ANNUAL BIODIVERSITY MONITORING 2024

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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 21 October 2024.

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., bitou bush, lantana, and cassia at the ventilation shaft site.
- Review security 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).

Table of Contents

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 uncontrolled 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 1.

DELTA COAL - Chain Valley Colliery

2024 Biodiversity Monitoring

- CVC Biodiversity Enhancement Area
- Vent Shaft
- Plots
- Tree Monitoring Point
- Photo Point

0 0.04 0.07 0.14 Kilometers

Date Created: 25/10/2024
Map Created By: J Pawson
Map Size: A4 Portrait
Coordinate System: GDA2020 MGA Zone 56
Map Reference: ATLGIS24-015_A4-1

Figure 1

3. Methodology

The walkover inspection was conducted on the 21 October 2024 by Atlantech Principal Environmental Consultant, Jason Desmond with the assistance of Environmental Consultant, Nina Rotton and Graduate Environmental Consultant, Jonathan Kool.

All data was collected in-field using an iPad with GIS software.

It is important to note that the 2021 and 2022 programs were completed in January. The 2023 and 2024 survey was undertaken in October 2023 and October 2024. Seasonal timing of the current program differs to that of the 2021 and 2022 surveys.

3.1 Ventilation Shaft Area Vegetation Health and Condition

The following data surrounding the ventilation shaft area was collected:

- 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 photos.
- The dominant species in each vegetation layer present around the ventilation shaft was recorded.

3.2 Swamp Oak Forest Vegetation Condition, Structure and Composition

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.

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 B. The combined weighted score for the two plots was then calculated and assessed against the local benchmarks (refer to Appendix C) and BMP trigger value for remedial works which is less than 60%.

3.3 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.

3.4 Uncontrolled Public Access

The pit top eastern management zone and ventilation shaft area were surveyed on foot. Any evidence of uncontrolled public access or potential uncontrolled public access issues were recorded such as damaged fencing, vandalism, gates and signage.

4. Findings

The findings of the biodiversity monitoring program are provided in the following sub-sections. Associated spatial files have been provided separate to this report.

4.1 Ventilation Shaft Area Vegetation Health and Condition

Photos collected at the photo and tree monitoring points are provided in Appendix A.

Vegetation condition was generally similar compared to the results of the 2023 survey. Vegetation appeared to be in good health and no further dieback was evident. Minimal weed growth was present, and evidence of recent weed control was observed.

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.

4.2 Swamp Oak Forest Vegetation Condition, Structure and Composition

Detailed monitoring results are provided in Appendix C.

The weighted site attribute score for the Swamp Oak Forest plots is 81.6%. This result indicates a 3.8% increase in condition compared to 2022 results (77.8%). 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 and 2024 attribute scores is provided in

Table 1. A summary of the key changes is provided below:

- An 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. A strong dominance of rush species was instead recorded in the groundcover layers.
- Decrease in trees with hollows across plots due to tree with Hollow falling, however, no decrease in score due to ≥0 hollows scoring a 20% weighting.
- The total length of fallen logs varied from 2023 but the score for the plots was still ≥20m thereby not impacting the score.

Table 1: Comparison of 2023 and 2024 weighted scores.

Site Attribute	2023 Scores	2024 Scores	Change
Native plant species richness	22	25	↑
Native over-storey cover	10	10	–
Native mid-storey cover	3	3	–
Native groundcover (grasses)	1	1.5	↑
Native groundcover (shrubs)	3	3	–
Native groundcover (other)	1	1	–
Exotic plant cover	5	5	–
Trees with hollows	20	20	–
Over-storey regeneration	5	5	–
Total length of fallen logs	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 Weed Occurrence and Control Effectiveness

Weeds recorded during the survey are detailed in Table 2 and shown in Figure 2 and Figure 3.

Table 2: Weed occurrence recordings.

