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CHAIN VALLEY COLLIERY

Water Management Plan

ENVIRONMENTAL MANAGEMENT PLAN

Reviewed	
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Date:	18 January 2021

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1 Introduction

1.1 Purpose

The Water Management Plan (WMP) addresses the requirements for Development Consent SSD-5465 as modified (MOD 3) and EPL 1770.

The purpose of the WMP is to:

- guide the management of surface and groundwater resources throughout the operational life of the mine;
- address the relevant conditions of the development consent;
- meet the requirements of EPL 1770, including Pollution Reduction Programs (PRP's) that have been implemented on site;
- address the relevant commitments made within the Surface Water Assessment (SWA) (GSSE, 2013) and Environmental Impact Statement (EIS) (EMM, 2013); and
- address legislative requirements and guidelines relevant to the WMP.

The WMP incorporates the following components as required by SSD-5465:

- a Water Balance;
- a description of Surface Water Management;
- a Surface Water Monitoring Plan;
- a Ground Water Monitoring Plan; and
- a Water Management Review.

1.2 Background

Chain Valley Colliery (CVC) is an underground coal mine located on the southern side of Lake Macquarie approximately 60 km south of Newcastle and 80 km north of Sydney (see **Figure 1**). The pit-top is located approximately 1 km south-east of the township of Mannering Park at the southern extent of Lake Macquarie.

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 (VPPS) in April 1963.

In 2013 the owners of Mannering Colliery (MC) and CVC entered into an agreement which enabled LakeCoal to operate the MC until 2022. LakeCoal became the operator of MC effective 17 October 2013, with the underground link between CVC and MC completed in October 2017.

As of 1 April 2019, Great Southern Energy Pty Ltd (trading as Delta Coal, DC) own and operate the two underground coal mines, CVC and MC. Mining is currently undertaken at CVC, with the coal being transported underground to MC where the coal is crushed and screened and sent directly to VPPS.

1.3 Operations

CVC is an underground coal mine which extracts coal through both first and secondary workings. ROM coal from both the first and second workings is transported out of the mine via a conveyor system to Mannering Colliery for processing.

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The surface infrastructure comprises limited facilities at the 14 hectare pit top area adjacent to the Vales Point Power Station, off Construction Road at Mannering Park, and another 0.3 hectare area at the ventilation facility situated at Summerland Point. Both the pit top and ventilation facilities have remained largely unchanged since their establishment.

The above operations have potential impacts which were addressed in the SWA (GSSE, 2013). To address these, the SWA (GSSE, 2013) identified the following key objectives for surface water management at CVC:

- the prevention of the flow of pollutants into watercourses and the sedimentation on receiving waters, being Swindles Creek to the east of the pit top and Lake Macquarie;
- the control of discharges from the site to ensure that all discharges are within the water volume and quality criteria set out in EPL 1770;
- to minimise site potable water usage requirements and maximise runoff water reuse; and
- to ensure there is sufficient water available to meet Chain Valley Colliery's water requirements.

1.4 Consultation

The original WMP (GSSE, 2012) was prepared in consultation with the former NSW Office of Water (NOW), DTIRIS (Division of Resources & Energy (DRE)) and Wyong Shire Council. The previous WMP (GSSE, 2012) was submitted on the 23 August 2012 and approved by the Director-General on the 6 November 2012.

The 2015 revision of the WMP was prepared in consultation with the (former) NOW and the Environment Protection Authority (EPA) and incorporates outcomes of correspondence with EPA in relation to the variation of the EPL. Comments on the WMP were received from NOW on the 5 December 2014 and requested a change to the groundwater drawdown trigger to 2m over a 2 month period, which is consistent with the minimal impact considerations of the NSW Aquifer Interference Policy, this change has been made within the Groundwater Management Plan (**Appendix B**).

Comments were also sought from the EPA and subsequently requested via email in December 2014. On the 12 June 2015 the EPA responded stating that "The Environment Protection Authority ("EPA") encourages the development of such plans to ensure that proponents have met their statutory obligations and designated environmental objectives. However, EPA does not review these documents as our role is to set environmental objectives for environmental / conservation management, not to be directly involved in the development of strategies to achieve those objectives. The EPA has not reviewed this report and accordingly offers no comments in relation to it".

In accordance with Schedule 3, Condition 18 of development consent SSD-5465 the December 2019 WMP review was prepared by suitably qualified and experienced persons, Sally Callander (EMM Consulting), Andrew Dawkins (Geoterra) and Chris Armit (EMM Consulting), whose appointment has been endorsed by the Director-General.

A draft revision of the WMP was provided to DPIE - Water, EPA and DPIE on 26 November 2019 and a further review was provided in May 2020 associated with the Miniwall S4 Extraction Plan. A summary of the comments

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received and amendments subsequently made to the document prior to finalisation are detailed in **Table 1**. Evidence of consultation is provided in **Appendix 1**.

A review has been undertaken after the approval of SSD5465 Mod 3 (approved in June 2020) and for the submission of the Miniwall S5 and Northern Pillar area extraction plan (December 2020) with an updated Groundwater Management Plan.

Table 1: Consultation Summary

Stakeholder	Comments	Response/Action
NSW DPIE	TBC	TBC
NSW EPA	No comments	Nil required
DPIE - Water	No comments	Nil required
Natural Resource Access Regulator (NRAR)	No comments	Nil required
DPI-Fisheries	No objection or comments	Nil Required

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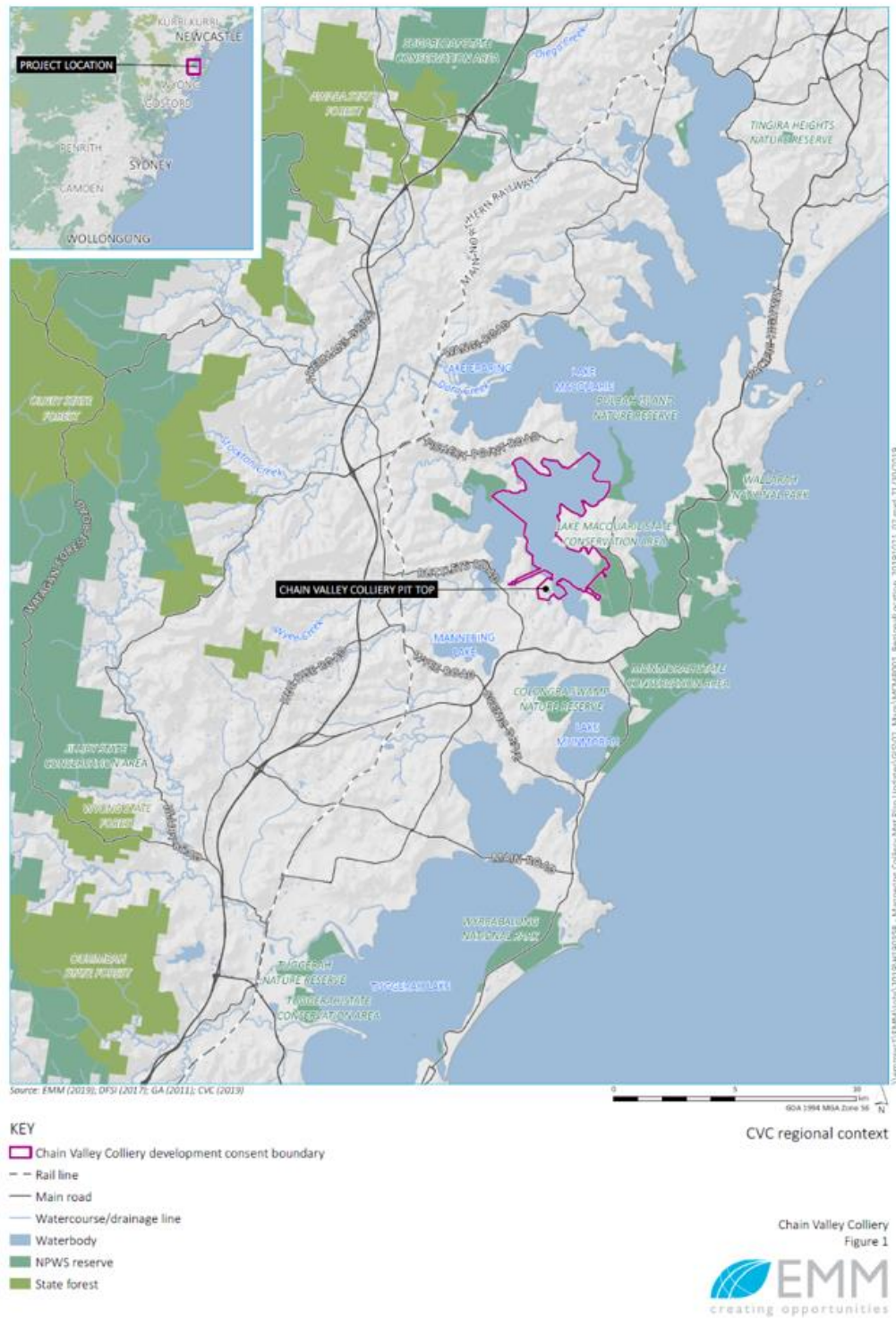


Figure 1: Regional Context

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2 Summary of the Statutory Approval Requirements

2.1 Key Legislation, Policy and Guidelines

A number of legislative requirements, government policies and guidelines relating to water management are applicable and have been addressed in detail within the SWA (GSSE, 2013). The key items of legislation and the relevant approval documents to this WMP are:

- *Water Act 1912 and Water Management Act 2000* - LakeCoal applied for a 4,443 ML/year groundwater license on the 5th October 2011 under the *Water Act, 1912* to pump water from the underground workings to the sedimentation and pollution control ponds at the pit top. The license (WAL41508) was subsequently granted on the 12 March 2013;
- *Protection of the Environment Operations Act 1997* (POEO Act) - Chain Valley Colliery has an existing EPL 1770 under the POEO Act for the discharge of water from site;
- *Environmental Planning and Assessment Act 1979* (EP&A Act) - On 23rd December 2013 development consent SSD-5465 was issued for the *Chain Valley Extension Project*, which has been modified twice by approval on the 27 November 2014 and 16 December 2015; and
- *Mining Act 1992* – Delta Coal holds numerous mining authorities under the Mining Act 1992, a list of all leases held is contained within the Environmental Management Strategy (OMP-D-16374), the most relevant for the WMP is Mining Purposes Lease 1349 as it pertains to the surface facilities area.

