LakeCoal	Doc Owner:	**Environment and Community Coordinator**
	Doc No:	RPT 00059

CHAIN VALLEY COLLIERY

Annual Review 2018

1 January 2018 – 31 December 2018

Author	Jessica Bowditch Environmental Officer
Authorised by:	Chris Armit Environment and Community Coordinator
Date:	Original submitted 31 March 2019 Rev 1 submitted 16 July 2019

Chain Valley Colliery – Annual Review (AEMR) 2018

Table 1 – Annual Review Title Block

Name of operation	Chain Valley Colliery
Name of operator	LakeCoal Pty Ltd
Project Approval #	SSD 5465
Name of Project Approval holder	LakeCoal Pty Ltd
Titles/Mining Leases #	Consolidated Coal Lease 707, Consolidated Coal Lease 706 (part), Mining lease 1051, Mining lease 1052, Mining lease 1308, Mining Lease 1370, Mining lease 1632 (part sublease), Mining Purposes Lease 1349, Mining Purposes Lease 337, Mining Purposes Lease 1389, Mining Purposes Lease 1400, Consolidated Coal Lease 719 (part sublease), Consolidated Coal Lease 721 (part sublease), Consolidated Coal Lease 722.
Name of holder of mining leases	LakeCoal Pty Ltd & Fassi Coal Pty Ltd
Water License #	20BL173107
MOP Commencement Date	1st April 2015 / 1st October 2018
MOP Completion Date	31st March 2018 / 31st December 2020
Annual Review start date	**1 January 2018**
Annual Review end date	**31 December 2018**

I, [INSERT AUTHORISED REPORTING OFFICER NAME], certify that this audit report is a true and accurate record of the compliance status of [INSERT OPERATION NAME] for the period [INSERT REPORTING PERIOD] and that I am authorised to make this statement on behalf of [INSERT OPERATOR NAME].

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: **Chris Armit** Title: **Environment & Community Coordinator** Date: **31/03/19 and Rev 1 - 16/07/19** Signature: 

Executive Summary

During the 2018 reporting period Chain Valley Colliery produced approximately 0.4Mt of coal from its underground mining operations and transported approximately 0.4Mt of coal from site. This result was significantly lower than the volume produced in the previous 2017 reporting period (1.36Mt).

During the reporting period, 394,213 tonnes of coal was transported from site.

There were no development consent modifications to Chain Valley Colliery development consent (SSD 5465) during the reporting period.

The LakeCoal Voluntary Planning Agreement (VPA) with Central Coast Council was executed during the previous reporting period. A total value of $398,336 was accrued and paid to Central Coast Council by LakeCoal during the reporting period.

A further $15,549.90 was accrued during the reporting period, which was the total indexed contribution (31/12/18).

The total VPA required from January to September (Pre Appointment) 2018 was $11,117.70. The total VPA required from October to December (Receivership Period) 2018 was $4, 432.20.

A summary of the key environmental performance indicators and statement of compliance for the 2018 reporting period is provided in Table 1.

Table 1 - Key Performance Indicators for the reporting period

Indicator	***Value***
Total full time employees (at 31 December 2018)	209
Total ROM coal produced on site (tonnes)	398,336
Total ROM coal transported from site (tonnes)	394,213
Total ROM coal to export market (tonnes)	0
Total ROM coal to domestic market (tonnes)	394,213
Total truck movements on public roads	0
General waste produced (tonnes)	211
Total waste recycled (tonnes)	216
Waste recycling % achieved	52%
Potable water consumed (ML)	97.3
Total water discharged from the operation (ML)	1915

Total number of community complaints received	1
Total number of reportable environmental incidents for the period	3
Total funding accrued for the Voluntary Planning Agreement with Council	$15, 549.90
Number of Community Consultative Committee (CCC) meetings undertaken	4
Total Greenhouse Gas Emissions (CO_2 equivalent tonnes) (2017/2018 financial period)	409,215

1 Statement of compliance

Summary of Non-compliances (2018 Reporting Period):

The **three** reportable environmental incidents during the reporting period all relate to air quality exceedances.

Table 2 - Statement of compliance

Were all conditions of the relevant approval(s) complied with?	
SSD 5465	No
EPL1770	No
CCL707, CCL706 (part), ML1051, ML1052, ML1308, ML1370, ML1632 (part sublease), MPL1349, MPL337, MPL1389, MPL1400, CCL719 (part sublease), CCL721 (part sublease), CCL722	Yes
Water Licence 20BL173107	Yes

Table 3 – Non-compliance

Relevant Approval	Condition #	Condition Description (summary)	Compliance Status	Comment	Section addressed
Development Consent- SSD 5465 (Mod 2)	Schedule 3- Condition 11	PM10 24 Hour Average Exceedance- Regional Dust Event	Non- Compliant	Exceedance	Section 7
Development Consent- SSD 5465 (Mod 2)	Schedule 3- Condition 11	PM10 24 Hour Average Exceedance- Regional Dust Event	Non-Compliant	Exceedance	Section 7
Development Consent- SSD 5465 (Mod 2)	Schedule 3- Condition 11	PM10 24 Hour Average Exceedance- Regional Dust Event	Non-Compliant	Exceedance	Section 7

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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Appendix 1 Development Consent SSD-5465: DA Conditions

Appendix 2 Plans: Figure of Chain Valley Colliery lease, mining areas and rehabilitation

Appendix 3 Environment Protection Licence EPL 1770: EPL Conditions

Appendix 4 Monitoring: Seagrass Monitoring Results

Appendix 5 Weed Action Plan

Appendix 6 Noise Monitoring Results

Appendix 7 Subsidence Monitoring Results

2 Introduction

The Chain Valley Colliery (the Colliery) is an underground coal mine located at the southern end of Lake Macquarie, approximately 60 km south of Newcastle (**Figure 1.1**) which is operated by LakeCoal Pty Ltd (LakeCoal) on behalf of the Wallarah Coal Joint Venture (WCJV). Underground mining has occurred at the Colliery since 1962 extracting coal from three seams – the Wallarah Seam, the Great Northern Seam and the Fassifern Seam, with current mining activities limited to the Fassifern Seam. The Colliery is located in the Swansea North Entrance Mine Subsidence District. Historically, underground mining was undertaken using the bord and pillar method; however in September 2011 miniwall mining was introduced.

In August 1960, J&A Brown and Abermain Seaham Collieries Ltd commenced clearing the present site with drift and shaft sinking starting a few months later. Production of coal from the Wallarah seam, commenced with the first delivery to the adjacent Delta Electricity's Vales Point power station in April 1963.

LakeCoal is a producer of thermal coal. The company was formed in 2001 to acquire BHP Billiton's 80% share in the Wallarah Coal Joint Venture (WCJV), the remaining 20% share was owned by Sojitz. In October 2006, Peabody Energy, a US listed company acquired LakeCoal Pty Limited.

In November 2009 LDO Coal Pty Limited purchased LakeCoal Pty Limited and in March 2011 the 20% share in the WCJV which Sojitz held was acquired by LDO Coal shareholders through the entity Fassi Coal Pty Ltd.

In November 2016 LakeCoal finalised commercial arrangements with investor into the business (RWE).

The WCJV had operated the Wallarah, Moonee and Chain Valley underground coal mines and the Catherine Hill Bay Coal Preparation Plant, all located at the southern end of Lake Macquarie. At the time of LakeCoal's acquisition by LDO Coal, both the Wallarah and Moonee mines were closed.

LakeCoal is currently undertaking the mine closure/rehabilitation process for the Moonee Colliery and the Catherine Hill Bay Coal Preparation Plant. The rehabilitation process for Wallarah Colliery has been completed and the lease in that area relinquished.

Chain Valley Colliery peaked with a workforce of approximately 380 personnel in the mid 1980's. At the end of the reporting period, Chain Valley Colliery had a workforce of 209 personnel.

Lake Coal went into receivership in 3 October 2018, however maintained operations.

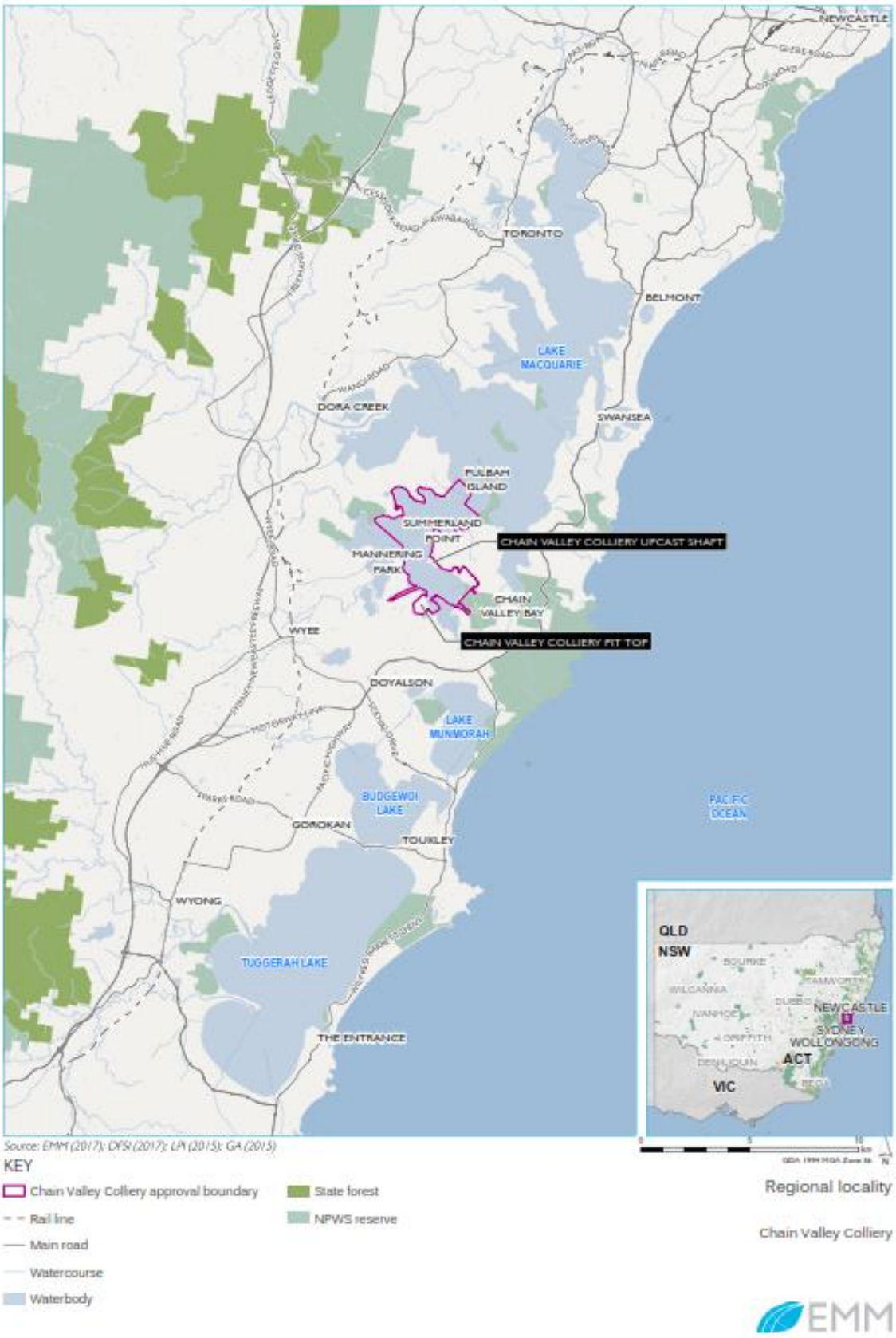


Figure 2.1: Location of Chain Valley Colliery

3 Approvals

3.1 Consent, Leases and Licences

3.1.1 Consents

Chain Valley Colliery commenced mining operations in 1962 and the mine had been operating under existing use rights until the 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) for the Colliery. 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 Project Approval permitted the continuation of mining within the Fassifern seam until the 31st December 2016. The Project Approval was subsequently modified on the 30th 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. A copy of the Project Approval is attached as **Appendix 1**.

In 2013 LakeCoal 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 currently approved extraction area to allow underground mining to continue within the Fassifern Seam (refer "Site" boundary on **Plan 2** (**Appendix 2**);
- 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 Vales Point Power Station (VPPS);
- minor upgrades and modifications to existing approved infrastructure;
- an extension of the approved mining by a period of approximately 14 years, i.e., to around 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 the 23rd December 2013.

On the 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 concurrently to permit coal to be received from Chain Valley Colliery and transported via existing facilities to the Vales Point Power Station. Public exhibition of the statement of environmental effects that supported to the modification application occurred from the 22 May 2014 to the 10 June 2014 and the modification applications were subsequently 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 Chain Valley's 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 around critical infrastructure from bushfires.

This Annual Review has been completed in compliance with Condition 4 of Schedule 6 within SSD-5465.

3.1.2 Leases

The surface areas occupied by Chain Valley Colliery lie within the Wyong Shire local government area. The facilities include the pit top area at Mannering Park and ventilation shaft site at Summerland Point.

All secondary extraction during the reporting period was undertaken beneath Lake Macquarie, i.e. part of the Lake Macquarie local government area.

The Colliery holding is shown on **Plan 1 (Appendix 1)** and the applicable mining tenements are listed in **Table 1.1**.

Table 3.1: Mining Tenements

Mining tenement	Holder	Grant date / Renewal date	Lease expiry date	Applicability
ML 1051	LakeCoal	7 July 1941	7 July 2022	Incorporates part of the approved mining area.
ML 1052	LakeCoal	7 July 1941	7 July 2022	Incorporates part of the approved mining area.
MPL 1349	LakeCoal	5 October 1967	5 October 2028	Mining purposes lease for the Chain Valley pit top area.
CCL 706 (part)	LakeCoal	24 January 1990	29 April 2022	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	LakeCoal	3 July 1989	30 December 2023	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.
ML 1308	LakeCoal	4 May 1965	4 May 2022	Mining lease for the mine drift entries.
MPL 337	LakeCoal	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 1389	LakeCoal	14 May 1970	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	LakeCoal	6 November 1970	6 November 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.
CCL 719 (June 2003)	Centennial Mannering	3 July 1989	22 December 2020	Part CCL 719 subleased to LakeCoal, incorporates historic workings within the Wallarah and Great Northern Seams which are utilised for passive operational activities.

Mining tenement	Holder	Grant date / Renewal date	Lease expiry date	Applicability
CCL 719 (Sublease B)	Centennial Mannering	3 July 1989	22 December 2020	Sub-lease from Centennial Mannering for Mannering Colliery.
CCL 721	Centennial Mannering	28 June 1989	29 July 2026	Incorporates part of the approved mining area, Part sublease to LakeCoal, incorporated into Chain Valley Colliery holding. Includes Mannering surface facilities.
ML1632	Centennial Myuna	13 April 2013	13 October 2022	Incorporates part of the approved mining area. Part sublease to LakeCoal, incorporated into Chain Valley Colliery holding.
CCL 722 (part)	Centennial Munmorah	28 June 1989	05 July 2019	Part sublease to LakeCoal, incorporated into Chain Valley Colliery holding.
ML1370 (part)	Centennial Myuna	26 Sep 1995	7 March 2033	Incorporates part of the approved mining area,. Part sublease to LakeCoal, incorporated into Chain Valley Colliery holding.
EL8428	LakeCoal Pty Ltd	07 Dec 2015	07 Dec 2020	Exploration Lease. Part of LakeCoal Tenement Holdings. Subsurface only.

It is noted that while the Chain Valley Colliery holding boundary now incorporates a significant portion of what was the Mannering Colliery holding, Annual Reviews for the two Collieries remain separate and relate specifically to the activities occurring within the relevant approval instrument boundaries.

3.1.3 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 Collieries activities / premises.

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. EPL1770 was last updated on the 30th October 2015.

A copy of EPL1770 is posted on the Colliery website, www.chainvalleymine.com.au or via the EPA website, http://www.environment.nsw.gov.au/licensing/ and is also provided as **Appendix 4**.

Monitoring results obtained in accordance with the license conditions are now also made available publically on the Colliery website (updated monthly), under the environmental reporting page: http://www.chainvalleymine.com.au/approvals-plans-reports/environmental-reporting/

LakeCoal also holds groundwater bore licence 20BL173107 issued under the Water Act 1912 and permits the extraction of 4443 ML per annum.

3.2 Mine Contacts

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

Mine Manager: Dave McLean
Telephone: 02 43580 800

Email: dmclean@lakecoal.com.au

Environment and Community Coordinator: Chris Armit
Telephone: 02 4358 0883
Email: carmit@lakecoal.com.au

Postal Address: LakeCoal Pty Ltd
P.O Box 7115
Mannering Park NSW 2259

3.3 Actions Required from Previous Annual Review Inspection

LakeCoal received formal acknowledgement from DP&E on 29 November 2018 that the site's 2017 Annual Review generally satisfied the project approval requirements. An inspection was undertaken on 23 November 2018. As identified in **Table 3.2**, there were some items required from DP&E's review (29/11/18).

Table 3.2: Actions required from last Annual Review inspection

Item	Issue / Observation	Action	Status
1	Approvals and Licences	Annual Review 2018 - Include compliance status with Water Licence 20BL173107 included in the Statement of Compliance	See Section 1.1.4
2	Environmental Predictions	Annual Review 2018 - Noise predictions	See Section 3.10
3	Water Take	Annual Review 2018 - Water Take - Water taken during the reporting guide is reported in accordance from Table 7 of the Annual Review Guideline	See Section 2.8
4	Independent Environmental Audit	Annual Review 2018 - Independent Environmental Audit - includes details of close-out of non-compliance and recommendations from the most recent audit. Include information on the next proposed audit.	See Section 6
5	Weed Management	Annual Review 2018 - Weed Management - Include Weed Action Plan in the next and future Annual Reviews- Weed Action Plan 2016	See Appendix 1- Plans
6	Housekeeping	Annual Review 2018 - Housekeeping - Include action plan in next and future Annual Reviews to address housekeeping	See Section 8

Item	Issue / Observation	Action	Status
7	Website update	Website update - Upload post 2014 Extraction Plans and SMPs documents. Upload Multi-seam mining feasibility investigation and its approval	See website (www.chainvalleymine.com.au)
8	Community	Community Complaints - please ensure trend analysis from community complaints for the life of project is provided	See Section 4.1
9	Community	Add Compliance Table to Annual Review 2018 to display compliance to 29/11/2018 Dept. of Planning Letter	See Section 1.3

3.4 Mine Geology

The Wallarah, Great Northern and Fassifern seams have been mined at Chain Valley Colliery 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 180 to 200 m with the seam being approximately 30 m deeper than the Great Northern seam, which underlies the Wallarah seam by approximately 30 m also. **Figure 3.2** shows the typical stratigraphy at Chain Valley Colliery including the Wallarah, Great Northern and Fassifern seams.

The Fassifern seam is overlain by a tuffaceous claystone material which varies in thickness between 20-30 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 seam; however the focus of operations and current development consent only permits mining within the Fassifern seam.

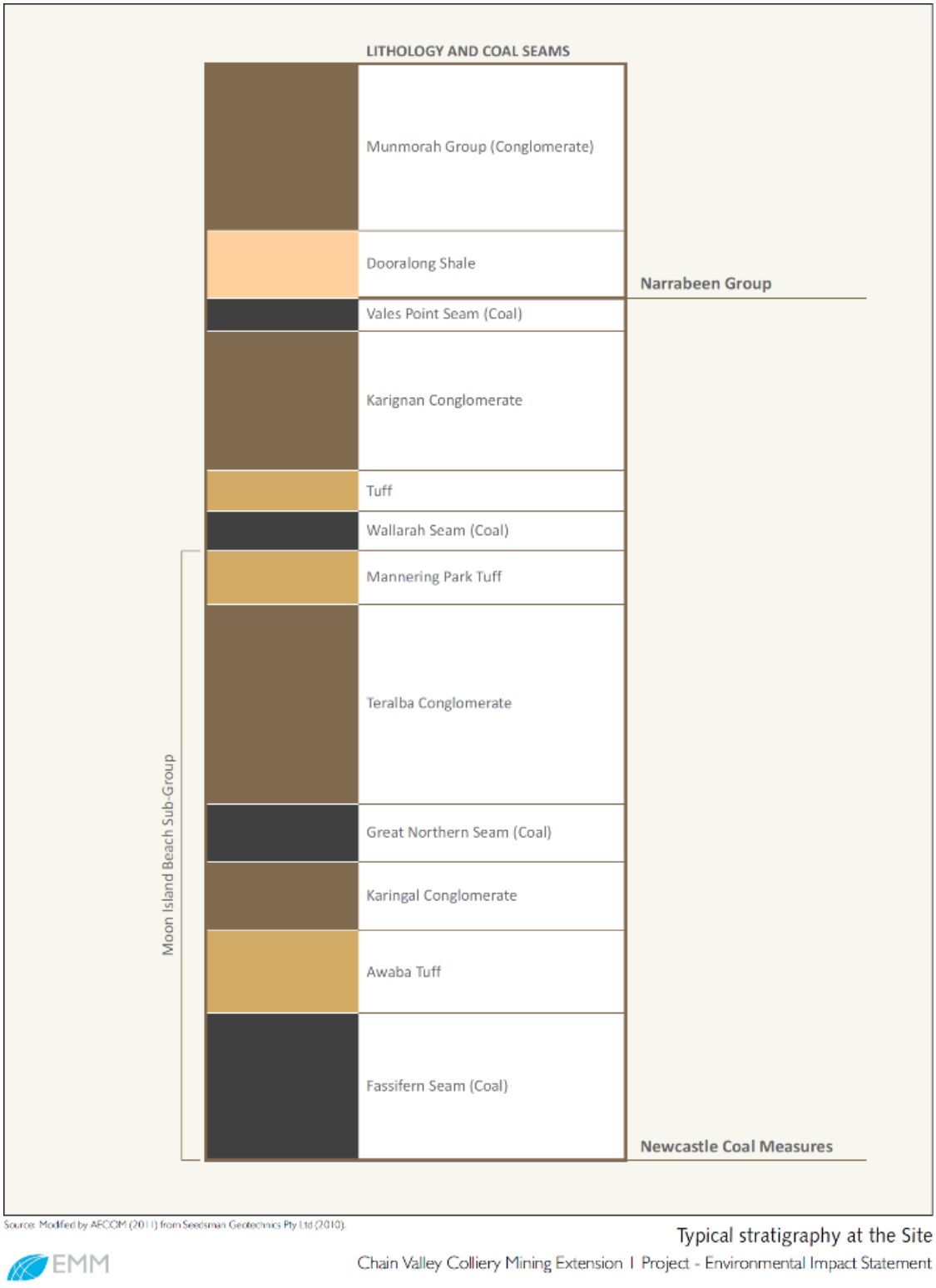


Figure 3.1: Typical stratigraphy at Chain Valley Colliery

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

There were no construction works undertaken during the reporting period. LakeCoal did however commenced planning works associated with a new control room building that is proposed to be constructed on the site during the next reporting period.

4.4 Mining

Since commencement of mining in the 1960's Chain Valley Colliery has been utilising bord and pillar methods with full and partial pillar extraction as the primary means of secondary coal extraction.

In the latter part of 2010 it was decided to change the primary extraction method to miniwall mining. Miniwall extraction commenced in September 2011.

During the reporting period LakeCoal achieved a significant operational milestone with the connection of both Chain Valley Colliery and Mannering Collieries underground and surface infrastructure through its link road project. As a result of the underground connection Chain Valley Colliery commenced the transport of coal to VPPS via the existing approved overland conveyor from Mannering Colliery in August 2017.

Total production for 2018 was 0.4Mt, comprised of 446m of longwall retreat and 5990m of development drivage. Miniwall mining during the reporting period consisted of Miniwall 12, Miniwall 5a and Miniwall CVB1.

Chain Valley Colliery completed mining in MW5A and commenced mining in the first miniwall panel in Chain Valley Bay (CVB1) during the reporting period.

Chain Valley Colliery will be developing and submitting a new Extraction Plan for its Northern Mining Area in the next reporting period.

A production summary for the reporting period is provided in **Table 4.1** while **Figure 4.1** shows the past 12 years' annual ROM production, including that for the current reporting period. Note that prior to 2013 the reporting period was on a financial year basis, however to align reporting with Development Consent requirements, this has now been moved to a calendar year basis.

Table 4.1: Production Summary

Material	Approved Limit (Mt)	Previous Reporting Period (Actual)	This Reporting Period (Actual)	Next Reporting Period
Waste Rock / Overburden	n/a	n/a	n/a	n/a
ROM Coal	2.1Mt	1.2Mt	0.4Mt	1.3Mt
Saleable Product (Same as ROM)	2.1Mt	1.2Mt	0.4Mt	1.3Mt
Coarse Reject	n/a	n/a	n/a	n/a
Fine Reject	n/a	n/a	n/a	n/a

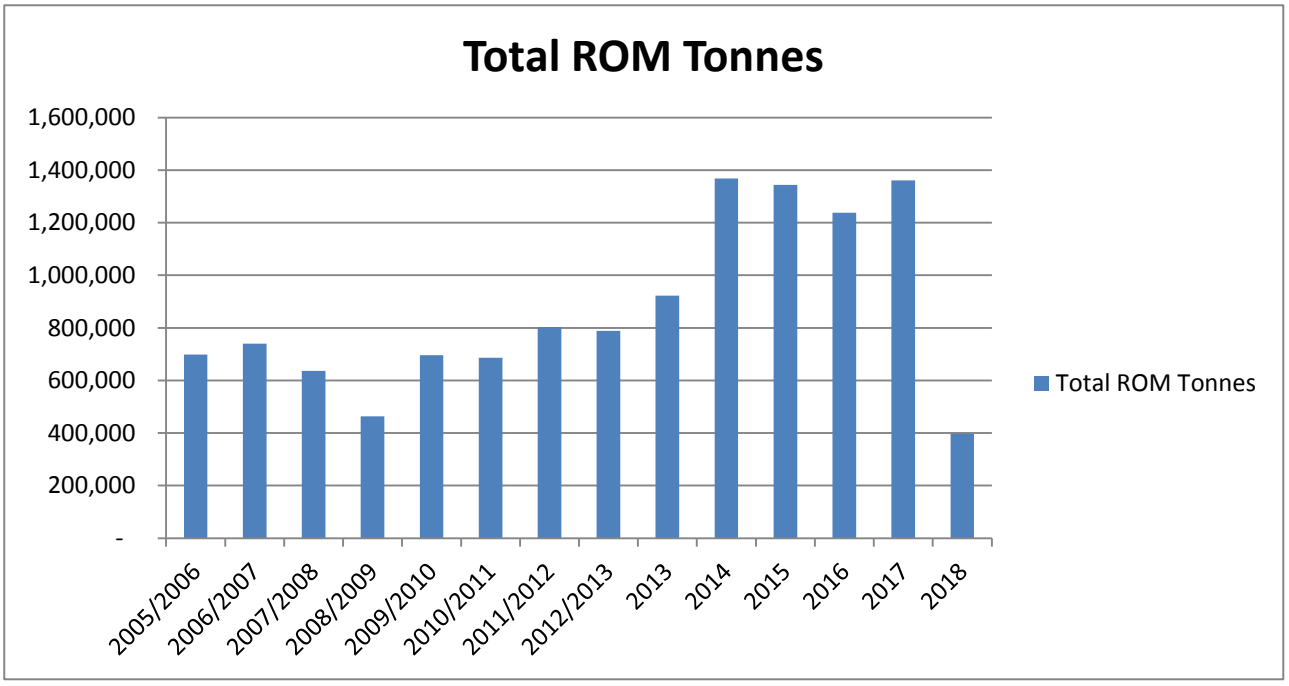


Figure 4.1: Annual ROM production levels

All coal produced, if not stockpiled at the end of the reporting period was dispatched to VPPS via conveyor from Mannering Colliery.

During the reporting period a total of 394, 213 tonnes was dispatched to VPPS (domestic market).

4.5 Mineral Processing

Chain Valley Colliery produces a raw, crushed thermal coal with low sulphur which is suitable for both export and domestic markets. Raw coal is screened, crushed and sized on site to the market demands of specific domestic customers, primarily Delta Electricity. No other mineral processing was carried out during the reporting period.

4.6 Waste Management

LakeCoal continued to implement a total waste management system for the site during the reporting period. The main waste streams currently provided for include;

- General Waste;
- Scrap Metal;
- Comingled Recycling;
- Waste Oil;
- Pallets/Timber Recycling;
- Oily Rags;
- Oil Filters;
- Oil Drums;
- Waste Batteries; and
- Confidential Documents.

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 on **Figure 4.3**. During the reporting period there was a continued focus on recycling with a large amount of scrap metal removed from site. The total waste management system will continue during the next reporting period.

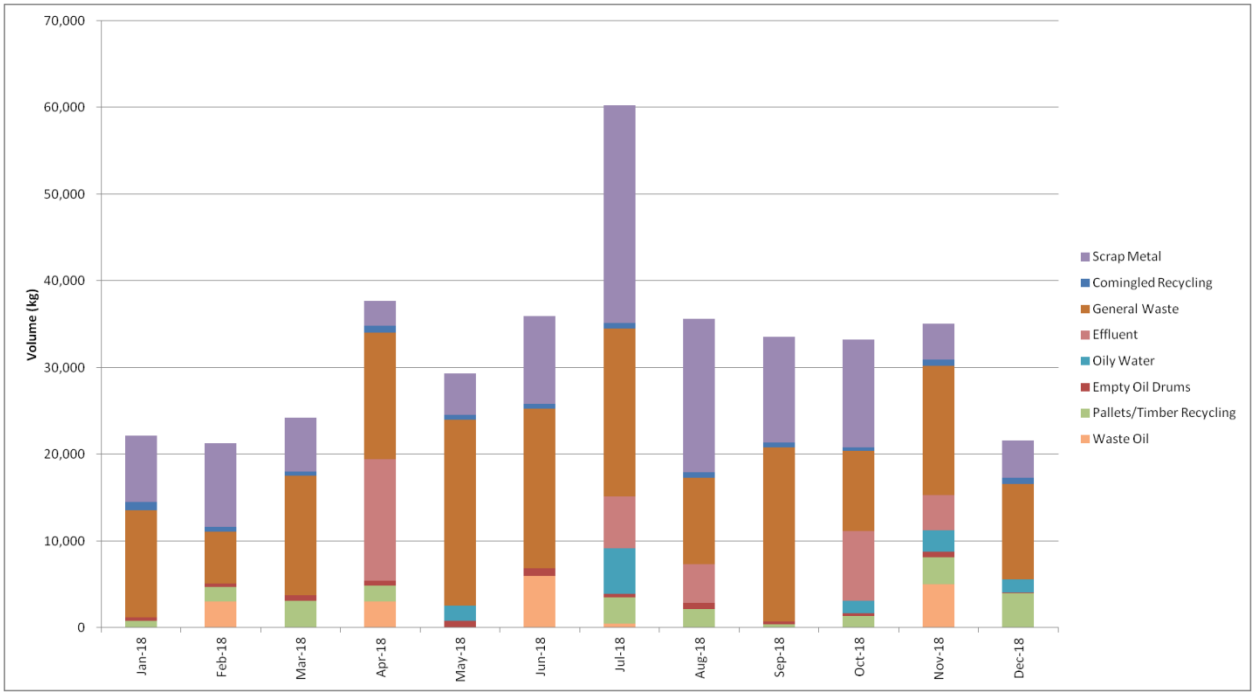


Figure 4.3: CVC Major waste streams and volumes

4.7 Stockpiles

Generally coal stockpiles are in the order of 40,000 tonnes but depending on demand up to 150,000 tonnes may be kept on site. The stockpile size is dependent on demand, shipping schedules, coal pad space and ship loading windows.

The coal stockpile generally sat at around 0 tonnes during the reporting period.

Generally run of mine coal cut at the face continues through the coal handling system to the final products bin and is then trucked to the customer (or port in the case of export coal) or temporarily stockpiled. If being stockpiled the coal is conveyed from the final product bin to the stockpile via a stacker conveyor. A bulldozer or front end loader manages the cone of coal under the stacker conveyor and the coal stockpile in general as required.

Following the linkage of both Chain Valley and Mannering Colliery underground in August 2017 no coal has been transferred to the surface at Chain Valley Colliery since this time. During the August the remainder of the coal stockpiled on site was transferred to VPPS.

4.8 Hazardous Materials Management

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

- a 15,900L diesel tank;
- chemical storage sheds;
- a covered, bunded area for storage of pallets of oils, and bulk fluid containers; and
- 31.4kL self bunded diesel tank (compliant with both AS1692 and AS1940) at the coal stockpile area.

There have been no other significant changes made to the management of hazardous materials during the reporting period.

4.9 Other Infrastructure Management

No significant changes have been made to other infrastructure during the reporting period.

5 Actions required from previous Annual Review

5.1 Actions Required from Previous Annual Review Inspection

LakeCoal received formal acknowledgement from DP&E on 29 November 2018 that the site's 2017 Annual Review generally satisfied the project approval requirements. An inspection was undertaken on 23 November 2018. As identified in **Table5.1**, there were some items required from DP&E's review (29/11/18).

Table 5.1: Actions required from last Annual Review inspection

Item	Issue / Observation	Action	Status
1	Approvals and Licences	Annual Review 2018 - Include compliance status with Water Licence 20BL173107 included in the Statement of Compliance	See Section 1.1.4
2	Environmental Predictions	Annual Review 2018 - Noise predictions	See Section 3.10
3	Water Take	Annual Review 2018 - Water Take - Water taken during the reporting guide is reported in accordance from Table 7 of the Annual Review Guideline	See Section 2.8
4	Independent Environmental Audit	Annual Review 2018 - Independent Environmental Audit - includes details of close-out of non-compliance and recommendations from the most recent audit. Include information on the next proposed audit.	See Section 6
5	Weed Management	Annual Review 2018 - Weed Management - Include Weed Action Plan in the next and future Annual Reviews- Weed Action Plan 2016	See Appendix 1- Plans
6	Housekeeping	Annual Review 2018 - Housekeeping - Include action plan in next and future Annual Reviews to address housekeeping	See Section 8
7	Website update	Website update - Upload post 2014 Extraction Plans and SMPs documents. Upload Multi-seam mining feasibility investigation and its approval	See website (www.chainvalleymine.com.au)
8	Community	Community Complaints - please ensure trend analysis from community complaints for the life of project is provided	See Section 4.1

Item	Issue / Observation	Action	Status
9	Community	Add Compliance Table to Annual Review 2018 to display compliance to 29/11/2018 Dept. of Planning Letter	See Section 1.3

Environmental management at Chain Valley Colliery is structured through the developed environmental management system based on the company's Environmental Policy. The site risk assessment of environmental aspects at Chain Valley Colliery 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 expanded throughout the reporting period to incorporate the documents as listed below in **Table 5.2**.

Table 5.2: Primary elements of the Environmental Management System

Document Title
Environment & Community Policy
Environmental Management Strategy
Environmental Risk Assessment
Environmental Objectives and Targets
Water Management Plan
Air Quality Management Plan
Best Management Practice Air Quality Assessment
Noise Management Plan
Heritage Management Plan
Biodiversity Management Plan
Seagrass Management Plan
Benthic Communities Management Plan
Rehabilitation Management Plan
Waste Management Standard
Spill Response Standard
Environmental Inspection
Complaints Register

6 Environmental Performance

6.1 Air Pollution

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 as well as the car park.

There were no complaints received during the reporting period relating to dust.

During the reporting period monitoring in accordance with the approved Air Quality Management Plan continued. Depositional dust monitoring results are shown in **Table 6.1** and the year-to-date averages are presented on **Figure 6.1.** In addition to the results during the reporting period, long term data showing the annual average depositional dust results trend from the commencement of monitoring are shown on **Figure 6.2.**

Table 6.1: Depositional dust results (2018)

	Limit	DDG001 - Mine Cottages	DDG002 - South Easement	DDG003 - Macquarie Shores	DDG004 - North Easement	DDG005 - Adjacent Vent Site
Month		Insoluble Solids	Insoluble Solids	Insoluble Solids	Insoluble Solids	Insoluble Solids
Jan-18	4	1.10	1.00	0.80	2.80	1.20
Feb-18	4	0.60	0.80	0.60	1.00	0.70
Mar-18	4	0.50	0.70	0.70	0.70	1.20
Apr-18	4	0.60	0.60	0.80	0.80	13.50
May-18	4	0.70	0.60	0.60	0.80	0.80
Jun-18	4	1.20	0.40	0.30	0.60	0.60
Jul-18	4	0.10	<0.10	<0.10	<0.10	<0.10
Aug-18	4	0.80	0.60	0.40	0.50	0.90
Sep-18	4	0.70	0.80	0.90	0.80	1.20
Oct-18	4	1.20	0.80	0.40	1.00	0.90
Nov-18	4	0.50	0.50	0.90	1.60	1.30
Dec-18	4	0.50	0.80	1.60	1.40	1.50
2018 AVG	4	0.71	0.69	0.73	1.09	2.16

Notes: 1) For site locations refer **Appendix 1: Plans**.

2) DDG005 recorded elevated results during the reporting period. An audit of the elevated results and dust gauge site confirmed that the elevated results were due to localized earthworks in the vicinity of the gauge over the Spring and Summer period. Consultation with the landowner and EPA will be undertaken in the next reporting period regarding the potential relocation of this gauge.

There was a high result at DDG005 in April 2018; this survey point is the closest resident gauge. This high result was most likely due to prevailing winds, maintenance activities and other related residential or industrial impacts. It is noted this high result is not an exceedance.

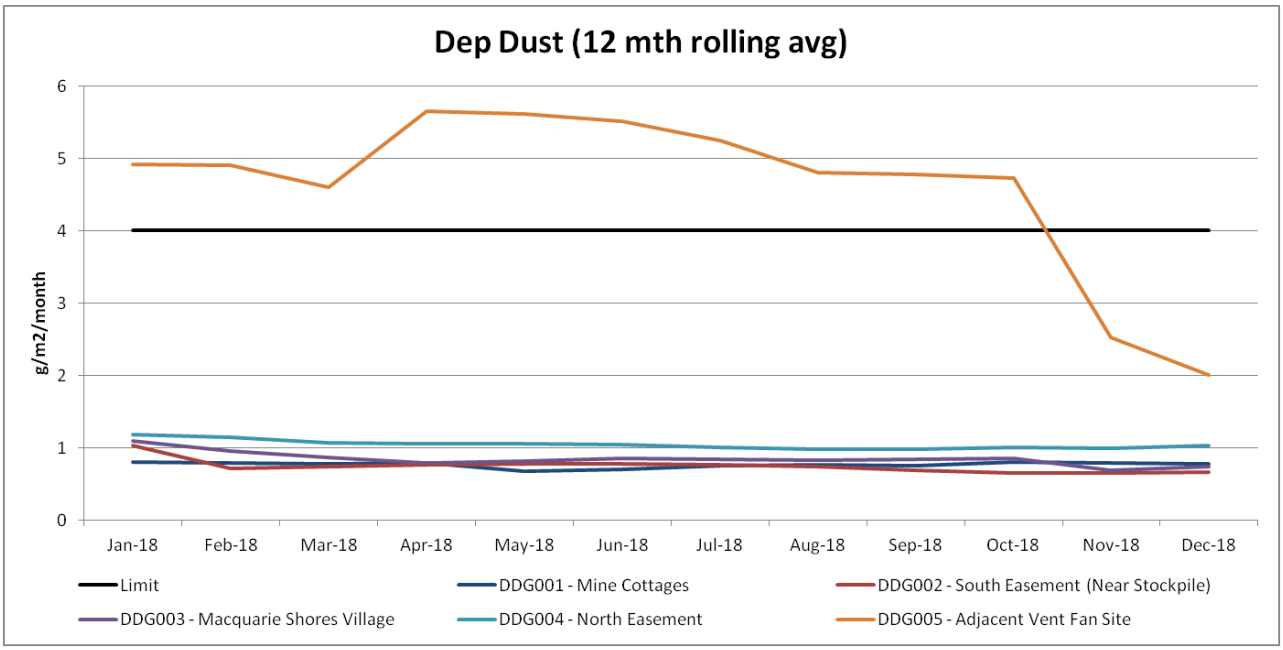
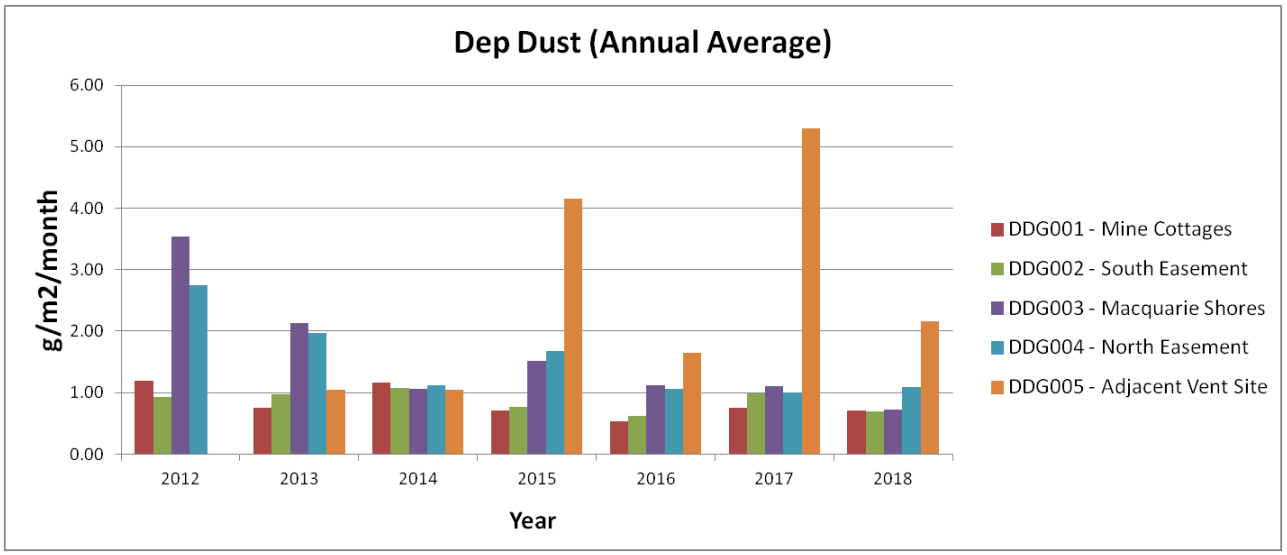


Figure 6.1: Annual average depositional dust results



Notes: 1) Monitoring commenced in September 2012, as such 2012 averages comprise only 4 months data

2) Monitoring of DDG005 was commenced in March 2013 upon gaining access to private property for monitoring purposes, as a result the annual average for 2013 includes only 10 months data and no 2012 data is available.

Figure 6.2: Annual average depositional dust result trend

Excluding DDG005, deposited dust levels for the reporting period were below the EPA long term criteria annual maximum level of 4 g/m^2/month at all sites. Additionally, no gauges showed annual increases in deposited dust levels above the EPA maximum of 2 g/m^2/month during the reporting period. Dust deposition results show low annual averages at all sites. Annual averages were generally similar to the maximum predicted cumulative air quality impacts identified in the EIS (May 2013) as presented in Table 7 of the Air Quality Management Plan.

As detailed in the 2013 AEMR, a 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 6.3**. The real-time monitor measures particulate matter less than 10 microns in size (PM_{10}).

Figure 6.3: Air quality monitoring locations

Data capture from the real time monitor for the 2018 period was 99.9%, with the results trend generally reflecting that expected, i.e. slightly higher daily results during the hotter months of the year. There were no exceedances of the EPA short-term 24hr average criteria (50 µg/m^3) during the reporting period.

The EPA long-term annual average criterion (30 µg/m3) was not exceeded during the 2018 period. Daily results, the rolling average and relevant limits are shown on **Figure 6.4.**

Daily (24-hour) results ranged from a minimum of 6.13 µg/m^3 to a maximum of 112.98 µg/m^3 during 2018. The 2018 annual average of 24hr PM_{10} results was 16.1 µg/m^3. The most comparative locations from the EIS where PM_{10} air quality modeling 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, so a result of 16.1 µg/m^3 is significantly below the modeled values.

Monitoring of the PM_{10} via the TEOM unit commenced in late December 2013. When comparing the 2018 annual results to the previous year, the data capture rate was slightly higher in 2017. Data from the commencement of monitoring through to the end of the reporting period is shown on **Error! Reference ource not found.**.

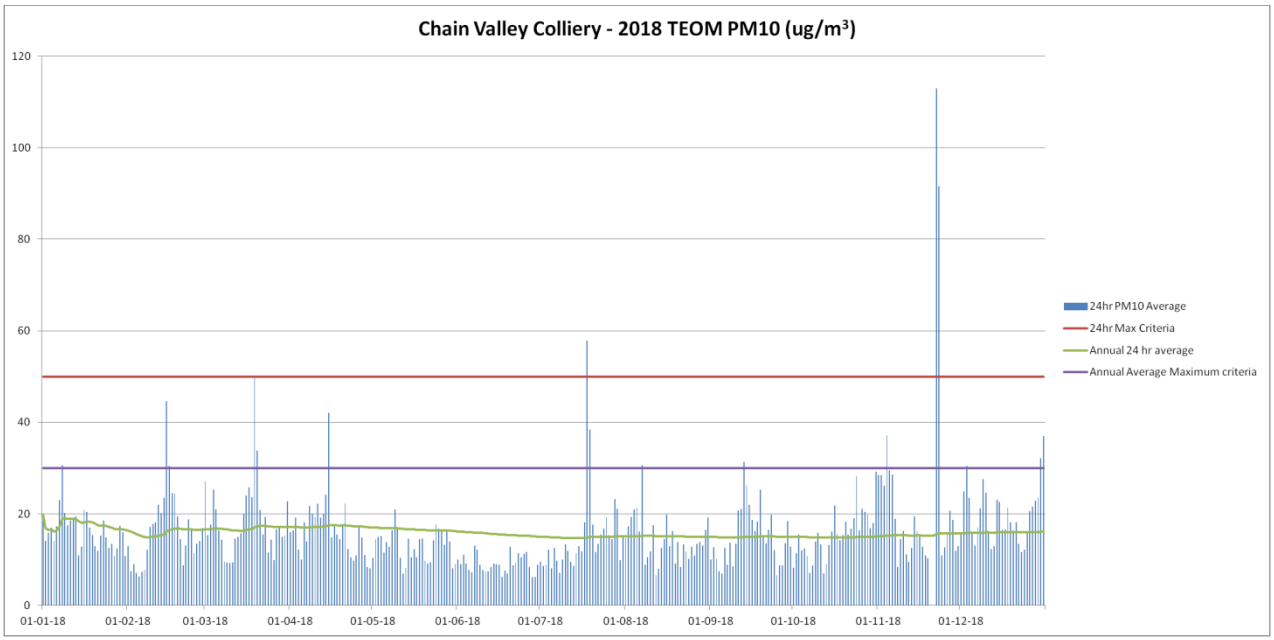


Figure 6.4: PM_{10} monitoring results during the reporting period

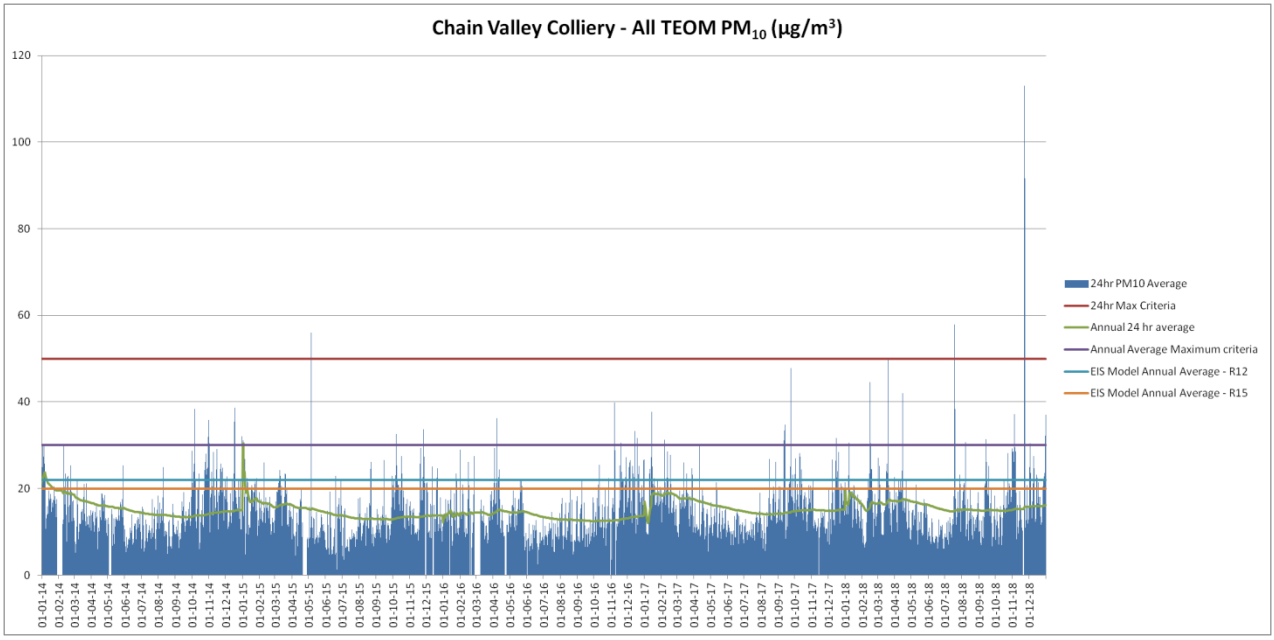


Figure 6.5: Long Term PM_{10} data compared against criteria and EIS predictions

In relation to **Figure 6.5,** note that the apparent spikes in the rolling 24 hour annual averages are associated with the commencement of a new calendar year when the annual average "resets", and is not reflective of significant annual average air quality changes.

