7.89	430
6/06/2025	1.5	17.49	42.08	5.2	7.86	26.99	93.5	7.61	431
6/06/2025	2.0	18.34	45.7	6.9	7.67	29.59	81.7	6.44	433
6/06/2025	2.5	18.43	45.77	8.7	7.65	29.64	77.1	6.06	433
Average		**17.69**	**42.97**	**4.90**	**7.82**	**27.63**	**90.07**	**7.29**	**430.67**
Stdev		**0.54**	**2.16**	**2.60**	**0.12**	**1.55**	**8.45**	**0.82**	**2.07**
Minimum		**17.29**	**41.4**	**1.6**	**7.65**	**26.51**	**77.1**	**6.06**	**428**
Maximum		**18.43**	**45.77**	**8.7**	**7.91**	**29.64**	**96.3**	**7.89**	**433**

T2

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	17.74	43.11	1.6	7.84	27.72	93.6	7.55	428
6/06/2025	0.5	17.88	43.57	2.9	7.8	28.06	92.4	7.41	430
6/06/2025	1.0	18.37	45.59	4.2	7.67	29.51	85.7	6.75	431
6/06/2025	1.5	18.53	45.87	4.9	7.68	29.71	80.4	6.31	432
6/06/2025	2.0	18.64	46.04	5.6	7.66	29.84	80.5	6.3	432
6/06/2025	2.5	18.84	46.31	7.4	7.65	30.03	79.6	6.2	432
6/06/2025	3.0	19.00	46.58	7.9	7.62	30.22	78.8	6.11	432
Average		**18.43**	**45.30**	**4.93**	**7.70**	**29.30**	**84.43**	**6.66**	**431.00**
Stdev		**0.47**	**1.38**	**2.28**	**0.08**	**0.99**	**6.27**	**0.60**	**1.53**
Minimum		**17.74**	**43.11**	**1.6**	**7.62**	**27.72**	**78.8**	**6.11**	**428**
Maximum		**19.00**	**46.58**	**7.9**	**7.84**	**30.22**	**93.6**	**7.55**	**432**

T3

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	18.03	44.28	1.4	7.77	28.57	87.1	6.95	428
6/06/2025	0.5	18.08	44.56	2.9	7.77	28.77	86.5	6.89	430
6/06/2025	1.0	18.33	44.98	4.1	7.71	29.07	82.3	6.51	430
6/06/2025	1.5	18.54	45.98	5.5	7.67	29.79	80.5	6.31	431
6/06/2025	2.0	18.70	46.09	6.5	7.65	29.87	79.4	6.2	432
Average		**18.34**	**45.18**	**4.08**	**7.71**	**29.21**	**83.16**	**6.57**	**430.20**
Stdev		**0.29**	**0.82**	**2.03**	**0.06**	**0.59**	**3.49**	**0.34**	**1.48**
Minimum		**18.03**	**44.28**	**1.4**	**7.65**	**28.57**	**79.4**	**6.2**	**428**
Maximum		**18.70**	**46.09**	**6.50**	**7.77**	**29.87**	**87.10**	**6.95**	**432.00**

T4

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	17.96	43.98	1.5	7.78	28.35	86.8	6.94	429
6/06/2025	0.5	17.95	44	2.5	7.78	28.37	86.8	6.95	430
6/06/2025	1.0	17.95	44	2.6	7.78	28.37	86.9	6.95	430
6/06/2025	1.5	18.03	44.17	2.4	7.78	28.49	87	6.95	430
6/06/2025	2.0	18.05	44.43	3.9	7.78	28.67	86.9	6.93	430
6/06/2025	2.5	18.04	44.25	5.3	7.81	28.55	90.6	7.23	430
Average		**18.00**	**44.14**	**3.03**	**7.79**	**28.47**	**87.50**	**6.99**	**429.83**
Stdev		**0.05**	**0.18**	**1.35**	**0.01**	**0.13**	**1.52**	**0.12**	**0.41**
Minimum		**17.95**	**43.98**	**1.5**	**7.78**	**28.35**	**86.8**	**6.93**	**429**
Maximum		**18.05**	**44.43**	**5.3**	**7.81**	**28.67**	**90.6**	**7.23**	**430**

T5

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	17.06	43.72	1.5	7.8	28.16	87.9	7.16	430
6/06/2025	0.5	17.28	43.84	3.3	7.79	28.25	87.2	7.07	431
6/06/2025	1.0	17.8	44.73	4.9	7.78	28.89	85.9	6.87	431
6/06/2025	1.5	17.62	44.87	5.6	7.77	28.99	86.1	6.91	432
6/06/2025	2.0	17.62	44.88	5.7	7.78	29	86.1	6.90	432
6/06/2025	2.5	18.3	45.76	6.9	7.68	29.63	80.7	6.36	432
6/06/2025	3.0	18.53	45.98	9.0	7.66	29.79	78.8	6.18	432
6/06/2025	3.5	18.06	45.37	8.8	7.7	29.35	80.7	6.41	433
Average		**17.78**	**44.89**	**5.71**	**7.75**	**29.01**	**84.18**	**6.73**	**431.63**
Stdev		**0.50**	**0.82**	**2.56**	**0.06**	**0.59**	**3.51**	**0.36**	**0.92**
Minimum		**17.06**	**43.72**	**1.5**	**7.66**	**28.16**	**78.8**	**6.18**	**430**
Maximum		**18.53**	**45.98**	**9**	**7.8**	**29.79**	**87.9**	**7.16**	**433**

T6

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	17.55	43.92	1.1	7.79	28.31	87.1	7.02	428
6/06/2025	0.5	17.65	44.03	2.6	7.79	28.39	87.2	7.02	430
6/06/2025	1.0	17.65	44.10	2.7	7.80	28.44	87.2	7.02	430
6/06/2025	1.5	17.87	44.29	3.6	7.79	28.58	87.0	6.97	430
6/06/2025	2.0	17.99	44.62	4.4	7.78	28.81	87.1	6.95	430
6/06/2025	2.5	17.93	45.06	6.2	7.77	29.13	86.4	6.88	431
Average		**17.77**	**44.34**	**3.43**	**7.79**	**28.61**	**87.00**	**6.98**	**429.83**
Stdev		**0.18**	**0.43**	**1.75**	**0.01**	**0.31**	**0.30**	**0.06**	**0.98**
Minimum		**17.55**	**43.92**	**1.1**	**7.77**	**28.31**	**86.4**	**6.88**	**428**
Maximum		**17.99**	**45.06**	**6.2**	**7.8**	**29.13**	**87.2**	**7.02**	**431**

T7

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	16.62	43.38	1.3	7.85	27.92	89.7	7.39	429
6/06/2025	0.5	17.62	44.66	2.5	7.84	28.84	88.5	7.10	430
6/06/2025	1.0	17.71	44.67	3.8	7.88	28.85	91.5	7.33	430
Average		**17.32**	**44.24**	**2.53**	**7.86**	**28.54**	**89.90**	**7.27**	**429.67**
Stdev		**0.61**	**0.74**	**1.25**	**0.02**	**0.53**	**1.51**	**0.15**	**0.58**
Minimum		**16.62**	**43.38**	**1.3**	**7.84**	**27.92**	**88.5**	**7.1**	**429**
Maximum		**17.71**	**44.67**	**3.8**	**7.88**	**28.85**	**91.5**	**7.39**	**430**

T8

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	16.96	43.46	1	7.83	27.98	87.8	7.18	431
6/06/2025	0.5	17.62	44.32	2.7	7.79	28.59	86.8	6.98	432
6/06/2025	1.0	17.69	44.73	3.5	7.78	28.89	85.9	6.89	433
6/06/2025	1.5	17.79	45.25	4.3	7.75	29.27	85.3	6.81	433
6/06/2025	2.0	17.98	45.44	5	7.73	29.41	83.7	6.65	434
6/06/2025	2.5	17.7	44.96	6.5	7.76	29.06	85.2	6.82	434
6/06/2025	3.0	16.63	43.38	6.5	7.84	27.92	89.3	7.35	428
Average		**17.48**	**44.51**	**4.21**	**7.78**	**28.73**	**86.29**	**6.95**	**432.14**
Stdev		**0.49**	**0.82**	**2.01**	**0.04**	**0.60**	**1.85**	**0.24**	**2.12**
Minimum		**16.63**	**43.38**	**1**	**7.73**	**27.92**	**83.7**	**6.65**	**428**
Maximum		**17.98**	**45.44**	**6.5**	**7.84**	**29.41**	**89.3**	**7.35**	**434**

E1

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	15.95	41.92	3.1	7.91	26.87	81.9	6.88	385
6/06/2025	0.5	15.96	41.9	3.4	7.91	26.87	81.7	6.86	387
6/06/2025	1.0	15.95	41.94	3.5	7.92	26.89	81.8	6.87	388
6/06/2025	1.5	15.98	41.93	6.6	7.92	26.89	81.8	6.86	389
Average		**15.96**	**41.92**	**4.15**	**7.92**	**26.88**	**81.80**	**6.87**	**387.25**
Stdev		**0.01**	**0.02**	**1.64**	**0.01**	**0.01**	**0.08**	**0.01**	**1.71**
Minimum		**15.95**	**41.9**	**3.1**	**7.91**	**26.87**	**81.7**	**6.86**	**385**
Maximum		**15.98**	**41.94**	**6.6**	**7.92**	**26.89**	**81.9**	**6.88**	**389**

E2

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	16.01	41.93	4.9	7.91	26.88	78.8	6.61	396
6/06/2025	0.5	16.04	41.94	4.6	7.91	26.89	79.9	6.70	396
6/06/2025	1.0	18.18	45.52	5.7	7.72	29.46	72.9	5.77	398
6/06/2025	1.5	18.64	46.68	5.4	7.67	30.3	68.0	5.31	398
6/06/2025	2.0	18.33	46.56	5.4	7.67	30.22	68.4	5.37	398
6/06/2025	2.5	18.30	46.55	6.8	7.65	30.21	67.8	5.33	399
Average		**17.58**	**44.86**	**5.47**	**7.76**	**28.99**	**72.63**	**5.85**	**397.50**
Stdev		**1.22**	**2.31**	**0.76**	**0.12**	**1.66**	**5.54**	**0.65**	**1.22**
Minimum		**16.01**	**41.93**	**4.6**	**7.65**	**26.88**	**67.8**	**5.31**	**396**
Maximum		**18.64**	**46.68**	**6.8**	**7.91**	**30.3**	**79.9**	**6.7**	**399**

E3

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	16.04	43.32	4.5	7.83	27.88	78.000	6.50	409
6/06/2025	0.5	16.02	43.27	4.3	7.83	27.84	78.1	6.51	409
6/06/2025	1.0	16.61	44.35	4.2	7.76	28.61	76.6	6.28	410
6/06/2025	1.5	17.46	45.31	4.2	7.73	29.31	73.7	5.92	411
6/06/2025	2.0	17.30	45.56	5.2	7.69	29.49	71.9	5.78	412
6/06/2025	2.5	17.30	45.81	5.5	7.63	29.67	68.0	5.46	413
Average		**16.79**	**44.60**	**4.65**	**7.75**	**28.80**	**74.38**	**6.08**	**410.67**
Stdev		**0.66**	**1.13**	**0.56**	**0.08**	**0.81**	**3.98**	**0.42**	**1.63**
Minimum		**16.02**	**43.27**	**4.2**	**7.63**	**27.84**	**68**	**5.46**	**409**
Maximum		**17.46**	**45.81**	**5.5**	**7.83**	**29.67**	**78.1**	**6.51**	**413**

E4

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	16.31	42.46	2.4	7.88	27.27	84.1	7.00	419
6/06/2025	0.5	16.49	42.69	2.5	7.87	27.42	83.8	6.94	419
6/06/2025	1.0	17.45	43.91	3.1	7.77	28.3	79.7	6.44	420
6/06/2025	1.5	18.15	45.9	4.1	7.66	29.74	70.5	5.57	421
6/06/2025	2.0	18.09	45.96	4.2	7.68	29.78	73.5	5.82	421
Average		**17.30**	**44.18**	**3.26**	**7.77**	**28.50**	**78.32**	**6.35**	**420.00**
Stdev		**0.87**	**1.69**	**0.86**	**0.10**	**1.21**	**6.12**	**0.65**	**1.00**
Minimum		**16.31**	**42.46**	**2.4**	**7.66**	**27.27**	**70.5**	**5.57**	**419**
Maximum		**18.15**	**45.96**	**4.2**	**7.88**	**29.78**	**84.1**	**7**	**421**

L1

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	16.9	44.21	2.2	7.75	28.52	79.2	6.46	431
6/06/2025	0.5	16.84	44.26	2.3	7.75	28.55	77.3	6.31	431
6/06/2025	1.0	16.78	44.45	2.4	7.74	28.69	78.4	6.4	432
6/06/2025	1.5	17.79	46.68	3.2	7.64	30.30	71.4	5.66	432
6/06/2025	2.0	17.85	46.49	4.5	7.63	30.17	69.9	5.55	432
Average		**17.23**	**45.22**	**2.92**	**7.70**	**29.25**	**75.24**	**6.08**	**431.60**
Stdev		**0.54**	**1.25**	**0.97**	**0.06**	**0.91**	**4.28**	**0.44**	**0.55**
Minimum		**16.78**	**44.21**	**2.2**	**7.63**	**28.52**	**69.9**	**5.55**	**431**
Maximum		**17.85**	**46.68**	**4.5**	**7.75**	**30.3**	**79.2**	**6.46**	**432**

E5

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	16.9	43.33	2.3	7.82	27.88	86.5	7.08	431
6/06/2025	0.5	16.88	43.32	2.2	7.83	27.88	86.7	7.10	431
6/06/2025	1.0	16.82	43.37	2.3	7.84	27.91	86.9	7.13	431
6/06/2025	1.5	16.84	43.36	3.0	7.85	27.91	87.3	7.16	432
Average		**16.86**	**43.35**	**2.45**	**7.84**	**27.90**	**86.85**	**7.12**	**431.25**
Stdev		**0.04**	**0.02**	**0.37**	**0.01**	**0.02**	**0.34**	**0.04**	**0.50**
Minimum		**16.82**	**43.32**	**2.2**	**7.82**	**27.88**	**86.5**	**7.08**	**431**
Maximum		**16.9**	**43.37**	**3**	**7.85**	**27.91**	**87.3**	**7.16**	**432**

E6

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	17.09	45.25	20.2	7.66	29.26	76.0	6.15	433
6/06/2025	0.5	17.14	45.55	2.2	7.64	29.48	75.5	6.10	433
6/06/2025	1.0	17.15	45.61	2.2	7.64	29.52	75.4	6.09	433
6/06/2025	1.5	17.35	45.97	3.2	7.58	29.78	71.6	5.75	434
6/06/2025	2.0	17.35	45.97	3.3	7.58	29.79	71.5	5.74	434
6/06/2025	2.5	17.35	46.04	7.3	7.56	29.84	70.0	5.62	434
6/06/2025	3.0	17.42	46.03	7.5	7.57	29.83	70.1	5.62	435
Average		**17.26**	**45.77**	**6.56**	**7.60**	**29.64**	**72.87**	**5.87**	**433.71**
Stdev		**0.13**	**0.31**	**6.42**	**0.04**	**0.22**	**2.66**	**0.24**	**0.76**
Minimum		**17.09**	**45.25**	**2.2**	**7.56**	**29.26**	**70**	**5.62**	**433**
Maximum		**17.42**	**46.04**	**20.2**	**7.66**	**29.84**	**76**	**6.15**	**435**

E8

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	16.85	43.42	1.3	7.85	27.95	90.5	7.42	433
6/06/2025	0.5	16.89	43.41	1.7	7.87	27.94	91.3	7.47	433
6/06/2025	1.0	16.87	43.47	2.6	7.85	27.98	91.3	7.48	434
6/06/2025	1.5	16.97	43.44	4.9	7.88	27.96	91.4	7.48	434
Average		**16.90**	**43.44**	**2.63**	**7.86**	**27.96**	**91.13**	**7.46**	**433.50**
Stdev		**0.05**	**0.03**	**1.61**	**0.02**	**0.02**	**0.42**	**0.03**	**0.58**
Minimum		**16.85**	**43.41**	**1.3**	**7.85**	**27.94**	**90.5**	**7.42**	**433**
Maximum		**16.97**	**43.47**	**4.9**	**7.88**	**27.98**	**91.4**	**7.48**	**434**

E9

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	17.66	44.04	1.2	7.85	28.39	91.1	7.33	433
6/06/2025	0.5	17.68	44.07	2.2	7.84	28.42	91.3	7.34	434
6/06/2025	1.0	17.75	44.30	3.5	7.81	28.58	90.0	7.22	434
6/06/2025	1.5	17.78	44.65	4.3	7.78	28.83	87.8	7.03	435
6/06/2025	2.0	17.81	45.07	5.1	7.75	29.13	86.4	6.90	435
6/06/2025	2.5	17.82	45.76	7.0	7.67	29.63	79.7	6.34	437
Average		**17.75**	**44.65**	**3.88**	**7.78**	**28.83**	**87.72**	**7.03**	**434.67**
Stdev		**0.07**	**0.67**	**2.08**	**0.07**	**0.48**	**4.37**	**0.38**	**1.37**
Minimum		**17.66**	**44.04**	**1.2**	**7.67**	**28.39**	**79.70**	**6.34**	**433**
Maximum		**17.82**	**45.76**	**7.0**	**7.85**	**29.63**	**91.30**	**7.34**	**437**

E10

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	17.36	44.42	1.5	7.77	28.67	86.3	6.97	436
6/06/2025	0.5	17.41	44.48	2.7	7.78	28.71	86.3	6.96	436
6/06/2025	1.0	17.67	45.26	3.8	7.76	29.27	86.2	6.89	437
6/06/2025	1.5	18.13	46.02	4.9	7.66	29.82	81.7	6.46	437
6/06/2025	2.0	18.13	46.02	4.9	7.66	29.82	81.3	6.42	437
6/06/2025	2.5	18.05	45.99	5.5	7.66	29.8	79.4	6.28	438
6/06/2025	3.0	18.26	46.23	6.0	7.57	29.97	75.0	5.91	438
6/06/2025	3.5	18.64	46.76	6.8	7.58	30.36	70.6	5.51	438
6/06/2025	4.0	19.04	46.94	8.6	7.53	30.49	65.6	5.07	438
Average		**18.08**	**45.79**	**4.97**	**7.66**	**29.66**	**79.16**	**6.27**	**437.22**
Stdev		**0.55**	**0.90**	**2.13**	**0.09**	**0.65**	**7.39**	**0.67**	**0.83**
Minimum		**17.36**	**44.42**	**1.5**	**7.53**	**28.67**	**65.6**	**5.07**	**436**
Maximum		**19.04**	**46.94**	**8.6**	**7.78**	**30.49**	**86.3**	**6.97**	**438**

E11

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	17.19	44.52	6.1	7.78	28.74	86.2	6.98	436
6/06/2025	0.5	17.28	44.81	4.7	7.77	28.95	86.6	7.00	437
6/06/2025	1.0	18.23	45.73	4.2	7.82	29.62	88.6	7.00	437
6/06/2025	1.5	18.09	45.46	5.7	7.79	29.42	88.7	7.04	437
Average		**17.70**	**45.13**	**5.18**	**7.79**	**29.18**	**87.53**	**7.01**	**436.75**
Stdev		**0.54**	**0.56**	**0.88**	**0.02**	**0.41**	**1.31**	**0.03**	**0.50**
Minimum		**17.19**	**44.52**	**4.2**	**7.77**	**28.74**	**86.2**	**6.98**	**436**
Maximum		**18.23**	**45.73**	**6.1**	**7.82**	**29.62**	**88.7**	**7.04**	**437**

E12

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	17.27	44.46	1.5	7.77	28.7	85.6	6.93	437
6/06/2025	0.5	17.25	44.56	1.8	7.77	28.77	86.1	6.96	438
6/06/2025	1.0	17.76	45.71	3.2	7.71	29.6	81.9	6.53	438
6/06/2025	1.5	18.18	45.97	5.1	7.66	29.79	80.3	6.34	439
6/06/2025	2.0	18.16	45.97	6.1	7.65	29.79	78.6	6.21	439
Average		**17.72**	**45.33**	**3.54**	**7.71**	**29.33**	**82.50**	**6.59**	**438.20**
Stdev		**0.46**	**0.76**	**2.02**	**0.06**	**0.55**	**3.28**	**0.34**	**0.84**
Minimum		**17.25**	**44.46**	**1.5**	**7.65**	**28.7**	**78.6**	**6.21**	**437**
Maximum		**18.18**	**45.97**	**6.1**	**7.77**	**29.79**	**86.1**	**6.96**	**439**

E13

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	17.55	45.38	2.0	7.72	29.36	83.5	6.69	438
6/06/2025	0.5	17.51	45.39	1.4	7.72	29.37	83.7	6.71	438
6/06/2025	1.0	17.77	45.7	2.6	7.69	29.59	80.9	6.45	439
6/06/2025	1.5	17.84	45.86	5.8	7.68	29.71	80.0	6.36	439
Average		**17.67**	**45.58**	**2.95**	**7.70**	**29.51**	**82.03**	**6.55**	**438.50**
Stdev		**0.16**	**0.24**	**1.96**	**0.02**	**0.17**	**1.86**	**0.17**	**0.58**
Minimum		**17.51**	**45.38**	**1.4**	**7.68**	**29.36**	**80**	**6.36**	**438**
Maximum		**17.84**	**45.86**	**5.8**	**7.72**	**29.71**	**83.7**	**6.71**	**439**

E14

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	16.60	44.61	1.7	7.81	28.81	87.2	7.15	440
6/06/2025	0.5	16.83	44.81	2.3	7.79	28.95	86.2	7.02	440
6/06/2025	1.0	16.88	44.89	2.9	7.75	29.00	84.4	6.87	440
6/06/2025	1.5	17.25	45.32	4.1	7.71	29.31	82.8	6.68	440
6/06/2025	2.0	17.27	45.36	4.6	7.71	29.35	81.2	6.54	440
Average		**16.97**	**45.00**	**3.12**	**7.75**	**29.08**	**84.36**	**6.85**	**440.00**
Stdev		**0.29**	**0.33**	**1.21**	**0.05**	**0.24**	**2.44**	**0.25**	**0.00**
Minimum		**16.6**	**44.61**	**1.7**	**7.71**	**28.81**	**81.2**	**6.54**	**440**
Maximum		**17.27**	**45.36**	**4.6**	**7.81**	**29.35**	**87.2**	**7.15**	**440**

E15

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	16.50	42.61	60.5	7.84	27.37	90.2	7.47	440
6/06/2025	0.5	16.48	42.49	6.6	7.85	27.29	90.2	7.47	440
6/06/2025	1.0	16.46	43.55	5.1	7.86	28.05	90.8	7.49	440
6/06/2025	1.5	16.48	43.67	3.1	7.86	28.13	90.7	7.48	440
Average		**16.48**	**43.08**	**18.83**	**7.85**	**27.71**	**90.48**	**7.48**	**440.00**
Stdev		**0.02**	**0.62**	**27.82**	**0.01**	**0.44**	**0.32**	**0.01**	**0.00**
Minimum		**16.46**	**42.49**	**3.1**	**7.84**	**27.29**	**90.2**	**7.47**	**440**
Maximum		**16.5**	**43.67**	**60.5**	**7.86**	**28.13**	**90.8**	**7.49**	**440**

E16

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	15.95	42.23	18.8	7.88	27.10	89.3	7.49	436
6/06/2025	0.5	16.51	43.67	2.4	7.83	28.13	87.6	7.22	436
6/06/2025	1.0	16.55	43.86	3.6	7.82	28.26	85.3	7.02	436
Average		**16.34**	**43.25**	**8.27**	**7.84**	**27.83**	**87.40**	**7.24**	**436.00**
Stdev		**0.34**	**0.89**	**9.14**	**0.03**	**0.64**	**2.01**	**0.24**	**0.00**
Minimum		**15.95**	**42.23**	**2.4**	**7.82**	**27.1**	**85.3**	**7.02**	**436**
Maximum		**16.55**	**43.86**	**18.8**	**7.88**	**28.26**	**89.3**	**7.49**	**436**

A1

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	17.93	44.68	7.3	7.77	28.85	88.7	7.08	440
6/06/2025	0.5	17.98	44.77	6.9	7.76	28.92	88.6	7.06	442
6/06/2025	1.0	18.65	46.21	7.2	7.62	29.96	84.0	6.57	444
6/06/2025	1.5	18.77	46.28	7.5	7.60	30.01	78.3	6.10	444
6/06/2025	2.0	18.78	46.26	7.8	7.60	30.00	76.0	5.93	444
Average		**18.42**	**45.64**	**7.34**	**7.67**	**29.55**	**83.12**	**6.55**	**442.80**
Stdev		**0.43**	**0.84**	**0.34**	**0.09**	**0.61**	**5.83**	**0.53**	**1.79**
Minimum		**17.93**	**44.68**	**6.9**	**7.6**	**28.85**	**76**	**5.93**	**440**
Maximum		**18.78**	**46.28**	**7.8**	**7.77**	**30.01**	**88.7**	**7.08**	**444**

A2

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	17.92	45.31	5.9	7.67	29.31	81.5	6.49	442
6/06/2025	0.5	18.12	45.48	6.2	7.65	29.43	79.8	6.33	443
6/06/2025	1.0	18.32	45.82	7.3	7.64	29.68	78.6	6.19	443
6/06/2025	1.5	18.59	46.41	13.1	7.61	30.1	77.8	6.08	444
Average		**18.24**	**45.76**	**8.13**	**7.64**	**29.63**	**79.43**	**6.27**	**443.00**
Stdev		**0.29**	**0.49**	**3.37**	**0.02**	**0.35**	**1.61**	**0.18**	**0.82**
Minimum		**17.92**	**45.31**	**5.9**	**7.61**	**29.31**	**77.8**	**6.08**	**442**
Maximum		**18.59**	**46.41**	**13.1**	**7.67**	**30.1**	**81.5**	**6.49**	**444**

A3

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	17.45	43.41	6.4	7.86	27.94	95.1	7.70	440
6/06/2025	0.5	18.05	44.63	7.2	7.76	28.82	93.0	7.41	441
6/06/2025	1.0	18.25	46.17	7.8	7.69	29.93	89.9	7.09	442
6/06/2025	1.5	18.91	46.95	9.7	7.57	30.5	80.6	6.25	443
6/06/2025	2.0	19.00	46.87	9.8	7.56	30.44	79.2	6.13	443
6/06/2025	2.5	19.16	46.83	11.8	7.54	30.41	75.0	5.79	443
Average		**18.47**	**45.81**	**8.78**	**7.66**	**29.67**	**85.47**	**6.73**	**442.00**
Stdev		**0.67**	**1.47**	**2.01**	**0.13**	**1.06**	**8.27**	**0.78**	**1.26**
Minimum		**17.45**	**43.41**	**6.4**	**7.54**	**27.94**	**75**	**5.79**	**440**
Maximum		**19.16**	**46.95**	**11.8**	**7.86**	**30.5**	**95.1**	**7.7**	**443**

A4

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	18.28	44.55	6.6	7.75	28.77	87.3	6.92	440
6/06/2025	0.5	18.29	44.49	6.6	7.78	28.72	90.1	7.14	442
6/06/2025	1.0	18.33	45.23	7.1	7.72	29.25	89.6	7.08	443
6/06/2025	1.5	18.56	46.20	8.6	7.65	29.95	86.3	6.76	443
6/06/2025	2.0	18.77	46.12	9.4	7.6	29.89	79.5	6.20	444
6/06/2025	2.5	18.75	45.50	28.8	7.73	29.44	81.5	6.38	443
6/06/2025	3.0	17.43	43.43	6.1	7.86	27.96	95.00	7.70	439
Average		**18.34**	**45.07**	**10.46**	**7.73**	**29.14**	**87.04**	**6.88**	**442.00**
Stdev		**0.45**	**0.99**	**8.18**	**0.08**	**0.71**	**5.28**	**0.50**	**1.83**
Minimum		**17.43**	**43.43**	**6.1**	**7.6**	**27.96**	**79.5**	**6.2**	**439**
Maximum		**18.77**	**46.2**	**28.8**	**7.86**	**29.95**	**95**	**7.7**	**444**

A5

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	19.16	46.46	7.7	7.61	30.14	75.7	5.85	443
6/06/2025	0.5	19.06	46.5	8.4	7.63	30.17	77.3	5.99	443
6/06/2025	1.0	19.06	46.41	8.6	7.63	30.1	77.6	6.01	443
6/06/2025	1.5	19.13	46.47	10.7	7.63	30.15	77.4	5.99	444
Average		**19.10**	**46.46**	**8.85**	**7.63**	**30.14**	**77.00**	**5.96**	**443.25**
Stdev		**0.05**	**0.04**	**1.29**	**0.01**	**0.03**	**0.88**	**0.07**	**0.50**
Minimum		**19.06**	**46.41**	**7.7**	**7.61**	**30.1**	**75.7**	**5.85**	**443**
Maximum		**19.16**	**46.5**	**10.7**	**7.63**	**30.17**	**77.6**	**6.01**	**444**

A6

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	18.56	45.92	4.8	7.67	29.75	79.6	6.24	441
6/06/2025	0.5	18.66	46.03	5.2	7.66	29.83	78.7	6.15	441
6/06/2025	1.0	18.98	46.38	5.8	7.61	30.08	76.0	5.90	442
6/06/2025	1.5	19.11	46.55	6.2	7.58	30.21	73.1	5.66	442
6/06/2025	2.0	19.13	46.58	6.6	7.58	30.23	72.2	5.59	443
6/06/2025	2.5	19.59	47.02	7.2	7.52	30.55	68.7	5.26	443
6/06/2025	3.0	19.7	47.11	7.7	7.5	30.61	64.6	4.93	443
6/06/2025	3.5	19.69	47.14	8.6	7.5	30.64	64.0	4.88	443
6/06/2025	4.0	19.65	47.18	10.1	7.5	30.66	63.3	4.83	443
Average		**19.23**	**46.66**	**6.91**	**7.57**	**30.28**	**71.13**	**5.49**	**442.33**
Stdev		**0.45**	**0.48**	**1.69**	**0.07**	**0.35**	**6.31**	**0.55**	**0.87**
Minimum		**18.56**	**45.92**	**4.8**	**7.5**	**29.75**	**63.3**	**4.83**	**441**
Maximum		**19.7**	**47.18**	**10.1**	**7.67**	**30.66**	**79.6**	**6.24**	**443**

S1

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	17.44	43.15	4.4	7.86	27.75	93.6	7.59	440
6/06/2025	0.5	17.46	43.3	4.8	7.85	27.87	93.7	7.59	441
6/06/2025	1.0	18.15	44.91	13.0	7.88	29.02	93.5	7.42	441
6/06/2025	1.5	18.15	44.06	19.8	7.87	28.41	98.2	7.82	441
Average		**17.80**	**43.86**	**10.50**	**7.87**	**28.26**	**94.75**	**7.61**	**440.75**
Stdev		**0.40**	**0.81**	**7.36**	**0.01**	**0.58**	**2.30**	**0.16**	**0.50**
Minimum		**17.44**	**43.15**	**4.4**	**7.85**	**27.75**	**93.5**	**7.42**	**440**
Maximum		**18.15**	**44.91**	**19.8**	**7.88**	**29.02**	**98.2**	**7.82**	**441**

S2

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	18.00	44.45	6.1	7.81	28.69	91.2	7.27	441
6/06/2025	0.5	17.93	44.99	6.4	7.76	29.08	91.4	7.28	442
6/06/2025	1.0	18.08	45.41	7.1	7.68	29.38	84.6	6.71	442
6/06/2025	1.5	18.76	46.32	7.9	7.6	30.04	77.0	6.00	443
6/06/2025	2.0	18.91	46.46	8.6	7.58	30.14	72.7	5.65	443
6/06/2025	2.5	18.94	46.46	10.1	7.58	30.14	71.1	5.52	443
Average		**18.44**	**45.68**	**7.70**	**7.67**	**29.58**	**81.33**	**6.41**	**442.33**
Stdev		**0.48**	**0.86**	**1.50**	**0.10**	**0.62**	**9.03**	**0.79**	**0.82**
Minimum		**17.93**	**44.45**	**6.1**	**7.58**	**28.69**	**71.1**	**5.52**	**441**
Maximum		**18.94**	**46.46**	**10.1**	**7.81**	**30.14**	**91.4**	**7.28**	**443**

S3

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	17.69	44.50	6.8	7.85	28.72	94.7	7.60	441
6/06/2025	0.5	17.71	44.51	7.6	7.84	28.73	92.4	7.41	441
6/06/2025	1.0	17.93	45.02	8.4	7.77	29.1	89.2	7.11	442
6/06/2025	1.5	18.07	45.46	8.9	7.7	29.42	83.5	6.62	442
6/06/2025	2.0	18.45	45.71	11.2	7.66	29.6	77.9	6.13	443
6/06/2025	2.5	18.27	45.45	10.6	7.67	29.41	77.6	6.13	443
Average		**18.02**	**45.11**	**8.92**	**7.75**	**29.16**	**85.88**	**6.83**	**442.00**
Stdev		**0.30**	**0.52**	**1.70**	**0.08**	**0.38**	**7.34**	**0.64**	**0.89**
Minimum		**17.69**	**44.5**	**6.8**	**7.66**	**28.72**	**77.6**	**6.13**	**441**
Maximum		**18.45**	**45.71**	**11.2**	**7.85**	**29.6**	**94.7**	**7.6**	**443**

S4

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	18.00	44.88	5.3	7.82	29.00	92.1	7.33	441
6/06/2025	0.5	18.14	45.27	5.8	7.74	29.28	89.9	7.13	441
6/06/2025	1.0	18.18	45.44	6.7	7.69	29.4	83.6	6.62	442
6/06/2025	1.5	18.27	45.52	8.0	7.68	29.46	80.8	6.38	442
6/06/2025	2.0	18.18	45.45	9.0	7.7	29.41	81.4	6.44	442
Average		**18.15**	**45.31**	**6.96**	**7.73**	**29.31**	**85.56**	**6.78**	**441.60**
Stdev		**0.10**	**0.26**	**1.53**	**0.06**	**0.19**	**5.13**	**0.43**	**0.55**
Minimum		**18**	**44.88**	**5.3**	**7.68**	**29**	**80.8**	**6.38**	**441**
Maximum		**18.27**	**45.52**	**9**	**7.82**	**29.46**	**92.1**	**7.33**	**442**

S5

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	18.06	43.91	4.0	7.83	28.3	92.3	7.37	439
6/06/2025	0.5	18.18	44.02	4.7	7.83	28.38	92.4	7.36	439
6/06/2025	1.0	18.11	44.32	5.2	7.83	28.6	92.5	7.37	440
6/06/2025	1.5	18.12	44.4	5.8	7.83	28.65	92.6	7.37	440
6/06/2025	2.0	18.14	44.5	6.4	7.84	28.73	92.8	7.38	440
6/06/2025	2.5	18.15	44.56	6.8	7.83	28.77	92.9	7.39	440
6/06/2025	3.0	18.37	45.23	7.3	7.77	29.25	91.5	7.22	441
6/06/2025	3.5	19.09	46.61	9.2	7.59	30.25	74.5	5.77	442
Average		**18.28**	**44.69**	**6.18**	**7.79**	**28.87**	**90.19**	**7.15**	**440.13**
Stdev		**0.34**	**0.87**	**1.64**	**0.09**	**0.63**	**6.35**	**0.56**	**0.99**
Minimum		**18.06**	**43.91**	**4.0**	**7.59**	**28.3**	**74.5**	**5.77**	**439**
Maximum		**19.09**	**46.61**	**9.2**	**7.84**	**30.25**	**92.9**	**7.39**	**442**

S6

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	18.00	43.85	1.8	7.81	28.26	90.0	7.19	439
6/06/2025	0.5	18.00	43.86	3.0	7.82	28.26	89.8	7.18	439
6/06/2025	1.0	18.03	44.02	4.0	7.82	28.38	90.4	7.22	440
6/06/2025	1.5	18.03	44.14	4.6	7.82	28.47	90.2	7.20	440
6/06/2025	2.0	18.19	44.79	5.5	7.79	28.94	88.8	7.05	441
6/06/2025	2.5	18.20	44.81	5.6	7.79	28.95	88.6	7.03	441
6/06/2025	3.0	18.25	44.83	16.0	7.78	28.97	87.1	6.91	441
Average		**18.10**	**44.33**	**5.79**	**7.80**	**28.60**	**89.27**	**7.11**	**440.14**
Stdev		**0.11**	**0.46**	**4.70**	**0.02**	**0.33**	**1.18**	**0.12**	**0.90**
Minimum		**18**	**43.85**	**1.8**	**7.78**	**28.26**	**87.1**	**6.91**	**439**
Maximum		**18.25**	**44.83**	**16**	**7.82**	**28.97**	**90.4**	**7.22**	**441**

S7

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	17.28	41.46	2.4	7.94	26.55	99.8	8.18	438
6/06/2025	0.5	17.28	41.46	2.5	7.94	26.55	99.8	8.18	438
6/06/2025	1.0	17.28	41.43	3.4	7.94	26.53	100.2	8.22	438
6/06/2025	1.5	17.31	41.47	4.5	7.95	26.56	100.6	8.24	438
6/06/2025	2.0	17.79	42.35	5.2	7.88	27.18	98.5	7.96	439
6/06/2025	2.5	18.11	43.07	9.6	7.81	27.7	87.3	6.99	440
Average		**17.51**	**41.87**	**4.60**	**7.91**	**26.85**	**97.70**	**7.96**	**438.50**
Stdev		**0.36**	**0.69**	**2.69**	**0.06**	**0.49**	**5.14**	**0.49**	**0.84**
Minimum		**17.28**	**41.43**	**2.4**	**7.81**	**26.53**	**87.3**	**6.99**	**438**
Maximum		**18.11**	**43.07**	**9.6**	**7.95**	**27.7**	**100.6**	**8.24**	**440**

S8

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
6/06/2025	0.3	17.26	41.43	5.0	7.97	26.53	100.7	8.25	437
6/06/2025	0.5	17.4	41.69	6.5	7.96	26.72	100.3	8.19	438
6/06/2025	1.0	17.54	42.18	6.7	7.94	27.06	100.2	8.14	438
6/06/2025	1.5	18.11	42.87	7.5	7.86	27.56	95.8	7.68	439
6/06/2025	2.0	18.08	43.37	8.5	7.82	27.92	90.7	7.26	439
6/06/2025	2.5	18.74	45.38	9.8	7.67	29.36	80.7	6.32	441
Average		**17.86**	**42.82**	**7.33**	**7.87**	**27.53**	**94.73**	**7.64**	**438.67**
Stdev		**0.56**	**1.45**	**1.67**	**0.11**	**1.04**	**7.88**	**0.75**	**1.37**
Minimum		**17.26**	**41.43**	**5**	**7.67**	**26.53**	**80.7**	**6.32**	**437**
Maximum		**18.74**	**45.38**	**9.8**	**7.97**	**29.36**	**100.7**	**8.25**	**441**

S9

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
12/06/2025	0.3	16.12	45.09	1.8	7.82	29.15	96.4	7.96	567
12/06/2025	0.5	16.12	45.08	3.0	7.83	29.14	97.2	8.02	566
12/06/2025	1.0	16.03	45.06	4.0	7.83	29.13	97.3	8.05	565
12/06/2025	1.5	15.93	45.09	4.7	7.82	29.15	96.1	7.96	565
12/06/2025	2.0	15.93	45.09	5.6	7.82	29.15	95.5	7.92	564
12/06/2025	2.5	15.93	45.10	5.7	7.82	29.16	95.5	7.92	563
12/06/2025	3.0	15.93	45.10	8.1	7.82	29.16	95.6	7.93	563
Average		**16.00**	**45.09**	**4.70**	**7.82**	**29.15**	**96.23**	**7.97**	**564.71**
Stdev		**0.09**	**0.01**	**2.05**	**0.00**	**0.01**	**0.77**	**0.05**	**1.50**
Minimum		**15.93**	**45.06**	**1.8**	**7.82**	**29.13**	**95.5**	**7.92**	**563**
Maximum		**16.12**	**45.1**	**8.1**	**7.83**	**29.16**	**97.3**	**8.05**	**567**

Crangan Bay

C1

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
12/06/2025	0.3	15.58	42.91	1.8	7.87	27.58	102	8.60	531
12/06/2025	0.5	15.52	42.98	3.0	7.87	27.63	101.9	8.60	531
12/06/2025	1.0	16.13	43.79	4.0	7.81	28.22	97.6	8.10	532
12/06/2025	1.5	15.66	43.66	4.7	7.86	28.12	101	8.47	532
12/06/2025	2.0	16.33	44.00	5.6	7.78	28.37	94.8	7.83	532
12/06/2025	2.5	16.61	44.14	5.7	7.77	28.47	94.2	7.73	531
12/06/2025	3.0	16.72	44.28	7.2	7.75	28.57	91.9	7.53	531
Average		**16.08**	**43.68**	**4.57**	**7.82**	**28.14**	**97.63**	**8.12**	**531.43**
Stdev		**0.50**	**0.54**	**1.81**	**0.05**	**0.39**	**4.11**	**0.44**	**0.53**
Minimum		**15.52**	**42.91**	**1.8**	**7.75**	**27.58**	**91.9**	**7.53**	**531**
Maximum		**16.72**	**44.28**	**7.2**	**7.87**	**28.57**	**102**	**8.6**	**532**

C2

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
12/06/2025	0.3	15.67	42.71	1.8	7.86	27.44	102.9	8.66	523
12/06/2025	0.5	15.71	43.00	3.0	7.85	27.65	102.3	8.59	524
12/06/2025	1.0	16.03	43.95	4.0	7.82	28.33	100.9	8.39	524
12/06/2025	1.5	16.54	43.98	4.7	7.78	28.35	97.8	8.05	524
12/06/2025	2.0	16.45	43.76	5.6	7.78	28.19	96.7	7.98	524
Average		**16.08**	**43.48**	**3.82**	**7.82**	**27.99**	**100.12**	**8.33**	**523.80**
Stdev		**0.40**	**0.59**	**1.48**	**0.04**	**0.42**	**2.75**	**0.31**	**0.45**
Minimum		**15.67**	**42.71**	**1.8**	**7.78**	**27.44**	**96.7**	**7.98**	**523**
Maximum		**16.54**	**43.98**	**5.6**	**7.86**	**28.35**	**102.9**	**8.66**	**524**

C3

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
12/06/2025	0.3	16.2	43.38	1.9	7.78	27.92	98.1	8.15	518
12/06/2025	0.5	16.2	43.38	3.3	7.78	27.92	98.2	8.15	518
12/06/2025	1.0	16.21	43.38	4.1	7.79	27.92	98.9	8.21	519
12/06/2025	1.5	16.26	43.44	5.8	7.8	27.96	100.3	8.31	519
12/06/2025	2.0	16.27	43.45	6.6	7.8	27.97	100.4	8.32	520
Average		**16.23**	**43.41**	**4.34**	**7.79**	**27.94**	**99.18**	**8.23**	**518.80**
Stdev		**0.03**	**0.04**	**1.89**	**0.01**	**0.02**	**1.11**	**0.08**	**0.84**
Minimum		**16.2**	**43.38**	**1.9**	**7.78**	**27.92**	**98.1**	**8.15**	**518**
Maximum		**16.27**	**43.45**	**6.6**	**7.8**	**27.97**	**100.4**	**8.32**	**520**

C4

Date	Depth (m)	Temp (C)	Cond (ms/cm)	Turb (ntu)	pH	Sal (ppt)	D.O. (%sat)	D.O. (mg/L)	ORP (mv)
12/06/2025	0.3	15.97	43.07	1.8	7.8	27.7	100.4	8.39	516
12/06/2025	0.5	15.97	43.05	4.1	7.8	27.68	100.6	8.41	516
12/06/2025	1.0	15.98	43.13	4.4	7.81	27.74	101.2	8.45	517
Average		**15.97**	**43.08**	**3.43**	**7.80**	**27.71**	**100.73**	**8.42**	**516.33**
Stdev		**0.01**	**0.04**	**1.42**	**0.01**	**0.03**	**0.42**	**0.03**	**0.58**
Minimum		**15.97**	**43.05**	**1.8**	**7.8**	**27.68**	**100.4**	**8.39**	**516**
Maximum		**15.98**	**43.13**	**4.4**	**7.81**	**27.74**	**101.2**	**8.45**	**517**

C. Seagrass Data – Analysis of Transects

Northern Shore Summerland Point, Frying Pan Bay

Transect C5										Surveyed 16th June 2025	
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total Seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
2	0	75	0	75	0	0	0	0	0	25	75
2	0	51	0	51	0	0	0	0	0	49	51
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	65	0	65	0	0	0	0	0	35	65
2	0	80	0	80	0	0	0	0	0	20	80
2	0	95	0	95	0	0	0	0	0	5	95
2	0	75	5	80	0	0	0	0	0	20	80
2	0	85	0	85	0	0	0	0	0	15	85
2	0	80	0	80	0	0	0	0	0	20	80
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	85	5	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	50	0	50	0	0	0	0	0	50	50
2	0	70	0	70	0	0	0	0	0	30	70
2	0	65	0	65	0	0	0	0	0	35	65
2	0	60	5	65	0	0	0	0	0	35	65
2	0	85	0	85	0	0	0	0	0	15	85
2	0	70	0	70	0	0	0	0	0	30	70
2	0	70	5	75	0	0	0	0	0	25	75
2	0	80	5	85	0	0	0	0	0	15	85
2	0	85	8	93	0	0	0	0	0	7	93
2	0	90	5	95	0	0	0	0	0	5	95
2	0	95	2	97	0	0	0	0	0	3	97
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100

Transect C6											Surveyed 16 June 2025
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total Seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
1	0	85	0	85	0	0	0	0	0	15	85
1	0	85	0	85	0	0	0	0	0	15	85
1	0	85	0	85	0	0	0	0	0	15	85
1	0	95	0	95	0	0	0	0	0	5	95
2	0	60	0	60	0	0	0	0	0	40	60
2	0	80	0	80	0	0	0	0	0	20	80
2	0	70	0	70	0	0	0	0	0	30	70
2	0	85	0	85	0	0	0	0	0	15	85
2	0	80	0	80	0	0	0	0	0	20	80
2	0	100	0	100	0	0	0	0	0	0	100
2	0	75	0	75	0	0	0	0	0	25	75
2	0	45	0	45	0	0	0	0	0	55	45
2	0	30	0	30	0	0	0	0	0	70	30
2	0	15	0	15	0	15	0	0	15	70	30
2	0	35	0	35	0	0	0	0	0	65	35
2	0	60	0	60	0	0	0	0	0	40	60
2	0	55	0	55	0	0	0	25	25	20	80
2	0	65	0	65	0	0	0	0	0	35	65
2	0	75	0	75	0	0	0	0	0	25	75
2	0	65	0	65	0	0	0	0	0	35	65
2	0	85	0	85	0	0	0	0	0	15	85
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	10	0	0	10	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	25	0	25	0	0	0	0	0	75	25
2	0	40	0	40	0	0	0	0	0	60	40
0	0	0	0	0	0	5	0	0	5	95	5
2	0	5	0	5	0	15	0	0	15	80	20
2	0	25	0	25	0	0	0	0	0	75	25
2	0	55	0	55	0	0	0	0	0	45	55
0	0	0	0	0	0	0	0	35	35	65	35
2	0	45	0	45	0	20	0	8	28	27	73
2	0	50	0	50	0	5	0	0	5	45	55
2	0	70	0	70	0	0	0	0	0	30	70
2	0	80	0	80	0	0	0	0	0	20	80
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	10	0	0	10	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
Average		**78.8**	**0.0**	**78.8**	**0.0**	**1.2**	**0.0**	**1.0**	**2.2**	**19.0**	**81.0**

Transect F1										Surveyed 16 June 2025	
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
2	0	55	0	55	0	0	0	0	0	45	55
2	0	90	0	90	0	0	0	0	0	10	90
2	0	55	0	55	0	0	0	0	0	45	55
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	85	5	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	45	0	45	0	0	0	0	0	55	45
2	0	80	5	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	75	2	77	0	0	0	0	0	23	77
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	50	0	50	0	0	0	0	0	50	50
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	75	0	75	0	0	0	0	0	25	75
2	0	85	0	85	0	0	0	0	0	15	85
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	75	0	75	0	0	0	0	0	25	75
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	75	0	75	0	10	0	0	10	15	85
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
Average		**91.4**	**0.2**	**91.6**	**0.0**	**0.1**	**0.0**	**0.0**	**0.1**	**8.3**	**91.7**

Transect F2										Surveyed 16 June 2025	
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
2	0	25	0	25	0	0	0	0	0	75	25
0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	100	0
2	0	45	0	45	0	0	0	0	0	55	45
2	0	40	0	40	0	0	0	0	0	60	40
2	0	80	0	80	0	0	0	0	0	20	80
2	0	80	0	80	0	0	0	0	0	20	80
2	0	65	0	65	0	0	0	0	0	35	65
2	0	65	0	65	0	0	0	0	0	35	65
0	0	0	0	0	0	0	0	0	0	100	0
2	0	65	0	65	0	0	0	0	0	35	65
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	30	0	30	0	0	0	0	0	70	30
2	0	40	0	40	0	0	0	0	0	60	40
2	0	15	0	15	0	0	0	0	0	85	15
2	0	55	0	55	0	0	0	0	0	45	55
2	0	75	0	75	0	0	0	0	0	25	75
2	0	90	0	90	0	0	0	0	0	10	90
1	0	65	0	65	0	0	0	0	0	35	65
1	0	65	0	65	0	0	0	0	0	35	65
1	0	55	0	55	0	0	0	0	0	45	55
1	0	55	0	55	0	0	0	0	0	45	55
1	0	40	0	40	0	0	0	0	0	60	40
1	0	30	0	30	0	10	0	0	10	60	40
1	0	85	0	85	0	5	0	0	5	10	90
1	0	75	5	80	0	0	0	0	0	20	80
1	0	95	0	95	0	0	0	0	0	5	95
1	0	95	0	95	0	0	0	0	0	5	95
1	0	95	0	95	0	0	0	0	0	5	95
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	95	0	95	0	0	0	0	0	5	95
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	90	0	90	0	0	0	0	0	10	90
1	0	95	0	95	0	0	0	0	0	5	95
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	90	0	90	0	10	0	0	10	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	95	0	95	0	0	0	0	0	5	95
1	1	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	90	0	90	0	0	0	10	10	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	90	0	90	0	10	0	0	10	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
0	0	0	0	0	0	90	0	0	90	10	90
1	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	10	0	0	10	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
Average		**78.3**	**0.1**	**78.4**	**0.0**	**2.0**	**0.0**	**0.1**	**2.1**	**19.5**	**80.5**

Transect F3										Surveyed 16 June 2025	
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total Seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
2	0	85	0	85	0	0	0	0	0	15	85
2	0	75	0	75	0	0	0	0	0	25	75
0	0	95	0	95	0	0	0	0	0	5	95
0	0	95	0	95	0	0	0	0	0	5	95
2	0	65	10	75	0	0	0	15	15	10	90
0	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	15	15	0	100
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	5	95	0	0	0	0	0	5	95
2	0	95	2	97	0	0	0	0	0	3	97
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	2	92	0	0	0	0	0	8	92
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	15	15	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	10	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	5	90	0	0	0	0	0	10	90
2	0	98	0	98	0	0	0	0	0	2	98
2	0	90	4	94	0	0	0	0	0	6	94
2	0	98	0	98	0	0	0	0	0	2	98
2	0	98	2	100	0	0	0	0	0	0	100
2	0	95	5	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	5	95	0	0	0	0	0	5	95
2	0	98	0	98	0	0	0	0	0	2	98
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	75	0	75	0	0	0	0	0	25	75
2	0	60	0	60	0	0	0	0	0	40	60
2	0	80	0	80	0	0	0	0	0	20	80
2	0	80	0	80	0	0	0	0	0	20	80
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
1	1	100	0	100	0	0	0	0	0	0	100
1	1	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
Average		**92.7**	**0.7**	**93.4**	**0.0**	**0.0**	**0.0**	**0.7**	**0.7**	**5.9**	**94.1**

Transect F4											Surveyed 16 June 2025
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total Seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	80	0	80	0	0	0	0	0	20	80
1	0	80	0	80	0	0	0	0	0	20	80
0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	100	0
2	0	50	0	50	0	0	0	0	0	50	50
2	0	90	0	90	0	0	0	0	0	10	90
2	0	60	0	60	0	0	0	0	0	40	60
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	75	0	75	0	0	0	0	0	25	75
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	75	0	75	0	0	0	0	0	25	75
2	0	75	0	75	0	0	0	0	0	25	75
2	0	70	5	75	0	0	0	0	0	25	75
2	0	65	0	65	0	0	0	0	0	35	65
2	0	80	10	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	60	5	65	0	0	0	0	0	35	65
2	0	70	5	75	0	0	0	0	0	25	75
2	0	75	5	80	0	0	0	0	0	20	80
2	0	75	15	90	0	0	0	0	0	10	90
2	0	80	15	95	0	0	0	0	0	5	95
2	0	80	5	85	0	0	0	0	0	15	85
2	0	65	0	65	0	0	0	0	0	35	65
2	0	85	0	85	0	0	0	0	0	15	85
2	0	75	0	75	0	0	0	0	0	25	75
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	80	0	80	0	0	0	0	0	20	80
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
Average		79.7	1.0	80.7	0.0	0.0	0.0	0.0	0.0	19.3	80.7

Transect F5									Surveyed 17 June 2025		
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total Seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	75	0	75	0	0	0	0	0	25	75
2	0	90	0	90	0	0	0	0	0	10	90
2	0	65	0	65	0	0	0	0	0	35	65
0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	100	0
2	0	35	0	35	0	0	0	0	0	65	35
2	0	65	0	65	0	0	0	0	0	35	65
2	0	40	0	40	0	0	0	0	0	60	40
0	0	0	0	0	0	0	0	0	0	100	0
2	0	30	0	30	0	0	0	0	0	70	30
2	0	30	0	30	0	0	0	0	0	70	30
2	0	45	0	45	0	0	0	0	0	55	45
2	0	90	0	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	75	0	75	0	0	0	0	0	25	75
2	0	65	0	65	0	0	0	0	0	35	65
2	0	0	10	10	0	0	0	0	0	90	10
0	0	0	0	0	0	0	0	0	0	100	0
2	0	65	5	70	0	0	0	0	0	30	70
2	0	70	5	75	0	0	0	0	0	25	75
2	0	75	5	80	0	0	0	0	0	20	80
2	0	75	0	75	0	0	0	0	0	25	75
2	0	75	0	75	0	0	0	0	0	25	75
2	0	80	0	80	0	0	0	0	0	20	80
2	0	80	5	85	0	0	0	0	0	15	85
2	0	85	5	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	80	5	85	0	0	0	0	0	15	85
2	0	70	5	75	0	0	0	0	0	25	75
2	0	85	5	90	0	0	0	0	0	10	90
2	0	75	5	80	0	0	0	0	0	20	80
2	0	70	5	75	0	0	0	0	0	25	75
2	0	80	5	85	0	0	0	0	0	15	85
2	0	85	5	90	0	0	0	0	0	10	90
2	0	75	5	80	0	0	0	0	0	20	80
2	0	75	3	78	0	0	0	0	0	22	78
2	0	65	0	65	0	0	0	0	0	35	65
2	0	65	0	65	0	0	0	0	0	35	65
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	65	5	70	0	0	0	0	0	30	70
2	0	85	3	88	0	0	0	0	0	12	88
2	0	75	0	75	0	0	0	0	0	25	75
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	75	0	75	0	0	0	0	0	25	75
2	0	75	0	75	0	0	0	0	0	25	75
2	0	75	0	75	0	0	0	0	0	25	75
2	0	75	0	75	0	0	0	0	0	25	75
2	0	75	0	75	0	0	0	0	0	25	75
2	0	85	0	85	0	0	0	0	0	15	85
2	0	75	0	75	0	0	0	0	0	25	75
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	75	5	80	0	0	0	0	0	20	80
2	0	85	5	90	0	0	0	0	0	10	90
Average		70.4	1.4	71.9	0.0	0.0	0.0	0.0	0.0	28.1	71.9

Transect F6										Surveyed 17 June 2025	
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total Seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
2	0	75	0	75	0	0	0	0	0	25	75
2	0	90	0	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	50	0	50	0	0	0	0	0	50	50
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	75	0	75	0	0	0	0	0	25	75
2	0	95	5	100	0	0	0	0	0	0	100
2	0	95	5	100	0	0	0	0	0	0	100
2	0	95	5	100	0	0	0	0	0	0	100
2	0	90	5	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	5	95	0	0	0	0	0	5	95
2	0	90	5	95	0	0	0	0	0	5	95
2	0	90	5	95	0	0	0	0	0	5	95
2	0	90	5	95	0	0	0	0	0	5	95
2	0	90	5	95	0	0	0	0	0	5	95
2	0	85	5	90	0	0	0	0	0	10	90
2	0	85	5	90	0	0	0	0	0	10	90
2	0	80	5	85	0	0	0	0	0	15	85
2	0	85	5	90	0	0	0	0	0	10	90
2	0	80	5	85	0	0	0	0	0	15	85
2	0	85	5	90	0	0	0	0	0	10	90
2	0	75	5	80	0	0	0	0	0	20	80
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	5	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	5	95	0	0	0	0	0	5	95
2	0	85	5	90	0	0	0	0	0	10	90
2	0	90	5	95	0	0	0	0	0	5	95
2	0	90	5	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	75	5	80	0	0	0	0	0	20	80
2	0	80	5	85	0	0	0	0	0	15	85
2	0	75	5	80	0	0	0	0	0	20	80
2	0	75	0	75	0	0	0	0	0	25	75
2	0	75	5	80	0	0	0	0	0	20	80
2	0	75	0	75	0	0	0	0	0	25	75
2	0	65	0	65	0	0	0	0	0	35	65
2	0	65	0	65	0	0	0	0	0	35	65
2	0	75	0	75	0	0	0	0	0	25	75
2	0	75	5	80	0	0	0	0	0	20	80
2	0	75	5	80	0	0	0	0	0	20	80
2	0	80	5	85	0	0	0	0	0	15	85
2	0	75	10	85	0	0	0	0	0	15	85
2	0	75	5	80	0	0	0	0	0	20	80
2	0	80	5	85	0	0	0	0	0	15	85
2	0	65	5	70	0	0	0	0	0	30	70
2	0	85	0	85	0	0	0	0	0	15	85
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	5	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
Average		85.0	2.5	87.5	0.0	0.0	0.0	0.0	0.0	12.5	87.5

Transect F7										Surveyed 17 June 2025	
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total Seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
2	0	60	0	60	0	0	0	0	0	40	60
2	0	55	0	55	0	0	0	0	0	45	55
2	0	70	2	72	0	0	0	0	0	28	72
2	0	85	5	90	0	0	0	0	0	10	90
2	0	85	5	90	0	0	0	0	0	10	90
2	0	85	5	90	0	0	0	0	0	10	90
2	0	80	2	82	0	0	0	0	0	18	82
2	0	85	0	85	0	0	0	0	0	15	85
2	0	75	5	80	0	0	0	0	0	20	80
2	2	55	10	65	0	0	0	0	0	35	65
2	2	55	10	65	0	0	0	0	0	35	65
2	2	60	15	75	0	0	0	0	0	25	75
2	2	60	10	70	0	0	0	0	0	30	70
2	2	60	10	70	0	0	0	0	0	30	70
2	2	80	5	85	0	0	0	0	0	15	85
2	2	80	5	85	0	0	0	0	0	15	85
2	2	75	5	80	0	0	0	0	0	20	80
2	2	85	5	90	0	0	0	0	0	10	90
2	2	80	5	85	0	0	0	0	0	15	85
2	0	85	5	90	0	0	0	0	0	10	90
2	0	65	10	75	0	0	0	0	0	25	75
2	0	65	5	70	0	0	0	0	0	30	70
2	0	65	10	75	0	0	0	0	0	25	75
2	0	70	15	85	0	0	0	0	0	15	85
2	0	60	5	65	0	0	0	0	0	35	65
2	0	70	10	80	0	0	0	0	0	20	80
2	0	85	0	85	0	0	0	0	0	15	85
2	0	70	15	85	0	0	0	0	0	15	85
2	0	85	5	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	2	87	0	0	0	0	0	13	87
2	0	65	0	65	0	0	0	0	0	35	65
2	0	50	2	52	0	0	0	0	0	48	52
2	0	30	5	35	0	0	0	0	0	65	35
2	0	50	0	50	0	0	0	0	0	50	50
2	0	50	5	55	0	0	0	0	0	45	55
2	0	60	5	65	0	0	0	0	0	35	65
2	0	60	0	60	0	0	0	0	0	40	60
2	0	80	8	88	0	0	0	0	0	12	88
2	0	75	5	80	0	0	0	0	0	20	80
2	0	70	5	75	0	0	0	0	0	25	75
2	0	85	5	90	0	0	0	0	0	10	90
2	0	85	5	90	0	0	0	0	0	10	90
2	0	75	5	80	0	0	0	0	0	20	80
2	0	75	5	80	0	0	0	0	0	20	80
2	0	70	5	75	0	0	0	0	0	25	75
2	0	55	15	70	0	0	0	0	0	30	70
2	0	55	5	60	0	0	0	0	0	40	60
2	0	55	5	60	0	0	0	0	0	40	60
2	0	90	5	95	0	0	0	0	0	5	95
2	0	90	5	95	0	0	0	0	0	5	95
2	0	90	5	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	5	95	0	0	0	0	0	5	95
2	0	90	5	95	0	0	0	0	0	5	95
2	0	90	5	95	0	0	0	0	0	5	95
2	0	85	10	95	0	0	0	0	0	5	95
2	0	50	15	65	0	0	0	0	0	35	65
2	0	85	10	95	0	0	0	0	0	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	100	0	100	0	0	0	0	0	0	100
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	75	0	75	0	0	0	0	0	25	75
Average		74.3	4.9	79.3	0.0	0.0	0.0	0.0	0.0	20.7	79.3

Transect E7										Surveyed 16 June 2025	
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total Seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
1	0	45	0	45	0	0	0	0	0	55	45
1	0	60	0	60	0	0	0	0	0	40	60
1	0	80	0	80	0	0	0	0	0	20	80
1	0	70	0	70	0	0	0	0	0	30	70
1	0	60	0	60	0	0	0	0	0	40	60
1	0	65	0	65	0	0	0	0	0	35	65
2	0	45	0	45	0	0	0	0	0	55	45
2	0	5	0	5	0	0	0	0	0	95	5
2	0	5	0	5	0	0	0	0	0	95	5
2	0	50	0	50	0	0	0	0	0	50	50
2	0	65	0	65	0	0	0	0	0	35	65
2	0	50	0	50	0	0	0	0	0	50	50
2	0	80	0	80	0	0	0	0	0	20	80
2	0	90	0	90	0	0	0	0	0	10	90
2	0	75	0	75	0	0	0	0	0	25	75
2	0	65	0	65	0	0	0	0	0	35	65
2	0	70	0	70	0	0	0	0	0	30	70
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	80	10	90	0	0	0	0	0	10	90
2	0	70	10	80	0	0	0	0	0	20	80
2	0	80	5	85	0	0	0	0	0	15	85
2	0	60	10	70	0	0	0	0	0	30	70
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	80	0	80	0	0	0	0	0	20	80
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	75	0	75	0	0	0	0	0	25	75
2	0	80	0	80	0	0	0	0	0	20	80
2	0	85	0	85	0	0	0	0	0	15	85
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	5	90	0	0	0	0	0	10	90
2	0	85	5	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	5	90	0	0	0	0	0	10	90
2	0	93	2	95	0	0	0	0	0	5	95
2	0	70	5	75	0	0	0	0	0	25	75
2	0	95	5	100	0	0	0	0	0	0	100
2	0	65	5	70	0	0	0	0	0	30	70
2	0	95	0	95	0	0	0	0	0	5	95
2	0	80	2	82	0	0	0	0	0	18	82
2	0	70	5	75	0	0	0	0	0	25	75
2	0	90	2	92	0	0	0	0	0	8	92
2	0	85	2	87	0	0	0	0	0	13	87
2	0	75	5	80	0	0	0	0	0	20	80
2	0	90	5	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	85	0	85	0	0	0	0	0	15	85
Average		**79.6**	**1.3**	**80.9**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**19.1**	**80.9**

Transect T1											Surveyed 16 June 2025
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total Seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	98	0	98	0	0	0	0	0	2	98
2	0	98	0	98	0	0	0	0	0	2	98
2	0	90	0	90	0	0	0	0	0	10	90
2	0	98	0	98	0	0	0	0	0	2	98
2	0	90	0	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	80	0	80	0	0	0	0	0	20	80
2	0	98	0	98	0	0	0	0	0	2	98
2	0	90	0	90	0	0	0	0	0	10	90
2	0	80	0	80	0	0	0	0	0	20	80
2	0	80	0	80	0	0	0	0	0	20	80
2	0	40	5	45	0	0	0	0	0	55	45
2	0	35	0	35	0	0	0	0	0	65	35
0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	10	10	0	0	0	0	0	90	10
2	0	45	10	55	0	0	0	0	0	45	55
2	0	45	5	50	0	0	0	0	0	50	50
2	0	20	15	35	0	0	0	0	0	65	35
2	0	5	45	50	0	0	0	0	0	50	50
2	0	10	45	55	0	0	0	0	0	45	55
2	0	45	15	60	0	0	0	0	0	40	60
2	0	65	0	65	0	0	0	0	0	35	65
2	0	75	0	75	0	0	0	0	0	25	75
2	0	85	0	85	0	0	0	0	0	15	85
2	0	35	15	50	0	0	0	0	0	50	50
2	0	50	10	60	0	0	0	0	0	40	60
2	0	35	20	55	0	0	0	0	0	45	55
2	0	60	15	75	0	10	0	0	10	15	85
2	0	20	40	60	0	0	0	0	0	40	60
2	0	60	10	70	0	0	0	0	0	30	70
2	0	75	10	85	0	0	0	0	0	15	85
2	0	85	15	100	0	0	0	0	0	0	100
2	0	95	5	100	0	0	0	0	0	0	100
2	0	90	5	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	5	95	0	0	0	5	5	0	100
2	0	90	5	95	0	0	0	0	0	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	80	0	80	0	0	0	20	20	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	5	0	5	10	0	100
2	0	95	0	95	0	5	0	0	5	0	100
2	0	85	0	85	0	0	0	15	15	0	100
2	0	95	2	97	0	0	0	0	0	3	97
2	0	100	0	100	0	0	0	0	0	0	100
2	0	80	10	90	0	0	0	0	0	10	90
2	0	95	5	100	0	0	0	0	0	0	100
2	0	95	5	100	0	0	0	0	0	0	100
2	0	85	15	100	0	0	0	0	0	0	100
2	0	85	15	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	85	15	100	0	0	0	0	0	0	100
2	0	90	5	95	0	0	0	5	5	0	100
2	0	95	0	95	0	0	0	0	0	5	95
Average		76.8	5.5	82.3	0.0	0.3	0.0	0.7	1.0	16.6	83.4

Transect T2											Surveyed 16 June 2025
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total Seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	100	0
2	0	30	0	30	0	0	0	0	0	70	30
2	0	60	0	60	0	0	0	0	0	40	60
2	0	50	0	50	0	0	0	0	0	50	50
2	0	5	0	5	0	0	0	0	0	95	5
0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	100	0
2	0	55	0	55	0	0	0	0	0	45	55
2	0	80	0	80	0	0	0	0	0	20	80
2	0	30	0	30	0	0	0	0	0	70	30
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	5	90	0	0	0	0	0	10	90
2	0	90	5	95	0	0	0	0	0	5	95
2	0	95	5	100	0	0	0	0	0	0	100
2	0	95	5	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	5	100	0	0	0	0	0	0	100
2	0	95	2	97	0	0	0	0	0	3	97
2	0	75	5	80	0	0	0	0	0	20	80
2	0	95	5	100	0	0	0	0	0	0	100
2	0	85	0	85	0	0	0	0	0	15	85
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	10	95	0	0	0	0	0	5	95
2	0	90	5	95	0	0	0	0	0	5	95
2	0	90	5	95	0	0	0	0	0	5	95
2	0	85	10	95	0	0	0	0	0	5	95
2	0	80	10	90	0	0	0	0	0	10	90
2	0	75	10	85	0	0	0	0	0	15	85
2	0	65	0	65	0	0	0	0	0	35	65
0	0	0	0	0	0	0	0	0	0	100	0
2	0	75	0	75	0	0	0	0	0	25	75
2	0	60	15	75	0	0	0	0	0	25	75
2	0	95	5	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	5	100	0	0	0	0	0	0	100
2	0	95	5	100	0	0	0	0	0	0	100
2	0	75	10	85	0	0	0	0	0	15	85
2	0	80	5	85	0	0	0	0	0	15	85
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	5	5	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	85	0	85	0	0	0	0	0	15	85
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	60	0	60	0	0	0	0	0	40	60
2	0	100	0	100	0	0	0	0	0	0	100
2	1	95	0	95	0	0	0	0	0	5	95
2	1	90	0	90	0	10	0	0	10	0	100
2	1	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	75	0	75	0	0	0	0	0	25	75
2	0	75	0	75	0	0	0	0	0	25	75
2	0	75	0	75	0	0	0	0	0	25	75
2	0	75	0	75	0	0	0	0	0	25	75
2	0	80	0	80	0	0	0	0	0	20	80
2	0	75	0	75	0	0	0	0	0	25	75
Average		76.1	1.9	78.0	0.0	0.1	0.0	0.1	0.2	21.7	78.3

Transect T3											Surveyed 16 June 2025
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
2	0	70	0	70	0	0	0	0	0	30	70
2	0	45	0	45	0	0	0	0	0	55	45
2	0	45	0	45	0	0	0	0	0	55	45
2	0	50	0	50	0	0	0	0	0	50	50
2	0	90	0	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	75	0	75	0	0	0	0	0	25	75
2	0	50	0	50	0	0	0	0	0	50	50
2	0	60	0	60	0	0	0	0	0	40	60
2	0	85	5	90	0	0	0	0	0	10	90
2	0	70	0	70	0	0	0	0	0	30	70
2	0	75	5	80	0	0	0	0	0	20	80
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	80	0	80	0	0	0	0	0	20	80
2	0	80	0	80	0	0	0	0	0	20	80
2	0	85	0	85	0	0	0	0	0	15	85
2	0	50	0	50	0	0	0	0	0	50	50
2	0	90	0	90	0	0	0	0	0	10	90
2	0	75	0	75	0	0	0	0	0	25	75
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	5	95	0	0	0	0	0	5	95
2	0	90	2	92	0	0	0	0	0	8	92
2	0	95	2	97	0	0	0	0	0	3	97
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	80	0	80	0	0	0	0	0	20	80
2	0	100	0	100	0	0	0	0	0	0	100
2	0	60	0	60	0	0	0	0	0	40	60
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	80	0	80	0	0	0	0	0	20	80
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	75	0	75	0	0	0	0	0	25	75
2	0	100	0	100	0	0	0	0	0	0	100
2	0	75	5	80	0	0	0	0	0	20	80
2	0	75	0	75	0	0	0	0	0	25	75
2	0	70	5	75	0	0	0	0	0	25	75
2	0	75	0	75	0	0	0	0	0	25	75
2	0	75	0	75	0	0	0	0	0	25	75
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	5	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	5	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
Average		84.8	0.6	85.4	0.0	0.0	0.0	0.0	0.0	14.6	85.4

Transect T4										Surveyed 16 June 2025	
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total Seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
2	0	70	0	70	0	0	0	0	0	30	70
2	0	80	0	80	0	0	0	0	0	20	80
2	0	40	5	45	0	0	0	0	0	55	45
2	0	75	0	75	0	0	0	0	0	25	75
2	0	50	0	50	0	0	0	0	0	50	50
2	0	50	0	50	0	0	0	0	0	50	50
2	0	80	5	85	0	0	0	0	0	15	85
2	0	70	0	70	0	0	0	0	0	30	70
2	0	95	0	95	0	0	0	0	0	5	95
2	0	80	0	80	0	0	0	0	0	20	80
2	0	75	5	80	0	0	0	0	0	20	80
2	0	80	0	80	0	0	0	0	0	20	80
2	0	75	0	75	0	0	0	0	0	25	75
2	0	60	0	60	0	0	0	0	0	40	60
2	0	40	0	40	0	0	0	0	0	60	40
2	0	90	5	95	0	0	0	0	0	5	95
2	0	70	0	70	0	0	0	0	0	30	70
2	0	80	0	80	0	0	0	0	0	20	80
2	0	50	0	50	0	0	0	0	0	50	50
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	80	0	80	0	0	0	0	0	20	80
2	0	70	10	80	0	0	0	0	0	20	80
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	98	2	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	0	90	0	10	0	0	10	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	70	0	70	0	0	0	0	0	30	70
2	0	80	5	85	0	0	0	0	0	15	85
2	0	80	0	80	0	0	0	0	0	20	80
2	0	85	5	90	0	0	0	0	0	10	90
2	0	75	5	80	0	0	0	0	0	20	80
2	0	50	0	50	0	0	0	0	0	50	50
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	5	100	0	0	0	0	0	0	100
2	0	85	0	85	0	0	0	0	0	15	85
Average		86.9	0.8	87.6	0.0	0.1	0.0	0.0	0.1	12.2	87.8

Transect T5											Surveyed 16 June 2025
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
2	0	70	0	70	0	0	0	0	0	30	70
2	0	30	0	30	0	0	0	0	0	70	30
2	0	70	0	70	0	0	0	0	0	30	70
2	0	70	0	70	0	0	0	0	0	30	70
2	0	80	0	80	0	0	0	0	0	20	80
2	0	55	5	60	0	0	0	0	0	40	60
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	75	0	75	0	0	0	0	0	25	75
2	0	40	0	40	0	5	0	0	5	55	45
2	0	85	0	85	0	0	0	0	0	15	85
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	5	0	0	5	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	50	0	50	0	0	0	0	0	50	50
2	0	70	0	70	0	0	0	0	0	30	70
2	0	50	10	60	0	0	0	0	0	40	60
2	0	85	0	85	0	0	0	0	0	15	85
2	0	70	0	70	0	0	0	0	0	30	70
2	0	85	0	85	0	0	0	0	0	15	85
2	0	95	0	95	0	0	0	0	0	5	95
2	0	70	5	75	0	0	0	0	0	25	75
2	0	65	0	65	0	0	0	0	0	35	65
2	0	80	5	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	80	0	80	0	0	0	0	0	20	80
2	0	50	2	52	0	0	0	0	0	48	52
2	0	75	0	75	0	0	0	0	0	25	75
2	0	65	0	65	0	0	0	0	0	35	65
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	80	0	80	0	0	0	0	0	20	80
2	0	65	0	65	0	0	0	0	0	35	65
2	0	75	0	75	0	0	0	0	0	25	75
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	5	95	0	0	0	0	0	5	95
0	0	0	0	0	0	0	0	0	0	100	0
2	0	70	0	70	0	0	0	0	0	30	70
2	0	75	5	80	0	0	0	0	0	20	80
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	80	5	85	0	0	0	0	0	15	85
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	90	0	90	0	0	0	0	0	10	90
1	0	25	5	30	0	0	0	0	0	70	30
1	0	90	0	90	0	0	0	0	0	10	90
1	0	95	0	95	0	0	0	0	0	5	95
1	0	100	0	100	0	0	0	0	0	0	100
2	0	80	0	80	0	0	0	0	0	20	80
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
2	0	85	0	85	0	0	0	0	0	15	85
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	80	0	80	0	0	0	0	0	20	80
2	0	85	0	85	0	0	0	0	0	15	85
2	0	100	0	100	0	0	0	0	0	0	100
2	0	80	0	80	0	0	0	0	0	20	80
0	0	0	0	0	0	0	0	0	0	100	0
2	0	80	0	80	0	0	0	0	0	20	80
Average		**78.5**	**0.7**	**79.1**	**0.0**	**0.1**	**0.0**	**0.0**	**0.1**	**20.7**	**79.3**

Transect T6											Surveyed 16 June 2025
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
1	0	50	0	50	0	0	0	0	0	50	50
0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	100	0
1	0	50	0	50	0	0	0	0	0	50	50
1	0	75	0	75	0	0	0	0	0	25	75
1	0	80	0	80	0	0	0	0	0	20	80
1	0	85	0	85	0	0	0	0	0	15	85
1	0	85	0	85	0	0	0	0	0	15	85
1	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	80	0	80	0	0	0	0	0	20	80
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	75	5	80	0	0	0	0	0	20	80
2	0	75	5	80	0	0	0	0	0	20	80
2	0	75	5	80	0	0	0	0	0	20	80
2	0	75	5	80	0	0	0	0	0	20	80
2	0	70	5	75	0	0	0	0	0	25	75
2	0	75	5	80	0	0	0	0	0	20	80
2	0	55	5	60	0	0	0	0	0	40	60
2	0	55	5	60	0	0	0	0	0	40	60
2	0	30	10	40	0	0	0	0	0	60	40
2	0	55	10	65	0	0	0	0	0	35	65
2	0	45	15	60	0	0	0	0	0	40	60
2	0	60	5	65	0	0	0	0	0	35	65
2	0	60	0	60	0	0	0	0	0	40	60
2	0	95	0	95	0	0	0	0	0	5	95
2	0	70	5	75	0	0	0	0	0	25	75
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	75	0	75	0	0	0	0	0	25	75
2	0	75	10	85	0	0	0	0	0	15	85
2	0	75	10	85	0	0	0	0	0	15	85
2	0	70	5	75	0	0	0	0	0	25	75
2	0	70	5	75	0	0	0	0	0	25	75
2	0	75	5	80	0	0	0	0	0	20	80
Average		79.6	1.8	81.3	0.0	0.0	0.0	0.0	0.0	18.7	81.3

Transect T7										Surveyed 16 June 2025	
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
2	0	55	0	55	0	0	0	0	0	45	55
2	0	65	0	65	0	0	0	0	0	35	65
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	80	0	80	0	0	0	0	0	20	80
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	75	0	75	0	0	0	0	0	25	75
2	0	50	25	75	0	0	0	0	0	25	75
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	65	0	65	0	0	0	0	0	35	65
2	0	80	0	80	0	0	0	0	0	20	80
2	0	93	0	93	0	0	0	0	0	7	93
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	92	0	92	0	0	0	0	0	8	92
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	80	5	85	0	0	0	0	0	15	85
2	0	50	5	55	0	0	0	0	0	45	55
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	75	10	85	0	0	0	0	0	15	85
2	0	85	5	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
Average		90.1	0.7	90.8	0.0	0.0	0.0	0.0	0.0	9.2	90.8

Transect T8									Surveyed 16 June 2025		
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
1	0	65	0	65	0	0	0	0	0	35	65
1	0	85	0	85	0	0	0	0	0	15	85
1	0	90	0	90	0	0	0	0	0	10	90
1	0	95	0	95	0	0	0	0	0	5	95
1	0	90	0	90	0	0	0	0	0	10	90
1	0	75	0	75	0	0	0	0	0	25	75
1	0	90	2	92	0	0	0	0	0	8	92
1	0	95	0	95	0	0	0	0	0	5	95
1	0	95	0	95	0	0	0	0	0	5	95
1	0	95	0	95	0	0	0	0	0	5	95
1	0	85	0	85	0	0	0	0	0	15	85
1	0	55	5	60	0	0	0	0	0	40	60
1	0	80	0	80	0	0	0	0	0	20	80
1	0	90	0	90	0	0	0	0	0	10	90
1	0	80	0	80	0	0	0	0	0	20	80
1	0	65	20	85	0	0	0	0	0	15	85
1	0	55	5	60	0	0	0	0	0	40	60
1	0	70	0	70	0	0	0	0	0	30	70
1	0	85	0	85	0	0	0	0	0	15	85
1	0	85	5	90	0	0	0	0	0	10	90
1	0	90	0	90	0	0	0	0	0	10	90
1	0	75	10	85	0	0	0	0	0	15	85
1	0	85	0	85	0	0	0	0	0	15	85
1	0	65	0	65	0	0	0	0	0	35	65
1	0	50	5	55	0	0	0	0	0	45	55
1	0	80	0	80	0	0	0	0	0	20	80
1	0	85	0	85	0	0	0	0	0	15	85
1	0	90	0	90	0	0	0	0	0	10	90
1	0	90	0	90	0	0	0	0	0	10	90
1	0	95	0	95	0	0	0	0	0	5	95
1	0	95	0	95	0	0	0	0	0	5	95
1	0	90	0	90	0	0	0	0	0	10	90
1	0	95	0	95	0	0	0	0	0	5	95
1	0	95	0	95	0	0	0	0	0	5	95
1	0	98	0	98	0	0	0	0	0	2	98
1	0	95	0	95	0	0	0	0	0	5	95
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	90	0	90	0	0	0	0	0	10	90
1	0	80	0	80	0	0	0	0	0	20	80
1	0	95	0	95	0	0	0	0	0	5	95
1	0	85	5	90	0	0	0	0	0	10	90
1	0	100	0	100	0	0	0	0	0	0	100
1	0	90	0	90	0	0	0	0	0	10	90
1	0	100	0	100	0	0	0	0	0	0	100
1	0	85	0	85	0	0	0	0	0	15	85
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	95	0	95	0	0	0	0	0	5	95
1	0	95	0	95	0	0	0	0	0	5	95
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	95	0	95	0	0	0	0	0	5	95
1	0	90	0	90	0	0	0	0	0	10	90
1	0	95	0	95	0	0	0	0	0	5	95
1	0	100	0	100	0	0	0	0	0	0	100
1	0	95	0	95	0	0	0	0	0	5	95
1	0	100	0	100	0	0	0	0	0	0	100
1	0	95	0	95	0	0	0	0	0	5	95
1	0	95	0	95	0	0	0	0	0	5	95
1	0	85	0	85	0	0	0	0	0	15	85
1	0	85	0	85	0	0	0	0	0	15	85
1	0	95	0	95	0	0	0	0	0	5	95
1	0	70	0	70	0	0	0	0	0	30	70
1	0	85	0	85	0	0	0	0	0	15	85
1	0	85	0	85	0	0	0	0	0	15	85
1	0	85	0	85	0	0	0	0	0	15	85
Average		**87.8**	**0.8**	**88.6**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**11.4**	**88.6**

Transect E1									Surveyed 6 June 2025		
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
1	0	100	0	100	0	0	0	0	0	0	100
1	0	98	0	98	0	2	0	0	2	0	100
1	0	95	0	95	0	0	0	0	0	5	95
1	0	90	0	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
1	0	85	0	85	0	10	0	0	10	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	75	0	75	0	0	0	0	0	25	75
2	0	90	0	90	0	5	0	0	5	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	75	0	75	0	0	0	0	0	25	75
2	0	65	0	65	0	0	0	0	0	35	65
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	2	2	13	87
2	0	75	0	75	0	0	0	0	0	25	75
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	65	0	65	0	0	0	0	0	35	65
2	0	80	2	82	0	0	0	0	0	18	82
2	0	75	5	80	0	0	0	0	0	20	80
2	0	75	0	75	0	0	0	0	0	25	75
2	0	85	0	85	0	5	0	0	5	10	90
2	0	90	5	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	98	0	98	0	0	0	0	0	2	98
2	0	85	0	85	0	5	0	0	5	10	90
2	0	90	0	90	0	5	0	0	5	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	80	0	80	0	0	0	0	0	20	80
2	0	75	0	75	0	0	0	0	0	25	75
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	5	0	0	5	5	95
2	0	75	0	75	0	10	0	0	10	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	80	0	80	0	0	0	0	0	20	80
1	0	90	0	90	0	10	0	0	10	0	100
1	0	90	0	90	0	0	0	0	0	10	90
1	0	90	0	90	0	0	0	0	0	10	90
1	0	90	0	90	0	5	0	0	5	5	95
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
2	0	40	0	40	0	0	0	0	0	60	40
2	0	30	0	30	0	0	0	0	0	70	30
2	0	90	0	90	0	5	0	0	5	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	80	0	80	0	0	0	0	0	20	80
2	0	10	10	20	0	0	0	0	0	80	20
2	0	10	20	30	0	0	0	0	0	70	30
2	0	60	10	70	0	0	0	0	0	30	70
2	0	50	50	100	0	0	0	0	0	0	100
2	0	50	50	100	0	0	0	0	0	0	100
2	0	20	10	30	0	60	0	0	60	10	90
2	0	20	40	60	0	0	0	0	0	40	60
2	0	15	25	40	0	0	0	0	0	60	40
2	0	0	30	30	0	0	0	0	0	70	30
2	0	25	65	90	0	0	0	0	0	10	90
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
Average		**78.5**	**4.7**	**83.2**	**0.0**	**1.9**	**0.0**	**0.0**	**1.9**	**14.9**	**85.1**

Transect E2										Surveyed 16 June 2025	
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
2	0	65	0	65	0	0	0	0	0	35	65
2	0	65	0	65	0	0	0	0	0	35	65
2	0	60	0	60	0	0	0	0	0	40	60
2	0	45	0	45	0	0	0	0	0	55	45
1	0	60	0	60	0	0	0	0	0	40	60
1	0	75	0	75	0	0	0	0	0	25	75
1	0	80	0	80	0	0	0	0	0	20	80
2	0	70	0	70	0	0	0	0	0	30	70
2	0	80	0	80	0	0	0	0	0	20	80
2	0	85	0	85	0	0	0	0	0	15	85
2	0	75	0	75	0	0	0	0	0	25	75
2	0	50	0	50	0	0	0	0	0	50	50
2	0	85	0	85	0	0	0	0	0	15	85
2	0	98	0	98	0	0	0	0	0	2	98
2	0	98	0	98	0	0	0	0	0	2	98
2	0	90	0	90	0	0	0	0	0	10	90
1	0	85	0	85	0	0	0	0	0	15	85
1	0	90	0	90	0	5	0	0	5	5	95
2	0	80	0	80	0	5	0	0	5	15	85
1	0	90	0	90	0	10	0	0	10	0	100
1	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	5	0	0	5	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	0	90	0	2	0	0	2	8	92
2	0	85	0	85	0	2	0	0	2	13	87
2	0	70	0	70	0	4	0	0	4	26	74
2	0	60	0	60	0	0	0	0	0	40	60
2	0	70	0	70	0	4	0	0	4	26	74
2	0	40	0	40	0	0	0	0	0	60	40
2	0	70	0	70	0	0	0	0	0	30	70
2	0	55	0	55	0	5	0	0	5	40	60
2	0	90	0	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	45	0	45	0	5	0	0	5	50	50
2	0	55	0	55	0	0	0	0	0	45	55
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	5	0	0	5	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	80	10	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	25	30	55	0	0	0	0	0	45	55
2	0	95	0	95	0	0	0	0	0	5	95
1	0	95	0	95	0	0	0	0	0	5	95
1	0	100	0	100	0	0	0	0	0	0	100
1	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
1	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
2	0	90	5	95	0	0	0	0	0	5	95
2	0	95	5	100	0	0	0	0	0	0	100
2	0	85	10	95	0	0	0	0	0	5	95
2	0	85	15	100	0	0	0	0	0	0	100
2	0	85	15	100	0	0	0	0	0	0	100
Average		**82.1**	**1.3**	**83.5**	**0.0**	**0.8**	**0.0**	**0.0**	**0.8**	**15.8**	**84.2**

Transect E3										Surveyed 16 June 2025	
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
1	0	75	0	75	0	0	0	0	0	25	75
2	0	65	0	65	0	0	0	0	0	35	65
2	0	50	0	50	0	0	0	0	0	50	50
2	0	55	0	55	0	0	0	0	0	45	55
2	0	95	0	95	0	0	0	0	0	5	95
2	0	75	0	75	0	0	0	0	0	25	75
2	0	75	0	75	0	0	0	0	0	25	75
2	0	95	0	95	0	0	0	0	0	5	95
2	0	80	0	80	0	0	0	0	0	20	80
1	0	95	0	95	0	0	0	0	0	5	95
1	0	95	0	95	0	0	0	0	0	5	95
1	0	100	0	100	0	0	0	0	0	0	100
1	0	90	0	90	0	0	0	0	0	10	90
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	95	0	95	0	0	0	0	0	5	95
1	0	95	0	95	0	0	0	0	0	5	95
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	95	0	95	0	0	0	0	0	5	95
1	0	95	0	95	0	0	0	0	0	5	95
1	0	95	0	95	0	0	0	0	0	5	95
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	95	0	95	0	0	0	0	0	5	95
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	45	0	45	0	0	0	0	0	55	45
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	50	30	80	0	0	0	0	0	20	80
2	0	25	45	70	0	0	0	0	0	30	70
Average		92.9	1.1	94.0	0.0	0.0	0.0	0.0	0.0	6.0	94.0

Transect E4										Surveyed 16 June 2025	
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
1	0	70	0	70	0	30	0	0	30	0	100
1	1	80	0	80	0	20	0	0	20	0	100
1	1	50	0	50	0	10	0	0	10	40	60
2	0	65	0	65	0	0	0	0	0	35	65
2	0	85	0	85	0	15	0	0	15	0	100
2	0	65	0	65	0	15	0	0	15	20	80
2	0	50	0	50	0	0	0	0	0	50	50
2	0	70	0	70	0	10	0	0	10	20	80
2	0	90	5	95	0	0	0	0	0	5	95
2	0	75	15	90	0	5	0	0	5	5	95
2	0	70	5	75	0	15	0	0	15	10	90
2	0	55	10	65	0	0	0	0	0	35	65
2	0	55	20	75	0	0	0	0	0	25	75
2	0	65	10	75	0	5	0	0	5	20	80
2	0	65	25	90	0	0	0	0	0	10	90
2	0	55	5	60	0	0	0	0	0	40	60
2	0	70	15	85	0	5	0	0	5	10	90
2	0	70	15	85	0	5	0	0	5	10	90
2	0	45	25	70	0	5	0	0	5	25	75
2	0	50	40	90	0	5	0	0	5	5	95
2	0	45	40	85	0	5	0	0	5	10	90
2	0	25	70	95	0	0	0	0	0	5	95
2	0	10	80	90	0	5	0	0	5	5	95
2	0	20	70	90	0	5	0	0	5	5	95
2	0	10	80	90	0	5	0	0	5	5	95
2	0	15	65	80	0	0	0	0	0	20	80
2	0	55	35	90	0	5	0	0	5	5	95
2	0	50	35	85	0	10	0	0	10	5	95
2	0	40	15	55	0	10	0	0	10	35	65
2	0	15	50	65	0	10	0	0	10	25	75
2	0	25	60	85	0	0	0	0	0	15	85
2	0	25	50	75	0	20	0	0	20	5	95
2	0	55	30	85	0	15	0	0	15	0	100
2	0	90	5	95	0	0	0	0	0	5	95
2	0	95	0	95	0	5	0	0	5	0	100
2	0	90	0	90	0	5	0	0	5	5	95
2	0	60	15	75	0	10	0	0	10	15	85
2	0	60	15	75	0	0	0	0	0	25	75
2	0	5	85	90	0	0	0	0	0	10	90
2	0	25	65	90	0	5	0	0	5	5	95
2	0	20	55	75	0	0	0	0	0	25	75
2	0	15	75	90	0	0	0	0	0	10	90
2	0	5	80	85	0	5	0	0	5	10	90
2	0	10	60	70	0	15	0	0	15	15	85
2	0	75	10	85	0	10	0	0	10	5	95
2	0	90	0	90	0	5	0	0	5	5	95
2	0	80	0	80	0	10	0	0	10	10	90
2	0	95	0	95	0	5	0	0	5	0	100
2	0	95	0	95	0	5	0	0	5	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
Average		**66.2**	**19.6**	**85.8**	**0.0**	**4.6**	**0.0**	**0.0**	**4.6**	**9.6**	**90.4**

Transect L1										Surveyed 16 June 2025	
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
1	1	95	0	95	0	0	0	0	0	5	95
1	1	95	0	95	0	0	0	0	0	5	95
1	1	90	0	90	0	0	0	0	0	10	90
1	1	85	0	85	0	0	0	0	0	15	85
1	1	85	0	85	0	0	0	0	0	15	85
1	1	90	0	90	0	0	0	0	0	10	90
1	1	90	0	90	0	0	0	0	0	10	90
1	1	90	0	90	0	0	0	0	0	10	90
1	1	85	0	85	0	0	0	0	0	15	85
1	1	100	0	100	0	0	0	0	0	0	100
1	1	80	0	80	0	0	0	0	0	20	80
1	1	65	0	65	0	0	0	0	0	35	65
1	1	70	0	70	0	0	0	0	0	30	70
1	1	65	0	65	0	0	0	0	0	35	65
1	1	70	0	70	0	0	0	0	0	30	70
2	1	50	8	58	0	0	0	0	0	42	58
0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	100	0
2	1	15	10	25	0	0	0	0	0	75	25
2	1	35	15	50	0	0	0	0	0	50	50
2	1	10	0	10	0	0	0	0	0	90	10
0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	100	0
2	0	10	5	15	0	0	0	0	0	85	15
0	0	0	5	5	0	0	0	0	0	95	5
0	0	0	0	0	0	0	0	0	0	100	0
2	0	40	5	45	0	0	0	0	0	55	45
2	0	35	15	50	0	0	0	0	0	50	50
1	0	65	0	65	0	0	0	0	0	35	65
1	0	70	15	85	0	0	0	0	0	15	85
1	0	50	15	65	0	0	0	0	0	35	65
2	0	55	0	55	0	0	0	0	0	45	55
1	1	30	0	30	0	0	0	0	0	70	30
0	0	0	0	0	0	0	0	0	0	100	0
1	0	50	10	60	0	0	0	0	0	40	60
2	0	50	10	60	0	0	0	0	0	40	60
1	0	85	0	85	0	0	0	0	0	15	85
1	0	65	0	65	0	5	0	0	5	30	70
2	0	60	0	60	0	0	0	0	0	40	60
1	0	85	0	85	0	0	0	0	0	15	85
1	0	60	0	60	0	0	0	0	0	40	60
2	0	60	10	70	0	0	0	0	0	30	70
1	0	95	0	95	0	0	0	0	0	5	95
1	0	100	0	100	0	0	0	0	0	0	100
1	0	95	0	95	0	0	0	0	0	5	95
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
2	0	10	35	45	0	0	0	0	0	55	45
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
2	0	50	10	60	0	0	0	0	0	40	60
2	0	30	0	30	0	0	0	0	0	70	30
2	0	65	0	65	0	0	0	0	0	35	65
2	0	95	0	95	0	0	0	0	0	5	95
2	0	30	0	30	0	0	0	0	0	70	30
0	0	0	0	0	0	0	0	0	0	100	0
1	0	75	10	85	0	0	0	0	0	15	85
1	0	40	25	65	0	0	0	0	0	35	65
1	0	50	0	50	0	0	0	0	0	50	50
Average		62.8	3.0	65.8	0.0	0.1	0.0	0.0	0.1	34.1	65.9

Transect E5										Surveyed 16 June 2025	
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
2	0	50	0	50	0	0	0	0	0	50	50
2	0	65	0	65	0	0	0	0	0	35	65
2	0	65	0	65	0	0	0	0	0	35	65
2	0	65	0	65	0	0	0	0	0	35	65
1	0	65	0	65	0	0	0	0	0	35	65
1	0	90	0	90	0	0	0	0	0	10	90
1	0	90	0	90	0	0	0	0	0	10	90
1	0	100	0	100	0	0	0	0	0	0	100
2	0	65	0	65	0	0	0	0	0	35	65
2	0	60	0	60	0	0	0	0	0	40	60
2	0	60	0	60	0	0	0	0	0	40	60
2	0	65	0	65	0	0	0	0	0	35	65
2	0	70	0	70	0	0	0	0	0	30	70
2	0	70	0	70	0	0	0	0	0	30	70
2	0	80	0	80	0	5	0	0	5	15	85
2	0	70	0	70	0	0	0	0	0	30	70
2	0	75	0	75	0	0	0	0	0	25	75
2	0	75	0	75	0	0	0	0	0	25	75
2	0	60	0	60	0	0	0	0	0	40	60
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	50	0	50	0	0	0	0	0	50	50
2	0	50	0	50	0	0	0	0	0	50	50
0	0	0	0	0	0	0	0	0	0	100	0
2	0	30	0	30	0	0	0	0	0	70	30
2	0	15	0	15	0	0	0	0	0	85	15
2	0	50	0	50	0	0	0	0	0	50	50
0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	10	10	0	0	0	0	0	90	10
0	0	0	10	10	0	0	0	0	0	90	10
2	0	30	15	45	0	0	0	0	0	55	45
2	0	75	15	90	0	0	0	0	0	10	90
2	0	85	5	90	0	0	0	0	0	10	90
0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	100	0
2	0	95	0	95	0	0	0	0	0	5	95
2	0	65	0	65	0	0	0	0	0	35	65
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	70	5	75	0	0	0	0	0	25	75
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	5	90	0	0	0	0	0	10	90
2	0	70	0	70	0	0	0	0	0	30	70
2	0	40	0	40	0	0	0	0	0	60	40
2	0	85	0	85	0	0	0	0	0	15	85
2	0	100	0	100	0	0	0	0	0	0	100
2	0	75	0	75	0	0	0	0	0	25	75
2	0	75	0	75	0	0	0	0	0	25	75
2	0	70	0	70	0	0	0	0	0	30	70
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	5	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
Average		**67.0**	**1.0**	**68.0**	**0.0**	**0.1**	**0.0**	**0.0**	**0.1**	**31.9**	**68.1**

Transect E6										Surveyed 16 June 2025	
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
1	0	80	0	80	0	0	0	0	0	20	80
1	0	90	0	90	0	0	0	0	0	10	90
1	0	40	0	40	0	0	0	0	0	60	40
1	0	50	0	50	0	0	0	0	0	50	50
1	0	40	0	40	0	0	0	0	0	60	40
1	0	20	0	20	0	0	0	0	0	80	20
0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	100	0
2	0	15	5	20	0	0	0	0	0	80	20
1	0	95	0	95	0	0	0	0	0	5	95
2	0	50	15	65	0	0	0	0	0	35	65
1	0	85	5	90	0	0	0	0	0	10	90
1	0	85	8	93	0	0	0	0	0	7	93
1	0	45	0	45	0	0	0	0	0	55	45
2	0	30	0	30	0	0	0	0	0	70	30
2	0	55	0	55	0	0	0	0	0	45	55
2	0	55	0	55	0	0	0	0	0	45	55
2	0	35	5	40	0	0	0	0	0	60	40
1	0	85	0	85	0	0	0	0	0	15	85
2	0	70	5	75	0	15	0	0	15	10	90
1	0	65	0	65	0	0	0	0	0	35	65
1	0	75	0	75	0	0	0	0	0	25	75
2	0	30	0	30	0	0	0	0	0	70	30
0	0	0	0	0	0	0	0	0	0	100	0
2	0	60	10	70	0	0	0	0	0	30	70
1	0	55	0	55	0	0	0	0	0	45	55
2	0	60	0	60	0	0	0	0	0	40	60
2	0	80	0	80	0	0	0	0	0	20	80
2	0	95	0	95	0	0	0	0	0	5	95
2	0	20	0	20	0	0	0	0	0	80	20
0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	100	0
2	0	20	0	20	0	0	0	0	0	80	20
2	0	20	0	20	0	0	0	0	0	80	20
0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	100	0
2	0	65	5	70	0	0	0	0	0	30	70
0	0	0	0	0	0	0	0	0	0	100	0
2	0	25	5	30	0	0	0	0	0	70	30
2	0	45	0	45	0	0	0	0	0	55	45
0	0	0	0	0	0	0	0	0	0	100	0
2	0	60	10	70	0	0	0	0	0	30	70
2	0	25	10	35	0	0	0	0	0	65	35
2	0	60	20	80	0	0	0	0	0	20	80
2	0	5	0	5	0	0	0	0	0	95	5
2	0	40	5	45	0	0	0	0	0	55	45
2	0	50	15	65	0	0	0	0	0	35	65
2	0	30	10	40	0	0	0	0	0	60	40
2	0	60	5	65	0	0	0	0	0	35	65
2	0	30	0	30	0	0	0	0	0	70	30
2	0	15	10	25	0	0	0	0	0	75	25
2	0	40	10	50	0	0	0	0	0	50	50
2	0	75	0	75	0	0	0	0	0	25	75
2	0	75	0	75	0	0	0	0	0	25	75
2	0	85	5	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	80	5	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
0	0	0	15	15	0	0	0	0	0	85	15
2	0	90	0	90	0	0	0	0	0	10	90
2	0	60	20	80	0	0	0	0	0	20	80
2	0	50	40	90	0	0	0	0	0	10	90
2	0	80	5	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
Average		48.9	3.6	52.5	0.0	0.2	0.0	0.0	0.2	47.2	52.8

Transect E8										Surveyed 16 June 2025	
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total Seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
2	0	85	0	85	0	0	0	0	0	15	85
2	0	75	0	75	0	0	0	0	0	25	75
2	0	90	0	90	0	0	0	0	0	10	90
2	0	50	0	50	0	0	0	0	0	50	50
2	0	65	0	65	0	0	0	0	0	35	65
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	98	0	98	0	0	0	0	0	2	98
2	0	98	0	98	0	0	0	0	0	2	98
2	0	80	0	80	0	0	0	0	0	20	80
2	0	90	0	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	80	0	80	0	0	0	0	0	20	80
2	0	75	0	75	0	0	0	0	0	25	75
2	0	60	0	60	0	0	0	0	0	40	60
2	0	100	0	100	0	0	0	0	0	0	100
2	0	45	0	45	0	0	0	0	0	55	45
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	75	5	80	0	0	0	0	0	20	80
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	80	5	85	0	0	0	0	0	15	85
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	85	5	90	0	0	0	0	0	10	90
2	0	45	20	65	0	0	0	0	0	35	65
2	0	65	15	80	0	0	0	0	0	20	80
2	0	90	5	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	75	20	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
Average		**90.4**	**1.1**	**91.5**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**8.5**	**91.5**

Transect E9										Surveyed 16 June 2025	
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total Seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
2	0	70	0	70	0	0	0	0	0	30	70
2	0	70	0	70	0	0	0	0	0	30	70
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	80	0	80	0	0	0	0	0	20	80
2	0	55	0	55	0	0	0	0	0	45	55
2	0	80	0	80	0	0	0	0	0	20	80
2	0	85	0	85	0	0	0	0	0	15	85
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	98	0	98	0	2	0	0	2	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	98	0	98	0	2	0	0	2	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	5	0	0	5	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	60	0	60	0	0	0	0	0	40	60
2	0	100	0	100	0	0	0	0	0	0	100
2	0	98	2	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	0	90	0	5	0	0	5	5	95
2	0	75	0	75	10	2	0	0	12	13	87
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	5	0	0	5	0	100
2	0	95	0	95	0	5	0	0	5	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	5	0	0	5	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	5	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	5	0	0	5	0	100
2	0	70	10	80	0	0	0	0	0	20	80
2	0	60	5	65	0	0	0	0	0	35	65
2	0	95	0	95	0	5	0	0	5	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	70	15	85	0	0	0	0	0	15	85
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	5	0	0	5	5	95
2	0	100	0	100	0	0	0	0	0	0	100
Average		93.7	0.5	94.2	0.1	0.7	0.0	0.0	0.8	5.0	95.0

Transect E10										Surveyed 16 June 2025	
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
2	0	60	0	60	0	0	0	0	0	40	60
2	0	45	0	45	0	0	0	0	0	55	45
0	0	0	0	0	0	0	0	0	0	100	0
2	0	45	0	45	0	0	0	0	0	55	45
2	0	80	0	80	0	0	0	0	0	20	80
2	0	80	0	80	0	0	0	0	0	20	80
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	75	0	75	0	0	0	0	0	25	75
2	0	95	0	95	0	0	0	0	0	5	95
2	0	65	5	70	0	0	0	0	0	30	70
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	85	0	85	0	0	0	0	0	15	85
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	75	0	75	0	0	0	0	0	25	75
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	80	0	80	0	0	0	0	0	20	80
2	0	100	0	100	0	0	0	0	0	0	100
2	0	80	0	80	0	0	0	0	0	20	80
2	0	50	0	50	0	0	0	0	0	50	50
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	80	0	80	0	0	0	0	0	20	80
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	25	35	60	0	0	0	0	0	40	60
Average		89.2	0.6	89.8	0.0	0.0	0.0	0.0	0.0	10.2	89.8

Transect E11										Surveyed 16 June 2025	
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total Seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
2	0	60	0	60	0	0	0	0	0	40	60
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	80	0	0	0	0	0	20	80
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	80	0	80	0	0	0	0	0	20	80
2	0	75	0	75	0	0	0	0	0	25	75
2	0	60	0	60	0	0	0	0	0	40	60
2	0	50	0	50	0	0	0	0	0	50	50
2	0	85	0	85	0	0	0	0	0	15	85
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	80	0	80	0	0	0	0	0	20	80
2	0	80	0	80	0	0	0	0	0	20	80
2	0	75	0	75	0	0	0	0	0	25	75
2	0	70	0	70	0	0	0	0	0	30	70
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	70	0	70	0	0	0	0	0	30	70
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	80	0	80	0	0	0	0	0	20	80
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	50	0	50	0	0	0	0	0	50	50
2	0	50	0	50	0	0	0	0	0	50	50
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
Average		**91.1**	**0.0**	**90.8**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**9.2**	**90.8**

Transect E12										Surveyed 16 June 2025	
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total Seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
2	0	10	0	10	0	0	0	0	0	90	10
2	0	35	5	40	0	0	0	0	0	60	40
2	0	90	5	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	98	0	98	0	0	0	0	0	2	98
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	2	92	0	0	0	0	0	8	92
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	5	90	0	0	0	0	0	10	90
2	0	85	2	87	0	0	0	0	0	13	87
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	80	0	80	0	0	0	0	0	20	80
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	60	0	60	0	0	0	0	0	40	60
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	5	95	0	0	0	0	0	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	70	5	75	0	0	0	0	0	25	75
2	0	55	10	65	0	0	0	0	0	35	65
2	0	70	5	75	0	0	0	0	0	25	75
2	0	80	5	85	0	0	0	0	0	15	85
2	0	75	0	75	0	0	0	0	0	25	75
2	0	90	0	90	0	0	0	0	0	10	90
2	0	80	5	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	80	0	80	0	0	0	0	0	20	80
2	0	100	0	100	0	0	0	0	0	0	100
2	0	70	5	75	0	0	0	0	0	25	75
2	0	90	0	90	0	0	0	0	0	10	90
2	0	75	5	80	0	0	0	0	0	20	80
2	0	90	0	90	0	0	0	0	0	10	90
2	0	70	0	70	0	0	0	0	0	30	70
0	0	0	0	0	0	0	0	100	100	0	100
0	0	0	0	0	0	0	0	100	100	0	100
2	0	15	20	35	0	0	0	15	15	50	50
2	0	70	5	75	0	0	0	0	0	25	75
2	0	65	5	70	0	0	0	0	0	30	70
2	0	50	5	55	0	0	0	0	0	45	55
2	0	60	5	65	0	0	0	0	0	35	65
2	0	95	0	95	0	0	0	0	0	5	95
2	0	70	0	70	0	0	0	0	0	30	70
2	0	90	0	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	80	0	80	0	0	0	0	0	20	80
Average		**81.3**	**1.5**	**82.8**	**0.0**	**0.0**	**0.0**	**3.2**	**3.2**	**14.0**	**86.0**

Transect E13										Surveyed 16 June 2025	
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total Seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
2	0	50	0	50	0	0	0	0	0	50	50
2	0	50	0	50	0	0	0	0	0	50	50
2	0	40	0	40	0	0	0	0	0	60	40
2	0	50	0	50	0	0	0	0	0	50	50
2	0	50	0	50	0	0	0	0	0	50	50
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	75	5	80	0	0	0	0	0	20	80
2	0	90	5	95	0	0	0	0	0	5	95
2	0	50	0	50	0	0	0	0	0	50	50
2	0	65	0	65	0	0	0	0	0	35	65
2	0	75	5	80	0	0	0	0	0	20	80
2	0	90	5	95	0	0	0	0	0	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	80	0	80	0	0	0	0	0	20	80
2	0	90	0	90	0	0	0	0	0	10	90
2	0	60	0	60	0	0	0	0	0	40	60
2	0	75	5	80	0	0	0	0	0	20	80
2	0	95	0	95	0	0	0	0	0	5	95
2	0	75	5	80	0	0	0	0	0	20	80
2	0	85	0	85	0	0	0	0	0	15	85
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	75	0	75	0	0	0	0	0	25	75
2	0	70	0	70	0	0	0	0	0	30	70
2	0	75	0	75	0	0	0	0	0	25	75
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	50	5	55	0	0	0	0	0	45	55
2	0	90	0	90	0	5	0	0	5	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	80	0	80	0	0	0	0	0	20	80
Average		**86.0**	**0.5**	**86.5**	**0.0**	**0.1**	**0.0**	**0.0**	**0.1**	**13.5**	**86.5**

Transect E14										Surveyed 16 June 2025	
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total Seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
0	0	0	0	0	0	0	0	0	0	100	0
2	0	15	0	15	0	0	0	0	0	85	15
2	0	15	0	15	0	0	0	0	0	85	15
2	0	10	0	10	0	0	0	0	0	90	10
0	0	0	0	0	0	0	0	0	0	100	0
2	0	40	0	40	0	0	0	0	0	60	40
0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	100	0
2	0	40	0	40	0	0	0	0	0	60	40
2	0	35	0	35	0	0	0	0	0	65	35
0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	100	0
2	0	15	0	15	0	0	0	0	0	85	15
0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	5	5	0	0	0	0	0	95	5
2	0	5	0	5	0	0	0	0	0	95	5
2	0	10	0	10	0	0	0	0	0	90	10
2	0	40	0	40	0	0	0	0	0	60	40
2	0	40	0	40	0	0	0	0	0	60	40
2	0	55	0	55	0	0	0	0	0	45	55
2	0	25	0	25	0	0	0	0	0	75	25
0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	100	0
2	0	5	0	5	0	0	0	0	0	95	5
0	0	0	0	0	0	0	0	0	0	100	0
2	0	5	5	10	0	0	0	0	0	90	10
2	0	25	0	25	0	0	0	0	0	75	25
0	0	0	0	0	0	0	0	0	0	100	0
2	0	5	0	5	0	0	0	0	0	95	5
2	0	30	0	30	0	0	0	0	0	70	30
2	0	5	0	5	0	0	0	0	0	95	5
0	0	0	0	0	0	0	0	0	0	100	0
2	0	5	0	5	0	0	0	0	0	95	5
0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	100	0
2	0	5	0	5	0	0	0	0	0	95	5
2	0	50	0	50	0	0	0	0	0	50	50
0	0	0	0	0	0	0	0	0	0	100	0
2	0	20	0	20	0	0	0	0	0	80	20
2	0	35	10	45	0	0	0	0	0	55	45
2	0	70	5	75	0	0	0	0	0	25	75
2	0	95	0	95	0	0	0	0	0	5	95
2	0	80	0	80	0	0	0	0	0	20	80
2	0	45	0	45	0	0	0	0	0	55	45
2	0	30	2	32	0	0	0	0	0	68	32
2	0	40	5	45	0	0	0	0	0	55	45
2	0	45	0	45	0	0	0	0	0	55	45
2	0	80	0	80	0	0	0	0	0	20	80
2	0	50	0	50	0	0	0	0	0	50	50
2	0	15	10	25	0	0	0	0	0	75	25
2	0	45	10	55	0	0	0	0	0	45	55
2	0	15	20	35	0	0	0	0	0	65	35
2	0	45	20	65	0	0	0	0	0	35	65
2	0	20	20	40	0	0	0	0	0	60	40
2	0	15	25	40	0	0	0	0	0	60	40
2	0	10	15	25	0	0	0	0	0	75	25
2	0	40	15	55	0	0	0	0	0	45	55
2	0	90	5	95	0	0	0	0	0	5	95
2	0	85	5	90	0	0	0	0	0	10	90
2	0	35	20	55	0	0	0	0	0	45	55
2	0	80	5	85	0	0	0	0	0	15	85
2	0	15	10	25	0	0	0	0	0	75	25
2	0	40	15	55	0	0	0	0	0	45	55
2	0	45	5	50	0	0	0	0	0	50	50
2	0	15	25	40	0	0	0	0	0	60	40
2	0	20	5	25	0	0	0	0	0	75	25
2	0	45	5	50	0	0	0	0	0	50	50
2	0	50	0	50	0	0	0	0	0	50	50
Average		26.4	3.9	30.3	0.0	0.0	0.0	0.0	0.0	69.7	30.3

Transect E15									Surveyed 16 June 2025		
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total Seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
1	0	50	0	50	0	0	0	0	0	50	50
0	0	0	0	0	0	0	0	0	0	100	0
1	0	55	0	55	0	0	0	0	0	45	55
1	0	65	0	65	0	0	0	0	0	35	65
1	0	50	0	50	0	0	0	0	0	50	50
1	1	60	0	60	0	0	0	0	0	40	60
1	0	55	0	55	0	0	0	0	0	45	55
1	0	100	0	100	0	0	0	0	0	0	100
1	0	10	0	10	0	0	0	0	0	90	10
2	0	70	0	70	0	0	0	0	0	30	70
1	1	100	0	100	0	0	0	0	0	0	100
1	0	85	0	85	0	0	0	0	0	15	85
2	0	50	0	50	0	0	0	0	0	50	50
2	0	60	0	60	0	0	0	0	0	40	60
2	0	10	10	20	0	0	0	0	0	80	20
2	0	10	10	20	0	0	0	0	0	80	20
2	0	45	10	55	0	0	0	0	0	45	55
2	0	25	10	35	0	0	0	0	0	65	35
2	0	55	20	75	0	0	0	0	0	25	75
2	0	40	5	45	0	0	0	0	0	55	45
2	0	20	0	20	0	0	0	0	0	80	20
2	0	55	0	55	0	0	0	0	0	45	55
2	0	70	5	75	0	0	0	0	0	25	75
2	0	45	0	45	0	0	0	0	0	55	45
0	0	0	0	0	0	0	0	0	0	100	0
2	0	80	0	80	0	0	0	0	0	20	80
2	0	85	5	90	0	0	0	0	0	10	90
2	0	75	5	80	0	0	0	0	0	20	80
2	0	50	10	60	0	0	0	0	0	40	60
2	0	90	5	95	0	0	0	0	0	5	95
2	1	100	0	100	0	0	0	0	0	0	100
2	1	95	0	95	0	0	0	0	0	5	95
2	1	95	0	95	0	0	0	0	0	5	95
2	1	95	0	95	0	0	0	0	0	5	95
1	1	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	80	10	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	85	0	85	0	5	0	0	5	10	90
2	0	75	0	75	0	0	0	0	0	25	75
2	0	75	0	75	0	0	0	0	0	25	75
2	0	65	0	65	0	0	0	0	0	35	65
2	0	75	0	75	0	0	0	0	0	25	75
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	5	0	0	5	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
Average		75.4	1.5	77.0	0.0	0.1	0.0	0.0	0.1	22.9	77.1

Transect E16										Surveyed 16 June 2025	
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total Seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
1	0	85	5	90	0	0	0	0	0	10	90
1	0	90	0	90	0	0	0	0	0	10	90
1	0	85	0	85	0	0	0	0	0	15	85
1	0	85	0	85	0	0	0	0	0	15	85
1	0	70	0	70	0	0	0	0	0	30	70
1	0	75	0	75	0	0	0	0	0	25	75
1	0	90	0	90	0	0	0	0	0	10	90
1	0	50	0	50	0	0	0	0	0	50	50
2	0	80	0	80	0	0	0	0	0	20	80
1	0	100	0	100	0	0	0	0	0	0	100
2	0	50	0	50	0	0	0	0	0	50	50
2	0	30	0	30	0	0	0	0	0	70	30
2	0	60	0	60	0	0	0	0	0	40	60
2	0	75	0	75	0	0	0	0	0	25	75
1	0	100	0	100	0	0	0	0	0	0	100
1	1	70	0	70	0	0	0	0	0	30	70
2	0	70	0	70	0	0	0	0	0	30	70
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	75	0	75	0	0	0	0	0	25	75
2	0	75	0	75	0	0	0	0	0	25	75
2	0	75	0	75	0	0	0	0	0	25	75
2	0	25	0	25	0	0	0	0	0	75	25
2	0	25	0	25	0	0	0	0	0	75	25
2	0	25	0	25	0	0	0	0	0	75	25
2	0	30	0	30	0	0	0	0	0	70	30
2	0	70	0	70	0	0	0	0	0	30	70
2	0	80	0	80	0	0	0	0	0	20	80
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	70	0	70	0	5	0	0	5	25	75
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
1	1	100	0	100	0	0	0	0	0	0	100
1	1	100	0	100	0	0	0	0	0	0	100
1	1	100	0	100	0	0	0	0	0	0	100
1	1	100	0	100	0	0	0	0	0	0	100
2	0	30	0	30	0	0	0	0	0	70	30
2	1	100	0	100	0	0	0	0	0	0	100
2	1	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
1	1	100	0	100	0	0	0	0	0	0	100
2	1	80	0	80	0	0	0	0	0	20	80
2	0	80	0	80	0	0	0	0	0	20	80
2	0	70	0	70	0	0	0	0	0	30	70
1	0	70	0	70	0	0	0	0	0	30	70
1	0	100	0	100	0	0	0	0	0	0	100
1	1	70	0	70	0	5	0	0	5	25	75
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
Average		**83.6**	**0.1**	**83.7**	**0.0**	**0.1**	**0.0**	**0.0**	**0.1**	**16.2**	**83.8**

Transect A1									Surveyed 12 June 2025		
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total Seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
1	0	85	0	85	0	0	0	0	0	15	85
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	70	0	70	0	0	0	0	0	30	70
1	0	50	0	50	0	0	0	0	0	50	50
1	0	25	0	25	0	0	0	0	0	75	25
1	0	10	0	10	0	0	0	0	0	90	10
1	0	80	0	80	0	10	0	0	10	10	90
1	0	100	0	100	0	0	0	0	0	0	100
1	0	90	0	90	0	10	0	0	10	0	100
1	0	95	0	95	0	0	0	0	0	5	95
1	0	90	0	90	0	5	0	0	5	5	95
1	0	90	0	90	0	0	0	0	0	10	90
1	0	100	0	100	0	0	0	0	0	0	100
1	0	85	0	85	0	0	0	0	0	15	85
1	0	90	0	90	0	10	0	0	10	0	100
1	0	50	0	50	0	5	0	0	5	45	55
0	0	0	0	0	0	10	0	0	10	90	10
2	0	30	0	30	0	20	0	0	20	50	50
1	0	60	0	60	0	20	0	0	20	20	80
1	0	80	0	80	0	0	0	0	0	20	80
1	0	100	0	100	0	0	0	0	0	0	100
1	0	90	0	90	0	10	0	0	10	0	100
1	0	85	0	85	0	15	0	0	15	0	100
1	0	45	0	45	0	20	0	0	20	35	65
1	0	85	0	85	0	10	0	0	10	5	95
2	0	25	0	25	0	10	0	0	10	65	35
0	0	0	0	0	0	30	0	0	30	70	30
2	0	25	0	25	0	30	0	0	30	45	55
0	0	0	0	0	0	10	0	30	40	60	40
0	0	0	0	0	0	15	0	0	15	85	15
0	0	0	0	0	0	0	0	15	15	85	15
2	0	50	0	50	0	0	0	5	5	45	55
2	0	75	0	75	0	10	0	0	10	15	85
2	0	75	0	75	0	10	0	0	10	15	85
2	0	75	0	75	0	10	0	0	10	15	85
2	0	65	0	65	0	5	0	0	5	30	70
2	0	70	0	70	0	10	0	0	10	20	80
2	0	75	0	75	0	0	0	0	0	25	75
2	0	85	0	85	0	5	0	0	5	10	90
2	0	75	0	75	0	0	0	0	0	25	75
2	0	90	0	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	95	0	95	0	0	0	0	0	5	95
2	0	45	0	45	0	0	0	15	15	40	60
2	0	75	0	75	0	10	0	5	15	10	90
2	0	85	0	85	0	5	0	5	10	5	95
2	0	75	0	75	0	0	0	10	10	15	85
2	0	65	0	65	0	10	0	0	10	25	75
2	0	90	0	90	0	5	0	5	10	0	100
2	0	55	0	55	0	10	0	0	10	35	65
2	0	75	0	75	0	0	0	0	0	25	75
2	0	65	0	65	0	5	0	0	5	30	70
2	0	65	0	65	0	0	0	10	10	25	75
2	0	55	10	65	0	0	0	0	0	35	65
2	0	45	0	45	0	0	0	15	15	40	60
2	0	60	0	60	0	0	0	0	0	40	60
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	10	10	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	10	0	0	10	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	75	0	75	0	0	0	0	0	25	75
2	0	100	0	100	0	0	0	0	0	0	100
2	0	85	0	85	0	10	0	0	10	5	95
2	0	95	0	95	0	0	0	0	0	5	95
Average		**69.2**	**0.1**	**69.3**	**0.0**	**5.2**	**0.0**	**1.8**	**7.1**	**23.6**	**76.4**

Transect A2										Surveyed 12 June 2025	
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total Seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
1	0	85	0	85	0	0	0	0	0	15	85
1	0	85	0	85	0	0	0	0	0	15	85
1	0	90	0	90	0	0	0	0	0	10	90
1	0	90	0	90	0	0	0	0	0	10	90
1	0	85	0	85	0	0	0	0	0	15	85
1	0	100	0	100	0	0	0	0	0	0	100
1	0	85	0	85	0	0	0	0	0	15	85
1	0	85	0	85	0	0	0	0	0	15	85
1	0	100	0	100	0	0	0	0	0	0	100
1	0	90	0	90	0	0	0	10	10	0	100
1	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	65	0	65	0	0	0	15	15	20	80
2	0	60	0	60	0	0	0	10	10	30	70
2	0	60	0	60	0	0	0	35	35	5	95
2	0	65	0	65	0	0	0	15	15	20	80
2	0	100	0	100	0	0	0	0	0	0	100
2	0	85	0	85	0	0	0	0	0	15	85
2	0	65	0	65	0	0	0	35	35	0	100
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	75	0	75	0	0	0	0	0	25	75
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	85	0	85	0	5	0	0	5	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	100	0	100	0	0	0	0	0	0	100
2	0	75	0	75	0	0	0	0	0	25	75
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	0	85	0	5	0	0	5	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	5	0	0	5	0	100
2	0	85	0	85	0	0	0	0	0	15	85
2	0	65	0	65	0	0	0	0	0	35	65
2	0	45	0	45	0	0	0	0	0	55	45
2	0	35	0	35	0	10	0	0	10	55	45
2	0	45	0	45	0	15	0	0	15	40	60
2	0	75	0	75	0	0	0	0	0	25	75
0	0	0	0	0	0	15	0	0	15	85	15
2	0	40	0	40	0	5	0	0	5	55	45
2	0	80	0	80	0	0	0	0	0	20	80
2	0	65	0	65	0	0	0	0	0	35	65
2	0	90	0	90	0	0	0	10	10	0	100
2	0	75	0	75	0	0	0	15	15	10	90
2	0	80	0	80	0	5	0	0	5	15	85
2	0	90	0	90	0	5	0	0	5	5	95
Average		83.3	0.0	83.3	0.0	1.0	0.0	2.1	3.2	13.5	86.5

Transect A3										Surveyed 12 June 2025	
		Seagrasses			Algae						
Long=1	Fouling	*Zostera*	*Halophila*	Total	*Codium*	*Cystoseira*	*Caulerpa*	% algae	Total	% Bare	Total
Short=2	0,1,2	% cover	% cover	seagrasses	% cover	% cover	% cover	Other	Algae	Ground	Cover
1	0	95	0	95	0	0	0	0	0	5	95
1	0	95	0	95	0	0	0	0	0	5	95
1	0	85	0	85	0	0	0	0	0	15	85
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	35	0	35	0	0	0	0	0	65	35
1	0	30	0	30	0	0	0	0	0	70	30
1	0	85	0	85	0	0	0	0	0	15	85
1	0	90	0	90	0	5	0	0	5	5	95
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	80	0	80	0	0	0	10	10	10	90
1	0	100	0	100	0	0	0	0	0	0	100
1	0	95	0	95	0	0	0	0	0	5	95
1	0	100	0	100	0	0	0	0	0	0	100
1	0	95	0	95	0	0	0	0	0	5	95
1	0	90	0	90	0	0	0	0	0	10	90
1	0	95	0	95	0	0	0	0	0	5	95
1	0	95	0	95	0	0	0	0	0	5	95
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	95	0	95	0	0	0	0	0	5	95
1	0	95	0	95	0	0	0	0	0	5	95
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	90	0	90	0	10	0	0	10	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	95	0	95	0	0	0	5	5	0	100
1	0	90	0	90	0	0	0	0	0	10	90
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	95	0	95	0	0	0	0	0	5	95
1	0	100	0	100	0	0	0	0	0	0	100
1	0	85	0	85	0	0	0	0	0	15	85
1	0	95	0	95	0	0	0	0	0	5	95
1	0	90	0	90	0	0	0	0	0	10	90
1	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
1	0	70	0	70	0	0	0	0	0	30	70
1	0	85	0	85	0	0	0	0	0	15	85
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	95	0	95	0	0	0	0	0	5	95
1	0	90	0	90	0	0	0	0	0	10	90
1	0	95	0	95	0	0	0	0	0	5	95
2	0	80	0	80	0	0	0	0	0	20	80
2	0	85	0	85	0	0	0	0	0	15	85
2	0	65	0	65	0	10	0	0	10	25	75
1	0	80	0	80	0	0	0	0	0	20	80
1	0	100	0	100	0	0	0	0	0	0	100
Average		**91.5**	**0.0**	**91.5**	**0.0**	**0.4**	**0.0**	**0.3**	**0.7**	**7.8**	**92.2**

Transect A4											Surveyed 12 June 2025
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total Seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
1	0	70	0	70	0	0	0	0	0	30	70
1	0	50	0	50	0	0	0	0	0	50	50
1	0	80	0	80	0	0	0	0	0	20	80
1	0	100	0	100	0	0	0	0	0	0	100
1	0	85	0	85	0	0	0	0	0	15	85
1	0	100	0	100	0	0	0	0	0	0	100
1	0	90	0	90	0	0	0	0	0	10	90
1	0	75	0	75	0	0	0	0	0	25	75
1	0	95	0	95	0	0	0	0	0	5	95
1	0	55	0	55	0	0	0	0	0	45	55
1	0	85	0	85	0	0	0	0	0	15	85
1	0	75	0	75	0	0	0	0	0	25	75
2	0	75	0	75	0	0	0	0	0	25	75
2	0	95	0	95	0	0	0	0	0	5	95
1	0	90	0	90	0	0	0	0	0	10	90
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	65	0	65	0	0	0	0	0	35	65
2	0	50	0	50	0	0	0	0	0	50	50
1	0	100	0	100	0	0	0	0	0	0	100
1	0	75	0	75	0	0	0	0	0	25	75
1	0	85	0	85	0	0	0	0	0	15	85
1	0	55	0	55	0	0	0	0	0	45	55
2	0	50	0	50	0	0	0	0	0	50	50
2	0	100	0	100	0	0	0	0	0	0	100
1	0	95	0	95	0	0	0	0	0	5	95
1	0	90	0	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
2	0	75	5	80	0	0	0	0	0	20	80
2	0	100	0	100	0	0	0	0	0	0	100
2	0	80	2	82	0	0	0	0	0	18	82
2	0	60	0	60	0	0	0	0	0	40	60
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	75	0	75	0	0	0	0	0	25	75
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	75	0	75	0	0	0	0	0	25	75
2	0	85	5	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	50	0	50	0	0	0	0	0	50	50
2	0	60	15	75	0	0	0	0	0	25	75
2	0	50	30	80	0	0	0	0	0	20	80
2	0	95	5	100	0	0	0	0	0	0	100
2	0	95	5	100	0	0	0	0	0	0	100
2	0	85	15	100	0	0	0	0	0	0	100
2	0	70	25	95	0	0	0	0	0	5	95
2	0	70	25	95	0	0	0	0	0	5	95
2	0	80	15	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
Average		86.2	2.2	88.3	0.0	0.0	0.0	0.0	0.0	11.7	88.3

Transect A5										Surveyed 12 June 2025	
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total Seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	10	0	10	20	80	20
2	0	75	10	85	0	0	0	0	0	15	85
2	0	65	10	75	0	0	0	0	0	25	75
2	0	85	5	90	0	0	0	0	0	10	90
2	0	55	5	60	0	0	0	0	0	40	60
2	0	85	5	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	25	5	30	0	0	0	0	0	70	30
2	0	80	10	90	0	10	0	0	10	0	100
2	0	90	10	100	0	0	0	0	0	0	100
2	0	30	40	70	0	15	0	0	15	15	85
2	0	40	55	95	0	0	0	0	0	5	95
2	0	35	55	90	0	0	0	0	0	10	90
2	0	90	10	100	0	0	0	0	0	0	100
2	0	85	15	100	0	0	0	0	0	0	100
2	0	90	10	100	0	0	0	0	0	0	100
2	0	95	5	100	0	0	0	0	0	0	100
2	0	90	10	100	0	0	0	0	0	0	100
2	0	85	15	100	0	0	0	0	0	0	100
2	0	95	5	100	0	0	0	0	0	0	100
2	0	95	5	100	0	0	0	0	0	0	100
2	0	95	5	100	0	0	0	0	0	0	100
2	0	95	5	100	0	0	0	0	0	0	100
2	0	90	10	100	0	0	0	0	0	0	100
2	0	85	15	100	0	0	0	0	0	0	100
2	0	95	5	100	0	0	0	0	0	0	100
2	0	95	5	100	0	0	0	0	0	0	100
2	0	55	45	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	10	100	0	0	0	0	0	0	100
2	0	60	25	85	0	0	0	0	0	15	85
2	0	75	25	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	100	0
2	0	10	5	15	0	0	0	0	0	85	15
Average		**73.8**	**6.8**	**80.6**	**0.0**	**0.5**	**0.0**	**0.2**	**0.7**	**18.7**	**81.3**

Transect A6										Surveyed 12 June 2025	
		Seagrasses			Algae						
Long=1	Fouling	*Zostera*	*Halophila*	Total	*Codium*	*Cystoseira*	*Caulerpa*	% algae	Total	% Bare	Total
Short=2	0,1,2	% cover	% cover	Seagrasses	% cover	% cover	% cover	Other	Algae	Ground	Cover
2	0	75	0	75	0	0	0	0	0	25	75
2	0	65	0	65	0	0	0	0	0	35	65
2	0	50	0	50	0	0	0	5	5	45	55
2	0	60	0	60	0	0	0	0	0	40	60
2	0	80	0	80	0	0	0	0	0	20	80
2	0	85	0	85	0	0	0	0	0	15	85
2	0	80	0	80	0	0	0	0	0	20	80
2	0	80	0	80	0	0	0	0	0	20	80
2	0	75	0	75	0	0	0	0	0	25	75
0	0	0	0	0	0	0	0	0	0	100	0
2	0	10	5	15	0	0	0	0	0	85	15
2	0	45	30	75	0	0	0	0	0	25	75
2	0	0	50	50	0	0	0	0	0	50	50
0	0	0	50	50	0	10	0	0	10	40	60
2	0	45	15	60	0	0	0	0	0	40	60
2	0	15	80	95	0	0	0	0	0	5	95
2	0	10	45	55	0	0	0	0	0	45	55
2	0	55	5	60	0	10	0	0	10	30	70
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	65	0	65	0	0	0	0	0	35	65
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	65	15	80	0	0	0	0	0	20	80
2	0	30	25	55	0	0	0	0	0	45	55
2	0	65	15	80	0	0	0	0	0	20	80
2	0	80	15	95	0	0	0	0	0	5	95
2	0	80	2	82	0	0	0	0	0	18	82
2	0	85	2	87	0	0	0	0	0	13	87
2	0	100	0	100	0	0	0	0	0	0	100
2	0	50	5	55	0	0	0	0	0	45	55
2	0	92	3	95	0	0	0	0	0	5	95
2	0	80	15	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	85	0	85	0	5	0	0	5	10	90
2	0	85	0	85	0	5	0	0	5	10	90
2	0	85	5	90	0	0	0	0	0	10	90
2	0	45	25	70	0	0	0	0	0	30	70
2	0	85	5	90	0	0	0	0	0	10	90
2	0	75	10	85	0	0	0	0	0	15	85
2	0	65	20	85	0	0	0	0	0	15	85
2	0	95	0	95	0	0	0	0	0	5	95
2	0	50	15	65	0	0	0	0	0	35	65
2	0	50	5	55	0	0	0	0	0	45	55
2	0	70	10	80	0	0	0	0	0	20	80
2	0	80	0	80	0	0	0	0	0	20	80
2	0	95	0	95	0	0	0	0	0	5	95
2	0	75	5	80	0	5	0	0	5	15	85
0	0	0	0	0	0	45	0	0	45	55	45
2	0	15	45	60	0	0	0	0	0	40	60
2	0	35	25	60	0	15	0	0	15	25	75
2	0	30	15	45	0	0	0	0	0	55	45
2	0	70	0	70	0	0	0	0	0	30	70
2	0	90	0	90	0	0	0	0	0	10	90
2	0	75	0	75	0	5	0	0	5	20	80
2	0	85	0	85	0	0	0	0	0	15	85
Average		**67.1**	**8.8**	**75.8**	**0.0**	**1.6**	**0.0**	**0.1**	**1.6**	**22.5**	**77.5**

Transect S1											Surveyed 12 June 2025
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
1	0	100	0	100	0	0	0	0	0	0	100

Transect S2										Surveyed 12 June 2025	
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
1	0	50	0	50	0	0	0	0	0	50	50
1	0	100	0	100	0	0	0	0	0	0	100
1	0	80	0	80	0	0	0	0	0	20	80
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	95	0	95	0	0	0	0	0	5	95
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
Average		**89.0**	**5.4**	**94.4**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**5.6**	**94.4**

Transect S3											Surveyed 12 June 2025
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	95	0	95	0	0	0	0	0	5	95
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	95	0	95	0	0	0	0	0	5	95
1	0	100	0	100	0	0	0	0	0	0	100
1	0	95	0	95	0	0	0	0	0	5	95
1	0	100	0	100	0	0	0	0	0	0	100
1	0	98	0	98	0	0	0	0	0	2	98
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	90	0	90	0	0	0	0	0	10	90
1	0	95	0	95	0	0	0	0	0	5	95
1	0	95	0	95	0	0	0	0	0	5	95
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	95	0	95	0	0	0	0	0	5	95
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	75	5	80	0	0	0	0	0	20	80
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	95	0	95	0	0	0	0	0	5	95
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	40	0	40	0	0	0	0	0	60	40
0	0	0	0	0	0	0	0	0	0	100	0
2	0	65	5	70	0	0	0	0	0	30	70
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	85	0	85	0	0	0	0	0	15	85
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	40	5	45	0	0	0	0	0	55	45
1	0	100	0	100	0	0	0	0	0	0	100
Average		95.0	0.2	95.2	0.0	0.0	0.0	0.0	0.0	4.8	95.2

Transect S4											Surveyed 12 June 2025
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	75	0	75	0	0	0	0	0	25	75
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	100	0	100	0	0	0	0	0	0	100
2	0	70	0	70	0	0	0	0	0	30	70
2	0	85	0	85	0	0	0	0	0	15	85
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	5	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	55	0	55	0	0	0	0	0	45	55
2	0	45	5	50	0	0	0	0	0	50	50
2	0	95	0	95	0	0	0	0	0	5	95
2	0	80	0	80	0	0	0	0	0	20	80
2	0	60	0	60	0	0	0	0	0	40	60
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	80	0	80	0	0	0	0	0	20	80
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	85	0	85	0	0	0	0	0	15	85
2	0	75	0	75	0	0	0	0	0	25	75
2	0	10	0	10	0	0	0	0	0	90	10
2	0	55	5	60	0	0	0	0	0	40	60
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	2	97	0	0	0	0	0	3	97
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	85	0	85	0	0	0	0	0	15	85
Average		**90.8**	**0.3**	**91.1**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**8.9**	**91.1**

Transect S5										Surveyed 12 June 2025	
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
2	0	65	0	65	0	10	0	0	10	25	75
2	0	90	0	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	80	0	80	0	0	0	0	0	20	80
2	0	85	0	85	0	0	0	0	0	15	85
0	0	75	0	75	0	0	0	0	0	25	75
0	0	85	10	95	0	0	0	0	0	5	95
0	0	70	0	70	0	0	0	0	0	30	70
2	0	70	0	70	0	0	0	0	0	30	70
2	0	70	2	72	0	0	0	0	0	28	72
2	0	70	0	70	0	0	0	0	0	30	70
2	0	70	0	70	0	0	0	0	0	30	70
2	0	80	0	80	0	0	0	0	0	20	80
0	0	85	0	85	0	0	0	0	0	15	85
0	0	75	0	75	0	0	0	0	0	25	75
2	0	75	0	75	0	0	0	0	0	25	75
2	0	70	0	70	0	0	0	0	0	30	70
2	0	75	0	75	0	0	0	0	0	25	75
2	0	0	0	0	0	0	0	0	0	100	0
2	0	0	0	0	0	0	0	0	0	100	0
2	0	0	0	0	0	0	0	0	0	100	0
2	0	0	0	0	0	0	0	0	0	100	0
2	0	0	0	0	0	0	0	0	0	100	0
2	0	50	10	60	0	0	0	0	0	40	60
2	0	75	0	75	0	0	0	0	0	25	75
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	60	10	70	0	0	0	0	0	30	70
2	0	60	15	75	0	0	0	0	0	25	75
2	0	45	10	55	0	0	0	0	0	45	55
2	0	60	10	70	0	0	0	0	0	30	70
2	0	85	5	90	0	0	0	0	0	10	90
2	0	85	5	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	2	97	0	0	0	0	0	3	97
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	5	90	0	0	0	0	0	10	90
2	0	85	5	90	0	0	0	0	0	10	90
2	0	85	5	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	20	35	55	0	0	0	0	0	45	55
2	0	95	0	95	0	0	0	0	0	5	95
Average		77.7	1.9	79.6	0.0	0.1	0.0	0.0	0.1	20.2	79.8

Transect S6										Surveyed 17 June 2025	
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
2	0	50	0	50	0	0	0	0	0	50	50
2	0	50	0	50	0	0	0	0	0	50	50
2	0	70	0	70	0	0	0	0	0	30	70
2	0	75	0	75	0	0	0	0	0	25	75
2	0	50	0	50	0	0	0	0	0	50	50
2	0	45	0	45	0	0	0	0	0	55	45
2	0	85	0	85	0	0	0	0	0	15	85
2	0	55	0	55	0	0	0	0	0	45	55
2	0	60	0	60	0	0	0	0	0	40	60
2	0	60	0	60	0	0	0	0	0	40	60
2	0	70	0	70	0	0	0	10	10	20	80
2	0	55	0	55	0	0	0	0	0	45	55
2	0	60	0	60	0	0	0	0	0	40	60
2	0	70	0	70	0	0	0	0	0	30	70
2	0	60	0	60	0	0	0	0	0	40	60
2	0	80	0	80	0	0	0	0	0	20	80
2	0	70	0	70	0	0	0	0	0	30	70
2	0	60	0	60	0	0	0	0	0	40	60
2	0	75	10	85	0	0	0	0	0	15	85
2	0	85	5	90	0	0	0	0	0	10	90
2	0	45	10	55	0	10	0	0	10	35	65
2	0	65	10	75	0	0	0	0	0	25	75
2	0	40	15	55	0	0	0	0	0	45	55
2	0	35	0	35	0	0	0	0	0	65	35
2	0	15	0	15	0	0	0	0	0	85	15
2	0	40	0	40	0	5	0	0	5	55	45
2	0	10	0	10	0	0	0	0	0	90	10
2	0	20	0	20	0	0	0	0	0	80	20
2	0	10	0	10	0	0	0	0	0	90	10
2	0	50	0	35	0	0	0	0	0	65	35
2	0	65	0	65	0	0	0	0	0	35	65
2	0	90	0	90	0	0	0	0	0	10	90
2	0	75	0	75	0	0	0	0	0	25	75
2	0	15	0	15	0	0	0	0	0	85	15
2	0	15	0	15	0	5	0	0	5	80	20
2	0	30	0	30	0	0	0	10	10	60	40
2	0	60	5	65	0	0	0	0	0	35	65
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	80	0	80	0	0	0	0	0	20	80
2	0	85	0	85	0	5	0	0	5	10	90
2	0	55	0	55	0	10	0	0	10	35	65
2	0	90	0	90	0	5	0	0	5	5	95
2	0	80	0	80	0	0	0	0	0	20	80
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	80	10	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	5	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	80	10	90	0	0	0	0	0	10	90
2	0	60	15	75	0	0	0	0	0	25	75
2	0	85	5	90	0	5	0	0	5	5	95
2	0	95	5	100	0	0	0	0	0	0	100
2	0	95	5	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	35	60	95	0	0	0	0	0	5	95
2	0	85	15	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
Average		68.9	2.7	71.4	0.0	0.7	0.0	0.3	1.0	27.6	72.4

Transect S7										Surveyed 12 June 2025	
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
1	0	80	0	80	0	0	0	0	0	20	80
1	0	80	0	80	0	0	0	0	0	20	80
1	0	100	0	100	0	0	0	0	0	0	100
1	0	90	0	90	0	0	0	0	0	10	90
1	0	80	0	80	0	0	0	0	0	20	80
0	0	0	0	0	0	0	0	0	0	100	0
1	0	20	0	20	0	0	0	0	0	80	20
1	0	50	0	50	0	0	0	0	0	50	50
1	0	60	0	60	0	0	0	0	0	40	60
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	85	0	85	0	0	0	0	0	15	85
1	0	85	0	85	0	0	0	0	0	15	85
1	0	100	0	100	0	0	0	0	0	0	100
1	0	65	0	65	0	0	0	0	0	35	65
1	0	100	0	100	0	0	0	0	0	0	100
2	0	30	0	30	0	0	0	0	0	70	30
2	0	65	0	65	0	0	0	0	0	35	65
2	0	65	10	75	0	0	0	0	0	25	75
2	0	30	20	50	0	0	0	0	0	50	50
2	0	55	15	70	0	0	0	0	0	30	70
2	0	60	10	70	0	0	0	0	0	30	70
2	0	45	10	55	0	0	0	0	0	45	55
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	50	0	50	0	0	0	0	0	50	50
2	0	45	0	45	0	0	0	0	0	55	45
1	0	85	0	85	0	0	0	0	0	15	85
1	0	70	0	70	0	0	0	0	0	30	70
1	0	50	0	50	0	0	0	0	0	50	50
1	0	80	0	80	0	0	0	0	0	20	80
1	0	20	0	20	0	0	0	0	0	80	20
1	0	45	0	45	0	0	0	0	0	55	45
1	0	50	0	50	0	0	0	0	0	50	50
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	85	0	85	0	0	0	0	0	15	85
1	0	75	0	75	0	0	0	0	0	25	75
1	0	75	0	75	0	0	0	0	0	25	75
1	0	75	0	75	0	0	0	0	0	25	75
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	60	10	70	0	0	0	0	0	30	70
2	0	65	20	85	0	0	0	0	0	15	85
2	0	60	20	80	0	0	0	0	0	20	80
2	0	60	20	80	0	0	0	0	0	20	80
2	0	60	5	65	0	0	0	0	0	35	65
2	0	95	0	95	0	0	0	0	0	5	95
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	100	0	100	0	0	0	0	0	0	100
1	0	85	5	90	0	0	0	0	0	10	90
Average		77.7	2.1	79.9	0.0	0.0	0.0	0.0	0.0	20.1	79.9

Transect S8										Surveyed 17 June 2025	
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
2	0	80	10	90	0	0	0	0	0	10	90
2	0	45	15	60	0	0	0	0	0	40	60
2	0	80	0	80	0	0	0	0	0	20	80
2	0	80	0	80	0	0	0	0	0	20	80
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	75	20	95	0	0	0	0	0	5	95
2	0	70	20	90	0	0	0	0	0	10	90
2	0	85	10	95	0	0	0	0	0	5	95
2	0	90	10	100	0	0	0	0	0	0	100
2	0	80	15	95	0	0	0	0	0	5	95
2	0	85	10	95	0	0	0	0	0	5	95
2	0	90	10	100	0	0	0	0	0	0	100
2	0	85	10	95	0	0	0	0	0	5	95
2	0	80	10	90	0	0	0	0	0	10	90
2	0	90	5	95	0	0	0	0	0	5	95
2	0	90	5	95	0	0	0	0	0	5	95
2	0	90	5	95	0	0	0	0	0	5	95
2	0	95	5	100	0	0	0	0	0	0	100
2	0	90	5	95	0	0	0	0	0	5	95
2	0	90	5	95	0	0	0	0	0	5	95
2	0	95	5	100	0	0	0	0	0	0	100
2	0	95	5	100	0	0	0	0	0	0	100
2	0	85	10	95	0	0	0	0	0	5	95
2	0	90	10	100	0	0	0	0	0	0	100
2	0	95	5	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	5	100	0	0	0	0	0	0	100
2	0	95	5	100	0	0	0	0	0	0	100
2	0	98	2	100	0	0	0	0	0	0	100
2	0	98	2	100	0	0	0	0	0	0	100
2	0	95	5	100	0	0	0	0	0	0	100
2	0	90	5	95	0	0	0	0	0	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	2	87	0	0	0	0	0	13	87
2	0	100	0	100	0	0	0	0	0	0	100
2	0	50	0	50	0	0	0	0	0	50	50
2	0	80	0	80	0	0	0	0	0	20	80
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	5	0	0	5	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
Average		91.9	3.4	95.3	0.0	0.1	0.0	0.0	0.1	4.6	95.4

Transect S9										Surveyed 17 June 2025	
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
2	0	40	10	50	0	0	0	0	0	50	50
2	0	45	10	55	0	0	0	0	0	45	55
2	0	55	10	65	0	0	0	0	0	35	65
2	0	55	10	65	0	0	0	0	0	35	65
2	0	65	5	70	0	0	0	0	0	30	70
2	0	75	10	85	0	0	0	0	0	15	85
2	0	80	10	90	0	0	0	0	0	10	90
2	0	75	0	75	0	0	0	0	0	25	75
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	10	95	0	0	0	0	0	5	95
2	0	85	10	95	0	0	0	0	0	5	95
2	0	85	10	95	0	0	0	0	0	5	95
2	0	80	10	90	0	0	0	0	0	10	90
2	0	80	15	95	0	0	0	0	0	5	95
2	0	70	20	90	0	0	0	0	0	10	90
2	0	65	20	85	0	0	0	0	0	15	85
2	0	85	10	95	0	0	0	0	0	5	95
2	0	80	10	90	0	0	0	0	0	10	90
2	0	75	10	85	0	0	0	0	0	15	85
2	0	80	5	85	0	0	0	0	0	15	85
2	0	70	15	85	0	0	0	0	0	15	85
2	0	75	15	90	0	0	0	0	0	10	90
2	0	85	5	90	0	0	0	0	0	10	90
2	0	75	10	85	0	0	0	0	0	15	85
2	0	65	5	70	0	0	0	0	0	30	70
2	0	85	5	90	0	0	0	0	0	10	90
2	0	80	5	85	0	0	0	0	0	15	85
2	0	75	0	75	0	0	0	0	0	25	75
2	0	65	5	35	0	0	0	0	0	65	35
2	0	80	5	85	0	0	0	0	0	15	85
2	0	70	5	75	0	0	0	0	0	25	75
2	0	70	5	75	0	0	0	0	0	25	75
2	0	80	5	85	0	0	0	0	0	15	85
2	0	65	5	70	0	0	0	0	0	30	70
2	0	55	5	60	0	0	0	0	0	40	60
2	0	50	5	55	0	0	0	0	0	45	55
2	0	30	15	45	0	0	0	0	0	55	45
2	0	20	20	40	0	0	0	0	0	60	40
2	0	50	20	70	0	0	0	0	0	30	70
2	0	25	35	60	0	0	0	0	0	40	60
2	0	20	20	40	0	0	0	0	0	60	40
2	0	60	15	75	0	0	0	0	0	25	75
2	0	60	15	75	0	0	0	0	0	25	75
2	0	60	10	70	0	0	0	0	0	30	70
2	0	20	15	35	0	0	0	0	0	65	35
2	0	30	15	45	0	0	0	0	0	55	45
2	0	20	25	45	0	0	0	0	0	55	45
2	0	45	15	60	0	0	0	0	0	40	60
2	0	75	0	75	0	0	0	0	0	25	75
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	1	100	0	100	0	0	0	0	0	0	100
2	1	100	0	100	0	0	0	0	0	0	100
2	1	100	0	100	0	0	0	0	0	0	100
2	1	100	0	100	0	0	0	0	0	0	100
2	1	100	0	100	0	0	0	0	0	0	100
Average		73.3	7.6	80.4	0.0	0.0	0.0	0.0	0.0	19.6	80.4

Transect C1											Surveyed 12th June 2025
		Seagrasses			Algae						
Long=1	Fouling	*Zostera*	*Halophila*	Total	*Codium*	*Cystoseira*	*Caulerpa*	% algae	Total	% Bare	Total
Short=2	0,1,2	% cover	% cover	Seagrasses	% cover	% cover	% cover	Other	Algae	Ground	Cover
2	0	50	0	50	0	0	0	0	0	50	50
2	0	50	0	50	0	0	0	5	5	45	55
2	1	20	0	20	0	0	0	10	10	70	30
0	0	0	0	0	0	10	0	0	10	90	10
2	0	10	0	10	0	0	0	0	0	90	10
0	0	0	0	0	0	90	0	0	90	10	90
0	0	0	0	0	0	80	0	0	80	20	80
0	0	0	0	0	0	80	0	0	80	20	80
0	0	0	0	0	0	95	0	0	95	5	95
0	0	0	0	0	0	55	0	0	55	45	55
0	0	0	0	0	0	30	0	0	30	70	30
2	0	0	20	20	0	10	0	0	10	70	30
2	0	55	35	90	0	0	0	0	0	10	90
2	0	80	15	95	0	0	0	0	0	5	95
2	0	60	30	90	0	0	0	0	0	10	90
2	0	25	30	55	0	0	0	0	0	45	55
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	5	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	5	100	0	0	0	0	0	0	100
2	0	90	5	95	0	0	0	0	0	5	95
2	0	85	5	90	0	0	0	0	0	10	90
2	0	85	5	90	0	0	0	0	0	10	90
2	0	80	10	90	0	0	0	0	0	10	90
2	0	50	20	70	0	0	0	0	0	30	70
2	0	80	15	95	0	0	0	0	0	5	95
2	0	45	25	70	0	20	0	0	20	10	90
2	0	10	25	35	0	50	0	0	50	15	85
2	0	65	25	90	0	0	0	0	0	10	90
2	0	15	25	40	0	15	0	0	15	45	55
2	0	75	15	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	95	0	95	0	0	0	0	0	5	95
2	0	75	15	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	55	0	55	0	45	0	0	45	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	80	15	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
Average		72.1	5.1	77.2	0.0	8.5	0.0	0.2	8.8	14.0	86.0

Transect C2											Surveyed 12th June 2025
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total Seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
2	0	55	0	55	0	0	0	0	0	45	55
2	0	35	0	35	0	0	0	0	0	65	35
2	0	45	0	45	0	0	0	0	0	55	45
2	0	45	10	55	0	0	0	0	0	45	55
2	0	60	10	70	0	0	0	0	0	30	70
2	0	70	5	75	0	0	0	0	0	25	75
2	0	20	5	25	0	0	0	0	0	75	25
2	0	80	5	85	0	0	0	0	0	15	85
2	0	50	0	50	0	0	0	0	0	50	50
2	0	75	5	80	0	0	0	0	0	20	80
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	80	0	80	0	0	0	0	0	20	80
2	0	80	0	80	0	0	0	0	0	20	80
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	5	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	75	5	80	0	0	0	0	0	20	80
2	0	100	0	100	0	0	0	0	0	0	100

Transect C3											Surveyed 12th June 2025
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total Seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
2	0	35	0	35	0	0	0	0	0	65	35
2	0	70	15	85	0	0	0	0	0	15	85
2	0	80	10	90	0	0	0	0	0	10	90
2	0	70	5	75	0	0	0	0	0	25	75
2	0	80	0	80	0	0	0	0	0	20	80
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	5	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	85	0	85	0	0	0	0	0	15	85
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	15	25	40	0	0	0	0	0	60	40
2	0	75	10	85	0	0	0	0	0	15	85
2	0	75	5	80	0	5	0	0	5	15	85
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	70	0	70	0	0	0	0	0	30	70
2	0	50	0	50	0	0	0	0	0	50	50
2	0	45	5	50	0	0	0	0	0	50	50
2	0	50	0	50	0	0	0	0	0	50	50
2	0	25	0	25	0	0	0	0	0	75	25
Average		**88.5**	**1.4**	**89.9**	**0.0**	**0.1**	**0.0**	**0.0**	**0.1**	**10.0**	**90.0**

Transect C4											Surveyed 12th June 2025
		Seagrasses			Algae						
Long=1 Short=2	Fouling 0,1,2	*Zostera* % cover	*Halophila* % cover	Total Seagrasses	*Codium* % cover	*Cystoseira* % cover	*Caulerpa* % cover	% algae Other	Total Algae	% Bare Ground	Total Cover
2	0	70	0	70	0	0	0	0	0	30	70
2	0	80	0	80	0	0	0	0	0	20	80
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	5	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	80	0	80	0	0	0	0	0	20	80
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	5	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	90	5	95	0	0	0	0	0	5	95
2	0	90	0	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	65	0	65	0	0	0	0	0	35	65
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	90	5	95	0	0	0	0	0	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	80	5	85	0	0	0	0	0	15	85
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	80	10	90	0	0	0	0	0	10	90
2	0	85	5	90	0	0	0	0	0	10	90
2	0	90	5	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
2	0	100	0	100	0	0	0	0	0	0	100
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	50	15	65	0	0	0	0	0	35	65
2	0	50	5	55	0	0	0	0	0	45	55
2	0	65	0	65	0	0	0	0	0	35	65
2	0	75	0	75	0	5	0	0	5	20	80
2	0	75	5	80	0	0	0	0	0	20	80
2	0	75	10	85	0	0	0	0	0	15	85
2	0	75	10	85	0	0	0	0	0	15	85
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	0	85	0	10	0	0	10	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	5	90	0	0	0	0	0	10	90
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	98	0	98	0	10	0	0	10	-8	108
2	0	95	0	95	0	10	0	0	10	-5	105
2	0	95	0	95	0	0	0	0	0	5	95
2	0	75	0	75	0	0	0	0	0	25	75
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	95	0	95	0	0	0	0	0	5	95
2	0	85	0	85	0	0	0	0	0	15	85
2	0	85	0	85	0	0	0	0	0	15	85
2	0	90	0	90	0	0	0	0	0	10	90
2	0	95	0	95	0	0	0	0	0	5	95
2	0	100	0	100	0	0	0	0	0	0	100
Average		**88.2**	**1.4**	**89.6**	**0.0**	**0.5**	**0.0**	**0.0**	**0.5**	**9.9**	**90.1**

Table C.2 Changes in percentage cover of seagrasses – June 2025

Changes in percentage cover of the substratum by seagrasses off the northern shore of Summerland Point and Frying Pan Bay (2018-2025)

Transect C5	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	100.0	100.0	99.71	99.71	99.71	93.12	96.6	91.71
% bare ground	0.00	0.00	0.29	0.00	0.29	3.47	2.9	8.3
Transect C6	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	99.56	97.76	95.88	98.60	98.09	95.13	94.3	78.8
% bare ground	0.44	2.24	4.11	1.25	1.91	4.13	5.5	19.0
Transect F1	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	97.81	100.0	99.34	99.41	99.19	95.65	90.4	91.6
% bare ground	2.19	0.00	0.66	0.59	0.81	3.71	6.2	8.3
Transect F2	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	99.63	94.93	98.82	96.03	90.29	50.23	79.77	78.4
% bare ground	0.37	5.07	1.18	2.13	9.71	21.38	18.4	19.5
Transect F3	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	99.93	87.82	97.06	97.65	97.53	86.47	93.6	93.4
% bare ground	0.07	12.18	2.94	2.35	2.47	11.66	6.4	5.9
Transect F4	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	98.16	48.90	96.40	97.94	96.40	96.84	91.5	80.7
% bare ground	1.84	51.1	3.60	2.06	3.60	2.79	8.5	19.3
Transect F5	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	99.04	80.80	90.96	96.40	90.66	85.68	90.1	71.9
% bare ground	0.96	19.2	9.04	3.53	9.34	10.54	9.9	28.1
Transect F6	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	100.0	81.99	96.25	95.96	96.10	85.96	92.8	87.5
% bare ground	10.00	18.01	3.75	3.97	3.90	12.57	7.2	12.5
Transect F7	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	98.24	97.65	87.57	95.22	86.62	79.41	89.0	79.3
% bare ground	1.76	2.35	12.43	4.78	13.38	20.29	11.0	20.7

Changes in percentage cover of the substratum by seagrasses off the western shore of Summerland Point (2008-2025)

Transect E7	**2008**	**2010**	**2011**	**2012**	**2013**	**2015**	**2016**	**2017**	**2018**	**2019**
% seagrass	97.93	51.40	45.47	68.31	43.38	92.65	100.0	98.16	98.16	97.65
% bare ground	2.07	48.60	54.53	31.69	56.62	7.35	0.00	1.84	1.84	2.35
Transect T1	**2008**	**2010**	**2011**	**2012**	**2013**	**2015**	**2016**	**2017**	**2018**	**2019**
% seagrass	88.94	41.90	32.60	77.91	94.41	94.65	97.35	99.47	85.29	59.92
% bare ground	11.06	58.10	67.40	22.09	5.59	5.35	2.65	0.53	14.71	40.08
Transect T2	**2008**	**2010**	**2011**	**2012**	**2013**	**2015**	**2016**	**2017**	**2018**	**2019**
% seagrass	77.91	70.29	7.95	75.74	60.83	74.41	90.59	93.31	90.00	76.87

% bare ground	22.09	29.71	92.05	24.26	39.17	25.59	9.41	6.69	10.00	23.13
Transect T3	**2008**	**2010**	**2011**	**2012**	**2013**	**2015**	**2016**	**2017**	**2018**	**2019**
% seagrass	46.20	63.16	58.53	83.53	89.93	93.82	96.10	98.19	97.57	63.01
% bare ground	53.80	36.84	41.47	16.47	10.07	6.18	3.90	1.81	2.43	36.99
Transect T4	**2008**	**2010**	**2011**	**2012**	**2013**	**2015**	**2016**	**2017**	**2018**	**2019**
% seagrass	83.51	81.89	70.37	90.37	97.28	97.94	99.85	95.76	95.07	70.44
% bare ground	16.49	18.01	29.63	9.63	2.72	2.06	0.15	4.24	4.93	29.56
Transect T5	**2008**	**2010**	**2011**	**2012**	**2013**	**2015**	**2016**	**2017**	**2018**	**2019**
% seagrass	81.78	77.00	51.40	92.35	99.12	99.41	98.82	99.56	89.63	62.65
% bare ground	18.22	23.00	48.60	7.65	0.88	0.59	1.18	0.44	10.37	37.35
Transect T6	**2008**	**2010**	**2011**	**2012**	**2013**	**2015**	**2016**	**2017**	**2018**	**2019**
% seagrass	53.82	59.63	44.77	65.59	95.22	95.74	98.82	94.41	97.13	46.18
% bare ground	46.18	40.37	53.23	34.41	4.78	4.26	1.18	5.59	2.87	53.82
Transect T7	**2008**	**2010**	**2011**	**2012**	**2013**	**2015**	**2016**	**2017**	**2018**	**2019**
% seagrass	97.93	70.79	89.34	89.09	99.78	98.38	100.0	99.85	98.97	25.88
% bare ground	2.07	29.51	10.66	10.91	0.22	1.62	0.00	0.15	1.03	74.12
Transect T8	**2008**	**2010**	**2011**	**2012**	**2013**	**2015**	**2016**	**2017**	**2018**	**2019**
% seagrass	95.94	60.29	76.99	87.64	96.76	99.26	99.26	98.24	100.0	46.32
% bare ground	4.06	39.71	23.01	13.26	3.24	0.74	0.74	1.76	0.00	53.68

Transect E7	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	93.75	93.75	93.90	87.28	84.1	80.9
% bare ground	6.25	6.18	6.10	12.65	15.8	19.1
Transect T1	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	97.87	90.96	95.81	92.25	87.5	82.3
% bare ground	2.13	7.06	4.19	5.00	11.5	16.6
Transect T2	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	97.50	98.31	97.35	74.41	90.0	78.0
% bare ground	2.5	1.32	2.65	20.66	9.1	21.7
Transect T3	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	94.85	98.68	94.56	88.75	84.6	85.4
% bare ground	5.14	1.32	5.44	9.12	15.4	14.6
Transect T4	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	82.06	99.93	89.85	90.26	88.8	87.6
% bare ground	17.94	0.07	10.15	8.63	10.9	12.2
Transect T5	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	79.71	98.97	86.40	84.26	92.6	79.1
% bare ground	20.29	1.03	13.6	15.15	7.0	20.7
Transect T6	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	79.12	98.16	81.47	86.03	92.3	81.3
% bare ground	20.88	1.84	18.53	13.90	7.8	18.7
Transect T7	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	82.50	100.0	82.28	84.25	87.9	90.8

% bare ground	17.50	0.00	17.72	15.46	12.1	9.2
Transect T8	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	87.21	98.82	87.50	83.24	88.7	88.6
% bare ground	12.79	1.18	12.50	16.99	11.3	11.4

Changes in percentage cover of the substratum by seagrasses in Chain Valley Bay (2008-2025)

Transect E1	**2008**	**2010**	**2011**	**2012**	**2013**	**2015**	**2016**	**2017**	**2018**
% seagrass	84.15	81.01	77.75	98.62	99.44	92.44	99.88	97.96	97.87
% bare ground	15.85	18.99	22.25	1.38	0.56	7.56	0.12	2.04	2.13
Transect E2	**2008**	**2010**	**2011**	**2012**	**2013**	**2015**	**2016**	**2017**	**2018**
% seagrass	83.72	75.87	73.38	95.49	99.09	98.49	99.71	100.0	97.94
% bare ground	16.28	24.13	26.62	4.49	0.91	1.51	0.29	0.00	2.06
Transect E3	**2008**	**2010**	**2011**	**2012**	**2013**	**2015**	**2016**	**2017**	**2018**
% seagrass	98.29	98.97	92.76	96.97	99.16	100.0	83.53	98.90	94.56
% bare ground	1.71	1.03	7.24	1.54	0.84	0.00	16.47	1.10	5.44
Transect E4	**2008**	**2010**	**2011**	**2012**	**2013**	**2015**	**2016**	**2017**	**2018**
% seagrass	80.16	98.54	95.74	100.0	97.50	96.43	98.01	96.76	99.71
% bare ground	19.84	1.46	4.26	0.00	2.50	3.57	1.99	3.24	0.29
Transect L1	**2008**	**2010**	**2011**	**2012**	**2013**	**2015**	**2016**	**2017**	**2018**
% seagrass						99.12	99.71	97.87	97.87
% bare ground						0.88	0.29	2.13	2.13
Transect E5	**2008**	**2010**	**2011**	**2012**	**2013**	**2015**	**2016**	**2017**	**2018**
% seagrass	95.88	94.93	95.19	100.0	98.82	99.82	100.0	97.22	99.41
% bare ground	4.12	5.07	4.81	0.00	1.18	0.18	0.00	2.78	0.59
Transect E6	**2008**	**2010**	**2011**	**2012**	**2013**	**2015**	**2016**	**2017**	**2018**
% seagrass	17.74	34.06	49.56	55.51	54.93	76.62	100.0	99.56	89.91
% bare ground	82.16	65.94	50.44	44.49	45.07	23.38	0.00	0.44	10.09
Transect E8	**2008**	**2010**	**2011**	**2012**	**2013**	**2015**	**2016**	**2017**	**2018**
% seagrass	99.32	84.26	95.56	90.96	99.93	99.85	100.0	99.34	100.0
% bare ground	0.68	15.74	4.44	9.04	0.07	0.15	0.00	0.66	0.00
Transect E9	**2008**	**2010**	**2011**	**2012**	**2013**	**2015**	**2016**	**2017**	**2018**
% seagrass	95.94	99.39	95.51	99.49	99.71	99.56	100.0	99.78	100.0
% bare ground	4.06	0.61	4.49	0.51	0.29	0.44	0.00	0.22	0.00
Transect E10	**2008**	**2010**	**2011**	**2012**	**2013**	**2015**	**2016**	**2017**	**2018**
% seagrass	97.94	92.21	86.25	98.99	98.82	NS	100.0	100.0	100.0
% bare ground	2.06	7.79	13.75	1.01	1.18		0.00	0.00	0.00
Transect E11	**2008**	**2010**	**2011**	**2012**	**2013**	**2015**	**2016**	**2017**	**2018**
% seagrass			86.93	99.85	99.49	NS	100.0	100.0	100.0
% bare ground			13.07	0.15	0.51		0.00	0.00	0.00
Transect E12	**2008**	**2010**	**2011**	**2012**	**2013**	**2015**	**2016**	**2017**	**2018**
% seagrass			95.68	95.53	98.09	NS	100.0	100.0	100.0
% bare ground			7.32	4.47	1.91		0.00	0.00	0.00
Transect E13	**2008**	**2010**	**2011**	**2012**	**2013**	**2015**	**2016**	**2017**	**2018**

% seagrass			93.97	99.26	100.0	NS	100.0	100.0	100.0
% bare ground			6.03	0.74	0.00		0.00	0.00	0.00
Transect E14	**2008**	**2010**	**2011**	**2012**	**2013**	**2015**	**2016**	**2017**	**2018**
% seagrass			86.54	99.34	100.0	NS	100.0	90.44	100.0
% bare ground			13.46	0.56	0.00		0.00	9.56	0.00
Transect E15	**2008**	**2010**	**2011**	**2012**	**2013**	**2015**	**2016**	**2017**	**2018**
% seagrass			90.29	99.93	99.66	NS	100.0	93.31	99.85
% bare ground			9.71	0.07	0.34		0.00	6.69	0.15
Transect E16	**2008**	**2010**	**2011**	**2012**	**2013**	**2015**	**2016**	**2017**	**2018**
% seagrass			82.79	93.22	94.12	NS	100.0	99.94	99.71
% bare ground			17.21	6.78	5.88		0.00	0.06	0.29

Transect E1	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	99.12	99.04	99.34	98.81	85.35	82.6	83.2
% bare ground	0.88	0.96	0.66	1.19	9.03	4.8	14.9
Transect E2	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	97.94	98.53	99.26	98.74	87.24	76.4	83.5
% bare ground	2.06	1.47	0.37	1.26	5.07	7.1	15.8
Transect E3	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	98.97	100.0	99.93	100.0	96.69	91.8	94.0
% bare ground	1.03	0.00	0.66	0.00	3.31	7.7	6.0
Transect E4	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	99.85	98.82	98.68	98.68	91.51	87.5	85.8
% bare ground	0.15	1.18	0.88	1.32	5.81	4.9	9.6
Transect L1	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	94.63	95.74	99.85	97.65	93.65	79.15	65.8
% bare ground	5.37	4.26	0.15	2.35	5.62	20.2	34.1
Transect E5	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	98.97	100.0	100.0	99.54	96.37	88.09	68.0
% bare ground	1.03	0.00	0.00	0.46	3.12	11.8	31.9
Transect E6	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	76.69	97.35	99.78	94.71	75.04	72.94	52.5
% bare ground	23.31	2.65	0.00	5.29	22.09	26.9	47.2
Transect E8	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	99.34	97.87	99.78	98.09	87.51	86.28	91.5
% bare ground	0.66	2.13	0.00	1.91	12.41	13.5	8.5
Transect E9	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	100.0	99.71	100.0	99.71	96.22	90.07	94.2
% bare ground	0.00	0.29	0.00	0.29	3.46	6.8	5.0
Transect E10	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	98.21	97.94	100.0	99.72	89.03	95.96	89.8
% bare ground	1.79	2.06	0.00	0.28	2.75	4.0	10.2
Transect E11	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	98.94	99.63	100.0	100	96.56	96.7	90.8

% bare ground	1.06	0.37	0.00	0.00	3.22	3.2	9.2
Transect E12	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	97.0	99.26	100.0	100	94.82	88.93	82.8
% bare ground	3.0	0.74	0.00	0.00	4.81	11.0	14.0
Transect E13	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	99.95	100	99.71	100	99.34	89.85	86.5
% bare ground	0.05	0.00	0.29	0.00	0.44	9.0	13.5
Transect E14	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	98.24	99.41	99.78	99.63	92.50	76.0	30.0
% bare ground	1.76	0.59	0.22	0.37	6.62	14.9	69.7
Transect E15	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	50.66	99.34	100.0	99.78	89.63	86.4	77.0
% bare ground	49.34	0.66	0.00	0.22	10.15	13.2	22.9
Transect E16	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	95.0	98.31	98.75	98.75	95.22	87.6	83.7
% bare ground	5.0	1.69	1.25	1.25	4.63	12.4	16.2

Changes in percentage cover of the substratum by seagrasses in Bardens Bay (2014-2025)

Transect A1	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
% seagrass	97.97	98.09	88.97	99.85	96.18	85.15	88.88	97.87
% bare ground	2.03	1.91	11.03	0.15	3.82	14.85	11.10	1.91
Transect A2	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
% seagrass	92.38	96.99	98.75	98.38	94.93	98.09	96.91	97.13
% bare ground	7.62	3.01	1.25	1.62	5.07	1.91	3.09	2.28
Transect A3	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
% seagrass	100.0	86.40	94.85	96.69	98.01	99.26	99.12	91.03
% bare ground	0.00	13.60	5.15	3.31	1.99	0.74	0.88	8.97
Transect A4	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
% seagrass	94.51	93.97	99.12	100.0	89.78	48.98	99.41	100.0
% bare ground	5.49	6.03	0.88	0.00	10.22	51.02	0.59	0.00
Transect A5	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
% seagrass	96.37	95.59	99.71	100.0	97.35	84.50	96.76	97.13
% bare ground	3.63	4.41	0.29	0.00	2.65	15.50	3.24	2.87
Transect A6	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
% seagrass	99.56	98.01	96.97	97.65	93.53	90.88	94.26	96.62
% bare ground	0.44	1.99	3.03	2.35	6.47	9.12	5.74	3.38

Transect A1	**2022**	**2023**	**2024**	**2025**
% seagrass	89.41	74.26	81.5	69.3
% bare ground	10.59	16.32	11.2	23.6
Transect A2	**2022**	**2023**	**2024**	**2025**

% seagrass	96.18	82.47	95.1	83.3
% bare ground	3.82	8.90	2.6	13.5
Transect A3	**2022**	**2023**	**2024**	**2025**
% seagrass	99.19	86.78	94.4	91.5
% bare ground	0.81	6.09	4.9	7.8
Transect A4	**2022**	**2023**	**2024**	**2025**
% seagrass	98.31	96.40	85.0	88.3
% bare ground	1.69	3.53	13.9	11.7
Transect A5	**2022**	**2023**	**2024**	**2025**
% seagrass	97.96	83.46	69.5	80.6
% bare ground	2.04	16.62	30.1	18.7
Transect A6	**2022**	**2023**	**2024**	**2025**
% seagrass	96.84	97.57	82.2	75.8
% bare ground	3.16	1.35	17.0	22.5

Changes in percent cover of the substratum by seagrasses in Sugar Bay and Sunshine (2018-2025)

Transect S1	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	62.50	24.71	99.63	97.79	99.63	90.69	90.22	96.3
% bare ground	37.50	75.29	0.37	0.74	0.37	2.06	3.9	2.4
Transect S2	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	96.62	85.83	97.50	96.54	93.90	94.34	68.82	94.4
% bare ground	3.38	14.17	2.50	3.46	6.10	5.37	22.1	5.6
Transect S3	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	99.19	97.13	98.75	100.0	98.53	95.32	96.84	95.2
% bare ground	0.81	2.87	1.25	0.00	1.47	4.01	3.1	4.8
Transect S4	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	99.97	98.82	99.56	100.0	99.41	96.32	99.85	91.1
% bare ground	0.03	1.18	0.44	0.00	0.59	3.46	0.1	8.9
Transect S5	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	99.12	67.08	75.88	94.56	79.34	92.94	83.38	79.6
% bare ground	0.88	32.92	24.11	5.37	20.66	5.96	16.4	20.2
Transect S6	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	100.0	99.78	100.0	98.57	99.41	93.38	68.09	71.4
% bare ground	0.00	0.22	0.00	1.32	0.59	6.32	22.3	27.6

Changes in percent cover of the substratum by seagrasses in Crangan Bay (2008-2025)

Transect C1	2008	2010	2011	2012	2013	2015	2016	2017	2018	2019
% seagrass	48.60	80.53	68.71	85.38	99.31	94.04	99.94	76.18	99.68	34.26
% bare ground	51.40	19.47	31.29	14.62	0.69	5.96	0.06	23.82	0.32	65.74
Transect C2	**2008**	**2010**	**2011**	**2012**	**2013**	**2015**	**2016**	**2017**	**2018**	**2019**
% seagrass	93.09	98.03	67.79	95.21	97.24	100.0	98.09	99.40	96.69	81.62
% bare ground	6.91	1.97	32.21	4.79	2.76	0.00	1.91	0.60	3.31	18.38
Transect C3	**2008**	**2010**	**2011**	**2012**	**2013**	**2015**	**2016**	**2017**	**2018**	**2019**
% seagrass	95.59	88.75	94.41	97.16	99.93	98.46	99.90	96.47	100.0	87.21
% bare ground	4.41	11.25	5.59	2.84	0.07	1.54	0.10	3.53	0.00	12.79
Transect C4	**2008**	**2010**	**2011**	**2012**	**2013**	**2015**	**2016**	**2017**	**2018**	**2019**
% seagrass	87.25	86.56	58.09	90.40	100.0	99.49	99.96	96.47	96.76	74.56
% bare ground	12.75	13.44	41.91	9.60	0.00	0.51	0.04	3.53	3.24	25.44

Transect C1	2020	2021	2022	2023	2024	2025
% seagrass	88.68	93.90	89.04	82.07	96.76	77.2
% bare ground	11.32	3.90	10.96	10.35	1.1	14.0
Transect C2	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	96.76	97.72	98.60	92.21	93.68	91.5
% bare ground	3.24	1.25	1.40	6.54	5.4	7.7
Transect C3	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	96.84	100.0	97.81	95.15	99.04	89.9
% bare ground	3.16	0.00	2.19	2.87	0.8	10.0
Transect C4	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
% seagrass	94.93	99.85	97.15	95.22	97.28	89.6
% bare ground	5.07	0.15	2.85	1.62	2.2	9.9

Appendix 4: Biodiversity Monitoring Report

ANNUAL BIODIVERSITY MONITORING 2025

November 7, 2025



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Executive Summary

Atlantech was requested by Delta Coal to undertake the annual biodiversity monitoring at Chain Valley Colliery (CVC). Atlantech inspected the pit top eastern management zone and ventilation shaft area on 16 October 2025.