The relevant aspects of these approval documents are addressed further below.

Key policies and guidelines which are relevant to the preparation and implementation of this WMP include:

- Australian and New Zealand Environment Conservation Council (ANZECC) and the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ), Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC Guidelines), October 2000;
- Department of Environment and Conservation (DEC), Approved Methods for the Sampling and Analysis of Water Pollutants in NSW, March 2004;
- Managing Urban Stormwater: Soils and Construction (the Blue Book), Volume 1 and Volume 2E – Mines and Quarries (Landcom, 2004 and Department of Environment and Climate Change (DECC), 2008;
- NSW Water Quality and River Flow Objectives, September 1999;
- NSW State Rivers and Estuaries Policy, 1993;
- NSW Groundwater Quality Protection Policy, adopted in 1998;
- The NSW State Groundwater Dependent Ecosystems Policy, adopted in 2002;
- NSW Groundwater Quantity Management Policy;
- Australian Government, Charter: National Water Quality Management Strategy, 2018;

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- Australian and New Zealand Environment Conservation Council (ANZECC) and the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ), National Guidelines for Sewerage Systems - Effluent Management, 1997; and
- NSW Department of Environment and Conservation (DEC), Environmental Guidelines: Use of Effluent by Irrigation, 2004.

2.2 Development Consent (SSD-5465)

This plan has been prepared in accordance with Schedule 3, Condition 21 of SSD-5465, which states the requirements of the WMP and what it must address. Surface and groundwater related requirements of SSD-5465, including specific requirements that are to be addressed in this plan, and where they are addressed, are detailed in **Appendix 2**.

In accordance with Schedule 2, Conditions 2 and 2A, in addition to carrying out the works in accordance with the conditions of SSD-5465, DC will also carry out works generally in accordance with the Environmental Impact Statement (EIS), Statement of Environmental Effects (SEE) (Mod 1), SEE (Mod 2), SEE (Mod 3), Project Layout Plans, and Statement of Commitments.

2.3 Mining Leases

MPL 1349, is the most relevant lease to this WMP as MPL 1349 relates to the surface facilities. MPL 1349 contains the following provision with respect to surface water management.

2. The proponent shall implement all practical measures to prevent and/or minimise any harm to the environment that may result from the construction, operation or rehabilitation of the development.

18. Operations must be carried out in a manner that does not cause or aggravate air pollution, water pollution (including sedimentation) or soil contamination or erosion, unless otherwise authorised by a relevant approval, and in accordance with an accepted Mining Operations Plan. For the purpose of this condition, water shall be taken to include any watercourse, waterbody or groundwater and perform any instructions given by the Director-General in this regard.

2.4 Environmental Protection License (EPL 1770)

CVC operates under EPL 1770 issued by the Environment Protection Authority (EPA) under the POEO Act. The EPL has been modified a number of times, most recently on the 1 April 2019 for the transfer from Lake Coal Pty Ltd to Great Southern Energy Pty Ltd (trading as Delta Coal). Water related requirements of the EPL, including specific requirements that are to be addressed in this management plan and section references within the WMP are detailed in **Appendix 2**. A 5 year anniversary review of EPL 1770 was undertaken in 2019.

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2.5 Maximum Harvestable Right Dam Capacity

Under the NSW *Water Management Act 2000*, landholders are permitted to capture, store and use a portion of the rainfall runoff on their property. The right to harvest rainfall is determined by geographic location and is typically 10% of the total rainfall runoff for the property and storage is calculated under the Maximum Harvestable Right Dam Capacity (MHRDC) provision. Dams that exceed this capacity or are greater than a certain size must be licenced.

Where dams are used to control pollution or effluent, there are exemptions to the licencing requirements. This is the case for the pollution control dams at CVC where the dams are exempt from the MHRDC calculation.

3 Water Balance

A comprehensive site water balance has been prepared for the site and is described in detail within the SWA (GSSE, 2013). This section of the WMP provides a summary of the water balance to enable the key inputs and outputs to be understood along with the water balance results. It also describes the implications of the proposed changes to site water management described in **Section 4.4**.

For more detailed information on the site water balance refer to the SWA (GSSE, 2013).

3.1 Water Balance Model

A detailed 'daily time-step' water balance model was used to represent the Chain Valley Colliery water balance using GoldSim Version 10.50 (GoldSim Technology Group LLC). This software is a graphical, object-oriented system simulation software for completing either static or dynamic systems. GoldSim is commonly used to undertake 'daily time step' water balance simulations for coal mines within NSW due its enhanced modelling capability and flexibility compared to spreadsheet models that have predominately been used in the past. The Chain Valley Colliery water cycle, as simplified and modeled in GoldSim is shown in the schematic water flow diagram as shown on **Figure 2**.

3.2 Data (Model Inputs and Outputs)

3.2.1 Rainfall Runoff

The dataset developed for the water balance used information from the Wyee and Norah Head weather stations. There are other stations in the general vicinity, however these stations were selected due to their proximity to the CVC and length and completeness of the data, which together, provide over 100 years of rainfall data.

The pit top area was segregated into four distinct catchments which were further broken up into eight sub-catchments for the purpose of the CVC water balance.

The daily step GoldSim model was used to estimate the surface water runoff from different sub catchments at the pit top area. The runoff coefficients adopted are considered conservative but reflect the large impermeable area in the catchment which includes laydown areas, compacted roads and coal stockpile areas. The free

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water surfaces of the pollution control dams and the roofed areas were modelled as completely impervious areas, capturing all precipitation.

Catchment areas as modeled within the GoldSim model are provided in **Table 2**.

Table 2: Pit Top Catchment Areas

Major Catchment Name	Sub-Catchment Name	Catchment Area (ha)
Carpark (Catchment 1)	Carpark (not modelled)	NA
Storage Yard (Catchment 2)	Oil Water Separator	0.15
	Workshop (Roof)	0.24
	Old Bath House (Roof)	0.11
	Pit Top Storage Yard	3.03
Stockpile (Catchment 3)	CHP Stockpile	5.34
Pollution Control Dams (Catchment 4)	Dams D1 to D6	0.41
	Dams D7 to D13	1.97
Total catchment reporting to pollution control dams (excluding carpark)		11.25

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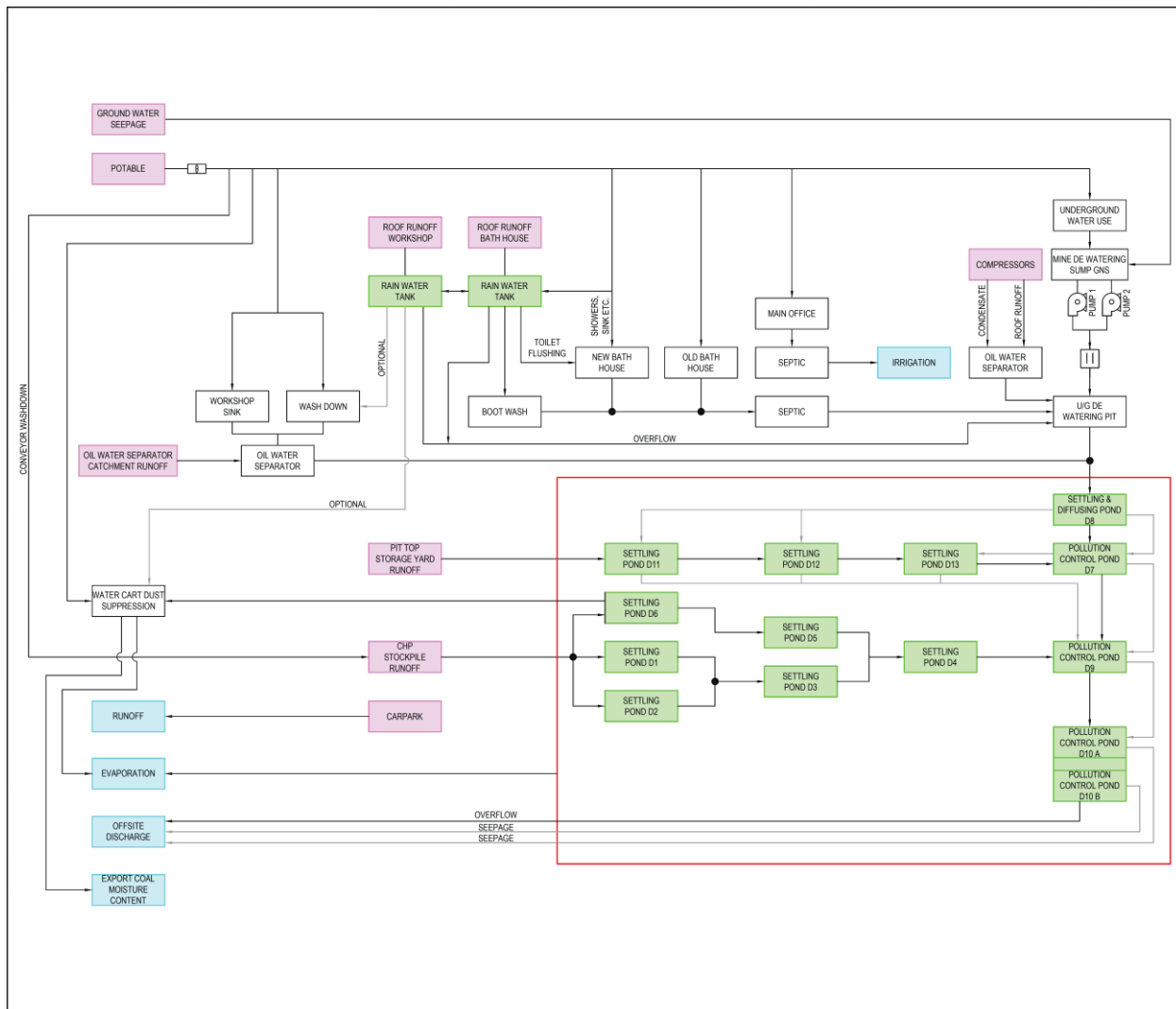


Figure 1: GoldSim schematic water flow diagram

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3.2.2 Evaporation

Evaporation data was obtained from the Peats Ridge weather station on Waratah Road (station number 61351), approximately 33km south-west of the site. This was the closest meteorological weather station to the CVC with over 25 years of evaporation information. Evaporation data from this weather station was adjusted for the change in site conditions from the measuring site to the sedimentation dams by multiplying the average monthly rates by a pan coefficient of 0.7.