Map ref	Weed species	Easting	Northing	# of individual plants	Area (m2)	Distance to native veg (m)	Recommended control measures
Weed 1	Exotic species – Agave spp.	366589.210307	6331116.0372	2	1	0	Dig out plants completely and appropriately dispose.
Weed 2	Bitou Bush (*Chrysanthemoides monilifera* subspecies *rotundata*)	366605.733053	6331075.346457	1	0.2	0	As per the Biodiversity Management Plan, Hand-weeding and/or cut and paint with Glyphosate in winter.
Weed 13		366648.946458	6331081.396668	2	0.5	0	
Weed 3	Lantana (*Lantana camara*)	366603.712481	6331074.197975	3	4	0	As per the Biodiversity Management Plan, cut and paint stems with Glyphosate.
Weed 4		366603.709924	6331067.241639	2	0.4	0	
Weed 5		366595.970148	6331055.558725	3	1	0	
Weed 6		366609.683229	6331042.418577	1	0.5	0	
Weed 7		366612.147262	6331040.025868	1	0.5	0	
Weed 8		366619.195745	6331036.968455	1	0.5	0	
Weed 9		366624.28757	6331029.419293	5	3	0	
Weed 11		366632.382516	6331028.0386	3	1	0	
Weed 14		366618.183143	6331101.136361	1	0.1	0	
Weed 10	Ground Asparagus (Asparagus aethiopicus)	366623.393915	6331028.481374	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.
Weed 17		365021.745469	6329497.494928	1	2	0	
Weed 18		365060.550032	6329612.591694	12	5	0	
Weed 19		365083.38318	6329627.683281	2	0.4	0	
Weed 20		365078.840577	6329618.479651	1	0.5	0	
Weed 21		365090.078839	6329603.403874	1	0.5	0	
Weed 12	Exotic species – Cassia (*Senna pendula*)	366635.487072	6330981.365917	1	0.3	0	Hand Pull young plants, cut and paint mature.
Weed 15		366605.176	6331065.9471	15	3	0	
Weed 16		366606.7643	6331045.8097	13	6	0	

DELTA COAL - Chain Valley Colliery

2024 Biodiversity Monitoring - Weeds

Vent Shaft
Dense Weeds
Weeds

0 0.01 0.02 0.04
Kilometers

Date Created: 25/10/2024
Map Created By: J Pawson
Map Size: A4 Portrait
Coordinate System: GDA2020 MGA Zone 56
Map Reference: ATLGIS24-015_A4-2

Figure 2

DELTA COAL - Chain Valley Colliery

2024 Biodiversity Monitoring - Weeds

CVC Biodiversity Enhancement Area

Plots

Weeds

0 0.03 0.07 0.13

Kilometers

Date Created: 25/10/2024
Map Created By: J Pawson
Map Size: A4 Portrait
Coordinate System: GDA2020 MGA Zone 56
Map Reference: ATLGIS24-015_A4-3

Figure 3

4.4 Feral Animal Presence

Feral animal observations recorded during the survey are detailed in Table 3 and shown in Figure 4 and Figure 5.

Table 3: Feral animal recordings.

Map ref	Feral animal species	Location	Easting	Northing	Observation type*	Recommended control measures
Feral Animal 1	Dog (*Canis lupus familiaris*)	Ventilation shaft	366686.16262	6331019.48367	Scat	Continue monitoring and if number of recordings increase, consider undertaking a control program.
Feral Animal 2	Dog (*Canis lupus familiaris*)	Pit top eastern management zone	365008.62618	6329482.04084	Scat	

**Observation type – sighting, tracks, diggings, burrows, scats or other.*

DELTA COAL - Chain Valley Colliery

2024 Biodiversity Monitoring - Pests

Vent Shaft

Feral Animal

0 0.01 0.01 0.03

Kilometers

Date Created: 25/10/2024
Map Created By: J Pawson
Map Size: A4 Portrait
Coordinate System: GDA2020 MGA Zone 56
Map Reference: ATLGIS24-015_A4-4

Figure 4

DELTA COAL - Chain Valley Colliery

2024 Biodiversity Monitoring - Pests

CVC Biodiversity Enhancement Area

Plots

Feral Animal

0 0.03 0.05 0.1

Kilometers

Date Created: 25/10/2024
Map Created By: J Pawson
Map Size: A4 Portrait
Coordinate System: GDA2020 MGA Zone 56
Map Reference: ATLGIS24-015_A4-5

Figure 5

4.5 Uncontrolled Public Access

Uncontrolled public access issues identified during the survey are detailed in Table 4 and shown in Figure 6.