The purpose of the survey was to assess vegetation condition and composition in the swamp oak forest biodiversity enhancement area and ventilation shaft area. Weed occurrence, feral animal presence and potential uncontrolled public assess issues were also assessed.

Following the inspection, Atlantech recommends the following:

- Undertake targeted weed control of ground asparagus in the pit top eastern management zone.
- Undertake continued targeted weed control of agave spp., lantana, and cassia at the ventilation shaft site.
- Review security or security signage around the ventilation shaft site and consider options to deter pedestrian and motorbike access.
- Continue annual biodiversity monitoring in line with the CVC Biodiversity Management Plan (2022).

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1. Introduction/Background

Chain Valley Colliery (CVC) is an underground coal mine operated by Great Southern Energy Pty Ltd (trading as Delta Coal) and is situated in the Newcastle coalfields of New South Wales. The mine operates in accordance with Development Consent SSD-5465.

The CVC Biodiversity Management Plan (BMP) was developed to address the requirements of Schedule 3, Condition 20 of SSD-5465. Atlantech was commissioned by Delta Coal to undertake the annual biodiversity monitoring program for CVC specified within the BMP (v6).

This report details the results of the monitoring program which have been assessed against the trigger values outlined in the BMP.

2. Scope and Objectives

In accordance with the Delta Coal CVC BMP, the objectives of the monitoring program were to assess:

- Weed occurrence and control effectiveness in the pit top eastern management zone and ventilation shaft areas.
- Presence of feral animals in the pit top eastern management zone and ventilation shaft areas.
- Potential unauthorised public assess issues in the pit top eastern management zone and ventilation shaft areas.
- Vegetation health and condition surrounding the ventilation shaft area.
- Photo and tree monitoring points in the ventilation shaft area.
- Vegetation condition, structure and composition in the swamp oak forest BioBanking plots.

Monitoring of bushfire risk and receiving waters was excluded from the current survey.

The survey areas are shown in Figure 4.

DELTA COAL - Chain Valley Colliery

2025 Biodiversity Monitoring



- CVC Biodiversity Enhancement Area
- Vent Shaft
- Plots
- Photo Monitoring Point
- Tree Monitoring Point

0 0.04 0.07 0.15 Kilometers

Date Created: 30/10/2025
Map Created By: J Pawson
Map Size: A4 Portrait
Coordinate System: GDA2020 MGA Zone 56
Map Reference: ATLGIS25-039_A4-1

Figure 1

3. Methodology

The walkover inspection was conducted on the 21 October 2025 by Atlantech Principal Environmental Consultant, Jason Desmond with the assistance of Environmental Consultant, Jonathan Kool and Graduate Environmental Consultant, Joshua Pawsonl.

All data was collected in-field using an iPad with GIS software.

The 2023, 2024 and 2025 surveys were undertaken in October as to limit variation of results due to different seasons.

3.1 Ventilation Shaft Area

The following data surrounding the ventilation shaft area was collected to monitor health and condition:

- Georeferenced photos and general observations of tree health and condition recorded at the two tree monitoring locations.
- Georeferenced photos collected at the four photo monitoring locations and compared against 2013 baseline photo monitoring points.
- The dominant species in each vegetation layer present around the ventilation shaft was recorded.

3.2 Swamp Oak Forest Vegetation

Vegetation data was collected from the two-swamp oak forest plots and transects using Biobanking methodology in accordance with Section 11.2 of the BMP to monitor condition, structure and composition.

The following data was collected within the 20 by 50 metre plots:

- Number of native plant species
- Number of trees with hollows
- Proportion of over-storey species occurring as regeneration (%)
- Total length of fallen logs (metres)
- Species occurrence
- Evidence of canopy dieback
- Georeferenced photos.

The following data was collected within the 20 by 20 metre sub plots:

- Native midstorey cover (%)
- Native ground (grasses) cover (%)
- Native ground (shrubs) cover (%)
- Native ground (other) cover (%)
- Exotics cover (%).

The following data was collected along the 50 metre transects:

- Transect start and finish coordinates
- Native overstory cover (%) every five (5) metres.

The plot attributes were scored using the condition criteria in Appendix D. The combined weighted score for the two plots was then calculated and assessed against the local benchmarks (refer to Appendix D) and BMP trigger value for remedial works which is less than 60%.

3.3 Monitoring Outcomes

3.3.1 Weed Occurrence and Control Effectiveness

Weed sightings were recorded across the pit top eastern management zone and ventilation shaft area. Species, density location were recorded. Evidence of weed control active or previous were compared to previous year's results to determine effectiveness.

3.3.2 Feral Animal Presence

Feral animal monitoring was conducted across the pit top eastern management zone and ventilation shaft area. Sightings of individuals were recorded as well as signs of presence including tracks, diggings, scats and burrows.

3.3.3 Waste

Waste sightings were recorded across the pit top eastern management zone and ventilation shaft area. Type of waste and location were recorded.

3.3.4 Unauthorised Public Access

The pit top eastern management zone and ventilation shaft area were surveyed on foot. Any evidence of unauthorised public access or potential Unauthorised public access issues were recorded such as damaged fencing, vandalism, gates and signage.

4. Report Findings

The findings of the biodiversity monitoring program are provided in the following sub-sections.

4.1 Ventilation Shaft Area

Photos collected at the photo and tree monitoring points are provided in Appendix A and B.

Vegetation condition was consistent with 2024 survey results. Vegetation appeared to be in good health, with no further dieback evident and active regrowth occurring. Minimal weed presence was observed, and evidence of successful weed control being undertaken was observed with a reduction in weeds since the 2024 survey.

Vegetation was diverse throughout the ventilation shaft area. The dominant species included the following:

- **Canopy layer** – Red Bloodwood (*Eucalyptus gumifera*) and Broad-leaved Paperbark (*Melaleuca quinquenervia*) and Smooth-barked apple (*Angophera costata*).
- **Mid-storey** – Hopbush (*Dodonaea triquetra*).
- **Groundcover** – Tall Saw Sedge (*Gahnia clarkei*) .

No remedial action in relation to vegetation required at this site. Continued weed treatment and inspections are recommended to be ensure weeds continue to be controlled.

4.2 Swamp Oak Forest Vegetation

Detailed monitoring results are provided in Appendix E and photos in Appendix C.

The weighted site attribute score for the Swamp Oak Forest plots is 81.25%. No additional management is required in the Swamp Oak Forest area as the weighted score is above the minimum trigger value of <60%.

A comparison of 2023, 2024 and 2025 attribute scores is provided in Table 1. A summary of the key changes is provided below:

- A continued increase in native species richness and in the percentage cover of native grasses was observed. Unlike the previous 2023 survey, Marine Couch (*Sporobolus virginicus*) was sighted in both plots again in 2025. A strong dominance of rush species was instead recorded in the groundcover layers.
- The total length of fallen logs varied from 2023 and 2024 but the score for the plots was still ≥20m thereby not impacting the score. Likely hood for reduction was the rot of Sheoak timber in a wet environment occurring at a rapid rate.

Table 1: Comparison of 2023, 2024 and 2025 weighted scores.

Site Attribute	2023 Scores	2024 Scores	2025 Scores	Change
Native plant species richness	22	25	25	–
Native over-storey cover	10	10	10	–
Native mid-storey cover	2.5	2.5	2.5	–
Native groundcover (grasses)	1	1.5	2.5	↑
Native groundcover (shrubs)	2.5	2.5	2.5	–
Native groundcover (other)	0.625	0.625	0.625	–
Exotic plant cover	5	5	5	–
Trees with hollows	20	20	20	–
Over-storey regeneration	3.125	3.125	3.125	–
Total length of fallen logs	10	10	10	–

↑ *Indicates the weighted score has increased compared to 2023.*
↓ *Indicates the weighted score has decreased compared to 2023.*
– *Indicates the weighted score has remained the same compared to 2023.*

4.3 Monitoring Outcomes

Monitoring outcomes for weeds, feral animals, waste and unauthorised public access in the pit top eastern management zone and ventilation shaft areas are shown in **Error! Reference source not found.**, Figure 3 and the following sections Tables Table 2 – 5 and Plates 1 - 4.

DELTA COAL - Chain Valley Colliery

2025 Biodiversity Monitoring - Vent Shaft



- Vent Shaft
- Access Issue
- Weeds
- Weed
- Vertebrate Pests
- Waste

0 0.01 0.02 0.04 Kilometers

Date Created: 07/11/2025
Map Created By: J Pawson
Map Size: A4 Portrait
Coordinate System: GDA2020 MGA Zone 56
Map Reference: ATLGIS25-039_A4-2

Figure 2

DELTA COAL - Chain Valley Colliery

2025 Biodiversity Monitoring - Biodiversity Enhancement Area

ATLANTECH



CVC Biodiversity Enhancement Area

Plot

Weed

Waste

0 0.03 0.07 0.13

Kilometers

Date Created: 07/11/2025
Map Created By: J Pawson
Map Size: A4 Portrait
Coordinate System: GDA2020 MGA Zone 56
Map Reference: ATLGIS25-039_A4-3

Figure 3

4.3.1 Weed Occurrence and Control Effectiveness

Weeds recorded during the survey are detailed in Table 2 and shown in and Figure 3.

Table 2: Weed occurrence recordings.

Weed species	Easting	Northing	# of individual plants	Area (m2)	Distance to native veg (m)	Recommended control measures
Exotic species – *Agave spp.*	*366,586.11*	*6,331,122.49*	2	1	0	Dig out plants completely and appropriately dispose.
Lantana (*Lantana camara*)	*366,651.98*	*6,331,071.71*	1	1	0	As per the Biodiversity Management Plan, cut and paint stems with Glyphosate.
	366,633.67	*6,330,994.22*	1	2	0	
	366,627.99	*6,331,027.88*	3	2	0	
	366,621.71	*6,331,035.21*	1	1	0	
Ground Asparagus (*Asparagus aethiopicus*)	*365,088.87*	*6,329,628.11*	1	0.5	0	As per the Biodiversity Management Plan, cut underground tubers with secateurs out of ground around root base and remove from site.
	365,083.38	*6,329,627.68*	1	2	0	
	365,021.75	*6,329,497.49*	12	5	0	
Cassia (*Senna pendula*)	*366,645.02*	*6,330,993.14*	1	0.3	1	Hand pull young plants, cut and paint mature plants.
	366,635.81	*6,330,982.56*	1	0.5	1	
	366,637.50	*6,330,980.64*	1	0.5	0	
	366,639.20	*6,331,001.03*	2	1	0	
	366,592.48	*6,331,070.70*	>10	10	0	
Pampas grass (*Cortaderia selloana*)	*366,652.23*	*6,331,059.88*	1	1	0	Manual removal of plant and root ball.
Fishbone Fern (*Nephrolepis cordifolia*)	*366,603.48*	*6,331,085.35*	>100	10% of 300	0	Combination of foliar spray with Glyphosate and hand pulling tubers.
Coolatai grass (*Hyparrhenia hirta*)	*366,644.41*	*6,331,006.71*	>50	200	3	Foliar spray with Glyphosate in Spring and Summer during active growth



Plate 1: Fishbone Fern in native vegetation.



Plate 2: Cassia near to native vegetation.

4.3.2 Feral Animal Presence

Feral animal observations recorded during the survey are detailed in Table 3 and shown in shown in Figure 3.

Table 3: Feral animal recordings.

Feral animal species	Location	Easting	Northing	Observation type*	Recommended control measures
Feline (Felis catus)	Ventilation shaft	*366,613.79*	*6,331,043.44*	Scat	Continue monitoring and if number of recordings increase, consider undertaking a control program.

**Observation type – sighting, tracks, diggings, burrows, scats or other.*

4.3.3 Waste

Waste issues identified and recorded during the survey are detailed in Table 4 and shown in and Figure 3.

Table 4: Waste issues identified.

Location	Easting	Northing	Waste issue	Recommended action
Plot 2	*365,083.96*	*6,329,589.13*	Powerline	Remove waste when practical and dispose of via appropriate means
Ventilation shaft	*366,692.68*	*6,331,039.41*	Scrap metal, power pole and concrete block	
Ventilation shaft	*366,597.77*	*6,331,052.53*	Asbestos piping	



Plate 3: Powerline in Plot 2.

4.3.4 Unauthorised Public Access

Unauthorised public access issues identified during the survey are detailed in Table 5 and shown in Figure 2.

Table 5: Unauthorised access issues identified.

Location	Easting	Northing	Access issue	Recommended action
Ventilation shaft	*366638.62*	*6330992.02*	Graffiti observed around the perimeter of the utility shed indicating unauthorised access to the site.	Review security around the ventilation shaft site and consider options to deter pedestrian and motorbike access. The current access gate in place only prevents vehicle access.
Ventilation shaft	*3666358.17*	*6331048.45*	Graffiti observed around the perimeter of the ventilation shaft fence indicating unauthorised access to the site.	



Plate 4: Graffiti present on infrastructure.

5. Recommendations

Following the inspection, Atlantech recommends the following:

- Undertake targeted weed control of ground asparagus in the pit top eastern management zone.
- Undertake continued targeted weed control of agave spp., lantana, and cassia at the ventilation shaft site.
- Review security or security signage around the ventilation shaft site and consider options to deter pedestrian and motorbike access.
- Continue annual biodiversity monitoring in line with the CVC Biodiversity Management Plan (2022).

Appendix A:

Photo Monitoring

Photo Monitoring Point 1:



Plate 5: Photo monitoring point 1 facing south-east (2023 – 2024).



Plate 6: Photo monitoring point 1 facing south-east (2025).



Plate 7: Photo monitoring point 1 facing north-west (2023 – 2024).



Plate 8: Photo monitoring point 1 facing north-west (2025).

Photo Monitoring Point 2:





Plate 9: Photo monitoring point 2 facing south-west (2023 – 2024).



Plate 10: Photo monitoring point 2 facing south-west (2025).

Photo Monitoring Point 3:



Plate 11: Photo monitoring point 3 facing north-west (2023 – 2024).



Plate 12: Photo monitoring point 3 facing north-west (2025).



Plate 13: Photo monitoring point 3 facing south-west (2023 – 2024).



Plate 14: Photo monitoring point 3 facing south-west (2023 – 2024).



Plate 15: Photo monitoring point 3 facing south-east (2023 – 2024).



Plate 16: Photo monitoring point 3 facing south-east (2025).

Photo Monitoring Point 4:



Plate 17: Photo monitoring point 4 facing north-west (2023 – 2024).



Plate 18: Photo monitoring point 4 facing north-west (2025).



Plate 19: Photo monitoring point 4 facing west (2023 – 2024).



Plate 20: Photo monitoring point 4 facing west (2025).



Plate 21: Photo monitoring point 4 facing south-east (2023 – 2024).



Plate 22: Photo monitoring point 4 facing south-east (2025).

Appendix B:

Tree Monitoring Photo

Tree Monitoring Point 1:



Plate 23: Tree monitoring point 1 (2023 – 2024).



Plate 24: Tree monitoring point 1 (2025).

Tree Monitoring Point 2:



Plate 25: Tree monitoring point 2 (2023 – 2024)



Plate 26: Tree monitoring point 2 (2025).

Appendix C:

Biodiversity Plot Photos

Biodiversity Plot 1:



Plate 27: Plot one south-western transect point (Start Point).



Plate 28: Plot one north-eastern transect point (End point).

Biodiversity Plot 2:



Plate 29: Plot two northern transect point (Start point)



Plate 30: Plot two southern transect point (End point)

Appendix D:

Condition Criteria and Local Benchmarks

In line with biobanking methodology, the local benchmarks that have been developed as a baseline for the Swamp Oak Forest at CVC and the associated site-specific condition criteria are provided in Table 6.

Table 6: CVC Vegetation Condition Criteria and Local Benchmarks.

Site Attribute		Local Benchmark	Site Attribute Score				Score Weight %
			1	2	3	4	
A	Native plant species richness	≥6	0	0 to <3	3 to <6	≥6	25%
B	Native over-storey cover	5 to 18	0 to 0.5 or >36	>0.5 to <2.5 or >27 to 36	2.5 - <5 or >18 to 27	5 to 18	10%
C	Native mid-storey cover	36 to 48	0 to 3.6 or >96	>3.6 to <18 or >72 to 96	18 - <36 or >48 to 72	36 to 48	10%
D	Native ground-cover (grasses)	3 to 21	0 to 0.3 or >42	>0.3 to <1.5 or >31.5 to 42	1.5 - <3 or >21 to 31.5	3 to 21	2.5%
E	Native groundcover (shrubs)	0 to 0				0	2.5%
F	Native groundcover (other)	1 to 13	0 to 0.1 or >26	>0.1 to <0.5 or >19.5 to 26	0.5 - <1 or >13 to 19.5	1 to 13	2.5%
G	Exotic plant cover (all strata)	N/A	>66%	>33% to 66%	>5% to 33%	0 - 5%	5%
H	Number of trees with hollows	≥0	N/A	N/A	N/A	≥0	20%
I	Proportion of over-storey species occurring as regeneration	N/A	0	>0 to <50%	50% to <100%	100%	12.5%
J	Total length of fallen logs	≥20	0 to 2	>2 to <10	10 to <20	≥20	10%
						Total weighted score	100%

Appendix E:

Swamp Oak Forest Plot Data

A summary of Plot scores is provided in Table 7 with each plot breakdown as per Table 8 and Table 9. Comparisons and scores are derived from Table 6 CVC Vegetation Condition Criteria and Local Benchmarks.

Table 7: Swamp oak forest plot scores

ID	Site Attribute	Local Benchmark	Plot 1 Data	Plot 1 Score	Plot 2 Data	Plot 2 Score	Average	Attribute Weighting	Weighted Score
A	Native plant species richness	≥6	6	4	7	4	4	25	25
B	Native over-storey cover	5 to 18	12	4	16	4	4	10	10
C	Native mid-storey cover	36 to 48	0	1	0	1	1	10	2.5
D	Native ground-cover (grasses)	3 to 21	3	4	4	4	4	2.5	2.5
E	Native groundcover (shrubs)	0 to 0	0	4	0	4	4	2.5	2.5
F	Native groundcover (other)	1 to 13	95	1	94	1	1	2.5	0.625
G	Exotic plant cover (all strata)	N/A	0.01	4	0.01	4	4	5	5
H	Number of trees with hollows	≥0	2	4	1	4	4	20	20
I	Proportion of over-storey species occurring as regeneration	N/A	0	1	0	1	1	12.5	3.125
J	Total length of fallen logs	≥20	23	4	21	4	4	10	10
							Final weighted site score		**81.25%**

Table 8: Plot one field sheet

Plot Number:	One	**Date:**	16/10/2025	**Time:**	11:35

20 x 20 metre sub plot		20 x 50 metre plot	
Native mid-storey cover (%)	0	Number of native plant species	6
Native ground-cover – grasses (%)	2	Number of trees with hollows	2
Native groundcover – shrubs (%)	0	Proportion of over-storey species occurring as regeneration (%)	0
Native groundcover – other (%)	95	Combined total length of all fallen logs (m)	23
Exotic plant cover (%)	0.01	Evidence of canopy dieback (Y/N)	No

50 metre transect – Native overstorey cover (%)	
Transect start coordinates:	E 365085.13, N 6329629.28
Transect end coordinates:	E 365085.18, N 6329578.82
0 m	10
5 m	5
10 m	0
15 m	25
20 m	5
25 m	10
30 m	10
35 m	0
40 m	30
45 m	5
50 m	25

Plant species recorded

Swamp Oak (*Casuarina glauca*), Broad-leaved Paperbark (*Melaleuca quinquenervia*), Sea Rush (*Juncus krausii*), Creeping Brookweed (*Samolus repens*), Beaded Samphire (*Salicornia quinqueflora*) and Marine Couch (*Sporobolus virginicus*)

Invasives: <5%
Ground asparagus (Asparagus aethiopicus) - Invasive

General observations

Plot is highly waterlogged, with active discharge occurring into plot area.

Vegetation consistent throughout the area but lacking mid-storey growth. Minimal weed density observed.

No pest fauna or public access issues.

Fish species observed (Mullet *Mugil cephalus*).

Table 9: Plot two field sheet

Plot Number:	Two	**Date:**	16/10/2025	**Time:**	10:38

20 x 20 metre sub plot		20 x 50 metre plot	
Native mid-storey cover (%)	0	Number of native plant species	7
Native ground-cover – grasses (%)	0	Number of trees with hollows	1
Native groundcover – shrubs (%)	0	Proportion of over-storey species occurring as regeneration (%)	0
Native groundcover – other (%)	94	Combined total length of all fallen logs (m)	21
Exotic plant cover (%)	0.01	Evidence of canopy dieback (Y/N)	No

50 metre transect – Native overstorey cover (%)	
Transect start coordinates:	E 365039.06, N 6329514.86
Transect end coordinates:	E 365013.57, N 6329475.8
0 m	20
5 m	15
10 m	2
15 m	5
20 m	30
25 m	5
30 m	25
35 m	15
40 m	5
45 m	5
50 m	35

Plant species recorded

Swamp Oak (*Casuarina glauca*), Broad-leaved Paperbark (*Melaleuca quinquenervia*), Sea Rush (*Juncus krausii*), Creeping Brookweed (*Samolus repens*), Marine Couch (*Sporobolus virginicus*), Common Silk pod (Persona staminea) and Swamp Weed (Goodenia radicans)

Invasives: <5%
Paspalum Sp., Ground Asparagus (*Asparagus aethiopicus),* Common Sow Thistle (Sonchus oleraceus)

General observations

Tree with hollow observed in edge of plot.

Area was variably waterlogged.

No signs of feral animals but at 32m line of plot cable was observed likely related to unauthorised public access.

Vegetation consistent throughout the area but lacking mid-storey growth. Minimal weeds density observed. However, outside within area is higher density and abundance Ground Asparagus.

Appendix 5: Benthic Communities Monitoring Reports

Delta Coal

Mannering & CVC Collieries

Lake Macquarie Benthos Survey

Results No. 25



by Dr Emma Laxton

May 2025

J.H. & E.S. Laxton - Environmental Consultants P/L

T: 0429 855891. Email: emmalaxton07@gmail.com

1. Executive Summary

J.H. & E.S. Laxton – Environmental Consultants P/L was engaged by Chain Valley Colliery to assess the potential effects of bord and pillar extraction mining beneath Lake Macquarie on benthic fauna.

The benthic survey and water quality monitoring were conducted on 5th and 6th May 2025. The survey involved the collection of benthos at 24 stations. The stations consisted of seven control, five reference and twelve impact stations. Two depth zones within the mud basin were sampled, -4.5m AHD and -5.5 to -6.0m AHD.

A total of 1207 marine benthic organisms greater than 1 mm in size were captured during the survey. These organisms represented twenty-one species. The fauna included one species of sponge; one nemertean and six polychaete worm species; eight bivalve species; one gastropod species; one chiton species, two echinoderm species and one crab species.

In May 2025, the greatest numbers of organisms were collected at benthic monitoring stations C7, IM12, R13 and IM11. The stations with the least number of organisms captured were IM4, IM6, IM9, IM10 and IM3. The number of organisms collected ranged from 24 to 307 organisms at the control monitoring stations, 26 to 87 organisms at the reference stations; and 9 to 132 organisms at the impact monitoring stations.

Polychaete worms and bivalves were the most commonly occurring organisms in the sediments off Summerland Point and in Chain Valley Bay and Bardens Bay in Autumn 2025. A total of 651 polychaetes were recorded, representing 53.9 percent of the organisms collected. *Sthenelais petitiboneae* was the most represented and widespread polychaete. A total of 295 *Sthenelais petitiboneae* were recorded, representing 24.4 percent of the organisms collected.

A total of 464 bivalves were collected during the benthic survey, representing 38.4 percent of the organisms collected. The most commonly occurring bivalve species recorded were *Theora lubrica*, *Dosinia sp*, *Corbula sp*, *Trichomya hirsuta*, *Saccostrea glomerata* and *Paphia undulata*. *Theora lubrica* was collected at 23 of the 24 monitoring stations. The majority of *Dosinia* were collected from the benthic monitoring station C7. A total of 89 *Corbula* were collected from 17 monitoring stations. *Trichomya hirsuta* was found at three monitoring stations only, with the greatest number collected from station IM11. Monitoring station IM11 also had a relatively high number of *Saccostrea glomerata*.

Other species that were recorded in the sediments were the sea star *Astropecten polyacanthus*, the brittle star *Ophionereis schayeri*, the sea slug *Philine angasi,* the sponge *Tetilla sp and* crab species.

At the time of survey sampling sites with benthos comprised predominantly of silt, were defined by relatively high numbers of the polychaete *Sthenelais petitiboneae*, and the bivalves *Theora lubrica* and *Paphia undulata.* Benthos with high portions of sand and/ or gravel were characterized by relatively higher numbers of the polychaete worms from the Chaetopteridae, Pectinariidae and Diopatra families, and the bivalve *Dosinia*. Stations that comprised predominantly of shell substrate were characterized by the presence of the mussel *Trichomya hirsuta* and the oyster *Saccostrea glomerata*. *Saccostrea glomerata* was encrusted on the large shell fragments. The dominant species were present at each depth zone indicating that water depth is not influencing the presence of these organisms in the sediments.

In Autumn 2025, the sampling stations with the greatest organism diversity were R13, IM2, IM12, C7 and IM11. Stations IM5, R12 and C3 also had relatively high organism diversity. Benthic monitoring stations R9, IM4 and IM9 had the lowest organism diversity. Species diversity ranged from 4 to 11 species at the control stations, 3 to 12 species at the reference stations, and 3 to 12 species at the impact stations. Comparisons of the average number of species collected at each monitoring station over a fourteen-year period revealed no discernable differences in diversity with water depth.

These findings support previous data collected between September 2016 and March 2020 in the Chain Valley Bay, Bardens Bay and Summerland Point regions. Despite reported changes in bed levels associated with Chain Valley Colliery underground workings, no statistical differences were found between the benthic assemblages at sites designated as Impact, Reference and Control stations (EMM, 2020).

Comparisons between the number of organisms collected during the Autumn sampling periods of March 2024 and May 2025 showed an increase in the numbers of organisms collected at seven of the 24 monitoring stations, a decrease at thirteen stations, and no change at four stations.

There was variation between the sediments collected within the study area. Three types of sediments were identified during the study. The most common sediment type comprised of a high portion of silt and shell fragments. The second sediment type consisted of silt and sand, and the third sediment or substrate type was composed largely of shell.

Rainfall in the months preceding the survey of May 2025 was 66.8 mm, 38.2 mm, 137.6 mm and 228 mm for January, February, March and April 2025 respectively (Cooranbong Lake Macquarie AWS No. 061412). By 6th May a further 30.6 mm had fallen in the catchment.

In May 2025 water temperature decreased slightly and conductivity, salinity, turbidity and pH increased with water depth due to rainfall events. Oxidation reduction potential was relatively uniform throughout the water column and dissolved oxygen either decreased with depth or was uniform throughout the water column. Testing of bottom water at each station found water temperature ranged from 20.37ºC to 21.85ºC. The average bottom water temperature was 21.23ºC. The conductivity of bottom waters ranged from 49.59 mS/cm to 51.34 mS/cm. Average bottom water conductivity was 50.78 mS/cm. Salinity of bottom waters ranged from 32.42 ppt to 33.71 ppt. Average bottom water salinity was 33.30 ppt. Average turbidity of the bottom waters ranged from 4.2 NTU to 40.3 NTU. The average bottom water turbidity was 8.95 NTU. Average pH of bottom waters ranged from pH 7.1 to pH 9.07. The average pH of bottom water was pH 8.33. The average ORP of bottom waters ranged from 440 mV to 630 mV. The average ORP of bottom waters was 494 mV . The average dissolved oxygen of bottom waters ranged from 40.7% saturation to 68% saturation. The average dissolved oxygen of bottom waters was 54.19% saturation. Average water quality did not vary significantly between control, impact and reference stations.

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3. Introduction

Lake Macquarie is the largest saline lake in New South Wales. It lies on the central coast between Sydney and Newcastle within the local government areas of Central Coast Council and Lake Macquarie Council. Lake Macquarie has a catchment of approximately 700 square kilometers and a water surface area of 110 square kilometers. The average depth of the lake is 8 metres (26 ft), with a maximum depth of 15 metres (49 ft). The lake has a permanent entrance to coastal waters at Swansea, and a shore length of approximately 174 kilometres.

The catchment of Lake Macquarie is largely rural with large areas of bushland and grazing land. The shoreline of Lake Macquarie is heavily urbanized, especially the eastern, western and northern shorelines. The region has a relatively long history of coal mining and power generation, with mining occurring since the late 1800s and the first power station at Lake Macquarie commencing operations in 1958.

Chain Valley Colliery (CVC) is an underground coal mine situated on the southern shores of Lake Macquarie about 1 kilometre south-east of the township of Mannering Park, NSW. It is located approximately 60 kilometres south of Newcastle and 80 kilometres north of Sydney. The mine has been operating since 1963. Mining is continuing within the Chain Valley Coal Lease Area using the miniwall method. Prior to mining, there were three economically viable seams in the lease area, namely the Wallarah seam (not mined since 1997); the Great Northern seam, and the Fassifern seam. In 2018 CVC went into voluntary receivership and was taken over by Great Southern Energy Pty Ltd (trading as Delta Coal) to provide coal for Vales Point Power Station.

Delta Coal is currently mining the Fassifern Seam beneath Lake Macquarie. To protect the lake foreshore, a protection zone has been established as part of the extraction plan. This zone, known as the High Water Mark (HWM) Subsidence Barrier, was calculated using a 35^{o} angle of draw from the depth of mining. The zone is approximately 130 meters wide. J.H. & E.S. Laxton – Environmental Consultants P/L was engaged by Delta Coal to assess the impact of previous miniwall mining on benthic fauna in Lake Macquarie.

In May 2025, the monitoring programme consisted of 24 stations, seven Control, five Reference and twelve Impact stations. Control stations are in areas of lakebed sufficiently remote from previous or proposed mining. Reference stations are located in areas of lakebed above subsidence areas of previous mining. Impact stations are in areas of lakebed where subsidence is expected/ experienced

from previous workings or proposed future workings. Two depth zones within the mud basin were sampled, -4.5m AHD and -5.5 to -6.0m AHD.

Over the years, as mining has progressed, reference stations have been reclassified as impact stations. Three reference stations (R7, R8, R11) were reclassified as impact stations in 2024. Due to this reclassification and in preparation for future extraction plans, two reference stations were added to the study (R12 and R13) in 2024.

The Autumn 2025 benthic communities survey and water quality testing were conducted on the 5th and 6th May.

4. Methods

Twenty-four stations were sampled in May 2025. At each station the following procedure was carried out:

- A GPS unit was used to locate the sampling station.
- A weighted line was used to measure water depth.
- A line with five sieve boxes (five replicates of 200 x 200 x 100 mm collection boxes with 1 mm mesh) and two core samplers (100 x 200 mm cylinders with 1 mm mesh) was cast overboard and secured as the boat drifted into position.
- The sieve and core samplers were filled using the forward momentum of the work boat.
- The samplers were then hauled to the surface, and the contents of each sampler placed in a clean, labeled zip-lock plastic bag.
- A 250mL jar was filled using the sediment collected from the core samplers.
- Processing of samples occurred in the laboratory.
- A water quality profile from surface to bottom or near bottom was measured using a calibrated Yeo-Kal 618 Water Quality Analyser. (The maximum reach of the Analyser is about 9 meters.) Water temperature, conductivity, salinity, pH, ORP, dissolved oxygen, turbidity and depth were measured. Each line of data was stored in the memory of the machine.

In the laboratory the marine benthic samples were treated in the following way:

- Each sample was tipped into a 1 mm mesh sieve and washed free of mud and fine sand.
- The washed material from each sample was then placed into an enamel dish and sorted for organisms.
- Organisms and parts of organisms were removed, counted, identified and the results entered into a spread sheet. This process was repeated until the debris of the entire sample had been examined.
- Sorted organisms were preserved in formaldehyde solution.

The 250mL samples of whole sediment were treated in the following way:

- Each sample was tipped into a 1L clear glass measuring cylinder and the volume made up to 800mL with freshwater.
- The cylinders were stoppered and shaken vigorously to suspend the sediment in the freshwater.
- The cylinders were then placed on the laboratory bench to allow the fractions of the sediment to settle.
- Fractions were decanted into separate measuring cylinders and allowed to settle.
- Once settled the volumes of each fraction (silt, sand, gravel and shell) were calculated and recorded. Results were displayed relative to the final volume of sediment collected.

5. Monitoring Points

Figure 5.1 shows the location of benthic monitoring stations, mine workings, and the SSD-S465 Consent boundary for May 2025. Twenty-four stations were sampled, seven control stations, five reference stations and twelve impact monitoring stations. Table 5.1 provides the depth zone, actual depth to the seabed at the time of sampling, and the location of each sampling station by eastings and northings using GDA 2020 coordinates. Two depth zones within the mud basin were sampled, -4.5m AHD and -5.5 to -6.0m AHD. Figure 5.2 shows the development consent areas for Delta Coal.



Figure 5.1 Location of benthic monitoring stations and mine workings

Table 5.1 Location, depth zone and actual depth to seabed for control (C), referenece (R) and impact (I) monitoring stations

Station	Type	Depth Zone (m) AHD	Depth (m) AHD	GDA 2020 Easting	GDA 2020 Northing
C1	C	-4.50	-4.80	364519	6330815
C2	C	-4.50	-5.20	366214	6332927
C3	C	-5.5 to -6.0m AHD	-5.10	366014	6333144
C4	C	--5.5 to -6.0m AHD	-4.50	364260	6332794
C5	C	-5.5 to -6.0m AHD	-6.30	367701	6334310
C6	C	--5.5 to -6.0m AHD	-5.50	363988	6332492
C7	C	-5.5 to -6.0m AHD	-5.00	366276	6334947
R1	R	-4.50	-6.80	364177	6331535
R9	R	-4.50	-5.00	365258	6331210
R10	R	--5.5 to -6.0m AHD	-5.90	365172	6334706
R12	R	--5.5 to -6.0m AHD	-7.00	365919	6330294
R13	R	--5.5 to -6.0m AHD	-5.90	366357	6334708
IM1	I	-4.50	-5.00	364738	6330734
IM2	I	-4.50	-4.10	364842	6332237
IM3	I	--5.5 to -6.0m AHD	-5.90	364693	6332101
IM4	I	--5.5 to -6.0m AHD	-6.90	364873	6332705
IM5 (R3)	I	-5.5 to -6.0m AHD	-7.00	364660	6332992
IM6 (R4)	I	-5.5 to -6.0m AHD	-6.30	364771	6332763
IM7 (R5)	I	--5.5 to -6.0m AHD	-6.70	364229	6333889

IM8 (R6)	I	--5.5 to -6.0m AHD	-6.00	364533	6334146
IM9 (R8)	I	--5.5 to -6.0m AHD	-6.10	364523	6332010
IM10 (R2)	I	-4.50	-4.80	365919	6330294
IM11 (R7)	I	--5.5 to -6.0m AHD	-7.00	366232	6333856
IM12 (R11)	I	--5.5 to -6.0m AHD	-5.00	367072	6333639

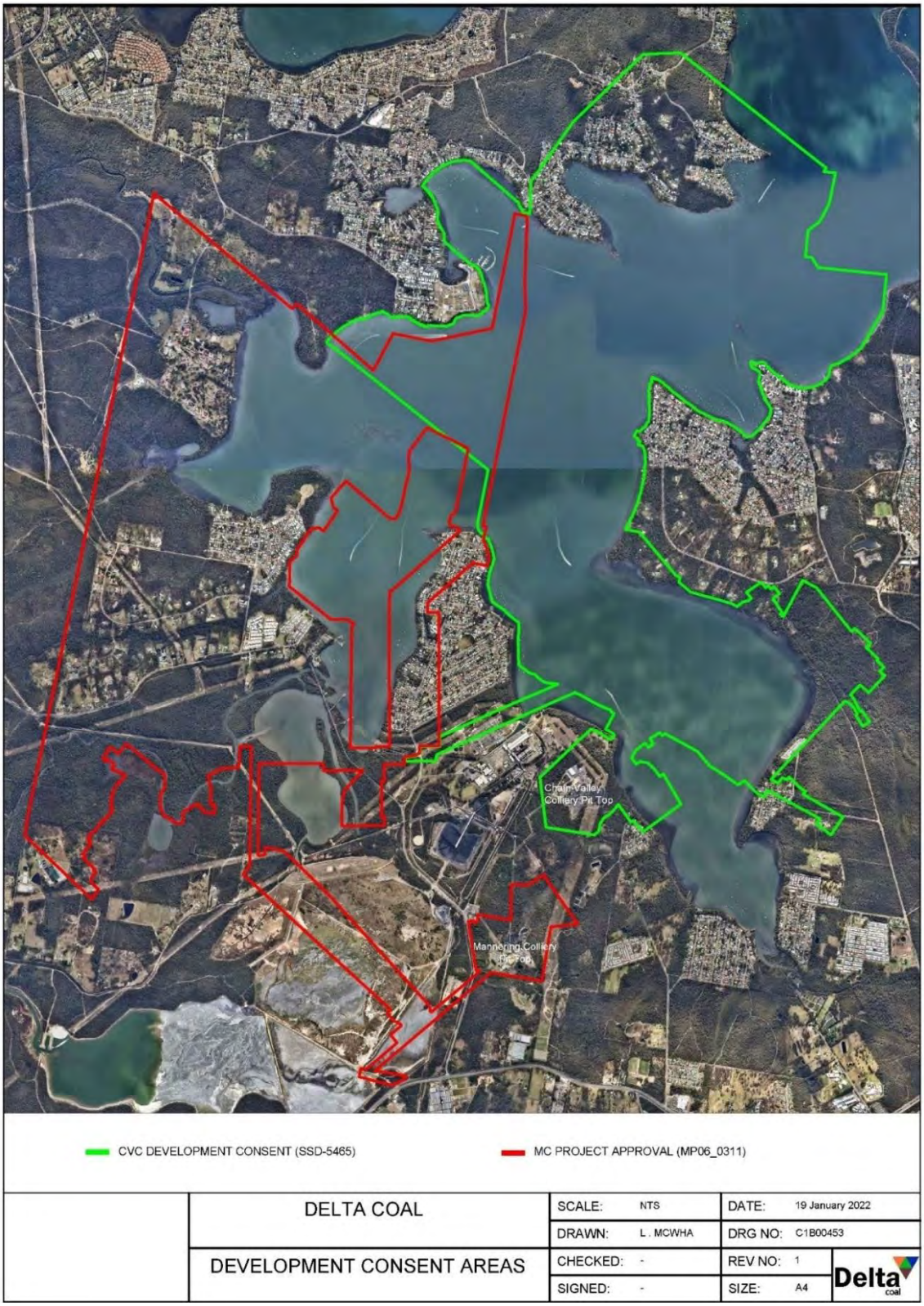


Figure 5.2 Development consent SSD-5465 and MP06_0311 areas

6. Results

a. Benthic organisms - Autumn 2025

Table 6A.1 shows the organisms found at each station sampled off Summerland Point and in Chain Valley Bay and Bardens Bay in May 2025. Benthic organisms were collected from twenty-four monitoring stations.

A total of 1207 benthic organisms greater than 1 mm in size were captured during the Autumn survey. These organisms represented twenty-one species (Table 6A.1). The fauna included one species of sponge (Plate A1), one nemertean and six polychaete worm species (Plate A3); eight bivalve species (Plate A5); one gastropod species (Plate A4); one chiton species (Plate A5), two echinoderm species (Plate A6) and one crab species.

In May 2025, the greatest numbers of organisms were collected at benthic monitoring stations C7 (307 organisms), IM12 (132 organisms), R13 (87 organisms) and IM11 (81 organisms). The stations with the least number of organisms captured were IM4 (9 organisms), IM6 (13 organisms), IM9 (12 organisms), IM10 (16 organisms) and IM3 (20 organisms). The number of organisms collected ranged from 24 to 307 organisms at the control monitoring stations, 26 to 87 organisms at the reference stations; and 9 to 132 organisms at the impact monitoring stations (Table 6A.1).

Polychaete worms and bivalves were the most commonly occurring organisms in the sediments off Summerland Point and in Chain Valley Bay and Bardens Bay in Autumn 2025. A total of 651 polychaetes were recorded, representing 53.9 percent of the organisms collected. *Sthenelais petitiboneae* was the most represented and widespread polychaete. It was found at all 24 benthic monitoring stations. A total of 295 *Sthenelais petitiboneae* were recorded, representing 24.4 percent of the organisms collected. The polychaete designated as “mud” was also found in relatively large numbers at 17 of the 24 monitoring stations. A total of 182 were recorded during the survey, representing 15.1 percent of the organisms collected. A total of 103 *Chaetopterus* parchment tubes were collected from 6 monitoring stations (Table 6A.1).

A total of 464 bivalves were collected during the benthic survey, representing 38.4 percent of the organisms collected. The most commonly occurring bivalve species were *Theora lubrica* (143 specimens), *Dosinia sp* (136 specimens), *Corbula sp* (89 specimens), *Trichomya hirsuta* (48 specimens), *Saccostrea glomerata* (17 specimens) and *Paphia undulata* (8 specimens). *Theora lubrica* was collected at 23 of the 24 monitoring stations. *Dosinia* was collected from nine monitoring stations,

with the majority (116 specimens) collected at benthic monitoring station C7. *Corbula* was collected from 17 monitoring stations. A total of 89 were recorded, mostly from monitoring stations IM7 (13 specimens), C2 (12 specimens) and R9 (10 specimens). *Trichomya hirsuta* was found at three monitoring stations only. The station with the greatest number of *Trichomya hirsuta* was IM11 with 42 specimens. Monitoring station IM11 also had a relatively high number of *Saccostrea glomerata* or the Sydney rock oyster (12 specimens). *Paphia undulata* was recorded at six of the monitoring stations only (Table 6A.1).

Two echinoid species were sampled. The sea star *Astropecten polyacanthus* was recorded at C7 (1 specimen) only. The brittle star *Ophionereis schayeri* was found at IM11 (3 specimens), R13 (4 specimens), C5 (2 specimens), IM2 (2 specimens), IM5 (1 specimen) and IM12 (1 specimen) (Table 6A.1).

A total of 57 sea slugs were recorded during the survey. *Philine angasi* was found at seven monitoring stations. The sites with the greatest number of *Philine* were C7 (38 specimens), R13 (6 specimens), IM12 (5 specimens), C3 (4 specimens) and IM3 (2 specimens).

One specimen of the sponge *Tetilla sp* was found at IM12 (Table 6A.1), and crab species were recorded at six stations with the greatest number caught at IM11 (8 specimens).

At the time of survey sampling sites with benthos comprised predominantly of silt, were defined by relatively high numbers of the polychaete *Sthenelais petitiboneae*, and the bivalves *Theora lubrica* and *Paphia undulata.* Benthos with high portions of sand and/ or gravel were characterized by relatively higher numbers of the polychaete worms from the Chaetopteridae, Pectinariidae and Diopatra families, and the bivalve *Dosinia*. Stations that comprised predominantly of shell substrate were characterized by the presence of the mussel *Trichomya hirsuta* and the oyster *Saccostrea glomerata* (Figs 6A.1 and 6A.2, Table 6B.2). *Saccostrea glomerata* encrusted the large shell fragments.

Table 6A.1 Organisms found in the sediments during Autumn 2025 benthic communities survey.

Control Station C1		Depth zone -4.50m AHD		Depth at time of survey -4.8m AHD				56 364519	6330815		Sampled 5-6 May 2025						
Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Bedeva*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid	Crab
C1.1	0	3	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
C1.2	0	3	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0
C1.3	0	2	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0
C1.4	0	4	0	0	0	0	0	0	0	2	3	0	1	0	0	0	0
C1.5	0	1	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0
Total	**0**	**13**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**5**	**14**	**0**	**1**	**0**	**0**	**0**	**0**
Mean/station	0.0	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	2.8	0.0	0.2	0.0	0.0	0.0	0.0
no./m2	0	65	0	0	0	0	0	0	0	25	70	0	5	0	0	0	0
No. species		**4**												**Total Organisms at Station**			**33**

Control Station C2		Depth zone-4.50m AHD		Depth at time of survey -5.2m AHD				56 366214	6332927		Sampled 5-6 May 2025						
Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Bedeva*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid	Crab
C2.1	0	1	0	2	0	0	0	0	0	3	1	0	0	0	0	0	0
C2.2	0	0	2	2	0	0	0	0	0	5	3	0	0	0	0	0	0
C2.3	0	0	0	2	0	0	0	0	0	3	2	0	0	0	0	0	0
C2.4	0	1	0	3	0	0	0	0	0	1	2	0	0	0	0	0	0
C2.5	0	2	0	1	0	0	0	0	0	0	3	0	0	0	0	0	0
Total	**0**	**4**	**2**	**10**	**0**	**0**	**0**	**0**	**0**	**12**	**11**	**0**	**0**	**0**	**0**	**0**	**0**
Mean/station	0.0	0.8	0.4	2.0	0.0	0.0	0.0	0.0	0.0	2.4	2.2	0.0	0.0	0.0	0.0	0.0	0.0
no./m2	0	20	10	50	0	0	0	0	0	60	55	0	0	0	0	0	0
No. species		**5**												**Total Organisms at Station**			**39**

Control Station C3		Depth zone -5.50m AHD		Depth at time of survey -5.1m AHD				56 366014	6333144		Sampled 5-6 May 2025						
Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Philine*	Gastropod *Bedeva*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid	Crab
C3.1	0	4	0	2	0	0	0	2	0	0	1	0	0	0	0	0	0
C3.2	0	2	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
C3.3	0	4	0	1	0	0	0	0	0	0	4	0	0	0	0	0	1
C3.4	0	5	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0
C3.5	0	0	0	2	0	0	0	2	0	0	5	0	0	0	0	0	0
Total	**0**	**15**	**0**	**5**	**0**	**0**	**0**	**4**	**0**	**0**	**12**	**1**	**2**	**0**	**0**	**0**	**1**
Mean/station	0.0	3.0	0.0	1.0	0.0	0.0	0.0	0.8	0.0	0.0	2.4	0.2	0.4	0.0	0.0	0.0	0.2
no./m2	0	75	0	25	0	0	0	20	0	0	60	5	10	0	0	0	5
No. species		**7**												**Total Organisms at Station**			**40**

Control Station C4 Depth zone -5.50m AHD Depth at time of survey -4.5m AHD 56 364260 6332794 Sampled 5-6 May 2025

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Bedeva*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid	Crab
C4.1	1	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
C4.2	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C4.3	0	4	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0
C4.4	1	3	0	3	0	0	0	0	0	1	1	0	0	0	0	0	0
C4.5	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**3**	**18**	**2**	**4**	**0**	**0**	**0**	**0**	**0**	**2**	**1**	**0**	**0**	**0**	**0**	**0**	**0**
Mean/station	0.6	3.6	0.4	0.8	0.0	0.0	0.0	0.0	0.0	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0
no./m2	15	90	10	20	0	0	0	0	0	10	5	0	0	0	0	0	0

No. species 6 **Total Organisms at Station** 30

Control Station C5 Depth zone -5.50m AHD Depth at time of survey -6.3m AHD 56 367701 6334510 Sampled 5-6 May 2025

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Bedeva*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid *Ophionereis*	Crab
C5.1	0	5	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0
C5.2	0	3	2	2	0	0	0	0	0	0	1	0	0	0	0	1	0
C5.3	0	2	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
C5.4	0	3	0	4	7	0	0	0	0	0	0	0	0	0	0	1	0
C5.5	0	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**16**	**2**	**14**	**10**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**2**	**0**
Mean/station	0.0	3.2	0.4	2.8	2.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.4	0.0
no./m2	0	80	10	70	50	0	0	0	0	0	5	0	0	0	0	10	0

No. species 6 **Total Organisms at Station** 45

Control Station C6 Depth zone -5.50m AHD Depth at time of survey -5.5m AHD 56 363988 6332492 Sampled 5-6 May 2025

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Bedeva*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid	Crab
C6.1	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
C6.2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C6.3	0	2	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0
C6.4	0	6	0	0	0	0	0	0	0	2	0	0	0	0	0	0	1
C6.5	0	3	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Total	**0**	**13**	**1**	**2**	**0**	**0**	**0**	**0**	**0**	**4**	**3**	**0**	**0**	**0**	**0**	**0**	**1**
Mean/station	0.0	2.6	0.2	0.4	0.0	0.0	0.0	0.0	0.0	0.8	0.6	0.0	0.0	0.0	0.0	0.0	0.2
no./m2	0	65	5	10	0	0	0	0	0	20	15	0	0	0	0	0	5

No. species 6 **Total Organisms at Station** 24

Control Station C7 Depth zone -5.50m AHD Depth at time of survey -5.0m AHD 56 364736 6334947 Sampled 5-6 May 2025

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Philine*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Asteroidea *Astropecten*	Crab
C7.1	1	1	4	15	5	3	0	0	13	0	2	0	24	0	0	0	1
C7.2	0	1	2	20	10	0	0	0	5	0	3	0	22	0	0	0	0
C7.3	0	3	5	15	2	8	0	0	5	0	4	0	24	0	0	0	0
C7.4	0	0	3	11	6	11	0	0	11	0	1	0	22	0	0	1	0
C7.5	0	0	0	9	3	3	0	0	4	0	0	0	24	0	0	0	0
Total	**1**	**5**	**14**	**70**	**26**	**25**	**0**	**0**	**38**	**0**	**10**	**0**	**116**	**0**	**0**	**1**	**1**
Mean/station	0.2	1.0	2.8	14.0	5.2	5.0	0.0	0.0	7.6	0.0	2.0	0.0	23.2	0.0	0.0	0.2	0.2
no./m2	5	25	70	350	130	125	0	0	190	0	50	0	580	0	0	5	5

No. species 11 **Total Organisms at Station** 307

Station R1 Depth zone -4.50m AHD Depth at time of survey -4.6m AHD 56 364177 6331535 Sampled 5-6 May 2025

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Bedeva*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid	Crab
R1.1	0	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
R1.2	0	8	0	1	0	0	0	0	0	2	1	0	0	0	0	0	0
R1.3	0	3	0	0	0	0	0	0	0	4	2	0	0	0	0	0	0
R1.4	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0
R1.5	0	6	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**18**	**0**	**2**	**3**	**1**	**0**	**0**	**0**	**6**	**5**	**0**	**0**	**0**	**0**	**0**	**0**
Mean/station	0.0	3.6	0.0	0.4	0.6	0.2	0.0	0.0	0.0	1.2	1.0	0.0	0.0	0.0	0.0	0.0	0.0
no./m2	0	90	0	10	15	5	0	0	0	30	25	0	0	0	0	0	0

No. species 6 **Total Organisms at Station** 35

Station R9 Depth zone -6.00m AHD Depth at time of survey -5.0m AHD 56 366232 6331210 Sampled 5-6 May 2025

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Bedeva*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid	Crab
R9.1	0	1	0	0	0	0	0	0	0	3	2	0	0	0	0	0	0
R9.2	0	2	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
R9.3	0	3	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0
R9.4	0	3	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
R9.5	0	2	0	0	0	0	0	0	0	3	3	0	0	0	0	0	0
Total	**0**	**11**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**10**	**8**	**0**	**0**	**0**	**0**	**0**	**0**
Mean/station	0.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0
no./m2	0	55	0	0	0	0	0	0	0	50	40	0	0	0	0	0	0

No. species 3 **Total Organisms at Station** 29

Station R10 Depth zone -6.00m AHD Depth at time of survey -5.9m AHD 56 365172 6334708 Sampled 5-6 May 2025

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Philine*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid	Crab
R10.1	0	4	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
R10.2	0	3	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0
R10.3	0	6	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0
R10.4	0	3	0	2	0	0	0	0	1	2	0	0	0	0	0	0	0
R10.5	0	4	0	0	0	0	0	0	0	5	3	0	0	0	0	0	0
Total	**0**	**20**	**0**	**2**	**0**	**0**	**0**	**0**	**1**	**11**	**7**	**1**	**0**	**0**	**0**	**0**	**0**
Mean/station	0.0	4.0	0.0	0.4	0.0	0.0	0.0	0.0	0.2	2.2	1.4	0.2	0.0	0.0	0.0	0.0	0.0
no./m2	0	100	0	10	0	0	0	0	5	55	35	5	0	0	0	0	0

No. species 6 **Total Organisms at Station** 42

Station R12 Depth zone -6.00m AHD Depth at time of survey -7.0m AHD 56 365919 6330294 Sampled 5-6 May 2025

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Philine*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid	Crab
R12.1	0	3	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0
R12.2	0	3	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0
R12.3	0	4	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0
R12.4	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0
R12.5	0	5	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0
Total	**0**	**15**	**1**	**2**	**0**	**0**	**0**	**0**	**1**	**1**	**5**	**1**	**0**	**0**	**0**	**0**	**0**
Mean/station	0.0	3.0	0.2	0.4	0.0	0.0	0.0	0.0	0.2	0.2	1.0	0.2	0.0	0.0	0.0	0.0	0.0
no./m2	0	75	5	10	0	0	0	0	5	5	25	5	0	0	0	0	0

No. species 7 **Total Organisms at Station** 26

Station R13 Depth zone -5.50m AHD Depth at time of survey -5.9m AHD 56 366357 6334708 Sampled 5-6 May 2025

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Philine*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid *Ophionereis*	Crab
R13.1	0	0	1	3	1	0	1	0	0	0	0	0	4	0	0	0	0
R13.2	0	3	0	5	5	0	0	0	4	0	1	0	0	0	0	0	0
R13.3	0	4	0	5	4	3	0	0	0	0	2	0	0	0	0	1	0
R13.4	1	9	0	5	9	0	0	0	1	0	0	1	0	0	0	3	0
R13.5	0	2	0	3	3	1	0	0	1	0	1	0	0	0	0	0	0
Total	**1**	**18**	**1**	**21**	**22**	**4**	**1**	**0**	**6**	**0**	**4**	**1**	**4**	**0**	**0**	**4**	**0**
Mean/station	0.2	3.6	0.2	4.2	4.4	0.8	0.2	0.0	1.2	0.0	0.8	0.2	0.8	0.0	0.0	0.8	0.0
no./m2	5	90	5	105	110	20	5	0	30	0	20	5	20	0	0	20	0

No. species 12 **Total Organisms at Station** 87

Station IM1 Depth zone -4.50m AHD Depth at time of survey -5.0m AHD 56 364738 6330734 Sampled 5-6 May 2025

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Bedeva*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid	Crab
IM1.1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IM1.2	0	4	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
IM1.3	1	6	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
IM1.4	0	5	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0
IM1.5	0	3	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Total	**1**	**20**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**5**	**3**	**0**	**0**	**0**	**0**	**0**	**0**
Mean/station	0.2	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0
no./m2	5	100	0	0	0	0	0	0	0	25	15	0	0	0	0	0	0

No. species 4 **Total Organisms at Station** 29

Station IM2 Depth zone -4.50m AHD Depth at time of survey -4.1m AHD 56 364842 6332237 Sampled 5-6 May 2025

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Bivalve *Saccostrea*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid *Ophionereis*	Crab
IM2.1	0	5	0	2	0	0	0	0	5	1	1	0	0	1	5	0	0
IM2.2	0	5	0	4	1	0	0	0	0	0	2	0	0	0	0	0	1
IM2.3	0	6	0	2	0	0	0	0	0	0	2	1	0	0	0	1	1
IM2.4	0	2	0	1	0	0	0	0	0	0	1	0	3	0	0	1	0
IM2.5	0	5	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0
Total	**0**	**23**	**0**	**9**	**1**	**0**	**0**	**0**	**5**	**7**	**6**	**1**	**3**	**1**	**5**	**2**	**2**
Mean/station	0.0	4.6	0.0	1.8	0.2	0.0	0.0	0.0	1.0	1.4	1.2	0.2	0.6	0.2	1.0	0.4	0.4
no./m2	0	115	0	45	5	0	0	0	25	35	30	5	15	5	25	10	10

No. species 12 **Total Organisms at Station** 65

Station IM3 Depth zone -5.50m AHD Depth at time of survey -5.9m AHD 56 364693 6332101 Sampled 5-6 May 2025

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Philine*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid	Crab
IM3.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IM3.2	0	2	0	0	0	0	0	0	1	2	1	0	0	0	0	0	0
IM3.3	0	3	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0
IM3.4	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
IM3.5	0	3	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
Total	**0**	**10**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**5**	**3**	**0**	**0**	**0**	**0**	**0**	**0**
Mean/station	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0
no./m2	0	50	0	0	0	0	0	0	10	25	15	0	0	0	0	0	0

No. species 4 **Total Organisms at Station** 20

Station IM4 Depth zone -6.00m AHD Depth at time of survey -6.9m AHD 56 364673 6332705 Sampled 5-6 May 2025

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Bedeva*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid	Crab
IM4.1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
IM4.2	0	1	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0
IM4.3	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
IM4.4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
IM4.5	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Total	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**6**	**0**	**0**	**0**	**0**	**0**	**0**
Mean/station	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.2	0.0	0.0	0.0	0.0	0.0	0.0
no./m2	0	10	0	0	0	0	0	0	0	5	30	0	0	0	0	0	0

No. species 3 **Total Organisms at Station** 9

Station IM5 (was R3) Depth zone -5.50m AHD Depth at time of survey -7.0 m AHD 56 364660 6332992 Sampled 5-6 May 2025

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Bedeva*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Mactra*	Bivalve *Trichomya*	Ophuroid *Ophionereis*	Crab
IM5.1	0	2	0	1	0	0	0	0	0	3	0	1	0	0	0	0	0
IM5.2	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IM5.3	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0
IM5.4		3	0	1	0	0	0	0	0	1	1	1	2	0	1	0	0
IM5.5	0	4	0	1	0	0	0	0	0	0	2	1	0	0	0	1	0
Total	**0**	**12**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**7**	**3**	**3**	**2**	**0**	**1**	**1**	**0**
Mean/station	0.0	2.4	0.0	0.6	0.0	0.0	0.0	0.0	0.0	1.4	0.6	0.6	0.4	0.0	0.2	0.2	0.0
no./m2	0	60	0	15	0	0	0	0	0	35	15	15	10	0	5	5	0

No. species 8 **Total Organisms at Station** 32

Station IM6 (was R4) Depth zone -6.00m AHD Depth at time of survey -6.3 m AHD 56 364771 6332763 Sampled 5-6 May 2025

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Bedeva*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid	Crab
IM6.1	0	3	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
IM6.2	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0
IM6.3	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
IM6.4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IM6.5	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
Total	**0**	**7**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**2**	**3**	**0**	**0**	**0**	**0**	**0**	**0**
Mean/station	0.0	1.4	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.4	0.6	0.0	0.0	0.0	0.0	0.0	0.0
no./m2	0	35	0	5	0	0	0	0	0	10	15	0	0	0	0	0	0

No. species 4 **Total Organisms at Station** 13

Station IM7 (was R5) Depth zone -6.00m AHD Depth at time of survey -6.7 m AHD 56 364229 6333889 Sampled 5-6 May 2025

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Bedeva*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid	Crab
IM7.1	0	1	0	1	0	0	0	0	0	1	3	0	0	0	0	0	0
IM7.2	0	7	0	0	0	0	0	0	0	6	3	0	1	0	0	0	0
IM7.3	0	4	0	0	0	0	0	0	0	4	2	0	0	0	0	0	0
IM7.4	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
IM7.5	0	5	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Total	**0**	**17**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**13**	**8**	**0**	**1**	**0**	**0**	**0**	**0**
Mean/station	0.0	3.4	0.0	0.2	0.0	0.0	0.0	0.0	0.0	2.6	1.6	0.0	0.2	0.0	0.0	0.0	0.0
no./m2	0	85	0	5	0	0	0	0	0	65	40	0	5	0	0	0	0

No. species 5 **Total Organisms at Station** 40

Station IM8 (was R6) Depth zone -6.00m AHD Depth at time of survey -6.8 m AHD 56 364533 6334146 Sampled 5-6 May 2025

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Bedeva*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid	Crab
IM8.1	0	3	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0
IM8.2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
IM8.3	0	2	0	1	0	0	0	0	0	3	0	0	0	0	0	0	0
IM8.4	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
IM8.5	0	3	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
Total	**0**	**8**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**6**	**5**	**0**	**0**	**0**	**0**	**0**	**0**
Mean/station	0.0	1.6	0.0	0.4	0.0	0.0	0.0	0.0	0.0	1.2	1.0	0.0	0.0	0.0	0.0	0.0	0.0
no./m2	0	40	0	10	0	0	0	0	0	30	25	0	0	0	0	0	0

No. species 4 **Total Organisms at Station** 21

Station IM9 (was R8) Depth zone -6.00m AHD Depth at time of survey -6.1 m AHD 56 364323 63322010 Sampled 5-6 May 2025

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Bedeva*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid	Crab
IM9.1	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
IM9.2	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
IM9.3	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
IM9.4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IM9.5	0	2	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
Total	**0**	**7**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**
Mean/station	0.0	1.4	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0
no./m2	0	35	0	5	0	0	0	0	0	0	20	0	0	0	0	0	0

No. species 3 **Total Organisms at Station** 12

Station IM10 (was R2) Depth zone -4.50m AHD Depth at time of survey -4.8 m AHD 56 365919 6330294 Sampled 5-6 May 2025

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Bedeva*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid	Crab
IM10.1	0	2	0	0	0	0	0	0	0	2	3	0	0	0	0	0	0
IM10.2	0	1	0	0	0	0	0	0	0	4	0	0	0	1	0	0	0
IM10.3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IM10.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IM10.5	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**6**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**6**	**3**	**0**	**0**	**1**	**0**	**0**	**0**
Mean/station	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.6	0.0	0.0	0.2	0.0	0.0	0.0
no./m2	0	30	0	0	0	0	0	0	0	30	15	0	0	5	0	0	0

No. species 4 **Total Organisms at Station** 16

Station IM11 (was R7) Depth zone -6.00m AHD Depth at time of survey -7.0 m AHD 56 366232 6333856 Sampled 5-6 May 2025

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Mollusca Polyplacophora	Ophuroid *Ophionereis*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve juvenile	Bivalve *Trichomya*	Bivalve *Saccostrea*	Crab
IM11.1	0	3	1	0	0	0	0	0	0	0	0	0	0	0	5	0	4
IM11.2	0	2	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0
IM11.3	0	2	0	0	0	0	0	0	2	0	0	0	0	0	13	2	1
IM11.4	0	1	0	0	0	0	0	0	0	0	0	0	1	0	18	7	0
IM11.5	0	1	1	0	0	0	0	1	1	0	0	0	0	0	6	3	3
Total	**0**	**9**	**3**	**0**	**0**	**0**	**0**	**1**	**3**	**0**	**0**	**0**	**1**	**2**	**42**	**12**	**8**
Mean/station	0.0	1.8	0.6	0.0	0.0	0.0	0.0	0.2	0.6	0.0	0.0	0.0	0.2	0.4	8.4	2.4	1.6
no./m2	0	45	15	0	0	0	0	5	15	0	0	0	5	10	210	60	40

No. species 9 **Total Organisms at Station** 81

Station IM12 (was R11) Depth zone -6.00m AHD Depth at time of survey -5.0 m AHD 56 367072 6333638 Sampled 5-6 May 2025

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Porifera *Tetilla*	Gastropod *Philine*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve juvenile	Bivalve *Trichomya*	Ophuroid *Ophionereis*	Crab
R11.1	0	0	2	11	12	3	0	0	1	0	8	0	0	0	0	1	0
R11.2	0	5	1	1	7	1	0	0	0	0	0	0	2	0	0	1	1
R11.3	0	2	1	9	8	0	0	0	0	0	1	0	0	0	0	0	0
R11.4	0	0	0	10	9	3	0	0	0	0	5	0	2	0	0	1	0
R11.5	1	1	0	2	5	3	0	1	4	0	3	0	2	2	0	0	0
Total	**1**	**8**	**4**	**33**	**41**	**10**	**0**	**1**	**5**	**0**	**17**	**0**	**6**	**2**	**0**	**3**	**1**
Mean/station	0.2	1.6	0.8	6.6	8.2	2.0	0.0	0.2	1.0	0.0	3.4	0.0	1.2	0.4	0.0	0.6	0.2
no./m2	5	40	20	165	205	50	0	5	25	0	85	0	30	10	0	15	5

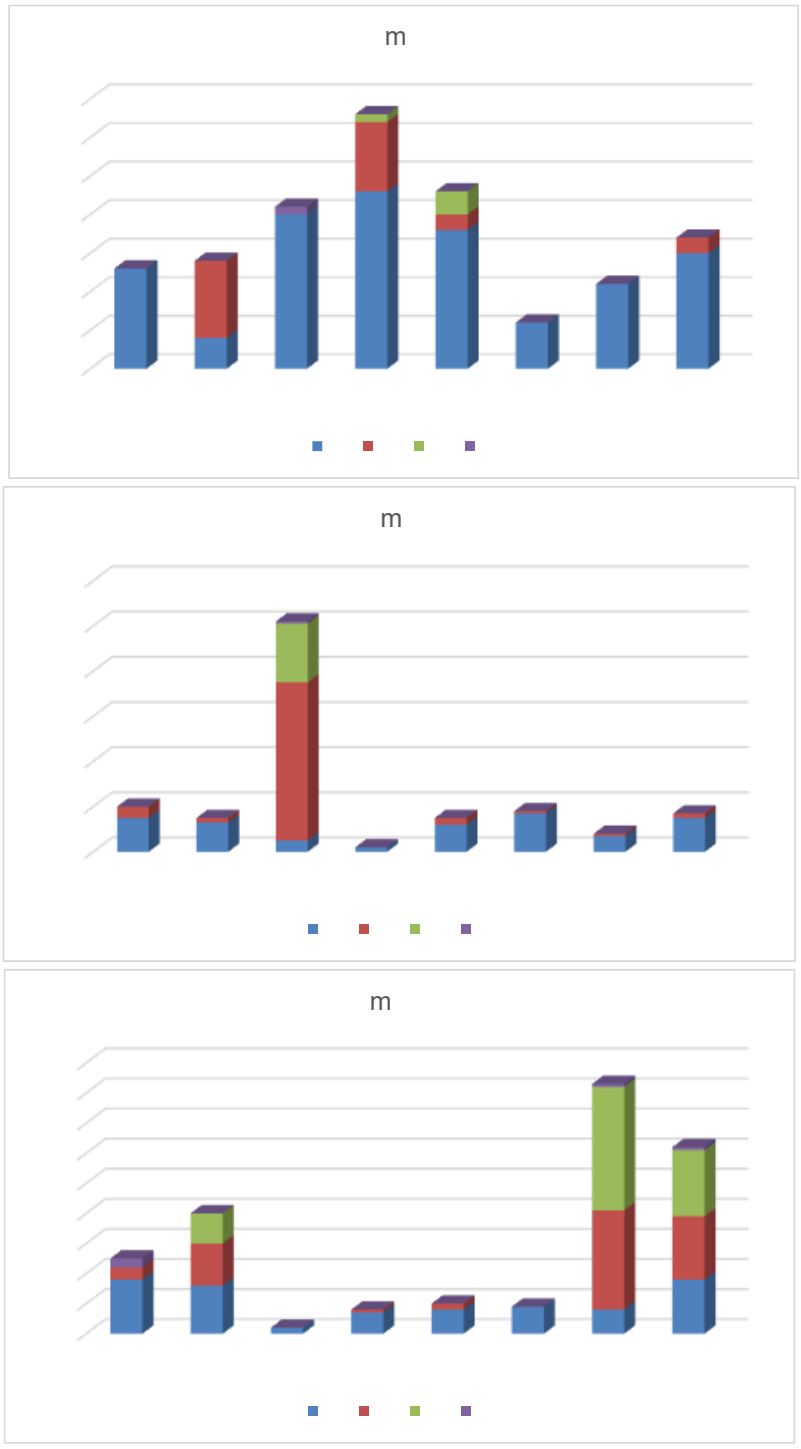
No. species 12 **Total Organisms at Station** 132

Total Organisms Collected 1207
Total number of species recorded 20

The dominant species such as the polychaetes *Sthenelais* and *Chaetopterus* and the bivalves *Theora*, *Corbula* and *Dosinia* were present at each depth zone. This indicates that at the time of the survey, water depth was not influencing the presence of these organisms in the sediments (Figures 6A.1 and 6A.2).

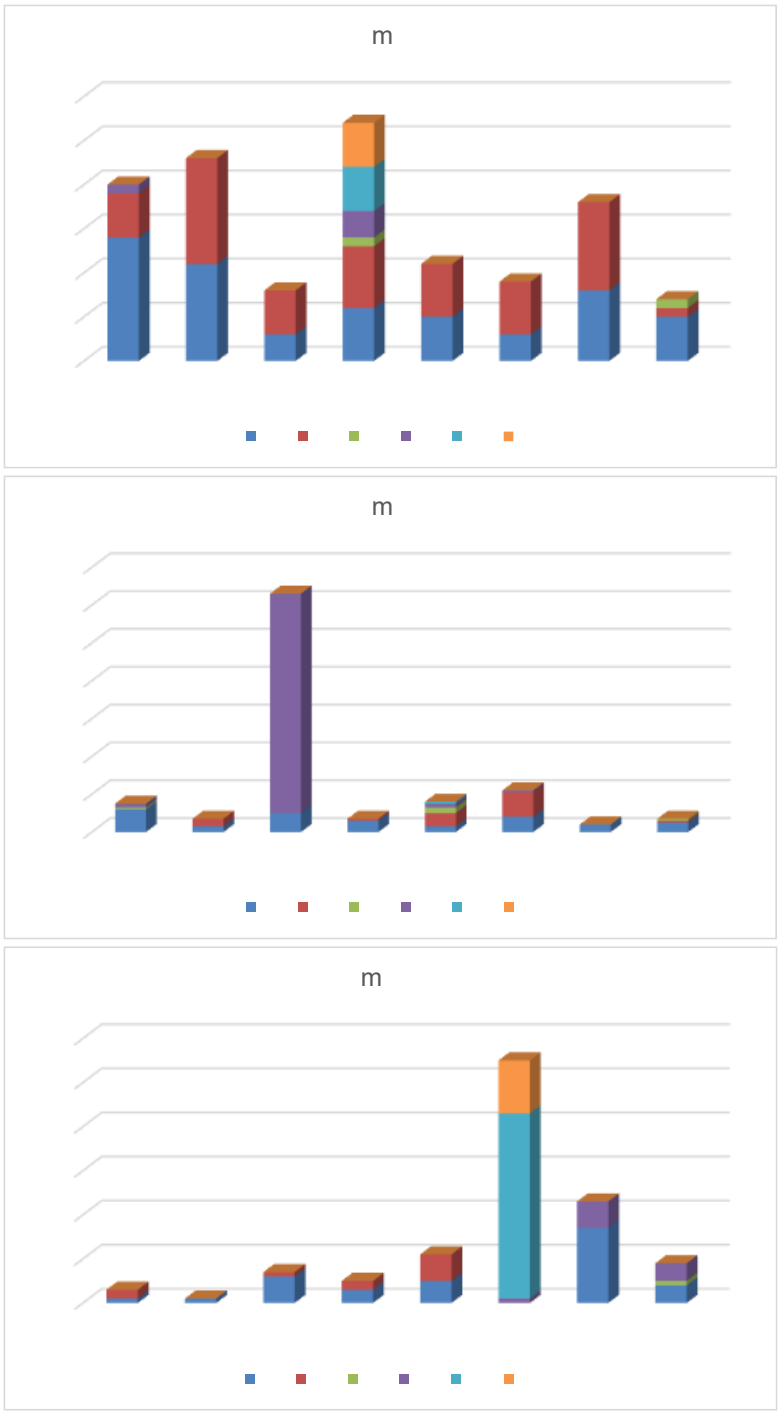
In Autumn 2025, the sampling stations with the greatest organism diversity were R13, IM2, IM12, C7 and IM11 with 12, 12, 12, 11 and 9 species recorded respectively. Stations IM5 (8), R12 (7) and C3 (7) also had relatively high organism diversity. Benthic monitoring stations R9, IM4 and IM9 had the lowest organism diversity with 3 species recorded at each station (Table 6A.2). Species diversity ranged from 4 to 11 species at the control stations, 3 to 12 species at the impact stations, and 3 to 12 species at the reference stations. Comparisons of the number of species collected at each monitoring station over a fourteen-year period revealed no discernable differences in diversity with water depth (Table 6A.2).

These findings support previous data collected between September 2016 and March 2020 in the Chain Valley Bay, Bardens Bay and Summerland Point regions. Despite reported changes in bed levels associated with Chain Valley Colliery underground workings, no statistical differences were found between the benthic assemblages at sites designated as Impact, Reference and Control stations (EMM, 2020).



P1 *Sthenelais pettiboneae* P2 Polychaete mud P3 Chaetopteridae P4 *Gorgonorhynchus repens*

Figure 6A.1 Number of worms found at each control, reference and impact Station, May 2025



B1 *Theora* B2 *Corbula* B3 *Paphia* B4 *Dosinia* B5 *Trichomya* B6 *Saccostrea*

Figure 6A.2 Number of bivalves found at each control, reference and impact Station, May 2025

Table 6A.2 Number of species found at each monitoring station with depth – years 2012 to 2025

-4.5m AHD. Overall mean: 5.18

Station	C1	C2	IM1	IM2	IM10 (R2)	R1	R9	R12
Feb 2012	10	5	7	4	8	8		
Sep 2012	3	6	4	4	3	6		
Mar 2013	4	5	7	5	5	6		
Sep 2013	6	6	4	3	6	5		
Mar 2014	4	3	5	9	4	6		
Sep 2014	3	4	5	6	5	6		
Mar 2015	3	3	5	4	3	5		
Sep 2015	5	4	5	5	3	5		
Mar 2016	6	4	6	6	5	6		
Sep 2016	7	3	6	4	4	8	8	
Mar 2017	2	4	3	4	5	4	5	
Sep 2017	4	4	5	5	3	4	4	
Mar 2018	4	4	5	7	8	7	4	
Sep 2018	3	4	4	8	4	4	5	
Mar 2019	6	3	5	5	5	4	4	
Sep 2019	5	6	6	5	3	4	4	
Mar 2020	5	6	7	7	6	6	4	
Aug 2020	6	5	5	6	5	4	5	
Mar 2021	5	6	7	7	4	5	6	
Sep 2021	4	4	3	7	4	5	4	
Mar 2022	5	6	5	6	4	6	5	
Sep 2022	5	5	6	8	5	6	7	
Mar 2023	6	6	8	9	4	6	6	
Mar 2024	6	6	9	8	3	7	4	5
May 2025	4	5	4	12	4	6	3	7
Mean	**4.84**	**4.68**	**5.44**	**6.16**	**4.52**	**5.56**	**4.88**	**6.00**
STD	**1.65**	**1.11**	**1.47**	**2.08**	**1.39**	**1.19**	**1.31**	**1.41**
Min	**2**	**3**	**3**	**3**	**3**	**4**	**3**	**5**
Max	**10**	**6**	**9**	**12**	**8**	**8**	**8**	**7**

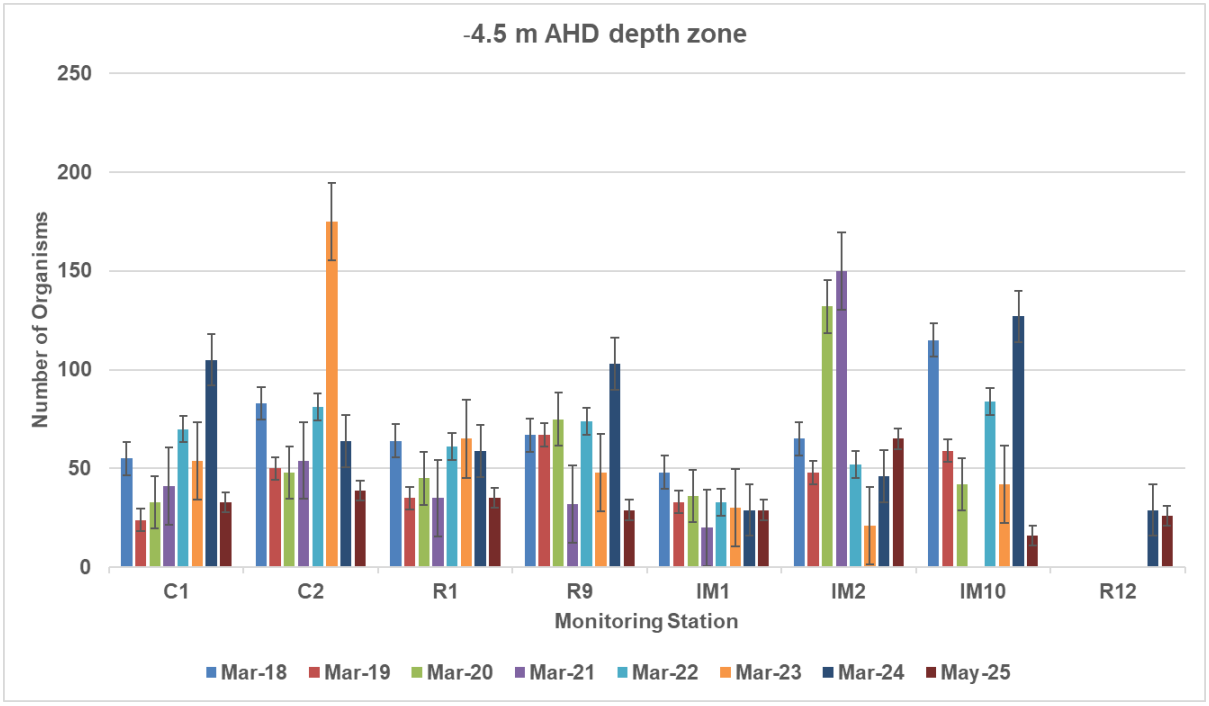
-5.5m AHD. Overall mean: 5.01

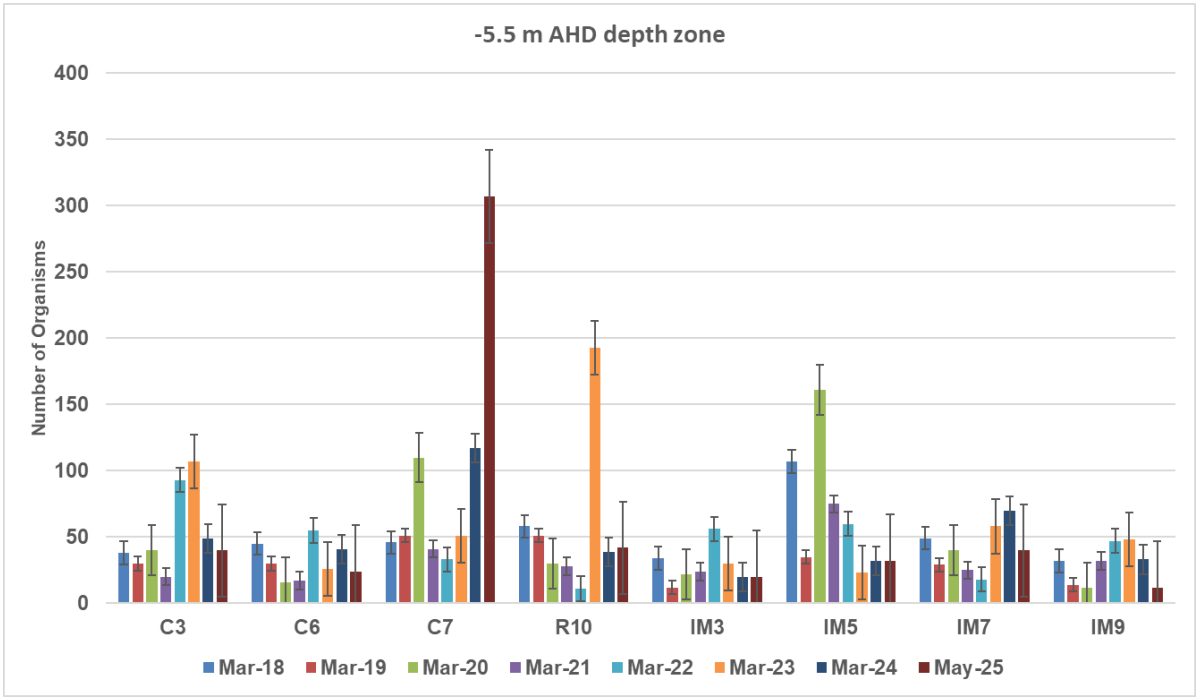
Station	C3	C6	C7	IM3	IM5 (R3)	IM7 (R5)	IM9 (R8)	R10
Feb 2012	5			4	5			
Sep 2012	4			3	4			
Mar 2013	7			5	6			
Sep 2013	3			4	5			
Mar 2014	5			4	5	4		
Sep 2014	4			3	6	3		
Mar 2015	5			4	6	3		
Sep 2015	4			4	4	5		
Mar 2016	5			3	6	4		
Sep 2016	6	8		6	5	6	5	
Mar 2017	5	5		3	4	4	3	
Sep 2017	4	5		5	6	4	5	
Mar 2018	8	3	5	3	5	6	3	4
Sep 2018	4	5	5	4	5	5	4	4
Mar 2019	4	5	3	2	7	5	4	6
Sep 2019	5	5	6	7	7	4	4	4
Mar 2020	6	3	6	4	7	4	3	4
Aug 2020	4	5	5	4	7	7	4	5
Mar 2021	3	2	2	5	7	5	4	5
Sep 2021	7	7	6	4	8	4	3	6
Mar 2022	4	7	4	5	9	4	3	6
Sep 2022	7	5	6	6	7	5	6	6
Mar 2023	5	4	6	4	4	4	6	5
Mar 2024	9	6	8	6	12	5	4	5
May 2025	7	6	11	4	8	5	3	6
Mean	**5.20**	**5.06**	**5.62**	**4.24**	**6.20**	**4.57**	**4.00**	**5.08**
STD	**1.55**	**1.57**	**2.22**	**1.16**	**1.83**	**0.98**	**1.03**	**0.86**
Min	**3**	**2**	**2**	**2**	**4**	**3**	**3**	**4**
Max	**9**	**8**	**11**	**7**	**12**	**7**	**6**	**6**

-6m AHD. Overall mean: 5.12

Station	C4	C5	IM4	IM6 (R4)	IM8 (R6)	IM11 (R7)	IM12 (R11)	R13
Feb 2012	7		5	5				
Sep 2012	4		5	5				
Mar 2013	7		5	5				
Sep 2013	7		5	4				
Mar 2014	5		5	3	3			
Sep 2014	8		6	6	3			
Mar 2015	3		5	5	3			
Sep 2015	3		4	6	4			
Mar 2016	5	5	4	4	4	8		
Sep 2016	5	4	3	6	7	7		
Mar 2017	3	5	4	5	4	4		
Sep 2017	4	4	5	5	4	4		
Mar 2018	4	4	4	4	3	4	4	
Sep 2018	6	5	4	5	4	6	4	
Mar 2019	4	6	4	3	4	4	6	
Sep 2019	5	4	5	4	4	5	3	
Mar 2020	4	7	4	4	4	8	4	
Aug 2020	4	3	6	4	5	8	4	
Mar 2021	4	5	7	4	5	5	8	
Sep 2021	6	7	4	3	4	7	7	
Mar 2022	7	6	6	7	4	8	6	
Sep 2022	7	6	3	6	4	4	5	
Mar 2023	6	6	7	4	5	5	4	
Mar 2024	6	8	4	4	4	13	7	9
May 2025	6	6	3	4	4	9	12	12
Mean	**5.20**	**5.35**	**4.68**	**4.60**	**4.10**	**6.41**	**5.69**	**10.50**
STD	**1.47**	**1.32**	**1.11**	**1.04**	**0.89**	**2.45**	**2.43**	**2.12**
Min	**3**	**3**	**3**	**3**	**3**	**4**	**3**	**9**
Max	**8**	**8**	**7**	**7**	**7**	**13**	**12**	**12**

Figure 6A.3 shows the number of organisms collected at each station from 2018 to 2025. Comparisons between the number of organisms collected during the Autumn sampling periods of March 2024 and May 2025 showed an increase in the numbers of organisms collected at seven of the 24 monitoring stations, a decrease at thirteen stations, and no change at four stations.


-4.5 m AHD depth zone
250
200
150
100
50
0
Number of Organisms
C1
C2
R1
R9
IM1
IM2
IM10
R12
Monitoring Station
Mar-18
Mar-19
Mar-20
Mar-21
Mar-22
Mar-23
Mar-24
May-25


-5.5 m AHD depth zone
400
350
300
250
200
150
100
50
0
Number of Organisms
C3
C6
C7
R10
IM3
IM5
IM7
IM9
Mar-18
Mar-19
Mar-20
Mar-21
Mar-22
Mar-23
Mar-24
May-25

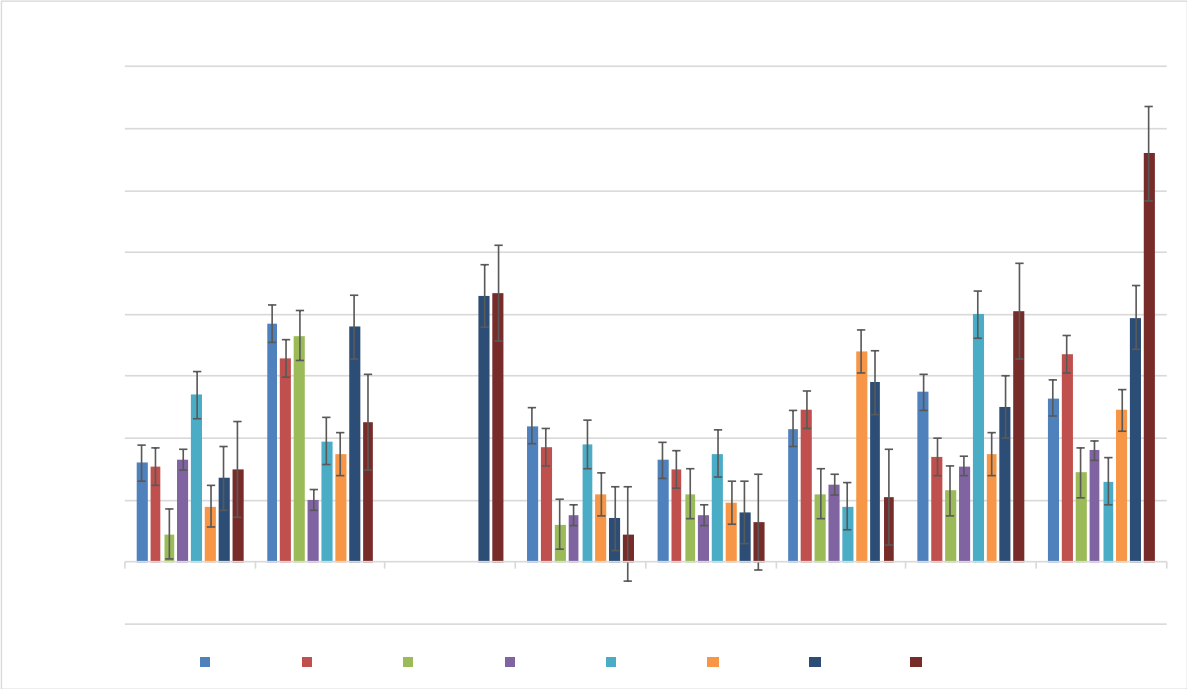


Figure 6A.4 Number of organisms at each benthic monitoring station from 2018-2025

b. Sediment Analysis

In May 2025, the sediment in the mud basin of Lake Macquarie off Summerland Point, Chain Valley Bay and Bardens Bay was largely composed of fine grey silt and small to large shell fragments (Table 6B.1). Benthic monitoring stations that had a high portion of both silt and shell were C4 (50% shell), IM5 (50% shell), IM10 (45% shell), IM1 (45% shell), C6 (40% shell) and IM2 (35% shell). Three monitoring stations had sediments with high portions of silt and sand. These benthic monitoring stations were IM12 with 49% sand, C7 with 45% sand and R13 with 20% sand. Benthic monitoring station IM11 was comprised of 98 percent small to large sized shell fragments (Table 6B.2).

Table 6B.1 Description of sediment collected from benthic sampling stations, May 2025

Station	Description
C1	Dark grey silt with small to large sized shell fragments.
C2	Dark grey silt with small to medium sized shell fragments.
C3	Dark grey silt with some small to medium sized shell fragments.
C4	Dark grey silt and small to medium sized shell fragments.
C5	Dark grey silt with small to large shell fragments. Some fine to medium grained grey sand.
C6	Dark grey silt with small to large shell fragments. Mud plastic in nature.
C7	Dark grey silt with fine to medium grained grey sand. Some gravel.
R1	Dark grey silt and some small sized shell fragments. Small percentage of fine grey sand.
R9	Dark grey silt with some small to medium sized shell fragments.
R10	Dark grey silt with some small to large shell fragments.
R12	Dark grey silt with some small to large shell fragments.
R13	Dark grey silt with fine grained dark grey sand and gravel.
IM1	Dark grey silt and small to large sized shell fragments and some medium to coarse grained sand.
IM2	Dark grey silt and small to large shell fragments. Some sand.
IM3	Dark grey silt with some small to medium sized shell fragments.
IM4	Dark grey silt and small to medium sized shell fragments.
IM5 (R3)	Dark grey silt and small to large sized shell fragments.
IM6 (R4)	Dark grey silt with some small to large sized shell fragments.
IM7 (R5)	Dark grey silt with some small to large sized shell fragments.

IM8 (R6)	Dark grey silt with small to medium sized shell fragments.
IM9 (R8)	Dark grey silt with some small to medium sized shell fragments.
IM10 (R2)	Dark grey silt and small to large sized shell fragments.
IM11 (R7)	Small to large shell fragments with some sand.
IM12 (R11)	Dark grey silt and fine to medium grained sand. Some gravel.

Table 6B.2 Percentage of silt, sand, gravel and shell in sediment collected at each station

	% Silt	% Sand	% Gravel	% Shell
C1	80	0	0	20
C2	75	0	0	15
C3	94	1	0	5
C4	50	0	0	50
C5	80	5	0	15
C6	60	0	0	40
C7	55	45	1	0
R1	93	2	0	5
R9	95	0	0	5
R10	90	0	0	10
R12	90	0	0	10
R13	74	20	5	1
IM1	50	5	0	45
IM2	60	5	0	35
IM3	74	1	0	25
IM4	85	0	0	15

IM5 (R3)	50	0	0	50
IM6 (R4)	80	0	0	20
IM7 (R5)	80	0	0	20
IM8 (R6)	90	0	0	10
IM9 (R8)	90	0	0	10
IM10 (R2)	65	0	0	45
IM11 (R7)	0	2	0	98
IM12 (R11)	50	49	1	0

c. Physical characteristics of water in Lake Macquarie – May 2025

Rainfall in the months preceding the survey of May 2025 was 66.8 mm, 38.2 mm, 137.6 mm and 228 mm for January, February, March and April 2025 respectively (Cooranbong Lake Macquarie AWS No. 061412). By 6th May a further 30.6 mm had fallen in the catchment.

At each station, a water quality profile was taken using a calibrated Yeo-Kal 618RU Analyser. The physical characteristics were measured on 5th and 6th May 2025**.** Units of measurement were Temperature (Temp) - degrees Celsius; Conductivity (Cond) - mS/cm; Salinity (Sal) - parts per thousand; pH; Dissolved Oxygen - % saturation and mg/L; Oxidation Reduction Potential (ORP) - mV and Turbidity (Turb) - NTU.

Throughout the study area, water temperature declined slightly with water depth (Appendix B). Water temperature at C2, for instance, was 21.93ºC at the surface and was 21.56ºC at -4.5m AHD. The water temperature throughout the water column ranged from 20.37ºC at IM10 (-4.8m AHD) to 24.16ºC at C6 (-0.3m AHD). The average water temperature throughout the water column was 21.44ºC and the standard deviation was 0.58ºC. There was no significant difference in water temperature throughout the water column between Control, Impact or Reference sites. The temperature of bottom water ranged from 20.37ºC at IM10 (-4.8m AHD) to 21.85ºC at IM7 (-6.7m AHD). Average bottom water temperature was 21.23ºC and the standard deviation was 0.39ºC (Table C6.1).

Conductivity increased slightly with water depth throughout the study area (Appendix B). At the time of survey water conductivity at C5 was 48.51 mS/cm at the surface increasing to 50.31 mS/cm at -6.3m

AHD. The increase in conductivity with water depth was due to the recent rainfall events with the influx of freshwater at the surface of the water profile. Conductivity throughout the water column ranged from 48.30 mS/cm at C2 (-0.5m AHD) to 51.39 mS/cm at R9 (-5.0m AHD). Average conductivity throughout the water column was 49.91 mS/cm and the standard deviation was 0.90 mS/cm. Average conductivity throughout the water column did not vary significantly between Control, Impact or Reference sites. The conductivity of bottom waters ranged from 49.59 mS/cm at C2 (-5.2m AHD) to 51.34 mS/cm at IM11 (-7.0m AHD). Average bottom water conductivity was 50.78 mS/cm and the standard deviation was 0.51 mS/cm (Table C6.1).

The influx of freshwater from rainfall events decreased salinity of surface waters throughout the study area and resulted in an increase of salinity with water depth throughout the water column (Appendix B). At the time of the survey, water salinity at monitoring station R12 was 32.06 ppt at the surface and 33.67 ppt at -7.0m AHD. Salinity throughout the water column ranged from 31.48 ppt at C2 to 33.55 ppt at C1. Average salinity throughout the water column was 32.66 ppt and the standard deviation was 0.66 ppt. Average salinity did not vary significantly between Control, Impact or Reference sites. Average salinity of bottom waters ranged from 32.42 ppt at C2 (-5.2m AHD) to 33.71 ppt at IM11 (-7.0m AHD). Average bottom water salinity was 33.30 ppt and the standard deviation was 0.37 ppt (Table C6.1).

The combination of rainfall and wind, wave and current action resulted in an increase of water turbidity with water depth throughout the study area (Appendix B). At the time of the survey, turbidity at monitoring station IM3 was 3.3 NTU at the surface increasing to 9.1 NTU at -5.9m AHD. Throughout the water column turbidity ranged from 1.9 NTU at R9 (-0.3m AHD) to 40.30 NTU at C1 (-4.8m AHD). Average turbidity throughout the water column was 4.46 NTU and the standard deviation was 2.62 NTU. Average turbidity did not vary significantly between Control, Impact or Reference sites. Average turbidity of bottom waters ranged from 4.2 NTU at IM7 (-6.7m AHD) to 40.3 NTU at C1 (-4.8m AHD). The average bottom water turbidity was 8.95 NTU and the standard deviation was 7.02 NTU (Table C6.1).

Throughout the study area, pH increased slightly with water depth (Appendix B). At C3, for instance, pH was 7.65 at the surface and increased to 8.58 at -5.1m AHD. Throughout the water column pH ranged from 5.93 at R13 (-0.3m AHD) to 9.16 at IM7 (-4.0m AHD). Average pH throughout the water column was 8.19 and the standard deviation was 0.56. Average pH did not vary significantly between Control, Impact or Reference sites. Average pH of bottom waters ranged from pH 7.1 at R12 (-7.0m

AHD) to pH 9.07 at IM8 (-6.8m AHD). The average pH of bottom water was pH 8.33 and the standard deviation was 0.53 (Table C6.1).

Oxidation reduction potential (ORP) was relatively uniform throughout the water column (Appendix B). At the time of survey, ORP at monitoring station R9 was 566 mV at the surface and was 562 mV at -5.0m AHD. Throughout the water column, ORP ranged from 440 mV at C2 (-4.5m AHD) to 647 mV at C1 (-0.3m AHD). The average ORP throughout the water column was 493 mV and the standard deviation was 55 mV. Average ORP did not vary significantly between Control, Impact or Reference sites. The average ORP of bottom waters ranged from 440 mV at C2 (-5.2m AHD) to 630 mV at C1 (-4.8m AHD). The average ORP of bottom waters was 494 mV and the standard deviation was 56 mV (Table C6.1).

Dissolved oxygen decreased with depth or was uniform throughout the water column and the study area. At IM6, for instance, dissolved oxygen decreased from 67.3% saturation at the surface to 62.8% saturation at -6.3m AHD. At monitoring station R10 dissolved oxygen decreased from 64.7% saturation at the surface to 41.4 % saturation at -5.9m AHD (Appendix B). Throughout the water column, dissolved oxygen concentrations ranged from 40.7% saturation at R12 (-7.0m AHD) to 82.2% saturation at IM12 (-2.5m AHD). The average dissolved oxygen throughout the water column was 64.87% saturation and the standard deviation was 8.01% saturation. Average dissolved oxygen did not differ significantly between Control, Impact or Reference sites. The average dissolved oxygen of bottom waters ranged from 40.7% saturation at R12 (-7.0m AHD) to 68% saturation at R1 (-4.6m AHD). The average dissolved oxygen of bottom waters was 54.19% saturation and the standard deviation was 8.3% saturation. (Table C6.1).

Table 6C.2 compares the average water quality variables of bottom water over a ten-year period from March 2016 to May 2025. Water temperature ranged from 21.23^{o}C to 27.54^{o}C, with an average of 25.15^{o}C and a standard deviation of 1.68^{o}C. Conductivity ranged from 50.52 mS/cm to 58.47 mS/cm, with an average of 54.49 mS/cm and a standard deviation of 3.11 mS/cm. Salinity had a range of 33.3 ppt to 39.0 ppt, with an average of 35.78 ppt and standard deviation of 2.18 ppt. Dissolved oxygen had a range of 54.2% saturation to 109.5% saturation, with an average of 84.7% saturation. pH ranged from pH 7.73 to pH 9.74, with an average of pH 8.44 and a standard deviation of pH 0.56. The water quality variables over the ten-year period did not vary significantly, and any variation was largely due to rainfall and other weather conditions such as wind and wave action.

Table 6C.1 Physical characteristics of bottom waters at benthic stations – May 2025

Station	Depth m	Temperature °C	Conductivity mS/cm	Salinity ppt	pH	ORP mV	Turbidity NTU	DO % sat	DO mg/L
Control Stations									
C1	4.8	20.83	51.12	33.55	8.38	630	40.3	60.6	4.45
C2	5.2	21.56	49.59	32.42	9.00	440	7.3	53.4	3.89
C3	5.1	21.41	50.04	32.75	8.58	442	9.2	49.8	3.64
C4	4.5	21.14	51.06	33.50	7.24	494	8.7	58.5	4.27
C5	6.3	21.25	50.31	32.95	8.59	442	7.2	62.7	4.59
C6	5.5	20.54	50.55	33.12	8.70	486	6.8	64.1	4.74
C7	5.0	21.40	50.12	32.81	8.63	444	5.8	57.9	4.23
Mean		**21.16**	**50.40**	**33.01**	**8.45**	**483**	**12.19**	**58.14**	**4.26**
Stdev		**0.36**	**0.56**	**0.41**	**0.56**	**69**	**12.45**	**5.08**	**0.39**
Min		**20.54**	**49.59**	**32.42**	**7.24**	**440**	**5.8**	**49.8**	**3.64**
Max		**21.56**	**51.12**	**33.55**	**9.00**	**630**	**40.30**	**64.10**	**4.74**
Reference Stations									
R1	4.6	20.85	50.63	33.18	7.77	481	7.0	68.0	5.00
R9	5	21.04	51.11	33.54	8.44	559	15.3	50.9	3.73
R10	5.9	21.70	51.30	33.68	8.26	452	7.8	41.4	2.99
R12	7	21.82	51.29	33.67	7.10	444	7.0	40.7	2.93
R13	5.9	21.44	50.89	33.38	7.83	451	5.1	47.9	3.49
Mean		**21.37**	**51.04**	**33.49**	**7.88**	**477**	**8.44**	**49.78**	**3.63**
Stdev		**0.42**	**0.29**	**0.21**	**0.52**	**48**	**3.96**	**11.06**	**0.84**
Min		**20.85**	**50.63**	**33.18**	**7.10**	**444**	**5.10**	**40.70**	**2.93**
Max		**21.82**	**51.30**	**33.68**	**8.44**	**559**	**15.30**	**68.00**	**5.00**
Impact Stations									
IM1	5	20.57	50.83	33.34	7.60	599	7.0	64.8	4.79
IM2	4.1	21.29	50.47	33.07	8.23	522	6.4	66.3	4.85
IM3	5.9	21.15	51.19	33.60	8.58	532	9.1	48.7	3.55
IM4	6.9	21.23	51.24	33.64	8.28	513	9.1	46.3	3.37
IM5 (R3)	7	21.29	51.24	33.64	8.65	501	8.5	49.8	3.63
IM6 (R4)	6.3	21.20	50.38	33.00	7.66	506	5.4	62.8	4.6
IM7 (R5)	6.7	21.85	51.27	33.66	9.00	459	4.2	54.2	3.91
IM8 (R6)	6.8	21.62	51.12	33.54	9.07	457	6.9	43.7	3.16
IM9 (R8)	6.1	20.98	51.13	33.56	8.41	543	8.7	54.3	3.98
IM10 (R2)	4.8	20.37	50.63	33.19	8.52	578	5.4	56.8	4.22
IM11 (R7)	7	21.59	51.34	33.71	8.64	444	9.6	41.2	2.98
IM12 (R11)	5	21.44	49.93	32.67	8.67	442	6.9	55.8	4.08
Mean		**21.22**	**50.90**	**33.39**	**8.44**	**508**	**7.27**	**53.73**	**3.93**
Stdev		**0.42**	**0.45**	**0.33**	**0.45**	**51**	**1.74**	**8.15**	**0.62**
Min		**20.37**	**49.93**	**32.67**	**7.6**	**442**	**4.2**	**41.2**	**2.98**
Max		**21.85**	**51.34**	**33.71**	**9.07**	**599**	**9.60**	**66.30**	**4.85**
Bottom Water Quality - all stations									
Mean		**21.23**	**50.78**	**33.30**	**8.33**	**494**	**8.95**	**54.19**	**3.96**
STDev		**0.39**	**0.51**	**0.37**	**0.53**	**56**	**7.02**	**8.30**	**0.63**
Min		**20.37**	**49.59**	**32.42**	**7.1**	**440**	**4.2**	**40.7**	**2.93**
Max		**21.85**	**51.34**	**33.71**	**9.07**	**630**	**40.3**	**68**	**5**

Table 6C.2 Average water quality of bottom waters - 2016 to 2025

	Temperature °C	Conductivity mS/cm	Salinity ppt	Dissolved Oxygen % sat	Dissolved Oxygen mg/L	pH	Turbidity NTU
Mar-16	27.54	51.00	33.40	99.2	6.50	8.20	4.0
Mar-17	23.90	57.10	38.00	109.5	7.42	8.30	7.5
Mar-18	25.73	58.47	39.04	87.7	5.73	8.96	46.5
Mar-19	26.20	58.39	38.97	83.3	5.39	9.74	1.6
Mar-20	24.86	50.52	33.33	63.6	4.36	8.69	6.88
Mar-21	24.93	51.88	34.11	88.9	6.05	7.98	5.02
Mar-22	24.36	53.77	35.55	90.0	6.12	8.58	11.39
Mar-23	26.90	57.48	35.28	88.35	5.68	7.73	27.46
Mar-24	25.80	55.53	36.82	81.89	5.41	7.91	10.45
May-25	21.23	50.78	33.30	54.19	3.96	8.33	8.95
Average	25.15	54.49	35.78	84.66	5.66	8.44	12.98
Std	1.68	3.11	2.18	15.10	0.94	0.56	13.04
Min	21.23	50.52	33.3	54.19	3.96	7.73	1.6
Max	27.54	58.47	39.04	109.5	7.42	9.74	46.5

7. Discussion

In May 2025, 24 benthic stations were sampled in the study area. A total of 1207 organisms greater than 1mm in size were found, comprising 21 species. Polychaete worms and bivalve molluscs were the most frequently encountered organisms. Stations were distinguished by the relative abundance of the dominant species.

During this survey, the presence of species in the benthos were not determined by water depth. The dominant species occupied sediments at each depth zone, from – 4.5m AHD to -6.0m AHD. These findings support the data collected by J.H. & E.S. Laxton - Environmental Consultants P/L from September 2016 to March 2020 in the Chain Valley Bay, Bardens Bay and Summerland Point regions, analysed independently by EMM in April 2020. It was found that despite reported changes in bed levels associated with Chain Valley Colliery underground working, no significant differences were identified

between the benthic assemblages at control, reference and impact sites (EMM, 2020).

Sediment composition appears to be a major parameter influencing the presence of organisms in the benthos. At the time of survey sampling sites with benthos comprised predominantly of silt, were defined by relatively high numbers of the polychaete *Sthenelais petitiboneae*, and the bivalves *Theora lubrica* and *Paphia undulata.* Benthos with high portions of sand and/ or gravel were characterized by relatively higher numbers of the polychaete worms from the Chaetopteridae, Pectinariidae and Diopatra families, and the bivalve *Dosinia*. Stations that comprised predominantly of shell substrate were characterized by the presence of the mussel *Trichomya hirsuta* and the oyster *Saccostrea glomerata*. *Saccostrea glomerata* was encrusted to the large shell fragments.

Physical variables such as salinity, conductivity and turbidity of the bottom water had little influence on the species composition of the benthos. Dissolved oxygen concentration, however, can have a major effect on abundance. Major extinction events have occurred in the mud basin of Lake Macquarie. The evidence for this lies in the presence of large numbers of intact but dead bivalve shells entombed in the mud in Chain Valley Bay. The cause of extinction events appeared to be prolonged dissolved oxygen depletion of bottom water.

8. Conclusion and Compliance Table

The results from the May 2025 benthic communities monitoring survey show compliance to Schedule 4 Environmental Conditions – underground mining performance measures – natural environment biodiversity – benthic communities table with respect to effects of subsidence on Benthic communities which display nil to minor environmental consequences due to underground mining.

The Environmental Subsidence Impact Performance Measures for benthic communities are listed in the table below:

Conditions from SSD-5465 – Mod 4	Compliance Status and Comments
Schedule 4 Environmental Conditions – underground mining Performance Measures – Natural Environment Biodiversity – Benthic Communities	**Compliant – See section 16 - Conclusions**

Subsidence Impact Performance Measure – Minor environmental consequences, including minor changes composition and/or distribution.	
Measurements undertaken by generally accepted methods. **Measures Methods fully described.**	**Compliant – See section 4 and 5** **Compliant – See section 4 and 5**

9. References

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Appendices

A. Background Information

i. Factors Affecting Depth of Water in Lake Macquarie

The bathymetric chart (**Figure A1**) of Lake Macquarie shows water depths relative to AHD throughout the year 1997. The actual water depth above the lakebed varied greatly, between 0 and 1.3m above AHD over the year.

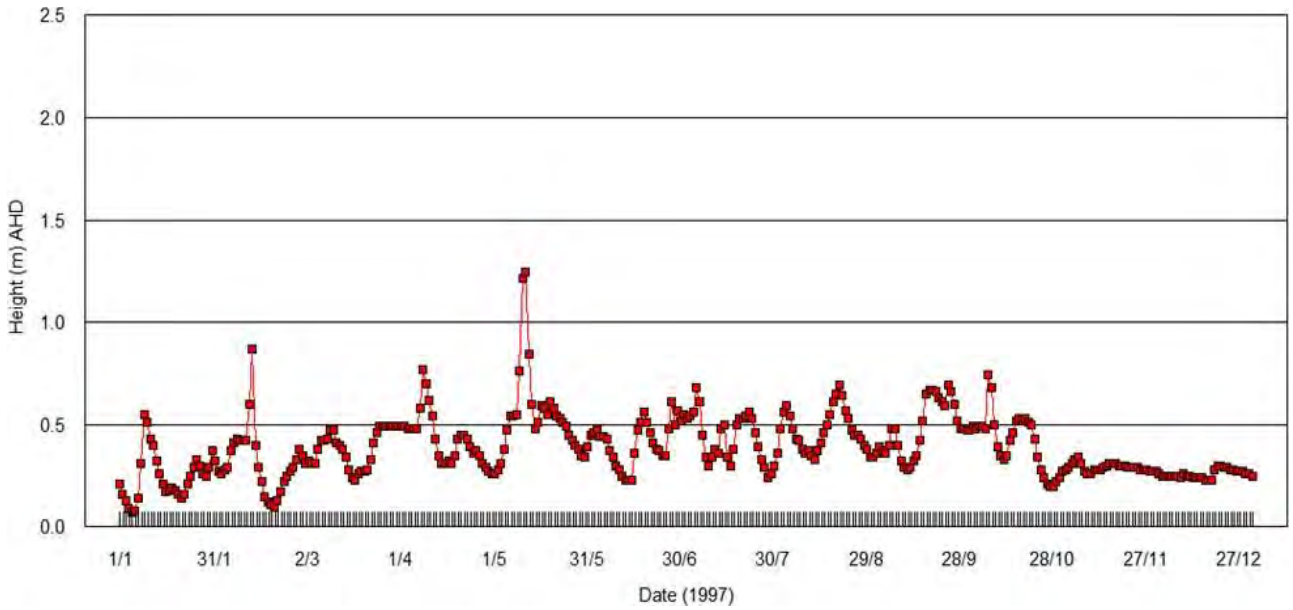


Figure A1 Water level changes in a coastal lagoon with an entrance open to coastal waters.

Water depths in coastal saline lakes with an open entrance to coastal waters vary due to combinations of the following factors:

- The body of Lake Macquarie is subject to tidal influence. The height of the tidal prism at Swansea Head may reach almost 2m (during spring tides) but by the time the body of the lake is reached, the tidal prism has been reduced to around 0.05m.
- The height of coastal waters and coastal lakes are influenced by changes in atmospheric pressure. The Tasman Sea acts as a huge barometer. When the atmospheric pressure is high

the sea surface is depressed. This causes water to drain from Lake Macquarie causing the depth of water in the body of the lake to decrease. When the atmospheric pressure over the Tasman Sea is low, the surface of the sea bulges upwards. This raising of sea level causes water to flow into Lake Macquarie, increasing the water depth.

- Low pressure systems in the Tasman Sea almost always generate strong winds and coastal rainfall. The strong winds cause large swells to form that impact the coast. Wave setup at the entrance to Lake Macquarie causes the water level in the lake to rise as large volumes of seawater enter the system.

- Rainfall during a period of low atmospheric pressure causes runoff into catchment rivers and streams to increase. When this extra water reaches the body of Lake Macquarie, the water level rises in proportion to the runoff volume. This water is prevented from exiting the lake by wave setup at the entrance and the state of the tide. Under these circumstances, the level of the lake may rise to heights of a meter or more above AHD.

ii. Benthic Organisms in Lake Macquarie

Previous studies (Laxton, 2022) conducted off Summerland Point and in Chain Valley Bay, Lake Macquarie between February 2012 and September 2024 found the following organisms were present in the benthos (**Table A1**):

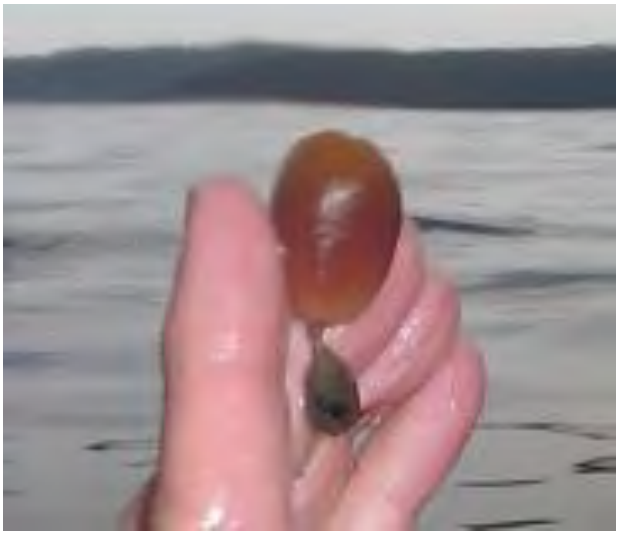
Table A1 Organisms found in Benthos of Lake Macquarie (2012-2024)

Designated name	Family or Species	Comments
Foraminifera	*Spiroloculina* *Trochammina*	Single-celled heterotrophic organisms that live predominantly in marine environments.
Anemone	Coelenterata	Found associated with mussel shells.
Planaria (Flat worm)	Platyhelminthes	Two specimens found in 2017.
Polychaete thin	*Sthenelais pettiboneae*	Most common polychaete present.
Polychaete	*Gorgonorhynchus repens*	Common.
Polychaete (mud tube)	Not yet identified	Present in small numbers.
Polychaete	*Chaetopterus sp*	Common.
Polychaete	*Diopatra sp*	Common.

Polychaete	*Pectinaria sp*	First found in March 2019
Gastropod	*Nassarius jonasii*	Present in small numbers.
Gastropod	*Lepsiella* (*Bedeva*) *hanleyi*	Present in small numbers.
Gastropod	*Philine angasi*	First recorded in August 2014.
Bivalve	*Corbula truncata*	Common as live animals and dead shells.
Bivalve	*Theora lubrica*	Common
Bivalve	*Paphia undulata*	Uncommon as live animals. Common as dead shells.
Bivalve	*Cyamiomactra mactroides*	Uncommon as live animals.
Bivalve	*Mactra sp*	First collected in December 2022 off Pulbah Island.
Bivalve	*Anadara trapezia*	Uncommon.
Bivalve	*Dosinia sculpta*	Found in sandy sediments.
Bivalve	*Trichomya hirsuta*	Common as dead shells. Found in large clumps.
Bivalve	*Saccostrea glomerata*	Occasionally found on mussel shells.
Ophuroid	*Ophionereis schayeri*	Found amongst mussel clumps and on mud.
Echinoid	*Astropecten polyacanthus*	Found in sandy sediments.
Echinoid	Sea urchins	Encountered in sandy sediments.
Echinoid	*Echinocardium cordatum*	Encountered in sandy sediments.
Sponge	*Tetilla sp*	Collected occasionally.
Sponge	*Dysidea sp*	Collected occasionally.
Sponge	Red sponge	Several specimens found in 2019.
Crabs	Small	Captured occasionally.
Prawn	Small	Captured occasionally.

Plates A1 to A8 provide information about the benthic organisms present in the basin muds and sands of Lake Macquarie, NSW.

Plate A1 Sponge species found on the benthos of Lake Macquarie



Phylum: Porifera
Class: Demospongiae
Subclass: Errantia
Order: Tetractinellida
Family: Tellidae
Species: *Tetilla sp*

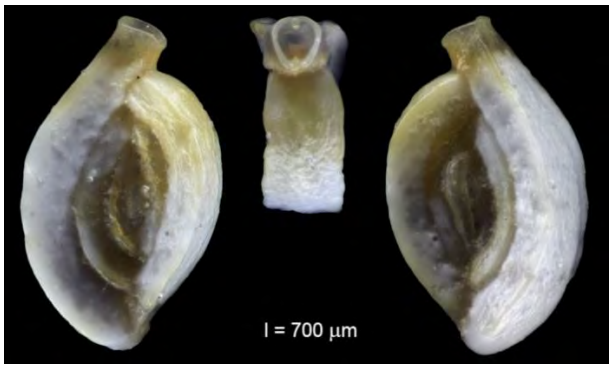
Remarks: Tetillids are ovoid to spherical sponges which are found commonly in all marine habitats at all depths. They are especially common in sedimented habitats.



Phylum: Porifera
Class: Demospongiae
Family: Dysideidae
Species: Dysidea *sp*

Remarks: Typically mauve in colour, irregularly shaped with varying numbers of oscula and a coarse, hard and bumpy surface texture.

Plate A2 Foraminifera greater than 1mm in size found in the benthos of Lake Macquarie



Phylum: Foraminifera
Class: Miliolata
Family: Spiroloculinidae
Species: *Spiroloculina communis*

Remarks: Genus of porcelaneous Foraminifera known from the Upper Cretaceous to the present. Planispiral throughout development.



Phylum: Foraminifera
Class: Miliolata
Family: Spiroloculinidae
Species: *Trochammina sp*

Remarks: Test trochospiral, free or attached. Wall agglutinated, single layered imperforate. Chambers subglobular or axially strongly compressed.

Plate A3 Annelid and Nemertean species found in the benthos of Lake Macquarie



Phylum: Annelida
Class: Polychaeta
Subclass: Errantia
Order: Phyllodocida
Family: Sigalionidae
Species: *Sthenelais petitiboneae*

Remarks: Found in marine environments



Phylum: Annelida
Class: Polychaeta
Subclass: Canalipalpata
Order: Terebellida
Family: Chaetopteridae
Genus: *Chaetopterus*

Remarks: *Chaetopterus* or the parchment worm or parchment tube worm is a genus of marine polychaete worm that lives in a tube it constructs in sediments or attaches to a rocky or coral reef substrate. The common name arises from the parchment-like appearance of the tubes that house these worms.



Phylum: Annelida
Class: Polychaeta
Subclass: Canalipalpata
Order: Terebellida
Family: Pectinariidae

Remarks: Pectinariidae live vertically, head-down in sandy sediments, with the narrow tip of the conical tube at about the sediment surface. They feed on buried organic matter within the sediments. *Pectinaria anitpoda* is one of the most common and widespread of this family. Found in inshore waters and off the continental shelf to a depth of about 90 m.



Phylum: Annelida
Class: Polychaeta
Subclass: Errantia
Order: Eunicida
Family: Onuphidae
Genus: *Diopatra*

Remarks: Members of this genus live in thick, parchment-like tubes that project from the sediment on the seabed. The tubes comprise of fragments of shell, algae, fibers and other small objects collected by the worm and stuck in place by mucus.



Phylum: Nemertea

Class: Anopla

Order: Heteronemertea

Family: Gorgonorhynchidae

Species: *Gorgonorhynchus repens*

Remarks: *G. repens* is orange in colour and grows to an unstretched length of about 50 mm. It is cylindrical in shape with bluntly tapering ends. The proboscis is a densely branching structure giving the impression of a cloud of mucus secretion. Proboscis worms are predatory, snaring or spearing their prey.

Plate A4 Gastropod species found in the benthos of Lake Macquarie



Phylum: Mollusca

Class: Gastropoda

Superfamily: Buccinoidea

Family: Nassariidae

Species: *Nassarius jonasii*

Remarks: Endemic to Australia; Noosa Heads, Qld, to SA. Inhabit sand and mud flats in estuaries and lagoons, intertidal down to 100 m. Most *Nassarius* species are very active scavengers. They often burrow into marine substrates and then wait with only their siphon protruding, until they smell nearby food.



Phylum: Mollusca

Class: Gastropoda

Order: Neogastropoda

Family: Muricidae

Species: *Lepsiella (Bedeva) hanleyi*

Remarks: Common name mussel drill. Shell up to 32 mm, with angulated whorls, a high spire and moderately long anterior canal and with both spiral threads and axial ribs. Endemic to Australia. Found in temperate and southern parts of tropical Australia. Lives mainly on sheltered shores, including estuaries and often in association with mangroves. Feeds by drilling holes in bivalves. Lays lens-shaped capsules and development is direct.



Phylum: Mollusca

Class: Gastropoda

Subclass: Heterobranchia

Family: Philinoidae

Species: *Philine angasi*

Remarks: Species of sea snail, marine opisthobranch gastropod mollusc. Commonly called headshield slugs. The foot of this family has developed into fleshy rounded lobes that surround and obscure the shell.

Plate A5 Bivalve species and other molluscs found in the benthos of Lake Macquarie



Phylum: Mollusca

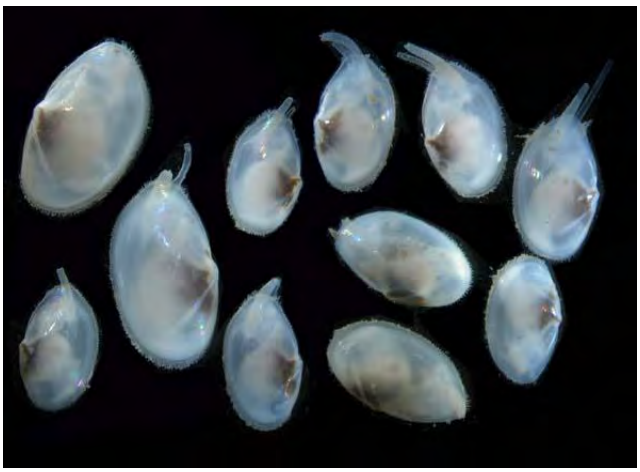
Class: Bivalvia

Order: Myoida

Family: Corbulidae

Species: *Corbula sp*

Remarks: Marine bivalve mollusc.



Phylum: Mollusca

Class: Bivalvia

Order: Veneroida

Family: Semelidae

Species: *Theora lubrica*

Remarks: Small infaunal bivalve native to the Northwest Pacific. It has been introduced to California, Australia, New Zealand, the Mediterranean Sea, and the Atlantic coast of Spain. It typically occurs in soft, muddy subtidal or lower intertidal sediments, rich in organic matter. It is considered a pollution-indicator species, because of its frequent dominance in highly polluted sediments. No ecological or economic impacts have been reported for this species.



Phylum: Mollusca

Class: Bivalvia

Order: Veneroida

Family: Veneridae

Species: *Paphia undulata*

Remarks: Saltwater clam, marine bivalve mollusc. Inhabits inshore shallow sandy seabeds.



Phylum: Mollusca

Class: Bivalvia

Order: Veneroida

Family: Veneridae

Species: *Dosinia sculpta*

Remarks: *Dosinia* is a genus of saltwater clams, marine bivalve molluscs in the family Veneridae, (subfamily Dosiniinae). The shell of *Dosinia* species is disc-like in shape, usually white, and therefore is reminiscent of the shells of Lucinid bivalves.

Typically found in the intertidal zone at the water's edge at a mean distance from sea level of -15 meters (-50 feet).



Phylum: Mollusca

Class: Bivalvia

Order: Veneroida

Family: Cyamiidae

Species: *Cyamiomactra mactroides*



Phylum: Mollusca

Class: Bivalvia

Order: Veneroida

Family: Mactridae

Species: *Mactra*

Remarks: Large genus of medium-sized marine bivalve mollusc or clam, commonly known as trough shells or duck clams. The word "trough" refers to the large ligamental pit at the hinge line, which contains a large internal ligament. Most bivalves in other families have an external ligament.



Phylum: Mollusca

Class: Bivalvia

Order: Arcoida

Family: Arcidae

Species: *Anadara trapezia*

Remarks: Sydney cockle, or ark cockle is an estuarine filter-feeding bivalve. Its calcareous, heavily-ribbed, shell can grow to approximately 7 to 8 cm across. Its current range is along the east coast of Australia, from Queensland to Victoria. It has been used as an indicator species to study levels of the metals selenium, copper and cadmium.



Phylum: Mollusca

Class: Bivalvia

Order: Mytiloida

Family: Mytilidae

Species: *Trichomya hirsuta*

Remarks: The hairy mussel is a major part of the megafauna of Lake Macquarie. It is tolerant of low oxygen levels in the water and its temperature tolerance range has been researched in connection with using the waters of the lake for cooling power stations.

Hairy mussels have been used as bioindicators to monitor concentrations of heavy metals (namely Pb, Cd, Cu, Zn, Co, Ni, and Ag) in marine environments.



Phylum: Mollusca

Class: Bivalvia

Order: Ostreoida

Family: Pectinidae

Species: *Saccostrea glomerata*

Remarks: Sydney rock oysters are endemic to Australia and New Zealand. In Australia it is found in bays, inlets and sheltered estuaries from Wingan Inlet in eastern Victoria, along the east coast of NSW and up to Hervey Bay QLD, around northern Australia and down the west coast to Shark Bay in WA. Sydney rock oysters are capable of tolerating a wide range of salinities. They are usually found in the intertidal zone to 3 metres below the low water mark.



Phylum: Mollusca

Class: Polyplacophora

Remarks: Chitons have a shell composed of eight separate shell plates or valves. These plates overlap slightly at the front and back edges, enabling articulation. These plates protect the mollusc; and enable the animal to flex upward when manoeuvering over uneven surfaces. It also makes it possible for chitons to curl up into a ball when dislodged from rocks. The shell plates are encircled by a skirt known as a girdle.

Chitons live worldwide, from cold to tropic waters. They live on hard surfaces such as under rocks or in crevices. They are fully marine.

Plate A6 Sea stars found in Lake Macquarie, NSW



Phylum: Echinodermata

Class: Ophiuroidea

Order: Ophiurida

Family: Ophionereididae

Species: *Ophionereis schayeri*

Remarks: Largest and most common brittle star found in Sydney waters. Brittle stars have five long, slender arms which radiate out from a central disc. The mouth is located in the centre of the underside of the disc. There is no anus. Offshore, brittle stars form dense aggregations. In intertidal zones, they are typically found as single individuals in crevices, under stones and amongst seaweed. They feed by raising their arms above the substrate; extending tube-feet; and removing particles from the water. They pass food along the arms to the mouth. They also scavenge on decaying matter.



Phylum: Echinodermata

Class: Asteroidea

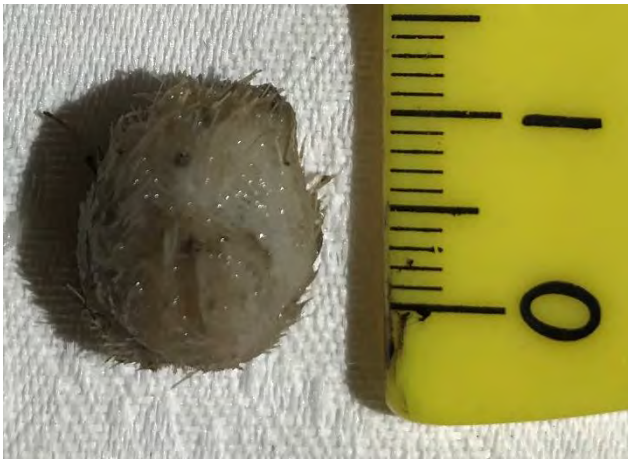
Order: Paxillosida

Family: Astropectinidae

Species: *Astropecten polyacanthus*

Remarks: Sand sifting starfish or comb sea star is a widespread species found throughout the Indo-Pacific region. The armspread is up to 20 cm. Spends much of its time buried in the silty seabed. Feeds on detritus, bivalves and gastropods. Also digests biofilm and small invertebrates. Mostly nocturnal.

Plate A7 Sea urchins found in Lake Macquarie, NSW



Phylum: Echinodermata

Class: Echinoidea

Order: Spatangoida

Family: Loveniidae

Species: *Echinocardium cordatum*

Remarks: Sand dollars are small in size. They possess a rigid skeleton called a test. The test consists of calcium carbonate plates arranged in a fivefold symmetric pattern.