Evaporation from the pollution control dams was calculated using a daily step within the GoldSim model similar to the runoff model calculations. This model used the evaporation rate, modified by the pan coefficient, and the surface area of the dams, which was calculated using survey data.

3.2.3 Underground Water Extraction

The Groundwater Assessment (Geoterra, 2013) predicted that the average daily water volumes pumped from the coal face would increase from approximately 7.3 ML/day to 10.5 ML/day. This estimated pumping rate is an average value and therefore pumped flow rates may exceed this value on occasions. It should be noted however, that this average daily volume was calculated as an 'end of mining' estimate and can be considered a 'worst case' prediction of groundwater inflow rates. It is not expected to occur for the majority of the project life.

The annual groundwater make from the mine is estimated at approximately at 1,817 ML/yr, or 4.98 ML/day (Geoterra, 2019).

Pump rate information provided by LakeCoal indicates that the two existing underground dewatering pumps from the Great Northern Seam sump have a maximum pumping rate of 75 L/sec and 75 L/sec respectively. This equates to a total maximum pumping rate from underground of approximately 12.96 ML/day.

However, within the EIS (EMM, 2013) LakeCoal committed to limiting the main underground pumps to a maximum pump out rate of 10.5 ML/day (equivalent to the predicted average daily volume that will need to be pumped from the coal face during the later stages of the project). This limit was put in place during September 2014, using the site Citect system to automatically stop the one of the underground pumps when 9.5 ML has been pumped and stopping the second pump if a total of 10.5 ML in any day has been pumped. The pumps are only able to be restarted the following day. This limit can however be temporarily disabled by authorised persons in the event of unacceptable risk (e.g. flooding and risk to employee health and safety), which was a requirement of the site risk assessment completed.

When not pumping, water accumulates underground in a number of storages that exist within both the Great Northern and Wallarah Seams, these are discussed in **Section 4.3**.

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3.2.4 Pollution Control Dam Characteristics

Information pertaining to the GoldSim modelling of the sedimentation dams was obtained from survey data. This information is shown in **Table 3**. It should be noted that the volume of dam D6 was not available and was estimated based on a 1 m depth, the measured surface area and standard stage/storage relationships. Dams D1 to D6 and D7 to D13 were each modelled as single storages to simplify the water balance processes at the site.

Table 3: Pollution Control Dam Capacities (as modelled in GoldSim)

Dam	Volume (m ³)
D1	80
D2	51
D3	284
D4	547
D5	770
D6	568
Total dams D1 to D6	2300
D7	3856
D8	2933
D9	3796
D10	4802
D11	297
D12	229
D13	168
Total dams D7 to D13	16081

3.2.5 Loss of Water through Coal Export

During mining and conveying, the moisture content in the coal increases due to the use of water sprays at the coal face and at transfer points along the conveyor system. A review of the CVC coal analysis data indicates that the inherent (air dried) moisture content of the coal from underground is approximately 2.7%.

This same data indicates that the total moisture of the CVC coal that is exported is approximately 7.3%, which means that around 4.6% of this total moisture content is added to the coal prior to export. This equates to 69,000 tonnes of additional water at the proposed maximum rate of production of 1.5 Mtpa. Therefore, approximately 69.0 ML of water is exported from the CVC every year, or 188.9 kL/day.

3.2.6 Additional Data

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A limited amount of water usage and flow monitoring data at CVC was available for the water balance investigation. However, where historic information was lacking, data and operational information was made available to best derive estimates of the respective water balance parameters (flow rates, water usage, etc.). Additional data, as used in the water balance model, is shown in **Table 4**, as well as comments/assumptions on how this data was derived.

Table 4: CVC Supplied and Derived Data

Parameter	Value	Comments/Assumptions
Potable Water: Underground (includes increase of 25% to account for any additional underground potable water demand)	140 ML/yr	Average of underground potable water from monitored water use with an additional 25% to account for increased potable water used underground.
Potable Water: Main Office	211 L/day	Includes shower, sink and toilet facilities. Shower (26 L/day): Assumes 9 L/min, 10 min/person, 2 showers per week. Toilet (154 L/day): Assumes 15 employees, employees at work 5 days/week, 6 L/toilet flush, average employee flushes 3 times/day (at work). Sink (31 L/day): Assumes 15 employees, 1.2 L/wash, employees at work 5 days/week, employees use sink 3 times/day.
Potable Water: Workshop	3724 L/day	Includes equipment washdown and sink use. Equipment Washdown (3712 L/day): Assumes 1-hour wash/day, 1.031 L/sec flow rate. Sink (12 L/day): Assumes 1.2 L/wash, 1 sink used 10 times per day.
Potable Water: Bath House 1	24 L/day	Includes sinks facilities. Sinks (24 L/day): Assumes 1.2 L/wash, 2 sinks each used 10 times per day.
Potable Water: Bath House 2 (Showers, Sink)	8519 L/day	Includes shower and sink facilities Shower (8190 L/day): Assumes 9L/min, 10 min/person, average of 91 shift ends / day (calculated from shift information provided by DC). Sink (329 L/day): Assumes 220 employees, 1.2 L/wash, employees at work 4 days/week, employees use sink 3 times/day.
Bath House 2 Toilet Flushing Demand	1097 L/day	Assumes 220 employees, employees at work 4 days/week, 4 L/toilet flush (reduced for urinals),

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		average employee flushes 3 times/day (at work).
Potable Water: Bath House 3 (Showers, Sink)	8519 L/day	Includes shower and sink facilities Shower (8190 L/day): Assumes 9L/min, 10 min/person, average of 91 shift ends / day (calculated from shift information provided by DC). Sink (329 L/day): Assumes 220 employees, 1.2 L/wash, employees at work 4 days/week, employees use sink 3 times/day.
Bath House 3 Toilet Flushing Demand	1097 L/day	Assumes 220 employees, employees at work 4 days/week, 4 L/toilet flush (reduced for urinals), average employee flushes 3 times/day (at work).
Bootwash Water Demand	480 L/day	Assumes it is used 3 L/person/shift, average of 91 shift ends / day (calculated from shift information provided by DC).
Dust Suppression Demand	11ML/yr	Calculated from available water cart records
Combined Rainwater Tank Capacity	30 kL	Estimated rainwater tank capacity.

3.3 Water Balance Results

3.3.1 Expected Discharge from Chain Valley Colliery

As noted in **Section 3.2.3**, DC limits the main underground pumps to a maximum pump out rate of 10.5 ML/day. As such, the GoldSim model was run (using a deterministic simulation) assuming that the pumps from the Great Northern Seam sump were constantly pumping at this 10.5 ML/day rate. This scenario assumes that adequate capacity is available in the underground workings to effectively store water during periods when the groundwater inflow rate exceeds the underground dewatering rate. This is further discussed in **Section 4.3**. It should be noted that assuming a constant underground pump rate of 10.5 ML/day is a 'worst case' scenario and is only predicted to occur, on occasions, near the end of the project life.

Key statistics from the GoldSim modelling, assuming a constant discharge from underground of 10.5 ML/day, include:

- daily average discharge through the LDP1 of 10.716 ML/day;
- maximum discharge through LDP1 of 35.124 ML/day; and
- likelihood of LDP1 volumetric limit exceedance on any given day of 4% (or approximately 15 times per year).

The prediction that rainfall events will regularly result in discharges above the EPL LDP limit of 12.161 ML/day is further discussed in **Section Error! Reference source not found.** During the period 2017 to 2020, there have b

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een 3 discharges above the LDP volumetric limit of 12.161 ML/day. Two occurred during 2016 and one in August 2019. All were reported to the EPA and DPIE.

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3.3.2 Potable Water Use

The total amount of potable water used at the CVC was investigated in the GoldSim model, with and without the committed water savings measures (as described in **Sections 4.7**) in order to quantify how much potable water these measures are likely to save at the site. GoldSim modelling estimates that the potable water used in the pit top area will be reduced from 55.9 kL/day to 23.7 kL/day with an overall saving of 32.3 kL/day (11.8 ML/year) as a result of water saving measures being implemented.

This equates to an approximate reduction in total potable water of 8.9% (for current levels of potable water use) and 7.4% (allowing for a 25% increase in the underground potable water use as a result of the proposed future mining works).

3.4 Water Supply and Security

All water required for operational activity has historically been sourced from the single potable water supply connection from the Central Coast Council town-water system. This connection is considered a secure source of water as it is only a small portion of the total water consumed annually by the Central Coast and no viable alternative sources have been identified. Further discussion on water savings and alternative water supply is contained in **Section 4.7**.

No water is obtained from unregulated water sources listed in the *Water Sharing Plan for the Central Coast Unregulated Water Sources 2009*.

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4 Surface Water Management

4.1 Overview of Water Management System

The water management at the CVC pit top is primarily focused on erosion and sediment control, however there are a number of water management components including the underground de-watering, oil water separator system, the effluent management train and the operation of the pollution control dams.

All water required for operational activity is sourced from the single potable water supply connection from the Central Coast Council town-water system. All excess water from the underground workings is pumped to the Great Northern Seam sump. This water is then pumped to the surface and discharged into the site's pollution control dams.

A combination of surface slope and earth diversion drains on the eastern and northern boundaries results in the majority of the site draining east towards the pollution control dams. A small catchment (i.e. carpark and access road) discharges off-site to the west and north. Other than the carpark catchment, the site's pollution control dams receive all rainfall runoff from the pit top, amenities water and underground mine water, as well as workshop and wash down water after treatment by an oil separator. A system of 13 pollution control dams have been constructed from a mixture of earth, crushed rock, recycled brick and stone. The dams are interconnected through a series of overflow pipes and spillways which allows water to circulate through each dam before reaching the site discharge point. The dams provide improvement to the site wastewater and runoff quality prior to discharge to Lake Macquarie (via Swindles Creek).

4.2 Potable water

All water used for underground mining purposes by CVC is potable water and used in equipment, for cleaning, and dust control. To quantify the estimated volume of water consumed underground a flow/volume meter is installed on the underground water line.

Water is made available throughout the underground workings to satisfy statutory obligations for the production of underground coal. Water is consumed mainly by the following processes.

- when cutting coal at the coal face - to reduce respirable dust and propensity for frictional ignition of coal dust and methane gas;
- when transferring coal along the underground conveyor system and at transfer points - to reduce dust make;
- for use in cleaning;
- for use in equipment; and
- for emergency firefighting purposes.