The air quality monitoring program, including depositional dust and PM_{10} monitoring will continue into the 2019 reporting period.

6.2 Contaminated Polluted Land

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

There is no known contaminated land at Chain Valley Colliery, 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 degree angle of draw to the Colliery workings. Only first workings are permitted in the Seagrass Protection Barrier, which will result in negligible subsidence.

Seagrass monitoring occurred during the reporting period in accordance with the current Seagrass Management Plan. Seagrass transect locations are shown on **Figure 6.7** and the discussion from the report (Laxton & Laxton, July 2018) related to the results obtained during the reporting period highlighted the following;

In June 2018, seagrass cover at the transects ranged from 62.50 to 100 percent in the study area (Table 67.1), with the majority of transects exhibiting a seagrass cover greater than 95%. The health and condition of the seagrass was good. Some seagrasses were lightly fouled with epiphytic algae while others were clear of epiphytic algae. The brown seaweed Cystophyllum onustum was present on shells and pebbles protruding through the seagrass, almost reaching the surface at Transects E1 to E4.

Changes in the percentage area of the substratum covered by seagrasses in 2016 to 2018, compared with the 2008 values are shown in Table 67.2. At transects where the percentage area of substratum covered was relatively low, such as Transects E6 (17.74%), T3 (46.20%) and T6 (53.82%), seagrass coverage has increased by approximately about 80%, 50% and 40% respectively.

Seagrass cover has been high consistently at each transect since 2012, with seagrass health and condition being good.

During the 2018 monitoring most sites reported similar results to the previous year and in most cases, when compared to the 2008 baseline data have shown a significant increase in seagrass cover. A significant portion of the sites sampled have achieved a 100% seagrass cover value.

Results from 2008 to 2018 for changes in seagrass cover are shown in **Figure 6.6.**

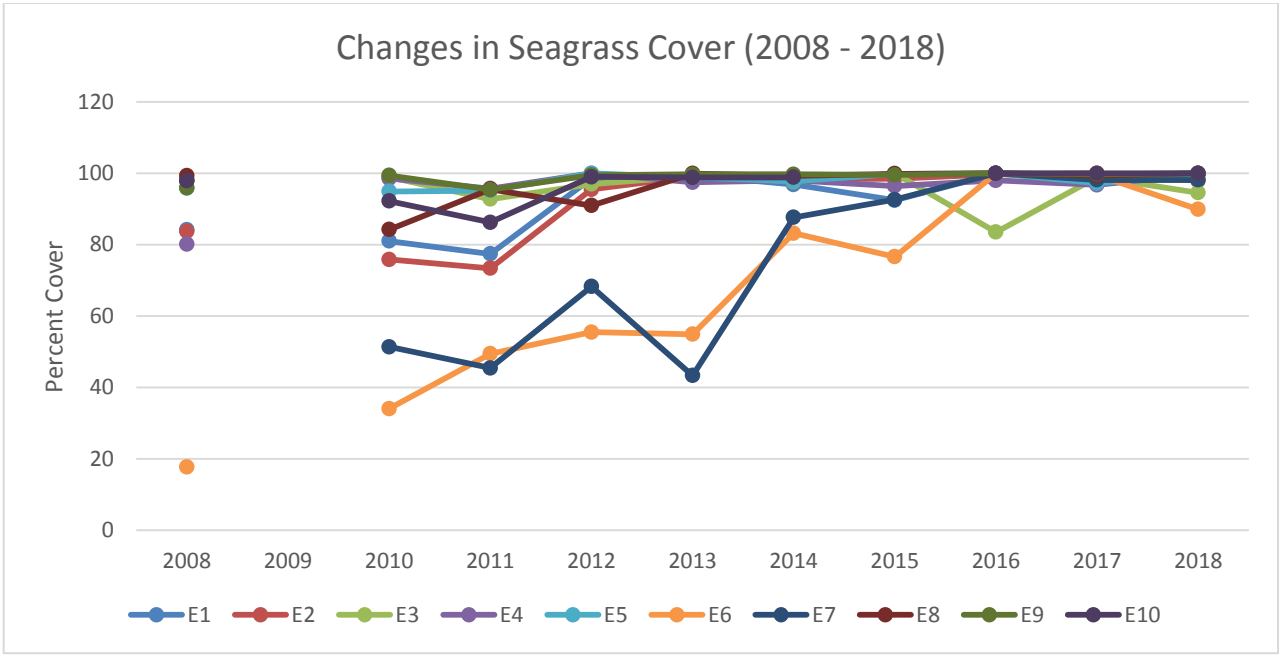


Figure 6.6: Changes in Seagrass Cover (2008-2018)

Figure 6.7: CVC Seagrass transect locations

6.4 Threatened Fauna

6.4.1 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 sclerophyl forest.

Surrounding the ventilation shaft site:

- coastal open woodland;
- grassy open woodland; and
- swamp sclerophyl forest.

Figure 6.8 and **Figure 6.9** identify the approximate boundaries of the communities surrounding the surface infrastructure.

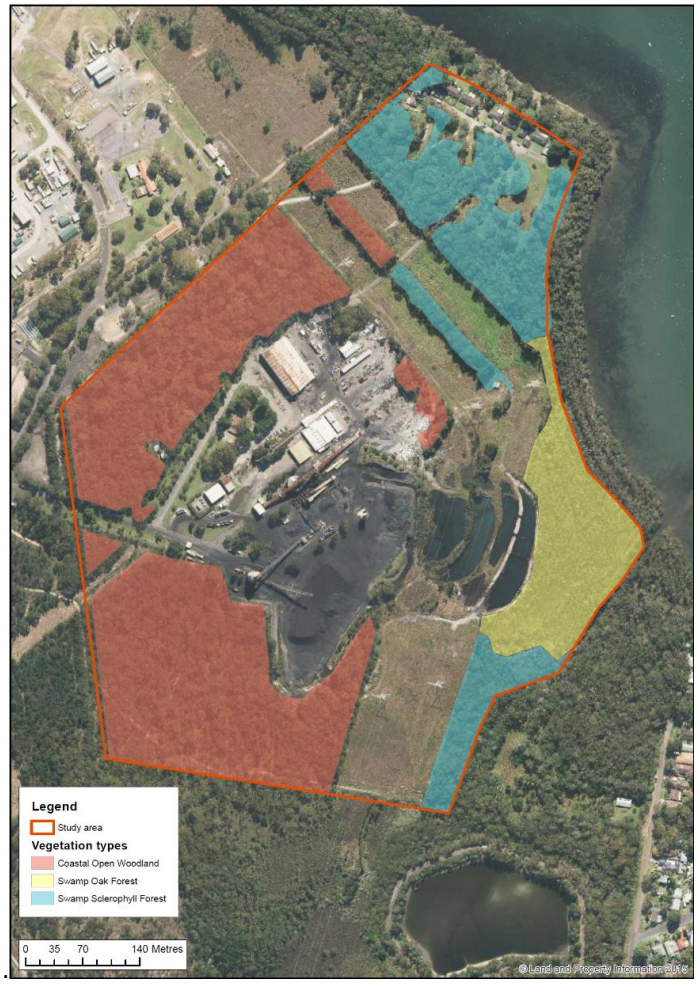


Figure 6.8: Vegetation communities around the pit top area

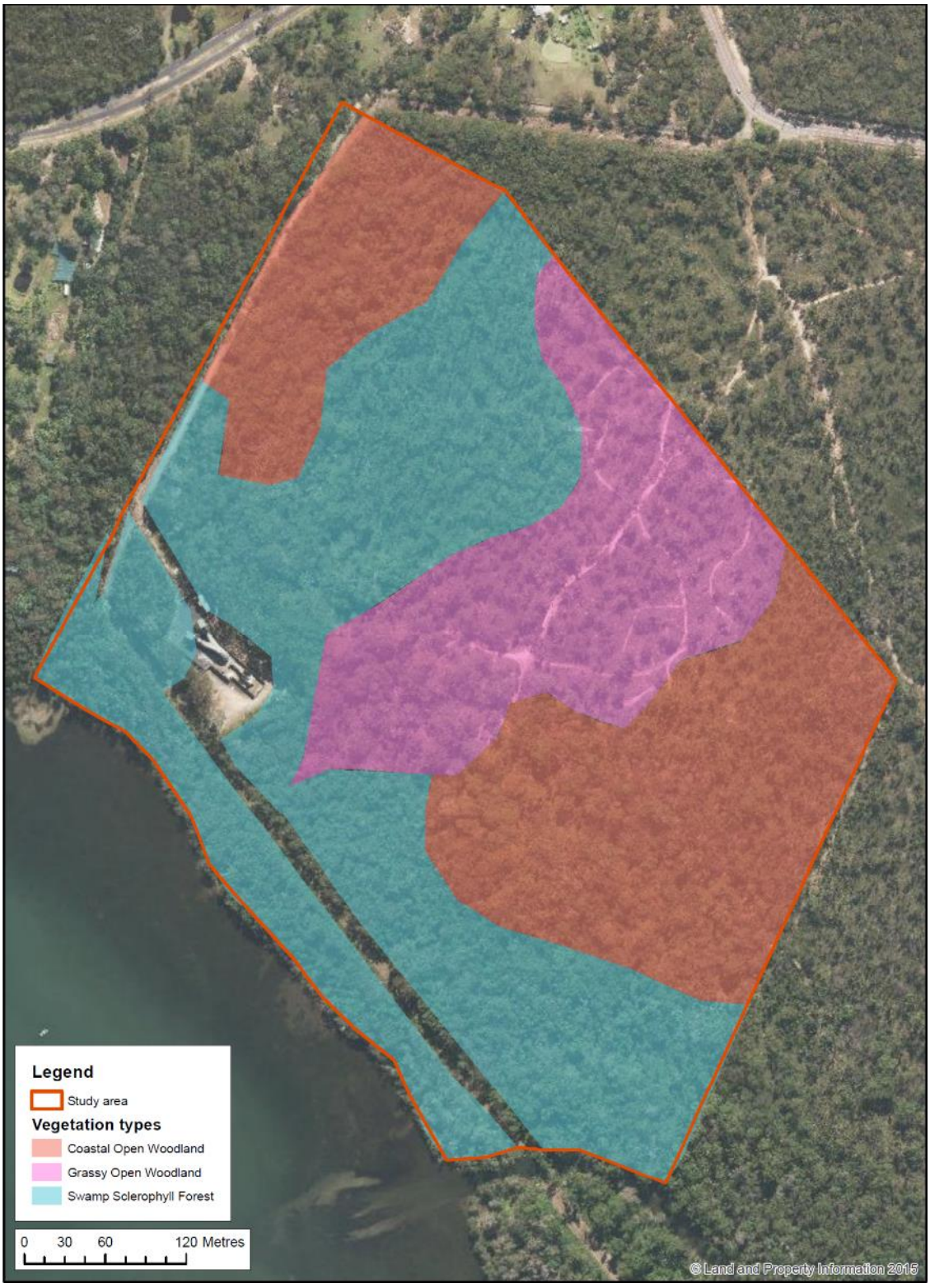


Figure 6.9: Vegetation communities around the ventilation shaft site

A Biodiversity Management Plan was previously completed and approved in 2012, and was updated during the reporting period. The Biodiversity Management Plan was updated to reflect the most recent development consent modification approved on the 15 December 2015. The latest version of this document is available from the Chain Valley Colliery website.

Annual biodiversity monitoring in accordance with the plan was continued during the reporting period, being undertaken in May 2018. The monitoring specifically looks at;

- the Swamp Oak Floodplain Forest below the sediment dams;
- 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 80.3% which is significantly higher than the established trigger value of 60% (refer to the Biodiversity Management Plan for details on site attributes and methodology for determining the weighted score). There was no feral animal activity recorded during the 2017 monitoring. Weed monitoring and management is discussed in **Section 6.5**.

6.4.2 Terrestrial Fauna

No clearing works were undertaken during the reporting period and as a result potential to impact to threatened fauna or other native fauna was minimised.

6.4.3 Aquatic Fauna

In March 2018, 22 benthic stations were sampled. The following is a history of benthos sampling from 2014 to 2018.

By March 2014, mining beneath the lake had proceeded so that two Reference stations (R) had been re-designated Impact Stations (IM). They were:

- R3 became IM5; and
- R4 became IM6.

By September 2014, Station R5 had also become an impact station, namely IM7.

In March 2016 two more stations were added to the sampling schedule. They were:

- C5 GR 367701 6334310; and
- R7 GR 366232 6333856.

In September 2016, difficult geology beneath Bardens Bay and along parts of Summerland Point led Lake Coal to begin mining beneath Chain Valley Bay. To accommodate this change in mining direction, three additional benthos sampling stations were added. They were C6, R8 and R9:

- C6 GR 363988 6332492;
- R8 GR 364523 6332010; and
- R9 GR 365258 6331210.

The total number of Stations sampled in September 2017 was 19. In March 2018, three new stations were added to the sampling programme. They were:

- C7 GR 366276 6334947;
- R10 GR 365172 6334706; and
- R11 GR 367072 6333639.

Benthic sampling locations are shown on **Figure 6.10**.

The mud basin off Summerland Point, in Chain Valley Bay and Bardens Bay, was found to be inhabited by 22 species of organisms greater than 1mm in size. This list was derived from the 13 samplings undertaken between February 2012 and March 2018. Polychaete worms and bivalve molluscs were the most frequently encountered animals.

During the reporting period sampling for benthic fauna was undertaken in Lake Macquarie during March 2018. Of the 5 new stations added during the previous reporting period, two were added to obtain baseline information in the site's northern mining domain (R7 and C5) while the remaining 3 sites (C6, R8 and R9) were added to the southern part of the mine plan due to the scheduling changes in the mine plan during 2016. Monitoring was undertaken in accordance with the approved Benthic Communities Management Plan.

The monitoring reports from March sampling provided the following information.

The 13 samplings of the benthos undertaken at six monthly intervals between February 2012 and March 2018 revealed the following:

- The same suite of organisms dominated each of the 22 sample stations. These were polychaete worms and bivalves;
- Stations were distinguished by the relative abundance of the dominant species;
- Water depth was not in any way important in determining the species composition at a station; and
- Physical variables such as salinity (conductivity), dissolved oxygen concentration and turbidity of the bottom water, measured only on the day the benthos was sampled, had little influence on the species composition of the benthos over the period sampled. However, it is clear that 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).

These results appear to support the notion that increasing the water depth by the predicted 0.8m subsidence has, to date, had no discernible effect on the composition and abundance of organisms making up the benthos of the mud basin.

In March 2018 a total of 1160 organisms were collected at the 22 stations as detailed in **Table 6.2**.

Table 6.2: Number of Species found at each Station from February 2012 to March 2018

Station	C1	C2	C3	C4	C5	C6	R1	R2	R3	R4	R5	R6	R7	R8	R9
Feb 2012	10	5	5	7			8	8	5	5					
Sept 2012	3	6	4	4			6	3	4	5					
March 2013	4	5	7	7			6	5	6	5					
Sept 2013	6	6	3	7			5	6	5	4					
March 2014	4	3	5	5			6	4	5	3	4	3			
Sept. 2014	3	4	4	8			6	5	6	6	3	3			
March 2015	3	3	5	3			5	3	6	5	3	3			
Sept. 2015	5	4	4	3			5	3	4	6	5	4			
March 2016	6	4	5	5	5		6	5	6	4	4	4	8		
Sept. 2016	7	3	6	5	4	8	8	4	5	6	6	7	7	5	8

March 2017	2	4	5	3	5	5	4	5	4	5	4	4	4	3	5
Sept. 2017	4	4	4	4	4	5	4	3	6	5	4	4	4	5	4
March 2018	4	4	8	4	4	3	7	8	5	4	6	3	4	3	4

Station	C7	IM1	IM2	IM3	IM4	R10	R11
Feb 2012		7	4	4	5		
Sept 2012		4	4	3	5		
March 2013		7	5	5	5		
Sept 2013		4	3	4	5		
March 2014		5	9	4	5		
Sept. 2014		5	6	3	6		
March 2015		5	4	4	5		
Sept. 2015		5	5	4	4		
March 2016		6	6	3	4		
Sept. 2016		6	4	6	3		
March 2017		3	4	3	4		
Sept. 2017		5	5	5	5		
March 2018	5	5	7	3	4	4	4

In summary, the mud basin off Summerland Point and in Chain Valley between February 2012 and March 2018 was found to be inhabited by 22 species of organisms greater than 1mm in size. Polychaete worms and bivalve molluscs were the most frequently encountered animals.

Bottom sediment in the study area was composed of a small fraction of black sand and shell fragments of various sizes. Most of the sediment was fine black mud. There was no significant difference in sediment characteristics at the 19 stations sampled except for various amount of sand and buried shell between samples taken between February 2012 and September 2016.

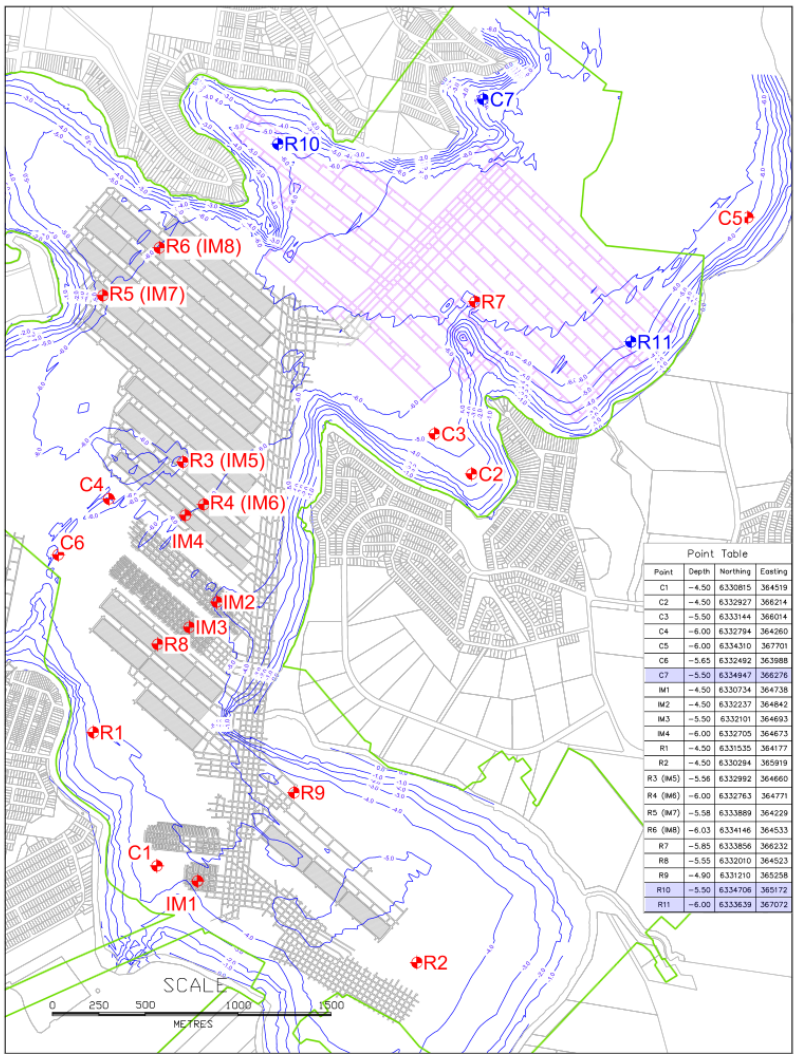
The eleventh and twelfth sampling events of the benthos in March 2018 continued to show that:

- The same suite of organisms dominated each of the 19 sample stations. These were polychaete worms and bivalves;
- Stations were distinguished by the relative abundance of the dominant species;
- The number of species present and tier abundance can fluctuate;
- Water depth was not a determining factor of the species composition at a station; and
- Physical variables such as salinity (conductivity), dissolved oxygen concentration and turbidity of the bottom water, measured only on the day the benthos was sampled, had little influence on the species composition of the benthos over the period sampled.

There were some differences in the relative abundance of organisms in the samples collected at the ten time periods although the same species of animals made up the fauna in each case. It is too early to say whether these differences represent seasonal changes or were caused by patchiness in the distribution of animals.

As the monitoring data received in the reporting period did not indicate any adverse impacts to benthic community diversity or abundance directly associated with mine subsidence, continued monitoring of the communities will be undertaken as per the Benthic Communities Management Plan.

Additional monitoring sites are planned to be added to the monitoring program in the 2018 period to obtain baseline information for the site's Northern Mining Area.



Point	Depth	Northing	Easting
C1	-4.50	6330815	364519
C2	-4.50	6332927	366214
C3	-5.50	6333144	366014
C4	-6.00	6332784	364260
C5	-6.00	6334310	367701
C6	-5.65	6332492	363988
C7	-5.50	6334947	366276
IM1	-4.50	6330734	364738
IM2	-4.50	6332237	364842
IM3	-5.50	6332101	364693
IM4	-6.00	6332705	364673
R1	-4.50	6331535	364177
R2	-4.50	6330284	365919
R3 (IM5)	-5.56	6332992	364660
R4 (IM6)	-6.00	6332763	364771
R5 (IM7)	-5.58	6333889	364229
R6 (IM8)	-6.03	6334146	364533
R7	-5.85	6333856	366232
R8	-5.55	6332010	364523
R9	-4.90	6331210	365258
R10	-5.50	6334706	365172
R11	-6.00	6333639	367072

Figure 6.10: CVC 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 LakeCoal engaged a weed contractor to undertake a significant weed control campaign across its operational areas. The main weeds targeted included Lantana, Bitou Bush, Crofton Weed and Pampas Grass.

LakeCoal will be continuing the weed control program in the 2019 reporting period.

See **Appendix 5** for the Weed Action Plan.

6.6 Blasting

No surface blasting activities were undertaken during the reporting period at the Colliery. From time to time period small amounts of explosives are used underground to remove geological intrusions into the coal seam and create overcasts; however this blasting is imperceptible from an environmental impact point of view.

6.7 Operational Noise

During the reporting period, quarterly environmental noise monitoring was undertaken on 19 and 23 March (Q1), 28 and 29 June (Q2), 28 and 29 August (Q3) and 19 and 20 December (Q4) 2018.

Global Acoustics conducted environmental noise monitoring around Mannering Colliery during the day/evening of 28/29 August 2018. On 29 August during the night survey, RA2 exceeded the impact assessment criterion by 1dB. Rotary breaker continuum was audible from MC throughout the measurement resulting in a site only LAeq of 40 dB. This has been reported within the Annual Review 2018 for Mannering Colliery.

Noise criteria are detailed in **Table 6.3** and **Table 6.4** and shown on **Figure 6.11**.

Table 6.3: 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

Table 6.4: 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

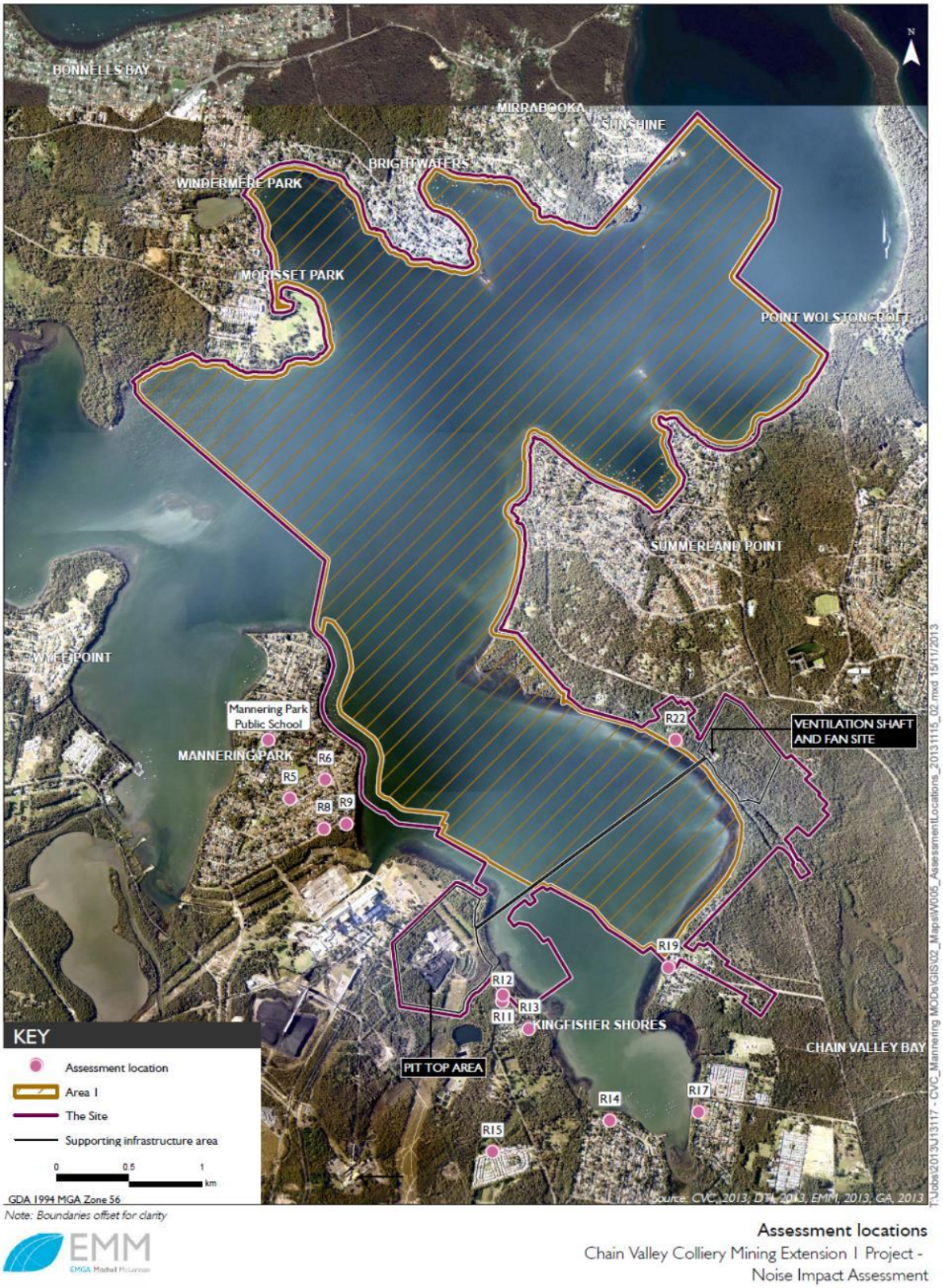


Figure 6.11: Noise Receiver Locations

Results of the attended noise monitoring undertaken during the 2018 reporting period in accordance with Chain Valley Colliery's Noise Management Plan are provided in **Appendix 6**.

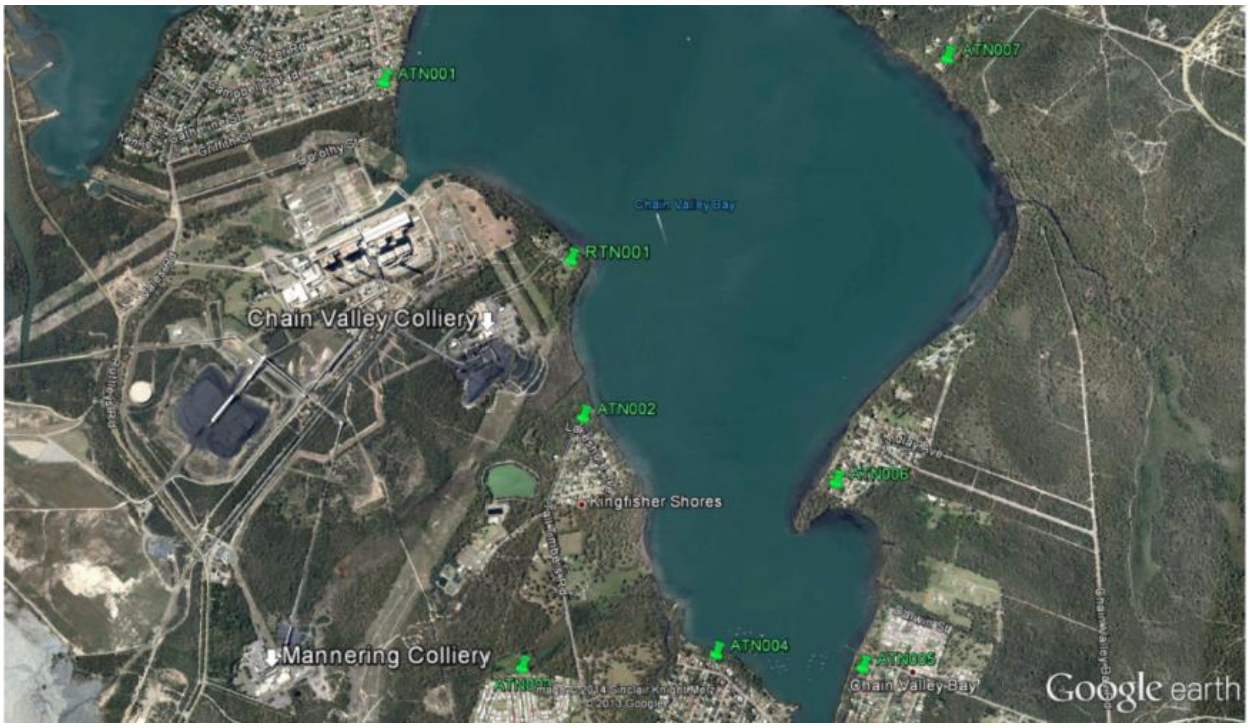


Figure 6.12: Noise monitoring locations

The real-time noise monitor located at site RTN001 as shown on **Figure 6.12** remained in operation during the reporting period and provided daily and weekly noise summary data via emailed reports which are automatically generated and distributed. There were no notifications that were triggered as a result of the Colliery's operations during the reporting period.

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 the reporting period.

6.9 Aboriginal Heritage

No impact on any Aboriginal heritage sites has occurred during the reporting period nor are any impacts expected due to the locations of the mine workings in relation to the known aboriginal sites. The surface facilities and disturbed area associated with mine infrastructure have no known Aboriginal sites.

The development of a Heritage Management Plan was completed during 2012 following consultation with Aboriginal stakeholders. This plan was updated and approved during 2014, the update was again completed in consultation with Aboriginal stakeholders. The primary update of the management plan was to include additional monitoring sites associated with proposed mining activities. However, mining is not scheduled to be undertaken in these areas for a number of years.

In accordance with the site Heritage Management Plan, monitoring of Aboriginal shell midden site #45-7-0189 was undertaken during the 2017 reporting period. The monitoring consisted of traditional survey (undertaken by Daly Smith) and a site inspection with the site's Registered Aboriginal Parties (RAP's).

During the 2017 inspection, the extent of visible surface shell and areas of exposure were of a comparable size to that recorded in the previous survey. It was noted that vegetation had assisted in stabilizing previously eroded areas. No ground disturbance from subsidence was noted during the inspection which was supported by the survey data. The next monitoring round has been scheduled for March 2019.

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 Chain Valley Colliery. The self-heating rates of the samples from the Chain Valley Colliery 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 Chain Valley Colliery 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 Chain Valley 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 Chain Valley Colliery. 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 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 Chain Valley Colliery during the reporting period.

6.12 Bush Fire

The pit top area contains vegetation which is considered to be bushfire prone land (Category 1) as shown on **Figure 6.14**. The ventilation shaft area has also been identified as containing Category 1 vegetation (**Figure 6.15**).

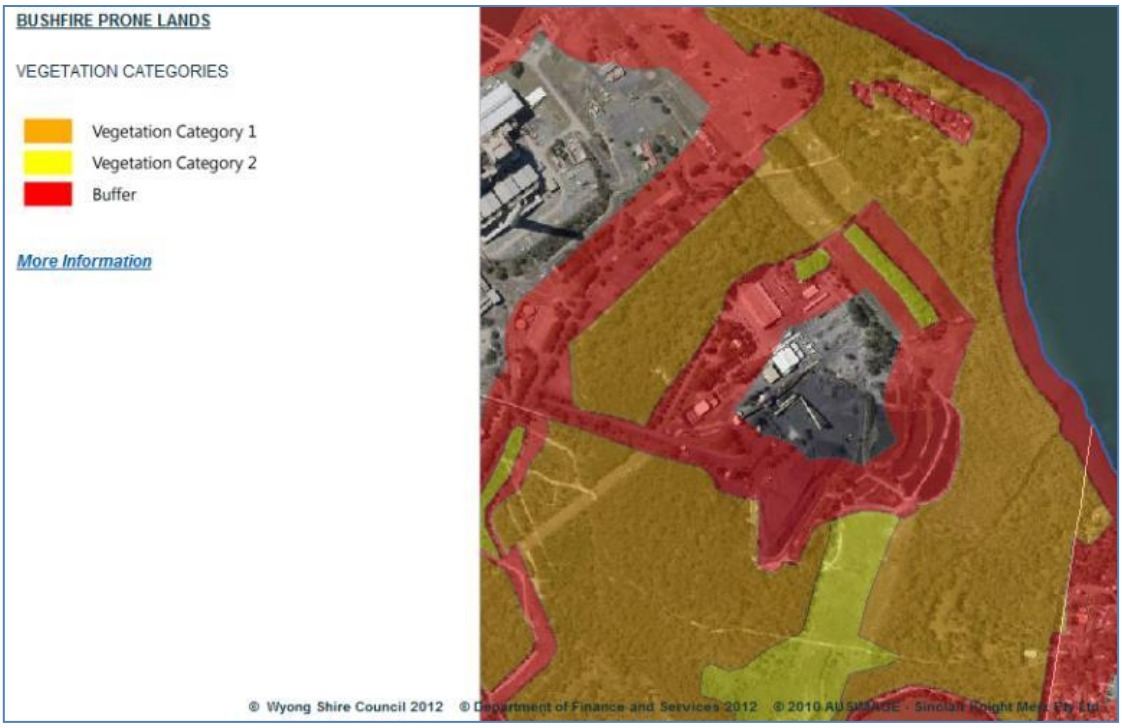


Figure 6.14: Bushfire Prone Land Map for the Pit Top Area (Source: Wyong Council, 2012)

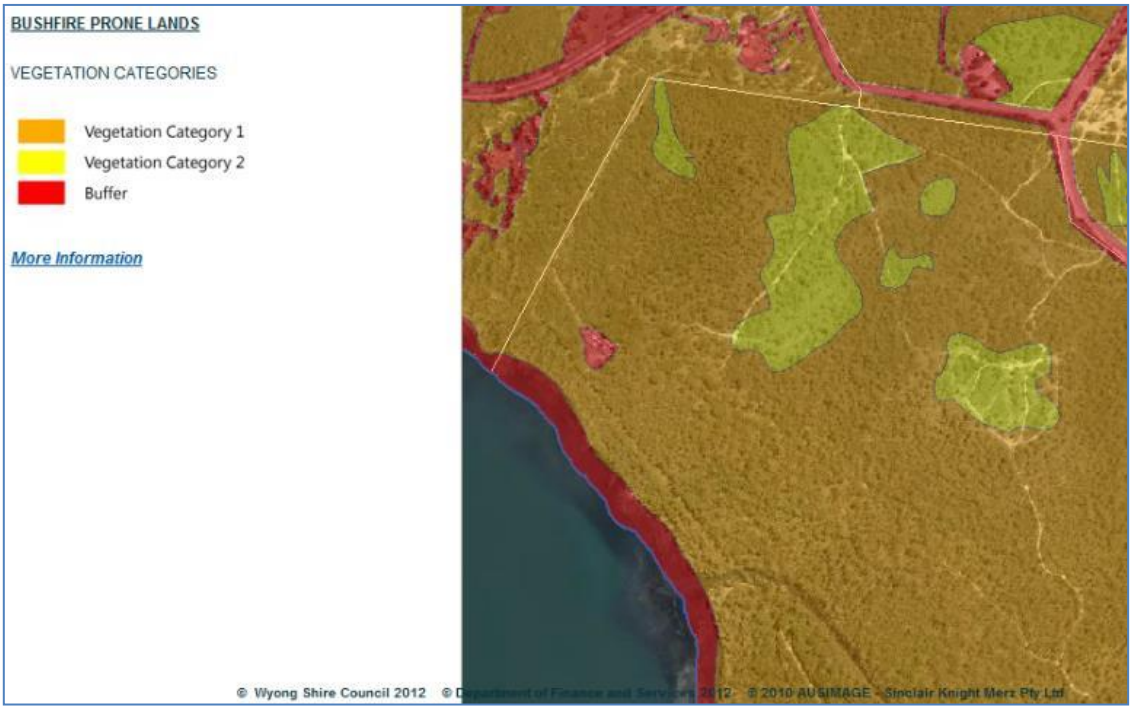


Figure 6.15: Bushfire Prone Land Map for the Ventilation Shaft Area (Source: Wyong Council, 2012)

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 LakeCoal 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;
- firebreaks and fire 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.

There was a significant bushfire on the 17th October 2013, which, while not affecting the pit top site, threatened the ventilation shaft site, the site was able to be defended by the rural fire service, but it highlighted a number of potential risks that had not previously been considered, such as access to the site during a bushfire event. A risk assessment and review was undertaken following this event which determined additional asset protection zones would be required. Approval was subsequently sought and approved during the reporting period for the establishment of the proposed APZ's. **Figure 6.16** shows the approved APZ area. LakeCoal progressed the establishment of the APZ's during the 2017 reporting period to improve its Bushfire protection zones.

Figure 6.16: Approved APZ's for Chain Valley Colliery.

6.13 Mine Subsidence

6.13.1 Overview of mining progress

Please refer to **Section 4.4** for details of the mining activities undertaken during the 2018 reporting period.

6.13.2 Approvals

During the reporting period LakeCoal undertook its mining activities in accordance with its extraction plan approvals for its MW5a and 7-12 area, its southern Chain Valley Bay mining area and N1/S2 Miniwalls.

In accordance with Schedule 4 of SSD-5465 Consent conditions, no secondary extraction was undertaken within the HWMSB or 26.5 degree angle of draw to the mapped seagrass extents.

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 (100m retreat, 50% and 100% complete). During extraction of Miniwall CVB1, weekly subsidence surveys of the foreshore areas were undertaken in accordance with an approved Subsidence Monitoring Program.

Bathymetric surveys are also undertaken each year to gauge subsidence levels over the area of secondary extraction undertaken beneath Lake Macquarie, where land-based surveys are not possible.

6.13.4 Performance Measures

Condition 1, Schedule 4 of SSD-5465 states:

“The Proponent shall ensure that vertical subsidence within the High Water Mark Subsidence Barrier and within Seagrass beds is limited to a maximum of 20 millimeters (mm).”

In addition to the above, Condition 2 within Schedule 4 of SSD-5465 also requires that:

“The Applicant shall ensure that the development does not cause any exceedance of the performance measures in Table 8 to the satisfaction of the Director-General.”

The relevant subsidence requirements from Table 8 within Schedule 4 of the Development Consent, including the relevant notes, are recreated in **Table 6.5**.

Table 6.5: Subsidence Impact Performance Measures - Natural and Heritage Features

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

Condition 4 within Schedule 4 of SSD-5465 also requires that:

“The Applicant shall ensure that the development does not cause any exceedances of the performance measures in Table 9, to the satisfaction of the Director-General”.

The relevant subsidence requirements from Table 9 within Schedule 4 of the Development Consent, including the relevant notes, are recreated in **Table 6.6**.

Table 6.6: Subsidence Impact Performance Measures – Built Features

Built Features	
Trinity Point Marina Development Other built features	• Always safe; • Serviceability should be maintained wherever practicable. Loss of serviceability must be fully compensated; • Damage must be fully compensated.

Subsidence monitoring results for Trinity Point peninsula, Brightwaters peninsular and subsidence monitoring lines numbers 23, 33, 32 and 24 are presented in **Appendix 7.**

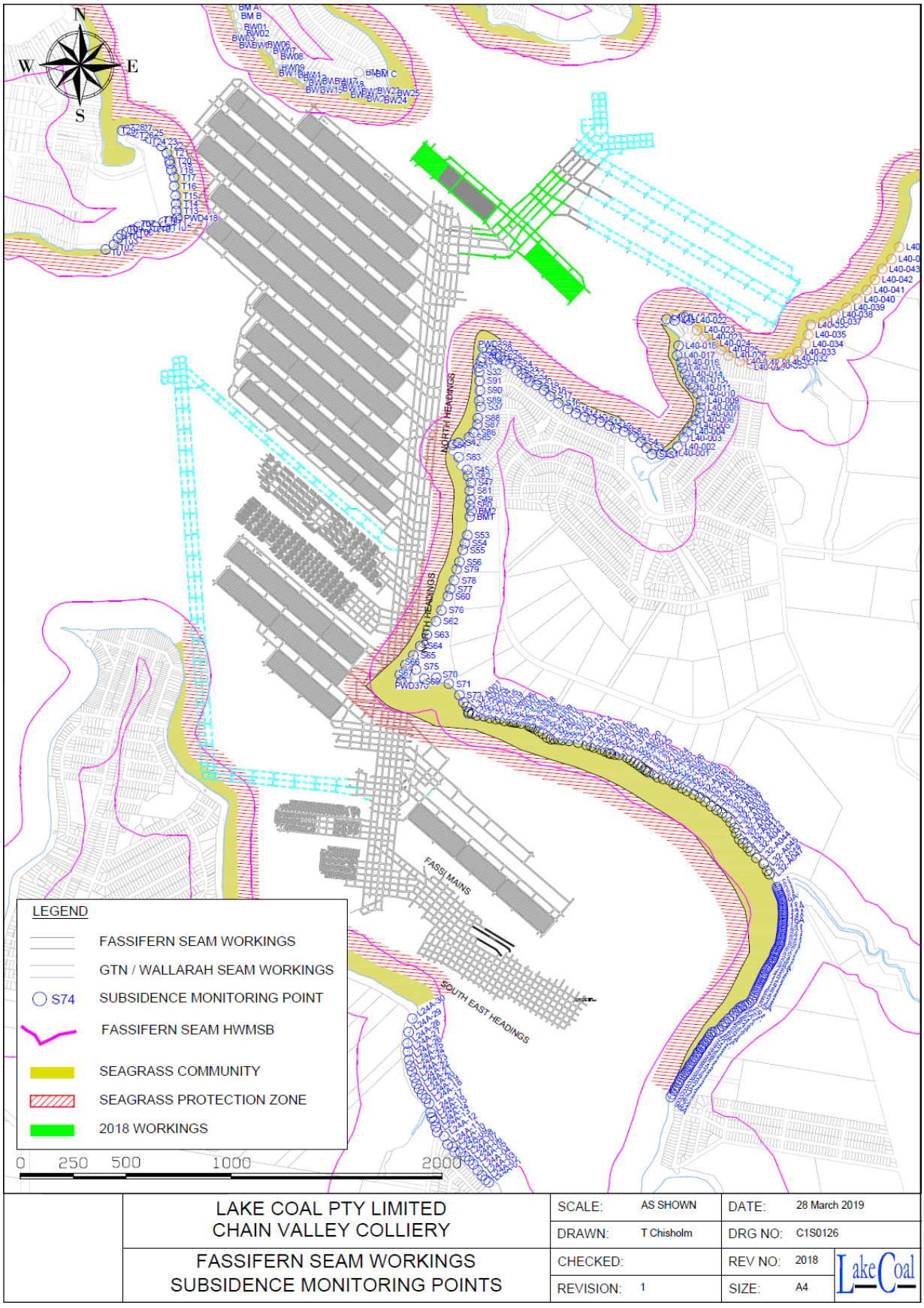


Figure 6.17: Shoreline subsidence monitoring locations

Trinity Point

No subsidence monitoring results for the reporting period at Trinity Point.

Brightwaters

Monitoring points were installed along the Brightwaters peninsula in June 2016 to monitor the effects of Miniwall 11 and 12 extractions. No subsidence monitoring results for the reporting period at Brightwaters.

Summerland Point – Line 23

The foreshore along Summerland Point has been monitored since 1994, after secondary extraction was undertaken in the Wallarah beneath the south-western point (corresponding to mark S63 – 74). **Figure 6.17** shows the location of specific monitoring points on foreshore areas surrounding the underground operation. **Table 3.19** in **Appendix 7** summarises the subsidence monitoring in 2018.

A maximum of 145mm of subsidence was measured (Point S71) since 1994. It is noted this point, along with points #63-75 have all experienced more than negligible amounts of subsidence (20mm) since June 2008. Since 2008, when Fassifern first workings were completed, subsidence has ranged between 20-40mm.

This subsidence is however linked to residual effects from both first and second workings in the Wallarah and Great Northern Seams above the Fassifern seam workings (*Ditton, 2013 - CHV-002/2*), due the presence of soft claystone floor beneath the Great Northern seam. The measured subsidence movement over time has been plotted alongside the theoretical subsidence movement in **Figure 6.18** and shows actual subsidence in line with expectations for Wallarah and Great Northern seam secondary pillar extraction. The Wallarah and Great Northern Seam workings were assessed as long term stable (*Seedsman, 2008 – CV11*) prior to mining in the Fassifern Seam being undertaken beneath the seams in the High Water Mark Subsidence Barrier (HWMSB). It is considered, then, that the continuing subsidence effects along the foreshore are not a result of the 2008 Fassifern first workings or current miniwall extraction – rather due to the continuing consolidation of moisture-sensitive claystones in the Great Northern seam floor, and would occurred irrespective of the development of the Fassifern Seam roadways.