Phylum: Echinodermata
Class: Echinoidea
Order: Cidaroida

Plate A8 Crab species found in Lake Macquarie, NSW



Phylum: Arthropoda
Class: Malacostraca
Order: Decapoda

B. Water Quality Data

Control monitoring stations

C1

Date	Time	Depth	Temp (C)	Cond (ms/cm)	Sal (ppt)	Turb (ntu)	pH	ORP (mv)	DO (%sat)	D.O. (mg/L)
5/05/2025	7:57:12	0.3	21.34	49.93	32.67	2.8	7.75	647	72.0	5.27
5/05/2025	7:57:30	0.5	21.19	50.49	33.08	2.8	8.21	645	72.4	5.30
5/05/2025	7:57:50	1	21.04	50.70	33.24	2.7	8.61	644	72.9	5.34
5/05/2025	7:58:03	1.5	20.98	50.72	33.25	2.7	8.79	643	73.5	5.4
5/05/2025	7:59:03	2	20.84	50.73	33.26	3.4	8.48	640	74.8	5.51
5/05/2025	7:59:16	2.5	20.52	50.82	33.33	3.5	8.35	639	74.9	5.54
5/05/2025	7:59:28	3	20.52	50.91	33.39	3.6	8.26	638	73.3	5.42
5/05/2025	7:59:31	3.5	20.52	50.91	33.39	3.5	8.26	638	73.0	5.40
5/05/2025	7:59:40	4	20.53	50.92	33.40	3.5	8.24	637	70.8	5.24
5/05/2025	7:59:53	4.5	20.66	51.00	33.46	3.9	8.28	636	68.6	5.06
5/05/2025	8:00:49	4.8	20.83	51.12	33.55	40.3	8.38	630	60.6	4.45
Average			**20.82**	**50.75**	**33.27**	**6.61**	**8.33**	**639.73**	**71.53**	**5.27**
Stdev			**0.29**	**0.32**	**0.24**	**11.18**	**0.26**	**4.82**	**4.03**	**0.30**
Min			**20.52**	**49.93**	**32.67**	**2.70**	**7.75**	**630.00**	**60.60**	**4.45**
Max			**21.34**	**51.12**	**33.55**	**40.30**	**8.79**	**647.00**	**74.90**	**5.54**

C2

Date	Time	Depth	Temp (C)	Cond (ms/cm)	Sal (ppt)	Turb (ntu)	pH	ORP (mv)	DO (%sat)	D.O. (mg/L)
6/05/2025	14:12:36	0.3	21.93	48.36	31.52	4.8	7.65	444	61.5	4.48
6/05/2025	14:12:47	0.5	21.81	48.30	31.48	4.7	7.69	443	60.8	4.44
6/05/2025	14:13:21	1	21.74	48.36	31.52	4.6	8.07	443	59.3	4.33
6/05/2025	14:13:45	1.5	21.57	48.38	31.54	4.5	8.21	443	58.0	4.25
6/05/2025	14:14:01	2	21.60	48.64	31.73	4.5	8.50	443	57.3	4.19
6/05/2025	14:14:19	2.5	21.74	49.08	32.05	4.5	8.67	443	56.5	4.12
6/05/2025	14:14:36	3	21.50	49.27	32.19	4.8	8.69	443	56.2	4.11
6/05/2025	14:14:56	3.5	21.57	49.56	32.4	5.0	8.78	443	55.7	4.06
6/05/2025	14:15:17	4	21.49	49.73	32.52	5.6	8.80	443	54.4	3.98
6/05/2025	14:17:02	4.5	21.56	49.59	32.42	7.3	9.00	440	53.4	3.89
Average			**21.65**	**48.93**	**31.94**	**5.03**	**8.41**	**443**	**57.31**	**4.19**
Stdev			**0.15**	**0.58**	**0.42**	**0.86**	**0.48**	**1**	**2.63**	**0.19**
Min			**21.49**	**48.30**	**31.48**	**4.50**	**7.65**	**440**	**53.40**	**3.89**
Max			**21.93**	**49.73**	**32.52**	**7.30**	**9.00**	**444**	**61.50**	**4.48**

C3

Date	Time	Depth	Temp (C)	Cond (ms/cm)	Sal (ppt)	Turb (ntu)	pH	ORP (mv)	DO (%sat)	D.O. (mg/L)
6/05/2025	13:51:06	0.3	22.24	48.41	31.56	4.7	7.65	443	71.0	5.15
6/05/2025	13:51:25	0.5	22.14	48.39	31.54	4.4	7.74	443	68.1	4.94
6/05/2025	13:51:44	1	21.86	48.40	31.55	4.6	7.92	443	65.0	4.74
6/05/2025	13:52:02	1.5	21.70	48.48	31.61	4.6	8.20	442	63.7	4.66
6/05/2025	13:52:20	2	21.78	48.67	31.75	4.3	8.42	442	63.0	4.60
6/05/2025	13:52:46	2.5	21.59	49.23	32.16	4.5	8.53	443	62.1	4.54
6/05/2025	13:53:08	3	21.39	49.27	32.19	4.6	8.54	442	61.2	4.49
6/05/2025	13:53:25	3.5	21.45	49.70	32.51	4.9	8.53	442	60.3	4.40
6/05/2025	13:53:28	4	21.45	49.74	32.53	4.9	8.53	442	60.1	4.40
6/05/2025	13:53:44	4.5	21.42	50.08	32.78	6.2	8.50	442	57.6	4.20
6/05/2025	13:54:07	5	21.34	50.48	33.07	6.3	8.49	442	53.3	3.89
6/05/2025	13:55:34	5.1	21.41	50.04	32.75	9.2	8.58	442	49.8	3.64
Average			**21.65**	**49.24**	**32.17**	**5.27**	**8.30**	**442**	**61.27**	**4.47**
Stdev			**0.30**	**0.76**	**0.56**	**1.40**	**0.34**	**0**	**5.84**	**0.42**
Min			**21.34**	**48.39**	**31.54**	**4.30**	**7.65**	**442**	**49.80**	**3.64**
Max			**22.24**	**50.48**	**33.07**	**9.20**	**8.58**	**443**	**71.00**	**5.15**

C4

Date	Time	Depth	Temp (C)	Cond (ms/cm)	Sal (ppt)	Turb (ntu)	pH	ORP (mv)	DO (%sat)	D.O. (mg/L)
5/05/2025	12:44:09	0.3	22.60	49.11	32.07	3.6	7.69	497	71.1	5.11
5/05/2025	12:44:37	0.5	22.60	49.24	32.17	3.8	8.2	496	70.2	5.04
5/05/2025	12:44:52	1	21.33	48.78	31.83	3.7	8.22	496	71.8	5.28
5/05/2025	12:45:08	1.5	21.26	49.00	31.99	3.7	8.12	496	72.9	5.36
5/05/2025	12:45:22	2	21.22	49.58	32.41	3.6	7.70	496	72.8	5.34
5/05/2025	12:45:37	2.5	21.31	50.46	33.06	3.5	7.81	496	70.8	5.17
5/05/2025	12:45:54	3	21.20	50.52	33.10	3.7	7.47	496	69.5	5.08
5/05/2025	12:46:13	3.5	20.88	50.80	33.31	4.1	6.53	496	68.6	5.04
5/05/2025	12:46:27	4	20.99	51.02	33.47	5.1	6.72	495	65.7	4.81
5/05/2025	12:46:44	4.5	21.14	51.06	33.50	6.4	6.68	495	62.4	4.56
Average			**21.45**	**49.96**	**32.69**	**4.12**	**7.51**	**496**	**69.58**	**5.08**
Stdev			**0.62**	**0.90**	**0.66**	**0.93**	**0.65**	**1**	**3.30**	**0.25**
Min			**20.88**	**48.78**	**31.83**	**3.50**	**6.53**	**495**	**62.40**	**4.56**
Max			**22.60**	**51.06**	**33.50**	**6.40**	**8.22**	**497**	**72.90**	**5.36**

C5

Date	Time	Depth	Temp (C)	Cond (ms/cm)	Sal (ppt)	Turb (ntu)	pH	ORP (mv)	DO (%sat)	D.O. (mg/L)
6/05/2025	12:38:44	0.5	22.16	48.51	31.63	3.6	7.58	443	74.8	5.42
6/05/2025	12:39:08	1	21.84	48.44	31.58	3.5	7.83	444	75.2	5.49
6/05/2025	12:39:28	1.5	21.49	48.42	31.57	3.6	8.23	444	74.9	5.50
6/05/2025	12:39:51	2	21.33	48.39	31.55	3.7	8.34	444	73.1	5.39
6/05/2025	12:40:07	2.5	21.37	48.50	31.62	3.7	8.39	444	72.6	5.34
6/05/2025	12:40:32	3	21.46	48.70	31.77	4.0	8.33	444	68.2	5.00
6/05/2025	12:40:48	3.5	21.42	49.75	32.54	4.4	8.35	444	66.3	4.85
6/05/2025	12:41:06	4	21.27	49.99	32.72	4.6	8.13	444	66.3	4.86
6/05/2025	12:41:28	4.5	21.24	50.16	32.84	4.9	8.35	444	65.2	4.77
6/05/2025	12:41:45	5	21.26	50.26	32.91	5.3	8.32	443	63.5	4.64
6/05/2025	12:41:59	5.5	21.24	50.33	32.97	5.5	8.31	443	64.7	4.73
6/05/2025	12:42:14	6	21.34	50.57	33.14	5.9	8.36	443	64.0	4.67
6/05/2025	12:43:45	6.3	21.25	50.31	32.95	7.2	8.59	442	62.7	4.59
Average			**21.44**	**49.41**	**32.29**	**4.61**	**8.24**	**444**	**68.58**	**5.02**
Stdev			**0.27**	**0.91**	**0.66**	**1.12**	**0.26**	**1**	**4.81**	**0.35**
Min			**21.24**	**48.39**	**31.55**	**3.50**	**7.58**	**442**	**62.70**	**4.59**
Max			**22.16**	**50.57**	**33.14**	**7.20**	**8.59**	**444**	**75.20**	**5.50**

C6

Date	Time	Depth	Temp (C)	Cond (ms/cm)	Sal (ppt)	Turb (ntu)	pH	ORP (mv)	DO (%sat)	D.O. (mg/L)
5/05/2025	13:10:19	0.5	24.16	49.89	32.64	4.3	7.93	488	64.9	4.52
5/05/2025	13:10:43	1	23.25	49.68	32.49	3.9	8.29	488	66.0	4.67
5/05/2025	13:11:07	1.5	21.86	49.45	32.32	4.2	8.41	488	67.9	4.93
5/05/2025	13:11:27	2	22.02	50.27	32.92	3.9	8.40	488	67.0	4.84
5/05/2025	13:11:54	2.5	21.34	50.41	33.03	3.9	8.50	488	65.9	4.81
5/05/2025	13:12:13	3	21.25	50.51	33.09	3.9	8.62	488	65.6	4.79
5/05/2025	13:12:33	3.5	21.17	50.50	33.09	4.2	8.39	488	65.0	4.76
5/05/2025	13:12:55	4	20.60	50.53	33.11	4.5	8.20	488	65.4	4.84
5/05/2025	13:13:11	4.5	20.58	50.69	33.23	5.4	8.30	487	64.8	4.79
5/05/2025	13:14:29	5.5	20.54	50.55	33.12	6.8	8.70	486	64.1	4.74
Average			**21.68**	**50.25**	**32.90**	**4.50**	**8.37**	**487.70**	**65.66**	**4.77**
Stdev			**1.20**	**0.42**	**0.31**	**0.93**	**0.22**	**0.67**	**1.12**	**0.11**
Min			**20.54**	**49.45**	**32.32**	**3.90**	**7.93**	**486.00**	**64.10**	**4.52**
Max			**24.16**	**50.69**	**33.23**	**6.80**	**8.70**	**488.00**	**67.90**	**4.93**

C7

Date	Time	Depth	Temp (C)	Cond (ms/cm)	Sal (ppt)	Turb (ntu)	pH	ORP (mv)	DO (%sat)	D.O. (mg/L)
6/05/2025	12:12:22	0.3	21.85	49.03	32.02	4.1	7.43	446	71.3	5.19
6/05/2025	12:12:36	0.5	21.72	49.03	32.01	3.6	7.50	445	70.1	5.12
6/05/2025	12:13:33	1	21.47	49.03	32.01	3.5	8.33	445	67.7	4.96
6/05/2025	12:13:54	1.5	21.37	49.07	32.04	3.6	8.54	445	68.9	5.06
6/05/2025	12:13:57	2	21.37	49.07	32.04	3.6	8.54	445	68.7	5.05
6/05/2025	12:14:08	2.5	21.29	49.04	32.02	3.6	8.55	445	68.0	5.00
6/05/2025	12:14:22	3	21.21	49.07	32.05	3.8	8.55	445	68.2	5.02
6/05/2025	12:14:37	3.5	21.19	49.60	32.43	4.1	8.59	445	66.9	4.91
6/05/2025	12:14:52	4	21.32	49.87	32.63	4.1	8.61	445	65.4	4.79
6/05/2025	12:15:07	4.5	21.37	49.99	32.71	4.2	8.63	445	63.7	4.65
6/05/2025	12:16:34	5	21.40	50.12	32.81	5.8	8.63	444	57.9	4.23
Average			**21.41**	**49.36**	**32.25**	**4.00**	**8.35**	**445.00**	**66.98**	**4.91**
Stdev			**0.20**	**0.44**	**0.32**	**0.65**	**0.45**	**0.45**	**3.66**	**0.27**
Min			**21.19**	**49.03**	**32.01**	**3.50**	**7.43**	**444.00**	**57.90**	**4.23**
Max			**21.85**	**50.12**	**32.81**	**5.80**	**8.63**	**446.00**	**71.30**	**5.19**

Reference monitoring stations

R1

Date	Time	Depth	Temp (C)	Cond (ms/cm)	Sal (ppt)	Turb (ntu)	pH	ORP (mv)	DO (%sat)	D.O. (mg/L)
5/05/2025	13:35:54	0.3	22.45	49.08	32.05	3.8	7.33	484	79.4	5.71
5/05/2025	13:36:20	0.5	22.09	49.47	32.34	3.8	7.38	483	77.8	5.62
5/05/2025	13:36:36	1	21.64	49.79	32.57	3.8	7.57	484	77.3	5.63
5/05/2025	13:36:39	1.5	21.63	49.79	32.57	3.8	7.60	484	77.5	5.65
5/05/2025	13:37:04	2	21.54	49.93	32.67	4.0	7.88	483	75.4	5.50
5/05/2025	13:37:21	2.5	21.34	50.52	33.10	3.8	7.94	483	76.1	5.55
5/05/2025	13:37:39	3	21.11	50.57	33.14	3.9	8.04	483	75.4	5.53
5/05/2025	13:37:57	3.5	20.87	50.60	33.16	4.3	8.08	483	72.9	5.36
5/05/2025	13:38:19	4	20.83	50.65	33.20	5.3	8.10	483	69.7	5.13
5/05/2025	13:39:23	4.5	20.85	50.63	33.19	6.9	7.76	481	68.1	5.01
5/05/2025	13:39:26	4.6	20.85	50.63	33.18	7.0	7.77	481	68.0	5.00
Average			**21.38**	**50.15**	**32.83**	**4.58**	**7.77**	**483**	**74.33**	**5.43**
Stdev			**0.55**	**0.56**	**0.41**	**1.25**	**0.27**	**1**	**4.05**	**0.26**
Min			**20.83**	**49.08**	**32.05**	**3.80**	**7.33**	**481**	**68.00**	**5.00**
Max			**22.45**	**50.65**	**33.20**	**7.00**	**8.10**	**484**	**79.40**	**5.71**

R9

Date	Time	Depth	Temp (C)	Cond (ms/cm)	Sal (ppt)	Turb (ntu)	pH	ORP (mv)	DO (%sat)	D.O. (mg/L)
5/05/2025	9:19:53	0.3	21.08	49.33	32.23	1.9	7.79	566	67.9	5.00
5/05/2025	9:20:19	0.5	20.84	49.72	32.52	2.0	8.04	566	67.5	4.99
5/05/2025	9:20:33	1	20.73	49.69	32.50	2.1	7.99	565	67.4	4.99
5/05/2025	9:20:49	1.5	20.84	50.10	32.80	2.2	8.56	565	66.1	4.88
5/05/2025	9:21:07	2	20.96	50.36	32.98	2.4	8.50	564	66.7	4.91
5/05/2025	9:21:27	2.5	20.79	50.52	33.11	2.6	8.61	564	67.5	4.98
5/05/2025	9:21:30	3	20.80	50.52	33.10	2.6	8.61	564	67.4	4.97
5/05/2025	9:21:46	3.5	20.54	50.47	33.07	2.9	8.64	564	66.1	4.90
5/05/2025	9:22:08	4	20.57	50.55	33.12	3.1	8.61	563	63.6	4.71
5/05/2025	9:22:45	4.5	20.94	51.14	33.56	4.0	8.66	563	57.8	4.23
5/05/2025	9:23:16	5	21.19	51.39	33.75	7.3	8.69	562	50.3	3.67
Average			**20.84**	**50.34**	**32.98**	**3.01**	**8.43**	**564**	**64.39**	**4.75**
Stdev			**0.20**	**0.61**	**0.45**	**1.54**	**0.32**	**1**	**5.51**	**0.42**
Min			**20.54**	**49.33**	**32.23**	**1.90**	**7.79**	**562**	**50.30**	**3.67**
Max			**21.19**	**51.39**	**33.75**	**7.30**	**8.69**	**566**	**67.90**	**5.00**

R10

Date	Time	Depth	Temp (C)	Cond (ms/cm)	Sal (ppt)	Turb (ntu)	pH	ORP (mv)	DO (%sat)	D.O. (mg/L)
6/05/2025	8:36:31	0.3	21.25	49.21	32.15	3.5	7.23	452	64.7	4.76
6/05/2025	8:36:51	0.5	21.25	49.21	32.14	3.7	7.85	453	64.2	4.72
6/05/2025	8:37:27	1	21.24	49.20	32.13	3.8	8.45	453	63.4	4.66
6/05/2025	8:37:51	1.5	21.24	49.22	32.15	4.0	8.49	453	62.7	4.61
6/05/2025	8:38:13	2	21.24	49.43	32.30	5.0	8.52	453	60.1	4.41
6/05/2025	8:38:32	2.5	21.22	49.50	32.35	4.4	8.5	453	59.8	4.39
6/05/2025	8:38:51	3	21.32	49.76	32.54	4.6	8.57	453	59.6	4.37
6/05/2025	8:39:05	3.5	21.35	50.05	32.76	4.9	8.54	453	58.7	4.29
6/05/2025	8:39:21	4	21.52	50.81	33.32	5.4	8.55	453	55.9	4.06
6/05/2025	8:39:24	4.5	21.52	50.84	33.34	5.4	8.55	453	55.5	4.03
6/05/2025	8:39:35	5	21.64	51.20	33.61	5.8	8.5	453	50.7	3.67
6/05/2025	8:39:53	5.5	21.69	51.27	33.66	8.3	8.56	453	45.1	3.26
6/05/2025	8:41:07	5.9	21.70	51.30	33.68	7.8	8.26	452	41.4	2.99
Average			**21.40**	**50.08**	**32.78**	**5.12**	**8.35**	**453**	**57.06**	**4.17**
Stdev			**0.19**	**0.87**	**0.64**	**1.48**	**0.39**	**0**	**7.30**	**0.56**
Min			**21.22**	**49.20**	**32.13**	**3.50**	**7.23**	**452**	**41.40**	**2.99**
Max			**21.70**	**51.30**	**33.68**	**8.30**	**8.57**	**453**	**64.70**	**4.76**

R12

Date	Time	Depth	Temp (C)	Cond (ms/cm)	Sal (ppt)	Turb (ntu)	pH	ORP (mv)	DO (%sat)	D.O. (mg/L)
6/05/2025	11:44:49	0.3	21.53	49.09	32.06	2.0	6.80	443	74.9	5.48
6/05/2025	11:45:10	0.5	21.47	49.08	32.05	2.0	6.43	443	71.4	5.23
6/05/2025	11:45:30	1	21.37	49.11	32.07	2.0	6.67	443	69.8	5.12
6/05/2025	11:45:42	1.5	21.42	49.17	32.12	2.1	6.93	443	69.4	5.09
6/05/2025	11:45:57	2	21.30	49.23	32.16	2.1	7.14	443	69.6	5.11
6/05/2025	11:46:12	2.5	21.46	49.33	32.23	2.2	7.26	443	65.6	4.80
6/05/2025	11:46:26	3	21.41	49.50	32.36	2.4	7.35	443	65.4	4.79
6/05/2025	11:46:41	3.5	21.39	49.61	32.44	2.6	7.01	443	61.9	4.53
6/05/2025	11:46:56	4	21.43	49.96	32.69	2.7	7.05	443	60.0	4.38
6/05/2025	11:47:16	4.5	21.74	50.99	33.45	3.2	7.22	444	56.7	4.10
6/05/2025	11:47:32	5	21.7	51.05	33.50	3.6	7.14	444	53.4	3.86
6/05/2025	11:47:52	5.5	21.71	51.07	33.51	4.1	7.19	444	49.9	3.61
6/05/2025	11:48:15	6	21.72	51.10	33.53	4.9	7.15	444	46.9	3.39
6/05/2025	11:48:18	6.5	21.71	51.10	33.53	4.9	7.10	444	46.6	3.37
6/05/2025	11:48:47	7	21.82	51.29	33.67	7.0	7.10	444	40.7	2.93
Average			**21.55**	**50.05**	**32.76**	**3.19**	**7.04**	**443**	**60.15**	**4.39**
Stdev			**0.17**	**0.92**	**0.68**	**1.47**	**0.24**	**1**	**10.60**	**0.80**
Min			**21.30**	**49.08**	**32.05**	**2.00**	**6.43**	**443**	**40.70**	**2.93**
Max			**21.82**	**51.29**	**33.67**	**7.00**	**7.35**	**444**	**74.90**	**5.48**

R13

Date	Time	Depth	Temp (C)	Cond (ms/cm)	Sal (ppt)	Turb (ntu)	pH	ORP (mv)	DO (%sat)	D.O. (mg/L)
6/05/2025	9:04:22	0.5	21.57	48.98	31.98	2.0	5.93	450	70.0	5.12
6/05/2025	9:04:50	1	21.57	49.06	32.04	2.4	6.65	450	68.7	5.02
6/05/2025	9:05:04	1.5	21.53	49.12	32.08	2.5	7.10	450	69.3	5.07
6/05/2025	9:05:17	2	21.53	49.11	32.07	2.5	7.73	450	67.7	4.95
6/05/2025	9:05:31	2.5	21.51	49.17	32.11	2.7	8.07	451	68.1	4.99
6/05/2025	9:05:46	3	21.36	49.17	32.12	2.7	8.32	451	67.4	4.95
6/05/2025	9:06:00	3.5	21.18	49.14	32.09	2.8	8.35	451	65.6	4.83
6/05/2025	9:06:16	4	21.06	49.20	32.14	3.0	8.39	451	64.4	4.75
6/05/2025	9:06:32	4.5	21.36	50.03	32.75	3.3	8.40	452	62.4	4.56
6/05/2025	9:06:46	5	21.35	50.89	33.38	3.6	8.42	452	60.9	4.44
6/05/2025	9:06:59	5.5	21.43	51.07	33.51	4.3	8.47	452	56.9	4.13
6/05/2025	9:08:07	5.9	21.44	50.89	33.38	5.1	7.83	451	47.9	3.49
Average			**21.41**	**49.65**	**32.47**	**3.08**	**7.81**	**451**	**64.11**	**4.69**
Stdev			**0.16**	**0.83**	**0.61**	**0.88**	**0.83**	**1**	**6.41**	**0.48**
Min			**21.06**	**48.98**	**31.98**	**2.00**	**5.93**	**450**	**47.90**	**3.49**
Max			**21.57**	**51.07**	**33.51**	**5.10**	**8.47**	**452**	**70.00**	**5.12**

IM1

Date	Time	Depth	Temp (C)	Cond (ms/cm)	Sal (ppt)	Turb (ntu)	pH	ORP (mv)	DO (%sat)	D.O. (mg/L)
5/05/2025	8:22:55	0.5	21.45	50.26	32.91	2.7	7.19	608	75.8	5.53
5/05/2025	8:23:14	1	21.53	50.16	32.84	2.9	7.39	607	75.8	5.52
5/05/2025	8:23:34	1.5	21.25	50.57	33.14	3.0	7.72	606	76.4	5.58
5/05/2025	8:23:59	2	21.02	50.63	33.19	3.4	8.03	605	77.2	5.67
5/05/2025	8:24:15	2.5	21.00	50.66	33.21	3.5	8.07	604	77.5	5.69
5/05/2025	8:24:29	3	20.72	50.62	33.18	3.6	8.07	604	78.0	5.76
5/05/2025	8:24:43	3.5	20.49	50.67	33.22	3.8	8.16	604	77.5	5.74
5/05/2025	8:24:58	4	20.55	50.81	33.32	4.3	7.78	603	75.4	5.57
5/05/2025	8:25:12	4.5	20.56	50.83	33.33	4.9	7.60	603	72.7	5.38
5/05/2025	8:26:44	5	20.57	50.83	33.34	7.0	7.60	599	64.8	4.79
Average			**20.91**	**50.60**	**33.17**	**3.91**	**7.76**	**604**	**75.11**	**5.52**
Stdev			**0.39**	**0.23**	**0.17**	**1.27**	**0.32**	**2**	**3.93**	**0.28**
Min			**20.49**	**50.16**	**32.84**	**2.70**	**7.19**	**599**	**64.80**	**4.79**
Max			**21.53**	**50.83**	**33.34**	**7.00**	**8.16**	**608**	**78.00**	**5.76**

IM2

Date	Time	Depth	Temp (C)	Cond (ms/cm)	Sal (ppt)	Turb (ntu)	pH	ORP (mv)	DO (%sat)	D.O. (mg/L)
5/05/2025	10:45:14	0.5	21.17	48.76	31.81	3.5	7.76	526	69.4	5.12
5/05/2025	10:45:39	1	21.01	48.76	31.82	3.5	8.02	525	71.5	5.29
5/05/2025	10:46:03	1.5	20.86	48.76	31.82	3.4	8.19	525	71.5	5.30
5/05/2025	10:46:06	2	20.86	48.76	31.81	3.4	8.22	525	71.5	5.30
5/05/2025	10:46:30	2.5	20.93	48.91	31.93	3.5	8.30	524	71.0	5.26
5/05/2025	10:46:53	3	21.25	49.76	32.55	3.7	8.50	524	67.9	4.98
5/05/2025	10:47:09	3.5	21.4	50.06	32.77	4.0	8.48	524	67.5	4.93
5/05/2025	10:47:29	4	21.32	50.32	32.95	4.3	8.54	523	67.9	4.96
5/05/2025	10:48:43	4.1	21.29	50.47	33.07	6.4	8.23	522	66.3	4.85
Average			**21.12**	**49.40**	**32.28**	**3.97**	**8.25**	**524**	**69.39**	**5.11**
Stdev			**0.21**	**0.74**	**0.54**	**0.96**	**0.25**	**1**	**2.05**	**0.18**
Min			**20.86**	**48.76**	**31.81**	**3.40**	**7.76**	**522**	**66.30**	**4.85**
Max			**21.40**	**50.47**	**33.07**	**6.40**	**8.54**	**526**	**71.50**	**5.30**

IM3

Date	Time	Depth	Temp (C)	Cond (ms/cm)	Sal (ppt)	Turb (ntu)	pH	ORP (mv)	DO (%sat)	D.O. (mg/L)
5/05/2025	10:19:12	0.5	21.06	48.84	31.87	3.3	7.10	537	65.7	4.86
5/05/2025	10:19:39	1	21.01	48.86	31.88	3.4	7.42	537	66.5	4.92
5/05/2025	10:20:03	1.5	20.87	48.91	31.92	3.4	7.68	536	66.2	4.91
5/05/2025	10:20:41	2	21.13	49.70	32.50	3.5	8.11	536	65.3	4.80
5/05/2025	10:21:02	2.5	21.36	50.01	32.73	3.9	8.28	535	64.9	4.74
5/05/2025	10:21:18	3	21.31	50.19	32.86	3.9	8.37	535	65.5	4.79
5/05/2025	10:21:42	3.5	21.25	50.44	33.05	4.3	8.45	534	65.5	4.79
5/05/2025	10:22:02	4	21.20	50.50	33.09	4.6	8.44	534	65.0	4.76
5/05/2025	10:22:20	4.5	21.08	51.17	33.58	5.6	8.43	535	62.5	4.57
5/05/2025	10:22:38	5	21.09	51.18	33.59	6.2	8.41	534	55.8	4.08
5/05/2025	10:22:53	5.5	21.11	51.19	33.60	7.2	8.43	534	53.3	3.90
5/05/2025	10:24:14	5.9	21.15	51.19	33.60	9.1	8.58	532	48.7	3.55
Average			**21.14**	**50.18**	**32.86**	**4.87**	**8.14**	**535**	**62.08**	**4.56**
Stdev			**0.13**	**0.93**	**0.69**	**1.82**	**0.48**	**1**	**6.00**	**0.45**
Min			**20.87**	**48.84**	**31.87**	**3.30**	**7.10**	**532**	**48.70**	**3.55**
Max			**21.36**	**51.19**	**33.60**	**9.10**	**8.58**	**537**	**66.50**	**4.92**

IM4

Date	Time	Depth	Temp (C)	Cond (ms/cm)	Sal (ppt)	Turb (ntu)	pH	ORP (mv)	DO (%sat)	D.O. (mg/L)
5/05/2025	11:08:38	0.5	21.04	48.67	31.75	3.4	7.33	518	70.3	5.20
5/05/2025	11:09:09	1	20.91	48.68	31.76	3.2	7.74	517	69.2	5.13
5/05/2025	11:09:12	1.5	20.80	48.65	31.73	3.3	7.64	517	69.0	5.13
5/05/2025	11:09:31	2	20.75	48.68	31.76	3.3	7.64	516	68.4	5.09
5/05/2025	11:09:50	2.5	21.06	50.03	32.74	3.6	7.58	517	66.4	4.88
5/05/2025	11:10:08	3	21.06	50.02	32.74	3.6	7.60	516	66.2	4.87
5/05/2025	11:10:11	3.5	21.18	50.30	32.94	4.0	7.61	516	63.7	4.66
5/05/2025	11:10:39	4	21.13	50.37	33.00	4.5	7.35	515	63.5	4.66
5/05/2025	11:11:03	4.5	21.21	50.59	33.16	4.9	7.45	515	63.4	4.64
5/05/2025	11:11:17	5	21.17	50.59	33.15	5.5	7.45	515	62.2	4.55
5/05/2025	11:11:40	5.5	21.26	51.24	33.64	6.5	7.48	515	58.1	4.23
5/05/2025	11:12:00	6	21.33	51.29	33.67	7.1	7.61	515	51.5	3.75
5/05/2025	11:12:18	6.5	21.40	51.35	33.72	8.8	7.83	515	46.8	3.40
5/05/2025	11:12:44	6.9	21.23	51.24	33.64	9.1	8.28	513	46.3	3.37
Average			**21.11**	**50.12**	**32.81**	**5.06**	**7.61**	**516**	**61.79**	**4.54**
Stdev			**0.19**	**1.05**	**0.77**	**2.05**	**0.24**	**1**	**8.12**	**0.63**
Min			**20.75**	**48.65**	**31.73**	**3.20**	**7.33**	**513**	**46.30**	**3.37**
Max			**21.40**	**51.35**	**33.72**	**9.10**	**8.28**	**518**	**70.30**	**5.20**

IM5

Date	Time	Depth	Temp (C)	Cond (ms/cm)	Sal (ppt)	Turb (ntu)	pH	ORP (mv)	DO (%sat)	D.O. (mg/L)
5/05/2025	12:10:01	0.5	21.06	48.53	31.65	3.2	7.35	504	67.7	5.01
5/05/2025	12:10:22	1	20.78	48.53	31.65	3.1	7.94	503	67.2	5.00
5/05/2025	12:10:57	1.5	20.84	48.75	31.81	3.2	8.43	502	66.4	4.93
5/05/2025	12:11:17	2	21.05	49.42	32.30	3.4	8.56	502	64.5	4.75
5/05/2025	12:11:35	2.5	21.14	50.26	32.91	3.8	8.59	503	62.7	4.6
5/05/2025	12:11:53	3	21.20	50.46	33.06	4.2	8.61	502	61.3	4.49
5/05/2025	12:12:08	3.5	21.22	50.53	33.11	4.7	8.61	502	61.0	4.46
5/05/2025	12:12:11	4	21.22	50.53	33.11	4.7	8.62	502	61.0	4.46
5/05/2025	12:12:30	4.5	21.19	50.59	33.15	5.4	8.65	501	60.6	4.43
5/05/2025	12:12:33	5	21.19	50.60	33.17	5.4	8.67	501	60.6	4.43
5/05/2025	12:12:47	5.5	21.22	51.13	33.56	6.9	8.66	502	58.8	4.29
5/05/2025	12:13:01	6	21.23	51.17	33.58	7.2	8.68	502	54.3	3.96
5/05/2025	12:13:13	6.5	21.25	51.18	33.59	7.9	8.69	501	51.8	3.78
5/05/2025	12:13:29	7	21.29	51.24	33.64	8.5	8.65	501	49.8	3.63
Average			**21.13**	**50.21**	**32.88**	**5.11**	**8.48**	**502**	**60.55**	**4.44**
Stdev			**0.15**	**0.99**	**0.73**	**1.84**	**0.38**	**1**	**5.44**	**0.43**
Min			**20.78**	**48.53**	**31.65**	**3.10**	**7.35**	**501**	**49.80**	**3.63**
Max			**21.29**	**51.24**	**33.64**	**8.50**	**8.69**	**504**	**67.70**	**5.01**

IM6

Date	Time	Depth	Temp (C)	Cond (ms/cm)	Sal (ppt)	Turb (ntu)	pH	ORP (mv)	DO (%sat)	D.O. (mg/L)
5/05/2025	11:37:52	0.5	21.12	48.66	31.74	2.9	8.06	510	67.3	4.97
5/05/2025	11:38:25	1	21.01	48.72	31.79	3.0	8.36	510	67.5	4.99
5/05/2025	11:38:42	1.5	20.84	48.64	31.73	3.0	8.46	510	67.4	5.00
5/05/2025	11:39:05	2	20.72	48.66	31.74	3.1	8.45	509	66.5	4.95
5/05/2025	11:39:22	2.5	21.05	49.94	32.68	3.4	8.31	509	64.8	4.76
5/05/2025	11:39:36	3	21.13	50.18	32.85	3.6	8.42	509	63.0	4.62
5/05/2025	11:39:52	4.5	21.19	50.37	33.00	3.8	8.33	508	62.9	4.61
5/05/2025	11:40:59	6.3	21.20	50.38	33.00	5.4	7.66	506	62.8	4.60
Average			**21.03**	**49.44**	**32.32**	**3.53**	**8.26**	**509**	**65.28**	**4.81**
Stdev			**0.17**	**0.84**	**0.61**	**0.82**	**0.27**	**1**	**2.15**	**0.18**
Min			**20.72**	**48.64**	**31.73**	**2.90**	**7.66**	**506**	**62.80**	**4.60**
Max			**21.20**	**50.38**	**33.00**	**5.40**	**8.46**	**510**	**67.50**	**5.00**

IM7

Date	Time	Depth	Temp (C)	Cond (ms/cm)	Sal (ppt)	Turb (ntu)	pH	ORP (mv)	DO (%sat)	D.O. (mg/L)
6/05/2025	7:46:36	0.5	22.9	48.93	31.94	2.9	8.55	461	69.2	4.95
6/05/2025	7:47:02	1	21.77	48.95	31.96	2.7	8.81	461	71.3	5.20
6/05/2025	7:47:24	1.5	21.53	49.07	32.04	2.6	8.97	461	72.7	5.32
6/05/2025	7:47:40	2	21.53	49.11	32.07	2.7	9.00	461	71.6	5.24
6/05/2025	7:48:02	2.5	21.61	49.17	32.11	2.7	9.06	461	71.4	5.22
6/05/2025	7:48:21	3	21.63	49.19	32.13	3.0	9.05	460	71.1	5.19
6/05/2025	7:48:37	3.5	21.67	49.41	32.29	3.1	9.12	460	71.1	5.18
6/05/2025	7:48:53	4	21.75	49.70	32.5	3.3	9.16	460	69.8	5.08
6/05/2025	7:49:06	4.5	21.81	49.91	32.65	3.5	9.10	460	68.3	4.95
6/05/2025	7:49:23	5	21.44	49.84	32.61	3.6	9.09	460	67.3	4.92
6/05/2025	7:49:30	5.5	21.61	51.22	33.62	3.9	9.06	460	66.7	4.83
6/05/2025	7:49:45	6	22.05	51.27	33.66	4.1	9.00	460	62.9	4.52
6/05/2025	7:50:02	6.5	21.86	51.28	33.66	4.5	8.99	460	57.7	4.16
6/05/2025	7:51:09	6.7	21.85	51.27	33.66	4.2	9.00	459	54.2	3.91
Average			**21.79**	**49.88**	**32.64**	**3.34**	**9.00**	**460**	**67.52**	**4.91**
Stdev			**0.36**	**0.96**	**0.70**	**0.63**	**0.15**	**1**	**5.57**	**0.43**
Min			**21.44**	**48.93**	**31.94**	**2.60**	**8.55**	**459**	**54.20**	**3.91**
Max			**22.90**	**51.28**	**33.66**	**4.50**	**9.16**	**461**	**72.70**	**5.32**

IM8

Date	Time	Depth	Temp (C)	Cond (ms/cm)	Sal (ppt)	Turb (ntu)	pH	ORP (mv)	DO (%sat)	D.O. (mg/L)
6/05/2025	8:10:29	0.5	22.87	48.90	31.92	3.8	7.76	457	65.2	4.66
6/05/2025	8:10:47	1	22.29	49.12	32.08	3.9	7.84	456	62.5	4.51
6/05/2025	8:10:59	1.5	21.63	49.04	32.02	3.8	8.21	457	63.3	4.62
6/05/2025	8:11:12	2	21.44	49.16	32.11	4.8	8.39	457	61.6	4.52
6/05/2025	8:11:30	2.5	21.42	49.24	32.16	4.6	8.42	457	61.2	4.49
6/05/2025	8:11:48	3	21.47	49.31	32.22	4.9	8.63	457	60.3	4.42
6/05/2025	8:12:04	3.5	21.36	49.27	32.19	4.8	8.76	457	58.9	4.32
6/05/2025	8:12:21	4	21.34	49.47	32.34	4.7	8.92	457	57.8	4.24
6/05/2025	8:12:35	4.5	21.52	50.19	32.86	4.7	9.04	457	57.3	4.17
6/05/2025	8:12:48	5	21.66	50.25	32.91	4.9	9.08	457	55.0	4.00
6/05/2025	8:13:01	5.5	21.56	50.61	33.17	5.4	8.95	457	53.8	3.91
6/05/2025	8:13:13	6	21.58	50.98	33.44	5.5	8.91	457	51.5	3.73
6/05/2025	8:13:25	6.5	21.64	51.13	33.56	6.8	8.98	458	49.1	3.55
6/05/2025	8:14:33	6.8	21.62	51.12	33.54	6.9	9.07	457	43.7	3.16
Average			**21.67**	**49.84**	**32.61**	**4.96**	**8.64**	**457**	**57.23**	**4.16**
Stdev			**0.41**	**0.84**	**0.61**	**0.95**	**0.45**	**0**	**6.04**	**0.44**
Min			**21.34**	**48.90**	**31.92**	**3.80**	**7.76**	**456**	**43.70**	**3.16**
Max			**22.87**	**51.13**	**33.56**	**6.90**	**9.08**	**458**	**65.20**	**4.66**

IM9 (was R8)

Date	Time	Depth	Temp (C)	Cond (ms/cm)	Sal (ppt)	Turb (ntu)	pH	ORP (mv)	DO (%sat)	D.O. (mg/L)
5/05/2025	9:50:22	0.5	21.62	49.21	32.14	3.3	7.69	551	67.8	4.95
5/05/2025	9:50:50	1	21.64	49.16	32.11	3.4	7.75	549	67.2	4.91
5/05/2025	9:51:20	1.5	21.55	49.13	32.08	3.5	7.85	548	67.9	4.96
5/05/2025	9:51:52	2	21.02	49.66	32.47	3.5	8.25	547	67.4	4.96
5/05/2025	9:52:14	2.5	21.24	50.13	32.82	3.7	8.36	547	66.1	4.84
5/05/2025	9:52:36	3	21.18	50.48	33.08	3.9	8.34	546	66.4	4.86
5/05/2025	9:53:03	3.5	21.21	50.51	33.10	4.3	8.46	546	66.1	4.83
5/05/2025	9:53:25	4	21.18	50.52	33.11	4.7	8.48	545	65.2	4.78
5/05/2025	9:53:41	4.5	21.00	51.14	33.56	6.0	8.46	546	63.5	4.65
5/05/2025	9:53:58	5	20.99	51.14	33.56	6.7	8.27	546	57.8	4.23
5/05/2025	9:54:09	5.5	20.99	51.14	33.56	6.3	8.24	546	56.2	4.12
5/05/2025	9:54:25	6	20.99	51.13	33.56	7.1	8.27	545	55.1	4.04
5/05/2025	9:55:58	6.1	20.98	51.13	33.56	8.7	8.41	543	54.3	3.98
Average			**21.20**	**50.34**	**32.98**	**5.01**	**8.22**	**547**	**63.15**	**4.62**
Stdev			**0.25**	**0.81**	**0.60**	**1.76**	**0.27**	**2**	**5.25**	**0.38**
Min			**20.98**	**49.13**	**32.08**	**3.30**	**7.69**	**543**	**54.30**	**3.98**
Max			**21.64**	**51.14**	**33.56**	**8.70**	**8.48**	**551**	**67.90**	**4.96**

IM10 (was R2)

Date	Time	Depth	Temp (C)	Cond (ms/cm)	Sal (ppt)	Turb (ntu)	pH	ORP (mv)	DO (%sat)	D.O. (mg/L)
5/05/2025	8:51:16	0.5	21.17	50.06	32.77	2.2	7.85	587	75.4	5.53
5/05/2025	8:51:38	1	21.07	50.22	32.88	2.6	8.06	586	69.6	5.11
5/05/2025	8:51:58	1.5	20.90	50.31	32.95	2.7	8.19	585	65.9	4.85
5/05/2025	8:52:19	2	20.71	50.33	32.97	3.3	8.37	584	64.4	4.76
5/05/2025	8:52:35	2.5	20.72	50.36	32.99	4.3	8.44	583	64.9	4.80
5/05/2025	8:52:47	3	20.71	50.36	32.99	3.1	8.41	582	64.1	4.73
5/05/2025	8:53:04	3.5	20.69	50.41	33.03	3.4	8.44	582	63.4	4.69
5/05/2025	8:53:26	4	20.44	50.56	33.13	3.7	8.58	581	62.2	4.62
5/05/2025	8:53:41	4.5	20.38	50.74	33.27	5.0	8.62	581	59.9	4.45
5/05/2025	8:55:15	4.8	20.37	50.63	33.19	5.4	8.52	578	56.8	4.22
Average			**20.72**	**50.40**	**33.02**	**3.57**	**8.35**	**583**	**64.66**	**4.78**
Stdev			**0.27**	**0.20**	**0.15**	**1.05**	**0.24**	**3**	**5.10**	**0.36**
Min			**20.37**	**50.06**	**32.77**	**2.20**	**7.85**	**578**	**56.80**	**4.22**
Max			**21.17**	**50.74**	**33.27**	**5.40**	**8.62**	**587**	**75.40**	**5.53**

IM11 (was R7)

Date	Time	Depth	Temp (C)	Cond (ms/cm)	Sal (ppt)	Turb (ntu)	pH	ORP (mv)	DO (%sat)	D.O. (mg/L)
6/05/2025	13:29:53	0.3	22.08	48.39	31.54	3.6	8.03	445	74.1	5.38
6/05/2025	13:30:17	0.5	21.75	48.43	31.57	3.8	8.31	445	73.7	5.39
6/05/2025	13:30:35	1	21.72	48.45	31.59	3.8	8.51	445	73.6	5.38
6/05/2025	13:30:51	1.5	21.63	48.56	31.67	3.7	8.58	445	73.8	5.40
6/05/2025	13:31:07	2	21.66	48.62	31.71	3.7	8.61	444	73.6	5.39
6/05/2025	13:31:25	2.5	21.50	48.77	31.82	3.9	8.60	444	72.4	5.31
6/05/2025	13:31:43	3	21.35	49.20	32.14	4.2	8.63	445	70.2	5.15
6/05/2025	13:31:59	3.5	21.37	49.58	32.41	4.6	8.67	445	68.5	5.01
6/05/2025	13:32:19	4	21.58	50.27	32.92	6.7	8.58	445	63.2	4.60
6/05/2025	13:32:43	4.5	21.49	50.74	33.26	5.8	8.49	445	59.3	4.31
6/05/2025	13:33:08	5	21.69	51.13	33.56	6.6	8.50	445	53.1	3.84
6/05/2025	13:33:27	5.5	21.81	51.29	33.68	7.1	8.57	445	50.0	3.61
6/05/2025	13:33:40	6	21.71	51.27	33.66	7.6	8.56	445	49.0	3.54
6/05/2025	13:33:53	6.5	21.61	51.29	33.68	8.1	8.57	445	47.1	3.41
6/05/2025	13:35:15	7	21.59	51.34	33.71	9.6	8.64	444	41.2	2.98
Average			**21.64**	**49.82**	**32.59**	**5.52**	**8.52**	**445**	**62.85**	**4.58**
Stdev			**0.18**	**1.25**	**0.92**	**1.97**	**0.16**	**0**	**11.81**	**0.88**
Min			**21.35**	**48.39**	**31.54**	**3.60**	**8.03**	**444**	**41.20**	**2.98**
Max			**22.08**	**51.34**	**33.71**	**9.60**	**8.67**	**445**	**74.10**	**5.40**

IM12 (was R11)

Date	Time	Depth	Temp (C)	Cond (ms/cm)	Sal (ppt)	Turb (ntu)	pH	ORP (mv)	DO (%sat)	D.O. (mg/L)
6/05/2025	13:01:50	0.5	22.09	48.55	31.66	3.2	7.62	445	79.2	5.75
6/05/2025	13:02:08	1	21.97	48.54	31.65	3.4	7.79	445	81.8	5.96
6/05/2025	13:02:39	1.5	21.97	48.53	31.65	3.5	8.37	445	79.7	5.80
6/05/2025	13:03:01	2	21.79	48.52	31.64	3.5	8.57	445	81.7	5.97
6/05/2025	13:03:21	2.5	21.81	48.60	31.69	3.3	8.62	444	82.2	6.00
6/05/2025	13:03:44	3	21.55	48.52	31.64	3.5	8.64	444	81.4	5.97
6/05/2025	13:04:10	3.5	21.61	49.51	32.37	3.8	8.64	444	78.8	5.75
6/05/2025	13:04:26	4	21.46	49.91	32.66	4.2	8.59	444	76.3	5.57
6/05/2025	13:04:46	4.5	21.54	50.18	32.86	6.4	8.51	444	70.4	5.13
6/05/2025	13:06:39	5	21.44	49.93	32.67	6.9	8.67	442	55.8	4.08
Average			**21.72**	**49.08**	**32.05**	**4.17**	**8.40**	**444**	**76.73**	**5.60**
Stdev			**0.23**	**0.71**	**0.52**	**1.34**	**0.38**	**1**	**8.16**	**0.59**
Min			**21.44**	**48.52**	**31.64**	**3.20**	**7.62**	**442**	**55.80**	**4.08**
Max			**22.09**	**50.18**	**32.86**	**6.90**	**8.67**	**445**	**82.20**	**6.00**

Appendix 6: 2024 Benthic Communities Statistical Review

Benthic Communities Monitoring - Statistical Review 2024

Chain Valley Colliery

Prepared for Delta Coal

January 2025

Benthic Communities Monitoring - Statistical Review 2024

Chain Valley Colliery

Delta Coal

E240492 RP1

January 2025

Version	Date	Prepared by	Reviewed by	Comments
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Approved by



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Executive summary

Chain Valley Colliery (CVC) is an underground coal mine located beneath the southern end of Lake Macquarie, approximately 60 kilometres (km) south of Newcastle, NSW. CVC produces thermal coal for the domestic and export markets. As part of CVC's environmental performance, and to satisfy Condition 7(h), Schedule 4 of Development Consent for SSD-5465 (Modification 4), a Benthic Communities Management Plan (BCMP) was developed (CVC 2023).

Since 2012, CVC has monitored the soft sediment benthic community in shallow lake environments above their underground mine workings. The overall aim of the monitoring is to assess potential impacts of underground coal operations (primarily subsidence) on aquatic ecology using benthic communities as the specific indicator of impact. CVC historically has undertaken six-monthly sampling of lake sediments for analysis of benthic community composition and environmental variables (water depth and sediment grain size). Samples are collected in Spring (March) and Autumn (September) at (potential) Impact, Reference, and Control sites. Since 2023, the monitoring frequency has reduced to annual sampling in autumn.

At each site, Laxton Environmental Consultants P/L collected five replicate sediment samples by diver using 200 x 200 x 100 millimetre (mm) sieve boxes with 1 mm mesh. Samples were sieved to remove particles less than 1 mm and captured material preserved for laboratory sorting and enumeration of infauna. Sediment grain size analysis was undertaken on one 250 millilitre (mL) sample of sediment from each site. Infauna were categorised into operational taxonomic units (OTUs) comprising molluscs, polychaete worms and various higher taxa, such as terebellids, ophiuroids, echinoids, sponges, crabs, barnacles and fish.

EMM Consulting Pty Ltd (EMM) conducted statistical analysis on the full benthic dataset from September 2012–March 2024. Descriptive statistics (means, standard deviations, standard errors, minimums, maximums, and counts) were calculated within MS Excel. Summary statistics were subsequently used for visualisation of trends by site and by treatment (Impact versus Control versus Reference).

Raw abundance data were imported into PRIMER v6 for univariate and multivariate analysis. Raw benthic counts were used to calculate univariate diversity indices comprising total number of species (S), total number of individuals (N), species richness (Margalef, d), evenness (Pielou, J') and diversity (Shannon-Wiener, log e, H'). Multivariate analysis of the benthic community data included non-metric multidimensional scaling (nMDS), analysis of similarities (ANOSIM) and similarity percentage analysis (SIMPER), correlated with environmental variables (water depth and grain size) using principal components analysis (PCA).

Ongoing development of CVC's underground coal extraction led to the redesignation of some Reference sites as Impact sites, with R3, R4, R5 and R6 becoming IM5, IM6, IM7 and IM8, respectively, in 2015, and R2, R7, R8 and R11 becoming IM10, IM11, IM9 and IM12, respectively, in March 2024. Also, new Reference sites, R12 and R13, were added in March 2024. To help discern greater relationship information, EMM focused univariate and multivariate statistical analysis of the different site treatments (Impact, Reference, and Control) for the monitoring period after redesignation of these sites (from September 2016 onwards).

From 21 sampling events between September 2012 and March 2024, a total of 26,816 benthic individuals from the 30 different taxonomic groups were counted in sediment samples from across the study area. The three most abundant taxa were the bivalve mollusc *Soletellina* (7,829 individuals), bivalve *Corbula* (6,481 individuals), and polychaetes-thin (6,175 individuals). Together these taxa account for 76% of the total number of benthic individuals collected in sediment samples throughout the monitoring period. The most speciose faunal groups are polychaetes and bivalve molluscs, with ten species collected in both groups.

Between 5 and 21 OTUs (mean 15.0) were reported per site. The lowest number of OTUs were at the new sites established in March 2024 (R12 and R13) with 5 and 9 OTUs, respectively. The next lowest number of OTUs (11) was at IM4 and R5 (now IM7), and the highest number of OTUs, 20 and 21, was at R3 (now IM5) and IM2, respectively. With the lowest and the highest OTU counts occurring at Reference and Impact sites, there is no clear spatial pattern associated with the number of OTUs per site type.

The total number of individuals per site varied from 29 and 86 (R12 and R13) and between 575 (R8/IM9) and 2,210 (C2). Abundances were lowest (<1,000 individuals) at C6 (746), C7 (793), R7/IM11 (751), R8/IM9 (575), R9 (955), R11/IM12 (622), R12 (29) and R13 (86).

Abundances were highest (>1,500) at C2 (2,210), C3 (1,555), C4 (1,604), R1 (1,562), R2/IM10 (1,726), R3/IM5 (1,514) and IM2 (1,650). There is no clear spatial pattern associated with the abundance of benthic species per site type.

Multivariate pairwise test results (ANOSIM) highly non-significant differences between all treatment pairs – Control versus Reference (0.561), Control versus Impact (0.603) and Reference versus Impact (0.433). Negative R-values are attributed to benthic habitats that are patchy and exhibit high variability between replicates (Chapman & Underwood 1999).

Cluster analysis of pair-wise Bray Curtis similarity between sites indicated that at 75% similarity level there were five clusters: C7; C5-R11; IM2-R3-R7; R10; and all remaining sites. Importantly, the Impact sites did not cluster together as a discrete group but were spread along the x-axis, interspersed amongst Reference and Control sites. Similarity patterns evident in the cluster analysis were further explored using an nMDS plot for abundance data at each site. The distribution (in nMDS space) of Impact, Reference and Control sites did not indicate site groupings attributed to impacts from CVC operations since benthic communities at most sites were tightly grouped (similar) and, except for IM2 and IM5, most sites with benthic communities that were significantly different to the main cluster of sites were Reference (R7, R10, R11) and Control (C5 and C7) sites.

The nMDS plots for benthic abundance data grouped by sampling event for each site indicated high variability (differences in nMDS space) between benthic community data over time at each site. Groupings were indicated for 70% similarity and indicated that benthic community structure differ between sampling events at each site and did not a follow an abrupt or sequential change over time that could be attributed to impacts from subsurface activities

SIMPER analysis of square-root transformed biological data indicated that more than 80% of the differences between the site clusters were mostly attributed to abundances of two polychaetes (mud and thin) and three bivalve molluscs, *Corbula*, *Soletellina* and *Trichomya*.

Principle components analysis (PCA) undertaken on the normalised environmental data, indicated that the three main site groups differentiated primarily due to silt, sand, and shell content. The site groupings based on environmental variables (PCA) were different to the site groupings evident in benthic community structure (nMDS) which suggests that factors other than, or in addition to, sediment composition are driving the benthic structure.

The BEST analysis indicated that none of the environmental variables were significant drivers of the benthic community structure. The highest correlation (R 0.427, non-significant) between the biological and environmental data was associated with sediment type, primarily the percentage of sand, followed by percentage of silt and shell. This is not unexpected since most benthic fauna have preferences for particular types of sediment.

From an ecological perspective, the benthic assemblages across the monitoring area fell into several groups that did not appear to be a response to CVC operations but were most likely due to subtle environmental variations driven by unknown environmental factors.

Statistical analysis of CVC's benthic monitoring data did not indicate exceedance of the BCMP (CVC 2023) subsidence impact performance measure of "minor environmental consequences, including minor changes to species composition and/or distribution" has occurred.

EMM recommends continuation of the existing benthic monitoring program – annual monitoring in autumn each year.

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1 Introduction

Chain Valley Colliery (CVC) is an underground coal mine located beneath the southern end of Lake Macquarie, approximately 60 kilometres (km) south of Newcastle, NSW. The mine produces thermal coal which is transported underground to the Manning Colliery where it is crushed and screened before being sent to Vales Point Power Station.

As part of CVC's environmental performance, and to satisfy Condition 7(h), Schedule 4 of Development Consent for SSD-5465 (Modification 4), a Benthic Communities Management Plan (BCMP) has been developed (CVC 2023). The stated purpose of the BCMP is to minimise the impact on Benthic Communities through:

- outlining the required data to be collected on monitored benthic communities
- identifying benthic community monitoring locations
- identifying reporting requirements
- detailing preventative management measures
- identifying the requirements for incident or exceedances reporting
- identifying the responsible persons for all required actions
- Identifying the review requirements for the BCMP.

Since 2012, CVC has monitored the soft sediment benthic community in shallow lake environments above their coal workings. The overall aim of the monitoring is to assess potential impacts of underground coal operations (primarily subsidence) on aquatic ecology, with benthic community composition as the specific indicator of impact.

CVC initially undertook six-monthly sampling of lake sediments for analysis of benthic community composition and environmental variables (water depth and sediment grain size), with samples collected in Autumn (March) and Spring (September). The monitoring frequency was reduced to once per year (March) in 2023 due to recommendations from the 2022 statistical review of benthic community monitoring data (EMM 2022).

Benthic monitoring occurs at potentially Impacted, Reference, and Control sites (Appendix A).

The BCMP defines the three site types as follows:

- Impacted (prefix IM) – sites currently or historically potentially impacted upon by subsidence.
- Reference (prefix R) – sites not currently impacted by subsidence but fall within the proposed future mining footprint. Following undermining, Reference sites are redesignated as Impacted sites.
- Control (prefix C) – sites which will not be impacted upon by subsidence, comprising those areas lying outside the footprint of current and future coal workings.

Full details of the benthic sampling and analysis regime are provided in Section 4 of the BCMP (CVC 2023). At each site, five replicate sediment samples are collected by diver using 200 x 200 x 100 mm sieve boxes with 1 mm mesh. Samples are sieved to remove particles less than 1 mm and captured material is preserved in formaldehyde for laboratory sorting and enumeration of infauna. Sediment grain size analysis is undertaken on one 250 millilitres (mL) sample of sediment from each site.

The BCMP prescribes statistical analysis methods for univariate and multivariate analysis of the benthic monitoring data – biological and environmental (Table 1.1).

Table 1.1 Benthic monitoring data statistical methods (BCMP, CVC 2023)

Variable type	Analysis	Description
Environmental: Water Quality	ANZECC/ARMCANZ Guidelines	Trigger values for slightly – moderately disturbed ecosystems: Estuaries.
Biotic and Environmental	Univariate	Descriptive graphical statistics. Analysis of Variance and Similarity (2-way nested).
Biotic and Environmental	Multivariate	Square-root transformed, Bray-Curtis similarity matrices, Cluster analysis and dendrograms.
	Multidimensional Scaling Ordination	Sites represented as points in space, relative distances indicate similarity.
	BIOENV [1]	Correlation between biotic and environmental data using PRIMER.

[1] Primer v6 replaced the BIOENV routine with BEST (BIOENV + BVStep)

This report provides the results of statistical analysis of the supplied benthic monitoring data in accordance with the BCMP.

2 Methods

Statistical analysis was undertaken on the full benthic dataset (September 2012 – March 2024) from Laxton Environmental, who undertake the field sampling programs on behalf of Delta Coal. The supplied benthic data were checked and reordered within multiple MS Excel worksheets to facilitate statistical analysis in accordance with the BCMP (CVC 2023).

Descriptive statistics (i.e. means, standard deviations, standard errors, minimums, maximums and counts) were calculated within MS Excel. Summary statistics were subsequently used for visualisation of trends by site and by treatment (impact versus control versus reference sites). For the purposes of analysis, the control and reference groups have been kept separate.

Raw data were imported into PRIMER v6 for univariate and multivariate analysis. PRIMER (Plymouth Routines in Multivariate Ecological Research) consists of a "wide range of univariate, graphical and multivariate routines for analysing arrays of species-by-samples data from community ecology" (Clarke & Gorley 2006) and is the software of choice for benthic ecology monitoring.

Univariate diversity indices were calculated from the raw benthic count data. Total number of species (S), total number of individuals (N), species richness (Margalef, d), evenness (Pielou, J') and diversity (Shannon-Wiener, log e, H') were calculated within PRIMER v6 (DIVERSE) and graphically presented to identify any site-by-site trends in benthic community structure.

Due to the high frequency of zeros in the benthic count data, the data were square root transformed to downplay taxa with comparatively high counts and to increase the statistical visibility of the rarer taxonomic groups. Bray Curtis similarity (resemblance) matrices were subsequently developed from the transformed data and statistical analysis of these multivariate data was undertaken using PRIMER v6 routines.

Simple agglomerative hierarchical clustering was undertaken, producing dendrograms to visually identify distinct data groups based on different levels of similarity in benthic community structure. Dendrograms (also known as tree diagrams) display groups of samples in successively smaller numbers of clusters as the threshold of similarity at which two groups merge decreases. Groups (clusters) of sites (or other factors) can be identified for further data exploration with respect to the potential drivers of the groupings.

Non-metric multidimensional scaling (nMDS) was undertaken using PRIMER v6. nMDS is a powerful multivariate tool used to analyse benthic community data whereby points (e.g. sites) are plotted in 2-dimensional space such that the relative distance between points is relative to the same rank order as relative dissimilarities of each sample, or in other words, points close together represent samples that are very similar in community composition and points further apart are more different. Distance between points cannot be used an absolute measure of similarity or dissimilarity, but instead the relative distance between points indicates relative similarity and dissimilarity.

The PRIMER v6 routine for analysis of similarities (ANOSIM) provides an approximate analogue of standard univariate analysis of variance (ANOVA). Using the resemblance matrix calculated from benthic count data, ANOSIM was used to test the null hypothesis that there are no differences between treatments (i.e. Impact, Reference and Control sites) allowing for potential differences between individual sites. A two-way crossed design – sites within treatments – was used. ANOSIM produces p and R values, where p indicates the level of significance for differences between benthic communities, in this case grouped into the three different site types, and R values indicate the strength of any differences. As R values approach 1 the strength of the difference between groups increases. R values close to zero indicate no difference between the groups. This is an important consideration given the inherently variable nature of benthic community data where small-scale variability (between replicates) can often be as great (or greater) than the larger scale differences between sites.

Subsequent interpretation of which individual benthic taxa are driving any of the observed differences between treatments and/or sites was undertaken using similarity percentage analysis (SIMPER) within PRIMER v6. SIMPER outputs indicate the percentage that each taxa contributes to the observed pairwise differences and informs the investigation of why the abundance (or absence) of certain species occur at individual sites.

Environmental data – water depth and sediment grain size – collected at each of CVC's benthic monitoring sites were investigated as potential influencing factors in benthic community composition. The environmental data were normalised (subtract mean and divide by standard deviation) to allow comparison between factors with different units of measure, such as metres water depth, percent silt and percent sand. Principle components analysis (PCA) was used to visualise site-by-site groupings based on water depth and sediment grain size (PRIMER v6).

The variation in environmental data was subsequently used to help identify potential factors, for example water depth, that are driving the development of the benthic assemblages. This approach is critical in defining the potential reasons for variation in benthic community structure within the context of natural variability, driven by environmental factors, and potential impacts from project-related activities.

Ongoing development of CVC's underground coal extraction has led to the redesignation of many of the early Reference sites as Impact sites (Table 2.1). Sites R2, R3, R4, R5, R6, R7, R8 and R11 have become IM10, IM5, IM6, IM7, IM8, IM11, IM9 and IM12, respectively, and to compensate for the loss of reference sites, additional reference and control sites were added.

Changing the 'treatment' designation of sites is necessary to account for the ongoing expansion of the coal workings but it does complicate the statistical analysis process since the potential for impacts from subsidence at these sites changes over time. To help discern greater relationship information, EMM focused statistical analysis of the different site types (impact, reference, and control) for the monitoring period after redesignation of the earlier reference sites to impact sites and after the addition of most of the new reference and control sites (from September 2016 onwards).

Table 2.1 List of benthic monitoring sites indicating sites redesignated due to expansion of CVC mining operations

Reference sites	Control sites	Impact sites
R1	**C1**	**IM1**
R9 *(added in September 2016)*	**C2**	**IM2**
R10 *(added in March 2018)*	**C3**	**IM3**
R12 *(added in March 2024)*	**C4**	**IM4**
R13 *(added in March 2024)*	**C5** *(added in March 2016)*	**IM5** *(=R3 prior to September 2015)*
	C6 *(added in September 2016)*	**IM6** *(=R4 prior to September 2015)*
	C7 *(added in March 2018)*	**IM7** *(=R5 prior to September 2015)*
		IM8 *(=R6 prior to September 2015)*
		IM9 *(=R8 prior to March 2024)*
		IM10 *(=R2 prior to March 2024)*
		IM11 *(=R7 prior to March 2024)*
		IM12 *(=R11 prior to March 2024)*

3 Analysis results

In the laboratory, biological samples were sorted into different taxonomic groups – operational taxonomic units (OTUs) – comprising some polychaete worms and molluscs sorted to genus or species level and all other fauna split into broader groups. These broader groups were higher taxa (such as terebellids, ophiuroids), general organism groups (sponges, crabs, barnacles, fish) or specific descriptive types (such as mud polychaetes, thin polychaetes and thick polychaetes).

Infauna were categorised into 31 OTUs (Table 3.1) and these have been used to differentiate sites during statistical analysis.

Table 3.1 Operational taxonomic units (OTUs) derived for CVC benthos, 2016–2024

Polychaetes – thin (P)	*Lepsiella (Bedeva) hanleyi* (G)	prawns (C)
Polychaetes – thick (P)	*Nassarius jonasii* (G)	crabs (C)
Polychaetes – mud (P)	*Philine angasi* (G)	barnacles (C)
terebellids (P)	*Anadara trapezia* (B)	ophiuroids (E)
Chaetopterus sp. (P)	*Corbula truncata* (B)	echinoids (E)*
Cirratulidae (P)	*Cyamiomactra mactroides* (B)	planaria (F)
Diopatra sp. (P)	*Dosinia sculpta* (B)	sponges (S)**
Gorgonorhynchus repens (P)	*Mactra* sp. (B)	fish
Pectinaria sp. (P)	*Paphia undulata* (B)	
Sthenelais pettiboneae (P)	*Saccostrea glomerata* (B)	* *Echinocardium cordatum* (E)
	Soletellina alba (B)	** *Dysidea* sp. (S)
	Theora lubrica (B)	** *Tetilla* sp. (S)
	Trichomya hirsuta (B)	

Key: (P) = polychaete worm; (G) = gastropod mollusc; (B) = bivalve mollusc; (C) = crustacean; (E) = Echinoderm; (F) = flatworm (Platyhelminth); (S) = sponges (Porifera)

3.1 Benthic data 2012–2024

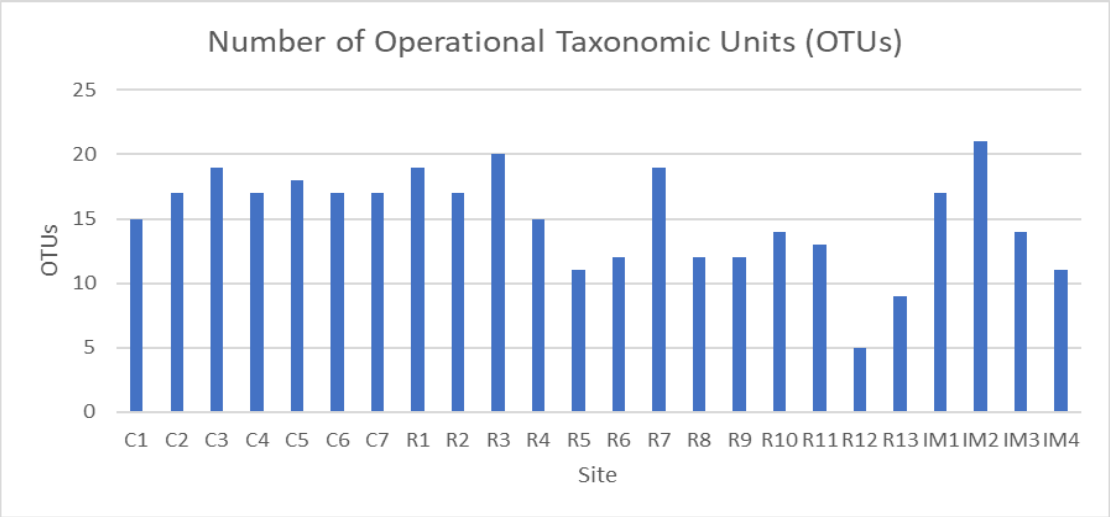
From 21 sampling events between September 2012 and March 2024, a total of 26,816 benthic individuals from the 30 different taxonomic groups were counted in sediment samples from across the study area. The three most abundant taxa were the bivalve mollusc *Soletellina* (7,829 individuals), bivalve *Corbula* (6,481 individuals), and polychaetes-thin (6,175 individuals). Together these taxa account for 76% of the total number of benthic individuals collected in sediment samples throughout the monitoring period. The most speciose faunal groups are polychaetes and bivalve molluscs, with ten species collected in both groups.

The number of OTUs and individuals identified for each site over time are shown in Figure 3.1. In these figures, the site numbering reflects the original reference site designations rather than changes that were made due to subsequent undermining.

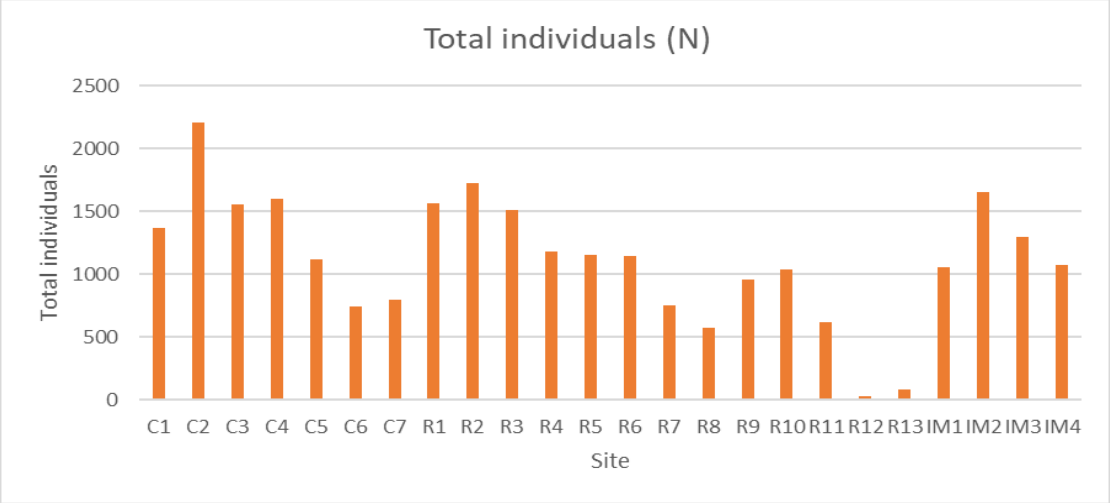
Between 5 and 21 OTUs (mean 15.0) were reported per site. The lowest number of OTUs were at the new sites established in March 2024 (R12 and R13) with 5 and 9 OTUs, respectively. The next lowest number of OTUs (11) was at IM4 and R5 (now IM7), and the highest number of OTUs, 20 and 21, was at R3 (now IM5) and IM2, respectively. With the lowest and the highest OTU counts occurring at Reference and Impact sites, there is no clear spatial pattern associated with the number of OTUs per site type.

The total number of individuals per site varied from 29 and 86 (R12 and R13) and between 575 (R8/IM9) and 2,210 (C2). Abundances were lowest (<1,000 individuals) at C6 (746), C7 (793), R7/IM11 (751), R8/IM9 (575), R9 (955), R11/IM12 (622), R12 (29) and R13 (86).

Abundances were highest (>1,500) at C2 (2,210), C3 (1,555), C4 (1,604), R1 (1,562), R2/IM10 (1,726), R3/IM5 (1,514) and IM2 (1,650). There is no clear spatial pattern associated with the abundance of benthic species per site type.



(a)



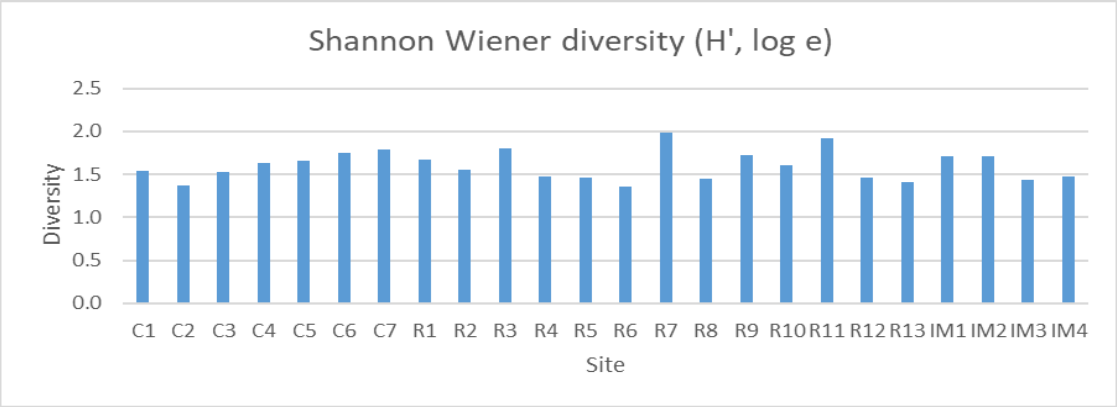
(b)

C = control sites R = reference sites IM = impact sites

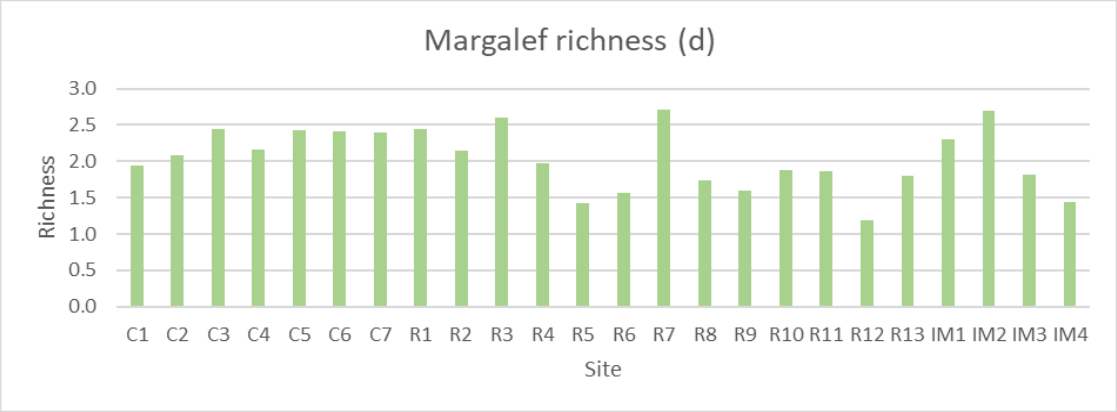
Figure 3.1 Total number of (a) operational taxonomic units (OTUs) and (b) individuals identified in benthic samples from each CVC monitoring site for the period 2012–2024

Shannon Wiener diversity (H', log e), Margalef richness (d) and Pielou's evenness (J') values for each site over time are shown in Figure 3.2.

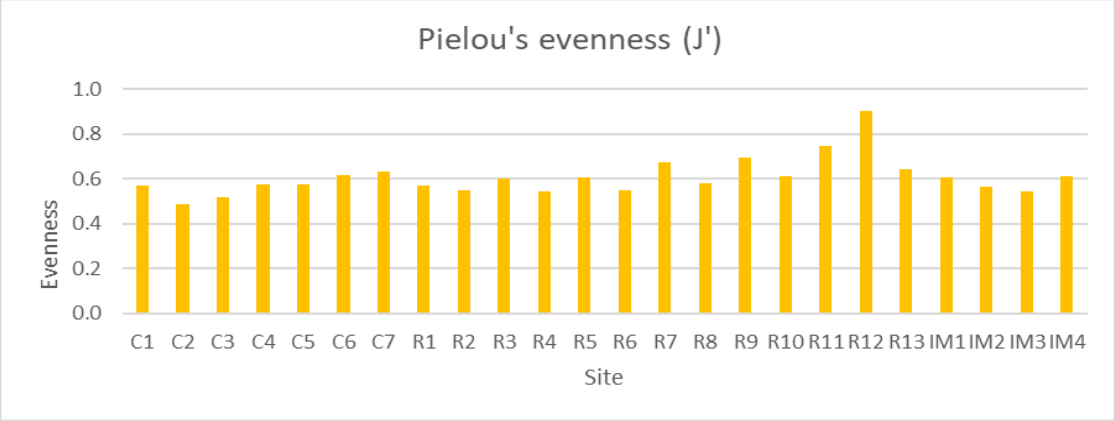
Each of these biodiversity indices are broadly similar across all sampling sites. Margalef richness most closely follows the distribution of OTUs per site, with marginally lower richness (<1.5) apparent at R5, R12 and IM4. The diversity and evenness vary across the sites within a narrow range of 1.36 - 1.98 and 0.48 - 0.90, respectively.



(a)



(b)



(c)

C = control sites R = reference sites IM = impact sites

Figure 3.2 **(a) Shannon Weiner diversity, (b) Margalef richness and (c) Pielou's evenness for benthic samples from each CVC monitoring site for the period 2012–2024**

As indicated in Methods (Chapter 2), to help discern greater relationship information, EMM has focused statistical analysis of the different site types (Impact, Reference, and Control) for the monitoring period after redesignation of sites R3, R4, R5 and R6 as IM5, IM6, IM7 and IM8, respectively. The analysis focus was shifted to the monitoring period from September 2016 onwards.

3.2 Benthic data 2016–2024

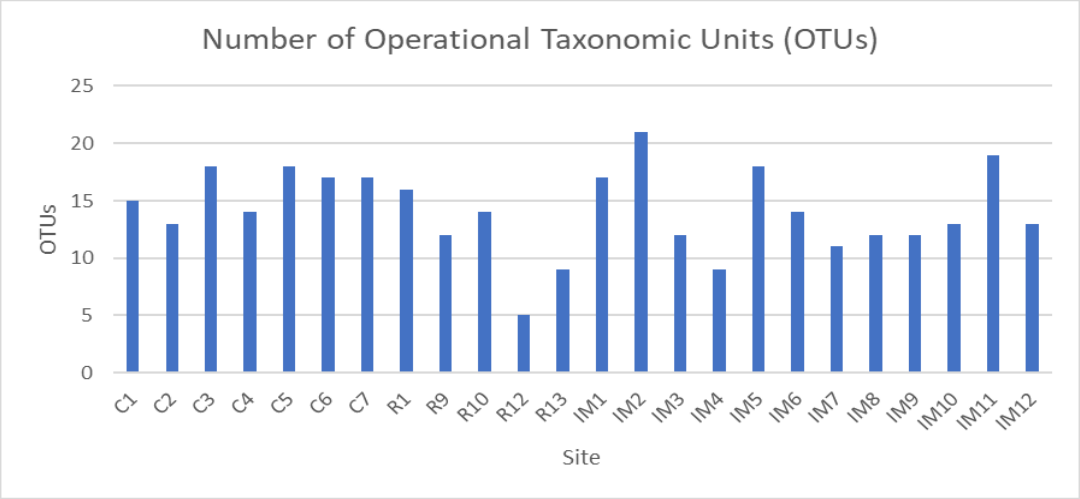
From 15 sampling events between September 2016 and March 2024, a total of 18,893 benthic individuals from 30 different taxonomic groups were counted in sediment samples from across the study area.

The number of OTUs and individuals identified for each site over time is shown in Figure 3.3. In these figures, the site numbering reflects the redesignation of reference sites (R3–R6) as impact sites (IM5–IM8), and subsequent redesignation of R2 (IM10), R7 (IM11), R8 (IM9) and R11 (IM12), due to ongoing expansion of the underground coal workings. Sites R12 and R13 were added in March 2024 to compensate for the 'loss' of reference sites during redesignation as impact sites.

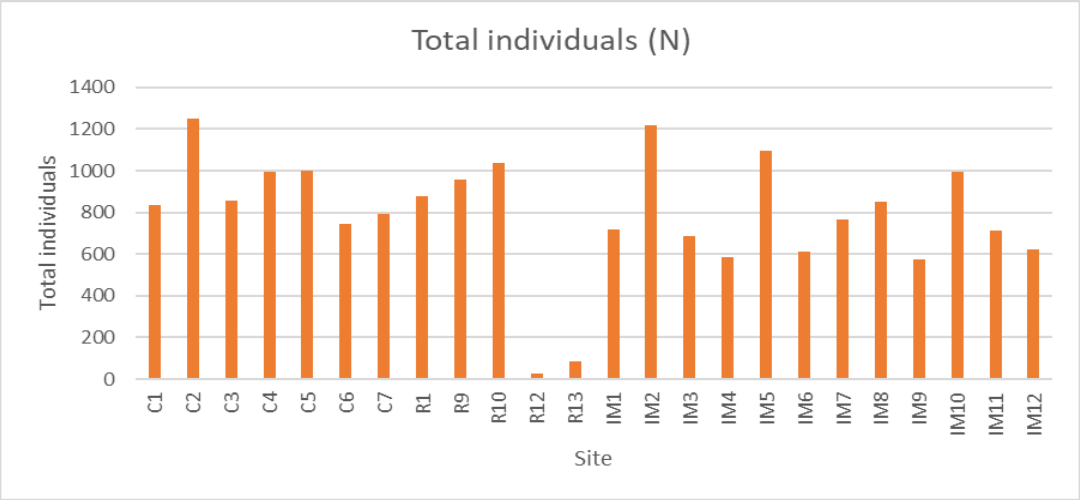
Between 5 and 21 OTUs (mean 14.1) were reported per site. The lowest number of OTUs were at R12 (5), IM4 and R13 (9) and the highest number of OTUs were at IM2 (21) and IM11 (19). There is no clear spatial pattern associated with the number of OTUs per site.

The total number of individuals per site varied between 29 (R12) and 1,251 (C2). Abundances were lowest (<600 individuals) at R12 (29), R13 (86), IM9 (575) and IM4 (583). Abundances were highest (>1,000 individuals) at C2 (1,251), IM2 (1,219), IM5 (1,095) and R10 (1,035). The new reference sites (R12 and R13) had the lowest number of OTUs and lowest abundances of all sites based on one sampling event at each site.

There is no clear spatial pattern associated with the abundance of benthic species per site.



(a)



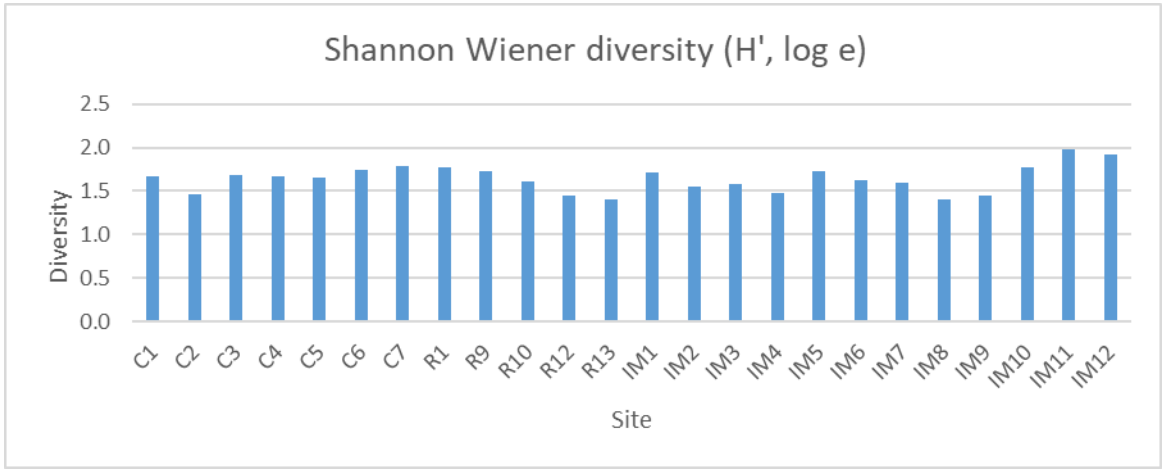
(b)

C = control sites R = reference sites IM = impact sites

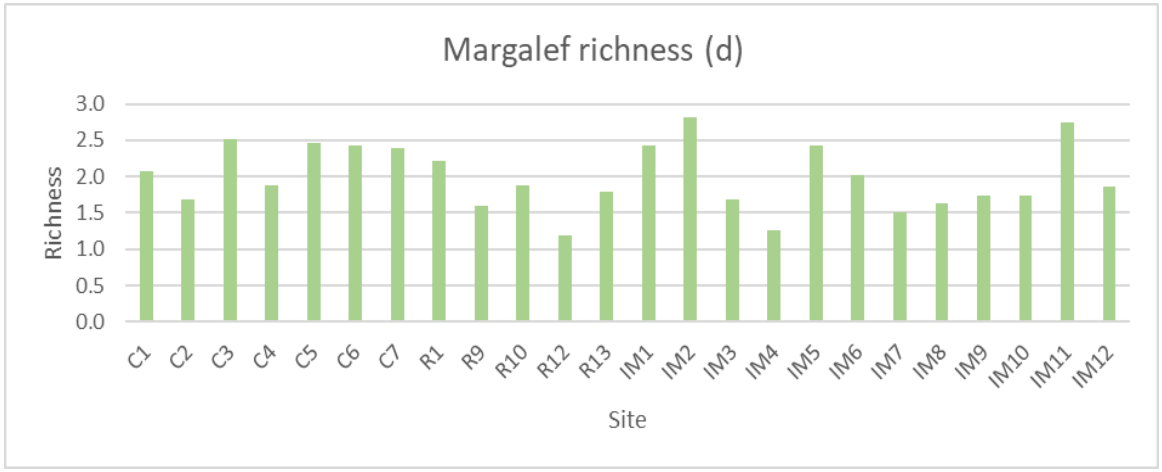
Figure 3.3 Total number of (a) operational taxonomic units (OTUs) and (b) individuals identified in benthic samples from each CVC monitoring site for the period 2016-2024

Shannon Wiener diversity, Margalef richness and Pielou's evenness values for each site over time (2016 - 2024) are shown in Figure 3.4.

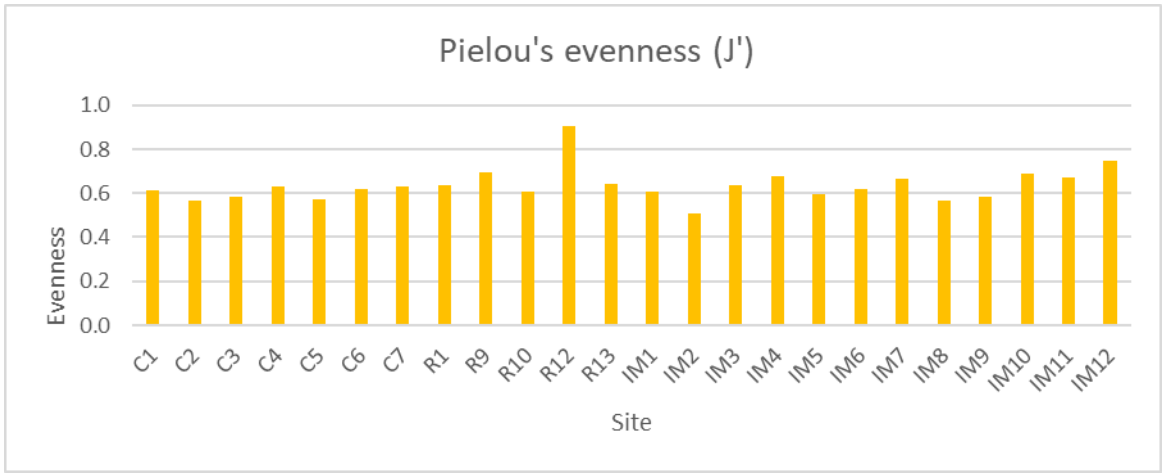
Each of these biodiversity indices are broadly similar across all sampling sites. Margalef richness most closely follows the distribution of OTUs per site, with marginally lower richness (<1.5) apparent at R12 and IM4. The diversity and evenness vary across the sites within a narrow range of 1.41 - 1.91 and 0.50 - 0.90, respectively.



(a)



(b)



(c)

C = control sites R = reference sites IM = impact sites

Figure 3.4 **(a) Shannon Weiner diversity, (b) Margalef richness and (c) Pielou's evenness for benthic samples from each CVC monitoring site for the period 2016–2024**

The limited data (one sampling event) currently available for the new reference sites (R12 and R13), skew the statistical analysis and prevent a meaningful assessment of differences between the other sites and treatments. Consequently, the statistical analysis shown below was undertaken without data from these two sites.

3.3 Analysis of similarity

In accordance with the statistical analysis suite identified in Table 1.1 of the BCMP, benthic data were explored using ANOSIM, cluster analysis and nMDS.

For ANOSIM, a two-way nested design was used to test for similarities between the three different site types (Impact, Reference and Control). Testing for differences in benthic communities between the three site types during the period September 2016 to March 2024 derived a global R value of -0.023 at a significance level (p) of 0.537 (well above the statistical significance level of 0.05). Pairwise test results indicate highly non-significant differences between all treatment pairs – Control versus Reference (0.561), Control versus Impact (0.603) and Reference versus Impact (0.433). Negative R-values are attributed to benthic habitats that are patchy and exhibit high variability between replicates (Chapman & Underwood 1999).

The ANOSIM plot indicates that there are no significant differences between the three site types (Figure 3.5) because the global R value (black vertical line shown at x-axis position -0.023) falls within the wider distribution of R values (blue bars).

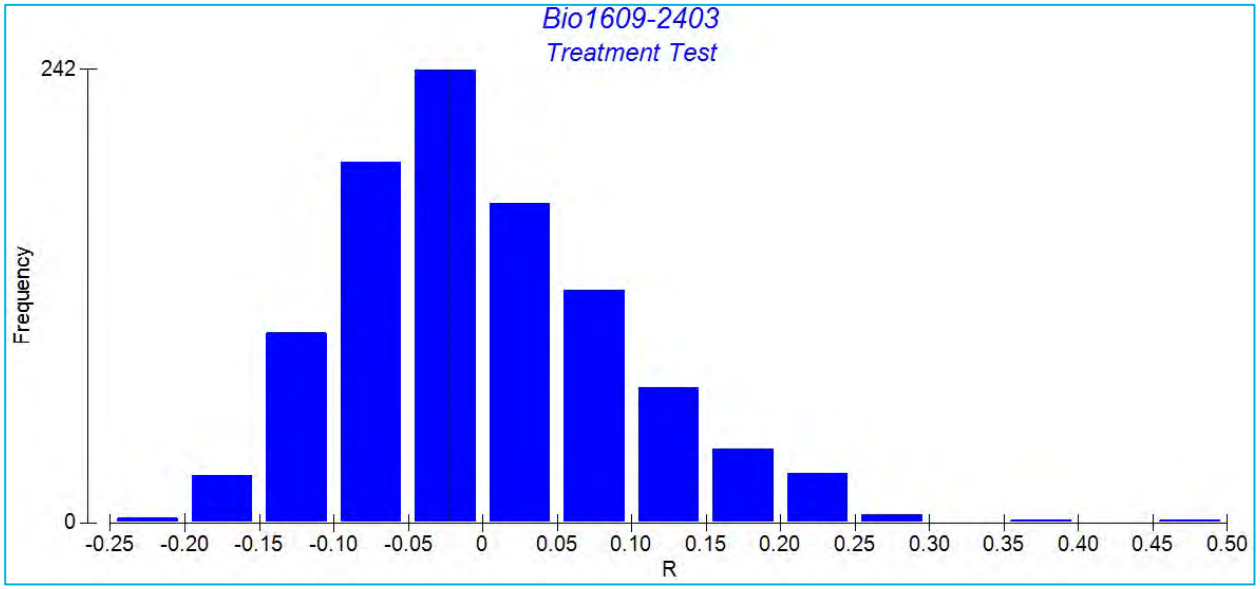


Figure 3.5 ANOSIM test results for benthic data across site types, September 2016 to March 2024. Vertical black line indicates the global R value of -0.023

3.4 Cluster analysis

Cluster analysis was used to visualise pair-wise similarity between sites based on levels of Bray Curtis similarity for the monitoring period September 2016 to March 2024 (Figure 3.6). The dendrogram indicates that at 75% similarity level, there are five clusters: C7; C5-R11; IM2-R3-R7; R10; and all remaining sites.

Importantly, the Impact sites do not cluster together as a discrete cluster but rather are spread along the x-axis, interspersed amongst Reference and Control sites.

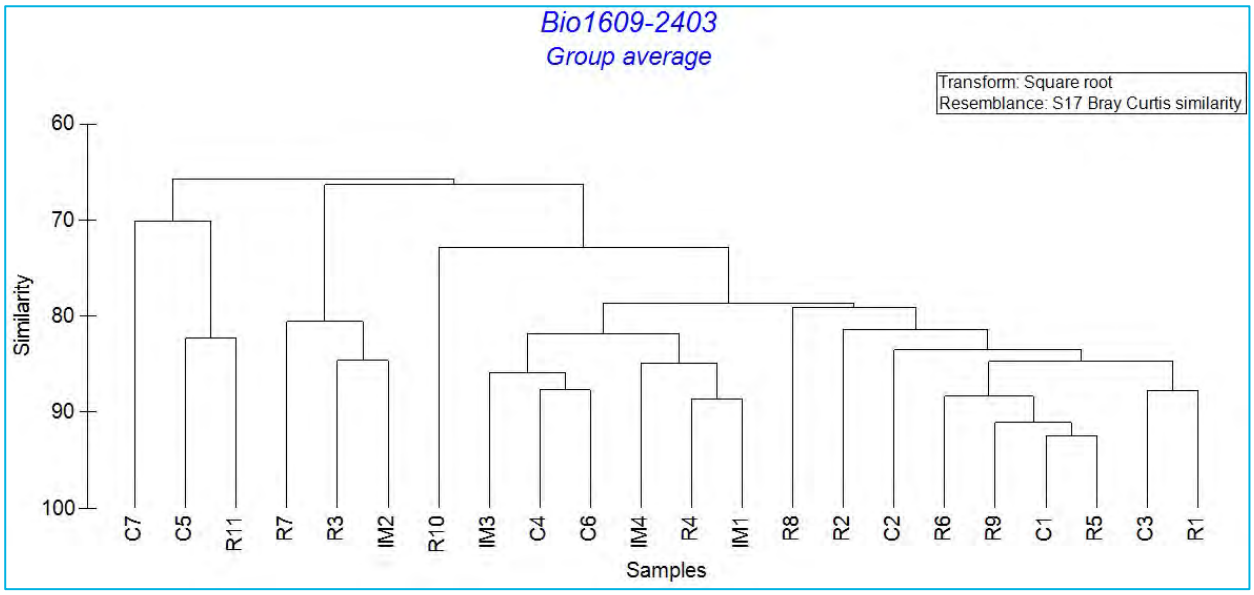


Figure 3.6 **Dendrogram derived from cluster analysis of CVC benthic community monitoring data across all sites between September 2016 and March 2024**

Averaging benthic species abundances across all sites for each sampling event (Figure 3.7) indicates the recent sampling events are most dissimilar, with four event clusters apparent at 75% similarity:

- March 2024 [2403]
- September 2022 [2209] + March 2023 [2303]
- March 2021 [2103] + March 2022 [2203]
- all other events.

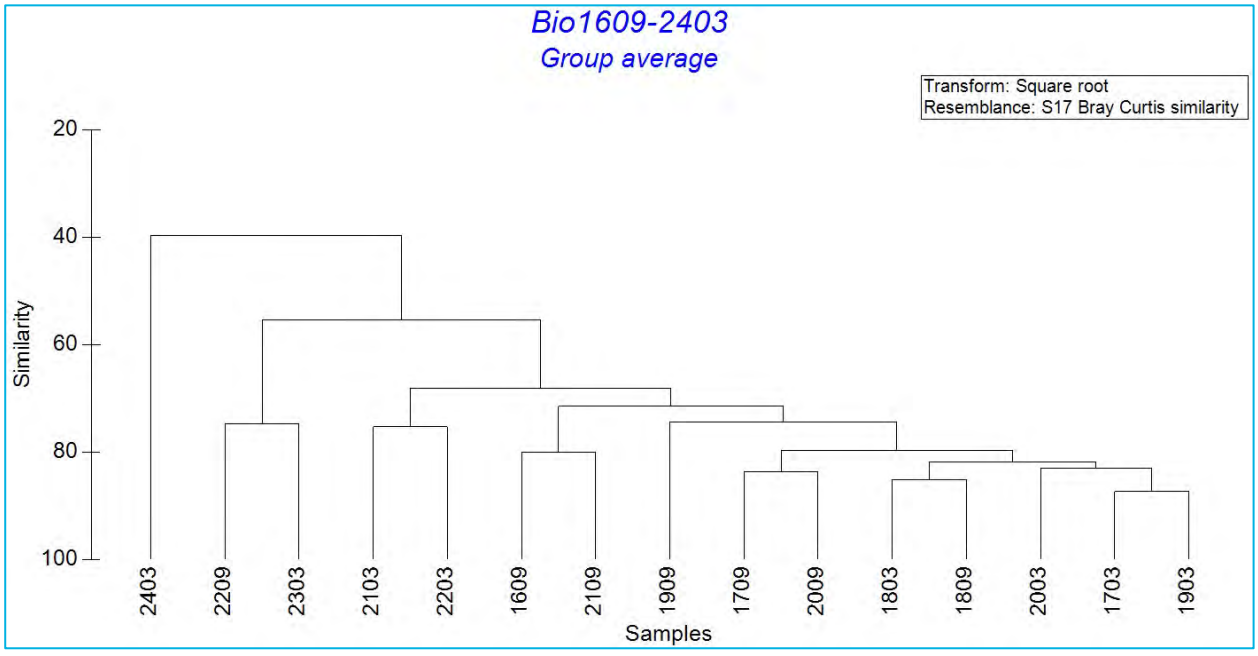


Figure 3.7 **Dendrogram derived from cluster analysis of CVC benthic community monitoring data across all events between September 2016 and March 2024**

3.5 Multi-dimensional scaling

Non-metric multi-dimensional scaling (nMDS) is used to represent samples as points in 2D space such that points that are close together represent samples that are similar in community composition (Clarke & Gorley 2006). The similarity patterns indicated in the cluster analysis of abundance data grouped by site were further explored using an nMDS plot for abundance data for all sampling events at each site (Figure 3.8). The green circles indicate site groupings that correspond to the 75% similarity level.

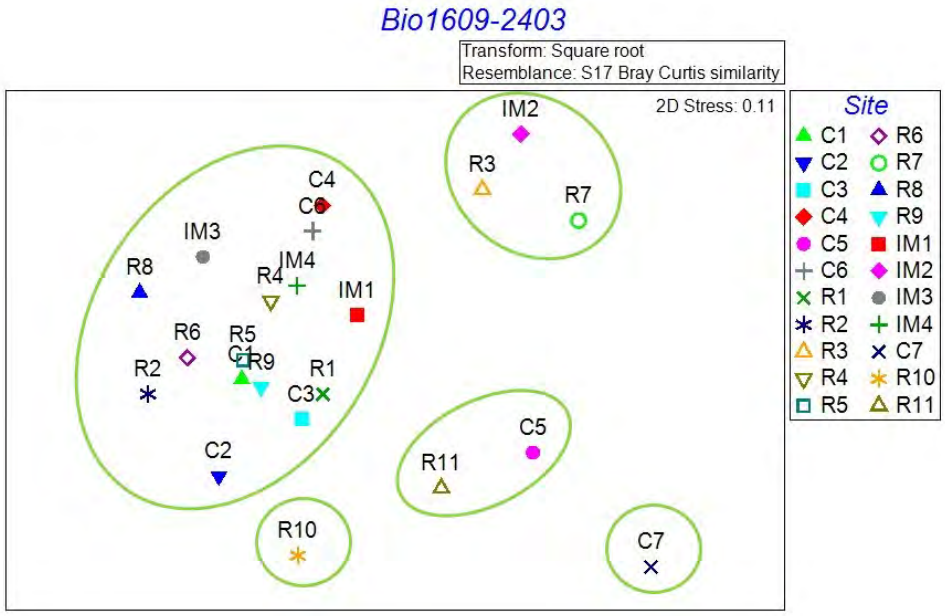


Figure 3.8 Patterns in community structure depicted as nMDS plot based on square-root transformed abundance data of all taxa (OTUs) for each site (all events), September 2016–March 2024

The distribution (in nMDS space) of Impact, Reference and Control sites does not indicate site groupings that could be attributed to impacts from CVC operations since most sites have similar benthic communities (tightly grouped) and several smaller groups of similar sites. Six out of the seven sites that exhibit significantly different benthic communities to the main group were originally designated as reference (R3, R7, R10 and R11) or control (C5 and C7) site types; although, R3, R7 and R11 were subsequently redesignated as impact sites (IM5, IM11 and IM12, respectively).

The nMDS plots for benthic abundance data grouped by sampling event for each site (Figure 3.9, Figure 3.10 and Figure 3.11) indicate high variability (differences in nMDS space) between benthic community data over time at each site. Groupings are indicated for 70% similarity and indicate that benthic community structure differ between sampling events at each site and do not a follow an abrupt or sequential change over time that could be attributed to impacts from subsurface activities.

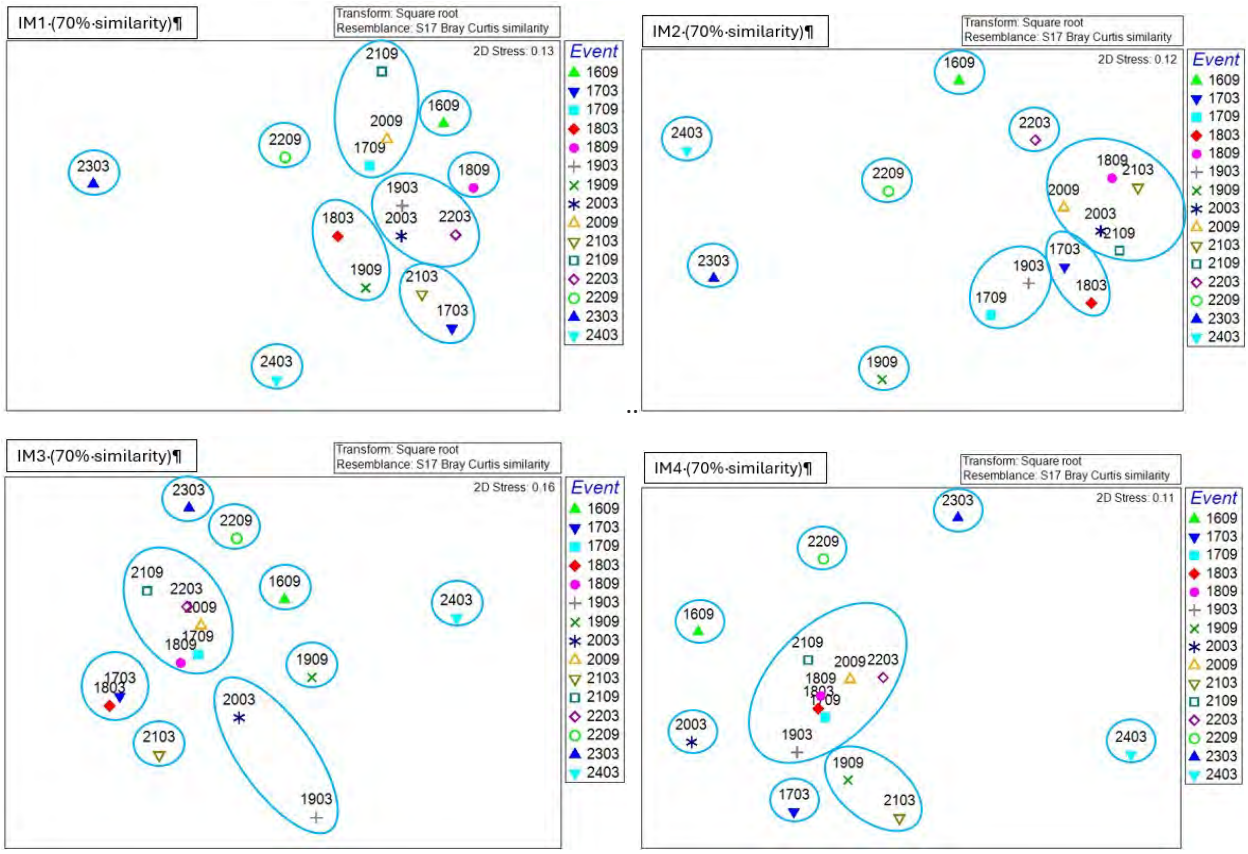


Figure 3.9 **nMDS plots of square root transformed benthic abundance data grouped by sampling event (YYMM) at each Impact site**

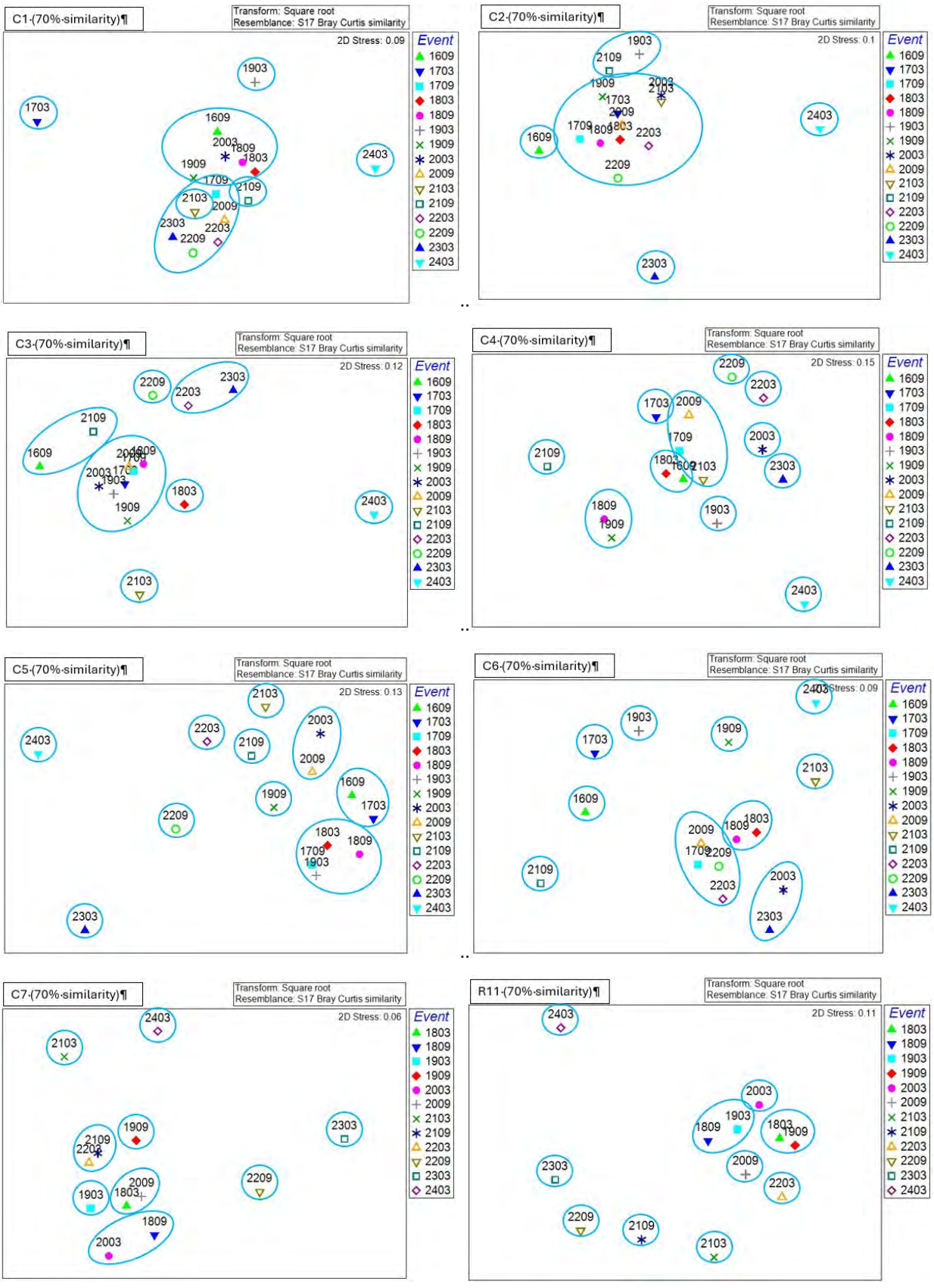


Figure 3.10 **nMDS plots of square root transformed benthic abundance data grouped by sampling event (YYMM) at each Control site and Reference site R11**



Figure 3.11 **nMDS plots of square root transformed benthic abundance data grouped by sampling event (YYMM) at each Reference site (R11 is shown in previous figure)**

The nMDS plots indicate that there are differences in benthic abundance data through time at all sites (Control, Impact and Reference). The groupings (at 70% similarity) are unrelated to specific periods of time and therefore indicate natural changes in benthic community structure evident at all sites across the multiple years. Such widespread variability over time is highly unlikely to be associated with subsurface activity by CVC.

3.6 SIMPER

SIMPER analysis was undertaken on the square-root transformed biological data to identify which taxa are contributing to the separation between benthic communities evident at the C5-C7-R11(IM12), IM2-IM5(R3)-IM11(R7) and R10 site groups identified during cluster analysis and confirmed by nMDS (Figure 3.8).

SIMPER results indicate that more than 80% of the differences between the site groups are attributed to abundances of two polychaetes (thin and mud) and three bivalve molluscs, *Corbula, Soletellina* and *Trichomya*.

Specific differences between the site groups are as follows:

- C5-C7-IM12 (Group A):
  - Much higher abundances of 'polychaete-mud' compared to other site groups.
  - Lower abundances of *Corbula and Soletellina* compared to Group D.
- IM2-IM5-IM11 (Group B):
  - Higher abundances of *Trichomya* compared to other site groups.
  - Lower abundances of *Soletellina* compared to Group D.
  - Lower abundances of *Corbula* compared to Group D.
- R10 (Group C):
  - Higher abundances of *Soletellina* compared to other site groups.
  - Higher abundances of *Corbula* compared to Group A and Group B.
- All other sites (Group D):
  - Higher abundances of *Corbula* and *Soletellina* compared to other groups at most sampling times.

3.7 Temporal comparison of site groups

Comparison of temporal variation in abundances (mean + standard deviation) for each site group (C5-C7-IM12, IM2-IM5-IM11, R10, and 'all other') are provided for the five most abundant OTUs reported across the benthic monitoring area (Figure 3.12 and Figure 3.13).

Thin polychaete abundances are broadly similar for three of the four site groups at each monitoring event, with more variability apparent over time in the C5-C7-IM12 group, higher in the earliest monitoring periods and lower abundances more recently, but with fluctuating abundances across the entire monitoring period.

Mud polychaete abundances are variable between site groups and over time. The notable differences are higher abundances (and variability) apparent in the C5-C7-IM12 group and at R10 compared to the other site groups. Large variability between sites is apparent, as shown by the often-large standard deviation lines above the bars.

Abundances of bivalves *Corbula* and *Soletellina* are similar across all site groups for most monitoring events; although mostly higher in the 'all other' site group, except in 2018 when R10 had higher mean abundances of *Corbula* and in September 2022 (2209) and March 2023 (2303) when R10 had higher abundances of *Soletellina*.

Trichomya abundances are significantly higher within the IM2-IM5-IM11 site group, which drives the separation of this site's benthic community from the other sites. Abundances vary across time, notably higher in samples collected in 2020 and 2021. *Trichomya* (commonly called the hairy mussel) attaches to hard substrate such as rocks and shell, and the higher abundance of this species at IM2-IM5-IM11 is likely to be associated with the availability of suitable hard substrate.

The important aspect to note from these plots is that the IM2-IM5-IM11 group, that differs in benthic community structure from all other sites, is not changing consistently over time (abundances neither increasing or decreasing) and therefore is not indicative of an impact from the CVC operations.

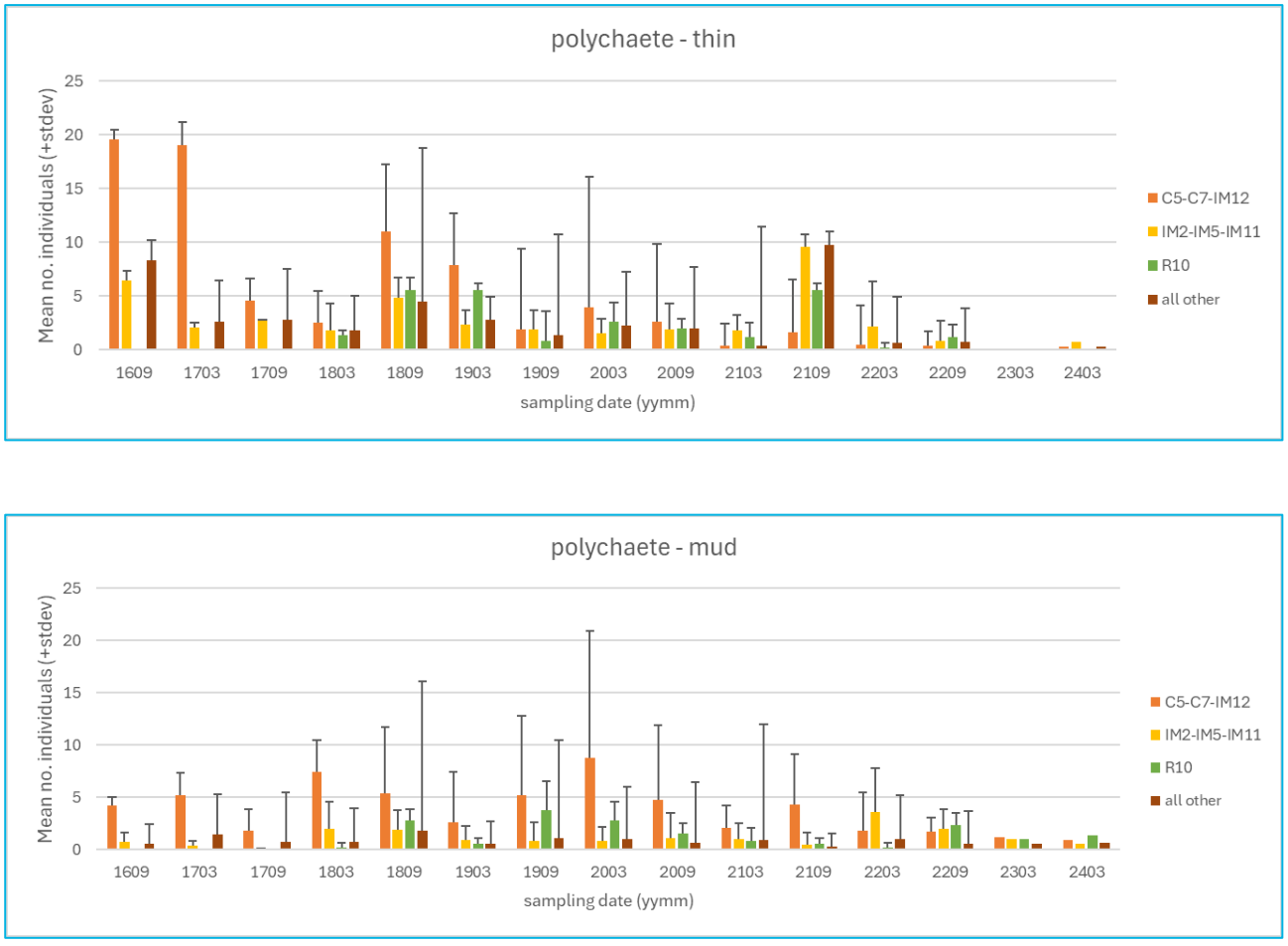


Figure 3.12 Temporal comparison of benthic abundances by site group for thin and mud polychaetes



Figure 3.13 **Temporal comparison of benthic abundances by site group for the bivalve molluscs *Corbula, Soletellina* and *Trichomya***

3.8 Environmental data

Environmental data were reported for each site and were analysed to discern potential environmental drivers of the observed site groupings evident in the benthic community data.

3.8.1 Sediment composition

The sediments at all sites sampled in March 2024 were described as 'largely composed of fine grey silt' with 'small to large shell fragments…at most stations' (Laxton & Laxton 2024).

Principal component analysis (PCA) was undertaken for sediment composition and four main site groups were differentiated due to silt, sand, and shell content:

- Group 1: IM8 and IM11 – high shell (95–98%), no sand (0%) and low silt (2–5%).
- Group 2: C5 and C7 – low shell (0–3%), medium to high sand (44–64%) and medium silt (36–53%).
- Group 3: C4 and IM5 – medium shell (35–50%), no sand (0%) and medium silt (50–65%).
- Group 4: all other sites – low shell (0–20%), low sand (<4%) and high silt (>80%).

The grouping of most sites is associated with the relative contribution of silt and shell: however, two sites (C5 and C7) were distinctly separated from the other sites due to higher sand component (Figure 3.14). Group 3 (C4 and IM5) falls midway along the silt–shell continuum.

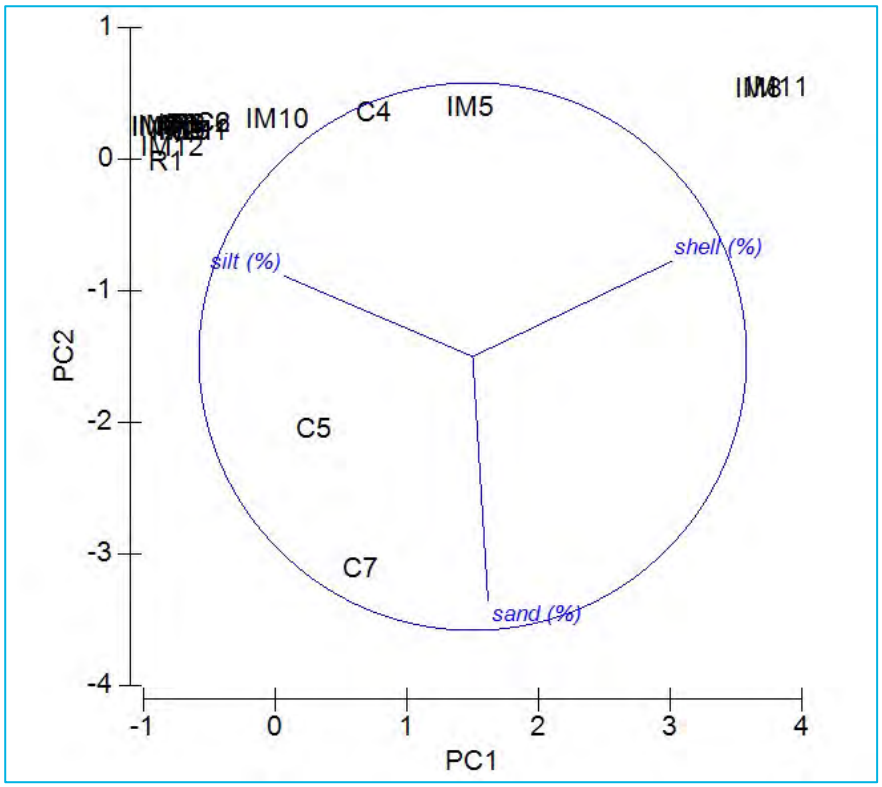


Figure 3.14 Principal components analysis (PCA) plot for sediment composition in March 2024.

3.8.2 Water quality

The measured physico-chemical quality of bottom waters was largely consistent across all sites, with only minor variability evident:

- temperature (°C): 25.18 to 26.48 (mean 25.80)
- conductivity (µS/cm): 55.17 to 55.90 (mean 55.53)
- salinity (parts per thousand, ppt): 36.55 to 37.10 (mean 36.82)

- pH: 7.55 to 8.72 (mean 7.90)
- dissolved oxygen (DO, mg/L): 4.67 to 5.9 (mean 5.4)
- turbidity (NTU): 0.20 to 17.70 (mean 8.41)
- oxidation reduction potential (ORP, mV): 257 to 496 (mean 304.46).

For clarity, PCA was undertaken for water quality, on two sets of indicators: 'conductivity, temperature and pH' and 'ORP, turbidity and DO'.

PCA results for conductivity, temperature and pH indicated most sites are similar for these parameters and fall within the centre of the PCA plot (Figure 3.15). There are some minor variations apparent with water at IM7 and IM8 being slightly warmer and with higher conductivity, water at IM1, IM10 and C1 being slightly cooler and water at C5, C6 and R13 having slightly higher pH than most sites. Variations in the water quality are only minor in magnitude and unlikely to drive significant differences in benthic community structure.

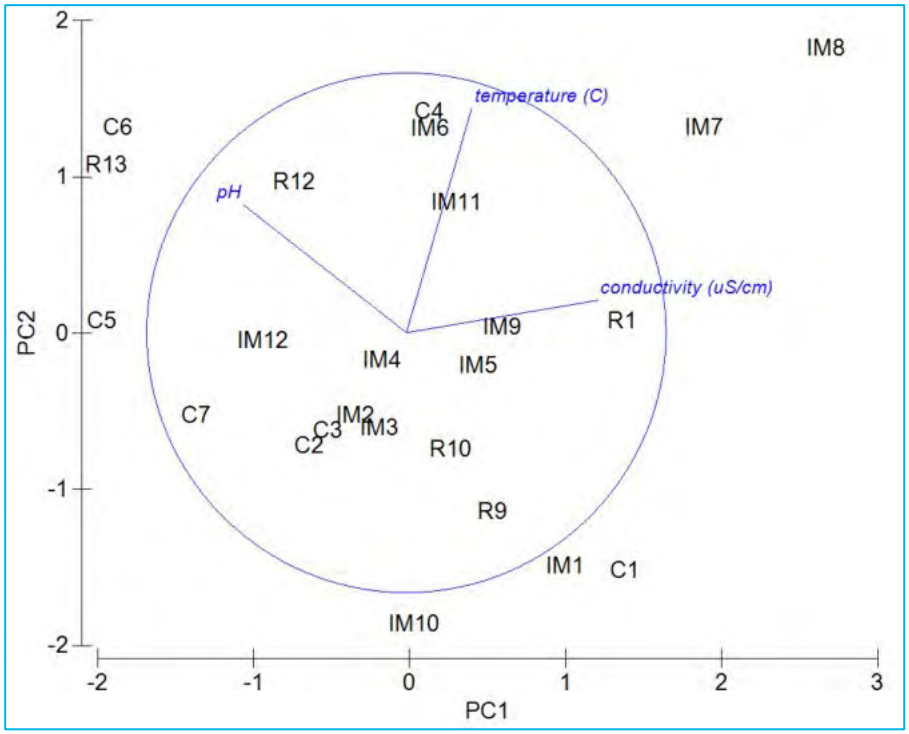


Figure 3.15 Principal component analysis plot for pH, temperature and conductivity at each site in March 2024.

PCA results for ORP, turbidity and DO indicated most sites are similar for these parameters and fall within the centre of the PCA plot (Figure 3.16). There are some minor variations apparent with water at C6 having higher ORP, water at IM6 having slightly higher DO and marginally higher turbidity apparent at IM1, C1 and C3 compared to most sites. These minor differences in water quality are unlikely to cause significant differences in benthic community structure.

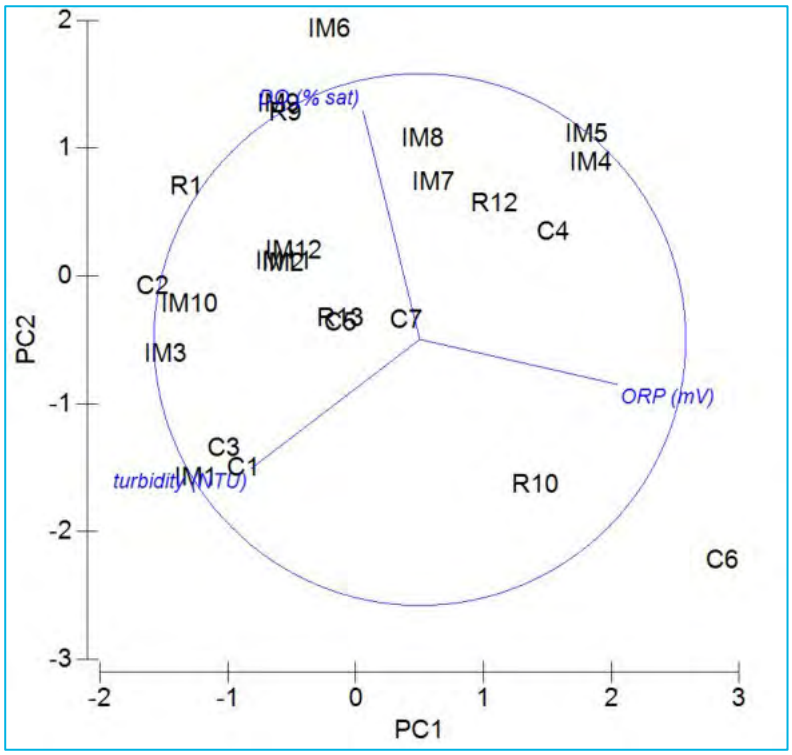


Figure 3.16 Principal component analysis plot for ORP, turbidity and DO at each site in March 2024.

3.8.3 BEST

The Primer v6 routine 'BEST' (which replaces the BIOENV routine in earlier Primer versions) finds a best match between the multivariate among-sample patterns of an assemblage and that from environmental variables associated with those samples (Clarke & Gorely 2006).

BEST was used to assess the biological data against the following environmental variables:

- silt (%)
- sand (%)
- shell (%)
- water depth (m)
- pH
- ORP (mV)
- turbidity (NTU)
- dissolved oxygen (mg/L).

Water temperature and conductivity varied so slightly between sites (1.3°C and 0.73 µS/cm, respectively) that they were deemed unlikely to drive differences in the benthic community data and were not included in the BEST analysis.

The BEST results (Figure 3.17) indicate that none of the environmental variables were significant drivers of the benthic community structure. The highest correlation between the biological and environmental data had an R value of 0.427 at a significance level of 0.07 (non-significant) and was associated with sediment type, primarily the percentage of sand, followed by percentage of silt and shell. This is not unexpected since most benthic fauna have preferences for particular types of sediment. Importantly, sediment type would not be affected by CVC operations beneath the lake.

Parameters
Rank correlation method: Spearman
Method: BIOENV
Maximum number of variables: 5
Resemblance:
Analyse between: Samples
Resemblance measure: D1 Euclidean distance

Variables
1 silt (%)
2 sand (%)
3 shell (%)
4 depth (m)
5 pH
6 ORP (mV)
7 turbidity (NTU)
8 DO (mg/L)

Global Test
Sample statistic (Rho): 0.427
Significance level of sample statistic: 7%
Number of permutations: 99 (Random sample)
Number of permuted statistics greater than or equal to Rho: 6

Best results

No.Vars	Corr.	Selections
1	0.427	2
2	0.414	1,2
2	0.375	2,3
3	0.354	1-3
3	0.347	1,2,5
3	0.347	1,2,7
3	0.344	1,2,4
3	0.340	1,2,6
4	0.323	1-4
4	0.320	1,2,5,7

Figure 3.17 Primer v6 BEST routine results

The only monitored environmental variable that could be affected by CVC operations is water depth (if subsidence was to occur). The BEST routine results indicate that water depth is not contributing to the observed differences in benthic community structure between sites – water depth, when combined with percentage of silt and sand, has a non-significant correlation of less than 35% of the observed differences in benthic community structure (R value 0.344).

4 Discussion and recommendations

4.1 Discussion

Benthic communities are inherently variable across different spatial and temporal scales, typically in response to differences in local environmental conditions. When assessing potential impacts from project activities, it is important not to attribute site-by-site differences to project impacts without due consideration of the environmental and biological context.

The soft sediment benthic communities within the CVC monitoring area are dominated by polychaete worms and bivalve molluscs. Fauna abundances and diversity indices (richness, evenness, and diversity) differ slightly between each site (as expected) although were found to be within a relatively narrow range across the monitoring area. Statistical analysis of the benthic data indicates a level of variability within the treatment groups (Impact, Reference and Control) that is similar to or greater than the variability between treatment groups. There are no significant differences between the treatment groups – Impact versus Reference versus Control.

Temporal variability is high across the monitoring period (2016–2024) at each site, regardless of the treatment type. Benthic abundances vary between sampling events but do not follow specific trajectories that might indicate a changing benthic habitat. If CVC activities were causing changes in the shallow environment in Lake Macquarie that affect the benthic communities, it might reasonably be expected that the community structure would switch relatively quickly (over a few sampling events) and develop into a different community structure that reflects the new environment. This is clearly not the case since the community structure at all sites varies through time and similarities are apparent between sampling events at different times throughout the eight-year period of monitoring. The data do not indicate a gradually (or rapidly) changing benthic environment that could be attributed to CVC operations beneath the lake.

Indeed, the best correlation (albeit non-significant) between the benthic community data and the site-specific environmental conditions is attributed to sediment type, specifically percentage of sand, silt and shell. The sediment composition of the lake bed is not associated with CVC operations and would be largely driven by the sources of sediment from the local catchment and the circulation patterns in the lake, whereby more sheltered sites accumulate finer grained sediments compared to the more exposed sites.

The high natural variability between sites and between sampling events indicates fluctuating species abundances that are likely to be driven by wider spatial and temporal drivers such as circulation patterns in Lake Macquarie, climate (wetter and/or drier periods) and associated variability in inter-year breeding success of benthic species that drive the cohort size in subsequent years.

From an ecological perspective, the benthic assemblages across the monitoring area fall into several groups that do not appear to be a response to CVC operations but are most likely grouping because of currently unconfirmed environmental factors.

For example, monitoring sites furthest north are likely to be exposed to greater water circulation within greater Lake Macquarie that may provide increased food availability and/or better water quality that is reflected in benthic community composition. Sites that have sediments with higher sand content may support different benthic communities compared to the high silt areas further south. Higher sand content is often correlated with higher water movement.

These large-scale drivers are too large to be adequately assessed by the monitoring program and are not the aim of CVC's environmental monitoring program, which necessarily targets detectable impacts of their operations at impact sites relative to control and reference sites. Awareness of natural environmental drivers for benthic community structure is important when assessing the potential impacts from activities.

Importantly, there is no indication from the benthic community data collected since 2016 that coal extraction by CVC beneath Lake Macquarie is impacting benthic communities within areas of Lake Macquarie directly above the workings.

4.2 Recommendations

Based on the statistical analysis of benthic community monitoring data, it is recommended that monitoring continues in its current form (annual sampling in autumn) to capture any annual variation in benthic assemblages that might occur following any summer temperature and/or rainfall extremes.

The frequency of monitoring should be reviewed if future monitoring results indicate impacts to benthic assemblages that are potentially associated with CVC operations, or if the local benthic environmental conditions change substantially.

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Clarke KR & Gorley RN (2006) *PRIMER v6: User Manual/Tutorial*. PRIMER-E, Plymouth 190pp.

CVC (2023) *Environmental Management System, Chain Valley Colliery – Benthic Communities Management Plan*. Document ID ENV00021, 28 July 2023.

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Appendix A

Map of benthic sampling locations (source: Delta Coal)

EMM
creating opportunities

C7
R10
IM8 (R6)
IM7 (R5)
IM11 (R7)
IM12 (R11)
C3
IM6 (R4)
C2
C4
IM5 (R3)
IM4
C6
IM2
IM3
IM9 (R8)
R1
R9
C1
IM1
IM10 (R2)

- Benthic Monitoring Locations
- SSD-5465 Consent Boundary — SSD-5465 Consent Boundary.shp
- Mine Workings
- Lake Macquarie Contours Major

0 250 500 m

Delta coal

Delta Coal
Benthic Communities Monitoring

Mine Name: Chain Valley Colliery

Plan Name: Benthic Communities Monitoring

Drawn by: LM

Date: 28/07/2023

Australia

SYDNEY
Ground floor 20 Chandos Street
St Leonards NSW 2065
T 02 9493 9500

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Level 3 175 Scott Street
Newcastle NSW 2300
T 02 4907 4800

BRISBANE
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Spring Hill QLD 4000
T 07 3648 1200

CANBERRA
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Canberra City ACT 2601

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Adelaide SA 5000
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Melbourne VIC 3000
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Appendix 7: Weed Action Plan

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Weed Action Plan

Chain Valley Colliery, Mannering Colliery and Summerland Point Ventilation Shaft

Total Earth Care Pty Ltd

January 20

Weed Action Plan

Chain Valley Colliery, Mannering Colliery and Summerland Point Ventilation Shaft

January 20

Quality Control	© Total Earth Care Pty Ltd 2019		
Revision/Version No.	Final	**Date of revision**	17 January 2020
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Prepared for:	Delta Coal		
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1 INTRODUCTION

1.1 Background

Total Earth Care (TEC) has been commissioned by Delta Coal to prepare this update for the Weed Action Plan for the three (3) Delta Coal sites: Chain Valley Colliery, Mannering Colliery and Summerland Point Ventilation Shaft. The site is within the Central Coast LGA (formerly Wyong LGA).

A Weed Action Plan was developed for Lake Coal in 2016 to guide weed management of the aforementioned sites in a consolidated report. The sites are now managed by Delta Coal and an updated Weed Action Plan is required to assess the current weed densities on the site and provide relevant management actions that will assist in the development of updated Biodiversity Management Plans for each site. The Weed Action Plan will guide on ground weed management and assist in tracking the progress of since the previous Weed Action Plan developed in 2016.

1.2 Subject Sites and Study Area

The “Study Area” has been defined as each of the three (3) sites: Chain Valley Colliery, Mannering Colliery and Summerland Point Ventilation Shaft. Management Zones have previously been defined for these sites. Please see the Maps 1 to 3 below which indicate the boundaries of the Project Area and the existing management zones.

All three (3) sites fall within the Local Land Services Greater Sydney Region, bordering on the Hunter Region.

1.3 Goals and Objectives

The objectives of this management program are to:

- Describe the existing flora and fauna within the subject site based on current survey effort and database searches of the subject site and surveys of the wider study area.
- Provide ground-truthed weed density maps, highlighting priority weeds under the *NSW Biosecurity Act 2015.*
- Report any threats to Endangered Ecological Communities.
- Provide a program for ongoing weed management and/or eradication.

Title: Chain Valley Colliery:
Subject Site & Survey Effort

Map No: 1

Site: Chain Valley Colliery

Client: Delta Coal

Date: November 2019

Project No: 11483

Author: G Barron

Legend

- Management Zones
- Road
- Creek
- Survey Effort

EEC under BC Act 2016

- Swamp Oak Floodplain Forest
- Swamp Sclerophyll Forest on Coastal Floodplains EEC



0 50 100 200 Meters

N

Data Source:
Total Earth Care
Nearmap
Wyong ELA 2016 v2

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Tel: 02 9913 1432 Fax: 02 9913 1434

total earth care

Title: Mannering Colliery:
Subject Site & Survey Effort

Map No: 2

Site: Mannering Colliery

Client: Delta Coal

Date: November 2019

Project No: 11483

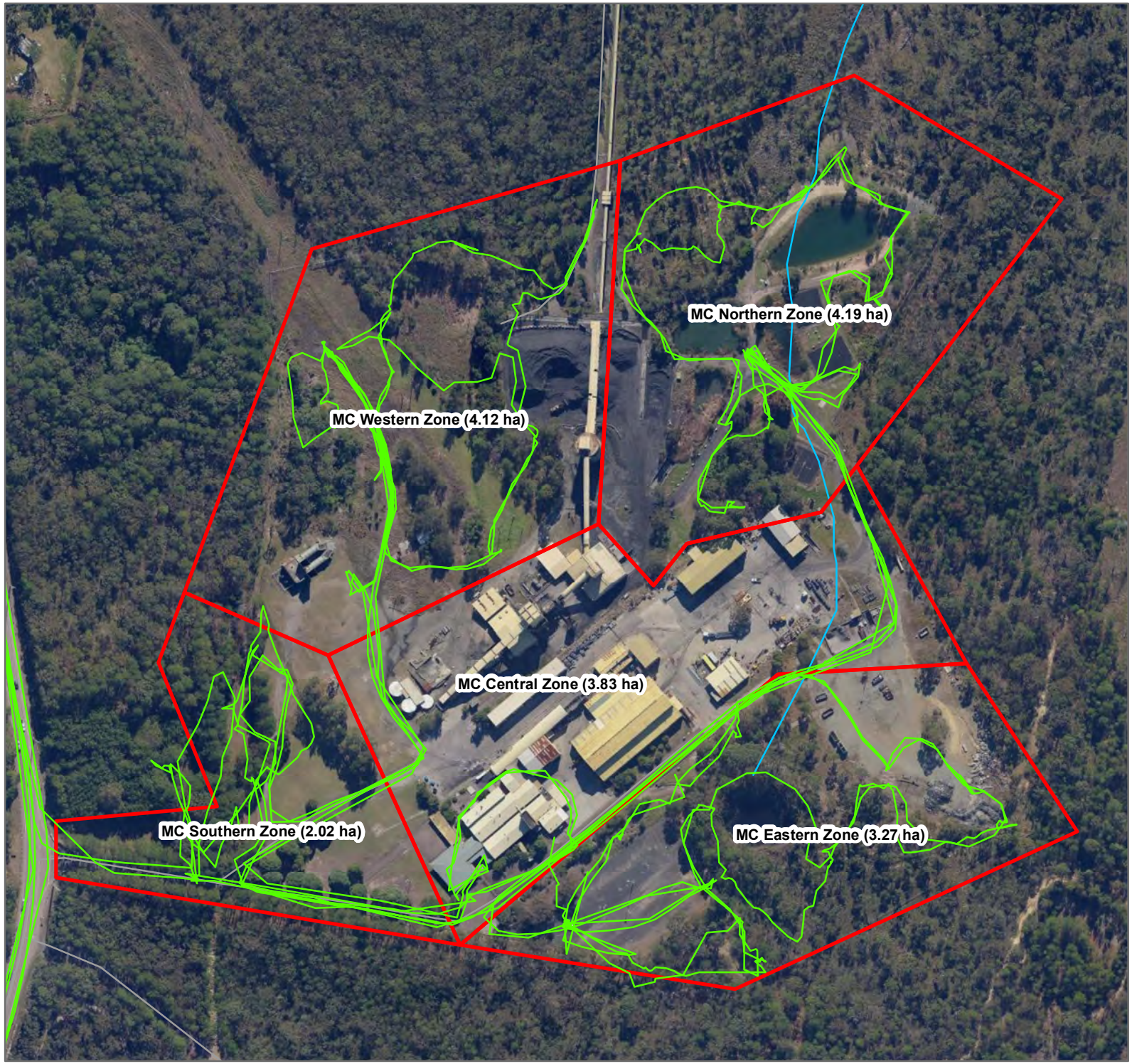
Author: G Barron

Legend

- Management Zones
- Road
- Creek
- Survey Effort

0 25 50 100 Meters

N



Data Source:
Total Earth Care
Nearmap

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Tel: 02 9913 1432 Fax: 02 9913 1434

Title: Summerland Point Ventilation Shaft: Subject Site, EECs & Survey Effort
Map No: 3
Site: Summerland Point Ventilation Shaft
Client: Delta Coal
Date: November 2019
Project No: 11483
Author: G Barron

Legend

- Summerland Point
- Road
- Creek
- Survey Effort

EEC under BC Act 2016

- Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion
- Swamp Sclerophyll Forest on Coastal Floodplains EEC

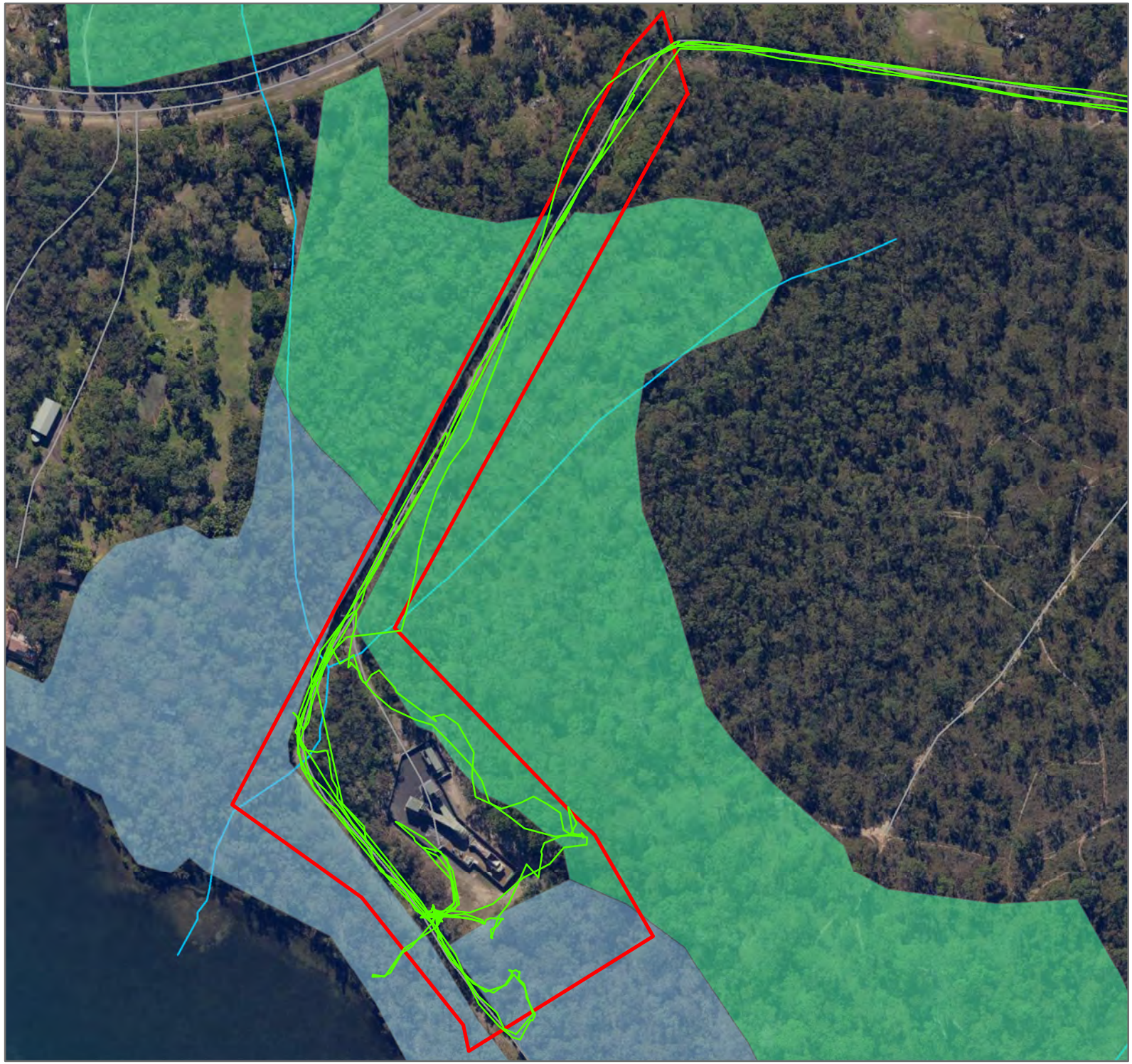
0 25 50 100 Meters

N

Data Source:
Total Earth Care
SIX Maps
Wyong ELA 2016 v2

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1.4 Relevant Legislation and Strategies

This Weed Action Plan will be written in accordance with:

1 Commonwealth laws including:
   a. *Environment Protection and Biodiversity Conservation Act 1999*
2 NSW laws including:
   a. *Biodiversity Conservation Act 2016*
   b. *Biosecurity Act 2015*
3 Local laws LGA:
   a. *Wyong Local Environment Plan 2013*
   b. *Wyong Development Control Plan 2013*
4 Weed Strategies
   a. *Australian Weeds Strategy 2017-2027*
   b. *Greater Sydney Regional Strategic Management Plan*

1.4.1 NSW Biosecurity Act 2015 – Weeds

The NSW *Biosecurity Act 2015*, repealed the NSW *Noxious Weeds Act 1993* on the 1st of July 2017.

The purpose of the NSW *Biosecurity Act 2015* is to provide framework for risk-based prevention, elimination and minimisation of biosecurity risks. These include pests, diseases, contaminants, non-indigenous animals, bees, weeds and other biosecurity matter. One of the main objectives of the Biosecurity Act 2015 is to promote biosecurity issues as a shared responsibility between government, industry, and communities, i.e. private and public land managers have the same obligations under the Act. Local Council is the control authority who enforces this Act. A State Weeds Committee has been established, as well as eleven (11) Regional Weeds Committees who will provide guidance and facilitate community and stake holder input into weed management.

Under the *Biosecurity Act 2015*, the definition of a weed is a plant that is a pest, and the definition of a pest is a plant or animal (other than a human) that has an adverse effect on, or is suspected of having an adverse effect on, the environment, the economy or the community.

Schedule 1 describes the special provisions relating to weeds. Under this Schedule, land occupiers have a duty to:

- control weeds on roads which bound their occupied land;
- control aquatic weeds along a watercourse, river, or inland water which bound their occupied land; and
- control weeds on land extended from their occupied land if that land is an irrigation area forming any part of a public road, public reserve or public channel, or watercourse, river or inland water.

Regional Strategic Weed Management Plans have been developed which describe the land occupier's expectations for managing weeds and form the basis for an enforceable general biosecurity duty. The three (3) Delta Coal sites fall within the Greater Sydney Local Land Services area, therefore the *Greater Sydney Regional Strategic Management Plan* applies to these sites.

1.4.2 Australian Weeds Strategy – Weeds of National Significance (WoNS)

Australian Weeds Strategy provides a national framework for addressing weed issues. It lists thirty-two (32) weed species or genera that are required to be managed under state legislation. These are Weeds of National Significance (WoNS). Five (5) of these have been identified on site and are listed in Section 3 of this management plan.

1.4.3 NSW Biodiversity Conservation Act 2016

The NSW *Biodiversity Conservation Act 2016* (BC Act), with associated regulations and maps, repealed the *Threatened Species Conservation Act 1995* on the 25th of August 2017. The BC Act is now the key piece of legislation protecting threatened species, populations and ecological communities within NSW.

There are a number of Endangered Ecological Communities (EEC) mapped on the Delta Coal sites (ELA 2016). These include;

- *Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions;*
- *Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*; and

- *Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion.*

Refer to Maps 1, 2 and 3 for mapped EECs. The Mannering Colliery does not contain any EECs.

One aim of the BC Act is to eliminate or manage certain Key Threatening Processes (KTPs) that threaten the survival or evolutionary development of threatened species, populations and ecological communities.

KTPs listed by the BC Act are identified as having significant impacts on the conservation of native flora and fauna. There are currently thirty-seven (37) KTPs listed under the BC Act including:

i. Invasion and establishment of exotic vines and scramblers.
ii. Invasion, establishment and spread of *Lantana camara*.
iii. Invasion of native plant communities by *Chrysanthemoides monilifera* (Bitou Bush and Boneseed).
iv. Invasion of native plant communities by exotic perennial grasses.
v. Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants.

2 METHODS

2.1 Desktop Research

A preliminary desktop study was conducted to assess the previously mapped weed locations (Kleinfelder 2016) and existing plant community types using the Wyong ELA 2016 PCT (ELA, 2016) mapping.

2.2 Site Survey

A site survey was conducted over two (2) days on the 15th and 16th October 2019. Weather conditions were clear with maximum temperatures of approximately 25˚C on the 15th and 24˚C on the 16th. See Maps 1, 2 and 3 for survey effort.

A general weed survey was conducted using random meanders. Edges of bushland, creek lines, disturbed areas and any other areas likely to contain weeds were targeted as were areas where weeds were previously identified in the 2016 Weed Action Plan.

- The identification of native and exotic plant species according to *Field Guide to the Native Plants of Sydney* (Robinson, 2003), Flora of NSW, Volumes 1-4 (Harden 1992, 1993, 2000, 2002), *Weeds of the south-east: an identification guide for Australia* (Richardson et al, 2006) and PlantNET (2019), with reference to recent taxonomic changes;

Any “weed infestations” found during survey were recorded using a hand held GPS. Weed infestations are defined as:

- Areas where weeds make up >80% percentage foliage cover.
- Weeds of national significance
- Priority weeds and other weeds of regional concern as listed in the Greater Sydney Regional Strategic Weed Management Plan

Any WoNS and/or any priority weeds for the Greater Sydney Region which were identified on site, are listed in Appendix A which includes their biosecurity status under the *Biosecurity Act 2015*.

2.3 Weed Density Mapping

Weed density maps were developed for each zone. All weeds present were considered when determining the weed densities for each area.

GPS locations were mapped to provide clear locations for WoNS, significant weed infestation and Priority Weeds.

2.4 Priorities

The priorities of targeted weed work detailed in Section 4 - Management Zones, were determined by the species listing and the landholder’s obligations under the *Biosecurity Act 2015* and the Greater Sydney Regional Strategic Weed Management Plan. Species listed as WoNS are considered a high priority. Other weeds that were deemed to have the potential to significantly impact biodiversity were also included as Priority Weeds.

Priority areas were determined by the resilience and condition of existing bushland and the location of weed infestations. Infestation or small outbreaks of weeds in high quality, undisturbed or resilient bushland are considered a high priority to conserve the existing biodiversity values and to prevent further spread which could become more costly to address in the future. Infestations along property boundaries, creek lines and waterways are considered high priority as weeds are more susceptible to spread onto neighbouring properties downstream or across boundary edges.

2.5 Limitations

The diurnal field survey was conducted over two (2) days during October 2019. Random meanders were conducted across the site and targeted searches for weeds along creek line, bushland edges and disturbed areas where weeds are likely to occur. Some areas were not searched due to access issues and time constraints. The central zones mainly consist of infrastructure and planted species and were not surveyed for this report.

When reviewing maps please note that the hand-held GPS equipment used is only accurate to 3 metres.

3 RESULTS

The weed survey identified thirty-six (36) weed species under the *Biosecurity Act 2015.* These are listed in Appendix A along with the land holder's obligations under the Act. Of these, five (5) are WoNS. These are:

- Asparagus Fern (*Asparagus aethiopicus*)
- Bitou Bush (*Chrysanthemoides monilifera subsp rotundata*)
- Lantana (*Lantana camara*)
- Blackberry (*Rubus fruticosus* aggregate)
- Fireweed (*Senecio madagascariensis*)

Bitou Bush, Lantana and Fireweed are also listed as State Priority Weeds. Six (6) weeds are listed as Priority Weeds under the Greater Sydney Regional Strategic Weed Management Plan. These include Giant Reed (*Arundo donax*), Pampas Grass (*Cortaderia jubata*) and the above mentioned WoNS.

Weeds are mostly contained to disturbed areas, bushland edges, tracks and riparian areas across all three (3) sites. There are some small outbreaks within large resilient bushland areas which have been prioritised within this Plan. Many of these have been treated as part of primary bush regeneration efforts and require follow up treatment of new shoots.

Two (2) areas with two (2) to three (3) individual orchids of the genus Microtis were identified. One (1) area is located in the easement of the eastern zone of Chain Valley Colliery and another along the disturbed edges of the eastern zone at Mannering Colliery. These have been mapped in Map 7 and Map 11.

The current condition, locations of weed infestation and weed densities have been discussed in detail within Section 4 - Management Zones.

4 MANAGEMENT ZONES

TEC have based the management zones on those created for the 2016 Weed Action Plan (Kleinfelder, 2016). The boundaries have been adjusted slightly to follow existing structural boundaries such as roads, tracks, clearings, easements and fences to allow for clearer delineation of management zones during on ground works.

The Central Zone of both the Chain Valley Colliery and Mannering Park Colliery are entirely disturbed and contain the site infrastructure. The zones are mostly void of native vegetation except for remnant canopy trees and planted native and ornamental species, as such these zones were not included in the weed survey.

4.1 Chain Valley Colliery

The Chain Valley Colliery site is made up of the following EECs:

- *Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions;* and
- *Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*

See Map 1 for EEC locations.

Chain Valley Colliery contains high quality resilient bushland in most zones. Managing weed outbreaks in these areas is a high priority to prevent degradation and further encroachment on bushland areas. Most weed outbreaks occur in the disturbed areas including cleared easements, easement edges, along tracks, creek lines and dam edges. These outbreaks are small and in their early stages of growth and therefore should be targeted before they progress any further. Bush regeneration efforts targeting Lantana and Pampas Grass (*Cortaderia selloana*) are evident throughout the site but now require follow up treatment. The following maps and tables provide further details on each management zone including priority weeds and management issues.



Figure 1. Eastern Zone of Chain Valley Colliery along creek line.



Figure 2. Treated Lantana and Blackberry in Northern Zone of Chain Valley Colliery near cottages.



Figure 3. Fishbone Fern and Crofton Weed in Western Zone Area B of Chain Valley Colliery along drainage area.

4.1.1 Chain Valley Colliery – Northern Zone

Table 1. Chain Valley Colliery – Northern Zone Area Descriptions

Description	This zone is approximately 8.2 ha and includes cleared powerline easements and modified areas surrounding the cottages and bushland. **Area A – <5% weed cover** The most resilient area of the zone with low weed densities. Some weed encroachments on the edges of the bushland. A small area of treated Lantana and Blackberry is located to the south-east of this zone. **Area B – 5-25% weed cover** Highest weed densities are found along the edge of the bushland and species present include Blackberry, Asparagus Fern, Fishbone Fern (*Nephrolepis cordifolia*), *Monstera deliciosa* and *Senna pendula var. glabrata.* **Area C – 25-50% weed cover** Dense area of Blackberry, Lantana, Ochna serrulata, Wild Tobacco (*Solanum mauritianum)* and herbaceous weeds. Evidence of Blackberry and Pampas Grass being treated. Appears to have been the focus area of Bush Regeneration efforts. **Area D – 5-25% weed cover** Mostly ornamental exotic plant species in front of houses. **Area E – 5-25% weed cover** Dense patch of *Monstera deliciosa*. **Area F – 5-25% weed cover** Patch of Camphor Laurel (*Cinnamomum camphora*) and Coral trees (*Erythrina x sykesii*) including several saplings. **Area G – 5-25% weed cover** Bushland strip between powerline easements containing scattered small outbreaks of weeds including *Senna pendula var. glabrata* and Lantana. **Area H – 5-25% weed cover** Powerline easement with scattered Fireweed and Purple Top (*Verbena bonariensis*).
Priority Weeds	Lantana, Blackberry, Pampas Grass and Asparagus Fern
Priority Areas	Area A and B has the most resilience and is connected to larger tracts of bushland. Weeds should be controlled to prevent further spread.
Key Management Issues	• Follow up treatment of Lantana, Blackberry, *Senna pendula var. glabrata* in Areas A and C. • Primary treatment of Asparagus Fern particularly along edges in Area B. • Primary treatment of *Senna pendula var. glabrata* and *Monstera deliciosa,* and untreated areas of Lantana and Pampas Grass.
Notes	Access to this zone via dirt road from near CVC site entry. Key required. Caution to be taken driving around cottages due to rubbish and debris hidden by long grass.

Title: Chain Valley Northern Zone Weed Density

Map No: 4

Site: Chain Valley Colliery

Client: Delta Coal

Date: November 2019

Project No: 11483

Author: G Barron

Road

Management Zones

Weed Density

- < 5%
- 5 - 25%
- 25 - 50%

Key Points

- Blackberry
- Blackberry & Lantana camara - treated
- Blackberry, Lantana camara & Pampas Grass - treated
- Blackberry, Lantana camara, Senna pendula var. glabrata & Wild Tobacco
- Camphor Laurel
- Coral Tree
- Coral Tree - treated
- Coral Tree, Lantana camara & Senna pendula var. glabrata
- Coral Tree, Ochna serrulata & Senna pendula var. glabrata
- Lantana camara
- Lantana camara & Senna pendula var. glabrata
- Lantana camara - treated

0 20 40 80 Meters

N

Data Source:
Total Earth Care
Nearmap

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4.1.2 Chain Valley Colliery – Western Zone

Table 2. Chain Valley Colliery – Western Zone Area Descriptions

Description	This zone is approximate 6.4 ha of highly resilient bushland with predominantly low weed densities. Evidence throughout of bush regeneration efforts. **Area A – <5% weed cover** Highly resilient bushland with a very low weed density. Scattered outbreaks of Blackberry and Lantana on the side of the road that runs along the north-west boundary. All identified scattered Lantana thickets in the south-east part of the area have been treated. Some juvenile Lantana coming up in these treated areas. **Area B – 5-25% weed cover** Damp drainage areas in some places have encourage weed growth. Lantana, Crofton Weed, Asparagus Fern, Fishbone Fern and herbaceous weed species scattered throughout this zones (see Figure 3). All identified Lantana patches have been treated. Some juvenile Lantana coming up in these treated areas. Pampas Grass and some Fishbone Fern has been treated but requiring follow up treatment.
Priority Weeds	Lantana, Blackberry, Pampas Grass, Asparagus Fern and Crofton Weed.
Priority Areas	Both Area A and B. The surrounding bushland is highly resilient and further weed outbreaks should be prevented.
Key Management Issues	• Follow up treatment of Lantana and Pampas Grass. • Primary treatment of Crofton Weed and Fishbone Fern. • Hand weeding and spraying. • Priority zone. Edges and tracks should be monitored regularly.
Notes	Access to the track along the north-west boundary of this zone via dirt road from near CVC site entry. Key required.

Title: Chain Valley Western Zone Weed Density

Map No: 5

Site: Chain Valley Colliery

Client: Delta Coal

Date: November 2019

Project No: 11483

Author: G Barron

Road

Management Zones

Weed Density

< 5%

5 - 25%

25 - 50%

Key Points

- Asparagus Fern
- Blackberry & Fireweed
- Crofton Weed
- Crofton Weed & Lantana camara
- Lantana camara
- Lantana camara - treated
- Pampas Grass & Lantana camara - treated and Asparagus Fern & Crofton Weed
- Senna pendula var. glabrata

0 20 40 80 Meters

N



Data Source:
Total Earth Care
Nearmap

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4.1.3 Chain Valley Colliery – Southern Zone

Table 3. Chain Valley Colliery – Southern Zone Area Descriptions

Description	This zone is approximate 7.2 ha of highly resilient and mostly undisturbed bushland with predominantly low weed densities. **Area A – 5-25% weed cover** Scattered small outbreaks of *Senna pendula var. glabrata*, Blackberry, Bitou Bush, Ochna and Lantana, Lantana has been treated but some small shoots are coming up. Most weeds are along the track edge to the north and the eastern boundary of the bush and powerline easement. **Area B – <5% weed cover** Highly resilient bushland. Some *Pinus radiata* saplings coming up adjacent to the track that runs along the southern part of the area. **Area C – 5-25% weed cover** Powerline easement containing scattered *Pinus radiata* saplings, herbaceous weeds and Oleander. **Area D – <5% weed cover** Resilient bushland with scattered *Pinus radiata* saplings along easement edge. **Area E – 5-25% weed cover** Mostly managed lawn along driveway. Scattered *Pinus radiata* saplings, African Lovegrass (*Eragrostis curvula*) and Oleander (*Nerium oleander*) on bushland edges. **Area F – 25-50% weed cover** Disturbed bushland edges with scattered small outbreaks of Bitou Bush, Lantana, Pampas Grass, Banana Trees and African Love Grass. Most Pampas Grass in this area has been treated.
Priority Weeds	Lantana, Pampas Grass, Bitou Bush and *Pinus radiata* saplings
Priority Areas	Area B is highly resilient and has very few weed outbreaks. All other areas of this management zone should be managed to prevent further spread of weeds into Area B.
Key Management Issues	• Follow up treatment of Pampas Grass • Follow up and primary treatment of Lantana. Small shoots can be hand pulled. • Primary treatment of Bitou Bush. Most can be hand pulled. • Primary treatment of *Pinus radiata* saplings particularly along the track in Area B. This is a highly resilient area and invasion of Pines in this area should be prevented. • High priority zone. Monitor tracks for any weed out breaks.
Notes	Access to the track within this zone is via a locked gate or through powerline easement.

Title: Chain Valley Southern Zone Weed Density

Map No: 6

Site: Chain Valley Colliery

Client: Delta Coal

Date: November 2019

Project No: 11483

Author: G Barron

Road

Management Zones

Weed Density

- < 5%
- 5 - 25%
- 25 - 50%

Key points

- African Lovegrass & Pampas Grass
- African Lovegrass & Pinus radiata
- Asparagus Fern & Lantana camara
- Asparagus Fern, Senna pendula var. glabrata & Bitou Bush
- Bitou Bush
- Bitou Bush & Lantana camara
- Bitou Bush & Senna pendula var. glabrata
- Bitou Bush - removed
- Lantana camara
- Lantana camara & Senna pendula var. glabrata
- Lantana camara (treated), African Lovegrass & Bitou Bush
- Lantana camara - treated
- Ochna serrulata
- Ochna serrulata & Senna pendula var. glabrata
- Pamas Grass (treated) & Lantana camara
- Pampas Grass (treated)
- Pinus radiata
- Senna pendula var. glabrata
- Senna pendula var. glabrata - removed

0 15 30 60 Meters

N

Data Source:
Total Earth Care
Nearmap

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4.1.4 Chain Valley Colliery – Eastern Zone

Table 4. Chain Valley Colliery – Eastern Zone Area Descriptions

Description	This zone is approximate 11.17 ha of bushland cleared powerline easements and sediment ponds. These ponds consistently discharge across the bushland in Area H and into the lake.to the north-east. **Area A – <5% weed cover** Small occurrences of Caster Oil and Lantana on dam walls. Scattered occurrences of *Senna pendula var. glabrata* and Narrow-leafed Cotton Bush (*Gomphocarpus fruticosus*) in the easements to the north. **Area B – 5-25% weed cover** Small amounts of scattered Whiskey Grass (*Andropogon virginicus*), Pampas Grass and Bitou Bush on easement edges and damp areas. **Area C – <5% weed cover** Small amounts of scattered Whiskey Grass, Pampas Grass, Bitou Bush and other herbaceous weeds on easement edges. **Area D – 5-25% weed cover** Encroachments of weeds from the track to the south of the area and the easement edges. Scattered small outbreaks of Asparagus Fern, *Senna pendula var. glabrata*, Lantana, African Love Grass, Blackberry Nightshade and Bitou Bush. A small Lantana thicket has been treated. **Area E – 5-25% weed cover** Dense areas of Pampas Grass in this area and across property boundary. Scattered occurrences of Crofton Weed, Lantana and Bitou Bush. **Area F – 5-25% weed cover** Cleared powerline easement containing scattered Whiskey Grass, Cotton Bush, Fireweed and herbaceous weeds. Small lantana thicket and Pampas Grass under powerline pylon. **Area G – 25-50% weed cover** Dense stand of Wild Tobacco. Asparagus Fern starting to come up. Scattered small occurrences of Bitou Bush, Lantana, Ginger Lily, Ochna, Inkweed, Crofton and *Senna pendula var. glabrata*. Large stands of Lantana have been treated. Coral trees, Fishbone Fern, *Monstera deliciosa*, *Senna pendula var. glabrata* and Ginger Lily along creek line in southern corner. **Area H – <5% weed cover** Parts of this area have been recently burnt and are coming up with early successional native species such as *Dodonaea triquetra.* Track edges south-east of the dam have scattered small occurrences of Bitou Bush, Asparagus Fern, Lantana, Crofton Weed and Fireweed. Some sporadic occurrences of Lantana, Bitou Bush and *Senna pendula var. glabrata* along the edges of the easement in the north of this area.
Priority Weeds	Lantana, Asparagus Fern, Bitou Bush, Pampas Grass and *Senna pendula var. glabrata*.
Priority Areas	Area G along creek line should be targeted to prevent weed propagules travelling downstream. Area H is mostly resilient bushland that has been mapped as two EECs (see Map 1).

Key Management Issues	• Prioritise treating weeds in the southern half of this zone. • Follow up treatment of Lantana. Small shoots can be hand pulled. • Primary treatment of Bitou Bush, Asparagus Fern, *Senna pendula var. glabrata* and Pampas Grass along track and easement edges.
Notes	Vehicle access via the tracks near the sediment ponds and via the track through the south-west corner of the zone.

Title: Chain Valley Eastern Zone Weed Density

Map No: 7

Site: Chain Valley Colliery

Client: Delta Coal

Date: November 2019

Project No: 11483

Author: G Barron

Road

Creek

Management Zones

Weed Density

< 5%

5 - 25%

25 - 50%

Key Points

- Asparagus Fern
- Asparagus Fern, Crofton Weed, Lantana Camara, Ochna serrulata, Senna pendula var. glabrata & Wild Tobacco
- Bitou Bush
- Bitou Bush & Lantana camara
- Bitou Bush & Senna pendula var. glabrata
- Fireweed, Crofton Weed & Asparagus Fern
- Orchid - Microtis sp.
- Pampas Grass
- Pampas Grass, Lantana camara & Fireweed

0 25 50 100 Meters

N

Data Source:
Total Earth Care
SIX Maps

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4.2 Mannering Colliery

Mannering Colliery has more disturbed areas and fewer large tracts of undisturbed bushland then the Chain Valley Colliery. However, the site is surrounded by bushland and therefore it is imperative that weeds are prevented from spreading into neighbouring resilient areas. Most outbreaks are small and should be targeted before they progress any further. Bush regeneration efforts targeting Lantana and Pampas Grass are evident throughout the site but now require follow up treatment. This site does not contain any EECs.

The following maps and tables provide further details on each management zone including priority weeds, priority areas and management issues.



Figure 4. Resilient bushland in Eastern Zone Area D of Mannering Colliery.



Figure 5. Bamboo and Crofton Weed in Western Zone Area F of Mannering Colliery.



Figure 6. Crofton Weed and *Juncus acutus* in wetland area of Northern Zone Area B of Mannering Colliery.

4.2.1 Mannering Colliery – Northern Zone

Table 5. Mannering Colliery – Northern Zone Area Descriptions

Description	This zone is approximate 4.24 ha and consists of four (4) dams, access tracks and some patches of disturbed bushland. Water is discharged from the ponds across Area A, B and G. **Area A – 5-25% weed cover** *Pinus radiata* saplings, Whiskey Grass and Fireweed along track edges. Treated *Acacia saligna.* Dense stands of *Juncus acutus* in low lying areas. **Area B – 50-75% weed cover** Dense area of weeds including Lantana, Bitou Bush, Crofton Weed, Pampas Grass, Senna and *Juncus acutus.* Lantana and some Pampas Grass has been treated. **Area C – 25-50% weed cover** High density of herbaceous weeds. *Acacia saligna* present, most of which has been treated. *Juncus acutus* present. Pampas Grass present most of which has been treated. Whiskey Grass along track edges. **Area D – 25-50% weed cover** High density of herbaceous weeds across disturbed area. **Area E – 5-25% weed cover** Hydrocotyl is scattered along the dam edges and Typha within the dam. **Area F – 5-25% weed cover** Typha within the dam. **Area G – 5-25% weed cover** The edges of Area G contains *Pinus radiata* saplings. Within the low lying damp wetland areas Large stands of Lantana and Pampas Grass have been treated. **Area H – <5% weed cover** Limited access due to fencing. Scattered Crofton Weed, Lantana, Bitou Bush, Camphor Laurel trees and mature and sapling *Pinus radiata.* A Resource Regulator identified Coolatai Grass (*Hyparrhenia hirta*) present on the western wall of the largest dam. EMM consultants confirmed the species ID. **Area I – <5% weed cover** Mostly disturbed and cleared areas. Herbaceous weeds, Whiskey Grass and Fireweed along track edges. **Area J – 50-75% weed cover** Dense and scattered stands of Bitou Bush, Lantana, Crofton and Senna. Lantana has been treated but new young shoots are coming up. Large and sapling *Pinus radiata* present. Scattered herbaceous weeds including *Bidens pilosa*, Fleabane (*Conyza sp.*) and Purple Top.
Priority Weeds	Lantana, Bitou Bush, Pampas Grass, Crofton Weed, Fireweed, Senna, *Pinus radiata, Juncus acutus, Coolatai Grass* and Senna
Priority Areas	Area J to follow up from primary weed treatment in this area. Area B to follow up primary treatment of Lantana and Pampas Grass and prevent propagules form spreading downstream.

Key Management Issues	• Follow up treatment of Lantana. Young, small shoots can be hand pulled. • Follow up treatment for Pampas Grass and Crofton Weed using cut/paint, hand removal and spraying. • Primary treatment of *Juncus acutus* • Hand pull Fireweed opportunistically. • Prioritise areas A, E, G and J.
Notes	Easy vehicle access to most areas. No obvious access to Area H due to fence.

Title: Mannering Colliery
Northern Zone Weed Density

Map No: 8

Site: Mannering Colliery

Client: Delta Coal

Date: November 2019

Project No: 11483

Author: G Barron

Management Zones

Road

Creek

Weed Density

- < 5%
- 5 - 25%
- 25 - 50%
- 50 - 75%

Key Points

- Acacia saligna
- Acacia saligna (treated) & Juncus acutus
- Acacia saligna, Bitou Bush & Crofton Weed,
- Bitou Bush
- Bitou Bush & Crofton Weed
- Bitou Bush & Lantana camara
- Bitou Bush - removed
- Coolatai Grass
- Crofton Weed & Senna pendula var. glabrata
- Crofton Weed, Juncus acutus & Pampas Grass (treated)
- Fireweed
- Juncus acutus
- Lantana camara
- Lantana camara - treated
- Pampas Grass - treated
- Pinus radiata
- Senna pendula var. glabrata

0 15 30 60 Meters

N

Data Source:
Total Earth Care
Nearmap

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4.2.2 Mannering Colliery – Western Zone

Table 6. Mannering Colliery – Western Zone Area Descriptions

Description	This zone is approximately 4.12 ha including cleared powerline easements, a dam, and disturbed patches of remnant bushland some of which connect to greater bushland extents. **Area A – 5-25% weed cover** Scattered herbaceous weeds and exotic grasses. Small scattered patches of Asparagus Fern. **Area B – 5-25% weed cover** Powerline easements mostly consisting of exotic grasses, some Lantana patches, *Senna pendula var. glabrata* and Fireweed, particularly closer to the dam edges. **Area C – 5-25% weed cover** Small scattered outbreaks of Crofton Weed, Pampas Grass, Bitou Bush, Whiskey Grass and African Love Grass throughout this area. **Area D – 25-50% weed cover** Scattered outbreaks of Lantana, Crofton Weed, Bitou Bush, Whiskey Grass and herbaceous weeds. Lantana thickets have been treated. New shoots are coming requiring treatment. **Area E – <5% weed cover** Isolated patch of vegetation containing a small thicket of Lantana. **Area F – 25-50% weed cover** Lantana, Crofton Weed, Bitou Bush, and a large outbreak of Bamboo are dominating this area. **Area G – 5-25% weed cover** A fence divides this area from the rest of the western zone. A large area of Lantana is located in the northern part of this area.
Priority Weeds	Asparagus Fern, Lantana, Senna, Crofton Weed, Bitou Bush and Bamboo.
Priority Areas	Areas C, F and G are a priority within this zone due to their proximity to remnant bushland and potential for WoNS and Priority Weeds under the Biosecurity Act to spread.
Key Management Issues	• Follow up and primary treatment of Lantana. • Primary treatment of Bamboo, Crofton Weed, Asparagus Fern. • Opportunistic hand pulling of Fireweed.
Notes	Easy vehicle access to most areas. Area G is separated from the rest of the zone by a fence so vehicle access is limited. On foot access is possible by following the fence from the main driveway entrance to the south.

Title: Mannering Colliery
Western Zone Weed Density

Map No: 9

Site: Mannering Colliery

Client: Delta Coal

Date: November 2019

Project No: 11483

Author: G Barron

Management Zones

Road

Creek

Weed Density

- < 5%
- 5 - 25%
- 25 - 50%
- 50 - 75%

Key Points

- African Lovegrass & Bitou Bush
- Asparagus Fern
- Bamboo
- Bamboo, Lantana camara & Pampas Grass
- Bitou Bush
- Bitou Bush & Lantana camara
- Crofton Weed
- Crofton Weed & Pampas Grass
- Crofton Weed, Fireweed, Lantana camara & Senna pendula var. glabrata
- Crofton Weed, Lantana camara & Senna pendula var. glabrata
- Lantana camara
- Lantana camara - treated
- Pinus radiata
- Senna pendula var. glabrata

0 12.5 25 50 Meters

N

Data Source:
Total Earth Care
Nearmap

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4.2.3 Mannering Colliery – Southern Zone

Table 7. Mannering Colliery – Southern Zone Area Descriptions

Description	This zone is approximately 2.02 ha. It is mostly dominated by mature *Pinus radiata* and Bamboo. This zone is a low priority due to the lack of remnant bushland and the extent of the pine forest. **Area A – 50-75% weed cover** Mature and sapling *Pinus radiata* lining the driveways. **Area B – 25-50% weed cover** High densities of mature *Pinus radiata* and Bamboo on western side of fence. Other exotic ornamental species including Oleander and Agave. Camphor Laurel trees on western side of fence. Whiskey Grass and Fireweed across managed lawn. Low priority area as dominated by *Pinus radiata.* **Area C – 5-25% weed cover** Mostly herbaceous weeds and exotic grasses.
Priority Weeds	Bamboo, Fireweed, Camphor Laurel trees.
Priority Areas	All areas within this zone are low priority. Other zones of the Mannering Colliery are to be prioritised over this one.
Key Management Issues	• Primary treatment of Fireweed and *Pinus radiata* saplings in Area C
Notes	Fence divides Area B. Western side of Area B can be accessed from southern end near driveway.

Title: Mannering Colliery
Southern Zone Weed Density

Map No: 10

Site: Mannering Colliery

Client: Delta Coal

Date: November 2019

Project No: 11483

Author: G Barron

Management Zones

Road

Creek

Weed Density

< 5%

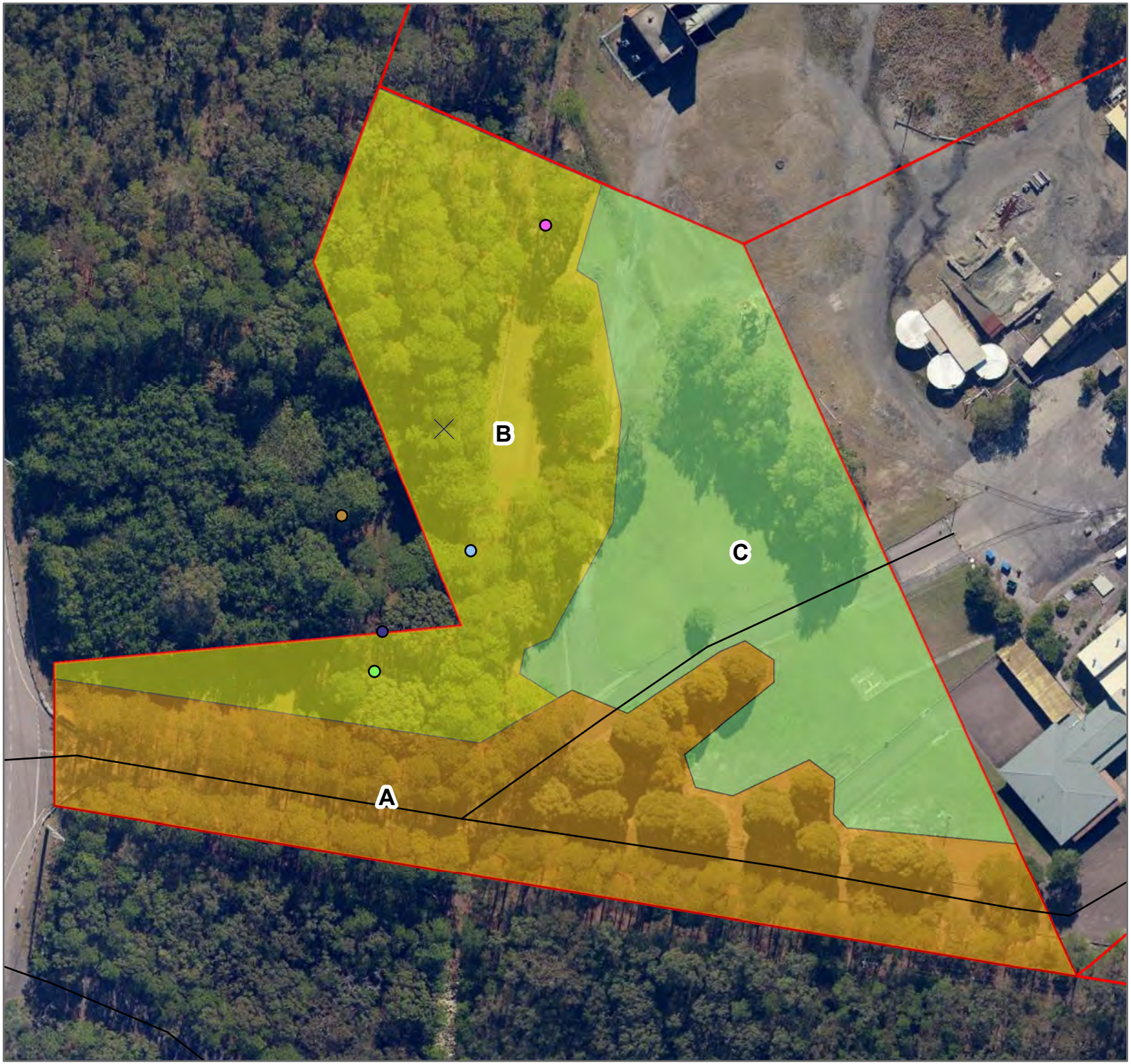
5 - 25%

25 - 50%

50 - 75%

Key points

- African Lovegrass
- Bamboo
- Bamboo & Coral Tree
- Fireweed
- Senna pendula var. glabrata



0 10 20 40 Meters

N

Data Source:
Total Earth Care
Nearmap

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4.2.4 Mannering Colliery – Eastern Zone

Table 8. Mannering Colliery – Eastern Zone Area Descriptions

Description	This zone is approximately 3.29 ha. This zone contains a carpark, cleared stockpile areas and dam, all bordered by bushland. The bushland is contiguous with adjacent bushland beyond the property boundary to the south. Weeds are generally confined to the bushland edges and disturbed areas. **Area A – 5-25% weed cover** Mostly planted ornamental exotics and some natives. Herbaceous weeds, exotic grasses and Fireweed across lawn. **Area B – 25-50% weed cover** Scattered herbaceous weeds, exotic and weedy grasses around edges of disturbed area. **Area C – 5-25% weed cover** Small area of weed encroachment including Crofton Weed. Evidence of treated Pampas Grass. Small outbreaks of Crofton Weed and Lantana present. **Area D – <5% weed cover** Mostly weed free bushland with some *Pinus radiata* saplings and African Lovegrass in the south-west corner of the area. **Area E – 25-50% weed cover** Dominated by mature and sapling *Pinus radiata.*
Priority Weeds	Crofton Weed, Lantana, Pampas Grass, *Pinus radiata* and Fireweed.
Priority Areas	Area C and D. These areas are highly resilient and connected to bushland to the south.
Key Management Issues	• Follow up treatment of Pampas Grass. • Primary treatment of Lantana and Crofton Weed.
Notes	Site easily accessible.

Title: Mannering Colliery
Eastern Zone Weed Density

Map No: 11

Site: Mannering Colliery

Client: Delta Coal

Date: November 2019

Project No: 11483

Author: G Barron

Management Zones

Road

Creek

Weed Density

- < 5%
- 5 - 25%
- 25 - 50%
- 50 - 75%

Key Points

- Acacia saligna
- African Lovegrass
- African Lovegrass & Senna pendula var. glabrata
- Bitou Bush
- Crofton Weed
- Fireweed
- Lantana camara
- Orchid - Microtis sp.
- Pampas Grass
- Pinus radiata
- Senna pendula var. glabrata



0 15 30 60 Meters

N

Data Source:
Total Earth Care
Nearmap

total earth care

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Tel: 02 9913 1432 Fax: 02 9913 1434

4.3 Summerland Point Ventilation Shaft

The Summerland Point Ventilation Shaft site is made up of the following EECs:

- *Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions;* and
- *Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregions.*

See Map 3 for EEC locations.

The site contains an unsealed road that provides access to a cleared area where the ventilation shaft infrastructure sits. The areas surrounding the ventilation shaft have been cleared and contain most of the weed species identified on the site. The site is surrounded by highly resilient bushland. Areas along the unsealed road have also been subject to some weed invasion.



Figure 7. Giant Reed within bushland at the Summerland Ventilation Shaft site. .



Figure 8. Unsealed road and easement within the Summerland Ventilation Shaft site.



Figure 9. Vegetation adjacent to road on the Summerland Ventilation Shaft site.

Table 9. Summerland Point Ventilation Shaft – Area Descriptions

Description	This zone is approximately 3.73 ha. This zone contains an unsealed road, a cleared area for the ventilation shaft infrastructure and remnant adjacent bushland. Weeds are generally confined to the bushland edges and disturbed areas. **Area A – 5-25% weed cover** Mostly bushland and road edges effected by weeds. Lantana thickets have been treated but required follow up treatment. Scattered small shoots of Lantana and Bitou Bush andherbaceous weeds.
Priority Weeds	Lantana, Giant Reed, Bitou Bush
Priority areas	Entire site – small weeds outbreaks on edges of highly resilient bushland must be targeted to prevent further spread.
Key Management Issues	• Follow up treatment of Lantana and Bitou Bush. Small shoots can be hand pulled. • Primary treatment of a small area of Giant Reed. • Monitor bushland edges and road edges for new outbreaks.
Notes	Easy vehicle access. Key required. Red-bellied black snake observed on site.

Title: Summerland Point Ventilation Shaft Weed Density

Map No: 12

Site: Summerland Point Ventilation Shaft

Client: Delta Coal

Date: November 2019

Project No: 11483
Author: G Barron

Summerland Point

Road

Creek

Weed Density

5 - 25%

Key Points

- Arundo donax & Lantana camara
- Bitou Bush
- Bitou Bush - removed
- Crofton Weed
- Fireweed
- Lantana camara
- Lantana camara & Senna pendula var. glabrata
- Lantana camara (treated) & Senna pendula var. glabrata
- Lantana camara - treated
- Senna pendula var. glabrata

0 25 50 100 Meters

N

Data Source:
Total Earth Care
SIX Maps

total earth care

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5 WEED MANAGEMENT

Species specific recommended weeding techniques including recommended herbicides and ratios are included Appendix B.

Weed recruitment and outbreaks are often triggered by disturbance or clearing. Weed management is a form of disturbance that can trigger additional recruitment of weeds as areas are cleared. Therefore secondary treatment is essential to successful weeding and bush regeneration methods.

All weeding management actions on these sites must be carried out by trained bush regenerators. Bush Regeneration contractors must comply with the *Pesticides Act 1999 and the Pesticides Regulation 2017.*

7 MONITORING GUIDELINES

Monitoring is required to assess the outcomes of the weed management work and help determine if management strategies should be amended. Monitoring should be completed every six (6) months by a qualified ecologist or bush regeneration supervisor using the following methods:

- Assessment of weed control works, native regeneration and revegetation success via permanent repeatable photographic monitoring points; and
- Mapping of weed density per zone to assess the progress of the work. The mapping included in this report can assist in the development of baseline data.

Monitoring reports must include:

- Details of the work carried out including weed management techniques and herbicide used;
- Photo monitoring points – baseline and follow up photos; and
- Recommendations for corrective measures and/or specific vegetation management required.

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Appendix A. Weed Species listed as a Biosecurity Risk

Table 10. Categories of Management under the Greater Sydney Regional Strategic Weed Management Plan 2017-2022 under the NSW Biosecurity Act 2015

Category	Management Action
Prevention (Prevent)	To prevent the weed species arriving and establishing in the Region.
Eradication (Eliminate)	To permanently remove the species and its propagules from the Region, OR to destroy infestations to reduce the extent of the weed in the region with the aim of local eradication.
Containment (Minimise)	To prevent the ongoing spread of the species in all or part of the Region.
Asset Protection (Manage)	To prevent the spread of weeds to key sites/ assets of high economic, environmental and social value, or to reduce their impact on these sites if spread.
GBD (General Biosecurity Duty)	All plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable."
RRM (Regional Recommended Measure)	Specific details for each species included in table.
PoD (Prohibition on Dealings)	Must not be imported into the State or sold.
B Zone (Biosecurity Zone)	Specific details for each species included in table.
PM (Prohibited Matter)	A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries.