Water used in the pit top operations is consumed by amenities, dust suppression and wash down.

4.3 Underground Water

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In addition to the potable water, naturally saline groundwater migrates into the underground workings of the mine. This water is pumped to or collects in a sump within the Great Northern Seam, from there it is pumped to the pollution control dams on the surface. This water is not used for operational purposes due to its high salinity and subsequent potential effects on mine machinery and equipment.

As mentioned in **Section 3.2.3**, DC has limited the main underground pumps to a maximum pump out rate of 10.5 ML/day. To facilitate restrictions to pumping rates, underground water can be stored within both the Great Northern and Wallarah Seams. The underground storage volumes have been assessed and estimated at the following capacities:

- Great Northern Seam – North East Sump, ~ 100 ML;
- Great Northern Seam - Shaft Headings Sump, ~ 200 ML;
- Great Northern Seam - Sump Headings, ~ 5 ML; and
- Wallarah Seam – Wallarah Sump/Storage Location, 150 to 200 ML.

Details on groundwater management are contained in the Groundwater Management Plan (GwMP) (GeoTerra, 2019) which is in **Appendix 3**.

4.4 Surface Water Catchments and Controls

For the purpose of the WMP runoff from the pit top area is managed as 4 catchment areas including:

- Catchment 1 (Carpark) – carpark, office building and partial runoff from the workshop roof;
- Catchment 2 (Storage Yard) – rear storage yard and oil water separator;
- Catchment 3 (Stockpile) – stockpile, entry road and bathhouse form the third catchment; and
- Catchment 4 (Sedimentation Dams) – pollution control dams.

The above catchments and the major drainage structures are shown on **Figure 2**.

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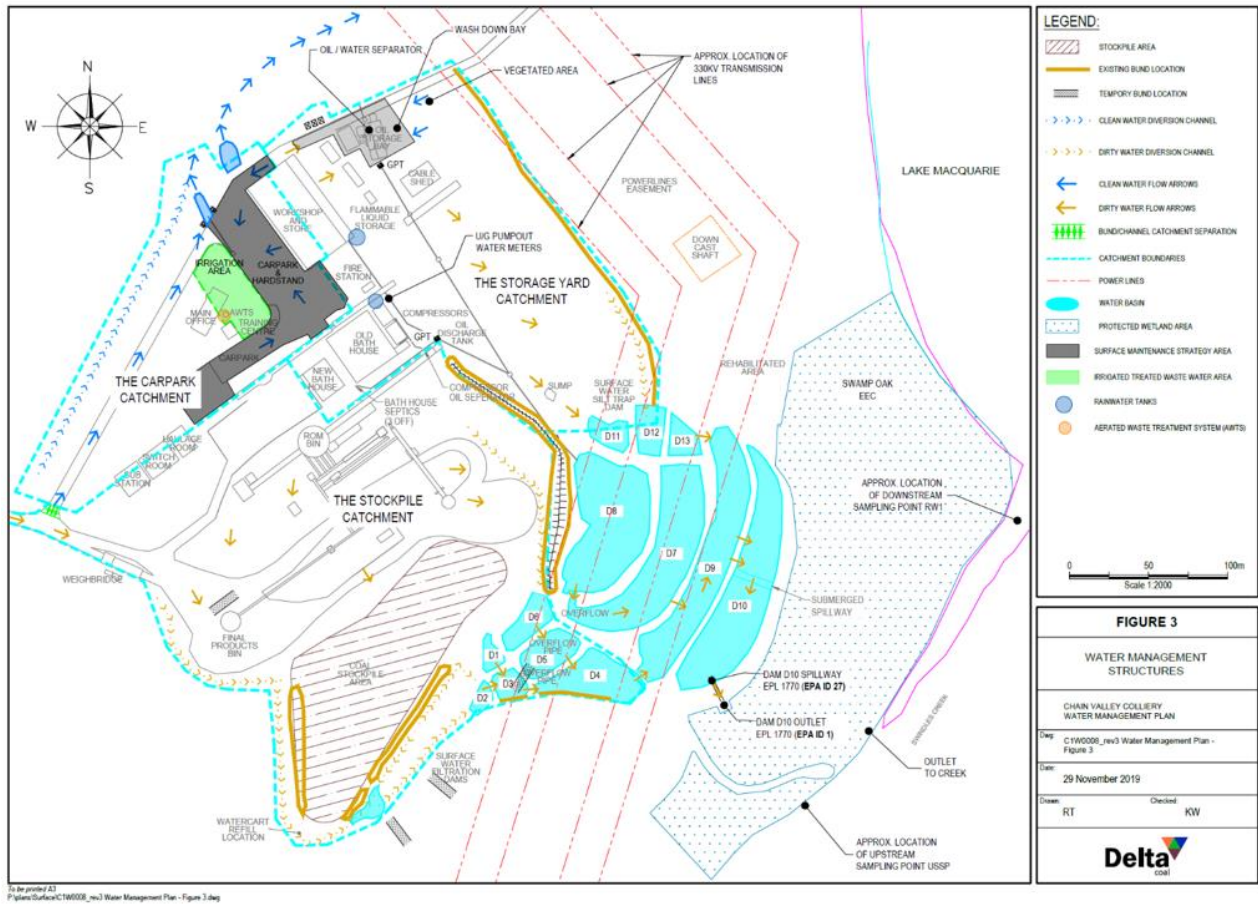


Figure 2: Water Management Structures

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4.4.1 Catchment 1

Catchment 1 (carpark catchment) is a relatively clean catchment as a large portion of this area is vegetated, and there are areas of offices and sealed roads. However, the carpark is unsealed (gravel hardstand) and some sediments accumulate on the surface.

The key control methods implemented in Catchment 1 include:

- clean water diversion channel runs down the north-western perimeter of the pit top to divert any off-site run-on into the natural drainage channel. This is the only major clean water diversion channel required on-site with the remaining topography such that small bunds are sufficient to prevent overland flows entering the site;
- a concrete spoon drain at the intersection with the main site entry road directs dirty runoff from the entry road toward the weighbridge within the storage yard catchment and prevents it from entering this catchment;
- regular sweeping of the carpark surface to remove accumulated sediment;
- kerb and guttering on the access road provides the perimeter drainage directing runoff to the sediment treatment basins within this catchment; and
- utilisation of two small basins, the first is in line with main drainage outlet of the carpark and the second is beside the workshop adjacent to the carpark. Both basins allow coarse sediment to be removed prior to discharge into the natural drainage channel and are shown on **Figure 2**.

4.4.2 Catchment 2

Catchment 2 (storage yard catchment) includes the main storage yard, the majority of which is gravelled hardstand for equipment storage. This area also includes the vehicle wash down bay and bunded areas which drain to the oil water separator within this catchment.

The key control methods implemented in Catchment 2 include:

- there is no off-site water flowing into this catchment and subsequently clean water diversion is not required;
- an earth bund is installed along the eastern perimeter of the catchment which contains all dirty water runoff; and
- a large portion of this storage yard area drains south-east via overland flow into the pollution control dams D11, D12 and D13 which function as primary settling dams before discharging into the main mine water treatment system (i.e. dams D7 to D10);

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- the remainder of the catchment (e.g. bathhouse, workshop and treated water) enters various inlet pits and drains south-east via the pit and pipe network into the main mine water treatment system via dams D8; and
- an oil water separator to treat runoff from the bunded hydrocarbon storage areas and vehicle wash down bay (see **Section 4.10**).

4.4.3 Catchment 3

Catchment 3 (stockpile catchment) includes the main entry/haul road, weighbridge (no longer in use), coal handling (including ROM bin) and coal stockpiles (also no longer in use).

The key control methods implemented in Catchment 3 include:

- perimeter bunding along south-west perimeter to prevent clean water entering this area and dirty water leaving the site;
- bunding and surface grading around the water cart fill location to directed runoff to a stockpile catch drain;
- bunding and drainage around the weigh bridge to directed runoff to a stockpile catch drain;
- runoff is contained by two main stockpile catch drains that surround the stockpile. Runoff from this area contains a significant amount of coal fines and there are in-line sumps within the catch drains to trap coarse material before it enters the series of pollution control dams below the stockpile; and
- runoff from this catchment area reports to the pollution control dams D1 to D6 which function as primary settling dams before discharging into the main mine water treatment system (i.e. dams D7 to D10).

4.4.4 Catchment 4

This catchment contains all the pollution control dams (i.e. D1 to D13) which receive runoff from the storage yard area, the stockpile area, pumping of water from underground, and rainfall directly into the dams. The management of this catchment is described in **Section 4.5**.

4.5 Management of Pollution Control Dams

Effective management of surface water runoff relies heavily on the use of pollution control dams for the detention of dirty water as well as mine water. All surface water runoff potentially containing sediment, septic treated bathhouse wastewater, treated water from the oil water separator and underground mine water is captured by the site's pollution control dams prior to discharge under EPL 1770. These dams have been constructed with a mixture of earth, crushed rock, crushed recycled brick and stone and are interconnected through a series of overflow pipes and spillways. The dams discharge through the LDP into native vegetation and flow to Swindles Creek prior to draining into Lake Macquarie on the western shoreline of Chain Valley Bay.

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Water is directed through the treatment dams from a number of main inlet locations. Runoff from the stockpile area and the storage yard enters the pollution control dams as described above for those catchments. The underground mine water is pumped to a pit adjacent the compressor house and is combined with the septic treated wastewater from the bathhouse, the treated compressor condensate water and some surface runoff.

From this pit the water is piped to D8 for settling and diffusion. Water within D8 enters D7 via a spillway at the southern end of D8. However, due to the imperfect nature of the dam's construction an unknown amount of water diffuses through the dam wall. The water in D7 flows into D9 in a similar manner, in D9 the underground water is combined with the runoff from other areas on site. The primary spill from D9 to D10 is at the northern end of D9. Once in D10 the water flows over a shallow buffer spillway to the main discharge spillway and offsite at the LDP. A real time monitoring system on the final spillway was installed in February 2015, with monitoring data sent every 30 minutes via 3G to an online database where data can then be viewed or downloaded.

The dams provide improvement to the site wastewater and runoff quality through the settlement of fines and suspended solids and prevention of off-site discharge of hydrocarbon spills prior to discharge to Lake Macquarie. Based on the volume of the dams and the average daily discharge, the estimated residence time of the water in the pollution control dams is 1 – 2 days. The storage capacity of these dams is provided in **Section 3.2.4**.