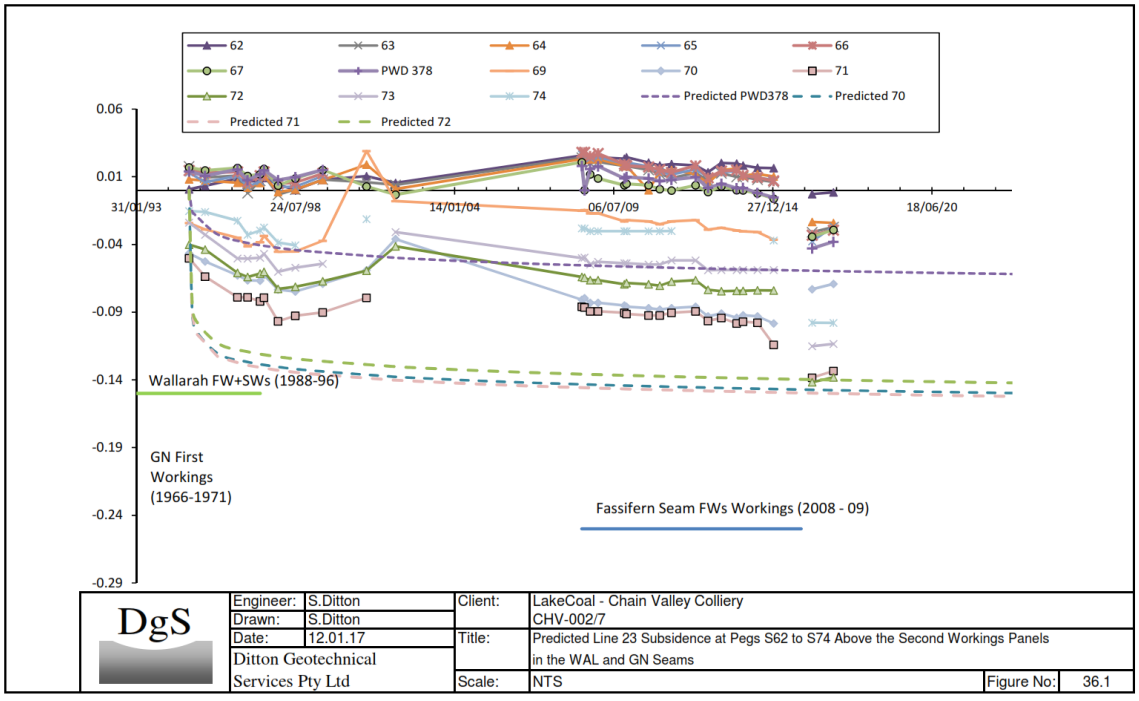


Figure 6.18: Long term predicted vs measured subsidence (Line 23)

It is considered, then, that the continuing subsidence effects along the foreshore are not a result of the 2008 Fassifern first workings or current miniwall extraction – rather due to the continuing consolidation of moisture-sensitive claystones in the Great Northern seam floor, and would occurred irrespective of the development of the Fassifern Seam roadways.

Chain Valley Bay– Lines 33, 32 and 24

Monitoring Points on the foreshore of Chain Valley Bay (refer to **Figures 3.20 - 3.21**) have historically been monitored during periods of extraction in the Great Northern and Wallarah Seams in the vicinity of the shoreline. Due to the commencement of Fassifern Seam extraction in Chain Valley Bay (CVB), a Multi-Seam Mining Feasibility Investigation (MSMFI) report *(Ditton, CHV-002-7)* was commissioned by Lakecoal to assess the impact of the Fassifern seam mine workings on the previously mined Great Northern and Wallarah seam workings and potential resultant impact on the foreshore in Chain Valley Bay.

Surveys of the existing monitoring points were resumed during the reporting period, and where required additional monitoring locations were installed. Similarly to the Summerland Point monitoring, many of the historically monitored subsidence marks have experienced greater than negligible subsidence (20mm), however no additional subsidence movement was detected during the miniwall extraction in CVB. **Tables 3.22** to **3.23** of **Appendix 7** summarise the subsidence results in Chain Valley Bay

6.13.1 Lake Floor Bathymetric Survey / Scanning

As all of Chain Valley Colliery's secondary extraction is located beneath the lakebed bathymetric surveys are used to determine the levels of subsidence that are seen across its mining areas. A bathymetric survey of Domains 1 and 2 commissioned by LakeCoal in March 2012 was compared to a bathymetric survey of Lake Macquarie undertaken by OEH in 2010, to determine the subsidence which had occurred during this period LakeCoal was granted a licence to use the OEH data for the purposes of monitoring changes in the bed of Lake Macquarie and acknowledges the OEH's data which has enabled the subsidence comparison.

The 2012 survey, which was undertaken with a higher resolution of data points than the OEH data, will be used as the baseline for future subsidence comparisons. In 2017 additional baseline points were added prior to miniwall extraction commencing in the Chain Valley Bay mining area.

From 2013 to 2018 these surveys were carried out on an annual basis over the mining area and the results compared to the original survey. During the 2017 survey it was identified that the site had exceeded it vertical subsidence predictions over the MW7-12 mining area by approximately 430mm. LakeCoal notified the relevant authorities of the exceedance and submitted an incident report on 11 November 2017. Bathymetric surveys over the Chain Valley Bay mining area have indicated subsidence is developing in line with predictions. As a result of the exceedance LakeCoal has committed to increasing the frequency of the surveys to 6 monthly.

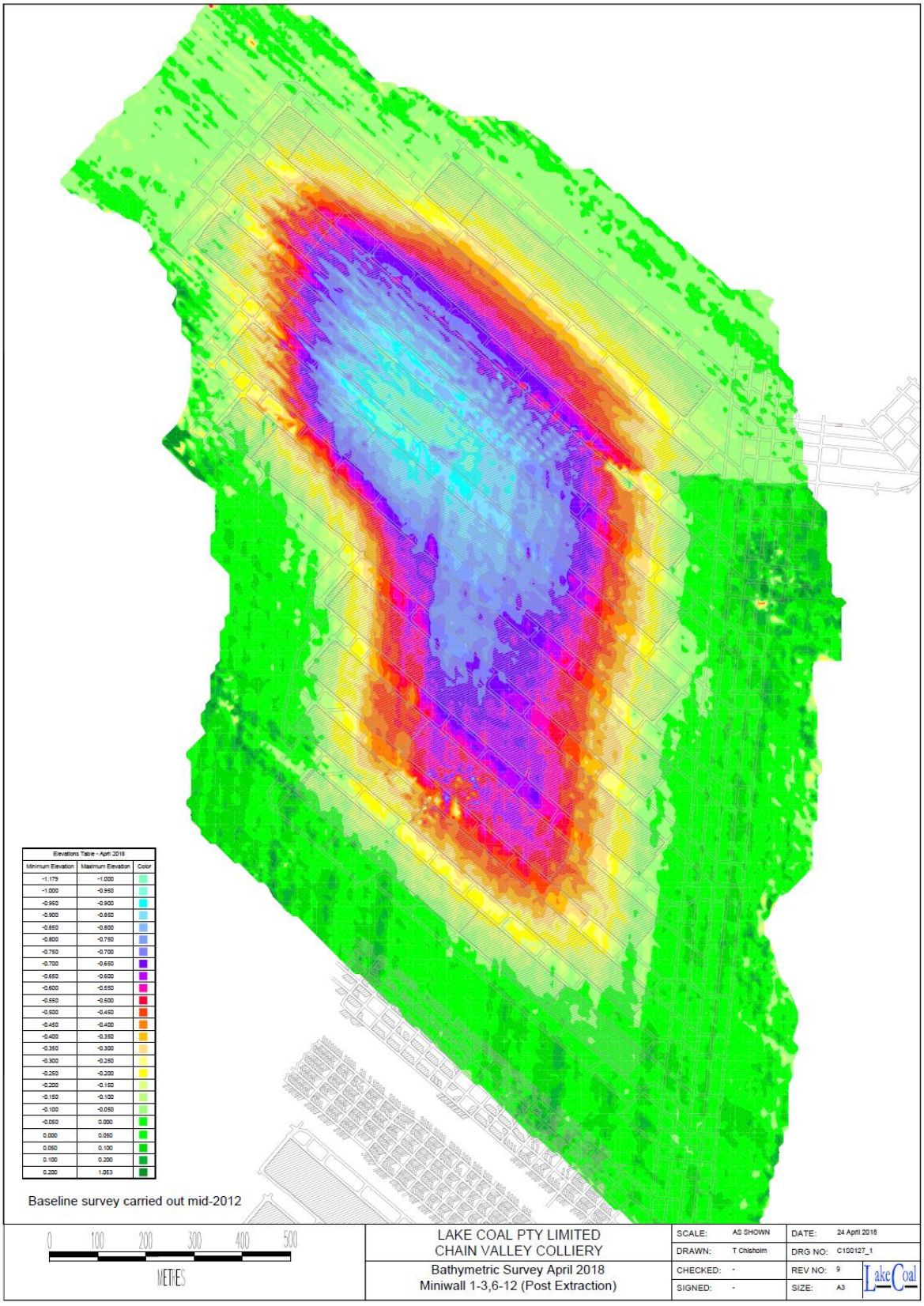


Figure 6.19: the extent of measured subsidence from the 2018 survey

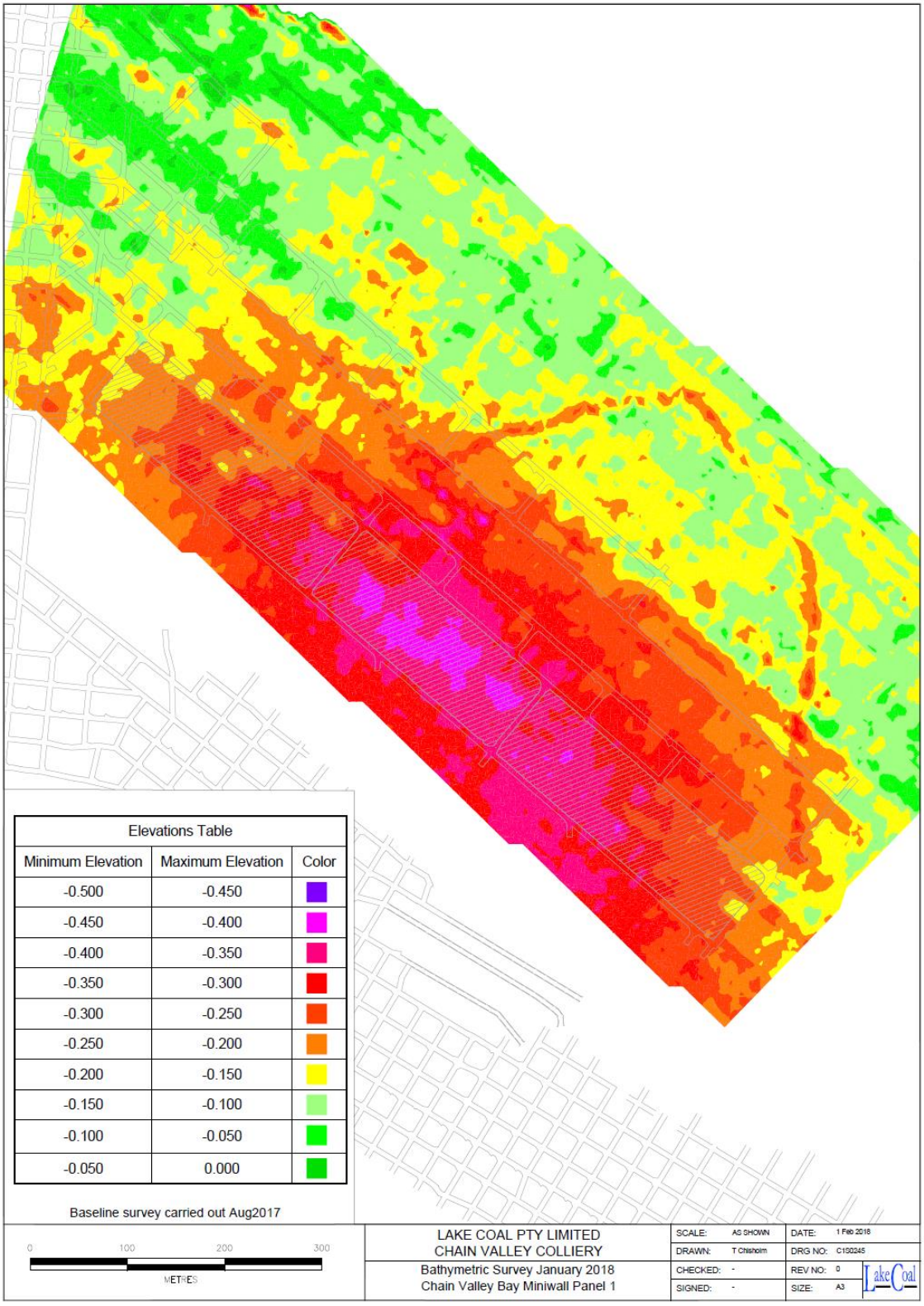


Figure 6.20: 2018 Lake bed subsidence results over Chain Valley Bay Miniwall 1

Bathymetric Scanning

The Lake Macquarie bathymetric scan is carried out annually. **Figure 6.19** and **Figure 6.20** shows the 2018 scan results comparative to the initial bathymetric surveys. A maximum difference of approximately 1100 – 1150 mm was recorded with the majority of vertical subsidence ranging between 300-900mm as evident in **Figure 3.22**. These results were approximately 370mm greater than the subsidence modelling predications which indicated up to 780mm of vertical subsidence in association with single seam extraction (such is the case with the current mining area). Note that increased subsidence of approximately 1230mm was predicted in areas beneath existing workings. LakeCoal notified the relevant authorities of the exceedance and submitted an incident report on 11 November 2017.

Bathymetric surveys over the Chain Valley Bay mining area (**Figure 6.19** and **Figure 6.20**) have indicated subsidence is developing in line with, or below predictions (up to 350mm with approximately 50% of extraction remaining).

Monitoring is planned to continue in accordance with the approved Extraction Plan during the 2018 reporting period.

It is also important to note both the results and limitations of the Bathymetric scanning. The multi-beam echo sounder captures data at approximately ±0.100m. The survey vessel captures a swathe of data (down to sub-metre resolution) and is weeded to a 10m x 10m grid. In addition to this, the dynamic nature of lake bed sediment movement and change has and will affect the depth of the lake bed over time; such effects are unable to be accounted for in the survey results. As a result, the collected data - while useful in determining trends of subsidence and approximate subsidence that has occurred - is not as accurate as land based surveys and should be viewed in consideration of these constraints. Some noise is evident in **Figure 6.20** due to a combination of these limitations but there is a measureable change in the lake floor due to mining activities, which is useful for fine-tuning the geotechnical subsidence model in addition to detecting any exceedances of the predicted subsidence values.

In accordance with the requirements of SSD 5465 LakeCoal submitted the multi-seam mining feasibility investigation required for the mining of the miniwalls in the Chain Valley Bay Area (shown as MW41-45 in SSD 5465) during the reporting period. While the consent conceptually approved 5 miniwalls in this area (subject to the feasibility investigation) LakeCoal lodged an extraction plan for only 3 miniwalls during the reporting period. Extensive consultation with the Department of Resources and Energy as well as the Department of Planning and Environment was undertaken during the reporting period as part of the Extraction Plan development for the Chain Valley Bay Miniwalls. As at 31 December 2017 lakeCoal had not received approval for miniwall panels CVB2 and CVB3 which were subject to further investigations /assessments.

6.14 Hydrocarbon Contamination

Hydrocarbons are managed in accordance with the site Storage of Fuel and Chemical Standard (STD-0038).

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 all 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

Methane levels in the Fassifern seam of approximately 2 – 4 m^3/t do not warrant the need 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 generally low enough to ensure operations are not adversely affected by the gas levels.

Given the mining operations are being undertaken beneath Lake Macquarie and 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 the Colliery are reported annually to the Clean Energy Regulator in accordance with the *National Greenhouse and Energy Reporting Act 2007* (NGER Act).

During the reporting period Chain Valley Colliery emitted approximately 409,215 tonnes of CO_2e.

6.16 Public Safety

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

The public safety around the ventilation shaft site is generally 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 area 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 generally undertaken at times of higher unauthorised access risk such as nights, public holidays and weekends.

Public access will be monitored and managed during operation of the mine through the standard incident reporting process which would include 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.

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 LakeCoal's operations.

6.17 Other Issues and Risks

During the reporting period approximately 99% of the coal produced at Chain Valley Colliery was sent to the VPPS and since August 2017 all coal was transported via overland conveyor. This is a significant reduction in public safety risk as transport previous reporting period was via truck and overland conveyor.

7 Water management

7.1 Water Management

7.1.1 Licensed Mine Dewatering

LakeCoal holds a groundwater bore license 20BL173107 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 2018 reporting period each week approximately 5246 kL of mine water was extracted from within the mine workings, before being pumped to the Chain Valley Colliery surface facilities, where it is discharged into sediment dams prior to being discharged into Lake Macquarie under the Environment Protection Authority (EPA) Licence No.1770.

In comparison, during the previous water year (1 July to 30 June 2017), each week approximately 40 ML of mine water was extracted from within the mine workings, before being pumped to the Chain Valley Colliery surface facilities, where it is discharged into sediment dams prior to being discharged into Lake Macquarie under the EPA Licence No.1770.

The average groundwater extraction pumping rate over the reporting period was 5246 kL per day (for days when pumping occurred), with the daily average consistent over the reporting period when compared with 2017 data (refer to **Section 7.1.4** Water Balance for long term water data). During the reporting year, a total of 1915 ML was extracted in accordance with 20BL173107, or around 46% of the licenced 4443 ML limit.

The maximum groundwater extraction on any day during 2018 peaked at 9443 kL, which reflects the automated control of pumping limits implemented on site as committed to by LakeCoal within the Environmental Impact Statement (EIS) for the current mining operations.

LakeCoal operated well within the groundwater extraction limits prescribed by license 20BL173107, utilising less than half of the licensed extraction volume. Groundwater extraction data is summarised in **Table 7.1** and **Figure 7.1.**

Table 7.1: Water Take 2018

Water Licence #	Water sharing plan, source and management zone (as applicable)	Entitlement	Passive Take / inflows	Active pumping	TOTAL
20BL173107	Sydney Basin North Coast Groundwater Source	4443 ML	N/A	1915 ML	1915 ML

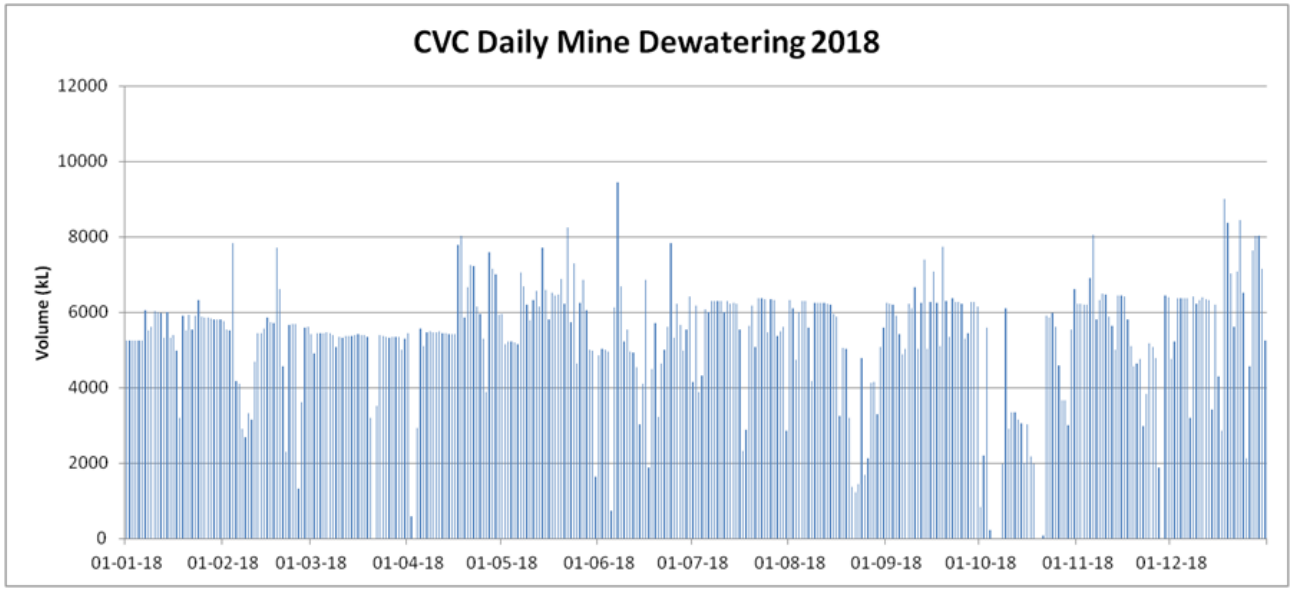


Figure 7.1: Daily groundwater extraction volumes (2018)

7.1.2 Licenced Discharge under EPL1770

LakeCoal holds EPL1770 which licences the discharge of up to 12,161 kL per day from the site.

During the 2018 reporting period the daily average discharges were 6006 kL with a maximum of 11,142.5 kL and a minimum of 10.3 kL. The daily average during pumping was 5379 kL.

The total volume discharged over the reporting period was approximately 1915 ML.

Figure 7.2 presents 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. There were no discharges via Point 27 during the reporting period. Volumes presented are the sum of both points, to reflect total discharge volumes against the relevant licence limit.

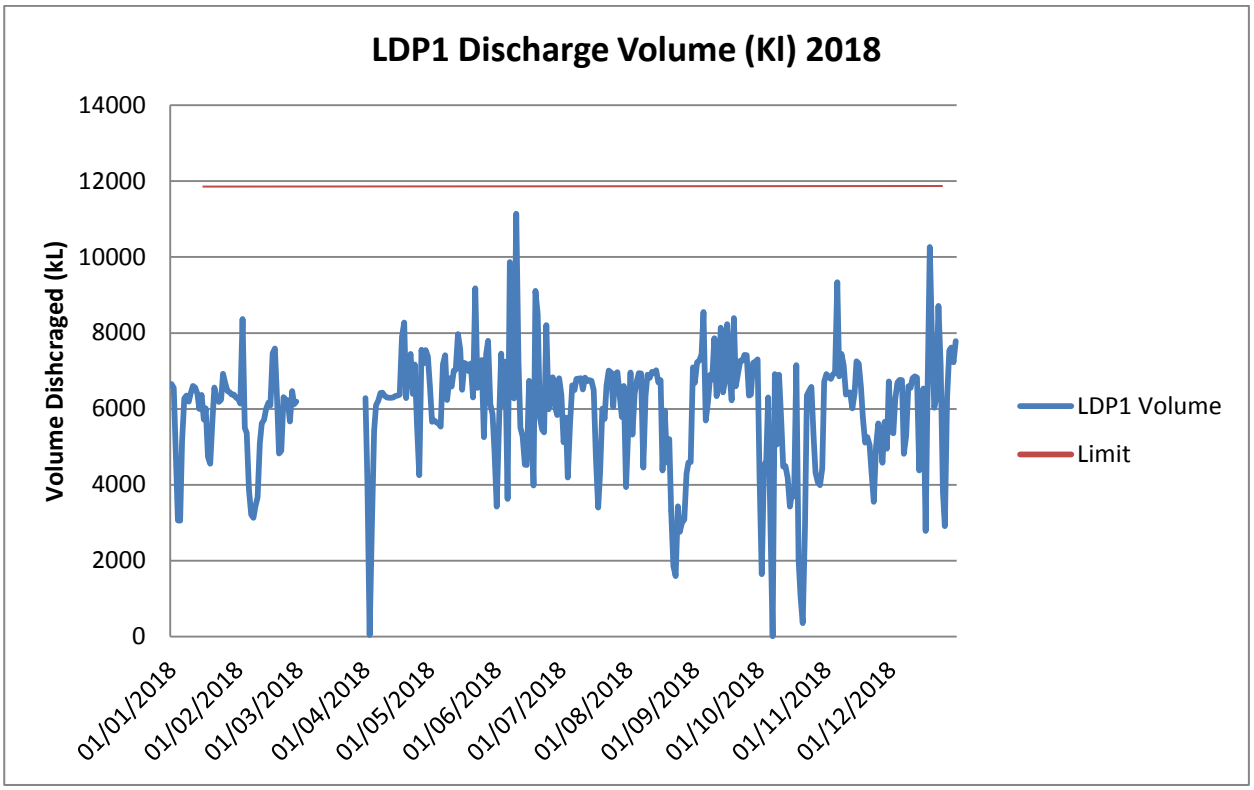


Figure 7.2: Mine dewatering volumes during the reporting period

As evident in **Figure 7.2**, there were no exceedances of the daily volumetric limit (12,161 kL) during the reporting period.

Chain Valley Colliery also completed an upgrade to the underground water storage and pumping network during the previous reporting period. The increased storage capacity allows UG dewatering to be restricted for longer periods of time which ultimately improves the storm surge capacity in the surface water management system. The reduction in the exceedances modelled has been attributed to this improvement project. Real time telemetry was also added to the site's discharge point in 2015 to assist with the review of actual (real time flows) during prolonged rain events.

Water quality monitoring is required, and undertaken, at the licensed discharge point (LDP1). Refer to **Plan 3** (**Appendix 2**) for the location of LDP1. Results for pH, EC, TSS and faecal coliforms and a comparison against the compliance limits specified in EPL 1770 are presented in **Figure 7.3**, **Figure 7.4**, **Figure 7.5** and **Figure 7.6**, respectively.

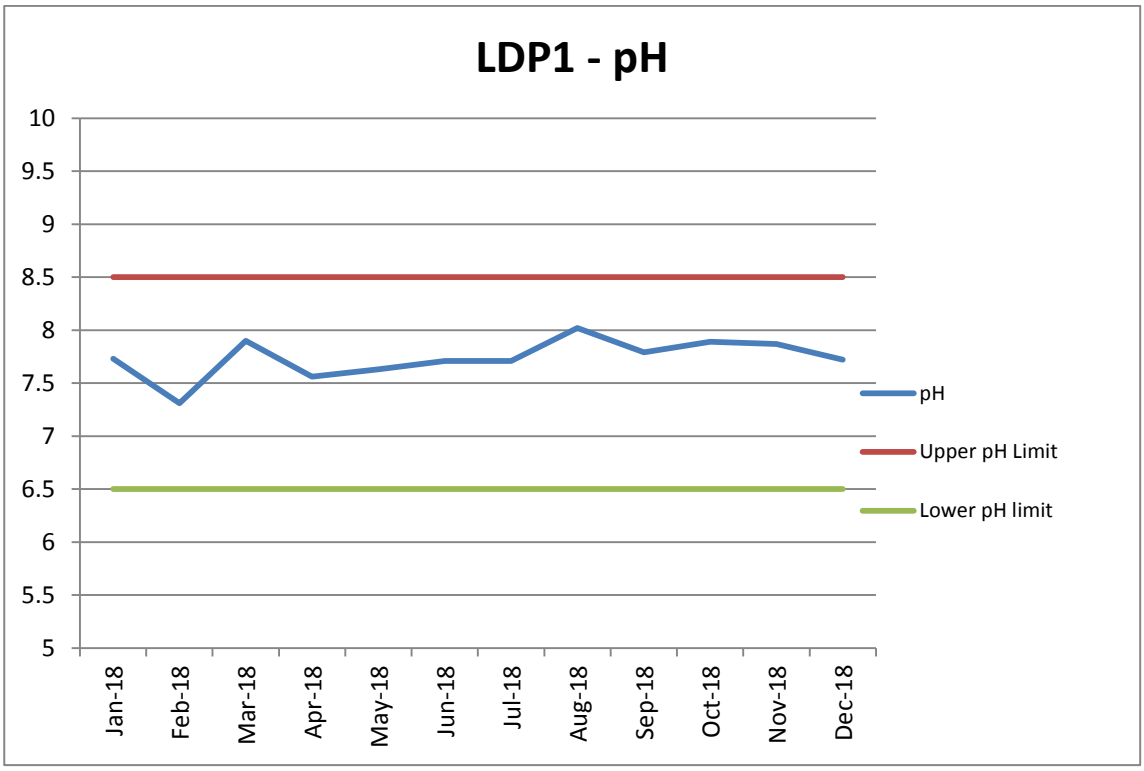


Figure 7.3: pH monitoring results at the licensed discharge point

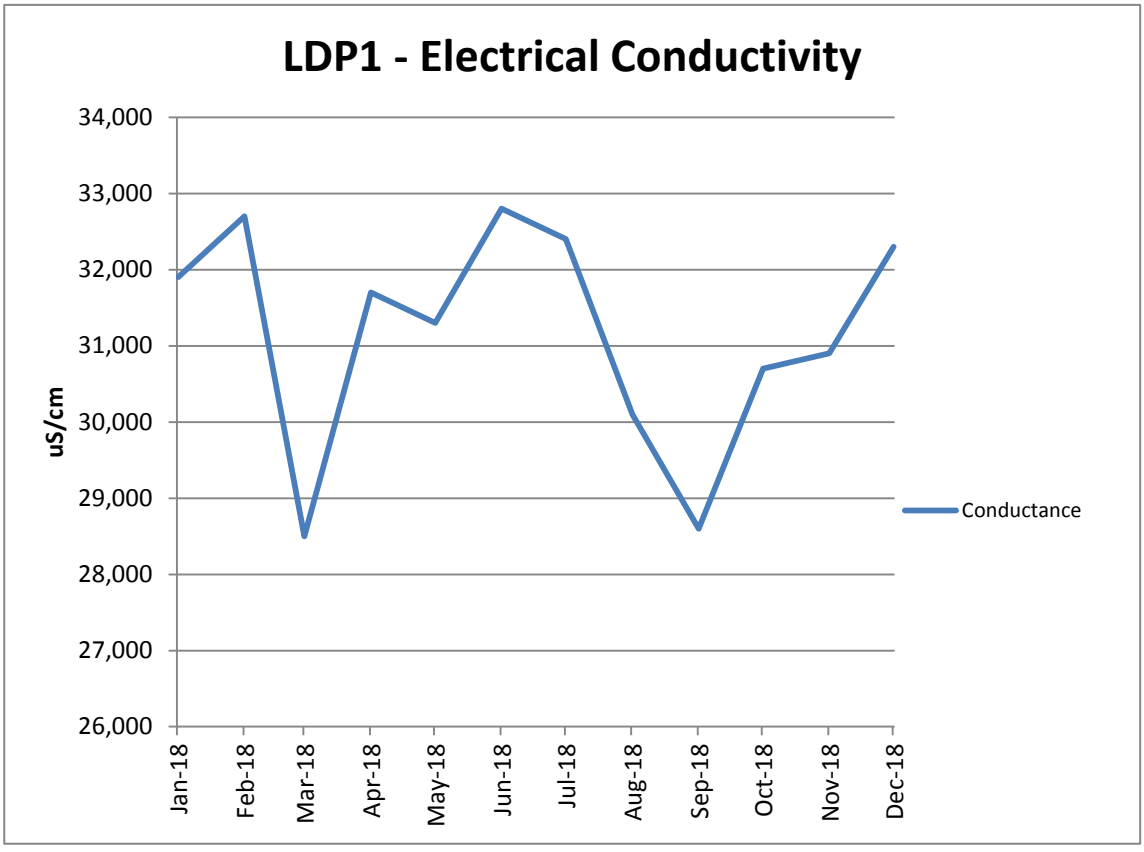


Figure 7.4: Electrical conductivity monitoring results at LDP1

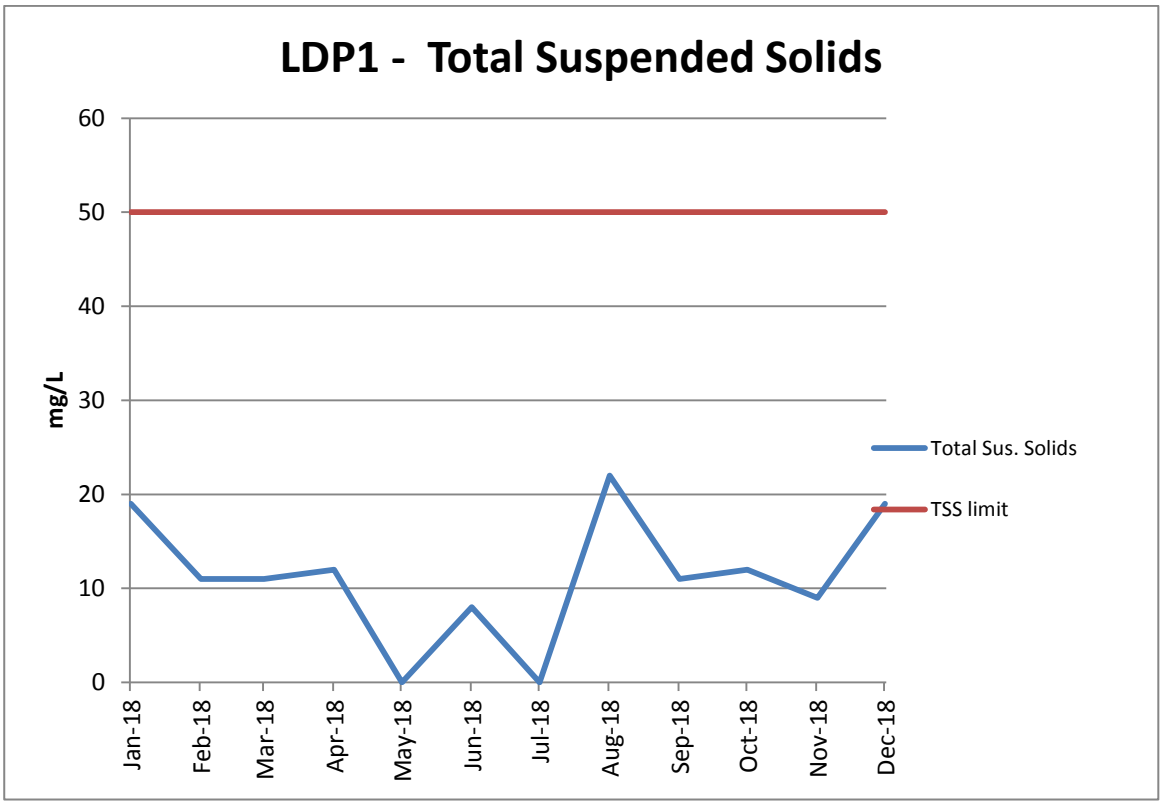


Figure 7.5: Total suspended solids monitoring results at LDP1

Notes: 1. Results shown as zero were below the limit of reporting (<5mg/L)

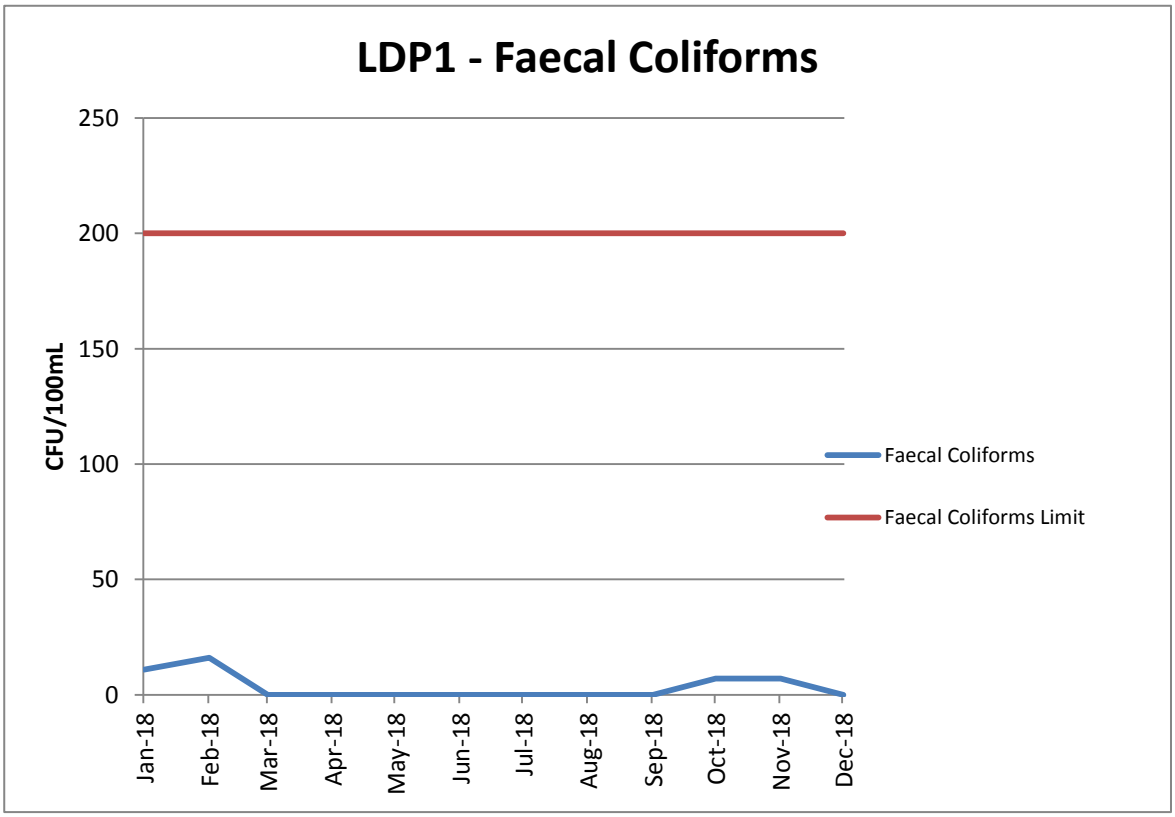


Figure 7.6: Faecal coliform results at LDP1

7.1.3 Long Term Water Management

To assess any long-term trends in both water quality and quantity, seven years of data is presented for pH (**Figure 7.7**), electrical conductivity (**Figure 7.8**), total suspended solids (**Figure 7.9**) and faecal coliforms from LDP1 (**Figure 7.10**).

The annual average of mine dewatering volumes for the past ten years is also presented in **Figure 7.11**. 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 it is evident that despite some infrequent higher results of faecal coliforms and one TSS result over 50 mg/L, there are no significant trends or changes in the water quality parameters. There is no obvious increase in mine dewatering volumes over the last six 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 (approximately 6.0 ML/day during 2018) are still significantly below this level.

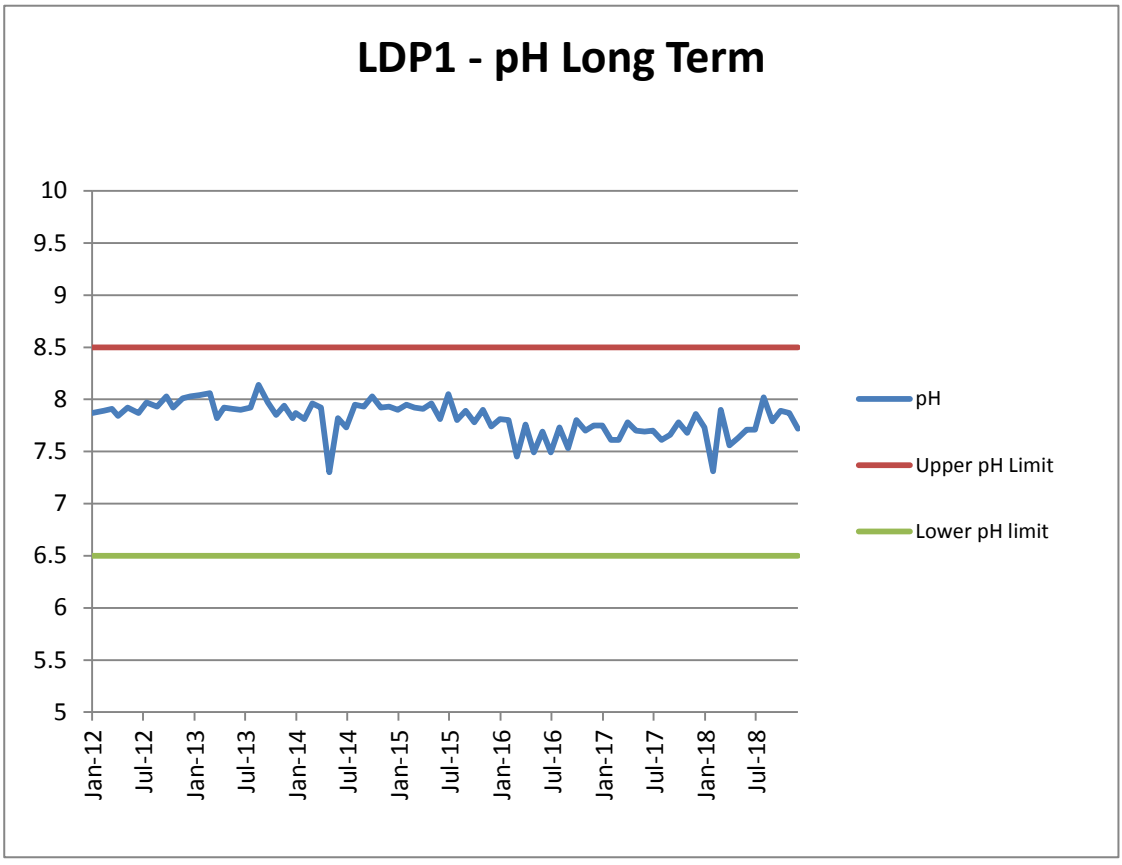


Figure 7.7: Long term pH results from LDP1

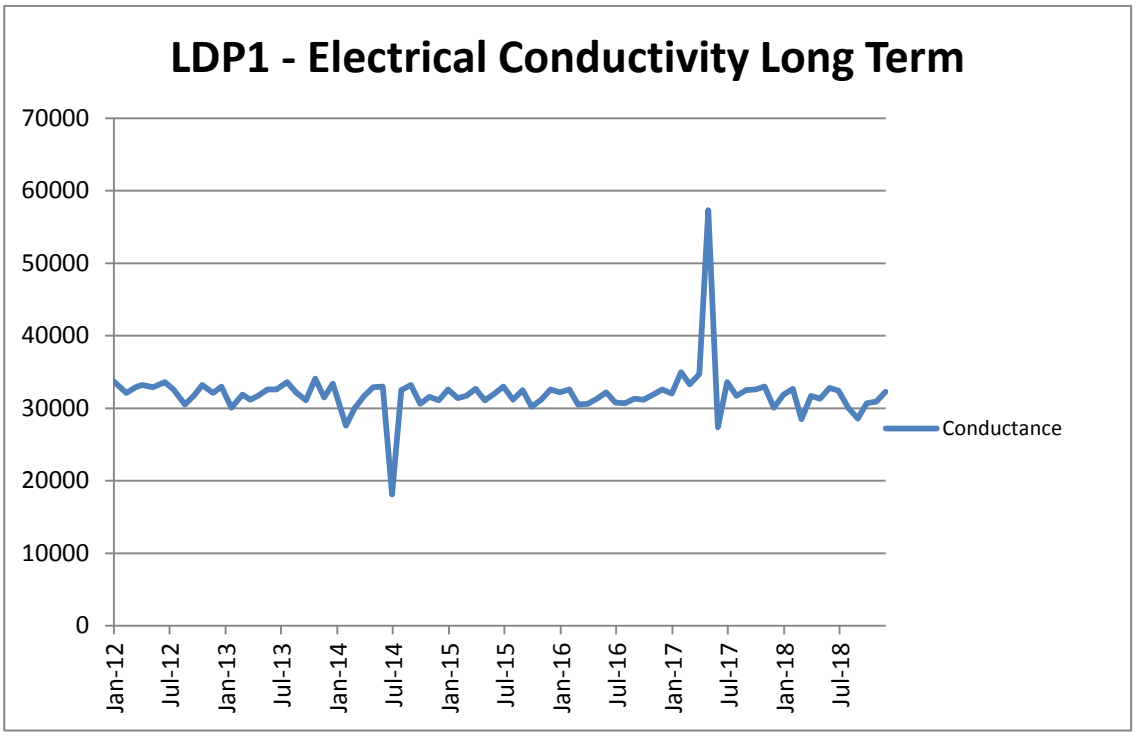


Figure 7.8: Long term EC results from LDP1

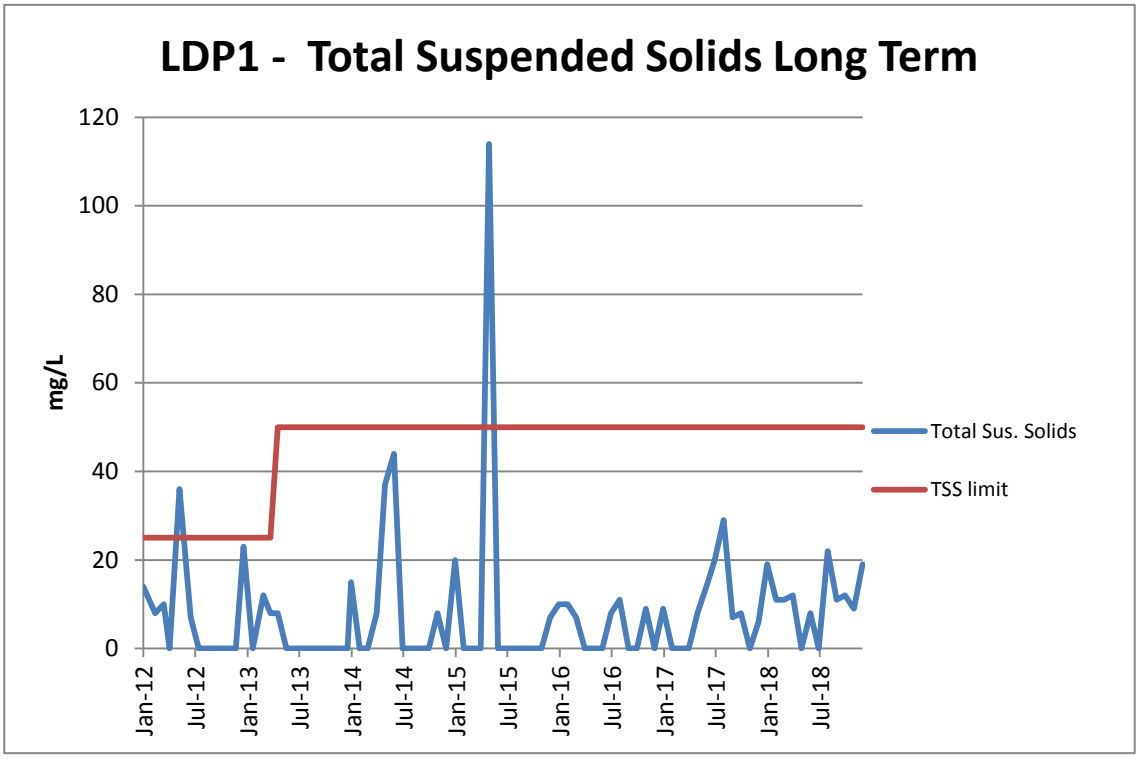


Figure 7.9: Long term TSS results from LDP1

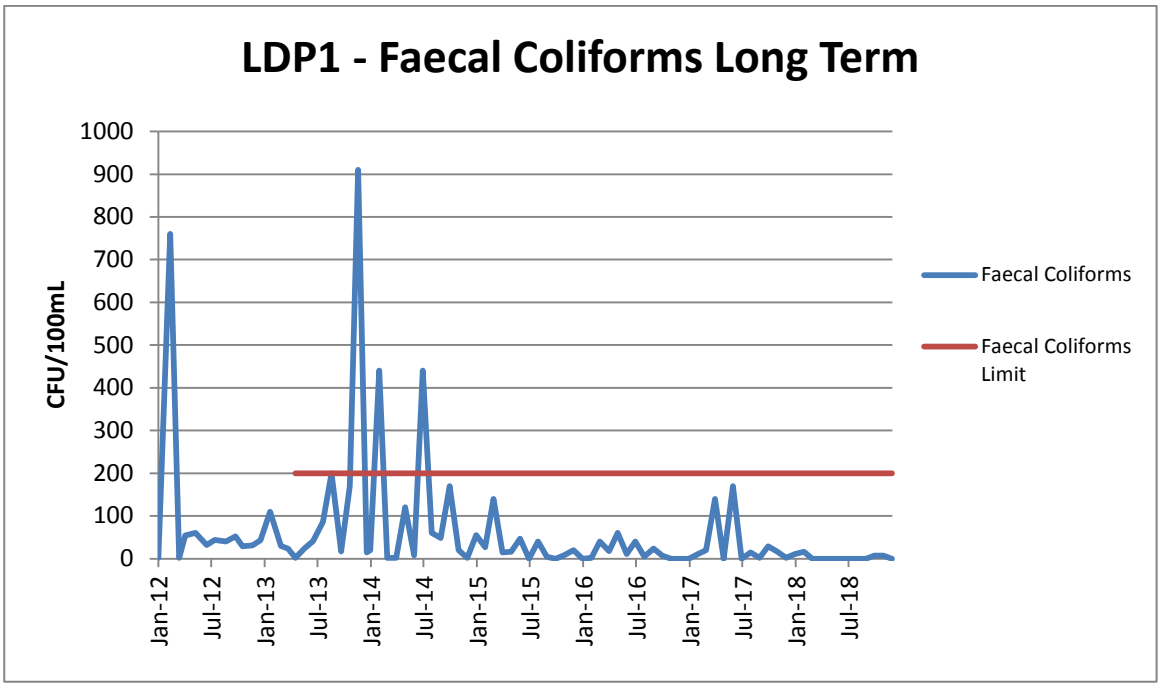


Figure 7.10: Long term faecal coliform results from LDP1

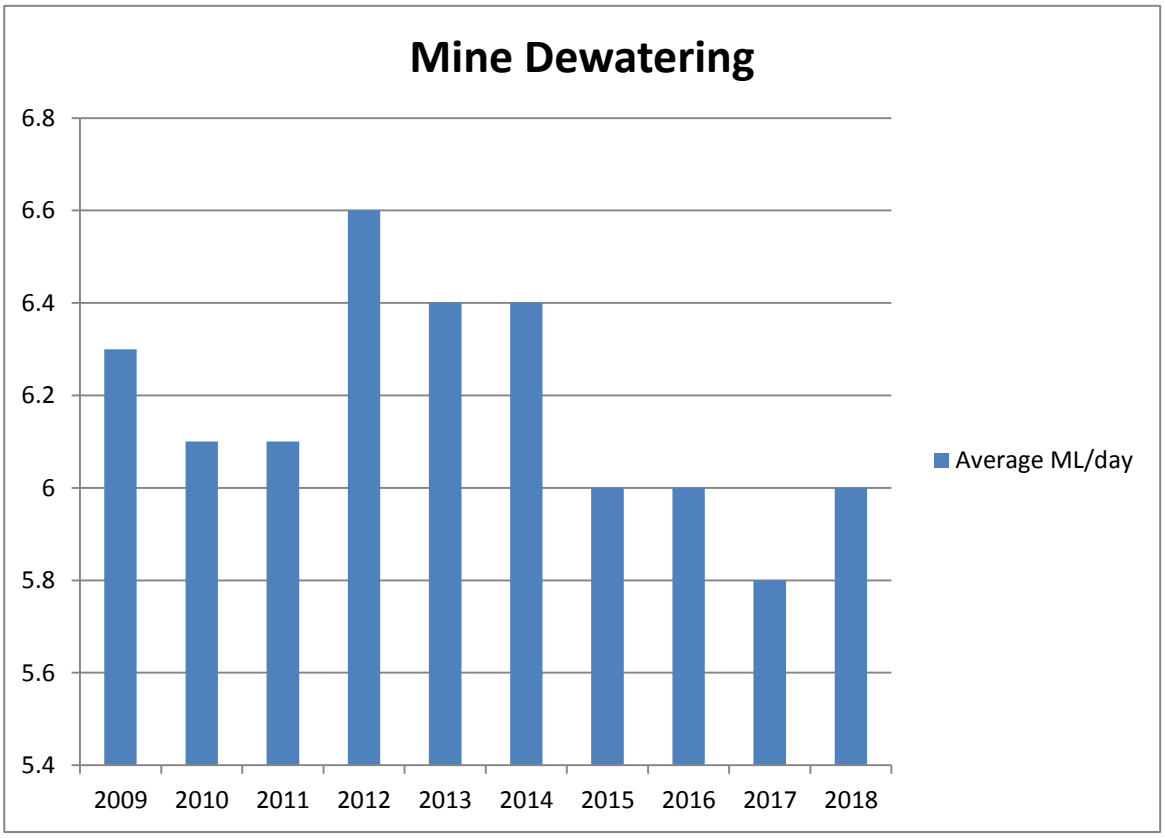


Figure 7.11: Long term mine dewatering volumes

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 7.2.**

Table 7.2: Key water balance predictions and actual results during 2018

Water Balance Results (from EIS)	Reporting Period Result	Comment
Daily average discharge through the LDP1 of 16.46 ML/day	Daily annual average discharge of 6.006 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. Result is significantly below the water balance prediction but not unexpected due to the assumptions used in the water balance.
Maximum discharge through LDP1 of 30.52 ML/day	Maximum discharge of 11.14 ML/day	Result is significantly lower than water balance prediction as water balance was conducted using a daily time step model over a 100-year period, as a result maximum result would not be expected except in the event of a 1:100 ARI rainfall event. UG Storage and Pumping infrastructure upgrade project completed in 2016.
Likelihood of LDP1 volumetric limit exceedance on any given day of 4% (or approximately 15 times per year)	No exceedances of the volumetric limit at LDP1	Result reflects significance of rainfall events during the year and improvements made to both the surface and underground water management system subsequent to the EIS modelling.
Average annual rainfall 1206mm	1158.4 mm	Average rainfall consistent with previous data.
Potable water use of 161.9 ML/yr	97.3 ML	Potable water usage varies depending on operational requirements including dust suppression.