Table 11. Weeds under the Biosecurity Act recorded within the subject site listed as State or Regional Priority Weeds in the Greater Sydney Regional Strategic Weed Management Plan 2017-2022

Common Name	Botanical Name	WONS	State Priority Weed-Mgmt. Actions	Regional Priority Weeds-Mgmt. Actions	Other Regional Weeds-Asset/value at risk	Duties for Priority Weeds of Greater Sydney
Golden Wreath Wattle	*Acacia saligna*				Environment	
Crofton Weed	*Ageratina adenophora*				Environment, Agriculture	
Scarlet Pimpernel	*Anagallis arvensis*					
Whisky Grass	*Andropogon virginicus*				Environment	
Giant Reed	*Arundo donax*			Asset Protection		RRM; Land managers should mitigate the risk of new weeds being introduced to their land. The plant should not be bought, sold, grown, carried or released into the environment.
Asparagus Fern	*Asparagus aethiopicus*	Yes				PoD
Cobblers Pegs	*Bidens pilosa*					
Buffalo Grass	*Bouteloua dactyloides*					
Bitou Bush	*Chrysanthemoides monilifera subsp rotundata*	Yes	Containment			PoD, B Zone; The Bitou Bush Biosecurity Zone is established for all land within the State except land within 10 kilometres of the mean high water mark of the Pacific Ocean between Cape Byron in the north and Point Perpendicular in the south.
Camphor Laurel	*Cinnamomum camphora*				Environment, Agriculture, Human health	

Common Name	Botanical Name	WONS	State Priority Weed-Mgmt. Actions	Regional Priority Weeds-Mgmt. Actions	Other Regional Weeds-Asset/value at risk	Duties for Priority Weeds of Greater Sydney
Spear Thistle	*Cirsium vulgare*					
Fleabane	*Conyza bonariensis*					
Pampas Grass	*Cortaderia jubata*			Asset Protection		RRM: Land managers mitigate the risk of the plant being introduced to their land. Land managers prevent spread from their land where feasible. Land managers reduce the impact on priority assets. The plant should not be bought, sold, grown, carried or released into the environment. This Regional Recommended Measure applies to Cortaderia jubata (pink pampas grass)
Panic Veldgrass	*Ehrharta erecta*					
African Lovegrass	*Eragrostis curvula*				Environment	
Coral Tree, Common Coral Tree	*Erythrina x sykesii*				Environment	
Fennel	*Foeniculum vulgare*					
Narrow-Leaf Cotton Bush / Swan Plant	*Gomphocarpus fruticosus*					
Ginger Lily	*Hedychium gardnerianum*				Environment	
Pennywort	*Hydrocotyle bonariensis*					
Coolatai Grass	*Hyparrhenia hirta*				Environment, Agriculture	
Spiny Rush, Spike Rush, Sharp Rush	*Juncus acutus*				Environment	

Common Name	Botanical Name	WONS	State Priority Weed-Mgmt. Actions	Regional Priority Weeds-Mgmt. Actions	Other Regional Weeds-Asset/value at risk	Duties for Priority Weeds of Greater Sydney
Lantana	*Lantana camara*	Yes	Asset Protection			PoD
Fishbone Fern	*Nephrolepis cordifolia*				Environment	
Ochna	*Ochna serrulata*				Environment	
Bamboo, Black Bamboo, Rhizomatous Bamboo,	*Phyllostachys nigra*				Environment	
Inkweed	*Phytolacca octandra*					
Radiata Pine, Pine Wildings	*Pinus radiata*				Environment	
Plantain	*Plantago lanceolata*					
Castor Oil Plant	*Ricinus communis*					
Blackberry	*Rubus fruticosus aggregate*	Yes				PoD; All species in the Rubus fruiticosus species aggregate have this requirement, except for the varietals Black Satin, Chehalem, Chester Thornless, Dirksen Thornless, Loch Ness, Murrindindi, Silvan, Smooth Stem, and Thornfree
Fireweed	*Senecio madagascariensis*	Yes	Asset Protection			PoD
Senna / Cassia	*Senna pendula*				Environment	
Paddy's Lucerne	*Sida rhombifolia*					
Tobacco Bush/ Wild Tobacco	*Solanum mauritianum*				Environment, Agriculture	

Common Name	Botanical Name	WONS	State Priority Weed-Mgmt. Actions	Regional Priority Weeds-Mgmt. Actions	Other Regional Weeds-Asset/value at risk	Duties for Priority Weeds of Greater Sydney
Blackberry Night Shade	*Solanum nigrum*					
Purpletop	*Verbena bonarensis*					

Appendix B. Species Specific Weeding Techniques

Common Name	Botanical Name	Weeding Technique	Recommended Timing for Treatment	Herbicide Application	Herbicide Group	Ratio
Golden Wreath Wattle	*Acacia saligna*	Chainsaw and paint with neat Glyphosate.	All year round	Glyphosate 360g/L	M	Neat
Crofton Weed	*Ageratina adenophora*	Hand removal, brush cut and foliar sprayed with Glyphosate	All year round	Glyphosate 360g/L	M	1/100
Scarlet Pimpernel	*Anagallis arvensis*	Hand removal, spot spraying with Glyphosate.	All year round	Glyphosate 360g/L	M	1/100
Whisky Grass	*Andropogon virginicus*	Remove seed and crown out with knife or spot spray	Prior to flowering in March to May	Glyphosate 360g/L	M	1/100
Giant Reed	*Arundo donax*	Cut and paint with neat Glyphosate.	All year round	Glyphosate 360g/L	M	Neat
Asparagus Fern	*Asparagus aethiopicus*	Small single specimens to be crowned or Sprayed with Glyphosate/metsulfuron methyl	All year round	Glyphosate 360g/L & Metsulfuron-Methyl 600 g/kg	M & B	1/100 & 1g/10L
Cobblers Pegs	*Bidens pilosa*	Foliar spraying using Glyphosate, hand pulled and brush cut	All year round	Glyphosate 360g/L	M	1/100
Buffalo Grass	*Bouteloua dactyloides*	Hand removal, brush cut and foliar sprayed with Glyphosate	All year round	Glyphosate 360g/L	M	1/100
Bitou Bush	*Chrysanthemoides monilifera subsp rotundata*	Small single specimens hand pulled or larger shrubs cut and painted with neat Glyphosate	All year round	Glyphosate 360g/L	M	Neat
Camphor Laurel	*Cinnamomum camphora*	Scrape and paint or drill and fill with neat Glyphosate	All year round	Glyphosate 360g/L	M	Neat
Spear Thistle	*Cirsium vulgare*	Foliar spraying with Glyphosate, hand pulled and brush cut	All year round	Glyphosate 360g/L	M	1/100
Fleabane	*Conyza bonariensis*	Foliar spraying with Glyphosate, hand pulled and brush cut	All year round	Glyphosate 360g/L	M	1/100
Pampas Grass	*Cortaderia jubata*	Foliar spraying or cut/paint with Glyphosate or hand removed.	Prior to flowering in March to May	Glyphosate 360g/L	M	1/100 & Neat
Panic Veldgrass	*Ehrharta erecta*	Foliar spraying with Glyphosate	All year round	Glyphosate 360g/L	M	1/100

Common Name	Botanical Name	Weeding Technique	Recommended Timing for Treatment	Herbicide Application	Herbicide Group	Ratio
African Lovegrass	*Eragrostis curvula*	Hand pulled or brush cut and foliar sprayed with Glyphosate	All year round	Glyphosate 360g/L	M	1/100
Coral Tree, Common Coral Tree	*Erythrina x sykesii*	<80mm cut & painted; >80mm will be drilled/frilled with neat Glyphosate	All year round	Glyphosate 360g/L	M	Neat
Fennel	*Foeniculum vulgare*	Foliar spraying with Glyphosate, hand pulled and brush cut	All year round	Glyphosate 360g/L	M	1/100
Narrow-Leaf Cotton Bush / Swan Plant	*Gomphocarpus fruticosus*	Foliar spraying with Glyphosate, hand pulled and brush cut	All year round	Glyphosate 360g/L	M	1/100 & Neat
Ginger Lily	*Hedychium gardnerianum*	Physical removal. Large stands cut and painted with Glyphosate/Metsulfuron-Methyl.	All year round	Glyphosate 360g/L & Metsulfuron-Methyl 600 g/kg	M & B	Neat
Pennywort	*Hydrocotyle bonariensis*	Hand pulled or spot sprayed with Dicamba	All year round			
Coolatai Grass	*Hyparrhenia hirta*	Hand pulled or brush cut and foliar sprayed with Glyphosate. Up to three applications of Glyphosate in the same growing season will be required.	All year round	Glyphosate 360g/L	M	200ml/10l
Spiny Rush, Spike Rush, Sharp Rush	*Juncus acutus*	Juvenile single specimens to be dug out. Large infestations foliar spraying with Glyphosate.	All year round	Glyphosate 360g/L	M	1/100
Lantana	*Lantana camara*	Cut and paint, sprayed or splattered with Glyphosate. Hand pull small shoots.	All year round	Glyphosate 360g/L	M	Neat
Fishbone Fern	*Nephrolepis cordifolia*	Hand removal. Brush cut then sprayed with Glyphosate.	All year round	Glyphosate 360g/L	M	1/100
Ochna	*Ochna serrulata*	Double side scrape and paint all stems to 75% coverage.	All year round	Glyphosate 360g/L	M	Neat
Bamboo, Black Bamboo, Rhizomatous Bamboo,	*Phyllostachys nigra*	Chainsaw/cut close to base. Allow new shoots to return. Cut and paint new shoots with neat Glyphosate.	All year round	Glyphosate 360g/L	M	Neat
Inkweed	*Phytolacca octandra*	Foliar spraying with Glyphosate, hand pulled and brush cut	All year round	Glyphosate 360g/L	M	1/100
Radiata Pine, Pine Wildings	*Pinus radiata*	<80mm cut & painted; >80mm will be drilled/frilled with neat Glyphosate	All year round	Glyphosate 360g/L	M	Neat

Common Name	Botanical Name	Weeding Technique	Recommended Timing for Treatment	Herbicide Application	Herbicide Group	Ratio
Plantain	*Plantago lanceolata*	Foliar spraying with Glyphosate	All year round	Glyphosate 360g/L	M	1/100
Castor Oil Plant	*Ricinus communis*	Hand pulled and cut & painted with neat Glyphosate	All year round	Glyphosate 360g/L	M	Neat
Blackberry	*Rubus fruticosus aggregate*	Brush cut, crowned and scraped & painted with neat Glyphosate	Between flowering and fruiting from November to January	Glyphosate 360g/L	M	Neat
Fireweed	*Senecio madagascariensis*	Foliar spraying with Glyphosate, hand pulled and brush cut	All year round	Glyphosate 360g/L	M	1/100
Senna / Cassia	*Senna pendula*	Small individuals hand removed, larger plants cut and painted with neat Glyphosate	All year round	Glyphosate 360g/L	M	Neat
Paddy's Lucerne	*Sida rhombifolia*	Foliar spraying with Glyphosate, hand pulled and brush cut	All year round	Glyphosate 360g/L	M	1/100
Tobacco Bush/ Wild Tobacco	*Solanum mauritianum*	Cut & paint with Glyphosate	All year round	Glyphosate 360g/L	M	Neat
Blackberry Night Shade	*Solanum nigrum*	Foliar spraying with Glyphosate, hand pulled and brush cut	All year round	Glyphosate 360g/L	M	1/100
Purpletop	*Verbena bonarensis*	Foliar spraying with Glyphosate, hand pulled and brush cut	All year round	Glyphosate 360g/L	M	1/100

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Weed Action Plan – Addendum

Chain Valley Colliery, Mannering Colliery and Summerland Point Ventilation Shaft

Total Earth Care Pty Ltd

August 2020

Weed Action Plan - Addendum

Chain Valley Colliery, Mannering Colliery and Summerland Point Ventilation Shaft

August 2020

DRAFT

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Revision/Version No.	Addendum 1	**Date of revision**	28 August 2020
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1 INTRODUCTION

1.1 Background

Total Earth Care (TEC) previously prepared the Weed Action Plan (WAP) in January 2020 for the three (3) Delta Coal sites: Chain Valley Colliery, Mannering Colliery and Summerland Point Ventilation Shaft. This Addendum is developed to incorporate an additional area on the Lake Macquarie foreshore at the Chain Valley Colliery in the WAP. Delta Coal was granted a licence by the Minister for Water, Property & Housing on 11th June 2020 under Section 2.20 of the Crown Land Management Act 2016 for the use of the licensed area for *Environmental Rehabilitation – Vegetation Management.*

This Addendum provides guidance for managing the weeds within the license's foreshore area. Current weed densities of the licence's area are provided as well as the relevant management actions.

1.2 Subject Sites and Study Area

The "Study Area" for this Addendum includes the licensed area of Crown Land (Lot 2, DP1198253) that abuts the Chain Valley Colliery site managed by Delta Coal. This will be referred to as the "Foreshore Zone". The area included in the license extends along the foreshore of the neighbouring Delta Electricity site to the north-west, but this area was not part of the scope of this project. Please see the Map 1 below which indicates the boundaries of the Study Area. The site falls within the Local Land Services Greater Sydney Region, bordering on the Hunter Region.

2 METHODS

2.1 Desktop Research

A preliminary desktop study was conducted to assess the previously mapped weed locations (Kleinfelder 2016) and existing plant community types using the Wyong ELA 2016 PCT (ELA, 2016) mapping.

2.2 Site Survey

A site survey was conducted over one (1) day on the 4th August 2020. Weather conditions were clear with maximum temperatures of approximately 18˚C. See Map 1 for survey effort. Survey methodology followed that outlined in the WAP 2020.

3 RESULTS

The weed survey identified twenty-five (25) weed species under the *Biosecurity Act 2015.* These are listed in Appendix A along with the landholder's obligations under the Act. Of these, four (4) are listed as Weeds of National Significance (WoNS). These are:

- Asparagus Fern (*Asparagus aethiopicus*);
- Bitou Bush (*Chrysanthemoides monilifera subsp rotundata*);
- Lantana (*Lantana camara*); and
- Fireweed (*Senecio madagascariensis*).

Bitou Bush, Lantana and Fireweed are also listed as State Priority Weeds. The above listed weeds are also listed as Priority Weeds under the Greater Sydney Regional Strategic Weed Management Plan.

Weeds are mostly encroaching from the lot boundaries of the land, which is managed by Delta Coal. There are some small outbreaks within large resilient bushland areas which have been prioritised within this Plan.

Approximately six (6) *Dendrobium teretifolium,* an epiphytic orchid, were recorded at the southern end of this zone attached to the trunks of Casuarinas. These have been mapped in Map 2 of this Addendum.

The current condition, locations of weed infestations and weed densities have been discussed in detail within Section 4 - Management Zones.

DRAFT

Title: Chain Valley Colliery:
Subject Site & Survey Effort

Map No: Addendum Map 1

Site: Chain Valley Colliery

Client: Delta Coal

Date: August 2020

Project No: J4925

Author: G Teear

Legend

- Management Zones
- Survey Track
- Road
- Creek

EEC under BC Act 2016

- Swamp Oak Floodplain Forest
- Swamp Sclerophyll Forest on Coastal Floodplains EEC



Data Source:
Total Earth Care
Nearmap
Wyong ELA 2016 v2

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4 MANAGEMENT ZONE

The Foreshore Area is the Crown Land foreshore of the southern end of Lake Macquarie. The Foreshore area forms an additional management zone to those outlined in the WAP 2020. A detailed description of the zone and the weed presence is included in Table 1.

4.1.1 Chain Valley Colliery – Foreshore Area

Table 1. Chain Valley Colliery – Foreshore Area Description

Description	This zone is approximately 2.7 ha and runs along the foreshore of Lake Macquarie abutting the north-east boundary of the Chain Valley Colliery. **Area A – <5% weed cover** The most resilient area of this zone with low weed densities. Scattered occurrences of Bitou Bush (*Chrysanthemoides monilifera*) and Asparagus Fern (*Asparagus aethiopicus*), mostly along the lake edge. Approximately six (6) *Dendrobium teretifolium,* an epiphytic orchid, were recorded at the southern end of this zone attached to the trunks of Casuarinas. **Area B – 50 – 75% weed cover** Area with the highest weed density within this zone, which this mostly within the ground and shrub layer. Weed occurrences in this area mostly consist of *Lantana camara, Ochna serrulata*, Wild Tobacco (*Solanum mauritianum),* Bitou Bush (*Chrysanthemoides monilifera*), *Tradescantia fluminensis* and Asparagus Fern (*Asparagus aethiopicus*). The areas of densest weeds are along the western boundary of Area B. **Area C – 50 – 75% weed cover** Weeds are mostly within the ground layer which consists of exotic grasses, Watsonia (*Watsonia meriana var. bulbillifera*), Fireweed (*Senecio madagascariensis*), Asparagus Fern (*Asparagus aethiopicus*) and herbaceous weeds. Scattered occurrences and small patches of *Senna pendula var. glabrata,* Fishbone Fern (*Nephrolepis cordifolia*), *Ochna serrulata*, Coolatai Grass (*Hyparrhenia hirta*), *Lantana camara,* Rhodes Grass (*Chloris gayana*) and Crofton Weed (*Ageratina adenophora*) occur along the front of the cottages. Other ornamental exotic plant species are present here, most likely as plantings installed by previous residents of the cottages. **Area D – 5-25% weed cover** Scattered occurrences of *Lantana camara, Ochna serrulata*, and Asparagus Fern (*Asparagus aethiopicus*).
Priority Weeds	*Lantana camara*, Bitou Bush (*Chrysanthemoides monilifera*), Fireweed (*Senecio madagascariensis*) and Asparagus Fern (*Asparagus aethiopicus).*
Priority Areas	Area A and B has the most resilience. Weeds should be controlled to prevent further spread. Working from the lake edge towards the Chain Valley Colliery lot boundaries will help in containing weeds within the Delta Coal's land and follow best practice of working from areas of highest resilience to lowest.
Key Management Issues	• Targeted treatment of Bitou Bush (*Chrysanthemoides monilifera)* and Asparagus Fern (*Asparagus aethiopicus)* particularly along lake edges in Areas A and B. • Primary and targeted treatment of *Senna pendula var. glabrata,* Fishbone Fern **(***Nephrolepis cordifolia***)**, *Ochna serrulata*, Coolatai Grass (*Hyparrhenia hirta*), *Lantana camara,* Rhodes Grass (*Chloris gayana*) and Crofton Weed (*Ageratina adenophora*).
Notes	Access to this zone via dirt road from near the Chain Valley Colliery site entry. Key required. Caution to be taken driving around cottages due to rubbish and debris hidden by long grass.



Figure 1. Area C showing the small patch of Coolatai Grass present.



Figure 2. Boundary of Area B and D.

Title: Chain Valley Colliery: Foreshore Zone Weeds

Map No: Addendum Map 2

Site: Chain Valley Colliery

Client: Delta Coal

Date: August 2020

Project No: J4925

Author: G Teear

Legend

Management Zones

Road

Creek

Key Points

- Asparagus Fern
- Asparagus Fern, Senna, Coral Trees
- Asparagus fern
- Bitou Bush
- Bitou Bush, Asparagus Fern, Senna
- Coolatai Grass
- Dendrobium teretifolium
- Easter Daisy, Bitou Bush, Asparagus Fern
- Fishbone Fern, Buffalo, Couch
- Grevellia robusta
- Lantana Thicket
- Lantana camara, Asparagus Fern, Senna, Buffalo
- Lantana, Crofton Weed, Bidens, Watsonia, Senna
- Narrow-leaved Cotton Bush
- Ochna
- Ochna, Lantana, Asparagus Fern
- Ochna, Roads Grass
- Spear Thistle, Lantana
- Treated Bitou Bush
- Wild Tobacco, Senna

Weed Density

- < 5%
- 5 - 25%
- 25 - 50%
- 50 - 75%



Data Source:
Total Earth Care
Nearmap

total earth care

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Tel: 02 9913 1432 Fax: 02 9913 1434

5 MONITORING GUIDELINES

Monitoring is required to assess the outcomes of the weed management work and help determine if management strategies should be amended. Monitoring should be completed every six (6) months by a qualified ecologist or bush regeneration supervisor using the following methods:

- Assessment of weed control works, native regeneration and revegetation success via permanent repeatable photographic monitoring points; and
- Mapping of weed density per zone to assess the progress of the work. The mapping included in this report can assist in the development of baseline data.

Monitoring reports must include:

- Details of the work carried out including weed management techniques and herbicide used;
- Photo monitoring points – baseline and follow up photos; and
- Recommendations for corrective measures and/or specific vegetation management required.

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Appendix A. Weed Species listed as a Biosecurity Risk

Table 2. Categories of Management under the Greater Sydney Regional Strategic Weed Management Plan 2017-2022 under the NSW Biosecurity Act 2015

Category	Management Action
Prevention (Prevent)	To prevent the weed species arriving and establishing in the Region.
Eradication (Eliminate)	To permanently remove the species and its propagules from the Region, OR to destroy infestations to reduce the extent of the weed in the region with the aim of local eradication.
Containment (Minimise)	To prevent the ongoing spread of the species in all or part of the Region.
Asset Protection (Manage)	To prevent the spread of weeds to key sites/ assets of high economic, environmental and social value, or to reduce their impact on these sites if spread.
GBD (General Biosecurity Duty)	All plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable."
RRM (Regional Recommended Measure)	Specific details for each species included in table.
PoD (Prohibition on Dealings)	Must not be imported into the State or sold.
B Zone (Biosecurity Zone)	Specific details for each species included in table.
PM (Prohibited Matter)	A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries.

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Table 3. Weeds recorded within the subject site with respective categories listed in the Greater Sydney Regional Strategic Weed Management Plan 2017-2022

Common Name	Botanical Name	WONS	State Priority Weed-Mgmt. Actions	Regional Priority Weeds-Mgmt. Actions	Other Regional Weeds-Asset/value at risk	Duties for Priority Weeds of Greater Sydney
Crofton Weed	*Ageratina adenophora*				Environment, Agriculture	
Whisky Grass	*Andropogon virginicus*				Environment	
Asparagus Fern	*Asparagus aethiopicus*	Yes				PoD
Cobblers Pegs	*Bidens pilosa*					
Buffalo Grass	*Bouteloua dactyloides*					
Bitou Bush	*Chrysanthemoides monilifera subsp rotundata*	Yes	Containment			PoD, B Zone; The Bitou Bush Biosecurity Zone is established for all land within the State except land within 10 kilometres of the mean high water mark of the Pacific Ocean between Cape Byron in the north and Point Perpendicular in the south.
Spear Thistle	*Cirsium vulgare*					
Fleabane	*Conyza bonariensis*					
Panic Veldgrass	*Ehrharta erecta*					
African Lovegrass	*Eragrostis curvula*				Environment	
Coral Tree, Common Coral Tree	*Erythrina x sykesii*				Environment	
Narrow-Leaf Cotton Bush / Swan Plant	*Gomphocarpus fruticosus*					
Pennywort	*Hydrocotyle bonariensis*					

Common Name	Botanical Name	WONS	State Priority Weed-Mgmt. Actions	Regional Priority Weeds-Mgmt. Actions	Other Regional Weeds-Asset/value at risk	Duties for Priority Weeds of Greater Sydney
Coolatai Grass	*Hyparrhenia hirta*				Environment, Agriculture	
Lantana	*Lantana camara*	Yes	Asset Protection			PoD
Fishbone Fern	*Nephrolepis cordifolia*				Environment	
Ochna	*Ochna serrulata*				Environment	
Fireweed	*Senecio madagascariensis*	Yes	Asset Protection			PoD
Senna / Cassia	*Senna pendula*				Environment	
Paddy's Lucerne	*Sida rhombifolia*					
Tobacco Bush/ Wild Tobacco	*Solanum mauritianum*				Environment, Agriculture	
Blackberry Night Shade	*Solanum nigrum*					
Purpletop	*Verbena bonarensis*					

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Appendix B. Species Specific Weeding Techniques

Common Name	Botanical Name	Weeding Technique	Recommended Timing for Treatment	Herbicide Application	Herbicide Group	Ratio
Crofton Weed	*Ageratina adenophora*	Hand removal, brush cut and foliar sprayed with Glyphosate	All year round	Glyphosate 360g/L	M	1/100
Whisky Grass	*Andropogon virginicus*	Remove seed and crown out with knife or spot spray	Prior to flowering in March to May	Glyphosate 360g/L	M	1/100
Asparagus Fern	*Asparagus aethiopicus*	Small single specimens to be crowned or Sprayed with Glyphosate/metsulfuron methyl	All year round	Glyphosate 360g/L & Metsulfuron-Methyl 600 g/kg	M & B	1/100 & 1g/10L
Cobblers Pegs	*Bidens pilosa*	Foliar spraying using Glyphosate, hand pulled and brush cut	All year round	Glyphosate 360g/L	M	1/100
Buffalo Grass	*Bouteloua dactyloides*	Hand removal, brush cut and foliar sprayed with Glyphosate	All year round	Glyphosate 360g/L	M	1/100
Bitou Bush	*Chrysanthemoides monilifera subsp rotundata*	Small single specimens hand pulled or larger shrubs cut and painted with neat Glyphosate	All year round	Glyphosate 360g/L	M	Neat
Spear Thistle	*Cirsium vulgare*	Foliar spraying with Glyphosate, hand pulled and brush cut	All year round	Glyphosate 360g/L	M	1/100
Fleabane	*Conyza bonariensis*	Foliar spraying with Glyphosate, hand pulled and brush cut	All year round	Glyphosate 360g/L	M	1/100
Panic Veldgrass	*Ehrharta erecta*	Foliar spraying with Glyphosate	All year round	Glyphosate 360g/L	M	1/100
African Lovegrass	*Eragrostis curvula*	Hand pulled or brush cut and foliar sprayed with Glyphosate	All year round	Glyphosate 360g/L	M	1/100
Coral Tree, Common Coral Tree	*Erythrina x sykesii*	<80mm cut & painted; >80mm will be drilled/frilled with neat Glyphosate	All year round	Glyphosate 360g/L	M	Neat
Narrow-Leaf Cotton Bush / Swan Plant	*Gomphocarpus fruticosus*	Foliar spraying with Glyphosate, hand pulled and brush cut	All year round	Glyphosate 360g/L	M	1/100 & Neat
Pennywort	*Hydrocotyle bonariensis*	Hand pulled or spot sprayed with Dicamba	All year round			
Coolatai Grass	*Hyparrhenia hirta*	Hand pulled or brush cut and foliar sprayed with Glyphosate. Up to three applications of Glyphosate in the same growing season will be required.	All year round	Glyphosate 360g/L	M	200ml/10l

Common Name	Botanical Name	Weeding Technique	Recommended Timing for Treatment	Herbicide Application	Herbicide Group	Ratio
Lantana	*Lantana camara*	Cut and paint, sprayed or splattered with Glyphosate. Hand pull small shoots.	All year round	Glyphosate 360g/L	M	Neat
Fishbone Fern	*Nephrolepis cordifolia*	Hand removal. Brush cut then sprayed with Glyphosate.	All year round	Glyphosate 360g/L	M	1/100
Ochna	*Ochna serrulata*	Double side scrape and paint all stems to 75% coverage.	All year round	Glyphosate 360g/L	M	Neat
Fireweed	*Senecio madagascariensis*	Foliar spraying with Glyphosate, hand pulled and brush cut	All year round	Glyphosate 360g/L	M	1/100
Senna / Cassia	*Senna pendula*	Small individuals hand removed, larger plants cut and painted with neat Glyphosate	All year round	Glyphosate 360g/L	M	Neat
Paddy's Lucerne	*Sida rhombifolia*	Foliar spraying with Glyphosate, hand pulled and brush cut	All year round	Glyphosate 360g/L	M	1/100
Tobacco Bush/ Wild Tobacco	*Solanum mauritianum*	Cut & paint with Glyphosate	All year round	Glyphosate 360g/L	M	Neat
Blackberry Night Shade	*Solanum nigrum*	Foliar spraying with Glyphosate, hand pulled and brush cut	All year round	Glyphosate 360g/L	M	1/100
Purpletop	*Verbena bonarensis*	Foliar spraying with Glyphosate, hand pulled and brush cut	All year round	Glyphosate 360g/L	M	1/100

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Appendix 8: Noise Monitoring Results

Chain Valley Colliery

Quarterly attended noise monitoring - Q1 2025

Prepared for Delta Power & Energy (Chain valley) Pty Ltd (Trading as Delta Coal)

April 2025

Chain Valley Colliery

Quarterly attended noise monitoring - Q1 2025

Delta Power & Energy (Chain valley) Pty Ltd (Trading as Delta Coal)

E241225 RP1

April 2025

Version	Date	Prepared by	Reviewed by	Comments
V1	8/04/2025	Kirsten Garlick	Teanuanua Villierme	Draft
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1 Introduction

1.1 Background

EMM Consulting Pty Ltd (EMM) was engaged by Delta Power & Energy (Chain valley) Pty Ltd (Trading as Delta Coal) to conduct a quarterly noise survey of operations at Chain Valley Colliery (CVC) located on Construction Road, Mannering Park NSW. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified limits.

Attended environmental noise monitoring described in this report was done during the day, evening and night periods on 18th and 20th March 2025 at nine monitoring locations.

1.2 Attended monitoring locations

Attended monitoring locations are detailed in Table 1.1 and shown on Figure 1.1. It should be noted that Figure 1.1 shows actual monitoring locations, not necessarily the location of residences and are based on the approved noise management plan.

Table 1.1 Attended noise monitoring locations

Location descriptor	Description	Coordinates (MGA56)	
		Easting	Northing
ATN001	Griffith Street, Mannering Park	363990	6330529
ATN002	Lakeshore Avenue, Kingfisher Shores	365218	6329388
ATN003	Short Street, Macquarie Shores	365165	6328323
ATN004	Lloyd Avenue, Chain Valley Bay	365949	6328530
ATN005	Teragalin Drive, Chain Valley Bay	366560	6328590
ATN006	Sunset Parade, Chain Valley Bay	366305	6329321
ATN007[1]	Cams Boulevard, Chain Valley Bay	366559	6331109
R12	Lakeshore Avenue, Kingfisher Shores	365185	6329352
R13	Karoola Avenue, Kingfisher Shores	365391	6329169

Notes: 1. Attended noise monitoring was undertaken at the R22 residence (EPL Point 23) instead.



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

0 0.5 1 km
GDA 1994 MGA Zone 56

N

\\emm.local\vxdrive\2024\E240010- Delta Coal Noise CY24\8 GIS\02_Maps\N001_MonitoringLocations\N001_MonitoringLocations_20240411_01.aprx 12/04/2024

KEY

- (A) Noise monitoring location
- (W) Meteorological station
- CVC consent boundary
- Major road
- Minor road
- Watercourse/drainage line
- Waterbody

CVC attended noise monitoring locations

Chain Valley Colliery
Quarterly Attended Noise Monitoring
Figure 1.1

EMM creating opportunities

1.3 Terminology and abbreviations

Definitions of terms and abbreviations which may be used in this report are provided in Table 1.2.

Table 1.2 Terminology and abbreviations

Term/descriptor	Definition
dB(A)	Noise level measurement units are decibels (dB). The "A" weighting scale is used to approximate how humans hear noise.
L_{Amax}	The maximum root mean squared A-weighted noise level over a time period.
L_{A1}	The A-weighted noise level which is exceeded for 1 per cent of the time.
$L_{A1,1minute}$	The A-weighted noise level which is exceeded for 1 per cent of the specified time period of 1 minute.
L_{A10}	The A-weighted noise level which is exceeded for 10 percent of the time.
L_{Aeq}	The energy average A-weighted noise level.
$L_{Aeq,15minute}$	The energy average A-weighted noise level over the specified time period of 15 minutes.
L_{A50}	The A-weighted noise level which is exceeded for 50 per cent of the time, also the median noise level during a measurement period.
L_{A90}	The A-weighted noise level exceeded for 90 percent of the time, also referred to as the "background" noise level and commonly used to derive noise limits.
L_{Amin}	The minimum A-weighted noise level over a time period.
L_{Ceq}	The energy average C-weighted noise energy during a measurement period. The "C" weighting scale is used to take into account low-frequency components of noise within the audibility range of humans.
SPL	Sound pressure level. Fluctuations in pressure measured as 10 times a logarithmic scale, with the reference pressure being 20 micropascals.
Hertz (Hz)	The frequency of fluctuations in pressure, measured in cycles per second. Most sounds are a combination of many frequencies together.
AWS	Automatic weather station used to collect meteorological data, typically at an altitude of 10 metres
VTG	Vertical temperature gradient in degrees Celsius per 100 metres altitude.
Sigma-theta	The standard deviation of the horizontal wind direction over a period of time.
IA	Inaudible. When site noise is noted as IA then there was no site noise at the monitoring location.
NM	Not measurable. If site noise is noted as NM, this means some noise was audible but could not be quantified.
Day	Monday – Saturday: 7 am to 6 pm, on Sundays and Public Holidays: 8 am to 6 pm.
Evening	Monday – Saturday: 6 pm to 10 pm, on Sundays and Public Holidays: 6 pm to 10 pm.
Night	Monday – Saturday: 10 pm to 7 am, on Sundays and Public Holidays: 10 pm to 8 am.

Appendix A provides further information that gives an indication as to how an average person perceives changes in noise level, and examples of common noise levels.

2 Noise limits

2.1 Development consent

Noise limits for CVC are provided in Table 1, Condition 7 of Schedule 3 of the current development consent SSD-5465 (DC) dated July 2021. Long-term goals for CVC are provided in Condition 8(d) of Schedule 3 of the DC. Relevant sections of the DC are reproduced in Appendix B.1.

2.2 Environment protection licence

Noise limits for CVC are provided in Conditions L5.1 and L5.2 of the current Environment Protection Licence 1770 (EPL) dated 26 November 2024. Relevant sections of the EPL are reproduced in Appendix B.2.

2.3 Noise management plan

The approved noise management plan (NMP) (dated 20 April 2022) was prepared in line with the Mod 4 approval and in accordance with the NSW EPA 'Noise Policy for Industry' (NPfI) issued in October 2017. Table 5 of the NMP adopts nine attended noise monitoring (NM) locations that are representative of residences outlined in the DC. Where several assessment locations are in one NM catchment, representative noise limits have been adopted to ensure that the lowest (most stringent) limits within the NM catchment can be achieved. Relevant sections of the NMP are reproduced in Appendix B.3.

2.4 Noise limits

Noise impact limits based on the DC and EPL are provided in Table 2.1. Assessment location represented by each noise monitoring location is consistent with the NMP, most of which are listed in the DC and EPL (as shown in brackets alongside where applicable).

Table 2.1 Noise impact limits, dB

Noise monitoring location (NMP)	Represented assessment location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$	Night $L_{A1,1minute}$
ATN001	R8 (EPL Point 9)	38	38	38	45
ATN002	R11 (EPL Point 12)	49	49	49	54
ATN003	R15 (EPL Point 16)	36	36	36	45
ATN004	R14[1]	35	35	35	45
ATN005	R17[1]	35	35	35	45
ATN006	R19 (EPL Point 20)	37	37	37	45
ATN007[2]	R22 (EPL Point 23)	46	46	46	46
R12	R12 (EPL Point 13)	49	49	49	53
R13	R13 (EPL Point 14)	43	43	43	49

Notes: 1. DC limits for this location are under 'all other privately-owned land'.

2. Attended noise monitoring was undertaken at the R22 residence (EPL Point 23) instead.

2.5 Meteorological conditions

Appendix 8 of the DC states meteorological conditions under which noise limits do not apply as follows:

- during periods of rain or hail
- average wind speed at microphone height exceeds 5 m/s
- wind speeds greater than 3 m/s at 10 m above ground level
- temperature inversion conditions greater than 3°C/100 m.

Condition L5.4 of the EPL states meteorological conditions under which noise limits do not apply as follows:

- wind speeds greater than 3 m/s at 10 m above ground level
- stability category F temperature inversion conditions and wind speeds greater than 2 m/s at 10 m above ground level
- stability category G temperature inversion conditions
- or as defined under the NPfI.

The last point referencing the NPfI adds the concept of 'very noise-enhancing' conditions which are considered outside the 'standard' or 'noise-enhancing' meteorological conditions defined in Table D1 of Fact Sheet D of the NPfI.

Further, Fact Sheet E of the NPfI (point 6 of Section E1) provides additional guidance on monitoring the performance of a site against 'suitable' noise limits placed in the DC/EPL. Noise limits are based on 'achievable' noise levels under the 'standard' and/or 'noise-enhancing' meteorological conditions. Where meteorological conditions are considered 'very noise-enhancing', a positive adjustment of 5 dB applies to noise limits for 'standard' or 'noise-enhancing' meteorological conditions.

In accordance with the NPfI, where 'very noise-enhancing' meteorological conditions were present during a noise measurement, a positive adjustment of 5 dB has been applied to the noise limits. This approach means that noise limits are always applicable, with or without a positive adjustment of 5 dB, depending on whether meteorological conditions are 'very noise-enhancing' or not.

2.6 Additional requirements

2.6.1 Attended noise monitoring

Condition M4.1 of the EPL specifies additional noise monitoring requirements to determine compliance, including the following:

- locations of monitoring – EPL points as listed in Table 2.1 above
- frequency of monitoring – quarterly and at least two months between monitoring periods
- periods of monitoring:
  - For three out of four quarterly periods – each day, evening and night periods for a minimum of 15 minutes. Night period monitoring must be undertaken between the hours of 1 am and 4 am.

- For one out of four quarterly periods – day period monitoring must be undertaken for a minimum of 1.5 hours (six 15-minute periods); evening period monitoring must be undertaken for a minimum of 30 minutes (two 15-minue periods); night period monitoring must be undertaken for a minimum of 1 hour (four 15-minute periods).

- days of monitoring – each quarterly monitoring must be undertaken on a different day of the week excluding Saturday, Sundays and public holidays.

In accordance with the preceding, this round of quarterly attended noise monitoring (Q1 2025) was undertaken on Tuesday 18 and Thursday 20 March 2025 which is more than two months since the last quarterly monitoring (Q4 2024) which finished on Wednesday 11 December 2024. This quarterly period (Q1 2025), monitoring at each monitoring location (as per the EPL) was conducted for a minimum of 15 minutes, with night period monitoring undertaken between the hours of 1 am and 4 am on 20 March 2025.

As per the approved NMP, attended noise monitoring is scheduled considering the occurrence of regular operations at CVC. Noise monitoring avoids scheduled down-time or maintenance. Regular operations were occurring during this round of monitoring (Q1 2025).

Monitoring and reporting have been done in accordance with the NPfI and 'Approved methods for the measurement and analysis of environmental noise in NSW' (the approved methods) (EPA 2022).

2.6.2 CVC long-term goals

Long-term goals for CVC are provided in Condition 8(d) of Schedule 3 of the DC, which states:

> 8. The Applicant must:
>
> (d) use its best endeavours to achieve the long-term noise goals in Table 2, where reasonable and feasible, and report on progress towards achieving these goals in each Annual Review;

The long-term goals for CVC in Table 2 of the DC are summarised in Table 2.2 for the relevant assessment locations.

Table 2.2 CVC long-term goals

Assessment location	Day $L_{Aeq,15minute}$, dB	Evening $L_{Aeq,15minute}$, dB	Night $L_{Aeq,15minute}$, dB
R11 (EPL Point 12)	41	41	41
R12 (EPL Point 13)	41	41	41
R13 (EPL Point 14)	41	41	41
R22 (EPL Point 23)	40	40	40

As stated in Appendix 9 of the DC, Delta Coal is committed to the progressive implementation of feasible measures to target long-term noise goals which are designed to reduce noise emissions from CVC. For this compliance noise monitoring assessment, site $L_{Aeq,15minute}$ have also been compared to the long-term goals as discussed in Section 4.2.2.

3 Methodology

3.1 Overview

Attended environmental noise monitoring was done in accordance with Australian Standard AS1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant EPA requirements. Meteorological data was obtained from the Mannering Colliery automatic weather station (AWS) which allowed correlation of atmospheric parameters with measured site noise levels.

3.2 Attended noise monitoring

During the Q1 survey, attended noise monitoring was conducted during the day, evening and night periods at each location. Minimum monitoring periods at each location was in accordance with the EPL; 15 minutes during the day, evening and night periods. Atmospheric conditions (at microphone height) were measured at each monitoring location.

Measured sound levels from various sources were noted during each measurement, and particular attention was paid to the extent of site contribution (if any) to measured levels. At each monitoring location, the site-only $L_{Aeq,15minute}$ and L_{Amax} were measured directly or determined by other methods in accordance with Section 7.1 of the NPfI.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may be used in this report. When site noise is noted as IA, it was inaudible at the monitoring location. When site noise is noted as NM, this means it was audible but could not be quantified. All results noted as NM in this report were due to one or more of the following:

- Site noise levels were very low, typically more than 10 dB below the measured background (L_{A90}), and unlikely to be noticed.
- Site noise levels were masked by more dominant sources that are characteristic of the environment (such as breeze in foliage or continuous road traffic noise) that cannot be eliminated by monitoring at an alternate or intermediate location.
- It was not feasible or reasonable to employ methods, such as to move closer and back calculate. Cases may include rough terrain preventing closer measurement, addition/removal of significant source-to-receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

If the exact noise levels from site could not be established due to masking by other noise sources in a similar frequency range but were determined to be at least 5 dB lower than relevant limits, then a maximum estimate may be provided. This is expressed as a 'less than' quantity, such as <20 dB or <30 dB.

For this assessment, the measured L_{Amax} has been used as a conservative estimate of $L_{A1,1minute}$. The EPA accepts sleep disturbance analysis based on either the $L_{A1,1minute}$ or L_{Amax} metrics, with the L_{Amax} representing a more conservative assessment of site noise emissions.

3.3 Meteorological data

This assessment determined stability categories throughout attended monitoring period using the sigma-theta method as per Fact Sheet D of the NPfI. This data was sourced from the Mannering Colliery AWS, in accordance with requirements of EPL 1770.

3.4 Modifying factors

All measurements were evaluated for potential modifying factors in accordance with the NPfI. Assessment of modifying factors is undertaken at the time of measurement if the site was audible and directly quantifiable. If applicable, modifying factor adjustments have been reported and added to measured site-only L_{Aeq}.

A low-frequency noise (LFN) modifying factor adjustment has been applied to the site L_{Aeq} where the site caused the low-frequency noise threshold exceedance. Specific methodology for assessment of modifying factors is outlined in Fact Sheet C of the NPfI.

3.5 Instrumentation

Equipment used to measure environmental noise levels is detailed in Table 3.1. Calibration certificates are provided in Appendix C.

Table 3.1 Attended noise monitoring equipment

Item	Serial number	Calibration due date	Relevant standard
Rion NA-28 sound level meter	01070590	27/05/2026	IEC 61672-1:2002
Brüel & Kjær 2250 sound level meter	3029363	08/11/2026	IEC 61672-1:2013
Svantek SV-36 calibrator	79952	09/10/2025	IEC 60942:2017
Svantek SV-36 calibrator	162605	19/09/2025	IEC 60942:2017

4 Results

4.1 Total measured noise levels and atmospheric conditions

Overall noise levels measured at each location during attended measurements are provided in Table 4.1.

Table 4.1 Total measured noise levels[1], dB – Quarter 1 2025

Location	Period	Start date and time	L_{Amax}	L_{A1}	L_{A10}	L_{Aeq}	L_{A50}	L_{A90}	L_{Amin}
ATN001	Day	20/03/2025 11:06	69	51	46	45	43	42	40
ATN001	Evening	18/03/2025 21:14	53	47	46	45	44	43	41
ATN001	Night	20/03/2025 01:24	72	51	45	47	43	43	41
ATN002	Day	20/03/2025 12:19	71	65	56	54	51	47	40
ATN002	Evening	18/03/2025 20:47	44	42	40	39	39	38	36
ATN002	Night	20/03/2025 01:49	52	41	40	39	39	38	36
ATN003	Day	20/03/2025 11:35	81	62	50	51	42	37	33
ATN003	Evening	18/03/2025 19:31	56	54	53	52	52	50	48
ATN003	Night	20/03/2025 02:30	46	43	40	38	37	36	34
ATN004	Day	20/03/2025 12:44	74	68	55	55	47	41	35
ATN004	Evening	18/03/2025 19:06	72	56	44	45	38	33	30
ATN004	Night	18/03/2025 22:47	51	45	34	33	31	29	27
ATN005	Day	20/03/2025 13:11	74	62	48	50	39	34	31
ATN005	Evening	18/03/2025 19:23	57	52	50	48	47	40	34
ATN005	Night	18/03/2025 23:15	45	43	42	40	39	34	29
ATN006	Day	20/03/2025 13:34	64	58	52	48	41	36	33
ATN006	Evening	18/03/2025 19:01	48	43	39	36	33	31	29
ATN006	Night	20/03/2025 02:57	41	33	31	30	30	28	26
R22	Day	18/03/2025 17:46	60	45	42	41	41	39	37
R22	Evening	18/03/2025 18:15	55	50	45	42	41	40	38
R22	Night	20/03/2025 03:42	47	42	41	40	40	39	37
R12	Day	20/03/2025 12:19	71	65	56	54	51	47	40
R12	Evening	18/03/2025 20:47	44	42	40	39	39	38	36
R12	Night	20/03/2025 01:49	52	41	40	39	39	38	36
R13	Day	20/03/2025 11:58	72	67	59	56	49	42	36
R13	Evening	18/03/2025 20:27	52	46	43	42	41	40	38
R13	Night	20/03/2025 02:06	60	42	40	38	38	36	34

Notes: 1. Levels in this table are not necessarily the result of activity at site.

Atmospheric condition data measured by the operator during each measurement using a hand-held weather meter is shown in Table 4.2. The wind speed, direction and temperature were measured at approximately 1.5 m above ground. Attended noise monitoring is not done during rain, hail, or average wind speeds above 5 m/s at microphone height.

Table 4.2 Measured atmospheric conditions – Quarter 1 2025

Location	Period	Start date and time	Temperature °C	Wind speed m/s	Wind direction °Magnetic north[1]	Cloud cover 1/8s
ATN001	Day	20/03/2025 11:06	27	1.6	40	1
ATN001	Evening	18/03/2025 21:14	22	1.4	60	7
ATN001	Night	20/03/2025 01:24	21	<0.5	-	0
ATN002	Day	20/03/2025 12:19	30	<0.5	-	1
ATN002	Evening	18/03/2025 20:47	23	<0.5	-	8
ATN002	Night	20/03/2025 01:49	21	<0.5	-	0
ATN003	Day	20/03/2025 11:35	28	1.3	50	1
ATN003	Evening	18/03/2025 19:31	23	1.3	50	8
ATN003	Night	20/03/2025 02:30	21	<0.5	-	0
ATN004	Day	20/03/2025 12:44	29	0.8	315	0
ATN004	Evening	18/03/2025 19:06	23	<0.5	-	8
ATN004	Night	18/03/2025 22:47	24	<0.5	-	6
ATN005	Day	20/03/2025 13:11	30	0.7	0	0
ATN005	Evening	18/03/2025 19:23	21	<0.5	-	8
ATN005	Night	18/03/2025 23:15	22	<0.5	10	4
ATN006	Day	20/03/2025 13:34	30	0.9	350	0
ATN006	Evening	18/03/2025 19:01	21	<0.5	-	6
ATN006	Night	20/03/2025 02:57	21	<0.5	-	0
R22	Day	18/03/2025 17:46	22	<0.5	-	8
R22	Evening	18/03/2025 18:15	22	<0.5	-	5
R22	Night	20/03/2025 03:42	20	<0.5	-	0
R12	Day	20/03/2025 12:19	30	<0.5	-	1
R12	Evening	18/03/2025 20:47	23	<0.5	-	8
R12	Night	20/03/2025 01:49	21	<0.5	-	0
R13	Day	20/03/2025 11:58	27	1.4	10	1
R13	Evening	18/03/2025 20:27	23	1.1	35	7
R13	Night	20/03/2025 02:06	21	<0.5	-	0

Notes: 1. "-" indicates calm conditions at monitoring location.

4.2 Site only noise levels

4.2.1 Monitoring results

Table 4.3 provides site noise levels in the absence of other sources, where possible, and includes weather data from the Mannering Colliery AWS. Noise limits are applicable under all weather conditions but are adjusted during very noise-enhancing weather conditions, where relevant, as defined in the NPfI.

Table 4.3 Site noise levels and limits – Quarter 1 2025

Location	Start date and time	Period	Wind		Stability class	Very noise-enhancing?[1]	Limits, dB		Site levels, dB		Exceedances, dB	
			Speed m/s	Direction[3]			$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$[2]	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
ATN001	20/03/2025 11:06	Day	1.9	30	A	No	38	N/A	IA	N/A	Nil	N/A
ATN001	18/03/2025 21:14	Evening	1.5	45	F	No	38	N/A	IA	N/A	Nil	N/A
ATN001	20/03/2025 01:24	Night	1.2	43	F	No	38	45	IA	IA	Nil	Nil
ATN002	20/03/2025 12:19	Day	1.8	16	A	No	49	N/A	IA	N/A	Nil	N/A
ATN002	18/03/2025 20:47	Evening	1.4	50	F	No	49	N/A	IA	N/A	Nil	N/A
ATN002	20/03/2025 01:49	Night	1.5	42	F	No	49	54	IA	IA	Nil	Nil
ATN003	20/03/2025 11:35	Day	2.0	31	A	No	36	N/A	IA	N/A	Nil	N/A
ATN003	18/03/2025 19:31	Evening	1.1	68	F	No	36	N/A	IA	N/A	Nil	N/A
ATN003	20/03/2025 02:30	Night	1.3	45	F	No	36	45	IA	IA	Nil	Nil
ATN004	20/03/2025 12:44	Day	2.7	61	A	No	35	N/A	IA	N/A	Nil	N/A
ATN004	18/03/2025 19:06	Evening	1.4	72	F	No	35	N/A	IA	N/A	Nil	N/A
ATN004	18/03/2025 22:47	Night	0.9	52	F	No	35	45	IA	IA	Nil	Nil
ATN005	20/03/2025 13:11	Day	2.1	40	A	No	35	N/A	IA	N/A	Nil	N/A
ATN005	18/03/2025 19:23	Evening	1.1	68	F	No	35	N/A	IA	N/A	Nil	N/A
ATN005	18/03/2025 23:15	Night	1.0	55	F	No	35	45	IA	IA	Nil	Nil
ATN006	20/03/2025 13:34	Day	2.2	47	A	No	37	N/A	IA	N/A	Nil	N/A
ATN006	18/03/2025 19:01	Evening	1.4	72	F	No	37	N/A	IA	N/A	Nil	N/A
ATN006	20/03/2025 02:57	Night	1.0	31	F	No	37	45	IA	IA	Nil	Nil

Table 4.3 Site noise levels and limits – Quarter 1 2025

Location	Start date and time	Period	Wind		Stability class	Very noise-enhancing?[1]	Limits, dB		Site levels, dB		Exceedances, dB	
			Speed m/s	Direction[3]			$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$[2]	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
R22	18/03/2025 17:46	Day	2.2	62	A	No	46	N/A	40	N/A	Nil	N/A
R22	18/03/2025 18:15	Evening	1.9	68	F	No	46	N/A	44 (39+5)[4]	N/A	Nil	N/A
R22	20/03/2025 03:42	Night	0.7	49	F	No	46	46	45 (40+5)[4]	41[5]	Nil	Nil
R12	20/03/2025 12:19	Day	1.8	16	A	No	49	N/A	IA	N/A	Nil	N/A
R12	18/03/2025 20:47	Evening	1.4	50	F	No	49	N/A	IA	N/A	Nil	N/A
R12	20/03/2025 01:49	Night	1.5	42	F	No	49	53	IA	IA	Nil	Nil
R13	20/03/2025 11:58	Day	1.9	34	A	No	43	N/A	IA	N/A	Nil	N/A
R13	18/03/2025 20:27	Evening	1.4	58	F	No	43	N/A	IA	N/A	Nil	N/A
R13	20/03/2025 02:06	Night	1.2	42	F	No	43	49	IA	IA	Nil	Nil

Notes:
1. Noise limits are adjusted by +5 dB during 'very noise-enhancing meteorological conditions' in accordance with the NPfI.
2. Site-only $L_{Aeq,15minute}$, includes modifying factor adjustments if applicable.
3. Degrees magnetic north, "-" indicates calm conditions.
4. A positive adjustment for LFN was applicable.
5. Modifying factor adjustments do not apply to site L_{Amax}.

4.2.2 Long term noise goals

Site $L_{Aeq,15minute}$ were also compared to the long-term noise goals (refer to Table 2.2) for the relevant locations (i.e. R11, R12, R13 and R22). Site $L_{Aeq,15minute}$ measured at ATN002 (R11), R12 and R13 satisfied the relevant long-term goals during the day, evening and night periods. At R22, the measured site $L_{Aeq,15minute}$ (inclusive of modifying factor adjustment for LFN) exceeded the relevant long-term $L_{Aeq,15minute}$ 40 dB goal by 4 dB during the evening period measurement, and by 5 dB during the night period measurement.

5 Summary

EMM was engaged by Delta Power & Energy (Chain valley) Pty Ltd (Trading as Delta Coal) to conduct a quarterly noise survey of operations at CVC. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified noise limits.

Attended environmental noise monitoring described in this report was done during the day, evening and night periods on 18th and 20th March at nine monitoring locations.

Noise levels from site complied with relevant limits at all monitoring locations during the Quarter 1 2025 survey.

CVC $L_{Aeq,15minute}$ were also compared to the long-term noise goals applicable at R11 (ATN002), R12, R13 and R22 (ATN007). CVC $L_{Aeq,15minute}$ satisfied these during all measurements at R11 (ATN002), R12 and R13. At R22, the measured site $L_{Aeq,15minute}$ (inclusive of modifying factor adjustment for LFN) exceeded the long-term $L_{Aeq,15minute}$ 40 dB goal by 4 dB during the night period measurement, and by 5 dB during the night period measurement.

Appendix A
Noise perception and examples

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A.1 Noise levels

Table A.1 gives an indication as to how an average person perceives changes in noise level. Examples of common noise levels are provided in Figure A.1.

Table A.1 Perceived change in noise

Change in sound pressure level (dB)	Perceived change in noise
up to 2	Not perceptible
3	Just perceptible
5	Noticeable difference
10	Twice (or half) as loud
15	Large change
20	Four times (or quarter) as loud

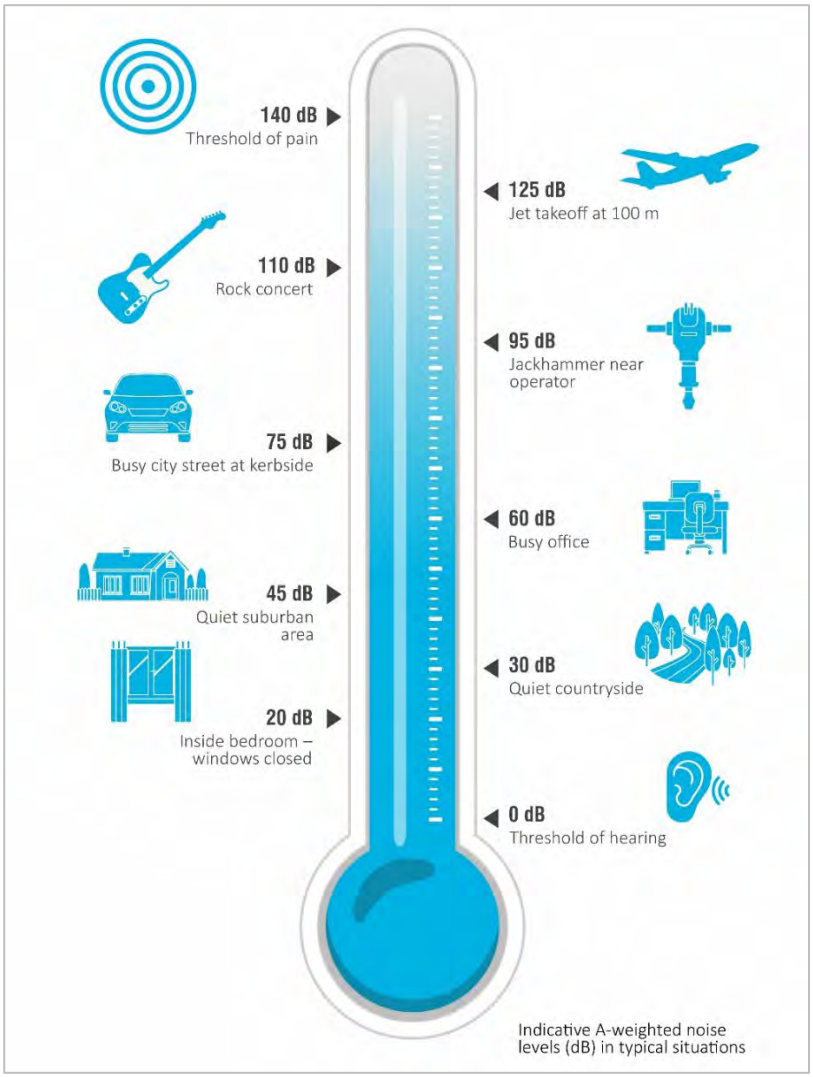


Figure A.1 Common noise levels

Appendix B
Regulator documents

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4. Prior to 31 March 2014, and every 12 months thereafter for each calendar year in which coal haulage from the site is undertaken utilising public roads, unless the Planning Secretary directs otherwise, the Applicant must commission a suitably qualified person, whose appointment has been approved by the Planning Secretary at least one month prior to undertaking the audit, to conduct an Independent Traffic Audit of the development. This audit must:
   (a) be undertaken without prior notice to the Applicant, and in consultation with TfNSW, NCC, CC Council and the CCC;
   (b) assess the impact of the development on the performance and safety of the road network, including a review of:
      - haulage records;
      - accident records on the haulage route, infringements relating to the code of conduct and any incidents involving haulage vehicles;
      - community complaints register; and
   (c) assess the effectiveness of the Road Transport Protocol; and, if necessary, recommend measures to reduce or mitigate any adverse (or potentially adverse) impacts.

5. Within 1 month of receiving the audit report, or as otherwise agreed by the Planning Secretary, the Applicant must submit a copy of the report to the Planning Secretary, with a detailed response to any of the recommendations contained in the audit report, including a timetable for the implementation of any measures proposed to address the recommendations in the audit report.

   A summary of the audit report must be included in the Annual Review.

Alternative Coal Transport Options

6. Prior to 31 December 2014, and every three years thereafter, the Applicant must prepare and submit to the Planning Secretary for approval, a study of the reasonable and feasible options to reduce or eliminate the use of public roads to transport coal from the development, unless otherwise agreed by the Planning Secretary. The assessment must include:
   (a) an analysis of the capital, construction and operating costs of the alternative transport options; and
   (b) quantified social and environmental impacts associated with road and rail transport.

NOISE

Noise Impact Assessment Criteria

7. The Applicant must ensure that the noise generated by the development at any residence on privately-owned land does not exceed the criteria for the location in Table 1 nearest to that residence.

Table 1: Noise Criteria dB(A)

Location	Day	Evening	Night	
	$L_{Aeq(15\ min)}$	$L_{Aeq(15\ min)}$	$L_{Aeq(15\ min)}$	$L_{A1(1\ min)}$
R8	38	38	38	45
R11	49	49	49	54
R12	49	49	49	53
R13	43	43	43	49
R15	36	36	36	45
R19	37	37	37	45
R22	46	46	46	46
all other privately-owned land	35	35	35	45

Notes:
- *To interpret the locations referred to in Table 1, see Appendix 6 and the EIS; and*
- *Noise generated by the development is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy. Appendix 8 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.*

However, these criteria do not apply if the Applicant has a written agreement with the relevant landowner to exceed the noise criteria, and the Applicant has advised the Department in writing of the terms of this agreement.

Operating Conditions

8. The Applicant must:
   (a) implement best management practice, including all reasonable and feasible noise mitigation measures, to minimise the construction, operational and transport noise generated by the development;
   (b) regularly assess the noise monitoring and meteorological data and relocate, modify, and/or stop operations on site to ensure compliance with the relevant conditions of this consent;
   (c) minimise the noise impacts of the development during meteorological conditions under which the noise limits in this consent do not apply (see Appendix 8);
   (d) use its best endeavours to achieve the long-term noise goals in Table 2, where reasonable and feasible, and report on progress towards achieving these goals in each Annual Review;
   (e) carry out a comprehensive noise audit of the development in conjunction with each independent environmental audit; and
   (f) prepare an action plan to implement any additional reasonable and feasible onsite noise mitigation measures identified by each audit;
   to the satisfaction of the Planning Secretary.

Table 2: Long-term Noise Goals dB(A)

Location	***Day***	***Evening***	***Night***
	$L_{Aeq(15\ min)}$	$L_{Aeq(15\ min)}$	$L_{Aeq(15\ min)}$
R11 – R13	41	41	41
R22	40	40	40

Notes:
- *To interpret the locations referred to in Table 2, see Appendix 6 and the EIS; and*
- *Noise generated by the development is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy. Appendix 8 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.*

Noise Management Plan

9. The Applicant must prepare a Noise Management Plan for the development to the satisfaction of the Planning Secretary. This plan must:
   (a) be prepared in consultation with the EPA and submitted to the Planning Secretary for approval within 4 months of the date of this consent, unless otherwise agreed by the Planning Secretary;
   (b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this consent;
   (c) describe the proposed noise management system in detail including the mitigation measures that would be implemented to minimise noise during construction and operations, including on and off site road noise generated by vehicles associated with the development; and
   (d) include a monitoring program that:
      - uses attended monitoring to evaluate the compliance of the development against the noise criteria in this consent;
      - evaluates and reports on:
        - the effectiveness of the on-site noise management system; and
        - compliance against the noise operating conditions; and
      - defines what constitutes a noise incident, and includes a protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents.

The Applicant must implement the Noise Management Plan as approved by the Planning Secretary.

AIR QUALITY

Odour

10. The Applicant must ensure that no offensive odours are emitted from the site, as defined under the POEO Act.

APPENDIX 6
NOISE RECEIVER LOCATIONS

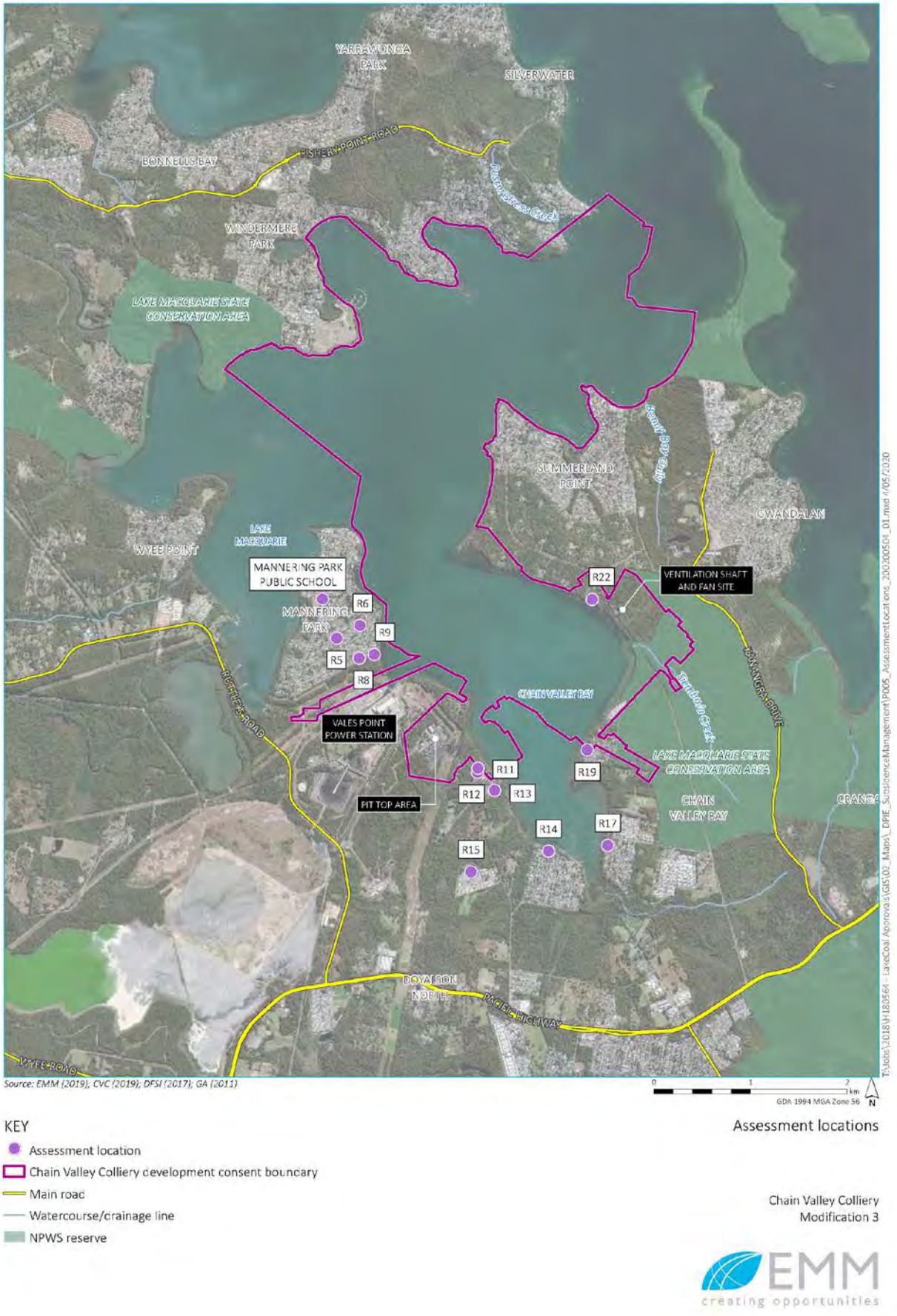


Figure 1: *Noise Receiver Locations*

APPENDIX 8
NOISE COMPLIANCE ASSESSMENT

Applicable Meteorological Conditions

1. The noise criteria in Table 1 of the conditions are to apply under all meteorological conditions except the following:
   (a) during periods of rain or hail;
   (b) average wind speed at microphone height exceeds 5 m/s;
   (c) wind speeds greater than 3 m/s measured at 10 m above ground level; or
   (d) temperature inversion conditions greater than 3°C/100 m.

Determination of Meteorological Conditions

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions must be that recorded by the meteorological station described in condition 14 of schedule 3.

Compliance Monitoring

3. Attended monitoring is to be used to evaluate compliance with the relevant conditions of this consent.

4. This monitoring must be carried out at least 4 times in each calendar year (ie at least once every 3 months), unless the Planning Secretary directs otherwise.

5. Unless otherwise agreed with the Planning Secretary, this monitoring is to be carried out in accordance with the relevant requirements for reviewing performance set out in the *NSW Industrial Noise Policy* (as amended from time to time), in particular the requirements relating to:
   (a) monitoring locations for the collection of representative noise data;
   (b) meteorological conditions during which collection of noise data is not appropriate;
   (c) equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and
   (d) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration.

	results of this monitoring program will be reviewed by a suitably qualified expert and used to determine the appropriateness of the existing irrigation area to receive this effluent; • develop a program to monitor creek line channel stability and the health of riparian vegetation within Swindles Creek. Monitoring will be undertaken in accordance with Section 8.5.2 of the Surface Water Impact Assessment (EIS Appendix E) and incorporated into the Colliery's WMP or Biodiversity Management Plan; and • record monitoring data in accordance with the Colliery's WMP and EPL 1770. Monitoring data will be interpreted as it is received to ensure appropriate operational guidance on monitoring water quality within desired parameters. Results of water quality monitoring will be reported in the Annual Review and made available to the CCC, as well as CC Council and LMCC.
Noise	Management and monitoring of noise will continue to be undertaken in accordance with the Colliery's NMP, which will be reviewed and updated as required to include the commitments made below. Great Southern Energy Pty Limited will: • continue attended compliance monitoring on site which will be used to identify potential hot spots and primary noise sources; • continue real-time noise monitoring alerts to site personnel to enable implementation of any required rapid noise management initiatives; • manage potential non-compliance through a noise complaint handling and response system, including the identification of responsible sources to enable targeted remedial action; • assess if further noise mitigation options for the ventilation fans are reasonable and feasible following the receipt of attenuation proposals; and • discuss potential management measures or agreement options with the landowner at 275 Cams Boulevard, following receipt of proposals from acoustics specialists. In addition to the above, Great Southern Energy Pty Limited is committed to the progressive implementation of feasible measures to target long-term noise goals which are designed to reduce noise emissions from the Colliery. Long-term options for investigation include: • modification to belt/movement alarms; • investigation of surface conveyer and coal preparation equipment, to determine if noise reductions are possible; • identifying sound attenuation options for the surface bulldozer and front-end loader; • strategic placement of acoustic barriers; • attenuation for the surface screener/shaker; • installation of quiet rollers for surface conveyor belts; • acoustic treatments around compressors; and • the use of a conveyor stacker for product coal stockpiling.
Air Quality and greenhouse gases	Management and monitoring of air quality and greenhouse gases will continue to be undertaken in accordance with the Colliery's AQGHGMP, which will be reviewed and updated as required to include the commitments made below Great Southern Energy Pty Limited will: • investigate the use of a stacker to replace hauling between current conveyor system and stockpiles; • undertake GHG monitoring comprising measurement of carbon dioxide and methane at the ventilation shaft and fan sites; and • record and report annual diesel, oil, grease, acetylene and electricity use to fulfil National Greenhouse and Energy Reporting Scheme requirements.
Traffic and transport	Management and monitoring of traffic and transport will continue to be undertaken in accordance with the Colliery's RTP. In addition, Great Southern Energy Pty Limited will continue to investigate alternative options for transporting export coal to the Port of Newcastle, specifically the preferred rail transport option, requiring the construction of a private haul road to the VPPS coal unloading facility and associated infrastructure upgrades. In addition, Great Southern Energy Pty Limited will investigate options to reduce peak hour traffic would be investigated including potentially limiting the peak hourly volumes of the Colliery truck traffic which would be permitted to travel via this intersection should the Colliery not be using rail transport for export coal by five years from the granting of development consent. Alternatively, a pro-rata financial contribution to the cost of installing traffic signals at the southbound intersection of the F3 and Sparks Road interchange could be made commensurate with the percentage of Colliery generated traffic using the intersection.
Subsidence	Management and monitoring of subsidence will continue to be undertaken in accordance with the Colliery's SMP or Extraction Plans, which will be reviewed and

Environment Protection Licence

1	Discharge to waters Discharge quality and volume monitoring	Discharge to waters Discharge quality and volume monitoring	Discharge to waters and monitoring from final settlement pond, gravity fed discharge pipe as identified in plan titled "Delta Coal Chain Valley Colliery, Surface EPA Premises Plan, DRG No: C1S0165_2" 10 August 2021 and saved as EPA Document DOC21/691135.
27	Discharge to waters Discharge quality and volume monitoring	Discharge to waters Discharge quality and volume monitoring	Discharge to waters via dam spillway from final settlement pond adjacent to EPA Point 1 as identified in plan titled "Delta Coal Chain Valley Colliery, Surface EPA Premises Plan, DRG No: C1S0165_2" 10 August 2021 and saved as EPA Document DOC21/691135.

P1.4 The following points referred to in the table below are identified in this licence for the purposes of weather and/or noise monitoring and/or setting limits for the emission of noise from the premises.

Noise/Weather

EPA identification no.	Type of monitoring point	Location description
9	Noise monitoring	Noise monitoring site R8 as defined in Development Consent SSD-5465 (MOD 3), located at 109 Griffith Street, MANNERING PARK, 2259
12	Noise monitoring	Noise monitoring site R11 as defined in Development Consent SSD-5465 (MOD 3), located at 35 Lakeshore Avenue, CHAIN VALLEY BAY, 2259
13	Noise monitoring	Noise monitoring site R12 as defined in Development Consent SSD-5465 (MOD 3), located at 20 Lakeshore Avenue, Kingfisher Shores, CHAIN VALLEY BAY, 2259
14	Noise monitoring	Noise monitoring site R13 as defined in Development Consent SSD-5465 (MOD 3), located at 33 Karoola Avenue, Kingfisher Shores, CHAIN VALLEY BAY, 2259
16	Noise monitoring	Noise monitoring site R15 as defined in Development Consent SSD-5465 (MOD 3), located at Short Street, Macquarie Shores, CHAIN VALLEY BAY, 2259
20	Noise monitoring	Noise monitoring site R19 as defined in Development Consent SSD-5465 (MOD 3), located at 2 Sunset Parade, CHAIN VALLEY BAY, 2259

23	Noise monitoring	Noise monitoring site R22 as defined in Development Consent SSD-5465 (MOD 3), located at 275a Cams Boulevard, CHAIN VALLEY BAY, 2259
26	Meteorological Station	Mannering Colliery Meteorological Station, Ruttleys Road, Doyalson 2259.

3 Limit Conditions

L1 Pollution of waters

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Concentration limits

L2.1 For each monitoring/discharge point or utilisation area specified in the table/s below (by a point number), the concentration of a pollutant discharged at that point, or applied to that area, must not exceed the concentration limits specified for that pollutant in the table.

L2.2 Where a pH quality limit is specified in the table, the specified percentage of samples must be within the specified ranges.

L2.3 To avoid any doubt, this condition does not authorise the pollution of waters by any pollutant other than those specified in the table\s.

L2.4 Water and/or Land Concentration Limits

POINT 1,27

Pollutant	Units of Measure	50 percentile concentration limit	90 percentile concentration limit	3DGM concentration limit	100 percentile concentration limit
Faecal Coliforms	colony forming units per 100 millilitres				200
pH	pH				6.5-8.5
Total suspended solids	milligrams per litre				50

Environment Protection Licence

L3 Volume and mass limits

L3.1 For each discharge point or utilisation area specified below (by a point number), the volume/mass of:
a) liquids discharged to water; or;
b) solids or liquids applied to the area;
must not exceed the volume/mass limit specified for that discharge point or area.

Point	Unit of Measure	Volume/Mass Limit
1	kilolitres per day	12161
27	kilolitres per day	12161

L3.2 The volumetric daily discharge limit for the premises is the combined discharge measured at EPA discharge points 1 and 27 and must not exceed 12161 kilolitres per day.

L4 Waste

L4.1 The licensee must not cause, permit or allow any waste to be received at the premises, except the wastes expressly referred to in the column titled “Waste” and meeting the definition, if any, in the column titled “Description” in the table below.
Any waste received at the premises must only be used for the activities referred to in relation to that waste in the column titled “Activity” in the table below.
Any waste received at the premises is subject to those limits or conditions, if any, referred to in relation to that waste contained in the column titled “Other Limits” in the table below.
This condition does not limit any other conditions in this licence.

Code	Waste	Description	Activity	Other Limits
NA	General or Specific exempted waste	Waste that meets all the conditions of a resource exemption under Clause 92 of the Protection of the Environment Operations (Waste) Regulation 2014.	As specified in each particular resource recovery exemption	NA

L5 Noise limits

L5.1 Noise generated at the premises that is measured at each noise monitoring point established under this licence must not exceed the noise levels specified in Column 4 of the table below for that point during the corresponding time periods specified in Column 1 when measured using the corresponding measurement parameters listed in Column 2.

POINT 12

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)

Environment Protection Licence

Day	Day-LAeq (15 minute)	-	49
Evening	Evening-LAeq (15 minute)	-	49
Night	Night-LAeq (15 minute)	-	49
Night	Night-LA1 (1 minute)	-	54

POINT 13

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	49
Evening	Evening-LAeq (15 minute)	-	49
Night	Night-LAeq (15 minute)	-	49
Night	Night-LA1 (1 minute)	-	53

POINT 14

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	43
Evening	Evening-LAeq (15 minute)	-	43
Night	Night-LAeq (15 minute)	-	43
Night	Night-LA1 (1 minute)	-	49

POINT 16

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	36
Evening	Evening-LAeq (15 minute)	-	36
Night	Night-LAeq (15 minute)	-	36
Night	Night-LA1 (1 minute)	-	45

POINT 20

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	37
Evening	Evening-LAeq (15 minute)	-	37
Night	Night-LAeq (15 minute)	-	37

Night	Night-LA1 (1 minute)	-	45

POINT 23

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	46
Evening	Evening-LAeq (15 minute)	-	46
Night	Night-LAeq (15 minute)	-	46
Night	Night-LA1 (1 minute)	-	46

POINT 9

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	38
Evening	Evening-LAeq (15 minute)	-	38
Night	Night-LAeq (15 minute)	-	38
Night	Night-LA1 (1 minute)	-	45

L5.2 The licensee must ensure that noise generated on the premises does not exceed:

a) 35 LAeq(15min) during the day, evening or night at any privately owned land nearest to the residence apart from those receivers identified in Condition 5.1; and
b) 45 LA1(1min) during the night at any privately owned land nearest to the residence apart from those receivers identified in Condition 5.1.

Note: The licensee may provide to the EPA written evidence of any agreement with a landholder which is subject to the above noise limits. The written evidence may be submitted with a licence variation to remove the landholder from the above tables.

L5.3 For the purpose of condition L5.1 and condition L5.2:
(a) Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sunday and public holidays;
(b) Evening is defined as the period 6pm to 10pm, and
(c) Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sunday and public holidays.

L5.4 The noise limits set out in condition L5.1 and condition L5.2 apply under all meterorological conditions except for any one of the following:

(a) Wind speeds greater than 3 metres/second at 10 metres above ground level; or
(b) Stability category F temperature inversion conditions and wind speeds greater than 2 metres/second at 10 metres above ground level; or
(c) Stability category G temperature inversion conditions.
(d) Or as defined under the NSW EPA Noise Policy for Industry 2017.

L5.5 For the purpose of condition L5.4:
(a) the meteorological data to be used for determining meteorological conditions is the data recorded at the meteorological station identified in this licence as EPA Identification Point 26.
(b) Stability category temperature inversion conditions are to be determined in accordance with the NSW EPA Noise Policy for Industry 2017.

Note: The weather station must be designed, commissioned and operated in a manner to obtain the necessary parameters required under the above condition.

L5.6 For the purpose of determining the noise generated at the premises the licensee must use a Class 1 or Class 2 noise monitoring device as defined by AS IEC61672.1 and AS IEC61672.2-2004, or other noise monitoring equipment accepted by the EPA in writing.

L5.7 To determine compliance:

1. With the $L_{Aeq(15\ min)}$ noise limits in condition L5.1 and condition L5.2, the licensee must locate noise monitoring equipment;

(a) within 30 metres of a dwelling facade (but not closer than 3 metres) where any dwelling on the property is situated more then 30 metres from the property boundary that is closest to the premises;

(b) approximately on the boundary where any dwelling is situated 30 metres or less from the property boundary that is closest to the premises, or, where applicable,

(c) within approximately 50 metres if the boundary of a national park or nature reserve.

2. With the LA1(1 minute) noise limits in condition L5.1 and L5.2, the noise monitoring equipment must be located within 1 metre of a dwelling facade.

3. With the noise limits in condition L5.1 and condition L5.2, the noise monitoring equipment must be located;

(a) at the most affected point at a location where there is no dwelling at the location, or

(b) at the most affected point within an area at a location prescribed by conditions L5.7 1(a) or L5.7 1(b).

L5.8 A non-compliance of condition L5.1 or condition L5.2 will still occur where noise generated from the premises in excess of the appropriate limit is measured;
a) at a location other than an area prescribed by conditions L5.7 1(a) and L5.7 1(b), and /or
b) at a point other than the most affected point at a location.

L5.9 For the purposes of determining the noise generated at the premises all applicable modification factors as described in the NSW EPA Noise Policy for Industry 2017 must be applied, as appropriate, to the noise levels measured by the noise monitoring equipment.

M3.2 Subject to any express provision to the contrary in this licence, monitoring for the concentration of a pollutant discharged to waters or applied to a utilisation area must be done in accordance with the Approved Methods Publication unless another method has been approved by the EPA in writing before any tests are conducted.

M4 Environmental monitoring

Requirement to monitor noise

M4.1 To determine compliance with condition L5.1, attended noise monitoring must be undertaken in accordance with conditions L5.7 and L5.8, and

(a) at each one of the locations listed in condition L5.1;
(b) occur quarterly within the reporting period of the Environment Protection Licence with at least 2 months between monitoring periods;
(c) occur during each day, evening and night period as defined in the NSW Industrial Noise Policy (EPA 2000) for a minimum of 15 minutes for three of the quarters;
(d) the night time 15 minute attended monitoring in accordance with c) must be undertaken between the hours of 1am and 4am;
(e) the night time LA1 (1 min) attended monitoring in accordance with c) must be undertaken between the hours of 1am and 4am;
(f) one quarterly monitoring must occur during each day, evening and night period as defined in the NSW EPA Noise Policy for Industry 2017 for a minimum of 1.5 hours during the day; 30 minutes during the evening; and 1 hours during the night, and
(g) each quarterly monitoring must be undertaken on a different day(s) of the week not including Saturdays, Sundays and public holidays; and
(h) these monitoring conditions take effect in the 2015 Reporting period.

Note: The intention of this condition is that quarterly monitoring be undertaken at each sensitive receiver. That at each sensitive receiver monitoring is undertaken over a range of different days excluding weekends and public holidays during the reporting period so as to be representative of operating hours. That night time 15 minute attended monitoring and the LA1 (1min) monitoring for three of the quarters be undertaken at worst case being the most stable atmospheric conditions and when noise would be most intrusive to sleep. All of the sensitive receivers do not have to be monitored on the same day, evening and night for sub condition f.

M4.2 For the Annual Reporting Period ending March 2015 the EPA will accept all monitoring required by the current Department of Planning and Environment consent (usually quarterly monitoring for noise as dB(A) Leq15minutes) for compliance with noise monitoring requirements in this licence, as a single report attached to the Annual Return for the premises.

M5 Weather monitoring

M5.1 At the point(s) identified below, the licensee must monitor (by sampling and obtaining results by analysis) the parameters specified in Column 1 of the table below, using the corresponding sampling method, units of measure, averaging period and sampling frequency, specified opposite in the Columns 2, 3, 4 and 5 respectively.

2.4 Chain Valley Colliery Environmental Protection License 1770

CVC operates under EPL 1770 issued by the NSW EPA under the POEO Act. The EPL has been modified, most recently on 2 April 2019 acknowledging the transfer of ownership from LakeCoal Pty Ltd to Great Southern Energy Pty Ltd.

Noise related requirements of EPL 1770 together with where they are addressed in this NMP are provided in **Appendix E**.

2.5 Mannering Colliery Environmental Protection License 191

Mannering Colliery operates under EPL 191 issued by the NSW EPA under the POEO Act. The EPL has been modified, most recently on 1 April 2019 following the statutory five-year review and consisting of a number of variations which were mostly administrative in nature.

Condition L5 of EPL 191 notes that noise limits are not specified, with the Department of Planning, Industry and Environment being the appropriate authority for regulating noise conditions under Project Approval 06_0311.

2.6 Operational Noise Criteria

Noise limits within CVC Development Consent SSD-5465 and MC Project Approval 06_0311 have been outlined in **Table 2**.

Table 2: Consented Operational Noise Criteria dB(A) for Delta Coal Collieries

Consent/Approval/EPL Location	Day		Evening		Night		
	$L_{Aeq\ (15\ min)}$		$L_{Aeq\ (15\ min)}$		$L_{Aeq\ (15\ min)}$		$L_{A1\ (1\ min)}$
Chain Valley Colliery							
R8 (EPL Point 8)	38		38		38		45
R11 (EPL Point 11)	49	41^	49	41^	49	41^	54
R12 (EPL Point 12)	49	41^	49	41^	49	41^	53
R13 (EPL Point 13)	43	41^	43	41^	43	41^	49
R15 (EPL Point 15)	36		36		36		45
R19 (EPL Point 19)	37		37		37		45
R22 (EPL Point 22)	46	40^	46	40^	46	40^	46
All other privately-owned land	35		35		35		45
Mannering Colliery							
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 – Macquarie Shores Home Village	42		42		42		47
9 – Jeans	40		37		37		47
11 – Jeans	40		36		36		46
18 – Jeans	40		36		36		46
20 – Knight and all other privately-owned residences	40		36		36		46

^ = Long Term Noise Goals (where long-term goals differ from consented criteria)

Noise criteria outlined in **Table 2** do not apply if Delta Coal has an agreement with the owner/s of the relevant residence or land to exceed the noise criteria and Delta Coal has advised the EPA and DPIE in writing of the terms of this agreement.

As CVC has been operating for approximately 58 years, some of the predicted noise impacts at local receivers are greater than would usually be permissible without the requirement to offer noise treatments or voluntary acquisition. Notably the relocation of coal handling from CVC to MC in 2017 significantly improved CVC progression toward realising the long-term goals at receivers R11 to R13, where currently monitoring typically notes that occasional forklift and plant start-up warnings can be heard during monitoring at these receivers, while typically the site is inaudible. Consistent with noise monitoring results, community complaints from residents at these receivers regarding noise emissions has significantly decreased.

4.2.2 Chain Valley Colliery

Consistent with the noise impact assessment prepared by AECOM Pty Ltd for CVC in 2011 and undertaken as part of the Environmental Impact Statement (EIS) for Development Consent of SSD-5465, residential receivers have been divided into seven (7) noise catchment areas with similar geographical and acoustic features. The following points are considered representative of each noise catchment area:

- ATN001, representative of EPL 1770 monitoring point identification number 9, also identified in Development Consent SSD-5465 as receiver 'R8'. The attended monitoring point captures noise emissions at privately-owned residential properties located in Mannering Park, northwest of the Chain Valley Colliery pit top. The dominant noise sources in this area are birds, insects, traffic and other industrial sources;
- ATN002, representative of EPL 1770 monitoring point identification number 12, also identified in Development Consent SSD-5465 as receiver 'R11'. The attended monitoring point captures noise emissions at privately-owned residential properties located in Kingfisher Shores, south-east of the Chain Valley Colliery pit top. The dominant noise sources in this area are birds, insects, traffic and other industrial sources;
- ATN003, representative of EPL 1770 monitoring point identification number 16, also identified in Development Consent SSD-5465 as receiver 'R15'. The attended monitoring point captures noise emissions at privately-owned relocatable residences within MSHV, south of the Chain Valley Colliery pit top. The dominant noise sources in this receiver area are birds, insects, traffic and other industrial sources. Activities at Mannering Colliery are also audible at times;
- ATN004, representative of Development Consent SSD-5465 receiver 'R14'. The attended monitoring point captures noise emissions at privately-owned residential properties located in Chain Valley Bay South, south-east of the Chain Valley Colliery pit top. The dominant noise sources in this area are birds, insects, traffic and other industrial sources;
- ATN005, representative of Development Consent SSD-5465 receiver 'R17'. The attended monitoring point captured noise emissions at privately-owned residential properties located in Chain Valley Bay East, south-east of the Chain Valley Colliery pit top. The dominant noise sources in this area are birds, insects, traffic and other industrial sources;
- ATN006, representative of EPL 1770 monitoring point identification number 20, also identified in Development Consent SSD-5465 as receiver 'R19'. The attended monitoring point captures noise emissions at privately-owned residential properties located in Chain Valley Bay North, east of the Chain Valley Colliery pit top. The dominant noise sources in this area are birds, insects, traffic and other industrial sources
- ATN007, representative of EPL 1770 monitoring point identification number 23, also identified in Development Consent SSD-5465 as receiver 'R22'. The attended monitoring point captured

noise emissions at privately-owned residential properties located in Summerland Point, surrounding Chain Valley Colliery's Summerland Point ventilation shaft and fan site. The dominant noise sources in this area are birds, insects, traffic and the Summerland Point ventilation shaft and fan site.

It is noted that, with reference to the requirements of the EPL, two receivers were not considered to be captured by the seven (7) noise catchment areas outlined in the EIS and as such, monitoring is to be undertaken at the following points in addition to locations ATN001 to ATN007:

- R12, identified in EPL 1770 as noise monitoring point 13, noted to be adjacent to ATN002 at Kingfisher Shores on Lakeshore Avenue, Kingfisher Shores; and
- R13, identified in EPL 1770 as noise monitoring point 14, located on Karoola Avenue, Kingfisher Shores.

The spatial locations of the CVC attended monitoring locations and relevant noise criteria are detailed in **Table 5** below.

Table 5: Noise Monitoring Locations and Limits for Chain Valley Colliery

Location	Receivers Represented EPL 1770 ID SSD-5465 ID	Coordinates	Day $L_{Aeq(15\ min)}$ dB (A)	Evening $L_{Aeq(15\ min)}$ dB (A)	Night $L_{Aeq(15\ min)}$ dB (A)	Night $L_{A1(1\ min)}$ dB (A)
ATN001	EPL #9 R8	364140 E 6330594 N	35	35	35	35
ATN002	EPL #12 R11	365218 E 6329388 N	49	49	49	54
ATN003	EPL#16 R15	365165 E 6328323 N	36	36	36	45
ATN004	N/A R14	365949 N 6328530 E	35	35	35	45
ATN005	N/A R17	366560 N 6328590 E	35	35	35	45
ATN006	20 R19	366305 N 6329321 E	37	37	37	45
ATN007	23 R22	366425 N 6331135 E	46	46	46	46
R12	13 R12	365185 N 6329352 E	49	49	49	53
R13	14 R13	365391 N 6329169 E	43	43	43	49

Appendix C
Calibration certificates

EMM
creating opportunities

Acoustic Research Labs Pty Ltd
Unit 36/14 Loyalty Rd
North Rocks NSW AUSTRALIA 2151
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3:2013
Calibration Certificate

Calibration Number C24405

Client Details EMM Consulting
Level 3, 175 Scott Street
Newcastle NSW 2300

Equipment Tested/ Model Number : NA-28
Instrument Serial Number : 01070590
Microphone Serial Number : 08184
Pre-amplifier Serial Number : 52329
Firmware Version : v2.0

Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions	
Ambient Temperature :	24.4 °C	**Ambient Temperature :**	23.8 °C
Relative Humidity :	45.2 %	**Relative Humidity :**	46.7 %
Barometric Pressure :	101.3 kPa	**Barometric Pressure :**	101.26 kPa

Calibration Technician : Peter Elters
Secondary Check: Rhys Gravelle
Calibration Date : 27 May 2024
Report Issue Date : 3 Jun 2024

Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	*Pass*	17: Level linearity incl. the level range control	*Pass*
13: Electrical Sig. tests of frequency weightings	*Pass*	18: Toneburst response	*Pass*
14: Frequency and time weightings at 1 kHz	*Pass*	19: C Weighted Peak Sound Level	*Pass*
15: Long Term Stability	*Pass*	20: Overload Indication	*Pass*
16: Level linearity on the reference level range	*Pass*	21: High Level Stability	*Pass*

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation test performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2013.

Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
125Hz	*±0.13 dB*	*Temperature*	*±0.1 °C*
1kHz	*±0.13 dB*	*Relative Humidity*	*±1.9 %*
8kHz	*±0.14 dB*	*Barometric Pressure*	*±0.11 kPa*
Electrical Tests	*±0.13 dB*		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025 - Calibration.

The results of the tests, calibrations and/or measurements included in this document are traceable to SI units.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: SLM51838

EQUIPMENT TESTED: Sound Level Meter

Manufacturer:	B&K		
Type No:	2250	**Serial No:**	3029363
Mic. Type:	B&K 4189	**Serial No:**	3260501
Pre-Amp. Type:	B&K ZC0032	**Serial No:**	30109
Filter Type:	1/3 Octave	**Test No:**	F051839

Owner: EMM Consulting
Suite 01, 20 Chandos St
St Leonards NSW 2065

Tests Performed: IEC 61672-3:2013 & IEC 61260-3:2016

Comments: All Test passed for Class 1. (See overleaf for details)

CONDITIONS OF TEST:

Ambient Pressure	997	hPa ±1 hPa	**Date of Receipt :**	05/11/2024
Temperature	25	°C ±1° C	**Date of Calibration :**	08/11/2024
Relative Humidity	53	% ±5%	**Date of Issue :**	08/11/2024

Acu-Vib Test Procedure: AVP10 (SLM) & AVP06 (Filters)

CHECKED BY: .....

AUTHORISED SIGNATURE: .....

Bruce Meldrum

Accredited for compliance with ISO/IEC 17025 - Calibration

Results of the tests, calibration and/or measurements included in this document are traceable to SI units through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.

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Acu-Vib Electronics
ACOUSTICS AND VIBRATIONS
Head Office & Calibration Laboratory
Unit 14, 22 Hudson Avenue, Castle Hill NSW 2154
(02) 9680 8133
www.acu-vib.com.au

NATA
WORLD RECOGNISED ACCREDITATION
Accredited Laboratory No. 9262
Acoustic and Vibration Measurements

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: C51438

EQUIPMENT TESTED : Acoustic Calibrator

Manufacturer: Svantek
Type No: SV 36 **Serial No:** 79952
Class: 1
Owner: EMM Consulting Pty Ltd
L3, 175 Scott Street
Newcastle, NSW 2300
Tests Performed: Measured Output Pressure level, Frequency & Distortion
Comments: See Details and Class Tolerance overleaf.

CONDITION OF TEST:

Ambient Pressure	1013	hPa ±1 hPa	**Date of Receipt :**	02/10/2024
Temperature	22	°C ±1° C	**Date of Calibration :**	09/10/2024
Relative Humidity	42	% ±5%	**Date of Issue :**	09/10/2024

Acu-Vib Test Procedure: AVP02 (Calibrators)
Test Method: AS IEC 60942 - 2017

CHECKED BY: .....

AUTHORISED SIGNATURE: .....
Hein Soe

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NATA
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No. 9262
Acoustic and Vibration
Measurements

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: C51269

EQUIPMENT TESTED : Acoustic Calibrator

Manufacturer: Svantek
Type No: SV 36 **Serial No:** 162605
Class: 1
Owner: EMM Consulting
20 Chandos Street
St Leonards NSW 2065
Tests Performed: Measured Output Pressure level, Frequency & Distortion
Comments: See Details and Class Tolerance overleaf.

CONDITION OF TEST:

Ambient Pressure	993	hPa ±1 hPa	**Date of Receipt :**	19/09/2024
Temperature	24	°C ±1° C	**Date of Calibration :**	19/09/2024
Relative Humidity	28	% ±5%	**Date of Issue :**	19/09/2024

Acu-Vib Test Procedure: AVP02 (Calibrators)
Test Method: AS IEC 60942 - 2017

CHECKED BY: .....

AUTHORISED SIGNATURE: .....
Hein Soe

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Chain Valley Colliery

Quarterly attended noise monitoring - Q2 2025

Prepared for Delta Power & Energy (Chain valley) Pty Ltd (Trading as Delta Coal)

June 2025

Chain Valley Colliery

Quarterly attended noise monitoring - Q2 2025

Delta Power & Energy (Chain valley) Pty Ltd (Trading as Delta Coal)

E241225 RP1

June 2025

Version	Date	Prepared by	Reviewed by	Comments
V1	18/06/2025	Kirsten Garlick	Teanuanua Villierme	Draft
V2	23/06/2025	Kirsten Garlick	Teanuanua Villierme	Final

Approved by



Teanuanua Villierme
Associate Acoustics Consultant
23 June 2025

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This report has been prepared in accordance with the brief provided by Delta Power & Energy (Chain valley) Pty Ltd (Trading as Delta Coal) and, in its preparation, EMM has relied upon the information collected at the times and under the conditions specified in this report. All findings, conclusions or recommendations contained in this report are based on those aforementioned circumstances. This report is to only be used for the purpose for which it has been provided. Except as permitted by the Copyright Act 1968 (Cth) and only to the extent incapable of exclusion, any other use (including use or reproduction of this report for resale or other commercial purposes) is prohibited without EMM's prior written consent. Except where expressly agreed to by EMM in writing, and to the extent permitted by law, EMM will have no liability (and assumes no duty of care) to any person in relation to this document, other than to Delta Power & Energy (Chain valley) Pty Ltd (Trading as Delta Coal) (and subject to the terms of EMM's agreement with Delta Power & Energy (Chain valley) Pty Ltd (Trading as Delta Coal)).

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1 Introduction

1.1 Background

EMM Consulting Pty Limited (EMM) was engaged by Delta Power & Energy (Chain valley) Pty Ltd (Trading as Delta Coal) to conduct a quarterly noise survey of operations at Chain Valley Colliery (CVC) located on Construction Road, Mannering Park NSW. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified limits.

Attended environmental noise monitoring described in this report was done during the day, evening and night periods on 3, 5 and 12 June 2025 at nine monitoring locations.

1.2 Attended monitoring locations

Attended monitoring locations are detailed in Table 1.1 and shown on Figure 1.1. It should be noted that Figure 1.1 shows actual monitoring locations, not necessarily the location of residences and are based on the approved noise management plan.

Table 1.1 Attended noise monitoring locations

Location descriptor	Description	Coordinates (MGA56)	
		Easting	Northing
ATN001	Griffith Street, Mannering Park	363990	6330529
ATN002	Lakeshore Avenue, Kingfisher Shores	365218	6329388
ATN003	Short Street, Macquarie Shores	365165	6328323
ATN004	Lloyd Avenue, Chain Valley Bay	365949	6328530
ATN005	Teragalin Drive, Chain Valley Bay	366560	6328590
ATN006	Sunset Parade, Chain Valley Bay	366305	6329321
ATN007[1]	Cams Boulevard, Chain Valley Bay	366559	6331109
R12	Lakeshore Avenue, Kingfisher Shores	365185	6329352
R13	Karoola Avenue, Kingfisher Shores	365391	6329169

Notes: 1. Attended noise monitoring was undertaken at the R22 residence (EPL Point 23) instead.



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

0 0.5 1 km
GDA 1994 MGA Zone 56

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KEY

- (A) Noise monitoring location
- (W) Meteorological station
- CVC consent boundary
- Major road
- Minor road
- Watercourse/drainage line
- Waterbody

CVC attended noise monitoring locations

Chain Valley Colliery
Quarterly Attended Noise Monitoring
Figure 1.1

EMM creating opportunities

1.3 Terminology and abbreviations

Definitions of terms and abbreviations which may be used in this report are provided in Table 1.2.

Table 1.2 Terminology and abbreviations

Term/descriptor	Definition
dB(A)	Noise level measurement units are decibels (dB). The "A" weighting scale is used to approximate how humans hear noise.
L_{Amax}	The maximum root mean squared A-weighted noise level over a time period.
L_{A1}	The A-weighted noise level which is exceeded for 1 per cent of the time.
$L_{A1,1minute}$	The A-weighted noise level which is exceeded for 1 per cent of the specified time period of 1 minute.
L_{A10}	The A-weighted noise level which is exceeded for 10 percent of the time.
L_{Aeq}	The energy average A-weighted noise level.
$L_{Aeq,15minute}$	The energy average A-weighted noise level over the specified time period of 15 minutes.
L_{A50}	The A-weighted noise level which is exceeded for 50 per cent of the time, also the median noise level during a measurement period.
L_{A90}	The A-weighted noise level exceeded for 90 percent of the time, also referred to as the "background" noise level and commonly used to derive noise limits.
L_{Amin}	The minimum A-weighted noise level over a time period.
L_{Ceq}	The energy average C-weighted noise energy during a measurement period. The "C" weighting scale is used to take into account low-frequency components of noise within the audibility range of humans.
SPL	Sound pressure level. Fluctuations in pressure measured as 10 times a logarithmic scale, with the reference pressure being 20 micropascals.
Hertz (Hz)	The frequency of fluctuations in pressure, measured in cycles per second. Most sounds are a combination of many frequencies together.
AWS	Automatic weather station used to collect meteorological data, typically at an altitude of 10 metres
VTG	Vertical temperature gradient in degrees Celsius per 100 metres altitude.
Sigma-theta	The standard deviation of the horizontal wind direction over a period of time.
IA	Inaudible. When site noise is noted as IA then there was no site noise at the monitoring location.
NM	Not measurable. If site noise is noted as NM, this means some noise was audible but could not be quantified.
Day	Monday – Saturday: 7 am to 6 pm, on Sundays and Public Holidays: 8 am to 6 pm.
Evening	Monday – Saturday: 6 pm to 10 pm, on Sundays and Public Holidays: 6 pm to 10 pm.
Night	Monday – Saturday: 10 pm to 7 am, on Sundays and Public Holidays: 10 pm to 8 am.

Appendix A provides further information that gives an indication as to how an average person perceives changes in noise level, and examples of common noise levels.

2 Noise limits

2.1 Development consent

Noise limits for CVC are provided in Table 1, Condition 7 of Schedule 3 of the current development consent SSD-5465 (DC) dated July 2021. Long-term goals for CVC are provided in Condition 8(d) of Schedule 3 of the DC. Relevant sections of the DC are reproduced in Appendix B.1.

2.2 Environment protection licence

Noise limits for CVC are provided in Conditions L5.1 and L5.2 of the current Environment Protection Licence 1770 (EPL) dated 9 April 2025. Relevant sections of the EPL are reproduced in Appendix B.2.

2.3 Noise management plan

The approved noise management plan (NMP) (dated 20 April 2022) was prepared in line with the Mod 4 approval and in accordance with the NSW EPA 'Noise Policy for Industry' (NPfI) issued in October 2017. Table 5 of the NMP adopts nine attended noise monitoring (NM) locations that are representative of residences outlined in the DC. Where several assessment locations are in one NM catchment, representative noise limits have been adopted to ensure that the lowest (most stringent) limits within the NM catchment can be achieved. Relevant sections of the NMP are reproduced in Appendix B.3.

2.4 Noise limits

Noise impact limits based on the DC and EPL are provided in Table 2.1. Assessment location represented by each noise monitoring location is consistent with the NMP, most of which are listed in the DC and EPL (as shown in brackets alongside where applicable).

Table 2.1 Noise impact limits, dB

Noise monitoring location (NMP)	Represented assessment location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$	Night $L_{A1,1minute}$
ATN001	R8 (EPL Point 9)	38	38	38	45
ATN002	R11 (EPL Point 12)	49	49	49	54
ATN003	R15 (EPL Point 16)	36	36	36	45
ATN004	R14[1]	35	35	35	45
ATN005	R17[1]	35	35	35	45
ATN006	R19 (EPL Point 20)	37	37	37	45
ATN007[2]	R22 (EPL Point 23)	46	46	46	46
R12	R12 (EPL Point 13)	49	49	49	53
R13	R13 (EPL Point 14)	43	43	43	49

Notes: 1. DC limits for this location are under 'all other privately-owned land'.

2. Attended noise monitoring was undertaken at the R22 residence (EPL Point 23) instead.

2.5 Meteorological conditions

Appendix 8 of the DC states meteorological conditions under which noise limits do not apply as follows:

- during periods of rain or hail
- average wind speed at microphone height exceeds 5 m/s
- wind speeds greater than 3 m/s at 10 m above ground level
- temperature inversion conditions greater than 3°C/100 m.

Condition L5.4 of the EPL states meteorological conditions under which noise limits do not apply as follows:

- wind speeds greater than 3 m/s at 10 m above ground level
- stability category F temperature inversion conditions and wind speeds greater than 2 m/s at 10 m above ground level
- stability category G temperature inversion conditions
- or as defined under the NPfI.

The last point referencing the NPfI adds the concept of 'very noise-enhancing' conditions which are considered outside the 'standard' or 'noise-enhancing' meteorological conditions defined in Table D1 of Fact Sheet D of the NPfI.

Further, Fact Sheet E of the NPfI (point 6 of Section E1) provides additional guidance on monitoring the performance of a site against 'suitable' noise limits placed in the DC/EPL. Noise limits are based on 'achievable' noise levels under the 'standard' and/or 'noise-enhancing' meteorological conditions. Where meteorological conditions are considered 'very noise-enhancing', a positive adjustment of 5 dB applies to noise limits for 'standard' or 'noise-enhancing' meteorological conditions.

In accordance with the NPfI, where 'very noise-enhancing' meteorological conditions were present during a noise measurement, a positive adjustment of 5 dB has been applied to the noise limits. This approach means that noise limits are always applicable, with or without a positive adjustment of 5 dB, depending on whether meteorological conditions are 'very noise-enhancing' or not.

2.6 Additional requirements

2.6.1 Attended noise monitoring

Condition M4.1 of the EPL specifies additional noise monitoring requirements to determine compliance, including the following:

- locations of monitoring – EPL points as listed in Table 2.1 above
- frequency of monitoring – quarterly and at least two months between monitoring periods
- periods of monitoring:
  - For three out of four quarterly periods – each day, evening and night periods for a minimum of 15 minutes. Night period monitoring must be undertaken between the hours of 1 am and 4 am.

- For one out of four quarterly periods – day period monitoring must be undertaken for a minimum of 1.5 hours (six 15-minute periods); evening period monitoring must be undertaken for a minimum of 30 minutes (two 15-minue periods); night period monitoring must be undertaken for a minimum of 1 hour (four 15-minute periods).

- days of monitoring – each quarterly monitoring must be undertaken on a different day of the week excluding Saturday, Sundays and public holidays.

In accordance with the preceding, this round of quarterly attended noise monitoring (Q2 2025) was undertaken on Tuesday 3 and Thursday 5 and 12 June 2025 which is more than two months since the last quarterly monitoring (Q1 2025) which finished on Thursday 20 March 2025. This quarterly period (Q2 2025), monitoring at each monitoring location (as per the EPL) was conducted for a minimum of 15 minutes, with night period monitoring undertaken between the hours of 1 am and 4 am on 12 June 2025.

As per the approved NMP, attended noise monitoring is scheduled considering the occurrence of regular operations at CVC. Noise monitoring avoids scheduled down-time or maintenance. Regular operations were occurring during this round of monitoring (Q2 2025).

Monitoring and reporting have been done in accordance with the NPfI and 'Approved methods for the measurement and analysis of environmental noise in NSW' (the approved methods) (EPA 2022).

2.6.2 CVC long-term goals

Long-term goals for CVC are provided in Condition 8(d) of Schedule 3 of the DC, which states:

8. The Applicant must:

(d) use its best endeavours to achieve the long-term noise goals in Table 2, where reasonable and feasible, and report on progress towards achieving these goals in each Annual Review;

The long-term goals for CVC in Table 2 of the DC are summarised in Table 2.2 for the relevant assessment locations.

Table 2.2 CVC long-term goals

Assessment location	Day $L_{Aeq,15minute}$, dB	Evening $L_{Aeq,15minute}$, dB	Night $L_{Aeq,15minute}$, dB
R11 (EPL Point 12)	41	41	41
R12 (EPL Point 13)	41	41	41
R13 (EPL Point 14)	41	41	41
R22 (EPL Point 23)	40	40	40

As stated in Appendix 9 of the DC, Delta Coal is committed to the progressive implementation of feasible measures to target long-term noise goals which are designed to reduce noise emissions from CVC. For this compliance noise monitoring assessment, site $L_{Aeq,15minute}$ have also been compared to the long-term goals as discussed in Section 4.2.2.

3 Methodology

3.1 Overview

Attended environmental noise monitoring was done in accordance with Australian Standard AS1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant EPA requirements. Meteorological data was obtained from the Mannering Colliery automatic weather station (AWS) which allowed correlation of atmospheric parameters with measured site noise levels.

3.2 Attended noise monitoring

During the Q2 survey, attended noise monitoring was conducted during the day, evening and night periods at each location. Minimum monitoring periods at each location was in accordance with the EPL; 15 minutes during the day, evening and night periods. Atmospheric conditions (at microphone height) were measured at each monitoring location.

Measured sound levels from various sources were noted during each measurement, and particular attention was paid to the extent of site contribution (if any) to measured levels. At each monitoring location, the site-only $L_{Aeq,15minute}$ and L_{Amax} were measured directly or determined by other methods in accordance with Section 7.1 of the NPfI.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may be used in this report. When site noise is noted as IA, it was inaudible at the monitoring location. When site noise is noted as NM, this means it was audible but could not be quantified. All results noted as NM in this report were due to one or more of the following:

- Site noise levels were very low, typically more than 10 dB below the measured background (L_{A90}), and unlikely to be noticed.
- Site noise levels were masked by more dominant sources that are characteristic of the environment (such as breeze in foliage or continuous road traffic noise) that cannot be eliminated by monitoring at an alternate or intermediate location.
- It was not feasible or reasonable to employ methods, such as to move closer and back calculate. Cases may include rough terrain preventing closer measurement, addition/removal of significant source-to-receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

If the exact noise levels from site could not be established due to masking by other noise sources in a similar frequency range but were determined to be at least 5 dB lower than relevant limits, then a maximum estimate may be provided. This is expressed as a 'less than' quantity, such as <20 dB or <30 dB.

For this assessment, the measured L_{Amax} has been used as a conservative estimate of $L_{A1,1minute}$. The EPA accepts sleep disturbance analysis based on either the $L_{A1,1minute}$ or L_{Amax} metrics, with the L_{Amax} representing a more conservative assessment of site noise emissions.

3.3 Meteorological data

This assessment determined stability categories throughout attended monitoring period using the sigma-theta method as per Fact Sheet D of the NPfI. This data was sourced from the Mannering Colliery AWS, in accordance with requirements of EPL 1770.

3.4 Modifying factors

All measurements were evaluated for potential modifying factors in accordance with the NPfI. Assessment of modifying factors is undertaken at the time of measurement if the site was audible and directly quantifiable. If applicable, modifying factor adjustments have been reported and added to measured site-only L_{Aeq}.

A low-frequency noise (LFN) modifying factor adjustment has been applied to the site L_{Aeq} where the site caused the low-frequency noise threshold exceedance. Specific methodology for assessment of modifying factors is outlined in Fact Sheet C of the NPfI.

3.5 Instrumentation

Equipment used to measure environmental noise levels is detailed in Table 3.1. Calibration certificates are provided in Appendix C.

Table 3.1 Attended noise monitoring equipment

Item	Serial number	Calibration due date	Relevant standard
Rion NA-28 sound level meter	01070590	27/05/2026	IEC 61672-1:2002
Brüel & Kjær 2250 sound level meter	2759405	20/12/2025	IEC 61672-1:2013
Pulsar 105 acoustic calibrator	96080	04/03/2026	IEC 60942:2003
Svantek SV-36 calibrator	162796	28/01/2026	IEC 60942:2017

4 Results

4.1 Total measured noise levels and atmospheric conditions

Overall noise levels measured at each location during attended measurements are provided in Table 4.1.

Table 4.1 Total measured noise levels[1], dB – Quarter 2 2025

Location	Period	Start date and time	L_{Amax}	L_{A1}	L_{A10}	L_{Aeq}	L_{A50}	L_{A90}	L_{Amin}
ATN001	Evening	03/06/2025 21:01	58	56	54	52	52	50	48
ATN001	Day	05/06/2025 14:01	76	66	53	54	47	46	44
ATN001	Night	12/06/2025 01:20	74	46	45	45	44	43	41
ATN002	Evening	03/06/2025 20:29	58	55	52	50	50	48	46
ATN002	Day	05/06/2025 16:38	78	65	52	54	46	42	39
ATN002	Night	12/06/2025 02:04	52	50	49	47	47	46	44
ATN003	Evening	03/06/2025 19:21	50	47	45	44	44	42	40
ATN003	Day	05/06/2025 15:56	71	59	49	48	44	41	38
ATN003	Night	12/06/2025 01:45	48	43	41	40	40	38	36
ATN004	Evening	03/06/2025 18:57	53	46	41	39	38	37	35
ATN004	Night	03/06/2025 23:06	48	44	41	39	39	37	35
ATN004	Day	05/06/2025 15:33	74	67	51	53	42	37	34
ATN005	Evening	03/06/2025 18:27	63	52	45	43	40	39	37
ATN005	Night	03/06/2025 23:34	46	44	41	40	39	38	36
ATN005	Day	05/06/2025 15:05	73	62	50	50	40	37	34
ATN006	Evening	03/06/2025 18:02	49	43	41	40	40	39	37
ATN006	Day	05/06/2025 14:42	59	53	50	48	47	45	41
ATN006	Night	12/06/2025 02:49	52	45	44	43	43	42	41
R22	Day	05/06/2025 17:42	54	49	47	46	46	45	43
R22	Evening	05/06/2025 18:16	49	48	47	46	46	45	43
R22	Night	12/06/2025 03:44	59	53	50	48	48	46	44
R12	Evening	03/06/2025 20:29	58	55	52	50	50	48	46
R12	Day	05/06/2025 16:38	78	65	52	54	46	42	39
R12	Night	12/06/2025 02:04	52	50	49	47	47	46	44
R13	Evening	03/06/2025 20:07	57	52	49	48	47	46	44
R13	Day	05/06/2025 16:18	73	69	54	54	44	40	36
R13	Night	12/06/2025 02:21	64	48	47	46	45	44	42

Notes: 1. Levels in this table are not necessarily the result of activity at site.

Atmospheric condition data measured by the operator during each measurement using a hand-held weather meter is shown in Table 4.2. The wind speed, direction and temperature were measured at approximately 1.5 m above ground. Attended noise monitoring is not done during rain, hail, or average wind speeds above 5 m/s at microphone height.

Table 4.2 Measured atmospheric conditions – Quarter 2 2025

Location	Period	Start date and time	Temperature °C	Wind speed m/s	Wind direction ° Magnetic north[1]	Cloud cover 1/8s
ATN001	Evening	03/06/2025 21:01	15	1.2	210	7
ATN001	Day	05/06/2025 14:01	21	<0.5	-	0
ATN001	Night	12/06/2025 01:20	4	<0.5	-	0
ATN002	Evening	03/06/2025 20:29	13	<0.5	-	7
ATN002	Day	05/06/2025 16:38	16	<0.5	-	0
ATN002	Night	12/06/2025 02:04	5	<0.5	-	0
ATN003	Evening	03/06/2025 19:21	12	<0.5	255	0
ATN003	Day	05/06/2025 15:56	16	0.6	180	0
ATN003	Night	12/06/2025 01:45	4	<0.5	-	0
ATN004	Evening	03/06/2025 18:57	15	<0.5	-	0
ATN004	Night	03/06/2025 23:06	13	<0.5	-	2
ATN004	Day	05/06/2025 15:33	18	<0.5	-	0
ATN005	Evening	03/06/2025 18:27	15	<0.5	-	0
ATN005	Night	03/06/2025 23:34	13	<0.5	-	1
ATN005	Day	05/06/2025 15:05	18	1.1	190	0
ATN006	Evening	03/06/2025 18:02	16	0.6	180	0
ATN006	Day	05/06/2025 14:42	17	1.5	200	0
ATN006	Night	12/06/2025 02:49	5	<0.5	-	0
R22	Day	05/06/2025 17:42	14	<0.5	-	0
R22	Evening	05/06/2025 18:16	11	<0.5	-	0
R22	Night	12/06/2025 03:44	4	<0.5	-	0
R12	Evening	03/06/2025 20:29	13	<0.5	-	7
R12	Day	05/06/2025 16:38	16	<0.5	-	0
R12	Night	12/06/2025 02:04	5	<0.5	-	0
R13	Evening	03/06/2025 20:07	14	0.9	200	1
R13	Day	05/06/2025 16:18	15	<0.5	-	0
R13	Night	12/06/2025 02:21	5	<0.5	-	0

Notes: 1. "-" indicates calm conditions at monitoring location.

4.2 Site only noise levels

4.2.1 Monitoring results

Table 4.3 provides site noise levels in the absence of other sources, where possible, and includes weather data from the Mannering Colliery AWS. Noise limits are applicable under all weather conditions but are adjusted during very noise-enhancing weather conditions, where relevant, as defined in the NPfI.

Table 4.3 Site noise levels and limits – Quarter 2 2025

Location	Start date and time	Period	Wind		Stability class	Very noise-enhancing?[1]	Limits, dB		Site levels, dB		Exceedances, dB	
			Speed m/s	Direction[3]			$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$[2]	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
ATN001	03/06/2025 21:01	Evening	1.0	273	E	No	38	N/A	IA	N/A	Nil	N/A
ATN001	05/06/2025 14:01	Day	2.6	185	A	No	38	N/A	IA	N/A	Nil	N/A
ATN001	12/06/2025 01:20	Night	0.2	197	F	No	38	45	IA	IA	Nil	Nil
ATN002	03/06/2025 20:29	Evening	1.3	268	E	No	49	N/A	IA	N/A	Nil	N/A
ATN002	05/06/2025 16:38	Day	0.4	214	A	No	49	N/A	IA	N/A	Nil	N/A
ATN002	12/06/2025 02:04	Night	0.6	249	F	No	49	54	IA	IA	Nil	Nil
ATN003	03/06/2025 19:21	Evening	1.2	264	F	No	36	N/A	IA	N/A	Nil	N/A
ATN003	05/06/2025 15:56	Day	1.3	176	A	No	36	N/A	IA	N/A	Nil	N/A
ATN003	12/06/2025 01:45	Night	0.4	224	F	No	36	45	IA	IA	Nil	Nil
ATN004	03/06/2025 18:57	Evening	1.0	261	F	No	35	N/A	IA	N/A	Nil	N/A
ATN004	03/06/2025 23:06	Night	0.8	272	F	No	35	N/A	IA	N/A	Nil	N/A
ATN004	05/06/2025 15:33	Day	1.2	183	A	No	35	45	IA	IA	Nil	Nil
ATN005	03/06/2025 18:27	Evening	1.2	264	E	No	35	N/A	IA	N/A	Nil	N/A
ATN005	03/06/2025 23:34	Night	0.5	277	F	No	35	N/A	IA	N/A	Nil	N/A
ATN005	05/06/2025 15:05	Day	2.1	179	B	No	35	45	IA	IA	Nil	Nil
ATN006	03/06/2025 18:02	Evening	1.4	261	E	No	37	N/A	IA	N/A	Nil	N/A
ATN006	05/06/2025 14:42	Day	2.4	179	A	No	37	N/A	IA	N/A	Nil	N/A
ATN006	12/06/2025 02:49	Night	0.8	251	F	No	37	45	IA	IA	Nil	Nil

Table 4.3 Site noise levels and limits – Quarter 2 2025

Location	Start date and time	Period	Wind		Stability class	Very noise-enhancing?[1]	Limits, dB		Site levels, dB		Exceedances, dB	
			Speed m/s	Direction[3]			$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$[2]	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
R22	05/06/2025 17:42	Day	0.4	227	F	No	46	N/A	43-44 (41-42+2)[4]	N/A	Nil	N/A
R22	05/06/2025 18:16	Evening	1.1	244	F	No	46	N/A	46-47 (41-42+5)[4]	N/A	Nil-1	N/A
R22	12/06/2025 03:44	Night	0.6	167	E	No	46	46	46 (41+5)[4]	42[5]	Nil	Nil
R12	03/06/2025 20:29	Evening	1.3	268	E	No	49	N/A	IA	N/A	Nil	N/A
R12	05/06/2025 16:38	Day	0.4	214	A	No	49	N/A	IA	N/A	Nil	N/A
R12	12/06/2025 02:04	Night	0.6	249	F	No	49	53	IA	IA	Nil	Nil
R13	03/06/2025 20:07	Evening	1.4	264	E	No	43	N/A	IA	N/A	Nil	N/A
R13	05/06/2025 16:18	Day	1.2	181	A	No	43	N/A	IA	N/A	Nil	N/A
R13	12/06/2025 02:21	Night	0.6	271	F	No	43	49	IA	IA	Nil	Nil

Notes:
1. Noise limits are adjusted by +5 dB during 'very noise-enhancing meteorological conditions' in accordance with the NPfI.
2. Site-only $L_{Aeq,15minute}$, includes modifying factor adjustments if applicable.
3. Degrees magnetic north, "-" indicates calm conditions.
4. A positive adjustment for LFN was applicable.
5. Modifying factor adjustments do not apply to site L_{Amax}.

4.2.2 Long term noise goals

Site $L_{Aeq,15minute}$ were also compared to the long-term noise goals (refer to Table 2.2) for the relevant locations (i.e. R11, R12, R13 and R22). Site $L_{Aeq,15minute}$ measured at ATN002 (R11), R12 and R13 satisfied the relevant long-term goals during the day, evening and night periods. At R22, the measured site $L_{Aeq,15minute}$ (inclusive of modifying factor adjustment for LFN) exceeded the relevant long-term $L_{Aeq,15minute}$ 40 dB goal by 3-4 dB during the day measurement, by 6-7 dB during the evening measurement, and by 6 dB during the night measurement.

5 Summary

EMM was engaged by Delta Power & Energy (Chain valley) Pty Ltd (Trading as Delta Coal) to conduct a quarterly noise survey of operations at CVC. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified noise limits.

Attended environmental noise monitoring described in this report was done during the day, evening and night periods on 3, 5 and 12 June at nine monitoring locations.

Noise levels from site complied with relevant limits at most monitoring locations during the Quarter 2 2025 survey. The exception was at R22 where the site $L_{Aeq,15minute}$ (including a +5 dB adjustment for LFN) potentially exceeded the limit by 1 dB during the evening measurement on 5 June 2025. During the measurement, noise from the CVC ventilation fan (located at Summerland Point) was audible throughout, generating a site-only $L_{Aeq,15minute}$ of 41-42 dB. A low-frequency modifying factor was identified as applicable to the site $L_{Aeq,15minute}$ contribution and hence a 5 dB positive adjustment was applied in accordance with the NPfI, resulting in a site $L_{Aeq,15minute}$ of 46-47 dB. It is noted that Vales Point Power Station (VPPS) was also audible (dominant) during the measurement, contributing to the total measured noise levels. Due to the influence of VPPS noise on total measured levels at the time of the measurement, some uncertainty remains around its exact contribution and that of site, and hence the site contribution has been reported as a range. Notwithstanding, the potential 1 dB exceedance measured during the evening measurement (inclusive of the +5 dB LFN adjustment) at R22 was reported and a review of operations (as related to the ventilation fan) operations was undertaken by Delta Coal. A follow-up attended noise measurement at R22 was undertaken on 12 June 2025. The monitoring results show that the CVC ventilation fan was audible throughout the measurement, generating a site-only $L_{Aeq,15minute}$ of 46 dB (including a +5 dB adjustment for LFN) and hence satisfying the relevant noise limit at R22.

Noise monitoring results ($L_{Aeq,15minute}$) were also compared to the long-term noise goals applicable at R11, R12, R13 and R22 as per the DC. CVC $L_{Aeq,15minute}$ satisfied these during all measurements at R11 (ATN002), R12 and R13. At R22, the measured site $L_{Aeq,15minute}$ (inclusive of modifying factor adjustment for LFN) exceeded the long-term $L_{Aeq,15minute}$ 40 dB goal by 3-4 dB during the day measurement, by 6-7 dB during the evening measurement, and by 6 dB during the night measurement.

Appendix A
Noise perception and examples

EMM
creating opportunities

A.1 Noise levels

Table A.1 gives an indication as to how an average person perceives changes in noise level. Examples of common noise levels are provided in Figure A.1.

Table A.1 Perceived change in noise

Change in sound pressure level (dB)	Perceived change in noise
up to 2	Not perceptible
3	Just perceptible
5	Noticeable difference
10	Twice (or half) as loud
15	Large change
20	Four times (or quarter) as loud

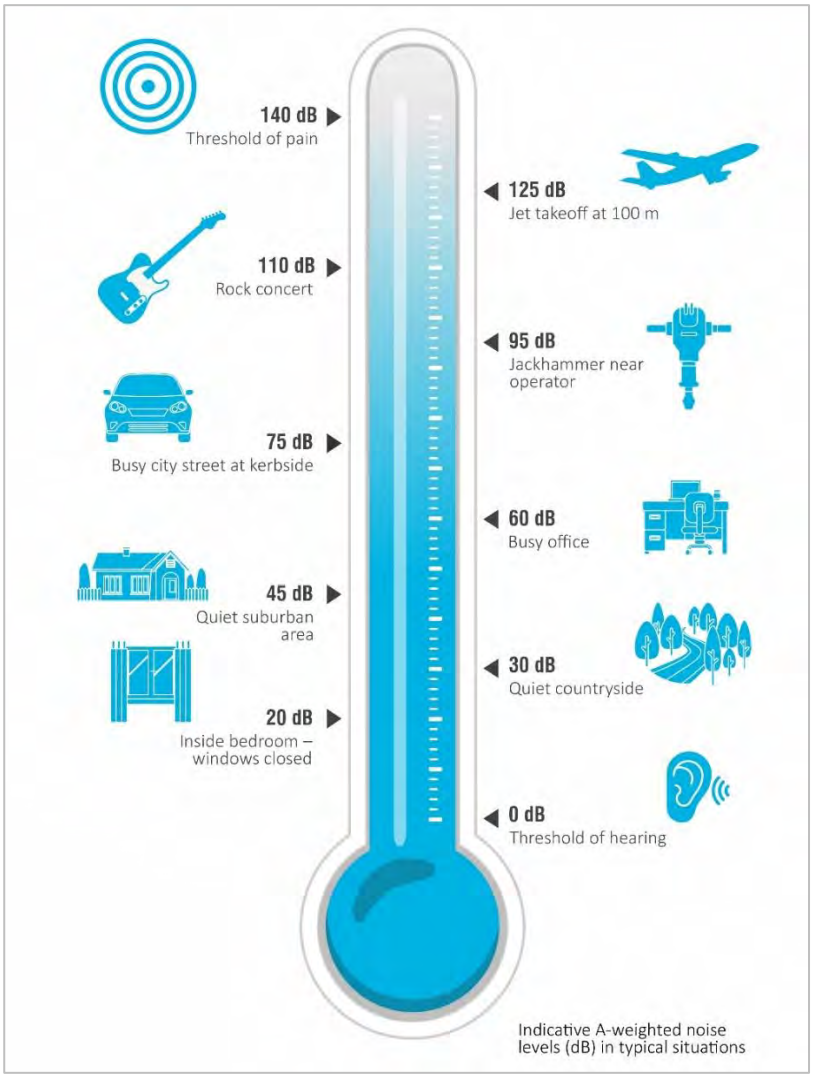


Figure A.1 Common noise levels

Appendix B
Regulator documents

EMM
creating opportunities

B.1 Development consent

4. Prior to 31 March 2014, and every 12 months thereafter for each calendar year in which coal haulage from the site is undertaken utilising public roads, unless the Planning Secretary directs otherwise, the Applicant must commission a suitably qualified person, whose appointment has been approved by the Planning Secretary at least one month prior to undertaking the audit, to conduct an Independent Traffic Audit of the development. This audit must:
   (a) be undertaken without prior notice to the Applicant, and in consultation with TfNSW, NCC, CC Council and the CCC;
   (b) assess the impact of the development on the performance and safety of the road network, including a review of:
      - haulage records;
      - accident records on the haulage route, infringements relating to the code of conduct and any incidents involving haulage vehicles;
      - community complaints register; and
   (c) assess the effectiveness of the Road Transport Protocol; and, if necessary, recommend measures to reduce or mitigate any adverse (or potentially adverse) impacts.

5. Within 1 month of receiving the audit report, or as otherwise agreed by the Planning Secretary, the Applicant must submit a copy of the report to the Planning Secretary, with a detailed response to any of the recommendations contained in the audit report, including a timetable for the implementation of any measures proposed to address the recommendations in the audit report.

   A summary of the audit report must be included in the Annual Review.

Alternative Coal Transport Options

6. Prior to 31 December 2014, and every three years thereafter, the Applicant must prepare and submit to the Planning Secretary for approval, a study of the reasonable and feasible options to reduce or eliminate the use of public roads to transport coal from the development, unless otherwise agreed by the Planning Secretary. The assessment must include:
   (a) an analysis of the capital, construction and operating costs of the alternative transport options; and
   (b) quantified social and environmental impacts associated with road and rail transport.

NOISE

Noise Impact Assessment Criteria

7. The Applicant must ensure that the noise generated by the development at any residence on privately-owned land does not exceed the criteria for the location in Table 1 nearest to that residence.

Table 1: Noise Criteria dB(A)

Location	Day	Evening	Night	
	$L_{Aeq(15\ min)}$	$L_{Aeq(15\ min)}$	$L_{Aeq(15\ min)}$	$L_{A1(1\ min)}$
R8	38	38	38	45
R11	49	49	49	54
R12	49	49	49	53
R13	43	43	43	49
R15	36	36	36	45
R19	37	37	37	45
R22	46	46	46	46
all other privately-owned land	35	35	35	45

Notes:
- *To interpret the locations referred to in Table 1, see Appendix 6 and the EIS; and*
- *Noise generated by the development is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy. Appendix 8 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.*

However, these criteria do not apply if the Applicant has a written agreement with the relevant landowner to exceed the noise criteria, and the Applicant has advised the Department in writing of the terms of this agreement.

Operating Conditions

8. The Applicant must:
   (a) implement best management practice, including all reasonable and feasible noise mitigation measures, to minimise the construction, operational and transport noise generated by the development;
   (b) regularly assess the noise monitoring and meteorological data and relocate, modify, and/or stop operations on site to ensure compliance with the relevant conditions of this consent;
   (c) minimise the noise impacts of the development during meteorological conditions under which the noise limits in this consent do not apply (see Appendix 8);
   (d) use its best endeavours to achieve the long-term noise goals in Table 2, where reasonable and feasible, and report on progress towards achieving these goals in each Annual Review;
   (e) carry out a comprehensive noise audit of the development in conjunction with each independent environmental audit; and
   (f) prepare an action plan to implement any additional reasonable and feasible onsite noise mitigation measures identified by each audit;
   to the satisfaction of the Planning Secretary.

Table 2: Long-term Noise Goals dB(A)

Location	***Day***	***Evening***	***Night***
	$L_{Aeq(15\ min)}$	$L_{Aeq(15\ min)}$	$L_{Aeq(15\ min)}$
R11 – R13	41	41	41
R22	40	40	40

Notes:
- *To interpret the locations referred to in Table 2, see Appendix 6 and the EIS; and*
- *Noise generated by the development is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy. Appendix 8 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.*

Noise Management Plan

9. The Applicant must prepare a Noise Management Plan for the development to the satisfaction of the Planning Secretary. This plan must:
   (a) be prepared in consultation with the EPA and submitted to the Planning Secretary for approval within 4 months of the date of this consent, unless otherwise agreed by the Planning Secretary;
   (b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this consent;
   (c) describe the proposed noise management system in detail including the mitigation measures that would be implemented to minimise noise during construction and operations, including on and off site road noise generated by vehicles associated with the development; and
   (d) include a monitoring program that:
      - uses attended monitoring to evaluate the compliance of the development against the noise criteria in this consent;
      - evaluates and reports on:
        - the effectiveness of the on-site noise management system; and
        - compliance against the noise operating conditions; and
      - defines what constitutes a noise incident, and includes a protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents.

The Applicant must implement the Noise Management Plan as approved by the Planning Secretary.

AIR QUALITY

Odour

10. The Applicant must ensure that no offensive odours are emitted from the site, as defined under the POEO Act.

APPENDIX 6
NOISE RECEIVER LOCATIONS

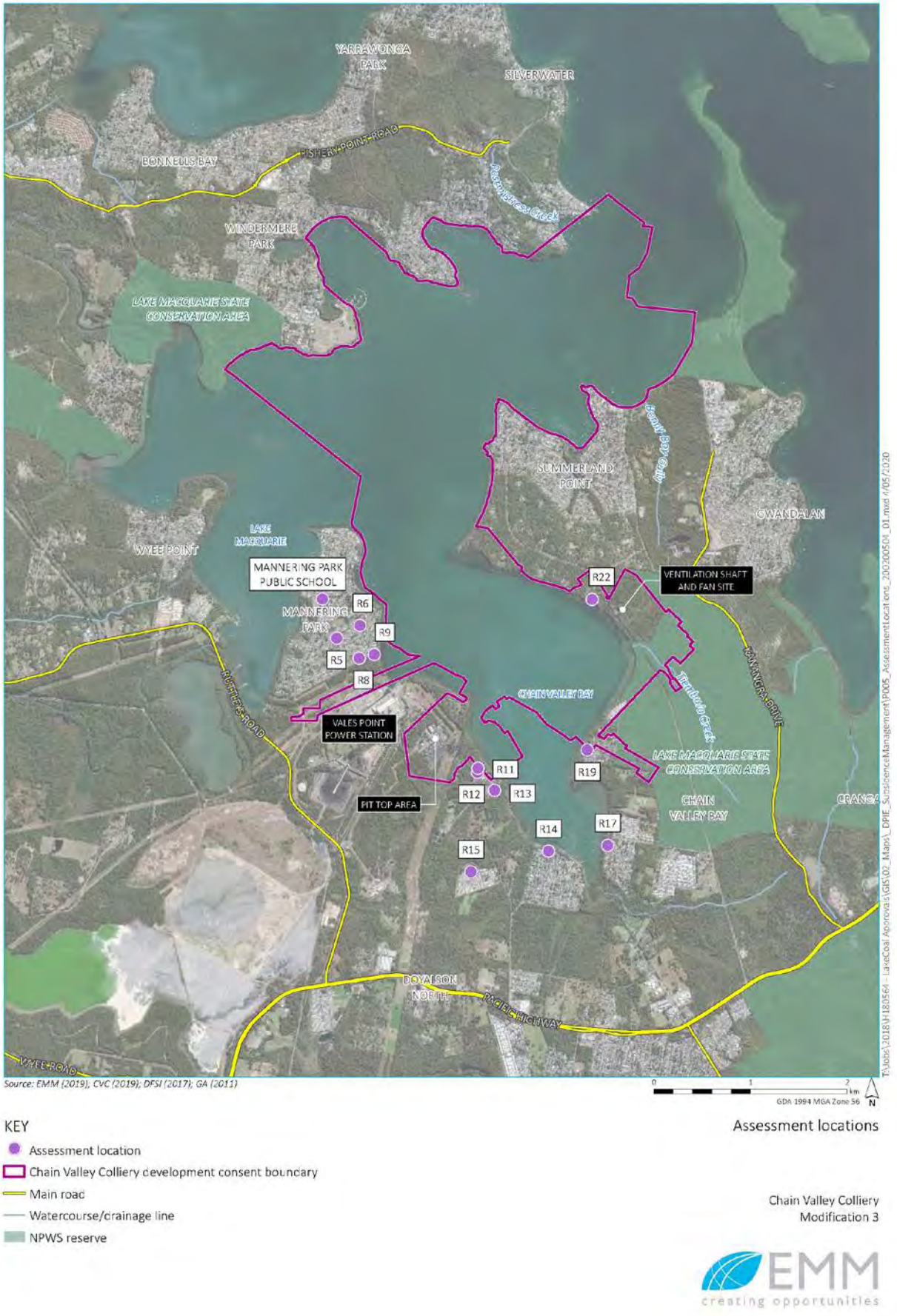


Figure 1: *Noise Receiver Locations*

APPENDIX 8
NOISE COMPLIANCE ASSESSMENT

Applicable Meteorological Conditions

1. The noise criteria in Table 1 of the conditions are to apply under all meteorological conditions except the following:
   (a) during periods of rain or hail;
   (b) average wind speed at microphone height exceeds 5 m/s;
   (c) wind speeds greater than 3 m/s measured at 10 m above ground level; or
   (d) temperature inversion conditions greater than 3°C/100 m.

Determination of Meteorological Conditions

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions must be that recorded by the meteorological station described in condition 14 of schedule 3.

Compliance Monitoring

3. Attended monitoring is to be used to evaluate compliance with the relevant conditions of this consent.

4. This monitoring must be carried out at least 4 times in each calendar year (ie at least once every 3 months), unless the Planning Secretary directs otherwise.

5. Unless otherwise agreed with the Planning Secretary, this monitoring is to be carried out in accordance with the relevant requirements for reviewing performance set out in the *NSW Industrial Noise Policy* (as amended from time to time), in particular the requirements relating to:
   (a) monitoring locations for the collection of representative noise data;
   (b) meteorological conditions during which collection of noise data is not appropriate;
   (c) equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and
   (d) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration.

	results of this monitoring program will be reviewed by a suitably qualified expert and used to determine the appropriateness of the existing irrigation area to receive this effluent; • develop a program to monitor creek line channel stability and the health of riparian vegetation within Swindles Creek. Monitoring will be undertaken in accordance with Section 8.5.2 of the Surface Water Impact Assessment (EIS Appendix E) and incorporated into the Colliery's WMP or Biodiversity Management Plan; and • record monitoring data in accordance with the Colliery's WMP and EPL 1770. Monitoring data will be interpreted as it is received to ensure appropriate operational guidance on monitoring water quality within desired parameters. Results of water quality monitoring will be reported in the Annual Review and made available to the CCC, as well as CC Council and LMCC.
Noise	Management and monitoring of noise will continue to be undertaken in accordance with the Colliery's NMP, which will be reviewed and updated as required to include the commitments made below. Great Southern Energy Pty Limited will: • continue attended compliance monitoring on site which will be used to identify potential hot spots and primary noise sources; • continue real-time noise monitoring alerts to site personnel to enable implementation of any required rapid noise management initiatives; • manage potential non-compliance through a noise complaint handling and response system, including the identification of responsible sources to enable targeted remedial action; • assess if further noise mitigation options for the ventilation fans are reasonable and feasible following the receipt of attenuation proposals; and • discuss potential management measures or agreement options with the landowner at 275 Cams Boulevard, following receipt of proposals from acoustics specialists. In addition to the above, Great Southern Energy Pty Limited is committed to the progressive implementation of feasible measures to target long-term noise goals which are designed to reduce noise emissions from the Colliery. Long-term options for investigation include: • modification to belt/movement alarms; • investigation of surface conveyer and coal preparation equipment, to determine if noise reductions are possible; • identifying sound attenuation options for the surface bulldozer and front-end loader; • strategic placement of acoustic barriers; • attenuation for the surface screener/shaker; • installation of quiet rollers for surface conveyor belts; • acoustic treatments around compressors; and • the use of a conveyor stacker for product coal stockpiling.
Air Quality and greenhouse gases	Management and monitoring of air quality and greenhouse gases will continue to be undertaken in accordance with the Colliery's AQGHGMP, which will be reviewed and updated as required to include the commitments made below Great Southern Energy Pty Limited will: • investigate the use of a stacker to replace hauling between current conveyor system and stockpiles; • undertake GHG monitoring comprising measurement of carbon dioxide and methane at the ventilation shaft and fan sites; and • record and report annual diesel, oil, grease, acetylene and electricity use to fulfil National Greenhouse and Energy Reporting Scheme requirements.
Traffic and transport	Management and monitoring of traffic and transport will continue to be undertaken in accordance with the Colliery's RTP. In addition, Great Southern Energy Pty Limited will continue to investigate alternative options for transporting export coal to the Port of Newcastle, specifically the preferred rail transport option, requiring the construction of a private haul road to the VPPS coal unloading facility and associated infrastructure upgrades. In addition, Great Southern Energy Pty Limited will investigate options to reduce peak hour traffic would be investigated including potentially limiting the peak hourly volumes of the Colliery truck traffic which would be permitted to travel via this intersection should the Colliery not be using rail transport for export coal by five years from the granting of development consent. Alternatively, a pro-rata financial contribution to the cost of installing traffic signals at the southbound intersection of the F3 and Sparks Road interchange could be made commensurate with the percentage of Colliery generated traffic using the intersection.
Subsidence	Management and monitoring of subsidence will continue to be undertaken in accordance with the Colliery's SMP or Extraction Plans, which will be reviewed and

B.2 Environment Protection Licence

27	Discharge to waters Discharge quality and volume monitoring	Discharge to waters Discharge quality and volume monitoring	Discharge to waters via dam spillway from final settlement pond adjacent to Point 1, shown as "Point 27" on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to the EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3).

P1.4 The following points referred to in the table below are identified in this licence for the purposes of weather and/or noise monitoring and/or setting limits for the emission of noise from the premises.

Noise/Weather

EPA identification no.	Type of monitoring point	Location description
9	Noise monitoring	Noise monitoring site, shown as "Point 9", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). Located at 109 Griffith Street, MANNERING PARK, 2259. Identified as R8 in Development Consent SSD-5465 (MOD 4) submitted to the EPA and dated 12 August 2021 (EPA Ref: DOC21/691135-1).
12	Noise monitoring	Noise monitoring site, shown as "Point 12", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). Located at 35 Lakeshore Avenue, KINGFISHER SHORES, 2259. Identified as R11 in Development Consent SSD-5465 (MOD 4) submitted to the EPA and dated 12 August 2021 (EPA Ref: DOC21/691135-1).
13	Noise monitoring	Noise monitoring site, shown as "Point 13", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). Located at 20 Lakeshore Avenue, KINGFISHER SHORES, 2259. Identified as R12 in Development Consent SSD-5465 (MOD 4) submitted to the EPA and dated 12 August 2021 (EPA Ref: DOC21/691135-1).

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14	Noise monitoring	Noise monitoring site, shown as "Point 14", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to the EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). Located at 33 Karoola Avenue, KINGFISHER SHORES, 2259. Identified as R13 in Development Consent SSD-5465 (MOD 4) submitted to the EPA and dated 12 August 2021 (EPA Ref: DOC21/691135-1).
16	Noise monitoring	Noise monitoring site, shown as "Point 16", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to the EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). Located at 150 Tall Timbers Road, DOYALSON NORTH, 2262. Identified as R15 in Development Consent SSD-5465 (MOD 4) submitted to the EPA and dated 12 August 2021 (EPA Ref: DOC21/691135-1).
20	Noise monitoring	Noise monitoring site, shown as "Point 20", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to the EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). Located at 2 Sunset Parade, CHAIN VALLEY BAY, 2259. Identified as R19 in Development Consent SSD-5465 (MOD 4) submitted to the EPA and dated 12 August 2021 (EPA Ref: DOC21/691135-1).
23	Noise monitoring	Noise monitoring site, shown as "Point 23", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to the EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). Located at 275 Cams Boulevard, SUMMERLAND POINT, 2259. Identified as R22 in Development Consent SSD-5465 (MOD 4) submitted to the EPA and dated 12 August 2021 (EPA Ref: DOC21/691135-1).
26	Meteorological Station	Meteorological monitoring site, shown as "Point 26", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to the EPA and dated 24 October 2024 (DOC24/771631-3) and 11 August 2021 (DOC21/691135). Located at Mannering Colliery (Ruttleys Road), DOYALSON NORTH, 2259.

3 Limit Conditions

L1 Pollution of waters

Environment Protection Licence

Licence - 1770

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Concentration limits

L2.1 For each monitoring/discharge point or utilisation area specified in the table/s below (by a point number), the concentration of a pollutant discharged at that point, or applied to that area, must not exceed the concentration limits specified for that pollutant in the table.

L2.2 Where a pH quality limit is specified in the table, the specified percentage of samples must be within the specified ranges.

L2.3 To avoid any doubt, this condition does not authorise the pollution of waters by any pollutant other than those specified in the table\s.

L2.4 Water and/or Land Concentration Limits

POINT 1,27

Pollutant	Units of Measure	50 percentile concentration limit	90 percentile concentration limit	3DGM concentration limit	100 percentile concentration limit
Oil and Grease	milligrams per litre				10
pH	pH				6.5-8.5
Total suspended solids	milligrams per litre				50

L3 Volume and mass limits

L3.1 For each discharge point or utilisation area specified below (by a point number), the volume/mass of:
a) liquids discharged to water; or;
b) solids or liquids applied to the area;
must not exceed the volume/mass limit specified for that discharge point or area.

Point	Unit of Measure	Volume/Mass Limit
1	kilolitres per day	12161
27	kilolitres per day	12161

L3.2 The volumetric daily discharge limit for the premises is the combined discharge measured at EPA discharge

points 1 and 27 and must not exceed 12161 kilolitres per day.

L4 Waste

L4.1 The licensee must not cause, permit or allow any waste to be received at the premises, except the wastes expressly referred to in the column titled “Waste” and meeting the definition, if any, in the column titled “Description” in the table below.
Any waste received at the premises must only be used for the activities referred to in relation to that waste in the column titled “Activity” in the table below.
Any waste received at the premises is subject to those limits or conditions, if any, referred to in relation to that waste contained in the column titled “Other Limits” in the table below.
This condition does not limit any other conditions in this licence.

Code	Waste	Description	Activity	Other Limits
NA	General or Specific exempted waste	Waste that meets all the conditions of a resource exemption under Clause 92 of the Protection of the Environment Operations (Waste) Regulation 2014.	As specified in each particular resource recovery exemption	NA

L5 Noise limits

L5.1 Noise generated at the premises that is measured at each noise monitoring point established under this licence must not exceed the noise levels specified in Column 4 of the table below for that point during the corresponding time periods specified in Column 1 when measured using the corresponding measurement parameters listed in Column 2.

POINT 12

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	49
Evening	Evening-LAeq (15 minute)	-	49
Night	Night-LAeq (15 minute)	-	49
Night	Night-LA1 (1 minute)	-	54

POINT 13

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	49
Evening	Evening-LAeq (15 minute)	-	49

Environment Protection Licence

Night	Night-LAeq (15 minute)	-	49
Night	Night-LA1 (1 minute)	-	53

POINT 14

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	43
Evening	Evening-LAeq (15 minute)	-	43
Night	Night-LAeq (15 minute)	-	43
Night	Night-LA1 (1 minute)	-	49

POINT 16

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	36
Evening	Evening-LAeq (15 minute)	-	36
Night	Night-LAeq (15 minute)	-	36
Night	Night-LA1 (1 minute)	-	45

POINT 20

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	37
Evening	Evening-LAeq (15 minute)	-	37
Night	Night-LAeq (15 minute)	-	37
Night	Night-LA1 (1 minute)	-	45

POINT 23

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	46
Evening	Evening-LAeq (15 minute)	-	46
Night	Night-LAeq (15 minute)	-	46
Night	Night-LA1 (1 minute)	-	46

Environment Protection Licence

POINT 9

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	38
Evening	Evening-LAeq (15 minute)	-	38
Night	Night-LAeq (15 minute)	-	38
Night	Night-LA1 (1 minute)	-	45

L5.2 The licensee must ensure that noise generated on the premises does not exceed:

a) 35 LAeq(15min) during the day, evening or night at any privately owned land nearest to the residence apart from those receivers identified in Condition 5.1; and
b) 45 LA1(1min) during the night at any privately owned land nearest to the residence apart from those receivers identified in Condition 5.1.

Note: The licensee may provide to the EPA written evidence of any agreement with a landholder which is subject to the above noise limits. The written evidence may be submitted with a licence variation to remove the landholder from the above tables.

L5.3 For the purpose of condition L5.1 and condition L5.2:
(a) Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sunday and public holidays;
(b) Evening is defined as the period 6pm to 10pm, and
(c) Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sunday and public holidays.

L5.4 The noise limits set out in condition L5.1 and condition L5.2 apply under all meterorological conditions except for any one of the following:
(a) Wind speeds greater than 3 metres/second at 10 metres above ground level; or
(b) Stability category F temperature inversion conditions and wind speeds greater than 2 metres/second at 10 metres above ground level; or
(c) Stability category G temperature inversion conditions.
(d) Or as defined under the NSW EPA Noise Policy for Industry 2017.

L5.5 For the purpose of condition L5.4:
(a) the meteorological data to be used for determining meteorological conditions is the data recorded at the meteorological station identified in this licence as EPA Identification Point 26.
(b) Stability category temperature inversion conditions are to be determined in accordance with the NSW EPA Noise Policy for Industry 2017.

Note: The weather station must be designed, commissioned and operated in a manner to obtain the necessary parameters required under the above condition.

L5.6 For the purpose of determining the noise generated at the premises the licensee must use a Class 1 or Class 2 noise monitoring device as defined by AS IEC61672.1 and AS IEC61672.2-2004, or other noise monitoring equipment accepted by the EPA in writing.

L5.7 To determine compliance:

1. With the $L_{Aeq(15\ min)}$ noise limits in condition L5.1 and condition L5.2, the licensee must locate noise monitoring equipment;

(a) within 30 metres of a dwelling facade (but not closer than 3 metres) where any dwelling on the property is situated more then 30 metres from the property boundary that is closest to the premises;

(b) approximately on the boundary where any dwelling is situated 30 metres or less from the property boundary that is closest to the premises, or, where applicable,

(c) within approximately 50 metres if the boundary of a national park or nature reserve.

2. With the LA1(1 minute) noise limits in condition L5.1 and L5.2, the noise monitoring equipment must be located within 1 metre of a dwelling facade.

3. With the noise limits in condition L5.1 and condition L5.2, the noise monitoring equipment must be located;

(a) at the most affected point at a location where there is no dwelling at the location, or

(b) at the most affected point within an area at a location prescribed by conditions L5.7 1(a) or L5.7 1(b).

L5.8 A non-compliance of condition L5.1 or condition L5.2 will still occur where noise generated from the premises in excess of the appropriate limit is measured;
a) at a location other than an area prescribed by conditions L5.7 1(a) and L5.7 1(b), and /or
b) at a point other than the most affected point at a location.

L5.9 For the purposes of determining the noise generated at the premises all applicable modification factors as described in the NSW EPA Noise Policy for Industry 2017 must be applied, as appropriate, to the noise levels measured by the noise monitoring equipment.

4 Operating Conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.
This includes:
a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

Environment Protection Licence

O2 Maintenance of plant and equipment

O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:
a) must be maintained in a proper and efficient condition; and
b) must be operated in a proper and efficient manner.

O3 Dust

O3.1 The premises must be maintained in a condition which minimises or prevents the emission of dust on or from the premises.

O3.2 Activities occurring in or on the premises must be carried out in a manner that will minimise the generation of wind-blown or traffic generated dust.

O3.3 All trafficable areas, coal stockpile(s) and storage areas, and vehicle manoeuvring areas in or on the premises must be maintained, at all times, in a condition that will minimise the generation of dust.

O3.4 All vehicles transporting coal from the premises must be covered immediately after loading to prevent wind blown emissions and spillage.

Note: Vehicles transporting coal on the private haul road from Chain Valley Colliery to Vales Point Power station are exempt from covering their load if surface coal moisture is above 8%.

O3.5 Activities occuring in or on the premises must be carried out in a manner that will minimise the tracking of dust from the premises.

O4 Emergency response

Note: The licensee must maintain, and implement as necessary, a current Pollution Incident Response Management Plan (PIRMP) for the premises. The PIRMP must be developed in accordance with the requirements in Part 5.7A of the *Protection of the Environment Operations* (POEO) Act 1997 and POEO Regulations. The licensee must keep the incident response plan on the premises at all times. The incident response plan must document systems and procedures to deal with all types of incidents (e.g. spills, explosions or fire) that may occur at the premises or that may be associated with activities that occur at the premises and which are likely to cause harm to the environment. The PIRMP must be tested annually or following a pollution incident.

O5 Processes and management

Bunding

O5.1 All above ground tanks containing material that is likely to cause environmental harm must be bunded or have an alternative spill containment system in place.

O5.2 Bunds must:
a) have walls and floors constructed of impervious materials;
b) be of sufficient capacity to contain 110% of the volume of the tank (or 110% volume of the largest tank

where a group of tanks are installed);
c) have floors graded to a collection sump; and
d) not have a drain valve incorporated in the bund structure, or be constructed and operated in a manner that achieves the same environmental outcome.

O6 Waste management

O6.1 The licensee must ensure that any liquid and/or non liquid waste generated and/or stored at the premises is assessed in accordance with the EPA Waste Classification Guidelines as in force from time to time.

O6.2 The licensee must ensure that waste identified for recycling is stored separately from other waste.

5 Monitoring and Recording Conditions

M1 Monitoring records

M1.1 The results of any monitoring required to be conducted by this licence or a load calculation protocol must be recorded and retained as set out in this condition.

M1.2 All records required to be kept by this licence must be:
a) in a legible form, or in a form that can readily be reduced to a legible form;
b) kept for at least 4 years after the monitoring or event to which they relate took place; and
c) produced in a legible form to any authorised officer of the EPA who asks to see them.

M1.3 The following records must be kept in respect of any samples required to be collected for the purposes of this licence:
a) the date(s) on which the sample was taken;
b) the time(s) at which the sample was collected;
c) the point at which the sample was taken; and
d) the name of the person who collected the sample.

M2 Requirement to monitor concentration of pollutants discharged

M2.1 For each monitoring/discharge point or utilisation area specified below (by a point number), the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The licensee must use the sampling method, units of measure, and sample at the frequency, specified opposite in the other columns:

M2.2 Air Monitoring Requirements

POINT 25

Pollutant	Units of measure	Frequency	Sampling Method
Particulate matter	micrograms per cubic metre	Continuous	AM-22

M2.3 Water and/ or Land Monitoring Requirements

POINT 1

Pollutant	Units of measure	Frequency	Sampling Method
Biochemical oxygen demand	milligrams per litre	Once a month (min. of 4 weeks)	Grab sample
Oil and Grease	milligrams per litre	Once a month (min. of 4 weeks)	Grab sample
pH	pH	Once a month (min. of 4 weeks)	Grab sample
Total suspended solids	milligrams per litre	Once a month (min. of 4 weeks)	Grab sample

POINT 27

Pollutant	Units of measure	Frequency	Sampling Method
Oil and Grease	milligrams per litre	Daily during any discharge	Grab sample
pH	pH	Daily during any discharge	Grab sample
Total suspended solids	milligrams per litre	Daily during any discharge	Grab sample

M3 Testing methods - concentration limits

M3.1 Monitoring for the concentration of a pollutant emitted to the air required to be conducted by this licence must be done in accordance with:
a) any methodology which is required by or under the Act to be used for the testing of the concentration of the pollutant; or
b) if no such requirement is imposed by or under the Act, any methodology which a condition of this licence requires to be used for that testing; or
c) if no such requirement is imposed by or under the Act or by a condition of this licence, any methodology approved in writing by the EPA for the purposes of that testing prior to the testing taking place.

Note: The *Protection of the Environment Operations (Clean Air) Regulation 2022* requires testing for certain purposes to be conducted in accordance with test methods contained in the publication "Approved Methods for the Sampling and Analysis of Air Pollutants in NSW".

M3.2 Subject to any express provision to the contrary in this licence, monitoring for the concentration of a pollutant discharged to waters or applied to a utilisation area must be done in accordance with the Approved Methods Publication unless another method has been approved by the EPA in writing before any tests are conducted.

Environment Protection Licence

M4 Environmental monitoring

Requirement to monitor noise

M4.1 To determine compliance with condition L5.1, attended noise monitoring must be undertaken in accordance with conditions L5.7 and L5.8, and

(a) at each one of the locations listed in condition L5.1;
(b) occur quarterly within the reporting period of the Environment Protection Licence with at least 2 months between monitoring periods;
(c) occur during each day, evening and night period as defined in the NSW Industrial Noise Policy (EPA 2000) for a minimum of 15 minutes for three of the quarters;
(d) the night time 15 minute attended monitoring in accordance with c) must be undertaken between the hours of 1am and 4am;
(e) the night time LA1 (1 min) attended monitoring in accordance with c) must be undertaken between the hours of 1am and 4am;
(f) one quarterly monitoring must occur during each day, evening and night period as defined in the NSW EPA Noise Policy for Industry 2017 for a minimum of 1.5 hours during the day; 30 minutes during the evening; and 1 hours during the night, and
(g) each quarterly monitoring must be undertaken on a different day(s) of the week not including Saturdays, Sundays and public holidays; and
(h) these monitoring conditions take effect in the 2015 Reporting period.

Note: The intention of this condition is that quarterly monitoring be undertaken at each sensitive receiver. That at each sensitive receiver monitoring is undertaken over a range of different days excluding weekends and public holidays during the reporting period so as to be representative of operating hours. That night time 15 minute attended monitoring and the LA1 (1min) monitoring for three of the quarters be undertaken at worst case being the most stable atmospheric conditions and when noise would be most intrusive to sleep. All of the sensitive receivers do not have to be monitored on the same day, evening and night for sub condition f.

M5 Weather monitoring

M5.1 At the point(s) identified below, the licensee must monitor (by sampling and obtaining results by analysis) the parameters specified in Column 1 of the table below, using the corresponding sampling method, units of measure, averaging period and sampling frequency, specified opposite in the Columns 2, 3, 4 and 5 respectively.

B.3 Noise management plan

2.4 Chain Valley Colliery Environmental Protection License 1770

CVC operates under EPL 1770 issued by the NSW EPA under the POEO Act. The EPL has been modified, most recently on 2 April 2019 acknowledging the transfer of ownership from LakeCoal Pty Ltd to Great Southern Energy Pty Ltd.

Noise related requirements of EPL 1770 together with where they are addressed in this NMP are provided in **Appendix E**.

2.5 Mannering Colliery Environmental Protection License 191

Mannering Colliery operates under EPL 191 issued by the NSW EPA under the POEO Act. The EPL has been modified, most recently on 1 April 2019 following the statutory five-year review and consisting of a number of variations which were mostly administrative in nature.

Condition L5 of EPL 191 notes that noise limits are not specified, with the Department of Planning, Industry and Environment being the appropriate authority for regulating noise conditions under Project Approval 06_0311.

2.6 Operational Noise Criteria

Noise limits within CVC Development Consent SSD-5465 and MC Project Approval 06_0311 have been outlined in **Table 2**.

Table 2: Consented Operational Noise Criteria dB(A) for Delta Coal Collieries

Consent/Approval/EPL Location	Day		Evening		Night		
	$L_{Aeq\ (15\ min)}$		$L_{Aeq\ (15\ min)}$		$L_{Aeq\ (15\ min)}$		$L_{A1\ (1\ min)}$
Chain Valley Colliery							
R8 (EPL Point 8)	38		38		38		45
R11 (EPL Point 11)	49	41^	49	41^	49	41^	54
R12 (EPL Point 12)	49	41^	49	41^	49	41^	53
R13 (EPL Point 13)	43	41^	43	41^	43	41^	49
R15 (EPL Point 15)	36		36		36		45
R19 (EPL Point 19)	37		37		37		45
R22 (EPL Point 22)	46	40^	46	40^	46	40^	46
All other privately-owned land	35		35		35		45
Mannering Colliery							
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 – Macquarie Shores Home Village	42		42		42		47
9 – Jeans	40		37		37		47
11 – Jeans	40		36		36		46
18 – Jeans	40		36		36		46
20 – Knight and all other privately-owned residences	40		36		36		46

^ = Long Term Noise Goals (where long-term goals differ from consented criteria)

Noise criteria outlined in **Table 2** do not apply if Delta Coal has an agreement with the owner/s of the relevant residence or land to exceed the noise criteria and Delta Coal has advised the EPA and DPIE in writing of the terms of this agreement.

As CVC has been operating for approximately 58 years, some of the predicted noise impacts at local receivers are greater than would usually be permissible without the requirement to offer noise treatments or voluntary acquisition. Notably the relocation of coal handling from CVC to MC in 2017 significantly improved CVC progression toward realising the long-term goals at receivers R11 to R13, where currently monitoring typically notes that occasional forklift and plant start-up warnings can be heard during monitoring at these receivers, while typically the site is inaudible. Consistent with noise monitoring results, community complaints from residents at these receivers regarding noise emissions has significantly decreased.

4.2.2 Chain Valley Colliery

Consistent with the noise impact assessment prepared by AECOM Pty Ltd for CVC in 2011 and undertaken as part of the Environmental Impact Statement (EIS) for Development Consent of SSD-5465, residential receivers have been divided into seven (7) noise catchment areas with similar geographical and acoustic features. The following points are considered representative of each noise catchment area:

- ATN001, representative of EPL 1770 monitoring point identification number 9, also identified in Development Consent SSD-5465 as receiver 'R8'. The attended monitoring point captures noise emissions at privately-owned residential properties located in Mannering Park, northwest of the Chain Valley Colliery pit top. The dominant noise sources in this area are birds, insects, traffic and other industrial sources;
- ATN002, representative of EPL 1770 monitoring point identification number 12, also identified in Development Consent SSD-5465 as receiver 'R11'. The attended monitoring point captures noise emissions at privately-owned residential properties located in Kingfisher Shores, south-east of the Chain Valley Colliery pit top. The dominant noise sources in this area are birds, insects, traffic and other industrial sources;
- ATN003, representative of EPL 1770 monitoring point identification number 16, also identified in Development Consent SSD-5465 as receiver 'R15'. The attended monitoring point captures noise emissions at privately-owned relocatable residences within MSHV, south of the Chain Valley Colliery pit top. The dominant noise sources in this receiver area are birds, insects, traffic and other industrial sources. Activities at Mannering Colliery are also audible at times;
- ATN004, representative of Development Consent SSD-5465 receiver 'R14'. The attended monitoring point captures noise emissions at privately-owned residential properties located in Chain Valley Bay South, south-east of the Chain Valley Colliery pit top. The dominant noise sources in this area are birds, insects, traffic and other industrial sources;
- ATN005, representative of Development Consent SSD-5465 receiver 'R17'. The attended monitoring point captured noise emissions at privately-owned residential properties located in Chain Valley Bay East, south-east of the Chain Valley Colliery pit top. The dominant noise sources in this area are birds, insects, traffic and other industrial sources;
- ATN006, representative of EPL 1770 monitoring point identification number 20, also identified in Development Consent SSD-5465 as receiver 'R19'. The attended monitoring point captures noise emissions at privately-owned residential properties located in Chain Valley Bay North, east of the Chain Valley Colliery pit top. The dominant noise sources in this area are birds, insects, traffic and other industrial sources
- ATN007, representative of EPL 1770 monitoring point identification number 23, also identified in Development Consent SSD-5465 as receiver 'R22'. The attended monitoring point captured

noise emissions at privately-owned residential properties located in Summerland Point, surrounding Chain Valley Colliery's Summerland Point ventilation shaft and fan site. The dominant noise sources in this area are birds, insects, traffic and the Summerland Point ventilation shaft and fan site.

It is noted that, with reference to the requirements of the EPL, two receivers were not considered to be captured by the seven (7) noise catchment areas outlined in the EIS and as such, monitoring is to be undertaken at the following points in addition to locations ATN001 to ATN007:

- R12, identified in EPL 1770 as noise monitoring point 13, noted to be adjacent to ATN002 at Kingfisher Shores on Lakeshore Avenue, Kingfisher Shores; and
- R13, identified in EPL 1770 as noise monitoring point 14, located on Karoola Avenue, Kingfisher Shores.

The spatial locations of the CVC attended monitoring locations and relevant noise criteria are detailed in **Table 5** below.