4.6 Erosion and Sediment Control / Ground Disturbance

Erosion and sediment control are predominately managed through the implementation of the primary controls described above within the surface water management systems. In addition to these controls, temporary erosion and sediment controls are implemented for any construction disturbance that is not contained with the surface water management system. The primary objective is to ensure that appropriate procedures and programs of work are in place to meet the requirements of Managing Urban Stormwater: Soils and Construction (the Blue Book), Volume 1 and Volume 2E – Mines and Quarries (Landcom, 2004 and Department of Environment and Climate Change (DECC), 2008).

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4.6.1 Soils

CVC surface facilities are situated at the southern end of Lake Macquarie. This area is principally comprised of the Doyalson soil landscape with small parts on the Wyong soil landscape. The Doyalson soil landscape is characterised by gently undulating rises on Munmorah Conglomerate with broad crests, ridges and long gently inclined slopes.

Local relief is up to 30 metres and slope gradient is less than 10%. Doyalson soils are strongly acidic soils of low fertility with slight to high erodibility. The Wyong soil landscape is characterised by broad, poorly drained deltaic floodplains and alluvial flats of Quaternary sediments. Local relief is less than 10 metres and slope gradient is less than 3%. Wyong soils are strongly acidic, poorly drained, impermeable soils of very low fertility with saline subsoils.

There is also the potential for acid sulfate soils (ASS) to be present, with probability of occurrence increasing with proximity to the shoreline of Lake Macquarie (see **Section 4.8**).

4.6.2 Potential Impacts

As there is expected to be very little disturbance to ground surfaces and generally restricted to limited construction activities associated with the mines pit top, erosion impacts will be minimal. Construction activities would typically be in areas of relatively flat land at the pit top, with mitigation measures to be put in place to control mobilisation of disturbed soils at the time of, and immediately following, the construction activity.

The greatest potential for soil exposure and movement of soil would occur during any construction activities within areas outside of the pit top water management system (such as at the ventilation shaft site). Exposed soil may be mobilised, leading to erosion, fugitive dust emissions and potential sedimentation of Lake Macquarie. The following sections provide control measures to prevent adverse impacts on surrounding catchment areas and receiving waters.

4.6.3 Standard Erosion and Sediment Controls

Erosion and sediment controls are to be implemented across the CVC for all phases of the operation including construction, operation and maintenance activities to mitigate impacts on watercourses and the surrounding environment. Where activities are contained within the pit top surface water management system, erosion and sediment control will be achieved through the controls described in the previous section.

Where soil disturbance activities are outside of these controls, standard erosion and sediment control techniques and management principles are used in accordance with the requirements of Managing Urban Stormwater: Soils and Construction Vol. 1 and Vol. 2E - Mines and Quarries (referred to as the Blue Book in this Plan) (Landcom, 2004 and DECC, 2008).

For activities at CVC, a 'Permit to Clear or Disturb Land' is required prior to disturbance. This permit includes requirements to have water management and erosion controls in place prior to disturbance.

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4.6.4 Construction Erosion Management Plan

Where soil disturbance activities are outside of the surface water management system, erosion and sedimentation shall be effectively controlled through the development of a Construction Erosion Management Plan (CEMP) prior to undertaking large scale disturbances (i.e. greater than 2,500 m²). The CEMP shall be consistent with the Blue Book (Landcom, 2004 and DECC, 2008) and would include the following key principles:

- conducting best practice land clearing procedures for all proposed disturbance areas including:
 - coordinating construction activities to minimise exposure of disturbed soils to the elements; and
 - topsoil stripping procedures to reduce deterioration in topsoil quality and dust generation.
- appropriate storage of topsoil stockpiles in areas away from roadways and other drainage lines;
- appropriate design of access tracks;
- use of diversion structures to separate 'clean' water runoff from disturbed areas runoff, to minimise volumes of sediment-laden and mine water for management;
- ensuring sediment-laden runoff is treated via designated sediment control devices;
- topsoiling, reshaping and revegetation of disturbed areas as soon as possible following the completion of construction activities;
- temporary erosion and sediment controls to be in place prior to any construction activity outside of an existing dirty water management system; and
- implementing an effective maintenance program for the site.

The above principles are addressed in further detail in **Appendix 4**.

4.7 Water Savings

CVC seeks continual improvement in relation to water consumption, potential improvements in water efficiency, alternative water sources and options for recycling and reuse. The following measures are implemented on site:

- use of a road sweeper to clean roads (as opposed to more frequent washing of roads with a water cart);
- rainwater tank installed on the workshop;
- repair works to aging pipelines to reduce losses from leakage; and
- trial use of chemical dust suppressant to reduce water cart usage.

The primary use of potable water is to supply underground activities. The water storage within the dirty water dams is not suitable for supply to underground machinery.

4.8 Acid Sulfate Soils

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The ASS risk map for coastal NSW shows a high probability of occurrence of ASS below the pollution control dams, and down to the shoreline of Lake Macquarie.

Disturbance of ASS would be avoided wherever practicable. Where ASS has the potential to be disturbed, an ASS management plan would be prepared. Any ASS disturbed would be tested and handled in accordance with the ASS management plan and would be treated or disposed of to an appropriately licensed facility. For activities at CVC, a 'Permit to Clear or Disturb Land' is required prior to disturbance which includes requirements to manage the disturbance of ASS.

Geotechnical drilling in March 2020 for the buried sewer pipeline and pump station was tested by Douglas Partners for acid sulfate soils but none was detected.

4.9 Sewerage Disposal and Management

There are two sources of domestic wastewater located at the pit top facilities. The first source is generated in the administration office building and the second is generated in the operations bathhouses and operations area. Both wastewater streams are treated by separate treatment systems. The administration office treatment system is an aerated wastewater treatment system (AWTS) while the bathhouse system is a traditional 3 part septic.

Following treatment, the office wastewater is sprayed onto the grass surrounding the office building via a spray irrigation system. The bathhouse wastewater is discharged to the pollution control dams. Both systems have a quarterly monitoring and maintenance schedule in place that is undertaken by an external wastewater treatment system service contractor.

EPL 1770 also has a limit for faecal coliforms of 200 CFU/100 mL at the LDP. This is monitored for and reported on monthly. In addition, effluent stream monitoring is undertaken quarterly (monitoring parameters are detailed in **Section 5.3**) and annual soil sampling of the effluent irrigation area is undertaken, as per **Section 5.6**.

4.10 The Oil Water Separator

Water that is likely to be contaminated with oil and grease, such as runoff from the oil storage facilities, diesel tank storage, workshop / maintenance areas and wash bay is directed to and treated by an oil water separator.

The system includes a packed bed oil separation system where solids are removed in the grit trap and oily water is drawn from the sump through a floating skimmer, into the packed bed oil separator by a non-emulsifying pump. The system has a capacity of 2000 L/hr of through flow. The waste oil is collected in a container and the treated water flows by gravity to the pollution control dams.

A separate oil water separation system is installed on the condensate drain from the compressors on site. This system consists of an in-ground tank where water is passed through and under over a weir arrangement and then discharged to the pollution control dams.

Inspections and maintenance of the separation systems occurs regularly, in addition to water quality monitoring and analysis for total oil and grease at all monitoring points as per **Section 5.3**.

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5 Monitoring

To ensure the continued functionality of the surface water management system and to assist CVC identify any potential issues with the system, an on-going water monitoring program is implemented, inclusive of water quality and stream health monitoring.

5.1 Baseline Water Quality Monitoring Data

CVC collates and maintains an up to date database of surface water quality monitoring data for all sampling at the mine. A summary of the baseline water quality data available for the site is presented in Section 3.5.2 of the SWA (GSSE, 2013).

5.2 Impact Assessment Criteria and Trigger Levels

5.2.1 Surface Waters

Table 5 provides water quality parameters and relevant limits to be measured at the LDP as per EPL 1770.

Table 5: Water Quality Monitoring Limits for Chain Valley Colliery

Parameter	Trigger Value	Source
Faecal coliform	200 colony forming units per 100 millilitres	EPL 1770
pH	6.5-8.5	EPL 1770
TSS	50 mg/L	EPL 1770

5.2.2 Underground Water

Groundwater monitoring is described within the GwMP provided in **Appendix 3**.

5.3 Surface Water Monitoring and Frequency

DC will continue to monitor as required by the EPL and also undertake monitoring beyond the requirements of the EPL. The monitoring locations, parameters to be monitored and the required frequency are detailed in **Table 6** with the position of these monitoring locations shown on **Figure 3**. Surface water quality monitoring summary plots for LDP1 for the period from January 2012 to December 2018 are presented in **Appendix 5**.

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Table 6: Surface Water Quality Monitoring Locations and Frequency

Identification	Type of Monitoring Point	Parameter	Frequency	Sampling Method
Outlet to Creek (OTC)	Operational (where discharged water enters Swindles creek)	pH	Monthly (min 4 weeks)	Grab sample
Dam 10 Outlet LDP1 and LDP27	EPL 1770 Licensed Discharge Points 1 (Dam piped discharge) and 27 (Dam spillway)	Total suspended solids		
USSP	Baseline Data (Swindles Creek Upstream of Site)	Biochemical Oxygen Demand		
RW1	Baseline Data (Swindles Creek Downstream of Site)	Faecal Coliforms		
		Enterococci		
		Total oil and grease		
		Electrical Conductivity		
		Total Nitrogen		
		Total Phosphorus		
		Anionic Surfactants		

All monitoring of waters should be undertaken in accordance with Approved Methods for Sampling and Analysis of Water Pollutants in NSW (DECCW, March 2004). Additionally, pollutant concentration measurements shall be determined in micrograms per litre and within ANZECC concentration limits unless noted otherwise.

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5.4 Stream Health Channel Flow and Riparian Vegetation Monitoring

A program to monitor creek line channel stability and health of riparian vegetation within Swindles Creek is undertaken along a short length of the downstream watercourse. Observations of stream health and stability are undertaken quarterly and recorded on the CVC 'Creek Stability Inspection' form.

Monitoring of Swindles Creek, as per the creek stability form, includes multiple photographic points at representative locations. Photos are taken over multiple inspections in a repeatable manner, with the inspection specifically including:

- general observations of water quantity and quality;
- documenting locations and dimensions of significant erosive or depositional features;
- documenting evidence of erosion and exposed soils;
- noting general indicators of stream health, including abundance of flora and fauna; and
- a review and comparison of results to previous inspections.