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 and consist of:

- The exposed areas of the car park, workshop, laydown and internal access tracks;
- Coal stockpiles 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 will if required overflow in D9, which then flows into D10 prior to being discharged from site via the licenced discharge point. The pollution control ponds (sediment dams) and the location of the monitoring points are show on **Plan 3** (**Appendix 2**).

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. Runoff from this area can contain a significant amount of coal fines due to the nature of the activities. 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.

There were no exceedances of water quality criteria during the reporting period.

7.3 Surface Water Pollution

There were no surface water related incidents during the reporting period.

7.4 Ground Water Pollution

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

8 Rehabilitation

8.1 Buildings

There was no rehabilitation of buildings undertaken in the reporting period.

8.2 Rehabilitation of Disturbed Land

There were no significant rehabilitation works on disturbed lands during the reporting period, which relates the fixed nature of the surface infrastructure and the ongoing mining operations requiring continued use of all this area. A summary of the rehabilitation statistics for Chain Valley Colliery is provided in **Tables 8.1** and **8.2**. A copy of the site's final rehabilitation plans is provided in **Appendix 2.** The plans are consistent with the approved Chain Valley Colliery MOP.

Table 8.1: Summary of Rehabilitation at Chain Valley Colliery

	This period (2018)	Next period (2019)
A. Total Mine Footprint (managed by LakeCoal)	Approximately 14.70	Approximately 14.70
B Total Active Disturbance	14.70	14.70
C. Land being prepared for rehabilitation	Nil	Nil
D Land Under Active Rehabilitation	Nil	Nil
E Completed Rehabilitation	Nil	Nil

Table 8.2: Maintenance Activities on Rehabilitated Land at Chain Valley Colliery

	Area Treated (Ha)		
NATURE OF TREATMENT	**This period (2018)**	**Next period (2019)**	**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	0	n/a
Re-seeding/Replanting (species density, season etc.)	0	0	n/a
Adversely Affected by Weeds (type and treatment)	5	7	Extensive weed control program undertaken during the reporting period. Further works planned for the next reporting period.

	Area Treated (Ha)		
NATURE OF TREATMENT	**This period (2018)**	**Next period (2019)**	**Comment/Control Strategies/Treatment Detail**
Feral Animal Control (additional fencing, trapping, baiting etc.)	0	14.70	No feral animal control undertaken during the reporting period. Planned to be undertaken in the next reporting period.

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 Rehabilitation Management Plan (EMP-D-16373) was updated during the 2014 reporting period, it was provided to numerous regulators and stakeholders as required by Condition 27, Schedule 3 of SSD-5465, however comments were only received back from Wyong Shire Council, Delta Electricity (the landowner) and the NSW Office of Water, all comments were addressed, and documented within the consultation section, within the final version of the Rehabilitation Management Plan that was submitted to both the Department of Planning and Environment and DRE for approval on the 8 December 2014.

At the end of the reporting period the revised Rehabilitation Management Plan had not been approved. The contents of the plan were however used to form the basis of the new Mining Operations Plan for the Colliery which was approved on 27 March 2015 by the Department and is current until 30 June 2018. The proposed final rehabilitation plan, consistent with both the Rehabilitation Management Plan and Mining Operations Plan is provided as **Plan 4 (Appendix 2).**

8.5 Post Rehabilitation Land Use(s)

As identified in the 2018-2020 Mining Operations Plan (MOP) the post mining land uses for Chain Valley Colliery (CVC) is to revegetate the surface facilities areas to a near-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. The Colliery is on land owned by Sunset Energy 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). One other small area of grassland is proposed at the Mannering downcast shaft site, which is consistent with grassed areas surrounding the site.

The final land use for each of the secondary domains is:

- Domain A - Establishment of a native bushland ecosystem compatible with the surrounding vegetation communities, which includes targeting a final vegetation community comparable to:
  - Broad-Leaved Scribbly Gum Open Forest (for Mannering pit top);
  - Coastal Open Woodland (for majority of Chain Valley pit top);
  - Swamp Sclerophyll Forest (for Chain Valley upcast shaft).
- Domain B - Establishment of grass cover consistent with surrounding grass species for the:
  - Areas of the Chain Valley site that are within existing high voltage power line easements;
  - Mannering downcast shaft site.
- Domain C – Retention of water management structures.

8.5.1 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 coal bins, 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);
- Concrete pads and footings will be removed to an estimated depth of 300mm below surface levels and disposed of in an appropriate place or recycled, and following removal will be covered with at least 300mm 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; and
- Buried services encountered during civil works will either be completely removed or removed to 300mm below the final landform level and remain buried. As mentioned above, all services, including buried services would be 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.

8.5.2 Objectives

The rehabilitation objectives below have been compiled from Condition 13 within Schedule 3 of MP 06_0311 and Condition 25 within Schedule 3 of SSD-5465 and are listed in **Table 8.3**.

Table 8.3: 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 1961*.
Community	• Ensure public safety. • Minimise the adverse socio-economic effects associated with mine closure.

8.6 Other Infrastructure

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

9 Community

9.1 Community Complaints

Only one community complaint was received during the reporting period (related to a combination of noise, dust and vibration). Details of the complaint including the action taken by LakeCoal are detailed in **Table 9.1**.

A copy of the Complaints Register is provided on the Chain Valley Colliery website. The Annual total complaints and complaints by subject type trends are **Figure 9.1** and **Figure 9.2**.

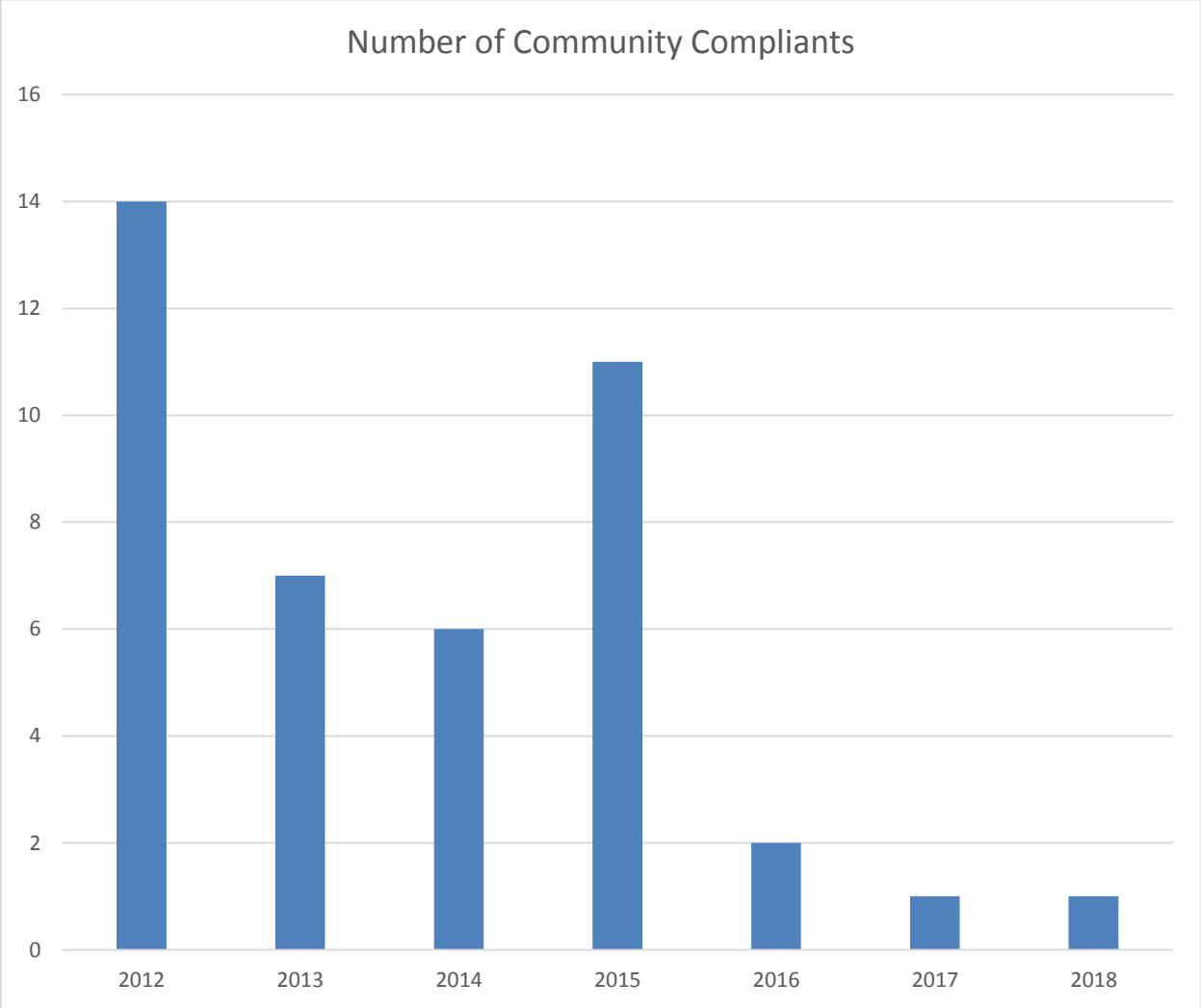


Figure 9.1: Total community complaints by year

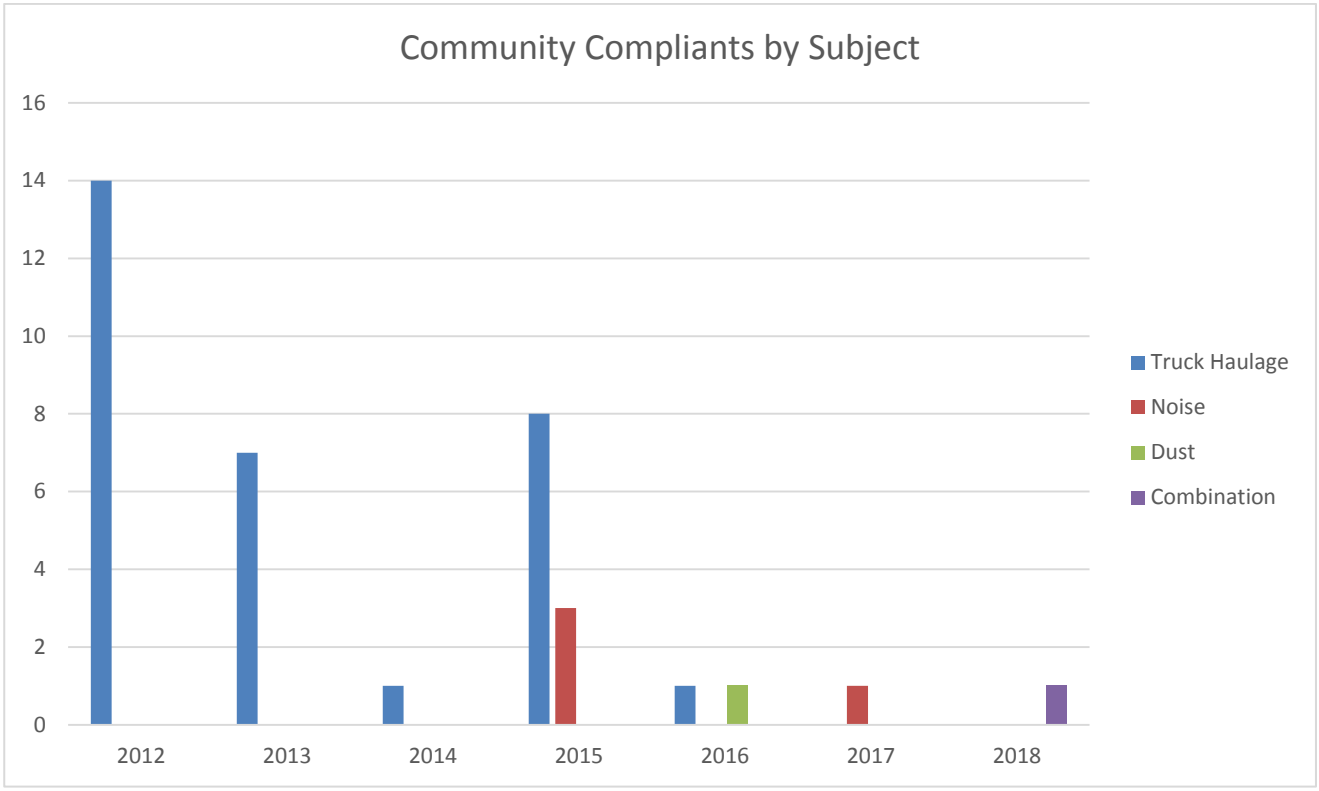


Figure 9.2: Community complaints by subject

Table 9.1: Complaint Summary and actions taken during the reporting period

Date	Nature of Complaint	Complaint Details	Action Taken
20/07/18	Noise/Dust/ Vibration	Complainant from Kingfisher Shores contacted the EPA to complain about noise, dust and vibration impacts via the EPA hotline. Complainant advised the EPA that she was affected by noise and vibration. Complainant advised EPA it was likely impacts were from VPPS or Chain Valley Colliery.	The complainant was contacted by LakeCoal's Environment and Community Coordinator at 2.30pm on 20/07/18 to discuss the nature of the complaint. The complainant advised that they had concerns about vibration impacts at her property which she believed were as a result of the mine or the power station. She advised that they had completed renovations recently and had cracks develop in the gyprock. She explained that she had contacted the mine subsidence board and they had inspected the property and determined that the impacts were not related to historical mining. The complainant was provided an overview of LakeCoal's operations and was advised that there had been no changes to the existing approved operations on site. The complainant was advised that coal handling was no longer undertaken at Chain Valley Colliery. A follow up meeting with the complainant at her residence was undertaken at 4pm on 23rd July by LakeCoal's E&C Coordinator and Operations Manager. LakeCoal agreed to investigate the potential to install a dust gauge at the property to quantify existing dust levels.

9.2 Community Liaison

The Chain Valley Colliery Community Consultative Committee (CCC) continued to operate in accordance with the *Guidelines for Establishing and Operating Community Consultative Committees for Mining Project, June 2007 (NSW Department of Planning)* during the reporting period. The current CCC representatives are listed in **Table 9.2.**

There were four CCC meetings held during the reporting period on the 23 February 2018, 16 May 2018, 15 August 2018 and the 14 November 2018.

Minutes for each of the committee meetings are available on the LakeCoal website (http://www.chainvalleymine.com.au/community/consultative-committee-information/).

Table 9.2: Community Consultative Committee (CCC) Members

Stakeholder	Name
Chairperson	Margaret MacDonald-Hill
Community	Andrew Whitbourne
Community	John Oakes
Community	Neil Wynn
Community	Paul Maky
Community	Ian Carr
LakeCoal	Wade Covey
Lake Macquarie City Council	John Gilbert
Wyong Shire Council	Julie Vaughn

In addition to the above the LakeCoal 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 687 557) also remained in place during the reporting period and is displayed prominently and permanently on the website.

9.3 LakeCoal Voluntary Planning Agreement

As outlined previously LakeCoal successfully finalised and coordinated the establishment of the VPA with Central Coast Council during the 2016/2017 reporting periods.

Following extensive consultation with Central Coast Council during the reporting period the Community Advisory Panel was established and met on two occasions during the year to plan and coordinate the framework for the 2017 VPA funding.

The Chain Valley Colliery VPA fund was successfully launched during September 2017 via the Council Smarty grant scheme. LakeCoal and Central Coast Council held community information sessions in the suburbs of Mannering Park, Gwandalan and Chain Valley Bay to advise local residents and community groups of the recently established fund

9.4 Community Support / Engagement

LakeCoal is committed to supporting and engaging with the local communities which surround its operations. While LakeCoal provides a monetary offsets associated with its Voluntary Planning Agreement under its operating approvals LakeCoal 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

Mannering Colliery was not subject to an independent environmental compliance audit during the reporting period. There is an Independent Environmental Compliance Audit planned for Quarter 2 2019. An updated table of compliance with the previous 2016 Independent Environmental Audit will be completed as part of that audit.

11 Incidents and non-compliances during the reporting period

All non-compliances and exceedances, and reportable incidents relating to the site's licences and approvals are summarised below in **Table 11.1.**

Table 11.1: Summary of reportable incidents/non-compliances for the reporting period

Date	Description of Non-compliance	Approval/Condition/Clause	Actions taken to address Non-compliance
3/4/2018	PM10 24 Hour Average Exceedance (RTD 001)-Kingfisher Shores	SSD 5465	As outlined in the initial notification, the TEOM recorded a 24 hour PM10 value of 50.2ug/m3 against the 24 hour average criterion of 50ug/m3 on the 19th March. A copy of the TEOM Data recorded for the month of March is provided in Attachment 2. Following a preliminary investigation of the exceedance, a follow-up phone call was made to DPE in which LakeCoal advised that it was of the opinion that the exceedance was not a direct result of its mining activities and was more likely a result of a regional dust event which was occurring at the time, noting that on 19 March, it had received automatic notifications from OEH (via oeh.airquality@environment.nsw.gov.au) that both the Central Coast and Lower Hunter Central Coast PM10 levels exceeded national air quality standards (copies attached). Notwithstanding, it was agreed that LakeCoal would submit an incident report on the event. As previously advised, based on the results of the preliminary and subsequent investigations, LakeCoal remains of the opinion that the minor exceedance of the 24 hour PM10 value of 50.2µg/m3 recorded on 19 March 2018 was not as a consequence of its activities and, in the absence of any other known local sources and the warnings received from OEH, is firmly of the opinion that the exclusion nominated in the footnote to Table 4 in SSD-5465 applies and consequently the exceedance does not represent a non–compliance with the consent. Accordingly Lakecoal is not intending to undertake any further actions as a result of the minor exceedance and would like to request the Secretary's agreement that it does not constitute a non-compliance for the purpose of SSD 5465 for its internal compliance records.
18/7/2018	PM10 24 Hour Average Exceedance (RTD 001)-Kingfisher Shores	SSD 5465	As outlined in the initial notification, the TEOM recorded a 24 hour PM10 value of 57.82ug/m3 against the 24 hour average criterion of 50ug/m3 on the 18th July. A copy of the TEOM Data recorded for the month of July is provided in Attachment 2. Following a preliminary investigation of the exceedance, a follow-up phone call was made to DPE in which LakeCoal advised that it was of the opinion that the exceedance was not a direct result of its mining activities and was more likely a result of a regional dust event which was occurring at the time, noting that on 18 July, it had received automatic notifications from OEH (via oeh.airquality@environment.nsw.gov.au) that both the Central Coast and Lower Hunter Central Coast PM10 levels exceeded national air quality standards (copies attached). Notwithstanding, it was agreed that LakeCoal would submit an incident report on the event. As outlined in SSD 5465, LakeCoal is required to ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the development do not cause an exceedance of the criteria listed in Tables 3, 4 and 5 at any residence on privately-owned land. Table 4, "Short-term criterion for (PM10) nominates a 24 hour PM10 criterion of 50µg/m3 as:

Date	Description of Non-compliance	Approval/Condition/Clause	Actions taken to address Non-compliance
			• applying to total impact (i.e. incremental increase in concentrations due to the development plus background concentrations due to other sources); and • excluding extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents, illegal activities or any other activity agreed to by the Secretary As previously advised, based on the results of the preliminary and subsequent investigations, LakeCoal remains of the opinion that the minor exceedance of the 24 hour PM10 value of 57.82µg/m3 recorded on 18 July 2018 was not as a consequence of its activities and, in the absence of any other known local sources and the warnings received from OEH, is firmly of the opinion that the exclusion nominated in the footnote to Table 4 in SSD-5465 applies and consequently the exceedance does not represent a non–compliance with the consent. Accordingly Lakecoal is not intending to undertake any further actions as a result of the minor exceedance and would like to request the Secretary's agreement that it does not constitute a non-compliance for the purpose of SSD 5465 for its internal compliance records
4/12/2018	PM10 24 Hour Average Exceedance (RTD 001)-Kingfisher Shores	SSD 5465	As outlined in the initial notification, the TEOM recorded a 24 hour PM10 value of 112.98 µg/m3 and 91.59 µg/m3 against the 24 hour average criterion of 50µg/m3 on the 22nd and 23rd November respectively. A copy of the TEOM Data recorded for the month of November is provided in Attachment 2. Following a preliminary investigation of the exceedance, a follow-up phone call was made to DPE in which LakeCoal advised that it was of the opinion that the exceedance was not a direct result of its mining activities and was more likely a result of a regional dust event which was occurring at the time, noting that on 22nd and 23rd November, it had received automatic notifications from OEH (via oeh.airquality@environment.nsw.gov.au) that both the Central Coast and Lower Hunter Central Coast PM10 levels exceeded national air quality standards (copies attached). Notwithstanding, it was agreed that LakeCoal would submit an incident report on the event. As outlined in SSD 5465, LakeCoal is required to ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the development do not cause an exceedance of the criteria listed in Tables 3, 4 and 5 at any residence on privately-owned land. Table 4, "Short-term criterion for (PM10) nominates a 24 hour PM10 criterion of 50µg/m3 as: • applying to total impact (i.e. incremental increase in concentrations due to the development plus background concentrations due to other sources); and • excluding extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents, illegal activities or any other activity agreed to by the Secretary. As previously advised, based on the results of the preliminary and subsequent investigations, LakeCoal remains of the opinion that the exceedance of the 24 hour PM10 value of 112.98µg/m3 and 91.59 µg/m3 recorded on

Date	Description of Non-compliance	Approval/Condition/Clause	Actions taken to address Non-compliance
			the 22nd and 23rd November 2018 respectively was not as a consequence of its activities and, in the absence of any other known local sources and the warnings received from OEH, is of the opinion that the exclusion nominated in the footnote to Table 4 in SSD-5465 applies and consequently the exceedance does not represent a non–compliance with the consent. Accordingly LakeCoal is not intending to undertake any further actions as a result of the exceedance and would like to request the Secretary's agreement that it does not constitute a non-compliance for the purpose of SSD 5465 for its internal compliance records

12 Activities to be completed in the next reporting period

A summary of the activities that were proposed to be undertaken during the 2019 reporting period and current status is provided in **Table 12.1.**

Table 12.1: Update on activities planned to be undertaken in the 2019 reporting period

Activity Proposed	Status Update
Trial of chemical dust suppressant around unsealed access roads to reduce windblown dust	To be commissioned and completed in 2019.
Implementation of the 2019 Weed Action Plan	To be commissioned and completed in 2019.
Development of the site rehabilitation monitoring program and baseline monitoring.	Consultant engaged to conduct in Q2 2019.
A modification to the development consent will be submitted to allow for an increase in the amount of coal handled at Mannering Colliery and transferred via existing infrastructure to Vales Point Power Station. The modification also includes a minor change in mining method (namely the description of bord and pillar mining)	The environmental assessment (EA) and supporting air quality and noise mitigation assessments are being finalised for submission to DPE in Q2, 2019.
Independent Environmental Audit	To be commissioned and completed in Q2 2019.
Transfer of Environmental Licences (EPL, Water and Radiation) and Titles	To be completed in Q1/Q2 2019 due receivership and change in ownership.
Demolition of Mine Cottages	To be completed in Q4 2019 and Q1 2020.
Submission of Extraction Plan for S2/S3 Miniwall Panels.	To be completed in Q2 2019.
Submission of updated MOP including Bord and Pillar activities post S2/S3 Miniwalls	To be completed in 2019
A modification to the development consent will be submitted to allow for the transfer of additional coal to Mannering Colliery (via the approved underground linkage) and a change in mining method (including an updated definition of first workings).	The environmental assessment (EA) and supporting subsidence and groundwater assessments are being finalised for submission to DPE in Q2, 2019.
Housekeeping Activities	Ongoing

13 References

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.

Global Acoustics, 2018 – *Chain Valley Colliery Environmental Noise Monitoring, Quarter 1 2018.*

Global Acoustics, 2018 – *Chain Valley Colliery Environmental Noise Monitoring, Quarter 2 2018.*

Global Acoustics, 2018 – *Chain Valley Colliery Environmental Noise Monitoring, Quarter 3 2018.*

Global Acoustics, 2018 – *Chain Valley Colliery Environmental Noise Monitoring, Quarter 4 2018.*

Laxton, J. H. & Laxton, E. S., 2018 – *Seagrass Survey of Chain Valley Bay, Summerland Point and Crangan Bay, Lake Macquarie, NSW (Results for 2008 to 2018)*

Laxton, J. H. & Laxton, E. S., 2018 – *Lake Macquarie Benthos Survey Results No. 13 (March 2018)*.

Project Approval MP 10_0161 (as modified), issued under Section 75J of the *Environmental Planning and Assessment Act, 1979*.

Development Consent SSD 5465 (as modified), issued under Section 89E of the *Environmental Planning and Assessment Act, 1979*.

14 Acronyms

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 generally required by mining leases.

CCC
Community Consultative Committee

CVC
LakeCoal - Chain Valley Colliery

DRE
Division of Resources and Energy within the Department of Trade, Investment, Regional Infrastructure and Services.

EPA
Environment Protection Authority

EP&A Act
Environmental Planning and Assessment Act, 1979

EPL
Environment Protection Licence

EMS
Environmental Management System

kL
Kilolitre

LDP1
Licenced Discharge Point 1 (per EPL1770)

OEH
NSW Office of Environment and Heritage

PWCS
Port Waratah Coal Services

t CO_2-e
tonnes of carbon dioxide equivalence

The website
the website of LakeCoal - Chain Valley Colliery, which is, www.chainvalleymine.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

Appendix 2: Plans

Appendix 3: Environment Protection Licence 1770

Appendix 4: Seagrass Monitoring

Appendix 5: Weed Action Plan

Appendix 6: Noise Monitoring

Appendix 7: Subsidence Monitoring

16 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:	LakeCoal 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)

TABLE OF CONTENTS

DEFINITIONS

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
Annual Review	The review required by Condition 4 of Schedule 6
Applicant	LakeCoal Pty Limited, or any other person or persons who rely on this consent to carry out the development that is subject to this consent
Approved mine plan	The mine plan show 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
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
CCC	Community Consultative Committee
Coal haulage route	The route proposed in the EIS for haulage of coal by trucks between the site and Port Waratah Coal Services (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 & Environment
Development	The development described in the EIS, as amended by SEE Mod 1
DPI Water	Department of Primary Industries - Water
DRE	Division of Resources and Energy of the Department of Industry
DPI Fisheries	Fisheries Division of the Department of Primary Industries
EA	Environmental Assessment titled '*Environmental Assessment – Chain Valley Colliery Domains 1 and 2 Continuation Project*' dated July 2010 and associated response to submissions titled '*Submissions Report – Chain Valley Colliery Domains 1 and 2 Continuation Project',* dated 14 November 2011
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*
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	Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000*
EPL	Environment Protection Licence issued under the POEO Act
Evening	The period from 6pm to 10pm
Feasible	Feasible relates to engineering considerations and what is practical to build or carry out
First workings	Development of the main headings and gateroads in the underground mining area
Ha	Hectare
Heritage item	An item as defined under the *Heritage Act 1977* and/or an Aboriginal object or Aboriginal place as defined under the *National Parks and Wildlife Act 1974*
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	A set of circumstances that: • causes or threatens to cause material harm to the environment; and/or • breaches or exceeds the limits or performance measures/criteria in this consent
Land	As defined in the EP&A Act, except for where the term is used in the noise and air quality conditions in Schedule 3 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 the Land Titles Office at the date of this consent
LMCC	Lake Macquarie City Council
Material harm to the environment	Actual or potential harm to the health or safety of human beings or to ecosystems that is not trivial
Mining operations	Includes all extraction, processing, handling, storage and transportation of coal carried out on the site
Minister	Minister for Planning, or delegate
Minor	Not very large, important or serious
Mitigation	Activities associated with reducing the impacts of the development
MSB	Mine Subsidence Board
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
OEH	Office of Environment and Heritage
Peak hour periods	7 am to 9 am and 4:30 pm to 6 pm weekdays
POEO Act	*Protection of the Environment Operations Act 1997*
Privately-owned land	Land that is not owned by a public agency, Delta Electricity or a mining company (or its subsidiary)
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
Rehabilitation	The treatment or management of land disturbed by the development for the purpose of establishing a safe, stable and non-polluting environment
Remediation	Activities associated with partially or fully repairing or rehabilitating the impacts of the development or controlling the environmental consequences of this impact
Road Maintenance Agreement	The document prepared by McCullough Robertson Lawyers and titled '*Road Maintenance Agreement*', signed by WSC on 1 July 2013 and by LakeCoal on 5 July 2013
ROM coal	Run-of-mine coal
RMS	Roads and Maritime Services
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 miniwall or pillar extraction methods
Secretary	Secretary of the Department, or nominee
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.
Site	All land within the Development Area (see Appendices 1 and 2)
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

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
Threatened Species	As defined under the *Threatened Species Conservation Act 1995* and the *Environment Protection and Biodiversity Conservation Act 1999*
WSC	Wyong Shire Council

SCHEDULE 2
ADMINISTRATIVE CONDITIONS

OBLIGATION TO MINIMISE HARM TO THE ENVIRONMENT

1. In addition to meeting the specific performance criteria established under this consent, the Applicant shall implement all reasonable and feasible measures to prevent and/or minimise any harm to the environment that may result from the construction, operation, or rehabilitation of the development.

TERMS OF CONSENT

2. The Applicant shall carry out the development generally in accordance with the:
   (a) EIS;
   (b) SEE Mod 1;
   (c) SEE Mod 2; and
   (d) Project Layout Plans.

   Note: The Project Layout Plans of the development are shown in Appendices 2 to 4 and Appendix 7A

2A. The Applicant shall carry out the development in accordance with the:
   (a) Statement of Commitments; and
   (b) conditions of this consent.

3. If there is any inconsistency between the documents in condition 2, the more recent document shall prevail to the extent of the inconsistency. The conditions of this consent shall prevail over the documents in conditions 2 and 2A(a) to the extent of any inconsistency.

4. The Applicant shall comply with any reasonable requirement/s of the Secretary arising from the Department's assessment of:
   (a) any strategies, plans, programs, reviews, audits, reports or correspondence that are submitted by the Applicant in accordance with this consent; and
   (b) the implementation of any actions or measures contained in these documents.

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 Secretary or the DRE. 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 shall 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 shall 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 shall not dispatch from the site more than:
   (a) 660,000 tonnes of product coal in any calendar year to Port Waratah Coal Services 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 shall 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 Secretary, and subject to any restrictions that the Secretary may impose.

10. The Applicant shall 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 Secretary, the Applicant shall enter into a planning agreement with the WSC in accordance with Division 6 of Part 4 of the EP&A Act that provides for payment to the WSC 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 WSC relating to the preparation or implementation of the planning agreement, then either party may refer the matter to the Secretary for resolution.

COMMUNITY ENHANCEMENT

12. The Applicant shall pay WSC $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.

SURRENDER OF EXISTING PROJECT APPROVAL

13. Within 12 months of the date of this development consent, unless the Secretary agrees otherwise, the Applicant shall surrender its project approval for the Chain Valley Colliery Domains 1 & 2 Continuation Project (10_0161) to the satisfaction of the Secretary, in accordance with section 75YA of the EP&A Act.

    Note: This requirement does not extend to the surrender of construction and occupation certificates for existing and proposed building works under Part 4A of the EP&A Act. Surrender of a consent or approval should not be understood as implying that works legally constructed under a valid consent or approval can no longer be legally maintained or used.

14. Prior to the surrender of the existing project approval, the conditions of this consent (including any notes) shall prevail to the extent of any inconsistency with the conditions of the existing project approval (10_0161).

STRUCTURAL ADEQUACY

15. The Applicant shall 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 MSB where the building or structure is located on land within declared Mine Subsidence Districts.

    Notes:
    - *Under Part 4A 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 15 of the Mine Subsidence Compensation Act 1961, the Applicant is required to obtain the MSB's approval before constructing any improvements in a Mine Subsidence District.*

DEMOLITION

16. The Applicant shall 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. The Applicant shall ensure that all plant and equipment used at the site is:
    (a) maintained in a proper and efficient condition; and
    (b) operated in a proper and efficient manner.

UPDATING AND STAGING STRATEGIES, PLANS OR PROGRAMS

18. The Applicant must regularly review the strategies, plans and programs required under this consent and ensure that these documents are updated to incorporate measures to improve the environmental performance of the development and reflect current best practice in the mining industry. To facilitate these updates, the Applicant may at any time submit revised strategies, plans or programs for the approval of the Secretary. With the agreement of the Secretary, the Applicant may also submit any strategy, plan or program required by this consent on a staged basis.

With the agreement of the Secretary, the Applicant may prepare a revision or stage of any strategy, plan or program required under this consent without undertaking consultation with all parties nominated under the applicable condition in this consent.

Notes:

- *While any strategy, plan or program may be submitted on a staged basis, the Applicant must ensure that the existing operations on site are covered by suitable strategies, plans or programs at all times.*
- *If the submission of any strategy, plan or program is to be staged, then the relevant strategy, plan or program must clearly describe the specific stage to which the strategy, plan or program applies, the relationship of this stage to any future stages, and the trigger for updating the strategy, plan or program.*

ROAD MAINTENANCE CONTRIBUTION

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

SCHEDULE 3
ENVIRONMENTAL CONDITIONS – GENERAL

TRANSPORT

Monitoring of Coal Transport

1. The Applicant shall:
   (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 shall upgrade the Ruttleys Road and Construction Road intersection within 6 months of the date of this consent, unless the 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, WSC, RMS and Delta Electricity and to the satisfaction of the Secretary.

Road Transport Protocol

3. The Applicant shall prepare a Road Transport Protocol to the satisfaction of the Secretary. This protocol shall:
   (a) be prepared in consultation with RMS, NCC, WSC, DRE and CCC and submitted to the 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 shall implement the approved Road Transport Protocol as approved from time to time by the Secretary.

Independent Traffic Audit

4. Prior to 31 March 2014, and every 12 months thereafter, unless the Secretary directs otherwise, the Applicant shall commission a suitably qualified person, whose appointment has been approved by the Secretary, 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 RMS, NCC, WSC 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 Secretary, the Applicant shall submit a copy of the report to the 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 shall prepare and submit to the 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. 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 shall 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 shall:
   (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 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 shall prepare a Noise Management Plan for the development to the satisfaction of the Secretary. This plan must:
(a) be prepared in consultation with the EPA and submitted to the Secretary for approval within 4 months of the date of this consent, unless otherwise agreed by the 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 shall implement the approved management plan as approved from time to time by the Secretary.

AIR QUALITY

Odour

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

Air Quality Criteria

11. The Applicant shall ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the development do not cause exceedance of the criteria listed in Tables 3, 4 and 5 at any residence on privately-owned land.

Table 3: Long-term criteria for particulate matter

Pollutant	Averaging period	[d] Criterion
Total suspended particulate (TSP) matter	Annual	[a] 90 µg/m^3
Particulate matter < 10 µm (PM_{10})	Annual	[a] 30 µg/m^3

Table 4: Short-term criterion for particulate matter

Pollutant	***Averaging period***	***[d] Criterion***
Particulate matter < 10 µm (PM_{10})	24 hour	[a] 50 µg/m^3

Table 5: Long-term criteria for deposited dust

Pollutant	***Averaging period***	***Maximum increase in deposited dust level***	***Maximum total deposited dust level***
[c] Deposited dust	Annual	[b] 2 g/m^2/month	[a] 4 g/m^2/month

Notes for Tables 3 to 5:

- *[a] Total impact (i.e. incremental increase in concentrations due to the development plus background concentrations due to other sources);*
- *[b] Incremental impact (i.e. incremental increase in concentrations due to the development on its own);*
- *[c] 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; and*
- *[d] Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents, illegal activities or any other activity agreed to by the Secretary.*

Operating Conditions

12. The Applicant shall:
    (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 d to Tables 3-5 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 Secretary.

Air Quality Management Plan

13. The Applicant shall prepare an Air Quality Management Plan for the development to the satisfaction of the Secretary. This plan must:
    (a) be prepared in consultation with the EPA, and submitted to the 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 shall implement the approved management plan as approved from time to time by the Secretary.

METEOROLOGICAL MONITORING

14. During the life of the development, the Applicant shall 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 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 shall 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 Secretary.

Water Pollution

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

Sewage Management

17. The Applicant shall manage on-site sewage in accordance with *NSW Environmental Guidelines: Use of Effluent by Irrigation* (DEC 2004) and the *National Guidelines for Sewerage Systems - Effluent Management (ANZECC 1997)* or its latest version, to the satisfaction of EPA.

Water Management Plan

18. The Applicant shall prepare a Water Management Plan for the surface facilities sites to the satisfaction of the Secretary. This plan must be prepared in consultation with DPI Water and EPA, by suitably qualified and experienced persons whose appointment has been endorsed by the Secretary, and submitted to the 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 shall implement the approved management plan as approved from time to time by the Secretary.

Note: The Secretary may require the Applicant to implement upgrades and other changes identified under paragraph (e), in accordance with condition 4 of schedule 2.

BIODIVERSITY

Biodiversity Enhancement Strategy

19. The Applicant shall implement a Biodiversity Enhancement Strategy as described in the EIS and summarised in Table 6, in consultation with OEH, and to the satisfaction of the Secretary.

Table 6: 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 6 see the applicable figures in Appendix 7.

The Applicant shall 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 OEH and to the satisfaction of the Secretary.

Biodiversity Management Plan

20. The Applicant shall 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 Secretary. This plan must:
    (a) be prepared by a suitably qualified person approved by the Secretary; in consultation with OEH, and submitted to the 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 shall implement the approved management plan as approved from time to time by the Secretary.

20A. Within 3 months of the approval of MOD 2, the Applicant shall 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 Secretary for approval.

HERITAGE

Heritage Management Plan

21. The Applicant shall prepare a Heritage Management Plan for the development to the satisfaction of the Secretary. This Plan must:
    (a) be prepared in consultation with any relevant Aboriginal stakeholders;
    (b) be submitted to the Secretary for approval within 6 months of the date of this consent;

(c) include consideration of the Aboriginal and non-Aboriginal cultural context and significance of the site;
(d) detail the responsibilities of all stakeholders; and
(e) include programs/procedures and management measures for:
- the ongoing monitoring of site 45-7-0189 at Summerland Point;
- managing the discovery of any human remains or previously unidentified Aboriginal objects on site, including (in the case of human remains) stop work provisions and notification protocols;
- ongoing consultation and involvement of the Aboriginal community in the conservation and management of Aboriginal heritage within the site; (including procedures for keeping records of this);
- appropriate identification, management, conservation and protection of both Aboriginal and non-Aboriginal heritage items identified on the site; and
- ensuring relevant workers on site receive suitable heritage inductions prior to carrying out any activities which may disturb Aboriginal sites, and that suitable records are kept of these inductions.

The Applicant shall implement the approved management plan as approved from time to time by the Secretary.

VISUAL

Visual Amenity and Lighting

22. The Applicant shall:
(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 Secretary.

WASTE

23. The Applicant shall:
(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 Secretary.

BUSHFIRE MANAGEMENT

24. The Applicant shall:
(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 shall rehabilitate the site to the satisfaction of the DRE. This rehabilitation must be generally consistent with the proposed rehabilitation strategy described in the EIS, and comply with the objectives in Table 7.

Table 7: Rehabilitation Objectives

Feature	***Objective***
Mine site (as a whole)	• Safe, stable and non-polluting. • Final land use compatible with surrounding land uses.
Rehabilitation materials	• Materials (including topsoils, substrates and seeds of the disturbed area) are recovered, appropriately managed and used effectively as resources in rehabilitation.
Surface infrastructure	• To be decommissioned and removed, unless the DRE 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 DRE 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 *Mine Subsidence Compensation Act 1961.*
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 shall carry out the rehabilitation of the site progressively, that is, as soon as reasonably practicable following disturbance to the satisfaction of the Secretary and DRE.

Rehabilitation Management Plan

27. The Applicant shall prepare a Rehabilitation Management Plan for the development, in consultation with OEH, DPI Water, WSC, LMCC, and the CCC, and to the satisfaction of the DRE. This plan must:
    (a) be submitted to the Secretary and the DRE for approval within 12 months of the date of approval of this development consent;
    (b) be prepared in accordance with any relevant DRE guideline and be consistent with the rehabilitation objectives in the EIS and in Table 7;
    (c) describe how the performance of the rehabilitation would be monitored and assessed against the objectives in Table 7;
    (d) describe the process whereby additional measures would be identified and implemented to ensure the rehabilitation objectives are achieved;
    (e) 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
    (f) be integrated with the other management plans required under this consent.

    The Applicant shall implement the approved management plan as approved from time to time by the Secretary.

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

SCHEDULE 4
ENVIRONMENTAL CONDITIONS – UNDERGROUND MINING

SUBSIDENCE

1. The Applicant shall 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 shall ensure that the development does not cause any exceedance of the performance measures in Table 8 to the satisfaction of the Secretary.

Table 8: 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 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 8 and the 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 shall provide a suitable offset to compensate for the impact or environmental consequence to the satisfaction of the 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 shall ensure that the development does not cause any exceedances of the performance measures in Table 9, to the satisfaction of the Secretary.

Table 9: 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 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 Mine Subsidence Compensation Act 1961.*

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 9 is to be settled by the Secretary, following consultation with the MSB and the DRE. Any decision by the 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 for Miniwalls 41 to 45 in Chain Valley Bay, the Applicant must prepare a detailed Multi-Seam Mining Feasibility Investigation to the satisfaction of the Secretary. This plan must:
   (a) be prepared in consultation with DRE by suitably qualified and experienced persons whose appointment has been endorsed by the 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 shall prepare an Extraction Plan for all second workings on site, to the satisfaction of the Secretary. Each Extraction Plan must:
   (a) be prepared by suitably qualified and experienced persons whose appointment has been endorsed by the Secretary;
   (b) be approved by the 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 8 and 9;
   (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 8 and 9, and manage or remediate any impacts and/or environmental consequences;
   (g) include a Built Features Management Plan, which has been prepared in consultation with DRE 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 other 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 OEH, 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 OEH, 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;

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

(k) include a Subsidence Monitoring Program which has been prepared in consultation with DRE, 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 8 and 9, or where any such exceedance appears likely;

(m) include appropriate revisions to the Rehabilitation Management Plan required under Condition 28 of Schedule 3; and

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

The Applicant shall implement the approved management plan as approved from time to time by the Secretary.

Notes:
- *To identify the underground mining areas approved under this consent referred to in this condition, see Appendix 3.*
- *This condition does not limit secondary extraction under a Subsidence Management Plan approved as at the date of this consent.*

8. The Applicant shall 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 shall not carry out first workings on site that are not generally in accordance with the approved mine plan without written approval of the Secretary.

9A. Within 3 months of the approval of MOD 1, the Applicant shall 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 Secretary.

Payment of Reasonable Costs

10. The Applicant shall 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 shall 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 shall send a copy of the NSW Health fact sheet entitled "Mine Dust and You" (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 Secretary in writing for an independent review of the impacts of the development on his/her land.

   If the Secretary is satisfied that an independent review is warranted, then within 2 months of the Secretary's decision the Applicant shall:
   (a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the 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 Secretary and landowner a copy of the independent review.

SCHEDULE 6
ENVIRONMENTAL MANAGEMENT, REPORTING AND AUDITING

ENVIRONMENTAL MANAGEMENT

Environmental Management Strategy

1. The Applicant shall prepare an Environmental Management Strategy for the development to the satisfaction of the Secretary. This strategy must:
   (a) be submitted to the Secretary for approval within 7 months of the date of this consent;
   (b) provide the strategic framework for environmental management of the development;
   (c) identify the statutory approvals that apply to the development;
   (d) describe the role, responsibility, authority and accountability of all key personnel involved in the environmental management of the development;
   (e) describe the procedures that would be implemented to:
      - keep the local community and relevant agencies informed about the operation and environmental performance of the development;
      - receive, handle, respond to, and record complaints;
      - resolve any disputes that may arise during the course of the development;
      - respond to any non-compliance;
      - respond to emergencies; and
   (f) include:
      - copies of any strategies, plans and programs approved under the conditions of this consent; and
      - a clear plan depicting all the monitoring required to be carried out under the conditions of this consent.