Table 5: Noise Monitoring Locations and Limits for Chain Valley Colliery

Location	Receivers Represented EPL 1770 ID SSD-5465 ID	Coordinates	Day $L_{Aeq(15\ min)}$ dB (A)	Evening $L_{Aeq(15\ min)}$ dB (A)	Night $L_{Aeq(15\ min)}$ dB (A)	Night $L_{A1(1\ min)}$ dB (A)
ATN001	EPL #9 R8	364140 E 6330594 N	35	35	35	35
ATN002	EPL #12 R11	365218 E 6329388 N	49	49	49	54
ATN003	EPL#16 R15	365165 E 6328323 N	36	36	36	45
ATN004	N/A R14	365949 N 6328530 E	35	35	35	45
ATN005	N/A R17	366560 N 6328590 E	35	35	35	45
ATN006	20 R19	366305 N 6329321 E	37	37	37	45
ATN007	23 R22	366425 N 6331135 E	46	46	46	46
R12	13 R12	365185 N 6329352 E	49	49	49	53
R13	14 R13	365391 N 6329169 E	43	43	43	49

Appendix C
Calibration certificates

EMM
creating opportunities

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: C52587

EQUIPMENT TESTED : Acoustic Calibrator

Manufacturer: Svantek
Type No: SV 36 **Serial No:** 162796
Class: 1
Owner: EMM Consulting
Level 1, 175 Scott Street
Newcastle, NSW 2300
Tests Performed: Measured Output Pressure level, Frequency & Distortion
Comments: See Details and Class Tolerance overleaf.

CONDITION OF TEST:

Ambient Pressure	995	hPa ±1 hPa	**Date of Receipt :**	28/01/2025
Temperature	24	°C ±1° C	**Date of Calibration :**	28/01/2025
Relative Humidity	45	% ±5%	**Date of Issue :**	29/01/2025

Acu-Vib Test Procedure: AVP02 (Calibrators)
Test Method: AS IEC 60942 - 2017

CHECKED BY: .....

AUTHORISED SIGNATURE: .....

Hein Soe

Accredited for compliance with ISO/IEC 17025 - Calibration
Results of the tests, calibration and/or measurements included in this document are traceable to SI units through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.

This report applies only to the item identified in the report and may not be reproduced in part.

The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.

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Sound Level Meter
IEC 61672-3:2013
Calibration Certificate

Calibration Number C24405

Client Details EMM Consulting
Level 3, 175 Scott Street
Newcastle NSW 2300

Equipment Tested/ Model Number : NA-28
Instrument Serial Number : 01070590
Microphone Serial Number : 08184
Pre-amplifier Serial Number : 52329
Firmware Version : v2.0

Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions	
Ambient Temperature :	24.4 °C	**Ambient Temperature :**	23.8 °C
Relative Humidity :	45.2 %	**Relative Humidity :**	46.7 %
Barometric Pressure :	101.3 kPa	**Barometric Pressure :**	101.26 kPa

Calibration Technician : Peter Elters
Secondary Check: Rhys Gravelle
Calibration Date : 27 May 2024
Report Issue Date : 3 Jun 2024

Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	*Pass*	17: Level linearity incl. the level range control	*Pass*
13: Electrical Sig. tests of frequency weightings	*Pass*	18: Toneburst response	*Pass*
14: Frequency and time weightings at 1 kHz	*Pass*	19: C Weighted Peak Sound Level	*Pass*
15: Long Term Stability	*Pass*	20: Overload Indication	*Pass*
16: Level linearity on the reference level range	*Pass*	21: High Level Stability	*Pass*

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation test performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2013.

Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
125Hz	*±0.13 dB*	*Temperature*	*±0.1 °C*
1kHz	*±0.13 dB*	*Relative Humidity*	*±1.9 %*
8kHz	*±0.14 dB*	*Barometric Pressure*	*±0.11 kPa*
Electrical Tests	*±0.13 dB*		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025 - Calibration.

The results of the tests, calibrations and/or measurements included in this document are traceable to SI units.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: C53022

EQUIPMENT TESTED : Acoustic Calibrator

Manufacturer: Pulsar
Type No: 105 **Serial No:** 96080
Class: 1
Owner: EMM Consulting
Level 1, 175 Scott Street
Newcastle, NSW 2300
Tests Performed: Measured Output Pressure level, Frequency & Distortion
See Details and Class Tolerance overleaf.

Comments:

CONDITION OF TEST:

Ambient Pressure	1008	hPa ±1 hPa	**Date of Receipt :**	27/02/2025
Temperature	24	°C ±1° C	**Date of Calibration :**	04/03/2025
Relative Humidity	52	% ±5%	**Date of Issue :**	04/03/2025

Acu-Vib Test Procedure: AVP02 (Calibrators)
Test Method: AS IEC 60942 - 2017

CHECKED BY: ..... **AUTHORISED SIGNATURE:** .....

Hein Soe

Accredited for compliance with ISO/IEC 17025 - Calibration
Results of the tests, calibration and/or measurements included in this document are traceable to SI units through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.

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Suite 4.03, Level 4, 3 Thomas Holt Drive, Macquarie Park NSW 2113, Australia
Accredited for compliance with ISO/IEC 17025 - Calibration. Laboratory No. 1301

CERTIFICATE OF CALIBRATION

Certificate No: CAU2300941

CALIBRATION OF:

Sound Level Meter:	Brüel & Kjær	2250	No: 2759405
Microphone:	Brüel & Kjær	4189	No: 2983733
Preamplifier:	Brüel & Kjær	ZC-0032	No: 22666
Supplied Calibrator:	None		
Software version:	BZ7224 Version 4.7.4	Pattern Approval:	-
Instruction manual:	BE1712-22	Identification:	N/A

CUSTOMER:

EMM Consulting Pty Limited
20 Chandos Street
St Leonards NSW 2065

CALIBRATION CONDITIONS:

Preconditioning:	4 hours at 23 °C
Environment conditions:	*see actual values in **Environmental conditions** sections*

SPECIFICATIONS:

The Sound Level Meter has been calibrated in accordance with the requirements as specified in IEC61672-1:2013 class 1.
Procedures from IEC 61672-3:2013 were used to perform the periodic tests.
The measurements included in this document are traceable to Australian/National standards.

PROCEDURE:

The measurements have been performed with the assistance of Brüel & Kjær Sound Level Meter Calibration System B&K 3630 with application software type 7763 (version 8.6 - DB: 8.60) and test procedure 2250-4189.

RESULTS:

	Initial calibration		Calibration prior to repair/adjustment
X	Calibration without repair/adjustment		Calibration after repair/adjustment

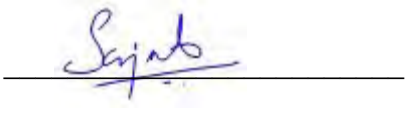
The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ providing a level of confidence of approximately 95 %. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from the standards, calibration method, effect of environmental conditions and any short time contribution from the device under calibration.

Date of Calibration:20/12/2023

Certificate issued:21/12/2023

Calibration Technician: Sajeeb Tharayil

Approved signatory: Sajeeb Tharayil



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Chain Valley Colliery

Quarterly attended noise monitoring - Q3 2025

Prepared for Delta Power & Energy (Chain valley) Pty Ltd (Trading as Delta Coal)

September 2025

Chain Valley Colliery

Quarterly attended noise monitoring - Q3 2025

Delta Power & Energy (Chain valley) Pty Ltd (Trading as Delta Coal)

E241225 RP2

September 2025

Version	Date	Prepared by	Reviewed by	Comments
V1	17/09/2025	Abhinav Konde	Teanuanua Villierme	Draft
V2	18/09/2025	Abhinav Konde	Teanuanua Villierme	Final

Approved by



Teanuanua Villierme
Associate Acoustics Consultant
18 September 2025

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This report has been prepared in accordance with the brief provided by Delta Power & Energy (Chain valley) Pty Ltd (Trading as Delta Coal) and, in its preparation, EMM has relied upon the information collected at the times and under the conditions specified in this report. All findings, conclusions or recommendations contained in this report are based on those aforementioned circumstances. This report is to only be used for the purpose for which it has been provided. Except as permitted by the Copyright Act 1968 (Cth) and only to the extent incapable of exclusion, any other use (including use or reproduction of this report for resale or other commercial purposes) is prohibited without EMM's prior written consent. Except where expressly agreed to by EMM in writing, and to the extent permitted by law, EMM will have no liability (and assumes no duty of care) to any person in relation to this document, other than to Delta Power & Energy (Chain valley) Pty Ltd (Trading as Delta Coal) (and subject to the terms of EMM's agreement with Delta Power & Energy (Chain valley) Pty Ltd (Trading as Delta Coal)).

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ABN: 28 141 736 558

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1 Introduction

1.1 Background

EMM Consulting Pty Limited (EMM) was engaged by Delta Power & Energy (Chain valley) Pty Ltd (Trading as Delta Coal) to conduct a quarterly noise survey of operations at Chain Valley Colliery (CVC) located on Construction Road, Mannering Park NSW. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified limits.

Attended environmental noise monitoring described in this report was done during the day, evening and night periods of 25 August, 28 August and 5 September 2025 at nine monitoring locations.

1.2 Attended monitoring locations

Attended monitoring locations are detailed in Table 1.1 and shown on Figure 1.1. It should be noted that Figure 1.1 shows actual monitoring locations, not necessarily the location of residences and are based on the approved noise management plan.

Table 1.1 Attended noise monitoring locations

Location descriptor	Description	Coordinates (MGA56)	
		Easting	Northing
ATN001	Griffith Street, Mannering Park	363990	6330529
ATN002	Lakeshore Avenue, Kingfisher Shores	365218	6329388
ATN003	Short Street, Macquarie Shores	365165	6328323
ATN004	Lloyd Avenue, Chain Valley Bay	365949	6328530
ATN005	Teragalin Drive, Chain Valley Bay	366560	6328590
ATN006	Sunset Parade, Chain Valley Bay	366305	6329321
ATN007[1]	Cams Boulevard, Chain Valley Bay	366559	6331109
R12	Lakeshore Avenue, Kingfisher Shores	365185	6329352
R13	Karoola Avenue, Kingfisher Shores	365391	6329169

Notes: 1. Attended noise monitoring was undertaken at the R22 residence (EPL Point 23) instead.



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

0 0.5 1 km
GDA 1994 MGA Zone 56

N

\\emm.local\vxdrive\2024\E240010- Delta Coal Noise CY24\8 GIS\02_Maps\N001_MonitoringLocations\N001_MonitoringLocations_20240411_01.aprx 12/04/2024

KEY

- (A) Noise monitoring location
- (W) Meteorological station
- CVC consent boundary
- Major road
- Minor road
- Watercourse/drainage line
- Waterbody

CVC attended noise monitoring locations

Chain Valley Colliery
Quarterly Attended Noise Monitoring
Figure 1.1

EMM creating opportunities

1.3 Terminology and abbreviations

Definitions of terms and abbreviations which may be used in this report are provided in Table 1.2.

Table 1.2 Terminology and abbreviations

Term/descriptor	Definition
dB(A)	Noise level measurement units are decibels (dB). The "A" weighting scale is used to approximate how humans hear noise.
L_{Amax}	The maximum root mean squared A-weighted noise level over a time period.
L_{A1}	The A-weighted noise level which is exceeded for 1 per cent of the time.
$L_{A1,1minute}$	The A-weighted noise level which is exceeded for 1 per cent of the specified time period of 1 minute.
L_{A10}	The A-weighted noise level which is exceeded for 10 percent of the time.
L_{Aeq}	The energy average A-weighted noise level.
$L_{Aeq,15minute}$	The energy average A-weighted noise level over the specified time period of 15 minutes.
L_{A50}	The A-weighted noise level which is exceeded for 50 per cent of the time, also the median noise level during a measurement period.
L_{A90}	The A-weighted noise level exceeded for 90 percent of the time, also referred to as the "background" noise level and commonly used to derive noise limits.
L_{Amin}	The minimum A-weighted noise level over a time period.
L_{Ceq}	The energy average C-weighted noise energy during a measurement period. The "C" weighting scale is used to take into account low-frequency components of noise within the audibility range of humans.
SPL	Sound pressure level. Fluctuations in pressure measured as 10 times a logarithmic scale, with the reference pressure being 20 micropascals.
Hertz (Hz)	The frequency of fluctuations in pressure, measured in cycles per second. Most sounds are a combination of many frequencies together.
AWS	Automatic weather station used to collect meteorological data, typically at an altitude of 10 metres
VTG	Vertical temperature gradient in degrees Celsius per 100 metres altitude.
Sigma-theta	The standard deviation of the horizontal wind direction over a period of time.
IA	Inaudible. When site noise is noted as IA then there was no site noise at the monitoring location.
NM	Not measurable. If site noise is noted as NM, this means some noise was audible but could not be quantified.
Day	Monday – Saturday: 7 am to 6 pm, on Sundays and Public Holidays: 8 am to 6 pm.
Evening	Monday – Saturday: 6 pm to 10 pm, on Sundays and Public Holidays: 6 pm to 10 pm.
Night	Monday – Saturday: 10 pm to 7 am, on Sundays and Public Holidays: 10 pm to 8 am.

Appendix A provides further information that gives an indication as to how an average person perceives changes in noise level, and examples of common noise levels.

2 Noise limits

2.1 Development consent

Noise limits for CVC are provided in Table 1, Condition 7 of Schedule 3 of the current development consent SSD-5465 (DC) dated July 2021. Long-term goals for CVC are provided in Condition 8(d) of Schedule 3 of the DC. Relevant sections of the DC are reproduced in Appendix B.1.

2.2 Environment protection licence

Noise limits for CVC are provided in Conditions L5.1 and L5.2 of the current Environment Protection Licence 1770 (EPL) dated 9 April 2025. Relevant sections of the EPL are reproduced in Appendix B.2.

2.3 Noise management plan

The approved noise management plan (NMP) (dated 20 April 2022) was prepared in line with the Mod 4 approval and in accordance with the NSW EPA 'Noise Policy for Industry' (NPfI) issued in October 2017. Table 5 of the NMP adopts nine attended noise monitoring (NM) locations that are representative of residences outlined in the DC. Where several assessment locations are in one NM catchment, representative noise limits have been adopted to ensure that the lowest (most stringent) limits within the NM catchment can be achieved. Relevant sections of the NMP are reproduced in Appendix B.3.

2.4 Noise limits

Noise impact limits based on the DC and EPL are provided in Table 2.1. Assessment location represented by each noise monitoring location is consistent with the NMP, most of which are listed in the DC and EPL (as shown in brackets alongside where applicable).

Table 2.1 Noise impact limits, dB

Noise monitoring location (NMP)	Represented assessment location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$	Night $L_{A1,1minute}$
ATN001	R8 (EPL Point 9)	38	38	38	45
ATN002	R11 (EPL Point 12)	49	49	49	54
ATN003	R15 (EPL Point 16)	36	36	36	45
ATN004	R14[1]	35	35	35	45
ATN005	R17[1]	35	35	35	45
ATN006	R19 (EPL Point 20)	37	37	37	45
ATN007[2]	R22 (EPL Point 23)	46	46	46	46
R12	R12 (EPL Point 13)	49	49	49	53
R13	R13 (EPL Point 14)	43	43	43	49

Notes: 1. DC limits for this location are under 'all other privately-owned land'.

2. Attended noise monitoring was undertaken at the R22 residence (EPL Point 23) instead.

2.5 Meteorological conditions

Appendix 8 of the DC states meteorological conditions under which noise limits do not apply as follows:

- during periods of rain or hail
- average wind speed at microphone height exceeds 5 m/s
- wind speeds greater than 3 m/s at 10 m above ground level
- temperature inversion conditions greater than 3°C/100 m.

Condition L5.4 of the EPL states meteorological conditions under which noise limits do not apply as follows:

- wind speeds greater than 3 m/s at 10 m above ground level
- stability category F temperature inversion conditions and wind speeds greater than 2 m/s at 10 m above ground level
- stability category G temperature inversion conditions
- or as defined under the NPfI.

The last point referencing the NPfI adds the concept of 'very noise-enhancing' conditions which are considered outside the 'standard' or 'noise-enhancing' meteorological conditions defined in Table D1 of Fact Sheet D of the NPfI.

Further, Fact Sheet E of the NPfI (point 6 of Section E1) provides additional guidance on monitoring the performance of a site against 'suitable' noise limits placed in the DC/EPL. Noise limits are based on 'achievable' noise levels under the 'standard' and/or 'noise-enhancing' meteorological conditions. Where meteorological conditions are considered 'very noise-enhancing', a positive adjustment of 5 dB applies to noise limits for 'standard' or 'noise-enhancing' meteorological conditions.

In accordance with the NPfI, where 'very noise-enhancing' meteorological conditions were present during a noise measurement, a positive adjustment of 5 dB has been applied to the noise limits. This approach means that noise limits are always applicable, with or without a positive adjustment of 5 dB, depending on whether meteorological conditions are 'very noise-enhancing' or not.

2.6 Additional requirements

2.6.1 Attended noise monitoring

Condition M4.1 of the EPL specifies additional noise monitoring requirements to determine compliance, including the following:

- locations of monitoring – EPL points as listed in Table 2.1 above
- frequency of monitoring – quarterly and at least two months between monitoring periods
- periods of monitoring:
  - For three out of four quarterly periods – each day, evening and night periods for a minimum of 15 minutes. Night period monitoring must be undertaken between the hours of 1 am and 4 am.

- For one out of four quarterly periods – day period monitoring must be undertaken for a minimum of 1.5 hours (six 15-minute periods); evening period monitoring must be undertaken for a minimum of 30 minutes (two 15-minue periods); night period monitoring must be undertaken for a minimum of 1 hour (four 15-minute periods).

- days of monitoring – each quarterly monitoring must be undertaken on a different day of the week excluding Saturday, Sundays and public holidays.

In accordance with the preceding, this round of quarterly attended noise monitoring (Q3 2025) was undertaken on Monday 25 August, Thursday 28 August, and Friday 5 September 2025 which is more than two months since the last quarterly monitoring (Q2 2025) which finished on Thursday 12 June 2025. This quarterly period (Q3 2025), monitoring at each monitoring location (as per the EPL) was conducted for a minimum of 15 minutes, with night period monitoring undertaken between the hours of 1 am and 4 am on 5 September 2025.

As per the approved NMP, attended noise monitoring is scheduled considering the occurrence of regular operations at CVC. Noise monitoring avoids scheduled down-time or maintenance. Regular operations were occurring during this round of monitoring (Q3 2025).

Monitoring and reporting have been done in accordance with the NPfI and 'Approved methods for the measurement and analysis of environmental noise in NSW' (the approved methods) (EPA 2022).

2.6.2 CVC long-term goals

Long-term goals for CVC are provided in Condition 8(d) of Schedule 3 of the DC, which states:

> 8. The Applicant must:
>
> (d) use its best endeavours to achieve the long-term noise goals in Table 2, where reasonable and feasible, and report on progress towards achieving these goals in each Annual Review;

The long-term goals for CVC in Table 2 of the DC are summarised in Table 2.2 for the relevant assessment locations.

Table 2.2 CVC long-term goals

Assessment location	Day $L_{Aeq,15minute}$, dB	Evening $L_{Aeq,15minute}$, dB	Night $L_{Aeq,15minute}$, dB
R11 (EPL Point 12)	41	41	41
R12 (EPL Point 13)	41	41	41
R13 (EPL Point 14)	41	41	41
R22 (EPL Point 23)	40	40	40

As stated in Appendix 9 of the DC, Delta Coal is committed to the progressive implementation of feasible measures to target long-term noise goals which are designed to reduce noise emissions from CVC. For this compliance noise monitoring assessment, site $L_{Aeq,15minute}$ have also been compared to the long-term goals as discussed in Section 4.2.2.

3 Methodology

3.1 Overview

Attended environmental noise monitoring was done in accordance with Australian Standard AS1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant EPA requirements. Meteorological data was obtained from the Mannering Colliery automatic weather station (AWS) which allowed correlation of atmospheric parameters with measured site noise levels.

3.2 Attended noise monitoring

During the Q3 survey, attended noise monitoring was conducted during the day, evening and night periods at each location. Minimum monitoring periods at each location was in accordance with the EPL; 15 minutes during the day, evening and night periods. Atmospheric conditions (at microphone height) were measured at each monitoring location.

Measured sound levels from various sources were noted during each measurement, and particular attention was paid to the extent of site contribution (if any) to measured levels. At each monitoring location, the site-only $L_{Aeq,15minute}$ and L_{Amax} were measured directly or determined by other methods in accordance with Section 7.1 of the NPfI.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may be used in this report. When site noise is noted as IA, it was inaudible at the monitoring location. When site noise is noted as NM, this means it was audible but could not be quantified. All results noted as NM in this report were due to one or more of the following:

- Site noise levels were very low, typically more than 10 dB below the measured background (L_{A90}), and unlikely to be noticed.
- Site noise levels were masked by more dominant sources that are characteristic of the environment (such as breeze in foliage or continuous road traffic noise) that cannot be eliminated by monitoring at an alternate or intermediate location.
- It was not feasible or reasonable to employ methods, such as to move closer and back calculate. Cases may include rough terrain preventing closer measurement, addition/removal of significant source-to-receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

If the exact noise levels from site could not be established due to masking by other noise sources in a similar frequency range but were determined to be at least 5 dB lower than relevant limits, then a maximum estimate may be provided. This is expressed as a 'less than' quantity, such as <20 dB or <30 dB.

For this assessment, the measured L_{Amax} has been used as a conservative estimate of $L_{A1,1minute}$. The EPA accepts sleep disturbance analysis based on either the $L_{A1,1minute}$ or L_{Amax} metrics, with the L_{Amax} representing a more conservative assessment of site noise emissions.

3.3 Meteorological data

This assessment determined stability categories throughout attended monitoring period using the sigma-theta method as per Fact Sheet D of the NPfI. This data was sourced from the Mannering Colliery AWS, in accordance with requirements of EPL 1770.

3.4 Modifying factors

All measurements were evaluated for potential modifying factors in accordance with the NPfI. Assessment of modifying factors is undertaken at the time of measurement if the site was audible and directly quantifiable. If applicable, modifying factor adjustments have been reported and added to measured site-only L_{Aeq}.

A low-frequency noise (LFN) modifying factor adjustment has been applied to the site L_{Aeq} where the site caused the low-frequency noise threshold exceedance. Specific methodology for assessment of modifying factors is outlined in Fact Sheet C of the NPfI.

3.5 Instrumentation

Equipment used to measure environmental noise levels is detailed in Table 3.1. Calibration certificates are provided in Appendix C.

Table 3.1 Attended noise monitoring equipment

Item	Serial number	Calibration due date	Relevant standard
Brüel & Kjær 2250 sound level meter	2759405	20/12/2025	IEC 61672-1:2013
Svantek SV-36 calibrator	162796	28/01/2026	IEC 60942:2017

4 Results

4.1 Total measured noise levels and atmospheric conditions

Overall noise levels measured at each location during attended measurements are provided in Table 4.1.

Table 4.1 Total measured noise levels[1], dB – Quarter 3 2025

Location	Period	Start date and time	L_{Amax}	L_{A1}	L_{A10}	L_{Aeq}	L_{A50}	L_{A90}	L_{Amin}
ATN001	Evening	25/08/2025 21:17	77	54	48	51	47	47	46
ATN001	Day	28/08/2025 15:15	69	61	55	53	51	47	44
ATN001	Night	05/09/2025 01:11	64	46	45	44	44	43	41
ATN002	Evening	25/08/2025 20:33	51	48	47	45	45	44	43
ATN002	Day	28/08/2025 15:40	73	63	55	53	50	46	42
ATN002	Night	05/09/2025 1:55	64	43	41	40	40	39	36
ATN003	Evening	25/08/2025 21:45	46	45	44	43	43	42	40
ATN003	Day	28/08/2025 16:17	64	54	48	46	44	42	40
ATN003	Night	05/09/2025 01:36	44	42	41	40	40	37	33
ATN004	Evening	25/08/2025 19:52	70	52	37	44	35	34	33
ATN004	Night	28/08/2025 22:40	51	39	37	36	35	34	32
ATN004	Day	28/08/2025 16:37	70	59	52	49	46	42	39
ATN005	Night	25/08/2025 23:05	58	56	51	48	46	43	39
ATN005	Evening	28/08/2025 18:44	68	58	52	50	48	46	43
ATN005	Day	05/09/2025 07:22	64	55	48	47	45	43	41
ATN006	Evening	28/08/2025 19:06	48	44	42	40	40	38	36
ATN006	Day	05/09/2025 07:00	65	57	49	47	45	42	39
ATN006	Night	05/09/2025 02:39	54	41	39	38	38	37	35
R22	Day	28/08/2025 17:45	60	56	48	46	44	42	40
R22	Evening	28/08/2025 18:05	56	48	44	43	43	41	39
R22	Night	05/09/2025 03:45	60	50	47	46	46	45	43
R12	Evening	25/08/2025 20:33	51	48	47	45	45	44	43
R12	Day	28/08/2025 15:40	73	63	55	53	50	46	42
R12	Night	05/09/2025 1:55	64	43	41	40	40	39	36
R13	Evening	25/08/2025 20:51	50	48	47	45	45	44	42
R13	Day	25/08/2025 15:57	70	60	55	52	50	46	41
R13	Night	05/09/2025 02:12	53	45	43	42	42	41	39

Notes: 1. Levels in this table are not necessarily the result of activity at site.

Atmospheric condition data measured by the operator during each measurement using a hand-held weather meter is shown in Table 4.2. The wind speed, direction and temperature were measured at approximately 1.5 m above ground. Attended noise monitoring is not done during rain, hail, or average wind speeds above 5 m/s at microphone height.

Table 4.2 Measured atmospheric conditions – Quarter 3 2025

Location	Period	Start date and time	Temperature °C	Wind speed m/s	Wind direction ° Magnetic north[1]	Cloud cover 1/8s
ATN001	Evening	25/08/2025 21:17	13	<0.5	-	0
ATN001	Day	28/08/2025 15:15	20	2.2	295	1
ATN001	Night	05/09/2025 01:11	8	<0.5	-	4
ATN002	Evening	25/08/2025 20:33	13	<0.5	-	0
ATN002	Day	28/08/2025 15:40	20	1.3	270	1
ATN002	Night	05/09/2025 1:55	12	<0.5	-	2
ATN003	Evening	25/08/2025 21:45	13	<0.5	-	0
ATN003	Day	28/08/2025 16:17	20	2.0	265	1
ATN003	Night	05/09/2025 01:36	9	<0.5	-	3
ATN004	Evening	25/08/2025 19:52	14	<0.5	-	0
ATN004	Night	28/08/2025 22:40	13	<0.5	-	0
ATN004	Day	28/08/2025 16:37	19	<0.5	-	1
ATN005	Night	25/08/2025 23:05	13	<0.5	-	0
ATN005	Evening	28/08/2025 18:44	15	1.5	320	0
ATN005	Day	05/09/2025 07:22	14	<0.5	-	0
ATN006	Evening	28/08/2025 19:06	15	<0.5	-	0
ATN006	Day	05/09/2025 07:00	10	<0.5	-	0
ATN006	Night	05/09/2025 02:39	11	<0.5	-	0
R22	Day	28/08/2025 17:45	17	1.2	330	0
R22	Evening	28/08/2025 18:05	16	1.1	330	0
R22	Night	05/09/2025 03:45	9	<0.5	-	0
R12	Evening	25/08/2025 20:33	13	<0.5	-	0
R12	Day	28/08/2025 15:40	20	1.3	270	1
R12	Night	05/09/2025 1:55	12	<0.5	-	2
R13	Evening	25/08/2025 20:51	13	<0.5	-	0
R13	Day	25/08/2025 15:57	19	2.0	265	1
R13	Night	05/09/2025 02:12	11	<0.5	-	1

Notes: 1. "-" indicates calm conditions at monitoring location.

4.2 Site only noise levels

4.2.1 Monitoring results

Table 4.3 provides site noise levels in the absence of other sources, where possible, and includes weather data from the Mannering Colliery AWS. Noise limits are applicable under all weather conditions but are adjusted during very noise-enhancing weather conditions, where relevant, as defined in the NPfI.

Table 4.3 Site noise levels and limits – Quarter 3 2025

Location	Start date and time	Period	Wind		Stability class	Very noise-enhancing?[1]	Limits, dB		Site levels, dB		Exceedances, dB	
			Speed m/s	Direction[3]			$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$[2]	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
ATN001	25/08/2025 21:17	Evening	0.3	25	F	No	38	N/A	IA	N/A	Nil	N/A
ATN001	28/08/2025 15:15	Day	4.5	279	A	Yes	43 (38+5)	N/A	IA	N/A	Nil	N/A
ATN001	05/09/2025 01:11	Night	0.4	204	F	No	38	45	IA	IA	Nil	Nil
ATN002	25/08/2025 20:33	Evening	0.4	28	F	No	49	N/A	IA	N/A	Nil	N/A
ATN002	28/08/2025 15:40	Day	2.9	278	A	No	49	N/A	IA	N/A	Nil	N/A
ATN002	05/09/2025 1:55	Night	0.7	198	F	No	49	54	IA	IA	Nil	Nil
ATN003	25/08/2025 21:45	Evening	0.3	288	F	No	36	N/A	IA	N/A	Nil	N/A
ATN003	28/08/2025 16:17	Day	2.3	280	A	No	36	N/A	IA	N/A	Nil	N/A
ATN003	05/09/2025 01:36	Night	1.8	180	F	No	36	45	IA	IA	Nil	Nil
ATN004	25/08/2025 19:52	Evening	0.2	121	F	No	35	N/A	IA	N/A	Nil	N/A
ATN004	28/08/2025 22:40	Night	0.9	19	F	No	35	45	IA	IA	Nil	Nil
ATN004	28/08/2025 16:37	Day	3.3	288	A	Yes	40 (35+5)	N/A	IA	N/A	Nil	N/A
ATN005	25/08/2025 23:05	Night	0.8	28	F	No	35	45	IA	IA	Nil	Nil
ATN005	28/08/2025 18:44	Evening	1.7	322	F	No	35	N/A	IA	N/A	Nil	N/A
ATN005	05/09/2025 07:22	Day	1.2	241	A	No	35	N/A	IA	N/A	Nil	N/A
ATN006	28/08/2025 19:06	Evening	1.6	319	F	No	37	N/A	IA	N/A	Nil	N/A
ATN006	05/09/2025 07:00	Day	0.9	240	B	No	37	N/A	IA	N/A	Nil	N/A
ATN006	05/09/2025 02:39	Night	0.6	213	F	No	37	45	IA	IA	Nil	Nil

Table 4.3 Site noise levels and limits – Quarter 3 2025

Location	Start date and time	Period	Wind		Stability class	Very noise-enhancing?[1]	Limits, dB		Site levels, dB		Exceedances, dB	
			Speed m/s	Direction[3]			$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$[2]	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
R22	28/08/2025 17:45	Day	1.7	318	F	No	46	N/A	40 (38+2)[4]	N/A	Nil	N/A
R22	28/08/2025 18:05	Evening	1.5	325	F	No	46	N/A	43 (38+5)[4]	N/A	Nil	N/A
R22	05/09/2025 03:45	Night	0.2	223	F	No	46	46	46 (41+5)[4]	41[5]	Nil	Nil
R12	25/08/2025 20:33	Evening	0.4	28	F	No	49	N/A	IA	N/A	Nil	N/A
R12	28/08/2025 15:40	Day	2.9	278	A	No	49	N/A	IA	N/A	Nil	N/A
R12	05/09/2025 1:55	Night	0.7	198	F	No	49	53	IA	IA	Nil	Nil
R13	25/08/2025 20:51	Evening	0.3	30	E	No	43	N/A	IA	N/A	Nil	N/A
R13	25/08/2025 15:57	Day	3.5	276	A	Yes	48 (43+5)	N/A	IA	N/A	Nil	N/A
R13	05/09/2025 02:12	Night	0.6	253	F	No	43	49	IA	IA	Nil	Nil

Notes:
1. Noise limits are adjusted by +5 dB during 'very noise-enhancing meteorological conditions' in accordance with the NPfI.
2. Site-only $L_{Aeq,15minute}$, includes modifying factor adjustments if applicable.
3. Degrees magnetic north, "-" indicates calm conditions.
4. A positive adjustment for LFN was applicable.
5. Modifying factor adjustments do not apply to site L_{Amax}.

4.2.2 Long term noise goals

Site $L_{Aeq,15minute}$ were also compared to the long-term noise goals (refer to Table 2.2) for the relevant locations (i.e. R11, R12, R13 and R22). Site $L_{Aeq,15minute}$ measured at ATN002 (R11), R12 and R13 satisfied the relevant long-term goals during the day, evening and night periods. At R22, the measured site $L_{Aeq,15minute}$ (inclusive of modifying factor adjustment for LFN) exceeded the relevant long-term $L_{Aeq,15minute}$ 40 dB goal by 3 dB during the evening period measurement, and by 6 dB during the night period measurement.

5 Summary

EMM was engaged by Delta Power & Energy (Chain valley) Pty Ltd (Trading as Delta Coal) to conduct a quarterly noise survey of operations at CVC. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified noise limits.

Attended environmental noise monitoring described in this report was done during the day, evening and night periods on 25 August, 28 August and 4 September at nine monitoring locations.

Noise levels from site complied with relevant limits at all monitoring locations during the Quarter 3 2025 survey.

Noise monitoring results ($L_{Aeq,15minute}$) were also compared to the long-term noise goals applicable at R11, R12, R13 and R22 as per the DC. CVC $L_{Aeq,15minute}$ satisfied these during all measurements at R11 (ATN002), R12 and R13. At R22, the measured site $L_{Aeq,15minute}$ (inclusive of modifying factor adjustment for LFN) exceeded the long-term $L_{Aeq,15minute}$ 40 dB goal by 3 dB during the evening measurement, and by 6 dB during the night measurement.

Appendix A
Noise perception and examples

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A.1 Noise levels

Table A.1 gives an indication as to how an average person perceives changes in noise level. Examples of common noise levels are provided in Figure A.1.

Table A.1 Perceived change in noise

Change in sound pressure level (dB)	Perceived change in noise
up to 2	Not perceptible
3	Just perceptible
5	Noticeable difference
10	Twice (or half) as loud
15	Large change
20	Four times (or quarter) as loud

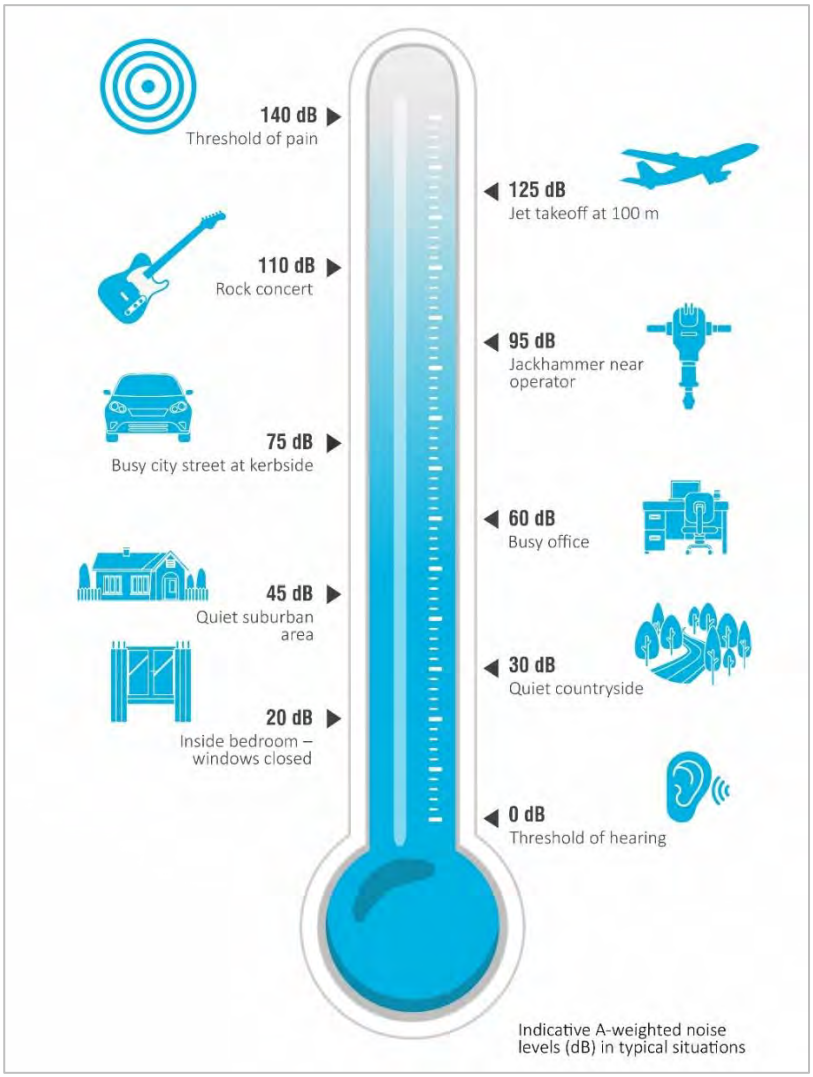


Figure A.1 Common noise levels

Appendix B
Regulator documents

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B.1 Development consent

4. Prior to 31 March 2014, and every 12 months thereafter for each calendar year in which coal haulage from the site is undertaken utilising public roads, unless the Planning Secretary directs otherwise, the Applicant must commission a suitably qualified person, whose appointment has been approved by the Planning Secretary at least one month prior to undertaking the audit, to conduct an Independent Traffic Audit of the development. This audit must:
   (a) be undertaken without prior notice to the Applicant, and in consultation with TfNSW, NCC, CC Council and the CCC;
   (b) assess the impact of the development on the performance and safety of the road network, including a review of:
      - haulage records;
      - accident records on the haulage route, infringements relating to the code of conduct and any incidents involving haulage vehicles;
      - community complaints register; and
   (c) assess the effectiveness of the Road Transport Protocol; and, if necessary, recommend measures to reduce or mitigate any adverse (or potentially adverse) impacts.

5. Within 1 month of receiving the audit report, or as otherwise agreed by the Planning Secretary, the Applicant must submit a copy of the report to the Planning Secretary, with a detailed response to any of the recommendations contained in the audit report, including a timetable for the implementation of any measures proposed to address the recommendations in the audit report.

   A summary of the audit report must be included in the Annual Review.

Alternative Coal Transport Options

6. Prior to 31 December 2014, and every three years thereafter, the Applicant must prepare and submit to the Planning Secretary for approval, a study of the reasonable and feasible options to reduce or eliminate the use of public roads to transport coal from the development, unless otherwise agreed by the Planning Secretary. The assessment must include:
   (a) an analysis of the capital, construction and operating costs of the alternative transport options; and
   (b) quantified social and environmental impacts associated with road and rail transport.

NOISE

Noise Impact Assessment Criteria

7. The Applicant must ensure that the noise generated by the development at any residence on privately-owned land does not exceed the criteria for the location in Table 1 nearest to that residence.

Table 1: Noise Criteria dB(A)

Location	Day	Evening	Night	
	$L_{Aeq(15\ min)}$	$L_{Aeq(15\ min)}$	$L_{Aeq(15\ min)}$	$L_{A1(1\ min)}$
R8	38	38	38	45
R11	49	49	49	54
R12	49	49	49	53
R13	43	43	43	49
R15	36	36	36	45
R19	37	37	37	45
R22	46	46	46	46
all other privately-owned land	35	35	35	45

Notes:
- *To interpret the locations referred to in Table 1, see Appendix 6 and the EIS; and*
- *Noise generated by the development is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy. Appendix 8 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.*

However, these criteria do not apply if the Applicant has a written agreement with the relevant landowner to exceed the noise criteria, and the Applicant has advised the Department in writing of the terms of this agreement.

Operating Conditions

8. The Applicant must:
   (a) implement best management practice, including all reasonable and feasible noise mitigation measures, to minimise the construction, operational and transport noise generated by the development;
   (b) regularly assess the noise monitoring and meteorological data and relocate, modify, and/or stop operations on site to ensure compliance with the relevant conditions of this consent;
   (c) minimise the noise impacts of the development during meteorological conditions under which the noise limits in this consent do not apply (see Appendix 8);
   (d) use its best endeavours to achieve the long-term noise goals in Table 2, where reasonable and feasible, and report on progress towards achieving these goals in each Annual Review;
   (e) carry out a comprehensive noise audit of the development in conjunction with each independent environmental audit; and
   (f) prepare an action plan to implement any additional reasonable and feasible onsite noise mitigation measures identified by each audit;
   to the satisfaction of the Planning Secretary.

Table 2: Long-term Noise Goals dB(A)

Location	***Day***	***Evening***	***Night***
	$L_{Aeq(15\ min)}$	$L_{Aeq(15\ min)}$	$L_{Aeq(15\ min)}$
R11 – R13	41	41	41
R22	40	40	40

Notes:
- *To interpret the locations referred to in Table 2, see Appendix 6 and the EIS; and*
- *Noise generated by the development is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy. Appendix 8 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.*

Noise Management Plan

9. The Applicant must prepare a Noise Management Plan for the development to the satisfaction of the Planning Secretary. This plan must:
   (a) be prepared in consultation with the EPA and submitted to the Planning Secretary for approval within 4 months of the date of this consent, unless otherwise agreed by the Planning Secretary;
   (b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this consent;
   (c) describe the proposed noise management system in detail including the mitigation measures that would be implemented to minimise noise during construction and operations, including on and off site road noise generated by vehicles associated with the development; and
   (d) include a monitoring program that:
      - uses attended monitoring to evaluate the compliance of the development against the noise criteria in this consent;
      - evaluates and reports on:
        - the effectiveness of the on-site noise management system; and
        - compliance against the noise operating conditions; and
      - defines what constitutes a noise incident, and includes a protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents.

The Applicant must implement the Noise Management Plan as approved by the Planning Secretary.

AIR QUALITY

Odour

10. The Applicant must ensure that no offensive odours are emitted from the site, as defined under the POEO Act.

APPENDIX 6
NOISE RECEIVER LOCATIONS

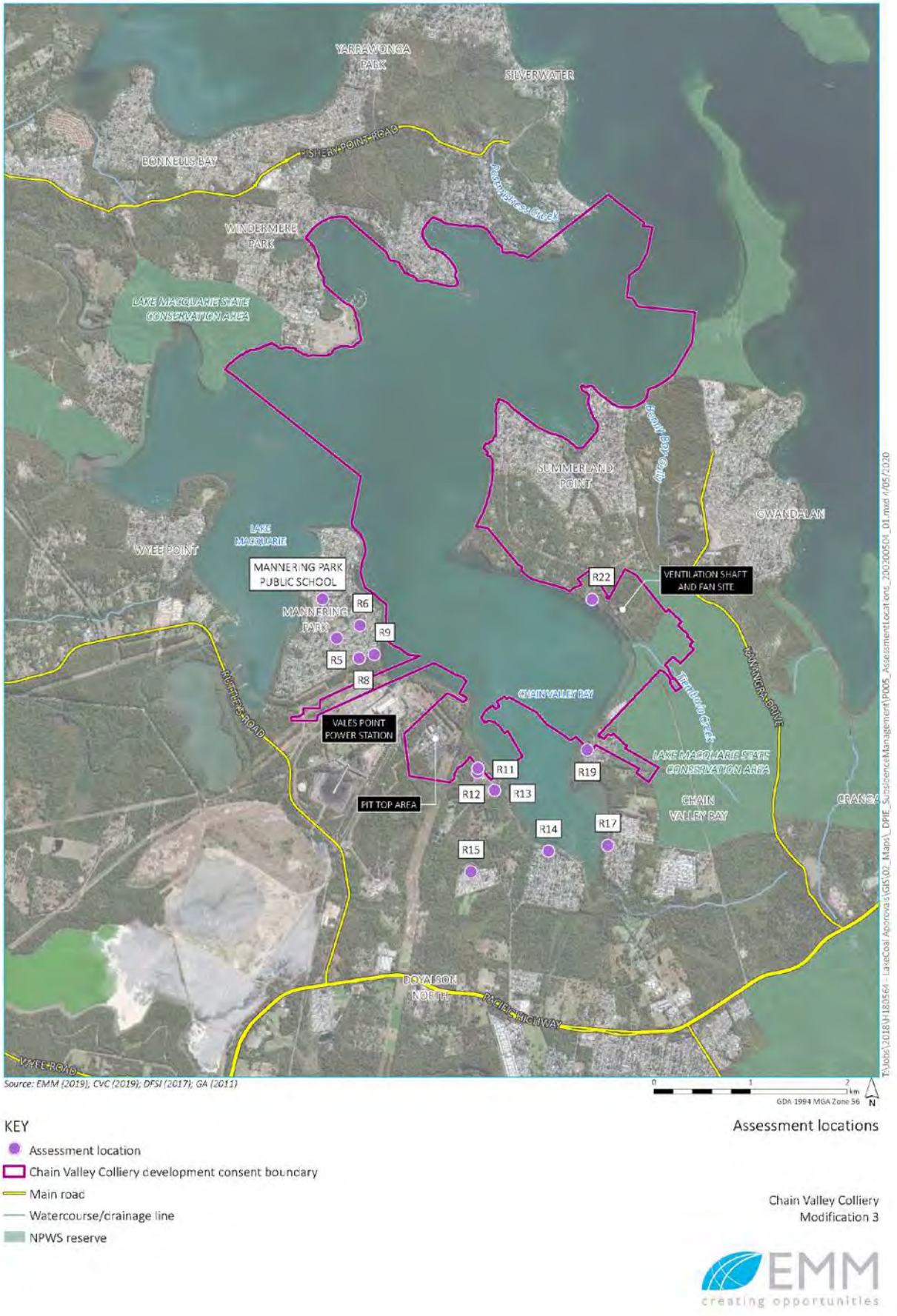


Figure 1: *Noise Receiver Locations*

APPENDIX 8
NOISE COMPLIANCE ASSESSMENT

Applicable Meteorological Conditions

1. The noise criteria in Table 1 of the conditions are to apply under all meteorological conditions except the following:
   (a) during periods of rain or hail;
   (b) average wind speed at microphone height exceeds 5 m/s;
   (c) wind speeds greater than 3 m/s measured at 10 m above ground level; or
   (d) temperature inversion conditions greater than 3°C/100 m.

Determination of Meteorological Conditions

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions must be that recorded by the meteorological station described in condition 14 of schedule 3.

Compliance Monitoring

3. Attended monitoring is to be used to evaluate compliance with the relevant conditions of this consent.

4. This monitoring must be carried out at least 4 times in each calendar year (ie at least once every 3 months), unless the Planning Secretary directs otherwise.

5. Unless otherwise agreed with the Planning Secretary, this monitoring is to be carried out in accordance with the relevant requirements for reviewing performance set out in the *NSW Industrial Noise Policy* (as amended from time to time), in particular the requirements relating to:
   (a) monitoring locations for the collection of representative noise data;
   (b) meteorological conditions during which collection of noise data is not appropriate;
   (c) equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and
   (d) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration.

	results of this monitoring program will be reviewed by a suitably qualified expert and used to determine the appropriateness of the existing irrigation area to receive this effluent; • develop a program to monitor creek line channel stability and the health of riparian vegetation within Swindles Creek. Monitoring will be undertaken in accordance with Section 8.5.2 of the Surface Water Impact Assessment (EIS Appendix E) and incorporated into the Colliery's WMP or Biodiversity Management Plan; and • record monitoring data in accordance with the Colliery's WMP and EPL 1770. Monitoring data will be interpreted as it is received to ensure appropriate operational guidance on monitoring water quality within desired parameters. Results of water quality monitoring will be reported in the Annual Review and made available to the CCC, as well as CC Council and LMCC.
Noise	Management and monitoring of noise will continue to be undertaken in accordance with the Colliery's NMP, which will be reviewed and updated as required to include the commitments made below. Great Southern Energy Pty Limited will: • continue attended compliance monitoring on site which will be used to identify potential hot spots and primary noise sources; • continue real-time noise monitoring alerts to site personnel to enable implementation of any required rapid noise management initiatives; • manage potential non-compliance through a noise complaint handling and response system, including the identification of responsible sources to enable targeted remedial action; • assess if further noise mitigation options for the ventilation fans are reasonable and feasible following the receipt of attenuation proposals; and • discuss potential management measures or agreement options with the landowner at 275 Cams Boulevard, following receipt of proposals from acoustics specialists. In addition to the above, Great Southern Energy Pty Limited is committed to the progressive implementation of feasible measures to target long-term noise goals which are designed to reduce noise emissions from the Colliery. Long-term options for investigation include: • modification to belt/movement alarms; • investigation of surface conveyer and coal preparation equipment, to determine if noise reductions are possible; • identifying sound attenuation options for the surface bulldozer and front-end loader; • strategic placement of acoustic barriers; • attenuation for the surface screener/shaker; • installation of quiet rollers for surface conveyor belts; • acoustic treatments around compressors; and • the use of a conveyor stacker for product coal stockpiling.
Air Quality and greenhouse gases	Management and monitoring of air quality and greenhouse gases will continue to be undertaken in accordance with the Colliery's AQGHGMP, which will be reviewed and updated as required to include the commitments made below Great Southern Energy Pty Limited will: • investigate the use of a stacker to replace hauling between current conveyor system and stockpiles; • undertake GHG monitoring comprising measurement of carbon dioxide and methane at the ventilation shaft and fan sites; and • record and report annual diesel, oil, grease, acetylene and electricity use to fulfil National Greenhouse and Energy Reporting Scheme requirements.
Traffic and transport	Management and monitoring of traffic and transport will continue to be undertaken in accordance with the Colliery's RTP. In addition, Great Southern Energy Pty Limited will continue to investigate alternative options for transporting export coal to the Port of Newcastle, specifically the preferred rail transport option, requiring the construction of a private haul road to the VPPS coal unloading facility and associated infrastructure upgrades. In addition, Great Southern Energy Pty Limited will investigate options to reduce peak hour traffic would be investigated including potentially limiting the peak hourly volumes of the Colliery truck traffic which would be permitted to travel via this intersection should the Colliery not be using rail transport for export coal by five years from the granting of development consent. Alternatively, a pro-rata financial contribution to the cost of installing traffic signals at the southbound intersection of the F3 and Sparks Road interchange could be made commensurate with the percentage of Colliery generated traffic using the intersection.
Subsidence	Management and monitoring of subsidence will continue to be undertaken in accordance with the Colliery's SMP or Extraction Plans, which will be reviewed and

B.2 Environment Protection Licence

27	Discharge to waters Discharge quality and volume monitoring	Discharge to waters Discharge quality and volume monitoring	Discharge to waters via dam spillway from final settlement pond adjacent to Point 1, shown as "Point 27" on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to the EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3).

P1.4 The following points referred to in the table below are identified in this licence for the purposes of weather and/or noise monitoring and/or setting limits for the emission of noise from the premises.

Noise/Weather

EPA identification no.	Type of monitoring point	Location description
9	Noise monitoring	Noise monitoring site, shown as "Point 9", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). Located at 109 Griffith Street, MANNERING PARK, 2259. Identified as R8 in Development Consent SSD-5465 (MOD 4) submitted to the EPA and dated 12 August 2021 (EPA Ref: DOC21/691135-1).
12	Noise monitoring	Noise monitoring site, shown as "Point 12", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). Located at 35 Lakeshore Avenue, KINGFISHER SHORES, 2259. Identified as R11 in Development Consent SSD-5465 (MOD 4) submitted to the EPA and dated 12 August 2021 (EPA Ref: DOC21/691135-1).
13	Noise monitoring	Noise monitoring site, shown as "Point 13", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). Located at 20 Lakeshore Avenue, KINGFISHER SHORES, 2259. Identified as R12 in Development Consent SSD-5465 (MOD 4) submitted to the EPA and dated 12 August 2021 (EPA Ref: DOC21/691135-1).

Environment Protection Licence

14	Noise monitoring	Noise monitoring site, shown as "Point 14", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to the EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). Located at 33 Karoola Avenue, KINGFISHER SHORES, 2259. Identified as R13 in Development Consent SSD-5465 (MOD 4) submitted to the EPA and dated 12 August 2021 (EPA Ref: DOC21/691135-1).
16	Noise monitoring	Noise monitoring site, shown as "Point 16", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to the EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). Located at 150 Tall Timbers Road, DOYALSON NORTH, 2262. Identified as R15 in Development Consent SSD-5465 (MOD 4) submitted to the EPA and dated 12 August 2021 (EPA Ref: DOC21/691135-1).
20	Noise monitoring	Noise monitoring site, shown as "Point 20", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to the EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). Located at 2 Sunset Parade, CHAIN VALLEY BAY, 2259. Identified as R19 in Development Consent SSD-5465 (MOD 4) submitted to the EPA and dated 12 August 2021 (EPA Ref: DOC21/691135-1).
23	Noise monitoring	Noise monitoring site, shown as "Point 23", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to the EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). Located at 275 Cams Boulevard, SUMMERLAND POINT, 2259. Identified as R22 in Development Consent SSD-5465 (MOD 4) submitted to the EPA and dated 12 August 2021 (EPA Ref: DOC21/691135-1).
26	Meteorological Station	Meteorological monitoring site, shown as "Point 26", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to the EPA and dated 24 October 2024 (DOC24/771631-3) and 11 August 2021 (DOC21/691135). Located at Mannering Colliery (Ruttleys Road), DOYALSON NORTH, 2259.

3 Limit Conditions

L1 Pollution of waters

Environment Protection Licence

Licence - 1770

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Concentration limits

L2.1 For each monitoring/discharge point or utilisation area specified in the table/s below (by a point number), the concentration of a pollutant discharged at that point, or applied to that area, must not exceed the concentration limits specified for that pollutant in the table.

L2.2 Where a pH quality limit is specified in the table, the specified percentage of samples must be within the specified ranges.

L2.3 To avoid any doubt, this condition does not authorise the pollution of waters by any pollutant other than those specified in the table\s.

L2.4 Water and/or Land Concentration Limits

POINT 1,27

Pollutant	Units of Measure	50 percentile concentration limit	90 percentile concentration limit	3DGM concentration limit	100 percentile concentration limit
Oil and Grease	milligrams per litre				10
pH	pH				6.5-8.5
Total suspended solids	milligrams per litre				50

L3 Volume and mass limits

L3.1 For each discharge point or utilisation area specified below (by a point number), the volume/mass of:
a) liquids discharged to water; or;
b) solids or liquids applied to the area;
must not exceed the volume/mass limit specified for that discharge point or area.

Point	Unit of Measure	Volume/Mass Limit
1	kilolitres per day	12161
27	kilolitres per day	12161

L3.2 The volumetric daily discharge limit for the premises is the combined discharge measured at EPA discharge

points 1 and 27 and must not exceed 12161 kilolitres per day.

L4 Waste

L4.1 The licensee must not cause, permit or allow any waste to be received at the premises, except the wastes expressly referred to in the column titled “Waste” and meeting the definition, if any, in the column titled “Description” in the table below.
Any waste received at the premises must only be used for the activities referred to in relation to that waste in the column titled “Activity” in the table below.
Any waste received at the premises is subject to those limits or conditions, if any, referred to in relation to that waste contained in the column titled “Other Limits” in the table below.
This condition does not limit any other conditions in this licence.

Code	Waste	Description	Activity	Other Limits
NA	General or Specific exempted waste	Waste that meets all the conditions of a resource exemption under Clause 92 of the Protection of the Environment Operations (Waste) Regulation 2014.	As specified in each particular resource recovery exemption	NA

L5 Noise limits

L5.1 Noise generated at the premises that is measured at each noise monitoring point established under this licence must not exceed the noise levels specified in Column 4 of the table below for that point during the corresponding time periods specified in Column 1 when measured using the corresponding measurement parameters listed in Column 2.

POINT 12

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	49
Evening	Evening-LAeq (15 minute)	-	49
Night	Night-LAeq (15 minute)	-	49
Night	Night-LA1 (1 minute)	-	54

POINT 13

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	49
Evening	Evening-LAeq (15 minute)	-	49

Environment Protection Licence

Night	Night-LAeq (15 minute)	-	49
Night	Night-LA1 (1 minute)	-	53

POINT 14

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	43
Evening	Evening-LAeq (15 minute)	-	43
Night	Night-LAeq (15 minute)	-	43
Night	Night-LA1 (1 minute)	-	49

POINT 16

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	36
Evening	Evening-LAeq (15 minute)	-	36
Night	Night-LAeq (15 minute)	-	36
Night	Night-LA1 (1 minute)	-	45

POINT 20

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	37
Evening	Evening-LAeq (15 minute)	-	37
Night	Night-LAeq (15 minute)	-	37
Night	Night-LA1 (1 minute)	-	45

POINT 23

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	46
Evening	Evening-LAeq (15 minute)	-	46
Night	Night-LAeq (15 minute)	-	46
Night	Night-LA1 (1 minute)	-	46

Environment Protection Licence

POINT 9

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	38
Evening	Evening-LAeq (15 minute)	-	38
Night	Night-LAeq (15 minute)	-	38
Night	Night-LA1 (1 minute)	-	45

L5.2 The licensee must ensure that noise generated on the premises does not exceed:

a) 35 LAeq(15min) during the day, evening or night at any privately owned land nearest to the residence apart from those receivers identified in Condition 5.1; and
b) 45 LA1(1min) during the night at any privately owned land nearest to the residence apart from those receivers identified in Condition 5.1.

Note: The licensee may provide to the EPA written evidence of any agreement with a landholder which is subject to the above noise limits. The written evidence may be submitted with a licence variation to remove the landholder from the above tables.

L5.3 For the purpose of condition L5.1 and condition L5.2:
(a) Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sunday and public holidays;
(b) Evening is defined as the period 6pm to 10pm, and
(c) Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sunday and public holidays.

L5.4 The noise limits set out in condition L5.1 and condition L5.2 apply under all meterorological conditions except for any one of the following:
(a) Wind speeds greater than 3 metres/second at 10 metres above ground level; or
(b) Stability category F temperature inversion conditions and wind speeds greater than 2 metres/second at 10 metres above ground level; or
(c) Stability category G temperature inversion conditions.
(d) Or as defined under the NSW EPA Noise Policy for Industry 2017.

L5.5 For the purpose of condition L5.4:
(a) the meteorological data to be used for determining meteorological conditions is the data recorded at the meteorological station identified in this licence as EPA Identification Point 26.
(b) Stability category temperature inversion conditions are to be determined in accordance with the NSW EPA Noise Policy for Industry 2017.

Note: The weather station must be designed, commissioned and operated in a manner to obtain the necessary parameters required under the above condition.

L5.6 For the purpose of determining the noise generated at the premises the licensee must use a Class 1 or Class 2 noise monitoring device as defined by AS IEC61672.1 and AS IEC61672.2-2004, or other noise monitoring equipment accepted by the EPA in writing.

L5.7 To determine compliance:

1. With the $L_{Aeq(15\ min)}$ noise limits in condition L5.1 and condition L5.2, the licensee must locate noise monitoring equipment;

(a) within 30 metres of a dwelling facade (but not closer than 3 metres) where any dwelling on the property is situated more then 30 metres from the property boundary that is closest to the premises;

(b) approximately on the boundary where any dwelling is situated 30 metres or less from the property boundary that is closest to the premises, or, where applicable,

(c) within approximately 50 metres if the boundary of a national park or nature reserve.

2. With the LA1(1 minute) noise limits in condition L5.1 and L5.2, the noise monitoring equipment must be located within 1 metre of a dwelling facade.

3. With the noise limits in condition L5.1 and condition L5.2, the noise monitoring equipment must be located;

(a) at the most affected point at a location where there is no dwelling at the location, or

(b) at the most affected point within an area at a location prescribed by conditions L5.7 1(a) or L5.7 1(b).

L5.8 A non-compliance of condition L5.1 or condition L5.2 will still occur where noise generated from the premises in excess of the appropriate limit is measured;
a) at a location other than an area prescribed by conditions L5.7 1(a) and L5.7 1(b), and /or
b) at a point other than the most affected point at a location.

L5.9 For the purposes of determining the noise generated at the premises all applicable modification factors as described in the NSW EPA Noise Policy for Industry 2017 must be applied, as appropriate, to the noise levels measured by the noise monitoring equipment.

4 Operating Conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.
This includes:
a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

Environment Protection Licence

M4 Environmental monitoring

Requirement to monitor noise

M4.1 To determine compliance with condition L5.1, attended noise monitoring must be undertaken in accordance with conditions L5.7 and L5.8, and

(a) at each one of the locations listed in condition L5.1;
(b) occur quarterly within the reporting period of the Environment Protection Licence with at least 2 months between monitoring periods;
(c) occur during each day, evening and night period as defined in the NSW Industrial Noise Policy (EPA 2000) for a minimum of 15 minutes for three of the quarters;
(d) the night time 15 minute attended monitoring in accordance with c) must be undertaken between the hours of 1am and 4am;
(e) the night time LA1 (1 min) attended monitoring in accordance with c) must be undertaken between the hours of 1am and 4am;
(f) one quarterly monitoring must occur during each day, evening and night period as defined in the NSW EPA Noise Policy for Industry 2017 for a minimum of 1.5 hours during the day; 30 minutes during the evening; and 1 hours during the night, and
(g) each quarterly monitoring must be undertaken on a different day(s) of the week not including Saturdays, Sundays and public holidays; and
(h) these monitoring conditions take effect in the 2015 Reporting period.

Note: The intention of this condition is that quarterly monitoring be undertaken at each sensitive receiver. That at each sensitive receiver monitoring is undertaken over a range of different days excluding weekends and public holidays during the reporting period so as to be representative of operating hours. That night time 15 minute attended monitoring and the LA1 (1min) monitoring for three of the quarters be undertaken at worst case being the most stable atmospheric conditions and when noise would be most intrusive to sleep. All of the sensitive receivers do not have to be monitored on the same day, evening and night for sub condition f.

M5 Weather monitoring

M5.1 At the point(s) identified below, the licensee must monitor (by sampling and obtaining results by analysis) the parameters specified in Column 1 of the table below, using the corresponding sampling method, units of measure, averaging period and sampling frequency, specified opposite in the Columns 2, 3, 4 and 5 respectively.

B.3 Noise management plan

2.4 Chain Valley Colliery Environmental Protection License 1770

CVC operates under EPL 1770 issued by the NSW EPA under the POEO Act. The EPL has been modified, most recently on 2 April 2019 acknowledging the transfer of ownership from LakeCoal Pty Ltd to Great Southern Energy Pty Ltd.

Noise related requirements of EPL 1770 together with where they are addressed in this NMP are provided in **Appendix E**.

2.5 Mannering Colliery Environmental Protection License 191

Mannering Colliery operates under EPL 191 issued by the NSW EPA under the POEO Act. The EPL has been modified, most recently on 1 April 2019 following the statutory five-year review and consisting of a number of variations which were mostly administrative in nature.

Condition L5 of EPL 191 notes that noise limits are not specified, with the Department of Planning, Industry and Environment being the appropriate authority for regulating noise conditions under Project Approval 06_0311.

2.6 Operational Noise Criteria

Noise limits within CVC Development Consent SSD-5465 and MC Project Approval 06_0311 have been outlined in **Table 2**.

Table 2: Consented Operational Noise Criteria dB(A) for Delta Coal Collieries

Consent/Approval/EPL Location	Day		Evening		Night		
	$L_{Aeq\ (15\ min)}$		$L_{Aeq\ (15\ min)}$		$L_{Aeq\ (15\ min)}$		$L_{A1\ (1\ min)}$
Chain Valley Colliery							
R8 (EPL Point 8)	38		38		38		45
R11 (EPL Point 11)	49	41^	49	41^	49	41^	54
R12 (EPL Point 12)	49	41^	49	41^	49	41^	53
R13 (EPL Point 13)	43	41^	43	41^	43	41^	49
R15 (EPL Point 15)	36		36		36		45
R19 (EPL Point 19)	37		37		37		45
R22 (EPL Point 22)	46	40^	46	40^	46	40^	46
All other privately-owned land	35		35		35		45
Mannering Colliery							
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 – Macquarie Shores Home Village	42		42		42		47
9 – Jeans	40		37		37		47
11 – Jeans	40		36		36		46
18 – Jeans	40		36		36		46
20 – Knight and all other privately-owned residences	40		36		36		46

^ = Long Term Noise Goals (where long-term goals differ from consented criteria)

Noise criteria outlined in **Table 2** do not apply if Delta Coal has an agreement with the owner/s of the relevant residence or land to exceed the noise criteria and Delta Coal has advised the EPA and DPIE in writing of the terms of this agreement.

As CVC has been operating for approximately 58 years, some of the predicted noise impacts at local receivers are greater than would usually be permissible without the requirement to offer noise treatments or voluntary acquisition. Notably the relocation of coal handling from CVC to MC in 2017 significantly improved CVC progression toward realising the long-term goals at receivers R11 to R13, where currently monitoring typically notes that occasional forklift and plant start-up warnings can be heard during monitoring at these receivers, while typically the site is inaudible. Consistent with noise monitoring results, community complaints from residents at these receivers regarding noise emissions has significantly decreased.

4.2.2 Chain Valley Colliery

Consistent with the noise impact assessment prepared by AECOM Pty Ltd for CVC in 2011 and undertaken as part of the Environmental Impact Statement (EIS) for Development Consent of SSD-5465, residential receivers have been divided into seven (7) noise catchment areas with similar geographical and acoustic features. The following points are considered representative of each noise catchment area:

- ATN001, representative of EPL 1770 monitoring point identification number 9, also identified in Development Consent SSD-5465 as receiver 'R8'. The attended monitoring point captures noise emissions at privately-owned residential properties located in Mannering Park, northwest of the Chain Valley Colliery pit top. The dominant noise sources in this area are birds, insects, traffic and other industrial sources;
- ATN002, representative of EPL 1770 monitoring point identification number 12, also identified in Development Consent SSD-5465 as receiver 'R11'. The attended monitoring point captures noise emissions at privately-owned residential properties located in Kingfisher Shores, south-east of the Chain Valley Colliery pit top. The dominant noise sources in this area are birds, insects, traffic and other industrial sources;
- ATN003, representative of EPL 1770 monitoring point identification number 16, also identified in Development Consent SSD-5465 as receiver 'R15'. The attended monitoring point captures noise emissions at privately-owned relocatable residences within MSHV, south of the Chain Valley Colliery pit top. The dominant noise sources in this receiver area are birds, insects, traffic and other industrial sources. Activities at Mannering Colliery are also audible at times;
- ATN004, representative of Development Consent SSD-5465 receiver 'R14'. The attended monitoring point captures noise emissions at privately-owned residential properties located in Chain Valley Bay South, south-east of the Chain Valley Colliery pit top. The dominant noise sources in this area are birds, insects, traffic and other industrial sources;
- ATN005, representative of Development Consent SSD-5465 receiver 'R17'. The attended monitoring point captured noise emissions at privately-owned residential properties located in Chain Valley Bay East, south-east of the Chain Valley Colliery pit top. The dominant noise sources in this area are birds, insects, traffic and other industrial sources;
- ATN006, representative of EPL 1770 monitoring point identification number 20, also identified in Development Consent SSD-5465 as receiver 'R19'. The attended monitoring point captures noise emissions at privately-owned residential properties located in Chain Valley Bay North, east of the Chain Valley Colliery pit top. The dominant noise sources in this area are birds, insects, traffic and other industrial sources
- ATN007, representative of EPL 1770 monitoring point identification number 23, also identified in Development Consent SSD-5465 as receiver 'R22'. The attended monitoring point captured

noise emissions at privately-owned residential properties located in Summerland Point, surrounding Chain Valley Colliery's Summerland Point ventilation shaft and fan site. The dominant noise sources in this area are birds, insects, traffic and the Summerland Point ventilation shaft and fan site.

It is noted that, with reference to the requirements of the EPL, two receivers were not considered to be captured by the seven (7) noise catchment areas outlined in the EIS and as such, monitoring is to be undertaken at the following points in addition to locations ATN001 to ATN007:

- R12, identified in EPL 1770 as noise monitoring point 13, noted to be adjacent to ATN002 at Kingfisher Shores on Lakeshore Avenue, Kingfisher Shores; and
- R13, identified in EPL 1770 as noise monitoring point 14, located on Karoola Avenue, Kingfisher Shores.

The spatial locations of the CVC attended monitoring locations and relevant noise criteria are detailed in **Table 5** below.

Table 5: Noise Monitoring Locations and Limits for Chain Valley Colliery

Location	Receivers Represented EPL 1770 ID SSD-5465 ID	Coordinates	Day $L_{Aeq(15\ min)}$ dB (A)	Evening $L_{Aeq(15\ min)}$ dB (A)	Night $L_{Aeq(15\ min)}$ dB (A)	Night $L_{A1(1\ min)}$ dB (A)
ATN001	EPL #9 R8	364140 E 6330594 N	35	35	35	35
ATN002	EPL #12 R11	365218 E 6329388 N	49	49	49	54
ATN003	EPL#16 R15	365165 E 6328323 N	36	36	36	45
ATN004	N/A R14	365949 N 6328530 E	35	35	35	45
ATN005	N/A R17	366560 N 6328590 E	35	35	35	45
ATN006	20 R19	366305 N 6329321 E	37	37	37	45
ATN007	23 R22	366425 N 6331135 E	46	46	46	46
R12	13 R12	365185 N 6329352 E	49	49	49	53
R13	14 R13	365391 N 6329169 E	43	43	43	49

Appendix C
Calibration certificates

EMM
creating opportunities

Sydney Calibration Laboratory
Suite 4.03, Level 4, 3 Thomas Holt Drive, Macquarie Park NSW 2113, Australia
Accredited for compliance with ISO/IEC 17025 - Calibration. Laboratory No. 1301

CERTIFICATE OF CALIBRATION

Certificate No: CAU2300941

CALIBRATION OF:

Sound Level Meter:	Brüel & Kjær	2250	No: 2759405
Microphone:	Brüel & Kjær	4189	No: 2983733
Preamplifier:	Brüel & Kjær	ZC-0032	No: 22666
Supplied Calibrator:	None		
Software version:	BZ7224 Version 4.7.4	Pattern Approval:	-
Instruction manual:	BE1712-22	Identification:	N/A

CUSTOMER:

EMM Consulting Pty Limited
20 Chandos Street
St Leonards NSW 2065

CALIBRATION CONDITIONS:

Preconditioning:	4 hours at 23 °C
Environment conditions:	*see actual values in **Environmental conditions** sections*

SPECIFICATIONS:

The Sound Level Meter has been calibrated in accordance with the requirements as specified in IEC61672-1:2013 class 1.
Procedures from IEC 61672-3:2013 were used to perform the periodic tests.
The measurements included in this document are traceable to Australian/National standards.

PROCEDURE:

The measurements have been performed with the assistance of Brüel & Kjær Sound Level Meter Calibration System B&K 3630 with application software type 7763 (version 8.6 - DB: 8.60) and test procedure 2250-4189.

RESULTS:

	Initial calibration		Calibration prior to repair/adjustment
X	Calibration without repair/adjustment		Calibration after repair/adjustment

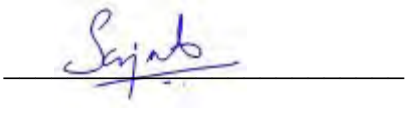
The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ providing a level of confidence of approximately 95 %. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from the standards, calibration method, effect of environmental conditions and any short time contribution from the device under calibration.

Date of Calibration:20/12/2023

Certificate issued:21/12/2023

Calibration Technician: Sajeeb Tharayil

Approved signatory: Sajeeb Tharayil



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CERTIFICATE OF CALIBRATION

CERTIFICATE NO: C52587

EQUIPMENT TESTED : Acoustic Calibrator

Manufacturer: Svantek
Type No: SV 36 **Serial No:** 162796
Class: 1
Owner: EMM Consulting
Level 1, 175 Scott Street
Newcastle, NSW 2300
Tests Performed: Measured Output Pressure level, Frequency & Distortion
Comments: See Details and Class Tolerance overleaf.

CONDITION OF TEST:

Ambient Pressure	995	hPa ±1 hPa	**Date of Receipt :**	28/01/2025
Temperature	24	°C ±1° C	**Date of Calibration :**	28/01/2025
Relative Humidity	45	% ±5%	**Date of Issue :**	29/01/2025

Acu-Vib Test Procedure: AVP02 (Calibrators)
Test Method: AS IEC 60942 - 2017

CHECKED BY: .....

AUTHORISED SIGNATURE: .....

Hein Soe

Accredited for compliance with ISO/IEC 17025 - Calibration
Results of the tests, calibration and/or measurements included in this document are traceable to SI units through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.

This report applies only to the item identified in the report and may not be reproduced in part.

The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.

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Chain Valley Colliery

Quarterly attended noise monitoring - Q4 2025

Prepared for Delta Power & Energy (Chain Valley) Pty Ltd (Trading as Delta Coal)

January 2025

Chain Valley Colliery

Quarterly attended noise monitoring - Q4 2025

Delta Power & Energy (Chain Valley) Pty Ltd (Trading as Delta Coal)

E241225 RP2

January 2025

Version	Date	Prepared by	Reviewed by	Comments
1	10 January 2026	Kirsten Garlick	Teanuanua Villierme	Draft
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3	14 January 2026	Kirsten Garlick	Teanuanua Villierme	Final

Approved by



Teanuanua Villierme
Associate Acoustics Consultant
14 January 2026

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This report has been prepared in accordance with the brief provided by Delta Power & Energy (Chain Valley) Pty Ltd (Trading as Delta Coal) and, in its preparation, EMM has relied upon the information collected at the times and under the conditions specified in this report. All findings, conclusions or recommendations contained in this report are based on those aforementioned circumstances. This report is to only be used for the purpose for which it has been provided. Except as permitted by the *Copyright Act 1968* (Cth) and only to the extent incapable of exclusion, any other use (including use or reproduction of this report for resale or other commercial purposes) is prohibited without EMM's prior written consent. Except where expressly agreed to by EMM in writing, and to the extent permitted by law, EMM will have no liability (and assumes no duty of care) to any person in relation to this document, other than to Delta Power & Energy (Chain Valley) Pty Ltd (Trading as Delta Coal) (and subject to the terms of EMM's agreement with Delta Power & Energy (Chain Valley) Pty Ltd (Trading as Delta Coal)).

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1 Introduction

1.1 Background

EMM Consulting Pty Ltd (EMM) was engaged by Delta Power & Energy (Chain Valley) Pty Ltd (Trading as Delta Coal) to conduct a quarterly noise survey of operations at Chain Valley Colliery (CVC) located at Construction Road, Mannering Park NSW. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified limits.

Attended environmental noise monitoring described in this report was done at nine monitoring locations during the day, evening and night periods on 27 November 2025 and 1, 2, 3, 5 and 8 December 2025.

1.2 Attended monitoring locations

Site monitoring locations are detailed in Table 1.1 and shown on Figure 1.1. It should be noted that Figure 1.1 shows actual monitoring positions, not necessarily the location of residences and are based on the approved noise management plan.

Table 1.1 Attended noise monitoring locations

Location descriptor	Description	Coordinates (MGA56)	
		Easting	Northing
ATN001	Griffith Street, Mannering Park	363990	6330529
ATN002	Lakeshore Avenue, Kingfisher Shores	365218	6329388
ATN003	Short Street, Macquarie Shores	365165	6328323
ATN004	Lloyd Avenue, Chain Valley Bay	365949	6328530
ATN005	Teragalin Drive, Chain Valley Bay	366560	6328590
ATN006	Sunset Parade, Chain Valley Bay	366305	6329321
ATN007[1]	Cams Boulevard, Chain Valley Bay	366559	6331109
R12	Lakeshore Avenue, Kingfisher Shores	365185	6329352
R13	Karoola Avenue, Kingfisher Shores	365391	6329169

Notes: 1. Attended noise monitoring was undertaken at the R22 residence (EPL Point 23) instead.



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

0 0.5 1 km
GDA 1994 MGA Zone 56

N

\\emm.local\vxdrive\2024\E240010- Delta Coal Noise CY24\8 GIS\02_Maps\N001_MonitoringLocations\N001_MonitoringLocations_20240411_01.aprx 12/04/2024

KEY

- (A) Noise monitoring location
- (W) Meteorological station
- CVC consent boundary
- Major road
- Minor road
- Watercourse/drainage line
- Waterbody

CVC attended noise monitoring locations

Chain Valley Colliery
Quarterly Attended Noise Monitoring
Figure 1.1

EMM creating opportunities

1.3 Terminology and abbreviations

Definitions of terms and abbreviations which may be used in this report are provided in Table 1.2.

Table 1.2 Terminology and abbreviations

Term/descriptor	Definition
dB(A)	Noise level measurement units are decibels (dB). The "A" weighting scale is used to approximate how humans hear noise.
L_{Amax}	The maximum root mean squared A-weighted noise level over a time period.
L_{A1}	The A-weighted noise level which is exceeded for 1% of the time.
$L_{A1,1minute}$	The A-weighted noise level which is exceeded for 1% of the specified time period of 1 minute.
L_{A10}	The A-weighted noise level which is exceeded for 10% of the time.
L_{Aeq}	The energy average A-weighted noise level.
$L_{Aeq,15minute}$	The energy average A-weighted noise level over the specified time period of 15 minutes.
L_{A50}	The A-weighted noise level which is exceeded for 50% of the time, also the median noise level during a measurement period.
L_{A90}	The A-weighted noise level exceeded for 90% of the time, also referred to as the "background" noise level and commonly used to derive noise limits.
L_{Amin}	The minimum A-weighted noise level over a time period.
Hertz (Hz)	The frequency of fluctuations in pressure, measured in cycles per second. Most sounds are a combination of many frequencies together.
AWS	Automatic weather station used to collect meteorological data, typically at an altitude of 10 metres (m).
Sigma-theta	The standard deviation of the horizontal wind direction over a period of time.
IA	Inaudible. When site noise is noted as IA then there was no site noise at the monitoring location.
NM	Not Measurable. If site noise is noted as NM, this means some noise was audible but could not be quantified.
Day	Monday – Saturday: 7:00 am to 6:00 pm, on Sundays and Public Holidays: 8:00 am to 6:00 pm.
Evening	Monday – Saturday: 6:00 pm to 10:00 pm, on Sundays and Public Holidays: 6:00 pm to 10:00 pm.
Night	Monday – Saturday: 10:00 pm to 7:00 am, on Sundays and Public Holidays: 10:00 pm to 8:00 am.

Appendix A provides further information that gives an indication as to how an average person perceives changes in noise level, and examples of common noise levels.

2 Noise limits

2.1 Development consent

Noise limits for CVC are provided in Table 1, Condition 7 of Schedule 3 of the current development consent SSD-5465 (DC) dated July 2021. Long-term goals for CVC are provided in Condition 8(d) of Schedule 3 of the DC. Relevant sections of the DC are reproduced in Appendix B.1.

2.2 Environment protection licence

Noise limits for CVC are provided in Conditions L5.1 and L5.2 of environment protection licence 1770 (EPL) dated 9 April 2025. Relevant sections of the EPL are reproduced in Appendix B.2.

2.3 Noise management plan

The approved noise management plan (NMP) (dated 20 April 2022) was prepared in line with the Mod 4 approval and in accordance with the NSW EPA 'Noise Policy for Industry' (NPfI) issued in October 2017. Table 5 of the NMP adopts nine attended noise monitoring (NM) locations that are representative of residences outlined in the DC. Where several assessment locations are in one NM catchment, representative noise limits have been adopted to ensure that the lowest (most stringent) limits within the NM catchment can be achieved. Relevant sections of the NMP are reproduced in Appendix B.3.

2.4 Noise limits

Noise impact limits based on the DC and EPL are provided in Table 2.1. The assessment location represented by each noise monitoring location is consistent with the NMP, most of which are listed in the DC and EPL (as shown in brackets alongside where applicable).

Table 2.1 Noise impact limits, dB

Noise monitoring location	Assessment location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$	Night $L_{A1,1minute}$
ATN001	R8 (EPL Point 9)	38	38	38	45
ATN002	R11 (EPL Point 12)	49	49	49	54
ATN003	R15 (EPL Point 16)	36	36	36	45
ATN004	R14[1]	35	35	35	45
ATN005	R17[1]	35	35	35	45
ATN006	R19 (EPL Point 20)	37	37	37	45
ATN007[2]	R22 (EPL Point 23)	46	46	46	46
R12	R12 (EPL Point 13)	49	49	49	53
R13	R13 (EPL Point 14)	43	43	43	49

Notes: 1. DC limits for this location are under 'all other privately-owned land'.

2. Attended noise monitoring was undertaken at the R22 residence (EPL Point 23) instead.

2.5 Meteorological conditions

Appendix 8 of the DC states meteorological conditions under which noise limits do not apply as follows:

- during periods of rain or hail
- average wind speed at microphone height exceeds 5 meters per second (m/s)
- wind speeds greater than 3 m/s at 10 m above ground level
- temperature inversion conditions greater than 3°C/100 m.

Condition L5.4 of the EPL states meteorological conditions under which noise limits do not apply as follows:

- wind speeds greater than 3 m/s at 10 m above ground level
- stability category F temperature inversion conditions and wind speeds greater than 2 m/s at 10 m above ground level
- stability category G temperature inversion conditions
- as defined under the NPfI.

The last point referencing the NPfI adds the concept of 'very noise-enhancing' conditions which are considered outside the 'standard' or 'noise-enhancing' meteorological conditions defined in Table D1 of Fact Sheet D of the NPfI.

Further, Fact Sheet E of the NPfI (point 6 of Section E1) provides additional guidance on monitoring the performance of a site against 'suitable' noise limits placed in the DC/EPL. Noise limits are based on 'achievable' noise levels under the 'standard' and/or 'noise-enhancing' meteorological conditions. Where meteorological conditions are considered 'very noise-enhancing', a positive adjustment of 5 dB applies to noise limits for 'standard' or 'noise-enhancing' meteorological conditions.

In accordance with the NPfI, where 'very noise-enhancing' meteorological conditions were present during a noise measurement, a positive adjustment of 5 dB has been applied to the noise limits. This approach means that noise limits are always applicable, with or without a positive adjustment of 5 dB, depending on whether meteorological conditions are 'very noise-enhancing' or not.

2.6 Additional requirements

2.6.1 Attended noise monitoring

Condition M4.1 of the EPL specifies additional noise monitoring requirements to determine compliance, including the following:

- Locations of monitoring – EPL points listed in Table 2.1 above.
- Frequency of monitoring – quarterly and at least two months between monitoring periods.
- Periods of monitoring:
    - For three out of four quarterly periods – each day, evening and night periods for a minimum of 15 minutes. Night period monitoring must be undertaken between the hours of 1:00 am and 4:00 am.

- For one out of four quarterly periods – day period monitoring must be undertaken for a minimum of 1.5 hours (six 15 minute periods); evening period monitoring must be undertaken for a minimum of 30 minutes (two 15 minute periods); night period monitoring must be undertaken for a minimum of 1 hour (four 15 minute periods).

- Days of monitoring – each quarterly monitoring must be undertaken on a different day of the week excluding Saturday, Sundays and public holidays.

In accordance with the preceding, this round of quarterly attended noise monitoring (Q4 2025) was undertaken on Thursday 27 November 2025 as well as Monday 1, Tuesday 2, Wednesday 3 and Friday 5 December 2025, which is more than two months since the last quarterly monitoring (Q3 2025) which finished on Friday 5 September 2025. This quarterly period (Q4 2025), monitoring at each monitoring location (listed in the EPL) was conducted for a minimum of 1.5 hours during the day period, 0.5 hour during the evening period and 1 hour during the night period. The 'short' periods monitoring (e.g. 15 minutes during each period with night period monitoring undertaken between the hours of 1:00 am and 4:00 am) is planned to be completed next in Q1 2026. Monitoring at locations not listed in the EPL (i.e. ATN004 and ATN005) was conducted for 15 minutes during each period in accordance with the NMP.

As per the approved NMP, attended noise monitoring is scheduled considering the occurrence of regular operations at CVC. Noise monitoring avoids scheduled down-time or maintenance. Regular operations were occurring during this round of monitoring (Q4 2025).

Monitoring and reporting have been done in accordance with the NPfI and 'Approved methods for the measurement and analysis of environmental noise in NSW' (the approved methods) (EPA 2022).

2.6.2 CVC long-term goals

Long-term goals for CVC are provided in Condition 8(d) of Schedule 3 of the DC, which states:

> 8. The Applicant must:
>
> (d) use its best endeavours to achieve the long-term noise goals in Table 2, where reasonable and feasible, and report on progress towards achieving these goals in each Annual Review;

The long-term goals for CVC in Table 2.2 of the DC are summarised in Table 2.2 for the relevant assessment locations.

Table 2.2 CVC long-term goals

Assessment location	Day $L_{Aeq,15minute}$, dB	Evening $L_{Aeq,15minute}$, dB	Night $L_{Aeq,15minute}$, dB
R11 (EPL Point 12)	41	41	41
R12 (EPL Point 13)	41	41	41
R13 (EPL Point 14)	41	41	41
R22 (EPL Point 23)	40	40	40

As stated in Appendix 9 of the DC, Delta Coal is committed to the progressive implementation of feasible and reasonable measures to target long-term noise goals which are designed to reduce noise emissions from CVC. For this compliance noise monitoring assessment, site $L_{Aeq,15minute}$ have also been compared to the long-term goals as discussed in Section 4.2.2.

3 Methodology

3.1 Overview

Attended environmental noise monitoring was done in accordance with Australian Standard AS1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant EPA requirements. Meteorological data was obtained from the Mannering Colliery automatic weather station (AWS) which allowed correlation of atmospheric parameters with measured site noise levels.

3.2 Attended noise monitoring

During this survey, attended noise monitoring was conducted during the day, evening and night periods at each location. Minimum monitoring periods at each EPL location was in accordance with the EPL; 1.5 hours during the day period, 30 minutes during the evening period and 1 hour during the night period. The duration of each measurement was 15 minutes. Atmospheric conditions (at microphone height) were measured at each monitoring location.

Measured sound levels from various sources were noted during each measurement, and particular attention was paid to the extent of site contribution (if any) to measured levels. At each monitoring location, the site-only $L_{Aeq,15minute}$ and L_{Amax} were measured directly or determined by other methods detailed in Section 7.1 of the NPfI.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may be used in this report. When site noise is noted as IA, it was inaudible at the monitoring location. When site noise is noted as NM, this means it was audible but could not be quantified. All results noted as NM in this report were due to one or more of the following:

- Site noise levels were very low, typically more than 10 dB below the measured background (L_{A90}), and unlikely to be noticed.
- Site noise levels were masked by more dominant sources that are characteristic of the environment (such as breeze in foliage or continuous road traffic noise) that cannot be eliminated by monitoring at an alternate or intermediate location.
- It was not feasible or reasonable to employ methods, such as to move closer and back calculate. Cases may include rough terrain preventing closer measurement, addition/removal of significant source-to-receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

If the exact noise levels from site could not be established due to masking by other noise sources in a similar frequency range but were determined to be at least 5 dB lower than relevant limits, then a maximum estimate may be provided. This is expressed as a 'less than' quantity, such as <20 dB or <30 dB.

For this assessment, the measured L_{Amax} has been used as a conservative estimate of $L_{A1,1minute}$. The EPA accepts sleep disturbance analysis based on either the $L_{A1,1minute}$ or L_{Amax} metrics, with the L_{Amax} representing a more conservative assessment of site noise emissions.

3.3 Meteorological data

This assessment determined stability categories throughout attended monitoring period using the sigma-theta method as per Fact Sheet D of the NPfI. This data was sourced from the Mannering Colliery AWS, in accordance with requirements of EPL 1770.

3.4 Modifying factors

All measurements were evaluated for potential modifying factors in accordance with the NPfI. Assessment of modifying factors is undertaken at the time of measurement if the site was audible and directly quantifiable. If applicable, modifying factor adjustments have been reported and added to measured site-only L_{Aeq}.

A low-frequency noise (LFN) modifying factor adjustment has been applied to the site-only L_{Aeq} where the site caused the LFN threshold exceedance. Specific methodology for assessment of each modifying factor is outlined in Fact Sheet C of the NPfI.

3.5 Instrumentation and personnel

Attended noise monitoring was conducted by Acoustical Consultants Teanuanua Villierme and Kirsten Garlick. Qualifications, experience and competency are in accordance with the Approved methods and demonstration of this is available upon request.

Equipment used to measure environmental noise levels is detailed in Table 3.1. Calibration certificates are provided in Appendix C.

Table 3.1 Attended noise monitoring equipment

Item	Serial number	Calibration due date	Relevant standard
Brüel & Kjær 2250 sound level meter	2759405	20/12/2025	IEC 61672-1:2013
Svantek SV-36 calibrator	162796	28/01/2025	IEC 60942:2017
Brüel & Kjær 2255 sound level meter	100299	14/08/2026	IEC 61672-1:2013
Svantek SV-36 calibrator	140737	02/10/2026	IEC 60942:2017

4 Results

4.1 Total measured noise levels and atmospheric conditions

Overall noise levels measured at each location during attended measurements are provided in Table 4.1.

Table 4.1 Total measured noise levels[1], dB – Quarter 4 2025

Location	Period	Start date and time	L_{Amax}	L_{A1}	L_{A10}	L_{Aeq}	L_{A50}	L_{A90}	L_{Amin}
ATN001	Day	27/11/2025 8:33	70	64	52	52	48	47	46
ATN001	Day	27/11/2025 8:51	69	61	50	50	47	46	44
ATN001	Day	27/11/2025 9:08	76	62	50	52	47	46	44
ATN001	Day	27/11/2025 9:25	78	69	51	56	47	46	44
ATN001	Day	27/11/2025 9:40	72	65	56	53	47	46	44
ATN001	Day	27/11/2025 9:56	74	64	49	52	46	45	41
ATN001	Evening	2/12/2025 21:19	61	47	46	45	45	44	42
ATN001	Evening	2/12/2025 21:35	62	50	46	45	45	44	42
ATN001	Night	2/12/2025 22:00	79	47	46	50	45	44	42
ATN001	Night	2/12/2025 22:16	48	47	46	45	45	44	42
ATN001	Night	2/12/2025 22:32	58	47	46	45	45	44	43
ATN001	Night	2/12/2025 22:47	64	47	46	45	45	44	42
ATN002	Day	27/11/2025 12:29	74	64	56	54	50	46	42
ATN002	Day	27/11/2025 12:45	74	60	53	52	49	46	43
ATN002	Day	27/11/2025 13:03	75	58	49	49	46	43	41
ATN002	Day	27/11/2025 13:19	69	58	49	48	46	44	41
ATN002	Day	27/11/2025 13:35	60	52	48	46	46	44	41
ATN002	Day	27/11/2025 13:51	94	66	50	73	46	44	41
ATN002	Evening	2/12/2025 20:31	55	46	39	37	36	34	32
ATN002	Evening	2/12/2025 20:47	47	40	37	36	36	34	33
ATN002	Night	8/12/2025 22:03	48	40	39	38	38	37	35
ATN002	Night	8/12/2025 22:18	44	40	39	38	38	37	35
ATN002	Night	8/12/2025 22:34	43	40	39	38	38	37	35
ATN002	Night	8/12/2025 22:49	51	40	39	38	38	36	34
ATN003	Day	27/11/2025 14:16	66	59	50	48	44	40	37
ATN003	Day	27/11/2025 14:34	63	53	48	45	43	40	37
ATN003	Day	27/11/2025 14:50	66	59	50	48	45	41	37
ATN003	Day	27/11/2025 15:05	70	56	48	46	43	39	36

Location	Period	Start date and time	L_{Amax}	L_{A1}	L_{A10}	L_{Aeq}	L_{A50}	L_{A90}	L_{Amin}
ATN003	Day	27/11/2025 15:21	61	52	47	44	42	39	36
ATN003	Day	27/11/2025 15:36	71	55	49	48	43	39	36
ATN003	Evening	3/12/2025 21:15	58	40	39	37	37	36	34
ATN003	Evening	8/12/2025 21:43	50	44	41	40	40	38	36
ATN003	Night	1/12/2025 22:00	54	43	40	39	38	37	35
ATN003	Night	1/12/2025 22:15	56	43	39	37	37	35	33
ATN003	Night	1/12/2025 22:30	49	40	37	36	35	34	33
ATN003	Night	1/12/2025 22:45	44	39	38	36	36	34	33
ATN004	Day	5/12/2025 11:25	65	51	42	42	37	34	31
ATN004	Evening	3/12/2025 20:38	64	51	38	39	34	32	29
ATN004	Night	1/12/2025 23:11	49	44	41	39	38	36	34
ATN005	Day	05/12/2025 10:58	68	54	41	44	36	34	32
ATN005	Evening	3/12/2025 20:00	68	57	49	46	39	35	31
ATN005	Night	2/12/2025 00:52	63	49	45	42	41	39	37
ATN006	Day	5/12/2025 9:04	56	44	40	38	38	36	33
ATN006	Day	5/12/2025 9:20	53	46	42	40	40	36	33
ATN006	Day	5/12/2025 9:37	57	47	43	41	40	37	35
ATN006	Day	5/12/2025 9:54	57	51	45	42	39	37	35
ATN006	Day	5/12/2025 10:11	61	51	44	41	37	35	33
ATN006	Day	5/12/2025 10:26	64	49	44	42	42	36	34
ATN006	Evening	3/12/2025 19:18	63	53	44	42	37	34	31
ATN006	Evening	3/12/2025 19:35	63	45	41	38	36	33	31
ATN006	Night	1/12/2025 23:42	64	43	41	39	39	37	34
ATN006	Night	1/12/2025 23:57	50	45	43	41	40	39	36
ATN006	Night	2/12/2025 0:13	60	44	42	40	40	38	36
ATN006	Night	2/12/2025 0:28	49	44	42	40	40	38	36
R22	Day	5/12/2025 7:00	63	52	45	45	44	42	40
R22	Day	5/12/2025 7:16	66	52	43	43	42	41	40
R22	Day	5/12/2025 7:32	62	55	45	45	43	42	40
R22	Day	5/12/2025 7:47	61	52	44	44	43	42	40
R22	Day	5/12/2025 8:02	58	48	44	43	42	41	40
R22	Day	5/12/2025 8:17	64	48	44	44	42	41	40
R22	Evening	3/12/2025 18:34	63	49	47	45	44	42	40

Location	Period	Start date and time	L_{Amax}	L_{A1}	L_{A10}	L_{Aeq}	L_{A50}	L_{A90}	L_{Amin}
R22	Evening	3/12/2025 18:50	49	47	45	44	43	42	40
R22	Night	5/12/2025 5:50	62	47	44	44	43	42	41
R22	Night	5/12/2025 6:08	57	47	44	44	43	43	41
R22	Night	5/12/2025 6:23	69	53	45	46	44	43	41
R22	Night	5/12/2025 6:41	63	56	48	46	44	43	41
R12	Day	27/11/2025 12:29	74	64	56	54	50	46	42
R12	Day	27/11/2025 12:45	74	60	53	52	49	46	43
R12	Day	27/11/2025 13:03	75	58	49	49	46	43	41
R12	Day	27/11/2025 13:19	69	58	49	48	46	44	41
R12	Day	27/11/2025 13:35	60	52	48	46	46	44	41
R12	Day	27/11/2025 13:51	94	66	50	73	46	44	41
R12	Evening	2/12/2025 20:31	55	46	39	37	36	34	32
R12	Evening	2/12/2025 20:47	47	40	37	36	36	34	33
R12	Night	8/12/2025 22:03	48	40	39	38	38	37	35
R12	Night	8/12/2025 22:18	44	40	39	38	38	37	35
R12	Night	8/12/2025 22:34	43	40	39	38	38	37	35
R12	Night	8/12/2025 22:49	51	40	39	38	38	36	34
R13	Day	27/11/2025 10:29	64	57	53	49	46	41	39
R13	Day	27/11/2025 10:45	70	61	52	50	44	41	37
R13	Day	27/11/2025 11:01	65	60	51	49	45	41	38
R13	Day	27/11/2025 11:17	66	61	57	53	49	43	40
R13	Day	27/11/2025 11:37	66	58	54	51	49	45	42
R13	Day	27/11/2025 11:52	69	56	52	49	48	43	40
R13	Evening	2/12/2025 19:55	61	50	42	40	38	35	32
R13	Evening	2/12/2025 20:12	66	56	43	44	37	35	32
R13	Night	8/12/2025 23:10	53	41	39	36	35	33	31
R13	Night	8/12/2025 23:25	53	51	49	43	36	34	31
R13	Night	8/12/2025 23:40	59	56	51	47	43	34	31
R13	Night	8/12/2025 23:55	61	54	52	48	44	35	32

Notes: 1. Levels in this table are not necessarily the result of activity at site.

Atmospheric condition data measured by the operator during each measurement using a hand-held weather meter is shown in Table 4.2. The wind speed, direction and temperature were measured at approximately 1.5 m above ground. Attended noise monitoring is not done during rain, hail, or average wind speeds above 5 m/s at microphone height.

Table 4.2 Measured atmospheric conditions – Quarter 4 2025

Location	Period	Start date and time	Temperature °C	Wind speed m/s	Wind direction ° Magnetic north[1]	Cloud cover 1/8s
ATN001	Day	27/11/2025 8:33	27	<0.5	-	0
ATN001	Day	27/11/2025 8:51	28	0.5	245	0
ATN001	Day	27/11/2025 9:08	28	2.2	250	0
ATN001	Day	27/11/2025 9:25	28	2.0	250	0
ATN001	Day	27/11/2025 9:40	29	2.0	230	0
ATN001	Day	27/11/2025 9:56	30	1.7	250	0
ATN001	Evening	2/12/2025 21:19	18	<0.5	-	1
ATN001	Evening	2/12/2025 21:35	18	<0.5	-	3
ATN001	Night	2/12/2025 22:00	18	<0.5	-	1
ATN001	Night	2/12/2025 22:16	18	<0.5	-	3
ATN001	Night	2/12/2025 22:32	18	<0.5	-	2
ATN001	Night	2/12/2025 22:47	18	<0.5	-	1
ATN002	Day	27/11/2025 12:29	34	0.6	140	0
ATN002	Day	27/11/2025 12:45	35	0.6	160	0
ATN002	Day	27/11/2025 13:03	34	0.6	350	0
ATN002	Day	27/11/2025 13:19	35	<0.5	340	0
ATN002	Day	27/11/2025 13:35	35	0.8	20	0
ATN002	Day	27/11/2025 13:51	34	<0.5	-	0
ATN002	Evening	2/12/2025 20:31	19	<0.5	-	3
ATN002	Evening	2/12/2025 20:47	18	<0.5	-	2
ATN002	Night	8/12/2025 22:03	22	<0.5	-	0
ATN002	Night	8/12/2025 22:18	22	<0.5	-	0
ATN002	Night	8/12/2025 22:34	22	<0.5	-	0
ATN002	Night	8/12/2025 22:49	22	<0.5	-	0
ATN003	Day	27/11/2025 14:16	35	1.2	230	0
ATN003	Day	27/11/2025 14:34	34	1.5	220	0
ATN003	Day	27/11/2025 14:50	34	1.2	220	0
ATN003	Day	27/11/2025 15:05	34	0.8	280	0
ATN003	Day	27/11/2025 15:21	34	1.6	210	0
ATN003	Day	27/11/2025 15:36	34	1.6	240	0
ATN003	Evening	3/12/2025 21:15	20	0.6	300	0

Location	Period	Start date and time	Temperature °C	Wind speed m/s	Wind direction °Magnetic north[1]	Cloud cover 1/8s
ATN003	Evening	8/12/2025 21:43	22	<0.5	-	0
ATN003	Night	1/12/2025 22:00	18	0.6	220	4
ATN003	Night	1/12/2025 22:15	18	<0.5	-	3
ATN003	Night	1/12/2025 22:30	17	<0.5	-	1
ATN003	Night	1/12/2025 22:45	17	<0.5	-	5
ATN004	Day	5/12/2025 11:25	35	0.9	300	0
ATN004	Evening	3/12/2025 20:38	20	0.7	30	0
ATN004	Night	1/12/2025 23:11	17	<0.5	-	2
ATN005	Day	5/12/2025 10:58	35	0.8	345	0
ATN005	Evening	3/12/2025 20:00	21	1.2	40	0
ATN005	Night	2/12/2025 00:52	17	0.6	200	8
ATN006	Day	5/12/2025 9:04	27	<0.5	-	0
ATN006	Day	5/12/2025 9:20	32	0.7	40	0
ATN006	Day	5/12/2025 9:37	32	1.1	350	0
ATN006	Day	5/12/2025 9:54	30	1.7	345	0
ATN006	Day	5/12/2025 10:11	32	0.5	340	0
ATN006	Day	5/12/2025 10:26	34	<0.5	-	0
ATN006	Evening	3/12/2025 19:18	21	1.5	325	0
ATN006	Evening	3/12/2025 19:35	21	2.0	350	0
ATN006	Night	1/12/2025 23:42	18	0.5	210	5
ATN006	Night	1/12/2025 23:57	18	<0.5	-	6
ATN006	Night	2/12/2025 0:13	18	<0.5	-	6
ATN006	Night	2/12/2025 0:28	17	<0.5	-	7
R22	Day	5/12/2025 7:00	18	<0.5	-	0
R22	Day	5/12/2025 7:16	19	<0.5	-	0
R22	Day	5/12/2025 7:32	20	<0.5	-	0
R22	Day	5/12/2025 7:47	21	<0.5	-	0
R22	Day	5/12/2025 8:02	22	<0.5	-	0
R22	Day	5/12/2025 8:17	24	<0.5	-	0
R22	Evening	3/12/2025 18:34	22	1.4	340	0
R22	Evening	3/12/2025 18:50	22	0.8	320	0
R22	Night	5/12/2025 5:50	17	<0.5	-	0
R22	Night	5/12/2025 6:08	16	<0.5	-	0

Location	Period	Start date and time	Temperature °C	Wind speed m/s	Wind direction °Magnetic north[1]	Cloud cover 1/8s
R22	Night	5/12/2025 6:23	16	<0.5	-	0
R22	Night	5/12/2025 6:41	17	<0.5	-	0
R12	Day	27/11/2025 12:29	30	2.7	220	0
R12	Day	27/11/2025 12:45	30	0.9	230	0
R12	Day	27/11/2025 13:03	31	1.3	330	0
R12	Day	27/11/2025 13:19	32	1.2	275	0
R12	Day	27/11/2025 13:35	32	1.2	260	0
R12	Day	27/11/2025 13:51	32	1.0	255	0
R12	Evening	2/12/2025 20:31	19	<0.5	-	2
R12	Evening	2/12/2025 20:47	19	<0.5	-	2
R12	Night	8/12/2025 22:03	22	<0.5	-	0
R12	Night	8/12/2025 22:18	22	<0.5	-	0
R12	Night	8/12/2025 22:34	22	<0.5	-	0
R12	Night	8/12/2025 22:49	22	<0.5	-	0
R13	Day	27/11/2025 10:29	30	2.7	220	0
R13	Day	27/11/2025 10:45	30	0.9	230	0
R13	Day	27/11/2025 11:01	31	1.3	330	0
R13	Day	27/11/2025 11:17	32	1.2	275	0
R13	Day	27/11/2025 11:37	32	1.2	260	0
R13	Day	27/11/2025 11:52	32	1.0	255	0
R13	Evening	2/12/2025 19:55	19	<0.5	-	2
R13	Evening	2/12/2025 20:12	19	<0.5	-	2
R13	Night	8/12/2025 23:10	21	<0.5	-	0
R13	Night	8/12/2025 23:25	21	<0.5	-	0
R13	Night	8/12/2025 23:40	21	<0.5	-	0
R13	Night	8/12/2025 23:55	21	<0.5	-	0

Notes: 1. "-" indicates calm conditions at monitoring location.

4.2 Site only noise levels

4.2.1 Monitoring results

Table 4.3 provides site noise levels in the absence of other sources, where possible, and includes weather data from the Mannering Colliery AWS. Noise limits are applicable under all weather conditions but are adjusted during very noise-enhancing weather conditions, where relevant, as defined in the NPfI.

Table 4.3 Site noise levels and limits – Quarter 4 2025

Location	Start date and time	Period	Wind[1]		Stability class[1]	Very noise-enhancing?[2]	Limits, dB		Site levels, dB		Exceedances, dB	
			Speed m/s	Direction[4]			$L_{Aeq,15minute}$	$L_{A1,1minute}$	$L_{Aeq,15minute}$[3]	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
ATN001	27/11/2025 8:33	Day	1.1	228	A	No	38	N/A	IA	N/A	Nil	N/A
ATN001	27/11/2025 8:51	Day	1.5	248	A	No	38	N/A	IA	N/A	Nil	N/A
ATN001	27/11/2025 9:08	Day	2.2	254	A	No	38	N/A	IA	N/A	Nil	N/A
ATN001	27/11/2025 9:25	Day	3.1	252	A	Yes	43	N/A	IA	N/A	Nil	N/A
ATN001	27/11/2025 9:40	Day	2.5	254	A	No	38	N/A	IA	N/A	Nil	N/A
ATN001	27/11/2025 9:56	Day	3.2	257	A	Yes	43	N/A	IA	N/A	Nil	N/A
ATN001	2/12/2025 21:19	Evening	1.1	173	F	No	38	N/A	IA	N/A	Nil	N/A
ATN001	2/12/2025 21:35	Evening	1.6	183	F	No	38	N/A	IA	N/A	Nil	N/A
ATN001	2/12/2025 22:00	Night	1.4	186	F	No	38	45	IA	IA	Nil	Nil
ATN001	2/12/2025 22:16	Night	1.3	181	F	No	38	45	IA	IA	Nil	Nil
ATN001	2/12/2025 22:32	Night	1.7	181	F	No	38	45	IA	IA	Nil	Nil
ATN001	2/12/2025 22:47	Night	1.1	186	F	No	38	45	IA	IA	Nil	Nil
ATN002	27/11/2025 12:29	Day	4.3	281	A	Yes	54	N/A	IA	N/A	Nil	N/A
ATN002	27/11/2025 12:45	Day	4.0	286	A	Yes	54	N/A	IA	N/A	Nil	N/A
ATN002	27/11/2025 13:03	Day	3.7	272	A	Yes	54	N/A	IA	N/A	Nil	N/A
ATN002	27/11/2025 13:19	Day	4.7	284	A	Yes	54	N/A	IA	N/A	Nil	N/A
ATN002	27/11/2025 13:35	Day	3.4	289	A	Yes	54	N/A	IA	N/A	Nil	N/A
ATN002	27/11/2025 13:51	Day	4.7	267	A	Yes	54	N/A	IA	N/A	Nil	N/A

Location	Start date and time	Period	Wind[1]		Stability class[1]	Very noise-enhancing?[2]	Limits, dB		Site levels, dB		Exceedances, dB	
			Speed m/s	Direction[4]			$L_{Aeq,15minute}$	$L_{A1,1minute}$	$L_{Aeq,15minute}$[3]	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
ATN002	2/12/2025 20:31	Evening	1.4	173	F	No	49	N/A	IA	N/A	Nil	N/A
ATN002	2/12/2025 20:47	Evening	1.0	178	F	No	49	N/A	IA	N/A	Nil	N/A
ATN002	8/12/2025 22:03	Night	1.5	58	A	No	49	54	IA	IA	Nil	Nil
ATN002	8/12/2025 22:18	Night	1.5	55	A	No	49	54	IA	IA	Nil	Nil
ATN002	8/12/2025 22:34	Night	1.6	48	A	No	49	54	IA	IA	Nil	Nil
ATN002	8/12/2025 22:49	Night	1.4	49	A	No	49	54	<25	51	Nil	Nil
ATN003	27/11/2025 14:16	Day	4.8	261	A	Yes	41	N/A	IA	N/A	Nil	N/A
ATN003	27/11/2025 14:34	Day	4.7	273	A	Yes	41	N/A	IA	N/A	Nil	N/A
ATN003	27/11/2025 14:50	Day	3.1	285	A	Yes	41	N/A	IA	N/A	Nil	N/A
ATN003	27/11/2025 15:05	Day	3.4	271	A	Yes	41	N/A	IA	N/A	Nil	N/A
ATN003	27/11/2025 15:21	Day	3.8	268	A	Yes	41	N/A	IA	N/A	Nil	N/A
ATN003	27/11/2025 15:36	Day	3.5	271	A	Yes	41	N/A	IA	N/A	Nil	N/A
ATN003	3/12/2025 21:15	Evening	1.9	28	F	No	36	N/A	IA	N/A	Nil	N/A
ATN003	8/12/2025 21:43	Evening	1.5	55	A	No	36	N/A	IA	N/A	Nil	N/A
ATN003	1/12/2025 22:00	Night	1.4	225	F	No	36	45	IA	IA	Nil	Nil
ATN003	1/12/2025 22:15	Night	1.5	228	F	No	36	45	IA	IA	Nil	Nil
ATN003	1/12/2025 22:30	Night	1.3	219	F	No	36	45	IA	IA	Nil	Nil
ATN003	1/12/2025 22:45	Night	1.2	241	F	No	36	45	IA	IA	Nil	Nil
ATN004	5/12/2025 11:25	Day	2.1	266	A	No	35	N/A	IA	N/A	Nil	N/A
ATN004	3/12/2025 20:38	Evening	2.3	39	F	Yes	40	N/A	<20	N/A	Nil	N/A

Location	Start date and time	Period	Wind[1]		Stability class[1]	Very noise-enhancing?[2]	Limits, dB		Site levels, dB		Exceedances, dB	
			Speed m/s	Direction[4]			$L_{Aeq,15minute}$	$L_{A1,1minute}$	$L_{Aeq,15minute}$[3]	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
ATN004	1/12/2025 23:11	Night	2.3	269	F	Yes	40	50	IA	IA	Nil	Nil
ATN005	5/12/2025 10:58	Day	2.7	302	A	No	35	N/A	IA	N/A	Nil	N/A
ATN005	3/12/2025 20:00	Evening	1.6	48	F	No	35	N/A	IA	N/A	Nil	N/A
ATN005	2/12/2025 00:52	Night	3.6	250	D	Yes	40	50	IA	IA	Nil	Nil
ATN006	5/12/2025 9:04	Day	2.9	283	A	No	37	N/A	IA	N/A	Nil	N/A
ATN006	5/12/2025 9:20	Day	4.0	293	A	Yes	42	N/A	IA	N/A	Nil	N/A
ATN006	5/12/2025 9:37	Day	3.4	284	A	Yes	42	N/A	IA	N/A	Nil	N/A
ATN006	5/12/2025 9:54	Day	3.6	290	A	Yes	42	N/A	IA	N/A	Nil	N/A
ATN006	5/12/2025 10:11	Day	2.9	290	A	No	37	N/A	IA	N/A	Nil	N/A
ATN006	5/12/2025 10:26	Day	3.3	275	A	Yes	42	N/A	IA	N/A	Nil	N/A
ATN006	3/12/2025 19:18	Evening	2.5	50	F	Yes	42	N/A	IA	N/A	Nil	N/A
ATN006	3/12/2025 19:35	Evening	2.2	54	F	Yes	42	N/A	IA	N/A	Nil	N/A
ATN006	1/12/2025 23:42	Night	3.1	244	E	Yes	42	50	IA	IA	Nil	Nil
ATN006	1/12/2025 23:57	Night	3.1	250	E	Yes	42	50	IA	IA	Nil	Nil
ATN006	2/12/2025 0:13	Night	3.3	249	D	Yes	42	50	IA	IA	Nil	Nil
ATN006	2/12/2025 0:28	Night	3.5	253	E	Yes	42	50	IA	IA	Nil	Nil
R22	5/12/2025 7:00	Day	0.3	360	A	No	46	N/A	42 (40+2)	N/A	Nil	N/A
R22	5/12/2025 7:16	Day	0.3	28	A	No	46	N/A	39	N/A	Nil	N/A
R22	5/12/2025 7:32	Day	0.5	48	A	No	46	N/A	41 (39+2)	N/A	Nil	N/A
R22	5/12/2025 7:47	Day	0.6	51	A	No	46	N/A	39	N/A	Nil	N/A

Location	Start date and time	Period	Wind[1]		Stability class[1]	Very noise-enhancing?[2]	Limits, dB		Site levels, dB		Exceedances, dB	
			Speed m/s	Direction[4]			$L_{Aeq,15minute}$	$L_{A1,1minute}$	$L_{Aeq,15minute}$[3]	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
R22	5/12/2025 8:02	Day	0.6	9	A	No	46	N/A	38	N/A	Nil	N/A
R22	5/12/2025 8:17	Day	0.9	270	A	No	46	N/A	39	N/A	Nil	N/A
R22	3/12/2025 18:34	Evening	2.5	55	A	No	46	N/A	45 (43+2)	N/A	Nil	N/A
R22	3/12/2025 18:50	Evening	2.5	56	A	No	46	N/A	44 (42+2)	N/A	Nil	N/A
R22	5/12/2025 5:50	Night	0.3	192	A	No	46	46	45 (40+5)	40[6]	Nil	Nil
R22	5/12/2025 6:08	Night	0.5	240	B	No	46	46	45 (40+5)	40[6]	Nil	Nil
R22	5/12/2025 6:23	Night	0.2	349	A	No	46	46	42 (40+2)	40[6]	Nil	Nil
R22	5/12/2025 6:41	Night	0.2	23	A	No	46	46	45 (40+5)	40[6]	Nil	Nil
R12	27/11/2025 12:29	Day	4.3	281	A	Yes	54	N/A	IA	N/A	Nil	N/A
R12	27/11/2025 12:45	Day	4.0	286	A	Yes	54	N/A	IA	N/A	Nil	N/A
R12	27/11/2025 13:03	Day	3.7	272	A	Yes	54	N/A	IA	N/A	Nil	N/A
R12	27/11/2025 13:19	Day	4.7	284	A	Yes	54	N/A	IA	N/A	Nil	N/A
R12	27/11/2025 13:35	Day	3.4	289	A	Yes	54	N/A	IA	N/A	Nil	N/A
R12	27/11/2025 13:51	Day	4.7	267	A	Yes	54	N/A	IA	N/A	Nil	N/A
R12	2/12/2025 20:31	Evening	1.4	173	F	No	49	N/A	IA	N/A	Nil	N/A
R12	2/12/2025 20:47	Evening	1.0	178	F	No	49	N/A	IA	N/A	Nil	N/A
R12	8/12/2025 22:03	Night	1.5	58	A	No	49	53	IA	IA	Nil	Nil
R12	8/12/2025 22:18	Night	1.5	55	A	No	49	53	IA	IA	Nil	Nil
R12	8/12/2025 22:34	Night	1.6	48	A	No	49	53	IA	IA	Nil	Nil
R12	8/12/2025 22:49	Night	1.4	49	A	No	49	53	<25	51	Nil	Nil

Location	Start date and time	Period	Wind[1]		Stability class[1]	Very noise-enhancing?[2]	Limits, dB		Site levels, dB		Exceedances, dB	
			Speed m/s	Direction[4]			$L_{Aeq,15minute}$	$L_{A1,1minute}$	$L_{Aeq,15minute}$[3]	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
R13	27/11/2025 10:29	Day	3.4	246	A	Yes	48	N/A	IA	N/A	Nil	Nil
R13	27/11/2025 10:45	Day	3.0	283	A	No	43	N/A	IA	N/A	Nil	Nil
R13	27/11/2025 11:01	Day	3.5	268	A	Yes	48	N/A	IA	N/A	Nil	Nil
R13	27/11/2025 11:17	Day	4.7	265	A	Yes	48	N/A	IA	N/A	Nil	Nil
R13	27/11/2025 11:37	Day	3.4	267	A	Yes	48	N/A	IA	N/A	Nil	Nil
R13	27/11/2025 11:52	Day	3.9	257	A	Yes	48	N/A	IA	N/A	Nil	Nil
R13	2/12/2025 19:55	Evening	2.1	177	F	Yes	48	N/A	IA	N/A	Nil	Nil
R13	2/12/2025 20:12	Evening	1.8	175	F	No	43	N/A	IA	N/A	Nil	Nil
R13	8/12/2025 23:10	Night	1.1	60	F	No	43	49	IA	N/A	Nil	Nil
R13	8/12/2025 23:25	Night	1.0	71	F	No	43	49	IA	N/A	Nil	Nil
R13	8/12/2025 23:40	Night	0.9	70	F	No	43	49	IA	N/A	Nil	Nil
R13	8/12/2025 23:55	Night	0.8	61	F	No	43	49	IA	N/A	Nil	Nil

Notes:
1. Sourced from the Mannering Colliery AWS and measured at 10 m above ground level.
2. Noise limits are adjusted by +5 dB during 'very noise-enhancing meteorological conditions' in accordance with the NPfI.
3. Site-only $L_{Aeq,15minute}$, includes modifying factor adjustments if applicable.
4. Degrees magnetic north, "-" indicates calm conditions.
5. A positive adjustment for LFN was applicable.
6. Modifying factor adjustments do not apply to site L_{Amax}.
7. Calculated site $L_{A1,1minute}$ as the site L_{Amax} was measured 1 dB above the $L_{A1,1minute}$ limit.

4.2.2 Discussion of site noise

Noise from CVC was audible at the following monitoring locations during the Quarter 4 monitoring survey:

- ATN004: site-only L_{Aeq} of less than 20 dB was measured for one evening 15 minute measurement. Noise from the CVC dolly cart was just audible.
- ATN002/R12: site-only L_{Aeq} of less than 25 dB was measured for one night 15 minute measurement. Impact noise ('bang') from CVC was briefly audible on two occasions generating an L_{Amax} of 51 dB.
- R22: site-only L_{Aeq} of up to 42 dB were measured during the day measurements, and up to 45 dB during the evening and night measurements. The CVC ventilation fan was audible. Its contribution was above the NPfI LFN thresholds and hence modifying factor adjustments were applied where relevant.

4.2.3 Long term noise goals

Site $L_{Aeq,15minute}$ were also compared to the long-term noise goals (refer to Table 2.2) for the relevant locations (i.e. R11, R12, R13 and R22). Site $L_{Aeq,15minute}$ measured at ATN002 (R11), R12 and R13 satisfied the relevant long-term goals during the day, evening and night periods. At R22, the measured site $L_{Aeq,15minute}$ (inclusive of modifying factor adjustment for LFN) was above (by up to 2 dB) the relevant long-term $L_{Aeq,15minute}$ 40 dB goal for two of the six day period measurements. During all of the evening and night period measurements, the measured site $L_{Aeq,15minute}$ (inclusive of modifying factor adjustment for LFN) was above the relevant long-term goal by up to 5 dB.

5 Summary

EMM was engaged by Delta Power & Energy (Chain Valley) Pty Ltd (Trading as Delta Coal) to conduct a quarterly noise survey of operations at CVC. The survey purpose was to quantify the acoustic environment and compare site noise levels against specified noise limits.

Attended environmental noise monitoring described in this report was done at nine monitoring locations during the day, evening and night periods on 27 November 2025 and 1, 2, 3, 5 and 8 December 2025.

Noise levels from site complied with relevant limits at all monitoring locations during the Q4 2025 survey.

CVC $L_{Aeq,15minute}$ were also compared to the long-term noise goals applicable at R11 (ATN002), R12, R13 and R22. CVC $L_{Aeq,15minute}$ satisfied these during all measurements at R11 (ATN002), R12 and R13. At R22, the measured site $L_{Aeq,15minute}$ (inclusive of modifying factor adjustment for LFN) was above (by up to 2 dB) the long-term $L_{Aeq,15minute}$ 40 dB goal for two of the six day period measurements. During all of the evening and night period measurements, the measured site $L_{Aeq,15minute}$ (inclusive of modifying factor adjustment for LFN) was above the long-term goal (by up to 5 dB).

Appendix A
Noise perception and examples

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A.1 Noise levels

Table A.1 gives an indication as to how an average person perceives changes in noise level. Examples of common noise levels are provided in Figure A.1.

Table A.1 Perceived change in noise

Change in sound pressure level (dB)	Perceived change in noise
up to 2	Not perceptible
3	Just perceptible
5	Noticeable difference
10	Twice (or half) as loud
15	Large change
20	Four times (or quarter) as loud

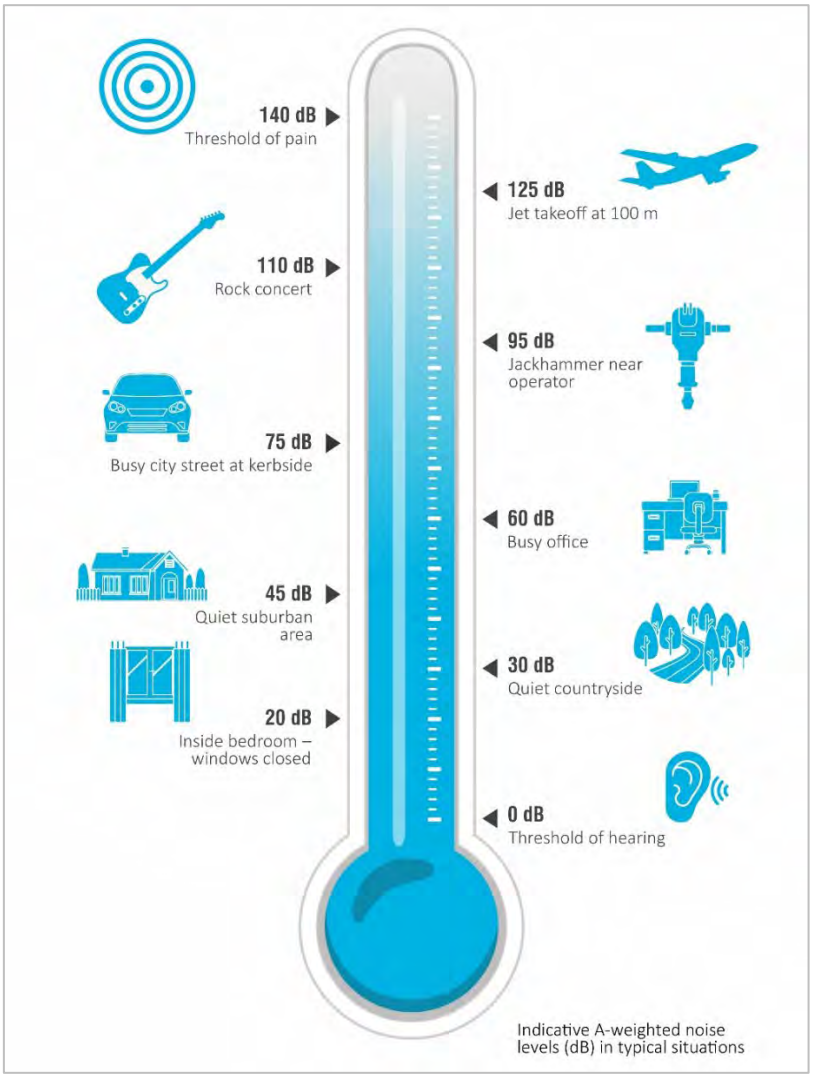


Figure A.1 Common noise levels

Appendix B
Regulator documents

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B.1 Development consent

4. Prior to 31 March 2014, and every 12 months thereafter for each calendar year in which coal haulage from the site is undertaken utilising public roads, unless the Planning Secretary directs otherwise, the Applicant must commission a suitably qualified person, whose appointment has been approved by the Planning Secretary at least one month prior to undertaking the audit, to conduct an Independent Traffic Audit of the development. This audit must:
   (a) be undertaken without prior notice to the Applicant, and in consultation with TfNSW, NCC, CC Council and the CCC;
   (b) assess the impact of the development on the performance and safety of the road network, including a review of:
      - haulage records;
      - accident records on the haulage route, infringements relating to the code of conduct and any incidents involving haulage vehicles;
      - community complaints register; and
   (c) assess the effectiveness of the Road Transport Protocol; and, if necessary, recommend measures to reduce or mitigate any adverse (or potentially adverse) impacts.

5. Within 1 month of receiving the audit report, or as otherwise agreed by the Planning Secretary, the Applicant must submit a copy of the report to the Planning Secretary, with a detailed response to any of the recommendations contained in the audit report, including a timetable for the implementation of any measures proposed to address the recommendations in the audit report.

   A summary of the audit report must be included in the Annual Review.

Alternative Coal Transport Options

6. Prior to 31 December 2014, and every three years thereafter, the Applicant must prepare and submit to the Planning Secretary for approval, a study of the reasonable and feasible options to reduce or eliminate the use of public roads to transport coal from the development, unless otherwise agreed by the Planning Secretary. The assessment must include:
   (a) an analysis of the capital, construction and operating costs of the alternative transport options; and
   (b) quantified social and environmental impacts associated with road and rail transport.

NOISE

Noise Impact Assessment Criteria

7. The Applicant must ensure that the noise generated by the development at any residence on privately-owned land does not exceed the criteria for the location in Table 1 nearest to that residence.

Table 1: Noise Criteria dB(A)

Location	Day	Evening	Night	
	$L_{Aeq(15\ min)}$	$L_{Aeq(15\ min)}$	$L_{Aeq(15\ min)}$	$L_{A1(1\ min)}$
R8	38	38	38	45
R11	49	49	49	54
R12	49	49	49	53
R13	43	43	43	49
R15	36	36	36	45
R19	37	37	37	45
R22	46	46	46	46
all other privately-owned land	35	35	35	45

Notes:
- *To interpret the locations referred to in Table 1, see Appendix 6 and the EIS; and*
- *Noise generated by the development is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy. Appendix 8 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.*

However, these criteria do not apply if the Applicant has a written agreement with the relevant landowner to exceed the noise criteria, and the Applicant has advised the Department in writing of the terms of this agreement.

Operating Conditions

8. The Applicant must:
   (a) implement best management practice, including all reasonable and feasible noise mitigation measures, to minimise the construction, operational and transport noise generated by the development;
   (b) regularly assess the noise monitoring and meteorological data and relocate, modify, and/or stop operations on site to ensure compliance with the relevant conditions of this consent;
   (c) minimise the noise impacts of the development during meteorological conditions under which the noise limits in this consent do not apply (see Appendix 8);
   (d) use its best endeavours to achieve the long-term noise goals in Table 2, where reasonable and feasible, and report on progress towards achieving these goals in each Annual Review;
   (e) carry out a comprehensive noise audit of the development in conjunction with each independent environmental audit; and
   (f) prepare an action plan to implement any additional reasonable and feasible onsite noise mitigation measures identified by each audit;
   to the satisfaction of the Planning Secretary.

Table 2: Long-term Noise Goals dB(A)

Location	***Day***	***Evening***	***Night***
	$L_{Aeq(15\ min)}$	$L_{Aeq(15\ min)}$	$L_{Aeq(15\ min)}$
R11 – R13	41	41	41
R22	40	40	40

Notes:
- *To interpret the locations referred to in Table 2, see Appendix 6 and the EIS; and*
- *Noise generated by the development is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy. Appendix 8 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.*

Noise Management Plan

9. The Applicant must prepare a Noise Management Plan for the development to the satisfaction of the Planning Secretary. This plan must:
   (a) be prepared in consultation with the EPA and submitted to the Planning Secretary for approval within 4 months of the date of this consent, unless otherwise agreed by the Planning Secretary;
   (b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this consent;
   (c) describe the proposed noise management system in detail including the mitigation measures that would be implemented to minimise noise during construction and operations, including on and off site road noise generated by vehicles associated with the development; and
   (d) include a monitoring program that:
      - uses attended monitoring to evaluate the compliance of the development against the noise criteria in this consent;
      - evaluates and reports on:
        - the effectiveness of the on-site noise management system; and
        - compliance against the noise operating conditions; and
      - defines what constitutes a noise incident, and includes a protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents.

The Applicant must implement the Noise Management Plan as approved by the Planning Secretary.

AIR QUALITY

Odour

10. The Applicant must ensure that no offensive odours are emitted from the site, as defined under the POEO Act.

APPENDIX 6
NOISE RECEIVER LOCATIONS

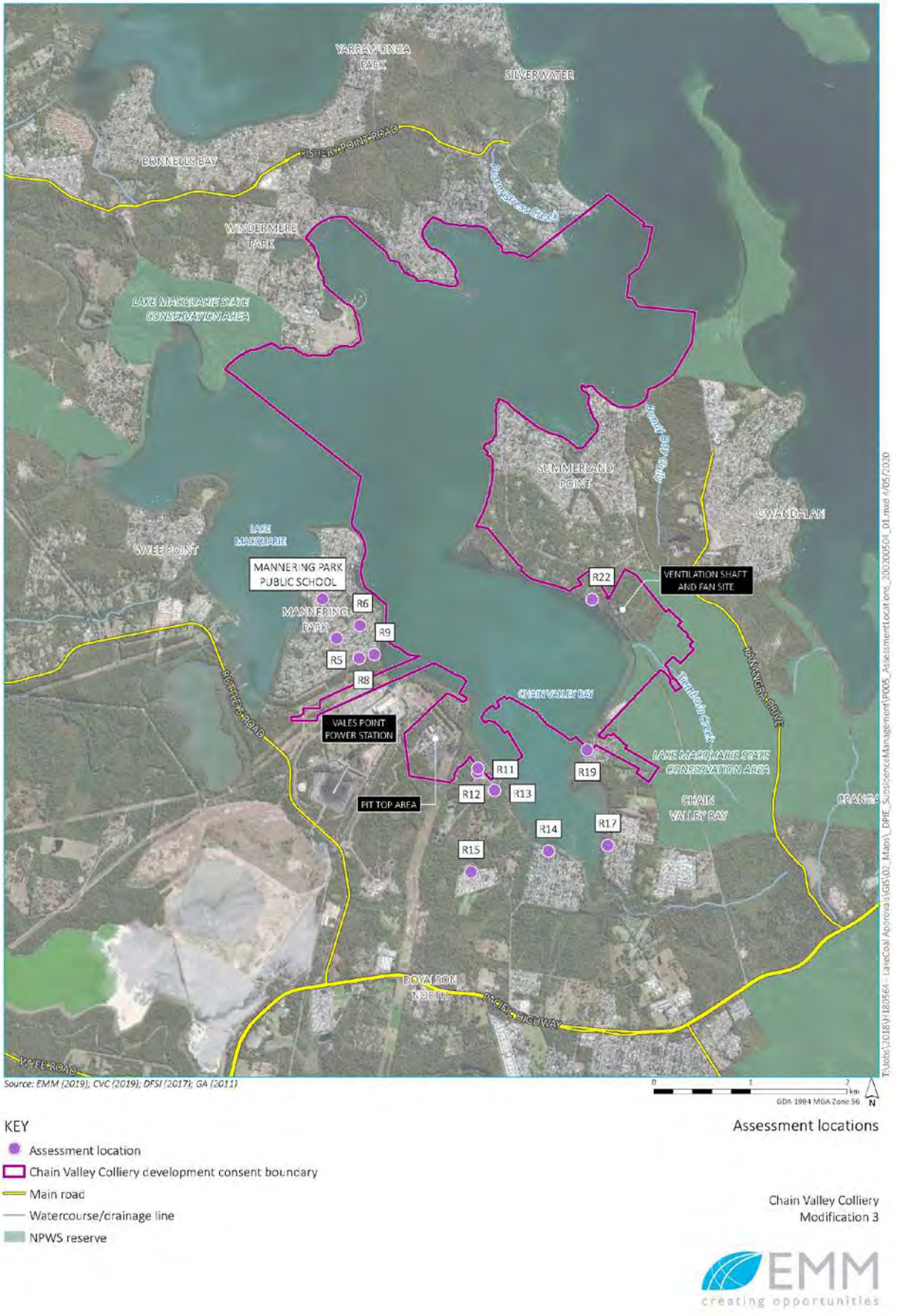


Figure 1: *Noise Receiver Locations*

APPENDIX 8
NOISE COMPLIANCE ASSESSMENT

Applicable Meteorological Conditions

1. The noise criteria in Table 1 of the conditions are to apply under all meteorological conditions except the following:
   (a) during periods of rain or hail;
   (b) average wind speed at microphone height exceeds 5 m/s;
   (c) wind speeds greater than 3 m/s measured at 10 m above ground level; or
   (d) temperature inversion conditions greater than 3°C/100 m.

Determination of Meteorological Conditions

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions must be that recorded by the meteorological station described in condition 14 of schedule 3.

Compliance Monitoring

3. Attended monitoring is to be used to evaluate compliance with the relevant conditions of this consent.

4. This monitoring must be carried out at least 4 times in each calendar year (ie at least once every 3 months), unless the Planning Secretary directs otherwise.

5. Unless otherwise agreed with the Planning Secretary, this monitoring is to be carried out in accordance with the relevant requirements for reviewing performance set out in the *NSW Industrial Noise Policy* (as amended from time to time), in particular the requirements relating to:
   (a) monitoring locations for the collection of representative noise data;
   (b) meteorological conditions during which collection of noise data is not appropriate;
   (c) equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and
   (d) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration.

	results of this monitoring program will be reviewed by a suitably qualified expert and used to determine the appropriateness of the existing irrigation area to receive this effluent; • develop a program to monitor creek line channel stability and the health of riparian vegetation within Swindles Creek. Monitoring will be undertaken in accordance with Section 8.5.2 of the Surface Water Impact Assessment (EIS Appendix E) and incorporated into the Colliery's WMP or Biodiversity Management Plan; and • record monitoring data in accordance with the Colliery's WMP and EPL 1770. Monitoring data will be interpreted as it is received to ensure appropriate operational guidance on monitoring water quality within desired parameters. Results of water quality monitoring will be reported in the Annual Review and made available to the CCC, as well as CC Council and LMCC.
Noise	Management and monitoring of noise will continue to be undertaken in accordance with the Colliery's NMP, which will be reviewed and updated as required to include the commitments made below. Great Southern Energy Pty Limited will: • continue attended compliance monitoring on site which will be used to identify potential hot spots and primary noise sources; • continue real-time noise monitoring alerts to site personnel to enable implementation of any required rapid noise management initiatives; • manage potential non-compliance through a noise complaint handling and response system, including the identification of responsible sources to enable targeted remedial action; • assess if further noise mitigation options for the ventilation fans are reasonable and feasible following the receipt of attenuation proposals; and • discuss potential management measures or agreement options with the landowner at 275 Cams Boulevard, following receipt of proposals from acoustics specialists. In addition to the above, Great Southern Energy Pty Limited is committed to the progressive implementation of feasible measures to target long-term noise goals which are designed to reduce noise emissions from the Colliery. Long-term options for investigation include: • modification to belt/movement alarms; • investigation of surface conveyer and coal preparation equipment, to determine if noise reductions are possible; • identifying sound attenuation options for the surface bulldozer and front-end loader; • strategic placement of acoustic barriers; • attenuation for the surface screener/shaker; • installation of quiet rollers for surface conveyor belts; • acoustic treatments around compressors; and • the use of a conveyor stacker for product coal stockpiling.
Air Quality and greenhouse gases	Management and monitoring of air quality and greenhouse gases will continue to be undertaken in accordance with the Colliery's AQGHGMP, which will be reviewed and updated as required to include the commitments made below Great Southern Energy Pty Limited will: • investigate the use of a stacker to replace hauling between current conveyor system and stockpiles; • undertake GHG monitoring comprising measurement of carbon dioxide and methane at the ventilation shaft and fan sites; and • record and report annual diesel, oil, grease, acetylene and electricity use to fulfil National Greenhouse and Energy Reporting Scheme requirements.
Traffic and transport	Management and monitoring of traffic and transport will continue to be undertaken in accordance with the Colliery's RTP. In addition, Great Southern Energy Pty Limited will continue to investigate alternative options for transporting export coal to the Port of Newcastle, specifically the preferred rail transport option, requiring the construction of a private haul road to the VPPS coal unloading facility and associated infrastructure upgrades. In addition, Great Southern Energy Pty Limited will investigate options to reduce peak hour traffic would be investigated including potentially limiting the peak hourly volumes of the Colliery truck traffic which would be permitted to travel via this intersection should the Colliery not be using rail transport for export coal by five years from the granting of development consent. Alternatively, a pro-rata financial contribution to the cost of installing traffic signals at the southbound intersection of the F3 and Sparks Road interchange could be made commensurate with the percentage of Colliery generated traffic using the intersection.
Subsidence	Management and monitoring of subsidence will continue to be undertaken in accordance with the Colliery's SMP or Extraction Plans, which will be reviewed and

B.2 Environmental Protection Licence

27	Discharge to waters Discharge quality and volume monitoring	Discharge to waters Discharge quality and volume monitoring	Discharge to waters via dam spillway from final settlement pond adjacent to Point 1, shown as "Point 27" on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to the EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3).

P1.4 The following points referred to in the table below are identified in this licence for the purposes of weather and/or noise monitoring and/or setting limits for the emission of noise from the premises.

Noise/Weather

EPA identification no.	Type of monitoring point	Location description
9	Noise monitoring	Noise monitoring site, shown as "Point 9", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). Located at 109 Griffith Street, MANNERING PARK, 2259. Identified as R8 in Development Consent SSD-5465 (MOD 4) submitted to the EPA and dated 12 August 2021 (EPA Ref: DOC21/691135-1).
12	Noise monitoring	Noise monitoring site, shown as "Point 12", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). Located at 35 Lakeshore Avenue, KINGFISHER SHORES, 2259. Identified as R11 in Development Consent SSD-5465 (MOD 4) submitted to the EPA and dated 12 August 2021 (EPA Ref: DOC21/691135-1).
13	Noise monitoring	Noise monitoring site, shown as "Point 13", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). Located at 20 Lakeshore Avenue, KINGFISHER SHORES, 2259. Identified as R12 in Development Consent SSD-5465 (MOD 4) submitted to the EPA and dated 12 August 2021 (EPA Ref: DOC21/691135-1).

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14	Noise monitoring	Noise monitoring site, shown as "Point 14", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to the EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). Located at 33 Karoola Avenue, KINGFISHER SHORES, 2259. Identified as R13 in Development Consent SSD-5465 (MOD 4) submitted to the EPA and dated 12 August 2021 (EPA Ref: DOC21/691135-1).
16	Noise monitoring	Noise monitoring site, shown as "Point 16", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to the EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). Located at 150 Tall Timbers Road, DOYALSON NORTH, 2262. Identified as R15 in Development Consent SSD-5465 (MOD 4) submitted to the EPA and dated 12 August 2021 (EPA Ref: DOC21/691135-1).
20	Noise monitoring	Noise monitoring site, shown as "Point 20", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to the EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). Located at 2 Sunset Parade, CHAIN VALLEY BAY, 2259. Identified as R19 in Development Consent SSD-5465 (MOD 4) submitted to the EPA and dated 12 August 2021 (EPA Ref: DOC21/691135-1).
23	Noise monitoring	Noise monitoring site, shown as "Point 23", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to the EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). Located at 275 Cams Boulevard, SUMMERLAND POINT, 2259. Identified as R22 in Development Consent SSD-5465 (MOD 4) submitted to the EPA and dated 12 August 2021 (EPA Ref: DOC21/691135-1).
26	Meteorological Station	Meteorological monitoring site, shown as "Point 26", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to the EPA and dated 24 October 2024 (DOC24/771631-3) and 11 August 2021 (DOC21/691135). Located at Mannering Colliery (Ruttleys Road), DOYALSON NORTH, 2259.

3 Limit Conditions

L1 Pollution of waters

Environment Protection Licence

Licence - 1770

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Concentration limits

L2.1 For each monitoring/discharge point or utilisation area specified in the table/s below (by a point number), the concentration of a pollutant discharged at that point, or applied to that area, must not exceed the concentration limits specified for that pollutant in the table.

L2.2 Where a pH quality limit is specified in the table, the specified percentage of samples must be within the specified ranges.

L2.3 To avoid any doubt, this condition does not authorise the pollution of waters by any pollutant other than those specified in the table\s.

L2.4 Water and/or Land Concentration Limits

POINT 1,27

Pollutant	Units of Measure	50 percentile concentration limit	90 percentile concentration limit	3DGM concentration limit	100 percentile concentration limit
Oil and Grease	milligrams per litre				10
pH	pH				6.5-8.5
Total suspended solids	milligrams per litre				50

L3 Volume and mass limits

L3.1 For each discharge point or utilisation area specified below (by a point number), the volume/mass of:
a) liquids discharged to water; or;
b) solids or liquids applied to the area;
must not exceed the volume/mass limit specified for that discharge point or area.

Point	Unit of Measure	Volume/Mass Limit
1	kilolitres per day	12161
27	kilolitres per day	12161

L3.2 The volumetric daily discharge limit for the premises is the combined discharge measured at EPA discharge

points 1 and 27 and must not exceed 12161 kilolitres per day.

L4 Waste

L4.1 The licensee must not cause, permit or allow any waste to be received at the premises, except the wastes expressly referred to in the column titled “Waste” and meeting the definition, if any, in the column titled “Description” in the table below.
Any waste received at the premises must only be used for the activities referred to in relation to that waste in the column titled “Activity” in the table below.
Any waste received at the premises is subject to those limits or conditions, if any, referred to in relation to that waste contained in the column titled “Other Limits” in the table below.
This condition does not limit any other conditions in this licence.

Code	Waste	Description	Activity	Other Limits
NA	General or Specific exempted waste	Waste that meets all the conditions of a resource exemption under Clause 92 of the Protection of the Environment Operations (Waste) Regulation 2014.	As specified in each particular resource recovery exemption	NA

L5 Noise limits

L5.1 Noise generated at the premises that is measured at each noise monitoring point established under this licence must not exceed the noise levels specified in Column 4 of the table below for that point during the corresponding time periods specified in Column 1 when measured using the corresponding measurement parameters listed in Column 2.

POINT 12

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	49
Evening	Evening-LAeq (15 minute)	-	49
Night	Night-LAeq (15 minute)	-	49
Night	Night-LA1 (1 minute)	-	54

POINT 13

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	49
Evening	Evening-LAeq (15 minute)	-	49

Environment Protection Licence

Night	Night-LAeq (15 minute)	-	49
Night	Night-LA1 (1 minute)	-	53

POINT 14

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	43
Evening	Evening-LAeq (15 minute)	-	43
Night	Night-LAeq (15 minute)	-	43
Night	Night-LA1 (1 minute)	-	49

POINT 16

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	36
Evening	Evening-LAeq (15 minute)	-	36
Night	Night-LAeq (15 minute)	-	36
Night	Night-LA1 (1 minute)	-	45

POINT 20

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	37
Evening	Evening-LAeq (15 minute)	-	37
Night	Night-LAeq (15 minute)	-	37
Night	Night-LA1 (1 minute)	-	45

POINT 23

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	46
Evening	Evening-LAeq (15 minute)	-	46
Night	Night-LAeq (15 minute)	-	46
Night	Night-LA1 (1 minute)	-	46

Environment Protection Licence

POINT 9

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	Day-LAeq (15 minute)	-	38
Evening	Evening-LAeq (15 minute)	-	38
Night	Night-LAeq (15 minute)	-	38
Night	Night-LA1 (1 minute)	-	45

L5.2 The licensee must ensure that noise generated on the premises does not exceed:

a) 35 LAeq(15min) during the day, evening or night at any privately owned land nearest to the residence apart from those receivers identified in Condition 5.1; and
b) 45 LA1(1min) during the night at any privately owned land nearest to the residence apart from those receivers identified in Condition 5.1.

Note: The licensee may provide to the EPA written evidence of any agreement with a landholder which is subject to the above noise limits. The written evidence may be submitted with a licence variation to remove the landholder from the above tables.

L5.3 For the purpose of condition L5.1 and condition L5.2:
(a) Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sunday and public holidays;
(b) Evening is defined as the period 6pm to 10pm, and
(c) Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sunday and public holidays.

L5.4 The noise limits set out in condition L5.1 and condition L5.2 apply under all meterorological conditions except for any one of the following:
(a) Wind speeds greater than 3 metres/second at 10 metres above ground level; or
(b) Stability category F temperature inversion conditions and wind speeds greater than 2 metres/second at 10 metres above ground level; or
(c) Stability category G temperature inversion conditions.
(d) Or as defined under the NSW EPA Noise Policy for Industry 2017.

L5.5 For the purpose of condition L5.4:
(a) the meteorological data to be used for determining meteorological conditions is the data recorded at the meteorological station identified in this licence as EPA Identification Point 26.
(b) Stability category temperature inversion conditions are to be determined in accordance with the NSW EPA Noise Policy for Industry 2017.

Note: The weather station must be designed, commissioned and operated in a manner to obtain the necessary parameters required under the above condition.

L5.6 For the purpose of determining the noise generated at the premises the licensee must use a Class 1 or Class 2 noise monitoring device as defined by AS IEC61672.1 and AS IEC61672.2-2004, or other noise monitoring equipment accepted by the EPA in writing.

L5.7 To determine compliance:

1. With the $L_{Aeq(15\ min)}$ noise limits in condition L5.1 and condition L5.2, the licensee must locate noise monitoring equipment;

(a) within 30 metres of a dwelling facade (but not closer than 3 metres) where any dwelling on the property is situated more then 30 metres from the property boundary that is closest to the premises;

(b) approximately on the boundary where any dwelling is situated 30 metres or less from the property boundary that is closest to the premises, or, where applicable,

(c) within approximately 50 metres if the boundary of a national park or nature reserve.

2. With the LA1(1 minute) noise limits in condition L5.1 and L5.2, the noise monitoring equipment must be located within 1 metre of a dwelling facade.

3. With the noise limits in condition L5.1 and condition L5.2, the noise monitoring equipment must be located;

(a) at the most affected point at a location where there is no dwelling at the location, or

(b) at the most affected point within an area at a location prescribed by conditions L5.7 1(a) or L5.7 1(b).

L5.8 A non-compliance of condition L5.1 or condition L5.2 will still occur where noise generated from the premises in excess of the appropriate limit is measured;
a) at a location other than an area prescribed by conditions L5.7 1(a) and L5.7 1(b), and /or
b) at a point other than the most affected point at a location.

L5.9 For the purposes of determining the noise generated at the premises all applicable modification factors as described in the NSW EPA Noise Policy for Industry 2017 must be applied, as appropriate, to the noise levels measured by the noise monitoring equipment.

4 Operating Conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.
This includes:
a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

Environment Protection Licence

M4 Environmental monitoring

Requirement to monitor noise

M4.1 To determine compliance with condition L5.1, attended noise monitoring must be undertaken in accordance with conditions L5.7 and L5.8, and

(a) at each one of the locations listed in condition L5.1;
(b) occur quarterly within the reporting period of the Environment Protection Licence with at least 2 months between monitoring periods;
(c) occur during each day, evening and night period as defined in the NSW Industrial Noise Policy (EPA 2000) for a minimum of 15 minutes for three of the quarters;
(d) the night time 15 minute attended monitoring in accordance with c) must be undertaken between the hours of 1am and 4am;
(e) the night time LA1 (1 min) attended monitoring in accordance with c) must be undertaken between the hours of 1am and 4am;
(f) one quarterly monitoring must occur during each day, evening and night period as defined in the NSW EPA Noise Policy for Industry 2017 for a minimum of 1.5 hours during the day; 30 minutes during the evening; and 1 hours during the night, and
(g) each quarterly monitoring must be undertaken on a different day(s) of the week not including Saturdays, Sundays and public holidays; and
(h) these monitoring conditions take effect in the 2015 Reporting period.

Note: The intention of this condition is that quarterly monitoring be undertaken at each sensitive receiver. That at each sensitive receiver monitoring is undertaken over a range of different days excluding weekends and public holidays during the reporting period so as to be representative of operating hours. That night time 15 minute attended monitoring and the LA1 (1min) monitoring for three of the quarters be undertaken at worst case being the most stable atmospheric conditions and when noise would be most intrusive to sleep. All of the sensitive receivers do not have to be monitored on the same day, evening and night for sub condition f.

M5 Weather monitoring

M5.1 At the point(s) identified below, the licensee must monitor (by sampling and obtaining results by analysis) the parameters specified in Column 1 of the table below, using the corresponding sampling method, units of measure, averaging period and sampling frequency, specified opposite in the Columns 2, 3, 4 and 5 respectively.

B.3 Noise management plan

2.4 Chain Valley Colliery Environmental Protection License 1770

CVC operates under EPL 1770 issued by the NSW EPA under the POEO Act. The EPL has been modified, most recently on 2 April 2019 acknowledging the transfer of ownership from LakeCoal Pty Ltd to Great Southern Energy Pty Ltd.

Noise related requirements of EPL 1770 together with where they are addressed in this NMP are provided in **Appendix E**.

2.5 Mannering Colliery Environmental Protection License 191

Mannering Colliery operates under EPL 191 issued by the NSW EPA under the POEO Act. The EPL has been modified, most recently on 1 April 2019 following the statutory five-year review and consisting of a number of variations which were mostly administrative in nature.

Condition L5 of EPL 191 notes that noise limits are not specified, with the Department of Planning, Industry and Environment being the appropriate authority for regulating noise conditions under Project Approval 06_0311.

2.6 Operational Noise Criteria

Noise limits within CVC Development Consent SSD-5465 and MC Project Approval 06_0311 have been outlined in **Table 2**.

Table 2: Consented Operational Noise Criteria dB(A) for Delta Coal Collieries

Consent/Approval/EPL Location	Day		Evening		Night		
	$L_{Aeq\ (15\ min)}$		$L_{Aeq\ (15\ min)}$		$L_{Aeq\ (15\ min)}$		$L_{A1\ (1\ min)}$
Chain Valley Colliery							
R8 (EPL Point 8)	38		38		38		45
R11 (EPL Point 11)	49	41^	49	41^	49	41^	54
R12 (EPL Point 12)	49	41^	49	41^	49	41^	53
R13 (EPL Point 13)	43	41^	43	41^	43	41^	49
R15 (EPL Point 15)	36		36		36		45
R19 (EPL Point 19)	37		37		37		45
R22 (EPL Point 22)	46	40^	46	40^	46	40^	46
All other privately-owned land	35		35		35		45
Mannering Colliery							
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 – Macquarie Shores Home Village	42		42		42		47
9 – Jeans	40		37		37		47
11 – Jeans	40		36		36		46
18 – Jeans	40		36		36		46
20 – Knight and all other privately-owned residences	40		36		36		46

^ = Long Term Noise Goals (where long-term goals differ from consented criteria)

Noise criteria outlined in **Table 2** do not apply if Delta Coal has an agreement with the owner/s of the relevant residence or land to exceed the noise criteria and Delta Coal has advised the EPA and DPIE in writing of the terms of this agreement.

As CVC has been operating for approximately 58 years, some of the predicted noise impacts at local receivers are greater than would usually be permissible without the requirement to offer noise treatments or voluntary acquisition. Notably the relocation of coal handling from CVC to MC in 2017 significantly improved CVC progression toward realising the long-term goals at receivers R11 to R13, where currently monitoring typically notes that occasional forklift and plant start-up warnings can be heard during monitoring at these receivers, while typically the site is inaudible. Consistent with noise monitoring results, community complaints from residents at these receivers regarding noise emissions has significantly decreased.

4.2.2 Chain Valley Colliery

Consistent with the noise impact assessment prepared by AECOM Pty Ltd for CVC in 2011 and undertaken as part of the Environmental Impact Statement (EIS) for Development Consent of SSD-5465, residential receivers have been divided into seven (7) noise catchment areas with similar geographical and acoustic features. The following points are considered representative of each noise catchment area:

- ATN001, representative of EPL 1770 monitoring point identification number 9, also identified in Development Consent SSD-5465 as receiver 'R8'. The attended monitoring point captures noise emissions at privately-owned residential properties located in Mannering Park, northwest of the Chain Valley Colliery pit top. The dominant noise sources in this area are birds, insects, traffic and other industrial sources;
- ATN002, representative of EPL 1770 monitoring point identification number 12, also identified in Development Consent SSD-5465 as receiver 'R11'. The attended monitoring point captures noise emissions at privately-owned residential properties located in Kingfisher Shores, south-east of the Chain Valley Colliery pit top. The dominant noise sources in this area are birds, insects, traffic and other industrial sources;
- ATN003, representative of EPL 1770 monitoring point identification number 16, also identified in Development Consent SSD-5465 as receiver 'R15'. The attended monitoring point captures noise emissions at privately-owned relocatable residences within MSHV, south of the Chain Valley Colliery pit top. The dominant noise sources in this receiver area are birds, insects, traffic and other industrial sources. Activities at Mannering Colliery are also audible at times;
- ATN004, representative of Development Consent SSD-5465 receiver 'R14'. The attended monitoring point captures noise emissions at privately-owned residential properties located in Chain Valley Bay South, south-east of the Chain Valley Colliery pit top. The dominant noise sources in this area are birds, insects, traffic and other industrial sources;
- ATN005, representative of Development Consent SSD-5465 receiver 'R17'. The attended monitoring point captured noise emissions at privately-owned residential properties located in Chain Valley Bay East, south-east of the Chain Valley Colliery pit top. The dominant noise sources in this area are birds, insects, traffic and other industrial sources;
- ATN006, representative of EPL 1770 monitoring point identification number 20, also identified in Development Consent SSD-5465 as receiver 'R19'. The attended monitoring point captures noise emissions at privately-owned residential properties located in Chain Valley Bay North, east of the Chain Valley Colliery pit top. The dominant noise sources in this area are birds, insects, traffic and other industrial sources
- ATN007, representative of EPL 1770 monitoring point identification number 23, also identified in Development Consent SSD-5465 as receiver 'R22'. The attended monitoring point captured

noise emissions at privately-owned residential properties located in Summerland Point, surrounding Chain Valley Colliery's Summerland Point ventilation shaft and fan site. The dominant noise sources in this area are birds, insects, traffic and the Summerland Point ventilation shaft and fan site.

It is noted that, with reference to the requirements of the EPL, two receivers were not considered to be captured by the seven (7) noise catchment areas outlined in the EIS and as such, monitoring is to be undertaken at the following points in addition to locations ATN001 to ATN007:

- R12, identified in EPL 1770 as noise monitoring point 13, noted to be adjacent to ATN002 at Kingfisher Shores on Lakeshore Avenue, Kingfisher Shores; and
- R13, identified in EPL 1770 as noise monitoring point 14, located on Karoola Avenue, Kingfisher Shores.

The spatial locations of the CVC attended monitoring locations and relevant noise criteria are detailed in **Table 5** below.

Table 5: Noise Monitoring Locations and Limits for Chain Valley Colliery

Location	Receivers Represented EPL 1770 ID SSD-5465 ID	Coordinates	Day $L_{Aeq(15\ min)}$ dB (A)	Evening $L_{Aeq(15\ min)}$ dB (A)	Night $L_{Aeq(15\ min)}$ dB (A)	Night $L_{A1(1\ min)}$ dB (A)
ATN001	EPL #9 R8	364140 E 6330594 N	35	35	35	35
ATN002	EPL #12 R11	365218 E 6329388 N	49	49	49	54
ATN003	EPL#16 R15	365165 E 6328323 N	36	36	36	45
ATN004	N/A R14	365949 N 6328530 E	35	35	35	45
ATN005	N/A R17	366560 N 6328590 E	35	35	35	45
ATN006	20 R19	366305 N 6329321 E	37	37	37	45
ATN007	23 R22	366425 N 6331135 E	46	46	46	46
R12	13 R12	365185 N 6329352 E	49	49	49	53
R13	14 R13	365391 N 6329169 E	43	43	43	49

Appendix C
Calibration certificates

EMM
creating opportunities

Sydney Calibration Laboratory
Suite 4.03, Level 4, 3 Thomas Holt Drive, Macquarie Park NSW 2113, Australia
Accredited for compliance with ISO/IEC 17025 - Calibration. Laboratory No. 1301

CERTIFICATE OF CALIBRATION

Certificate No: CAU2300941

CALIBRATION OF:

Sound Level Meter:	Brüel & Kjær	2250	No: 2759405
Microphone:	Brüel & Kjær	4189	No: 2983733
Preamplifier:	Brüel & Kjær	ZC-0032	No: 22666
Supplied Calibrator:	None		
Software version:	BZ7224 Version 4.7.4	Pattern Approval:	-
Instruction manual:	BE1712-22	Identification:	N/A

CUSTOMER:

EMM Consulting Pty Limited
20 Chandos Street
St Leonards NSW 2065

CALIBRATION CONDITIONS:

Preconditioning:	4 hours at 23 °C
Environment conditions:	*see actual values in **Environmental conditions** sections*

SPECIFICATIONS:

The Sound Level Meter has been calibrated in accordance with the requirements as specified in IEC61672-1:2013 class 1.
Procedures from IEC 61672-3:2013 were used to perform the periodic tests.
The measurements included in this document are traceable to Australian/National standards.

PROCEDURE:

The measurements have been performed with the assistance of Brüel & Kjær Sound Level Meter Calibration System B&K 3630 with application software type 7763 (version 8.6 - DB: 8.60) and test procedure 2250-4189.

RESULTS:

	Initial calibration		Calibration prior to repair/adjustment
X	Calibration without repair/adjustment		Calibration after repair/adjustment

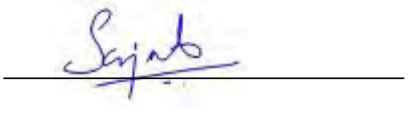
The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ providing a level of confidence of approximately 95 %. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from the standards, calibration method, effect of environmental conditions and any short time contribution from the device under calibration.

Date of Calibration:20/12/2023

Certificate issued:21/12/2023

Calibration Technician: Sajeeb Tharayil

Approved signatory: Sajeeb Tharayil



Reproduction of the complete certificate is allowed. Part of the certificate may only be reproduced after written permission.

NVMS

Sydney Calibration Laboratory
Unit 21, 1 Talavera Road, Macquarie Park NSW 2113, Australia
Accredited for compliance with ISO/IEC 17025 - Calibration. Laboratory No. 1301

NATA
WORLD RECOGNISED ACCREDITATION

CERTIFICATE OF CALIBRATION

Certificate No: CAU2400803

CALIBRATION OF:

Sound Level Meter:	Brüel & Kjær	2255	No: 2255-100299
Microphone:	Brüel & Kjær	4966	No: 3403563
Preamplifier:	Brüel & Kjær	ZC-0043	No: 3399249
Supplied Calibrator:	None		
Software version:	BZ7300 Version 1.2.0.1325	Pattern Approval:	-
Instruction manual:	BE1917-11	Identification:	N/A

CUSTOMER:

EMM Consulting Pty Limited
20 Chandos Street
St Leonards NSW 2065

CALIBRATION CONDITIONS:

Preconditioning:	4 hours at 23 °C
Environment conditions:	*see actual values in **Environmental conditions** sections*

SPECIFICATIONS:

The Sound Level Meter has been calibrated in accordance with the requirements as specified in IEC61672-3:2006 class 1. Procedures from IEC 61672-3:2006 were used to perform the periodic tests. The measurements included in this document are traceable to Australian / International standards through accredited calibration of all relevant reference equipment.

PROCEDURE:

The measurements have been performed with the assistance of Brüel & Kjær Sound Level Meter Calibration System B&K 3630 with application software type 7763 (version 8.6 - DB: 8.60) and test procedure 2255-N, 4966 (BZ-7300).

RESULTS:

X	Initial calibration		Calibration prior to repair/adjustment
	Calibration without repair/adjustment		Calibration after repair/adjustment

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ providing a level of confidence of approximately 95 %. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from the standards, calibration method, effect of environmental conditions and any short time contribution from the device under calibration.

Date of Calibration: 14/08/2024

Certificate issued: 14/08/2024

Barath Chandar Rajendran
Calibration Technician

Sajeeb Tharayil
Approved signatory

Reproduction of the complete certificate is allowed. Parts of the certificate may only be reproduced after written permission.

Summary

Preliminary inspection	**Passed**
Environmental conditions, Prior to calibration	**Passed**
Reference information	**Passed**
Indication at the calibration check frequency	**Passed**
Acoustical signal tests of a frequency weighting, C weighting	**Passed**
Self-generated noise, Microphone installed	**Passed**
Self-generated noise, Electrical	**Passed**
Electrical signal tests of frequency weightings, A weighting	**Passed**
Electrical signal tests of frequency weightings, C weighting	**Passed**
Electrical signal tests of frequency weightings, Z weighting	**Passed**
Frequency and time weightings at 1 kHz	**Passed**
Long-term stability, Reference	**Passed**
Level linearity on the reference level range, Upper	**Passed**
Level linearity on the reference level range, Lower	**Passed**
Toneburst response, Time-weighting Fast	**Passed**
Toneburst response, Time-weighting Slow	**Passed**
Toneburst response, Leq	**Passed**
C-weighted peak sound level, 8 kHz	**Passed**
C-weighted peak sound level, 500 Hz	**Passed**
Overload indication	**Passed**
Long-term stability, 1. relative	**Passed**
High-level stability	**Passed**
Long-term stability, 2. relative	**Passed**
Environmental conditions, Following calibration	**Passed**

The sound level meter submitted for testing successfully completed the periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organization responsible for approving the results of pattern-evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 specifications of IEC 61672-1:2013.

Conformance to a performance specification is demonstrated when the following criteria are both satisfied: (a) a measured deviation from a design goal does not exceed the applicable acceptance limit and (b) the corresponding uncertainty of measurement does not exceed the corresponding maximum-permitted uncertainty of measurement given in IEC 61672-1:2013 for the same coverage probability of 95 %.