Where degradation or adverse erosion is occurring, additional investigations will be undertaken to assess whether the impacts may be associated with the operation of the mine and ameliorative actions undertaken as required. In addition, further riparian vegetation monitoring will be undertaken in accordance with the Biodiversity Management Plan.

5.5 Groundwater Monitoring Program

Details of the groundwater monitoring program is contained in the GwMP in **Appendix 3**, which includes monitoring of mine inflows and private bore water levels.

5.6 Effluent Monitoring

In accordance with *Environmental Guidelines: Use of Effluent by Irrigation* (DEC, 2004), quarterly monitoring of the irrigated effluent from the AWTS at the administration building is undertaken. The parameters that are monitored are identified in **Table 7**.

Soil monitoring (of the surface soil and soil profile adjacent to the administration building) is also undertaken in accordance with *Environmental Guidelines: Use of Effluent by Irrigation* (DEC, 2004). Soil monitoring is undertaken annually using hand auger to assess soils within the irrigation area. The parameters monitored and frequency of monitoring is identified in **Table 8**, which is more frequent than the recommended sampling frequency.

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Table 7: Monitoring of CVC AWTS Effluent Stream

Identification	Type of Monitoring Point	Parameter	Frequency	Sampling Method
AWTS	Effluent from AWTS	pH Electrical Conductivity Sodium Adsorption Ratio Total Dissolved Solids Total Suspended Solids Total Phosphorus Total Nitrogen Faecal Coliforms Enterococci Total Oil and Grease Biochemical Oxygen Demand	Annual	Grab sample

Table 8: Soil Monitoring at CVC

Monitoring Location	Parameter	Frequency of Sampling	
		Surface Soil	Soil Profile
Effluent Irrigation Area	pH	Annually	Annually
	Electrical Conductivity (EC) (dS/m)	Annually	Annually
	Nitrate-N	Annually	Annually
	Total N	Annually	Annually
	Available P	Annually	N/A
	Total P	Annually	Annually
	Exchangeable Sodium Percentage	Annually	Annually
	Heavy Metals & Pesticides	Annually	N/A
	P sorption	Annually	Annually

5.7 Additional Operational Monitoring

In addition to the other monitoring described above, DC also undertakes periodic surface water quality monitoring for dams within the site. This additional monitoring allows the performance of the surface water management system to be assessed for various areas around the site. CVC is also committed to monitoring water usage onsite. Water usage is currently monitored through the following:

- metering of the potable supply to site;
- monitoring of the volume of water pumped from the Great Northern Seam sump to the surface and maintaining records of the water cart operation, including fill times.

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5.8 Inspections and Maintenance

All water management structures will be inspected regularly. **Table 9** contains the inspection schedule used to ensure the water management structures are functioning effectively throughout CVC. The inspections will also determine the scheduling of maintenance required for the structures.

Table 9: Inspection Schedule for Water Management Structures

To Be Inspected	Frequency
All water management structures	Monthly
Works In Progress (including temporary erosion and sediment control structures)	Weekly

In addition to these inspections, regular water quality monitoring is undertaken as described above. The results of this monitoring with regards to total suspended solids will assist in assessing the effectiveness of the water management system, along with highlighting any possible areas that need to have additional controls added or improve the function of existing controls.

All water management structures will be maintained in a functioning condition. Where controls are observed to be not functioning correctly, the controls will be restored to meet the required standard. The maintenance and monitoring of specific features of the site are described in the sections below.

5.8.1 Sediment Dams

Visual inspections of the sediment dams are undertaken to determine the clarity of the water and if any maintenance is required. The inspections also enable correct scheduling of de-silting works and prompt repairs and/or replacement of damaged works. When required, the silt from dams is removed and stored so that it is not able to be washed back into the dam. Documented inspections of the above are part of the Monthly Environmental Inspection which is scheduled via a work order (part of the CVC maintenance management system).

De-silting of dams is scheduled to occur annually. However, the schedule may be amended based on the above inspections and identified requirements.

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5.8.2 Drainage Channels

For clean water diversions, any signs of erosion along the length of the drains should be noted and remedial works undertaken as required. Where significant erosion is observed, additional erosion controls are constructed e.g. establishment of vegetation cover, use of temporary sediment devices until the vegetation is established, scour protection (rock-armouring or erosion blanket) of the channel surface.

Where dirty water drainage channels contain in-line sumps, these will be cleaned on a regular basis depending on the accumulation of material within the sumps.

5.8.3 Temporary ESC Structures

Regular visual checks will be made of any temporary erosion and sediment controls (ESC) such as sediment filter fences, sandbag weirs etc. to ensure that they are functioning adequately. Structures will be repaired where required.

5.8.4 Roads and Hard Stand Areas

A water cart will be used around the site to ensure dust is kept to a minimum. This will be undertaken on an as needs basis, with more regular use during the warmer months. The use of chemical dust suppressant is also being trialed to reduce water usage.

5.8.5 Washbay Oil Water Separator

The packed bed oil separator system is designed to minimise maintenance and servicing. As oil separator systems are critical for the reliable prevention of oil contamination, regular inspections/servicing are important. It is critical that the mechanisms be regularly checked for operation to prevent environmental contamination. Preventative maintenance may also prevent failures before they occur by detecting trends in functionality.

This system has specific weekly and monthly work orders that ensure the system is serviced and maintained.

All accumulated waste oils and solid material shall be disposed of periodically by a licensed operator. The weekly waste management inspection will determine waste oil levels and disposal requirements.

5.8.6 Compressor Condensate Oil Water Separator

Excess oil from the compressors and surrounds is contained, piped to a collection tank which is inspected weekly to ensure the system is serviced and maintained.

Any accumulated waste oil is then removed for recycling by licensed and approved waste management contractors.

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5.8.7 Carpark

The carpark hardstand area shall be regularly maintained to minimise the generation of sediment. The maintenance strategy shall include the immediate removal or shaping of material that might result in concentrated flow paths by maintaining a smoothly graded surface. A water cart will be used around the site (as required) to ensure dust is kept to a minimum. A street sweeper is used a monthly basis to sweep the sealed entrance roads.

5.8.8 Underground Flow Monitoring Devices

Water flow monitoring appliances have been installed in the mine to measure pumped water volumes to and from the mine workings. These appliances shall be maintained in good working order, and if required, the mine will supply a test certificate to certify the current accuracy of the appliances furnished by the manufacturer or by some duly qualified person or organisation.

5.9 Data Recording and Publication

Recording of monitoring data will be undertaken in accordance with the requirements outlined in EPL 1770. DC will collate and maintain an up-to-date database of surface water quality monitoring data for all sampling at the mine. Monitoring results will be interpreted as they are received in order to ensure water quality is maintained within the desired parameters.

A summary of results, including daily volumetric discharge and water quality results, will be prepared monthly and made publicly available on the DC website (www.deltacoal.com.au) in accordance with the requirements of *Protection of the Environment Operations Act, 1997*.

The results will also be compared to relevant site operations and meteorological conditions to further interpret the results. This comparison between samples, sampling periods and against other factors will assist in identifying whether the activities on the site are in fact affecting the water quality of the local catchment.

Results of surface water quality monitoring will be reported in the Annual Review. The results will also be made available to the Community Consultative Committee members on a regular basis as part of the Environmental Monitoring and Reporting process, as well as to the Central Coast Council and Lake Macquarie City Council (LMCC).

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6 Reporting

6.1 Regular Reporting

The water monitoring results will be reviewed on a monthly basis to confirm compliance with the conditions specified in **Section 5** or ensure corrective action is taken where results or trends indicate non-compliance or risk of future non-compliance.

A summary of monthly environmental monitoring results will be published on the DC website.

6.2 Annual Review

The water monitoring results will be reviewed on a monthly basis to confirm compliance with the conditions specified in **Section 5** or ensure corrective action is taken where results or trends indicate non-compliance or risk of future non-compliance.

The results will also be included in the Annual Review. The Annual Review will include:

- a summary of monitoring results,
- comparison against the water quality criteria;
- summary of previous years monitoring results;
- comparison against predictions in the Environmental Impact Statement (EIS);
- identify any trends in water quality/quantity;
- identify any non-conformances over the year; and
- describe any actions currently implemented or planned to ensure compliance with the water quality impact criteria.

The Annual Review will be forwarded to the relevant authorities including the DPIE, EPA and WaterNSW. The Annual Review will also be forwarded to members of the Community Consultative Committee and local Councils (Central Coast and Lake Macquarie) and will also be placed on the CVC website.

The EPA will be provided with an annual return, including monitoring details, as required by EPL 1770.

6.3 Incident or Non-Compliance Response and Reporting

Following detection or notification of an incident, site personnel at CVC will immediately focus on the mitigation of any potential environmental harm. Should potential or actual harm to the environment be identified, the appropriate regulatory authority shall be immediately notified, and remediation measures applied. Where ameliorative actions may reduce the threat or harm to the environment, action will be undertaken immediately to mitigate or rectify the issue. These actions will be followed by an investigation into the cause of the incident.

If monitoring reveals that, as a direct result of CVC operations, levels have exceeded the relevant criteria outlined in **Section 5**, DC will conduct an investigation into the source of the non-compliance. As detailed in Condition 7, Schedule 6 of SSD-5465, relevant agencies will be notified by phone or email at the earliest

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opportunity of an incident that causes or threatens to cause material harm to the environment. For all other incidents, relevant agencies will be notified by phone or email as soon as practicable.

An investigation will consider any activities and plant operation or other factors that may have caused or contributed to the incident or non-compliance. This will include a review of rainfall data, an investigation regarding the water source, and an inspection of all relevant pollution control structures to ensure they are functioning correctly. Aspects to be inspected include:

- integrity of all structures to capture/convey flows as designed;
- level of sediment in pollution control dams and drains;
- amount of vegetation (reeds) in pollution control dams, which may affect the pH of the water;
- the location of the water source; and
- the presence of any hydrocarbon spills underground or on the surface in the vicinity of pollution control structures.

The written report will be provided to any affected landowner and/or existing tenants, including tenants of mine owned properties, to the DPIE, EPA and any other relevant stakeholders within 7 days of the date of the incident or being made aware of the incident (such as receiving monitoring data). The report will:

- describe the date, time and nature of the observation;
- identify the cause (or likely cause) of the damage;
- describe what action has been taken to date; and
- describe the proposed measures to address the impacts and prevent further such occurrences.