   The Applicant shall implement the approved management strategy as approved from time to time by the Secretary.

Adaptive Management

2. The Applicant must assess and manage development-related risks to ensure that there are no exceedances of the criteria and/or performance measures in Schedules 3 and 4. Any exceedance of these criteria and/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 and/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 remediation measures as directed by the Secretary,

   to the satisfaction of the Secretary.

Management Plan Requirements

3. The Applicant shall ensure that the management plans required under this consent are prepared in accordance with any relevant guidelines, and include:
   (a) detailed baseline data;
   (b) a description of:
      - the relevant statutory requirements (including any relevant approval, licence or lease conditions);
      - any relevant limits or performance measures/criteria;
      - 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) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;
   (d) a program to monitor and report on the:
      - impacts and environmental performance of the development;
      - effectiveness of any management measures (see c above);
   (e) 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;
   (f) a program to investigate and implement ways to improve the environmental performance of the development over time;
   (g) a protocol for managing and reporting any:

- incidents;
- complaints;
- non-compliances with statutory requirements; and
- exceedances of the impact assessment criteria and/or performance criteria; and

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

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

Annual Review

4. By the end of March each year, or other timing as may be agreed by the Secretary, the Applicant shall review the environmental performance of the development to the satisfaction of the Secretary. This review must:
   (a) describe the development (including any rehabilitation) that was carried out in the past 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 past calendar year, which includes 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 documents listed in condition 2 of Schedule 2;

   (c) identify any non-compliance over the past calendar year, and describe what actions were (or are being) taken to ensure compliance;
   (d) identify any trends in the monitoring data over the life of the development;
   (e) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and
   (f) describe what measures will be implemented over the current financial year to improve the environmental performance of the development.

Revision of Strategies, Plans and Programs

5. Within 3 months of:
   (a) the submission of an annual review under Condition 4 above;
   (b) the submission of an incident report under Condition 7 below;
   (c) the submission of an audit report under Condition 9 below; or
   (d) any modification to the conditions of this consent, (unless the conditions require otherwise),

   the Applicant shall review, and if necessary revise, the strategies, plans, and programs required under this consent, to the satisfaction of the Secretary. Where this review leads to revisions in any such document, then within 4 weeks of the review the revised document must be submitted for the approval of the Secretary.

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

Community Consultative Committee

6. The Applicant shall continue to operate a Community Consultative Committee (CCC) for the development to the satisfaction of the Secretary. This CCC must be operated in accordance with the *Guidelines for Establishing and Operating Community Consultative Committees for Mining Developments* (Department of Planning, 2007, or its latest version).

   Notes:
   - *The CCC is an advisory committee. The Department and other relevant agencies are responsible for ensuring that the Applicant complies with this consent.*
   - *In accordance with the guideline, the Committee should be comprised of an independent chair and appropriate representation from the Applicant, Council, recognised environmental groups and the local community.*
   - *In operating the CCC, the Department will accept the continued representation from existing CCC members.*

REPORTING

Incident Reporting

7. The Applicant shall immediately notify the Secretary and any other relevant agencies of any incident that has caused, or threatens to cause, material harm to the environment. For any other incident associated with the development, the Applicant shall notify the Secretary and any other relevant agencies as soon as practicable after the Applicant becomes aware of the incident. Within 7 days of the date of the incident, the

Applicant shall provide the Secretary and any relevant agencies with a detailed report on the incident, and such further reports as may be requested.

Regular Reporting

8. The Applicant shall provide regular reporting on the environmental performance of the development on its website, in accordance with the reporting arrangements in any plans or programs approved under the conditions of this consent.

INDEPENDENT ENVIRONMENTAL AUDIT

9. By the end of February 2016 (or other such timing as agreed by the Secretary), and every 3 years thereafter, unless the Secretary directs otherwise, the Applicant shall commission and pay the full cost of an Independent Environmental Audit of the development. This audit must:
   (a) be conducted by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Secretary;
   (b) include consultation with the relevant agencies;
   (c) assess the environmental performance of the development and assess whether it is complying with the requirements in this consent and any relevant EPL or Mining Lease (including any assessment, plan or program required under these approvals);
   (d) review the adequacy of strategies, plans or programs required under the abovementioned approvals; and
   (e) recommend appropriate measures or actions to improve the environmental performance of the development, and/or any assessment, plan or program required under the abovementioned approvals.

   Note: This audit team must be led by a suitably qualified auditor and include experts in any field specified by the Secretary.

10. Within 6 weeks of the completion of this audit, or as otherwise agreed by the Secretary, the Applicant shall submit a copy of the audit report to the Secretary, together with its response to any recommendations contained in the audit report.

ACCESS TO INFORMATION

11. The Applicant shall:
   (a) make copies of the following publicly available on its website:
      - the EIS;
      - all current statutory approvals for the development;
      - all approved strategies, plans and programs required under the conditions of this consent;
      - a comprehensive summary of the monitoring results of the development, which have been reported in accordance with the various plans and programs approved under the conditions of this consent;
      - a complaints register (updated monthly);
      - minutes of CCC meetings;
      - the Annual Reviews of the development;
      - any Independent Environmental Audit, and any other audit, and the Applicant's response to the recommendations in these audits;
      - any other matter required by the Secretary; and

   (b) keep this information up-to-date,

   to the satisfaction of the 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
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23	13120
24	13120
60	13120
30	13123
31	13123
A	368634
100	1065718
102	1065718
20	1113256
7329	1148149
5	981103
9	13120
100	713777
25	13120
26	13120
27	13120
28	13120
29	13120

APPENDIX 2
DEVELOPMENT AREA

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

APPENDIX 3
DEVELOPMENT LAYOUT

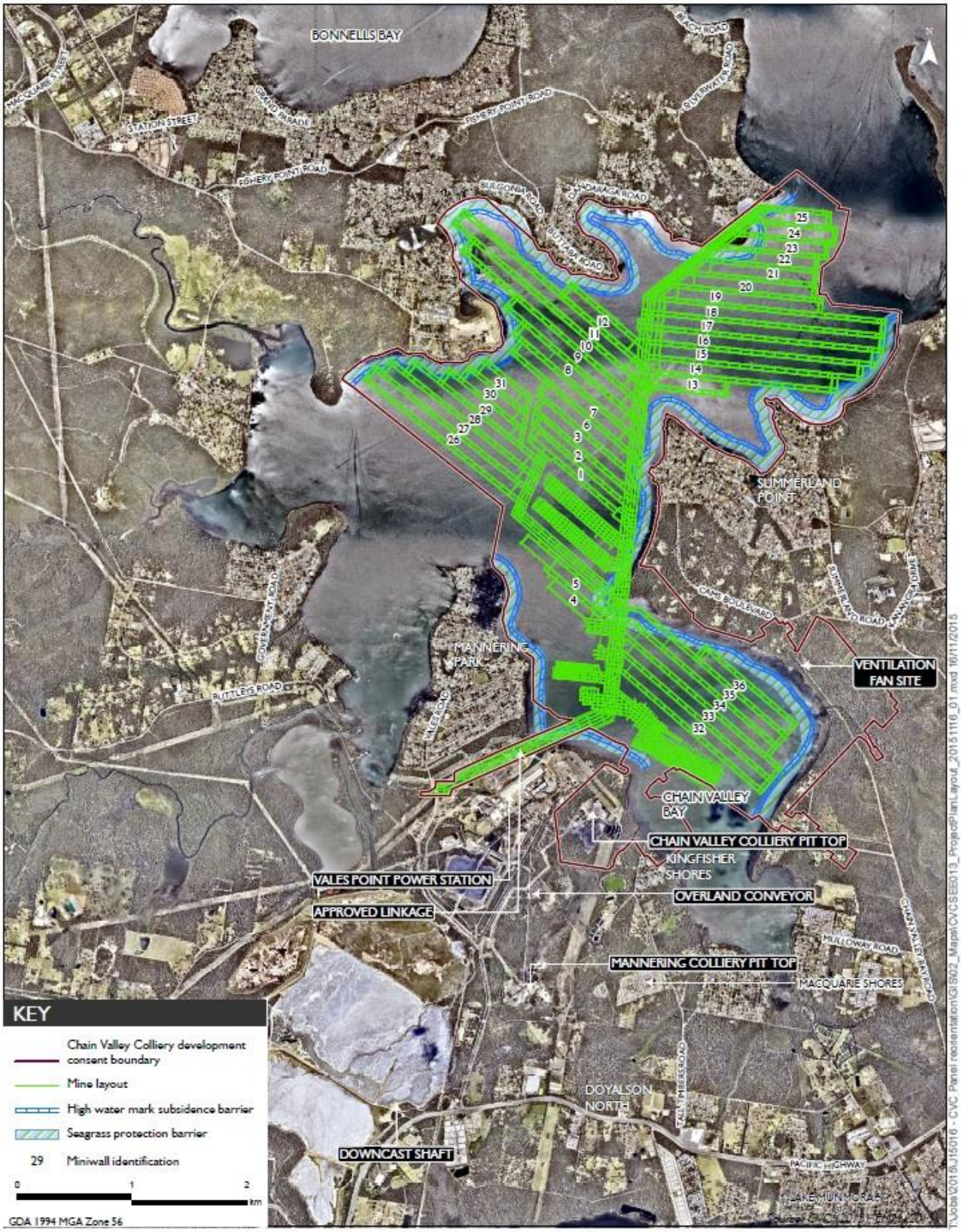


Figure 1: *Layout of the Chain Valley Extension Project*

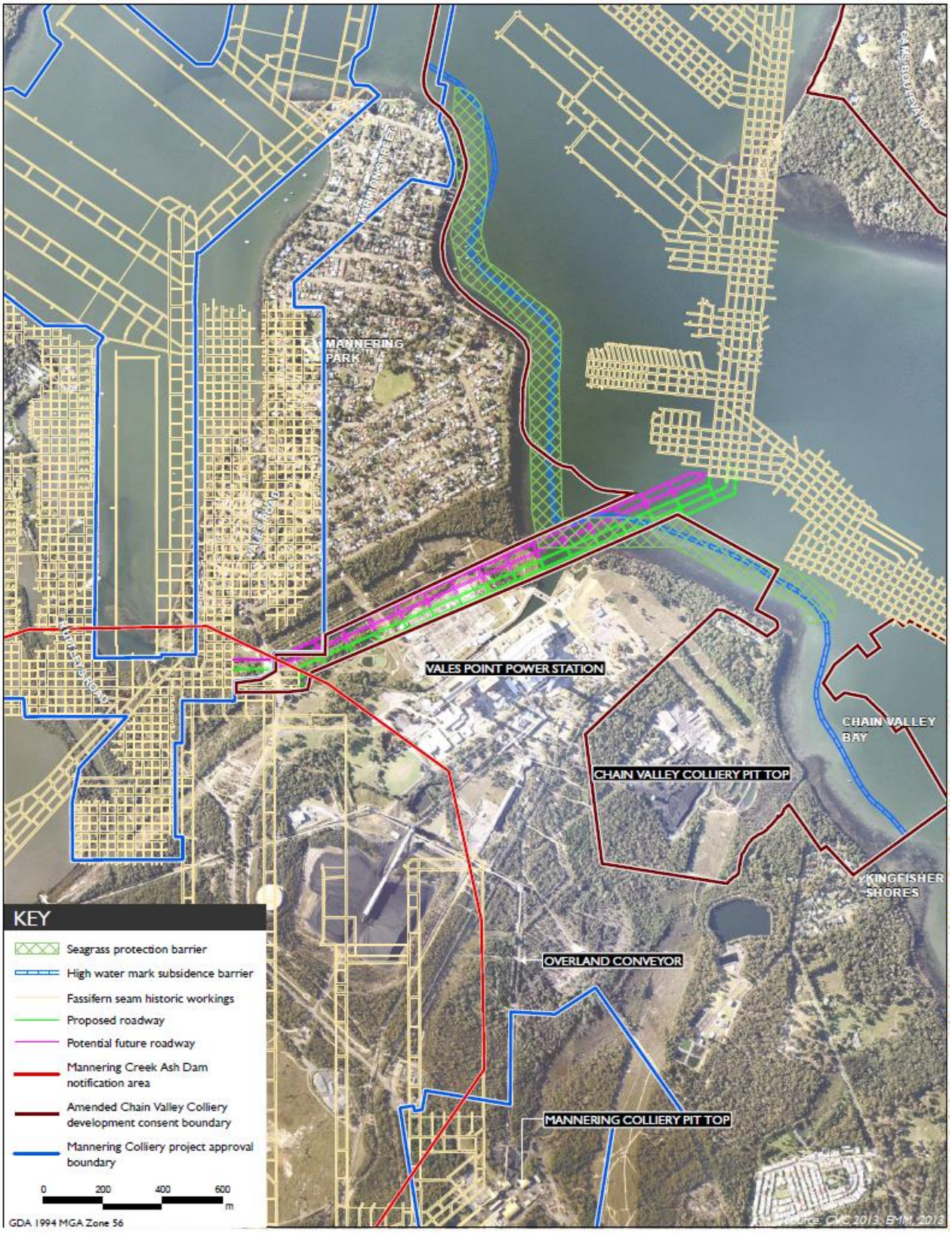


Figure 2: *Location of the underground linkage to Mannering Colliery*

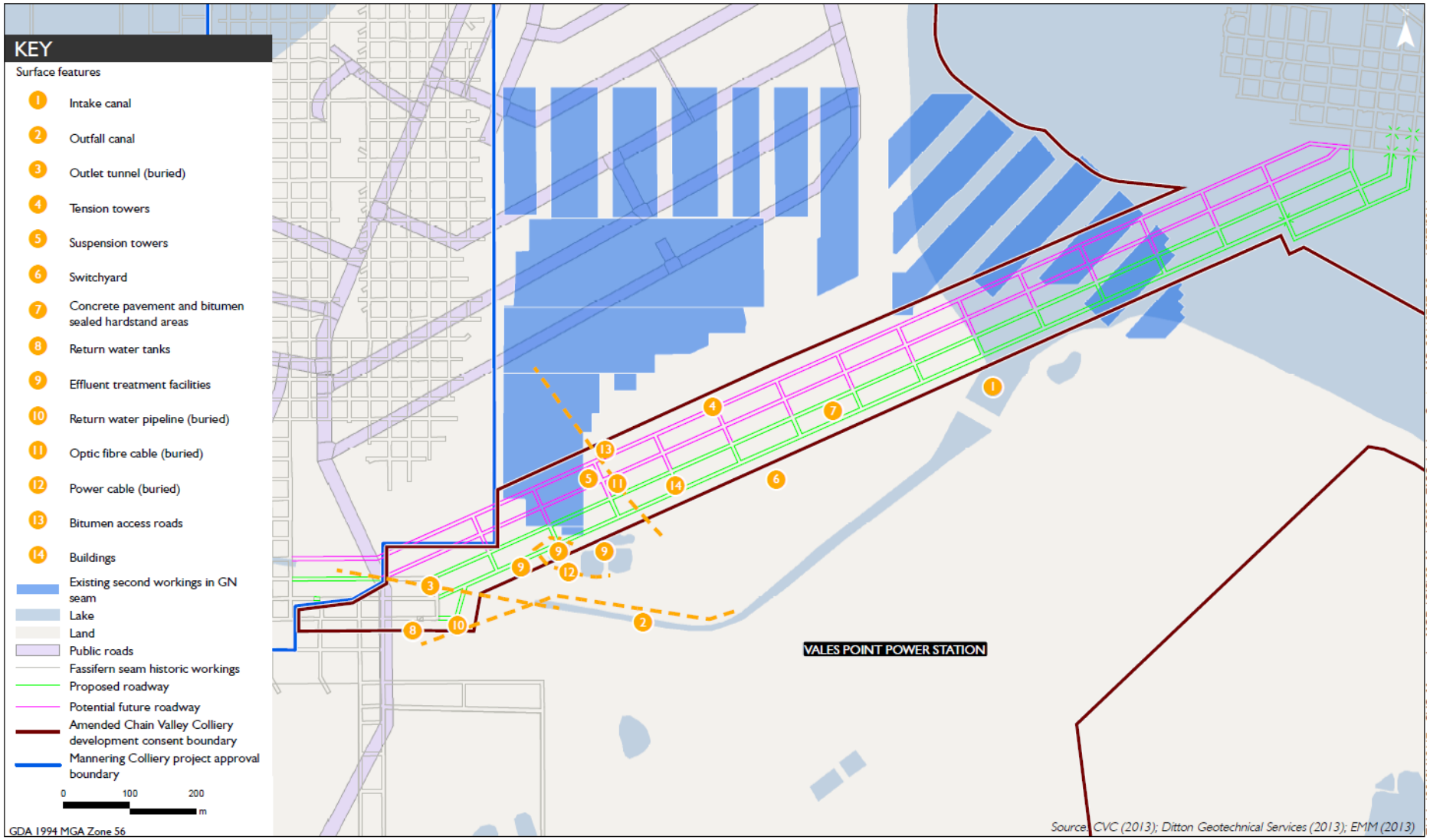


Figure 3: *Location of the underground linkage and surface infrastructure*

APPENDIX 4
KEY SURFACE FACILITIES

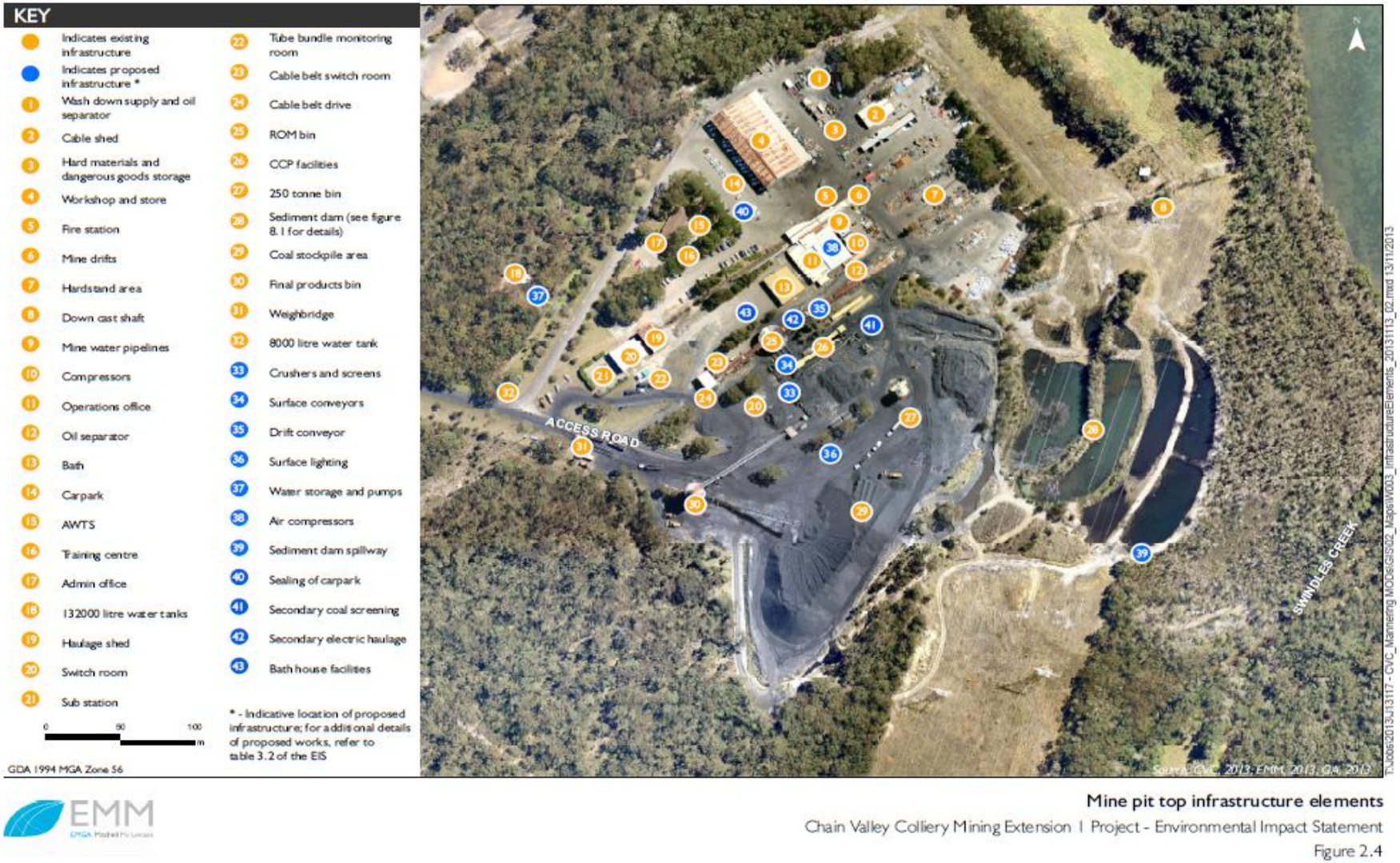


Figure 1: *General Arrangement of the Chain Valley Colliery surface facilities site*

APPENDIX 5
COAL HAULAGE ROUTE – PUBLIC ROADS

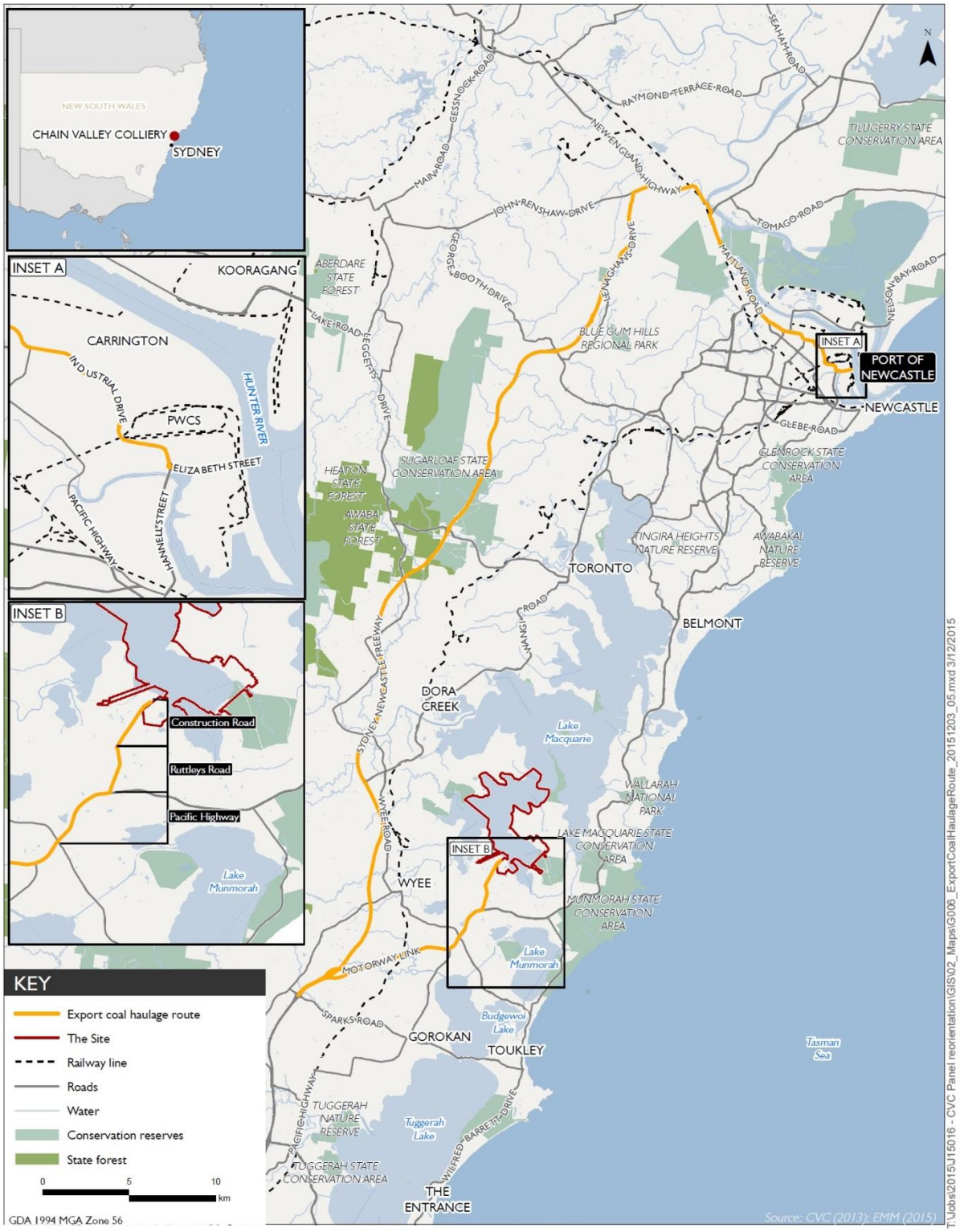


Figure 1: *Export Coal Haulage Route*

APPENDIX 6
NOISE RECEIVER LOCATIONS

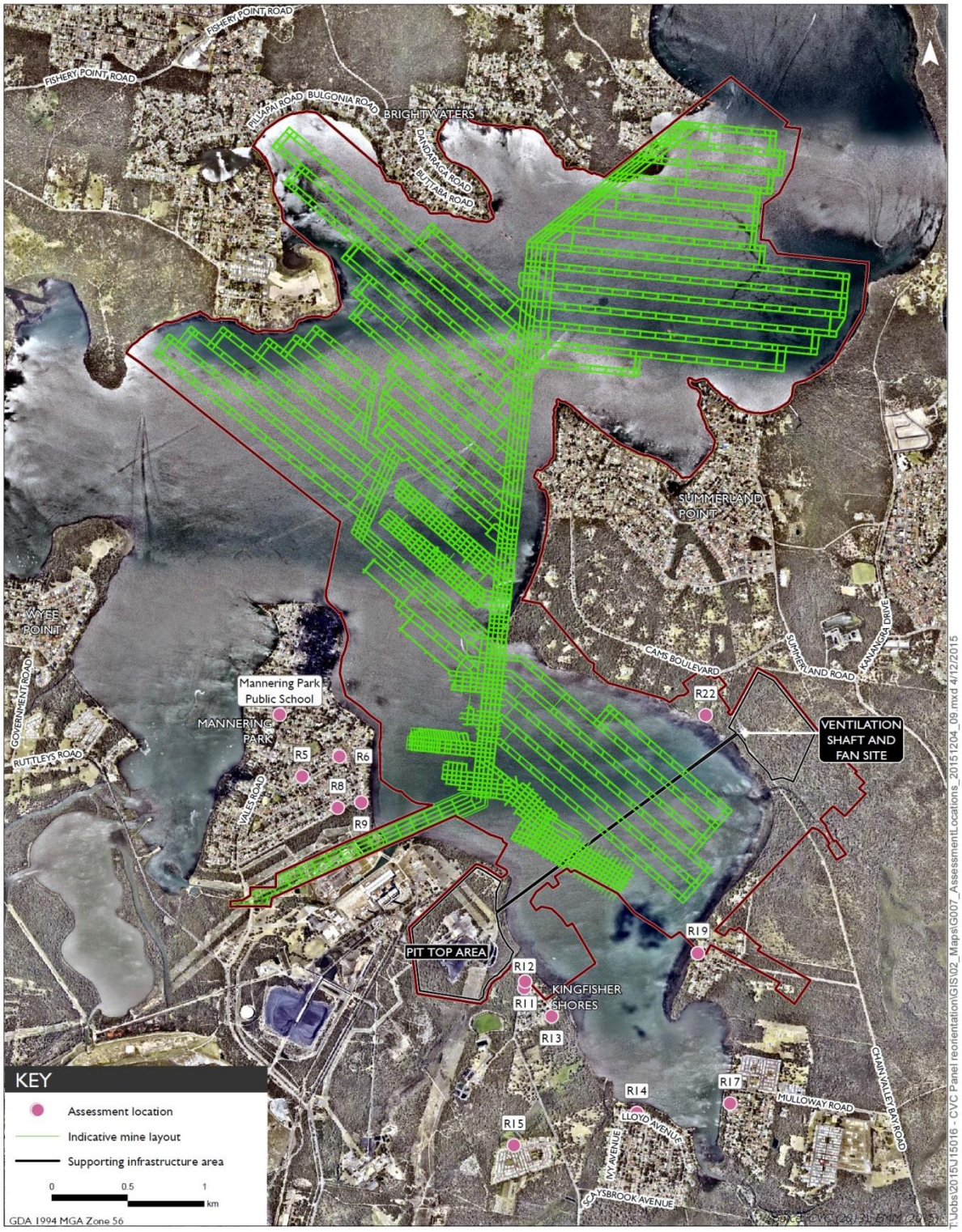


Figure 1: *Noise Receiver Locations*

APPENDIX 7
BIODIVERSITY ENHANCEMENT AREA

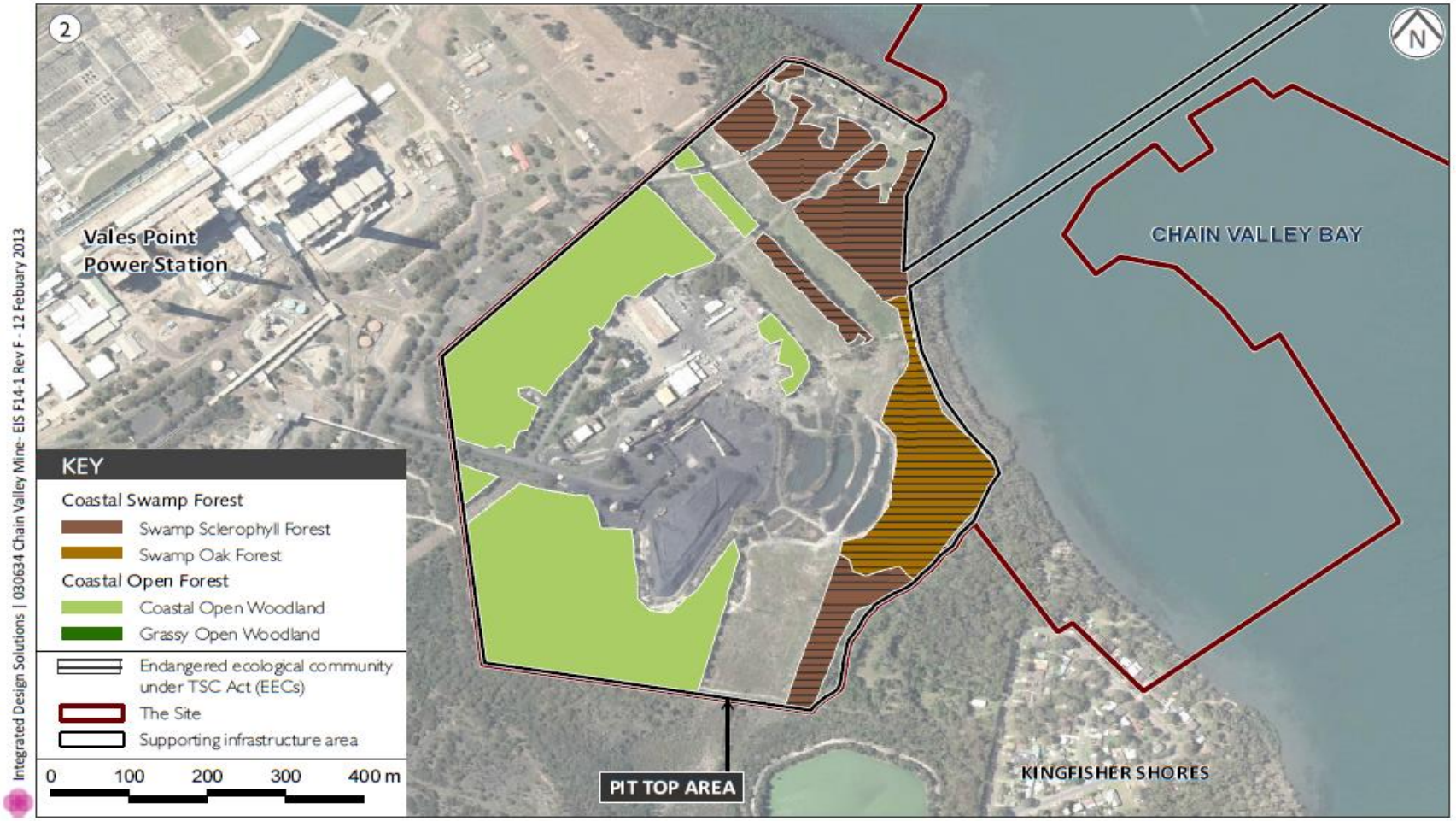


Figure 1: *Location of the Biodiversity Enhancement Area, shown in red and orange hatching*

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 shall be that recorded by the meteorological station described in condition 15 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 Secretary directs otherwise.

5. Unless otherwise agreed with the 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. LakeCoal 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 DPI 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, LakeCoal 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 LakeCoal. 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, LakeCoal will enter into negotiations with the affected landowners and the Mine Subsidence Board 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. LakeCoal will: • update the WMP to include any changes as a result of the proposed modification; • 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 LakeCoal'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 WSC 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 parametres 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 parametres. Results of water quality monitoring will be reported in the Annual Review and made available to the CCC, as well as Wyong

	and Lake Macquarie Councils.
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. LakeCoal 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, LakeCoal 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 AQCHCMP, which will be reviewed and updated as required to include the commitments made below. LakeCoal 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, LakeCoal will continue to investigate alternative options for transporting export coal to the PWCS, 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, LakeCoal will: • provide a detailed feasibility report of rail transport options to DP&I as part of the next coal transport options report to be submitted, by 31 December 2014. Should the report identify that coal transport via rail is feasible, and subject to obtaining necessary agreements, LakeCoal will prepare and lodge an application to modify the relevant approval so as to permit the installation and operation of facilities necessary to undertaken rail transport of coal to PWCS; • discuss the potential to utilise proposed rail loading facilities associated with the Wallarah 2 Coal Project, following this project receiving approval; and • 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, which will be reviewed and updated as required to include the commitments made below. LakeCoal will: • provide raw subsidence survey data to OEH within 7 days of completion; • undertake annual bathymetric surveys of the lake bed to determine actual subsidence and undertake a comparison with predicted levels. Should measured subsidence significantly exceed predicted levels, LakeCoal will review future panel 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 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. LakeCoal will • revise the BCMP to include the sampling locations in the assessment of the Proposal; • undertake seasonal surveys (spring and autumn) for the Site 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 annual 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. LakeCoal will:
	• investigate one of the following options in consultation with OEH to offset the biodiversity impacts arising from the proposed modification:
	  ○ 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
	  ○ consult with OEH to identify a suitable conservation program and provide $10,000 of funding; or
	  ○ purchase and retire 5 credits on the Biobanking register.
	• update the BMP to include the following:
	  ○ 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);
	  ○ 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;
	  ○ installation of delineation fencing around threatened flora populations (if found) to ensure their protection during development and maintenance of the APZs;
	  ○ condition monitoring for threatened flora populations (if found);
	  ○ retention of hollow-bearing trees in the APZs, where possible, with details to be included in a hollow tree register;
	  ○ 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;
	  ○ measures for APZ maintenance that include weed control;
	  ○ clearing of hollow-bearing trees (if required) under the supervision of a suitably

	qualified ecologist; ○ any injured fauna would be taken to the nearest veterinary hospital for treatment before release; and ○ 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. LakeCoal 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. OEH 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, LakeCoal 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, LakeCoal 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. LakeCoal 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	LakeCoal 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	LakeCoal 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. LakeCoal 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 LakeCoal 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 LakeCoal'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	LakeCoal will commit to only carrying out mining operations in the extension areas consistent with the development consent granted pursuant to this Proposal.

17 Plans

ML 1632 - A
CCL721 - A
ML 1632 - B
ML 1370 - B
CCL721
ML 1632 - A
ML 1632 - B
ML1051
CCL707
EASSIFERN SEAM HOLDING
ML1051
ML1052
CCL707
ML1051
CCL707
ML1052
LOT 1 DP226133
CCL707
CCL707
MPL1308
MPL337
MPL1389
MPL1349
pt CCL719
(GTN only)
CCL707
(Fassi only)
CCL707
FASSIFERN SEAM HOLDING
CCL721
CCL722

Lease No	Area	Particulars
CCL 707	815ha	Expires 30/12/2023
CCL 706	368.2ha	Expires 29/04/2022
ML 1051	259ha	Expires 07/07/2022
ML 1052	213.6ha	Expires 07/07/2022
ML 1308	8.1ha	Expires 04/05/2022
MPL 1349	32.8ha	Expires 05/10/2028
MPL 1400	3.1ha	Expires 06/11/2031
MPL 1389	0.1ha	Expires 14/05/2031
MPL 337	0.7ha	Expires 25/01/2037
Sublease CCL 719	10ha	Expires 22/09/2020
Sublease CCL 719 (Sublease B)	808.5ha	Expires 30/06/2022
Sublease CCL 721 (Sublease B)	2405.8ha	Expires 30/06/2022
Sublease CCL 722 (Sublease B)	30.8ha	Expires 30/06/2022
Sublease ML 1632 (Sublease B)	427.2ha	Expires 30/06/2022
Sublease ML 1370 (Sublease B)	112.7ha	Expires 30/06/2022
Sublease CCL 721 (Sublease A)	26.8ha	Expires 01/07/2018, Renewal Sought
Sublease ML 1632 (Sublease A)	67.7ha	Expires 01/07/2018, Renewal Sought
EL8428	656.2ha	Expires 07/12/2020
Lot 1 DP 226133	95.6ha	Freehold

Chain Valley Holding - Fassifern Seam

Mining Leases

LAKE COAL PTY LIMITED
CHAIN VALLEY COLLIERY

ANNUAL REVIEW (AEMR) 2018
PLAN 1 - Mining Tenements

SCALE:	1:15 000 @ A2	DATE:	13 March 2019
DRAWN:	T Chisholm	DRG NO:	C4P0180_2
CHECKED:	C Armit	REV NO:	2018
		SIZE:	A2

LakeCoal

6335000
6334000
6333000
6332000
6331000
6330000
6329000
6328000

MINIWALL 10
MINIWALL 9
MINIWALL 8
MINIWALL 7
MINIWALL 6

WEST 2
WEST 1

Surface Ventilation Fan Site

Pit Top Facilities

LEGEND

GREAT NORTHERN SEAM WORKINGS
FASSIFERN SEAM WORKINGS (2018)

SITE BOUNDARY (SSD 5465)
FASSIFERN SEAM HOLDING
GREAT NORTHERN SEAM HOLDING

364000
365000
366000
367000
368000
369000

LAKE COAL PTY LIMITED
CHAIN VALLEY COLLIERY

ANNUAL REVIEW (AEMR) 2018
PLAN 2 - Mining Areas

SCALE:	1:15 000 @ A2	DATE:	13 March 2019
DRAWN:	T Chisholm	DRG NO:	C4P0180_2
CHECKED:	C Armit	REV NO:	2018
		SIZE:	A2

LakeCoal

N
W
E
S

Oil / Water Separator
Wash down sump
Oxy - acetalene storage compounds
Workshop and Store
Cable shed
Hazardous Substances & Dangerous Goods
Fire Station
Hard Stand Storage
Aerated Water Treatment System
Mine Dewatering Lines
Main Office
Training Centre
Compressors
Operations Office
Bathhouse
132000 litre Water Tanks
Septic Tanks
Haulage Room
ROM Bin
Switch Room
Cable Belt Switch room
80000 litre Water Tank
Sub Station
Tube Bundle Monitoring
Cable belt Drive
Switchroom
250 tonne bin
Entry Gate to Colliery
Weighbridge
Final Products Bin
Coal Stockpile Area
Down cast Shaft
D11
D12
D13
D8
D7
D9
D10
Sediment Dams
D6
D1
D5
D4
D3
D2
Buried Discharge Pipeline
Licenced Discharge Point No. 1
E: 364 998
N: 6329 479
Tidal Creek

VENTILATION FAN SITE
Switch room
Ventilation Fans
Old switch room
Services Borehole

PIT TOP FACILITIES
CHAIN VALLEY COLLIERY

0 50 100 200
METRES

LAKE COAL PTY LIMITED CHAIN VALLEY COLLIERY	SCALE: 1:2000	DATE: 14 March 2019	
	DRAWN: T Chisholm	DRG NO: C4P0180_3	
ANNUAL REVIEW (AEMR) 2018 Plan 3 - Surface Facilities	CHECKED: C Armit	REV NO: 2018	LakeCoal
		SIZE: A3	

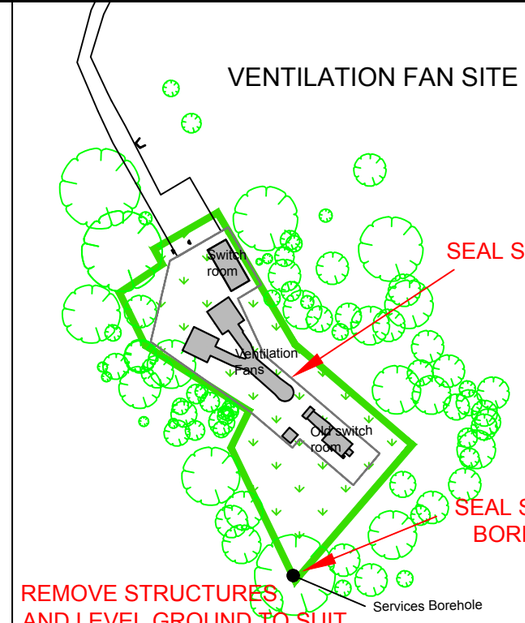
N
W
E
S

Oil / Water Separator
Wash down sump
Oxy - acetalene storage compounds
Cable shed
Workshop and Store
Hazardous Substances & Dangerous Goods
Fire Station
Hard Stand Storage
Aerated Water Treatment System
Mine Dewatering Lines
Compressors
Main Office
Training Centre
Operations Office
Bathhouse
Septic Tanks
132000 litre Water Tanks
80000 litre Water Tank
Haulage Room
Switch Room
Sub Station
Tube Bundle Monitoring
Cable Belt Switch room
ROM Bin
Cable belt Drive
Switchroom
250 tonne bin
Entry Gate to Colliery
Weighbridge
Final Products Bin
Coal Stockpile Area
SEAL SHAFT
Down cast Shaft
SEAL DRIFTS
CUT & FILL TO MATCH SURROUNDING RL's
REMOVE STRUCTURES AND LEVEL GROUND TO SUIT
Sediment Dams
D1
D2
D3
D4
D5
D6
D7
D8
D9
D10
D11
D12
Tidal Creek

PIT TOP FACILITIES
CHAIN VALLEY COLLIERY

0 50 100 200
METRES

VENTILATION FAN SITE



Rehabilitation - Bushland
Rehabilitation -Grassland
Rehabilitation - Surface Water Flow
Rehabilitation - Proposed Dams

LAKE COAL PTY LIMITED
CHAIN VALLEY COLLIERY

ANNUAL REVIEW (AEMR) 2018
Plan 4 - Proposed Rehabilitation

SCALE:	1:2000	DATE:	14 March 2019
DRAWN:	T Chisholm	DRG NO:	C4P0180_4
CHECKED:	C Armit	REV NO:	2018
		SIZE:	A3

LakeCoal

18 Environment Protection Licence EPL1770

Environment Protection Licence

Licence - 191

Licence Details	
Number:	191
Anniversary Date:	01-January

Licensee
LAKECOAL PTY LTD
PO BOX 7115
MANNERING PARK NSW 2259

Premises
MANNERING COLLIERY
RUTLEYS ROAD
DOYALSON NSW 2262

Scheduled Activity
Coal Works
Mining for Coal

Fee Based Activity	Scale
Coal works	0-2000000 T handled
Mining for coal	> 500000-2000000 T produced

Region
North - Hunter
Ground Floor, NSW Govt Offices, 117 Bull Street NEWCASTLE WEST NSW 2302
Phone: (02) 4908 6800
Fax: (02) 4908 6810
PO Box 488G NEWCASTLE
NSW 2300

Environment Protection Licence

Licence - 191

Environment Protection Licence

Licence - 191

Environment Protection Licence

Licence - 191

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).

Environment Protection Licence

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:

LAKECOAL PTY LTD
PO BOX 7115
MANNERING PARK NSW 2259

subject to the conditions which follow.

Environment Protection Licence

Licence - 191

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	0 - 2000000 T handled
Mining for Coal	Mining for coal	> 500000 - 2000000 T produced

A1.2 The licensee must not:
(a) Produce by mining activities more than 1.1 million tonnes of coal within any 12 month period.
(b) Undertake coal works handling more than 1.1 million tonnes within any 12 month period, where ROM coal handled on the premises may be made up of coal produced by mining activities from both the Mannering premises as defined in this licence or Chain Valley premises as defined in Environment Protection Licence number 1770.

Note: These limits on the scale of the fee based activities are based on project Approval 06_0311 granted under the *Environmental Planning and Assessment Act 1979* which limits extraction to 1.1 million tonnes of run of mine (ROM) coal per year and its modifications, the most recent of which is dated 27 November 2014.

A2 Premises or plant to which this licence applies

A2.1 The licence applies to the following premises:

Premises Details
MANNERING COLLIERY
RUTLEYS ROAD
DOYALSON
NSW 2262
SURFACE PREMISES DESCRIBED BY PLAN OF PREMISES TITLED "MANNERING COLLIERY EPL PREMISES PLAN FIGURE 2 SURFACE EXTENTS, COMPLIANCE AND MONITORING LOCATIONS" DATED 21 JANUARY 2015 DOC14/370090-03 AND MINING FOR COAL IN THE FASSIFERN AND GREAT NORTHERN COAL SEAMS DESCRIBED BY THE PLAN OF THE PREMISES TITLED "MANNERING COLLIERY EPL PREMISES PLAN FIGURE 1 PROJECT EXTENTS" DATED 21 JANUARY 2015 DOC14/370090-03.

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
3	Dust monitoring		Dust deposition gauge identifed as point 3 on plan titled "Mannering Colliery EPL Premises Plan - Figure 2 Surface Extents, Compliance and Monitoring Locations" dated 21 January 2015 DOC14/370090-03
4	Dust monitoring		Dust deposition gauge identifed as point 4 on plan titled "Mannering Colliery EPL Premises Plan - Figure 2 Surface Extents, Compliance and Monitoring Locations" dated 21 January 2015 DOC14/370090-03
5	Dust monitoring		Dust deposition gauge identifed as point 5 on plan titled "Mannering Colliery EPL Premises Plan - Figure 2 Surface Extents, Compliance and Monitoring Locations" dated 21 January 2015 DOC14/370090-03
6	Dust monitoring		Dust deposition gauge identifed as point 6 on plan titled "Mannering Colliery EPL Premises Plan - Figure 2 Surface Extents, Compliance and Monitoring Locations" dated 21 January 2015 DOC14/370090-03
7	Dust monitoring		Dust deposition gauge identifed as point 3 on plan titled "Mannering Colliery EPL Premises Plan - Figure 2 Surface Extents, Compliance and Monitoring Locations" dated 21 January 2015 DOC14/370090-03

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 monitoring	Discharge to waters Discharge quality monitoring	Discharge from Final Treatment Pond (surface and groundwater) identifed as point 1 on plan titled "Mannering Colliery EPL Premises Plan - Figure 2 Surface Extents, Compliance and Monitoring Locations" dated 21 January 2015 DOC14/370090-03

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

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	4000

L3.2 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 10mm during the 24 hours immediately prior to the commencement of discharge

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	Waste	Any other waste received on the premises for storage, treatment, processing, sorting or disposal and which receipt is not a scheduled activity under Schedule 1 of the POEO Act, as in force from time to time.		
NA	General or Specific exempted waste	Waste that meets all the conditions of a resource	As specified in each particular resource	N/A

	recovery exemption under Clause 51A of the Protection of the Environment Operations (Waste) Regulation 2014	recovery exemption

L4.2 The licensee must not cause, permit or allow any waste generated outside the premises to be received at the premises for storage, treatment, processing, reprocessing or disposal or any waste generated at the premises to be disposed of at the premises, except as expressly permitted by the licence.