Instruments

Category:	Type:	Manufacturer:	Serial No.:
Voltmeter	DMM34461A	Keysight / Agilent	MY60055667
Generator	Pulse Generator	Bruel & Kjaer	BK3161-105338
Calibrator	4226	Bruel & Kjaer	3222931
AmplifierDivider	WB-3630 Output Module	Bruel & Kjaer	3330940
Adaptor	WA0302B, 15 pF	Bruel & Kjaer	2747050

Preliminary inspection

Visually inspect instrument, and operate all relevant controls. (clause 5)

	Result
Visual inspection	OK

Environmental conditions, Prior to calibration

Actual environmental conditions prior to calibration. (clause 7)

	Expected	Accept - Limit	Accept + Limit	Measured [Deg / kPa / %RH]
Air temperature	23.00	-3.00	3.00	24.10
Air pressure	101.30	-21.30	3.70	101.50
Relative humidity	50.00	-25.00	20.00	51.20

Reference information

Information about reference range, level and channel. (clause 22.h + 22.m)

	Value [dB SPL]
Reference sound pressure level	94
Reference level range	140
Channel number	1

Indication at the calibration check frequency

Measure and adjust sound level meter using the supplied calibrator. (clause 10 + 22.m)

	Expected [dB SPL / Hz]	Measured [dB SPL / Hz]	Uncertainty [dB]
Calibration check frequency (in-house calibrator)	1000.00	1000.00	1.00
Initial indication (in-house calibrator)	93.89	93.96	0.29
Adjusted indication (in-house calibrator)	93.89	93.93	0.29

Acoustical signal tests of a frequency weighting, C weighting

Frequency weightings measured acoustically with a calibrated multi-frequency sound calibrator. Averaging time is 10 seconds, and the result is the average of 2 measurements. (clause 12)

	Coupler Pressure Lc	Mic. Correction C4226	Body Influence	Expected	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB]	[dB]	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
1000Hz, Ref. (1st)	93.96	0.06	0.01	93.89	93.91	-0.7	0.7	0.02	0.29
1000Hz, Ref. (2nd)	93.96	0.06	0.01	93.89	93.91	-0.7	0.7	0.02	0.29
1000Hz, Ref. (Average)	93.96	0.06	0.01	93.89	93.91	-0.7	0.7	0.02	0.29
125.89Hz (1st)	94.04	0.00	0.00	93.85	93.86	-1.0	1.0	0.01	0.26
125.89Hz (2nd)	94.04	0.00	0.00	93.85	93.83	-1.0	1.0	-0.02	0.26
125.89Hz (Average)	94.04	0.00	0.00	93.85	93.84	-1.0	1.0	-0.01	0.26
7943.3Hz (1st)	93.69	2.88	-0.03	87.85	87.58	-2.5	1.5	-0.27	0.47
7943.3Hz (2nd)	93.69	2.88	-0.03	87.85	87.58	-2.5	1.5	-0.27	0.47
7943.3Hz (Average)	93.69	2.88	-0.03	87.85	87.58	-2.5	1.5	-0.27	0.47

Self-generated noise, Microphone installed

Self-generated noise measured with microphone submitted for periodic testing. Averaging time is 30 seconds. An anechoic chamber is used to isolate environmental noise.
The level of self-generated noise is reported for information only and is not used to assess conformance to a requirement. (clause 11.1)

	Max	Measured	Uncertainty
	[dB SPL]	[dB SPL]	[dB]
A weighted	17.30	16.81	0.50

Self-generated noise, Electrical

Self-generated noise measured in most sensitive range, with electrical substitution for microphone, according to manufactures specifications.
The level of self-generated noise is reported for information only and is not used to assess conformance to a requirement. (clause 11.2)

	Max	Measured	Uncertainty
	[dB SPL]	[dB SPL]	[dB]
A weighted	12.00	7.05	0.30
C weighted	15.30	12.07	0.30
Z weighted	21.50	18.11	0.30

Electrical signal tests of frequency weightings, A weighting

Frequency response measured with electrical signal relative to level at 1 kHz in reference range. (clause 13)
Electrical and acoustical response and body influence corrections are adjusted with the respective correction values at the reference frequency, in accordance with clause 13.6

	Input Level	Expected	Measured	Response Corr.	Body Influence	Corr. Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dBV]	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
1000Hz, Ref.	-25.00	95.00	95.00	0.00	0.00	95.00	-0.5	0.5	0.00	0.12
63.096Hz	1.20	95.00	94.95	0.02	-0.01	94.96	-1.0	1.0	-0.04	0.12
125.89Hz	-8.90	95.00	94.96	0.02	-0.01	94.97	-1.0	1.0	-0.03	0.12
251.19Hz	-16.40	95.00	94.96	0.01	0.02	94.99	-1.0	1.0	-0.01	0.12
501.19Hz	-21.80	95.00	94.96	0.01	0.07	95.04	-1.0	1.0	0.04	0.12
1995.3Hz	-26.20	95.00	95.04	-0.03	-0.11	94.90	-1.0	1.0	-0.10	0.12
3981.1Hz	-26.00	95.00	95.09	-0.11	0.12	95.10	-1.0	1.0	0.10	0.12
7943.3Hz	-23.90	95.00	94.90	0.09	-0.04	94.95	-2.5	1.5	-0.05	0.12
15849Hz	-18.40	95.00	94.43	0.57	0.14	95.14	-16.0	2.5	0.14	0.12

Electrical signal tests of frequency weightings, C weighting

Frequency response measured with electrical signal relative to level at 1 kHz in reference range. (clause 13)
Electrical and acoustical response and body influence corrections are adjusted with the respective correction values at the reference frequency, in accordance with clause 13.6

	Input Level	Expected	Measured	Response Corr.	Body Influence	Corr. Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dBV]	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
1000Hz, Ref.	-25.00	95.00	95.00	0.00	0.00	95.00	-0.5	0.5	0.00	0.12
63.096Hz	-24.20	95.00	94.91	0.02	-0.01	94.92	-1.0	1.0	-0.08	0.12
125.89Hz	-24.80	95.00	95.03	0.02	-0.01	95.04	-1.0	1.0	0.04	0.12
251.19Hz	-25.00	95.00	94.99	0.01	0.02	95.02	-1.0	1.0	0.02	0.12
501.19Hz	-25.00	95.00	95.02	0.01	0.07	95.10	-1.0	1.0	0.10	0.12
1995.3Hz	-24.80	95.00	95.07	-0.03	-0.11	94.93	-1.0	1.0	-0.07	0.12
3981.1Hz	-24.20	95.00	95.10	-0.11	0.12	95.11	-1.0	1.0	0.11	0.12
7943.3Hz	-22.00	95.00	94.90	0.09	-0.04	94.95	-2.5	1.5	-0.05	0.12
15849Hz	-16.50	95.00	94.40	0.57	0.14	95.11	-16.0	2.5	0.11	0.12

Electrical signal tests of frequency weightings, Z weighting

Frequency response measured with electrical signal relative to level at 1 kHz in reference range. (clause 13)
Electrical and acoustical response and body influence corrections are adjusted with the respective correction values at the reference frequency, in accordance with clause 13.6

	Input Level	Expected	Measured	Response Corr.	Body Influence	Corr. Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dBV]	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
1000Hz, Ref.	-25.04	95.00	95.00	0.00	0.00	95.00	-0.5	0.5	0.00	0.12
63.096Hz	-25.04	95.00	94.94	0.02	-0.01	94.95	-1.0	1.0	-0.05	0.12
125.89Hz	-25.04	95.00	94.97	0.02	-0.01	94.98	-1.0	1.0	-0.02	0.12
251.19Hz	-25.04	95.00	94.99	0.01	0.02	95.02	-1.0	1.0	0.02	0.12
501.19Hz	-25.04	95.00	95.00	0.01	0.07	95.08	-1.0	1.0	0.08	0.12
1995.3Hz	-25.04	95.00	95.04	-0.03	-0.11	94.90	-1.0	1.0	-0.10	0.12
3981.1Hz	-25.04	95.00	95.12	-0.11	0.12	95.13	-1.0	1.0	0.13	0.12
7943.3Hz	-25.04	95.00	94.92	0.09	-0.04	94.97	-2.5	1.5	-0.03	0.12
15849Hz	-25.04	95.00	94.44	0.57	0.14	95.15	-16.0	2.5	0.15	0.12

Frequency and time weightings at 1 kHz

Frequency and time weighting measured at 1 kHz with electrical signal in reference range. Measured relative to A-weighted and Fast response. (clause 14)

	Expected	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
LAF, Ref.	94.00	94.00	-0.5	0.5	0.00	0.12
LCF	94.00	94.00	-0.2	0.2	0.00	0.12
LZF	94.00	94.04	-0.2	0.2	0.04	0.12
LAS	94.00	94.00	-0.1	0.1	0.00	0.12
LAeq	94.00	94.00	-0.1	0.1	0.00	0.12

Long-term stability, Reference

Long-term stability over 25 to 35 minutes, with steady 1kHz signal at reference level. (clause 15)
Adjusting to reference level indication.

	Measured	Accept - Limit	Accept + Limit	Deviation	Timestamp	Uncertainty
	[dB SPL]	[dB]	[dB]	[dB]		[dB]
Reference	94.00	-0.5	0.5	0.00	2024-08-14 12:06:21	0.10

Level linearity on the reference level range, Upper

Level linearity in reference range, measured at 8 kHz until overload. (clause 16)

	Expected	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
94 dB	94.00	94.00	-0.5	0.5	0.00	0.13
99 dB	99.00	99.00	-0.8	0.8	0.00	0.13
104 dB	104.00	104.00	-0.8	0.8	0.00	0.13
109 dB	109.00	109.00	-0.8	0.8	0.00	0.13
114 dB	114.00	114.00	-0.8	0.8	0.00	0.13
119 dB	119.00	119.00	-0.8	0.8	0.00	0.13
124 dB	124.00	124.00	-0.8	0.8	0.00	0.13
129 dB	129.00	129.00	-0.8	0.8	0.00	0.13
134 dB	134.00	134.00	-0.8	0.8	0.00	0.13
135 dB	135.00	135.00	-0.8	0.8	0.00	0.13
136 dB	136.00	136.00	-0.8	0.8	0.00	0.13
137 dB	137.00	137.00	-0.8	0.8	0.00	0.13
138 dB	138.00	138.00	-0.8	0.8	0.00	0.13
139 dB	139.00	139.00	-0.8	0.8	0.00	0.13
140 dB	140.00	140.00	-0.8	0.8	0.00	0.13

Level linearity on the reference level range, Lower

Level linearity in reference range, measured at 8 kHz down to lower limit, or until underrange. (clause 16)

	Expected	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
94 dB	94.00	94.00	-0.5	0.5	0.00	0.13
89 dB	89.00	89.00	-0.8	0.8	0.00	0.13
84 dB	84.00	84.00	-0.8	0.8	0.00	0.13
79 dB	79.00	79.00	-0.8	0.8	0.00	0.13
74 dB	74.00	74.00	-0.8	0.8	0.00	0.13
69 dB	69.00	69.00	-0.8	0.8	0.00	0.13
64 dB	64.00	64.00	-0.8	0.8	0.00	0.13
59 dB	59.00	59.00	-0.8	0.8	0.00	0.13
54 dB	54.00	54.00	-0.8	0.8	0.00	0.13
49 dB	49.00	49.00	-0.8	0.8	0.00	0.13
44 dB	44.00	44.00	-0.8	0.8	0.00	0.13
39 dB	39.00	39.00	-0.8	0.8	0.00	0.24
34 dB	34.00	34.01	-0.8	0.8	0.01	0.24
29 dB	29.00	29.03	-0.8	0.8	0.03	0.24
28 dB	28.00	28.04	-0.8	0.8	0.04	0.24
27 dB	27.00	27.05	-0.8	0.8	0.05	0.24
26 dB	26.00	26.04	-0.8	0.8	0.04	0.24
25 dB	25.00	25.09	-0.8	0.8	0.09	0.24
24 dB	24.00	24.08	-0.8	0.8	0.08	0.24
23 dB	23.00	23.11	-0.8	0.8	0.11	0.24

Toneburst response, Time-weighting Fast

Response to 4 kHz toneburst measured in reference range, relative to continuous signal. (clause 18)

	Expected	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
Continuous, Ref.	137.00	137.00	-0.5	0.5	0.00	0.12
200 ms Burst	136.00	136.02	-0.5	0.5	0.02	0.12
2 ms Burst	119.00	118.95	-1.5	1.0	-0.05	0.12
0.25 ms Burst	110.00	109.83	-3.0	1.0	-0.17	0.12

Toneburst response, Time-weighting Slow

Response to 4 kHz toneburst measured in reference range, relative to continuous signal. (clause 18)

	Expected	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
Continuous, Ref.	137.00	137.00	-0.5	0.5	0.00	0.12
200 ms Burst	129.60	129.58	-0.5	0.5	-0.02	0.12
2 ms Burst	110.00	109.97	-3.0	1.0	-0.03	0.12

Toneburst response, Leq

Response to 4 kHz toneburst measured in reference range, relative to continuous signal. (clause 18)

	Expected	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
Continuous, Ref.	137.00	137.00	-0.5	0.5	0.00	0.12
200 ms Burst	120.00	120.01	-0.5	0.5	0.01	0.12
2 ms Burst	100.00	99.98	-1.5	1.0	-0.02	0.12
0.25 ms Burst	91.00	90.85	-3.0	1.0	-0.15	0.12

C-weighted peak sound level, 8 kHz

Peak-response to a 8 kHz single-cycle sine measured in least-sensitive range, relative to continuous signal. (clause 19)

	Expected	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
Continuous, Ref.	132.00	132.00	-0.5	0.5	0.00	0.09
Single Sine	135.40	135.32	-2.0	2.0	-0.08	0.20

C-weighted peak sound level, 500 Hz

Peak-response to a 500 Hz half-cycle sine measured in least-sensitive range, relative to continuous signal. (clause 19)

	Expected	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB SPL]	[dB]	[dB]	[dB]	[dB]
Continuous, Ref.	135.00	135.00	-0.5	0.5	0.00	0.09
Half-sine, Positive	137.40	137.14	-1.0	1.0	-0.26	0.12
Half-sine, Negative	137.40	137.14	-1.0	1.0	-0.26	0.12

Overload indication

Overload indication in the least sensitive range determined with a 4 kHz positive/negative half-cycle signal. (clause 20)

	Measured / Input Level	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB]	[dB]	[dB]	[dB]
Continuous	140.00	-0.5	0.5	0.00	0.25
Half-sine, Positive	142.00	-10.0	10.0	2.00	0.25
Half-sine, Negative	142.00	-10.0	10.0	2.00	0.25
Difference	142.00	-1.5	1.5	0.00	0.25

Long-term stability, 1. relative

Long-term stability over 25 to 35 minutes, with steady 1kHz signal at reference level. (clause 15) Relative to prior adjustment to reference level indication.

	Measured	Accept - Limit	Accept + Limit	Deviation	Timestamp	Uncertainty
	[dB SPL / Min]	[dB / Min]	[dB / Min]	[dB / Min]		[dB]
Measurement	94.00	-0.1	0.1	0.00	2024-08-14 12:38:01	0.10
Time passed	31.40	0.0	35.0	31.40		0.00

High-level stability

High-level stability over 5 minutes, with steady 1kHz signal, 1dB below upper boundary. (clause 21)

	Measured	Accept - Limit	Accept + Limit	Deviation	Uncertainty
	[dB SPL]	[dB]	[dB]	[dB]	[dB]
High-level, Ref.	139.00	-0.5	0.5	0.00	0.10
High-level, after 5min	139.00	-0.1	0.1	0.00	0.10

Long-term stability, 2. relative

Long-term stability over 25 to 35 minutes, with steady 1kHz signal at reference level. (clause 15)
Relative to prior adjustment to reference level indication.

	Measured	Accept - Limit	Accept + Limit	Deviation	Timestamp	Uncertainty
	[Min / dB SPL]	[Min / dB]	[Min / dB]	[Min / dB]		[dB]
Wait	37.20	25.0	120.0	37.20		0.00
Measurement	94.00	-0.1	0.1	0.00	2024-08-14 12:44:02	0.10

Environmental conditions, Following calibration

Actual environmental conditions following calibration. (clause 7)

	Expected	Accept - Limit	Accept + Limit	Measured
				[Deg / kPa / %RH]
Air temperature	23.00	-3.00	3.00	24.07
Air pressure	101.30	-21.30	3.70	101.40
Relative humidity	50.00	-25.00	20.00	52.06

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Sound Calibrator

IEC 60942:2017

Calibration Certificate

Calibration Number C25652-V1

Client Details EMM Consulting
Level 3, 175 Scott Street
Newcastle, NSW, 2300

	Manufacturer	*Model*	*Serial*
Equipment Tested :			
Instrument :	Svantek	SV36	140737

Atmospheric Conditions

Ambient Temperature : 21.8 °C
Relative Humidity : 38 %
Barometric Pressure : 99.58 kPa

Calibration Technician : Peter Elters
Secondary Check: Rhys Gravelle
Calibration Date : 02-Oct-2025
Report Issue Date : 03-Oct-2025

Approved Signatory : Ken Williams

Characteristic Tested	Result
Generated Sound Pressure Level	*Pass*
Frequency Generated	*Pass*
Total Distortion	*Pass*

Nominal Level	Nominal Frequency	Measured Level	Measured Frequency
94	1000	94.11	1000.00
114	1000	114.09	1000.00

The sound calibrator has been shown to conform to the class 1 requirements for periodic testing, described in Annex B of IEC 60942:2017 for the sound pressure level(s) and frequency(ies) stated, for the environmental conditions under which the tests were performed..

Uncertainties of Measurement -

Specific Tests		Environmental Conditions	
Generated SPL	*±0.10 dB*	*Temperature*	*±0.1 °C*
Frequency	*±0.07 %*	*Relative Humidity*	*±1.9 %*
Distortion	*±0.20 %*	*Barometric Pressure*	*±0.019 kPa*

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025 - Calibration.

The results of the tests, calibrations and/or measurements included in this document are traceable to SI units.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.

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Sound Calibrator
IEC 60942:2017
Calibration Test Report

Calibration Number C25652-V1

Client Details EMM Consulting
Level 3, 175 Scott Street
Newcastle, NSW, 2300

	Manufacturer	*Model*	*Serial*
Equipment Tested : Instrument :	Svantek	SV36	140737

Atmospheric Conditions

Ambient Temperature : 21.8 °C
Relative Humidity : 38 %
Barometric Pressure : 99.58 kPa

Calibration Technician : Peter Elters
Secondary Check: Rhys Gravelle
Calibration Date : 02-Oct-2025
Report Issue Date : 03-Oct-2025

Approved Signatory : Ken Williams

Characteristic Tested	Result
Generated Sound Pressure Level	*Pass*
Frequency Generated	*Pass*
Total Distortion	*Pass*

The sound calibrator has been shown to conform to the class 1 requirements for periodic testing, described in Annex B of IEC 60942:2017 for the sound pressure level(s) and frequency(ies) stated, for the environmental conditions under which the tests were performed..

Uncertainties of Measurement -

Specific Tests		Environmental Conditions	
Generated SPL	*±0.10 dB*	*Temperature*	*±0.1 °C*
Frequency	*±0.07 %*	*Relative Humidity*	*±1.9 %*
Distortion	*±0.20 %*	*Barometric Pressure*	*±0.019 kPa*

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

This report applies only to the item tested and shall only be reproduced in full, unless approved in writing by Acoustic Research Labs.

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1. REVISION HISTORY

Revision	Date	Description
1	03-Oct-2025	Original Issue

2. OVERVIEW

This report presents the calibration test results of a SV36 Acoustic Calibrator, and associated equipment. Calibration is carried out in accordance with *IEC 60942-2017, Electroacoustics - Sound Calibrators*.

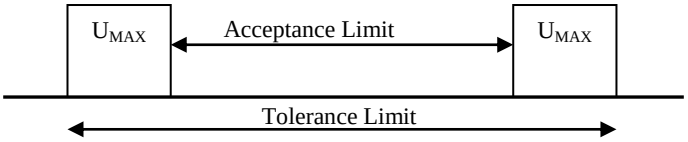
Relevant clauses from this standard have been used for periodic testing in conjunction with Acoustic Research Labs internal test methods described in Section 2 of the calibration work instruction manual.

This report was generated using template version identifier of 69876974.

2.1 UNCERTAINTIES

For each test performed, the associated measurement uncertainties are derived at the 95% confidence level and are given with a coverage factor of 2.

The uncertainty applies at the time of measurement only, and takes no account of any drift or other effects that may apply afterwards. When estimating uncertainty at any later time, other relevant information should also be considered, including, where possible, the history of the performance of the instrument and the manufacturer's specifications.



Where deviations from the design goals are provided to determine conformance to performance specifications, each measurement is reported with:

- The measured deviation from the design goal
- Associated acceptance limits for the test
- Maximum allowable uncertainty of measurement for the test
- Actual expanded uncertainty for each measurement

2.2 DOCUMENT CONVENTIONS

Test results which highlight non-conformances relative to the standard, and the sound level meter type specified by the manufacturer have been marked with an **F** in the respective tests.

Any tests that are not required, due to sound level meter configuration, are marked N/A.

3. GENERAL

3.1 DEVICE UNDER TEST

Equipment Tested :	*Manufacturer*	*Model*	*Serial*
Instrument :	Svantek	SV36	140737

Instrument received in fair condition.

3.2 ENVIRONMENTAL CONDITIONS DURING TEST

No corrections have been applied to any results obtained to compensate for the environmental conditions.

All tolerance limits stated apply to measurements made at and around reference environmental conditions within the following ranges:

80 kPa to 105 kPa

20°C to 26°C

25% to 90% relative humidity

3.3 CALIBRATION TESTS

Where applicable the following tests were performed in accordance with the requirements of *IEC 60942-2017* Annex B.

3.4 TEST EQUIPMENT USED

All test equipment used during periodic testing are calibrated every 12months by an accredited laboratory, traceable to SI units.

The performance of all equipment during these calibrations and the effects of instrument stability are used to determine the measurement uncertainty of each reported result.

3.4.1 Multi-function Acoustic Calibrator

A Bruel & Kjaer 4226 Multi-function calibrator (S/N – 3215300) was used as the reference for the sound pressure level and the signal frequency.

3.4.2 Sound Level Meter

ARL Ngara Class 1 (S/N – 878035). This device was used for converting acoustic signals into voltages which may be measured by the multimeter.

3.4.3 Audio Analyser

Abonet Audio Analyzer AVR-3710 (S/N – V859B9018). This device was used for measuring the AC voltage output of the reference Ngara unit. The AC level is proportional to the sound pressure level and frequency applied to the reference microphone.

3.4.4 Environmental Monitoring

A MHB-382SD (S/N – AH88227) was used for measuring environmental conditions during device calibration. It is capable of providing temperature, relative humidity and pressure measurements.

4. CALIBRATION TEST RESULTS

4.1 SOUND PRESSURE LEVEL

4.1.1 Generated Sound Pressure Level

The sound pressure level generated by the sound calibrator was measured three times as an average over 20 s of operation. During each measurement the sound calibrator was decoupled and rotated from the microphone to ensure any variations in operation were captured.

Table 1 – Generated Sound Pressure Level Results

Nominal Level (dB)	Nominal Frequency (Hz)	Measured Level (dB)	Deviation (dB)	Acceptance Limit (dB)	P/F	Uncertainty (dB)	Maximum Permitted Uncertainty (dB)	
94	1000	94.11	0.11	±0.25	P	0.10	0.15	Measured Output
114	1000	114.09	0.09	±0.25	P	0.10	0.15	Measured Output

4.2 FREQUENCY OUTPUT

The frequency generated by the sound calibrator was measured as an average over 20s of operation. The deviation from expected values is calculated as the absolute value of the difference in per cent between the frequency of the sound generated by the sound calibrator and the corresponding specified frequency.

Table 2 – Frequency Output Results

Nominal Level (dB)	Nominal Frequency (Hz)	Measured Frequency (Hz)	Deviation (Hz)	Acceptance Limit (Hz)	P/F	Uncertainty (Hz)	Maximum Permitted Uncertainty (Hz)	
94	1000	1000.00	0.00	±7.00	P	0.70	2.00	Measured Output
114	1000	1000.00	0.00	±7.00	P	0.70	2.00	Measured Output

4.3 TOTAL HARMONIC DISTORTION AND NOISE

The total harmonic distortion and noise (THD+N), measured over the frequency range from 22,5 Hz to 20 kHz, was measured as an average over 20s of operation.

Table 3 – THD+N Results

Nominal Level (dB)	Nominal Frequency (Hz)	Distortion (%)	Acceptance Limit (%)	P/F	Uncertainty (%)	Maximum Permitted Uncertainty (%)	
94	1000	0.32	±2.50	P	0.20	0.50	Measured Output
114	1000	0.87	±2.50	P	0.20	0.50	Measured Output

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: C52587

EQUIPMENT TESTED : Acoustic Calibrator

Manufacturer: Svantek
Type No: SV 36 **Serial No:** 162796
Class: 1
Owner: EMM Consulting
Level 1, 175 Scott Street
Newcastle, NSW 2300
Tests Performed: Measured Output Pressure level, Frequency & Distortion
Comments: See Details and Class Tolerance overleaf.

CONDITION OF TEST:

Ambient Pressure	995	hPa ±1 hPa	**Date of Receipt :**	28/01/2025
Temperature	24	°C ±1° C	**Date of Calibration :**	28/01/2025
Relative Humidity	45	% ±5%	**Date of Issue :**	29/01/2025

Acu-Vib Test Procedure: AVP02 (Calibrators)
Test Method: AS IEC 60942 - 2017

CHECKED BY: .....

AUTHORISED SIGNATURE: .....

Hein Soe

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Results of the tests, calibration and/or measurements included in this document are traceable to SI units through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.

This report applies only to the item identified in the report and may not be reproduced in part.

The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.

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Appendix 9: Annual Subsidence Report 2025

SITE:	Chain Valley Colliery and Mannering Colliery
Department:	Health, Safety and Environment
REPORT TITLE:	2025 Annual Subsidence Report
Prepared by:	Nicholas van Bezouwen – Environment and Community Coordinator Grant Lord – Registered Mine Surveyor
Report Date:	19 March 2026
Distribution:	Department of Planning, Housing and Infrastructure NSW Resources Regulator

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1 Introduction

1.1 Background

Chain Valley Colliery (CVC) and Mannering Colliery (MC) are underground coal mines on the southern side of Lake Macquarie, approximately 60 kilometres (km) south of Newcastle and 80 km north of Sydney.

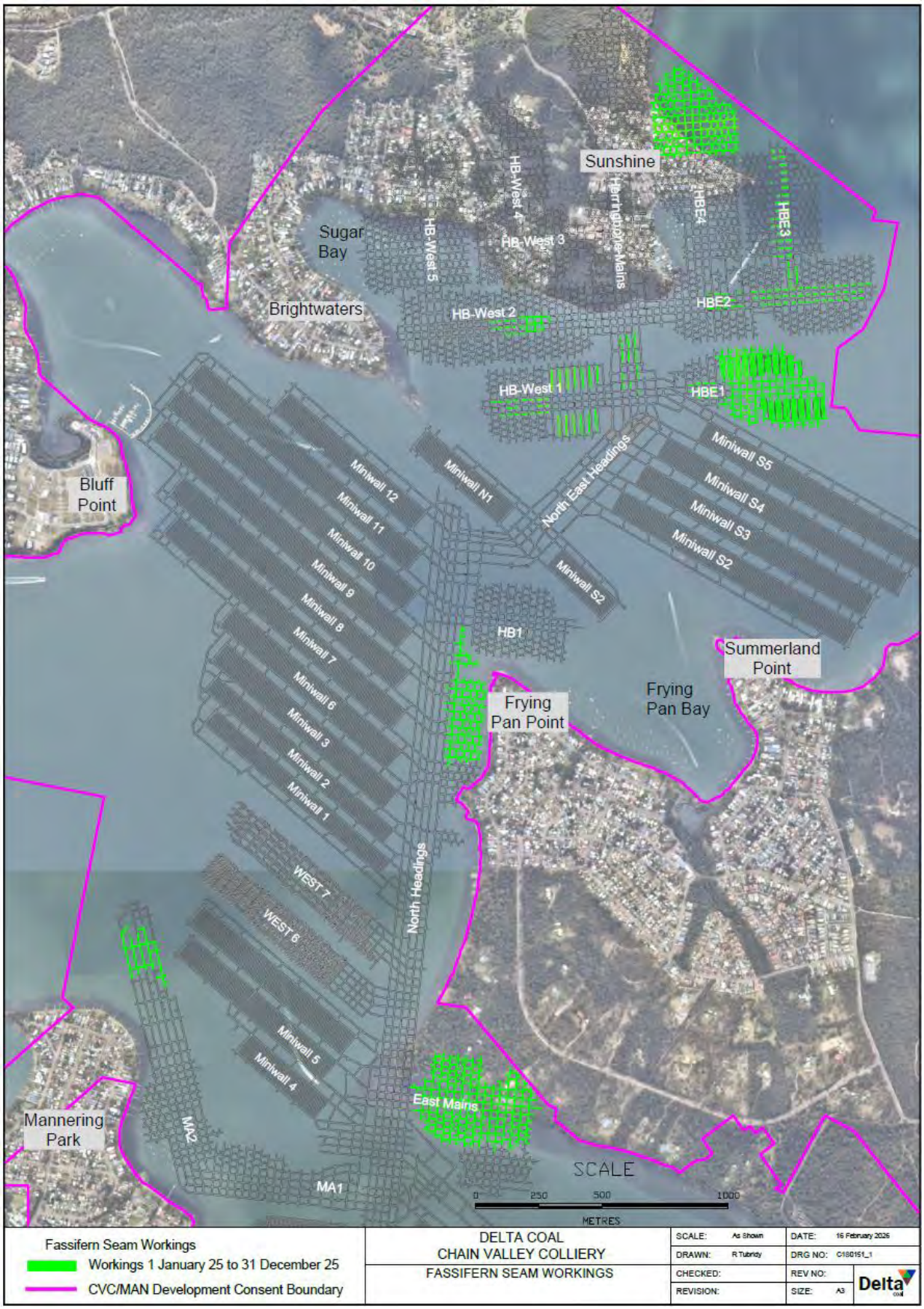
CVC operates under Development Consent SSD-5465, as modified, which was originally granted on 23 December 2013 by the then Minister for Planning and Infrastructure under Part 4, Division 4.1 of the NSW Environmental Planning and Assessment Act 1979 (EP&A Act), which relates to State significant development (SSD). The consent permits underground bord and pillar mining as well as Miniwall mining in the Fassifern Seam at a maximum rate of 2.1 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal, with all secondary extraction confined to areas under the Lake Macquarie water body.

MC was granted Project Approval (MP06_0311) under Part 3A of the EP&A Act on 12 March 2008 and, as modified, permits the extraction of up to 1.1 Mtpa of ROM coal until 31 December 2027. It also permits the handling of up to 2.1 Mtpa ROM coal with that coal transported via a dedicated overland conveyor to Delta Electricity's Vales Point Power Station (VPPS) for domestic energy generation.

1.2 Purpose

This Annual Subsidence Report (ASR) provides an overview of subsidence monitoring data and management performance for CVC and MC in the 2025 calendar year and has been prepared as an appendix to the Chain Valley Colliery and Mannering Colliery Annual reviews.

Figure 1 - CVC Fassifern Workings (green represents 2025 Mining Progress)



1.3 Approvals and Legislation

This ASR has been prepared to meet the annual subsidence report requirement within the CVC SSD-5465 Statement of Commitments.

Subsidence monitoring is undertaken in accordance with Chain Valley Colliery's approved Subsidence Monitoring Programs (SMP):

- Chain Valley Colliery, Subsidence Monitoring Program, Northern Mining Area First Workings and Lake Macquarie Extraction, August 2021.
- Chain Valley Colliery, Subsidence Monitoring Program, Miniwall S5 and Northern Mining Area Pillar Extraction, November 2025 (forms part of the approved CVC MWS5 and NMA Extraction Plan Amendment 3).

1.4 Stakeholder Engagement

Delta Coal has consulted with the local community via the CVC and MC Community Consultative Committee (CCC) on subsidence results at the four quarterly meetings undertaken in 2025. This report is appended to the 2025 Chain Valley Colliery and Mannering Colliery Annual Reviews and will be made available to the CCC and applicable stakeholders as well as being made publicly available on the Delta Coal website.

1.5 Supporting Documentation

This ASR is informed by the relevant sections of the following documents:

- June 2025, Lake Macquarie Benthos Survey Report No. 25. Report prepared by J.H. & E.S. Laxton – Environmental Consultants P/L for Delta Coal
- May 2025 Seagrass Survey of Chain Valley Bay, Summerland Point, Bardens Bay and Crangan Bay, Lake Macquarie, NSW (Results for 2008 to 2025). Report prepared by J.H. & E.S. Laxton – Environmental Consultants P/L for Delta Coal
- 2023 Benthic Communities Management Plan, Delta Coal
- 2022 Seagrass Management Plan, Delta Coal
- 2025 Subsidence Monitoring Program, Delta Coal (Extraction Plan Miniwall S5 and Northern Pillar Extraction)

- 2021 Subsidence Monitoring Program, Delta Coal (Northern Mining Area First Workings and Lake Macquarie Pillar Extraction)
- 2025 Chain Valley Colliery Miniwall S5 and Northern Pillar Area Extraction Plan
- 2021 Built Features Management Plan, Delta Coal
- 2021 Public Safety Management Plan, Delta Coal
- 2024 Biennial Benthic Communities Monitoring Statistical Analysis Report prepared by EMM Consulting for Delta Coal

2 Monitoring and Comparison

2.1 Monitoring Overview

As detailed in Section 1.4.1, CVC has two actively approved Subsidence Monitoring Programs, with one program addressing Miniwall S5 and pillar extraction and the other addressing first-workings and pillar extraction in Lake Macquarie. Scope of Subsidence Monitoring.

Monitoring undertaken in 2025 comprised:

- Shoreline and terrestrial monitoring of fixed reference points installed prior to underground mining to determine levels of vertical subsidence;
- Bathymetric scans of the lake bed in areas of secondary extraction, surveys are undertaken prior to, during and following secondary extraction; and
- Visual inspections undertaken of areas overlying mining zones, with particular focus on steep slopes and cliffs in built areas, for signs of possible surface disturbance.

2.1.1 Shoreline (High Water Mark Subsidence Control Zones)

In accordance with Condition 1, Schedule 4 of SSD-5465, vertical subsidence within the HWMSB is limited to a maximum subsidence (S_{max}) of 20 mm. The primary control to achieve this limit is the implementation of a conservative mine design, utilising first workings only with long term stable pillars in this zone.

To monitor the effectiveness of the mine design, monitoring of the shoreline is carried out at fixed reference marks (subsidence marks) which are surveyed at regular intervals. The frequency is dependent on the proximity to active operations.

2.1.2 Seagrass

Condition 2, Schedule 4 of SSD-5465 requires that negligible environmental consequences occur to the seagrass beds due to underground mining operations (in Lake Macquarie). Surveys of the seagrass extents are undertaken in order to monitor impacts on the seagrass population.

Delta Coal's *Seagrass Management Plan* (2022) outlines the methodology used to determine changes to composition and quantity of seagrass populations in Lake Macquarie as a result of mining activities at CVC.

Subsidence monitoring of the lakebed is undertaken via bathymetric survey over CVC's current mining areas to validate subsidence predictions.

2.1.3 Benthic Communities

Annual surveys of the lakebed are undertaken in order to monitor variations in the composition and density of benthos due to mining, environmental and/or other seasonal factors. Condition 2, Schedule 4 of SSD-5465 permits minor environmental consequences to benthic communities as a result of mining induced subsidence.

Delta Coal's *Benthic Communities Management Plan* (Delta Coal 2023) outlines the methodology used to determine changes to species diversity and abundance.

Subsidence monitoring of the lakebed is undertaken via bathymetric survey over CVC's current mining area in order to validate subsidence predictions and to determine approximate levels of subsidence on specific benthic sample locations.

2.1.4 Methods of Subsidence Monitoring

2.1.4.1 Overview

Subsidence monitoring at CVC includes a combination of bathymetric surveys and terrestrial level monitoring. Results are used to validate modelled outcomes; enable early detection of subsidence trends which allows adaptive management and the implementation of contingency measures.

2.1.4.2 Bathymetric Surveys

A third party is commissioned to undertake bathymetric surveys over the areas of past, current and proposed workings at CVC and MC. Baseline bathymetric data was provided to NSW Office of Environment and Heritage (OEH) in 2010. The accuracy of the bathymetric surveys are ±0.1 m.

Since 2012, bathymetric surveys have been completed on at least an annual basis with ongoing surveys providing accurate details of the lake depth within CVC's mining areas. During the 2017 survey it was

identified that the site had exceeded vertical subsidence predictions over the MW7-12 mining area by approximately 370mm. LakeCoal (the operator at that time) notified the relevant authorities of the exceedance and submitted an incident report on 11 November 2017. Subsidence associated with MW7-12 has proven to have stabilised since, with no discernible affect identified within seagrass and benthic communities monitoring.

Table 1 - Chain Valley Colliery Secondary Extraction Subsidence Monitoring Commitments

Secondary Extraction Panel	Approved S_{max}(mm)	Predicted S_{max} (mm)	Measured S_{max} (mm)	Extraction Completion date	Post Extraction Bathymetric Scanning Commitment
Miniwall S1	780	420	<200	September 2018	Annual for 3 years unless TARP triggered
Miniwall S2	780	300	200-250	March 2020	Annual for 3 years unless TARP triggered
Miniwall S3	780	300	350-400	July 2020	Annual for 3 years unless TARP triggered
Miniwall S4	780	300	500-550	February 2021	Annual for 3 years unless TARP triggered
Miniwall S5	780	500	350-400	August 2021	Annual for 3 years unless TARP triggered
NMA Pillar Extraction	780	500	<100	Not completed.	Annual for 3 years unless TARP triggered

Monitoring has continued in accordance with the approved *Miniwall S5 and Northern Pillar Extraction Plan* in the 2025 period.

A software error was identified in the bathymetric survey results in the 2023 reporting period, which altered the survey height results. Unfortunately, this software error resulted in a -0.15m height discrepancy between the old and new projects.

This was a software developer error for that particular version (2012) of the software and was corrected in the 2023 bathymetric data but was present in previous surveys (excluding the baseline survey). Going forward, Delta Coal will keep the old project levels and adjust survey values by +0.15m to align with the old data. All data will remain relevant to the original baseline survey.

3 Bathymetric Monitoring

Bathymetric scans undertaken in March and September 2025 are presented in **Figures 2 through to Figure 4,** which include:

- MWS2, MWS3, MWS4, MWS5 and the Northern Mining Area.

Figure 2 present Bathymetric surveys over the Miniwall S2-S5 extraction area which have indicated subsidence of up to 500-550 mm directly over the extracted area of MWS4 which prompted a independent geotechnical review to ensure ongoing compliance with the subsidence limit of 780mm. The report noted that while there was minimal risk of exceeding the 780mm subsidence limit, there was a likelihood for additional subsidence of 30-50mm.

Figure 2 – Miniwalls S2-S5 Bathymetric Scan – March 2025

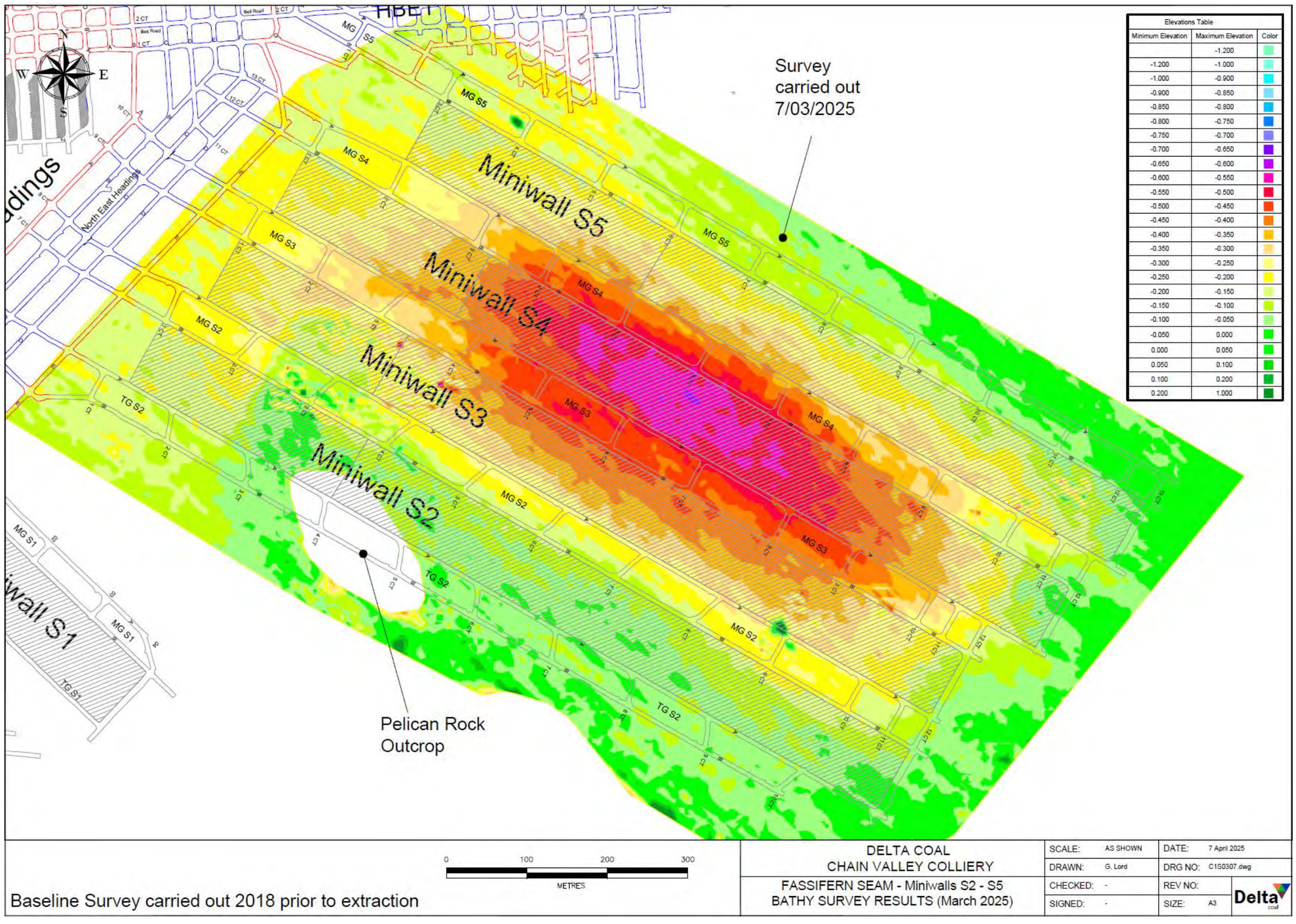


Figure 3 - Miniwalls S2-S5 Bathymetric Scan, September 2025

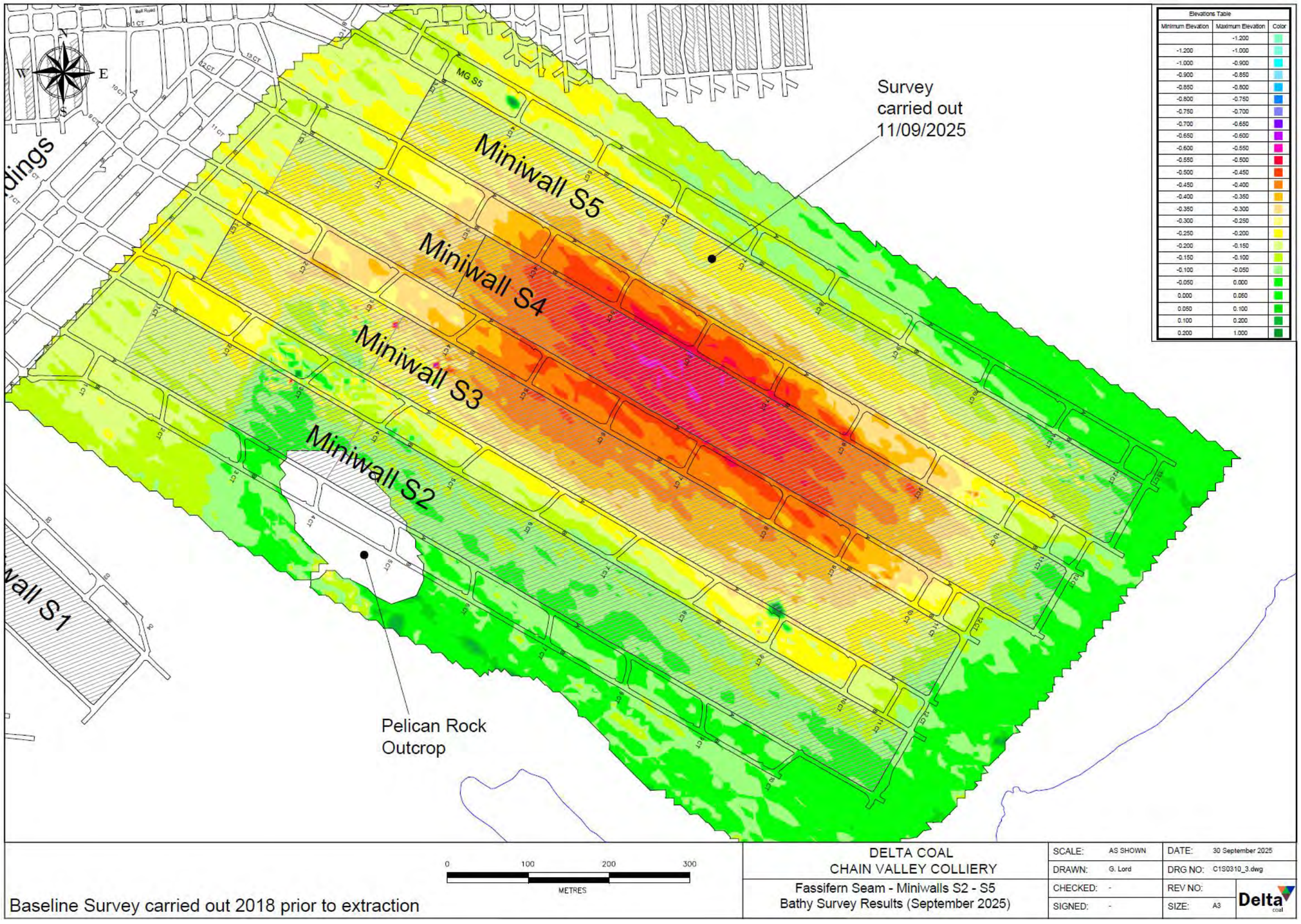


Figure 4 - Northern Mining Area Bathymetric Scan, March 2025

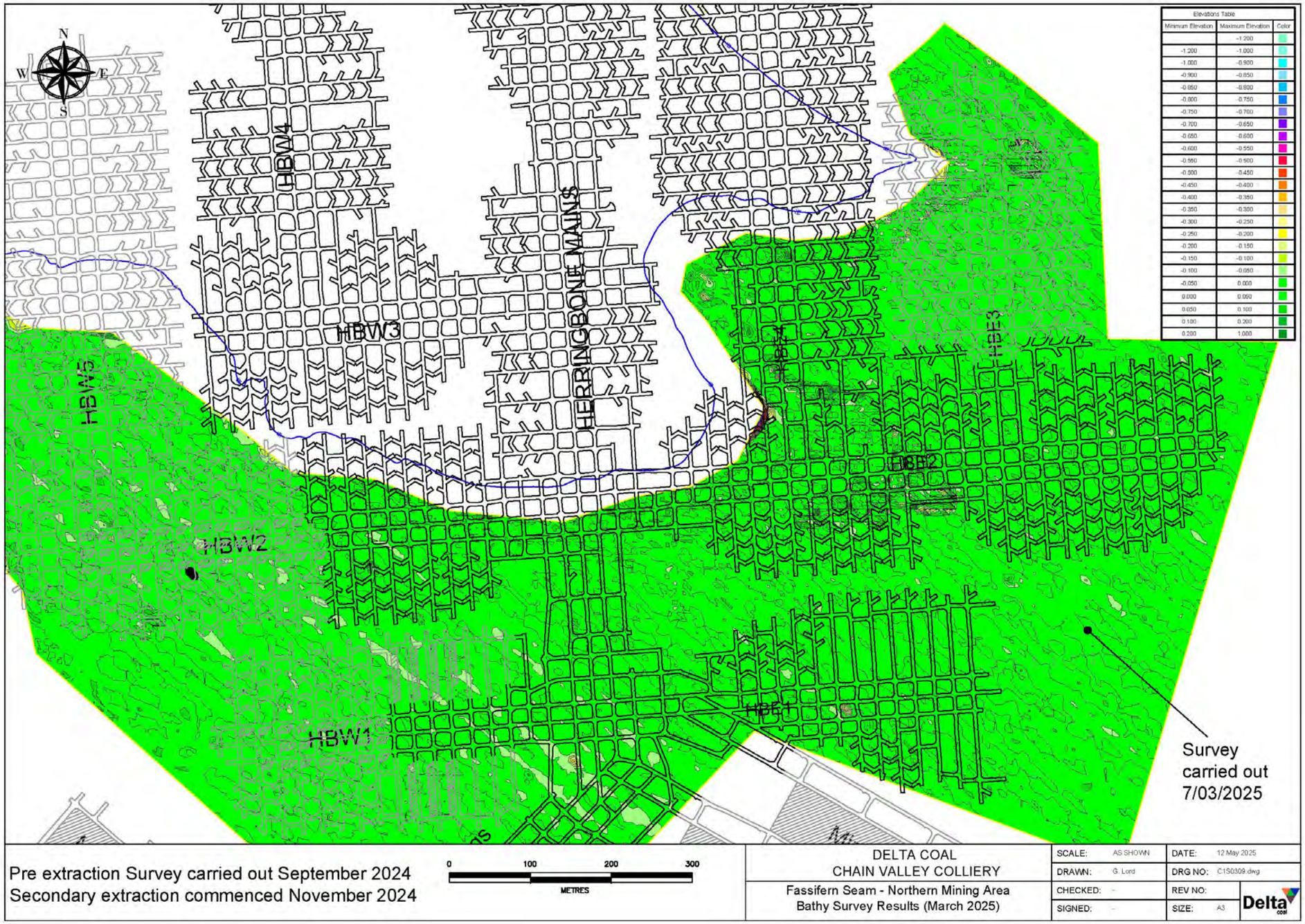
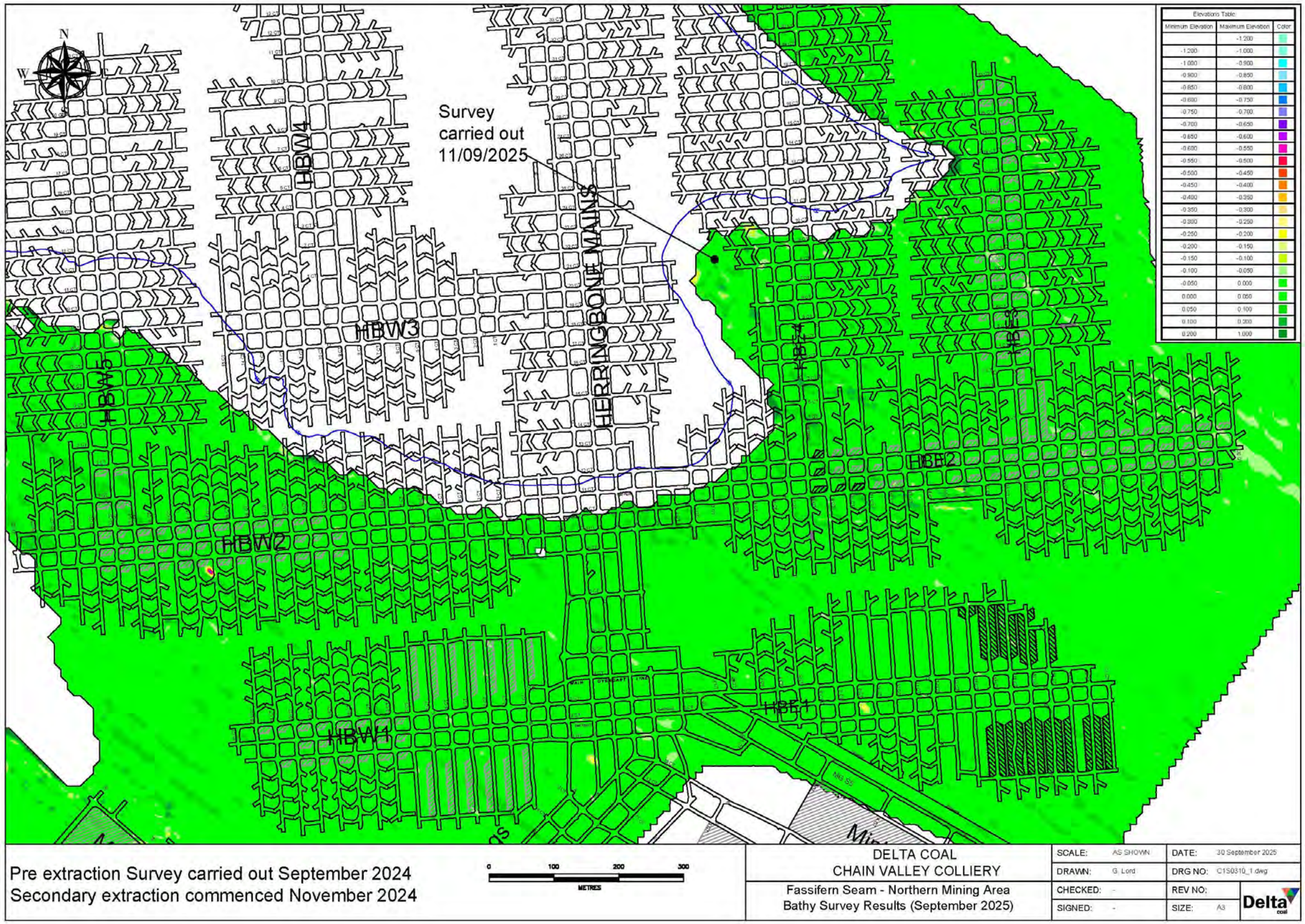


Figure 5 - Northern Mining Area Bathymetric Scan, September 2025

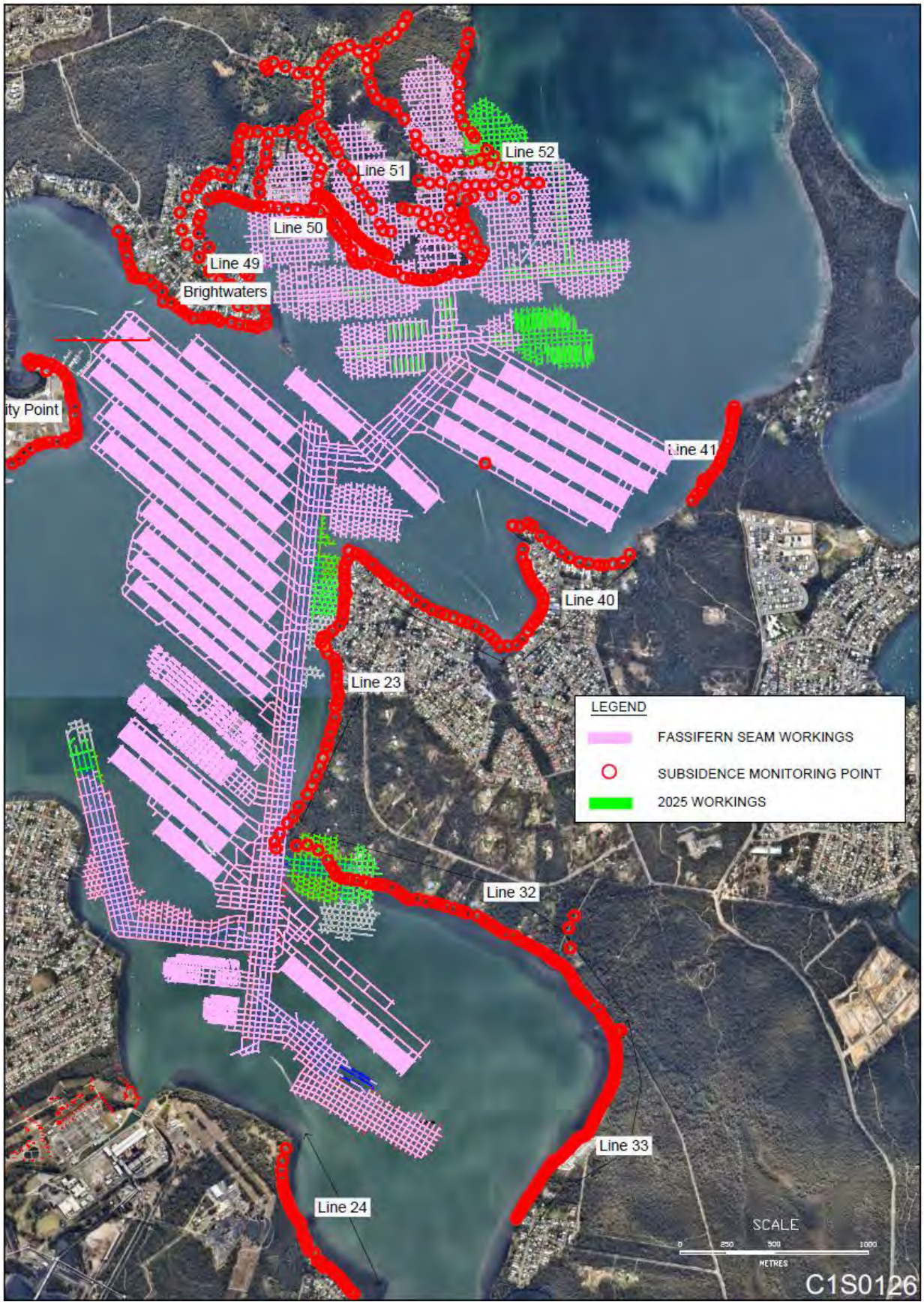


4 Foreshore Monitoring

Delta Coal completes subsidence monitoring around Trinity Point, Brightwaters, Mirrabooka, Sunshine, Frying Pan Bay, Summerland Point & Chain Valley Bay (**Figure 4**). Monitoring points occur along the foreshore at approximately 20m – 30m intervals where practicable / achievable. Monitoring survey results are uploaded to the Resources Regulator SSIMS portal.

A Visual Subsidence Inspection Proforma is completed at monthly intervals over the current mining areas under an agreement between Delta Coal and the Resources Regulator. These visual inspections, look for any signs of impacts or changes to public safety and include visual inspection of steep slopes, ponding and other potential effects of mine subsidence. Annual foreshore surveying was undertaken throughout 2025.

Figure 4 - Foreshore Subsidence Monitoring Points



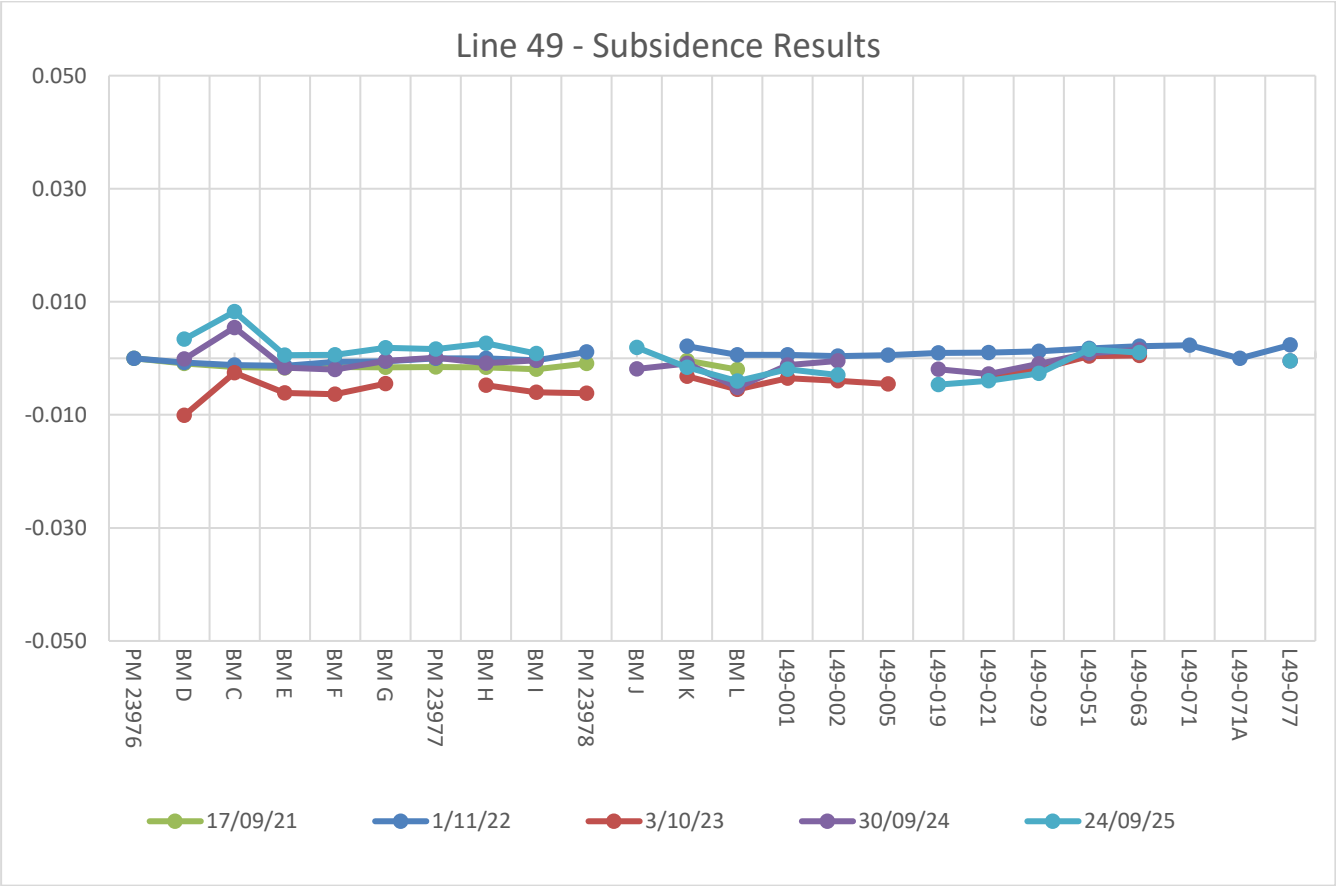
4.1 Chain Valley Colliery

4.1.1 Morisset Peninsula Line 49, 50, 51 and 52

Foreshore monitoring lines 49, 50 and 51 were installed in 2021, for the purpose of monitoring potential subsidence associated with future northern mining area workings. Line 52 was installed in 2022 to cover the foreshore as mining extended to the north. Surveys are carried out over the current mining areas quarterly, with annual surveys over the full grid.

Line 49

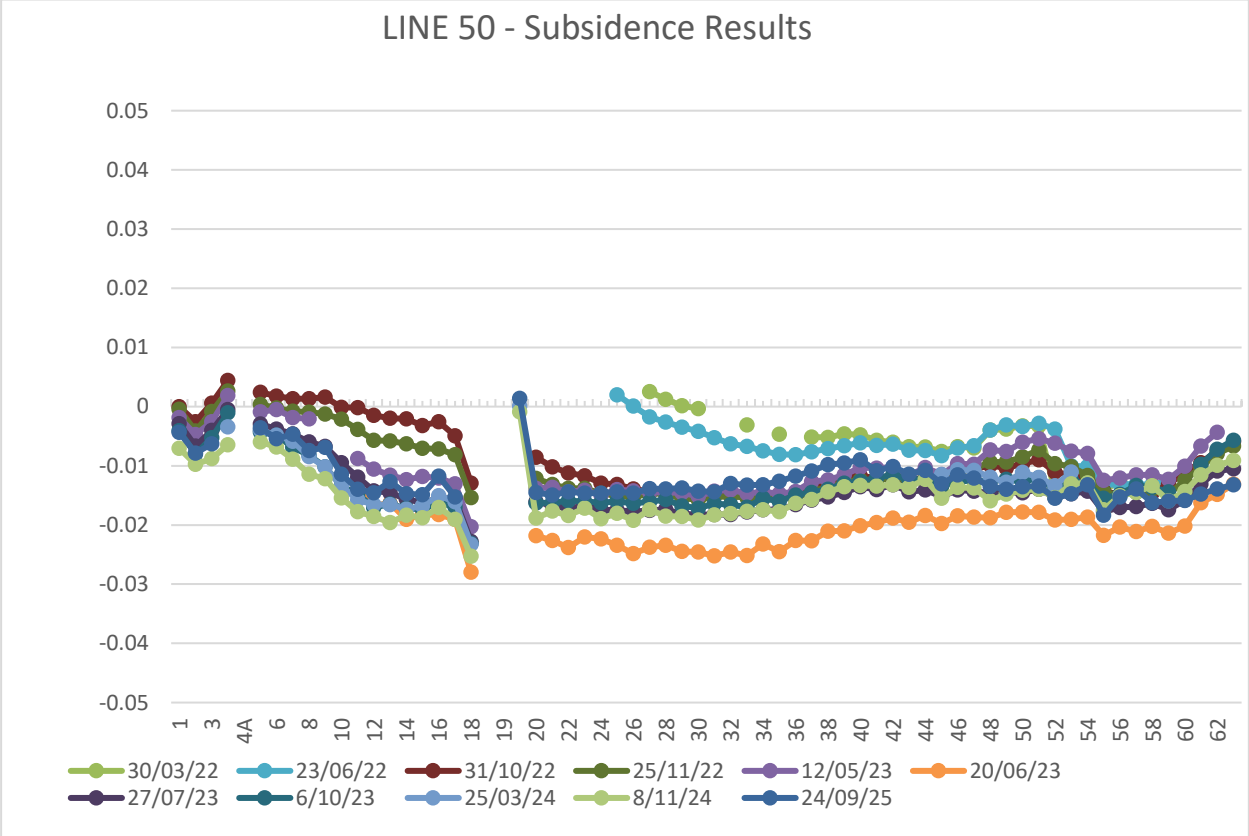
Survey results for line 49 show less than 20mm movement.



Line 50

Survey results for line 50 generally show less than 20mm movement. Noting that:-

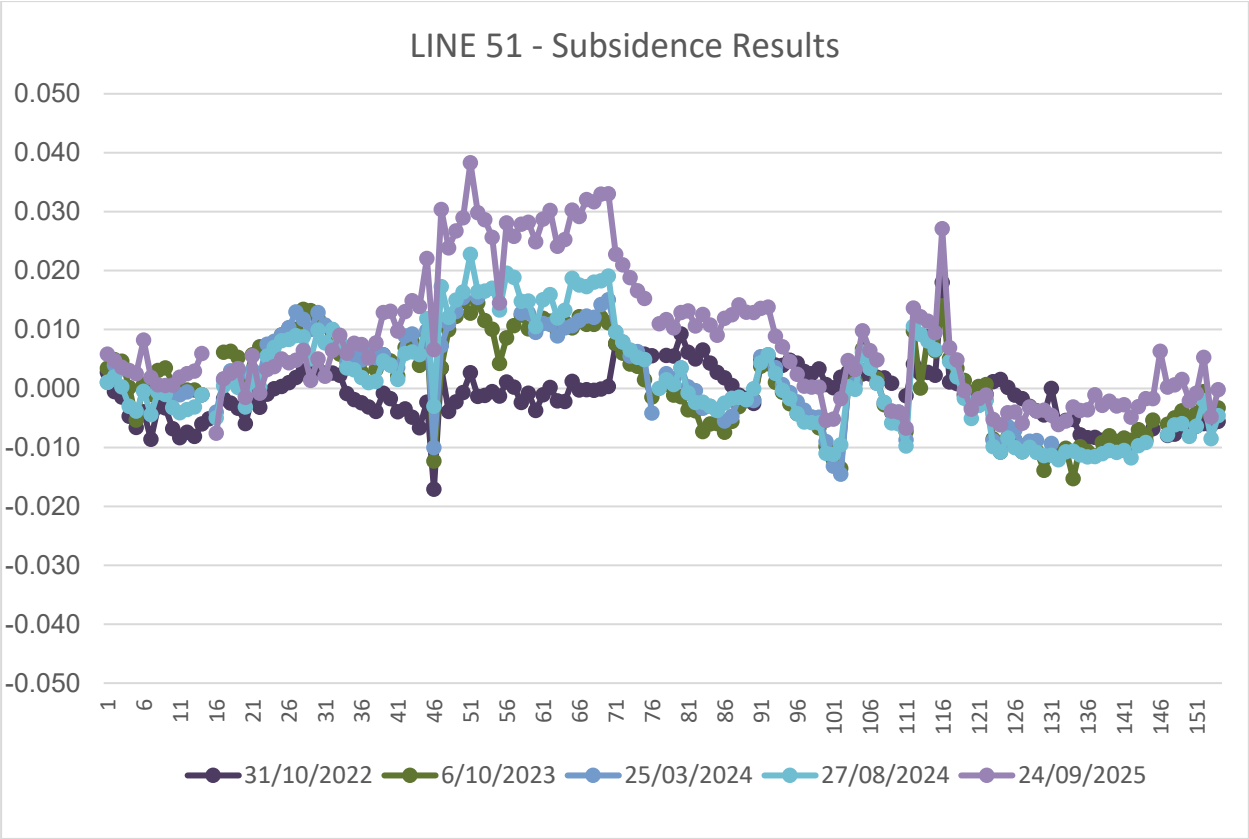
- Results showing a drop in RL for mark 18 are not indicative of mining induced subsidence, but rather a possible issue with the integrity of the survey mark.
- Anomalous results received for Line 50 in the June 2023 survey is presumed to be natural ground movement as all subsequent survey results were compliant within the 20mm subsidence limit.



Line 51

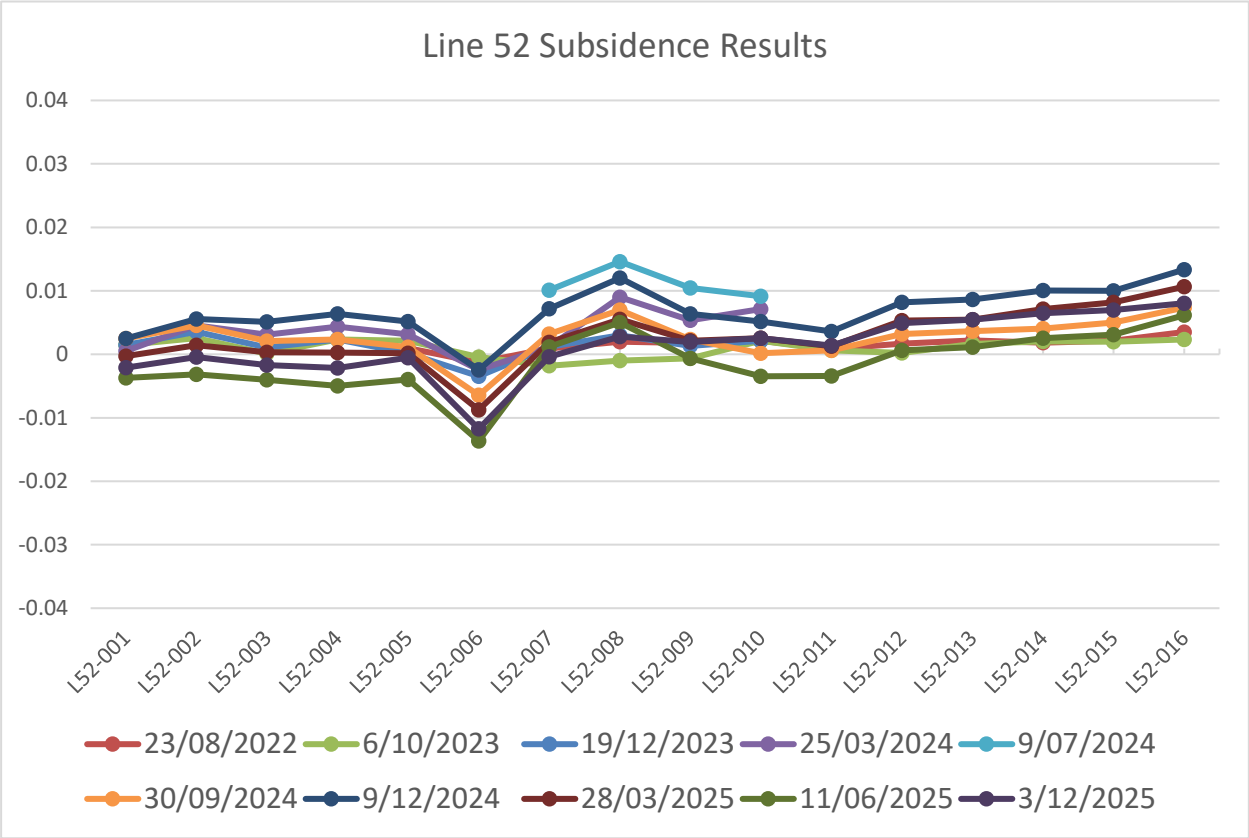
The Morisset Peninsular subsidence monitoring marks have been subject to much natural ground movement. With extensive levelling surveys held in the area showing constant changes to the level of marks often seen as upward movement while benchmarks and benchmark checks remain stable.

The largest variations seen in the chart below represent monitoring marks that have not been undermined, yet up to 35mm of movement was recorded.



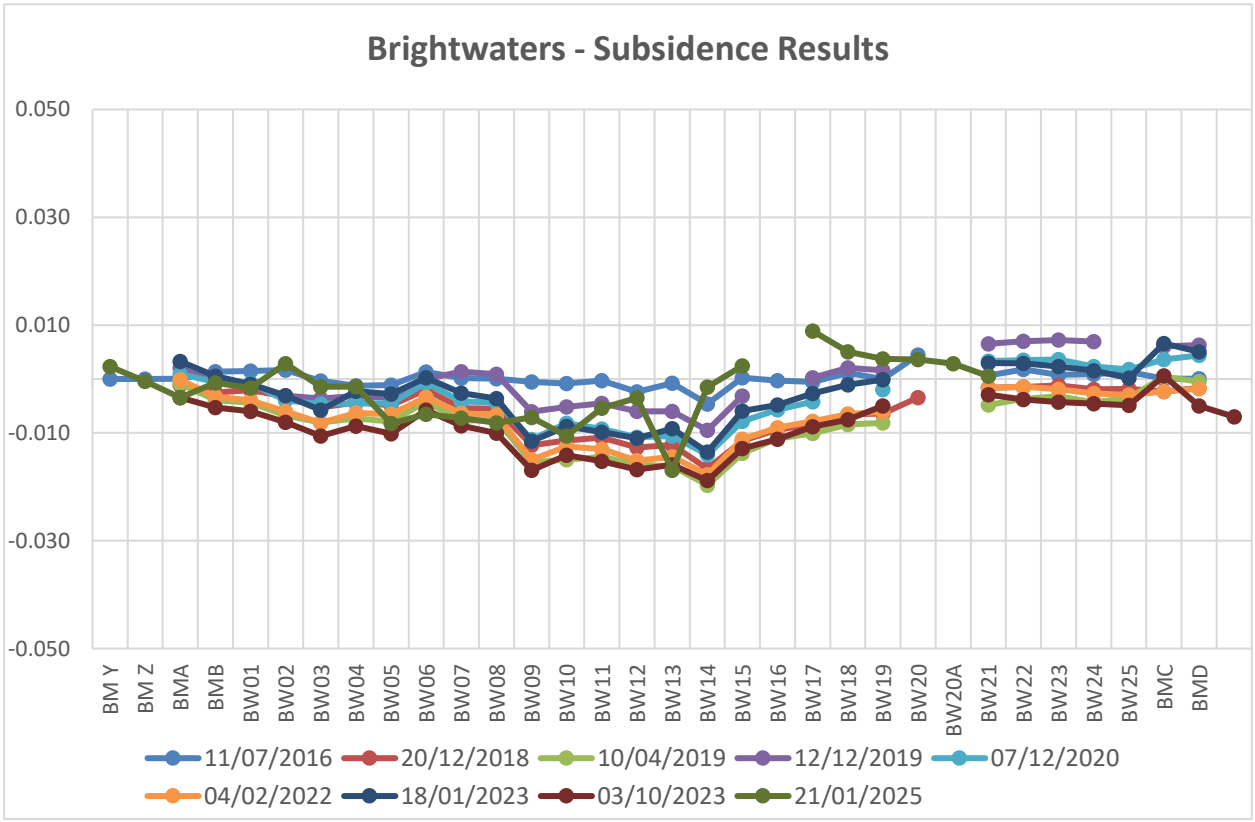
Line 52

Survey results for line 52 show the area to remain stable.



4.1.2 Brightwaters

Monitoring points were installed along the Brightwaters peninsula in June 2016 to monitor the effects of Miniwall 11 and 12 extraction, which finished in July 2017. Surveys were previously carried out over the Brightwaters foreshore annually. Due to the relative stability (<20mm) of the results over the past nine years, monitoring of this line has now ceased.

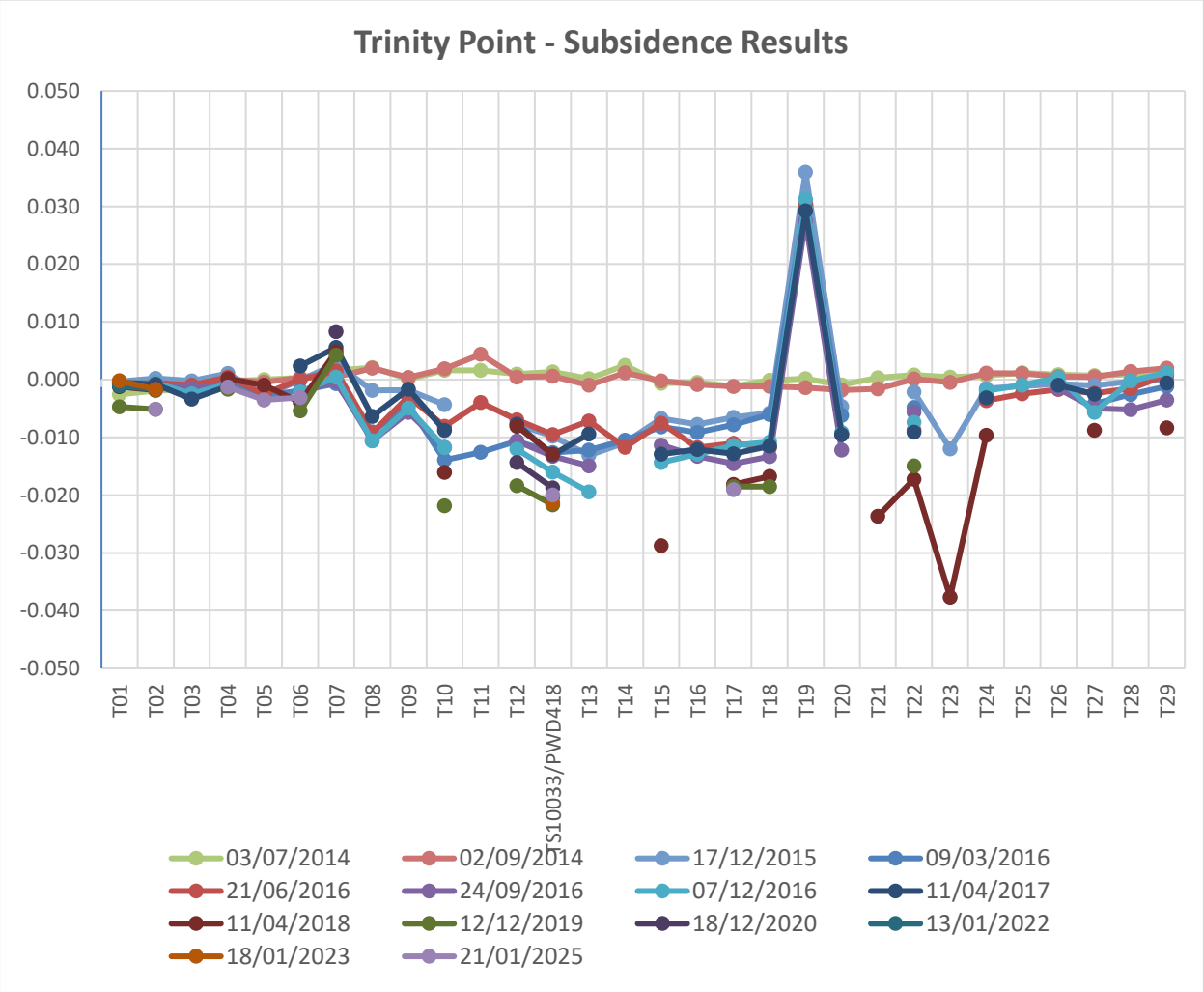


4.1.3 Trinity Point

Monitoring points were installed in the Trinity Point area in 2014 for shoreline monitoring during extraction of Miniwalls 7-12 panels. Since 2018 a number of marks have been disturbed or destroyed due to development along the foreshore in the area. The 2024 annual survey (Jan-25) shows only 6 marks that were able to be identified, however nil movement attributable to subsidence has been detected. A few anomalous marks show greater than 20mm movement, but all can be attributed to local disturbance of the mark. These anomalous marks are PWD418, T15, T21 and T23.

During 2025, all marks along this foreshore were reestablished and a new baseline survey was run for comparison in future years.

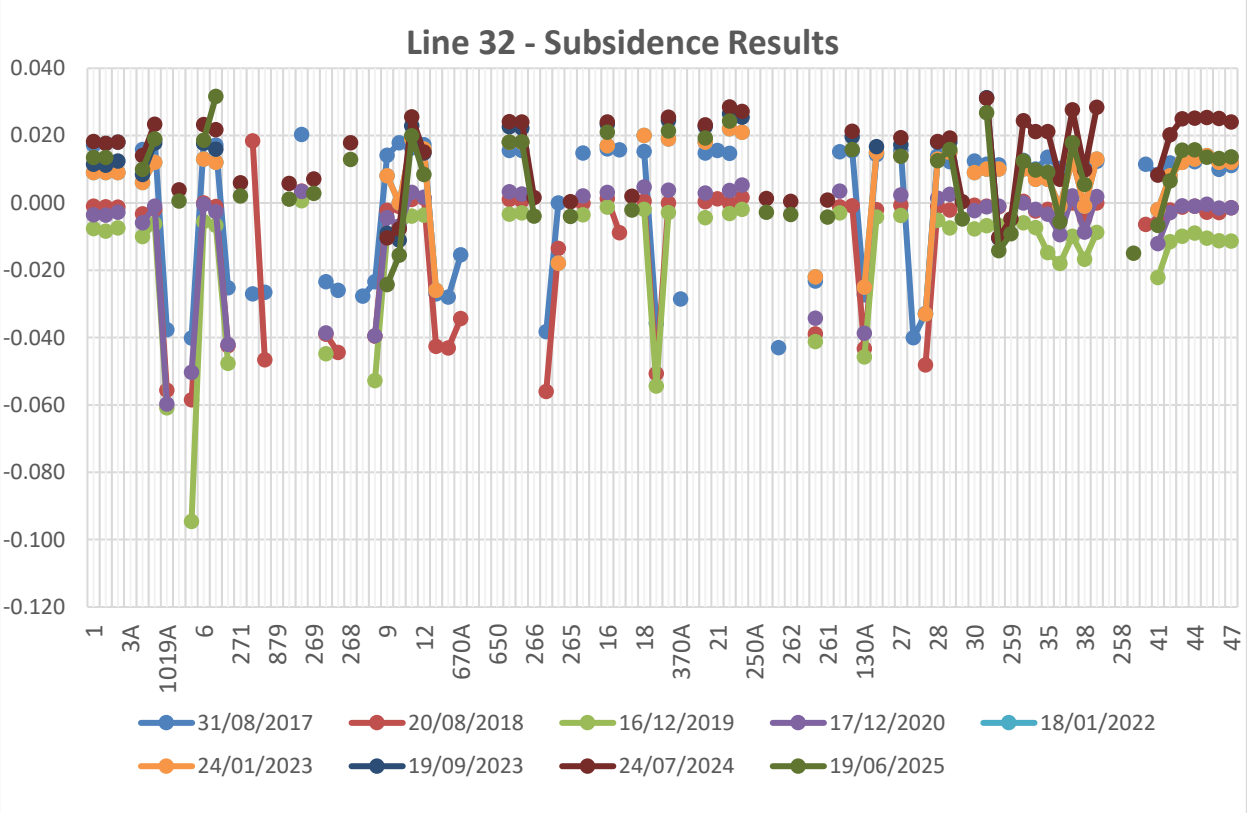
This monitoring line is surveyed annually.



Summerland Point, Lines 32, 23, 40 and 41

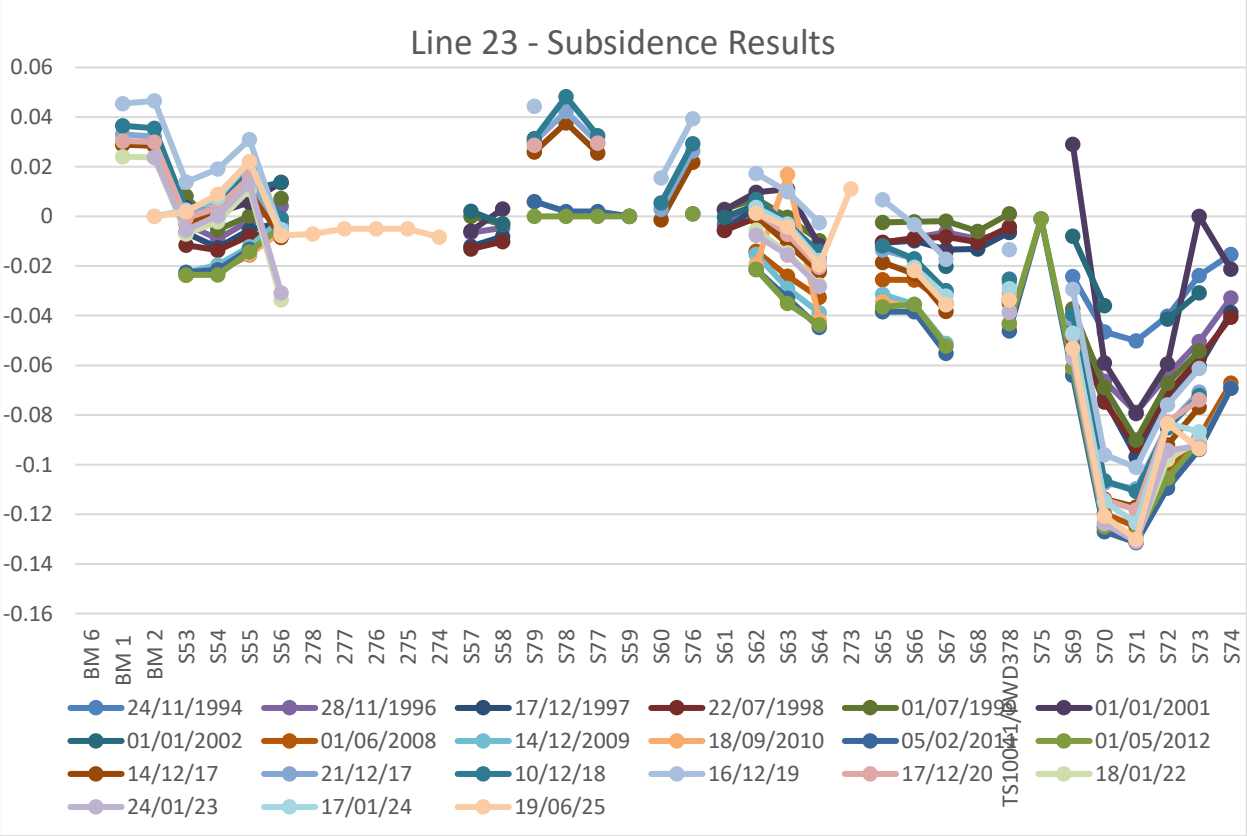
Line 32

Line 32 was originally installed in 1989. Due to their age and that a number of the marks are steel star pickets (now heavily rusted), the integrity of some of the marks has been affected. Monitoring data shows that the area has been stable for the past few years. Line 32 monitoring marks are surveyed annually.



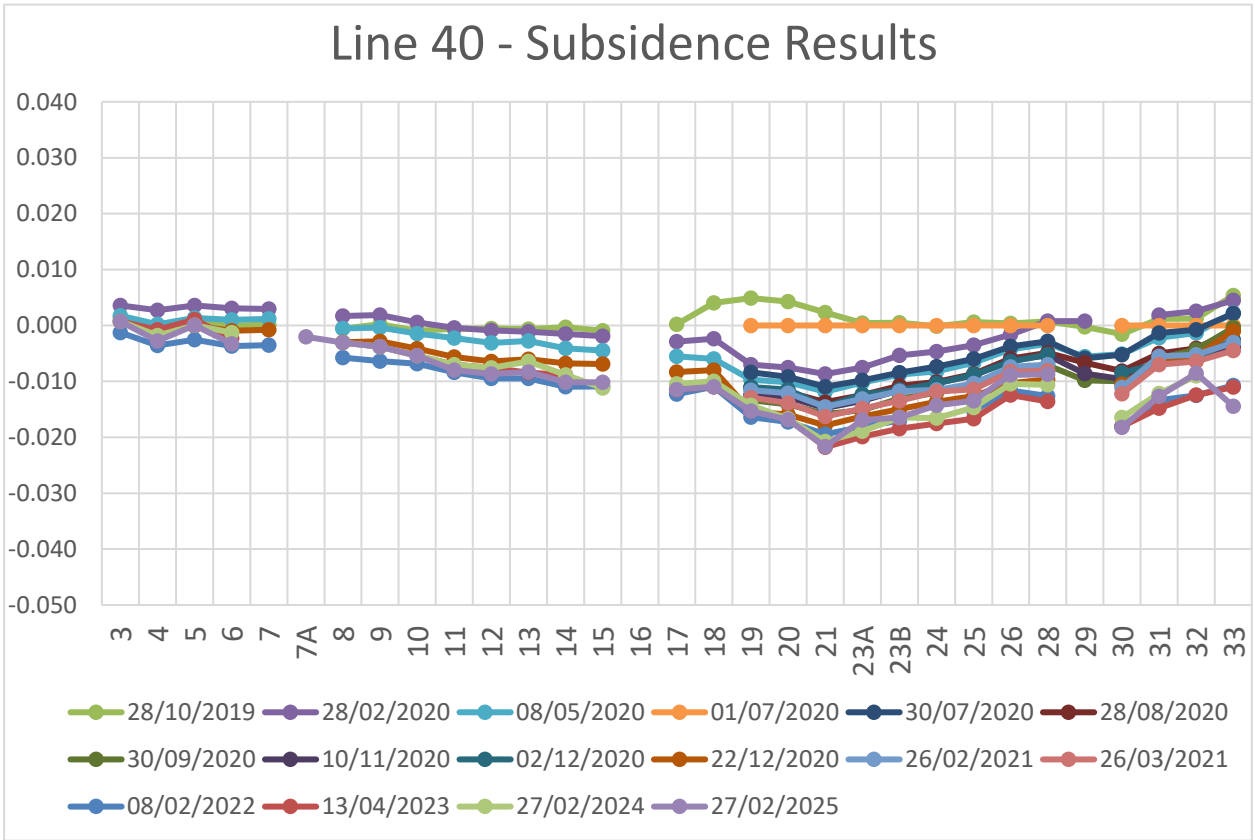
Line 23

The foreshore along Summerland Point has been monitored since 1994, after secondary extraction was undertaken in the Wallarah Seam beneath the south-western point (corresponding to mark S63 – 74 of Line 23). Approximately 130mm to 150mm of subsidence was measured (Point S71 - Line 23). There has been no observable movement from the 2008 datasets to the current (Figure 11). Line 23 monitoring marks are surveyed annually.



Line 40

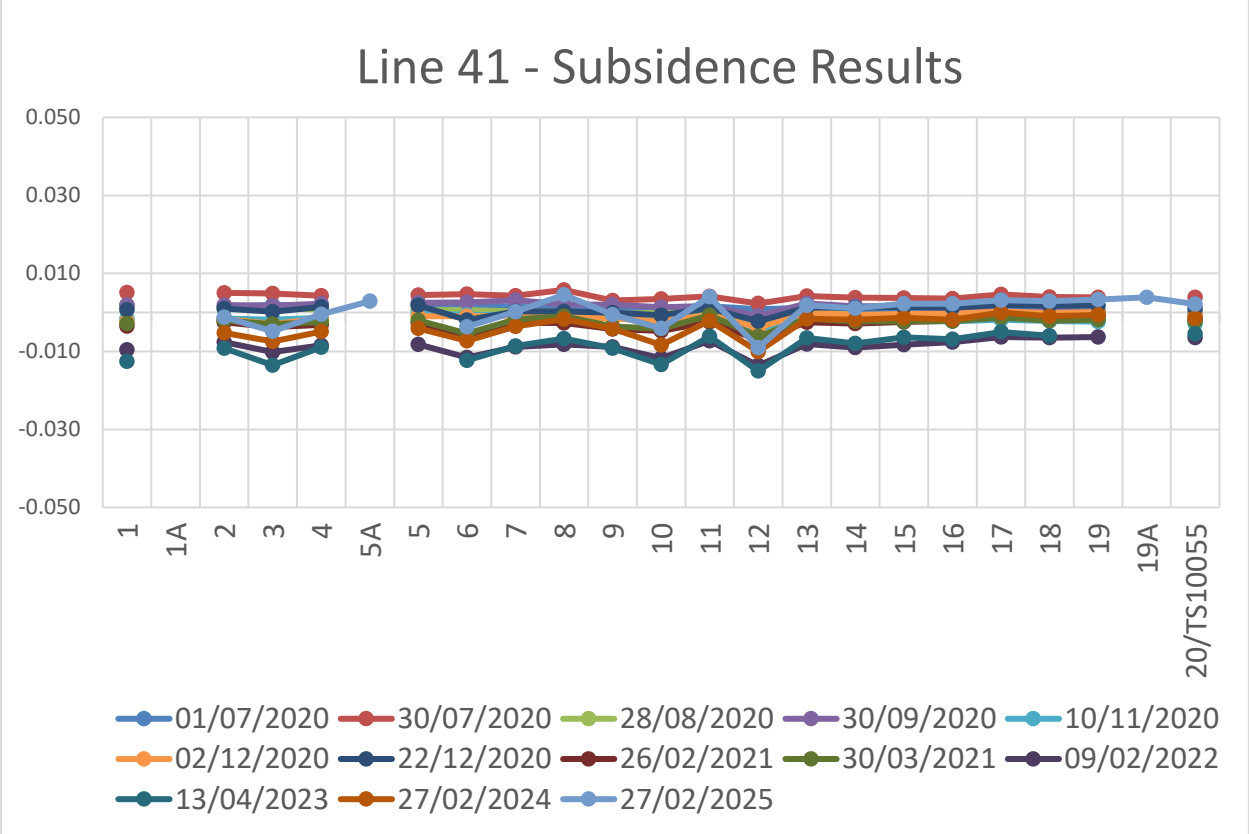
Monitoring points along Line 40 were established in 2018 to monitor the shoreline adjacent to Miniwall S1. This line was extended in 2019 as part of the subsidence monitoring program for Miniwalls S2 and S3. Minor ground movement along the line appears seasonal, with most movement limited to <20mm. Point 21 has recorded results of 22 mm over the past few years, given these results met or exceeded the 20mm subsidence limit Chain Valley Colliery is continuing to monitor the survey line. Note that the 22mm of recorded subsidence is not believed to be all mining induced. Monitoring of Line 40 is undertaken annually.



Line 41

Line 41 was established in July 2020 to monitor the shoreline adjacent Miniwall S4. Monitoring is undertaken annually, with surveys indicating negligible (<20mm) movement within compliance limits.

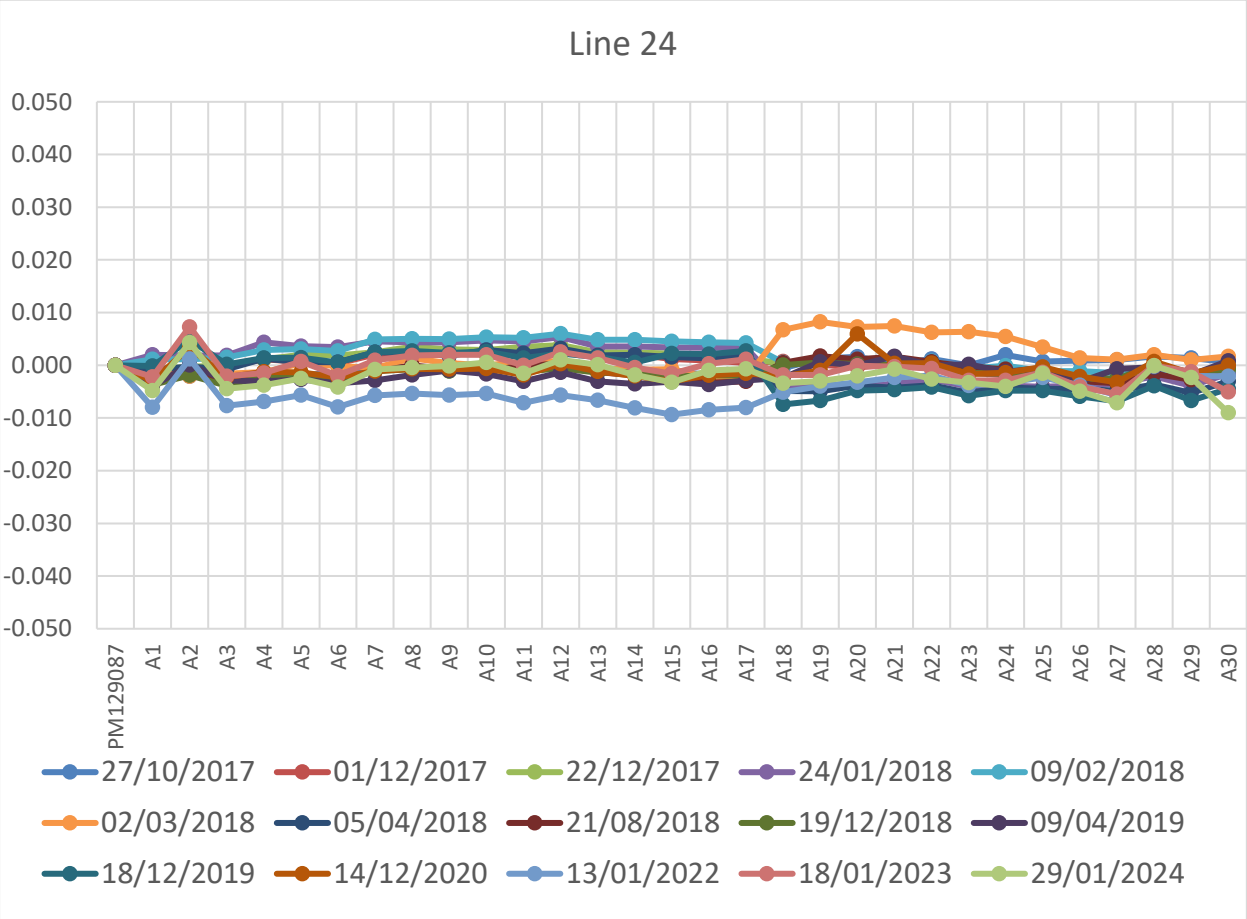
Monitoring of Line 41 is undertaken annually.



4.1.4 Chain Valley Bay, Lines 24 and 33

Line 24

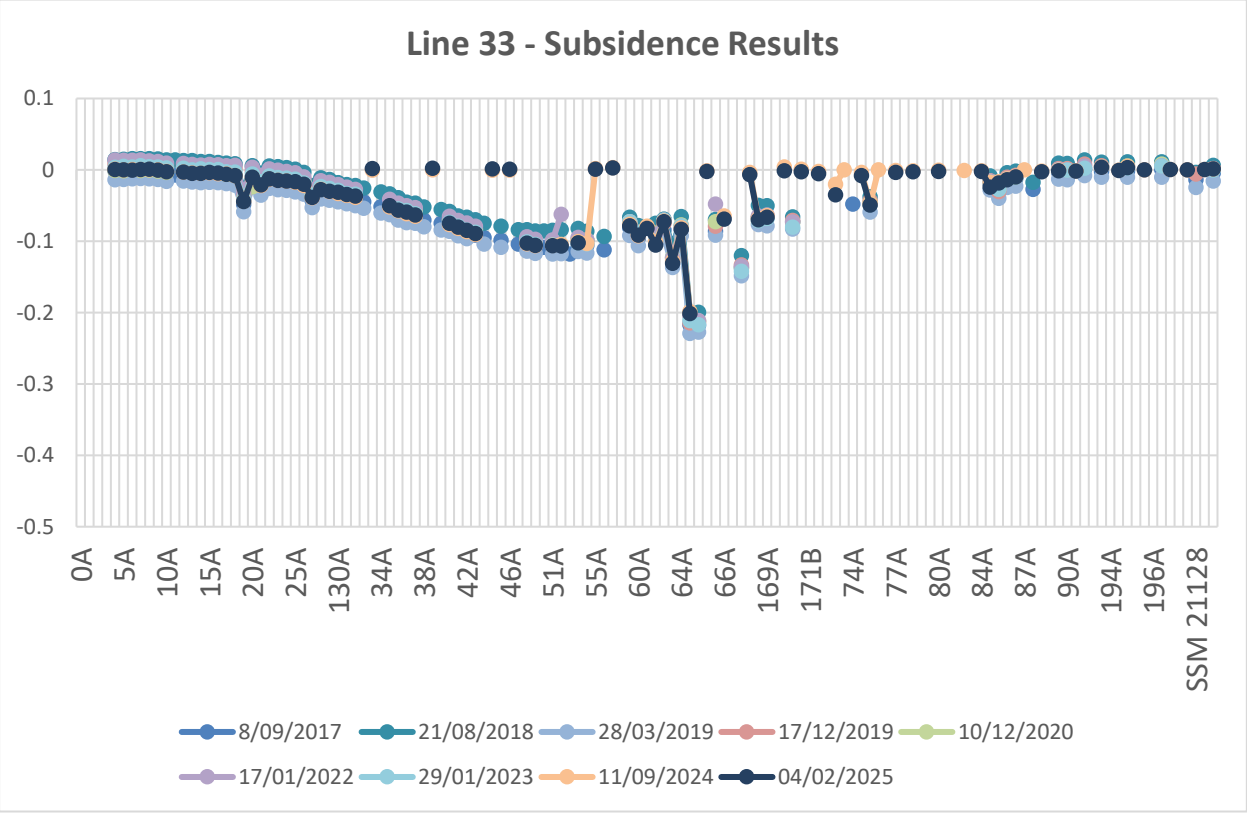
Line 24 lies on the western foreshore of Chain Valley Bay. Monitoring results have not identified mining induced vertical movement (< 20mm). Line 24 monitoring points were previously surveyed annually. Monitoring of the Line 24 was ceased in 2024 after notifying the Resources Regulator of the intention to stop.



Line 33

The Line 33 baseline survey was conducted in 1991. Line 33 is underlain with old mine workings in the upper seams and many of the historically monitored subsidence marks have experienced up to 120mm. No additional subsidence movement was detected during the miniwall extraction in CVB. The monitoring indicates compliance to limits with one monitoring location (A63) impacted by surface activities unrelated to the mine site. Three anomalous marks, 62A, 63A & 65A have recorded up to 230mm of movement, which is most likely due to the integrity of the marks on the lake edge. Noting that these results have not changed significantly for over 8 years.

No additional subsidence was observed at Line 33A within the reporting period.



4.1.5 Timing of Subsidence Monitoring

Timing of subsidence monitoring at CVC is defined in approved Extraction Plans and is summarised in **Table 2**. CVC has also made subsidence monitoring commitments to first-workings, also presented in **Table 2**.

Table 2 - Frequency of Subsidence Monitoring for Secondary Extraction

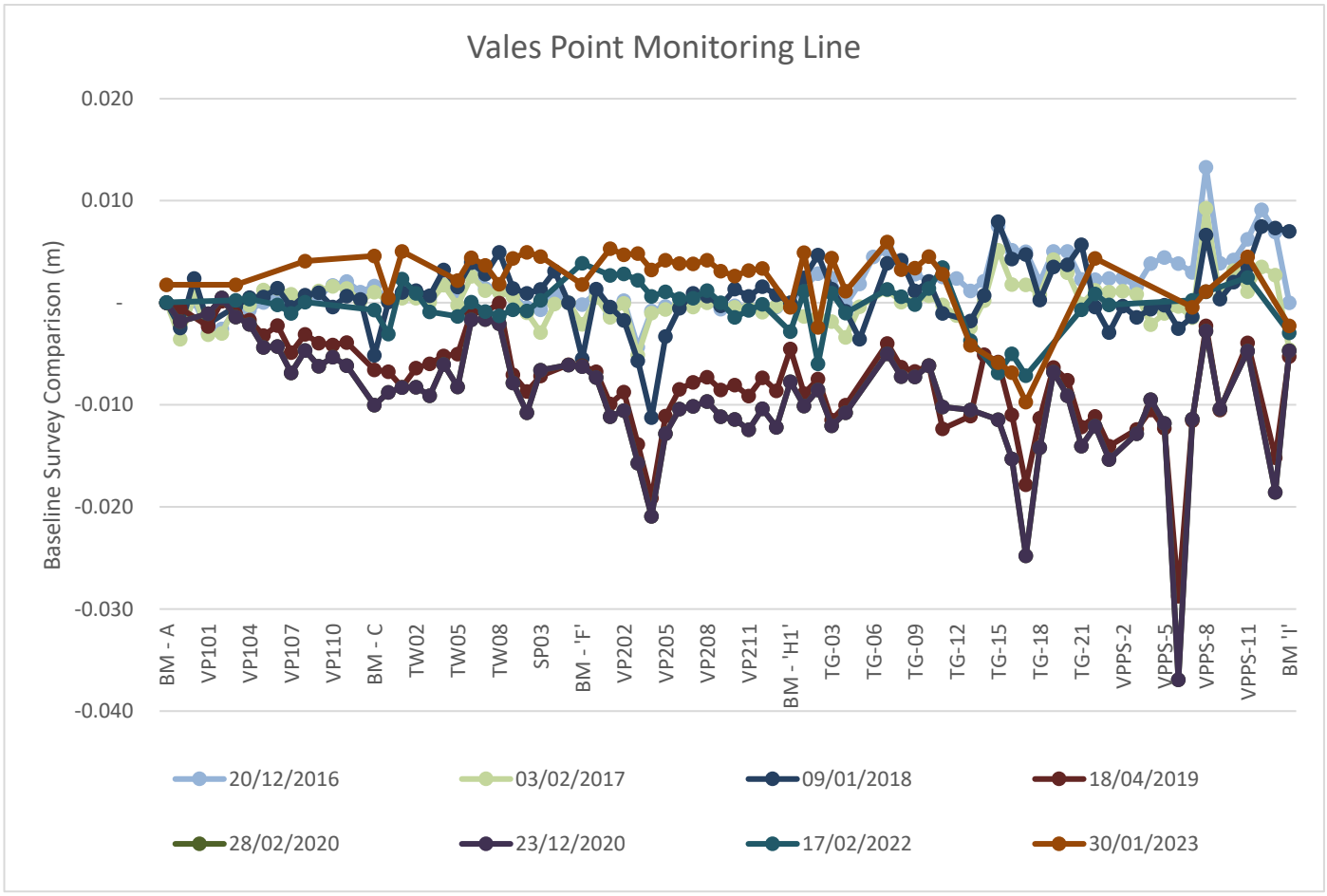
Type of monitoring	Pre-extraction requirements	During extraction requirements	Post extraction requirements
Secondary Extraction			
Bathymetric surveys	Single baseline survey prior to extraction	End of panel (of relevance to S2, S3, S4 and S5) Annual surveys over areas of pillar extraction (not commenced)	Annual for three years unless TARP triggered
Foreshore monitoring	Baseline survey prior to commencement of extraction	Monthly intervals	Annual for three years unless TARP triggered
Pelican Rock Navigation Marker	Baseline RL and tilt measurements	End of panel (of relevance to S2 and S3)	Visual inspection and confirmation from RMS of nil impacts
First Workings			
Terrestrial based subsidence monitoring (foreshore)	Baseline prior to extraction	Annual surveys during extraction unless TARP triggered	Annual surveys ongoing unless TARP triggered
Terrestrial based subsidence monitoring (along main roads in suburbs of Brightwaters, Mirrabooka and Sunshine)	Baseline prior to extraction	Annual surveys during extraction unless TARP triggered	Annual surveys ongoing unless TARP triggered

4.2 Mannering Colliery

4.2.1 Monitoring Overview

At the commencement of mining operations associated with the link road project between CVC and MC, a subsidence monitoring program was implemented. Due to the sensitive nature of the infrastructure being undermined (ie VPPS), subsidence monitoring was undertaken on a weekly basis within a 250 m radius of the mining activity. At the completion of mining, the frequency of subsidence monitoring of the link road development was reduced to an annual survey. Monitoring results have been presented in **Figure 16** and indicate <30 mm subsidence recorded to date, with anomalous readings recorded at monitoring point VPPS-6 from 18/04/2019.

There was no mining undertaken at Mannering Colliery during 2025. Surveying of the VPPS monitoring line was ceased after 8 consecutive years of subsidence monitoring, displaying negligible movement.


Vales Point Monitoring Line
Baseline Survey Comparison (m)
0.020
0.010
-
-0.010
-0.020
-0.030
-0.040
BM - A
VP101
VP104
VP107
VP110
BM - C
TW02
TW05
TW08
SP03
BM - 'F'
VP202
VP205
VP208
VP211
BM - 'H1'
TG-03
TG-06
TG-09
TG-12
TG-15
TG-18
TG-21
VPPS-2
VPPS-5
VPPS-8
VPPS-11
BM 'I'
20/12/2016
03/02/2017
09/01/2018
18/04/2019
28/02/2020
23/12/2020
17/02/2022
30/01/2023

5 Impacts to Built Features from 2025 Mining Activities

5.1 Chain Valley Colliery

No built features have been identified as requiring direct subsidence management from mining activities undertaken at CVC during 2025.

First workings were undertaken beneath the Morisset Peninsula within the NMA with no subsidence impacts to surface facilities or infrastructure reported to date. Visual inspections are carried out on a monthly basis over the sections of the Morisset Peninsular that have been undermined.

5.1.1 Pelican Rock Navigational Marker

As described in CVC's Subsidence Monitoring Program, the Pelican Rock Navigation Marker is expected to be impacted by approximately 90 mm of subsidence from mining within Miniwall panels S2 and S3.

NSW Roads and Maritime Services (RMS) has indicated a functional impact on the marker is likely to occur at 500 mm of subsidence and 5° or 87 mm/m of tilt.

A survey for RL and tilt was conducted on 10 July 2019 by Daly Smith Surveyors prior to mining and measured Pelican Rock Navigation Marker was 1.14m Australian Height Datum (AHD) and the navigational pole was vertical.

A final survey was undertaken on 16 June 2023, recording the level at 1.09m AHD, indicating an impact of 50 mm. Miniwall mining methods were ceased at Chain Valley Colliery in August 2021, with MWS3 completed in July 2020.

Following completion of the June 2023 survey of Pelican Rock navigational marker, Delta Coal contacted Transport for NSW (formerly RMS), seeking confirmation that the navigational marker was deemed still suitable for operation and to confirm monitoring of the marker could cease, provided no further subsidence impacts where anticipated. In 2024, Delta Coal received confirmation from Transport for NSW that Delta Coal was able to cease monitoring of the Pelican Rock navigational marker.



5.2 Mannering Colliery

There were no built features identified as requiring direct subsidence management as a result of MC former workings during 2025.

6 Impacts to Natural Features

6.1 Chain Valley Colliery

Subsidence impact performance measures to natural and heritage features are detailed in SSD-5465 Modification 4, Table 6 as below.

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; and • *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.

6.1.1 Seagrass Bed Monitoring

Annual seagrass bed monitoring was undertaken in June 2025 as per the approved Seagrass Management Plan. The Seagrass monitoring report is publicly available at www.deltapae.com.au. **Table 3** is taken from the report and displays compliance to the subsidence impact performance measures table for 2025.

Table 3 - Seagrass Monitoring Compliance

Feature	Requirement	Compliance Status
Threatened species, populations or their habitats and endangered ecological communities.	Negligible impact or environmental consequences	Yes
Seagrass beds	Negligible environmental consequences including: • *Negligible* change in the size and distribution of seagrass beds • *Negligible change* in the functioning of seagrass beds; and • *Negligible* change to the composition or distribution of seagrass species within seagrass beds	Yes

6.1.2 Benthic Communities Monitoring

Benthic monitoring was undertaken in May 2025. The Benthic Communities reports are publicly available at www.deltapae.com.au. The below table is taken from the May 2025 report and displays compliance to the subsidence impact performance measures.

The results from the May 2025 benthic communities monitoring show compliance to SSD5465 (Mod 4) with respect to the Subsidence Impact Performance Measures for Benthic communities, which display nil to minor environmental consequences due to underground mining.

Table 4 - Benthic Communities Compliance

Conditions from SSD-5465 – Mod 4	Compliance Status and Comments
Schedule 4 Environmental Conditions – underground mining Performance Measures – Natural Environment Biodiversity – Benthic Communities **Subsidence Impact Performance Measure – Minor environmental consequences, including minor changes composition and/or distribution.**	**Compliant – See section 16 - Conclusions**
Measurements undertaken by generally accepted methods. **Measures Methods fully described.**	**Compliant – See section 4 and 5** **Compliant – See section 4 and 5**

7 Adaptive Management – Subsidence Management Trigger Action Response Plan (TARP) Implementation and Remediation

7.1 Chain Valley Colliery

Adaptive management includes monitoring subsidence impacts and subsidence effects. based on the results, modifying the mining plan as mining proceeds to ensure that the effects, impacts and/or associated environmental consequences remain within predicted and designated ranges and in compliance with the conditions of this consent. The subsidence Monitoring TARPs for Miniwall S5 and Northern Pillar Extraction has been provided as **Figure 6**.

Triggers and performance indicators (including measured subsidence and inspections for environmental impact) are provided across a number of different management plans at CVC and include specific information regarding:

- subsidence monitoring requirements (including baseline monitoring)
- remediation
- adaptive management techniques and
- contingency plans.

A summary of these are provided in CVC's Subsidence Management TARP which aims to consolidate all subsidence management requirements into a central location, triggering a response or set of responses commensurate with the nature of the measurement or the impact that has been identified.

There were no subsidence related remediation activities undertaken during 2025 as a result of mining activities at CVC.

7.2 Mannering Colliery

There is no subsidence management TARP at MC, with no mining undertaken within the collieries boundaries since the establishment of the link road.

There were no subsidence related remediation activities undertaken during 2025 as associated with Mannering Colliery.

Figure 5 - CVC Subsidence Management TARP

Revision 4 - 10/08/2021

CHAIN VALLEY COLLIERY- SUBSIDENCE MANAGEMENT TRIGGER ACTION RESPONSE PLAN (TARP 00136)

SUBSIDENCE MANAGEMENT NORTHERN MINING AREA DOMAIN (S5 and Northern Pillar Area)

	DETAILED PERFORMANCE INDICATORS	MONITORING REQUIREMENTS	CONTAINMENT / REMEDIATION MEASURES	ADAPTIVE MANAGEMENT MEASURES	CONTINGENCY PLANS
SUBSIDENCE PARAMETERS (Bathymetric Survey)	**Normal** Subsidence ≤ 500mm	As per Subsidence Monitoring (SM) Program			
	Trigger Level 1 Subsidence > 500mm to ≤ 780mm	6 monthly surveys until subsidence stabilises, then as per SM Program		Update subsidence predictions based on monitoring data Identify controlling mechanisms Review potential change in impact on natural and built features & update management plans if required	Review ability to limit further increases based on understood mechanisms including: Extraction heights, panel widths, panel recovery
	Trigger Level 2 Subsidence >780mm	6 monthly until subsidence stabilises then as per SM Program	Review if increase likely to create impact at foreshore/seagrass or exceed final subsidence prediction Notify immediately DPIE if incident and within 7 days for non-compliance Notify RR, BCD, affected landholders or infrastructure owner	Implement further controls as applicable from review Update subsidence predictions based on monitoring data Update impact assessment on natural and built features	Immediately review mine plan including panel width, pillar widths, extraction height and panel length Consult with DPIE and RR Review and update Extraction Plan
SUBSIDENCE PARAMETERS (Foreshore / Land Based Survey over minimum of 2 adjacent pegs)	**Normal** <20mm recorded movement	Monitoring as per SM Program			
	Trigger Level 1 <20mm recorded movement with slow (3-5mm/month) creep	Validate increase with additional monthy survey/s then as per SM program		Update subsidence predictions based on monitoring data Identify controlling mechanisms Review potential change in impact on natural and built features & update management plans if reqd	
	Trigger Level 2 >20mm recorded movement (assoicated with mining)	Implement Ecological Monitoring program for HWMSB exceedance Increase frequency of subsidence parameter monitoring to until rates stabilises. Then as per SM program	**Cease extraction in panel in question until review conducted in consultation with DPIE and DRE** Notify immediately DPIE if incident and within 7 days for non-compliance Notify RR, OEH, affected landholders or infrastructure owner	Investigate cause of exceedance (ie validate impact due to FAS extraction or not). Update subsidence predictions based on monitoring data Update impact assessment on natural and built features	Provide offsets for any ecological communities or threatened species in the HWMSB if impacts detected Immediately review mine plan including panel width, pillar widths, extraction height in consultation. Consult with DPIE and RR Review and update Extraction Plan
BUILT FEATURES	**Normal** No damage requiring remediation	Monitoring as per Subsidence Monitoring Program RMS routine monitoring navigation markers			
	Trigger Level 1 Subsidence parameters exceeded such that Fassifern workings indicated to have potential impact on foreshore Private bore capacity reduced	Monitoring as per BFMP (Built Feature Management Plan)	Review navigational marker freeboard and notify Transport for NSW if impacted Notify immediately DPIE if incident and within 7 days for non-compliance Notify RR and potentially affected landholders or infrastructure owner. Provide temporary water if required.		Develop BFMP in conjunction with owner for built features surrounding potential impact area
	Trigger Level 2 Impact to built feature	Monitoring as per BFMP	**Cease extraction in panel in question until review conducted in consultation with DPIE and RR** Assist owner with information to aid in Subsidence Advisory NSW claim in accordance with BFMP	Update impact assessment based on observed damage	Immediately review mine plan including panel width, pillar widths Consult with DPIE and RR Review and update Extraction Plan

Revision 4 - 10/08/2021

CHAIN VALLEY COLLIERY- SUBSIDENCE MANAGEMENT TRIGGER ACTION RESPONSE PLAN (TARP 00136)

SUBSIDENCE MANAGEMENT NORTHERN MINING AREA DOMAIN (S5 and Northern Pillar Area)

		DETAILED PERFORMANCE INDICATORS	MONITORING REQUIREMENTS	CONTAINMENT / REMEDIATION MEASURES	ADAPTIVE MANAGEMENT MEASURES	CONTINGENCY PLANS
Triggers	PUBLIC SAFETY (Foreshore / Land Based areas and steep slopes)	**Normal** No impact	Monitoring as per SM Program and Public Safety MP			
		Trigger Level 1 Subsidence parameters exceeded such that Fassifern workings indicated to have potential impact on foreshore / land based areas	Increase visual inspection of foreshore to daily until public safety risk quantified as low Inspect Foreshore / Land Based areas in vicinity of steep slopes and retaining walls for signs of movement ASAP. Implement TARP as required.		Review potential of flooding and drainage impacts about foreshore or Land Based areasor stability concerns at steep slopes/ retaining walls. Undertake appropriate risk assessments	
		Trigger Level 2 Area around foreshore or other land based areas becomes unstable or shows signs of mining induced impact Flooding or drainage impacts considered likely as result of Fassifern extraction	Visual inspections frequency to be commensurate with level of risk (ie increase until controls put in place) Inspect Foreshore / Land Based areas in vicinity of other steep slopes and retaining walls for signs of movement ASAP. Implement TARP as required.	**Cease extraction in panel in question until review conducted in consultation with DPIE and RR** Immediately implement temporary safety controls (barricades and signage available from mine site). Arrange for assistance and stay at site if immediate risk to public exists Inform ECC as to result of inspection Geotechnical Engineer to inspect area immediately Notify LMCC and Transport for NSW Notify BCD, DPIE and RR	Implement longer term safety controls	Foreshore / Land based area stabilisation of unsafe areas in consultation with LMCC/CC Council and RR as soon as possible Flooding and drainage rectification works in consultation with infrastructure owner as soon as possible
	BENTHIC COMMUNITIES	**Normal** ANOVA/ANOSIM >5%	Monitoring as per Benthic MP			
		Trigger Level 1 ANOVA/ANOSIM level is approaching 5%	Liaise with monitoring consultant & undertake internal review to determine if impacts are related to mining Arrange a peer review of the monitoring results and statistical analysis			
		Trigger Level 2 ANOVA/ANOSIM <5%	Undertake follow up monitoring at affected sites to obtain confirmation of impacts. Incident Report to be completed and distributed to relevant agencies	Notify DPIE-Fisheries, LMCC and DPIE Notify immediately DPIE if incident and within 7 days for non-compliance	Consult with relevant authorities about monitoring and management controls	Consult with relevant authorities to identify if offsets are required and how these are to be implemented.
	SEAGRASS	**Normal** Negligible impact	Monitoring as per Seagrass MP			
		Trigger Level 1 Approaching 20% decline in condition Approaching 20mm of additional mine induced subsidence within mapped seagrass	Liaise with monitoring consultant & undertake internal review to determine if impacts are related to mining		Review if variation is within broader background variation range for the site.	
		Trigger Level 2 >20% decline in conditions from year baseline survey >150mm of additional mine induced subsidence at survey location	Incident Report to be completed and distributed to relevant agencies	Notify immediately DPIE if incident and within 7 days for non-compliance Notify DPIE-Fisheries and LMCC	Consult with relevant authorities about monitoring and management controls	Consult with relevant authorities to identify if offsets are required and how these are to be implemented.
	THREATENED SPECIES AND ENDANGERED POPULATIONS	**Normal** Negligible environmental consequences	Monitoring as per Subsidence Monitoring Program, Benthic Communities Management Plan and Seagrass Management Plan			
		Trigger Level 1 As per Seagrass and Benthic Community Management Plans Monitoring Level 1 triggers	Liaise with monitoring consultant & undertake internal review to determine if impacts are related to mining and greater than neglible environmental consequences.		Review if variation is within broader background variation range for the site.	
		Trigger Level 2 As per Seagrass and Benthic Community Management Plans Monitoring Level 2 triggers >780mm subsidence	Incident Report to be completed and distributed to relevant agencies	Notify immediately DPIE if incident and within 7 days for non-compliance Notify DPIE-Fisheries and LMCC	initiate ecological monitoring program to assess the impacts to ecological communities and threatened species. Consult with relevant authorities about monitoring and management controls	Consult with relevant authorities to identify if offsets or rehabilitation is required and how this is to be implemented.
	WATER INFLOW	Ongoing monitoring of water inflows and site water management through operational Water Management and Monitoring TARP process				

		Revision 4 - 10/09/2021 CHAIN VALLEY COLLIERY- SUBSIDENCE MANAGEMENT TRIGGER ACTION RESPONSE PLAN (TARP 00136) **SUBSIDENCE MANAGEMENT NORTHERN MINING AREA DOMAIN (S5 and Northern Pillar Area)**
Responsibilities	Environment Compliance Coordinator	Coordinate and undertake all environmental monitoring as outlined in TARP Implement TARP actions in consultation with regulatory agencies as/if required Notify the relevant Government agencies and other affected parties of exceedance of performance measures Coordinate Subsidence Review as a part of Annual Environmental Reporting Arrange for subsidence prediction and impact updates as required Update Extraction Plan as required Audit public safety controls regularly
	Mine Surveyor	Coordinate subsidence monitoring as outlined in TARP Review subsidence monitoring results against TARP triggers Inform relevant stakeholders as to subsidence monitoring trends and exceedances
	Mine Manager	Ensure adequate financial and personnel resources are made available for implementation of this plan Review and approve required mine plan changes

Appendix 10: Chain Valley Colliery Independent Environmental Audit

SSD-5465 Independent Environmental Audit 2025

Chain Valley Colliery

Delta Power & Energy (Chain Valley) Pty Ltd

Revision 0

2 July 2025



Document version history

Version	Date	Revision description	Author
A	26 May 2025	Draft 2025 Independent Environmental Report	Elliot Holland: Lead Auditor Kurt Speirs: Auditor Gemma van Hemert: Assistant Auditor
0	2 July 2025	Final 2025 Independent Environmental Report	Elliot Holland: Lead Auditor Kurt Speirs: Auditor Gemma van Hemert: Assistant Auditor

Abbreviations

Abbreviation	Definition
ANC	administrative non-compliance
AQGHGMP	Air Quality and Greenhouse Gas Management Plan
BCD	Biodiversity Conservation Department
BCMP	Benthic Communities Management Plan
BFMP	Built Features Management Plan
BMP	Biodiversity Management Plan
CA	corrective action
CCC	community consultative committee
CCL	Consolidated Coal Lease
CVC	Chain Valley Colliery
DCCEEWW	Department of Climate Change, Energy, the Environment and Water
DPE	former Department of Planning and Environment (NSW)
DPHI	Department of Planning, Housing and Infrastructure (NSW)
DPIE	former Department of Planning, Industry and the Environment (NSW)
EMS	Environment Management Strategy
EPA	Environment Protection Agency
EPL	Environment Protection License
GHD	GHD Pty Ltd
HMP	Heritage Management Plan
IEA	independent environmental audit
LDP	licensed discharge point
MC	Mannering Colliery
ML	Mining lease
MOP	mining operations plan
MPL	Mining Purposes Lease
m/s	metres per second
mtpa	million tonnes per annum
NMP	Noise Management Plan
OFI	opportunity for improvement
Onward	Onward Consulting Pty Ltd
PIRMP	Pollution Incident Response Management Plan
PM	particulate matter
RMP	Rehabilitation Management Plan
ROM	run-of-mine
RR	Resources Regulator (NSW)
RTP	Roads Transport Protocol
SMP	Seagrass Management Plan
SSD	state significant development
t	tonnes
TARP	trigger action response plan
VPA	voluntary planning agreement

Abbreviation	Definition
VPPS	Vaes Point Power Station
WMP	Water Management Plan

Executive summary

Onward Consulting Pty Ltd (Onward) was engaged by Delta Power & Energy (Chain Valley) Pty Ltd (trading as Delta Coal) to conduct an Independent Environmental Audit (IEA) of Chain Valley Colliery (CVC), an existing underground coal mine. CVC is located on the southern end of Lake Macquarie approximately 60 km south of Newcastle, 80 km north of Sydney.

The IEA was undertaken in accordance with the requirements of:

- AS/NZS ISO 19011:2019 Guidelines for quality and / or environmental management systems auditing
- Schedule 6, Condition 9 of SSD-5465
- the Independent Audit Post Approval Requirements (DPIE, 2020)

The audit period to which this audit applies is inclusive of the period from 12 April 2022 to 16 April 2025. This report presents the findings of this audit.

The audit team consisted of:

- Lead Auditor – Elliot Holland of Onward
- Auditor – Kurt Speirs
- Assistant Auditor – Gemma van Hemert

The audit was inclusive of the following:

- a single day site inspection at CVC on 16 April 2025, which included interviews with key site personnel, of all key aspects of the development (Section 1 and Appendix G of this IEA report)
- consultation with regulatory agencies and the chair of the Community Consultative Committee (CCC) to obtain feedback and identification of any key issues to focus on during the audit (Section 2.3 and Appendix C of this IEA report)
- the status of implementation of the previous IEA findings, recommendations and actions (Section 3.1 of this IEA report)
- an assessment of compliance against all conditions:
    - SSD-5465 (Section 3.3.1 and Appendix D of this IEA report)
    - Environmental Protection Licence (EPL) 1770 (Section 3.3.2 and Appendix F of this IEA report)
    - Leases (i.e. Consolidated Coal Lease [CCL] 706, CCL707, Mining Lease [ML] 1781, ML1782, ML1051, ML1783, ML1052, ML1784, ML1308, ML1785, Mining Purposes Lease [MPL] 1349, MPL1389, MPL1400, MPL337) (Section 3.3.3)
    - Standard Conditions (Schedule 8A, Part 2) of the Mining Regulation 2016 (NSW) (Section 3.3.3 and Appendix F of this IEA report)
- a review of the adequacy of the environmental management strategies, plans and programs required under the consent (Section 3.4 of this IEA report)
- identification and discussion of complaints and incidents that occurred during the audit period (Section 3.5 of this IEA report)
- an assessment of the environmental performance of the development through review of the implementation of key environmental management strategies, plans and programs (Section 4 of this IEA)
- identification of the Corrective Actions (CAs) and / or Opportunities for Improvement (OFIs) (Section 5 of this IEA)

Audit findings summary

The IEA identified a total of 19 non-compliances, however, overall compliance with conditions of relevant approvals, licences and leases was noted as high, as follows:

- **SSD-5465**: Compliance with approximately 89% of conditions (i.e. 50 of 56 conditions, excluding conditions which are notes or were not triggered) (Appendix D of this IEA report).
- **EPL 1770**: Compliance with approximately 85% of conditions (i.e. 53 of 62 conditions, excluding conditions which are notes or were not triggered) (Appendix E of this IEA report).
- Relevant leases:
  - Up to 1 July 2022 – CCLs, MLs, and MPLs (see Section 1.3.2 of this IEA report): Compliance with 100% of conditions
  - From 2 July 2022 – Standard Conditions (Schedule 8A, Part 2) of the Mining Regulation 2016: Compliance with approximately 85% of conditions (i.e. 23 of 27 conditions) (Appendix F of this IEA report)

However, the IEA assessed a total of 19 non-compliances, as follows:

- **SSD-5465**, with more detail provided in Section 3.3.1 of this IEA report, non-compliances include:
  - ***NC01*** (Schedule 2, Condition 2)
  - ***NC02*** (Schedule 3, Condition 7)
  - ***NC03*** (Schedule 3, Condition 16)
  - ***NC04*** (Schedule 3, Condition 23)
  - ***NC05*** (Schedule 6, Condition 5)
  - ***NC06*** (Schedule 6, Condition 13)
- **EPL 1770**, with more detail provided in Section 3.3.2 of this IEA report, non-compliances include:
  - ***NC07*** (Condition L1.1)
  - ***NC08*** (Condition L2.1)
  - **NC09** (Condition L2.4)
  - ***NC10*** (Condition L3.1)
  - ***NC11*** (Condition L3.2)
  - ***NC12*** (Condition L5.7)
  - ***NC13*** (Condition O6.2)
  - ***NC14*** (Condition M2.3)
  - ***NC15*** (Condition M8.1)
- **Standard Conditions** (Schedule 8A, Part 2) of the Mining Regulation 2016, with more detail provided in Section 3.3.3.2 of this IEA report, non-compliances include:
  - ***NC15*** (Division 3, Condition 11)
  - ***NC17*** (Division 3, Condition 15[1])
  - ***NC18*** (Division 3, Condition 15[2])
  - ***NC19*** (Division 3, Condition 19([2])

Associated CAs and OFIs are included in Section 5 of this IEA report, as relevant.

Executive Summary Table Non-compliance summary

Finding ID	Non-compliance	Source	Condition	Risk rating
NC01	This is a non-compliance in relation to the other five non-compliances against relevant conditions of consent. These include Schedule 3, Conditions 7, 16, and 23; and Schedule 6, Conditions 5 and 13.	SSD-5465	Schedule 2 Condition 2	Low
NC02	Whilst undertaking on-site monitoring at R22 for the purpose of a Noise Mitigation Options Assessment, Delta Coal identified an exceedance of noise limits at receiver R22 on 15 September 2022.		Schedule 3 Condition 7	Low
NC03	There were 12 exceedances in relation to EPL criteria for discharge during the audit period, including two exceedances of the 50 mg/L limit for TSS, one exceedance of the 10 ml/L limit for oils and grease, and nine exceedances of the limits for faecal coliform (which have been removed from EPL 1770 as a result of the variation approved 13 September 2024). In addition, during construction works installing a new sewer pipeline, a pressurised sewer main was punctured. The incident was immediately reported to the CC Council and NSW EPA, with CC Council shutting down the sewage pump station to facilitate clean-up works and repairs undertaken by the construction contractor. Outcomes of the incident investigation indicated <1,000 L of sewage entered the Swindles Creek. Subsequent sampling indicated that there was no ongoing impact.		Schedule 3 Condition 16	Low
NC04	During the site inspection, adequate vessels for recycling were observed to be available on site; however, instances of recycling disposal not being appropriately followed were observed. No CA or OFI is proposed on the basis that Delta Coal has followed all the reasonable and feasible measures as proposed in the 2022 IEA, including: • clear labelling and adequate availability of waste disposal facilities • completion of training packages and toolbox talks on the importance of waste management		Schedule 3 Condition 23	Low
NC05	The audit was able to verify review of strategies, plans and/or programs in accordance with Schedule 5, Condition 5 where reviews resulted in updates. However, the audit was unable to confirm reviews of strategies, plans and/or programs were undertaken in accordance with Schedule 6, Condition 5 where reviews determined updates were not required. As such, the audit was unable to confirm compliance with the requirements of Schedule 6, Condition 5.		Schedule 6 Condition 5	ANC
NC06	Conduct of the 2025 IEA identified the current BMP (Revision 6, November 2022) was not available on the Project website, constituting a non-compliance with Schedule 6, Condition 13 of SSD-5465. However, it is noted that since the site inspection, Delta Coal has uploaded the current BMP.		Schedule 6 Condition 13	ANC
NC07	Per discussion at ***NC03***.	EPL 1770	L1.1	Low
NC08	Per discussion at ***NC03***.		L2.1	Low
NC09	Per discussion at ***NC03***.		L2.4	Low
NC10	There were two exceedances of volumetric limits during the audit period on 5 July 2022 (attributed to a heavy rainfall event over 2-6 July 2022) and 6 July 2022, constituting a non-compliance with Condition L3.1.		L3.1	Low
NC11	Per discussion at ***NC10***.		L3.2	Low
NC12	Monitoring for LA1(1minute) noise levels is not completed at 1m from a façade; however, such noise monitoring is generally not practical due to disturbance to residents during the sensitive night-time period.		L5.7	ANC
NC13	During the site inspection, adequate vessels for recycling were observed to be available on site; however, instances of recycling disposal not being appropriately followed were observed. No CA or OFI is proposed on the basis that Delta Coal has followed all the reasonable and feasible measures as proposed in the 2022 IEA, including: • clear labelling and adequate availability of waste disposal facilities • completion of training packages and toolbox talks on the importance of waste management		O6.2	Low

Finding ID	Non-compliance	Source	Condition	Risk rating
NC14	A review of the data for the audit period indicates that samples are being taken in compliance with this condition; however, only LDP1 is routinely reported in the monthly environmental reports. There were occasions where LDP27 was triggered, but not reported on in the monthly report. During the significant rainfall period of 2-6 July 2022, which triggered the spillway and need to sample LDP27, no sample was taken at LDP27 due to a failure in un-attended sampler thus constituting a non-compliance with the condition.		M2.3	ANC
NC15	As discussed for Condition M2.3, there were two volumetric exceedances recorded during the audit period, attributed to significant rainfall events (in July 2022) for which Delta Coal failed to sample the discharge water due to a failure at the un-attended sampler. Delta Coal took the appropriate actions and therefore no further CA has been deemed relevant. In addition, a review of the data provided indicates that samples are being taken in compliance with this condition; however, only LDP1 is routinely reported in the monthly environmental reports. There were occasions where LDP27 was triggered and not reported on in the monthly report.		M8.1	Low
NC16	Review of the RMP indicates this requirement is generally addressed; however, the Approved Rehabilitation Objectives Statement is dated 20 November 2023, with the RMP not revised until 15 January 2024, which is more than 30 days after approval of the Rehabilitation Objectives Statement. Therefore, this has resulted in an ANC.	Standard Conditions (Schedule 8A, Part 2) of the Mining Regulation 2016	Division 3 Condition 11	ANC
NC17	With consideration to the definition of 'initial period' defined in Condition 15(8), the RMP, rehabilitation outcome documents and forward program were required within 30 days of 2 July 2022 (i.e. by 30 July 2022). The Forward Program Thursday 7 July 2022 to Sunday 6 July 2025 was not submitted until 23 January 2023, resulting in an administrative non-compliance; however, as the initial period will no longer be relevant going forward, no CA or OFI has been deemed relevant.		Division 3 Condition 15(1)	ANC
NC18	Review of relevant documentation indicates general compliance with the requirements of this condition; however, the Annual Rehabilitation Report and Forward Program for 7 July 2022 to 6 July 2023 was not submitted until 12 September 2023, which is more than 60 days after the last day of the annual reporting period. Therefore, this has resulted in an ANC.		Division 3 Condition 15(2)	ANC
NC19	A review of the email correspondence between NSW Resources Regulator and Delta Coal, confirms that written notice was provided. However, the notice was required to be provided within 28 days of 2 July 2022 (i.e. 29 July 2022) and was not provided until 10 August 2022. Therefore, an ANC has been identified.		Division 3 Condition 19(2)	ANC

Furthermore, 3 of the 21 non-compliances were already identified in the Annual Reviews required by conditions of SSD-5465 and Annual Returns required by conditions of EPL 1770, including:

- **SSD-5465:** ***NC02*** (Schedule 3, Condition 7)
- **EPL1770:** ***NC09*** (Condition L2.4) and ***NC11*** (Condition L3.2)

All non-compliances were identified against relevant approvals are discussed in Section 3.3, Appendix D (i.e. SSD-5465), Appendix E (i.e. EPL 1770) and Appendix F (i.e. Standard Conditions [Schedule 8A, Part 2] of the Mining Regulation 2016).

A summary of CVC's overall environmental performance is summarised in Section 4 of this IEA report, and CAs or OFI are summarised in Section 5 of this IEA report.

Audit conclusion

With regard to environmental management of CVC, this site is led by competent and knowledgeable environmental professionals who provided all evidence requested during the audit and diligently facilitated the site inspection component of the audit.

The environment team has implemented appropriate management processes for CVC to ensure compliance is achieved and has demonstrated active adaptive management. This approach is complemented by the established systems which include corporate systems such as Pulse and internal site-specific measures.

CVC staff were transparent with the provision of information and open to receiving feedback and discussing contemporary with the audit team.

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1. Introduction

1.1. Background of the project

The Chain Valley Colliery (CVC) is an underground coal mine located on the southern end of Lake Macquarie approximately 60 km south of Newcastle, 80 km north of Sydney and adjacent to Vales Point Power Station (VPPS). The pit-top is located 1 km south-east of the township of Mannering Park.

Underground mining at CVC commenced in 1962 and since that time has extracted coal from three seams; namely, the Wallarah Seam, the Great Northern Seam and the Fassifern Seam, using a combination of bord and pillar and miniwall mining methods. Delta Power & Energy (Chain Valley) Pty Ltd (trading as Delta Coal) own and operate CVC, with current mining activities within the Fassifern Seam.

Over the audit period, mining was undertaken at CVC, with coal being transported underground to Mannering Colliery (MC) where the coal is sized and screened and sent directly to VPPS.

Delta Coal is currently undertaking the mine closure / rehabilitation process for the Moonee Colliery stockpile area, within intentions to relinquish this holding area to National Parks and Wildlife Services upon completion of rehabilitation.

As required by Schedule 6, Condition 9 of the Development Consent (i.e. SSD-5465), Delta Coal is required to complete an independent environmental audit (IEA) for CVC every three years.

1.1.1. Department of Planning, Housing and Infrastructure endorsement

Delta Coal engaged Onward Consulting Pty Ltd (Onward) to conduct the IEA with the following Audit Team:

- Lead Auditor – Elliot Holland of Onward
- Auditor – Kurt Speirs of Onward
- Assistant auditor – Gemma van Hemert of Onward

The Department of Planning, Housing and Infrastructure (DPHI) endorsed the appointment of the Audit Team on 5 February 2025. The letter of endorsement is included in Appendix A and requiring the IEA to be submitted to the Planning Secretary of the DPHI within 12 weeks of the date of the site inspection.

1.1.2. Period covered by the audit

The audit period is from 12 April 2022 (the day of the site inspection for the 2022 IEA completed by GHD Pty Ltd) to 16 April 2025 (the day of the site inspection for the 2025 IEA).

1.2. Site description

CVC was granted SSD-5465 on 23 December 2013, which has since had five modifications, including:

- Modification 1 (approved 27 November 2014) enabling construction of an underground linkage between CVC and MC for coal transportation.
- Modification 2 (approved 16 December 2015) enabling increased rate of coal extraction, with additional coal to be transported via MC to VPSS.
- Modification 3 (approved 20 June 2020) increasing the transport of product coal from CVC to MC.
- Modification 4 (approved 5 August 2021) extending the consent boundary to incorporate the Northern Mining Area (NMA), enabling transfer of coal extracted from the NMA to the CVC pit top.

Operations at CVC are conducted at rates of up to 2.1 million tonnes per annum (Mtpa) of run-of-mine (ROM), in accordance with Schedule 2, Condition 6 of SSD-5465,

Delta Power & Energy (Vales Point) Pty Ltd (trading as 'Delta Electricity') who own and operate the VPSS is the major landholder in the area, owning operational land of both Chain Valley Colliery and Mannering Colliery, with the exclusion of the CVC ventilation fan site at Summerland Point. To the north and north-east, CVC is adjacent to the southern extent of Lake Macquarie. To the west and south-west suburban residential areas are near to CVC, with the suburb of 'Kingfisher Shores', located within 230 m of CVC.

1.3. Audit objective and scope

1.3.1. Objective

Onward was commissioned to undertake an IEA of CVC on behalf of Delta Coal. The primary purpose of this IEA was to satisfy the Schedule 6, Conditions 9 and 10 of SSD-5465, which requires completion of an IEA every three years (Table 1.1).

Table 1.1 Audit requirements

Condition	Requirement	Reference to report section
Schedule 6, Condition 9	By the end of February 2022, and every three years after, unless the Planning Secretary directs otherwise, the Applicant must commission and pay the full cost of an Independent Environmental Audit of the development. The audit must:	
(a)	led by a suitably qualified, experienced and independent auditor whose appointment has been endorsed by the Planning Secretary;	Section 2.1, Appendix A, and Appendix B
(b)	be led and conducted by a suitably qualified, experienced and independent team of experts (including any be expert in field/s specified by the Planning Secretary) whose appointment has been endorsed by the Planning Secretary;	Section 2.1, Appendix A, and Appendix B
(c)	be carried out in consultation with the relevant agencies and the CCC;	Section 2.3, Appendix C
(d)	assess the environmental performance of the development and whether it is complying with the relevant requirements in this consent, water licences and mining leases for the development (including any assessment, strategy, plan or program required under these approvals);	Sections 3 and 4, Appendix D, Appendix E, and Appendix F
(e)	review the adequacy of any approved strategy, plan or program required under the abovementioned approvals and this consent;	Section 3.4
(f)	recommend appropriate measures or actions to improve the environmental performance of the development and any assessment, strategy, plan or program required under the abovementioned approvals and this consent; and	Section 5
(g)	be conducted and reported to the satisfaction of the Planning Secretary.	Outside the audit process
Schedule 6, Condition 10	Within three months of commencing an Independent Environmental Audit, or other timeframe agreed by the Planning Secretary, the Applicant must submit a copy of the audit report to the Planning Secretary, and any other NSW agency that requests it, together with its response to any recommendations contained in the audit report, and a timetable for the implementation of the recommendations. The recommendations must be implemented to the satisfaction of the Planning Secretary.	Outside the audit process

1.3.2. Scope

The audit considered compliance with conditions of relevant approvals, licences and leases listed in Table 1.2, and was conducted in accordance with:

- AS/NZS ISO 19011:2019 Guidelines for quality and / or environmental management systems auditing
- Schedule 6, Condition 9 of SSD-5465
- the Independent Audit Post Approval Requirements (DPIE, 2020)

Table 1.2 Approvals audited

Approval document	Relevant section reference
SSD-5465	Section 3.3.1 and Appendix D
Environment Protection Licence (EPL) 1770	Section 3.3.2 and Appendix E
Leases under the *Mining Act 1992* (NSW)[1] (i.e. Consolidated Coal Lease [CCL] 706, CCL707, Mining Lease [ML] 1781, ML1782, ML1051, ML1783, ML1052, ML1784, ML1308, ML1785, Mining Purposes Lease [MPL] 1349, MPL1389, MPL1400, MPL337)	Section 3.3.3.1
Standard Conditions (Schedule 8A, Part 2) of the Mining Regulation 2016[2]	Section 3.3.3.2 and Appendix F

1) Up to 1 July 2022.

2) Conditions applicable from 2 July 2022.

Relevant evidence to determine the compliance ratings against the conditions is presented in Appendix D, and Appendix E, Appendix F, including plans required by conditions of SSD-5465, as listed in Table 1.3.

Table 1.3 Management plans evaluated

Management plan	Version and date	Section reference
Delta Coal Environmental Management Strategy (EMS)	Revision 4 1 July 2024	Section 3.4.1, and Appendix D
Delta Coal Rehabilitation Management Plan (RMP)	Revision 2 15 January 2024	Section 3.4.2, Appendix D, and Appendix F
Water Management Plan (WMP)	Revision 7 16 January 2024	Section 3.4.3, Appendix D, and Appendix E
Delta Coal Air Quality and Greenhouse Gas Management Plan (AQGHGMP)	Revision 5 12 January 2024	Section 3.4.4, Appendix D, and Appendix E
Delta Coal Noise Management Plan (NMP)	Revision 1 20 April 2022	Section 3.4.5, Appendix D, and Appendix E
Delta Coal Heritage Management Plan (HMP)	Revision 5 27 September 2023	Section 3.4.6, and Appendix D
Biodiversity Management Plan (BMP)	Revision 5 1 December 2019	Section 3.4.7, and Appendix D
Seagrass Management Plan (SMP)	Revision 9 12 October 2022	Section 3.4.8, and Appendix D
Benthic Communities Management Plan (BCMP)	Revision 9 28 July 2023	Section 3.4.9, and Appendix D
Miniwall S5 and Northern Pillar Area Extraction Plan Amendment 1	Revision 1.4 26 August 2024	Section .4.10 Appendix D
Subsidence Monitoring Program	Revision 4 10 August 2021	Section 3.4.11, and Appendix D
Built Features Management Plan (BFMP)	Revision 0 19 March 2021	Section 3.4.12, and Appendix D
Road Transport Protocol (RTP)	Version 3 25 September 2020	Section 3.4.13, and Appendix D
Public Safety Management Plan (PSMP)	Revision 9 19 March 2021	Section 3.4.14 Appendix D

1.4. Audit commencement

The inception meeting was held between Onward and Delta Coal on 17 February 2025 to:

- confirm the audit methodology
- identify relevant personnel involved in the audit
- discuss key activities and systems occurring on site
- identify key documentation for review
- schedule a date for the site inspection

1.5. Limitations

This audit report has been prepared by Onward for Delta Coal and may only be used and relied on by Delta Coal for the purpose agreed between Onward and Delta Coal as set out in Section 1.3 of this report.

Onward otherwise disclaims responsibility to any person other than Delta Coal arising in connection with this report. Onward also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by Onward in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out Section 1.3.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. Onward has no responsibility or obligation to update this report to account for events or changes occurring after the date that the report was prepared.

2. Audit methodology

A desktop review of all approval documents including management plans, as well as monitoring data and community complaints was conducted to determine the contents of the audit protocol to be used during the site inspection and interviews. Evidence was collected and reviewed as part of the audit, including monitoring records, reports and correspondence.

Documents and data collected during the audit process were reviewed prior to the on-site component of the audit where possible. Additional documents were provided to the audit team during, and following completion of, the on-site component of the audit.

All information obtained during the audit process were verified by the audit team. Statements made by site personnel were verified by viewing relevant documentation and/or visual observations made during the site inspection. Audit findings have been outlined in this report including where suitable evidence was unable to be obtained.

2.1. Audit participants

The IEA was led by Elliot Holland, Lead Auditor – Environmental Management Systems (EMS) (C-115351) with the IEA participants listed in Table 2.1, which includes the audit team as approved by the DPHI (Appendix A), and relevant personnel of Onward.

Table 2.1 Audit participants

Audit participants	Organisation	Role	Qualifications
Elliot Holland	Onward	Lead Auditor	Exemplar Global Lead Auditor – EMS Bachelor of Environmental Science and Management
Kurt Speirs	Onward	Auditor	Exemplar Global Certified Lead Auditor – EMS and Work Health and Safety Bachelor of Environmental Science and Management
Gemma van Hemert	Onward	Assistant Auditor	Bachelor of Environmental Science and Management
Lachlan McWha	Delta Coal	Environmental Compliance and Approvals Coordinator	N/A

2.2. Audit site inspection

2.2.1. Opening and closing meetings

The opening and closing meetings were held at the CVC offices during the site inspection completed on Wednesday 16 April 2025.

The opening meeting discussed the audit objectives, scope, resources required and methodology to be applied, while the objectives of the closing meeting were to discuss any outstanding matters, present preliminary findings and outline the process for finalising the audit report.

2.2.2. Audit interviews

During the on-site component of the audit, interviews were conducted with the list of auditees included in Table 2.1.

2.2.3. Site inspection

A detailed site inspection was conducted on 16 April 2025.

During the inspection, site documentation and the physical aspects of environmental management and implementation of management plans and programs were reviewed.

Conditions during the site inspection were noted to be:

- up to 22.8 degrees Celsius
- winds up to 6.11 metres per second (m/s), predominantly from the west south west and south west
- mostly cloudy, with no rain during the site inspection or preceding 48 hours

The locations inspected during the site audit included:

- previous sewage treatment and discharge area (now decommissioned and connected to the Central Coast (CC) Council system)
- above ground tanks and bunding
- workshop, including hazardous and dangerous good storage areas
- oil/water separator
- dust deposition gauges (i.e. DDG001 and DDG004)
- waste sorting area in the hardstand and equipment storage area
- water storage and treatment dams, including
- pollution control dams, including groundwater dewatering into D8
- EPL Licensed Discharge Point 1 (LDP1)
- rehabilitation area at the former mining cottages

2.3. Agency / stakeholder consultation

The audit team attempted consultation with the following agency and administrative organisations:

- DPHI Compliance
- NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW), including the following agencies/divisions:
  - Water Group
  - Conservation Programs, Heritage & Regulation (CPHR) Group, including the NSW Environment Protection Authority (EPA)
- NSW Resources Regulator
- NSW Department of Primary Industries and Regional Development (DPIRD)
- Central Coast Council (CC Council)
- Lake Macquarie City Council (LMCC)
- CVC and MC Community Consultative Committee (CCC) Chairperson

Responses were not received from NSW DCCEEW, DPIRD, CC Council, or LMCC.

Agency and administrative organisation responses to the IEA request for input are provided in Table 2.2 and Appendix C.

Table 2.2 Agency and administrative organisation IEA requirements

Auditor to consider	Responses and / or relevant section reference
DPHI Compliance	
Request for consultation with Lake Macquarie Council (ATT: Development Compliance Coordinator), Hunter Water (or equivalent), Subsidence Advisory NSW and Resource Regulator for comment.	See responses and section references in this table, as well as Appendix C.
No other comments or concerns identified.	N/A.
NSW DCCEEW – Water Group	
Requests that the audit address compliance with the following specific elements of the consent conditions and related legislative requirements in a manner consistent with the above audit scope:	N/A
• The requirement to prepare and implement management plans that relate to water sources and their dependent ecosystems and users, and associated impact management and mitigation. These plans may include: ◦ Water Management Plans and related sub-plans e.g., Site Water Balance, Erosion and Sediment Control Plan, Stormwater Management Plan, Surface and Groundwater Management Plan. ◦ Extraction Plans and related sub-plans e.g., Water Management Plan, Subsidence Management Plan.	Section 3.4
• The requirement to prepare and implement trigger action response plans (TARPs) for water source impacts which set clearly defined limits and actions. This is to be reported on within annual and exceedance-based reporting.	Sections 3.3.1, 3.3.2, and 3.4
• Water supply availability is clearly defined for the project.	Section 4.3.1
• Water take at the site via storage, diversion, interception or extraction is clearly documented and is authorised by a relevant Water Access Licence (WAL) or exemption under the Water Management (General) Regulation 2018.	Section 4.3
• Water metering at the site is in accordance with the NSW Non-Urban Metering Framework where relevant.	N/A
• Water Access Licence/s used to account for water take by the project nominates the work where the water is being taken from.	Section 4.3
• Annual reporting clearly documents; 1) water take, use and water source impacts, 2) compares results with previous years, and 3) identifies exceedances and how these are managed/mitigated.	Section 4.3
NSW DCCEEW – CPHR Group	
CPHR has considered your request and does not have any comments regarding the performance of the Chain Valley Colliery and Mannering Colliery from a biodiversity, stormwater, flood or coastal management perspective, relating to: • Conditions of SSD-5465 • Performance with other requirements or obligations • Incidents of non-compliance	N/A.
NSW Resources Regulator	
The independent environmental audit is required to assess compliance against the relevant environmental management conditions of the mining leases up to 1 July 2022, including implementation of the mining operations plan for the site.	Section 3.3 – Summary of non-compliances Section 3.3.3 – Leases Appendix F – Standard conditions (Schedule 8A, Part 2) Mining Regulation 2016
From 2 July 2022, the independent environmental audit should provide an assessment of compliance with the requirements of Schedule 8A Standard conditions of mining leases, Part 2 Standard conditions, as set out in the Mining Regulation 2016.	
The audit should note observations where rehabilitation procedures, practices and outcomes represent best industry practice.	
NSW EPA	
No comments or concerns identified.	Appendix C
CCC Chair	
No comments or concerns identified.	Appendix C

2.4. Audit definitions

Audit reporting was undertaken generally in accordance with the requirements of the Independent Audit Post Approval Requirements (DPIE, 2020).

Compliant

The auditor has collected sufficient verifiable evidence to demonstrate that all elements of the requirement have been complied with within the scope of the audit.

Non-compliant

The auditor has determined that one or more specific elements of the conditions or requirements have not been complied with within the scope of the audit.

In addition, while not required by the Independent Audit Post Approval Requirements (DPIE, 2020), risk ratings have also been assigned for non-compliances as identified in Table 2.3.

Table 2.3 Risk ratings for non-compliances

Risk level	Colour code	Description
High		Non-compliance, with potential for significant environmental consequences, regardless of the likelihood of occurrence.
Medium		Non-compliance, with: • potential for serious environmental consequences, but is unlikely to occur; or • potential for moderate environmental consequences but is likely to occur.
Low		Non-compliance, with: • potential for moderate environmental consequences, but is unlikely to occur; or • potential for low environmental consequences but is likely to occur.
Administrative (ANC)		Only applied where the non-compliance does not result in any risk of environmental harm (e.g. submitting a report to government later than required under approval conditions).

Not triggered

A requirement has an activation or timing trigger that has not been met during the temporal scope of the audit being undertaken (may be a retrospective or future requirement), therefore an assessment of compliance is not relevant.

Note

A statement or fact, where no assessment of compliance is required.

Corrective action (CA)

Is identified where there is an issue of compliance, and the action needs to be undertaken to close out the compliance issue.

Opportunity for improvement (OFI)

Has generally been identified where there is not an issue of compliance, but improvements could be made to enhance tracking of compliance.

3. Audit findings

3.1. Previous independent audit and status

Table 3.1 Status of 2022 IEA findings / recommendations

Condition	ID	2022 IEA finding / recommendation	2025 IEA finding	Status
EPL 1770				
Corrective Actions				
L2.4 and L3.2	1	Keep DPE up-to-date on the progress of works under DA 845-2020 to address exceedances associated with licensed discharges.	The completion of works was reported on in the 2024 Annual Review which was submitted to the DPHI. Therefore, CA1 is considered closed.	Closed
O1.1 & O6.2	2	As bins are clearly labelled and adequate disposal facilities are available across the site, Delta should investigate means to address the workforce culture in relation to inadequate disposal of waste that has persisted across this, and the previous, audit.	Conduct of the audit determined Delta Coal has undertaken actions to improve waste management on site, including: • clear labelling and adequate availability of waste disposal facilities • completion of training packages and toolbox talks on the importance of waste management Therefore, CA2 is considered closed.	Closed
M1.3	3	Ensure contractors record sample time when recording air quality monitoring data in accordance with the requirements of Condition M1.3.	Delta Coal instructed third party contractors to include sampling times on field sheets after the 2022 IEA, with a number of monitoring sheets sighted during the 2025 IEA confirming the required information has been collected. Therefore, CA3 is considered closed.	Closed
Recommendations				
P1.1	1	As part of updates required to the AQMP, update Figure 3 to show the location of the meteorological station.	Figure 3 in the AQGHGMP was updated to reflect the meteorological station location. Therefore, Recommendation 1 is considered closed.	Closed
L2.4	2	There is an inconsistent naming convention for the discharge locations between sites. It is recommended that they are consistently referenced across management plans and annual reviews.	Review of the WMP, GWMP, Annual Reviews, and monthly environmental reports consistently referring to discharge locations as either LDP or discharge point. Therefore Recommendation 2 is considered closed.	Closed
M2.2	3	To improve data capture for PM10, review possibilities of backup power supply for the system.	Delta Coal reviewed the potential for installing a backup power supply and concluding that the installation of a separate generator is not proportionate to the incident. A review of the power outages data has confirmed the monitoring system was online 97.54% of the time between April 2022 and April 2025. Therefore, Recommendation 3 is considered closed.	Closed

Condition	ID	2022 IEA finding / recommendation	2025 IEA finding	Status
SSD-5465				
Corrective actions				
Schedule 2, Condition 23	4	Ensure that Trigger Action Response Plans (TARPs) are included in the AQMP, HMP, Seagrass Management Plan, Benthic Communities Management Plan and WMP in the next update. This includes developing a TARP to further detail the management procedures for the newly established PM2.5 alarms within the AQMP.	TARPs have been added into each of the required management plans. Therefore, CA4 is considered closed	Closed
Schedule 3, Condition 5	5	Ensure a summary of the results of Independent Traffic Audits are included in Annual Reviews.	Section 6.17 of the Annual Reviews now includes a summary on the status of any required independent traffic audit and coal haulage. Therefore, CA5 is considered closed.	Closed
Schedule 6, Condition 5	6	Ensure plans are updated within three months of submission of this IEA and otherwise in accordance with the requirements of Schedule 6, Condition 5.	Relevant management plans identified as requiring revision have either been updated, approved and uploaded to the Project website since the 2022 IEA, or have been updated and remain with the DPHI for approval. Therefore, CA6 is considered closed	Closed
Schedule 6, Condition 13	7	Ensure that the most up to date management plans are uploaded onto the website.	CA7 was not closed out at the time of the 2025 IEA, with the current BMP (Revision 6, November 2022) not available on the Project website, constituting a non-compliance with Schedule 6, Condition 13 of SSD-5465. However, it is noted that since the site inspection, Delta Coal has uploaded the current BMP. Therefore, CA7 is considered closed.	Closed
Recommendations				
Schedule 2, Condition 22	4	The Outcome of consultation is not included in the BMP, it is recommended a statement be added to indicate no comments were received to be included in the plan.	Review of the current BMP (Revision 6, November 2022) shows consultation was conducted with the BCD (dated 9 December 2022) and NSW EPA (dated 5 December 2022), with approval of the former Department of Planning and Environment (DPE) (now the DPHI) dated 24 April 2023. Therefore, Recommendation 4 is considered closed.	Closed
Schedule 3, Condition 17 and Condition 18	5	The WMP has not been implemented as approved in relation to sewage management. Ensure the WMP is updated to reflect the changes to on-site sewage management, which are scheduled to be completed by 26 August 2022.	The WMP was updated in January 2024 and reflects the update to on-site sewage management. Therefore, Recommendation 5 is considered closed.	Closed
Schedule 3, Condition 18	6	Ensure a maintenance schedule is established to ensure dams and drainage lines are free of silt and water storage is maximised.	A maintenance schedule is now included in Table 8 of WMP. Therefore, Recommendation 6 is considered closed.	Closed
Schedule 6, Condition 1	7	Include a requirement in the EMS to notify landowners of exceedances 'as soon as practical'. Define a time period for as ‘soon as practical’.	Notification requirements, including a seven day time period, is now included in EMS. Therefore, Recommendation 7 is considered closed.	Closed

Condition	ID	2022 IEA finding / recommendation	2025 IEA finding	Status
Schedule 3, Condition 27	8	Ensure the RMP required by SSD-5465 is updated to consider the requirements of the RMP and Annual Rehabilitation Report and Forward Program currently being prepared (as now required by the NSW Resources Regulator instead of a MOP) and documents where topsoil will be stored and the estimated volumes required for rehabilitation.	The RMP was most recently revised in January 2025 and is available on the Project website, and details the requirements for rehabilitation and provides the anticipated timeline. The RMP explains that a topsoil securement strategy would be developed prior to closure, as the historic nature of the site has meant limited amounts of topsoil were stripped and stored for rehabilitation purposes. This is considered appropriate and proportionate to the recommendation. Therefore, Recommendation 8 is considered closed.	Closed
Schedule 3, Condition 9	9	The outcomes of the noise mitigation study currently being completed should be captured in a revised noise management plan and reflect any changes to monitoring, as relevant.	Conduct of the audit determined the Noise Mitigation Options Assessment was initially submitted by the extended date of 30 September 2022, with a revised Noise Mitigation Options Assessment submitted on the 11 November 2024 to address comments from the DPHI. However, the Noise Mitigation Options Assessment is still awaiting approval from the DPHI. Therefore, Recommendation 9 remains open and has been updated in the 2025 IEA as ***OFI02.***	Open
Schedule 4, Condition 1-4	10	Assess the triggers from the Extraction Plans e.g. ANOVA/ANOSIM level is approaching 5% in the bi-annual monitoring reports.	Analysis was completed by EMM in 2022 and 2024, finding that there was an absence of statistically relevant differences and recommending to reduce the benthic community monitoring to once per year in Autumn. Therefore, Recommendation 10 is considered closed.	Closed
Schedule 4, Condition 2	11	Develop a TARP when updating the Benthic Communities Management Plan. This should address the wording of Schedule 4 Condition 2 SSD 5465. A series of triggers should be developed based on quantitative data and this should be reported in the bi - annual monitoring reports and the Annual Review. An example of a trigger would be '% change in organisms between monitoring events'.	A TARP is now included in the Benthic Communities Management Plan with endorsement from BCD dated 1 September 2023. Therefore, Recommendation 11 is considered closed.	Closed

3.2. Summary of agency notices, orders, and penalties

3.2.1. Notice to provide information and/or records from NSW EPA

On 28 April 2022, Delta Coal received notice N-47513 from the NSW EPA under Section 184 of the *Protection of the Environment Operations Act 1997* (NSW) (POEO Act). The notice required the provision of information and/or records in relation to the multiple exceedances of Conditions L2.4, O4 and O8 in EPL 1770 pertaining to faecal coliform, effluent and sewage management, which no longer form part of the conditions of EPL 1770. There were nine exceedances being investigated by the NSW EPA which spanned the period of 18 September 2019 to 30 March 2022. While the exceedances are outside the scope of this IEA, the notice is not.