DC will implement the recommendations of the investigation in order to address any future non-compliance issues. Additional details of the incident reporting process are provided in the Environmental Management Strategy.

The GwMP in **Appendix 3** contains the assessment triggers and ameliorative measures relevant to the groundwater monitoring.

Any incidents or complaints will be recorded and fully investigated to find root causes and corrective actions implemented where necessary. Additionally, the following measures will be undertaken:

- a review of management practices to systematically identify and implement options to modify site practices so as to ensure effective water management and erosion and sediment control activities in order to achieve the goals stated in this plan; and
- additional water quality monitoring may be conducted at a complainant's request at an appropriate frequency.

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7 Stakeholder Management, Response and Training

7.1 Complaint Protocol

DC has a 24-hour telephone hotline (1800 115 277) for members of the public to lodge complaints, concerns, or to raise issues associated with the operation. This service aims to promptly and effectively address community concerns and environmental matters. All complaints are recorded and responded to.

The information recorded in the complaint register includes:

- date and time the complaint was lodged;
- personal details provided by the complainant;
- nature of the complaint;
- action taken or if no action was taken, the reason why; and
- follow up contact with the complainant.

7.2 Independent Review

As detailed in Condition 2, Schedule 5 of SSD-5465, an Independent Review can be requested by a landowner who “*considers the development to be exceeding the relevant criteria in Schedule 3*”.

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*

7.3 Dispute Resolution

If any disputes are not adequately addressed by the complaints handling process then they will be handled by the Environmental Compliance Coordinator. If the response of CVC is not considered to satisfactorily address the concern of the complainant, a meeting may be convened with the complainant, Mine Manager together with the Environmental Compliance Coordinator to determine any further options to reduce potential impacts.

Any actions agreed from the meeting will be implemented by CVC. After implementation of the proposed actions the complainant will be contacted and advice sought as to the satisfaction or otherwise with the measures taken.

If no agreed outcome is determined or the complainant is still not satisfied by the action taken, then an Independent Review may be requested by the complainant. If determined to be warranted by the Secretary,

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an independent review will be undertaken in accordance with the process identified in Schedule 5 of SSD-5465.

7.4 Training, Awareness and Competence

Training is an essential component of the implementation phase of this WMP. The Environmental Compliance Coordinator will ensure that training and awareness processes are implemented to manage, identify and minimise potential impacts of CVC and to ensure personnel are aware of their roles and responsibilities in terms of water quality management and erosion and sediment control.

Generally training at CVC consists of induction training for new starters and contractors along with environmental awareness training at two-year intervals and ongoing “toolbox” training for all permanent employees as required. Site inductions also specifically identify that no unauthorised clearing is to occur.

As the document owner, the Environmental Compliance Coordinator is the contact point for any person that does not understand this document or their specific requirements and will provide guidance and training to any person that requires additional training regarding this management plan.

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8 Audit and Review

8.1 Overview

This document shall be reviewed, and if necessary revised, annually or within 3 months of the following;

- the submission of an Annual Review;
- the submission of an incident report;
- the submission of an independent environmental audit; and
- following any modification to the development consent or EPL.

8.2 Audits

Internal and external audits of this document and all other Environmental Management System documents are to be undertaken every three years. Improvements from the audit are to be incorporated in the site action database to ensure the actions are assigned to the relevant people and completed.

Audits shall be carried out by personnel who have the necessary qualifications and experience to make an objective assessment of the issues. The extent of the audit, although pre-determined, may be extended if a potentially serious deviation from this document is detected.

Any audit non-conformances and/or improvement opportunities will have corrective and preventative actions implemented to avoid recurrence, these actions will be loaded into the site Incident Database to ensure the actions are assigned to the relevant people and completed.

External audits will be conducted utilising external specialists and will consider this document and related documents. External auditors shall be determined based on skills and experience and upon what is to be accomplished.

An Independent Environmental Audit (IEA) was undertaken during June 2019. In accordance with SSD-5465 Schedule 6, Condition 9, IEA's will be scheduled for every three years thereafter (unless the Secretary directs otherwise) by an audit team whose appointment has been endorsed by the Secretary.

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9 Records and Document Control

9.1 Records

Generally, the Environmental Compliance Coordinator will maintain all Environmental Management System records which are not of a confidential nature. Records that will be maintained include:

- monitoring data and equipment calibration;
- environmental inspections and auditing results;
- environmental incident reports;
- the complaints register; and
- licences and permits.

All records will be stored so that they are legible, readily retrievable and protected against damage, deterioration and loss. Records will be maintained for a minimum of 4 years or as otherwise required under any legislation, licence, lease, permit or approval.

9.2 Document Control

This document and all others associated with the Environmental Management System shall be maintained in a document control system which is in compliance with the site Document Control Standard which is available to all site personnel. Any proposed change to this document will be via the Environmental Compliance Coordinator. Details on document revisions are provided in **Table 10**.

Table 10: Document Revision Details

Version	Date	Details of Revision	Company	Reviewed by/ Authorised by
1	23/08/2012	Revision 1	LakeCoal	GSS Environmental Chris Ellis
2	21/07/2015	Revision 2	LakeCoal	Niche Environment and Heritage Chris Ellis
3	30/11/2019	Updated to Delta Coal format and site update and results	Delta Coal EMM Consulting	Sally Callander Chris Armit Katie Weekes
4	18/12/2020	Updated for Modification 3 and updated Groundwater Management Plan	Delta Coal	Chris Armit

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10 Roles and Responsibilities

10.1 Responsibilities

All employees and contractors of Chain Valley Colliery are responsible for environmental management. However, various positions in the organisation have roles, responsibilities and authorities for managing environmental aspects, action plans, programs and controls.

Roles and responsibilities specific to completing the requirements of this WMP are identified in **Table 11**.

Table 11: Water Management Roles and Responsibilities

Role	Responsibilities
General Manager	Ensure that adequate financial and personnel resources are made available for the implementation of the WMP.
Manager of Mining Engineering	Overall responsibility for environmental compliance with Mining Lease, EPL, Development Consent and other mining approvals as they pertain to water management.
Environmental Compliance Coordinator	- Implementing the forward works program; - Planning for adequate resources to implement this site WMP. - Approving revised versions of this site WMP; - Co-ordination of external audits, corporate reporting and management; - Co-ordinate environmental monitoring, reporting, inspections, environmental training, authority liaison, maintaining complaints register and community liaison; - Allocation of resources within area of responsibility and budget; - The implementation and adherence to this site WMP; - Providing adequate training to employees and contractors regarding their requirements under this site WMP; - Contractor management; and - Delegating tasks associated with this site WMP when responsible personnel are absent.
Employees and contractors	Comply with the requirements of this WMP.

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11 References & Associated Documents

Documents used in the preparation of this management plan are detailed in **Table 12**.

Table 12: References and Associated Documents

Reference Type	Document			
Australian standards	AS/NZS ISO 14001:2004 <i>Environmental management systems – Requirements with guidance for use</i> AS/NZS ISO 14004:2004 <i>Environmental management systems – General guidelines on principles, systems and support techniques</i>			
Legislation and regulations	NSW EPA, EPL 1770 <i>Environment Protection License 1770</i> Development Consent SSD-5465 (Modification 2) dated 16 December 2015 for the Mining Extension 1 Project <i>Environmental Planning and Assessment Act 1979</i> <i>Mining Act 1992</i> <i>Protection of the Environment Operations Act, 1997</i> <i>Water Act 1912</i> <i>Water Management Act 2000</i>			
Delta Coal documents	Delta Coal - Environmental Management Strategy. LakeCoal, 2019. Chain Valley Colliery Annual Review 2018. Doc No. REP 00058, 16 May 2019. Delta Coal, 2020. Chain Valley Colliery Annual Review 2019.			
External documents	Australian and New Zealand Environment Conservation Council (ANZECC) and the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ), National Guidelines for Sewerage Systems - Effluent Management, 1997. Australian and New Zealand Environment Conservation Council (ANZECC) and the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ), Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC Guidelines), October 2000. Australian Government, Charter: National Water Quality Management Strategy, 2018. DECCW, March 2004. Approved Methods for Sampling and Analysis of Water Pollutants in NSW.			
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	Douglas Partners, 2020, Geotechnical assessment for Sewer Pipeline, Chain Valley Colliery. GEOTERRA, 2020, Groundwater Management Plan, Chain Valley Colliery. GEOTERRA, 2019, Groundwater Management Plan, Chain Valley Colliery. GEOTERRA, 2014, Groundwater Management Plan, Chain Valley Colliery. GEOTERRA, March 2013, Chain Valley Colliery Mining Extension 1 Groundwater Assessment. GSS Environmental, March 2013, Chain Valley Mining Extension 1 Project Surface Water Assessment. Landcom, 2004 and Department of Environment and Climate Change (DECC), 2008. Managing Urban Stormwater: Soils and Construction (the Blue Book), Volume 1 and Volume 2E – Mines and Quarries. NSW Water Quality and River Flow Objectives, September 1999. NSW State Rivers and Estuaries Policy, 1993. NSW Groundwater Quality Protection Policy, adopted in 1998. NSW Groundwater Quantity Management Policy. NSW Department of Environment and Conservation (DEC), Environmental Guidelines: Use of Effluent by Irrigation, 2004. The NSW State Groundwater Dependent Ecosystems Policy, adopted in 2002.
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12 Definitions

ANZECC Australia New Zealand Environment Conservation Council

AWTS Aerated Waste Water Treatment System

CC Council – Central Coast Council

DECCW Former NSW Department of Environment, Climate Change and Water

DP&E NSW Department of Planning and Environment (former)

DPIE NSW Department of Planning, Industry and Environment

DoI - Water NSW Department of Industry (Water)

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

EPA Environment Protection Authority

EP&A Act Environmental Planning and Assessment Act 1979

EPL Environment Protection License

GwMP Groundwater Management Plan

LDP Licensed Discharge Point

LMCC Lake Macquarie City Council

MPL Mining Purposes Lease

Mt Million Tonnes

NOW NSW Office of Water (former)

OEH Office of Environment and Heritage

POEO Act *Protection of the Environment Operations Act 1997*

ROM Run of Mine

Planning Secretary Planning Secretary of the Department of Planning, Industry and Environment, or nominee

SSD-5465 Development Consent SSD-5465 (for the Chain Valley Colliery Mining Extension 1 Project)

TARP Trigger Action Response Plan

TSS Total Suspended Solids

WMP Water Management Plan

WSC Wyong Shire Council (now part of Central Coast Council)

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Appendix 1: Consultation

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Appendix 2: Development Consent Summary

Chain Valley Colliery Development Consent SSD-5465 Summary

This WMP has been prepared in accordance to Schedule 3, Condition 21 of SSD-5465, which states the requirements of the WMP and what it must address. **Table A1** outlines the requirements of the WMP and where this document addresses these requirements.