Table 4: Uncontrolled public access issues identified.

Map ref	Location	Easting	Northing	Public access issue	Recommended action
Public Access 1	Ventilation shaft	366638.6238	6330992.0169	Graffiti and spray cans 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.
Public Access 2	Ventilation shaft	3666358.1669	6331048.453	Graffiti and spray cans observed around the perimeter of the ventilation shaft fence indicating unauthorised access to the site.	

DELTA COAL - Chain Valley Colliery

2024 Biodiversity Monitoring - Public Access

Vent Shaft

Public Access

0 0.01 0.01 0.03

Kilometers

Date Created: 25/10/2024
Map Created By: J Pawson
Map Size: A4 Portrait
Coordinate System: GDA2020 MGA Zone 56
Map Reference: ATLGIS24-015_A4-6

Figure 6

Appendix A – Photo and Tree Monitoring

Photo Monitoring Point 1

Plate 1: Photo monitoring point 1 facing south-east (2023 – 2024).

Plate 2: Photo monitoring point 1 facing north-west (2023 – 2024).

Plate 3: Photo monitoring point 1 facing north-east (2023- 2024).

Photo Monitoring Point 2

Plate 4: Photo monitoring point 2 facing south-west (2023 – 2024).

Photo Monitoring Point 3

Plate 5: Photo monitoring point 3 facing north-west (2023 – 2024).

Plate 6: Photo monitoring point 3 facing south-west (2023 – 2024).

Plate 7: Photo monitoring point 3 facing south-east (2023 – 2024).

Photo Monitoring Point 4

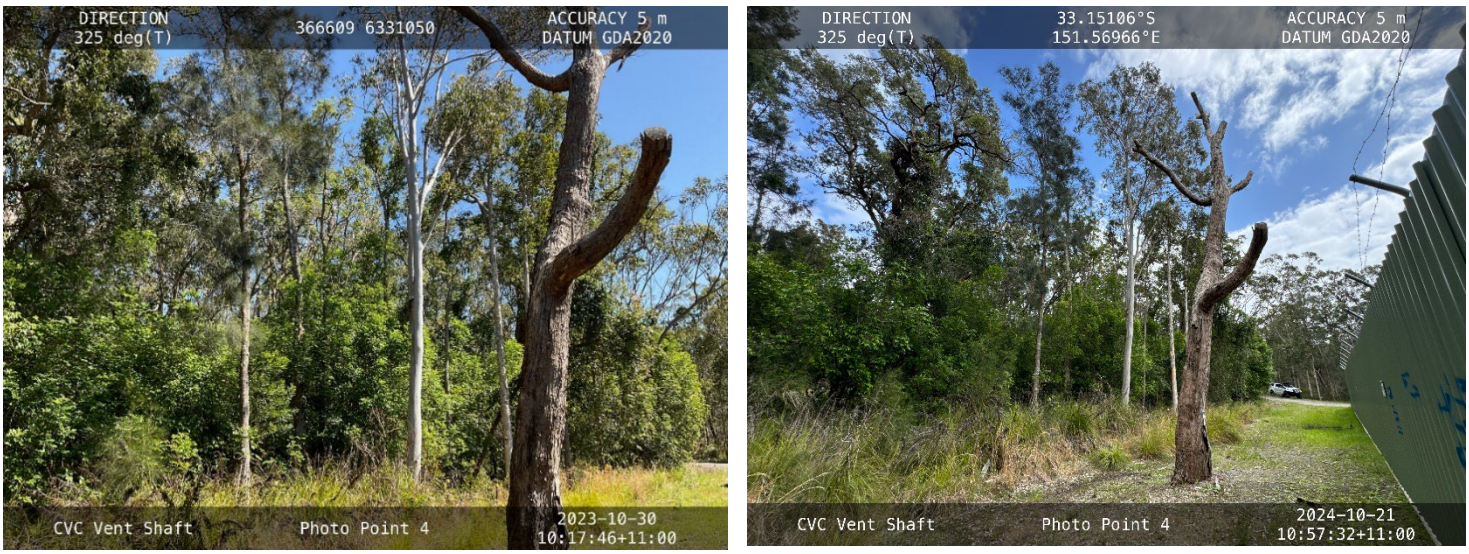

Plate 8: Photo monitoring point 4 facing north-west (2023 – 2024).