L4.3 This condition only applies to the storage, treatment, processing, reprocessing or disposal of waste at the premises if it requires an environment protection licence.

L5 Noise limits

Note: Noise limits are not specified as a condition of this licence. Noise limits are prescribed with the conditions of Project Approval 06_0311 granted under the *Environmental Planning and Assessment Act 1979.* Under the *Environmental Planning and Assessment Act 1979* the Department of Planning is the appropriate authority in respect of the administration and regulation of the Project Approval.

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.

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 from the premises.

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

O3.3 All trafficable areas, coal 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, or emission from the premises, of wind-blown or traffic generated dust.

O3.4 Trucks transporting coal from the premises must be covered immediately after loading to prevent wind blown emissions and spillage. The covering must be maintained until immediately before unloading the trucks.

O3.5 The tailgates of all haulage trucks leaving the premises must be securely fixed prior to loading or immediately after unloading to prevent loss of materials.

O3.6 Coal stockpiles must be maintained in a condition that will minimise the generation and emission of dust on the premises.

O4 Emergency response

O4.1 The licensee must maintain, and implement as necessary, a current emergency response plan for the premises. The licensee must keep the emergency response plan on the premises at all times. The emergency 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. If a current emergency response plan does not exist at the date on which this condition is attached to the licence, the licensee must develop an emergency response plan within three months of that date.

O5 Other operating conditions

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 The licensee must ensure that activities are conducted in an environmentally satisfactory manner. So as to minimise and prevent the pollution of air and water the licensee must:
(a) Ensure that vehicles or containers prior to leaving the premises are clean and sealed in a manner that will not cause materials or wastes used in conducting the activities at the premises to be tracked, thrown from, blown, fall, or cast from any vehicle or container onto a public road.
(b) The licensee must have in place and implement procedures to ensure that vehicles and containers exiting the premises are in a condition to ensure that materials are not tracked, thrown, blown, fall or cast onto a public road.

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.

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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 3,4,5,6,7

Pollutant	Units of measure	Frequency	Sampling Method
Particulates - Deposited Matter	grams per square metre per month	Monthly	AM-19

M2.3 Water and/ or Land Monitoring Requirements

POINT 1

Pollutant	Units of measure	Frequency	Sampling Method
Aluminium (dissolved)	micrograms per litre	Monthly during discharge	Grab sample
Aluminium (total)	micrograms per litre	Monthly during discharge	Grab sample
Antimony	micrograms per litre	Monthly during discharge	Grab sample
Arsenic (dissolved)	micrograms per litre	Monthly during discharge	Grab sample
Arsenic (total)	micrograms per litre	Monthly during discharge	Grab sample
Barium	micrograms per litre	Monthly during discharge	Grab sample

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Beryllium (dissolved)	micrograms per litre	Monthly during discharge	Grab sample
Beryllium (total)	micrograms per litre	Monthly during discharge	Grab sample
Boron	micrograms per litre	Monthly during discharge	Grab sample
Cadmium (dissolved)	micrograms per litre	Monthly during discharge	Grab sample
Cadmium (total)	micrograms per litre	Monthly during discharge	Grab sample
Calcium	micrograms per litre	Monthly during discharge	Grab sample
Chromium (dissolved)	micrograms per litre	Monthly during discharge	Grab sample
Chromium (total)	micrograms per litre	Monthly during discharge	Grab sample
Cobalt (dissolved)	micrograms per litre	Monthly during discharge	Grab sample
Cobalt (total)	micrograms per litre	Monthly during discharge	Grab sample
Conductivity	microsiemens per centimetre	Weekly during any discharge	Grab sample
Copper (dissolved)	micrograms per litre	Monthly during discharge	Grab sample
Copper (total)	micrograms per litre	Monthly during discharge	Grab sample
Iron	micrograms per litre	Monthly during discharge	Grab sample
Lead (dissolved)	micrograms per litre	Monthly during discharge	Grab sample
Lead (total)	micrograms per litre	Monthly during discharge	Grab sample
Lithium	micrograms per litre	Monthly during discharge	Grab sample
Magnesium	micrograms per litre	Monthly during discharge	Grab sample
Manganese (dissolved)	micrograms per litre	Monthly during discharge	Grab sample
Mercury (dissolved)	micrograms per litre	Monthly during discharge	Grab sample
Mercury (total)	micrograms per litre	Monthly during discharge	Grab sample
Molybdenum (dissolved)	micrograms per litre	Monthly during discharge	Grab sample
Molybdenum (total)	micrograms per litre	Monthly during discharge	Grab sample
Nickel (dissolved)	micrograms per litre	Monthly during discharge	Grab sample
Nickel (total)	micrograms per litre	Monthly during discharge	Grab sample
Nitrogen (ammonia)	micrograms per litre	Monthly during discharge	Grab sample
Oil and Grease	milligrams per litre	Weekly during any discharge	Grab sample

pH	pH	Weekly during any discharge	Grab sample
Phosphorus	micrograms per litre	Monthly during discharge	Grab sample
Potassium	micrograms per litre	Monthly during discharge	Grab sample
Selenium (dissolved)	micrograms per litre	Monthly during discharge	Grab sample
Selenium (total)	micrograms per litre	Monthly during discharge	Grab sample
Silica	micrograms per litre	Monthly during discharge	Grab sample
Silver (dissolved)	micrograms per litre	Monthly during discharge	Grab sample
Silver (total)	micrograms per litre	Monthly during discharge	Grab sample
Sulfur	micrograms per litre	Monthly during discharge	Grab sample
Tin	micrograms per litre	Monthly during discharge	Grab sample
Titanium	micrograms per litre	Monthly during discharge	Grab sample
Total suspended solids	milligrams per litre	Weekly during any discharge	Grab sample
Vanadium (dissolved)	micrograms per litre	Monthly during discharge	Grab sample
Vanadium (total)	micrograms per litre	Monthly during discharge	Grab sample
Zinc (dissolved)	micrograms per litre	Monthly during discharge	Grab sample
Zinc (total)	micrograms per litre	Monthly during 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 2010* 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.

M4 Weather monitoring

M4.1 For each monitoring point specified in the table below, the licensee must monitor (by sampling and obtaining results by analysis) the parameters specified in Column 1. The licensee must use the sampling method, units of measure, averaging period and sample at the frequency, specified opposite in the other columns. **Point W1**

Parameter	Units of Measure	Frequency	Averaging Period	Sampling Method
Rainfall	mm	Continuous	24 hour	AM-4
Wind direction	degrees	Continuous	1 hour	AM-2 and AM-4

M4.2 For the purpose of condition M4.1, Point W1 refers to a meteorological station established on the premises.

M4.3 The licensee may use the meteorological station established at Eraring Power Station provided the licensee has authority from Eraring Energy to access data from the Eraring Power Station at all times. However, if this station is not available at any time then condition M4.2 applies.

M4.4 The licensee must fully comply with condition M4 by 30 April 2011.

M5 Recording of pollution complaints

M5.1 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.

M5.2 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.

M5.3 The record of a complaint must be kept for at least 4 years after the complaint was made.

M5.4 The record must be produced to any authorised officer of the EPA who asks to see them.

M6 Telephone complaints line

M6.1 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.

M6.2 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.

M6.3 The preceding two conditions do not apply until 3 months after: the date of the issue of this licence.

M6.4 The licensee must nominate a representative of the company that is available all all times and is capable of providing immediate assistance or response during emergencies or any other incidents at the premises. The name of the nominated representative and their contact details, including a telephone number, must be current at all times.
Note: This condition does not apply until two (2) weeks after the date of issue of this licence.

M7 Requirement to monitor volume or mass

M7.1 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

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:
a) a Statement of Compliance; and
b) a Monitoring and Complaints Summary.
At the end of each reporting period, the EPA will provide to the licensee a copy of the form that must be completed and returned to the EPA.

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.

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 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 Statement 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 the incident occurred.

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

Receival of ROM Coal

R4.1 The licensee must notify the Manager Hunter Region hunter.region@epa.nsw.gov.au within 24 hours of the receival of ROM Coal at the Coal Handling and Preparation Plant that the plant has been re-commissioned.

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.

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

G2 Other general conditions

G2.1 **Completed Pollution Studies and Reduction Programs (PRPs)**

PRP	Description	Completed Date
PRP 1 - Assessment of Potential Impacts of Metals	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.(@)	26-June-2013
Coal Mine Particulate Matter Control Best Practice	Requires licensee to conduct a site specific Best Management Practice (BMP) determination to identify wyas to reduce particle emissions.	19-September-2012

8 Pollution Studies and Reduction Programs

U1 Coal Handling and Preparation Plant Commissioning Water Quality Monitoring Study

U1.1 The licensee must undertake a Coal Handling and Preparation Plant water quality monitoring commissioning study for 3 months upon re-commissioning of receipt of ROM Coal on the premises and normal coal handling procedures. The water quality monitoring study:

a) must be carried out by an appropriately qualified and experienced person;
b) include daily monitoring during discharge from monitoring point 1 of turbidity (NTU), total suspended solids (mg/L), electrical conductivity (us/cm), pH and oil and grease (mg/L); and
c) be carried out in accordance with the EPA's Approved Methods.

A report must be prepared by an appropriately qualified and experienced person and include:

d) comparison of results against limits in condition L2.4;
e) include a table in the appendix of the report of all the data;
f) include an analysis of the monthly results from metals monitoring as required in condition M2.3 and include mean daily discharge results as required in Condition M7.1.

The report must be sent to the Manager Hunter Region hunter.region@epa.nsw.gov.au within two months of completion of the monitoring.

Should the outcomes of this report identify that water management on the premises is not sufficient such that limits are met, the EPA may consider a pollution reduction program to investigate upgrade of the water management system.

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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 described 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

Ms Debbie Maddison

Environment Protection Authority

(By Delegation)

Date of this edition: 06-April-2000

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End Notes

1	Licence varied by notice V/M upgrade, issued on 10-Jul-2000, which came into effect on 10-Jul-2000.
2	Licence varied by notice 1005801, issued on 13-Aug-2001, which came into effect on 07-Sep-2001.
3	Licence varied by Change of contact details, issued on 16-Apr-2002, which came into effect on 16-Apr-2002.
4	Licence transferred through application 141582, approved on 21-Nov-2002, which came into effect on 07-Aug-2002.
5	Licence varied by notice 1024680, issued on 04-Feb-2003, which came into effect on 06-Feb-2003.
6	Licence varied by notice 1043601, issued on 14-Jan-2005, which came into effect on 08-Feb-2005.
7	Licence varied by notice 1055208, issued on 01-Mar-2006, which came into effect on 26-Mar-2006.
8	Condition A1.3 Not applicable varied by notice issued on <issue date> which came into effect on <effective date>
9	Licence varied by notice 1105215, issued on 23-Feb-2011, which came into effect on 23-Feb-2011.
10	Licence varied by notice 1502466 issued on 21-Dec-2011
11	Licence transferred through application 1517779 approved on 29-Oct-2013 , which came into effect on 17-Oct-2013
12	Licence varied by notice 1527523 issued on 13-May-2015

19 Seagrass Monitoring

Transect E1	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
% seagrass	84.15		81.01	77.75	98.62	99.44	96.85	92.44	99.88	97.96	97.87
% no seagrass	15.85		18.99	22.25	1.38	0.56	3.15	7.56	0.12	2.04	2.13
Transect E2	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass	83.72		75.87	73.38	95.49	99.09	98.38	98.49	99.71	100.0	97.94
% no seagrass	16.28		24.13	26.62	4.49	0.91	1.62	1.51	0.29	0.00	2.06
Transect E3	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass	98.29		98.97	92.76	96.97	99.16	97.66	100.0	83.53	98.90	94.56
% no seagrass	1.71		1.03	7.24	1.54	0.84	2.34	0.00	16.47	1.10	5.44
Transect E4	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass	80.16		98.54	95.74	100.0	97.50	98.06	96.43	98.01	96.76	99.71
% no seagrass	19.84		1.46	4.26	0.00	2.50	1.94	3.57	1.99	3.24	0.29
Transect E5	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass	95.88		94.93	95.19	100.0	98.82	97.01	99.82	100.0	97.22	99.41
% no seagrass	4.12		5.07	4.81	0.00	1.18	2.99	0.18	0.00	2.78	0.59

Transect E6	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass	17.74		34.06	49.56	55.51	54.93	83.24	76.62	100.0	99.56	89.91
% no seagrass	82.16		65.94	50.44	44.49	45.07	16.76	23.38	0.00	0.44	10.09
Transect E7	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass	97.93		51.40	45.47	68.31	43.38	87.65	92.65	100.0	98.16	98.16
% no seagrass	2.07		48.60	54.53	31.69	56.62	12.35	7.35	0.00	1.84	1.84
Transect E8	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass	99.32		84.26	95.56	90.96	99.93	99.26	99.85	100.0	99.34	100.0
% no seagrass	0.68		15.74	4.44	9.04	0.07	0.74	0.15	0.00	0.66	0.00
Transect E9	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass	95.94		99.39	95.51	99.49	99.71	99.71	99.56	100.0	99.78	100.0
% no seagrass	4.06		0.61	4.49	0.51	0.29	0.29	0.44	0.00	0.22	0.00
Transect E10	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass	97.94		92.21	86.25	98.99	98.82	98.87	NS	100.0	100.0	100.0
% no seagrass	2.06		7.79	13.75	1.01	1.18	1.13		0.00	0.00	0.00
Transect E11	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass				86.93	99.85	99.49	97.65	NS	100.0	100.0	100.0
% no seagrass				13.07	0.15	0.51	2.35		0.00	0.00	0.00

Transect E12	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass				95.68	95.53	98.09	97.94	NS	100.0	100.0	100.0
% no seagrass				7.32	4.47	1.91	2.06		0.00	0.00	0.00
Transect E13	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass				93.97	99.26	100.0	99.93	NS	100.0	100.0	100.0
% no seagrass				6.03	0.74	0.00	0.07		0.00	0.00	0.00
Transect E14	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass				86.54	99.34	100.0	99.68	NS	100.0	90.44	100.0
% no seagrass				13.46	0.56	0.00	0.32		0.00	9.56	0.00
Transect E15	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass				90.29	99.93	99.66	92.28	NS	100.0	93.31	99.85
% no seagrass				9.71	0.07	0.34	7.72		0.00	6.69	0.15
Transect E16	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass				82.79	93.22	94.12	97.87	NS	100.0	99.94	99.71
% no seagrass				17.21	6.78	5.88	2.13		0.00	0.06	0.29
Transect T1	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass	88.94		41.90	32.60	77.91	94.41	94.85	94.65	97.35	99.47	85.29

% no seagrass	11.06		58.10	67.40	22.09	5.59	5.15	5.35	2.65	0.53	14.71
Transect T2	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass	77.91		70.29	79.50	75.74	60.83	93.68	74.41	90.59	93.31	90.00
% no seagrass	22.09		29.71	92.05	24.26	39.17	6.32	25.59	9.41	6.69	10.00
Transect T3	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass	46.20		63.16	58.53	83.53	89.93	92.65	93.82	96.10	98.19	97.57
% no seagrass	53.80		36.84	41.47	16.47	10.07	7.35	6.18	3.90	1.81	2.43
Transect T4	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass	83.51		81.89	70.37	90.37	97.28	99.41	97.94	99.85	95.76	95.07
% no seagrass	16.49		18.01	29.63	9.63	2.72	0.59	2.06	0.15	4.24	4.93
Transect T5	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass	81.78		77.00	51.40	92.35	99.12	98.24	99.41	98.82	99.56	89.63
% no seagrass	18.22		23.00	48.60	7.65	0.88	1.76	0.59	1.18	0.44	10.37
Transect T6	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass	53.82		59.63	44.77	65.59	95.22	99.85	95.74	98.82	94.41	97.13
% no seagrass	46.18		40.37	53.23	34.41	4.78	0.15	4.26	1.18	5.59	2.87

Transect T7	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass	97.93		70.79	89.34	89.09	99.78	98.97	98.38	100.0	99.85	98.97
% no seagrass	2.07		29.51	10.66	10.91	0.22	1.03	1.62	0.00	0.15	1.03
99.26											
Transect T8	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass	95.94		60.29	76.99	87.64	96.76	99.85	99.26	99.26	98.24	100.0
% no seagrass	4.06		39.71	23.01	13.26	3.24	0.15	0.74	0.74	1.76	0.00
Transect A1	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass							97.97	98.09	88.97	99.85	96.18
% no seagrass							2.03	1.91	11.03	0.15	3.82
Transect A2	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass							92.38	96.99	98.75	98.38	94.93
% no seagrass							7.62	3.01	1.25	1.62	5.07
Transect A3	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass							100.0	86.40	94.85	96.69	98.01
% no seagrass							0.00	13.60	5.15	3.31	1.99
Transect A4	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass							94.51	93.97	99.12	100.0	89.78

% no seagrass							5.49	6.03	0.88	0.00	10.22
Transect A5	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass							96.37	95.59	99.71	100.0	97.35
% no seagrass							3.63	4.41	0.29	0.00	2.65
Transect A6	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass							99.56	98.01	96.97	97.65	93.53
% no seagrass							0.44	1.99	3.03	2.35	6.47
Transect C1	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass	48.60		80.53	68.71	85.38	99.31	97.82	94.04	99.94	76.18	99.68
% no seagrass	51.40		19.47	31.29	14.62	0.69	2.18	5.96	0.06	23.82	0.32
Transect C2	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass	93.09		98.03	67.79	95.21	97.24	96.69	100.0	98.09	99.40	96.69
% no seagrass	6.91		1.97	32.21	4.79	2.76	3.31	0.00	1.91	0.60	3.31
Transect C3	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass	95.59		88.75	94.41	97.16	99.93	98.75	98.46	99.90	96.47	100.0
% no seagrass	4.41		11.25	5.59	2.84	0.07	1.25	1.54	0.10	3.53	0.00
Transect C4	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**

% seagrass	87.25		86.56	58.09	90.40	100.0	98.49	99.49	99.96	96.47	96.76
% no seagrass	12.75		13.44	41.91	9.60	0.00	1.51	0.51	0.04	3.53	3.24
Transect C5	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass											100.0
% no seagrass											0.00
Transect C6	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass											99.56
% no seagrass											0.44
Transect L1	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass								99.12	99.71	97.87	97.87
% no seagrass								0.88	0.29	2.13	2.13
Transect F1	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass											97.81
% no seagrass											2.19
Transect F2	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass											99.63
% no seagrass											0.37

Transect F3	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass											99.93
% no seagrass											0.07
Transect F4	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass											98.16
% no seagrass											1.84
Transect F5	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass											99.04
% no seagrass											0.96
Transect F6	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass											100.0
% no seagrass											10.00
Transect F7	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass											98.24
% no seagrass											1.76
Transect S1	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass											62.50

% no seagrass											37.50
Transect S2	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass											96.62
% no seagrass											3.38
Transect S3	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass											99.19
% no seagrass											0.81
Transect S4	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass											99.97
% no seagrass											0.03
Transect S5	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass											99.12
% no seagrass											0.88
Transect S6	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
% seagrass											100.0
% no seagrass											0.00

20 Weed Action Plan

KLEINFELDER
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Weed Action Plan - 2016

Lake Coal Australia Pty Ltd

Chain Valley Colliery
Lake Munmorah, NSW

13 December 2016

Weed Action Plan - 2016

Lake Coal

Mannering Park, NSW

Kleinfelder Document Number: NCA16R48861
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EXECUTIVE SUMMARY

*This Weed Action Plan (*WAP*) is designed to identify the known extent of noxious and environmental weeds and to provide guidance for the management of weeds and the effectiveness of weed control measures across Lake Coal landholdings. The 2016 WAP covers the Chain Valley Colliery (CVC), the Mannering Colliery (MC), and the Summerland Point Ventilation Shaft (SPVS).*

Specifically this WAP addresses the following:

- *A mapped overview of the known Noxious Weeds, Weeds of National Significance (WoNS) and significant Environmental Weeds and their general locality across Lake Coal landholdings;*
- *Identify and set priorities for target species and areas for 2016/17 weed control works;*
- *Recommend control measures for targeted species based on location and abundance; and*
- *The incorporation of recommendations for an annual inspection of the effectiveness of treatment and control programs that will enable identification of any new outbreaks.*

Weed mapping of all areas was undertaken during September – October 2016. The study area was divided into nine (9) zones to assist in the allocation of weed control resources. These zones correlate with the existing Biodiversity Management Plan and Lake Coal infrastructure (**Figure 1, 2, 11):**

- *Chain Valley – Northern Zone (CVNZ);*
- *Chain Valley – Eastern Zone (CVEZ);*
- *Chain Valley – Southern Zone (CVSZ);*
- *Chain Valley – Western Zone (CVWZ);*
- *Mannering Colliery – Northern Zone (MCNZ);*
- *Mannering Colliery – Eastern Zone (MCEZ);*
- *Mannering Colliery – Southern Zone (MCSZ);*
- *Mannering Colliery – Western Zone (MCWZ); and*
- *Summerland Point – Ventilation Shaft (SPVS).*

The results of the weed mapping conducted within the study area show that there are noxious WoNs and environmental weed occurrences throughout Lake Coal landholdings. Annual monitoring will ensure that information about the current/known weed presence within the zones can be managed efficiently and any future outbreaks will be reduced.

Contents

Tables

Figures

1. INTRODUCTION

Kleinfelder was engaged by Lake Coal to develop the 2016 Weed Action Plan (WAP) for Lake Coal's landholdings; Chain Valley Colliery (CVC), Mannering Colliery (MC), and the Summerland Point Ventilation Shaft (SPVS).

Lake Coal previously had a Biodiversity Management Plan (EMP-D-16372 developed for Chain Valley Colliery dated 16/3/2016 (Lake Coal, 2016), and the other covered Summerland Point Ventilation Shaft. This weed action plan consolidated all landholdings, including Mannering Colliery as one WAP.

This WAP is a practical document that aims to identify the extent of Noxious Weeds, Weeds of National Significance, and significant Environmental Weeds throughout Lake Coal landholdings and buffer lands, and provides management actions for each weed species. This WAP uses a framework to prioritise weed species and their impacts and to ensure their effective and realistic reduction within the study area through:

- The development and continued review of weed management actions across the Lake Coal landholdings to target noxious and environmental weeds in accordance with relevant legislation and best practice techniques;
- Providing a template for future monitoring and inspections events; and
- Ongoing consultation with the relevant National, State, and Local authorities regarding weed listings, weed occurrence and best practice management technologies.

1.1 STUDY AREA

This WAP covers an area of 74.15 hectares (ha) within the CVC, MC, and SPVS. The vegetation within these areas is predominantly disturbed grassland, fragmented Coastal Open Woodland, Swamp Oak Forest, and Swamp Sclerophyll Forest, which exhibit signs of previous agricultural use and mining-related activities. There are also parcels of natural bushland that have small areas of disturbance due to access tracks, fire trails and mining activities e.g. CVSZ and CVWZ (**Figure 1**).

PROJECT REFERENCE: 2017 2115	**Chain Valley Colliery Management Zones**
DATE DRAWN: 31/03/2017 13:09Version 1	FIGURE: 1
DRAWN BY: BDeane	
DATA SOURCE: LPI - 2009 nearmap - 2017 Lake Coal Pty Ltd - 2016	Lake Coal Pty Ltd Annual WAP 2016 Chain Valley Colliery Vales Point NSW

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0 25 50 75 100

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PROJECT REFERENCE: 2017 2115

DATE DRAWN: 31/03/2017 13:05Version 1

DRAWN BY: BDeane

DATA SOURCE:
LPI - 2009
nearmap - 2017
Lake Coal Pty Ltd - 2016

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Mannering Colliery
Management Zones

Lake Coal Pty Ltd
Annual WAP 2016
Chain Valley Colliery
Vales Point NSW

FIGURE:

2

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2. METHODOLOGY

The Lake Coal landholdings were surveyed on 28 September and 4 October 2016. The aim of the survey was to map the distribution and densities of weeds located on the site. The priority weed species identified as part of this WAP are categorised under one and/or multiple of the following categories:

- Declared noxious weed under the *Noxious Weeds Act 1993*;
- Listed as a Weed of National Significance (WoNS);
- Considered a significant environmental weed that has the ability to spread rapidly and substantially reduce biodiversity.

Weeds were then ranked into Priority Ranking Category 1, 2, or 3 based on the number of the above categories they fall under (**Table 1, Section 4.1**).

Information from **Table 1** was then combined with information about the percentage cover of weeds (%), area of weed coverage (m^2), and integration with Weed control principles (see 4.2 Weed control principles) to develop Priority Ranking for management in each zone (e.g. Chain Valley – Southern Zone: Priority Ranking 1 – Lantana). Management Zones were defined using spatial data provided by the client. Vegetation Communities for each Zone were identified from the Lake Coal Biodiversity Management Plan (Lake Coal, 2016).

The location and distribution of all weed species included in the WAP were collected and recorded using a GPS Garmin and a Trimble unit. GIS maps were created based on the GPS data collected and assigned priority based on weed percentage area coverage (m^2). The site was surveyed by traversing on foot to spot weed occurrences and record observations. Not all areas were observed during the survey due to safety concerns, limited accessibility and timeframe restrictions.

3. MANAGEMENT ZONES

The study area has been divided into nine management zones for the purpose of identifying priority areas and recommending treatment methodologies. These management zones were delineated according to the following characteristics:

- Location of Lake Coal land holdings;
- Weed locations, abundance and density; and
- Areas nominated by the Biodiversity Management Plan (Lake Coal, 2016).

The delineation of management zones enables target weed species to be defined for each area and provides an effective means for allocating weed control resources. An overview of the management zones are shown in **Figure 1** and **Figure 2.** Detailed maps of each management zone are shown in **Figure 3** through to **11.**

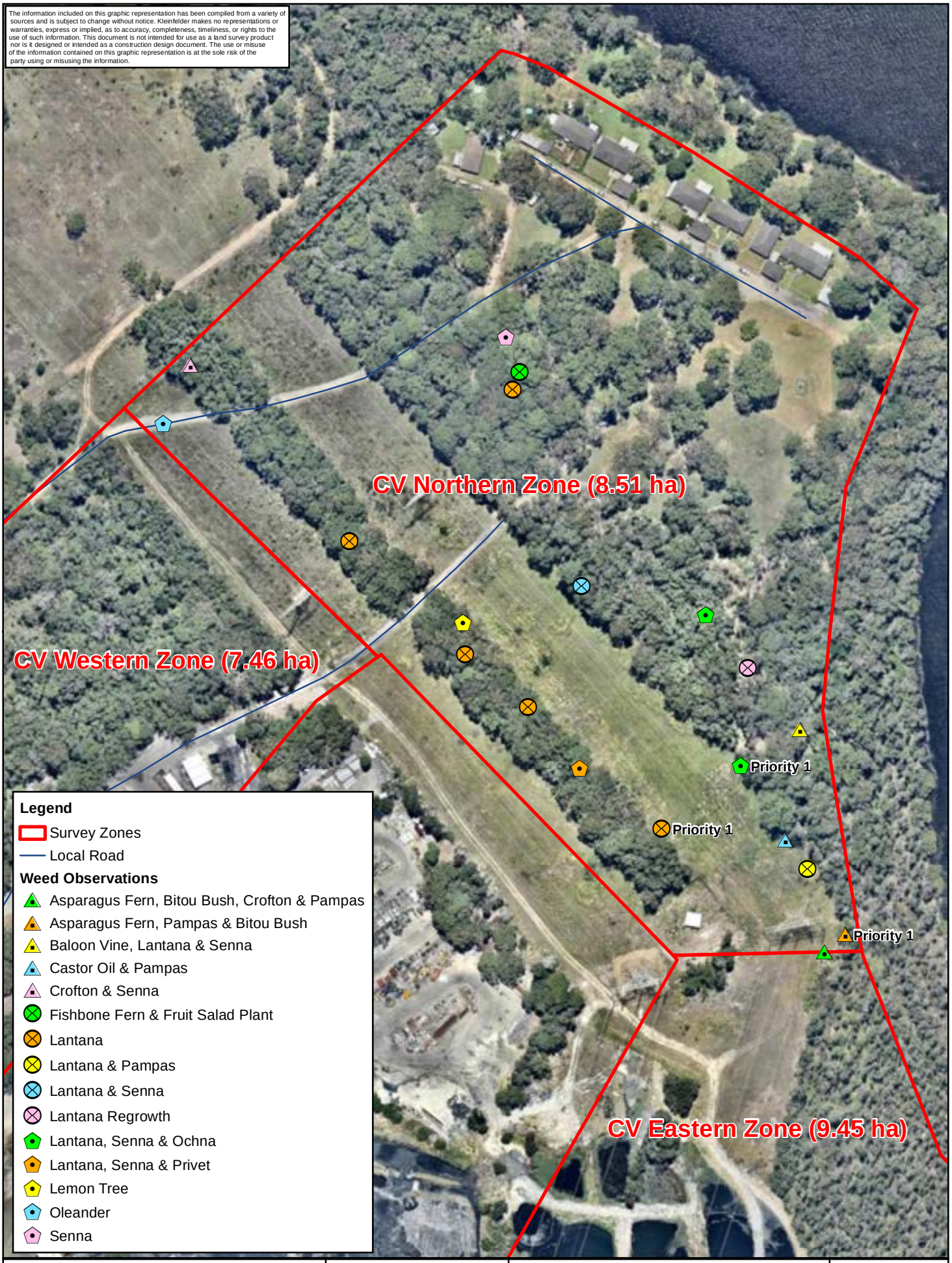
The management zones correlate with the following areas:

- *Chain Valley – Northern Zone (CVNZ);*
- *Chain Valley – Eastern Zone (CVEZ);*
- *Chain Valley – Southern Zone (CVSZ);*
- *Chain Valley – Western Zone (CVWZ);*
- *Mannering Colliery – Northern Zone (MCNZ);*
- *Mannering Colliery – Eastern Zone (MCEZ);*
- *Mannering Colliery – Southern Zone (MCSZ);*
- *Mannering Colliery – Western Zone (MCWZ); and*
- *Summerland Point – Ventilation Shaft (SPVS).*

Chain Valley and Mannering Colliery - Central Zones

The Central Zones for the Chain Valley and Mannering Colliery are areas that contain the most disturbed areas on the site. This zone is void of any native vegetation and contains roads, administration buildings, workshops and Coal Handling Plants, as such the weed survey was not conducted in these zones.

Target weed species for each zone and key management issues are provided after each map.



Legend

- Survey Zones
- Local Road

Weed Observations

- Asparagus Fern, Bitou Bush, Crofton & Pampas
- Asparagus Fern, Pampas & Bitou Bush
- Baloon Vine, Lantana & Senna
- Castor Oil & Pampas
- Crofton & Senna
- Fishbone Fern & Fruit Salad Plant
- Lantana
- Lantana & Pampas
- Lantana & Senna
- Lantana Regrowth
- Lantana, Senna & Ochna
- Lantana, Senna & Privet
- Lemon Tree
- Oleander
- Senna

Metres
0 10 20 40 60 80 100

N

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DATA SOURCE:
LPI - 2009
nearmap - 2016
Lake Coal Pty Ltd - 2016

Chain Valley
Northern Zone (CVNZ)

Lake Coal Pty Ltd
Annual WAP 2016
Chain Valley Colliery
Vales Point NSW

FIGURE:

3

L:\GIS FOLDER\00 CLIENT FILES\127223_LakeCoal_ChainValleyColliery\20172115_AnnualWAP_2016\Mapping\20172115_Fig03_CVC_North.mxd

Chain Valley – Northern Zone (CVNZ)

Description	**Chain Valley – Northern Zone (CVNZ)** consist of 8.51 ha of Modified and Degraded Areas (Resilience Priority 3 & 4) of Swamp Sclerophyll Forest bordering the cottages area (Lake Coal 2016). Lantana, Senna, and Bitou Bush are the dominant weeds in CVNZ, with scattered occurrences of Asparagus Fern, Fish Bone Fern and Fruit Salad Plant identified around the cottages and along the southern fence line **(Figure 3).** Some of the area adjacent to the cottages have been previously treated with good results, and other areas are showing signs of regrowth that require follow-up treatment to ensure they do not become re-infested.
Priority weeds	• Priority ranking 1 – Lantana, Bitou Bush; • Priority ranking 2 – Asparagus Fern, Fish Bone Fern, Senna; and • Priority ranking 3 – Fruit Salad Plant, Castor Oil Plant.
Key Management Issues	• Follow up treatment of Lantana, Senna, Fruit Salad Plant and Wild Tobacco in previously treated areas around cottages; • Primary treatment of Asparagus Fern, Fish Bone Fern, and Senna of Priority 1 nominated areas (**Figure 3**); and • Primary treatment of remaining priority 2 and 3 weeds above.
Notes	Vehicular access will be restricted due to grass height, uncertain terrain beneath the grass, and boundary fences restricting entry into site. Access is possible from the cottages side depending on permission from the residents.

Legend

Survey Zones
Local Road

Weed Observations

- Asparagus Fern & Bitou Bush
- Bitou Bush, Asparagus Fern & Juncus acutus
- Bitou Bush, Asparagus Fern & Senna
- Broad-leaf Privet
- Cotton Bush
- Cumbungi & Pampas
- Juncus acutus
- Lantana
- Lantana & Asparagus Fern
- Lantana & Bitou Bush
- Lantana & Broad-leaf Privet
- Lantana and Juncus acutus
- Lantana, Bitou Bush, Senna & Pampas
- Lantana, Coral Tree, Giant Reed & Fishbone
- Lantana, Cornflag, Giant Reed & Fishbone
- Pampas Grass
- Senna & Pampass

Metres
0 10 20 40 60 80 100
N

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DATA SOURCE:
LPI - 2009
nearmap - 2016
Lake Coal Pty Ltd - 2016

Chain Valley Eastern Zone (CVEZ)

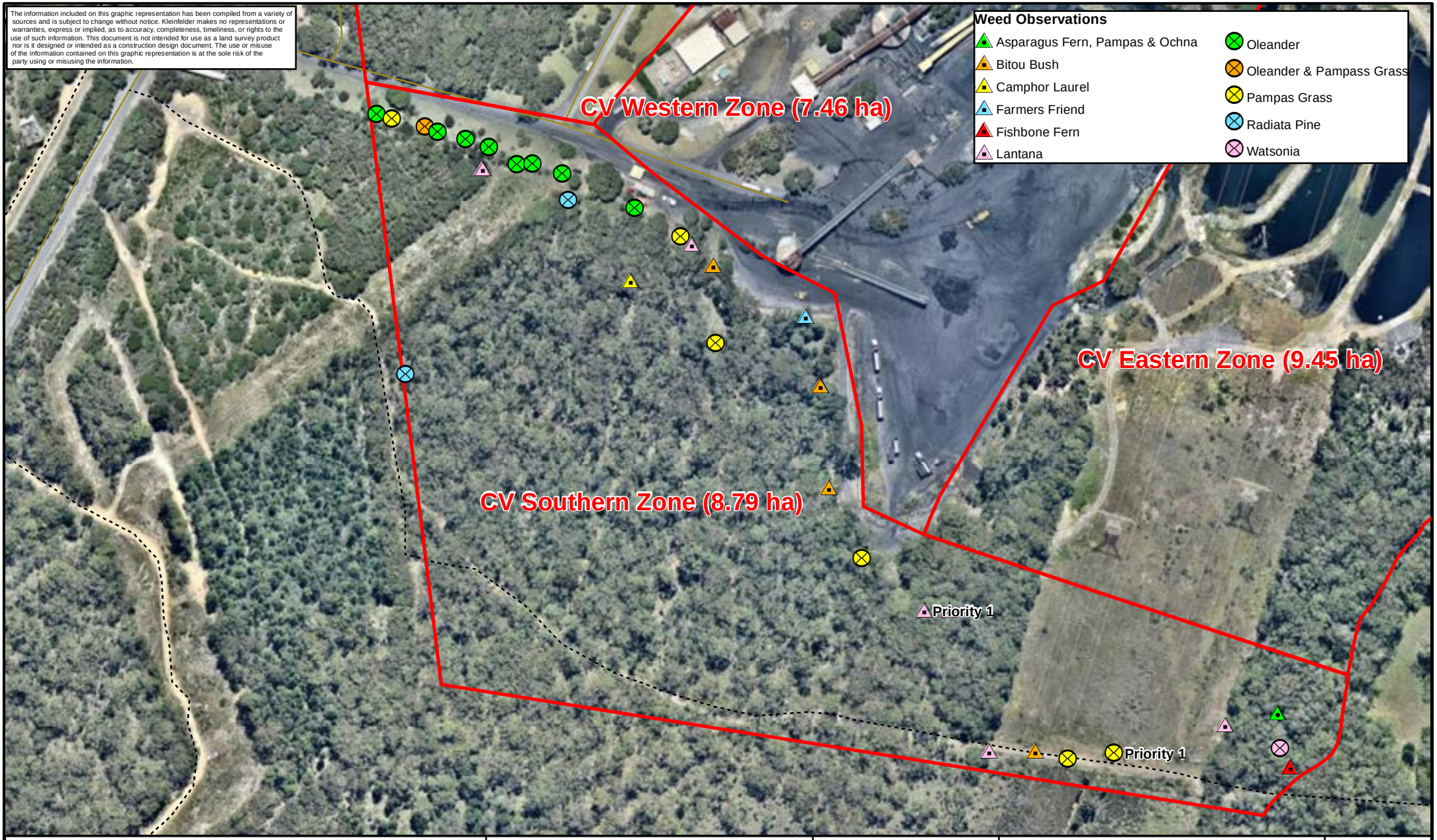
Lake Coal Pty Ltd
Annual WAP 2016
Chain Valley Colliery
Vales Point NSW

FIGURE:
4

L:\GIS FOLDER\00 CLIENT FILES\127223_LakeCoal_ChainValleyColliery\20172115_AnnualWAP_2016\Mapping\20172115_Fig04_CVC_East.mxd

Chain Valley – Eastern Zone (CVEZ)

Description	**Chain Valley – Eastern Zone (CVEZ)** extends from the southern-border fence following the powerline easement through to Lake Macquarie at its northern extent, and is bordered by a small creek to the east **(Figure 4)**. The CVEZ vegetation consists of a mixture of Little Disturbed and Modified (Resilience Priority 2 &3) Swamp Sclerophyll Forest that becomes Degraded to Highly Degraded (Resilience Priority 4 & 5) Swamp Oak Forest on the northern-half of the site at the point where the Sediment Ponds begin. The total area of the site is 9.45 ha, which receives constant overflow from the Sediment Ponds, and some of the area, particularly on the eastern side of the dams, is frequently inundated. Disturbance in these areas has allowed a number of large aquatic and riparian weeds to establish. Most of the weeds occurring in the riparian area fringe the creek line, and include Lantana, Fishbone Fern, Coral Trees, Senna, and Giant Reeds, with isolated Crofton Weed scattered throughout **(Figure 4)**. There is evidence of ongoing disturbance along the creek lines during high flows.
Priority weeds	• Priority ranking 1 – Lantana, Asparagus Fern, Pampas Grass, Bitou Bush; • Priority ranking 2 – Broad-Leaf Privet, Senna, Fishbone Fern; and • Priority ranking 3 – Crofton Weed, Ochna, Watsonia, Coral Tree.
Key Management Issues	• Primary treatment of Lantana, Pampas Grass, Bitou Bush infestation and scattered Asparagus Fern within the zone, including most of the riparian area along the creek and wetland area adjacent to the sediment pond to the west **(Figure 4);** • Primary treatment of Broad-Leaf Privet, Senna, and large outbreak of Fishbone Fern on the south-eastern side of the site **(Figure 4);** and • Opportunistic treatment of scattered Crofton Weed, Ochna, Watsonia, and Coral Tree within the rest of the zone.
Notes	Vehicular access to the site is available from a road that leads into the spillage ponds, which then reaches down to the northern extent of the bushland and wetland area.



Legend
- Survey Zones
- Local Road
- Track

Metres
0 10 20 40 60 80 100
N

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DATA SOURCE:
LPI - 2009
nearmap - 2016
Lake Coal Pty Ltd -2016

Chain Valley Southern Zone (CVSV)

Lake Coal Pty Ltd
Annual WAP 2016
Chain Valley Colliery
Vales Point NSW

FIGURE:
5

L:\GIS FOLDER\00 CLIENT FILES\127223_LakeCoal_ChainValleyColliery\20172115_AnnualWAP_2016\Mapping\20172115_Fig05_CVC_South.mxd

Chain Valley – Southern Zone (CVSZ)

Description	**Chain Valley – Southern Zone (CVSZ)** consists of large areas of Near Natural (Resilience Priority 1) Coastal Open Woodland with Little Disturbance (Resilience Priority 2) around the edges on the western side of the easement. Powerline infrastructure exists on the easement, which predominantly contains grassy paddocks, with some native Acacia species and scattered Pampas Grass **(Figure 5).** The CVEZ is 8.79 ha and contains the lowest density of weeds recorded during the site assessment (October 2016), other than a large stand of Radiata Pine located near Construction Road at the site's western edge. Lantana, Radiata Pine and Pampas Grass are the dominant weeds in this zone. There are some isolated patches of Crofton Weed and Oleander (*Nerium oleander*) fringing CVSZ parallel to the site-entry road **(Figure 5)**.
Priority weeds	• Priority ranking 1 – Lantana, Pampas Grass; • Priority ranking 2 – Oleander, Bitou Bush; and • Priority ranking 3 – Crofton Weed, Radiata Pine.
Key Management Issues	• Primary treatment of Priority 1 and 2 weeds can be coordinated at the same time, with Priority 2 weeds targeted by convenience and proximity to Priority 1 weeds; • Primary treatment of Pampas Grass to take place after all seed heads are carefully collected and disposed of; and • Opportunistic treatment of Priority 3 weeds coordinated after treatment of Priority 1 & 2 weeds.
Notes	Areas adjacent to the fire trail and close to Construction Road contain large stands of Radiata Pine that are spreading into the bushland. It is recommended they be felled or treated to stop further encroachment into the bush. Vehicular access via fire trails fringing the site on its southern side can be entered from Construction Rd.

Legend
- Survey Zones
- Local Road

Metres
0 10 20 40 60 80 100

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DATA SOURCE:
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Lake Coal Pty Ltd -2016

Chain Valley
Western Zone (CVWZ)
and Access Trails

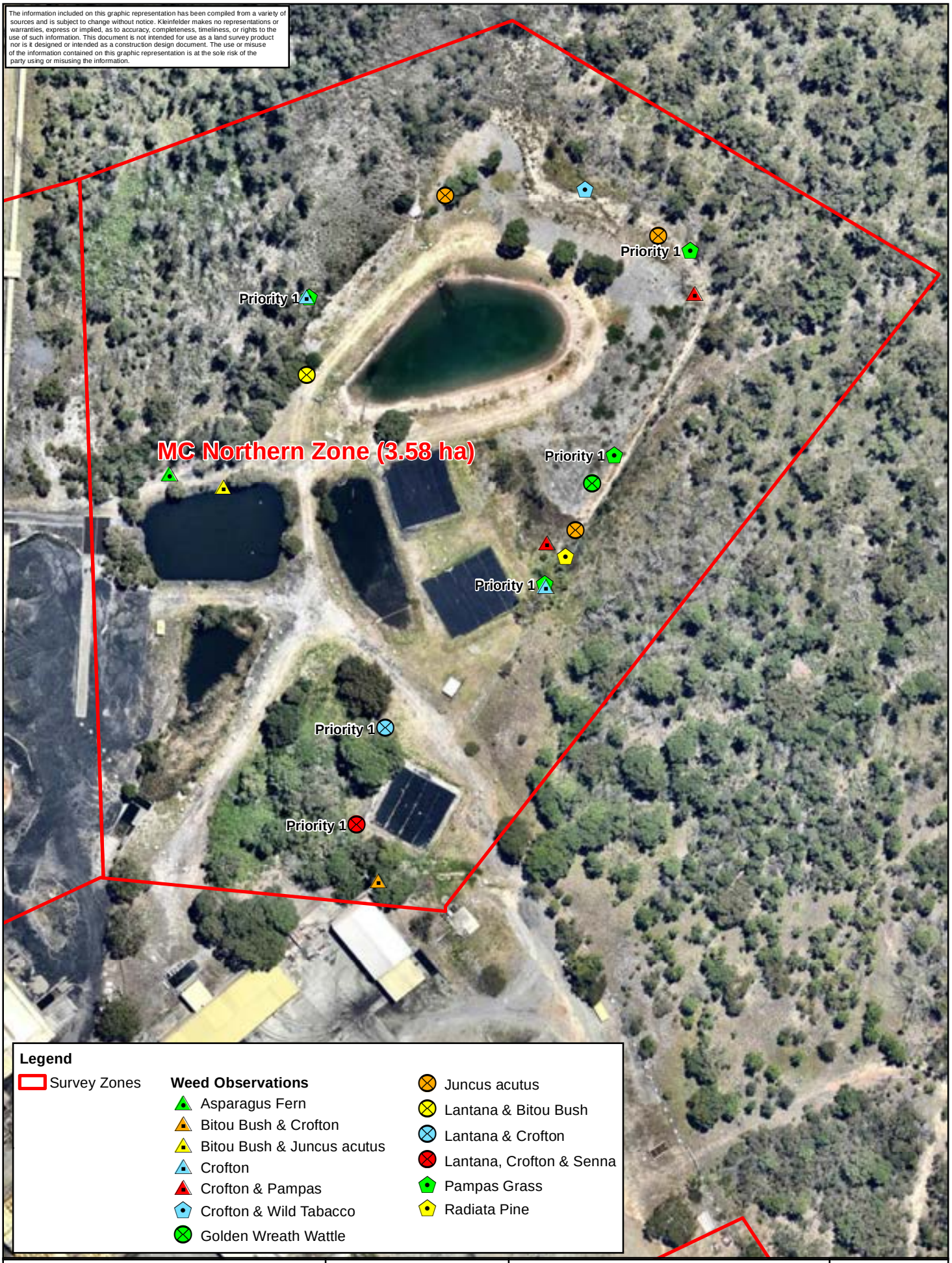
Lake Coal Pty Ltd
Annual WAP 2016
Chain Valley Colliery
Vales Point NSW

FIGURE:
6

L:\GIS FOLDER\00 CLIENT FILES\127223_LakeCoal_ChainValleyColliery\20172115_AnnualWAP_2016\Mapping\20172115_Fig06_CVC_West.mxd

Chain Valley – Western Zone (CVWZ)

Description	**Chain Valley – Western Zone (CVWZ)** consists of 7.46 ha of Little Disturbed and Modified (Resilience Priority 2 & 3) Coastal Open Woodland. The majority of the weed infestations are located close to the edges and along drainage lines leading off the Chain Valley Colliery. Wet conditions, partly as a consequence of drainage into the area (beginning around the Maintenance Shed leading Northward), have contributed to degradation and allowed the proliferation of a number of noxious and WoNS weed species, with most weeds located along the eastern edge. Weeds of significance within this area include: Lantana, Senna, and Crofton on the eastern side, with patches of Fishbone Fern and Sow Thistle close to the Maintenance Shed; Oleander on the Northern Fringe; and, Camphor Laurel on the North-Western Fringe **(Figure 6)**.
Priority weeds	• Priority ranking 1 – Lantana, Senna, Crofton Weed; • Priority ranking 2 – Fishbone Fern, Camphor Laurel; and • Priority ranking 3 – Oleander (*Nerium oleander*), Sow Thistle.
Key Management Issues	• Primary treatment of Lantana, Senna, Crofton Weed; • Primary treatment of Fishbone Fern, Camphor Laurel; • Systematic treatment of priority 3 weeds.
Notes	There are limited walking tracks into some of the site and paths would have to be cut in. Vehicular access is available around the edge of the entire site, though staff would need to be careful to not block access around the Maintenance Shed.