Delta Coal was required to submit their response by 5:00pm on 20 May 2022. This was achieved with a response submitted before close of business on 20 May 2022.

3.3. Summary of non-compliances

The IEA identified overall compliance was noted as high, as follows:

- **SSD-5465**: Compliance with approximately 89% of conditions (i.e. 50 of 56 conditions, excluding conditions which are notes or were not triggered) (Appendix D).
- **EPL 1770**: Compliance with approximately 85% of conditions (i.e. 53 of 62 conditions, excluding conditions which are notes or were not triggered) (Appendix E).
- Relevant leases:
  - Up to 1 July 2022 – CCLs, MLs, and MPLs (see Section 1.3.2): Compliance with 100% of conditions
  - From 2 July 2022 – Standard Conditions (Schedule 8A, Part 2) of the Mining Regulation 2016: Compliance with approximately 85% of conditions (i.e. 23 of 27 conditions) (Appendix F)

However, the IEA assessed a total of 19 non-compliances, as follows:

- **SSD-5465**, with more detail provided in Section 3.3.1, non-compliances include:
  - ***NC01*** (Schedule 2, Condition 2)
  - ***NC02*** (Schedule 3, Condition 7)
  - ***NC03*** (Schedule 3, Condition 16)
  - ***NC04*** (Schedule 3, Condition 23)
  - ***NC05*** (Schedule 6, Condition 5)
  - ***NC06*** (Schedule 6, Condition 13)
- **EPL 1770**, with more detail provided in Section 3.3.2, non-compliances include:
  - ***NC07*** (Condition L1.1)
  - ***NC08*** (Condition L2.1)
  - **NC09** (Condition L2.4)
  - ***NC10*** (Condition L3.1)
  - ***NC11*** (Condition L3.2)
  - ***NC12*** (Condition L5.7)
  - ***NC13*** (Condition O6.2)
  - ***NC14*** (Condition M2.3)
  - ***NC15*** (Condition M8.1)

- **Standard Conditions** (Schedule 8A, Part 2) of the Mining Regulation 2016, with more detail provided in Section 3.3.3.2, non-compliances include:
  - ***NC16*** (Division 3, Condition 11)
  - ***NC17*** (Division 3, Condition 15[1])
  - ***NC18*** (Division 3, Condition 15[2])
  - ***NC19*** (Division 3, Condition 19([2])

Associated CAs and OFIs are included in Section 5, as relevant.

3.3.1. SSD-5465

Table 3.2 SSD-5465 non-compliances

Finding ID	Condition	Requirement	Finding	Risk rating	CA or OFI
NC01	Schedule 2 Condition 2	The development may only be carried out: (a) in compliance with the conditions of this consent;…	This is a non-compliance in relation to the other five non-compliances against relevant conditions of consent. These include Schedule 3, Conditions 7, 16, and 23; and Schedule 6, Conditions 5 and 13.	Low	N/A
NC02	Schedule 3 Condition 7	The Applicant must ensure that the noise generated by the development at any residence on privately-owned land does not exceed the criteria for the location in Table 1 nearest to that residence.	While undertaking on-site monitoring on 15 September 2022 for the purpose of a noise mitigation options assessment, an exceedance of noise limits at receiver R22 was recorded. However, the exceedance was not identified at the monitoring point for R22 (ATN007) due to inconsistencies between modelled low-frequency noise (LFN) and appropriate LFN penalties to be applied at ATN007. Delta became aware on 21 October 2022 and implemented the appropriate notification and investigation protocols. An investigation into reasonable and feasible methodologies to mitigate ventilation fan noise contributing to the original exceedance was carried out as part of the assessment, concluding it was unreasonable and unfeasible to undertake noise mitigation works at the ventilation fan site given the cost of mitigation and the limited number of receivers and community members impacted by noise emissions generated by the ventilation fan. Delta Coal provided suitable justification for this conclusion. As this was a one off occurrence and has not reoccurred no CA or OFI has been deemed relevant.	Low	N/A
NC03	Schedule 3 Condition 16	Unless an EPL authorises otherwise, the Applicant must comply with Section 120 of the POEO Act.	There were exceedances in relation to EPL criteria for discharge during the audit period, including two exceedances of the 50 mg/L limit for TSS (on 5 July 2022 and 8 October 2022), one exceedance of the 10 ml/L limit for oils and grease (on 24 April 2024), and nine exceedances of the limits for faecal coliform (which have been removed from EPL 1770 as a result of the variation approved 13 September 2024) (on 5 July 2022, 8 October 2022, 14 February 2023, 20 March 2023, 13 November 2023, 11 March 2024, 12 April 2024, 10 May 2024, and 11 September 2024). In addition, during construction works installing a new sewer pipeline, a pressurised sewer main was punctured. The incident was immediately reported to the CC Council and NSW EPA, with CC Council shutting down the sewage pump station to facilitate clean-up works and repairs undertaken by the construction contractor. Outcomes of the incident investigation indicated <1,000 L of sewage entered the Swindles Creek. Subsequent sampling indicated that there was no ongoing impact.	Low	***OFI04***

Finding ID	Condition	Requirement	Finding	Risk rating	CA or OFI
			The exceedances of TSS, oils and grease, and faecal coliform and the puncture of the sewer main are considered to meet the definition of water pollution, as defined in Schedule 5 of the Protection of the Environment Operations (General) Regulation 2022 (NSW), specifically: *'The definition of water pollution for the Act includes the placing in or on, or otherwise introducing into or onto, the waters, whether through an act or omission, any matter, whether solid, liquid or gaseous, that is of a prescribed nature, description or class or that does not comply with a standard prescribed in relation to the matter.* *(a) excreta, manure or urine, or waste from an on-site human or animal waste storage facility or treatment device or matter containing faecal coliform or faecal streptococci* *(i) oil, grease or flammable liquid,* *(l) liquid that contains suspended or dissolved solids,'* This resulted in non-compliance with Condition L1.1 of the EPL. As these exceedances were notified to the relevant agencies, no CA has been identified; however, ***OFI03*** has been identified in relation to these notifications.		
NC04	Schedule 3 Condition 23	The Applicant must: (a) minimise and monitor the waste generated by the development;...	During the site inspection, adequate vessels for recycling were observed to be available on site; however, instances of recycling disposal not being appropriately followed were observed. No CA or OFI is proposed on the basis that Delta Coal has followed all the reasonable and feasible measures as proposed in the 2022 IEA, including: • clear labelling and adequate availability of waste disposal facilities • completion of training packages and toolbox talks on the importance of waste management	Low	N/A
NC05	Schedule 6 Condition 5	Within three months of:.. the suitability of existing strategies, plans and programs required under this consent must be reviewed by the Applicant.	The audit was able to verify review of strategies, plans and/or programs in accordance with Schedule 5, Condition 5 where reviews resulted in updates. However, the audit was unable to confirm reviews of strategies, plans and/or programs were undertaken in accordance with Schedule 6, Condition 5 where reviews determined updates were not required. As such, the audit was unable to confirm compliance with the requirements of Schedule 6, Condition 5. After conduct of the site inspection and interviews, a review tracking spreadsheet was prepared by Delta Coal to track these reviews. Therefore, no CA deemed relevant .However, to ensure the dates used on the cover page of plans is consistent, ***OFI06*** has been identified.	ANC	***OFI06***
NC06	Schedule 6 Condition 13	Until the completion of all rehabilitation required under this consent, the Applicant must: (a) make the following information and documents (as they are obtained, approved or as otherwise stipulated within the conditions of this consent) publicly available on its website:… • all approved strategies, plans and programs required under the conditions of this consent;…	Conduct of the 2025 IEA identified the current BMP (Revision 6, November 2022) was not available on the Project website, constituting a non-compliance with Schedule 6, Condition 13 of SSD-5465. However, it is noted that since the site inspection, Delta Coal has uploaded the current BMP. Therefore, no CA or OFI is deemed relevant.	ANC	N/A

3.3.2. EPL 1770

Table 3.3 EPL 1770 non-compliances

Finding ID	Condition	Requirement	Finding	Risk rating	CA or OFI
NC07	L1.1	Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.	There were exceedances in relation to EPL criteria for discharge during the audit period, including two exceedances of the 50 mg/L limit for TSS (on 5 July 2022 and 8 October 2022), one exceedance of the 10 ml/L limit for oils and grease (on 24 April 2024), and nine exceedances of the limits for faecal coliform (which have been removed from EPL 1770 as a result of the variation approved 13 September 2024) (on 5 July 2022, 8 October 2022, 14 February 2023, 20 March 2023, 13 November 2023, 11 March 2024, 12 April 2024, 10 May 2024, and 11 September 2024). In addition, during construction works installing a new sewer pipeline, a pressurised sewer main was punctured. The incident was immediately reported to the CC Council and NSW EPA, with CC Council shutting down the sewage pump station to facilitate clean-up works and repairs undertaken by the construction contractor. Outcomes of the incident investigation indicated <1,000 L of sewage entered the Swindles Creek. Subsequent sampling indicated that there was no ongoing impact. The exceedances of TSS, oils and grease, and faecal coliform and the puncture of the sewer main are considered to meet the definition of water pollution, as defined in Schedule 5 of the Protection of the Environment Operations (General) Regulation 2022 (NSW), specifically: *'The definition of water pollution for the Act includes the placing in or on, or otherwise introducing into or onto, the waters, whether through an act or omission, any matter, whether solid, liquid or gaseous, that is of a prescribed nature, description or class or that does not comply with a standard prescribed in relation to the matter.* *(a) excreta, manure or urine, or waste from an on-site human or animal waste storage facility or treatment device or matter containing faecal coliform or faecal streptococci* *(i) oil, grease or flammable liquid,* *(l) liquid that contains suspended or dissolved solids,'* This resulted in non-compliance with Condition L1.1 of the EPL. As these exceedances were notified to the relevant agencies, no CA has been identified; however, ***OFI03*** has been identified in relation to these notifications.	Low	***OFI03***
NC08	L2.1	For each monitoring/discharge point or utilisation area specified in the table\s below (by a point number), the concentration of a pollutant discharged at that point, or applied to that area, must not exceed the concentration limits specified for that pollutant in the table.	Refer to discussion regarding non-compliance with Condition L1.1 (i.e. ***NC07***).	Low	N/A
NC09	L2.4	Water and/or Land Concentration Limits	Refer to discussion regarding non-compliance with Condition L1.1 (i.e. ***NC07***).	Low	N/A

Finding ID	Condition	Requirement	Finding	Risk rating	CA or OFI
NC10	L3.1	For each discharge point or utilisation area specified below (by a point number), the volume/mass of: a) liquids discharged to water; or; b) solids or liquids applied to the area; must not exceed the volume/mass limit specified for that discharge point or area.	There were two exceedances of volumetric limits during the audit period on 5 July 2022 (attributed to a heavy rainfall event over 2-6 July 2022) and 6 July 2022, constituting a non-compliance with Condition L3.1. These exceedances were reported accordingly and appropriate management steps were taken, including review of the TARP, site water balance and clean water diversion system. Notably, excluding the two volumetric exceedances, CVC remained well under its daily discharge limit, with the 2022, 2023 and 2024 Annual Reviews reporting an average daily discharge of 6,429 kL, 6,703.4 kL and 5,943.5 kL respectively. Conduct of the audit determined, in response to these exceedances, Delta Coal demonstrated adaptive management and implemented appropriate mitigation and management measures. Therefore, no CA or OFI is deemed relevant.	Low	N/A
NC11	L3.2	The volumetric daily discharge limit for the premises is the combined discharge measured at EPA discharge points 1 and 27 and must not exceed 12161 kilolitres per day.	Refer to discussion regarding non-compliance with Condition L3.1.	Low	N/A
NC12	L5.7	To determine compliance:… 2. With the LA1(1 minute) noise limits in condition L5.1 and L5.2, the noise monitoring equipment must be located within 1 metre of a dwelling facade.	Monitoring for LA1(1minute) noise levels is not completed at 1m from a façade; however, such noise monitoring is generally not practical due to disturbance to residents during the sensitive night-time period. Furthermore, operation of Schedule 6, Condition 12 of SSD-5465 allows monitoring from representative locations. Therefore, no CA is proposed; however, it is noted that Delta Coal is preparing a new SSD application to combine its sites, as such ***OFI08*** has been identified.	ANC	***OFI08***
NC13	O6.2	The licensee must ensure that waste identified for recycling is stored separately from other waste.	During the site inspection, adequate vessels for recycling were observed to be available on site; however, instances of recycling disposal not being appropriately followed were observed. No CA or OFI is proposed on the basis that Delta Coal has followed all the reasonable and feasible measures as proposed in the 2022 IEA, including: • clear labelling and adequate availability of waste disposal facilities • completion of training packages and toolbox talks on the importance of waste management	Low	N/A
NC14	M2.3	Water and/ or Land Monitoring Requirements	A review of the data for the audit period indicates that samples are being taken in compliance with this condition; however, only LDP1 is routinely reported in the monthly environmental reports. There were occasions where LDP27 was triggered, but not reported on in the monthly report. Therefore, ***CA01*** has been identified. During the significant rainfall period of 2-6 July 2022, which triggered the spillway and need to sample LDP27, no sample was taken at LDP27 due to a failure in un-attended sampler thus constituting a non-compliance with the condition. As the incident was appropriately investigated and reported and corrective actions implemented, no further CA is proposed.	ANC	***CA01***

Finding ID	Condition	Requirement	Finding	Risk rating	CA or OFI
NC15	M8.1	For each discharge point or utilisation area specified below, the licensee must monitor: a) the volume of liquids discharged to water or applied to the area; b) the mass of solids applied to the area; c) the mass of pollutants emitted to the air; at the frequency and using the method and units of measure, specified below.	As discussed for Condition M2.3, there were two volumetric exceedances recorded during the audit period, attributed to significant rainfall events (in July 2022) for which Delta Coal failed to sample the discharge water due to a failure at the un-attended sampler. Delta Coal took the appropriate actions and therefore no further CA has been deemed relevant. In addition, a review of the data provided indicates that samples are being taken in compliance with this condition; however, only LDP1 is routinely reported in the monthly environmental reports. There were occasions where LDP27 was triggered and not reported on in the monthly report, as such, ***CA01*** is proposed.	Low	***CA01***

3.3.3. Leases

3.3.3.1. Mining Leases

A review of compliance with CCLs, MLs, and MPLs did not identify any non-compliance with conditions up to 1 July 2022.

3.3.3.2. Standard Conditions (Schedule 8A, Part 2) of the Mining Regulation 2016

By nature of being a mine and the holder of the above leases, Delta Coal and the CVC site must also comply with the standard conditions set out in Schedule 8A, Part 2 of the Mining Regulation 2016 (NSW). Conduct of the audit identified four non-compliances with these conditions, see Table 3.4.

Table 3.4 Standard Conditions (Schedule 8A, Part 2) of the Mining Regulation 2016 non-compliances

Finding ID	Condition	Requirement	Finding	Risk rating	CA or OFI
NC16	Division 3, Condition 11	The holder of a mining lease must amend the rehabilitation management plan for the mining lease as follows— a) to substitute the proposed version of a rehabilitation outcome document with the version approved by the Secretary—within 30 days after the document is approved	Review of the RMP indicates this requirement is generally addressed; however, the Approved Rehabilitation Objectives Statement is dated 20 November 2023, with the RMP not revised until 15 January 2024, which is more than 30 days after approval of the Rehabilitation Objectives Statement. Therefore, this has resulted in an ANC with Condition 11. As this non-compliance has been closed out, no CA or OFI has been deemed relevant.	ANC	N/A
NC17	Division 3 Condition 15(1)	The holder of a mining lease must do the following before the end of the initial period— c) prepare a forward program and give it to the Secretary.	With consideration to the definition of 'initial period' defined in Condition 15(8), the RMP, rehabilitation outcome documents and forward program were required within 30 days of 2 July 2022 (i.e. by 30 July 2022). The Forward Program Thursday 7 July 2022 to Sunday 6 July 2025 was not submitted until 23 January 2023, resulting in an administrative non-compliance; however, as the initial period will no longer be relevant going forward, no CA or OFI has been deemed relevant.	ANC	N/A

Finding ID	Condition	Requirement	Finding	Risk rating	CA or OFI
NC18	Division 3 Condition 15(2)	The holder of the mining lease must prepare a forward program and annual rehabilitation report and give them to the Secretary before— a) 60 days after the last day of each annual Reporting Period, commencing with the annual Reporting Period in which the forward program was given to Secretary under subclause (1)(c)...	Review of relevant documentation indicates general compliance with the requirements of this condition; however, the Annual Rehabilitation Report and Forward Program for 7 July 2022 to 6 July 2023 was not submitted until 12 September 2023, which is more than 60 days after the last day of the annual reporting period. Therefore, this has resulted in an ANC with Condition 15(2). As this non-compliance has not re-occurred in relation to submission of the annual rehabilitation report for 2023/2024, no CA or OFI has been deemed relevant.	ANC	N/A
NC19	Division 3 Condition 19(2)	The holder of the mining lease must give written notice to the Secretary of— a) 60 days after the last day of each annual Reporting Period, commencing with the annual Reporting Period in which the forward program was given to Secretary under subclause (1)(c)...	A review of the email correspondence between NSW Resources Regulator and Delta Coal, confirms that written notice was provided. However, the notice was required to be provided within 28 days of 2 July 2022 (i.e. 29 July 2022) and was not provided until 10 August 2022. Therefore, an ANC has been identified with Condition 19(2). However, as the nominated contact person has since been provided to the NSW Resources Regulator, no CA or OFI is deemed relevant.	ANC	N/A

3.4. Adequacy of any strategies / plans, programs and compliance documents

3.4.1. Environmental Management Strategy

The EMS (revision 4 dated 1 July 2024) has been written and implemented in accordance with the conditions of SSD-5465, including:

- Schedule 2, Condition 23 (Staging, Combining and Updating Strategies, Plans or Programs)
- Schedule 6, Condition 1 (EMS)
- Schedule 6, Conditions 3 and 4 (Management Plan Requirements)
- Schedule 6, Condition 5 (Revision of Strategies, Plans and Programs)

In accordance with Schedule 2, Condition 23(d) of SSD-5465, the EMS is combined with Delta Coal's adjacent MC site. Appendix 7 of the EMS includes the combined Environmental Monitoring Program.

The current EMS was approved by the DPHI on 22 October 2024, with two revisions made during the audit period, one on 12 October 2022 following the 2022 IEA and the second on 1 July 2024 following the request for information received from the former DPE (now the DPHI).

The most recent EMS was found to be publicly available on the Delta Coal website at the time of the audit.

There were no issues identified during the audit (i.e. documentary review, site inspection, and interviews) necessitating revision to the EMS, with the current EMS satisfying the requirements imposed on MC.

3.4.2. Rehabilitation Management Plan

The RMP is a combined plan for both the MC and CVC sites and has generally been written and implemented in accordance with:

- Relevant Standard Conditions (Schedule 8A, Part 2) of the Mining Regulation 2016 (NSW) and NSW Resources Regulator Form and Way and Guideline documents
- SSD-5465, specifically:
    - Schedule 2, Condition 23 (Staging, Combining and Updating Strategies, Plans or Programs)
    - Schedule 3, Condition 25 (Rehabilitation Objectives)
    - Schedule 3, Condition 26 (Progressive Rehabilitation)
    - Schedule 3, Condition 27 (RMP)
    - Schedule 6, Conditions 3 and 4 (Management Plan Requirements)
    - Schedule 6, Condition 5 (Revision of Strategies, Plans and Programs)

The RMP is now in its second revision, dated 15 January 2024, with both revisions prepared during the audit period, prepared in consultation with the NSW Resources Regulator. The first revision was prepared on 31 July 2022 to comply with the amendments made to Schedule 8A of the Mining Regulation 2016. The second was prepared following approval of Rehabilitation Objective Statement by the NSW Resource Regulator on 20 November 2023, and progress of the rehabilitation phase at the former CVC mine cottages.

There were no significant issues identified during the audit (i.e. documentary review, site inspection, and interviews), with the following related documents sighted during the audit:

- Approved Rehabilitation Objectives Statement Monday 20 November 2023
- Forward Program Thursday 7 July 2022 to Sunday 6 July 2025 (submitted 23 January 2023)
- Forward Program Friday 7 July 2023 to Monday 6 July 2026 (submitted 12 September 2023)
- Forward Program Sunday 7 July 2024 to Tuesday 6 July 2027 (submitted 27 November 2024)
- Annual Rehabilitation Report Thursday 7 July 2022 to Friday 6 July 2023 (submitted 12 September 2023)
- Annual Rehabilitation Report Friday 7 July 2023 to Saturday 6 July 2024 (submitted 5 September 2024)

Review of the RMP identified ***OFI01*** in relation to inclusion of consultation materials with relevant agencies.

The most recent RMP and Forward Program were found to be publicly available on the Delta Coal website at the time of the audit.

3.4.3. Water Management Plan

The WMP (Revision 7, 16 January 2024) for CVC has been written and implemented in accordance with the conditions of SSD-5465, including:

- Schedule 3, Condition 18 (WMP)
- Schedule 6, Conditions 3 and 4 (Management Plan Requirements)
- Schedule 6, Condition 5 (Revision of Strategies, Plans and Programs)

The WMP (Revision 7, 16 January 2024) was approved by the DPHI on 23 October 2024. The WMP has been revised during the audit period per the recommendations of the 2022 IEA and in consultation with the NSW EPA and NSW DCCEEW – Water Group. The WMP includes a water balance for the site, management plans for surface facilities, a surface water management plan, a ground water monitoring program and a detailed review of surface water management at the site contains, as required by conditions of SSD-5465.

The WMP additionally has CVCs Groundwater Management Plan, erosion and sediment controls and water management TARP attached as Appendices 1, 4 and 9 respectively.

A review of the WMP and conduct of the audit (including documentation review, site inspection and interviews) has found no significant issues with regard to the management of water, however it has been identified that the WMP still contains criteria now redundant to water management on-site, this being in relation to faecal coliform. As such, a revision is deemed appropriate to remove these criteria and subsequent implications, see ***OFI04.***

The most recent revision of the WMP was publicly available on the Delta Coal website at the time of the audit.

3.4.4. Air Quality and Greenhouse Gas Management Plan

The AQGHGMP (Revision 5, 12 January 2024) has been written and implemented in accordance with the conditions of SSD-5465, including:

- Schedule 2, Condition 22 (Staging, Combining and Updating Strategies, Plans or Programs)
- Schedule 3, Condition 10 (Odour)
- Schedule 3, Condition 11 (Air Quality Criteria)
- Schedule 3, Condition 12 (Operating Conditions)
- Schedule 3, Condition 13 (Air Quality Management Plan)
- Schedule 6, Conditions 3 and 4 (Management Plan Requirements)
- Schedule 6, Condition 5 (Revision of Strategies, Plans and Programs)

In accordance with Schedule 2, Condition 16(d) of MP06_0311, the AQGHGMP is combined with Delta Coal's adjacent MC site.

The current AQGHGMP was approved by the DPHI on 23 January 2024, with three revisions made during the audit period. The first (Revision 3) was prepared on 30 May 2023 following the 2022 IEA. The second (Revision 4, 18 September 2023) was made to address comments from the former NSW DPE (now the DPHI).

The most recent AQGHGMP was found to be publicly available on the Delta Coal website at the time of the audit.

There were no issues identified during the audit (i.e. documentary review, site inspection, and interviews), with the current AQGHGMP satisfying the requirements imposed on CVC.

3.4.5. Noise Management Plan

The NMP (Revision 1, 20 April 2022) has been written and implemented in accordance with the conditions of SSD-5465, including

- Schedule 2, Condition 22 (Staging, Combining and Updating Strategies, Plans or Programs)
- Schedule 3, Condition 7 (Noise Impact Assessment Criteria)
- Schedule 3, Condition 8 (Operating Conditions)
- Schedule 3, Condition 9 (NMP)
- Schedule 6, Conditions 3 and 4 (Management Plan Requirements)
- Schedule 6, Condition 5 (Revision of Strategies, Plans and Programs)

In accordance with Schedule 2, Condition 16(d) of MP06_0311, the NMP is combined with Delta Coal's adjacent MC site.

The current NMP was approved by the former DPIE (now the DPHI) on 19 April 2022 and in consultation with the NSW EPA, with revision required due to approval of Modification 2 for the CVC development consent (i.e. SSD-5465).

The most recent NMP was found to be publicly available on the Delta Coal website at the time of the audit.

There were no issues identified during the audit (i.e. documentary review, site inspection, and interviews) necessitating revision to the NMP, with the current NMP satisfying the requirements imposed on CVC. However, it is noted the NMP will required revision following approval of the Noise Mitigation Assessment Study prepared by Delta Coal, which remains with the DPHI for approval (see ***OFI02***).

3.4.6. Heritage Management Plan

The HMP (Revision 5, 12 October 2022) has been written and implemented in accordance with the conditions of SSD-5465, including:

- Schedule 2, Condition 22 (Staging, Combining and Updating Strategies, Plans or Programs)
- Schedule 3, Condition 21 and Condition 21A (Heritage)
- Schedule 6, Conditions 3 and 4 (Management Plan Requirements)
- Schedule 6 Condition 5 (Revision of Strategies, Plans and Programs)

In accordance with Schedule 2, Condition 16(d) of MP06_0311, the HMP is combined with Delta Coal's adjacent MC site.

The current HMP was approved by the former DPE (now the DPHI) on 27 September 2023 in consultation with the Heritage Council of NSW, with the registered Aboriginal parties previously consulted for the 2020 revision (outside of scope). This revision was required to address minor administrative updates resulting from recommendations of the 2022 IEA.

The currently approved HMP was publicly available on the Delta Coal website at the time of the audit.

There were no issues identified during the audit (i.e. documentary review, site inspection, and interviews); however, minor revision has been recommended to increase transparency and clarity on the identified Aboriginal Heritage Information Management Systems (AHIMS) sites (see ***OFI05***).

3.4.7. Biodiversity Management Plan

The BMP (Revision 6, 23 November 2022) was approved by the former DPE on 24 April 2023. The BMP has been prepared in consultation with the NSW EPA, former NSW DPE and former NSW BCD. There has only been one update during the audit period (forming the current revision 6), prepared after the last IEA and with changes made of an administrative context.

The BMP has been prepared in accordance with the required SSD-5465 Conditions:

- Schedule 3, Condition 19 (Biodiversity Rehabilitation Objectives)
- Schedule 3, Condition 20 and 20A (BMP)
- Schedule 3, Condition 24 (Bushfire)
- Schedule 6, Conditions 3 and 4 (Management Plan Requirements)
- Schedule 6, Condition 5 (revision of strategies, plans and programs)

An additional Weed Action Plan that is not required as a separate plan by the SSD-5465 conditions has also been prepared for CVC and MC on 17 January 2020. This Weed Action Plan further fulfils the weed management requirements of the BMP and was also publicly available on the Delta Coal website at the time of the audit.

At the time of the audit, the currently approved BMP was not publicly available on the website, however, since then the BMP has been uploaded and as such, no CA was required, however, ***OFI07*** has been identified. Conduct of the audit (including documentation review, site inspection and interviews) found no other compliance issues and the BMP is deemed adequate for CVC and required no additional update.

3.4.8. Seagrass Management Plan

The SMP (Revision 9, 12 October 2022) was approved by the DPHI on 23 October 2024 with only the one update during the audit period, for revision 9, following the last IEA submission and with only administrative changes made. The previous development of the plans revisions has been in consultation with all the required stakeholders.

The plan has been prepared in accordance with the following SSD-5465 Conditions:

- Schedule 4 Condition 2 (performance measures – natural environment)
- Schedule 4 Condition 7 and Condition 8 (extraction plan must include a Seagrass Management Plan)
- Schedule 6 Condition 3 and Condition 4 (management plan requirements)
- Schedule 6 Condition 5 (revision of strategies, plans and programs)

At the time of the audit, the most recent plan was publicly available on Delta Coals website. Conduct of the audit (including documentation review, site inspection and interviews) found no compliance issues and the Seagrass Management Plan is considered adequate for CVC and does not require a revision.

3.4.9. Benthic Communities Management Plan

The BCMP (Revision 9, 28 July 2023) was approved by the former DPE on 19 September 2023. The BCMP has been updated twice during the audit period, once for revision 8 on 16 November 2022, following the submission of the 2022 IEA and again for the current July 2023 revision to include recommendations of the biennial statistical review of the benthic communities monitoring results, indicating that the benthos of Lake Macquarie have not shown significant seasonal variation. The BCMP has been prepared in consultation with the required stakeholders, including the former NSW DPIE, former NSW BCD, LMCC and DPI Fisheries.

The BCMP has been prepared in accordance with the requirements of SSD-5465 Conditions:

- Schedule 3, Condition 2 (performance measures – natural environment)
- Schedule 4, Conditions 7 and Condition 8 (extraction plan must include a Benthic Communities Management Plan)
- Schedule 6, Condition 3 and Condition 4 (management plan requirements)
- Schedule 6, Condition 5 (revision of strategies, plans and programs)

At the time of the audit, the most recent version of the BCMP was publicly available on the Delta Coal website and conduct of the audit (including documentation review, site inspection and interviews) found no compliance issues for the BCMP, considering the plan adequate and not necessitating a revision.

3.4.10. Extraction Plan

The Miniwall S5 and Northern Pillar Area Extraction Plan Amendment 1 (Revision 1.4, 26 August 2024), was approved by the DPHI on 8 October 2024. The plan has been amended twice during the audit period, with revision 1.3 made on 27 May 2024 to incorporate additional geotechnical and subsidence prediction assessment for minor modification of planned pillar extraction in the NPA and the current amended plan (revision 1.4) was prepared to reflect the current mining status, addressing the DPHI's RFI. The amended plan consulted with the relevant stakeholders.

The Extraction Plan has been prepared in accordance with Schedule 4 Condition 7 (Extraction Plan) of SSD-5465 Conditions.

The currently approved Extraction Plan and its required sub-plans are publicly available on the Delta Coal website and conduct of the audit (including documentation review, site inspection and interviews) found no compliance issues, with no amendments required for the Extraction Plan.

3.4.11. Subsidence Monitoring Program

There have been two Subsidence Monitoring Programs developed for CVC as required by SSD-5465 Schedule 4 Condition 7 (Extraction Plan must include a Subsidence Monitoring Program), which are reviewed every year in the Annual Review documents for CVC.

The Subsidence Monitoring Program attached to the currently approved Miniwall S5 and Northern Pilare Area Extraction Plan Amendment 1 as Appendix 13 is in its fifth revision and dated 20 November 2020 and was previously prepared in consultation with the former NSW RMS, NSW Resource Regulator, and NSW DPHI.

The Subsidence Monitoring Program prepared for the Northern Mining Area First Workings and Lake Macquarie Extraction (revision 4 dated 10 August 2021) was prepared in consultation with the former NSW DRE and NSW RMS.

Both programs are available on the Delta Coal website and conduct of the audit (including documentation review, site inspection and interviews) found no compliance issues, with no amendments required for the content of the programs.

3.4.12. Built Features Management Plan

While the BFMP (Revision 0, 19 March 2021) was implemented during the audit period, the preparation of the BFMP in accordance with requirements of SSD-5465 was considered in the 2022 IEA.

There were no issues identified during the audit (i.e. documentation review, site inspection, and interviews) necessitating revision to the BFMP.

The most recent revision of the BFMP was publicly available on the Delta Coal website at the time of the audit.

3.4.13. Road Transport Protocol

As there has been no road transport of product coal during the audit period (or planned to occur), the RTP (Revision 3, 1 December 2019) has not required implementation during the audit period. In addition, the preparation of the RTP in accordance with requirements of SSD-5465 was considered in the 2022 IEA.

There were no issues identified during the audit (i.e. documentation review, site inspection, and interviews) necessitating revision to the RTP.

The most recent revision of the RTP was publicly available on the Delta Coal website at the time of the audit.

3.4.14. Public Safety Management Plan

While the PSMP (19 March 2021) was implemented during the audit period, the preparation of the PSMP in accordance with requirements of SSD-5465 was considered in the 2022 IEA.

There were no issues identified during the audit (i.e. documentation review, site inspection, and interviews) necessitating revision to the PSMP.

The most recent revision of the PSMP was publicly available on the Delta Coal website at the time of the audit.

3.5. Complaints and reportable incidents

3.5.1. Complaints

Delta Coal maintains a complete complaints and incidents register for the site and a review of complaints data for the audit period indicate that there were zero complaints received in relation to CVC.

Review of complaints data for the audit period indicate a significant decrease in complaints, with complaints decreasing from 110 during the 2022 IEA period to 0 during the current audit period.

Two enquiries were received during the audit period, including:

- **25 November 2022:** A phone call was received from a resident of Mirrabooka, noting erosion on their property and queried if this was due to undermining undertaken by Delta Coal. Delta Coal noted that there had been no recorded subsidence due to mining operations recorded in the vicinity of the property and worked with the resident to meet and inspect the reported erosion.
- **10 November 2023:** Enquiry received in relation to a Wyee residents property being classified as 'active workings'. Delta Coal responded appropriately with a formal letter explaining the classification in context of the mining boundaries and associated rights and obligations. Notably, this enquiry was not reported on in the register for that year.

3.5.2. Reportable incidents under the Protection of the Environment Operations Act 1997

During the review of relevant documentation and audit interviews conducted there were no identification of incidents that have occurred during the audit period, in relation to Section 148 (Pollution incidents causing or threatening material harm to be notified) of the POEO Act. However, there were exceedances in relation to EPL criteria for discharge during the audit period, including:

- two exceedances of the 50 mg/L limit for TSS on 5 July 2022 and 8 October 2022
- one exceedance of the 10 ml/L limit for oils and grease on 24 April 2024
- nine exceedances of the limits for faecal coliform (which have been removed from EPL 1770 as a result of the variation approved 13 September 2024) on 5 July 2022, 8 October 2022, 14 February 2023, 20 March 2023, 13 November 2023, 11 March 2024, 12 April 2024, 10 May 2024, and 11 September 2024

In addition, during construction works installing a new sewer pipeline, a pressurised sewer main was punctured. The incident was immediately reported to the CC Council and NSW EPA, with CC Council shutting down the sewage pump station to facilitate clean-up works and repairs undertaken by the construction contractor. Outcomes of the incident investigation indicated <1,000 L of sewage entered the Swindles Creek. Subsequent sampling indicated that there was no ongoing impact.

The exceedances of TSS, oils and grease, and faecal coliform and the puncture of the sewer main are considered to meet the definition of water pollution, as defined in Schedule 5 of the Protection of the Environment Operations (General) Regulation 2022 (NSW), specifically:

'The definition of water pollution for the Act includes the placing in or on, or otherwise introducing into or onto, the waters, whether through an act or omission, any matter, whether solid, liquid or gaseous, that is of a prescribed nature, description or class or that does not comply with a standard prescribed in relation to the matter.

(a) excreta, manure or urine, or waste from an on-site human or animal waste storage facility or treatment device or matter containing faecal coliform or faecal streptococci

(i) oil, grease or flammable liquid,

(l) liquid that contains suspended or dissolved solids,'

This resulted in non-compliance with Condition L1.1 of the EPL (see Section 3.3.2). As these exceedances were notified to the relevant agencies, no CA has been identified; however, ***OFI03*** has been identified in relation to these notifications.

4. Environmental performance

CVC demonstrated a high level of environmental performance during the audit period and site inspection. This was demonstrated in the general lack of exceedances of relevant criteria in SSD-5465 (Appendix D), EPL 1770 (Appendix E), the various Mining Leases and Standard Conditions (Schedule 8A, Part 2) of the Mining Regulation 2016 (Appendix F) and through observations made during the site inspection (Appendix G) and site interviews.

4.1. General environmental management

The following general observations were made based on evidence from the site interviews supported by onsite inspection:

- equipment lay down areas are tidy and free of contamination
- the workshop was free of spills and was tidy and well organised
- oil recycling areas and wash down area were in good condition and tidy
- weed management was being implemented accordingly

Other observations during conduct of the audit, including the site inspection and interviews, is provided in Sections 4.2 to 4.12.

4.2. Rehabilitation

Review of relevant documentation indicates relevant plans for rehabilitation during the audit period included:

- Rehabilitation Management Plan (Revision 2, 15 January 2024)
- Approved Rehabilitation Objectives Statement Monday 20 November 2023
- Forward Program Thursday 7 July 2022 to Sunday 6 July 2025 (submitted 23 January 2023)
- Forward Program Friday 7 July 2023 to Monday 6 July 2026 (submitted 12 September 2023)
- Forward Program Sunday 7 July 2024 to Tuesday 6 July 2027 (submitted 27 November 2024)
- Annual Rehabilitation Report Thursday 7 July 2022 to Friday 6 July 2023 (submitted 12 September 2023)
- Annual Rehabilitation Report Friday 7 July 2023 to Saturday 6 July 2024 (submitted 5 September 2024).
- Annual Reviews for 2022, 2023 and 2024, including rehabilitation walkover reports

4.2.1. Progressive rehabilitation

Conduct of the audit confirmed that, due to the nature of the surface infrastructure being fixed and relied upon for mining operations, no significant rehabilitation works on disturbed lands occurred during the audit period. This is due to the nature of the CVC being an underground mine, with disturbed areas relating to surface infrastructure still in use and not available for rehabilitation. As such, no land is currently being prepared for, or is under, active rehabilitation.

The Annual Reviews for 2022, 2023 and 2024 confirmed that of the 14.7 ha of CVC's total footprint, 14.7 ha remain disturbed, and is to remain for the duration of mining, with 0.69 ha of land under ongoing management in the ecosystem and land use sustainability phase of rehabilitation (the former mine cottages area).

The rehabilitation forward program indicated the following rehabilitation was planned:

- Former Mining Cottages Area Rehabilitation:
  - Ecosystem and Land Use Establishment phase, Q2 2021 – Q4 2023
  - Ecosystem and Land Use Sustainability phase, Q1 2024 – Q1 2026

The forecast also considered the Catherine Hill Bay – Possum Gulley Area Rehabilitation which is beyond the scope and conditions of SSD-5465.

Beyond the three years covered in the forward program, the RMP provides the following schedule for progressive rehabilitation.

Table 4.1 Rehabilitation schedule for CVC

Rehabilitation phase	Estimated timing	
	Pit top and ventilation Shaft	**Former Mining Cottages**
decommissioning	Q4 2029 – Q4 2030	completed
landform establishment	Q4 2030 – Q2 2031	completed
growth media development	Q2 2031 – Q4 2031	completed
Ecosystem and Land Use Establishment Phase	Q4 2031 – Q1 2032	completed
Ecosystem and Land Use Sustainability Phase	Q1 2032 – Q1 2033	Q1 2024 to Q1 2026
relinquishment	Q1 2033 – Q3 2033	Part of larger lease to be relinquished at cessation of mining and successful rehabilitation. Ongoing management until relinquishment

4.2.2. Rehabilitation design

The RMP is a combined plan for CVC and MC. The RMP details the final land use goals for CVC, with this being surface facilities and land returned to a near-native ecosystem compatible with the surrounding vegetation communities. The CVC site is planned to be either coastal open woodland and managed grasslands for the pit top (grassland are for the existing high voltage power line easements) or swamp sclerophyll forest for the upcast shaft.

The plan is broken up into rehabilitation phases:

- active mining phase (current phase)
- decommissioning
- landform establishment
- growth media development
- ecosystem and land use establishment
- ecosystem and land use development
- rehabilitation of areas affected by subsidence

Conduct of the audit, including the site inspection, confirmed that Delta Coal is conducting its activities in line with the RMP.

4.2.3. Rehabilitation management monitoring

The CVC site is currently in the active mining phase, with rehabilitation not forecast to commence until 2029 (pending approval of the mine life extension from 2027 to 2029) due to the required use of surface facilities for operations.

Delta Coal plans to prepare a detailed mine closure plan 2-5 years prior to closure and has had a rehabilitation monitoring program developed by specialist consultant EMM, with the baselining of analogue sites for monitoring purposes beginning in 2019.

In 2024, Delta Coal commissioned a rehabilitation walkover inspection report prepared by Atlantech which was provided in the 2024 Annual Review document.

The inspection focused on the rehabilitation of the former mine cottages and relevant analogue sites on the 29 August 2024. The results of the inspection were compared against the rehabilitation objectives and criteria, finding the site housed vegetation communities consistent with the analogue sites, with no erosion observed and ultimately that the site was tracking in line with the objectives.

4.3. Water management

4.3.1. Water supply and water balance

The overarching goals of water management for CVC in relation to water supply and water balance, as set out in the WMP (Revision 7, 16 January 2024), are:

- minimise site potable water usage
- maximise runoff water reuse
- ensure there is sufficient water available to meet CVC's requirements

Whilst Delta Coal holds the groundwater bore license WAL41508, permitting the use of up to 4,443 ML of groundwater per year, CVC only utilised:

- 2,286 ML in 2024
- 2,447 ML in 2023
- 2,346 ML in 2022

All potable water supplied for CVC comes from a single connection to the CC Council town water system, with the approved amount considered a small portion of the total water consumer annually by the Central Coast. CVC's primary use is to supply underground mining activities, as the water stored in the on-site dams (being for the purpose of pollution control) does not meet suitable water quality parameters required for underground machinery.

4.3.2. Compensatory water supply

No compensatory water supply was required during the audit period.

4.3.3. Water discharge and monitoring

CVC has two LDPs under EPL 1770, these being:

- LDP1 – piped dam discharge point (low-flow discharge point)
- LDP27 – on the dam spillway (high/emergency discharge point)

The primary goals for CVC in relation to water discharge and monitoring are:

- the prevention of the flow of pollutants into watercourses and the sedimentation on receiving waters
- the control of discharges and achieving the required volume and water quality parameters as provided by the EPL

The daily discharge limit for CVC is 12,161 kL. There were two exceedances of volumetric limits during the audit period on 5 July 2022 (attributed to a heavy rainfall event over 2-6 July 2022) and 6 July 2022, constituting a non-compliance with Condition L3.1. These exceedances were reported accordingly and appropriate management steps were taken, including review of the TARP, site water balance and clean water diversion system. Notably, despite the two volumetric exceedances, CVC remained well under its daily discharge limit, with the 2022, 2023 and 2024 Annual Reviews reporting an average daily discharge of 6,429 kL, 6,703.4 kL and 5,943.5 kL respectively. Conduct of the audit determined, in response to these exceedances, Delta Coal demonstrated adaptive management and implemented appropriate mitigation and management measures. Therefore, no CA or OFI was deemed relevant.

In addition, there were exceedances in relation to EPL criteria for discharge during the audit period, including:

- two exceedances of the 50 mg/L limit for TSS on 5 July 2022 and 8 October 2022
- one exceedance of the 10 mg/L limit for oils and grease on 24 April 2024
- nine exceedances of the limits for faecal coliform (which have been removed from EPL 1770 as a result of the variation approved 13 September 2024) on 5 July 2022, 8 October 2022, 14 February 2023, 20 March 2023, 13 November 2023, 11 March 2024, 12 April 2024, 10 May 2024, and 11 September 2024

In addition, during construction works installing a new sewer pipeline, a pressurised sewer main was punctured. The incident was immediately reported to the CC Council and NSW EPA, with CC Council shutting down the sewage pump station to facilitate clean-up works and repairs undertaken by the construction contractor. Outcomes of the incident investigation indicated <1,000 L of sewage entered the Swindles Creek. Subsequent sampling indicated that there was no ongoing impact.

This resulted in non-compliances as follows:

- Schedule 3, Condition 16 of SSD-5465
- Conditions L1.1, L2.1, L2.4, L3.1, and L3.2 of EPL 1770

Conduct of the audit determined, in response to these exceedances, Delta Coal demonstrated adaptive management and implemented appropriate mitigation and management measures. Therefore, no CA is deemed relevant. However, ***OFI03*** has been identified.

4.3.4. Performance measures

In conjunction with standard erosion and sediment control methods used on site, other water management measures used on the site to meet the necessary requirements is divided across four catchments:

- Catchment 1 – carpark catchment
- Catchment 2 – storage yard catchment
- Catchment 3 -stockpile catchment
- Catchment 4 – pollution control dams

Within each of the catchment areas, a combination of measures are used to ensure the required performance goals are met, these are broken down in the proceeding subsections.

4.3.4.1. Clean water diversions

As detailed in Section 4.4 of the WMP, the only major clean water diversion on the site exists on the north-western perimeter of the pit-top, to divert any off-site run-on into the natural drainage channel.

4.3.4.2. Bunding and drainage

CVC has a number of natural and man-made bunding and drainage systems to help direct and capture run-off and dirty water, these include:

- concrete spoon drain directing water to the weighbridge
- kerb and guttering on access roads directing run-off to the sediment treatment basins
- a series of basins helping to remove coarser sediments

The site inspection sighted a number of these measures, as per the WMP.

4.3.4.3. Pollution control dams

Section 4.5 of the WMP describes the series of pollution control dams used on site, of which there are 13 (i.e. D1-D13). These pollution control dams have a combined catchment area of 2.38 ha and a combined capacity of 18,381 m^3, and receive the run-off from the storage yard area, stockpile area, dewatered groundwater, and rainfall.

Dams 1-6 act as the primary settling dams and receive majority of the runoff from the catchment area, before discharging into the main mine water treatment system, this being dams 7-10. The water draining from the hardstand catchment area reports to the pollution control ponds D11, D12 and D13. D13 overflows in to D9 which then flows into D10 prior to being discharged from site via the gravity fed LDP1, or, if there is over-flow, via LDP27.

All dams were sighted during the site inspection and site interviews revealed that Delta Coal is planning to dredge D8. It was also sighted that a silt curtain had been relocated during the audit period, in an attempt to further reduce TSS. These measures reflected best-practice environmental adaptive management.

4.3.4.4. Water savings

There are a number of water saving measures implemented across the site as described in Section 4.7 of the WMP, these measures have been calculated to save the site approximately 11.8 ML/year of potable water use. These measures include:

- use of a sweeper to clean roads and reducing the need for a water cart/truck
- rainwater tank installed atop of the workshop
- pipeline repairs (especially to older pipelines) to reduce water-loss from leakage
- trialled use of chemical suppressant to reduce water cart usage

4.3.4.5. Oil water separator

As described Section 4.10 of the WMP, to treat runoff from the bunded hydrocarbon storage areas and vehicle wash down bay, a packed bed oil separation system is used, where solids are removed where solids are removed in the grit trap and oily water is drawn from the sump through a floating skimmer, into the packed bed oil separator by a non-emulsifying pump. The system has a capacity of 2,000 L/hr of through flow. The waste oil is collected in a container and the treated water flows by gravity to the pollution control dams.

A separate oil water separation system is installed on the condensate drain from the compressors on site. This system consists of an in-ground tank where water is passed through and under over a weir arrangement and then discharged to the pollution control dams.

4.3.4.6. Stream monitoring

Delta coal also monitors Swindles creek and unnamed creek on a quarterly basis to ensure stream health, channel flow and riparian vegetation remain stable. Inspections involve a visual assessment with photographs also taken.

4.3.4.7. Groundwater monitoring

As described in Section 5.5 and Appendix 1 of the WMP, Delta Coal also monitors the mine inflows and private bore water levels as part of the groundwater monitoring program.

4.3.4.8. Inspection and maintenance

Section 5.7 of the WMP details the inspection and maintenance schedule utilised on-site to ensure the water management measures can function accordingly. This schedule is considered adequate for the site, with inspections occurring on a weekly or monthly basis.

4.4. Blasting

There were no surface blasting activities undertaken during the audit period at CVC. The extent of blasting at CVC is limited to occasional small amounts of explosives being used underground to remove geological intrusions into the coal seam to create overcasts or inter-seam shafts.

In line with the above, no non-compliances have been recorded in relation to blasting and the CVC site performs well in this area.

4.5. Air quality

A review of the relevant documentation, including the approved AQGHGMP (Revision 5, 12 January 2024) and conduct of the audit has shown that Delta Coal is implementing best practice air quality management. Mine representatives were forthcoming with their provision of answers and evidence to demonstrate air quality management and implementation. Key aspects of air quality performance for the audit period include:

- There were exceedances in relation to deposition dust at a number of monitoring points throughout the audit period; however, with commensurate investigation and mitigation measures taken and a number of exceedances attributed to operations outside of Delta Coal, CVC is considered complaint with their SSD conditions.
- the site inspection also saw minimal dust generation during the visit and noted the location of the dust monitor adjacent to the large power lines and transmission infrastructure of which had been noted as the cause of dust exceedances, with third-party works undertaken in the area.
- Three exceedances of $PM_{2.5}$ daily limits were records during the audit period, constituting a non-compliance with Schedule 3, Condition 11. There were no exceedances for PM_{10} during the audit period.
- The data captured from the real-time air quality monitor was 98.9% in 2022, 97.5% for 2023 and 94.8% for 2024, with outages resulting from electrical storms. The overall average for continuous monitoring remained above 95% for the audit period.
- The AQGHGMP outlines the regular air quality and meteorological monitoring undertaken for CVC.
- There were no incidents or complaints received in relation to odour or spontaneous combustion during the audit period.

Conduct of the audit, including the site inspection, confirmed Delta Coal is implementing the approved AQGHGMP adequately on-site.

4.6. Noise management

During the site inspection, Delta Coal representatives were forthcoming in producing any evidence requested, and showed that the mine has exhibited best practice noise management in accordance with their NMP (Revision 1, 20 April 2022) during the audit period.

Review of the relevant documentation indicates compliance with the requirements of noise conditions, with the exception of one exceedance during 2022 noise monitoring being undertaken for the Noise Mitigation Options Assessment, noting:

- The NMP outlines management and mitigation measures which minimise development noise.
- During the audit period, Delta Coal finalised and submitted a Noise Mitigation Options Assessment for reasonably and feasibly achieving long-term noise goals, focussing on R22 adjacent to the CVC ventilation fan site (i.e. the source of the sole exceedance during the audit period). At the time of reporting the assessment remains pending with the Planning Secretary for the DPHI.
- Noise controls used at CVC include:
    - air compressors being housed in 3-sided enclosures to reduce noise
    - acoustically modified ventilation fans
    - major electrical motors are located within buildings
    - the conveyor systems final transfer point (only system used for coal transport during the audit period) is enclosed
    - primary coal crushing and sizing occurs underground
- Meteorological conditions are considered in noise management including the use of an on-site meteorological site providing daily forecasting. Alerts are in place for adverse conditions and data is accessible.
- CVC conducts operator-attended noise monitoring to assess performance every three months, with results published on the Project website.
- The site has received no noise complaints over the audit period.

Conduct of the audit, including the site inspection, confirmed Delta Coal is implementing the approved NMP adequately on-site. However, a non-compliance with Condition O1.1 of EPL 1770 is noted, which requires monitoring for LA1(1minute) noise levels to be completed at 1 m from a façade; however, such noise monitoring is generally not practical due to disturbance to residents during the sensitive night-time period. Furthermore, operation of Schedule 6, Condition 12 of SSD-5465 allows monitoring from representative locations. Therefore, no CA is proposed; however, it is noted that Delta Coal is preparing a new SSD application to combine its sites, as such ***OFI08*** has been identified.

4.7. Heritage

The HMP (Revision 5, 27 September 2023) for CVC is the overarching document for Aboriginal cultural heritage and historic heritage management and mitigation.

The HMP has been prepared and implemented in accordance with the required legislation and appropriate stakeholders, including the relevant departments and RAPs.

4.7.1. Aboriginal cultural heritage

The required monitoring, management and mitigation measures required for Aboriginal heritage is provided in Section 5.1 of the HMP.

Details on the existing three AHIMS sites is provided, as well as the obligation to avoid harm and unexpected finds procedure.

Conduct of the audit, including the site inspection, found no impacts or non-compliances with regards to Aboriginal heritage and that the approved HMP was being implemented accordingly.

4.7.2. Historic heritage

There are no known items of historic heritage found within CVC; however, as above, the unexpected finds procedure for items of historic heritage is provided in Section 5.2 of the HMP. There were no non-compliances found in relation to historic heritage during the audit.

4.8. Biodiversity

In accordance with the BMP (Revision 6, 23 November 2022) and associated sub-plans (i.e. the Seagrass MP (Revision 9, 12 October 2022) and BCMP (Revision 9, 28 July 2023), Delta Coal monitors and reports on a number of biodiversity values. The following is noted in relation to biodiversity management during the audit period:

- Threatened aquatic seagrass communities: As of June 2024, the coverage of seagrasses ranges from 70%-99%. The Atlantech Pty Ltd (Atlantech) monitoring report indicates that, since 2008, seagrass coverage has been increasing in the study area, concluding that there have been nil-minor environmental consequences resulting from CVC.
- Threatened terrestrial flora: Monitoring completed by Atlantech, in accordance with the BMP, indicates no TARPs were triggered during the audit period and that vegetation conditions were generally improving.
- Threatened terrestrial fauna: No clearing works were undertaken during the audit period, with minimal potential to impact threatened or other native fauna.
- Threatened aquatic benthic communities: Benthic communities monitoring undertaken during the audit periods has shown no statistically relevant differences with the reference and control sites. Over the audit period, the number of taxonomic groups inhabiting the area increased from 26 in 2022 to 30 in 2024. The revised BCMP approved in 2023 allowed for a reduction in benthic monitoring from six-monthly to annually.
- Feral species: Only two feral species were recorded during the audit period, these being the feral dog and European fox. Based on the small number of scat present, no additional controls were recommended by Atlantech, who completed the monitoring program.
- Weeds: During the audit period, weed management focussed on Lantana, Bitou Bush, Crofton Weed and Pampas Grass, with weed control undertaken by a contractor engaged by Delta Coal and completed in accordance with the Weed Action Plan developed for CVC.

Conduct of the audit found Delta Coal to be performing well with regards to biodiversity management and notes recommendations provided to Delta Coal over the audit period related to additional targeted weed control measures.

There were no non-compliances identified in relation to biodiversity during the audit period.

4.9. Social impact

Delta Coal is not required by the SSD-5465 conditions to have developed and implemented a social impact management plan; however, in line with the statement of commitments made, Delta Coal has:

- Maintained open and constructive communication with affected individuals and groups through the use of the Project website, contact number, contact email and complaints and incident procedure.
- Participated in the CCC, with meetings held every quarter and the meeting minutes and presentations available on the website, providing regular updates with landowners and local residents.
- Provided environmental monitoring data and other relevant information in a timely manner via the environment tab on the Project website.
- Been responsive to community issues related to activities at CVC, as evidenced by the prompt response-times and closures of enquiries received, and lack of complaints recorded for the audit period.
- Worked in partnership with stakeholders to address community needs, with additional community support and engagement provided to the local community through in-kind support, cash donations, staff time and charitable donations.
- Liaised regularly with relevant government agencies and councils.
- Continued payments to the VPA and community fund established, with annual payments made to the VPA and with a number of local community infrastructure and services the beneficiaries of funding, including Summerland Point, Gwandalan, Chain Valley Bay and Mannering Park.

4.10. Bushfire management

Bushfire management for CVC is completed in accordance with Section 9 of the BMP. The following measures are implemented for CVC:

- creation of Asset Protection Zones
- maintenance of fire trails and access roads
- provision of water by means of fire hydrants, fire reels, depots, use of dams and proximity to Lake Macquarie for emergency sources of water, as required
- prohibition of hot work activities during extreme and catastrophic fire risk periods
- regular training of CVC firefighting crews and liaison with local firefighting brigades

With no bushfire incidents occurring over the audit period and sighting of the above firefighting measures during the site inspection, Delta Coal is considered complaint with conditions of SSD-5465.

4.11. Waste management

Over the audit period, Delta Coal has improved their waste management processes, as evidenced by an increase in the recycling rate from 26.5% in the 2022 period to 44.5% in 2024. During this time, Delta Coal changed waste contractors and enhanced the on-site sorting area for waste management. Delta Coal implements a total waste management system, delivered an array of waste management education initiatives (including tool box talks, presentations and signage), conducts weekly site inspection through their waste contractor Cleanaway and regularly reports on waste via:

- Monthly waste reports and waste tracking spreadsheets (provided by contractor)
- NSW EPA Online Waste Tracking System Transport Certificates
- Waste acceptance notices – ash analyser

Conduct of the audit revealed a small extent of waste miss-management, with some material and waste stored incorrectly and placed in the incorrect bins around the warehouse, resulting in a non-compliance with Schedule 3, Condition 2 of SSD-5465 and Condition O6.2 of EPL 1770.

4.12. Visual amenity and lighting impacts

The lighting and visual impact reviews were completed in 2019 with the outcome being such that no future lighting surveys were required for MC unless directed by the Secretary, which has not occurred during the audit period.

There were no complaints or incidents over the audit period in relation to visual amenity or lighting impacts.

Conduct of the audit, including the site inspection, determined Delta Coal was compliant with all visual amenity and lighting conditions.

4.13. Subsidence management

Subsidence impacts at CVC are monitored in accordance with the Subsidence Monitoring Program, with monitoring methods and frequencies described in Section 4 of the document and reported on in Section 6.13 and Appendix 9 (annual subsidence report) of the Annual Reviews. Subsidence monitoring at CVC encompasses the following key elements:

- bathymetric surveys
- terrestrial based monitoring (foreshore and general)
- navigation marker monitoring

Throughout the audit period, Delta Coal has demonstrated adequate environmental performance with respect to subsidence monitoring, evident through:

- receiving confirmation from TfNSW in 2024 that monitoring of the navigational marker could cease
- approval to reduce bathymetric scanning from bi-annually to annually, on the basis subsidence impacts were proportionate to said reduction

Conduct of the audit has confirmed that Delta Coal was compliant with all conditions related to subsidence.

5. Corrective actions and opportunities for improvement

5.1. Corrective actions

Table 5.1 summarises the CAs made based on the findings of the audit and observations during the site inspection.

Table 5.1 Corrective actions identified during the audit

Consent / license / lease	Condition	CA ID	CA requirement
EPL 1770	M2.3 and M8.1	CA01	Report on LDP1 and LDP27 monitoring and sample results in the monthly environmental reports and Annual Reviews. If no discharge or sampling occurs, a note on this would be appropriate for consistency and improved environmental monitoring.

5.2. Opportunities for improvement

Table 5.2 summarises the OFIs made based on the findings of the audit and observations during the site inspection.

Table 5.2 Opportunities for improvement identified

Consent / license / lease	Condition	OFI ID	OFI requirement
SSD-5456	Schedule 2 Condition 22	OFI01	Update the RMP to include copies of emails / letters to / from BCD, DPIE Water (now DCCEEW Water Group), Central Coast Council, LMCC and the CCC.
SSD-5456	Schedule 3 Condition 27		
SSD-5465	Schedule 3 Condition 9	OFI02	On approval of the Noise Mitigation Options Assessment by the DPHI, ensure the NMP is revised to reflect any relevant changes and approved by the DPHI.
SSD-5465	Schedule 3 Condition 16	OFI03	Should any exceedance of discharge water quality criteria occur, ensure notifications include consideration to Section 120 of the Protection of the Environment Operations Act 1997 (NSW), including Schedule 5 of the Protection of the Environment Operations (General) Regulation 2022 (NSW).
SSD-5465	Schedule 3 Condition 18	OFI04	Update the WMP and future monthly environmental monitoring reports to remove redundant faecal coliform criteria.
SSD-5465	Schedule 3 Condition 21A	OFI05	Update the HMP to include discussion related to all three identified AHIMS items, including the two sites identified during removal of cottage sites in Section 5.1.1.
SSD-5465	Schedule 6 Condition 5	OFI06	To remove discrepancy and ensure consistency across plans, every management plan should be updated to have a consistent cover page identifying: • the date the plan was submitted/prepared • approval date • last review date • next review date
SSD-5465	Schedule 6 Condition 13	OFI07	Assign an internal periodic (e.g. six-monthly) action to check the Project website to ensure the most up-to-date management plans have been uploaded onto the website.
EPL 1770	Condition L5.7	OFI08	A request should be made to add a note to Condition L5.7 in reference to the residential restriction for LA1(1 minute), and align with Schedule 6, Condition 12 of SSD-5465 which allows monitoring at representative locations.

Appendix A

DPHI audit team endorsement

Department of Planning, Housing and Infrastructure

NSW Planning ref: SSD-5465-PA-153

Lachlan McWha
Environment and Approvals Coordinator
Great Southern Energy Pty Ltd
Off Construction Road Off Ruttleys Road
Mannering Park New South Wales 2259
05/02/2025

Sent via the Major Projects Portal only

Subject: Chain Valley Extension - IEA Auditor Endorsement Request

Dear Mr McWha,

I refer to your request for the Planning Secretary's approval of suitably qualified, experienced, and independent persons to conduct Independent Environmental Audits of the Chain Valley Extension Project and Mannering Coal Mine, submitted as required by Schedule 6, Condition 9(a) of SSD-5465 as modified (the consent) and Schedule 5, Condition 9(c) of MP06_0311 as modified (the approval) respectively, to the NSW Department of Planning, Housing and Infrastructure (NSW Planning) on 20 January 2025.

NSW Planning has reviewed the independent auditor nominations and based on the information you have provided is satisfied that the proposed persons are suitably qualified, experienced, and independent.

Consequently, as nominee of the Planning Secretary, I endorse the following independent audit team:

- Mr Elliot Holland – Lead Auditor
- Ms Kurt Speirs – Auditor
- Gemma van Hemert – Auditors Assistant

Please ensure this correspondence is appended to the Independent Audit report.

The Independent Audits must be prepared, undertaken, and finalised in accordance with the applicable conditions of consent and approval and the *Independent Audit Post Approval Requirements* (2020). Failure to meet these requirements will require revision and resubmission.

NSW Planning reserves the right to request an alternate auditor or audit team for future audits.

The Independent Audits must be carried out within 3 years of the previous Independent Audits, being 12 April 2025 for Chain Valley Extension Project and 2 May 2025 for Mannering Coal Mine. The site

inspections should be carried out as close to the end of these periods as possible and should be considered the last date of the audit period.

Please note, the Lead Auditor must attend the site inspections.

The Independent Audits [and your Response to the Auditors Recommendations (RAR)] must be submitted to the Planning Secretary within 12 weeks of the date of the site inspections.

Should you wish to discuss the matter further, please contact Laura Gothard, Senior Compliance Officer on 0484 269 988 or email compliance@planning.nsw.gov.au

Yours sincerely



Joel Curran
Acting Team Leader
Compliance

As nominee of the Planning Secretary

Appendix B

Independent audit declaration forms

6. Appendices

Appendix A – Declaration of Independence Form Template

Declaration of Independence - Auditor	
Project Name	Chain Valley Colliery Extension Project
Consent Number	SSD-5465
Description of Project	Chain Valley Colliery & associated infrastructure
Project Address	Off Construction Road, Vales Point, NSW, 2259
Proponent	Great Southern Energy Pty Ltd (trading as 'Delta Coal')
Date	22/01/2025

I declare that:

i. I am not related to any proponent, owner, operator or other entity involved in the delivery of the project. Such a relationship includes that of employer/employee, a business partnership, sharing a common employer, a contractual arrangement outside an Independent Audit, or that of a spouse, partner, sibling, parent, or child;

ii. I do not have any pecuniary interest in the project, proponent or related entities. Such an interest includes where there is a reasonable likelihood or expectation of financial gain (other than being reimbursed for performing the audit) or loss to the auditor, or their spouse, partner, sibling, parent, or child;

iii. I have not provided services (not including independent reviews or auditing) to the project with the result that the audit work performed by themselves or their company, except as otherwise declared to the Department prior to the audit;

iv. I am not an Environmental Representative for the project; and

v. I will not accept any inducement, commission, gift or any other benefit from auditee organisations, their employees or any interested party, or knowingly allow colleagues to do so.

Notes:

a) Under section 10.6 of the *Environmental Planning and Assessment Act 1979* a person must not include false or misleading information (or provide information for inclusion in) in a report of monitoring data or an audit report produced to the Minister in connection with an audit if the person knows that the information is false or misleading in a material respect. The proponent of an

approved project must not fail to include information in (or provide information for inclusion in) a report of monitoring data or an audit report produced to the Minister in connection with an audit if the person knows that the information is materially relevant to the monitoring or audit. The maximum penalty is, in the case of a corporation, $1 million and for an individual, $250,000; and

b) The *Crimes Act 1900* contains other offences relating to false and misleading information: section 307B (giving false or misleading information – maximum penalty 2 years imprisonment or 200 penalty units, or both)

Name of Proposed Auditor	Elliot Holland
Signature	
Qualification	Bachelor of Environmental Science & Management, and Certified Lead Auditor - EMS through Exemplar Global
Company	Onward Consulting Pty Ltd

6. Appendices

Appendix A – Declaration of Independence Form Template

Declaration of Independence - Auditor	
Project Name	Chain Valley Colliery Extension Project
Consent Number	SSD-5465
Description of Project	Chain Valley Colliery & Associated Infrastructure
Project Address	Off Construction Road, Vales Point, NSW, 2259
Proponent	Great Southern Energy Pty Ltd (trading as 'Delta Coal')
Date	03/02/2025

I declare that:

i. I am not related to any proponent, owner, operator or other entity involved in the delivery of the project. Such a relationship includes that of employer/employee, a business partnership, sharing a common employer, a contractual arrangement outside an Independent Audit, or that of a spouse, partner, sibling, parent, or child;

ii. I do not have any pecuniary interest in the project, proponent or related entities. Such an interest includes where there is a reasonable likelihood or expectation of financial gain (other than being reimbursed for performing the audit) or loss to the auditor, or their spouse, partner, sibling, parent, or child;

iii. I have not provided services (not including independent reviews or auditing) to the project with the result that the audit work performed by themselves or their company, except as otherwise declared to the Department prior to the audit;

iv. I am not an Environmental Representative for the project; and

v. I will not accept any inducement, commission, gift or any other benefit from auditee organisations, their employees or any interested party, or knowingly allow colleagues to do so.

Notes:

a) Under section 10.6 of the *Environmental Planning and Assessment Act 1979* a person must not include false or misleading information (or provide information for inclusion in) in a report of monitoring data or an audit report produced to the Minister in connection with an audit if the person knows that the information is false or misleading in a material respect. The proponent of an

approved project must not fail to include information in (or provide information for inclusion in) a report of monitoring data or an audit report produced to the Minister in connection with an audit if the person knows that the information is materially relevant to the monitoring or audit. The maximum penalty is, in the case of a corporation, $1 million and for an individual, $250,000; and

b) The *Crimes Act 1900* contains other offences relating to false and misleading information: section 307B (giving false or misleading information – maximum penalty 2 years imprisonment or 200 penalty units, or both)

Name of Proposed Auditor	Kurt Speirs
Signature	K. Speirs
Qualification	Bachelor of Environmental Science & Management, Grad Cert. Work Health & Safety, and Certified Lead Auditor through Exemplar Global
Company	Onward Consulting Pty Ltd

6. Appendices

Appendix A – Declaration of Independence Form Template

Declaration of Independence - Auditor	
Project Name	Chain Valley Colliery Extension Project
Consent Number	SSD-5465
Description of Project	Chain Valley Colliery & associated infrastructure
Project Address	Off Construction Road, Vales Point, NSW, 2259
Proponent	Great Southern Energy Pty Ltd (trading as 'Delta Coal')
Date	31/01/2025

I declare that:

i. I am not related to any proponent, owner, operator or other entity involved in the delivery of the project. Such a relationship includes that of employer/employee, a business partnership, sharing a common employer, a contractual arrangement outside an Independent Audit, or that of a spouse, partner, sibling, parent, or child;

ii. I do not have any pecuniary interest in the project, proponent or related entities. Such an interest includes where there is a reasonable likelihood or expectation of financial gain (other than being reimbursed for performing the audit) or loss to the auditor, or their spouse, partner, sibling, parent, or child;

iii. I have not provided services (not including independent reviews or auditing) to the project with the result that the audit work performed by themselves or their company, except as otherwise declared to the Department prior to the audit;

iv. I am not an Environmental Representative for the project; and

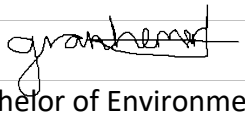
v. I will not accept any inducement, commission, gift or any other benefit from auditee organisations, their employees or any interested party, or knowingly allow colleagues to do so.

Notes:

a) Under section 10.6 of the *Environmental Planning and Assessment Act 1979* a person must not include false or misleading information (or provide information for inclusion in) in a report of monitoring data or an audit report produced to the Minister in connection with an audit if the person knows that the information is false or misleading in a material respect. The proponent of an

approved project must not fail to include information in (or provide information for inclusion in) a report of monitoring data or an audit report produced to the Minister in connection with an audit if the person knows that the information is materially relevant to the monitoring or audit. The maximum penalty is, in the case of a corporation, $1 million and for an individual, $250,000; and

b) The *Crimes Act 1900* contains other offences relating to false and misleading information: section 307B (giving false or misleading information – maximum penalty 2 years imprisonment or 200 penalty units, or both)

Name of Proposed Auditor	Gemma van Hemert
Signature	
Qualification	Bachelor of Environment Science and Management
Company	Onward Consulting Pty Ltd

Appendix C

Agency consultation

From: Elliot Holland
Sent: Tuesday, 11 March 2025 11:47 AM
To: Gemma van Hemert
Subject: DPHI Compliance - 2025 IEAs Consulta on: Chain Valley Colliery and Mannering Colliery

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From: Laura Gothard <laura.gothard@dpie.nsw.gov.au>
Sent: Tuesday, March 11, 2025 10:42 AM
To: Elliot Holland <elliot.holland@onward.au>
Subject: RE: DPHI Compliance - 2025 IEAs Consulta on: Chain Valley Colliery and Mannering Colliery

Hi Elliot,

Thank you for your email.

I will go through our information on this development and if there is anything above and beyond the IAPAR Guidelines or Development Consent Conditions I would like you to review, I will get back to you before the end of March.

In the meantime however, please reach out to Lake Macquarie Council (ATT: Development Compliance Coordinator), Hunter Water (or equivalent), Subsidence Advisory NSW and Resource Regulator for comment.

Kind Regards,

Laura Gothard
Senior Compliance Officer

Development Assessment | Department of Planning, Housing and Infrastructure
T 02 6575 3403 | **M** 0484 269 988 | **E** laura.gothard@dpie.nsw.gov.au

---

From: Elliot Holland <elliot.holland@onward.au>
Sent: Monday, March 10, 2025 4:58 AM
To: DPE PSVC Compliance Mailbox <compliance@planning.nsw.gov.au>
Cc: Gemma van Hemert <gemma.vanhemert@onward.au>; Kurt Speirs <kurt.speirs@onward.au>; Laura Gothard <laura.gothard@dpie.nsw.gov.au>
Subject: DPHI Compliance - 2025 IEAs Consulta on: Chain Valley Colliery and Mannering Colliery
Importance: High

Hi,

Delta Coal has engaged Onward Consulting Pty Ltd (Onward) to undertake independent environmental audits (IEAs) of the Chain Valley Colliery and Mannering Colliery. The IEAs will be prepared in accordance with:

- the Independent Audit Guideline Post Approval Requirements (DPIE, 2020)

- Schedule 6, Condition 9 of SSD-5465 for Chain Valley Colliery, with focus on
- Schedule 6, Condition 9 of PA 06_0311 for Mannering Colliery

The focus of the IEAs will be:

- conditions of:
    - Project Approvals
    - Environment Protection Licences
    - Up to 1 July 2022: Leases issued under the *Mining Act 1992* (NSW),
    - From 2 July 2022: Schedule 8A of Mining Regulation 2016 (NSW)
    - Relevant water and groundwater licences
    - Relevant groundwater licences
- implementation of approved management plans
- actions and recommendations from the 2022 IEA
- evidence of implementation and effectiveness of the site's environmental management plans as part of the conditions of SSD-6764
- assessment of environmental risks at the site during a site visit
- recommending measures or actions to improve the environmental performance of the project and/or any assessment, plan or program required under the approval

So that we may adequately address any concerns during the audit, I am writing to you to invite comment from yourself regarding Delta Coal's operations at Chain Valley Colliery and/or Mannering Colliery, as they relate to SSD-5465 and PA06_0311 respectively. I also invite you to comment on Delta Coal's performance with other requirements, as you may deem appropriate.
It would be appreciated if you could provide your comments regarding the performance of WCPL in meeting these obligations under the following headings:

- compliance with requirements
- progress to meeting requirements
- details of incidents of non-compliance
- adequacy of actions taken
- adequacy of the requirements of the approval / licence

The site visit for the audit is currently scheduled to be conducted Thursday 10 April 2025.

It would be appreciated if you could submit your written comments by close of business Wednesday 9 April 2025.

All correspondence in relation to the IEA should be directed to Elliot Holland (Principal – Auditing & Compliance, Exemplar Global Lead Auditor – EMS) on 0427 863 567 or elliot.holland@onward.net.au.

Regards,
Elliot Holland
Principal – Auditing and Compliance

0427 863 567
elliot.holland@onward.au
Suite 2, 88 Tudor Street
Hamilton NSW 2303



Please note my work days are Monday-Thursday. For anything urgent, please contact Mike Gale at mike.gale@onward.net.au. Otherwise, I will respond to your email as soon as possible when I am back in the office.

Where you have received this email outside 8.30am to 5.00pm Monday to Friday, I am sending you this message now because it is a good time for me. Please know, I do not expect you to read, respond or action anything in this message outside your regular hours.

CONFIDENTIALITY NOTICE: This email, including any attachments, is confidential and may be privileged. If you are not the intended recipient please notify the sender immediately, and please delete it; you should not copy it or use it for any purpose or disclose its contents to any other person.

NSW Resources
Resources Regulator

11 March 2025

Mr Elliot Holland
Onward Consulting Pty Ltd
Suite 2, Level 1, 28 Donald Street
Hamilton NSW 2303
By Email: elliot.holland@onward.au

Re: Chain Valley Colliery and Mannering Colliery – Independent Environmental Audit

Dear Mr Holland,

Thank you for your email dated 10 March 2025 (our reference: AREQ0062222) requesting consultation on the independent audit to be undertaken of the Chain Valley Colliery and the Manning Colliery which are covered by the following mining leases:

Chain Valley Colliery

- CCL706 (1973)
- CCL707 (1973)
- ML 1051 (1906
- ML1052 (1906)
- ML1308 (1906)
- ML1781 (1992)
- ML1782 (1992)
- ML1783 (1992)
- ML1784 (1992)
- ML1785 (1992)
- MPL1349 (1906)
- MPL1389(1906)
- MPL1400 (1906)
- MPL337 (1973)

Mannering Colliery

- CCL719 (1973)
- CCL721 (1973)

The independent environmental audit is required to assess compliance against the relevant environmental management conditions of the mining leases up to 1 July 2022, including implementation of the mining operations plan for the site.

From 2 July 2022, the independent environmental audit should provide an assessment of compliance with the requirements of Schedule 8A Standard conditions of mining leases, Part 2 Standard conditions, as set out in the Mining Regulation 2016.

The audit should note observations where rehabilitation procedures, practices and outcomes represent best industry practice. It would be appreciated if a copy of the final audit report could be sent to the Regulator at nswresourcesregulator@service-now.com upon completion of the audit.

Sincerely

Jenny Ehmsen
Principal Compliance Auditor
NSW Resources Regulator

Subsidence Advisory

Our Ref: EOTH25-00057

13 May 2025

Attention: Elliot Holland
Via email: elliot.holland@onward.au

RE: Request for Comment on Chain Valley and Mannering Colliery's compliance with their project approval ref: SSD-5465 and subsequent modification ref:PA06_0311

Dear Elliot,

Thank you for your email request 9 April 2025 regarding a request for comment on Chain Valley and Mannering Colliery's compliance with their project approval (ref: SSD-5465) and subsequent approved modification (ref:PA06_0311)

Subsidence Advisory NSW has not been made aware of any non-compliance by the coal mine operator with their project approval.

Please note: Subsidence Advisory NSW is not responsible for granting mining approvals or for mine regulation in NSW. Several NSW Government departments and agencies collaborate on different aspects of mine regulation in NSW, under different legislation.

If you would like more information, please contact me on (02) 4908 4300 or subsidencedevelopment@customerservice.nsw.gov.au.

Kind Regards,

Kieran Black
Technical Specialist, Subsidence Advisory NSW

From: Elliot Holland
Sent: Wednesday, 2 April 2025 8:43 AM
To: Gemma van Hemert
Subject: RE: NSW EPA - 2025 IEAs Consulta on: Chain Valley Colliery and Mannering Colliery

---

From: Chamila Samarasinghe Vidane Arachchige <chamila.samarasinghevidanearachchige@epa.nsw.gov.au>
Sent: Wednesday, April 2, 2025 8:42 AM
To: Elliot Holland <elliot.holland@onward.au>
Subject: RE: NSW EPA - 2025 IEAs Consulta on: Chain Valley Colliery and Mannering Colliery

Good Morning Elliot,

I refer to your e mail to the NSW Environment Protection Authority (EPA) on 10 March 2025 requesting consultation as part of independent environmental audits for Chain Valley Colliery and Mannering Colliery under conditions 9 of SSD-5465 and PA06_0311.

The EPA regulates activities at the Mannering Colliery and Chain Valley Colliery under *Environment Operations Act 1997* and Environmental Protection Licences 191 and 1770, both issued to Great Sothern Energy Pty Ltd (trading name “Delta Coal”).

The EPA encourages the preparation of audits as useful tools for industry to meet statutory obligations and to improve their environmental performance.

As a regulatory authority, the EPA administers and regulates statutes for environmental management and protection. As such, the EPA does not comment or review on such documents, as our role is to administer and regulate statutes for environmental management and protection that we regulate.

Please refer to the EPA’s public register at https://app.epa.nsw.gov.au/prpoeoapp/ where you can view the history of the Licence including License’s associated notices and non-compliances.

If you have any questions relating to this matter, I can be contacted on the details undersigned.

Kind Regards
Chamila Samarasinghe
Operations Assistant
Operations
NSW Environment Protection Authority
T 02 9895 6472| M 0475 771 421| www.epa.nsw.gov.au

Working days: Monday to Friday



The EPA acknowledges the Traditional Custodians of the land and waters where we work. As part of the world's oldest surviving culture, we pay our respect to Aboriginal Elders past and present.

I work on Awabakal Country..

Report pollution and environmental incidents 131 555 or +61 2 9995 5555

From: Environment Line <info@environment.nsw.gov.au>
Sent: Monday, 10 March 2025 11:05 AM
To: EPA Delivery Hub Mailbox <EPA.DeliveryHub@epa.nsw.gov.au>
Subject: FW: NSW EPA - 2025 IEAs Consulta on: Chain Valley Colliery and Mannering Colliery [ref:!00D7F06iTix.!500Mn0l0VFG:ref]

---------- Forwarded Message ----------
From: Elliot Holland [elliot.holland@onward.au]
Sent: 10/03/2025 08:00
To: info@epa.nsw.gov.au
Cc: gemma.vanhemert@onward.au; kurt.speirs@onward.au
Subject: NSW EPA - 2025 IEAs Consultation: Chain Valley Colliery and Mannering Colliery

Hi,
Delta Coal has engaged Onward Consulting Pty Ltd (Onward) to undertake independent environmental audits (IEAs) of the Chain Valley Colliery and Mannering Colliery. The IEAs will be prepared in accordance with:

1. the Independent Audit Guideline Post Approval Requirements (DPIE, 2020)
2. Schedule 6, Condition 9 of SSD-5465 for Chain Valley Colliery, with focus on
3. Schedule?6, Condition 9 of PA?06_0311 for Mannering Colliery

The focus of the IEAs will be:

4. conditions of:
    1. Project Approvals
    2. Environment Protection Licences
    3. Up to 1 July 2022: Leases issued under the *Mining Act 1992* (NSW),
    4. From 2 July 2022: Schedule 8A of Mining Regulation 2016 (NSW)
    5. Relevant water and groundwater licences
    6. Relevant groundwater licences
5. implementation of approved management plans
6. actions and recommendations from the 2022 IEA

7. evidence of implementation and effectiveness of the site's environmental management plans as part of the conditions of SSD-6764
8. assessment of environmental risks at the site during a site visit
9. recommending measures or actions to improve the environmental performance of the project and/or any assessment, plan or program required under the approval

So that we may adequately address any concerns during the audit, I am writing to you to invite comment from yourself regarding Delta Coal's operations at Chain Valley Colliery and/or Mannering Colliery, as they relate to SSD-5465 and PA06_0311 respectively. I also invite you to comment on Delta Coal's performance with other requirements, as you may deem appropriate.

It would be appreciated if you could provide your comments regarding the performance of WCPL in meeting these obligations under the following headings:

10. compliance with requirements
11. progress to meeting requirements
12. details of incidents of non-compliance
13. adequacy of actions taken
14. adequacy of the requirements of the approval / licence

The site visit for the audit is currently scheduled to be conducted Thursday 10 April 2025.

It would be appreciated if you could submit your written comments by close of business Wednesday 9 April 2025.

All correspondence in relation to the IEA should be directed to Elliot Holland (Principal – Auditing & Compliance, Exemplar Global Lead Auditor – EMS) on 0427 863 567 or elliot.holland@onward.net.au.

Regards,
Elliot Holland
Principal – Auditing and Compliance

0427 863 567
elliot.holland@onward.au
Suite 2, 88 Tudor Street
Hamilton NSW 2303



Please note my work days are Monday-Thursday. For anything urgent, please contact Mike Gale at mike.gale@onward.net.au. Otherwise, I will respond to your email as soon as possible when I am back in the office.

Where you have received this email outside 8.30am to 5.00pm Monday to Friday, I am sending you this message now because it is a good time for me. Please know, I do not expect you to read, respond or action anything in this message outside your regular hours.

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immediately, and please delete it; you should not copy it or use it for any purpose or disclose its contents to any other person.

This email is intended for the addressee(s) named and may contain confidential and/or privileged information.
If you are not the intended recipient, please notify the sender and then delete it immediately.
Any views expressed in this email are those of the individual sender except where the sender expressly and with authority states them to be the views of the NSW Office of Environment, Energy and Science.

PLEASE CONSIDER THE ENVIRONMENT BEFORE PRINTING THIS EMAIL



ref:!00D7F06iTix.!500Mn0l0VFG:ref

This email is intended for the addressee(s) named and may contain confidential and/or privileged information.
If you are not the intended recipient, please notify the sender and then delete it immediately.
Any views expressed in this email are those of the individual sender except where the sender expressly and with authority states them to be the views of the Environment Protection Authority.

PLEASE CONSIDER THE ENVIRONMENT BEFORE PRINTING THIS EMAIL

From: mmacdonald-hill@bigpond.com
Sent: Tuesday, 8 April 2025 1:42 PM
To: Elliot Holland
Cc: Lachlan McWha
Subject: RE: CCC Chairperson - 2025 IEAs Consulta on: Chain Valley Colliery and Mannering Colliery

Hi Elliot,

I have advised the CCC members of the IEA being undertaken by yourself and requested any ma ers they wished to raise with you within the scope of the audit. As expected, I can confirm there aren't any concerns.
Thanks for the opportunity to comment.

Margaret MacDonald-Hill
0448 414 888

From: Elliot Holland <elliot.holland@onward.au>
Sent: Monday, 10 March 2025 4:58 AM
To: mmacdonald-hill@bigpond.com
Cc: Gemma van Hemert <gemma.vanhemert@onward.au>; Kurt Speirs <kurt.speirs@onward.au>
Subject: CCC Chairperson - 2025 IEAs Consulta on: Chain Valley Colliery and Mannering Colliery
Importance: High

Hi Margaret,

Delta Coal has engaged Onward Consulting Pty Ltd (Onward) to undertake independent environmental audits (IEAs) of the Chain Valley Colliery and Mannering Colliery. The IEAs will be prepared in accordance with:

- the Independent Audit Guideline Post Approval Requirements (DPIE, 2020)
- Schedule 6, Condition 9 of SSD-5465 for Chain Valley Colliery, with focus on
- Schedule 6, Condition 9 of PA 06_0311 for Mannering Colliery

The focus of the IEAs will be:

- conditions of:
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    - Environment Protection Licences
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- From 2 July 2022: Schedule 8A of Mining Regulation 2016 (NSW)
- Relevant water and groundwater licences
- Relevant groundwater licences

- implementation of approved management plans
- actions and recommendations from the 2022 IEA
- evidence of implementation and effectiveness of the site's environmental management plans as part of the conditions of SSD-6764
- assessment of environmental risks at the site during a site visit
- recommending measures or actions to improve the environmental performance of the project and/or any assessment, plan or program required under the approval

So that we may adequately address any concerns during the audit, I am writing to you to invite comment from yourself regarding Delta Coal's operations at Chain Valley Colliery and/or Mannering Colliery, as they relate to SSD-5465 and PA06_0311 respectively. I also invite you to comment on Delta Coal's performance with other requirements, as you may deem appropriate.
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It would be appreciated if you could submit your written comments by close of business Wednesday 9 April 2025.

All correspondence in relation to the IEA should be directed to Elliot Holland (Principal – Auditing & Compliance, Exemplar Global Lead Auditor – EMS) on 0427 863 567 or elliot.holland@onward.net.au.

Regards,
Elliot Holland
Principal – Auditing and Compliance
0427 863 567
elliot.holland@onward.au
Suite 2, 88 Tudor Street
Hamilton NSW 2303



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Where you have received this email outside 8.30am to 5.00pm Monday to Friday, I am sending you this message now because it is a good time for me. Please know, I do not expect you to read, respond or action anything in this message outside your regular hours.

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NSW Department of Climate Change, Energy, the Environment and Water

Our ref: OUT25/3191

Name: Elliot Holland
Adress: Onward PTY
Email: elliot.holland@onward.au

28/03/2025

Subject: **Chain Valley Colliery and Mannering Colliery - Independent Environmental Audit – (SSD-5465 and PA06_0311)**

Dear Elliot,

I refer to your request seeking advice from the NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW) Water Group on an upcoming audit for the above matter. It is understood this consultation is in accordance with conditions of approval for the project.

NSW DCCEEW Water Group understands that the scope of the audit as outlined under the development consent and the reference guideline, "Independent Audit Post Approval Requirements (2020)" extends to at least the following:

- Identification of compliance requirements and documentation of any non-compliances.
- Assessment of the adequacy and implementation of management plans and sub plans.
- Assessment of compliance against relevant regulatory requirements and legislation.
- Assessment of compliance between actual and predicted impacts in the environmental assessment.
- Reporting requirements for management plans.
- Identification of strengths of the project in environmental management and opportunities for improvement.

NSW DCCEEW Water Group requests that the audit address compliance with the following specific elements of the consent conditions and related legislative requirements in a manner consistent with the above audit scope:

- The requirement to prepare and implement management plans that relate to water sources and their dependent ecosystems and users, and associated impact management and mitigation. These plans may include:
    - Water Management Plans and related sub-plans e.g., Site Water Balance, Erosion and Sediment Control Plan, Stormwater Management Plan, Surface and Groundwater Management Plan.

    - Extraction Plans and related sub-plans e.g., Water Management Plan, Subsidence Management Plan.
- The requirement to prepare and implement trigger action response plans for water source impacts which set clearly defined limits and actions. This is to be reported on within annual and exceedance-based reporting.
- Water supply availability is clearly defined for the project.
- Water take at the site via storage, diversion, interception or extraction is clearly documented and is authorised by a relevant Water Access Licence or exemption under the Water Management (General) Regulation 2018.
- Water metering at the site is in accordance with the NSW Non-Urban Metering Framework where relevant.
- Water Access Licence/s used to account for water take by the project nominates the work where the water is being taken from.
- Annual reporting clearly documents; 1) water take, use and water source impacts, 2) compares results with previous years, and 3) identifies exceedances and how these are managed/mitigated.

Should you have any further queries in relation to this submission please do not hesitate to contact DCCEEW - Water Assessments at water.assessments@dpie.nsw.gov.au

Yours sincerely,



Tim Baker
Senior Project Officer
Water Assessments
NSW Department of Climate Change, Energy, the Environment and Water

Department of Climate Change, Energy, the Environment and Water

Your ref: your email dated 10 March 2025
Our ref: DOC25/203512-1

Elliot Holland
Principal – Auditing & Compliance
Onward Consulting Pty Ltd

By email: elliot.holland@onward.net.au

Dear Elliot,

Chain Valley Colliery and Mannering Colliery – 2025 Independent Environmental Audit Consultation

Thank you for your email request dated 10 March 2025 seeking advice from the Conservation Programs, Heritage & Regulation Group (CPHR) Group of the NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW) on the 2025 Independent Environmental Audits for Chain Valley Colliery and Mannering Colliery.

CPHR has considered your request and does not have any comments regarding the performance of the Chain Valley Colliery and Mannering Colliery from a biodiversity, stormwater, flood or coastal management perspective, relating to:

- Conditions of SSD-5465
- Performance with other requirements or obligations
- Incidents of non-compliance.

If you have any further questions about this issue, please contact our Hunter Central Coast Planning Team at huntercentralcoast@environment.nsw.gov.au.

Yours Sincerely

Joe Thompson
Director Hunter Central Coast
Conservation Programs, Heritage & Regulation Group (CPHR)

10 April 2025

Appendix D

SSD-5465

Onward

Condition	Details	Compliance status	Relevant evidence	Commentary
	SCHEDULE 2 – ADMINISTRATIVE CONDITIONS			
	OBLIGATION TO MINIMISE HARM TO THE ENVIRONMENT			
1	In addition to meeting the specific performance measures and criteria established under this consent, the Applicant must implement all reasonable and feasible measures to prevent, and if prevention is not reasonable and feasible, minimise, any material harm to the environment that may result from the construction and operation of the development, and any rehabilitation required under this consent.	Compliant	• Site inspection conducted 16 April 2025. • Site interviews conducted 16 April 2025.	Conduct of the audit verifies compliance with the requirements of this condition.
	TERMS OF APPROVAL			
2	The development may only be carried out: (a) in compliance with the conditions of this consent; (b) in accordance with the statement of commitments in Appendix 9; (c) in accordance with the Subsidence Zones in Appendix 3; (d) in accordance with all written directions of the Planning Secretary; and (e) generally in accordance with the EIS, SEE (Mod 1), SEE (Mod 2), SEE (Mod 3) and SEE (Mod 4).	Non-compliant (Low risk)	• This audit. • Site inspection conducted 16 April 2025. • Site interviews conducted 16 April 2025.	The following conditions of this license were identified as being non-compliant over the reporting period: • Schedule 2 Condition 2 (low risk) • Schedule 3 Condition 7 (low risk) • Schedule 3 Condition 16 (low risk) • Schedule 6 Condition 5 (administrative) • Schedule 6 Condition 13 (administrative) As these conditions of the license have not been complied with, this condition is also non-compliant. The statement of commitments also state that six-monthly bathymetric surveys will be undertaken; however a six-monthly scan was missed for March 2022 and Delta was notified on 8 July 2022 and was a non-compliance. The missed commitment was reported against and as a result, a bathymetric survey was commissioned in September 2022. Refer to corrective actions and opportunities for improvement in each condition.
3	Consistent with the requirements in this consent, the Planning Secretary may make written directions to the Applicant in relation to: (a) the content of any strategy, study, system, plan, program, review, audit, notification, report or correspondence submitted under or otherwise made in relation to this consent, including those that are required to be, and have been, approved by the Planning Secretary; and (b) the implementation of any actions or measures contained in any such document referred to in condition 3(a).	Not triggered	• Annual Reviews for 2022, 2023, and 2024. • Site interviews conducted 16 April 2025.	No directions have been given to Delta Coal over the reporting period.
4	The conditions of this consent and directions of the Planning Secretary prevail to the extent of any inconsistency, ambiguity or conflict between them and a document/s listed in condition 2(e). In the event of an inconsistency, ambiguity or conflict between any of the document/s listed in condition 2(e), the most recent document prevails to the extent of the inconsistency, ambiguity or conflict.	Note		Noted
	LIMITS ON CONSENT			
	Mining Operations			
5	The Applicant may carry out mining operations on the site until 31 December 2027. Note: Under this consent, the Applicant is required to rehabilitate the site and perform additional undertakings to the satisfaction of either the Planning Secretary or the RR. Consequently, this consent will continue to apply in all other respects other than the right to conduct mining operations until the rehabilitation of the site and these additional undertakings have been carried out satisfactorily.	Compliant	This audit.	Mining operations were undertaken within the audit period.
	Coal Extraction			
6	The Applicant must not extract more than 2.1 million tonnes of ROM coal from the site in any calendar year.	Compliant	• Annual Reviews for 2022, 2023, and 2024. • Coal tracking spreadsheet.	Delta Coal produced coal within the limits of this condition. • 2022: 954,103 t • 2023: 931,016 t • 2024: 1,018,784 t Compliance for 2025 was not assessed as the reporting period did not encompass the entire calendar year. Delta Coal was compliant for the 2022, 2023 and 2024 calendar years.
	Coal Transport – Public Roads			
7	The Applicant must ensure that no laden coal trucks are 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.	Compliant	• Site interviews conducted 16 April 2025. • Annual Review for 2022, 2023 and 2024.	There was no use of public roads for coal transport in the 2022, 2023, 2024 or 2025, with coal produced transported from site via Mannering Colliery (MC) and on to domestic markets, utilising the conveyor system.

Condition	Details	Compliance status	Relevant evidence	Commentary
8	The Applicant must not dispatch from the site more than: (a) 660,000 tonnes of product coal in any calendar year to the Port of Newcastle for export; (b) 180,000 tonnes of product coal in any calendar year to domestic customers other than Vales Point Power Station; (c) a total of 270 laden coal trucks per day by public roads; (d) a total of 32 laden coal trucks per hour; and (e) 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.	Compliant	• Site interviews conducted 16 April 2025. • Annual Review for 2022, 2023 and 2024. • Coal haulage register for 2022, 2023, 2024 and 2025 (to date).	During the audit period all coal produced was dispatched to the VPPS via the conveyor system and is therefore within all limits of this condition.
	Coal Transport – Vales Point Power Station			
9	The Applicant must ensure that only private roads are used for the transport of coal by truck to Vales Point Power Station, except in an emergency. In an emergency, product coal may be transported by public roads, with the prior written approval of the Planning Secretary, and subject to any restrictions that the Planning Secretary may impose.	Not triggered	• Site interviews conducted 16 April 2025. • Annual Reviews for 2022, 2023, and 2024. • Coal haulage register for 2022, 2023, 2024, and 2025 (to date).	All coal was transported to the VPPS via the conveyor system, through the MC CHPP.
10	The Applicant must restrict the transport of coal by truck to the Vales Point Power Station between 10 pm and 5:30 am to: (a) 16 laden trucks per hour for the Spring and Autumn months; and (b) zero during Winter months	Not triggered	• Site interviews conducted 16 April 2025. • Road Transport Protocol (Rev 3 – dated 1 December 2019).	All coal was transported to the VPPS was via the conveyor system.
	PLANNING AGREEMENT			
11	Within 12 months of the date of this consent, unless otherwise agreed by the Planning Secretary, the Applicant must enter into a planning agreement with the CC Council in accordance with Division 6 of Part 4 of the EP&A Act that provides for payment to the CC Council for community enhancement purposes. The agreement must include provision for those matters set out in condition 12 below. If there is any dispute between the Applicant and CC Council relating to the preparation or implementation of the planning agreement, then either party may refer the matter to the Planning Secretary for resolution.	Not triggered	N/A.	Not triggered as this was executed in 2016, which is outside reporting period.
	COMMUNITY ENHANCEMENT			
12	The Applicant must pay CC Council $0.035 for each tonne of product coal produced by the development for the purposes of improving public infrastructure and providing community projects for the communities of Summerland Point, Gwandalan, Chain Valley Bay and Mannering Park. Payments from the approval date of project approval 10_0161 must be: (a) made by the end of March, for coal produced in the previous calendar year; (b) made for each year that coal is produced by the colliery; and (c) subject to indexation in accordance with the Australian Bureau of Statistics Consumer Price Index.	Compliant	• Annual Reviews for 2022, 2023, and 2024. • VPA Tracking spreadsheet. • Payment receipts.	Table 1 in the Annual Review details the money accrued for the Voluntary Planning Agreement with Council. • 2022: $42,725 paid at the indexed rate of $0.04478 per t of ROM coal sold • 2023: $43,404 paid at the indexed rate of $0.0462 per t of ROM coal sold • 2024: $48,693 paid at the indexed rate pf $0.047 per t of ROM coal sold A comparison of production statistics and required contributions found that Delta Coal were operating in compliance with the requirements of this condition. Evidence of payment was provided during the audit. Compliance for 2025 was not assessed as the reporting period did not encompass the entire calendar year.
13	Deleted			
14	Deleted			
	STRUCTURAL ADEQUACY			
15	The Applicant must ensure that all new buildings and structures, and any alterations or additions to existing buildings and structure, that are part of the development are constructed in accordance with: (a) the relevant requirements of the BCA; and (b) any additional requirements of the SA NSW where the building or structure is located on land within declared Mine Subsidence Districts. Notes: • Under Part 8 of the EP&A Act, the Applicant is required to obtain construction and occupation certificates for the proposed building works; • Part 8 of the EP&A Regulation sets out the requirements for the certification of the development; and • Under section 21 of the Coal Mine Subsidence Compensation Act 2017, the Applicant is required to obtain the SA NSW's approval before constructing any improvements in a Mine Subsidence District.	Not triggered	N/A.	No new buildings have been constructed over the audit period. This condition is not triggered.
	DEMOLITION			
16	The Applicant must ensure that all demolition work is carried out in accordance with Australian Standard AS 2601-2001: The Demolition of Structures, or its latest version.	Not triggered	Site interviews conducted 16 April 2025.	No demolition works were undertaken during the audit period.

Condition	Details	Compliance status	Relevant evidence	Commentary
	OPERATION OF PLANT AND EQUIPMENT			
17	All plant and equipment used on site, or to monitor the performance of the development must be: (a) maintained in a proper and efficient condition; and (b) operated in a proper and efficient manner.	Compliant	• Calibration certificates samples. • Pulse tracking system samples. • Training Needs Analysis sheet. • Plant and equipment inspection form samples.	Calibration certificates for the meteorological station, noise loggers and the TEOM were provided. The Pulse tracking system was also reviewed while completing the site inspection and was found to meet the requirements of the condition.
18	Deleted			
	ROAD MAINTENANCE CONTRIBUTION			
19	The Applicant must pay Road Maintenance Fees to CC Council in accordance with its Road Maintenance Agreement with CC Council.	Compliant	Correspondence with Central Coast Council related to road maintenance.	Correspondence with council regarding the payment of Road Maintenance Fees was provided.
	COMMUNITY CONSULTATIVE COMMITTEE			
20	A Community Consultative Committee (CCC) must continue to operate for the development in accordance with the Department's Community Consultative Committee Guidelines: State Significant Projects (2019). The CCC must continue to operate during the life of the development, or other timeframe agreed by the Planning Secretary. Notes: • The CCC is an advisory committee only. • In accordance with the Guidelines, the Committee should comprise an independent chair and appropriate representation from the Applicant, Affected Councils and the local community.	Compliant	• Community Consultative Committee (CCC) Meeting Minutes and agenda. • CCC Annual reports for 2022, 2023, and 2024.	The Community Consultative Committee (CCC) were held quarterly over the reporting period, in February, May, August and November each year, and is in compliance with the requirements of this condition.
21	With the approval of the Planning Secretary, the Applicant may combine the CCC required by this consent with any similar CCC required by a consent or approval for any adjoining mine subject to common, shared or related ownership or management.	Not triggered	• CCC Meeting Minutes • CCC Annual reports for 2022, 2023, and 2024.	The CCC for the CVC is combined with MC
	EVIDENCE OF CONSULTATION			
22	Where conditions of this consent require consultation with an identified party, the Applicant must: (a) consult with the relevant party prior to submitting the subject document; (b) provide details of the consultation undertaken including: i. the outcome of that consultation, matters resolved and unresolved; and ii. details of any disagreement remaining between the party consulted and the Applicant and how the Applicant has addressed the matters not resolved.	Compliant	• Air Quality and Greenhouse Gas Management Plan (AQGHGMP) (Rev 5 – 12/01/2024), with Department of Planning, Housing and Infrastructure (DPHI) approval (dated 23/01/2024). • Benthic Communities Management Plan (BCMP) (Rev 9 – 28 July 2023), with former Department of Planning and Environment (DPE) (now DPHI) approval (dated 19/09/2023), including consultation with Biodiversity Conservation Division (BCD) (dated 28/02/2023 and 1/09/2023), Lake Macquarie City Council (LMCC) (dated 8/12/2022) and DPI – Fisheries (dated 21/02/2023). • Biodiversity Management Plan (BMP) (Rev 6, dated 23/11/2022), with DPE approval dated (24/04/2023), including consultation with the BCD (dated 9/12/2022) and NSW EPA (dated 5/12/2022). • Heritage Management Plan (HMP) (Rev 5 – dated 12/10/2022), with DPE approval (dated 27/09/2023), including consultation with Heritage NSW (dated 10/12/2022). • Noise Management Plan (NMP) (Rev 1– dated 20/04/2022), with DPE approval (dated 19/04/2022), including consultation with NSW EPA (dated 9/07/2021). • Miniwall S5 and Northern Pillar Area Extraction Plan Amendment 1 (Rev 1.4 – dated 26/08/2024), with DPHI approval dated 8/10/2024.	**2022 IEA Findings:** ***Recommendation 4:*** *The outcome of consultation is not included in the BMP, it is recommended that a statement saying that no comments were received is included in the plan.* **2025 IEA Findings:** Status of 2022 IEA Recommendation 4: Closed out. Review of the revised BMP (Rev 6, dated 23/11/2022) verified consultation was conducted with the BCD (dated 9/12/2022) and NSW EPA (dated 5/12/2022), with DPE approval dated (24/04/2023). 2025 IEA findings: AQGHGMP: Consultation summary table provided in section 1.6 demonstrating consultation with the relevant parties. Consultation evidence and department approval letters are included in the appendix. BCMP: Consultation summary table has been included in Section 1.3 demonstrating consultation with required parties. Consultation evidence and department approval letters are included in the appendix. HMP: Consultation summary table has been included in Section 1.5 demonstrating consultation with the required parties. Consultation evidence and department approval letters are provided in the appendix. NMP: Consultation summary table is provided in Section 1.5 demonstrating consultation with the required parties. Consultation evidence and department approval letters are provided in the appendix. Extraction Plan: Consultation summary table is provided in Section 2.5 demonstrating consultation with the required parties. Consultation evidence and department approval letters are provided in the appendix. RMP: Consultation summary table is provided in Section 4.2 demonstrating consultation with the required parties. However, there is no consultation evidence provided in the appendix as per other plans. Therefore, ***OFI01*** has been identified. ***OFI01:*** *Update the RMP to include copies of emails / letters to / from BCD, DPIE Water (now DCCEEW Water Group), Central Coast Council, LMCC and the CCC.* Seagrass Management Plan: Consultation summary table has been included in Section 1.3 demonstrating consultation with the required parties. Consultation evidence and department approval letters are provided in the appendix. Subsidence: Review of relevant documentation verifies compliance.

Condition	Details	Compliance status	Relevant evidence	Commentary
			• Rehabilitation Management Plan (RMP) (Rev 2 – dated 15/01/2024). • Seagrass Management Plan (Rev 9 – dated 12/10/2022), with DPHI approval dated 23/10/2024, including consultation with BCD (dated 9/12/2022), LMCC (dated 22/12/2022), and Department of Regional NSW – Mining, Exploration and Geoscience (MEG) (dated 30/11/2022). • Subsidence Monitoring Program (Rev 4 - dated 10/08/2021) for Northern Mining Area First Workings and Lake Macquarie Extraction • Subsidence Monitoring Program (Rev 5 – dated 20/11/2020) as Appendix 13 to the Miniwall S5 and Northern Mining Area Pillar Amendment 1 Extraction Plan, with DPHI approval dated 8/10/2024 • Water Management Plan (WMP) (Rev 7– dated 16/01/2024), with DPHI approval (dated 23/10/2024), including consultation with DCCEEW Water Group (dated 7/02/2024). • Environmental Management Strategy (EMS) (Rev 4 – dated 1/07/2024) with DPHI approval dated 22/10/2024, including consultation with DPE (dated 15/03/2023).	WMP: Consultation summary table has been included in Section 1.4 demonstrating consultation with the required parties. Consultation evidence and department approval letters are provided in the appendix. EMS: No consultation is required under the conditions for this strategy. The department approval letters are provided in the appendix.
	STAGING, COMBINING AND UPDATING STRATEGIES, PLANS OR PROGRAMS			
23	With the approval of the Planning Secretary, the Applicant may: (a) prepare and submit any strategy, plan or program required by this consent on a staged basis (if a clear description is provided as to the specific stage and scope of the development to which the strategy, plan or program applies, the relationship of the stage to any future stages and the trigger for updating the strategy, plan or program); (b) combine any strategy, plan or program required by this consent (if a clear relationship is demonstrated between the strategies, plans or programs that are proposed to be combined); (c) update any strategy, plan or program required by this consent (to ensure the strategies, plans and programs required under this consent are updated on a regular basis and incorporate additional measures or amendments to improve the environmental performance of the development); and (d) combine any strategy, plan or program required by this consent with any similar strategy, plan or program required by an adjoining mining consent or approval, in common ownership or management.	Compliant	• AQGHGMP (Rev 5 – 12/01/2024), with DPHI approval (dated 23/01/2024). • BCMP (Rev 9 – 28 July 2023), with DPE approval (dated 19/09/2023), including consultation with BCD (dated 28/02/2023 and 1/09/2023), LMCC (dated 8/12/2022) and DPI – Fisheries (dated 21/02/2023). • BMP (Rev 6, dated 23/11/2022), with DPE approval (dated24/04/2023), including consultation with the BCD (dated 9/12/2022) and NSW EPA (dated 5/12/2022). • HMP (Rev 5 – dated 12/10/2022), with DPE approval (dated 27/09/2023), including consultation with Heritage NSW (dated 10/12/2022). • NMP (Rev 1– dated 20/04/2022), with DPE approval (dated 19/04/2022), including consultation with NSW EPA (dated 9/07/2021). • Miniwall S5 and Northern Pillar Area Extraction Plan Amendment 1 (Rev 1.4 – dated 26/08/2024), with DPHI approval dated 8/10/2024. • RMP (Rev 2 – dated 15/01/2024).	**2022 IEA Findings:** ***Corrective Action (CA) 4:*** *Ensure that TARPs are included in the AQMP, HMP, Seagrass Management Plan, Benthic Communities Management Plan and WMP in the next update. This includes developing a TARP to further detail the management procedures for the newly established PM2.5 alarms within the AQMP.* **2025 IEA findings:** Status of 2022 CA4: Closed out - TARPs have been added into each of the aforementioned management plans. 2025 IEA findings A number of plans were updated during the audit period, as identified in the evidence column. Delta Coal has also combined the following plans with their Mannering Coal operations, receiving approval in the audit period: • AQGHGMP • EMS (as well as an environmental monitoring program) • HMP • NMP • RMP In addition, a combined LMP is also being prepared, pending final approval from DPHI.

Condition	Details	Compliance status	Relevant evidence	Commentary
			• Seagrass Management Plan (Rev 9 – dated 12/10/2022), with DPHI approval dated 23/10/2024, including consultation with BCD (dated 9/12/2022), LMCC (dated 22/12/2022), and MEG (dated 30/11/2022). • WMP (Rev 7– dated 16/01/2024), with DPHI approval (dated 23/10/2024), including consultation with DCCEEW Water Group (dated 7/02/2024). • EMS (Rev 4 – dated 1/07/2024), with DPHI approval dated 22/10/2024, including consultation with DPE (dated 15/03/2023). • Approval of suitably qualified and experienced persons from former DPE (now DPHI) (dated 13/09/2022) for revisions to: ◦ Land Management Plan (LMP), combining CVC and MC and addressing stakeholder comments ◦ HMP, combining CVC and MC and addressing stakeholder comments ◦ EMS, NMP, AQGHGMP, RMP, WMP, Biodiversity Management Plan (BMP), Seagrass Management Plan, Benthic Communities Management Plan (BCMP), Public Safety Management Plan (PSMP), Built Features Management Plan (BFMP), Subsidence Monitoring Program (SMP) for MWS5 and NMA Pillar Extraction, and SMP for NMA First Workings and Lake Macquarie Extraction	
24	If the Planning Secretary agrees, a strategy, plan or program may be staged or updated without consultation being undertaken with all parties required to be consulted in the relevant condition in this consent.	Not triggered	Site interviews conducted 16 April 2025.	Delta Coal have not received directions such as this over the reporting period. This condition remains not triggered.
25	If the Planning Secretary agrees, a strategy, plan or program may be staged without addressing particular requirements of the relevant condition of this consent if those requirements are not applicable to the particular stage.	Not triggered	Site interviews conducted 16 April 2025.	Delta Coal have not received directions such as this over the reporting period. This condition remains not triggered.
	APPLICATION OF EXISTING STRATEGIES, PLANS OR PROGRAMS			
26	The Applicant must continue to apply existing management strategies, plans or monitoring programs approved prior to the approval of Modification 3, until the approval of a similar plan, strategy or program following the approval of Modification 3.	Not triggered	Site interviews conducted 16 April 2025.	Modification 3 (MOD3) was issued in June 2020. The current consent is MOD4 issued July 2021. Condition was considered in 2022 IEA and no longer applies.
	PROTECTION OF PUBLIC INFRASTRUCTURE			
27	Unless the Applicant and the applicable authority agree otherwise, the Applicant must: (a) repair, or pay the full costs associated with repairing, any public infrastructure a that is damaged by carrying out the development; and (b) relocate, or pay the full costs associated with relocating, any public infrastructure a that needs to be relocated as a result of the development. a This condition does not apply to any damage to roads caused as a result of general road usage or to damage that has been compensated under the Mining Act 1992.	Not triggered	Site interviews conducted 16 April 2025.	No public infrastructure has been damaged over the reporting period. This condition remains not triggered.

Condition	Details	Compliance status	Relevant evidence	Commentary
	COMPLIANCE			
28	The Applicant must ensure that all of its employees, contractors (and their sub-contractors) are made aware of, and are instructed to comply with, the conditions of this consent relevant to activities they carry out in respect of the development.	Compliant	• Site interviews conducted 16 April 2025. • Site induction package. • Toolbox Talks. • Whole of mine refresher presentation in December 2024.	Conduct of the site inspection and review of relevant documentation verifies compliance with the requirements of this condition.
	APPLICABILITY OF GUIDELINES			
29	References in the conditions of this consent to any guideline, protocol, Australian Standard or policy are to such guidelines, protocols, Standards or policies in the form they are in as at the date of inclusion (or later update) in the condition.	Note		
30	However, consistent with the conditions of this consent and without altering any limits or criteria in this consent, the Planning Secretary may, in respect of ongoing monitoring and management obligations, agree to or require compliance with an updated or revised version of such a guideline, protocol, Standard or policy, or a replacement of them.	Not triggered	Site interviews conducted 16 April 2025.	No directions of this manner have been received during the audit period. This condition remains not triggered.
	SCHEDULE 3 ENVIRONMENTAL CONDITIONS – GENERAL			
	TRANSPORT			
	Monitoring of Coal Transport			
1	The Applicant must: (a) keep accurate records of the amount of coal transported from the site (on a weekly basis); and (b) make these records publicly available on its website at the end of each calendar quarter.	Compliant	• Environmental Reporting webpage (https://www.deltacoal.com.au/environment/chain-valley-colliery/chain-valley-colliery-environmental-reporting). • Coal haulage reports for 2022, 2023, 2024 and 2025 (to date).	Weekly coal road haulage reports provided and maintained throughout the audit period, available publicly on the website.
	Road Works			
2	The Applicant must upgrade the Ruttleys Road and Construction Road intersection within 6 months of the date of this consent, unless the Planning Secretary directs otherwise, by: (a) installing additional signage on and adjacent to Construction Road prior to the intersection; (b) repairing the surface of Construction Road as required and ensuring the edge seal of the left turn lane is of sufficient width to accommodate coal trucks; (c) installing or replacing “Stop” signs in accordance with Austroads guidelines; (d) repainting road line markings and raised pavements associated with this intersection; and (e) installing barriers to prevent trucks parking on the gravel area adjacent to the intersection and the electricity substation located in the vicinity of this intersection. The design and construction of these works must be undertaken in consultation with, and to the relevant satisfaction of, CC Council, TfNSW and Delta Electricity and to the satisfaction of the Planning Secretary.	Not triggered	Site interviews conducted 16 April 2025.	Not triggered as this was executed outside the reporting period
	Road Transport Protocol			
3	The Applicant must prepare a Road Transport Protocol to the satisfaction of the Planning Secretary. This protocol must: (a) be prepared in consultation with TfNSW, NCC, CC Council and CCC and submitted to the Planning Secretary for approval within 6 months of the date of this consent; (b) describe the designated haulage routes to be used (as shown in Appendix 5); the maximum number of road movements proposed and the haulage hours permitted under this consent; (c) include a Traffic Management Plan, which includes: • procedures to ensure that drivers adhere to the designated haulage routes; • measures to maximise the use of a low frequency (regular) trucking schedule rather than an intermittently-high frequency (campaign) trucking schedule, especially during the morning peak hour; • contingency plans to apply when (for example) the designated haulage route is disrupted, including procedures for notifying relevant agencies and affected communities of the need to implement such contingency plans; • procedures to ensure that all haulage vehicles associated with the development are clearly distinguishable as Chain Valley Colliery coal haulage trucks; • details of procedures for receiving and addressing complaints from the community concerning traffic issues associated with truck movements to and from the site; • measures to ensure that the provisions of the Traffic Management Plan are implemented, eg driver training in the heavy vehicle driver’s Code of Conduct and contractual agreements with heavy vehicle operators; and • procedures for ensuring compliance with and enforcement of the heavy vehicle driver’s Code of Conduct; (d) include a Code of Conduct for heavy vehicle drivers that addresses:	Not triggered	• Road Transport Protocol – (V3 - dated 25/09/2020). • Site interviews conducted 16 April 2025.	The Road Transport Protocol has not been subject to updates during the audit period, and no road transport has occurred to trigger the implementation of the existing approved plan.

<table>
<tr><th>Condition</th><th>Details</th><th>Compliance status</th><th>Relevant evidence</th><th>Commentary</th></tr>
<tr><td></td><td>• travelling speeds;
• instructions to avoid grouping or convoying of trucks;
• instructions to drivers not to overtake each other on the haulage route, as far as practicable, and to maintain appropriate distances between vehicles;
• instruction to drivers to adhere to the designated haulage routes;
• instruction to drivers to be properly safety conscious and to strictly obey all traffic regulations; and
• appropriate penalties for infringements of the Code.
The Applicant must implement the approved Road Transport Protocol as approved from time to time by the Planning Secretary.</td><td></td><td></td><td></td></tr>
<tr><td>4</td><td>Prior to 31 March 2014, and every 12 months thereafter for each calendar year in which coal haulage from the site is undertaken utilising public roads, unless the Planning Secretary directs otherwise, the Applicant must commission a suitably qualified person, whose appointment has been approved by the Planning Secretary at least one month prior to undertaking the audit, to conduct an Independent Traffic Audit of the development. This audit must:
(a) be undertaken without prior notice to the Applicant, and in consultation with TfNSW, NCC, CC Council and the CCC;
(b) assess the impact of the development on the performance and safety of the road network, including a review of:
• haulage records;
• accident records on the haulage route, infringements relating to the code of conduct and any incidents involving haulage vehicles;
• community complaints register; and
(c) assess the effectiveness of the Road Transport Protocol; and, if necessary, recommend measures to reduce or mitigate any adverse (or potentially adverse) impacts.</td><td>Not triggered</td><td>• Annual Reviews for 2022, 2023, and 2024.
• Coal haulage register for 2022, 2023, 2024 and 2025 (to date).</td><td>As no coal haulage was undertaken using public roads during the audit period, no independent traffic audits were required.</td></tr>
<tr><td>5</td><td>Within 1 month of receiving the audit report, or as otherwise agreed by the Planning Secretary, the Applicant must submit a copy of the report to the Planning Secretary, with a detailed response to any of the recommendations contained in the audit report, including a timetable for the implementation of any measures proposed to address the recommendations in the audit report.
A summary of the audit report must be included in the Annual Review.</td><td>Not triggered</td><td>• Annual Reviews for 2022, 2023, and 2024.
• Site interviews conducted 16 April 2025.</td><td>2022 IEA findings:
CA 5: Ensure a summary of the results of Independent Traffic Audits are included in Annual Reviews.
2025 IEA findings:
<u>Status of Corrective Action 5:</u>
Closed out with section 6.17 in the Annual Reviews now including a summary on the status of any required independent traffic audit and coal haulage.
No road coal haulage occurred during the audit period and that no audits were required to be completed as a result.</td></tr>
<tr><td></td><td>Alternative Coal Transport Options</td><td></td><td></td><td></td></tr>
<tr><td>6</td><td>Prior to 31 December 2014, and every three years thereafter, the Applicant must prepare and submit to the Planning Secretary for approval, a study of the reasonable and feasible options to reduce or eliminate the use of public roads to transport coal from the development, unless otherwise agreed by the Planning Secretary. The assessment must include:
(a) an analysis of the capital, construction and operating costs of the alternative transport options; and
(b) quantified social and environmental impacts associated with road and rail transport.</td><td>Compliant</td><td>• Correspondence and approval accepting exception from study.
• Annual Reviews for 2022, 2023, and 2024.</td><td>As noted in 2022 IEA, Delta Coal received correspondence from DPE on 15 December 2020 granting an exception from conducting the Alternative Coal Transport Options Assessment. The exception applies until such time coal haulage via public roads is proposed and as such, remained applicable for the audit period.</td></tr>
<tr><td></td><td>NOISE</td><td></td><td></td><td></td></tr>
<tr><td></td><td>Noise Impact Assessment Criteria</td><td></td><td></td><td></td></tr>
<tr><td>7</td><td>The Applicant must ensure that the noise generated by the development at any residence on privately-owned land does not exceed the criteria for the location in Table 1 nearest to that residence.

Table 1: Noise Criteria dB(A)
<table><tr><th>Location</th><th>Day</th><th>Evening</th><th colspan="2">Night</th></tr><tr><th></th><th>$L_{Aeq(15\ min)}$</th><th>$L_{Aeq(15\ min)}$</th><th>$L_{Aeq(15\ min)}$</th><th>$L_{A1(1\ min)}$</th></tr><tr><td>R8</td><td>38</td><td>38</td><td>38</td><td>45</td></tr><tr><td>R11</td><td>49</td><td>49</td><td>49</td><td>54</td></tr><tr><td>R12</td><td>49</td><td>49</td><td>49</td><td>53</td></tr><tr><td>R13</td><td>43</td><td>43</td><td>43</td><td>49</td></tr><tr><td>R15</td><td>36</td><td>36</td><td>36</td><td>45</td></tr><tr><td>R19</td><td>37</td><td>37</td><td>37</td><td>45</td></tr><tr><td>R22</td><td>46</td><td>46</td><td>46</td><td>46</td></tr><tr><td>all other privately-owned land</td><td>35</td><td>35</td><td>35</td><td>45</td></tr></table>Notes:
• To interpret the locations referred to in Table 1, see Appendix 6 and the EIS; and
• Noise generated by the development is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy. Appendix 8 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.
However, these criteria do not apply if the Applicant has a written agreement with the relevant landowner to exceed the noise criteria, and the Applicant has advised the Department in writing of the terms of this agreement.</td><td>Non-compliant (Low risk)</td><td>• NMP (Rev 1– dated 20/04/2022), with DPE approval (dated 19/04/2022), including consultation with NSW EPA (dated 9/07/2021).
• Annual reviews for 2022, 2023 and 2024.
• Quarterly Noise Monitoring Reports for 2022, 2023, 2024 and 2025 (to date).
• Noise Mitigation Options Assessment Report dated 11/11/2024.</td><td>While undertaking on-site monitoring on 15 September 2022 for the purpose of a noise mitigation options assessment, an exceedance of noise limits at receiver R22 was recorded. However, the exceedance was not identified at the monitoring point for R22 (ATN007) due to inconsistencies between modelled low-frequency noise (LFN) and appropriate LFN penalties to be applied at ATN007.
Delta became aware on 21 October 2022 and implemented the appropriate notification and investigation protocols.
An investigation into reasonable and feasible methodologies to mitigate ventilation fan noise contributing to the original exceedance was carried out as part of the assessment, concluding it was unreasonable and unfeasible to undertake noise mitigation works at the ventilation fan site given the cost of mitigation and the limited number of receivers and community members impacted by noise emissions generated by the ventilation fan. Delta Coal provided suitable justification for this conclusion.
As this was a one off occurrence and has not reoccurred no CA or OFI has been deemed relevant.</td></tr>
</table>

<table>
<tr><th>Condition</th><th>Details</th><th>Compliance status</th><th>Relevant evidence</th><th>Commentary</th></tr>
<tr><td></td><td>Operating Conditions</td><td></td><td></td><td></td></tr>
<tr><td>8</td><td>The Applicant must:
(a) implement best management practice, including all reasonable and feasible noise mitigation measures, to minimise the construction, operational and transport noise generated by the development;
(b) regularly assess the noise monitoring and meteorological data and relocate, modify, and/or stop operations on site to ensure compliance with the relevant conditions of this consent;
(c) minimise the noise impacts of the development during meteorological conditions under which the noise limits in this consent do not apply (see Appendix 8);
(d) use its best endeavours to achieve the long-term noise goals in Table 2, where reasonable and feasible, and report on progress towards achieving these goals in each Annual Review;
(e) carry out a comprehensive noise audit of the development in conjunction with each independent environmental audit; and
(f) prepare an action plan to implement any additional reasonable and feasible onsite noise mitigation measures identified by each audit; to the satisfaction of the Planning Secretary.
Table 2: Long-term Noise Goals dB(A)
<table><tr><th rowspan="2">Location</th><th>Day</th><th>Evening</th><th>Night</th></tr><tr><th>$L_{Aeq(15\ min)}$</th><th>$L_{Aeq(15\ min)}$</th><th>$L_{Aeq(15\ min)}$</th></tr><tr><td>R11 – R13</td><td>41</td><td>41</td><td>41</td></tr><tr><td>R22</td><td>40</td><td>40</td><td>40</td></tr></table>Notes:
• To interpret the locations referred to in Table 2, see Appendix 6 and the EIS; and
• Noise generated by the development is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy. Appendix 8 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.</td><td>Compliant</td><td>• NMP (Rev 1– dated 20/04/2022), with DPE approval (dated 19/04/2022), including consultation with NSW EPA (dated 9/07/2021).
• Site interviews conducted 16 April 2025.
• Annual reviews for 2022, 2023 and 2024.
• Complaints and Incident Register for 2022, 2023, 2024 and 2025 (to date)
• Quarterly Noise Monitoring Reports for 2022, 2023, 2024 and 2025 (to date)</td><td>Real time monitoring was reported upon in the relevant Annual Reviews for the audit period.
It was reported in all quarterly noise monitoring reports completed for the audit period and in the 2022, 2023 and 2024 annual reviews that noise measure for R22 consistently exceed the long term noise criteria, linked to the ventilation fan on site. An exceedance of this nature was also recorded in Q3 and Q4 2021 during the last audit period.
As above, a Noise Mitigation Options Assessment for reasonably and feasibly achieving long-term noise goals at R22 was prepared and initially submitted by the extended date of 30 September 2022, with a revised Noise Mitigation Options Assessment submitted on the 11 November 2024, this remains pending with the Planning Secretary. It is therefore recommended that once their decision is handed down, the outcome of the assessment should be reflected in an update of the NMP.
As 8(d) does not require absolute compliance, instead being based on complying where reasonable and feasible, a non-compliance with this condition has not been identified.
A review of the complaints register for the audit period shows that no complaints were received during the audit period and only incident was reported as noted for Schedule 3, Condition 7. This indicates adaptive management is being undertaken by Delta Coal.</td></tr>
<tr><td></td><td>Noise Management Plan</td><td></td><td></td><td></td></tr>
<tr><td>9</td><td>The Applicant must prepare a Noise Management Plan for the development to the satisfaction of the Planning Secretary. This plan must:
(a) be prepared in consultation with the EPA and submitted to the Planning Secretary for approval within 4 months of the date of this consent, unless otherwise agreed by the Planning Secretary;
(b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this consent;
(c) describe the proposed noise management system in detail including the mitigation measures that would be implemented to minimise noise during construction and operations, including on and off site road noise generated by vehicles associated with the development; and
(d) include a monitoring program that:
• uses attended monitoring to evaluate the compliance of the development against the noise criteria in this consent;
• evaluates and reports on:
- the effectiveness of the on-site noise management system; and
- compliance against the noise operating conditions; and
• defines what constitutes a noise incident, and includes a protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents.
The Applicant must implement the Noise Management Plan as approved by the Planning Secretary.</td><td>Compliant</td><td>• NMP (Rev 1– dated 20/04/2022), with DPE approval (dated 19/04/2022), including consultation with NSW EPA (dated 9/07/2021).
• Extension for Noise Mitigation Options Assessment from DPE (dated 27/05/2022) to 30/09/2022.
• Quarterly Noise Monitoring Reports for 2022, 2023, 2024 and 2025 (to date).
• Site inspection conducted 16 April 2025
• Annual reviews for 2022, 2023 and 2024</td><td>2022 IEA findings:
Recommendation 9: The outcomes of the noise mitigation study currently being completed should be captured in a revised noise management plan and reflect any changes to monitoring, as relevant.
2025 IEA findings:
<u>Status of 2022 IEA Recommendation 9:</u>
Not closed out. Conduct of the audit determined the Noise Mitigation Options Assessment was initially submitted by the extended date of 30 September 2022, with a revised Noise Mitigation Options Assessment submitted on the 11 November 2024 to address comments from the DPHI. The Noise Mitigation Options Assessment is still awaiting approval from DPHI. Therefore, Recommendation 9 has been included as OFI02.
OFI02: On approval of the Noise Mitigation Options Assessment by the DPHI, ensure the NMP is revised to reflect any relevant changes and approved by the DPHI.
<u>2025 IEA Findings:</u>
Review of the revised NMP verifies compliance with the requirements of this condition, while conduct of the audit has confirmed it is being implemented.
The NMP adequately describes measures to be implemented on the site to minimise and manage noise to ensure compliance with the noise criteria and operating conditions in Section 3.
The on-site noise management and monitoring system is adequately described in Section 3.2.
The monitoring program presented in Section 4 is adequately described.
The current NMP adheres to the requirements of this condition.</td></tr>
<tr><td></td><td>AIR QUALITY</td><td></td><td></td><td></td></tr>
<tr><td></td><td>Odour</td><td></td><td></td><td></td></tr>
<tr><td>10</td><td>The Applicant must ensure that no offensive odours are emitted from the site, as defined under the POEO Act.</td><td>Compliant</td><td>Complaints and Incidents Register for 2022, 2023, 2024 and 2025 (to date)</td><td>No complaints regarding odours have been received over the reporting period.</td></tr>
</table>

<table>
<tr><th>Condition</th><th>Details</th><th>Compliance status</th><th>Relevant evidence</th><th>Commentary</th></tr>
<tr><td></td><td>Air Quality Criteria</td><td></td><td></td><td></td></tr>
<tr><td>11</td><td>The Applicant must ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the development do not cause exceedances of the criteria listed in Table 3 at any residence on privately-owned land.
Table 3: Air quality criteria
<table><tr><th>Pollutant</th><th>Averaging period</th><th colspan="2">Criterion</th></tr><tr><td rowspan="2">Particulate matter < 2.5 µm ($PM_{2.5}$)</td><td>Annual</td><td colspan="2">[a, c] 8 µg/m³</td></tr><tr><td>24 hour</td><td colspan="2">[b] 25 µg/m³</td></tr><tr><td rowspan="2">Particulate matter < 10 µm (PM_{10})</td><td>Annual</td><td colspan="2">[a, c] 25 µg/m³</td></tr><tr><td>24 hour</td><td colspan="2">[a] 50 µg/m³</td></tr><tr><td>Total suspended particulate (TSP) matter</td><td>Annual</td><td colspan="2">[a, c] 90 µg/m³</td></tr><tr><td>[d] Deposited dust</td><td>Annual</td><td>[b] 2 g/m²/month</td><td>[a] 4 g/m²/month</td></tr></table>Notes:
a Total impact (i.e. incremental increase in concentrations due to the development plus background concentrations due to all other sources).
b Incremental impact (i.e. incremental increase in concentrations due to the development on its own).
c Excludes extraordinary events such as bushfires, prescribed burning, dust storms, fire incidents or any other activity agreed by the Planning Secretary.
d Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method.</td><td>Compliant</td><td>AQGHGMP (Rev 5 – 12/01/2024), with DPHI approval (dated 23/01/2024).
Annual reviews for 2022, 2023 and 2024
Air quality monitoring data for 2022, 2023, 2024 and 2025 (to date) (provided in monthly environmental reports)</td><td>There was only one exceedance of PM2.5 during the audit period:
An exceedance of daily limits for PM2.5 at Wyee BAM monitoring location on 22 April 2022. It was determined that such exceedances occurred during the maintenance shift during which no coal was being produced or handled and as such, that the exceedance was not attributable to Delta Coal operations. Data validation by the BAM contractor also confirmed that operations were within the limits
The Wyee monitoring unit was also vandalised causing a cessation of data collection on 8 June 2022. The unit was since replaced with a TEOM unit on the 30 June 2022.
There were a number of depositional dust exceedances which occurred throughout the audit period:
At DDG006
Exceedance recorded on the 15 November 2022. The exceedance was reported on and investigated accordingly, and Delta continues to monitor the CVC ventilation fan for any trends and congruent mitigation measures.
At DDG001
Exceedance recorded for the August/September 2023 period; however It was noted that operations were normal during this period and watercart operations were undertaken as usual for the site with dirt attributable to traffic on unsealed roads an identified likely contributor.
At DDG003 –
There were 2 exceedances to the maximum total increase in deposited dust level (increase greater than 2 g/m2/month) recorded in the 2024 period; however these were linked to works occurring in the adjacent powerline easement (civil works and new powerline tower). The easement is not managed by Delta Coal.
At DDG002 –
There was an exceedance to the maximum total increase in deposited dust level (increase greater than 2 g/m2/month) at DDG002 for the sampling period between 3rd February and 5th March 2025. Delta investigated and deduced that no dust-generating operations occurred and that the exceedance was un-related to on-site operations.
At DDG004 –
Exceedance recorded for the November/December 2023 period. It was noted that operations were normal during this period and watercart operations were undertaken as usual for the site with dirt attributable to traffic on unsealed roads an identified likely contributor.
There were four exceedances to the maximum total increase in deposited dust level (increase greater than 2 g/m2/month) in the 2024 period; however these were all linked to works occurring in the adjacent powerline easement (i.e. slashing, civil works and the erection of a new powerline tower). The easement is not managed by Delta Coal.
As a result of the numerous exceedances not linked to Delta Coal, the annual average depositional dust limit was also exceeded; however it has been appropriately considered that the site ahs been frequently contaminated by u-related activities.
All exceedances adhered to the required notification procedures and the rolling average remained below the annual limit of the condition for the audit period, aside from DDG004 in the 2024 calendar year, due to activities outside of CVC operations.
Delta coal has conducted investigations into each exceedance and subsequent mitigation measures were implemented, thus Delta Coal is considered compliant with the condition.</td></tr>
<tr><td>11A</td><td>The air quality criteria in Table 3 do not apply if the Applicant has an agreement with the owner/s of the relevant residence or land to exceed the air quality criteria, and the Applicant has advised the Department in writing of the terms of this agreement.</td><td>Note</td><td></td><td>Noted</td></tr>
<tr><td></td><td>Operating Conditions</td><td></td><td></td><td></td></tr>
<tr><td>12</td><td>The Applicant must:
(a) implement best practice air quality management at the site, including all reasonable and feasible measures to minimise the off-site odour, fume and dust emissions generated by the development;
(b) implement best practice management to minimise the risk of spontaneous combustion and related emissions;
(c) implement all reasonable and feasible measures to minimise the release of greenhouse gas emissions from the site;
(d) operate an air quality management system on site to ensure compliance with the relevant conditions of this consent;
(e) minimise the air quality impacts of the development during adverse meteorological conditions and extraordinary events (see note c to Table 3 above);
(f) regularly assess the air quality monitoring data, and modify operations on site to ensure compliance with the relevant conditions of this consent,
to the satisfaction of the Planning Secretary.</td><td>Compliant</td><td>AQGHGMP (Rev 5 – 12/01/2024), with DPHI approval (dated 23/01/2024).
Site inspection conducted 16 April 2025.
Annual reviews for 2022, 2023 and 2024.
Air quality monitoring data for 2022, 2023, 2024 and 2025 (to date) (provided in monthly environmental reports).
Complaints data.</td><td>As discussed in Schedule 3 Condition 11, there have been numerous exceedances of air quality criteria. The majority of these exceedances have been attributed to contamination and activities not associated with Delta Coal.
A review of the controls and monitoring program in the AQGGMP found them satisfactory with the requirements of this condition. The site inspection identified that the site produces limited dust, and that measures such as water carts are used on days where rain is not forecast.
In regard to spontaneous combustion (clause (b)), there have been no incidents occurring over the reporting period. Controls such as sealing of extracted panels and monitoring of mine gasses occur to mitigate the risk of spontaneous combustion on site.</td></tr>
</table>

Condition	Details	Compliance status	Relevant evidence	Commentary
	Air Quality Management Plan			
13	The Applicant must prepare an Air Quality Management Plan for the development to the satisfaction of the Planning Secretary. This plan must: (a) be prepared in consultation with the EPA, and submitted to the Planning Secretary for approval within 6 months of the date of this consent; (b) describe the measures that would be implemented to ensure compliance with the relevant air quality criteria and operating conditions of this consent; (c) describe the measures that would be implemented to minimise the release of greenhouse gas emissions from the site; (d) describe the proposed on-site air quality management system; and (e) include an air quality monitoring program that: • is capable of evaluating the operating conditions of this consent; • evaluates and reports on: - the effectiveness of the air quality management system; and - compliance against the air quality operating conditions; • defines what constitutes an air quality incident and includes a protocol for identifying and notifying the Department and relevant stakeholders of any air quality incidents. The Applicant must implement the Air Quality Management Plan as approved by the Planning Secretary.	Compliant	• AQGHGMP (Rev 5 – 12/01/2024), with DPHI approval (dated 23/01/2024). • Site inspection conducted 16 April 2025. • Annual reviews for 2022, 2023 and 2024. • Air quality monitoring data for 2022, 2023, 2024 and 2025 (to date) (in monthly environmental reports). • Complaints data.	The AQGHGMP has been updated in January 2024. The plan adequately describes measures to be implemented on the site to minimise and manage the impact on air quality by dust generation, spontaneous combustion and meteorological impacts in Section 3. The on-site air quality management and monitoring system is adequately described in Section 4. Appropriate measures to minimise greenhouse gas emissions are described in Section 5. The monitoring program presented in Section 4 is adequately described. Incident definition and protocol provided in Section 6. The current AQGHGMP adheres to the requirements of this condition.
	METEOROLOGICAL MONITORING			
14	During the life of the development, the Applicant must ensure that there is a suitable meteorological station operating in the vicinity of the site that: (a) complies with the requirements in the Approved Methods for Sampling of Air Pollutants in New South Wales guideline; and (b) is capable of continuous real-time measurement of temperature lapse rate in accordance with the NSW Industrial Noise Policy, unless a suitable alternative is approved by the Planning Secretary following consultation with the EPA.	Compliant	• AQGHGMP (Rev 5 – 12/01/2024), with DPHI approval (dated 23/01/2024). • NMP (Rev 1– dated 20/04/2022), with DPE approval (dated 19/04/2022), including consultation with NSW EPA (dated 9/07/2021). • Weather data provided in monthly environmental reports. • Site inspection conducted 16 April 2025.	Delta Coal operate a meteorological station that collects data continually, the location of which is shown in Figure 3 of the AQGHGMP and Figure 2 of the NMP.
	SOIL & WATER			
	Note: Under the Water Act 1912 and/or the Water Management Act 2000, the Applicant is required to obtain the necessary water licences for the development.	Compliant	• Annual reviews for 2022, 2023 and 2024. • Site inspection conducted 16 April 2025.	Annual reviews indicate Water Access License (WAL) 41508 / Work Approval 20MW065025 have been obtained for the project.
	Water Supply			
15	The Applicant must ensure that it has sufficient water for all stages of the development, and if necessary, adjust the scale of mining operations to match its available water supply, to the satisfaction of the Planning Secretary.	Compliant	Annual reviews for 2022, 2023 and 2024.	Annual reviews indicate Water Access License 41508/Work Approval 20MW065025 have been obtained for the project. This WAL approves the industrial dewatering of groundwater up to a volume of 4443 ML per year. The take during the audit period amounts to: • 2022 - 2346 ML • 2023 - 2447 ML • 2024 - 2286 ML • 2025 not included as the audit period only covers a portion of the year. Delta Coal operate well within their WAL limits and are compliant with the condition.

Condition	Details	Compliance status	Relevant evidence	Commentary
	Water Pollution			
16	Unless an EPL authorises otherwise, the Applicant must comply with Section 120 of the POEO Act.	Non-compliant (Low risk)	Annual Reviews for 2022, 2023 and 2024 Incident reports	There were exceedances in relation to EPL criteria for discharge during the audit period, including: • two exceedances of the 50 mg/L limit for TSS on 5 July 2022 and 8 October 2022 • one exceedance of the 10 ml/L limit for oils and grease on 24 April 2024 • nine exceedances of the limits for faecal coliform (which have been removed from EPL 1770 as a result of the variation approved 13 September 2024) on 5 July 2022, 8 October 2022, 14 February 2023, 20 March 2023, 13 November 2023, 11 March 2024, 12 April 2024, 10 May 2024, and 11 September 2024 In addition, during construction works installing a new sewer pipeline, a pressurised sewer main was punctured. The incident was immediately reported to the CC Council and NSW EPA, with CC Council shutting down the sewage pump station to facilitate clean-up works and repairs undertaken by the construction contractor. Outcomes of the incident investigation indicated <1,000 L of sewage entered the Swindles Creek. Subsequent sampling indicated that there was no ongoing impact. The exceedances of TSS, oils and grease, and faecal coliform and the puncture of the sewer main are considered to meet the definition of water pollution, as defined in Schedule 5 of the Protection of the Environment Operations (General) Regulation 2022 (NSW), specifically: *'The definition of water pollution for the Act includes the placing in or on, or otherwise introducing into or onto, the waters, whether through an act or omission, any matter, whether solid, liquid or gaseous, that is of a prescribed nature, description or class or that does not comply with a standard prescribed in relation to the matter.* *(a) excreta, manure or urine, or waste from an on-site human or animal waste storage facility or treatment device or matter containing faecal coliform or faecal streptococci* *(i) oil, grease or flammable liquid,* *(l) liquid that contains suspended or dissolved solids,'* This resulted in non-compliance with Condition L1.1 of the EPL. As these exceedances were notified to the relevant agencies, no CA has been identified; however, ***OFI03*** has been identified in relation to these notifications. ***OFI03:*** *Should any exceedance of discharge water quality criteria occur, ensure notifications include consideration to Section 120 of the Protection of the Environment Operations Act 1997 (NSW), including Schedule 5 of the Protection of the Environment Operations (General) Regulation 2022 (NSW).*
	Sewage Management			
17	The Applicant must manage sewage generated by the development in accordance with the requirements of an EPL.	Compliant	• WMP (Rev 7– dated 16/01/2024), with DPHI approval (dated 23/10/2024), including consultation with DCCEEW Water Group (dated 7/02/2024). • Annual Reviews for 2022, 2023, and 2024. • Monitoring data for 2022, 2023, 2024 and 2025 (to date). • Site inspection conducted 16 April 2025 • Servicing records of sewage system for 2022 and 2023. • PRP Completion Report dated 1 August 2023.	**2022 IEA findings:** ***Recommendation 5:*** Ensure the WMP is updated to reflect the changes to on-site sewage management, which are scheduled to be completed by 26 August 2022. **2025 IEA findings:** Status of the 2022 IEA Recommendation 5: Closed out with the WMP being updated in January 2024, showing the changes to on-site sewage management. 2025 IEA findings: As of July 2023, wastewater streams are pumped to the municipal sewer system via an on-site sewage pump station and rising main, as per the pollution reduction program (PRP) 8 and PRP 9 of the EPL. The site is operating in accordance with the EPL conditions, with the subsequent removal of sewage treatment and effluent application to land conditions from the EPL conditions.

<table>
<tr><th>Condition</th><th>Details</th><th>Compliance status</th><th>Relevant evidence</th><th>Commentary</th></tr>
<tr><td></td><td>Water Management Plan</td><td></td><td></td><td></td></tr>
<tr><td>18</td><td>18. The Applicant must prepare a Water Management Plan for the surface facilities sites to the satisfaction of the Planning Secretary. This plan must be prepared in consultation with DPIE Water and EPA, by suitably qualified and experienced persons whose appointment has been endorsed by the Planning Secretary and submitted to the Planning Secretary for approval within 6 months of the date of this consent. This plan must include:
(a) a comprehensive water balance for the development that includes details of:
• sources and security of water supply;
• water make in the underground workings;
• water transfers from the underground operations to the surface;
• water use; and
• any water discharges;
(b) management plans for the surface facilities sites, that include:
• a detailed description of water management systems for each site, including:
- clean water diversion systems;
- erosion and sediment controls; and
- any water storages;
• measures to minimise potable water use and to reuse and recycle water;
• measures to manage acid sulphate soils, if encountered;
• activities that would involve ground disturbance at the site; and
• monitoring and reporting procedures.
(c) a Surface Water Management Plan which:
• includes baseline data on surface water flows and quality of Swindles Creek;
• details surface water impact assessment criteria, including trigger levels for investigating any potentially adverse impacts on surface water resources or surface water quality;
• provides a program to monitor:
- surface water discharges;
- surface water flows and quality; and
- channel stability;
(d) a Ground Water Monitoring Program which includes a program to:
• monitor and report groundwater inflows to underground workings;
• predict, manage and monitor impacts to nearby groundwater bores on privately-owned land that may be impacted by the development; and
(e) a detailed review of surface water management at the site, with particular reference to the water storages within the dirty water management system, to:
• determine whether the capacity, integrity, retention time and management of the dirty water storages (particularly the final Pollution Control Dam) are sufficient to ensure that water discharged from the site meets the EPL limits and surface water impact assessment criteria within the Surface Water Management Plan; and
• propose any appropriate changes to the surface water management system.
The Applicant must implement the Water Management Plan as approved by the Planning Secretary.
Note: The Planning Secretary may require the Applicant to implement upgrades and other changes identified under paragraph (e), in accordance with condition 3 of Schedule 2.</td><td>Compliant</td><td>• WMP (Rev 7– dated 16/01/2024), with DPHI approval (dated 23/10/2024), including consultation with DCCEEW Water Group (dated 7/02/2024).
• Groundwater Management Plan (GWMP) (Rev A – dated 15 December 2020).
• Site inspection conducted 16 April 2025.</td><td>2022 IEA findings:
Recommendation 6: Ensure a maintenance schedule is established to ensure dams and drainage lines are free of silt and water storage is maximised.
2025 IEA findings:
<u>Status of 2022 IEA Recommendation 6:</u>
Closed out with a maintenance schedule included in Table 8 of WMP.
<u>2025 IEA findings:</u>
Section 3 of the WMP adequately describes the sites water balance.
The required plan elements (a) through to (d) are found in the WMP according to the requirements of this condition.
Whilst there were a number of surface water pollution incidents recorded during the audit period, every annual review assessed the surface water management at the site and details actions take to mitigate the risk of the exceedance and prevent reoccurrence.
The site has 13 Pollution control dams to help manage surface water impacts. These are considered sufficient with no exceedances beyond two volumetric exceedances (attributed to large rainfall events) and a number of faecal coliform exceedances; however with the completion of Pollution Reduction programs 8 and 9, removing the on-site sewage management system and connecting the site to the council operated sewage system, these exceedances are now considered redundant.
It is noted that despite the removal of faecal coliform limits from the EPL in November 2024, the WMP still identifies faecal coliforms as being relevant to water quality monitoring and monthly environmental monitoring reports still show this criteria, as it no longer applies, it is recommended to be removed to avoid confusion (see OFI04).
OFI04: Update the WMP and future monthly environmental monitoring reports to remove redundant faecal coliform criteria.</td></tr>
<tr><td></td><td>BIODIVERSITY</td><td></td><td></td><td></td></tr>
<tr><td></td><td>Biodiversity Enhancement Strategy</td><td></td><td></td><td></td></tr>
<tr><td>19</td><td>The Applicant must implement a Biodiversity Enhancement Strategy as described in the EIS and summarised in Table 4, in consultation with BCD, and to the satisfaction of the Planning Secretary.
Table 4: Summary of the Biodiversity Enhancement Strategy
<table><tr><th>Area</th><th>Offset Type</th><th>Minimum Size/Amount</th></tr><tr><td>Biodiversity Enhancement Area</td><td>Enhancement and restoration measures, including weed and rubbish removal, return of natural hydrological regime and regeneration with native endemic species.</td><td>3 ha (in total) of Swamp Sclerophyll Floodplain Forest and Swamp Oak Floodplain Forest endangered ecological communities within the surface facilities sites</td></tr></table>Note: To identify the Biodiversity Enhancement Area referred to in Table 4 see the applicable figures in Appendix 7.
The Applicant must implement its preferred option of the three options set out in new dot point 1 of the Terrestrial Ecology section of its Statement of Commitments by 1 December 2016, following consultation with BCD and to the satisfaction of the Planning Secretary.</td><td>Compliant</td><td>• BMP (Rev 6, dated 23/11/2022), with DPE approval (dated24/04/2023), including consultation with the BCD (dated 9/12/2022) and NSW EPA (dated 5/12/2022).
• Annual Reviews for 2022, 2023, and 2024, including annual biodiversity monitoring reports.</td><td>The Biodiversity Enhancement Strategy is described in section 6 of the BMP.
The biodiversity monitoring results are attached as an appendix to each annual review, indicating an improvement in the health of Swamp Oak Forest.
The BMP is missing a section showing consultation undertaken for the plan and also does not have the approval letter appended, as other plans do.
As noted in the recommendation discussed in Schedule 2, Condition 22, the most recently approved version of the BMP is not on the website and should be updated, ensuring inclusion of the consultation section (completed) and the approval letter appended.</td></tr>
</table>

Condition	Details	Compliance status	Relevant evidence	Commentary
	Biodiversity Management Plan			
20	The Applicant must prepare a Biodiversity Management Plan for the surface facilities sites, for all areas that are not, or will not, be subject to condition 7 of schedule 4, to the satisfaction of the Planning Secretary. This plan must: (a) be prepared by a suitably qualified person approved by the Planning Secretary; in consultation with BCD, and submitted to the Planning Secretary within 6 months of the date of this consent; (b) establish baseline data for the existing habitat in the Biodiversity Enhancement Area and elsewhere on the site; (c) describe the short, medium, and long term measures that would be implemented to: • manage the impacts of clearing vegetation; • manage the remnant vegetation and habitat in the Biodiversity Enhancement Area and elsewhere on the site; and • implement the Biodiversity Enhancement Strategy, including detailed performance and completion criteria; (d) include a program to monitor and report on the effectiveness of these measures, and progress against the detailed performance and completion criteria; (e) identify the potential risks to the successful implementation of the Biodiversity Enhancement Strategy, and the contingency measures that would be implemented to mitigate these risks; and (f) include details of who would be responsible for monitoring, reviewing, and implementing the plan. The Applicant must implement the Biodiversity Management Plan as approved by the Planning Secretary.	Compliant	• BMP (Rev 6, dated 23/11/2022), with DPE approval (dated24/04/2023), including consultation with the BCD (dated 9/12/2022) and NSW EPA (dated 5/12/2022). • Annual Reviews for 2022, 2023, and 2024, including annual biodiversity monitoring reports.	The BMP was prepared by a suitably qualified person. The BMP was submitted to the EPA, BCD and DPIE on 1 December for review and comment. There is no record of response from agencies to the BMP. Baseline data is adequately described in section 3.2, satisfying the requirements of clause (b) Short-, medium- and long-term measures are described adequately within the report. The biodiversity monitoring program is described in Section 11 and is consistent with clause (d). The main risks to implementation are described in Table 3, with appropriate corrective actions provided that fulfil the requirements of (e). Roles and responsibilities for implementation are described in Section 17 consistent with clause (f). Recent biodiversity monitoring shows that biodiversity parameters are trending in a neutral or positive direction and are not triggering the BMP TARPs, with compliance achieved against the SSD conditions.
20A	Within 3 months of the approval of MOD 2, the Applicant must revise the Biodiversity Management Plan to incorporate the measures required to implement its commitments described in new dot point 2 of the Terrestrial Ecology section of its Statement of Commitments, and submit it to the Planning Secretary for approval.	Not triggered	Site interviews conducted 16 April 2025.	Conduct of the audit indicates this condition has not been triggered.
	HERITAGE			
	Protection of Aboriginal Heritage			
21	The Applicant must ensure that the development does not cause any direct or indirect impact on any identified heritage item located outside the approved disturbance area, beyond those predicted in the documents listed in condition 2(e) of Schedule 2.	Compliant	• HMP (Rev 5 – dated 12/10/2022), with DPE approval (dated 27/09/2023), including consultation with Heritage NSW (dated 10/12/2022). • Annual Reviews for 2022, 2023, and 2024.	The HMP was updated during the reporting period, following the 2022 IEA and approved in September 2023. The site has identified 29 AHIMS sites within/near the project area, three of which are within the surface footprint of the site and are appropriately fenced off. There are no known historic heritage items. No new sites were identified nor were known sites disturbed during the reporting period.
	Heritage Management Plan			
21A	The Applicant must prepare a Heritage Management Plan for the development to the satisfaction of the Planning Secretary. This Plan must: (a) be prepared by suitably qualified and experienced persons whose appointment has been endorsed by the Planning Secretary; (b) be prepared in consultation with BCD and Registered Aboriginal Parties; (c) include consideration of the Aboriginal and non-Aboriginal cultural context and significance of the site; (d) describe the procedures and management measures to be implemented on the site or within any offset area to: i. ensure all workers receive suitable Aboriginal cultural heritage inductions prior to carrying out any activities which may cause impacts to Aboriginal objects or Aboriginal places, and that suitable records are kept of these inductions; ii. protect, monitor and manage identified non-Aboriginal heritage, Aboriginal objects and Aboriginal places (including any proposed archaeological investigations of potential subsurface objects and salvage of objects within the approved disturbance area) in accordance with the commitments made in the document/s listed in condition 2(e) of Schedule 2 and including the ongoing monitoring of site 45-7-0189 at Summerland Point; iii. protect non-Aboriginal heritage, Aboriginal objects and Aboriginal places located outside the approved disturbance area from impacts of the development; iv. manage the discovery of suspected human remains and any new Aboriginal objects or Aboriginal places, including provisions for burials, over the life of the development; v. maintain and manage reasonable access for relevant Aboriginal stakeholders to Aboriginal objects and Aboriginal places (outside of the approved disturbance area); and vi. facilitate ongoing consultation and involvement of Registered Aboriginal Parties in the conservation and management of Aboriginal cultural heritage on the site; and (e) include a strategy for the care, control and storage of Aboriginal objects salvaged on site, both during the life of the development and in the long term. The Applicant must implement the Heritage Management Plan approved by the Planning Secretary.	Compliant	HMP (Rev 5 – dated 12/10/2022), with DPE approval (dated 27/09/2023), including consultation with Heritage NSW (dated 10/12/2022).	Section 1.5 outlines the consultation completed in the preparation of the plan, which is satisfactory of clause (b). The Aboriginal cultural context is adequately described in Section 3 and non-Aboriginal cultural context in Section 4. Section 5 of the plan adequately describes the procedures and measures in place to protect and manage the sites. Section 8.1 of the HMP details that the plan should be reviewed, and if necessary, updated if an incident report has been submitted. As discussed in Schedule 3 Condition 21, an incident report was submitted to DPIE during 2020 as an unexpected find occurred. In addition, the HMP was revised to cover these additional sites and was approved as part of the Extraction Plan for Miniwall S5 and NPA Extraction Plan on 6 April 2021. Management of Aboriginal item salvage is described in Section 5.1.3 and is compliant with the requirements of this condition. The management plan identified three AIHMS sites within the disturbance area of the Chain Valley Top Pit, these being two middens, 45-7-0413 and 45-7-04-12, identified as a result of demolition of the mining cottages in 2020, as well as the isolated find 45-7-0339, as shown in Figure 2 in the HMP. These sites shown in Figure 2 correspond to the three sites referred to in annual reviews; however, Section 5.1.1 of the HMP is unclear on which items and corresponding IDs have been identified as sites for monitoring with no reference to 45-7-0413 or 45-7-04-12 in the body of text and instead a number of references are made to a previously monitored site with ID 45-7-0189. As such, it is recommended the text in Section 5.1.1 be amended, see ***OFI05.*** ***OFI05:*** *Update the HMP to include discussion related to all three identified AHIMS items, including the two sites identified during removal of cottage sites in Section 5.1.1.* Appropriate signage and fencing surrounding AHIMS items was sighted during the site inspection.

Condition	Details	Compliance status	Relevant evidence	Commentary
	VISUAL			
	Visual Amenity and Lighting			
22	The Applicant must: (a) minimise visual impacts, and particularly the off-site lighting impacts, of the Surface facilities sites; (b) take all reasonable and feasible measures to further mitigate off-site lighting impacts from the development; and . (c) ensure that all external lighting associated on site complies with Australian Standard AS4282 (INT) 1995 – Control of Obtrusive Effects of Outdoor Lighting, to the satisfaction of the Planning Secretary.	Compliant	• Site inspection conducted 16 April 2025. • Submission and approval letters for visual impact/lighting measures. • Complaints data.	Delta Coal undertook a lightning survey to assess the sites compliance with this condition and Australian Standards in 2019 finding the site was operating in accordance with the condition and that no future surveys were considered necessary unless specifically directed. Since the lighting survey and previous IEA, no significant changes to surface lighting or visual amenity were undertaken and no complaints of nature relevant to the condition were received.
	WASTE			
23	The Applicant must: (a) minimise and monitor the waste generated by the development; (b) ensure that the waste generated by the development is appropriately stored, handled and disposed of and (c) report on waste management and minimisation in the Annual Review, to the satisfaction of the Planning Secretary.	Non-compliant (Low risk)	• Annual Reviews for 2022, 2023, and 2024. • Waste tracking register. • Site inspection conducted 16 April 2025.	A review of the Waste Tracking register found that waste was being adequately tracked as per clause (a). Waste management is reported in section 4.6 in the Annual Reviews as per clause with (c) The total waste recycled in each audit year was greater than that of the previous, indicating the site is successfully minimising waste generated by the development. During the site inspection, adequate vessels for recycling were observed to be available on site; however, instances of recycling disposal not being appropriately followed were observed. No CA or OFI is proposed on the basis that Delta Coal has followed all the reasonable and feasible measures as proposed in the 2022 IEA, including: • clear labelling and adequate availability of waste disposal facilities • completion of training packages and toolbox talks on the importance of waste management
	BUSHFIRE MANAGEMENT			
24	The Applicant must: (a) ensure that the development is suitably equipped to respond to any fires on site; and (b) assist the Rural Fire Service and emergency services as much as possible if there is a fire in the vicinity of the Surface facilities sites.	Compliant	• Site interviews conducted 16 April 2025. • Site inspection conducted 16 April 2025. • STD 00110 – Standards Template – Fire Water Reticulation and Bushfire Fighting (Rev 2 – dated 02 June 2022).	STD 00110 – Standards Template – Fire Water Reticulation and Bushfire Fighting (Rev 2) outlines the procedure for bushfire fighting and water reticulation for the site. It was noted during audit interviews the Land Management Plan (LMP) (combined with Mannering) has been revised and will be submitted to RFS soon for comment/information. As noted in the 2022 IEA, the LMP has been revised and submitted to DPHI for approval, at the time of this audit the LMP remains with DPHI for approval and thus no OFI has been identified with Delta Coal to begin implementing the plan and update the website version once approved. The Annual Reviews report on bushfire in Section 6.12, detailing appropriate measures to manage bushfire risk, including APZs, water provisions, fire hydrants and regular training of mine firefighting crews and liaison with rural brigades.

Condition	Details	Compliance status	Relevant evidence	Commentary
	REHABILITATION			
	Rehabilitation Objectives			
25	The Applicant must rehabilitate the site in accordance with the conditions imposed on the mining lease(s) associated with the development under the Mining Act 1992. This rehabilitation must be generally consistent with the proposed rehabilitation strategy described in the EIS, and comply with the objectives in Table 5. *Table 5: Rehabilitation Objectives* ***Feature*** / ***Objective*** Mine site (as a whole): • Safe, stable and non-polluting. • Final land use compatible with surrounding land uses. Surface infrastructure: • To be decommissioned and removed, unless the RR agrees otherwise. 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 the RR agrees otherwise); and – 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 *Coal Mine Subsidence Compensation Act 2017*. Community: • Ensure public safety. • Minimise the adverse socio-economic effects associated with mine closure. *Notes:* • *These rehabilitation objectives apply to all subsidence impacts and environmental consequences caused by underground mining taking place after the granting of project approval MP 10_0161, and to all development surface infrastructure that is part of the development, whether constructed prior to or following the date of this consent.* • *Rehabilitation of subsidence impacts and environmental consequences caused by mining which took place prior to the date of project approval (MP 10_0161) may be subject to the requirements of other approvals (eg under a mining lease or a Subsidence Management Plan approval).*	Compliant	• Rehabilitation Management Plan (RMP) (Revision 2, 15/01/2024). • CVC Forward Program Thursday 7 July 2022 to Sunday 6 July 2025 (24/01/2023). • CVC Annual Rehabilitation Report and Forward Program 2023 7 July 2022 to 6 July 2023 (12/09/2023). • CVC Annual Rehabilitation Report Friday 7 July 2023 to Saturday 6 July 2024 (5/09/2024). • CVC Annual Biodiversity Monitoring Report 2022 (EMM, February 2023). • CVC Annual Biodiversity Monitoring Report 2023 (Atlantech, 30/10/2023). • CVC Annual Biodiversity Monitoring Report 2024 (Atlantech, 6/11/2024). • CVC Annual Rehabilitation Walkover Inspections (Atlantech, 09/2024) • Annual Reviews for 2022, 2023, and 2024.	Minor rehabilitation works have been undertaken though the demolition of former mine cottages in Mining Domain 1A has occurred over the reporting period. Land is being returned to open grasslands. Rehabilitation has been undertaken in compliance with the approved RMP. There were no changes to site infrastructure during the reporting period, with the exception of the installation of the sewage pump which connected the site to the councils sewer system. There were no significant rehabilitation work undertaken during the audit period, with the total mine disturbance and completed rehabilitation remaining unchanged, at 14.7 and 0.69 ha respectively. At the completion of 2022, the area which housed the former mine cottages was returned to open grassland and managed accordingly. Rehabilitation at the site is generally in accordance with the strategy described in the EIS and conditions set out in Table 5.
	Progressive Rehabilitation			
26	The Applicant must carry out the rehabilitation of the site progressively, that is, as soon as reasonably practicable following disturbance.	Compliant	• RMP (Revision 2, 15/01/2024). • CVC Forward Program Thursday 7 July 2022 to Sunday 6 July 2025 (24/01/2023). • CVC Annual Rehabilitation Report and Forward Program 2023 7 July 2022 to 6 July 2023 (12/09/2023). • CVC Annual Rehabilitation Report Friday 7 July 2023 to Saturday 6 July 2024 (5/09/2024). • CVC Annual Biodiversity Monitoring Report 2022 (EMM, February 2023). • CVC Annual Biodiversity Monitoring Report 2023 (Atlantech, 30/10/2023). • CVC Annual Biodiversity Monitoring Report 2024 (Atlantech, 6/11/2024). • Annual Reviews for 2022, 2023, and 2024.	The former mine cottages in Mining Domain 1A have undergone progressive rehabilitation, being returned to an open grassland and remaining in the 'ecosystem and land use sustainability phase' during the audit period, with relinquishment not expected until 2026. The site undergoes weed and invasive species management as a part of this phase. The limited extent of surface areas corresponds to limited opportunities for rehabilitation during operations. The site is conducting rehabilitation in accordance with the Rehabilitation Forward Program and no relinquishment has occurred yet.