Plate 9: Photo monitoring point 4 facing west (2023 – 2024).

Plate 10: Photo monitoring point 4 facing south-east (2023 – 2024).

Tree Monitoring Point 1

Plate 11: Tree monitoring point 1 (2023 – 2024).

Tree Monitoring Point 2

Plate 12: Tree monitoring point 2 (2023 – 2024).

Biodiversity Plot 1 and 2

Plate 13: Plot one north-eastern transect point.

Plate 14: Plot one south-western transect point.

Plate 15: Plot two southern transect point.

Plate 16: Plot two northern transect point.

Appendix B – 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 5.

Table 5: CVC Vegetation Condition Criteria and Local Benchmarks.

Site Attribute		Local Benchmark	Site Attribute Score				Weighting for site score attribute
			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 C - Swamp Oak Forest Plot Data

Table 6: 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	9	4	6	4	4	25.0	25
B	Native over-storey cover	5 to 18	11	4	15	4	4	10.0	10
C	Native mid-storey cover	36 to 48	0	1	0	1	1	10.0	2.5
D	Native ground-cover (grasses)	3 to 21	2	3	0	1	2	2.5	1.3
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	99	1	1	2.5	0.6
G	Exotic plant cover (all strata)	N/A	0.01	4	0.01	4	4	5.0	5.0
H	Number of trees with hollows	≥0	0	4	0	4	4	20.0	20.0
I	Proportion of over-storey species occurring as regeneration	N/A	1%	2	0%	1	1.5	12.5	4.7
J	Total length of fallen logs	≥20	22.4	4	40	4	4	10.0	10.0
								Final weighted site score	**81.6%**

Table 7: Plot one field sheet

Plot Number:	One	**Date:**	21/10/2024	**Time:**	14:14

20 x 20 metre sub plot		20 x 50 metre plot	
Native mid-storey cover (%)	0	Number of native plant species	9
Native ground-cover – grasses (%)	2	Number of trees with hollows	0
Native groundcover – shrubs (%)	0	Proportion of over-storey species occurring as regeneration (%)	1
Native groundcover – other (%)	95	Combined total length of all fallen logs (m)	22.4
Exotic plant cover (%)	0.01	Evidence of canopy dieback (Y/N)	No

50 metre transect – Native overstorey cover (%)		Plant species recorded
Transect start coordinates:	E 365085.13, N 6329629.28	Swamp Oak (*Casuarina glauca*), Broad-leaved Paperbark (*Melaleuca quinquenervia*), Juncus spp., Sea Rush (*Juncus krausii*), Creeping Brookweed (*Samolus repens*), Beaded Samphire (*Salicornia quinqueflora*) and Marine Couch (*Sporobolus virginicus*)
Transect end coordinates:	E 365085.18, N 6329578.82	
0 m	10	
5 m	5	
10 m	5	
15 m	20	
20 m	5	General observations
25 m	10	Highly waterlogged, with evidence of active discharge occurring to the area. Canine feral animals observed (faeces) and no public access issues. Active waterline with flow recorded at the transect 37 metre point with Fish species observed (Mullet *Mugil cephalus*).
30 m	10	
35 m	0	
40 m	25	
45 m	15	
50 m	10	

Table 8: Plot two field sheet

Plot Number:	Two	**Date:**	21/10/2024	**Time:**	13:17

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 (%)	0	Number of trees with hollows	0
Native groundcover – shrubs (%)	0	Proportion of over-storey species occurring as regeneration (%)	0
Native groundcover – other (%)	99	Combined total length of all fallen logs (m)	40.2
Exotic plant cover (%)	0	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*), Juncus spp., Sea Rush (*Juncus krausii*), Creeping Brookweed (*Samolus repens*), Marine Couch (*Sporobolus virginicus*) and Ground Asparagus (*Asparagus aethiopicus*).

General observations

Tree with hollow no longer observed in plot (Fallen). Area was variably waterlogged. No signs of feral animals and or unauthorised public access. Vegetation consistent throughout the area. Lacking mid-storey growth. Minimal weeds observed; ground asparagus found within plot but outside of the 20 x 20 metre subplot.