Legend

Survey Zones

Weed Observations

- Asparagus Fern
- Bitou Bush & Crofton
- Bitou Bush & Juncus acutus
- Crofton
- Crofton & Pampas
- Crofton & Wild Tabacco
- Golden Wreath Wattle
- Juncus acutus
- Lantana & Bitou Bush
- Lantana & Crofton
- Lantana, Crofton & Senna
- Pampas Grass
- Radiata Pine

Metres
0 5 10 20 30 40 50

N

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DATA SOURCE:
LPI - 2009
nearmap - 2016
Lake Coal Pty Ltd - 2016

Mannering Colliery
Northern Zone (MCNZ)

Lake Coal Pty Ltd
Annual WAP 2016
Mannering Colliery
Vales Point NSW

FIGURE:

7

L:\GIS FOLDER\00 CLIENT FILES\127223_LakeCoal_ChainValleyColliery\20172115_AnnualWAP_2016\Mapping\20172115_Fig07_MC_North.mxd

Mannering Colliery – Northern Zone (MCNZ)

Description	**Mannering Colliery – Northern Zone (MCNZ)** covers 3.58 ha that contains several dams and a spillage drainage. This area is a Degraded to Highly Degraded (Resilience Priority 4 & 5) Swamp Sclerophyll forest and contains a ground cover that is dominated by weed grass species within the easement. It receives constant water from the dams which allows the spread and transfer of several aquatic weed species. Within the area, weeds in the bushland closest to the infrastructure on the southern side of MCEZ include some large clusters of Lantana, Senna, and Crofton Weed. Areas fringing the fence and dams several infestations of Pampas Grass, isolated patches of Crofton Weed, and an extensive infestation of *Juncus acutus* (1000 m^2) exist. There is a mulched rehabilitation area that appears in good condition though there are several stands of Golden Wreath Wattle (*Acacia saligna*) with that can be easily treated with cut and paint methods. Treatment of the *Juncus acutus* infestation is recommended to limit further encroachment and allow native species to grow within the area.
Priority weeds	• Priority ranking 1 – Pampas Grass, Lantana; • Priority ranking 2 – Crofton Weed, Asparagus Fern; and • Priority ranking 3 – Senna, Bitou Bush, *Juncus acutus*, Golden Wreath Wattle.
Key Management Issues	• Primary treatment of Pampas Grass, Lantana; • Primary treatment of Crofton Weed, *Juncus acutus*, Asparagus Fern after control of Priority Ranking 1 weeds; and • Opportunistic treatment of Priority Ranking 3 - Senna, Bitou Bush, Golden Wreath Wattle.
Notes	Site is easy to traverse and vehicular access is available with permission from the mine and keys to access the dam area.

Legend

Survey Zones
Local Road

Weed Observations

Crofton
Pampas Grass

Metres
0 5 10 20 30 40 50

N

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DATA SOURCE:
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nearmap - 2016
Lake Coal Pty Ltd -2016

Mannering Colliery
Eastern Zone (MCEZ)

Lake Coal Pty Ltd
Annual WAP 2016
Mannering Colliery
Vales Point NSW

FIGURE:
8

L:\GIS FOLDER\00 CLIENT FILES\127223_LakeCoal_ChainValleyColliery\20172115_AnnualWAP_2016\Mapping\20172115_Fig08_MC_East.mxd

Mannering Colliery – Eastern Zone

Description	**Mannering Colliery – Eastern Zone** covers 2.85 ha and consists of Modified and Degraded (Resilience Priority 3 & 4) Coastal Open Woodland around the carpark and dam area. Despite the disturbance there is very little proliferation of weeds within this area, and the dam area consists predominantly of naturally regenerated Acacia and Gahnia species. Within this zone there is some isolated patches of Crofton Weed and Pampas Grass, but no large infestations **(8)**.
Priority weeds	• Priority ranking 1: Crofton Weed, Pampas Grass; and • Priority ranking 2: Secondary treatment and maintenance.
Key Management Issues	• Primary treatment of Crofton Weed and Pampas; and • Follow-up treatment with spot-spray.
Notes	Site is easily traversed by foot, and vehicular access is available around the edge of the entire site.

Metres
0 5 10 20 30 40 50
N

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DATA SOURCE:
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Lake Coal Pty Ltd - 2016

Mannering Colliery
Southern Zone (MCSZ)

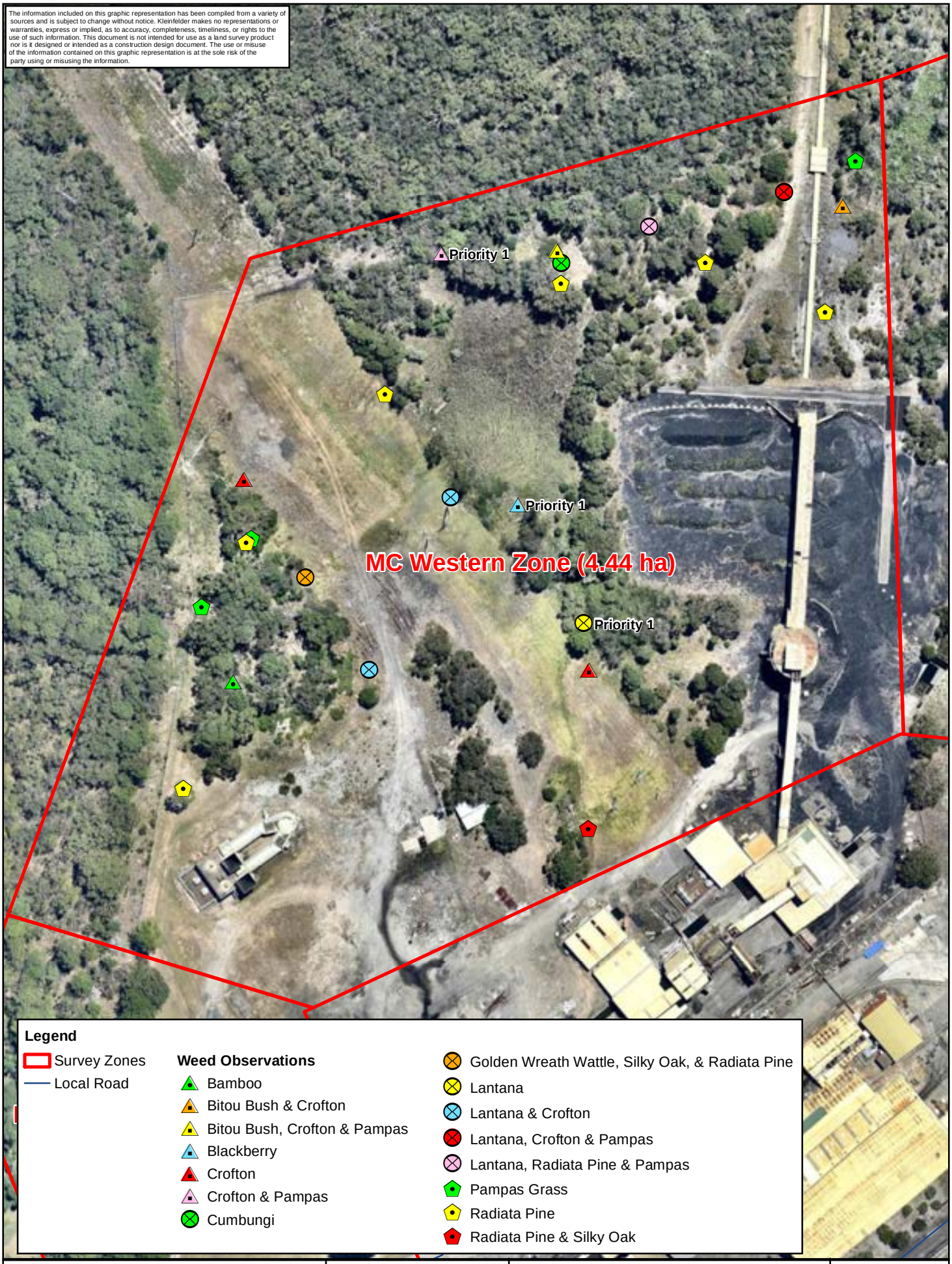
Lake Coal Pty Ltd
Annual WAP 2016
Mannering Colliery
Vales Point NSW

FIGURE:
9

L:\GIS FOLDER\00 CLIENT FILES\127223_LakeCoal_ChainValleyColliery\20172115_AnnualWAP_2016\Mapping\20172115_Fig09_MC_South.mxd

Mannering Colliery – Southern Zone (MCSZ)

Description	**Mannering Colliery – Southern Zone (MCSZ)** contains 2.21 ha of land that is located on the south site entry and main garden area **(9)**. The area is a totally cleared landscaped garden area, therefore weeds were mapped for the convenience of the client who knows to manage accordingly. There are two species of weed here including large planted stands of Radiata Pine and a clump of Agave.
Priority weeds	• Priority ranking 1 – Radiata Pine and Agave
Key Management Issues	• Primary treatment of Radiata Pine and Agave
Notes	Zone 3 is a landscaped garden area which can be accessed by vehicle and easily traversed.



Legend

Survey Zones
Local Road

Weed Observations

- Bamboo
- Bitou Bush & Crofton
- Bitou Bush, Crofton & Pampas
- Blackberry
- Crofton
- Crofton & Pampas
- Cumbungi
- Golden Wreath Wattle, Silky Oak, & Radiata Pine
- Lantana
- Lantana & Crofton
- Lantana, Crofton & Pampas
- Lantana, Radiata Pine & Pampas
- Pampas Grass
- Radiata Pine
- Radiata Pine & Silky Oak

Metres
0 5 10 20 30 40 50

N

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DATA SOURCE:
LPI - 2009
nearmap - 2016
Lake Coal Pty Ltd - 2016

Mannering Colliery
Western Zone (MCWZ)

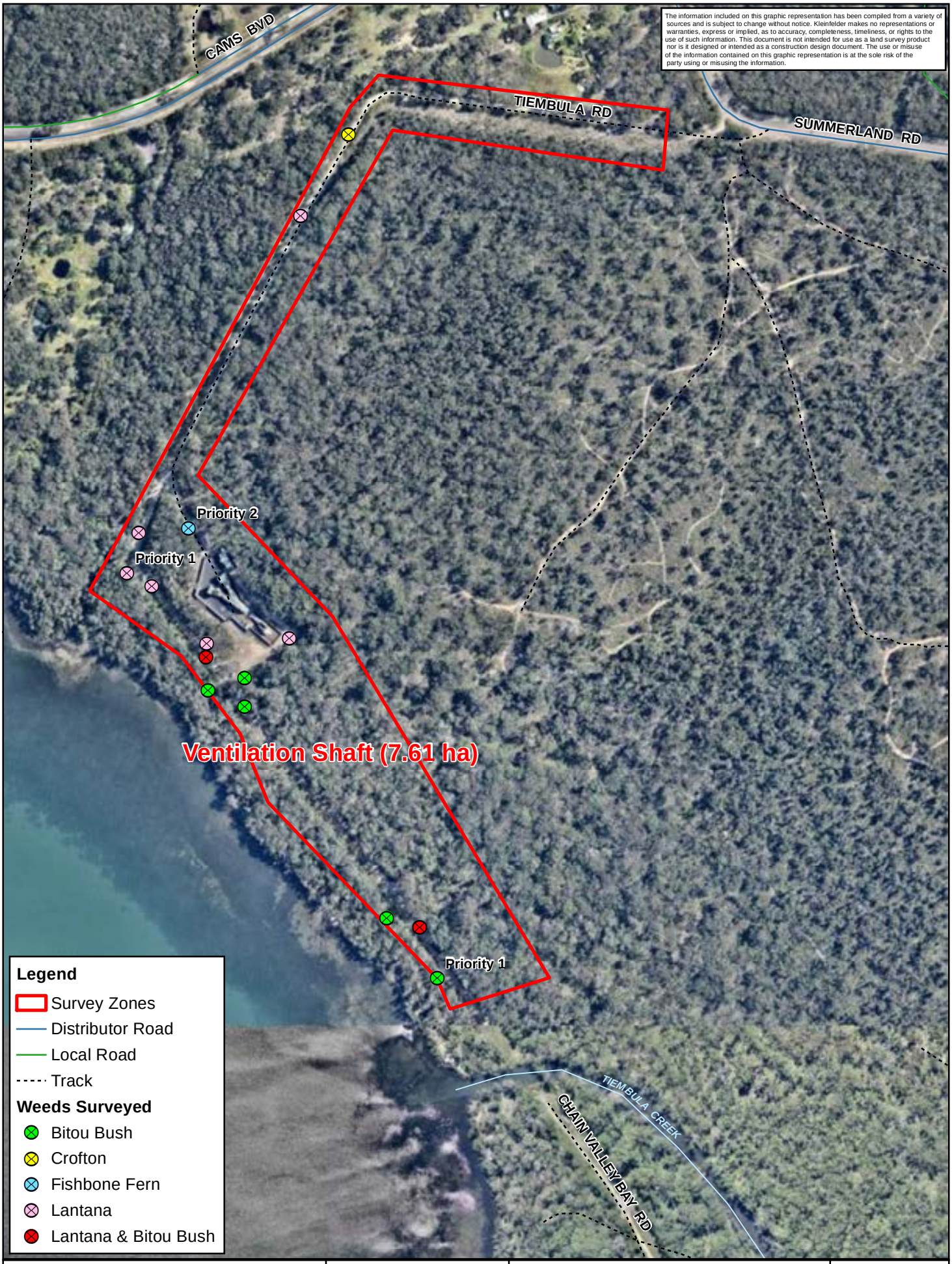
Lake Coal Pty Ltd
Annual WAP 2016
Mannering Colliery
Vales Point NSW

FIGURE:
10

L:\GIS FOLDER\00 CLIENT FILES\127223_LakeCoal_ChainValleyColliery\20172115_AnnualWAP_2016\Mapping\20172115_Fig10_MC_West.mxd

Mannering Colliery – Western Zone (MCWZ)

Description	Mannering Colliery – Western Zone (MCWZ) covers 4.44 ha starting at the western side of the coal loader. The vegetation community contains Modified to Degraded (Resilience Priority 3 & 4), and some areas of Highly Degraded (Resilience Priority 4) Coastal Open Woodland separated by grassy cleared areas **(10).** Being a degraded environment, weed presence throughout the zone is high, though weed species are mainly located in either clusters or stands, with Lantana, Crofton Weed and Blackberry, and isolated Pampas Grass in the areas closest to the infrastructure on the southern side of MCEZ. Throughout the site there are also several places where Radiata Pine and Pampas Grass have taken advantage of disturbance and there is a small amount of Bamboo on the western side.
Priority weeds	• Priority ranking 1 – Pampas Grass, Lantana, Blackberry • Priority ranking 2 – Crofton Weed and Radiata Pine • Priority ranking 3 – Bamboo
Key Management Issues	• Primary treatment of Pampas Grass, Lantana, Blackberry • Primary treatment of Crofton Weed and Radiata Pine
Notes	Zone 2 is easily traversed by foot and could be accessed in vehicles with permission from the mine.



Metres
0 10 20 40 60 80 100

N

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DATA SOURCE:
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Lake Coal Pty Ltd - 2016

Summerland Point Ventilation Shaft (SPVS)

Lake Coal Pty Ltd
Annual WAP 2016
Chain Valley Colliery Ventilation Area
Summerland Point NSW

FIGURE:

11

L:\GIS FOLDER\00 CLIENT FILES\127223_LakeCoal_ChainValleyColliery\20172115_AnnualWAP_2016\Mapping\20172115_Fig11_VentilationShaft.mxd

Summerland Point – Ventilation Shaft (SPVS)

Description	**Summerland Point - Ventilation Shaft (SPVS)** covers 9.29 ha from Tiembula Entry Road off Summerland Road, and the area surrounding the ventilation shaft located between Lake Macquarie foreshore and Lake Macquarie State Conservation Area **(Figure 11).** The SPVS area is Swamp Sclerophyll Forest, with a small 300 m stretch from Summerland Road down Tiembula Road heading south identified as Grassy Open Woodland. The Swamp Sclerophyll Forest surrounding the ventilation shaft is in relatively good condition, with some areas away from the edge in Near Natural (Resilience Priority 1) condition, with Modified and Degraded Areas (Resilience Priority 2 & 3) fringing the new access road and power pole development. Scattered weed infestations exist along the road boundaries and lake foreshore including isolated Lantana and Bitou Bush clumps **(Figure 11)**. A small clump of Fishbone Fern exists close to the SPVS and would be easily treated **(Figure 11)**. Along Tiembula Road there is Crofton Weed, Blackberry and Lantana that can be treated within a day.
Priority weeds	• Priority ranking 1 – Bitou Bush, Lantana, Pampass Grass • Priority ranking 2 – Fishbone Fern and Crofton Weed, • Priority ranking 3 – N/A
Key Management Issues	• Primary treatment of Bitou Bush, Lantana, Pampass Grass • Primary treatment of Fishbone Fern and Crofton Weed
Notes	Access tracks within the zone allow easy vehicular access. Most bush areas can easily be traversed, though there are some steeper sections along the Lake Macquarie foreshore.

4. PRIORITY WEED SPECIES

Twenty-two (22) weed species have been chosen as priority species. The priority weeds are listed in **Table 1** below. The priority weeds fall under one and/or multiple of the following categories:

- Declared noxious weed under the *Noxious Weeds Act 1993*;
- Listed as a Weed of National Significance (WoNS); and
- Considered a significant environmental weed that has the ability to spread rapidly and substantially reduce biodiversity.

There are weed species that have not been included in this WAP that are present in the study area. Those weeds fall under one and/or multiples of the following categories:

- Those not declared as noxious weeds under the *Noxious Weeds Act 1993* or listed as WoNS;
- Their abundance within the study area is extremely low or isolated due to unsuitable conditions which contributes to a very low likelihood of their spread and/or effect on biodiversity;
- Considered as Annual or Biennial weeds that only have a short life cycle, consisting of two years or less that usually die back and do not provide permanent competition for native species; and
- They are present onsite and locally on such a scale that they are considered to have become naturalised. Most forms of control are considered to be extremely ineffective and/or impractical as the likelihood of re-establishment is very high.

4.1 PRIORITY WEED RANKING

A ranking of 1 indicates the highest priority of control required for a weed that is recognised on a national level (WoNS) and is a regionally declared noxious weed. The weed is currently abundant on site, spreading or has the capacity to spread into new areas. These weeds will significantly affect biodiversity where they are established.

A ranking of 2 indicates that significant management would be required before the next monitoring survey to reduce presence, abundance and spread.

A ranking of 3 indicates a weed that is currently in a low abundance, limited desirable conditions, and is unlikely to spread beyond its current distribution. Control should be undertaken with ongoing monitoring to ensure significant reduction in distribution.

Table 1: Priority weed species

* NW Act = *Noxious Weed Act 1993*, Class applies to Lake Macquarie LGA Control Area

Priority Ranking Category	Common Name	Botanical Name	NW Act*	WoNS	Environmental Weed
1	Bitou Bush	*Chrysanthemoides monilifera*	Class 4	✓	✓
1	Blackberry	*Rubus fruticosus*	Class 4	✓	
1	Lantana	*Lantana camara*		✓	✓
1	Pampas Grass	*Cortaderia selloana*	Class 3		
2	Castor Oil Plant	*Ricinus communis*			✓
2	Crofton Weed	*Ageratina adenophora*	Class 4		✓
2	Giant Reed	*Arundo donax*	Class 4		✓
2	Golden Wreath Wattle	*Acacia saligna*			✓
2	Morning Glory	*Ipomoea indica* and *Ipomoea cairica*			✓
2	Radiata Pine	*Pinus radiata*			
2	Queensland Silver Wattle	*Acacia podalyriifolia*			✓
2	Senna	*Senna pendula* var. *glabrata*			✓
2	Wild Tobacco	*Solanum mauritianum*			✓
2	Fishbone Fern	*Nephrolepis cordifolia*			✓
2	Spiny Rush	*Juncus acutus*			
3	Broad-Leaf Privet	*Ligustrum lucidium*			✓

3	Camphor Laurel	*Cinnamomum camphora*			✓
3	Coral Tree	*Erythrina x sykesii*			✓
3	Moth Vine	*Araujia sericifera*			✓
3	Silky Oak	*Grevillea robusta*			✓
3	Hydrocotyl	*Phyllostachys species*	Class 4		
3	Spiny Rush	*Juncus acutus*			

4.2 WEED CONTROL PRINCIPLES

The principal objectives of weed management programs are guided by national, state and local legislation. A program must take into consideration factors such as the interest of all stakeholders, development consent conditions, biodiversity values, geographic location, accessibility and availability of adequate funding.

The basic set of guidelines used, along with current legislation to determine the prioritisation of weed species for targeted control within Lake Coal landholdings are as follows:

- Preventing the introduction of noxious and environmental weeds into new and highly desirable areas such as rehabilitation areas and high biodiversity value areas;
- Eradicating high risk infestations that are new and/or have the potential to spread quickly or significantly impact biodiversity if left unmanaged;
- Managing declared noxious weeds taking into account their class and known distribution;
- Containment and management of noxious and WoNs that are widespread; and
- Containment and control of environmental weeds that pose a high risk to biodiversity in riparian, bushland and grassland habitats. This includes areas where control measures have already been undertaken.

5. WEED MANAGEMENT

In most cases weeds should be seen as a symptom of another problem or disturbance rather than just a stand-alone issue. All plant species have a desirable habitat or set of environmental conditions in which they prefer to grow and some exotic species can be faster growing and spread more vigorously than native species. Weed seed can be present within the soil but never establish, however, the majority of weed species require some form of disturbance to trigger germination in the soil.

Some of the most common disturbance triggers are:

- Land clearing;
- Soil disturbance;
- Fires or change in fire regimes; and
- Drought.

It is not always feasible or possible to effectively control all weeds over the long term and if these disturbances are still occurring, there will be a high likelihood that weeds will re-establish. Weed control itself is a form of disturbance, as it changes the canopy cover and therefore the ecological niche, which can trigger other weeds to germinate from the soil seed bank or provide existing weeds with more opportunity to flourish. Follow up weed control should always be undertaken and be considered essential to ensure an effective weed management program.

5.1 WEED CONTROL

There is an ever increasing range of control techniques available to weed management contractors. Different techniques can be used on a variety of weed species during various times of year.

Contractors using control techniques which are herbicide based must comply with the *Pesticides Act 1999* (NSW). Only registered herbicides can be used to control weeds according to the directions on each herbicide's label. The Pesticide*s Amendment (Records) Regulation 2001* (NSW) stipulates the requirements for record keeping when undertaking herbicide application. More information on this can be located in the "Noxious and environment weed control handbook" (Ensbey, 2016). The handbook also lists all the current control techniques and herbicides registered for each weed species. Not all registered herbicides and techniques

work well on different species and they all have a varying level of control under different environmental circumstances.

Appendix 3 recommends techniques and methods under a variety of environmental situations to which best achieve effective control of the priority species. It is desirable that all contractors be trained in Conservation and Land Management Level II or higher, or equivalent. All contractors must hold a chemical accreditation of Level 3 (AQF 3) or higher to ensure that herbicide application is carried out in a safe manner for the applicators, the public and the environment.

Appendix 4 provides information regarding resilience and explains the way weed treatment methodologies can encourage or obstruct natural regeneration - that is the recruitment and germination of native species. Sound land management practices such as bush regeneration can provide the right conditions for degraded native bushland to recover and establish strong resilience.

6. MONITORING AND REPORTING

Monitoring is the systematic collection, recording and analysis of on ground observations over time. Without monitoring the effectiveness of the control methods, weed management cannot be improved or adjusted to improve results and reduce costs.

6.1 ANNUAL MONITORING

Annual monitoring will be vital to assessing the effectiveness of the treatment methods carried out. Assessing the site response to the treatments will be essential in providing follow up treatments. This can be done by collecting information about the site and the treatment methods in the following ways:

- Using photographic monitoring points;
- Mapping of weed species, their location and densities;
- Noting if the weeds have been previously treated; and
- Recording significant native species and their density within the treatment area.

Information on best practice weed monitoring and detail on the monitoring techniques is available in the “Guidelines for monitoring weed control and recovery of native vegetation” (Auld, 2009).

6.2 REPORTING

Reporting is essential in compiling the results of the monitoring with the information collected pre and post weed treatments. The results and recommendations from the monitoring should be prepared in an annual report or WAP for the Lake Coal Environment & Community Department.

Basic information should be collected when treatments are carried out. This will be used as baseline data when assessing the effectiveness of control and measuring the presence and densities of weed species over time.

The weed contractors must maintain daily activity reports recording the following information:

- Number of contractors and total number of person hours worked;
- Weed control methods used;
- Herbicide application including the type of chemical and quantity/volume used;
- Weather conditions, morning, midday and afternoon, including Delta T measurements;
- Location of work performed;
- The approximate area (m^2) or % of weeds treated within each management area;
- Consider establishing photo points at significant infestation areas;
- Other information or observations that may be relevant;
- Provide this information in a report to Lake Coal, summarising weed management activities undertaken; and
- Record threatened or endangered flora of fauna identified within the study area.

7. DISCUSSION AND RECOMMENDATIONS

The results of the weed mapping conducted within the study area show that there are noxious WoNs and environmental weed occurrences throughout Lake Coal landholdings. Annual monitoring will ensure that information about the current/known weed presence within the zones can be managed efficiently and any future outbreaks will be reduced. It is recommended that the following points be considered by Lake Coal to ensure an effective outcome for the study area and surrounding lands:

- Consistent recording and tracking of works undertaken in the study area;
- Weed management activities during 2016/2017 to focus on the mapped priority weeds in the areas identified in this WAP;
- Annual monitoring be undertaken to assess their success and identify the need for any additional and/or follow up works;
- Annual weed mapping to establish the overall decline and spread of priority weeds and recommendations provided for 2016/2017 weed control works.

8. REFERENCES

Auld, B. (2009). *Guidelines for monitoring weed control and recovery of native vegetation,* NSW Department of Primary Industries.

Buchanan, R. (1999). *Bush regeneration*. Sydney: TAFE Student Learning Publications.

Ensbey, R. (2016). *Noxious and environmental handbook a guide to weed control in non-crop aquatic and bushland situations,* Department of Primary Industries.

Lake Coal (2016). Biodiversity Management Plan. Chain Valley Colliery: Lake Coal Pty Ltd.

APPENDIX 1. PRIORITY WEED SPECIES

Noxious Weeds

A noxious weed is a weed that is declared noxious by the NSW Minister for Primary Industries in accordance with the *Noxious Weeds Act 1993*. The *Noxious Weeds Act 1993* provides for the Minister for Primary Industries to issue an order declaring a plant noxious, either in the whole of the state or a portion of the state. The Act requires declared Noxious Weeds to be listed in one of the five control categories specified in the Act.

Priority for noxious declaration categories is determined by the detrimental effect a plant has on the environment and its ability to cause severe economic loss to agriculture or the environment. Weeds are declared noxious on local and state levels and will only be declared noxious if there are reasonable and enforceable means of control.

Noxious Weed Control Categories

The following weed control classes may be applied to a plant by a weed control order and the characteristics of each class are described below:

- Class 1 - State Prohibited Weeds;
- Class 2 - Regionally Prohibited Weeds;
- Class 3 - Regionally Controlled Weeds;
- Class 4 - Locally Controlled Weeds; and
- Class 5 - Restricted Plants.

Class 1 noxious weeds are plants that pose a potentially serious threat to primary production or the environment and are not present in the State or are present only to a limited extent. According to the Act, "The plant must be eradicated from the land and the land must be kept free of the plant".

Class 2 noxious weeds are plants that pose a potentially serious threat to primary production or the environment of a region to which the order applies and are not present in the region or are present only to a limited extent. According to the Act, "The plant must be eradicated from the land and the land must be kept free of the plant".

Class 3 noxious weeds are plants that pose a serious threat to primary production or the environment of an area to which the order applies, are not widely distributed in the area and are likely to spread in the area or to another area. According to the Act, "The plant must be fully and continuously suppressed and destroyed".

Class 4 noxious weeds are plants that pose a threat to primary production, the environment or human health, are widely distributed in an area to which the order applies and are likely to spread in the area or to another area. According to the Act, "The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority".

Class 5 noxious weeds are plants that are likely, by their sale or the sale of their seeds or movement within the State or an area of the State, to spread in the State or outside the State. According to the Act, "Requirements in the *Noxious Weeds Act 1993* for a notifiable weed must be complied with" and "The plant must not be sold, propagated or knowingly distributed".

A noxious weed that is classified as a Class 1, 2 or 5 noxious weed is referred to in this Act as a notifiable weed. An occupier of land on which there is a notifiable weed must notify the local control authority for that land within 3 days of becoming aware that a notifiable weed is on their property.

Weeds of National Significance (WoNS)

Under the National Weeds Strategy, 32 introduced plants were identified as Weeds of National Significance (WoNS).

This list of 32 weeds has been developed based on the following key criteria:

- Invasiveness;
- Impacts;
- Potential for spread; and
- Socioeconomic and environmental values.

National management strategies have been published for all of these species. Five of these species have been identified as occurring within Lake Coal landholdings.

Further information about the WoNs program, including national management arrangements, is available from the *(www.weeds.org.au).*

Significant Environmental Weeds

A significant environmental weed is a weed that is not declared noxious but locally will still impact on the environment through the degradation of natural systems and biodiversity by interfering with the growth and spread of native flora species endemic to the local area. Environmental weeds can also impact on native fauna by replacing their natural food sources and making wildlife corridors impenetrable. These species often can be limited to only a few areas within the study area and may require specific habitat or environments to spread and establish.

APPENDIX 2. RECOMMENDED CONTROL TECHNIQUES

Botanical Name	Common Name	Control Methods	Level of occurrence/Notes
Rubus fruticosus	Blackberry	Most plants can be sprayed using a large range of herbicides, selective herbicides include Picloram 100 g/L + Triclopyr 300 g/L +Aminopyralid 8 g/Grazon Extra® 350 or 500 mL per 100 L water or Metsulfuron-methyl 600 g/kg 10 g per 100 L of water	Scattered within Mannering Zone 4
Cinnamomum camphora	Camphor Laurel	Glyphosate 360 g/L (Roundup®). Rate: 1 part glyphosate to 50 parts water. Spray seedlings and coppice shoots. Alternatively, Rate: 1 part glyphosate to 1.5 parts water and cut stump/scrape stem application for saplings. Stem injection application large trees and shrubs.	Scattered within Western Zone
Ricinus communis	Castor Oil Plant	Hand pull smaller plants. Herbicide treatment Triclopyr 600 g/L (Garlon® 600). Rate: 1.0 L per 30 L of diesel	Light to medium infestations in Zone 3 and 4.
Ipomoea cairica	Coastal Morning Glory	Glyphosate 360 g/L (Roundup®). Rate: 200 mL per 10 L of water. Spot-spray for seedling control. Alternatively, Rate: 1 part glyphosate per 1.5 parts water and stem scraping application.	Medium to Heavy infestations along several roads and tracks, especially in Zone 4.
Erythrina x sykesii	Coral Tree	Glyphosate 360 g/L (Roundup®). Rate: 1 part glyphosate to 1.5 parts water. Cut stump/drill/axe cut/inject. Picloram 44.7 g/kg + Aminopyralid 4.47 g/L (Vigilant II ®). Rate: Undiluted. Cut stump/stem injection application. Apply a 3–5 mm layer of gel for stems less than 20 mm. Apply 5 mm layer on stems above 20 mm.	Isolated stands in Zone 3
Ageratina adenophora	Crofton Weed	Metsulfuron-methyl 600 g/kg, Rate: 15 g per 100 L of water. Add surfactant and thoroughly wet all foliage to point of run-off up to bud stage to prevent seed set. Glyphosate - Round Up Bioactive at 5 mL per 1 Litre of water. Apply to actively growing plants with full foliage.	Medium to light along the tracks of all zones.
Nephrolepis cordifolia	Fishbone Fern	Glyphosate 360 g/L with Metsulfuron-methyl 600 g/kg (Various products). Rate: 200 mL glyphosate plus 1.5 g Metsulfuron-methyl per 10 L of water. Knapsack spot spray. Metsulfuron-methyl 600 g/kg (Brush-off®). Rate: 1.0–2.0 g Metsulfuron-methyl per 10 L of water. Knapsack spot spray.	One dense clump in Zone 3

Arundo donax	Giant Reed	Glyphosate 360 g/L (Roundup®). Rate: 1 part glyphosate to 50 parts water. Knapsack application. Alternatively, Rate: 1 part glyphosate to 1.5 parts of water for cut stump application.	One dense stand in Zone 6
Acacia saligna	Golden Wreath Wattle	Picloram, Garlon and glyphosate are used for chemical control as overall sprays, stem injection or cut stump. Use Garlon 480 at 1:400 and Roundup CT at 1:200 as an overall spray for control of juvenile trees and 2 L/ha Garlon 480 for control of seedlings. Fire destroys the mature trees but usually leads to a mass germination of seedlings. However if these seedlings are controlled it very quickly reduces the seed bank in the soil. Seedlings tend not establish in mature stands. A long term control plan is usually required for success. Target areas that have been recently burnt because these will be more prone to invasion and the seed bank will be reduced due to the fire induced germination of seed.	Scattered and only present in Zone 7 (rehabilitation zone)
Lantana camara	Lantana	Splatter gun application using Glyphosate 360 g/L (Roundup®). Rate: 1 part per 9 parts water. Metsulfuron-methyl 600 g/kg (Brush-off®). Rate: 10 g per 100 L of water. Apply to bushes up to two metres tall. Spray to wet all foliage and stems. Re-treatment will be necessary.	Heavy to medium infestation in all Zones
Ligustrum lucidium	Broad-Leaf Privet	Glyphosate 360 g/L (Roundup®). Rate: Undiluted (1–2 mL per cut). Stem injection technique, as per label. Metsulfuron-methyl 300 g/kg + Aminopyralid 375 g/kg (Stinger™). Rate: 20 g per 100 L of water. Hand gun application. Metsulfuron-methyl 600 g/kg (Brush-off®). Rate: 10 g per 100 L of water. Apply to bushes up to 3 m high; complete coverage is essential.	Light to medium infestations in all Zones except Zones 1, 7 and 8
Anredera cordifolia	Madeira Vine	Glyphosate 360 g/L (Roundup®). Rate: Undiluted glyphosate. Stem scraping application. Alternatively, rate: 100 mL glyphosate per 10 L of water. Spot spray for seedling control. Add a surfactant. Fluroxypyr 200 g/L (Starane™). Rate: 500 mL in 100 L of water. Apply at times of active growth. Avoid drift on to desirable plants.	Light infestation restricted to Zone 1
Ipomoea indica and Ipomoea cairica	Morning Glory	Glyphosate 360 g/L (Roundup®). Rate: 200 mL per 10 L of water. Spot-spray for seedling control. Alternatively, Rate: 1 part glyphosate per 1.5 parts water and stem scraping application.	Medium to Heavy infestations along several roads and tracks, especially in Zone 4
Araujia sericifera	Moth Vine	Spot spray with Glyphosate 360 g/L with Metsulfuron-methyl 600 g/kg (Various products). Rate: 2 L glyphosate plus 15 g Metsulfuron-methyl in 100 L water. Or Metsulfuron-methyl 600 g/kg Rate: 10–20 g per 100 L of water.	Light infestation restricted to Zones 1 and 3
Senna pendula var. glabrata	Senna	Glyphosate 360 g/L (Roundup®). Rate: 1 part per 1.5 parts of water. Stem injection/cut stump application. Alternatively, rate: 200 mL glyphosate per 10 L water. Spot spray application. Metsulfuron-methyl 600 g/kg (Brush-off®). Rate: 1.0–2.0 g Metsulfuron-methyl per 10 L water. Spot spray application.	Medium to light along the track of most Zones except Zones 4, 7 and 8.
Grevillea robusta	Silky Oak	Glyphosate 360 g/L (Roundup®). Rate: 1 part per 1.5 parts of water. Stem injection/cut stump application.	Light infestation restricted to Zone 3

Cortaderia sp	Pampas Grass	Glyphosate 360 g/L (Roundup®). Rate: 1.0 or 1.3 L per 100 L of water. Actively growing plants, before flowering, spring to autumn. Use higher rate on plants over 1 m high.	Medium to heavy infestations within most Zones except Zones 2, 5, 6 and 9
Solanum mauritianum	Wild Tobacco	Stem injection using Glyphosate 360 g/L Undiluted.	Light to heavy in all Zones except Zone 8.
Pinus radiata	*Radiata Pine*	Picloram, Garlon and glyphosate are used for chemical control as overall sprays, stem injection or cut stump. Use Garlon 480 at 1:400 and Roundup CT at 1:200 as an overall spray for control of juvenile trees and 2 L/ha Garlon 480 for control of seedlings. Fire destroys the mature trees but usually leads to a mass germination of seedlings. However if these seedlings are controlled it very quickly reduces the seed bank in the soil. Seedlings tend not establish in mature stands. A long term control plan is usually required for success. Target areas that have been recently burnt because these will be more prone to invasion and the seed bank will be reduced due to the fire induced germination of seed	Light to heavy in CVSZ and in MCSZ
Monstera deliciosa	Fruit Salad Plant	Glyphosate 360 g/L (Roundup®). Rate: 1 part glyphosate to 50 parts water. Spray seedlings and coppice shoots. Alternatively, Rate: 1 part glyphosate to 1.5 parts water and cut stump/scrape stem application for saplings. Stem injection application large trees and shrubs.	Large Cluster in CVNZ
Nerium oleander	Oleander	Picloram 44.7 g/kg + Aminopyralid 4.47 g/L (Vigilant II ®). Rate: Undiluted Cut stump/stem injection application. Apply a 3–5 mm layer of gel for stems less than 20 mm. Apply 5 mm layer on stems above 20 mm .	Scattered along Northern Fringe – CVSZ, and Southern Fringe – CVWZ.
Asparagus aethiopicus	Asparagus Fern	Spot spray with Glyphosate 360 g/L with Metsulfuron-methyl 600 g/kg (Various products). Rate: 2 L glyphosate plus 15 g Metsulfuron-methyl in 100 L water. Or Metsulfuron-methyl 600 g/kg Rate: 10–20 g per 100 L of water.	Scattered throughout all Zones.
Juncus acutus subsp. *acutus*	Spiny Rush	Spot spray with glyphosate 360 at a rate of 20 ml glyphosate 360 to one litre of water, plus the addition of a penetrant, e.g. Pulse® at 2 ml/L water. Avoid spraying over free water. Where appropriate, supplement regular glyphosate with APVMA approved formulations such as Raze® and Roundup Biactive®. Arrange for follow up spraying to control missed plants and new seedlings.	
Phyllostachys spp.	Bamboo	Glyphosate 360 g/L (Roundup®). Rate: 1 part glyphosate to 50 parts water. Knapsack application. Alternatively, Rate: 1 part glyphosate to 1.5 parts of water for cut stump application	

APPENDIX 4. SITE RESILIENCE

The likelihood and degree of weed infestation in an area can be directly associated with the level of resilience an area has, that is the ability to recover from disturbance or damage with or without assistance based on the presence of native species and degree of disturbance. **Figure A4** shows the spectrum of resilience and the approach required at each level.

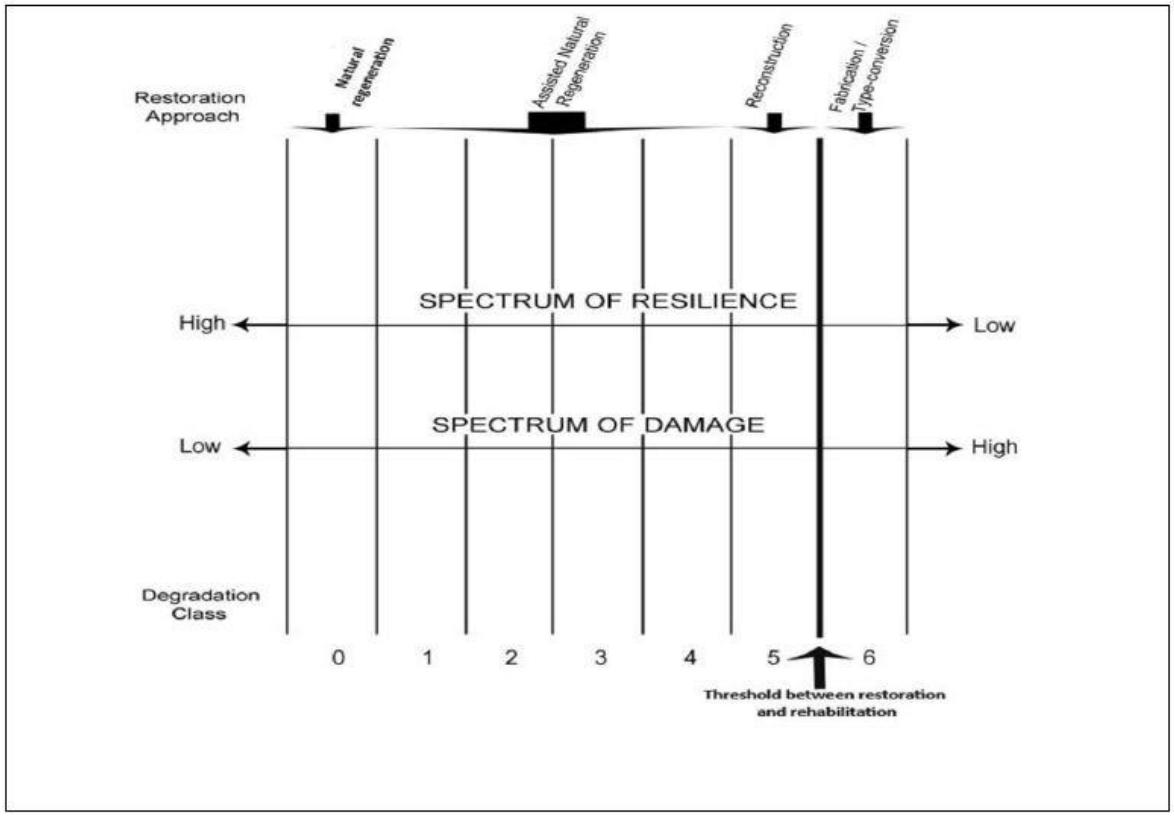

Figure A4: Spectrum of resilience

The manner in which weed treatment is carried out can encourage or obstruct natural recruitment and germination of native species. Sound land management practices such as bush regeneration can provide the right conditions for degraded native bushland to recover and establish strong resilience. The Bradley method is preferred for weed species and is considered as best practice. This method aims to remove weeds with minimal disturbance and allow native species to re-establish naturally (Buchanan, 1999). Further information on this method and bush regeneration can be found at the Australian Association of Bush Regenerators (AABR) website http://www.aabr.org.au/.

Throughout the study area different vegetation types, areas of bushland and management zones will have different levels of resilience. Those with a high level of resilience will generally have less invasive weeds in low abundance. Sites with a low resilience generally have a higher instance of invasive species in high abundance.

When undertaking weed control in each one of the management units, priority should generally be given to individual areas of high resilience, those with the most amount of native vegetation and fewer amount of weed species. A guide for resilience prioritising is given below.

Table A4: Resilience priority

Vegetation condition	Vegetation resilience	Restoration approach	Actions	Resilience Priority
Near - Natural	Intact	Protect	Monitor	1
Little Disturbed	Intact	Protect	Monitor and Consider implanting further management	2
Modified – Generally not cleared or subject to prolonged disturbance	Largely intact	Natural regeneration	Remove causes of degradation. Ensure native recruitment in occurring and is not inhibited. Monitor.	3
Degraded	Depleted	Assisted Natural Regeneration	Remove causes of degradation. Ensure native recruitment is occurring and is not inhibited. Monitor.	4
Highly degraded	Severely depleted	Assisted natural regeneration with revegetation of some species	Remove causes of degradation. Ensure native recruitment is occurring and is not inhibited. Monitor. Reintroduce native plant species	5
Totally cleared	absent	Revegetation	Remove causes of degradation. Substantial Re-introduction of native species. Monitor.	6

Benefits of considering the resilience of an area when establishing a strategy throughout the study area include but is not limited to:

- Less follow up weed control required;
- Increased native recruitment/regeneration; and
- Cost effective control of priority species.