Condition	Details	Compliance status	Relevant evidence	Commentary
	Rehabilitation Management Plan			
27	The Applicant must prepare a Rehabilitation Management Plan for the development, in accordance with the conditions imposed on the mining lease(s) associated with the development under the Mining Act 1992. This plan must: (a) be prepared in consultation with BCD, DPIE Water, CC Council, LMCC and the CCC; (b) be submitted to the RR within 12 months of the date of approval of this development consent; (c) be prepared in accordance with any relevant RR guideline and be consistent with the rehabilitation objectives in the EIS and in Table 5; (d) describe how the performance of the rehabilitation would be monitored and assessed against the objectives in Table 5; (e) describe the process whereby additional measures would be identified and implemented to ensure the rehabilitation objectives are achieved; (f) provide for detailed mine closure planning, including measures to minimise socio-economic effects due to mine closure, to be conducted prior to the site being placed on care and maintenance; and (g) be integrated with the other management plans required under this consent. Note: The Rehabilitation Management Plan should address all land impacted by the development whether prior to, or following, the date of this consent.	Compliant	RMP (Revision 2, 15/01/2024).	**2022 IEA findings:** ***Recommendation 8:*** *Ensure the RMP required by SSD-5465 is updated to consider the requirements of the RMP and Annual Rehabilitation Report and Forward Program currently being prepared (as now required by the NSW Resources Regulator instead of a MOP) and documents where topsoil will be stored and the estimated volumes required for rehabilitation.* **2025 IEA findings:** <u>Status of the 2022 IEA Recommendation 8:</u> Closed out with the RMP updated in January 2025 and available on the website. This plan details the requirements for rehabilitation and provides the anticipated timeline, The RMP explains that a topsoil securement strategy would be developed prior to closure as the historic nature of the site has meant limited amounts of topsoil were stripped and stored for rehabilitation purposes. This is considered appropriate and proportionate to the recommendation. <u>2025 IEA findings:</u> Clause (b) no longer applies, and the RMP is now in its second revision. Section 6 of the RMP gives great detail on the measures to be implemented to achieve the miens rehabilitation objectives, broken down into the various mine life stages. The RMP describes how mine closure planning will be conducted, that being via a separate mine closure plan prepared at least two years prior to cessation of mining, thus fulfilling clause (f). It is noted that the while the RMP describes the required consultation in Section 4.2 and has been prepared with the relevant guidelines, fulfilling clauses (a) and (c), it does not have evidence of the consultation undertaken for the plans development, see ***OFI01*** at Schedule 2, Condition 22. Further, the rehabilitation objectives for the mine have been included through inserting the entire NSW Resources Regulator (RR) 'Approved Rehabilitation Objectives Statement' document in Section 4. This gives the document a poor structure and is hard to follow, as such ***OFI01*** also includes a suggestion to amend this.
	EXPLORATION ACTIVITIES AND SURFACE INFRASTRUCTURE			
	Exploration Activities and Minor Surface Infrastructure Management Plan			
28	Prior to carrying out exploration activities on the site under this consent that would cause temporary surface disturbance, or exploration activities within the waters or lake bed of Lake Macquarie, or the construction and/or upgrade of minor surface infrastructure on the site, the Applicant must prepare an Exploration Activities and Minor Surface Infrastructure Management Plan for the development to the satisfaction of the Planning Secretary. This Plan must: (a) be prepared by a suitably qualified and experienced person/s whose appointment has been endorsed by the Planning Secretary; (b) be prepared in consultation with MEG, NSW Maritime Division of TfNSW, NSW Fisheries and BCD; (c) include a description of the measures to be implemented for: i. managing exploration activities; ii. managing construction and operation of minor surface infrastructure and associated access tracks; iii. consulting with and if necessary compensating affected landowners; iv. assessing noise, air quality, traffic, biodiversity, heritage, public safety and other impacts; v. beneficial re-use or flaring of drained hydrocarbon gases, wherever practicable; vi. avoiding significant impacts and minimisation of impacts generally; vii. avoiding or minimising impacts on threatened species, populations or their habitats and EECs; viii. minimising clearance and disturbance of native vegetation (including seagrasses); ix. minimising and managing erosion and sedimentation; and x. rehabilitating disturbed areas. The Applicant must implement the Exploration Activities and Minor Surface Infrastructure Management Plan as approved by the Planning Secretary.	Not triggered	• Annual Reviews for 2022, 2023, and 2024. • Site interviews conducted 16 April 2025.	No physical exploration has occurred over the reporting period. This condition is not been triggered.

<table>
<tr><th>Condition</th><th>Details</th><th>Compliance status</th><th>Relevant evidence</th><th>Commentary</th></tr>
<tr><td></td><td>SCHEDULE 4 ENVIRONMENTAL CONDITIONS – UNDERGROUND MINING</td><td></td><td></td><td></td></tr>
<tr><td></td><td>SUBSIDENCE</td><td></td><td></td><td></td></tr>
<tr><td>1</td><td>The Applicant must ensure that vertical subsidence within the High Water Mark Subsidence Barrier and within seagrass beds is limited to a maximum of 20 millimetres (mm). If at any stage predicted subsidence levels are exceeded within these areas, an ecological monitoring program shall be initiated to assess the impacts to ecological communities and threatened species and if appropriate, offsets are to be provided for any impacts detected.</td><td>Compliant</td><td>• Annual Reviews for 2022, 2023, and 2024, including Statistical Reviews for 2022 and 2024 completed by EMM.
• Subsidence Monitoring Program (Rev 4 - dated 10/08/2021) for Northern Mining Area First Workings and Lake Macquarie Extraction
• Subsidence Monitoring Program (Rev 5 – dated 20/11/2020) as Appendix 13 to the Miniwall S5 and Northern Mining Area Pillar Amendment 1 Extraction Plan, with DPHI approval dated 8/10/2024</td><td>2022 IEA findings:
The 2022 IEA made comment on the 2019 findings for Schedule 4 Con 1-4, stating that Delta Coal should assess the triggers from the Extraction Plans e.g. ANOVA/ANOSIM level is approaching 5% in the bi-annual monitoring reports. Delta Coal responded saying they would complete a bi-annual benthic statistics assessment and update the predictive model in 2022 and the results would be compared to triggers in the Extraction plan.
2025 IEA findings:
<u>Status on the 2022 IEA:</u>
Closed out with a statistical analysis completed by EMM in 2022 and 2024, finding that there was an absence of statistically relevant differences and recommending to reduce the benthic community monitoring to once per year in Autumn.
<u>2025 IEA findings:</u>
Subsidence remained below the approved limits in the 2022, 2023 and 2024 reporting period.</td></tr>
<tr><td></td><td>Performance Measures – Natural Environment</td><td></td><td></td><td></td></tr>
<tr><td>2</td><td>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.
Table 6: Subsidence Impact Performance Measures – Natural and Heritage Features
<table>
<tr><td colspan="2">Biodiversity</td></tr>
<tr><td>Threatened species or endangered populations</td><td>Negligible environmental consequences</td></tr>
<tr><td>Seagrass beds</td><td>Negligible environmental consequences including:
• negligible change in the size and distribution of seagrass beds;
• negligible change in the functioning of seagrass beds; and
• negligible change to the composition or distribution of seagrass species within seagrass beds.</td></tr>
<tr><td>Benthic communities</td><td>Minor environmental consequences, including minor changes to species composition and/or distribution.</td></tr>
<tr><td colspan="2">Mine workings</td></tr>
<tr><td>First workings under an approved Extraction Plan beneath any feature where performance measures in this table require negligible environmental consequences</td><td>To remain long-term stable and non-subsiding.</td></tr>
<tr><td>Second workings</td><td>To be carried out only in accordance with an approved Extraction Plan.</td></tr>
</table>
Notes:
• The Applicant will be required to define more detailed performance indicators (including impact assessment criteria) for each of these performance measures in the various management plans that are required under this consent (see Condition 7 below).
• Measurement and/or monitoring of compliance with performance measures and performance indicators is to be undertaken using generally accepted methods that are appropriate to the environment and circumstances in which the feature or characteristic is located. These methods are to be fully described in the relevant management plans. In the event of a dispute over the appropriateness of proposed methods, the Planning Secretary will be the final arbiter.
• The requirements of this condition only apply to the impacts and consequences of mining operations, construction or demolition undertaken following the date of approval of this consent.</td><td>Compliant</td><td>• Miniwall S5 and Northern Pillar Area Extraction Plan Amendment 1 (Rev 1.4 – dated 26/08/2024), with DPHI approval dated 8/10/2024.
• BCMP (Rev 9 – 28 July 2023), with DPE approval (dated 19/09/2023), including consultation with BCD (dated 28/02/2023 and 1/09/2023), LMCC (dated 8/12/2022) and DPI – Fisheries (dated 21/02/2023).
• BMP (Rev 6, dated 23/11/2022), with DPE approval (dated24/04/2023), including consultation with the BCD (dated 9/12/2022) and NSW EPA (dated 5/12/2022).
• Seagrass Management Plan (Rev 9 – dated 12/10/2022), with DPHI approval dated 23/10/2024, including consultation with BCD (dated 9/12/2022), LMCC (dated 22/12/2022), and MEG (dated 30/11/2022).
• Annual Reviews for 2022, 2023, and 2024.
• Mannering and CVC Collieries Annual Seagrass Survey Chain Valley Bay, Summerland Point, Bardens Bay and Crangan Bay, Lake Macquarie, NSW (J.H. & E.S. Laxton – Environmental Consultants Pty Ltd for 6/2022, 6/2023, and 6/2024).
• CVC Annual Biodiversity Monitoring Reports (EMM, 02/2023; and Atlantech, 10/2023 and 11/2024).
• Mannering and CVC Collieries Lake Macquarie Benthos Survey (J.H. & E.S. Laxton – Environmental Consultants Pty Ltd for 3/2022, 3/2023, and 3/2024).
• CVC Benthic Communities Monitoring – Statistical Review (EMM for 1/2023 and 1/2025)
• Annual Subsidence Reports for 2022, 2023, and 2024.</td><td>2022 IEA findings:
The 2022 IEA made comment on the 2019 IEA findings, stating that Delta Coal should develop a TARP when updating the Benthic Communities Management Plan. This should address the wording of Schedule 4 Condition 2 SSD 5465. A series of triggers should be developed based on quantitative data and this should be reported in the bi – annual monitoring reports and the Annual Review. An example of a trigger would be ‘% change in organisms between monitoring events’
2025 IEA findings:
<u>Status of the 2022 IEA:</u>
Closed out with a TARP now included in the management plan with approval from BCD on 1 September 2023.
<u>2025 IEA findings:</u>
The results from the March 2024 benthic communities monitoring show that Delta Coal was compliant with the performance measures table with respect to subsidence impact performance measures and that species composition and distribution were not impacted.
The annual seagrass monitoring survey completed in June-July 2024 found the size and distribution of seagrass beds had not been affected by subsidence, and there was no significant change in the composition of distribution of seagrass species within the seagrass beds. The results therefore show compliance with the condition.
The site has operated in accordance with its approved extraction plans and has not exceeded its subsidence limit.</td></tr>
</table>

<table>
<tr><th>Condition</th><th>Details</th><th>Compliance status</th><th>Relevant evidence</th><th>Commentary</th></tr>
<tr><td></td><td>Offsets</td><td></td><td></td><td></td></tr>
<tr><td>3</td><td>If the Applicant exceeds the performance measures in Table 6 and the Planning Secretary determines that:
(a) it is not reasonable or feasible to remediate the impact or environmental consequence; or
(b) the remediation measures implemented by the Applicant have failed to satisfactorily remediate the impact or environmental consequence;
then the Applicant must provide a suitable offset to compensate for the impact or environmental consequence to the satisfaction of the Planning Secretary.
Note: Any offset required under this condition must be proportionate with the significance of the impact or environmental consequence.</td><td>Not triggered</td><td>Annual Reviews for 2022, 2023, and 2024.</td><td>As subsidence monitoring did not exceed criteria presented in Table 6, this condition is not triggered.</td></tr>
<tr><td></td><td>Performance Measures – Built Features</td><td></td><td></td><td></td></tr>
<tr><td>4</td><td>The Applicant must ensure that the development does not cause any exceedances of the performance measures in Table 7, to the satisfaction of the Planning Secretary.
Table 7: Subsidence Impact Performance Measures – Built Features
<table><tr><th>Built Features</th><th>Performance Measure</th></tr><tr><td>Trinity Point Marina Development
Other built features</td><td>• Always safe.
• Serviceability should be maintained wherever practicable. Loss of serviceability must be fully compensated.
• Damage must be fully repaired, replaced or fully compensated.</td></tr><tr><td>Public Safety</td><td></td></tr><tr><td>Public Safety.</td><td>Negligible additional risk.</td></tr></table>
Notes:
• The Applicant will be required to define more detailed performance indicators for each of these performance measures in Built Features Management Plans or a Public Safety Management Plan (see Condition 7 below).
• Measurement and/or monitoring of compliance with performance measures and performance indicators is to be undertaken using generally accepted methods that are appropriate to the environment and circumstances in which the feature or characteristic is located. These methods are to be fully described in the relevant management plans. In the event of a dispute over the appropriateness of proposed methods, the Planning Secretary will be the final arbiter.
• The requirements of this condition only apply to the impacts and consequences of mining operations undertaken following the date of this development consent.
• Requirements regarding safety or serviceability do not preclude preventative actions or mitigation being taken prior to or during mining in order to achieve or maintain these outcomes.
• Requirements under this condition may be met by measures undertaken in accordance with the Coal Mine Subsidence Compensation Act 2017.</td><td>Compliant</td><td>• Annual Reviews for 2022, 2023, and 2024.
• Annual Subsidence Reports for 2022, 2023, and 2024.
• Site interviews conducted 16 April 2025.</td><td>Review of relevant documentation indicates compliance with the requirements of this condition.</td></tr>
<tr><td>5</td><td>Any dispute between the Applicant and the owner of any built feature over the interpretation, application or implementation of the subsidence performance measures in Table 7 is to be settled by the Planning Secretary, following consultation with the SA NSW and MEG. Any decision by the Planning Secretary shall be final and not subject to further dispute resolution under this consent.</td><td>Not triggered</td><td>• Annual Reviews for 2022, 2023, and 2024.
• Annual Subsidence Reports for 2022, 2023, and 2024.
• Complaints data.
• Site interviews conducted 16 April 2025.</td><td>No disputes of this nature have occurred over the reporting period and therefore this condition remains not triggered.</td></tr>
<tr><td></td><td>Multi-Seam Mining Feasibility Investigation</td><td></td><td></td><td></td></tr>
<tr><td>6</td><td>Prior to the submission of an Extraction Plan related to the Chain Valley Bay mining area as shown in Appendix 3, the Applicant must prepare a detailed Multi-Seam Mining Feasibility Investigation to the satisfaction of the Planning Secretary. This plan must:
(a) be prepared in consultation with MEG by suitably qualified and experienced persons whose appointment has been endorsed by the Planning Secretary;
(b) assess the extent of the soft claystone floor/roof conditions within former workings in the Great Northern and Wallarah Seams;
(c) assess the stability of remnant coal pillars within former workings in the Great Northern and Wallarah Seams;
(d) give particular consideration to the risks of irregular subsidence, pillar run and long-term subsidence leading to subsidence outside of the predicted angle of draw;
(e) include revised multi-seam subsidence predictions for the proposed second workings; and
(f) recommend final design of the second workings and any necessary adaptive management measures.</td><td>Not triggered</td><td>Annual Reviews for 2022, 2023, and 2024.</td><td>Mining in the Chain Valley Bay area has not recommenced, and therefore the requirement to undertake the Multi-Seam Mining Feasibility Investigation has not been triggered.</td></tr>
</table>

Condition	Details	Compliance status	Relevant evidence	Commentary
	Extraction Plan			
7	The Applicant must prepare an Extraction Plan for all second workings on site, to the satisfaction of the Planning Secretary. Each Extraction Plan must: (a) be prepared by suitably qualified and experienced persons whose appointment has been endorsed by the Planning Secretary; (b) be approved by the Planning Secretary before the Applicant carries out any second workings covered by the plan; (c) include detailed plans of existing and proposed first and second workings and any associated surface development, including any applicable adaptive management measures; (d) include detailed performance indicators for each of the performance measures in Tables 6 and 7; (e) provide revised predictions of the potential subsidence effects, subsidence impacts and environmental consequences of the proposed second workings, incorporating any relevant information obtained since this consent; (f) describe the measures that would be implemented to ensure compliance with the performance measures in Tables 6 and 7, and manage or remediate any impacts and/or environmental consequences; (g) include a Built Features Management Plan, which has been prepared in consultation with RR and the owners of affected public infrastructure, to manage the potential subsidence impacts and/or environmental consequences of the proposed second workings, and which • addresses in appropriate detail all items of public infrastructure and all classes of other built features; • has been prepared following appropriate consultation with the owner/s of potentially affected feature/s; • recommends appropriate remedial measures and includes commitments to mitigate, repair, replace or compensate all predicted impacts on potentially affected built features in a timely manner; and; (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 lake bed 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; and • updating the model every 2 years using the most recent monitoring and survey data; (i) include a Seagrass 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 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; (j) include a Public Safety Management Plan, which has been prepared in consultation with RR, to ensure public safety; (k) include a Subsidence Monitoring Program which has been prepared in consultation with RR, 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; and • informs the contingency plan and adaptive management process; (l) include a contingency plan that expressly provides for adaptive management where monitoring indicates that there has been an exceedance of any performance measure in Tables 6 and 7, or where any such exceedance appears likely; (m) include appropriate revisions to the Rehabilitation Management Plan required under Condition 27 of Schedule 3; and (n) include a program to collect sufficient baseline data for future Extraction Plans. The Applicant must implement the Extraction Plan as approved by the Planning Secretary.	Compliant	• Miniwall S5 and Northern Pillar Area Extraction Plan Amendment 1 (Rev 1.4 – dated 26/08/2024), with DPHI approval dated 8/10/2024. • BCMP (Rev 9 – 28 July 2023), with DPE approval (dated 19/09/2023), including consultation with BCD (dated 28/02/2023 and 1/09/2023), LMCC (dated 8/12/2022) and DPI – Fisheries (dated 21/02/2023). • Seagrass Management Plan (Rev 9 – dated 12/10/2022), with DPHI approval dated 23/10/2024, including consultation with BCD (dated 9/12/2022), LMCC (dated 22/12/2022), and MEG (dated 30/11/2022). • Public Safety Management Plan (PSMP) (dated 19/03/2021). • Built Features Management Plan (BFMP) (Rev 0 – dated 19/03/2021). • Subsidence Monitoring Program (Rev 4 - dated 10/08/2021) for Northern Mining Area First Workings and Lake Macquarie Extraction • Subsidence Monitoring Program (Rev 5 – dated 20/11/2020) as Appendix 13 to the Miniwall S5 and Northern Mining Area Pillar Amendment 1 Extraction Plan, with DPHI approval dated 8/10/2024	The Miniwall S5 and Northern Pillar Area Extraction Plan (Extraction Plan) was prepared in 2020 and amended in August 2024. Compliance against the requirements of this condition are detailed below: (a) A letter of approval of plan authors was received from DPIE on 22 October 2020. This is included in Appendix 16 (b) Approval of the plan was provided on 8 October 2024. This approval letter is included in Appendix 16. (c) Existing and proposed first and second workings are shown on the plans in Appendix 14 (d) Performance measures and requirements of this consent are outlined in Section 3.3 (e) Subsidence predictions are described in Section 3.2 (f) Section 3.4 outlines general measures that Delta Coal will take to manage environmental impact. Section 4 lists related plans that would also form part of the management framework and discussed the interaction between plans. (g) A review of the Built Features Management plan found it to be generally compliant with the requirements of this condition. (h) A review of the Benthic Communities Management Plan against the requirements of the requirements of this condition found that its satisfactory. (i) A review of the Seagrass Management Plan against the requirements of the requirements of this condition found that its satisfactory. (j) The Public Management Plan was prepared with RR (as well as other parties) to ensure public safety. Evidence of consultation is provided in the plan. (k) The subsidence monitoring program is compliant with the requirement of this condition. (l) The contingency plan is located in the form of Trigger Action Response Plans in Appendix 4 of the Extraction Plan. (m) Rehabilitation Management Plan is included in Appendix (n) Subsidence monitoring is discussed in Section 5.2 and Appendix 13 of the Extraction Plan. Plans appended contain monitoring criteria for assessment that would feed into future extraction plans. Recent monitoring has shown no impacts on benthic communities and was recommended to reduce monitoring to once annually, in autumn.

Condition	Details	Compliance status	Relevant evidence	Commentary
8	The Applicant must ensure that the management plans required under conditions 7(g)-(j) above include: (a) an assessment of the potential environmental consequences of the Extraction Plan, incorporating any relevant information that has been obtained since this consent; and (b) a detailed description of the measures that would be implemented to remediate predicted impacts.	Compliant	• Miniwall S5 and Northern Pillar Area Extraction Plan Amendment 1 (Rev 1.4 – dated 26/08/2024), with DPHI approval dated 8/10/2024. • BCMP (Rev 9 – 28 July 2023), with DPE approval (dated 19/09/2023), including consultation with BCD (dated 28/02/2023 and 1/09/2023), LMCC (dated 8/12/2022) and DPI – Fisheries (dated 21/02/2023). • Seagrass Management Plan (Rev 9 – dated 12/10/2022), with DPHI approval dated 23/10/2024, including consultation with BCD (dated 9/12/2022), LMCC (dated 22/12/2022), and MEG (dated 30/11/2022). • PSMP (dated 19/03/2021) • BFMP (Rev 0 – dated 19/03/2021) • Subsidence Monitoring Program (Rev 4 - dated 10/08/2021) for Northern Mining Area First Workings and Lake Macquarie Extraction • Subsidence Monitoring Program (Rev 5 – dated 20/11/2020) as Appendix 13 to the Miniwall S5 and Northern Mining Area Pillar Amendment 1 Extraction Plan, with DPHI approval dated 8/10/2024	A review of the plans required under condition 7(g)-(j) found that they include the potential environmental consequences of the extraction plan. Measures for the relevant environmental factors are adequately proposed.
	First Workings			
9	The Applicant may carry out first workings within Subsidence Zones A and B as shown in Appendix 3, other than in accordance with an approved Extraction Plan, provided that the first workings are designed to remain stable and non-subsiding in the long-term and do not generate more than 20 mm of vertical subsidence at the surface, except insofar as they may be impacted by approved second workings. Note: The intent of this condition is to ensure that first workings are built to geotechnical and engineering standards sufficient to ensure long-term stability, with negligible direct subsidence impacts.	Compliant	2022, 2023 and 2024 Annual Subsidence Reviews.	Delta Coal mined in accordance with its approved extraction plan for the mining of Minwall S5 and Pillar Extraction for majority of the audit period, with commencement of a new extraction plan NMA Pillar Extraction in Q4 of 2024. All mining was undertaken via bord and pillar first workings of which were made in compliance with the requirements of this condition. Pillar extraction also commenced in the northern mining area within subsidence zone B during 2024.
9A	Within 3 months of the approval of MOD 1, the Applicant must produce and subsequently implement a Built Features Management Plan that considers surface infrastructure potentially affected by the first workings of the Underground Linkage between Chain Valley Colliery and Mannering Colliery, including WCS's MP01 sewer rising main, TransGrid's electricity transmission assets and infrastructure associated with the Vales Point Power Station, to the satisfaction of the Planning Secretary.	Not triggered	N/A	Not triggered – outside of audit period
	Payment of Reasonable Costs			
10	The Applicant must pay all reasonable costs incurred by the Department to engage suitably qualified, experienced and independent experts to review the adequacy of any aspect of an Extraction Plan.	Not triggered	Site interviews conducted 16 April 2025.	DPE have not required Delta Coal to engage an independent expert to review the adequacy of the Extraction Plan. This condition is not triggered.
	SCHEDULE 5 ADDITIONAL PROCEDURES			
	NOTIFICATION OF LANDOWNERS			
1	As soon as practicable after obtaining monitoring results showing: (a) an exceedance of any relevant criteria in Schedule 3, the Applicant must notify affected landowners in writing of the exceedance, and provide regular monitoring results to each affected landowner until the development is again complying with the relevant criteria; and (b) an exceedance of any relevant air quality criteria in Schedule 3, the Applicant must send a copy of the NSW Health fact sheet entitled "Mine Dust and You" (NSW Health, 2017) (as may be updated from time to time) to the affected landowners and/or existing tenants of the land (including the tenants of any mine-owned land).	Not triggered	• AQGHGMP (Rev 5 – 12/01/2024). • Monthly environmental reports. • Complaints and incidents register for 2022, 2023, 2024 and 2025 (to date).	Review of relevant documentation indicates this condition has not been triggered during the audit period.

Condition	Details	Compliance status	Relevant evidence	Commentary
	INDEPENDENT REVIEW			
2	If an owner of privately-owned land considers the development to be exceeding the relevant criteria in Schedule 3, then he/she may ask the Planning Secretary in writing for an independent review of the impacts of the development on his/her land. If the Planning Secretary is satisfied that an independent review is warranted, then within 2 months of the Planning Secretary's decision the Applicant must: (a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Planning Secretary, to: • consult with the landowner to determine his/her concerns; • conduct monitoring to determine whether the development is complying with the relevant criteria in Schedule 3; and • if the development is not complying with these criteria then identify the measures that could be implemented to ensure compliance with the relevant criteria; and (b) give the Planning Secretary and landowner a copy of the independent review.	Not triggered		A request of this nature has not been received over the reporting period. This condition remains not triggered
	SCHEDULE 6 ENVIRONMENTAL MANAGEMENT, REPORTING AND AUDITING			
	ENVIRONMENTAL MANAGEMENT **Environmental Management Strategy**			
1	The Applicant must prepare an Environmental Management Strategy for the development to the satisfaction of the Planning Secretary. This strategy must: (a) provide the strategic framework for environmental management of the development; (b) identify the statutory approvals that apply to the development; (c) set out the role, responsibility, authority and accountability of all key personnel involved in the environmental management of the development; (d) set out the procedures to be implemented to: • keep the local community and relevant agencies informed about the operation and environmental performance of the development; • receive record, handle and respond to complaints; • resolve any disputes that may arise during the course of the development; • respond to any non-compliance and any incident; • respond to emergencies; and (e) include: • references to any strategies, plans and programs approved under the conditions of this consent; and • a clear plan depicting all the monitoring to be carried out under the conditions of this consent. The Applicant must implement the Environmental Management Strategy as approved by the Planning Secretary.	Compliant	EMS (Rev 4 – dated 1/07/2024) with DPHI approval dated 22/10/2024, including consultation with DPE (dated 15/03/2023).	**2022 IEA findings:** ***Recommendation 7****: Include a requirement in the EMS to notify landowner's of exceedances 'as soon as practical'. Define a time period for as 'soon as practical'.* **2025 IEA findings:** <u>Status of 2022 IEA Recommendation 7:</u> Closed out with notification requirements, including a 7 day time period, now included in EMS. <u>2025 IEA findings:</u> (a) The applicable statutory approvals are provided in Section 2.2 and Appendix 3. (b) The roles and responsibilities are detailed in Section 3.10. (c) Communication procedures are described in Section 4 which adequately address clause (d). (d) Section 3 and Appendix 7 provide for the relevant plans and monitoring requirements, satisfying (e).
	Adaptive Management			
2	The Applicant must assess and manage development-related risks to ensure that there are no exceedances of the criteria and performance measures in this consent. Any exceedance of these criteria or performance measures constitutes a breach of this consent and may be subject to penalty or offence provisions under the EP&A Act or EP&A Regulation. Where any exceedance of these criteria or performance measures has occurred, the Applicant must, at the earliest opportunity: (a) take all reasonable and feasible steps to ensure that the exceedance ceases and does not recur; (b) consider all reasonable and feasible options for remediation (where relevant) and submit a report to the Department describing those options and any preferred remediation measures or other course of action; and (c) implement reasonable remediation measures as directed by the Planning Secretary.	Compliant	• Annual Reviews for 2022, 2023, and 2024. • Quarterly Noise Monitoring Reports for 2022, 2023, 2024 and 2025 (to date). • Monitoring data for 2022, 2023, 2024 and 2025 (to date). • Incident reports for 2022, 2023, 2024 and 2025 (to date).	A review of the monitoring data and the Annual Review found that exceedances occurring over the reporting period were formally investigated. The majority of exceedances were air quality or depositional dust related; however most of these were not attributed to the site as discussed in Schedule 3 Condition 11. All exceedances were investigated adequately and when attributed to the site, were addressed commensurately, noting that alternative noise mitigation options are explored in relation to the on-site ventilation fan, as discussed for Schedule 3, Condition 8.

Condition	Details	Compliance status	Relevant evidence	Commentary
	Management Plan Requirements			
3	Management plans required under this consent must be prepared in accordance with relevant guidelines, and include: (a) a summary of relevant background or baseline data; (b) details of: • the relevant statutory requirements (including any relevant approval, licence or lease conditions); • any relevant limits or performance measures and criteria; and • the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures; (c) any relevant commitments or recommendations identified in the document/s listed in condition 2(e) of Schedule 2; (d) a description of the measures to be implemented to comply with the relevant statutory requirements limits, or performance measures and criteria; (e) a program to monitor and report on the: • impacts and environmental performance of the development; and • effectiveness of the management measures set out pursuant to condition 2(e) of Schedule 2; (f) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible; (g) a program to investigate and implement ways to improve the environmental performance of the development over time; (h) a protocol for managing and reporting any: • incident, non-compliance or exceedance of any impact assessment criterion or performance criterion; • complaint; or • failure to comply with other statutory requirements; (i) public sources of information and data to assist stakeholders in understanding environmental impacts of the development; and (j) a protocol for periodic review of the plan. Note: The Planning Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans.	Compliant	Updated plans in the audit period: • AQGHGMP (Rev 5 – 12/01/2024), with DPHI approval (dated 23/01/2024). • BCMP (Rev 9 – 28 July 2023), with DPE approval (dated 19/09/2023), including consultation with BCD (dated 28/02/2023 and 1/09/2023), LMCC (dated 8/12/2022) and DPI – Fisheries (dated 21/02/2023). • BMP (Rev 6, dated 23/11/2022), with DPE approval (dated24/04/2023), including consultation with the BCD (dated 9/12/2022) and NSW EPA (dated 5/12/2022). • HMP (Rev 5 – dated 12/10/2022), with DPE approval (dated 27/09/2023), including consultation with Heritage NSW (dated 10/12/2022). • NMP (Rev 1– dated 20/04/2022), with DPE approval (dated 19/04/2022), including consultation with NSW EPA (dated 9/07/2021). • Miniwall S5 and Northern Pillar Area Extraction Plan Amendment 1 (Rev 1.4 – dated 26/08/2024), with DPHI approval dated 8/10/2024. • RMP (Rev 2 – dated 15/01/2024). • Seagrass Management Plan (Rev 9 – dated 12/10/2022), with DPHI approval dated 23/10/2024, including consultation with BCD (dated 9/12/2022), LMCC (dated 22/12/2022), and MEG (dated 30/11/2022). • WMP (Rev 7– dated 16/01/2024), with DPHI approval (dated 23/10/2024), including consultation with DCCEEW Water Group (dated 7/02/2024). • EMS (Rev 4 – dated 1/07/2024), with DPHI approval dated 22/10/2024, including consultation with DPE (dated 15/03/2023).	All management plans are generally in accordance with the requirements of the condition.
4	The Applicant must ensure that management plans prepared for the development are consistent with the conditions of this consent and any EPL issued for the site.	Compliant	See Schedule 3, Conditions 9 (NMP), 13 (AQGHGMP), 18 (WMP), 20 (BMP), 21A (HMP), and 27 (RMP). See Schedule 4, Condition 7 (Extraction Plan, BCMP, Seagrass Management Plan, PSMP, BFMP, and SMP)	Review of relevant documentation has verified compliance with the requirements of this condition.

Condition	Details	Compliance status	Relevant evidence	Commentary
	REVISION OF STRATEGIES, PLANS AND PROGRAMS			
5	Within three months of: (a) the submission of an incident report under condition 6; (b) the submission of an Annual Review under condition 8; (c) the submission of an Independent Environmental Audit under condition 9; or (d) the approval of any modification of the conditions of this consent (unless the conditions require otherwise), the suitability of existing strategies, plans and programs required under this consent must be reviewed by the Applicant. If necessary, to either improve the environmental performance of the development, cater for a modification or comply with a direction, the strategies, plans and programs required under this consent must be revised, to the satisfaction of the Planning Secretary. Where revisions are required, the revised document must be submitted to the Planning Secretary for approval within six weeks of the review. Note: This is to ensure strategies, plans and programs are updated on a regular basis and to incorporate any recommended measures to improve the environmental performance of the development.:	Non-compliant (Administrative)	• Site interviews conducted 16 April 2025. • AQGHGMP (Rev 5 – 12/01/2024), with DPHI approval (dated 23/01/2024). • BCMP (Rev 9 – 28 July 2023), with DPE approval (dated 19/09/2023), including consultation with BCD (dated 28/02/2023 and 1/09/2023), LMCC (dated 8/12/2022) and DPI – Fisheries (dated 21/02/2023). • BMP (Rev 6, dated 23/11/2022), with DPE approval (dated24/04/2023), including consultation with the BCD (dated 9/12/2022) and NSW EPA (dated 5/12/2022). • HMP (Rev 5 – dated 12/10/2022), with DPE approval (dated 27/09/2023), including consultation with Heritage NSW (dated 10/12/2022). • NMP (Rev 1– dated 20/04/2022), with DPE approval (dated 19/04/2022), including consultation with NSW EPA (dated 9/07/2021). • Miniwall S5 and Northern Pillar Area Extraction Plan Amendment 1 (Rev 1.4 – dated 26/08/2024), with DPHI approval dated 8/10/2024. • RMP (Rev 2 – dated 15/01/2024). • Seagrass Management Plan (Rev 9 – dated 12/10/2022), with DPHI approval dated 23/10/2024, including consultation with BCD (dated 9/12/2022), LMCC (dated 22/12/2022), and MEG (dated 30/11/2022). • WMP (Rev 7– dated 16/01/2024), with DPHI approval (dated 23/10/2024), including consultation with DCCEEW Water Group (dated 7/02/2024). • EMS (Rev 4 – dated 1/07/2024), with DPHI approval dated 22/10/2024, including consultation with DPE (dated 15/03/2023). • Subsidence Monitoring Program (Rev 4 - dated 10/08/2021) for Northern Mining Area First Workings and Lake Macquarie Extraction • Subsidence Monitoring Program (Rev 5 – dated 20/11/2020) as Appendix 13 to the Miniwall S5 and Northern Mining Area Pillar Amendment 1 Extraction Plan, with DPHI approval dated 8/10/2024	***2022 IEA findings:*** ***CA 6:*** *Ensure plans are updated within three months of submission of this IEA and otherwise in accordance with the requirements of Schedule 6, Condition 5.* **2025 IEA findings:** <u>Status of 2022 IEA CA 6:</u> Closed out, with all management plans updated based on the recommendations of the 2022 IEA. <u>2025 IEA findings:</u> The audit was able to verify review of strategies, plans and/or programs in accordance with Schedule 5, Condition 5 where reviews resulted in updates. However, the audit was unable to confirm reviews of strategies, plans and/or programs were undertaken in accordance with Schedule 6, Condition 5 where reviews determined updates were not required. As such, the audit was unable to confirm compliance with the requirements of Schedule 6, Condition 5. After conduct of the site inspection and interviews, a review tracking spreadsheet was prepared by Delta Coal to track these reviews. Therefore, no CA deemed relevant .However, to ensure the dates used on the cover page of plans is consistent, ***OFI06*** has been identified. ***OFI06:*** *To remove discrepancy and ensure consistency across plans, the cover page for management plans should be updated have a consistent cover page identifying:* • *the date the plan was submitted/prepared* • *approval date* • *last review date* • *next review date*
	REPORTING AND AUDITING Incident Notification			
6	The Applicant must immediately notify the Department and any other relevant agencies immediately after it becomes aware of an incident. The notification must be in writing via the Department's Major Projects website and identify the development (including the development application number and name) and set out the location and nature of the incident.	Compliant	Incident notifications and reports provided for the audit period.	Several exceedances occurred over the reporting period, which are detailed in the conditions above. A review of several incident reports provided by Delta Coal have found that the reporting procedures are satisfactory with the requirements of this condition.

Condition	Details	Compliance status	Relevant evidence	Commentary
	Non-Compliance Notification			
7	7. Within seven days of becoming aware of a non-compliance, the Applicant must notify the Department of the non-compliance. The notification must be in writing via the Department's Major Projects website and identify the development (including the development application number and name), set out the condition of this consent that the development is non-compliant with, why it does not comply and the reasons for the non-compliance (if known) and what actions have been, or will be, undertaken to address the non-compliance. Note: A non-compliance which has been notified as an incident does not need to also be notified as a non-compliance	Compliant	Non-compliance notifications and reports provided for the audit period.	Review of relevant data verifies compliance with the requirements of this condition.
	Annual Review			
8	By the end of March in each year after the commencement of the development, or other timeframe agreed by the Planning Secretary, a report must be submitted to the Department reviewing the environmental performance of the development, to the satisfaction of the Planning Secretary. This review must: (a) describe the development (including any rehabilitation) that was carried out in the previous calendar year, and the development that is proposed to be carried out over the current calendar year; (b) include a comprehensive review of the monitoring results and complaints records of the development over the previous calendar year, including a comparison of these results against the: • relevant statutory requirements, limits or performance measures/criteria; • requirements of any plan or program required under this consent; • monitoring results of previous years; and • relevant predictions in the document/s listed in condition 2(e) of Schedule 2; (c) identify any non-compliance or incident which occurred in the previous calendar year, and describe what actions were (or are being) taken to rectify the non-compliance and avoid reoccurrence; (d) evaluate and report on: • the effectiveness of the noise and air quality management systems; and • compliance with the performance measures, criteria and operating conditions of this consent; (e) identify any trends in the monitoring data over the life of the development; (f) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and (g) describe what measures will be implemented over the next calendar year to improve the environmental performance of the development. Copies of the Annual Review must be submitted to the Affected Councils and made available to the CCC and any interested person upon request.	Compliant	Annual Reviews for 2022, 2023, and 2024.	A review of the Annual Reports for 2022, 2023 and 2024 found that they were generally prepared in compliance with this condition. The form of the Annual is consistent with *DPE Annual Review Guidelines (2015)*. Activities undertaken during the reporting period are adequately described in Section 4 of the Annual Review. Monitoring results are included in Section 6 and 7. The monitoring results presented compare results against criteria and predictions and are satisfactory with clause (b), (d) and (f) of this condition. Complaints are included adequately in Section 9. Non-compliances are briefly outlined in the Statement of Compliance and are detailed adequately in Section 11. Activities proposed over the subsequent reporting are described adequately in Section 12.
	Independent Environmental Audit			
9	By the end of February 2022, and every three years after, unless the Planning Secretary directs otherwise, the Applicant must commission and pay the full cost of an Independent Environmental Audit of the development. The audit must: (a) led by a suitably qualified, experienced and independent auditor whose appointment has been endorsed by the Planning Secretary; (b) be led and conducted by a suitably qualified, experienced and independent team of experts (including any be expert in field/s specified by the Planning Secretary) whose appointment has been endorsed by the Planning Secretary; (c) be carried out in consultation with the relevant agencies and the CCC; (d) assess the environmental performance of the development and whether it is complying with the relevant requirements in this consent, water licences and mining leases for the development (including any assessment, strategy, plan or program required under these approvals); (e) review the adequacy of any approved strategy, plan or program required under the abovementioned approvals and this consent; (f) recommend appropriate measures or actions to improve the environmental performance of the development and any assessment, strategy, plan or program required under the abovementioned approvals and this consent; and (g) be conducted and reported to the satisfaction of the Planning Secretary.	Compliant	This audit.	This audit. Delta Coal commissioned the auditors prior to the end of February 2025.
10	Within three months of commencing an Independent Environmental Audit, or other timeframe agreed by the Planning Secretary, the Applicant must submit a copy of the audit report to the Planning Secretary, and any other NSW agency that requests it, together with its response to any recommendations contained in the audit report, and a timetable for the implementation of the recommendations. The recommendations must be implemented to the satisfaction of the Planning Secretary.	Compliant	2022 IEA submission form submitted 20 June 2022.	The previous IEA was conducted on 12 April 2022 and submitted on 20 June 2022, within 3 months of it being conducted.

Condition	Details	Compliance status	Relevant evidence	Commentary
	Monitoring and Environmental Audits			
11	Any condition of this consent that requires the carrying out of monitoring or an environmental audit, whether directly or by way of a plan, strategy or program, is taken to be a condition requiring monitoring or an environmental audit under Division 9.4 of Part 9 of the EP&A Act. This includes conditions in respect of incident notification, reporting and response, non-compliance notification, compliance report and independent audit. For the purposes of the condition, as set out in the EP&A Act, "monitoring" is monitoring of the development to provide data on compliance with the consent or on the environmental impact of the development, and an "environmental audit" is a periodic or particular documented evaluation of the development to provide information on compliance with the consent or the environmental management or impact of the development.	Note		
12	Noise and/or air quality monitoring under this consent may be undertaken at suitable representative monitoring locations instead of at privately-owned residences or other locations listed in Schedule 3, providing that these representative monitoring locations are set out in the respective management plan/s.	Compliant	• AQGHGMP (Rev 5 – 12/01/2024), with DPHI approval (dated 23/01/2024). • NMP (Rev 1– dated 20/04/2022), with DPE approval (dated 19/04/2022), including consultation with NSW EPA (dated 9/07/2021).	The current NMP and AQGHGMP provide the relevant details of monitoring locations.
	ACCESS TO INFORMATION			
13	Until the completion of all rehabilitation required under this consent, the Applicant must: (a) make the following information and documents (as they are obtained, approved or as otherwise stipulated within the conditions of this consent) publicly available on its website: • the documents referred to in condition 2(e) of Schedule 2 of this consent; • all current statutory approvals for the development; • all approved strategies, plans and programs required under the conditions of this consent; • the proposed staging plans for the development if the construction, operation or decommissioning of the development is to be staged; • minutes of CCC meetings; • regular reporting on the environmental performance of the development in accordance with the reporting requirements in any plans or programs approved under the conditions of this consent; • a comprehensive summary of the monitoring results of the development, reported in accordance with the specifications in any conditions of this consent, or any approved plans and programs; • a summary of the current progress of the development; • contact details to enquire about the development or to make a complaint; • a complaints register, updated monthly; • the Annual Reviews of the development; • audit reports prepared as part of any Independent Environmental Audit of the development and the Applicant's response to the recommendations in any audit report; and • any other matter required by the Planning Secretary; and (b) keep such information up to date, to the satisfaction of the Planning Secretary.	Non-compliant (Administrative)	Delta Coal Website (https://www.deltacoal.com.au/)	**2022 IEA findings:** ***CA 7:*** *Ensure that the most up to date management plans are uploaded onto the website.* **2025 IEA findings:** Status of 2022 IEA CA 7: Document review prior to site inspection identified the BMP was not the most recent version, as such this ANC remained relevant during this audit period. It is noted that since the site inspection Delta Coal has uploaded the BMP, closing the identified ANC. Therefore, ***OFI07*** has been included for this condition for systematic improvements. 2025 IEA findings: All other required plans/strategies and programs are available on the website, alongside current approvals, CCC meetings, monthly and specialised environmental reports, annual reviews, audit reports, complaints line information and register, satisfying the condition. ***OFI07:*** *Assign an internal periodic (e.g. six-monthly) action to check the Project website to ensure the most up-to-date management plans have been uploaded onto the website.*

Appendix E

EPL 1770

Condition	Details	Compliance status	Relevant evidence	Commentary
1	**Administrative Conditions**			
A1	**What the licence authorises and regulates**			
A1.1	This licence authorises the carrying out of the scheduled activities listed below at the premises specified in A2. The activities are listed according to their scheduled activity classification, fee-based activity classification and the scale of the operation. Unless otherwise further restricted by a condition of this licence, the scale at which the activity is carried out must not exceed the maximum scale specified in this condition. **Scheduled Activity** / **Fee Based Activity** / **Scale** Coal works / Coal works / > 2000000 - 5000000 T annual handing capacity Mining for coal / Mining for coal / > 2000000 - 3500000 T annual production capacity	Compliant	• Site interviews conducted 16 April 2025. • Site inspection conducted 16 April 2025. • Annual Returns for 2022, 2023 and 2024.	The development is being conducted in generally in accordance with this license.
A1.2	The licensee must not extract by mining activities more than 2.1 million tonnes of ROM coal from the premises in any calendar year in line with Development Consent SSD5465 MOD 4.	Compliant	Annual Reviews for 2022, 2023 and 2024.	Delta Coal produced coal within the limits of this condition. • 2022: 954,103 t • 2023: 931,016 t • 2024: 1,018,784 t Compliance for 2025 was not assessed as the reporting period did not encompass the entire calendar year.
A2	**Premises or plant to which this licence applies**			
A2.1	The licence applies to the following premises: **Premises Details** **CHAIN VALLEY COLLIERY** **CONSTRUCTION ROAD** **CHAIN VALLEY BAY** **NSW 2259** **THE LICENSED PREMISES IS AS MARKED AND DEFINED IN THE PLANS TITLED "EPL 1770 BOUNDARIES AND MONITORING POINTS" "EPL 1770 UNDERGROUND BOUNDARY", AND "EPL 1770 SURFACE BOUNDARY" DATED 24 OCTOBER 2024 AND SHAPE FILES PROVIDED IN DOC24/771631-3.**	Note	• SIX Maps/SEED Portal. • Current surface boundary and site shapefiles.	Noted
A3	**Information supplied to the EPA**			
A3.1	Works and activities must be carried out in accordance with the proposal contained in the licence application, except as expressly provided by a condition of this licence. a) In this condition the reference to "the licence application" includes a reference to: a) the applications for any licences (including former pollution control approvals) which this licence replaces under the Protection of the Environment Operations (Savings and Transitional) Regulation 1998; and b) the licence information form provided by the licensee to the EPA to assist the EPA in connection with the issuing of this licence.	Note	N/A	N/A.

Condition	Details	Compliance status	Relevant evidence	Commentary
2	**Discharges to Air and Water and Applications to Land**			
P1	**Location of monitoring/discharge points and areas**			
P1.1	The following points referred to in the table below are identified in this licence for the purposes of monitoring and/or the setting of limits for the emission of pollutants to the air from the point. ***Air*** **EPA identification no.** / **Type of Monitoring Point** / **Type of Discharge Point** / **Location Description** 25 / Air Monitoring Point Particulate Matter PM10 / / TEOM Monitor located on the site of the Mannering Park Sewage Treatment Plant, shown as "Point 25" on the plan titled "EPL 1770 Boundaries and Monitoring Points" Submitted to the EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3).	Compliant	• Air Quality and Greenhouse Gas Management Plan (AQGHGMP) (Rev 5 – 12/01/2024), with DPHI approval (dated 23/01/2024). • Noise Management Plan (NMP) (Rev 1– dated 20/04/2022), with DPE approval (dated 19/04/2022), including consultation with NSW EPA (dated 9/07/2021). • Air quality monitoring reports (in the form of monthly environmental reports) for 2022, 2023, 2024 and 2025 (to date). • Noise monitoring reports for 2022, 2023, 2024 and 2025 (to date).	**2022 IEA findings:** Recommendation 1: As part of updates required to the AQMP, update figure 3 to show the location of the meteorological station. **2025 IEA findings:** Status of 2022 IEA Recommendation 1: Closed out with Figure 3 in the AQGHGMP updated to reflect meteorological station location
P1.2	The following utilisation areas referred to in the table below are identified in this licence for the purposes of the monitoring and/or the setting of limits for any application of solids or liquids to the utilisation area.	Note		Noted
P1.3	The following points referred to in the table are identified in this licence for the purposes of the monitoring and/or the setting of limits for discharges of pollutants to water from the point. ***Water and land*** **EPA Identification no.** / **Type of Monitoring Point** / **Type of Discharge Point** / **Location Description** 1 / Discharge to waters Discharge quality and volume monitoring / Discharge to waters Discharge quality and volume monitoring / Discharge to waters and monitoring from final settlement pond, gravity fed discharge pipe, shown as "Point 1" on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to the EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). 27 / Discharge to waters Discharge quality and volume monitoring / Discharge to waters Discharge quality and volume monitoring / Discharge to waters via dam spillway from final settlement pond adjacent to Point 1, shown as "Point 27" on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to the EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3).	Compliant	• Water Management Plan (WMP) (Rev 7– dated 16/01/2024), with DPHI approval (dated 23/10/2024), including consultation with DCCEEW Water Group (dated 7/02/2024). • Monthly environmental reports for 2022, 2023, 2024 and 2025 (to date) • Annual Reviews for 2022, 2023 and 2024. • Site inspection conducted 16 April 2025.	Conduct of the audit determined compliance with the requirements of this condition, with discharge data is presented in annual reviews and the monthly website reports and discharge locations were viewed in the site audit.

P1.4	The following points referred to in the table below are identified in this licence for the purposes of weather and/or noise monitoring and/or setting limits for the emission of noise from the premises. ***Noise/Weather***	Compliant	• NMP (Rev 1– dated 20/04/2022), with DPE approval (dated 19/04/2022), including consultation with NSW EPA (dated 9/07/2021). • Annual noise compliance assessment reports for 2022, 2023 and 2024. • Quarterly noise monitoring reports for 2022, 2023, 2024 and 2025 (to date). • Annual Reviews for 2022, 2023 and 2024.	Monitoring locations are shown in Figure 2 of the NMP and are described in Table 5. These locations are consistent with the requirements of this condition.

EPA identification no.	Type of monitoring point	Location description
9	Noise monitoring	Noise monitoring site, shown as "Point 9", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). Located at 109 Griffith Street, MANNERING PARK, 2259. Identified as R8 in Development Consent SSD-5465 (MOD 4) submitted to the EPA and dated 12 August 2021 (EPA Ref: DOC21/691135-1).
12	Noise monitoring	Noise monitoring site, shown as "Point 12", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). Located at 35 Lakeshore Avenue, KINGFISHER SHORES, 2259. Identified as R11 in Development Consent SSD-5465 (MOD 4) submitted to the EPA and dated 12 August 2021 (EPA Ref: DOC21/691135-1).
13	Noise monitoring	Noise monitoring site, shown as "Point 13", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). Located at 20 Lakeshore Avenue, KINGFISHER SHORES, 2259. Identified as R12 in Development Consent SSD-5465 (MOD 4) submitted to the EPA and dated 12 August 2021 (EPA Ref: DOC21/691135-1).
14	Noise monitoring	Noise monitoring site, shown as "Point 14", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to the EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). Located at 33 Karoola Avenue, KINGFISHER SHORES, 2259. Identified as R13 in Development Consent SSD-5465 (MOD 4) submitted to the EPA and dated 12 August 2021 (EPA Ref: DOC21/691135-1).
16	Noise monitoring	Noise monitoring site, shown as "Point 16", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to the EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). Located at 150 Tall Timbers Road, DOYALSON NORTH, 2262. Identified as R15 in Development Consent SSD-5465 (MOD 4) submitted to the EPA and dated 12 August 2021 (EPA Ref: DOC21/691135-1).
20	Noise monitoring	Noise monitoring site, shown as "Point 20", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to the EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). Located at 2 Sunset Parade, CHAIN VALLEY BAY, 2259. Identified as R19 in Development Consent SSD-5465 (MOD 4) submitted to the EPA and dated 12 August 2021 (EPA Ref: DOC21/691135-1).
23	Noise monitoring	Noise monitoring site, shown as "Point 23", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to the EPA and dated 24 October 2024 (EPA Ref: DOC24/771631-3). Located at 275 Cams Boulevard, SUMMERLAND POINT, 2259. Identified as R22 in Development Consent SSD-5465 (MOD 4) submitted to the EPA and dated 12 August 2021 (EPA Ref: DOC21/691135-1).
26	Meteorological Station	Meteorological monitoring site, shown as "Point 26", on the plan titled "EPL 1770 Boundaries and Monitoring Points" submitted to the EPA and dated 24 October 2024 (DOC24/771631-3) and 11 August 2021 (DOC21/691135). Located at Mannering Colliery (Ruttleys Road), DOYALSON NORTH, 2259.

Condition	Details	Compliance status	Relevant evidence	Commentary
3	**Limit Conditions**			
L1	**Pollution of waters**			
L1.1	Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.	Non-compliant (Low risk)	• Annual Reviews for 2022, 2023 and 2024. • Incident reports and subsequent notification to the Department and agencies during audit period. • EPL monitoring reports for audit period. • Annual returns for 2022, 2023 and 2024.	There were exceedances in relation to EPL criteria for discharge during the audit period, including: • two exceedances of the 50 mg/L limit for TSS on 5 July 2022 and 8 October 2022 • one exceedance of the 10 ml/L limit for oils and grease on 24 April 2024 • nine exceedances of the limits for faecal coliform (which have been removed from EPL 1770 as a result of the variation approved 13 September 2024) on 5 July 2022, 8 October 2022, 14 February 2023, 20 March 2023, 13 November 2023, 11 March 2024, 12 April 2024, 10 May 2024, and 11 September 2024 In addition, during construction works installing a new sewer pipeline, a pressurised sewer main was punctured. The incident was immediately reported to the CC Council and NSW EPA, with CC Council shutting down the sewage pump station to facilitate clean-up works and repairs undertaken by the construction contractor. Outcomes of the incident investigation indicated <1,000 L of sewage entered the Swindles Creek. Subsequent sampling indicated that there was no ongoing impact. The exceedances of TSS, oils and grease, and faecal coliform and the puncture of the sewer main are considered to meet the definition of water pollution, as defined in Schedule 5 of the Protection of the Environment Operations (General) Regulation 2022 (NSW), specifically: *'The definition of water pollution for the Act includes the placing in or on, or otherwise introducing into or onto, the waters, whether through an act or omission, any matter, whether solid, liquid or gaseous, that is of a prescribed nature, description or class or that does not comply with a standard prescribed in relation to the matter.* *(a) excreta, manure or urine, or waste from an on-site human or animal waste storage facility or treatment device or matter containing faecal coliform or faecal streptococci* *(i) oil, grease or flammable liquid,* *(l) liquid that contains suspended or dissolved solids,'* This resulted in non-compliance with Condition L1.1 of the EPL. As these exceedances were notified to the relevant agencies, no CA has been identified; however, ***OFI03*** has been identified in relation to these notifications.
L2	**Concentration limits**			
L2.1	For each monitoring/discharge point or utilisation area specified in the table\s below (by a point number), the concentration of a pollutant discharged at that point, or applied to that area, must not exceed the concentration limits specified for that pollutant in the table.	Non-compliant (Low risk)	• Annual Reviews for 2022, 2023 and 2024. • Water monitoring data for 2022, 2023, 2024 and 2025 (to date). • Incident reports and subsequent notification to the Department and agencies during audit period. • EPL monitoring reports for audit period. • Annual returns for 2022, 2023 and 2024.	Several non-compliances have occurred within the reporting period, with discussion provided at Conditions L2.4 and L3.2. Any exceedances, incident or non-compliance was investigated and reported upon accordingly and is explained in Section 11 of the Annual Reviews.
L2.2	Where a pH quality limit is specified in the table, the specified percentage of samples must be within the specified ranges.	Compliant	• Annual Reviews for 2022, 2023 and 2024. • Water monitoring data for 2022, 2023, 2024 and 2025 (to date). • Incident reports and subsequent notification to the Department and agencies during audit period. • EPL monitoring reports for audit period. • Annual returns for 2022, 2023 and 2024.	Whilst several non-compliances occurred over the reporting period, no exceedances of pH quality occurred.
L2.3	To avoid any doubt, this condition does not authorise the pollution of waters by any pollutant other than those specified in the table\s.	Note		Note

<table>
<tr><th>Condition</th><th>Details</th><th>Compliance status</th><th>Relevant evidence</th><th>Commentary</th></tr>
<tr><td>L2.4</td><td>Water and/or Land Concentration Limits
POINT 1,27<table><tr><th>Pollutant</th><th>Units of Measure</th><th>50 percentile concentration limit</th><th>90 percentile concentration limit</th><th>3DGM concentration limit</th><th>100 percentile concentration limit</th></tr><tr><td>Oil and Grease</td><td>milligrams per litre</td><td></td><td></td><td></td><td>10</td></tr><tr><td>pH</td><td>pH</td><td></td><td></td><td></td><td>6.5-8.5</td></tr><tr><td>Total suspended solids</td><td>milligrams per litre</td><td></td><td></td><td></td><td>50</td></tr></table></td><td>Non-compliant (Low risk)</td><td>Annual Reviews for 2022, 2023 and 2024.
Water monitoring data for 2022, 2023, 2024 and 2025 (to date).
Incident reports and subsequent notification to the Department and agencies during audit period.
EPL monitoring reports for audit period.
Annual returns for 2022, 2023 and 2024.
Monthly environmental reports.</td><td>2022 IEA findings:
Corrective Action (CA) 1: Keep DPE up-to-date on the progress of works under DA 845-2020 to address exceedances associated with licensed discharges.
Recommendation 2: There is an inconsistent naming convention for the discharge locations between sites. It is recommended that they are consistently referenced across management plans and annual reviews.
2025 IEA findings:
<u>Status of 2022 IEA CA 1:</u>
Closed out with the progression of works reported on in the 2024 Annual Review which was submitted to the Department of Planning, Housing and Infrastructure (DPHI).
<u>Status of 2022 IEA Recommendation 2</u>:
Closed out with the WMP, GWMP, Annual Reviews and monthly environmental reports consistently referring to discharge locations as either Licensed Discharge Point (LDP) or discharge point.
<u>2025 IEA findings:</u>
Refer to discussion regarding non-compliance with Condition L1.1 (i.e. NC07).</td></tr>
<tr><td>L3</td><td>Volume and mass limits</td><td></td><td></td><td></td></tr>
<tr><td>L3.1</td><td>For each discharge point or utilisation area specified below (by a point number), the volume/mass of:
a) liquids discharged to water; or;
b) solids or liquids applied to the area;
c) must not exceed the volume/mass limit specified for that discharge point or area.<table><tr><th>Point</th><th>Unit of Measure</th><th>Volume/Mass Limit</th></tr><tr><td>1</td><td>kilolitres per day</td><td>12161</td></tr><tr><td>27</td><td>kilolitres per day</td><td>12161</td></tr></table></td><td>Non-compliant (Low risk)</td><td>Annual Reviews for 2022, 2023 and 2024.
Water monitoring data for 2022, 2023, 2024 and 2025 (to date).
Incident reports and subsequent notification to the Department and agencies during audit period.
EPL monitoring reports for audit period.
Annual returns for 2022, 2023 and 2024.</td><td>There were two volumetric exceedances which occurred over the audit period, see Condition L3.2 below.
There were two exceedances of volumetric limits during the audit period on 5 July 2022 (attributed to a heavy rainfall event over 2-6 July 2022) and 6 July 2022, constituting a non-compliance with Condition L3.1.
These exceedances were reported accordingly and appropriate management steps were taken, including review of the TARP, site water balance and clean water diversion system.
Notably, despite the two volumetric exceedances, CVC remained well under its daily discharge limit, with the 2022, 2023 and 2024 Annual Reviews reporting an average daily discharge of 6,429 kL, 6,703.4 kL and 5,943.5 kL respectively.
Conduct of the audit determined, in response to these exceedances, Delta Coal demonstrated adaptive management and implemented appropriate mitigation and management measures. Therefore, no CA or OFI is deemed relevant.</td></tr>
<tr><td>L3.2</td><td>The volumetric daily discharge limit for the premises is the combined discharge measured at EPA discharge.</td><td>Non-compliant (Low risk)</td><td>Annual Reviews for 2022, 2023 and 2024.
Water monitoring data for 2022, 2023, 2024 and 2025 (to date).</td><td>2022 IEA findings:
<u>Status of 2022 IEA CA 1</u>:
Refer to Condition L2.4.
<u>2025 IEA findings:</u>
There were two volumetric exceedances which occurred over the audit period (see Condition L3.1).</td></tr>
<tr><td>L4</td><td>Waste</td><td></td><td></td><td></td></tr>
<tr><td>L4.1</td><td>The licensee must not cause, permit or allow any waste to be received at the premises, except the wastes expressly referred to in the column titled “Waste” and meeting the definition, if any, in the column titled “Description” in the table below.
Any waste received at the premises must only be used for the activities referred to in relation to that waste in the column titled “Activity” in the table below.
Any waste received at the premises is subject to those limits or conditions, if any, referred to in relation to that waste contained in the column titled “Other Limits” in the table below.
This condition does not limit any other conditions in this licence.<table><tr><th>Code</th><th>Waste</th><th>Description</th><th>Activity</th><th>Other Limits</th></tr><tr><td>NA</td><td>General or Specific exempted waste</td><td>Waste that meets all the conditions of a resource exemption under Clause 92 of the Protection of the Environment Operations (Waste) Regulation 2014.</td><td>As specified in each particular resource recovery exemption</td><td>NA</td></tr></table></td><td>Compliant</td><td>Annual Reviews for 2022, 2023 and 2024.
Waste tracking register.
Waste certificates.
Site interviews conducted 16 April 2025.
Site inspection conducted 16 April 2025.
Annual Returns for 2022, 2023 and 2024.</td><td>Conduct of the audit has confirmed no waste has been received at the premises over the reporting period.</td></tr>
</table>

<table>
<tr><th>Condition</th><th>Details</th><th>Compliance status</th><th>Relevant evidence</th><th>Commentary</th></tr>
<tr><td>L5</td><td>Noise limits</td><td></td><td></td><td></td></tr>
<tr><td>L5.1</td><td>Noise generated at the premises that is measured at each noise monitoring point established under this licence must not exceed the noise levels specified in Column 4 of the table below for that point during the corresponding time periods specified in Column 1 when measured using the corresponding measurement parameters listed in Column 2.

POINT 12
<table><tr><th>Time period</th><th>Measurement parameter</th><th>Measurement frequency</th><th>Noise level dB(A)</th></tr><tr><td>Day</td><td>Day-LAeq (15 minute)</td><td>-</td><td>49</td></tr><tr><td>Evening</td><td>Evening-LAeq (15 minute)</td><td>-</td><td>49</td></tr><tr><td>Night</td><td>Night-LAeq (15 minute)</td><td>-</td><td>49</td></tr><tr><td>Night</td><td>Night-LA1 (1 minute)</td><td>-</td><td>54</td></tr></table>
POINT 13
<table><tr><th>Time period</th><th>Measurement parameter</th><th>Measurement frequency</th><th>Noise level dB(A)</th></tr><tr><td>Day</td><td>Day-LAeq (15 minute)</td><td>-</td><td>49</td></tr><tr><td>Evening</td><td>Evening-LAeq (15 minute)</td><td>-</td><td>49</td></tr><tr><td>Night</td><td>Night-LAeq (15 minute)</td><td>-</td><td>49</td></tr><tr><td>Night</td><td>Night-LA1 (1 minute)</td><td>-</td><td>53</td></tr></table>
POINT 14
<table><tr><th>Time period</th><th>Measurement parameter</th><th>Measurement frequency</th><th>Noise level dB(A)</th></tr><tr><td>Day</td><td>Day-LAeq (15 minute)</td><td>-</td><td>43</td></tr><tr><td>Evening</td><td>Evening-LAeq (15 minute)</td><td>-</td><td>43</td></tr><tr><td>Night</td><td>Night-LAeq (15 minute)</td><td>-</td><td>43</td></tr><tr><td>Night</td><td>Night-LA1 (1 minute)</td><td>-</td><td>49</td></tr></table>
POINT 16
<table><tr><th>Time period</th><th>Measurement parameter</th><th>Measurement frequency</th><th>Noise level dB(A)</th></tr><tr><td>Day</td><td>Day-LAeq (15 minute)</td><td>-</td><td>36</td></tr><tr><td>Evening</td><td>Evening-LAeq (15 minute)</td><td>-</td><td>36</td></tr><tr><td>Night</td><td>Night-LAeq (15 minute)</td><td>-</td><td>36</td></tr><tr><td>Night</td><td>Night-LA1 (1 minute)</td><td>-</td><td>45</td></tr></table>
POINT 20
<table><tr><th>Time period</th><th>Measurement parameter</th><th>Measurement frequency</th><th>Noise level dB(A)</th></tr><tr><td>Day</td><td>Day-LAeq (15 minute)</td><td>-</td><td>37</td></tr><tr><td>Evening</td><td>Evening-LAeq (15 minute)</td><td>-</td><td>37</td></tr><tr><td>Night</td><td>Night-LAeq (15 minute)</td><td>-</td><td>37</td></tr><tr><td>Night</td><td>Night-LA1 (1 minute)</td><td>-</td><td>45</td></tr></table>
POINT 23
<table><tr><th>Time period</th><th>Measurement parameter</th><th>Measurement frequency</th><th>Noise level dB(A)</th></tr><tr><td>Day</td><td>Day-LAeq (15 minute)</td><td>-</td><td>46</td></tr><tr><td>Evening</td><td>Evening-LAeq (15 minute)</td><td>-</td><td>46</td></tr><tr><td>Night</td><td>Night-LAeq (15 minute)</td><td>-</td><td>46</td></tr><tr><td>Night</td><td>Night-LA1 (1 minute)</td><td>-</td><td>46</td></tr></table>
POINT 9
<table><tr><th>Time period</th><th>Measurement parameter</th><th>Measurement frequency</th><th>Noise level dB(A)</th></tr><tr><td>Day</td><td>Day-LAeq (15 minute)</td><td>-</td><td>38</td></tr><tr><td>Evening</td><td>Evening-LAeq (15 minute)</td><td>-</td><td>38</td></tr><tr><td>Night</td><td>Night-LAeq (15 minute)</td><td>-</td><td>38</td></tr><tr><td>Night</td><td>Night-LA1 (1 minute)</td><td>-</td><td>45</td></tr></table></td><td>Compliant</td><td>• NMP (Rev 1– dated 20/04/2022), with DPE approval (dated 19/04/2022), including consultation with NSW EPA (dated 9/07/2021).
• Annual noise compliance assessment reports for 2022, 2023 and 2024.
• Quarterly noise monitoring reports for 2022, 2023, 2024 and 2025 (to date).
• Annual Reviews for 2022, 2023 and 2024.
• Annual Returns for 2022, 2023 and 2024.</td><td>During the audit period, attended noise monitoring was undertaken quarterly, as per the approved NMP and the site was compliant with the conditions with no exceedances at Point 12, 13, 14, 16, 20, 23 or 9 occurring during the audit period.
Notably, EPL point 23 (ATN007) was approved for removal following the approval of the NMP in March 2022, as such the exceedance reported for this condition in the 2022 Annual Review which occurred on 15 September 2022 has not led to a non-compliance with this condition. The removal was justified based on the monitoring points location at the former mine cottages which were demolished in 2020, as such it no longer monitored a near-by receiver and was also dominated by VPPS noise emissions. Point 23 was decommissioned in April 2022.</td></tr>
</table>

Condition	Details	Compliance status	Relevant evidence	Commentary
L5.2	The licensee must ensure that noise generated on the premises does not exceed: a) 35 LAeq(15min) during the day, evening or night at any privately owned land nearest to the residence apart from those receivers identified in Condition 5.1; and b) 45 LA1(1min) during the night at any privately owned land nearest to the residence apart from those receivers identified in Condition 5.1. Note: The licensee may provide to the EPA written evidence of any agreement with a landholder which is subject to the above noise limits. The written evidence may be submitted with a licence variation to remove the landholder from the above tables.	Compliant	• Annual Reviews for 2022, 2023 and 2024. • Annual noise compliance assessment reports for 2022, 2023 and 2024. • Quarterly noise monitoring reports for 2022, 2023, 2024 and 2025 (to date). • Complaints data. • Incident reports for the audit period • Annual Returns for 2022, 2023 and 2024.	Monitoring results over the reporting period were in compliance with Condition L5.1. Therefore, no further monitoring at residences were required.
L5.3	For the purpose of condition L5.1 and condition L5.2: (a) Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sunday and public holidays; (b) Evening is defined as the period 6pm to 10pm, and (c) Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sunday and public holidays.	Note		Noted
	The noise limits set out in condition L5.1 and condition L5.2 apply under all meterorological conditions except for any one of the following: (a) Wind speeds greater than 3 metres/second at 10 metres above ground level; or (b) Stability category F temperature inversion conditions and wind speeds greater than 2 metres/second at 10 metres above ground level; or (c) Stability category G temperature inversion conditions. (d) Or as defined under the NSW EPA Noise Policy for Industry 2017.	Note		Noted
L5.5	For the purpose of condition L5.4: (a) the meteorological data to be used for determining meteorological conditions is the data recorded at the meteorological station identified in this licence as EPA Identification Point 26. (b) Stability category temperature inversion conditions are to be determined in accordance with the NSW EPA Noise Policy for Industry 2017. Note: The weather station must be designed, commissioned and operated in a manner to obtain the necessary parameters required under the above condition.	Compliant	• Annual Reviews for 2022, 2023 and 2024. • Annual Returns for 2022, 2023 and 2024. • NMP (Rev 1– dated 20/04/2022), with DPE approval (dated 19/04/2022), including consultation with NSW EPA (dated 9/07/2021). • Quarterly noise monitoring reports for 2022, 2023, 2024 and 2025 (to date). • Monthly environmental reports for 2022, 2023, 2024 and 2025 (to date). • Raw meteorological data.	The onsite meteorological station is used to determine weather parameters for the site during monitoring events in compliance with the requirements of this condition.
L5.6	For the purpose of determining the noise generated at the premises the licensee must use a Class 1 or Class 2 noise monitoring device as defined by AS IEC61672.1 and AS IEC61672.2-2004, or other noise monitoring equipment accepted by the EPA in writing.	Compliant	Quarterly noise monitoring reports for 2022, 2023, 2024 and 2025 (to date)	Quarterly noise monitoring reports indicate that measurements are being taken using calibrated machinery compliant with the requirements of this condition.
L5.7	To determine compliance: 1. With the LAeq(15 min) noise limits in condition L5.1 and condition L5.2, the licensee must locate noise monitoring equipment; (a) within 30 metres of a dwelling facade (but not closer than 3 metres) where any dwelling on the property is situated more then 30 metres from the property boundary that is closest to the premises; (b) approximately on the boundary where any dwelling is situated 30 metres or less from the property boundary that is closest to the premises, or, where applicable, (c) within approximately 50 metres if the boundary of a national park or nature reserve. 2. With the LA1(1 minute) noise limits in condition L5.1 and L5.2, the noise monitoring equipment must be located within 1 metre of a dwelling facade. 3. With the noise limits in condition L5.1 and condition L5.2, the noise monitoring equipment must be located; (a) at the most affected point at a location where there is no dwelling at the location, or (b) at the most affected point within an area at a location prescribed by conditions L5.7 1(a) or L5.7 1(b).	Non-compliant (Administrative)	• NMP (Rev 1– dated 20/04/2022), with DPE approval (dated 19/04/2022), including consultation with NSW EPA (dated 9/07/2021). • Quarterly noise monitoring reports for 2022, 2023, 2024 and 2025 (to date). • Annual Reviews for 2022, 2023 and 2024. • Annual Returns for 2022, 2023 and 2024.	Monitoring for LA1(1minute) noise levels is not completed at 1m from a façade; however, such noise monitoring is generally not practical due to disturbance to residents during the sensitive night-time period. Furthermore, operation of Schedule 6, Condition 12 of SSD-5465 allows monitoring from representative locations. Therefore, no CA is proposed; however, it is noted that Delta Coal is preparing a new SSD application to combine its sites. Therefore, ***OFI08*** has been identified. ***OFI08:*** *As part of the process of combining CVC and MC under one consent, when applying for/varying the EPL, Delta Coal should request the NSW EPA add a note to this condition in reference to the residential restriction for LA1(1 minute).*
L5.8	A non-compliance of condition L5.1 or condition L5.2 will still occur where noise generated from the premises in excess of the appropriate limit is measured; a) at a location other than an area prescribed by conditions L5.7 1(a) and L5.7 1(b), and /or b) at a point other than the most affected point at a location.	Note		Noted

Condition	Details	Compliance status	Relevant evidence	Commentary
L5.9	For the purposes of determining the noise generated at the premises all applicable modification factors as described in the NSW EPA Noise Policy for Industry 2017 must be applied, as appropriate, to the noise levels measured by the noise monitoring equipment.	Compliant	Quarterly noise monitoring reports for 2022, 2023, 2024 and 2025 (to date).	The NSW EPA Noise Policy for Industry is referenced in the noise management reports, as well as a discussion on its applicability with the data from the monitoring period.
4	**Operating Conditions**			
O1	Activities must be carried out in a competent manner	Compliant	• Site interviews conducted 16 April 2025. • Site inspection conducted 16 April 2025. • Induction procedure. • Servicing record samples on Pulse, sighted during the site inspection on 16 April 2025.	During the conduct of the audit, documentation reviewed, and the site inspection indicates general compliance with the requirements of this condition.
O1.1	Licensed activities must be carried out in a competent manner. This includes: a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.	Non-compliant (Low risk)	• Site interviews conducted 16 April 2025. • Site inspection conducted 16 April 2025. • Waste tracking sheet. • Waste certificates. • Waste presentation, toolbox talks and training packages.	**2022 IEA findings:** ***CA 2**: As bins are clearly labelled and adequate disposal facilities are available across the site, Delta should investigate means to address the workforce culture in relation to inadequate disposal of waste that has persisted across this, and the previous, audit.* **2025 IEA findings:** Status of 2022 IEA CA 2: Closed out with Delta implementing a waste management system by way of a PowerPoint presentation, training packages and toolbox talks that were developed throughout 2023 and 2024. 2025 IEA findings: During the conduct of the audit, documentation reviewed, and the site inspection indicates general compliance with the requirements of this condition.
O2	**Maintenance of plant and equipment**			
O2.1	All plant and equipment installed at the premises or used in connection with the licensed activity: a) must be maintained in a proper and efficient condition; and b) must be operated in a proper and efficient manner.	Compliant	• Site interviews conducted 16 April 2025. • Site inspection conducted 16 April 2025. • Servicing records. • Pulse system. • Site photos taken 16 April 2025.	During the conduct of the audit, documentation reviewed, and the site inspection indicates general compliance with the requirements of this condition.
O3	**Dust**			
O3.1	The premises must be maintained in a condition which minimises or prevents the emission of dust on or from the premises.	Compliant	• Annual Reviews for 2022, 2023, and 2024. • Site inspection conducted 16 April 2025. • Site photos taken 16 April 2025. • Air quality monitoring data for 2022, 2023, 2024 and 2025 (to date) (found in environmental monthly reports). • AQGHGMP (Rev 5 – 12/01/2024), with DPHI approval (dated 23/01/2024).	There were several exceedances for depositional dust over the reporting period and as discussed in Schedule 3, Condition 11 of SSD-5465, these exceedances were largely attributable to off-site activities outside of Delta Coals control. Similarly, there was also one exceedance of PM2.5 criteria at the Wyee BAM monitoring location, with investigations revealing the exceedance was not attributable to Delta Coal operations. The Wyee monitoring unit was also vandalised and subsequently replaced with a TEOM unit in June 2022. Several incident reports were viewed during the audit confirming that all exceedances were investigated and reported accordingly and that appropriate action was taken by Delta Coal in responding to incidents. During the site inspection some dust being generated on site was observed. It was noted that on dry days a watercart would be employed to keep dust down, and that as rain was forecast on the day of the audit, it had not been used.

Condition	Details	Compliance status	Relevant evidence	Commentary
O3.2	Activities occurring in or on the premises must be carried out in a manner that will minimise the generation of wind-blown or traffic generated dust.	Compliant	• Annual Reviews for 2022, 2023, and 2024. • Site inspection conducted 16 April 2025. • AQGHGMP (Rev 5 – 12/01/2024), with DPHI approval (dated 23/01/2024). • Air quality monitoring data for 2022, 2023, 2024 and 2025 (to date) (found in environmental monthly reports).	Trafficable areas were generally sealed or gravel roads. During the site inspection some dust being generated on site was observed. It was noted that on dry days a watercart would be employed to keep dust down, and that as rain was forecast on the day of the audit, it had not been used. Given the circumstances, the auditor considers Delta Coal to be compliant with this condition.
O3.3	All trafficable areas, coal stockpile(s) and storage areas, and vehicle manoeuvring areas in or on the premises must be maintained, at all times, in a condition that will minimise the generation of dust.	Compliant	• Site inspection conducted 16 April 2025. • Site interviews conducted 16 April 2025. • AQGHGMP (Rev 5 – 12/01/2024), with DPHI approval (dated 23/01/2024). • Air quality monitoring data for 2022, 2023, 2024 and 2025 (to date) (found in environmental monthly reports).	Refer to condition O3.2
O3.4	All vehicles transporting coal from the premises must be covered immediately after loading to prevent wind blown emissions and spillage Note: Vehicles transporting coal on the private haul road from Chain Valley Colliery to Vales Point Power station are exempt from covering their load if surface coal moisture is above 8%.	Not triggered	• Coal Haulage Reports for 2022, 2023, 2024 and 2025 (to date). • AQGHGMP (Rev 5 – 12/01/2024), with DPHI approval (dated 23/01/2024). • Air quality monitoring data for 2022, 2023, 2024 and 2025 (to date) (found in environmental monthly reports). • Site inspection conducted 16 April 2025. • Site interviews conducted 16 April 2025.	Delta Coal have used a conveyor system to transport coal throughout the audit period. No haul trucks were used and as such, the condition was not triggered.
O3.5	Activities occurring in or on the premises must be carried out in a manner that will minimise the tracking of dust from the premises.	Compliant	• Site inspection conducted 16 April 2025. • Site interviews conducted 16 April 2025. • AQGHGMP (Rev 5 – 12/01/2024), with DPHI approval (dated 23/01/2024). • Air quality monitoring data for 2022, 2023, 2024 and 2025 (to date) (found in environmental monthly reports)	Given that coal transport was by conveyor and not haul truck during the audit period, there is limited scope for dust to be tracked off the premises.

Condition	Details	Compliance status	Relevant evidence	Commentary
O4	**Emergency response**			
	Note: The licensee must maintain, and implement as necessary, a current Pollution Incident Response Management Plan (PIRMP) for the premises. The PIRMP must be developed in accordance with the requirements in Part 5.7A of the Protection of the Environment Operations (POEO) Act 1997 and POEO Regulations. The licensee must keep the incident response plan on the premises at all times. The incident response plan must document systems and procedures to deal with all types of incidents (e.g. spills, explosions or fire) that may occur at the premises or that may be associated with activities that occur at the premises and which are likely to cause harm to the environment. The PIRMP must be tested annually or following a pollution incident.	Compliant	• Pollution Incident Response Management Plan (PIRMP) (Rev 7 – dated 18/12/2023). • Site inspection conducted 16 April 2025	The PIRMP was sighted stored in an appropriate location during the sight visit. The PIRMP was tested 3 times in the reporting period: • 29 September 2022 • 18 December 2023 • 11 December 2024
O5	**Processes and management**			
	Bunding			
O5.1	All above ground tanks containing material that is likely to cause environmental harm must be bunded or have an alternative spill containment system in place.	Compliant	Site inspection conducted 16 April 2025.	All above ground storage tanks observed during the audit were bunded.
O5.2	Bunds must: a) have walls and floors constructed of impervious materials; b) be of sufficient capacity to contain 110% of the volume of the tank (or 110% volume of the largest tank where a group of tanks are installed); c) have floors graded to a collection sump; and d) not have a drain valve incorporated in the bund structure, or be constructed and operated in a manner that achieves the same environmental outcome.	Compliant	Site inspection conducted 16 April 2025.	Bunds were viewed in the site inspection and were compliant with the requirements of this condition.
O6	**Waste management**			
O6.1	The licensee must ensure that any liquid and/or non liquid waste generated and/or stored at the premises is assessed in accordance with the EPA Waste Classification Guidelines as in force from time to time.	Compliant	• Site inspection conducted 16 April 2025. • Site interviews conducted 16 April 2025. • Waste tracking register.	Wastewater and oil water separator systems viewed in site audit.
O6.2	The licensee must ensure that waste identified for recycling is stored separately from other waste.	Non-compliant (Low risk)	• Site inspection conducted 16 April 2025. • Waste tracking register.	**2022 IEA findings:** The site audit identified that there were adequate vessels for recycling on site; however recycling was not adequately implemented by staff. There was a small extent of incorrect waste being placed into a clearly labelled waste stream bin. No further CA was proposed. **2025 IEA findings:** During the site inspection, adequate vessels for recycling were observed to be available on site; however, instances of recycling disposal not being appropriately followed were observed. No CA or OFI is proposed on the basis that Delta Coal has followed all the reasonable and feasible measures as proposed in the 2022 IEA, including: • clear labelling and adequate availability of waste disposal facilities • completion of training packages and toolbox talks on the importance of waste management
5	**Monitoring and Recording Conditions**			
M1	**Monitoring records**			
M1.1	The results of any monitoring required to be conducted by this licence or a load calculation protocol must be recorded and retained as set out in this condition	Compliant	• Monitoring data for 2022, 2023, 2024 and 2025 (to date). • Annual Return for 2022, 2023 and 2024.	A review of the published data and the raw data provided found Delta Coal to be compliant with this condition.
M1.2	All records required to be kept by this licence must be: a) in a legible form, or in a form that can readily be reduced to a legible form; b) kept for at least 4 years after the monitoring or event to which they relate took place; and c) produced in a legible form to any authorised officer of the EPA who asks to see them.	Compliant	• Monitoring data for 2022, 2023, 2024 and 2025 (to date). • Annual Return for 2022, 2023 and 2024.	Evidence of data going back four years from the data of the audit have been sighted. Monitoring data available on the website dates backs 4 years or more.

<table>
<tr><th>Condition</th><th>Details</th><th>Compliance status</th><th>Relevant evidence</th><th>Commentary</th></tr>
<tr><td>M1.3</td><td>The following records must be kept in respect of any samples required to be collected for the purposes of this licence:
a) the date(s) on which the sample was taken;
b) the time(s) at which the sample was collected;
c) the point at which the sample was taken; and
d) the name of the person who collected the sample.</td><td>Compliant</td><td>• Depositional dust monitoring sheets.
• Surface Water Monitoring 13 June 2023, 7 July 2024, and 3 March 2024.
• Monitoring data for 2022, 2023, 2024 and 2025 (to date).
• Sampling records.</td><td>2022 IEA findings:
CA 3: Ensure contractors record sample time when recording air quality monitoring data in accordance with the requirements of Condition M1.3.
2025 IEA findings:
<u>Status of 2022 IEA Corrective Action 3:</u>
Delta Coal instructed third party contractors to include sampling times on the sampling field sheets after the previous audit, with a number of monitoring sheets sighted during the 2025 audit indicating the required information has been collected.</td></tr>
<tr><td>M2</td><td>Requirement to monitor concentration of pollutants discharged</td><td></td><td></td><td></td></tr>
<tr><td>M2.1</td><td>For each monitoring/discharge point or utilisation area specified below (by a point number), the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The licensee must use the sampling method, units of measure, and sample at the frequency, specified opposite in the other columns:</td><td>Compliant</td><td>• Annual Reviews for 2022, 2023 and 2024.
• Monitoring data for 2022, 2023, 2024 and 2025 (to date).
• Monthly environmental reports.</td><td>Data capture is presented in the Annual Reviews and on the website in the monthly data reports. Review of relevant data indicates compliance.</td></tr>
<tr><td>M2.2</td><td>Air Monitoring Requirements
POINT 25
<table><tr><th>Pollutant</th><th>Units of measure</th><th>Frequency</th><th>Sampling Method</th></tr><tr><td>Particulate matter</td><td>micrograms per cubic metre</td><td>Continuous</td><td>AM-22</td></tr></table></td><td>Compliant</td><td>• AQGHGMP (Rev 5 – 12/01/2024), with DPHI approval (dated 23/01/2024).
• Monitoring data for 2022, 2023, 2024 and 2025 (to date).
• Annual Reviews for 2022, 2023 and 2024.</td><td>2022 IEA findings:
Recommendation 3: Improve data capture for PM10. Review possibilities of backup power supply.
2025 IEA findings:
<u>Status of 2022 IEA Recommendation 3:</u>
Not implemented with Delta Coal reviewing the potential for installing a backup power supply and concluding that the installation of a separate generator is not proportionate to the incident.
Site interviews and TEOM monitoring data indicated 9 days offline due to power outage and calibrations and a further 18 days offline due to equipment malfunction and power outage occurred during the audit period. As the monitor was online for 97.54% of the time between 1 April 2022 and 31 March 2025 (online 1069/1096 days), the need for backup power supply was refuted, thus the 2022 IEA Recommendation 3 is no longer considered applicable.</td></tr>
<tr><td>M2.3</td><td>Water and/ or Land Monitoring Requirements
POINT 1
<table><tr><th>Pollutant</th><th>Units of measure</th><th>Frequency</th><th>Sampling Method</th></tr><tr><td>Biochemical oxygen demand</td><td>milligrams per litre</td><td>Once a month (min. of 4 weeks)</td><td>Grab sample</td></tr><tr><td>Oil and Grease</td><td>milligrams per litre</td><td>Once a month (min. of 4 weeks)</td><td>Grab sample</td></tr><tr><td>pH</td><td>pH</td><td>Once a month (min. of 4 weeks)</td><td>Grab sample</td></tr><tr><td>Total suspended solids</td><td>milligrams per litre</td><td>Once a month (min. of 4 weeks)</td><td>Grab sample</td></tr></table>POINT 27
<table><tr><th>Pollutant</th><th>Units of measure</th><th>Frequency</th><th>Sampling Method</th></tr><tr><td>Oil and Grease</td><td>milligrams per litre</td><td>Daily during any discharge</td><td>Grab sample</td></tr><tr><td>pH</td><td>pH</td><td>Daily during any discharge</td><td>Grab sample</td></tr><tr><td>Total suspended solids</td><td>milligrams per litre</td><td>Daily during any discharge</td><td>Grab sample</td></tr></table></td><td>Non-compliant (Administrative)</td><td>• WMP (Rev 7– dated 16/01/2024), with DPHI approval (dated 23/10/2024), including consultation with DCCEEW Water Group (dated 7/02/2024).
• Annual Reviews for 2022, 2023, and 2024.
• Monitoring data for 2022, 2023, 2024 and 2025 (to date).</td><td>A review of the data for the audit period indicates that samples are being taken in compliance with this condition; however, only LDP1 is routinely reported in the monthly environmental reports. There were occasions where LDP27 was triggered, but not reported on in the monthly report. Therefore, CA01 has been identified..
CA01: Report on LDP1 and LDP27 monitoring and sample results in the monthly environmental reports and Annual Reviews. If no discharge or sampling occurs, a note on this would be appropriate for consistency and improved environmental monitoring.
During the significant rainfall period of 2-6 July 2022, which triggered the spillway and need to sample LDP27, no sample was taken at LDP27 due to a failure in un-attended sampler thus constituting a non-compliance with the condition. As the incident was appropriately investigated and reported and corrective actions implemented, no further CA is proposed.</td></tr>
<tr><td>M3</td><td>Testing methods - concentration limits</td><td></td><td></td><td></td></tr>
<tr><td>M3.1</td><td>Monitoring for the concentration of a pollutant emitted to the air required to be conducted by this licence must be done in accordance with:
a) any methodology which is required by or under the Act to be used for the testing of the concentration of the pollutant; or
b) if no such requirement is imposed by or under the Act, any methodology which a condition of this licence requires to be used for that testing; or
c) if no such requirement is imposed by or under the Act or by a condition of this licence, any methodology approved in writing by the EPA for the purposes of that testing prior to the testing taking place.
Note: The Protection of the Environment Operations (Clean Air) Regulation 2022 requires testing for certain purposes to be conducted in accordance with test methods contained in the publication "Approved Methods for the Sampling and Analysis of Air Pollutants in NSW".</td><td>Compliant</td><td>• AQGHGMP (Rev 5 – 12/01/2024), with DPHI approval (dated 23/01/2024).
• Monitoring data for 2022, 2023, 2024 and 2025 (to date).</td><td>Monitoring methodology is being undertaken in compliance with the requirements of this EPL, SSD – 5465 and the POEO Act.</td></tr>
</table>

<table>
<tr><th>Condition</th><th>Details</th><th>Compliance status</th><th>Relevant evidence</th><th>Commentary</th></tr>
<tr><td>M3.2</td><td>Subject to any express provision to the contrary in this licence, monitoring for the concentration of a pollutant discharged to waters or applied to a utilisation area must be done in accordance with the Approved Methods Publication unless another method has been approved by the EPA in writing before any tests are conducted</td><td>Compliant</td><td>• WMP (Rev 7– dated 16/01/2024), with DPHI approval (dated 23/10/2024), including consultation with DCCEEW Water Group (dated 7/02/2024).
• Annual Reviews for 2022, 2023, and 2024.
• Monitoring data for 2022, 2023, 2024 and 2025 (to date).</td><td>A review of the data provided indicates that water monitoring is being undertaken as per the requirements of this condition.</td></tr>
<tr><td>M4</td><td>Environmental monitoring</td><td></td><td></td><td></td></tr>
<tr><td></td><td>Requirement to monitor noise</td><td></td><td></td><td></td></tr>
<tr><td>M4.1</td><td>To determine compliance with condition L5.1, attended noise monitoring must be undertaken in accordance with conditions L5.7 and L5.8, and
(a) at each one of the locations listed in condition L5.1;
(b) occur quarterly within the reporting period of the Environment Protection Licence with at least 2 months between monitoring periods;
(c) occur during each day, evening and night period as defined in the NSW Industrial Noise Policy (EPA 2000) for a minimum of 15 minutes for three of the quarters;
(d) the night time 15 minute attended monitoring in accordance with c) must be undertaken between the hours of 1am and 4am;
(e) the night time LA1 (1 min) attended monitoring in accordance with c) must be undertaken between the hours of 1am and 4am;
(f) one quarterly monitoring must occur during each day, evening and night period as defined in the NSW EPA Noise Policy for Industry 2017 for a minimum of 1.5 hours during the day; 30 minutes during the evening; and 1 hours during the night, and
(g) each quarterly monitoring must be undertaken on a different day(s) of the week not including Saturdays, Sundays and public holidays; and
(h) these monitoring conditions take effect in the 2015 Reporting period.
Note: The intention of this condition is that quarterly monitoring be undertaken at each sensitive receiver. That at each sensitive receiver monitoring is undertaken over a range of different days excluding weekends and public holidays during the reporting period so as to be representative of operating hours. That night time 15 minute attended monitoring and the LA1 (1min) monitoring for three of the quarters be undertaken at worst case being the most stable atmospheric conditions and when noise would be most intrusive to sleep. All of the sensitive receivers do not have to be monitored on the same day, evening and night for sub condition f.</td><td>Compliant</td><td>• NMP (Rev 1– dated 20/04/2022), with DPE approval (dated 19/04/2022), including consultation with NSW EPA (dated 9/07/2021).
• Quarterly Noise Monitoring Reports for 2022, 2023, 2024 and 2025 (to date).</td><td>A review of the quarterly noise monitoring reports found that noise monitoring was being undertaken consistent with the requirements of this condition.</td></tr>
<tr><td>M5</td><td>Weather monitoring</td><td></td><td></td><td></td></tr>
<tr><td>M5.1</td><td>At the point(s) identified below, the licensee must monitor (by sampling and obtaining results by analysis) the parameters specified in Column 1 of the table below, using the corresponding sampling method, units of measure, averaging period and sampling frequency, specified opposite in the Columns 2, 3, 4 and 5 respectively

POINT 26
<table><tr><th>Parameter</th><th>Sampling method</th><th>Units of measure</th><th>Averaging period</th><th>Frequency</th></tr><tr><td>Rainfall</td><td>AM-4</td><td>millimetres</td><td>24 hours</td><td>Continuous</td></tr><tr><td>Wind Direction at 10 metres</td><td>AM-2 & AM-4</td><td>Degrees</td><td>1 hour</td><td>Continuous</td></tr><tr><td>Wind Speed</td><td>AM-2 & AM-4</td><td>metres per second</td><td>1 hour</td><td>Continuous</td></tr><tr><td>Temperature at 10 metres</td><td>AM-4</td><td>degrees Celsius</td><td>1 hour</td><td>Continuous</td></tr><tr><td>Sigma Theta</td><td>AM-2 & AM-4</td><td>Degrees</td><td>15 minutes</td><td>Continuous</td></tr><tr><td>Relative humidity</td><td>AM-4</td><td>percent</td><td>1 hour</td><td>Continuous</td></tr></table></td><td>Compliant</td><td>• AQGHGMP (Rev 5 – 12/01/2024), with DPHI approval (dated 23/01/2024).
• NMP (Rev 1– dated 20/04/2022), with DPE approval (dated 19/04/2022), including consultation with NSW EPA (dated 9/07/2021).
• Annual Reviews for 2022, 2023, and 2024.
• Raw data export from meteorological station.</td><td>Weather data is presented in the Annual Review and monthly environmental report documents with relevant data recorded in accordance with this condition.</td></tr>
<tr><td>M5.2</td><td>The licensee may use the Vales Point Power Station Meteorological Station to determine compliance with condition M5.1, provided the licensee has authority from Sunset Power International Pty Ltd to access meteorological data at all times.</td><td>Not triggered</td><td></td><td>The Delta Coal weather station at MC is used to collect weather data. This condition remains not triggered.</td></tr>
<tr><td>M6</td><td>Recording of pollution complaints</td><td></td><td></td><td></td></tr>
<tr><td>M6.1</td><td>The licensee must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies.</td><td>Compliant</td><td>Complaint and incident register for 2022, 2023, 2024 and 2025 (to date).</td><td>The complaints register is kept on the project website.</td></tr>
</table>

Condition	Details	Compliance status	Relevant evidence	Commentary
M6.2	The record must include details of the following: a) the date and time of the complaint; b) the method by which the complaint was made; c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect; d) the nature of the complaint; e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and f) if no action was taken by the licensee, the reasons why no action was taken.	Compliant	• Complaint and incident register for 2022, 2023, 2024 and 2025 (to date). • Enquiry record dated 13/01/2023 verifying relevant records retained. • Incident reports.	The auditor viewed the complaints and incidents register on the website and the internal complaints database and was found to be compliant with the requirements of this condition.
M6.3	The record of a complaint must be kept for at least 4 years after the complaint was made.	Compliant	Complaint and incident register for 2022, 2023, 2024 and 2025 (to date).	Complaints and incidents register dating back to 2016 are available to view on the website.
M6.4	The record must be produced to any authorised officer of the EPA who asks to see them.	Not triggered	Site interviews conducted 16 April 2025.	No request of this nature has been made over the reporting period. This condition remains not triggered.
M7	**Telephone complaints line**			
M7.1	The licensee must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.	Compliant	• Community information line web page. • Complaint and incident register for 2022, 2023, 2024 and 2025 (to date).	The community information line functions as the complaints line. The number is 1800 115 277 and is provided on the website, found here: https://www.deltacoal.com.au/media/community-information-line
M7.2	The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.	Compliant	• Sample Community Newsletter. • Community information line web page.	As above, the community information line is advertised on the website in an easy to find location. The Community Newsletter from July 2022 provided the community with an update and this newsletter made reference to the email and phone line available to the public.
M7.3	The preceding two conditions do not apply until 3 months after: the date of the issue of this licence.	Note		Noted
M7.4	The licensee must notify the EPA with contact details of personnel capable of a timely response to emergencies or any other exigent circumstances. (a) the nominated contact must be available at all times. (b) contact details must include a telephone number and must be current. (c) such notification must be made within 14 days of receiving this licence.	Compliant	PIRMP (Rev 7 – dated 18/12/2023).	The PIRMP provides the designated representatives are nominated in Table 3. The details in the plan provides the names, positions and responsibilities of each person; however no contact numbers or emails are provided; however the EPA has been notified of these details through the EPA connect portal and as such, no CA is proposed.
M8	**Requirement to monitor volume or mass**			
M8.1	For each discharge point or utilisation area specified below, the licensee must monitor: a) the volume of liquids discharged to water or applied to the area; b) the mass of solids applied to the area; c) the mass of pollutants emitted to the air; at the frequency and using the method and units of measure, specified below. POINT 1 **Frequency** / **Unit of Measure** / **Sampling Method** Continuous during discharge / kilolitres per day / In line instrumentation POINT 27 **Frequency** / **Unit of Measure** / **Sampling Method** Continuous during discharge / kilolitres per day / In line instrumentation	Non-compliant (Low risk)	Annual Reviews for 2022, 2023, and 2024 Monitoring data for 2022, 2023, 2024 and 2025 (to date)	A review of the Annual Review and monitoring data has found that monitoring of discharge points was generally adequate over the reporting period. As discussed for Condition M2.3, there were two volumetric exceedances recorded during the audit period, attributed to significant rainfall events (in July 2022) for which Delta Coal failed to sample the discharge water due to a failure at the un-attended sampler. Delta Coal took the appropriate actions and therefore no further CA has been deemed relevant. In addition, a review of the data provided indicates that samples are being taken in compliance with this condition; however, only LDP1 is routinely reported in the monthly environmental reports. There were occasions where LDP27 was triggered and not reported on in the monthly report, as such, ***CA01*** is proposed.
6	**Reporting Conditions**			
R1	**Annual return documents**			
R1.1	The licensee must complete and supply to the EPA an Annual Return in the approved form comprising: 1. a Statement of Compliance, 2. a Monitoring and Complaints Summary, 3. a Statement of Compliance - Licence Conditions, 4. a Statement of Compliance - Load based Fee, 5. a Statement of Compliance - Requirement to Prepare Pollution Incident Response Management Plan, 6. a Statement of Compliance - Requirement to Publish Pollution Monitoring Data; and 7. a Statement of Compliance - Environmental Management Systems and Practices. At the end of each reporting period, the EPA will provide to the licensee notification that the Annual Return is due.	Compliant	Annual Return for 2022, 2023 and 2024.	Review of relevant data indicates compliance with the requirements of this condition.

Condition	Details	Compliance status	Relevant evidence	Commentary
R1.2	An Annual Return must be prepared in respect of each reporting period, except as provided below. Note: The term "reporting period" is defined in the dictionary at the end of this licence. Do not complete the Annual Return until after the end of the reporting period.	Compliant	Annual Return for 2022, 2023 and 2024.	Review of relevant data indicates compliance with the requirements of this condition.
R1.3	Where this licence is transferred from the licensee to a new licensee: a) the transferring licensee must prepare an Annual Return for the period commencing on the first day of the reporting period and ending on the date the application for the transfer of the licence to the new licensee is granted; and b) the new licensee must prepare an Annual Return for the period commencing on the date the application for the transfer of the licence is granted and ending on the last day of the reporting period. Note: An application to transfer a licence must be made in the approved form for this purpose.	Not triggered	Annual Return for 2022, 2023 and 2024.	Delta Coal remained the license holder throughout the audit period.
R1.4	Where this licence is surrendered by the licensee or revoked by the EPA or Minister, the licensee must prepare an Annual Return in respect of the period commencing on the first day of the reporting period and ending on: a) in relation to the surrender of a licence - the date when notice in writing of approval of the surrender is given; or b) in relation to the revocation of the licence - the date from which notice revoking the licence operates.	Not triggered	Annual Return for 2022, 2023 and 2024.	Delta Coal have not surrendered the licence within the reporting period, and therefore this condition remains not triggered.
R1.5	The Annual Return for the reporting period must be supplied to the EPA via eConnect EPA or by registered post not later than 60 days after the end of each reporting period or in the case of a transferring licence not later than 60 days after the date the transfer was granted (the 'due date').	Compliant	• Annual Return for 2022, 2023 and 2024. • Site interview completed 16/04/2025. • Electronic submission for 2023 Annual Return.	Review of relevant data indicates compliance with the requirements of this condition.
R1.6	The licensee must retain a copy of the Annual Return supplied to the EPA for a period of at least 4 years after the Annual Return was due to be supplied to the EPA.	Compliant	Annual Return for 2022, 2023 and 2024.	Review of relevant data indicates compliance with the requirements of this condition.
R1.7	Within the Annual Return, the Statements of Compliance must be certified and the Monitoring and Complaints Summary must be signed by: a) the licence holder; or b) by a person approved in writing by the EPA to sign on behalf of the licence holder.	Compliant	Annual Return for 2022, 2023 and 2024.	Review of relevant data indicates compliance with the requirements of this condition.
R2	**Notification of environmental harm**			
	Note: The licensee or its employees must notify all relevant authorities of incidents causing or threatening material harm to the environment immediately after the person becomes aware of the incident in accordance with the requirements of Part 5.7 of the Act.	Note		Noted
R2.1	Notifications must be made by telephoning the Environment Line service on 131 555.	Compliant	• Incident reports. • Annual Reviews for 2022, 2023 and 2024.	Notifications were made to the environment line as required, whilst there were environmental incidents occurring the audit period, none of these incidents required the PIRMP to be enacted.
R2.2	The licensee must provide written details of the notification to the EPA within 7 days of the date on which they became aware of the incident.	Compliant	• Incident reports. • Annual Reviews for 2022, 2023 and 2024.	Notifications were made to the environment line as required, whilst there were environmental incidents occurring the audit period, none of these incidents required the PIRMP to be enacted.
R3	**Written report**			
R3.1	Where an authorised officer of the EPA suspects on reasonable grounds that: a) where this licence applies to premises, an event has occurred at the premises; or b) where this licence applies to vehicles or mobile plant, an event has occurred in connection with the carrying out of the activities authorised by this licence, and the event has caused, is causing or is likely to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies), the authorised officer may request a written report of the event.	Note	Site interviews undertaken 16 April 2025.	A notice (Notice N47513) was given to Delta Coal by the EPA on 28 April 2022 requesting information be provided to the EPA in relation to the on-site effluent irrigation system and sewage treatment system used on the premises as a result of consistent exceedances of the EPLs faecal coliform limits for the period of 18 September 2019 to 30 March 2022.
R3.2	The licensee must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request.	Compliant	Site interviews undertaken 16 April 2025.	The required information was to be provided to the EPA by 5pm 20 May 2022. Delta Coal responded and provided the information within the required timeframe, providing the information in the early hours of the morning on 20 May 2022.
R3.3	The request may require a report which includes any or all of the following information: a) the cause, time and duration of the event; b) the type, volume and concentration of every pollutant discharged as a result of the event; c) the name, address and business hours telephone number of employees or agents of the licensee, or a specified class of them, who witnessed the event; d) the name, address and business hours telephone number of every other person (of whom the licensee is aware) who witnessed the event, unless the licensee has been unable to obtain that information after making reasonable effort; e) action taken by the licensee in relation to the event, including any follow-up contact with any complainants; f) details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and g) any other relevant matters.	Note	Site interviews undertaken 16 April 2025.	noted

Condition	Details	Compliance status	Relevant evidence	Commentary
R3.4	The EPA may make a written request for further details in relation to any of the above matters if it is not satisfied with the report provided by the licensee. The licensee must provide such further details to the EPA within the time specified in the request.	Not triggered	Site interviews undertaken 16 April 2025.	No further information was requested from Delta Coal
R4	**Other reporting conditions**			
	Noise Monitoring Report			
R4.1	The licensee must submit to the EPA a noise compliance assessment report at the end of each reporting period. The report must be submitted with the Environment Protection Licence Annual Return. The report must be prepared by a suitably qualified and experienced acoustical consultant which: (a) details the noise monitoring undertaken in accordance with condition M4; (b) assesses compliance with noise limits presented in condition L5.1 and condition 5.2; and (c) outlines any management actions taken within the monitoring period to address any exceedances of limits contained in condition L5.1 and condition L5.2. Note: The licensee must provide the EPA with one report, but this report may be a combination of the monitoring undertaken by the licensee as part of their quarterly monitoring program as required by the Project Approval SSD-5456 and must include LA1(1min).	Compliant	Annual noise compliance assessment reports for 2022, 2023 and 2024.	Consolidated noise reports were completed for 2022, 2023 and 2024 over the reporting period via the EPA eConnect portal.
7	**General Conditions**			
G1	**Copy of licence kept at the premises or plant**			
G1.1	A copy of this licence must be kept at the premises to which the licence applies	Compliant	Site inspection conducted 16 April 2025.	Conduct of the site inspection verified compliance with the requirements of this condition.
G1.2	The licence must be produced to any authorised officer of the EPA who asks to see it.	Compliant	Site interviews conducted 16 April 2025.	An EPA officer has not asked to see the licence over the reporting period. This condition remains not triggered.
G1.3	The licence must be available for inspection by any employee or agent of the licensee working at the premises.	Compliant	Site inspection conducted 16 April 2025.	Conduct of the site inspection verified compliance with the requirements of this condition.
G2	**Contact number for incidents and responsible employees**			
G2.1	The licensee must operate 24-hour telephone contact lines for the purpose of enabling the EPA to directly contact one or more representatives of the licensee who can: a) respond at all times to incidents relating to the premises; and b) contact the licensee's senior employees or agents authorised at all times to: i) speak on behalf of the licensee; and ii) provide any information or document required under this licence.	Compliant	Site interviews conducted 16 April 2025.	Changes of personnel at CVC have been updated via the EPA eConnect portal.
G2.2	The licensee is to inform the EPA in writing of the appointment of any subsequent contact persons, or changes to the person's contact details as soon as practicable and in any event within fourteen days of the appointment or change.	Compliant	Site interviews conducted 16 April 2025.	Changes of personnel at CVC have been updated via the EPA eConnect portal.
G3	**Other general conditions**			
G3.1	Completed Programs 	Compliant	PRP completion report.	Programs 8 and 9 were completed during the audit period.

Program	Description	Completed Date
Coal Mine Particulate Matter Control Best Practice	Requires licensee to conduct a site specific Best Management Practice (BMP) determination to identify ways to reduce particle emissions.	28-September-2012
Assessment of Potential Impacts of Metals in wastewater	The licensee must conduct an assessment of metals detected in wastewater discharges from the mine in accordance with the ANZECC water quality guidelines. To obtain a greater understanding of the type and concentration of metals discharged in mine water and entering the receiving waters. To limit the concentration of metals discharged in mine water within ANZECC guidelines.	23-October-2013
Air Quality Monitoring	The licensee must evaluate best locations and install monitoring devices as defined in Project Approval MP10_0161 under the Environent Planning & Assessment Act 1979.	31-December-2013
PRP4 - Upgrade to Clean and Dirty Water Management System	The licensee must review and upgrade separation of the Clean and Dirty Water Management System and review and upgrade bunding.	14-August-2015
PRP5 - Remediation of Dam Wall and Spillway formalisation	The licensee must design and remediate the dam wall on the final control pond and formalise a spillway to prevent dam seepage and to ensure that volumetric discharge can be monitored	27-February-2015
PRP 6 Upgrade to Sewage Treatment Systems	Assessment of options for improved disinfection of effluent from STP on licenced premises.	08-January-2015
PRP7 Sewage Treatment System Concept Design	Provide the EPA with a Concept Design and Timetable for Implementation of Upgrade to the Sewage Treatment System	19-February-2016
PRP 8 - Connection of Bathouse Wastewater to Sewer	Connection of Bathhouse to Central Coast Council Sewer.	14-July-2023
PRP 9 - Office Area Wastewater Sytem Upgrades to Best Practice	Office area wastewater treatment system upgrade to best practice.	27-July-2023

Appendix F

Standard conditions (Schedule 8A, Part 2) Mining Regulation 2016 (NSW)

Condition	Details	Compliance status	Relevant evidence	Commentary
Division 1 Protection of the environment and rehabilitation				
4 Must prevent or minimise harm to environment				
4(1)	The holder of a mining lease must take all reasonable measures to prevent, or if that is not reasonably practicable, to minimise, harm to the environment caused by activities under the mining lease.	Compliant	• This audit. • Annual Reviews for 2022, 2023, and 2024. • Environmental Monitoring reports for the audit period. • Site inspection completed 16 April 2025. • Site interviews completed 16 April 2025.	Conduct of the audit has determined compliance with the requirements of this condition.
4(2)	In this clause—harm to the environment has the same meaning as in the Protection of the Environment Operations Act 1997.	Note		Noted
5 Rehabilitation to occur as soon as reasonably practicable after disturbance				
	The holder of a mining lease must rehabilitate land and water in the mining area that is disturbed by activities under the mining lease as soon as reasonably practicable after the disturbance occurs.	Compliant	• Annual Reviews for 2022, 2023, and 2024. • Rehabilitation Management Plan (RMP) (Revision 2, 15/01/2024). • Chain Valley Colliery (CVC) Annual Rehabilitation Report and Forward Program 2023 7 July 2022 to 6 July 2023 (12/09/2023). • CVC Annual Rehabilitation Report Friday 7 July 2023 to Saturday 6 July 2024 (5/09/2024). • CVC Annual Biodiversity Monitoring Report 2022 (EMM, February 2023). • CVC Annual Biodiversity Monitoring Report 2023 (Atlantech, 30/10/2023). • CVC Annual Biodiversity Monitoring Report 2024 (Atlantech, 6/11/2024). • Site inspection completed 16 April 2025. • Site interviews completed 16 April 2025.	Review of the relevant documentation and the site inspection revealed that Delta Coal is complaint with this condition. The ongoing rehabilitation of the old mining cottage area was sighted during the site inspection and evidence of active weed management was also sighted.
6 Rehabilitation must achieve final land use				
6(1)	The holder of a mining lease must ensure that rehabilitation of the mining area achieves the final land use for the mining area.	Compliant	• Annual Reviews for 2022, 2023, and 2024. • RMP (Revision 2, 15/01/2024). • CVC Annual Rehabilitation Report and Forward Program 2023 7 July 2022 to 6 July 2023 (12/09/2023). • CVC Annual Rehabilitation Report Friday 7 July 2023 to Saturday 6 July 2024 (5/09/2024). • CVC Annual Biodiversity Monitoring Report 2022 (EMM, February 2023). • CVC Annual Biodiversity Monitoring Report 2023 (Atlantech, 30/10/2023). • CVC Annual Biodiversity Monitoring Report 2024 (Atlantech, 6/11/2024).	The site still has approximately 14.70 ha (the total mine footprint) still under active disturbance with 0.69 ha of land under ongoing management in the ecosystem and land use sustainability phase of rehabilitation (former mine cottages area).
6(2)	The holder of the mining lease must ensure any planning approval has been obtained that is necessary to enable the holder to comply with subclause (1).	Not triggered	N/A.	Review of relevant documentation indicates planning approval has not been required to comply with subclause (1).
6(3)	The holder of the mining lease must identify and record any reasonably foreseeable hazard that presents a risk to the holder's ability to comply with subclause (1).	Compliant	RMP (Revision 2, 15/01/2024).	Review of relevant documentation verifies compliance with these requirements.
	Note Clause 7 requires a rehabilitation risk assessment to be conducted whenever a hazard is identified under this subclause.	Note		Noted
6(4)	In this clause— final land use for the mining area means the final landform and land uses to be achieved for the mining area— a. as set out in the rehabilitation objectives statement and rehabilitation completion criteria statement, and b. for a large mine—as spatially depicted in the final landform and rehabilitation plan, and c. if the final land use for the mining area is required by a condition of development consent for activities under the mining lease—as stated in the condition. planning approval means— a. a development consent within the meaning of the Environmental Planning and Assessment Act 1979, or b. an approval under that Act, Division 5.1.	Note		Noted

Condition	Details	Compliance status	Relevant evidence	Commentary
Division 2 Risk assessment				
7 Rehabilitation risk assessment				
7(1)	The holder of a mining lease must conduct a risk assessment (a rehabilitation risk assessment) that— a. identifies, assesses and evaluates the risks that need to be addressed to achieve the following in relation to the mining lease— i. the rehabilitation objectives, ii. the rehabilitation completion criteria, iii. for large mines—the final land use as spatially depicted in the final landform and rehabilitation plan, and b. identifies the measures that need to be implemented to eliminate, minimise or mitigate the risks.	Compliant	RMP (Rev 2, 15/01/2024) – Appendix 2.	Review of relevant documentation verifies compliance with this requirement via Appendix 2 of the RMP.
7(2)	The holder of the mining lease must implement the measures identified.	Compliant	• Annual Reviews for 2022, 2023, and 2024. • RMP (Revision 2, 15/01/2024). • CVC Annual Rehabilitation Report and Forward Program 2023 7 July 2022 to 6 July 2023 (12/09/2023). • CVC Annual Rehabilitation Report Friday 7 July 2023 to Saturday 6 July 2024 (5/09/2024). • CVC Annual Biodiversity Monitoring Report 2022 (EMM, February 2023). • CVC Annual Biodiversity Monitoring Report 2023 (Atlantech, 30/10/2023). • CVC Annual Biodiversity Monitoring Report 2024 (Atlantech, 6/11/2024). • Site inspection completed 16 April 2025. • Site interviews completed 16 April 2025.	Review of documentation indicates compliance with these requirements.
7(3)	The holder of a mining lease must conduct a rehabilitation risk assessment— a. for a large mine—before preparing a rehabilitation management plan, and b. for a small mine—before preparing the rehabilitation outcome documents for the mine, and c. whenever a hazard is identified under clause 6(3)—as soon as reasonably practicable after it is identified, and d. whenever given a written direction to do so by the Secretary.	Compliant	RMP (Rev 2, 15/01/2024) – Appendix 2.	Review of relevant documentation verifies compliance with this requirement via Appendix 2 of the RMP.
Division 3 Rehabilitation documents				
8 Application of Division				
	This Division does not apply to a mining lease unless— a. the security deposit required under the mining lease is greater than the minimum deposit prescribed under the Act, section 261BF in relation to that type of mining lease, or b. the Secretary gives a written direction to the holder of the mining lease that this Division, or a provision of this Division, applies to the mining lease.	Note		Noted
9 General requirements for documents				
	A document required to be prepared under this Division must— a. be in a form approved by the Secretary, and Note— The approved forms are available on the Department's website. a. include any matter required to be included by the form, and b. if required to be given to the Secretary—be given in a way approved by the Secretary.	Compliant	• RMP (Revision 2, 15/01/2024), including Approved Rehabilitation Objectives Statement (dated Monday, 20/11/2023). • CVC Annual Rehabilitation Report and Forward Program 2023 7 July 2022 to 6 July 2023 (12/09/2023). • CVC Annual Rehabilitation Report Friday 7 July 2023 to Saturday 6 July 2024 (5/09/2024).	Review of relevant documentation verifies compliance with this requirement.

Condition	Details	Compliance status	Relevant evidence	Commentary
10 Rehabilitation management plans for large mines				
10(1)	The holder of a mining lease relating to a large mine must prepare a plan (a rehabilitation management plan) for the mining lease that includes the following— a. a description of how the holder proposes to manage all aspects of the rehabilitation of the mining area, b. a description of the steps and actions the holder proposes to take to comply with the conditions of the mining lease that relate to rehabilitation, c. a summary of rehabilitation risk assessments conducted by the holder, d. the risk control measures identified in the rehabilitation risk assessments, e. the rehabilitation outcome documents for the mining lease, f. a statement of the performance outcomes for the matters addressed by the rehabilitation outcome documents and the ways in which those outcomes are to be measured and monitored.	Compliant	RMP (Revision 2, 15/01/2024).	Review of the RMP indicates this requirement is addressed.
10(2)	If a rehabilitation outcome document has not been approved by the Secretary, the holder of the mining lease must include a proposed version of the document.	Compliant	RMP (Revision 2, 15/01/2024).	Review of the RMP indicates this requirement is addressed.
10(3)	A rehabilitation management plan is not required to be given to the Secretary for approval.	Note		Noted
10(4)	The holder of the mining lease— a. must implement the matters set out in the rehabilitation management plan, and b. if the forward program specifies timeframes for the implementation of the matters—must implement the matters within those timeframes.	Compliant	• Annual Reviews for 2022, 2023, and 2024. • RMP (Revision 2, 15/01/2024). • CVC Annual Rehabilitation Report and Forward Program 2023 7 July 2022 to 6 July 2023 (12/09/2023). • CVC Annual Rehabilitation Report Friday 7 July 2023 to Saturday 6 July 2024 (5/09/2024). • CVC Annual Biodiversity Monitoring Report 2022 (EMM, February 2023). • CVC Annual Biodiversity Monitoring Report 2023 (Atlantech, 30/10/2023). • CVC Annual Biodiversity Monitoring Report 2024 (Atlantech, 6/11/2024). • Site inspection completed 16 April 2025. • Site interviews completed 16 April 2025.	Review of documentation indicates compliance with these requirements.
11 Amendment of rehabilitation management plans				
	The holder of a mining lease must amend the rehabilitation management plan for the mining lease as follows— a. to substitute the proposed version of a rehabilitation outcome document with the version approved by the Secretary—within 30 days after the document is approved, b. as a consequence of an amendment made under clause 14 to a rehabilitation outcome document—within 30 days after the amendment is made, c. to reflect any changes to the risk control measures in the prepared plan that are identified in a rehabilitation risk assessment—as soon as practicable after the rehabilitation risk assessment is conducted, d. whenever given a written direction to do so by the Secretary—in accordance with the direction.	Non-compliant (Administrative)	RMP (Revision 2, 15/01/2024), including Approved Rehabilitation Objectives Statement (dated Monday, 20/11/2023).	Review of the RMP indicates this requirement is generally addressed; however, the Approved Rehabilitation Objectives Statement is dated 20/11/2023, with the RMP not revised until 15/01/2024, which is more than 30 days after approval of the Rehabilitation Objectives Statement. Therefore, this has resulted in a non-compliance (administrative) with Condition 11. As this non-compliance has been closed out, no corrective action or opportunity for improvement has been deemed relevant.
12 Rehabilitation outcome documents				
12(1)	The holder of a mining lease must prepare the following documents (the rehabilitation outcome documents) for the mining lease and give them to the Secretary for approval— a. the rehabilitation objectives statement, which sets out the rehabilitation objectives required to achieve the final land use for the mining area, b. the rehabilitation completion criteria statement, which sets out criteria, the completion of which will demonstrate the achievement of the rehabilitation objectives, c. for a large mine, the final landform and rehabilitation plan, showing a spatial depiction of the final land use.	Compliant	RMP (Revision 2, 15/01/2024), including Approved Rehabilitation Objectives Statement (dated Monday, 20/11/2023).	Review of documentation indicates compliance with these requirements.

Condition	Details	Compliance status	Relevant evidence	Commentary
12(2)	If the final land use for the mining area is required by a condition of development consent for activities under the mining lease, the holder of the mining lease must ensure the rehabilitation outcome documents are consistent with that condition.	Compliant	RMP (Revision 2, 15/01/2024), including Approved Rehabilitation Objectives Statement (dated Monday, 20/11/2023).	Review of documentation indicates compliance with these requirements.
13 Forward program and annual rehabilitation report				
13(1)	The holder of a mining lease must prepare a program (a forward program) for the mining lease that includes the following— a. a schedule of mining activities for the mining area for the next 3 years, b. a summary of the spatial progression of rehabilitation through its various phases for the next 3 years, c. a requirement that the rehabilitation of land and water disturbed by mining activities under the mining lease must occur as soon as reasonably practicable after the disturbance occurs.	Compliant	CVC Annual Rehabilitation Report and Forward Program 2023 7 July 2022 to 6 July 2023 (12/09/2023).	Review of documentation indicates compliance with these requirements.
13(2)	The holder of a mining lease must prepare a report (an annual rehabilitation report) for the mining lease that includes— a. a description of the rehabilitation undertaken over the annual Reporting Period, b. a report demonstrating the progress made through the phases of rehabilitation provided for in the forward program applying to the Reporting Period, c. a report demonstrating progress made towards the achievement of the following— i. the objectives set out in the rehabilitation objectives statement, ii. the criteria set out in the rehabilitation completion criteria statement, iii. for large mines—the final land use as spatially depicted in the final landform and rehabilitation plan.	Compliant	• CVC Annual Rehabilitation Report and Forward Program 2023 7 July 2022 to 6 July 2023 (12/09/2023). • CVC Annual Rehabilitation Report Friday 7 July 2023 to Saturday 6 July 2024 (5/09/2024).	Review of documentation indicates compliance with these requirements.
13(3)	If a rehabilitation outcome document has not been approved by the Secretary, the holder of the mining lease must rely on a proposed version of the document.	Note		Noted
13(4)	The holder of the mining lease must give the forward program and annual rehabilitation report to the Secretary.	Compliant	Email correspondence dated 7 September 2023 Submission email dated 12 September 2023 Email correspondence dated 4 November 2024	A review of the submission emails and associated email correspondence confirms that the Annual Rehabilitation Report and Forward Program for the 2023-2024 reporting period and 2024-2025 reporting period were provided to the RR on 7 September 2023 and 6 September 2024
13(5)	In this clause— annual Reporting Period means each period of 12 months commencing on— a. the date on which the mining lease is granted, or b. if the Secretary approves another date in relation to the mining lease—the other date.	Note		Noted
14 Amendment of rehabilitation outcome documents and forward program				
14(1)	This clause applies to— a. a rehabilitation outcome document if it has been approved by the Secretary, and b. a forward program if it has been given to the Secretary.	Note		Noted
14(2)	The holder of a mining lease must not amend a document to which this clause applies that relates to the mining lease unless— a. the Secretary gives the holder a written direction to do so, or b. the Secretary, on written application by the holder, gives a written approval of the amendment.	Note		Noted
14(3)	The holder of the mining lease must amend the document in accordance with the Secretary's direction or approval.	Note		Noted
14(4)	Nothing in this clause prevents the holder of a mining lease preparing a draft amendment for submission to the Secretary for approval.	Note		Noted

Condition	Details	Compliance status	Relevant evidence	Commentary
15 Times at which documents must be prepared and given				
15(1)	The holder of a mining lease must do the following before the end of the initial period— a. prepare a rehabilitation management plan, and b. prepare rehabilitation outcome documents and give them, other than the rehabilitation completion criteria statement, to the Secretary for approval, and c. prepare a forward program and give it to the Secretary.	Non-compliant (Administrative)	• RMP (Revision 2, 15/01/2024), including Approved Rehabilitation Objectives Statement (dated Monday, 20/11/2023). • CVC Annual Rehabilitation Report and Forward Program 2023 7 July 2022 to 6 July 2023 (12/09/2023). • Email correspondence	Review of the RMP indicates the requirements of Condition 15(1)(a) were addressed, with Revision 1 prepared 31/07/2022. The first rehabilitation objectives statement (ROBJ0001175) was submitted for approval on the 9 December 2022, and is therefore compliant with clause (b), as this was required to be submitted by 2 July 2023. The submission of the forward program was dated 7/09/2023 and therefore in contravention with clause (c) as this was required to be submitted by 2 July 2023. Despite the above non-compliance being identified, no CA or OFI has been identified on the basis that the initial period will no longer be relevant in the next IEA.
15(2)	The holder of the mining lease must prepare a forward program and annual rehabilitation report and give them to the Secretary before— a. 60 days after the last day of each annual Reporting Period, commencing with the annual Reporting Period in which the forward program was given to Secretary under subclause (1)(c), or b. a later date approved by the Secretary.	Non-compliant (Administrative)	• CVC Annual Rehabilitation Report and Forward Program 2023 7 July 2022 to 6 July 2023 (12/09/2023). • CVC Annual Rehabilitation Report Friday 7 July 2023 to Saturday 6 July 2024 (5/09/2024).	Review of relevant documentation indicates general compliance with the requirements of this condition; however, the Annual Rehabilitation Report and Forward Program for 7 July 2022 to 6 July 2023 was not submitted until 12/09/2023, which is more than 60 days after the last day of the annual reporting period. Therefore, this has resulted in a non-compliance (administrative) with Condition 15(2). As this non-compliance has not re-occurred in relation to submission of the Annual Rehabilitation Report for 2023/2024, no corrective action or opportunity for improvement has been deemed relevant.
15(3)	A rehabilitation completion criteria statement relating to completion of rehabilitation during a period covered by a forward program must be given to the Secretary for approval when the forward program is required to be given to the Secretary.	Compliant	RMP (Revision 2, 15/01/2024), including Approved Rehabilitation Objectives Statement (dated Monday, 20/11/2023).	Review of documentation indicates compliance with these requirements.
15(4)	The holder of the mining lease must prepare updated rehabilitation outcome documents for the mining lease and give them to the Secretary for approval before— a. 60 days after a development consent is modified following an application referred to in clause 20(1)(b), or b. a later date approved by the Secretary.	Not triggered	N/A.	Conduct of the audit has determined this condition has not been triggered during the audit period.
15(5)	A rehabilitation completion criteria statement is not required to be given to the Secretary under subclause (4) unless a rehabilitation completion criteria statement has already been given to the Secretary under subclause (3).	Not triggered	N/A.	Conduct of the audit has determined this condition has not been triggered during the audit period.
15(6)	The Secretary may, by written notice, direct the holder of a mining lease to prepare, or give to the Secretary, a document required to be prepared under this Division at a time other than that specified in this clause.	Not triggered	N/A.	Conduct of the audit has determined this condition has not been triggered during the audit period.
15(7)	The holder of the mining lease must comply with the direction.	Not triggered		Conduct of the audit has determined this condition has not been triggered during the audit period.
15(8)	In this clause— initial period means the period commencing when the mining lease is granted and ending— a. 30 days, or other period approved by the Secretary, after this Division first applies to the mining lease, or b. if this Division applies to the mining lease because of an increase in the required security deposit— i. when the surface of the mining area is disturbed by activities under the mining lease, or ii. at a later date approved by the Secretary.	Note		Noted
16 Certain documents to be publicly available				
16(1)	This clause applies to the following documents— a. a rehabilitation management plan, b. a forward program, c. an annual rehabilitation report.	Compliant	CVC website.	Conduct of the audit has determined compliance with the requirements of this requirement.

Condition	Details	Compliance status	Relevant evidence	Commentary
16(2)	The holder of a mining lease must make a document to which this clause applies publicly available by— a. publishing it on its website in a prominent position, or b. if the holder does not have a website— providing a copy of it to a person— i. on the written request of a person, and ii. without charge, and iii. within 14 days after the request is received.	Compliant	CVC website.	Conduct of the audit has determined compliance with the requirements of this requirement.
16(3)	If a document is published on the website of the holder of the mining lease, the holder must ensure that it is published— a. for a rehabilitation management plan—within 14 days after it is prepared or amended, or b. for a forward program or an annual rehabilitation report—within 14 days after it is given to the Secretary or amended.	Compliant	Email correspondence dated 30/11/2022 and 13/12/2022 Site interviews on 16 April 2025 Delta Coal website	A review of correspondence between Delta Coal representatives and the NSW RR confirmed that the RMP was uploaded onto the Delta Coal website on the 1 November 2022 with the plan dated 20 October 2022, and as such within the 14 day timeframe. The RMP has since been updated and uploaded on the website for the subsequent revision. The current Annual Rehabilitation Report and Forward Program are also found to be on the Delta Coal website.
16(4)	Personal information within the meaning of the Privacy and Personal Information Protection Act 1998 is not required to be included in a document made available to a person under this clause.	Note		Noted
Division 4 Records, reporting and notification				
17 Records demonstrating compliance				
	The holder of a mining lease must create and maintain records of all actions taken that demonstrate compliance with each of the conditions set out in this Part. Note— The Act, sections 163D and 163E provide for the form in which records must be kept and the period for which they must be retained.	Compliant	RMP (Rev 2, 15/01/2024) Email correspondence M-files system Site interviews on 16 April 2025 Site inspection on 16 April 2025	All required evidence was provided by Delta Coal personnel. Auditor viewed appropriate filling system while at mine site.
18 Report on non-compliance				
18(1)	The holder of a mining lease must provide the Minister with a written report detailing any non-compliance with— a. a condition of the mining lease, or Note—The Act, section 364A contains provisions relating to the use and disclosure of information provided under this condition. a. a requirement of the Act or this Regulation relating to activities under the mining lease.	Not triggered	N/A.	Conduct of the audit has determined this condition has not been triggered during the audit period.
18(2)	The holder of the mining lease must provide the report within 7 days after becoming aware of the non-compliance.	Not triggered	N/A.	Conduct of the audit has determined this condition has not been triggered during the audit period.
18(3)	The holder of the mining lease must ensure the report— a. identifies the condition of the mining lease, or the requirement of the Act or this Regulation, to which the non-compliance relates, and b. describes the non-compliance and specifies the date or dates on which, or the period during which, the non-compliance occurred, and c. describes the causes or likely causes of the non-compliance, and d. describes the action that has been taken, or will be taken, to mitigate the effects, and to prevent any recurrence, of the non-compliance.	Not triggered	N/A.	Conduct of the audit has determined this condition has not been triggered during the audit period.
19 Nominated contact person				
19(1)	The holder of a mining lease must nominate a natural person to be the contact person with whom the Secretary can communicate in relation to the mining lease for the purposes of the Act. Note— The Act, section 383 sets out the ways in which notices or other documents may be issued or given to, or served on, a person for the purposes of the Act.	Compliant	RMP (Rev 2, 15/01/2024)	Conduct of the audit has determined compliance with the requirements of this requirement.
19(2)	The holder of the mining lease must give written notice to the Secretary of— a. the full name and contact details of the nominated person—within 28 days after the date on which the standard conditions apply to the mining lease under clause 31A of this Regulation, and b. any change in nomination or in the nominated person's contact details—within 28 days after the change occurs.	Non-complaint (Administrative)	Email correspondence dated 19/04/2023, 11/08/2022 and 13/12/2022 with the NSW RR Letter dated 10 August 2022 NSW RR submission messaged dated 10/08/2022 and 19/04/2023	A review of the email correspondence between NSW RR and Delta Coal, the submission messages and CEO letter confirming the contact person (provided to NSW RR) confirms that written notice was provided, however the dating of this provision exceeds the timeframes provided, with the notice required to be provided within 28 days of 2 July 2022, as such, an administrative non-compliance has resulted, with no CA or OFI identified as the nominated contact person has since been provided to the NSW RR.

Condition	Details	Compliance status	Relevant evidence	Commentary
19(3)	The holder of the mining lease must ensure that the contact details for the nominated person include the person's phone number and postal and email addresses.	Compliant	RMP (Rev 2, 15/01/2024)	Conduct of the audit has determined compliance with the requirements of this requirement.
Division 5 Applications relating to development consent				
20 Additional requirements—application for or to modify development consent				
20(1)	The holder of a mining lease must give written notice to the Secretary within 10 days after— a. making an application for development consent that relates to the mining area, or b. making an application for modification of a development consent— i. under the Environmental Planning and Assessment Act 1979, section 4.55(2), and ii. that proposes to modify a condition of the consent that relates to rehabilitation of the mining area in a way that may affect an obligation under the mining lease relating to rehabilitation of the mining area.	Not triggered	N/A.	Per Clause 20(2) this clause does not apply to SSD.
20(2)	This clause does not apply if the development is State significant development.	Note	N/A.	N/A.

Appendix G

Site inspection photos



Plate 1 Fire-fighting equipment near workshop area



Plate 2 Dangerous goods storage



Plate 3 Waste oils storage area



Plate 4 Flammable and combustible liquids self-bunded storage



Plate 5 Oil water separator capturing runoff from the oil storage facilities, diesel tank storage, workshop / maintenance areas and wash bay



Plate 6 Wash bay adjacent to oil water separator



Plate 7 Rehabilitation of Former Mining Cottages, and AHIMS site 45-7-0423



Plate 8 DDG001



Plate 9 Above ground, self-bunded diesel storage tank



Plate 10 Waste receptables in workshop area



Plate 11 Emergency spill kits in the workshop area



Plate 12 Fire-fighting equipment in the hardstand and equipment storage area



Plate 13 Waste sorting area in the hardstand and equipment storage area



Plate 14 Waste sorting area in the hardstand and equipment storage area



Plate 15 Groundwater discharge location at D8, part of the pollution control dam catchment



Plate 16 Dam D10 spillway to LDP1 of EPLC 1770



Plate 17 D10 north of LDP1 of EPL 1770

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Appendix 11: Independent Environmental Audit Action Plan

Last Update: 3 July 2025

Chain Valley Colliery Independent Environmental Audit 2025 Action Plan					
Action/Rec #	**Requirement**	**Proposed Completion Date**	**Persons Responsible**	**Percentage Complete**	**Comments**
Corrective Action CA01	Report on LDP1 and LDP27 monitoring and sample results in the monthly environmental reports and Annual Reviews. If no discharge or sampling occurs, a note on this would be appropriate for consistency and improved environmental monitoring.	31-Mar-26	Environmental & Approvals Coordinator	80%	Update implemented in the June 2025 website environmental monitoring data reports and will remain hereafter. Will be implemented in March 2026 Annual Reviews.
Opportunity for Improvement OFI01	Update the Rehabilitation Management Plan (RMP) to include copies of emails / letters to / from BCD, DPIE Water (now DCCEEW Water Group), Central Coast Council, LMCC and the CCC.	30-Jan-26	Environmental & Approvals Coordinator	0%	Majority of RMP consultation was undertaken during the Mining Operations Plan (MOP) development in 2020. Delta Coal will undertake consultation with stakeholders on a revised versions of the RMP. Extended timeline considered due to uncertainty in timeframe for stakeholder response.
Opportunity for Improvement OFI02	On approval of the Noise Mitigation Options Assessment by the DPHI, ensure the NMP is revised to reflect any relevant changes and approved by the DPHI.	31-Dec-25	Environmental & Approvals Coordinator	0%	Noise Mitigation Options Assessment (NMOA) submitted to DPHI 11 November 2024. NMP will be revised with any outcomes resulting from the NMOA.
Opportunity for Improvement OFI03	Should any exceedance of discharge water quality criteria occur, ensure notifications include consideration to Section 120 of the Protection of the Environment Operations Act 1997 (NSW), including Schedule 5 of the Protection of the Environment Operations (General) Regulation 2022 (NSW).	31-Oct-25	Environmental & Approvals Coordinator	0%	Future water quality and water discharge related incidents / non-compliances will consider S.120 of the POEO Act and Schedule 5 of the POEO Regulation hereafter. To ensure this is captured and documented Delta Coal will revise the Chain Valley Colliery Water Management Plan Section 6.3 (Incident or Non-compliance Response and Reporting) to include consideration of Section 120 of the POEO Act and Schedule 5 of the POEO (General) Regulation during water related incident notification. WMP update proposed to be submitted to DPHI by 31 October 2025.
Opportunity for Improvement OFI04	Update the Water Management Plan (WMP) and future monthly environmental monitoring reports to remove redundant Faecal Coliform criteria.	31-Oct-25	Environmental & Approvals Coordinator	0%	Delta Coal will update the WMP to remove Faecal Coliform criteria. Updates to monthly environmental monitoring reports have been completed.
Opportunity for Improvement OFI05	Update the Heritage Management Plan (HMP) to include discussion related to all three identified AHIMS items, including the two sites identified during removal of cottage sites in Section 5.1.1.	31-Oct-25	Environmental & Approvals Coordinator	0%	Delta Coal will update the HMP to include discussion on all identified AHIMS sites within the sites mining leases (surface only). Discussion on AHIMS sites within the broader 'underground' lease areas is not considered applicable, as the current mining conditions under SSD-5465 does not permit greater than negligible subsidence (<20mm) under terrestrial lands.
Opportunity for Improvement OFI06	To remove discrepancy and ensure consistency across plans, every management plan should be updated to have a consistent cover page identifying: - The date the plan was submitted/prepared - Approval date - Last review date - Next review date	31-Oct-25	Environmental & Approvals Coordinator	0%	Delta Coal will implement a uniform cover page of all environmental management plans, the assumption is made that should only the title page be amended, the amendments will not require Secretary approval.
Opportunity for Improvement OFI07	Assign an internal periodic (e.g. six-monthly) action to check the project website top ensure the most up-to-date management plans have been uploaded onto the website	Complete	Environmental & Approvals Coordinator	100%	Work order created for 6 monthly review of environmental management plan currency on Delta Coals website.
Opportunity for Improvement OFI08	A request should be made to add a note to Condition L5.7 in reference to the residential restriction for LA1 (1 minute), and align with Schedule 6, Condition 12 of SSD-5465 which allows monitoring at representative locations	31-Dec-25	Environmental & Approvals Coordinator	0%	Delta Coal will request the variation to EPL 1770 to align condition L5.7 with Development Consent SSD-5465.

Appendix 12: 2025 Chain Valley Colliery - Coal Haulage Records

Chain Valley Colliery
2025 Coal haulage (Via Roadways)

Last Update: 2/1/2026

Week Ending	Coal Transport via Public Roads (t)	Coal Transport via Private Roads (t)
05/01/2025	0	0
12/01/2025	0	0
19/01/2025	0	0
26/01/2025	0	0
02/02/2025	0	0
09/02/2025	0	0
16/02/2025	0	0
23/02/2025	0	0
02/03/2025	0	0
09/03/2025	0	0
16/03/2025	0	0
23/03/2025	0	0
30/03/2025	0	0
06/04/2025	0	0
13/04/2025	0	0
20/04/2025	0	0
27/04/2025	0	0
04/05/2025	0	0
11/05/2025	0	0
18/05/2025	0	0
25/05/2025	0	0
01/06/2025	0	0
08/06/2025	0	0
15/06/2025	0	0
22/06/2025	0	0
29/06/2025	0	0
06/07/2025	0	0
13/07/2025	0	0
20/07/2025	0	0
27/07/2025	0	0
03/08/2025	0	0
10/08/2025	0	0
17/08/2025	0	0
24/08/2025	0	0
31/08/2025	0	0
07/09/2025	0	0
14/09/2025	0	0
21/09/2025	0	0
28/09/2025	0	0
05/10/2025	0	0
12/10/2025	0	0
19/10/2025	0	0
26/10/2025	0	0
02/11/2025	0	0
09/11/2025	0	0
16/11/2025	0	0
23/11/2025	0	0
30/11/2025	0	0
07/12/2025	0	0
14/12/2025	0	0
21/12/2025	0	0
28/12/2025	0	0

Appendix 13: DPIE Letter – 2025 Annual Review Approval

To be Provided

NSW Planning ref: SSD-5465-PA-156

Lachlan McWha
Environment and Approvals Coordinator
GREAT SOUTHERN ENERGY PTY LTD

24/06/2025

Sent via the Major Projects Portal only

Subject: Chain Valley Extension - Annual Review 2024

Dear Mr McWha

I refer to the Annual Review for the period 1 January 2024 – 31 December 2024, submitted as required by Schedule 6, Condition 8 of SSD-5465 as modified (the consent) to the NSW Department of Planning, Housing and Infrastructure (NSW Planning) on 31 March 2025.

NSW Planning has reviewed the Annual Review and considers it to generally satisfy the reporting requirements of the consent and the NSW Planning Annual Review Guideline (October 2015). It is also noted that your Annual Review is displayed on your website.

For future Annual Reviews, under the provisions of Schedule 2, Condition 2 of the consent, please include the following information:

1. In Table 11, you are required to include the date each non-compliance is reported to NSW Planning and applicable Post Approval number.

Please note that the NSW Planning's acceptance of this Annual Review is not an endorsement of the compliance status of the project. Non-compliances identified in the Annual Review have previously been assessed by NSW Planning and no further enforcement action proposed at this time. Please note however, that this does not preclude NSW Planning from taking alternate enforcement action in the future if it is deemed an alternative response is most appropriate.

Should you wish to discuss the matter further, please contact Laura Gothard, Senior Compliance Officer on 0484 269 988 or email compliance@planning.nsw.gov.au

Yours sincerely



Heidi Watters
Team Leader
Compliance

As nominee of the Planning Secretary

Appendix 14: Rehabilitation Monitoring Report

CHAIN VALLEY COLLIERY: REHABILITATION WALKOVER INSPECTION 2025

August 20, 2025



Prepared by:



Joshua Pawson
Graduate Environmental Consultant

Reviewed by:



Kieran Stephenson-Banks
Senior Environmental Consultant

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Document Control

DOCUMENT DETAILS	
Document	Chain Valley Colliery Rehabilitation Walkover 2025
Client	Delta Coal
Client Contact	Nick Van Bezouwen – Environment & Community Officer
Project	2025 Rehabilitation Monitoring
Project ID	AJP1010101131710005
Author	Atlantech Pty Ltd

DOCUMENT HISTORY			
Version	**Description**	**Author**	**Date**
1	Final issued to client	Joshua Pawson	20/08/2025

Executive Summary

Atlantech was requested by Delta Coal to undertake a walkover inspection of rehabilitation at the Chain Valley Colliery (CVC). Atlantech inspected the former mine cottages rehabilitation site, as well as relevant analogue site at CVC on 11 August 2025.

The purpose of the inspection was to complete a walkover assessment of revegetation success in comparison to analogue sites outside the domain. The inspection also assessed weed species, feral animals and other general field observations such as significant rehabilitation issues. Photographs were taken to enable visual analysis of change in vegetation structure, condition, and regeneration over time.

Following the inspection, Atlantech recommends the following for the former mine cottages rehabilitation site:

- Rehabilitate disused portions of the sealed access vehicle track to improve ground cover, this includes the removal of asphalt and roadbase materials.
- Undertake ongoing targeted weed control to prevent further spread and potential suppression of native species.
- Remove exotic ornamental species that do not align with the final land use domain.
- Continue rehabilitation monitoring in line with the Rehabilitation Management Plan (2024).

Atlantech recommends the following for the analogue site:

- Review adequacy of analogue site location and review potential alternatives.

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1. Introduction

Chain Valley Colliery (CVC) is an underground coal mine operated by Great Southern Energy Pty Ltd (trading as Delta Coal) and is situated in the Newcastle coalfields of New South Wales. The mine operates in accordance with Development Consent SSD-5465.

In 2020, Delta Coal demolished its former mine cottages and commenced rehabilitation of the area (approx. 7,800 m^2) to open grassland. The project has been in the ecosystem and land use sustainability phase since 2024.

Monitoring of rehabilitation areas at CVC is carried out in accordance with the rehabilitation monitoring program detailed in the site Rehabilitation Management Plan (dated 15 January 2024). As per the plan, for small scale projects such as the former mine cottages rehabilitation, visual inspections and photo monitoring were undertaken quarterly in the first year and walkover inspections completed annually to determine if rehabilitation is progressing adequately.

Atlantech was commissioned by Delta Coal to undertake an annual walkover inspection of the former mine cottages rehabilitation site, and its associated analogue site in accordance with the requested works issued by Delta Coal. Both the former mine cottage rehabilitation site and the analogue site inspected are depicted in Figure 1. This report details key findings on the success of the revegetation, in comparison to the relevant analogue sites, and provides recommended management actions required in relation to the presence of weed species, feral animals, or significant rehabilitation issues. Photographs captured during the inspection have also been provided to enable visual analysis of change over time.

DELTA COAL - Chain Valley Colliery

Inspection Areas



Former Mine Cottages Rehabilitation Area

Analogue Site

0 0.05 0.1 0.2 Kilometers

Date Created: 15/08/2025
Map Created By: J Pawson
Map Size: A4 Portrait
Coordinate System: GDA2020 MGA Zone 56
Map Reference: ATLGIS25-032_A4-1

Figure 1

2. Scope and Objectives

In accordance with the requested works issued by Delta Coal, the objectives of the inspection were to conduct the following;

- A walkover assessment of revegetation success including species abundance and diversity, vegetation health, presence of dieback and signs of predation.
- Monitoring of relevant analogue sites outside the domain.
- Assessment of weed species present and feral animal occurrence.
- Collection of photographs to enable visual analysis of changes in vegetation structure, condition and regeneration over time.
- General field observations including the identification of significant rehabilitation issues such as erosion, rubbish, bare patches, and other disturbances.

There are four analogue plot locations for the Delta Coal operations defined within the site Rehabilitation Management Plan. The former mine cottages rehabilitation site was compared to Analogue Plot 1 – Derived Native Grassland. The other three analogue sites were considered not applicable as they represent woodland ecosystems which do not align with the target final land use domain.

The objectives of the inspection were also aligned with the Resources Regulator's Guideline Rehabilitation Controls for rehabilitation monitoring during the ecosystem and land use establishment phase as per Table 1.

Table 1 – Resources Regulator's Guideline Rehabilitation Controls

Phase: Ecosystem and land Use Establishment	
Rehabilitation Monitoring Program Controls	**Relevant Report Section**
Implement long-term rehabilitation monitoring program and evaluate trajectory of rehabilitation against achieving rehabilitation objectives and rehabilitation completion criteria.	Appendix D.
Broadly, the scope of the ecosystem rehabilitation monitoring program will be required to include indicators that measure site condition, vegetation composition and vegetation structure and ecosystem function. The range of indices should directly relate to the rehabilitation objectives and rehabilitation completion criteria identified for the specific ecological outcome. While the program should be designed to be comparable between monitoring periods, the program will also need to be flexible to enable incorporating evolving best practice in monitoring techniques.	Section 4.
For areas rehabilitated to an agricultural land use, include surveys to assess the quality and health of soils and pasture/crop species along with stock carrying capacity (where required) and crop yields in rehabilitation monitoring programs.	Not applicable.
Include the monitoring and control of changes to surface and groundwater quality over time.	Outside the scope of this inspection.

Phase: Ecosystem and land Use Establishment	
Rehabilitation Monitoring Program Controls	**Relevant Report Section**
The scope of the monitoring program should usually include photographic monitoring from fixed points.	Section 4.2*. Appendix B*.

* Photos taken representative of previously completed walkovers.

3. Methodology

The walkover inspection was conducted on 11 August 2025 by Atlantech Principal Environmental Consultant, Jason Desmond with the assistance of Senior Environmental Consultant, Kieran Stephenson-Banks and Graduate Environmental Consultant, Joshua Pawson.

The entirety of the rehabilitation area was surveyed on foot and data was collected using an iPad with GIS software. Georeferenced photographs were taken at the rehabilitation and analogue sites. The analogue site (Analogue Plot 1 – Derived Native Grassland) was broadly inspected to better represent the species community rather than walking the plot only.

Following the walkover inspection, assessments were completed against:

- Historic vegetation species composition comparisons.
- The Rehabilitation Trigger Action Response Plan (TARP).
- Rehabilitation objectives and criteria.

4. Findings and Observations

Observations made during the walkover inspection of the former mine cottages rehabilitation site, and the analogue site are shown in Table 2 and Table 3 respectively. An overview of the spatial data surveyed during the walkover inspection is depicted in Figure 2. Associated spatial data that was provided to Chain Valley Colliery alongside this report is described in Appendix A. Reference photographs for inspection observations are displayed within Section 4.1. Additional photographs captured during the walkover inspection are provided in Appendix B.

A comparison of historic vegetation species composition for both sites is provided in Section 4.3. An assessment against the Rehabilitation TARP is provided in Section 4.4. An assessment against the relevant rehabilitation objectives and criteria is provided in Section 4.5.

4.1 Inspection Observations

Table 2 – Former mine cottages rehabilitation area walkover inspection findings

Walkover Inspection Summary: CVC Former Mine Cottages Rehabilitation Area			
Inspected By	**Position / Title**	**Date**	**Time**
Jason Desmond Kieran Stephenson-Banks Joshua Pawson	Principal Environmental Consultant Senior Environmental Consultant Graduate Environmental Consultant	11 August 2025	0935 – 1201

Inspection Item	Observations	Recommendations
Rehabilitation type	Open grassland.	Nil.
Contour banks	None present.	Nil.
Drainage condition	Natural – free draining.	Nil.
Topsoil	No stockpiles present. No evidence of carbonaceous material observed.	Nil.
Erosion and sedimentation	Small slumping observed in North eastern area. Currently demarcated with star pickets (Plate 1).	Suggest infilling with suitable material. Continue to monitor.
Large bare patches	None observed.	Nil.
Ground cover	Between 75-100% ground cover recorded. Gravel/asphalt vehicle track through area.	Disused portions of vehicle access track should have gravel and asphalt removed and be rehabilitated to improve total ground cover.

Walkover Inspection Summary: CVC Former Mine Cottages Rehabilitation Area			
Inspected By	**Position / Title**	**Date**	**Time**
Jason Desmond Kieran Stephenson-Banks Joshua Pawson	Principal Environmental Consultant Senior Environmental Consultant Graduate Environmental Consultant	11 August 2025	0935 – 1201

Inspection Item	Observations	Recommendations
Weed species cover	Between 0-25% weed species cover recorded. Priority species include; Lantana (*Lantana camara*)(Plate 2), Fireweed (*Secencio madagascariensis*), Purple top (*Verbana bonariensis*), Pampas grass (*Cortaderia selloana*)(Plate 3), Farmer's friends (*Bidens Pilosa*), *Agave sp.*(Plate 4), and an unidentified exotic palm species. Several other low threat weed species were also observed throughout (Table 4).	Overall weed cover is low, but targeted control should be undertaken to prevent the spread and establishment of priority species. Other weed species should also continue to be removed.
Rehabilitation success	High levels of native succession were observed. Juveniles included several acacia, melaleuca, and eucalyptus species. Swamp Oak (*Allocasuarina glauca*) dominant overstorey species. Sydney Golden Wattle (*Acacia longifolia*) dominant midstorey species. A high abundance of mature Swamp Oak was observed throughout the area (Plate 5).	Swamp Oak dominance within rehabilitation area may require thinning to prevent the suppression of various juvenile midstorey and groundcover species. Continue to monitor.
Other management items	Various small plastic waste items observed alongside the vehicle access track.	Remove waste from area.

Table 3 – Former mine cottages rehabilitation area walkover inspection findings

Walkover Inspection Summary: CVC Analogue Site			
Inspected By	**Position / Title**	**Date**	**Time**
Jason Desmond Kieran Stephenson-Banks Joshua Pawson	Principal Environmental Consultant Senior Environmental Consultant Graduate Environmental Consultant	11 August 2025	0828 – 0912

Inspection Item	Observations	Recommendations
Rehabilitation type	Open grassland.	Nil.
Contour banks	None present.	Nil.
Drainage condition	Natural – free draining.	Nil.
Topsoil	No stockpiles present. No evidence of carbonaceous material observed.	Nil.
Erosion and sedimentation	Nil observed.	Nil.
Large bare patches	Few small bare patches observed throughout area (Plate 6).	Continue to monitor.
Ground cover	Between 75-100% ground cover recorded. Grass species dominant (Plate 7). Vehicle tracks run alongside area (Plate 8). Small bare patches observed within the easement.	Continue to monitor.
Weed species cover	Between 0-25% weed species cover recorded. Priority species include; Lantana (*Lantana camara*) (Plate 9), Fireweed (*Secencio madagascariensis*), Purple top (*Verbana bonariensis*), Farmer's friends (*Bidens Pilosa*), Rhodes grass (*Chloris gayana*). Several other low threat weed species were also observed throughout (Table 5).	Overall weed cover is low, but targeted control should be undertaken to prevent the spread and establishment of priority species. Other weed species should also continue to be removed.
Rehabilitation success	Low levels of native succession was observed. Juveniles included several acacia and eucalyptus species (Plate 10).	Continue to monitor. Suggest relocating the analogue site away from the transmission line easement.

Walkover Inspection Summary: CVC Analogue Site			
Inspected By	**Position / Title**	**Date**	**Time**
Jason Desmond Kieran Stephenson-Banks Joshua Pawson	Principal Environmental Consultant Senior Environmental Consultant Graduate Environmental Consultant	11 August 2025	0828 – 0912

Inspection Item	Observations	Recommendations
Other management items	Small amounts of litter were observed alongside the vehicle access track. Historic vehicle tracks were observed within the area. These tracks are currently holding water. Kangaroo and dog scat was present. Area was very wet underfoot during the inspection.	Remove waste from area. Rehabilitate unused vehicle tracks to prevent erosion.

DELTA COAL - Chain Valley Colliery

Overview of Inspection Observations



Former Mine Cottages Rehabilitation Area
Analogue Site
Erosion
Weed Community
Individual Weeds

0 0.03 0.06 0.11
Kilometers

Date Created: 15/08/2025
Map Created By: J Pawson
Map Size: A4 Portrait
Coordinate System: GDA2020 MGA Zone 56
Map Reference: ATLGIS25-032_A4-2

Figure 2

4.2 Inspection Photographs



Plate 1 – Small slumping observed, demarcated with star pickets



Plate 2 – *Lantana camara* within rehabilitation area



Plate 3 – Pampas grass within rehabilitation area



Plate 4 – *Agave sp.* Within rehabilitation area



Plate 5 – Dense Swamp Oak community



Plate 6 – Bare patches observed within analogue site



Plate 7 – High grass species cover



Plate 8 – Juvenile *Allocasuarina sp.* Growing next to vehicle access track within analogue site



Plate 9 – *Lantana camara* growing within the analogue site



Plate 10 – Juvenile *Eucalyptus sp.* Growing within analogue site

4.3 Comparison of historic vegetation species composition

A comparison of species present during previous walkover inspections is completed in Table 4 and Table 5 for each of the former mine cottages rehabilitation area and the analogue site, respectively.

Although 19 species were recorded at the analogue site during both the 2019 and 2025 inspections, only 13 of the originally identified species were also observed in 2025. Of the 23 species observed within the rehabilitation plot in 2025, 9 of these were identified as exotic species.

Overall, the rehabilitation area contains 79 percent of the analogue site species identified in 2019 and 84 percent of those identified in 2025.

Table 4 – Comparison of former mine cottages rehabilitation area historic species composition

Former Mine Cottages Rehabilitation Area Historic Vegetation Species Composition			
Species Recorded	**2023**	**2024**	**2025**
Andropogon virginicus*	Yes	Yes	Yes
Breynia oblongfolia	No	Yes	Yes
Capillipedium parviflorum	Yes	Yes	No
Casuarina glauca	Yes	Yes	Yes
Chloris gayana*	No	No	Yes
Conyza bonariensis*	No	No	No
Cortaderia selloana*	No	No	Yes
Cymbopogon refractus	Yes	Yes	Yes
Cynodon dactylon	Yes	Yes	Yes
Glycine tabacina	No	No	Yes
Hydrocotyle bonariensis	Yes	Yes	Yes
Imperata cylindrica	Yes	Yes	Yes
Lilium formosanum*	Yes	Yes	No
Medicago lupulina*	Yes	Yes	No
Paspalum urvillei*	Yes	Yes	Yes
Plantago lanceolata*	Yes	Yes	Yes
Richardia brasiliensis*	Yes	Yes	Yes

Former Mine Cottages Rehabilitation Area Historic Vegetation Species Composition			
Species Recorded	**2023**	**2024**	**2025**
Setaria parviflora*	Yes	Yes	Yes
Sporobolus creber	Yes	Yes	Yes
Verbena rigida*	No	No	No
Verbena bonariensis*	Yes	Yes	Yes
Gomphocarpus fruticosus*	Yes	Yes	No
Onopordum acanthium*	Yes	No	No
Pennisetum clandestinum*	Yes	Yes	Yes
Nephrolepis exaltata	Yes	Yes	Yes
Geranium retrorsum	Yes	Yes	Yes
Melaleuca quinquenervia	Yes	Yes	Yes
Acacia longifolia	Yes	Yes	Yes
Eucalyptus spp.	Yes	Yes	Yes
Angophora costata	Yes	Yes	Yes
Pinus radiata*	No	No	No

* Exotic species.

Table 5 – Comparison of analogue site historic species composition

Analogue Site Historic Vegetation Species Composition				
Species Recorded	**2019**	**2023**	**2024**	**2025**
Andropogon virginicus*	Yes	Yes	Yes	Yes
Breynia oblongfolia	No	No	No	No
Capillipedium parviflorum	Yes	Yes	Yes	Yes
Casuarina glauca	Yes	Yes	Yes	Yes
Chloris gayana*	Yes	Yes	Yes	Yes
Conyza bonariensis*	Yes	No	No	No
Cortaderia selloana*	Yes	Yes	Yes	No
Cymbopogon refractus	Yes	Yes	Yes	Yes
Cynodon dactylon	Yes	Yes	Yes	Yes
Glycine tabacina	Yes	Yes	Yes	Yes
Hydrocotyle bonariensis	Yes	No	No	Yes
Imperata cylindrica	Yes	Yes	Yes	Yes
Lilium formosanum*	Yes	No	No	Yes
Medicago lupulina*	Yes	Yes	Yes	No
Paspalum urvillei*	Yes	Yes	Yes	No
Plantago lanceolata*	Yes	Yes	Yes	Yes
Richardia brasiliensis*	Yes	Yes	Yes	Yes
Setaria parviflora*	Yes	Yes	Yes	No
Sporobolus creber	Yes	Yes	Yes	Yes
Verbena rigida*	Yes	Yes	No	No
Verbena bonariensis*	No	Yes	Yes	Yes
Gomphocarpus fruticosus*	No	No	No	No
Onopordum acanthium*	No	No	No	Yes
Pennisetum clandestinum*	No	Yes	Yes	Yes
Nephrolepis exaltata	No	No	No	Yes
Geranium retrorsum	No	No	No	No
Melaleuca quinquenervia	No	No	No	No

Analogue Site Historic Vegetation Species Composition				
Species Recorded	**2019**	**2023**	**2024**	**2025**
Acacia longifolia	No	Yes	Yes	Yes
Eucalyptus spp.	No	No	Yes	Yes
Angophora costata	No	No	No	No
Pinus radiata*	No	Yes	Yes	No

* Exotic species.

4.4 Assessment against the Rehabilitation TARP

Of the complete Rehabilitation TARP outlined in the Chain Valley Colliery Rehabilitation Management Plan, depicted in Appendix C, items 2, 4, and 8 were considered relevant and assessed as part of the walkover inspection. The findings of the inspection indicate that no triggers have been activated for these items and therefore no action is required as per the Chain Valley Colliery Rehabilitation Management Plan.

However, item 4 notes that while the vegetation community is comparable to the analogue site, there are dense clusters of dominant overstorey species cover.

4.5 Assessment against the rehabilitation objectives and criteria

The former mine cottages rehabilitation site has been in the ecosystem and land use sustainability phase since 2024. Following the walkover inspection, the trajectory of the former mine cottages rehabilitation site was assessed against the objectives and completion criteria, as defined by the current phase of rehabilitation.

A detailed assessment is provided in Appendix D.

Appendix A:
Spatial Data

The following shapefiles have been provided alongside this report to Delta Coal (projected in GDA2020 Zone 56):

- Erosion_
- Individual_Weeds_
- Weed_Community_

Appendix B:

Site Inspection Photos

1. Former Mine Cottages



Plate 11 – View of the rehabilitation site from the eastern end



Plate 12 – View of the rehabilitation site from the western end



Plate 13 – Exotic palm species identified within the rehabilitation site



Plate 14 – Juvenile Coffee bush (*Breynia oblongifolia*) growing within the rehabilitation site



Plate 15 – *Bidens pilosa* observed within the rehabilitation site



Plate 16 – Dieback observed at eastern portion of the rehabilitation site



Plate 17 – Dense Boston fern (*Nephrolepis cordifolia*) community



Plate 18 – Dense Swamp Oak community



Plate 19 – Vehicle access track running through the rehabilitation area



Plate 20 – *Hibiscus mutabilis* showing signs of stress within rehabilitation area

2. Analogue Site



Plate 21 – Analogue site photo point 1



Plate 22 – Analogue site photo point 2



Plate 23 – Analogue site photo point 3



Plate 24 – Analogue site photo point 4



Plate 25 – Vehicular access evident running through analogue site



Plate 26 – Dense grass community dominating analogue site



Plate 27 – *Eucalyptus sp.* Observed within analogue site



Plate 28 – Transmission line easement present at the analogue site

Appendix C:

Rehabilitation TARP

Table 6 – Chain Valley Colliery Rehabilitation Trigger Action Response Plan (TARP)

Issue	Potential Hazard	Trigger	Action/Response	TARP Reference No.
Geology/geochemistry and material prone to spontaneous combustion	Geochemistry of coal materials that may cause combustion risk (through spontaneous combustion or other ignition sources post-mine closure – e.g. bushfire).	Assessment of combustion risk (to be undertaken following cessation of mining) identifies materials on site that may pose a combustion risk.	Not within the scope of this assessment.	1
Erosion and sediment control	Water quality impacts the local environment due to less than adequate erosion and sediment control during rehabilitation.	Site inspection identifies that erosion and/or controls are not in accordance with completion criteria/ESCP.	Not triggered – no erosion observed.	2
Soil type(s) and suitability (Growth Medium)	Insufficient growth medium material is available to achieve final land use objectives. Soils/growth medium pH.	Final soil characterisation (to occur following cessation of mining) identifies that the growth medium on-site is not adequate to meet completion criteria.	Not within the scope of this assessment.	3
Flora and Fauna	Failure to establish suitable vegetation communities as per Mining Operations Plan (MOP).	Vegetation monitoring identifies that vegetation communities established do not meet completion criteria (e.g. not comparable to adjacent/analogue vegetation/final land use objectives).	Not triggered – vegetation community comparable to Analogue Plot 1. Note clusters of dominant overstorey species cover.	4
Surface water	Discharge from the site water management system resulting in contamination of water resources.	Surface water quality monitoring identifies water parameters outside the completion range criteria and/or EPL.	Not within the scope of this assessment.	5
Contaminated land and hydrocarbon management	Contamination remains the following closure.	Completion of Phase 2 ESAs (to be undertaken following the completion of mining) identifies contamination remaining on site.	Not within the scope of this assessment.	6

Issue	Potential Hazard	Trigger	Action/Response	TARP Reference No.
Hazardous materials	Explosives remain following closure and present public safety risk. Note: No explosives are to remain at the premises following closure.	Delta Coal becomes aware that: • Explosives are remaining on site. • Explosives have not been licensed and/or management not in accordance with the Explosives Act 2003.	Not within the scope of this assessment.	7
Bushfire	Significant impact on rehabilitation as a result of bushfire occurring prior to the successful establishment of revegetation.	Bushfire occurs on-site and vegetation is destroyed or significantly damaged.	Not triggered – no evidence of bushfire in the area.	8

Appendix D:

Rehabilitation Objectives and Criteria

Table 7 – Assessment against the rehabilitation objectives and criteria

Ecosystem and Land Use Establishment Phase					
Final Land Use Domain	**Approved Rehabilitation Objectives**	**Performance indicator**	**Approved Completion Criteria**	**Validation Method**	**Current Status**
Native Ecosystem	Restore ecosystem function, including maintaining or establishing self-sustaining ecosystems comprising local native plant species.	Vegetation communities to be established to have key species consistent with the adjacent: • Broad-Leaved Scribbly Gum Open Forest (Mannering Colliery) • Coastal Open Woodland (Chain Valley Colliery) • Swamp Sclerophyll Forest (Chain Valley Colliery upcast shaft) Note: Delta Coal to implement a monitoring program including establishment of analogue sites to be used as a basis for future identification.	Vegetation becomes established. Majority (i.e. >50%) of established species are present in surrounding communities.	• Visual inspection and photos of rehabilitated area by suitably qualified specialist. • Monitoring and comparison to adjacent control sites. • Monitoring results included within Closure report.	Over 50% of the species present in the rehabilitation area are also present at the analogue site.
		The rehabilitated area does not constitute an erosion hazard.	Any site erosion is insignificant in that it is not resulting in pollution or unstable landforms. Surface area cover is consistent with adjacent analogue sites.		Minor erosion present at the site and ground cover percentage is representative of the analogue site.

Ecosystem and Land Use Establishment Phase					
Final Land Use Domain	**Approved Rehabilitation Objectives**	**Performance indicator**	**Approved Completion Criteria**	**Validation Method**	**Current Status**
Native Ecosystem	Restore ecosystem function, including maintaining or establishing self-sustaining ecosystems comprising local native plant species.	Weeds and feral animals are not competing or impacting the rehabilitated area.	Implementation of weed and feral animal control program to achieve number of weeds/ferals consistent with adjacent analogue sites.	• Visual inspection and photos of rehabilitated area by suitably qualified specialist. • Monitoring and comparison to adjacent control sites. • Monitoring results included within Closure report.	Weed species are present but consistent with the analogue site and represent less than 25% cover of the total area.