21 Noise Monitoring

Table F1: LAeq(15 min) attended noise monitoring results – Quarter 1 2018

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY CVC AGAINST IMPACT ASSESSMENT CRITERIA – QUARTER 1 2018

Location	Date and Time	Wind Speed (m/s)	VTG (°/C per 100m)[1]	L_{Aeq} Criterion dB	Criterion Applies?[2]	CVC L_{Aeq} dB[3,4,5]	Exceedance[4,5]
			Day				
ATN001	22/03/2018 15:11	2.2	-2.0	35	Yes	IA	Nil
ATN001	22/03/2018 15:26	1.8	-2.0	35	Yes	IA	Nil
ATN001	22/03/2018 15:41	1.6	-2.0	35	Yes	IA	Nil
ATN001	22/03/2018 15:57	2.3	-2.0	35	Yes	IA	Nil
ATN001	22/03/2018 16:12	1.5	-2.0	35	Yes	IA	Nil
ATN001	22/03/2018 16:27	3.9	-2.0	35	No	IA	NA
ATN002	22/03/2018 14:57	2.4	-2.0	49	Yes	NM	Nil
ATN002	22/03/2018 15:13	2.1	-2.0	49	Yes	IA	Nil
ATN002	22/03/2018 15:28	1.6	-2.0	49	Yes	IA	Nil
ATN002	22/03/2018 15:43	2.0	-2.0	49	Yes	IA	Nil
ATN002	22/03/2018 15:58	1.5	-2.0	49	Yes	IA	Nil
ATN002	22/03/2018 16:13	1.2	-2.0	49	Yes	NM	Nil
ATN003	19/03/2018 15:28	2.4	-2.0	36	Yes	IA	Nil
ATN003	19/03/2018 15:46	2.8	-2.0	36	Yes	IA	Nil
ATN003	19/03/2018 16:01	2.2	-2.0	36	Yes	IA	Nil
ATN003	19/03/2018 16:17	3.3	-2.0	36	No	IA	NA
ATN003	19/03/2018 16:33	1.9	-2.0	36	Yes	IA	Nil
ATN003	19/03/2018 16:49	3.3	-2.0	36	No	IA	NA
ATN004	22/03/2018 14:38	2.5	-2.0	35	Yes	IA	Nil
ATN005	22/03/2018 13:53	2.0	-2.0	35	Yes	IA	Nil
ATN006	23/03/2018 09:58	1.8	-1.8	37	Yes	NM	Nil
ATN006	23/03/2018 10:13	2.1	-2.0	37	Yes	IA	Nil
ATN006	23/03/2018 10:28	1.7	-2.0	37	Yes	IA	Nil
ATN006	23/03/2018 10:43	1.9	-2.0	37	Yes	NM	Nil
ATN006	23/03/2018 10:58	1.2	-2.0	37	Yes	IA	Nil
ATN006	23/03/2018 11:13	1.7	-2.0	37	Yes	IA	Nil
ATN007	23/03/2018 11:47	0.9	-2.0	46	Yes	37	Nil
ATN007	23/03/2018 12:02	1.9	-2.0	46	Yes	38	Nil
ATN007	23/03/2018 12:17	1.9	-2.0	46	Yes	38	Nil
ATN007	23/03/2018 12:32	2.6	-2.0	46	Yes	38	Nil
ATN007	23/03/2018 12:47	1.3	-2.0	46	Yes	<40	Nil
ATN007	23/03/2018 13:03	3.2	-2.0	46	No	<40	NA
R13	22/03/2018 16:30	3.9	-2.0	43	No	IA	NA
R13	22/03/2018 16:45	3.7	-2.0	43	No	IA	NA

		Speed (m/s)	(°/C per 100m)[1]	Criterion dB	Applies?[2]	dB [3,4,5]	
R13	22/03/2018 17:00	4.1	-2.0	43	No	IA	NA
R13	22/03/2018 17:15	4.3	-2.0	43	No	IA	NA
R13	22/03/2018 17:30	3.4	-1.8	43	No	IA	NA
R13	23/03/2018 13:39	2.6	-2.0	43	Yes	IA	Nil
			Evening				
ATN001	22/03/2018 18:08	3.7	-1.0	35	No	IA	NA
ATN001	22/03/2018 18:31	1.3	3.0	35	Yes	IA	Nil
ATN002	22/03/2018 19:13	0.6	3.0	49	Yes	IA	Nil
ATN002	22/03/2018 19:28	1.9	3.0	49	Yes	<30	Nil
ATN003	19/03/2018 18:24	2.5	3.0	36	Yes	NM	Nil
ATN003	19/03/2018 18:39	1.4	3.0	36	Yes	IA	Nil
ATN004	22/03/2018 18:58	1.2	3.0	35	Yes	IA	Nil
ATN005	22/03/2018 19:26	1.2	3.0	35	Yes	IA	Nil
ATN006	22/03/2018 19:54	1.2	3.0	37	Yes	IA	Nil
ATN006	22/03/2018 20:09	1.3	3.0	37	Yes	IA	Nil
ATN007	22/03/2018 20:36	1.8	3.0	46	Yes	41	Nil
ATN007	22/03/2018 20:52	1.4	3.0	46	Yes	41	Nil
R13	22/03/2018 18:11	3.7	-1.0	43	No	IA	NA
R13	22/03/2018 18:51	1.0	3.0	43	Yes	IA	Nil
			Night				
ATN001	23/03/2018 01:45	2.0	3.0	35	Yes	IA	Nil
ATN001	23/03/2018 02:00	2.1	3.0	35	Yes	IA	Nil
ATN001	23/03/2018 02:15	1.5	3.0	35	Yes	IA	Nil
ATN001	23/03/2018 02:30	1.5	3.0	35	Yes	IA	Nil
ATN002	20/03/2018 02:07	2.3	3.0	49	Yes	IA	Nil
ATN002	20/03/2018 02:22	2.8	3.0	49	Yes	IA	Nil
ATN002	20/03/2018 02:37	2.2	3.0	49	Yes	IA	Nil
ATN002	20/03/2018 02:52	2.6	3.0	49	Yes	IA	Nil
ATN003	20/03/2018 01:00	2.0	3.0	36	Yes	IA	Nil
ATN003	20/03/2018 01:16	2.1	3.0	36	Yes	IA	Nil
ATN003	20/03/2018 01:32	1.6	3.0	36	Yes	IA	Nil
ATN003	20/03/2018 01:47	1.8	3.0	36	Yes	IA	Nil
ATN004	23/03/2018 01:15	0.9	3.0	35	Yes	IA	Nil
ATN005	23/03/2018 00:48	1.9	3.0	35	Yes	IA	Nil
ATN006	22/03/2018 23:14	2.8	3.0	37	Yes	IA	Nil
ATN006	22/03/2018 23:29	2.8	3.0	37	Yes	IA	Nil

Table F2: LA1(1min) attended noise monitoring results – Quarter 1 2018

Location	Date and Time	Wind Speed (m/s)	VTG (°/C per 100m)[1]	L_{Aeq} Criterion dB	Criterion Applies?[2]	CVC L_{Aeq} dB[3,4,5]	Exceedance[4,5]
ATN006	22/03/2018 23:45	2.3	3.0	37	Yes	IA	Nil
ATN006	23/03/2018 00:01	2.9	3.0	37	Yes	IA	Nil
ATN007	22/03/2018 22:00	2.4	3.0	46	Yes	41	Nil
ATN007	22/03/2018 22:16	2.9	0.5	46	Yes	41	Nil
ATN007	22/03/2018 22:32	1.2	3.0	46	Yes	41	Nil
ATN007	22/03/2018 22:47	1.5	3.0	46	Yes	42	Nil
R13	20/03/2018 03:10	1.3	3.0	43	Yes	IA	Nil
R13	20/03/2018 03:25	1.5	3.0	43	Yes	IA	Nil
R13	20/03/2018 03:40	1.6	3.0	43	Yes	IA	Nil
R13	20/03/2018 03:55	1.7	3.0	43	Yes	IA	Nil

Table 4.3: $L_{A1,1minute}$ GENERATED BY CVC AGAINST IMPACT ASSESSMENT CRITERIA – QUARTER 1 2018

Location	Date And Time	Wind Speed (m/s)	VTG (°/C per 100m)[1]	$L_{A1,1min}$ Criterion dB	Criterion Applies?[2]	CVC $L_{A1,1min}$ dB[3,4,5]	Exceedance[5]
			Night				
ATN001	23/03/2018 01:45	2.0	3.0	45	Yes	IA	Nil
ATN001	23/03/2018 02:00	2.1	3.0	45	Yes	IA	Nil
ATN001	23/03/2018 02:15	1.5	3.0	45	Yes	IA	Nil
ATN001	23/03/2018 02:30	1.5	3.0	45	Yes	IA	Nil
ATN002	20/03/2018 02:07	2.3	3.0	53	Yes	IA	Nil
ATN002	20/03/2018 02:22	2.8	3.0	53	Yes	IA	Nil
ATN002	20/03/2018 02:37	2.2	3.0	53	Yes	IA	Nil
ATN002	20/03/2018 02:52	2.6	3.0	53	Yes	IA	Nil
ATN003	20/03/2018 01:00	2.0	3.0	45	Yes	IA	Nil
ATN003	20/03/2018 01:16	2.1	3.0	45	Yes	IA	Nil
ATN003	20/03/2018 01:32	1.6	3.0	45	Yes	IA	Nil
ATN003	20/03/2018 01:47	1.8	3.0	45	Yes	IA	Nil
ATN004	23/03/2018 01:15	0.9	3.0	45	Yes	IA	Nil
ATN005	23/03/2018 00:48	1.9	3.0	45	Yes	IA	Nil
ATN006	22/03/2018 23:14	2.8	3.0	45	Yes	IA	Nil
ATN006	22/03/2018 23:29	2.8	3.0	45	Yes	IA	Nil
ATN006	22/03/2018 23:45	2.3	3.0	45	Yes	IA	Nil
ATN006	23/03/2018 00:01	2.9	3.0	45	Yes	IA	Nil
ATN007	22/03/2018 22:00	2.4	3.0	46	Yes	43	Nil
ATN007	22/03/2018 22:16	2.9	0.5	46	Yes	44	Nil
ATN007	22/03/2018 22:32	1.2	3.0	46	Yes	43	Nil
ATN007	22/03/2018 22:47	1.5	3.0	46	Yes	44	Nil
R13	20/03/2018 03:10	1.3	3.0	49	Yes	IA	Nil
R13	20/03/2018 03:25	1.5	3.0	49	Yes	IA	Nil
R13	20/03/2018 03:40	1.6	3.0	49	Yes	IA	Nil
R13	20/03/2018 03:55	1.7	3.0	49	Yes	IA	Nil

Table F3: LAeq(15 min) attended noise monitoring results – Quarter 2 2018

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY CVC AGAINST IMPACT ASSESSMENT CRITERIA – QUARTER 2 2018

Location	Start Date and Time	Wind Speed (m/s)	VTG (°C per 100m)[1]	L_{Aeq} Criterion (dB)	Criterion Applies?[2]	CVC L_{Aeq} (dB)[3,4]	Exceedance (dB)[4,5]
			Day				
ATN001	29/06/2018 14:13	3.0	-2.0	35	Yes	IA	Nil
ATN002	29/06/2018 12:24	1.9	-2.0	49	Yes	IA	Nil
ATN003	29/06/2018 11:32	1.8	-2.0	36	Yes	IA	Nil
ATN004	29/06/2018 11:07	2.4	-2.0	35	Yes	IA	Nil
ATN005	29/06/2018 10:32	2.5	-2.0	35	Yes	IA	Nil
ATN006	29/06/2018 10:02	2.8	-2.0	37	Yes	IA	Nil
ATN007	29/06/2018 09:20	2.7	-2.0	46	Yes	42	Nil
R13	29/06/2018 12:45	2.6	-2.0	43	Yes	IA	Nil
			Evening				
ATN001	28/06/2018 19:17	0.4	3.0	35	Yes	IA	Nil
ATN002	28/06/2018 20:57	0.4	3.0	49	Yes	IA	Nil
ATN003	28/06/2018 20:09	0.5	3.0	36	Yes	IA	Nil
ATN004	28/06/2018 20:36	0.2	3.0	35	Yes	<30	Nil
ATN005	28/06/2018 20:01	0.6	0.5	35	Yes	<30	Nil
ATN006	28/06/2018 19:22	0.4	3.0	37	Yes	NM	Nil
ATN007	28/06/2018 18:34	0.6	3.0	46	Yes	44	Nil
R13	28/06/2018 21:05	0.2	3.0	43	Yes	NM	Nil
			Night				
ATN001	29/06/2018 03:50	1.1	0.5	35	Yes	IA	Nil
ATN002	29/06/2018 03:11	0.8	0.5	49	Yes	IA	Nil
ATN003	29/06/2018 02:53	1.1	0.5	36	Yes	IA	Nil
ATN004	29/06/2018 00:40	0.5	3.0	35	Yes	IA	Nil
ATN005	29/06/2018 02:23	2.1	0.5	35	Yes	IA	Nil
ATN006	29/06/2018 02:02	1.2	3.0	37	Yes	IA	Nil
ATN007	29/06/2018 01:20	0.4	3.0	46	Yes	44	Nil
R13	29/06/2018 03:27	0.8	-1.0	43	Yes	IA	Nil

Table F4: LA1(1min) attended noise monitoring results – Quarter 2 2018

Table 4.3: $L_{A1,1minute}$ GENERATED BY CVC AGAINST IMPACT ASSESSMENT CRITERIA – QUARTER 2 2018

Location	Start Date and Time	Wind Speed (m/s)	VTG (°C / 100m)[1]	L_{Aeq} Criterion (dB)	Criterion Applies?[2]	CVC $L_{A1,1minute}$ (dB)[3,4]	Exceedance (dB)[4,5]
ATN001	29/06/2018 03:50	1.1	0.5	45	Yes	IA	Nil
ATN002	29/06/2018 03:11	0.8	0.5	53	Yes	IA	Nil
ATN003	29/06/2018 02:53	1.1	0.5	45	Yes	IA	Nil
ATN004	29/06/2018 00:40	0.5	3.0	45	Yes	IA	Nil
ATN005	29/06/2018 02:23	2.1	0.5	45	Yes	IA	Nil
ATN006	29/06/2018 02:02	1.2	3.0	45	Yes	IA	Nil
ATN007	29/06/2018 01:20	0.4	3.0	46	Yes	45	Nil
R13	29/06/2018 03:27	0.8	-1.0	49	Yes	IA	Nil

Table F5: LAeq(15 min) attended noise monitoring results – Quarter 3 2018

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY CVC AGAINST IMPACT ASSESSMENT CRITERIA – QUARTER 3 2018

Location	Start Date and Time	Wind Speed (m/s)	VTG (°C per 100m)[1]	L_{Aeq} Criterion (dB)	Criterion Applies?[2]	CVC L_{Aeq} (dB)[3,4]	Exceedance (dB)[4,5]
			Day				
ATN001	29/08/2018 14:00	2.6	-2.0	35	Yes	IA	Nil
ATN002	29/08/2018 13:09	2.4	-2.0	49	Yes	IA	Nil
ATN003	29/08/2018 12:23	3.5	-2.0	36	No	IA	NA
ATN004	29/08/2018 11:58	2.3	-2.0	35	Yes	IA	Nil
ATN005	29/08/2018 11:24	3.0	-2.0	35	Yes	IA	Nil
ATN006	29/08/2018 10:59	2.4	-2.0	37	Yes	IA	Nil
ATN007	29/08/2018 10:31	2.8	-2.0	46	Yes	36	Nil
R13	29/08/2018 13:29	2.8	-2.0	43	Yes	IA	Nil
			Evening				
ATN001	28/08/2018 18:17	1.1	3.0	35	Yes	IA	Nil
ATN002	28/08/2018 19:46	0.6	0.5	49	Yes	IA	Nil
ATN003	28/08/2018 19:04	0.8	3.0	36	Yes	IA	Nil
ATN004	28/08/2018 19:59	0.7	3.0	35	Yes	IA	Nil
ATN005	28/08/2018 19:30	0.8	0.5	35	Yes	IA	Nil
ATN006	28/08/2018 19:04	0.8	3.0	37	Yes	IA	Nil
ATN007	28/08/2018 18:31	0.7	3.0	46	Yes	42	Nil
R13	28/08/2018 20:25	0.9	3.0	43	Yes	IA	Nil
			Night				
ATN001	29/08/2018 01:00	1.2	-1.0	35	Yes	IA	Nil
ATN002	29/08/2018 01:52	1.2	0.5	49	Yes	<30	Nil
ATN003	29/08/2018 01:29	1.0	0.5	36	Yes	IA	Nil
ATN004	29/08/2018 00:22	1.2	-1.0	35	Yes	NM	Nil
ATN005	28/08/2018 23:54	1.1	-1.0	35	Yes	32	Nil
ATN006	29/08/2018 02:41	0.6	0.5	37	Yes	IA	Nil
ATN007	29/08/2018 03:10	0.5	0.5	46	Yes	38	Nil
R13	29/08/2018 02:12	1.1	-1.0	43	Yes	IA	Nil

Table F6: LA1(1min) attended noise monitoring results – Quarter 3 2018

Table 4.3: $L_{A1,1minute}$ GENERATED BY CVC AGAINST IMPACT ASSESSMENT CRITERIA – QUARTER 3 2018

Location	Start Date and Time	Wind Speed (m/s)	VTG (°C / 100m)[1]	L_{Aeq} Criterion (dB)	Criterion Applies?[2]	CVC $L_{A1,1minute}$ (dB)[3,4]	Exceedance (dB)[4,5]
ATN001	29/08/2018 01:00	1.2	-1.0	45	Yes	IA	Nil
ATN002	29/08/2018 01:52	1.2	0.5	53	Yes	30	Nil
ATN003	29/08/2018 01:29	1.0	0.5	45	Yes	IA	Nil
ATN004	29/08/2018 00:22	1.2	-1.0	45	Yes	NM	Nil
ATN005	28/08/2018 23:54	1.1	-1.0	45	Yes	37	Nil
ATN006	29/08/2018 02:41	0.6	0.5	45	Yes	IA	Nil
ATN007	29/08/2018 03:10	0.5	0.5	46	Yes	39	Nil
R13	29/08/2018 02:12	1.1	-1.0	49	Yes	IA	Nil

Table F7: LAeq(15 min) attended noise monitoring results – Quarter 4 2018

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY CVC AGAINST IMPACT ASSESSMENT CRITERIA – QUARTER 4 2018

Location	Start Date and Time	Wind Speed (m/s)	VTG (°C per 100m)[1]	L_{Aeq} Criterion (dB)	Criterion Applies?[2]	CVC L_{Aeq} (dB)[3,4]	Exceedance (dB)[4,5]
			Day				
ATN001	19/12/2018 17:40	1.1	-2.0	35	Yes	IA	Nil
ATN002	19/12/2018 16:50	2.2	-2.0	49	Yes	IA	Nil
ATN003	19/12/2018 16:07	1.0	-2.0	36	Yes	IA	Nil
ATN004	19/12/2018 15:45	2.0	-2.0	35	Yes	IA	Nil
ATN005	19/12/2018 15:16	1.9	-1.6	35	Yes	IA	Nil
ATN006	19/12/2018 14:53	2.4	-1.8	37	Yes	IA	Nil
ATN007	19/12/2018 14:25	0.6	-2.0	46	Yes	41	Nil
R13	19/12/2018 17:10	1.1	-2.0	43	Yes	IA	Nil
			Evening				
ATN001	19/12/2018 18:00	1.9	-2.0	35	Yes	IA	Nil
ATN002	19/12/2018 21:58	3.2	-1.0	49	Yes	IA	Nil
ATN003	19/12/2018 18:46	1.4	-2.0	36	Yes	IA	Nil
ATN004	19/12/2018 19:28	0.9	3.0	35	Yes	IA	Nil
ATN005	19/12/2018 19:00	1.3	3.0	35	Yes	IA	Nil
ATN006	19/12/2018 18:34	1.4	-2.0	37	Yes	IA	Nil
ATN007	19/12/2018 1800	1.8	-2.0	46	Yes	45	Nil
R13	19/12/2018 19:25	1.0	3.0	43	Yes	IA	Nil
			Night				
ATN001	20/12/2018 01:01	1.7	3.0	35	Yes	IA	Nil
ATN002	20/12/2018 01:28	0.5	3.0	49	Yes	IA	Nil
ATN003	20/12/2018 02:08	0.6	3.0	36	Yes	IA	Nil

Location	Start Date and Time	Wind Speed (m/s)	VTG (°C per 100m)[1]	L_{Aeq} Criterion (dB)	Criterion Applies?[2]	CVC L_{Aeq} (dB)[3,4]	Exceedance (dB)[4,5]
ATN004	19/12/2018 23:04	2.7	0.5	35	Yes	IA	Nil
ATN005	19/12/2018 23:31	1.0	3.0	35	Yes	IA	Nil
ATN006	20/12/2018 02:43	0.8	3.0	37	Yes	IA	Nil
ATN007	20/12/2018 03:11	0.8	3.0	46	Yes	43	Nil
R13	20/12/2018 01:46	1.0	3.0	43	Yes	IA	Nil

Table F8: LA1(1min) attended noise monitoring results – Quarter 4 2018

Table 4.3: $L_{A1,1minute}$ GENERATED BY CVC AGAINST IMPACT ASSESSMENT CRITERIA – QUARTER 4 2018

Location	Start Date and Time	Wind Speed (m/s)	VTG (°C / 100m)[1]	$L_{A1,1minute}$ Criterion (dB)	Criterion Applies?[2]	CVC $L_{A1,1minute}$ (dB)[3,4]	Exceedance (dB)[4,5]
ATN001	20/12/2018 01:01	1.7	3.0	45	Yes	IA	Nil
ATN002	20/12/2018 01:28	0.5	3.0	53	Yes	IA	Nil
ATN003	20/12/2018 02:08	0.6	3.0	45	Yes	IA	Nil
ATN004	19/12/2018 23:04	2.7	0.5	45	Yes	IA	Nil
ATN005	19/12/2018 23:31	1.0	3.0	45	Yes	IA	Nil
ATN006	20/12/2018 02:43	0.8	3.0	45	Yes	IA	Nil
ATN007	20/12/2018 03:11	0.8	3.0	46	Yes	46	Nil
R13	20/12/2018 01:46	1.0	3.0	49	Yes	IA	Nil

22 Subsidence Monitoring

Table 3.19: Line 23 Subsidence Monitoring Results

Station	04/01/2018	11/01/2018	18/01/2018	25/01/2018	02/02/2018	09/02/2018	02/03/2018	22/08/2018	21/12/2018
53	-0.038	-0.038	-0.037	-0.037	-0.036	-0.038	-0.038	-0.038	-0.039
54	-0.030	-0.032	-0.029	-0.031	-0.029	-0.029	-0.032	-0.033	-0.032
55	-0.021	-0.023	-0.020	-0.022	-0.020	-0.020	-0.023	-0.024	-0.023
56	-0.040	-0.041	-0.037	-0.039	-0.038	-0.038	-0.041	-0.042	-0.041
79	-0.006	-0.006	-0.004	-0.005	-0.004	-0.005	-0.006	-0.008	-0.008
78	0.011	0.009	0.013	0.011	0.011	0.015	0.009	0.009	0.013
77	-0.001	-0.003	0.001	-0.001	-0.001	0.002	-0.004	-0.003	-0.003
60	-0.022	-0.022	-0.019	-0.020	-0.020	-0.018	-0.022	-0.024	-0.022
76	-0.002	-0.003	0.000	-0.002	-0.001	0.002	-0.004	-0.006	-0.004
62	-0.023	-0.024	-0.020	-0.023	-0.022	-0.019	-0.025	-0.027	-0.025
63	-0.028	-0.027	-0.024	-0.025	-0.027	-0.023	-0.025	-0.029	-0.028
64	-0.027	-0.029	-0.024	-0.027	-0.028	-0.022	-0.029	-0.030	-0.029
65	-0.027	-0.029	-0.024	-0.027	-0.027	-0.022	-0.030	-0.031	-0.031
66	-0.031	-0.032	-0.028	-0.030	-0.030	-0.024	-0.033	-0.034	-0.035
67	-0.040	-0.040	-0.036	-0.040	-0.040	-0.033	-0.044	-0.044	-0.045
PWD 378	-0.038	-0.038	-0.035	-0.038	-0.038	-0.031	-0.042	-0.043	-0.043
69	-0.066	-0.066	-0.063	-0.067	-0.067	-0.059	-0.072	-0.071	-0.071
70	-0.131	-0.131	-0.128	-0.133	-0.133	-0.125	-0.138	-0.137	-0.138
71	-0.135	-0.135	-0.133	-0.135	-0.136	-0.127	-0.141	-0.141	-0.142
72	-0.108	-0.108	-0.106	-0.109	-0.109	-0.101	-0.116	-0.115	-0.116
73	-0.094	-0.093	-0.093	-0.096	-0.096	-0.087	-0.103	-0.100	-0.103

Table 3.20: Line 33 Subsidence Monitoring Results

	04/01/2018	11/01/2018	18/01/2018	25/01/2018	02/02/2018	09/02/2018	02/03/2018	21/08/2018	21/12/2018
Station	0.000	-0.001	0.000	0.001	0.001	0.000	0.000	-0.001	-0.001
0A	0.001	0.000	0.000	0.001	0.001	0.001	0.001	0.000	-0.003
1A	0.001	0.000	0.000	0.001	0.001	0.001	0.001	0.001	
2A	0.001	0.000	0.000	0.002	0.001	0.001	0.002	0.001	-0.004
3A	0.001	0.000	0.000	0.002	0.002	0.001	0.003	0.001	-0.005
4A	0.000	-0.001	-0.001	0.001	0.000	0.000	0.002	0.000	-0.005
5A	-0.001	-0.004	-0.003	-0.001	-0.002	-0.003	0.001	-0.001	-0.007
6A	-0.002	-0.004	-0.004	-0.001	-0.002	-0.003	0.001	-0.001	-0.008
7A	-0.002	-0.004	-0.003	0.000	-0.002	-0.003	0.002	-0.002	-0.007
8A	-0.003	-0.005	-0.004	-0.002	-0.003	-0.004	0.000	-0.002	-0.008
9A	-0.004	-0.005	-0.005	-0.003	-0.003	-0.005	-0.002	-0.003	-0.008
10A	-0.003	-0.005	-0.004	-0.002	-0.003	-0.004	-0.001	-0.003	-0.008
11A	-0.004	-0.005	-0.005	-0.004	-0.004	-0.004	-0.003	-0.004	-0.008
12A	-0.006	-0.006	-0.006	-0.005	-0.005	-0.005	-0.004	-0.005	-0.009
13A	-0.008	-0.008	-0.008	-0.007	-0.006	-0.007	-0.006	-0.006	-0.011
14A	-0.046	-0.045	-0.045	-0.044	-0.044	-0.045	-0.042	-0.043	-0.049
15A	-0.011	-0.012	-0.011	-0.009	-0.009	-0.010	-0.008	-0.008	-0.015
16A	-0.023	-0.023	-0.022	-0.020	-0.020	-0.021	-0.018	-0.019	-0.026
17A	-0.014	-0.014	-0.013	-0.010	-0.011	-0.012	-0.008	-0.009	-0.017
18A	-0.015	-0.015	-0.015	-0.012	-0.013	-0.014	-0.009	-0.010	-0.019
19A	-0.016	-0.016	-0.016	-0.013	-0.014	-0.016	-0.011	-0.011	-0.020
20A	-0.018	-0.018	-0.017	-0.015	-0.016	-0.017	-0.013	-0.013	-0.021
21A	-0.021	-0.021	-0.021	-0.019	-0.019	-0.020	-0.017	-0.018	-0.025
22A	-0.043	-0.040	-0.043	-0.038	-0.042	-0.039	-0.036	-0.036	-0.043
23A	-0.028	-0.028	-0.028	-0.026	-0.026	-0.027	-0.024	-0.025	-0.031
24A	-0.030	-0.030	-0.029	-0.029	-0.029	-0.028	-0.027	-0.028	-0.033
25A	-0.032	-0.033	-0.031	-0.031	-0.031	-0.031	-0.030	-0.032	-0.035
26A	-0.035	-0.036	-0.034	-0.036	-0.034	-0.034	-0.033	-0.034	-0.040
27A	-0.038	-0.039	-0.037	-0.036	-0.036	-0.037	-0.035	-0.036	-0.041
28A	-0.041	-0.042	-0.040	-0.039	-0.039	-0.042	-0.038	-0.038	-0.044
29A	-0.047	-0.048	-0.047	-0.043	-0.045	-0.046	-0.043	-0.044	-0.049
30A	-0.051	-0.052	-0.051	-0.046	-0.049	-0.050	-0.046	-0.047	-0.053
31A	-0.056	-0.058	-0.056	-0.051	-0.055	-0.055	-0.051	-0.052	-0.059
32A	-0.061	-0.062	-0.061	-0.058	-0.060	-0.061	-0.055	-0.058	-0.063
33A	-0.063	-0.065	-0.063	-0.059	-0.062	-0.062	-0.058	-0.060	-0.066
34A	-0.068	-0.069	-0.068	-0.064	-0.066	-0.066	-0.062	-0.064	-0.069
35A	-0.072	-0.074	-0.071	-0.067	-0.070	-0.070	-0.067	-0.068	-0.074
36A	-0.075	-0.076	-0.074	-0.069	-0.073	-0.073	-0.069	-0.071	-0.077
37A	-0.081	-0.083	-0.082	-0.076	-0.080	-0.080	-0.074	-0.077	-0.083
38A	-0.084	-0.086	-0.084	-0.078	-0.083	-0.083	-0.077	-0.079	-0.087
39A	-0.088	-0.090	-0.089	-0.082	-0.087	-0.087	-0.081	-0.082	-0.091
40A	-0.091	-0.093	-0.092	-0.086	-0.090	-0.090	-0.084	-0.087	-0.096
41A	-0.095	-0.097	-0.095	-0.090	-0.093	-0.094	-0.088	-0.091	-0.099
42A	-0.100	-0.102	-0.100	-0.093	-0.099	-0.098	-0.094	-0.096	-0.103
43A	-0.099	-0.103	-0.099	-0.093	-0.100	-0.098	-0.093	-0.095	-0.105
44A	-0.102	-0.105	-0.102	-0.094	-0.103	-0.100	-0.096	-0.097	-0.108
45A	-0.102	-0.106	-0.102	-0.094	-0.103	-0.101	-0.096	-0.097	
46A	-0.103	-0.106	-0.102	-0.094	-0.103	-0.101	-0.095	-0.097	-0.110
47A	-0.102	-0.105	-0.101	-0.093	-0.102	-0.100	-0.094	-0.096	-0.109
49A	-0.100	-0.102	-0.098	-0.090	-0.099	-0.097	-0.092	-0.094	-0.106
50A	-0.101	-0.104	-0.100	-0.093	-0.101	-0.099	-0.094	-0.098	-0.107
54A	-0.082	-0.085	-0.082	-0.075	-0.079	-0.079	-0.075	-0.077	-0.081
55A	-0.092	-0.094	-0.092	-0.086	-0.092	-0.091	-0.084	-0.089	-0.095
56A						-0.965	-0.965	-0.965	-0.965
57A	-0.089	-0.091	-0.088	-0.083	-0.089	-0.087	-0.083	-0.086	-0.093
58A	-0.080	-0.082	-0.079	-0.074	-0.079	-0.081	-0.075	-0.080	-0.082
59A						-0.119	-0.115	-0.118	-0.123
60A	-0.082	-0.082	-0.080	-0.075	-0.079	-0.078	-0.073	-0.076	-0.080
61A	-0.216	-0.214	-0.212	-0.208	-0.212	-0.211	-0.209	-0.211	
62A	-0.216	-0.214	-0.211	-0.211	-0.211	-0.210	-0.208	-0.209	
63A	-0.083	-0.081	-0.077	-0.079	-0.079	-0.077	-0.076	-0.079	-0.079
64A	-0.136	-0.133	-0.131	-0.128	-0.133	-0.129	-0.130	-0.130	
65A	-0.068	-0.064	-0.063	-0.060	-0.065	-0.061	-0.061	-0.060	-0.064
66A	-0.067	-0.064	-0.062	-0.060	-0.064	-0.060	-0.062	-0.059	-0.064
68A	-0.076	-0.073	-0.071	-0.068	-0.071	-0.070	-0.070	-0.074	
71A	-0.047	-0.045	-0.043	-0.040	-0.043	-0.043	-0.042		
72A	-0.045	-0.041	-0.043	-0.036	-0.041	-0.038	-0.039	-0.045	-0.042
80A	-0.016	-0.012	-0.015	-0.008	-0.010	-0.006	-0.011	-0.015	-0.011
81A	-0.026	-0.023	-0.025	-0.019	-0.019	-0.016	-0.022	-0.025	-0.022
82A	-0.012	-0.008	-0.011	-0.003	-0.005	-0.003	-0.008	-0.010	-0.008
83A	-0.009	-0.005	-0.008	-0.001	-0.002	0.001	-0.006	-0.007	-0.005
84A	-0.024	-0.021	-0.023	-0.016	-0.018	-0.016	-0.023	-0.023	
86A	0.001	0.005	0.002	0.008	0.008	0.010	0.005	0.004	0.004
87A	0.000	0.003	0.001	0.009	0.006	0.009	0.004	0.003	0.003
88A	0.006	0.010	0.007	0.014	0.013	0.015	0.011	0.009	0.009
89A	0.003	0.007	0.004	0.012	0.010	0.011	0.009	0.006	0.006
91A	0.004	0.007	0.004	0.011	0.010	0.012	0.009	0.006	0.008
94A	0.005	0.009	0.005	0.012	0.012	0.014	0.009	0.006	0.011
96A	-0.009	-0.013	-0.009	-0.002	-0.002	-0.001	-0.004	-0.008	-0.003
97A	-0.001	0.005	0.002	0.006	0.007	0.010	0.005	0.002	0.007

Table 3.21: Line 32 Subsidence Monitoring Results (1 of 2)

	04/01/2018	11/01/2018	18/01/2018	25/01/2018	02/02/2018	09/02/2018	02/03/2018	21/08/2018	21/12/2018
Station	0.000	-0.001	0.000	0.001	0.001	0.000	0.000	-0.001	-0.001
0A	0.001	0.000	0.000	0.001	0.001	0.001	0.001	0.000	-0.003
1A	0.001	0.000	0.000	0.001	0.001	0.001	0.001	0.001	
2A	0.001	0.000	0.000	0.002	0.001	0.001	0.002	0.001	-0.004
3A	0.001	0.000	0.000	0.002	0.002	0.001	0.003	0.001	-0.005
4A	0.000	-0.001	-0.001	0.001	0.000	0.000	0.002	0.000	-0.005
5A	-0.001	-0.004	-0.003	-0.001	-0.002	-0.003	0.001	-0.001	-0.007
6A	-0.002	-0.004	-0.004	-0.001	-0.002	-0.003	0.001	-0.001	-0.008
7A	-0.002	-0.004	-0.003	0.000	-0.002	-0.003	0.002	-0.002	-0.007
8A	-0.003	-0.005	-0.004	-0.002	-0.003	-0.004	0.000	-0.002	-0.008
9A	-0.004	-0.005	-0.005	-0.003	-0.003	-0.005	-0.002	-0.003	-0.008
10A	-0.003	-0.005	-0.004	-0.002	-0.003	-0.004	-0.001	-0.003	-0.008
11A	-0.004	-0.005	-0.005	-0.004	-0.004	-0.004	-0.003	-0.004	-0.008
12A	-0.006	-0.006	-0.006	-0.005	-0.005	-0.005	-0.004	-0.005	-0.009
13A	-0.008	-0.008	-0.008	-0.007	-0.006	-0.007	-0.006	-0.006	-0.011
14A	-0.046	-0.045	-0.045	-0.044	-0.044	-0.045	-0.042	-0.043	-0.049
15A	-0.011	-0.012	-0.011	-0.009	-0.009	-0.010	-0.008	-0.008	-0.015
16A	-0.023	-0.023	-0.022	-0.020	-0.020	-0.021	-0.018	-0.019	-0.026
17A	-0.014	-0.014	-0.013	-0.010	-0.011	-0.012	-0.008	-0.009	-0.017
18A	-0.015	-0.015	-0.015	-0.012	-0.013	-0.014	-0.009	-0.010	-0.019
19A	-0.016	-0.016	-0.016	-0.013	-0.014	-0.016	-0.011	-0.011	-0.020
20A	-0.018	-0.018	-0.017	-0.015	-0.016	-0.017	-0.013	-0.013	-0.021
21A	-0.021	-0.021	-0.021	-0.019	-0.019	-0.020	-0.017	-0.018	-0.025
22A	-0.043	-0.040	-0.043	-0.038	-0.042	-0.039	-0.036	-0.036	-0.043
23A	-0.028	-0.028	-0.028	-0.026	-0.026	-0.027	-0.024	-0.025	-0.031
24A	-0.030	-0.030	-0.029	-0.029	-0.029	-0.028	-0.027	-0.028	-0.033
25A	-0.032	-0.033	-0.031	-0.031	-0.031	-0.031	-0.030	-0.032	-0.035
26A	-0.035	-0.036	-0.034	-0.036	-0.034	-0.034	-0.033	-0.034	-0.040
27A	-0.038	-0.039	-0.037	-0.036	-0.036	-0.037	-0.035	-0.036	-0.041
28A	-0.041	-0.042	-0.040	-0.039	-0.039	-0.042	-0.038	-0.038	-0.044
29A	-0.047	-0.048	-0.047	-0.043	-0.045	-0.046	-0.043	-0.044	-0.049
30A	-0.051	-0.052	-0.051	-0.046	-0.049	-0.050	-0.046	-0.047	-0.053
31A	-0.056	-0.058	-0.056	-0.051	-0.055	-0.055	-0.051	-0.052	-0.059
32A	-0.061	-0.062	-0.061	-0.058	-0.060	-0.061	-0.055	-0.058	-0.063
33A	-0.063	-0.065	-0.063	-0.059	-0.062	-0.062	-0.058	-0.060	-0.066
34A	-0.068	-0.069	-0.068	-0.064	-0.066	-0.066	-0.062	-0.064	-0.069
35A	-0.072	-0.074	-0.071	-0.067	-0.070	-0.070	-0.067	-0.068	-0.074
36A	-0.075	-0.076	-0.074	-0.069	-0.073	-0.073	-0.069	-0.071	-0.077
37A	-0.081	-0.083	-0.082	-0.076	-0.080	-0.080	-0.074	-0.077	-0.083
38A	-0.084	-0.086	-0.084	-0.078	-0.083	-0.083	-0.077	-0.079	-0.087
39A	-0.088	-0.090	-0.089	-0.082	-0.087	-0.087	-0.081	-0.082	-0.091
40A	-0.091	-0.093	-0.092	-0.086	-0.090	-0.090	-0.084	-0.087	-0.096
41A	-0.095	-0.097	-0.095	-0.090	-0.093	-0.094	-0.088	-0.091	-0.099
42A	-0.100	-0.102	-0.100	-0.093	-0.099	-0.098	-0.094	-0.096	-0.103
43A	-0.099	-0.103	-0.099	-0.093	-0.100	-0.098	-0.093	-0.095	-0.105
44A	-0.102	-0.105	-0.102	-0.094	-0.103	-0.100	-0.096	-0.097	-0.108
45A	-0.102	-0.106	-0.102	-0.094	-0.103	-0.101	-0.096	-0.097	
46A	-0.103	-0.106	-0.102	-0.094	-0.103	-0.101	-0.095	-0.097	-0.110
47A	-0.102	-0.105	-0.101	-0.093	-0.102	-0.100	-0.094	-0.096	-0.109
49A	-0.100	-0.102	-0.098	-0.090	-0.099	-0.097	-0.092	-0.094	-0.106
50A	-0.101	-0.104	-0.100	-0.093	-0.101	-0.099	-0.094	-0.098	-0.107
54A	-0.082	-0.085	-0.082	-0.075	-0.079	-0.079	-0.075	-0.077	-0.081
55A	-0.092	-0.094	-0.092	-0.086	-0.092	-0.091	-0.084	-0.089	-0.095
56A						-0.965	-0.965	-0.965	-0.965
57A	-0.089	-0.091	-0.088	-0.083	-0.089	-0.087	-0.083	-0.086	-0.093
58A	-0.080	-0.082	-0.079	-0.074	-0.079	-0.081	-0.075	-0.080	-0.082
59A						-0.119	-0.115	-0.118	-0.123
60A	-0.082	-0.082	-0.080	-0.075	-0.079	-0.078	-0.073	-0.076	-0.080
61A	-0.216	-0.214	-0.212	-0.208	-0.212	-0.211	-0.209	-0.211	
62A	-0.216	-0.214	-0.211	-0.211	-0.211	-0.210	-0.208	-0.209	
63A	-0.083	-0.081	-0.077	-0.079	-0.079	-0.077	-0.076	-0.079	-0.079
64A	-0.136	-0.133	-0.131	-0.128	-0.133	-0.129	-0.130	-0.130	
65A	-0.068	-0.064	-0.063	-0.060	-0.065	-0.061	-0.061	-0.060	-0.064
66A	-0.067	-0.064	-0.062	-0.060	-0.064	-0.060	-0.062	-0.059	-0.064
68A	-0.076	-0.073	-0.071	-0.068	-0.071	-0.070	-0.070	-0.074	
71A	-0.047	-0.045	-0.043	-0.040	-0.043	-0.043	-0.042		
72A	-0.045	-0.041	-0.043	-0.036	-0.041	-0.038	-0.039	-0.045	-0.042
80A	-0.016	-0.012	-0.015	-0.008	-0.010	-0.006	-0.011	-0.015	-0.011
81A	-0.026	-0.023	-0.025	-0.019	-0.019	-0.016	-0.022	-0.025	-0.022
82A	-0.012	-0.008	-0.011	-0.003	-0.005	-0.003	-0.008	-0.010	-0.008
83A	-0.009	-0.005	-0.008	-0.001	-0.002	0.001	-0.006	-0.007	-0.005
84A	-0.024	-0.021	-0.023	-0.016	-0.018	-0.016	-0.023	-0.023	
86A	0.001	0.005	0.002	0.008	0.008	0.010	0.005	0.004	0.004
87A	0.000	0.003	0.001	0.009	0.006	0.009	0.004	0.003	0.003
88A	0.006	0.010	0.007	0.014	0.013	0.015	0.011	0.009	0.009
89A	0.003	0.007	0.004	0.012	0.010	0.011	0.009	0.006	0.006
91A	0.004	0.007	0.004	0.011	0.010	0.012	0.009	0.006	0.008
94A	0.005	0.009	0.005	0.012	0.012	0.014	0.009	0.006	0.011
96A	-0.009	-0.013	-0.009	-0.002	-0.002	-0.001	-0.004	-0.008	-0.003
97A	-0.001	0.005	0.002	0.006	0.007	0.010	0.005	0.002	0.007

Station	04/01/2018	11/01/2018	18/01/2018	25/01/2018	02/02/2018	09/02/2018	02/03/2018	21/08/2018
L32A-047	0.004	0.007	0.011	0.013	0.011	0.021	0.014	0.004
L32A-046	0.003	0.007	0.010	0.012	0.010	0.020	0.015	0.003
L32A-045	0.003	0.007	0.010	0.012	0.010	0.020	0.015	0.003
L32A-044	0.005	0.008	0.012	0.014	0.012	0.022	0.014	0.005
L32A-043	0.004	0.007	0.011	0.013	0.011	0.021	0.013	0.004
L32A-042	0.004	0.007	0.010	0.012	0.011	0.021	0.013	0.003
L32A-041	-0.002	0.002	0.004	0.006	0.005	0.015	0.006	-0.001
L32A-040	0.005	0.009	0.009	0.012	0.011	0.019	0.010	-0.001
L32A-039	0.006	0.009	0.010	0.014	0.012	0.020	0.015	0.005
L32A-038	0.003	0.006	0.008	0.011	0.010	0.018	0.011	0.000
L32A-037	0.006	0.009	0.010	0.013	0.011	0.020	0.014	0.005
L32A-036	0.003	0.005	0.006	0.009	0.008	0.016	0.009	0.000
L32A-035	0.005	0.008	0.009	0.011	0.009	0.019	0.010	0.003
L32A-034	0.003	0.006	0.007	0.010	0.009	0.018	0.011	0.003
L32A-033	0.006	0.009	0.011	0.013	0.011	0.021	0.012	0.005
L32A-032	0.004	0.007	0.009	0.011	0.009	0.019	0.011	0.004
L32A-031	0.005	0.008	0.009	0.011	0.009	0.019	0.010	0.004
L32A-030	0.004	0.007	0.008	0.011	0.009	0.018	0.011	0.004
L32A-029	0.005	0.009	0.009	0.011	0.009	0.018	0.012	0.002
L32A-028	0.004	0.009	0.007	0.011	0.010	0.019	0.011	0.003
60A	-0.045	-0.039	-0.042	-0.037	-0.038	-0.030	-0.037	-0.045
L32A-027	0.004	0.010	0.007	0.012	0.011	0.019	0.012	0.004
L32A-026	0.002	0.008	0.005	0.010	0.009	0.016	0.011	0.002
130A	-0.039	-0.034	-0.035	-0.031	-0.032	-0.024	-0.032	-0.040
L32A-025	0.003	0.009	0.007	0.012	0.011	0.017	0.011	0.003
L32A-024	0.004	0.010	0.008	0.012	0.011	0.019	0.010	0.003
210A	-0.034	-0.029	-0.030	-0.027	-0.028	-0.020	-0.030	-0.036
220A	-0.033	-0.027	-0.029	-0.026	-0.026	-0.018	-0.027	-0.034
L32A-023	0.006	0.010	0.009	0.012	0.011	0.019	0.009	0.005
L32A-022	0.005	0.009	0.008	0.011	0.009	0.017	0.007	0.004
L32A-021	0.006	0.010	0.010	0.012	0.010	0.019	0.008	0.005
L32A-020	0.005	0.010	0.008	0.011	0.009	0.018	0.007	0.004
L32A-019	0.005	0.010	0.008	0.010	0.010	0.018	0.007	0.004
410A	-0.046	-0.041	-0.043	-0.042	-0.043	-0.034	-0.046	-0.048
L32A-018	0.005	0.011	0.008	0.010	0.008	0.018	0.006	0.004
L32A-017	0.006	0.011	0.008	0.011	0.009	0.017	0.007	-0.005
L32A-016	0.007	0.012	0.009	0.011	0.009	0.018	0.006	0.005
L32A-015	0.007	0.012	0.010	0.012	0.010	0.019	0.007	0.003
533A	-0.051	-0.046	-0.048	-0.047	-0.049	-0.039	-0.053	-0.053
L32A-014	0.006	0.010	0.008	0.010	0.008	0.016	0.006	0.004
L32A-013	0.007	0.010	0.009	0.010	0.008	0.017	0.005	0.004
670A	-0.025	-0.023	-0.024	-0.023	-0.024	-0.019	-0.028	-0.031
680A	-0.038	-0.035	-0.038	-0.035	-0.036	-0.029	-0.040	-0.040
690A	-0.039	-0.035	-0.039	-0.035	-0.036	-0.030	-0.040	-0.040
L32A-012	0.007	0.010	0.008	0.010	0.009	0.016	0.004	0.004
L32A-011	0.007	0.009	0.007	0.009	0.008	0.016	0.003	0.004
L32A-010	0.008	0.009	0.008	0.009	0.008	0.016	0.002	0.002
L32A-009	0.005	0.006	0.004	0.006	0.005	0.013	-0.001	0.001
799A	-0.033	-0.032	-0.033	-0.033	-0.034	-0.024	-0.039	-0.037
810A	-0.040	-0.045	-0.042	-0.041	-0.042			
820A	-0.039	-0.038	-0.039	-0.038	-0.039	-0.030	-0.043	-0.043
829A	-0.033	-0.033	-0.033	-0.033	-0.034	-0.024	-0.041	-0.037
L32A-008	0.010	0.011	0.012	0.010	0.009	0.020	0.002	0.006
899A	-0.041	-0.040	-0.041	-0.042	-0.042	-0.033	-0.048	-0.045
909A	-0.037	-0.037	-0.037	-0.038				
919A	-0.036	-0.036	-0.036	-0.037	-0.037	-0.028	-0.044	-0.041
L32A-007	0.007	0.007	0.007	0.005	0.005	0.015	-0.002	0.002
L32A-006	0.006	0.007	0.005	0.005	0.005	0.014	-0.001	0.002
989A	-0.053	-0.054	-0.054	-0.054	-0.056	-0.046	-0.061	-0.057
1019A	-0.050	-0.051	-0.051	-0.052	-0.052	-0.043	-0.057	-0.054
L32A-005	0.004	0.004	0.003	0.003	0.002	0.011	-0.002	0.000
L32A-004	0.004	0.003	0.004	0.001	0.001	0.010	-0.004	-0.001
L32A-003	0.005	0.006	0.006	0.004	0.004	0.012	-0.001	0.001
L32A-002	0.004	0.005	0.005	0.003	0.003	0.011	-0.002	0.001
L32A-001	0.006	0.005	0.007	0.003	0.003	0.012	-0.004	0.001

Table 3.22: Line 24 Subsidence Monitoring Results

Station	Survey 25/01/2018	Survey 9/02/2018	Survey 2/03/2018	Survey 21/08/2018	Survey 21/12/2018
L24A-01	0.964	0.963	0.959	0.959	0.958
L24A-02	1.069	1.068	1.065	1.065	1.065
L24A-03	0.945	0.945	0.942	0.941	0.940
L24A-04	0.921	0.919	0.916	0.915	0.915
L24A-05	0.881	0.880	0.878	0.876	0.876
L24A-06	0.960	0.958	0.957	0.955	0.953
L24A-07	0.915	0.914	0.910	0.909	0.909
L24A-08	0.874	0.874	0.871	0.870	0.869
L24A-09	1.139	1.139	1.135	1.134	1.133
L24A-10	0.907	0.907	0.903	0.902	0.902
L24A-11	0.924	0.924	0.921	0.920	0.918
L24A-12	1.163	1.162	1.159	1.158	1.157
L24A-13	1.245	1.245	1.242	1.240	1.240
L24A-14	0.972	0.972	0.968	0.967	0.967
L24A-15	0.778	0.778	0.775	0.773	0.772
L24A-16	0.824	0.823	0.819	0.818	0.818
L24A-17	0.998	0.997	0.993	0.992	0.992
L24A-18	0.885	0.888	0.895	0.889	0.889
L24A-19	1.086	1.088	1.097	1.091	1.090
L24A-20	1.144	1.147	1.154	1.148	1.148
L24A-21	1.064	1.066	1.074	1.068	1.067
L24A-22	1.237	1.238	1.244	1.239	1.239
L24A-23	1.100	1.102	1.109	1.103	1.102
L24A-24	1.163	1.165	1.171	1.165	1.165
L24A-25	1.352	1.353	1.358	1.353	1.355
L24A-26	1.230	1.231	1.234	1.230	1.230
L24A-27	1.141	1.142	1.145	1.140	1.141
L24A-28	0.728	0.729	0.731	0.728	0.730
L24A-29	1.065	1.066	1.070	1.066	1.068
L24A-30	1.405	1.405	1.408	1.406	1.406
PWD-TS10032	1.421	1.421	1.421	1.421	1.421

Table 3.22: Line 40 Subsidence Monitoring Results

Point Number	27/08/2018	27/10/2018	21/12/2018
L40_003	0.001	0.001	0.003
L40_004	-0.001	-0.002	0.016
L40_005	0.001	0.000	0.009
L40_006	-0.002	-0.004	0.009
L40_007	0.000	-0.002	0.008
L40_008	0.002	-0.005	0.009
L40_009	-0.001	-0.004	0.008
L40_010	-0.001	-0.001	0.009
L40_011	0.002	-0.005	0.008
L40_012	0.001	-0.003	0.009
L40_013	-0.002	-0.003	0.007
L40_014	-0.003	-0.006	0.008
L40_015	-0.001	-0.005	0.007
L40_016	-0.004	-0.003	0.007
L40_017	-0.001	-0.006	0.008
L40_018	-0.001	-0.004	0.008
L40_019	0.004	0.004	0.007
L40_020	0.006	0.006	0.008
L40_021	0.004	0.004	0.008
L40_022	0.002	0.002	0.011