Table A1: Requirements from Chain Valley Colliery Development consent SSD-5465

Condition No.	Requirement	Relevant section of this document
	Schedule 2 Administrative Conditions	
22	EVIDENCE OF CONSULTATION 22. Where conditions of this consent require consultation with an identified party, the Applicant must: - consult with the relevant party prior to submitting the subject document; - provide details of the consultation undertaken including: - the outcome of that consultation, matters resolved and unresolved; and - details of any disagreement remaining between the party consulted and the Applicant and how the Applicant has addressed the matters not resolved.	Section 1.4 Appendix 1
23	STAGING, COMBINING AND UPDATING STRATEGIES, PLANS OR PROGRAMS 23. With the approval of the Planning Secretary, the Applicant may: - prepare and submit any strategy, plan or program required by this consent on a staged basis (if a clear description is provided as to the specific stage and scope of the development to which the strategy, plan or program applies, the relationship of the stage to any future stages and the trigger for updating the strategy, plan or program); - combine any strategy, plan or program required by this consent (if a clear relationship is demonstrated between the strategies, plans or programs that are proposed to be combined); - update any strategy, plan or program required by this consent (to ensure the strategies, plans and programs required under this consent are updated on a regular basis and incorporate additional measures or amendments to improve the environmental performance of the development); and - combine any strategy, plan or program required by this consent with any similar strategy, plan or program required by an adjoining mining consent or approval, in common ownership or management.	Section 8
	Schedule 3 Specific Environmental Conditions	
18	<i>The Applicant must prepare and implement a Water Management Plan for the surface facilities sites to the satisfaction of the Planning Secretary.</i> <i>This plan must be prepared in consultation with DPIE Water and EPA, by suitably qualified and experienced persons whose appointment has been endorsed by the Planning Secretary and submitted to the Planning Secretary for approval within 6 months of the date of this consent.</i> <i>This plan must include:</i>	Section 1.4
	(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;	Section 3

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	(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 sulfate soils, if encountered; - activities that would involve ground disturbance at the site; and - monitoring and reporting procedures.	Section 4
	(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;	Section 5
	(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	Appendix A
	(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.	Appendix C
	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.	This document
	Statement of Commitments	
	Groundwater In addition to the management and mitigation measures undertaken at the Colliery for groundwater as described in the WMP, the following	GwMP in Appendix A

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	commitments specific to the Proposal will be undertaken. Some commitments are already undertaken under the WMP. Delta Coal 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 situation arise, Delta Coal would provide an alternative water supply until the impacted bore recovers.	GwMP in Appendix A
	Any monitored or reported adverse impacts on the yield, saturated thickness or quality of a private registered bore will be investigated by Delta Coal. 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, Delta Coal 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 (e.g., due to lowering pumps or installation of additional or alternative pumping equipment).	GwMP in Appendix A
	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. Delta Coal will:	This document
	update the WMP to include any changes as a result of the proposed modification;	This document
	limit the main underground pumps to a maximum pump out rate of 10.5 ML/day within 12 months of approval;	Section 3.2.3
	request an amendment of EPL 1770 to include a condition on the daily discharge volume limit stating that "Exceedence of the volume limit for	Section 1.1

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	<i>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”;</i>	
	<i>undertake daily measurements of discharge volumes and report publically on a monthly basis via Delta Coal’s website;</i>	Section 5.9
	<i>continue collection of baseline water quality data to aid in the development of appropriate discharge water quality trigger values;</i>	Section 5.3
	<i>engage a 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;</i>	Section 2.4
	<i>investigate water saving measures to minimise the amount of potable water required from WSC for Colliery operations;</i>	Section 4.7
	<i>quantify the groundwater storage capacity in the Great Northern and Wallarah Seams;</i>	Section 4.3
	<i>continue effluent monitoring regime of receiving soils from the AWTS in accordance with the parameters and testing frequencies identified in the Colliery’s WMP. The results of this monitoring program will be reviewed by a suitably qualified expert and used to determine the appropriateness of the existing irrigation area to receive this effluent;</i>	Section 5.6
	<i>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</i>	Section 5.4
	<i>record monitoring data in accordance with the Colliery’s WMP and EPL 1770. Monitoring data will be interpreted as it is received to ensure appropriate operational guidance on monitoring water quality within desired parameters. Results of water quality monitoring will be reported in the Annual Review and made available to the CCC, as well as Wyong and Lake Macquarie Councils.</i>	Section 5.9

CVC operates under EPL 1770 issued by the NSW EPA under the POEO Act. The EPL has been modified a number of times, most recently on the 2 April 2019. CVC has two Licensed Discharge Points (LDP) under EPL 1770. The main discharge point is defined in the EPL as Point 1 and referred to herein as Licensed Discharge Point 1 (LDP1). Licenced Discharge Point 27 is the spillway which rarely discharges.

Relevant sections of EPL 1770 detail water related requirements and are reproduced in **Table A2** below along with identification of where the requirements are addressed in this document.

Table A2: Environment Protection Licence 1770 Water Quality Requirements

Condition No.	Requirements	Relevant section of this document
2	Discharges to Air and Water and Applications to Land	

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P1	Location of monitoring/discharge points and areas																			
P1.2	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.	Noted																		
P1.3	The following points referred to in the table are identified in this licence for the purposes of the monitoring and/or the setting of limits for discharges of pollutants to water from the point. Water and land <table><tr><th>EPA Identification no.</th><th>Type of Monitoring Point</th><th>Type of Discharge Point</th><th>Location Description</th></tr><tr><td>1</td><td>Discharge to waters Discharge quality and volume monitoring</td><td>Discharge to waters Discharge quality and volume monitoring</td><td>Discharge to waters and monitoring from final settlement pond via low level discharge identified as EPA 1 on plan of the premises titled "EPL premises Plan Fig 1 Project Extents, Monitoring and Compliance Locations dated 12 March 2015 DOC15/83810.</td></tr><tr><td>27</td><td>Discharge to waters Discharge quality and volume monitoring</td><td>Discharge to waters Discharge quality and volume monitoring</td><td>Discharge to waters via concrete high level spillway from final settlement pond adjacent to EPA 1 on plan of the premises titled "EPL premises Plan Fig 1 Project extents, Monitoring and Compliance Locations" dated 12 March 2015 DOC15/83810.</td></tr></table>	EPA Identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description	1	Discharge to waters Discharge quality and volume monitoring	Discharge to waters Discharge quality and volume monitoring	Discharge to waters and monitoring from final settlement pond via low level discharge identified as EPA 1 on plan of the premises titled "EPL premises Plan Fig 1 Project Extents, Monitoring and Compliance Locations dated 12 March 2015 DOC15/83810.	27	Discharge to waters Discharge quality and volume monitoring	Discharge to waters Discharge quality and volume monitoring	Discharge to waters via concrete high level spillway from final settlement pond adjacent to EPA 1 on plan of the premises titled "EPL premises Plan Fig 1 Project extents, Monitoring and Compliance Locations" dated 12 March 2015 DOC15/83810.	Section 5						
EPA Identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description																	
1	Discharge to waters Discharge quality and volume monitoring	Discharge to waters Discharge quality and volume monitoring	Discharge to waters and monitoring from final settlement pond via low level discharge identified as EPA 1 on plan of the premises titled "EPL premises Plan Fig 1 Project Extents, Monitoring and Compliance Locations dated 12 March 2015 DOC15/83810.																	
27	Discharge to waters Discharge quality and volume monitoring	Discharge to waters Discharge quality and volume monitoring	Discharge to waters via concrete high level spillway from final settlement pond adjacent to EPA 1 on plan of the premises titled "EPL premises Plan Fig 1 Project extents, Monitoring and Compliance Locations" dated 12 March 2015 DOC15/83810.																	
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.	Section 2																		
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.	Section 5																		
L2.2	Where a pH quality limit is specified in the table, the specified percentage of samples must be within the specified ranges.	Section 5																		
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).	Noted																		
L2.4	Water and/or Land Concentration Limits Point 1, 27 <table><tr><th>Pollutant</th><th>Units of Measure</th><th>50 percentile concentration limit</th><th>90 percentile concentration limit</th><th>3DGM concentration limit</th><th>100 percentile concentration limit</th></tr><tr><td>Faecal Coliforms</td><td>colony forming units per 100 millilitres</td><td></td><td></td><td></td><td>200</td></tr><tr><td>pH</td><td>pH</td><td></td><td></td><td></td><td>6.5-8.5</td></tr></table>	Pollutant	Units of Measure	50 percentile concentration limit	90 percentile concentration limit	3DGM concentration limit	100 percentile concentration limit	Faecal Coliforms	colony forming units per 100 millilitres				200	pH	pH				6.5-8.5	Section 5
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	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. <table> <tr> <th>Point</th><th>Unit of Measure</th><th>Volume/Mass Limit</th></tr> <tr> <td>1</td><td>kilolitres per day</td><td>12161</td></tr> <tr> <td>27</td><td>kilolitres per day</td><td>12161</td></tr> </table>	Point	Unit of Measure	Volume/Mass Limit	1	kilolitres per day	12161	27	kilolitres per day	12161	Section 5
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1	kilolitres per day	12161									
27	kilolitres per day	12161									
L3.2	The volumetric daily discharge limit for the premises is the combined discharge measured at EPA discharge points 1 and 27 and must not exceed 12161 kilolitres per day.	Section 5									
M2	Requirement to monitor concentration of pollutants discharged										
M2.3	Water and/ or Land Monitoring Requirements	Section 5									

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	Point 1 <table><thead><tr><th>Pollutant</th><th>Units of measure</th><th>Frequency</th><th>Sampling Method</th></tr></thead><tbody><tr><td>Biochemical oxygen demand</td><td>milligrams per litre</td><td>Once a month (min. of 4 weeks)</td><td>Grab sample</td></tr><tr><td>Enterococci</td><td>colony forming units per 100 millilitres</td><td>Once a month (min. of 4 weeks)</td><td>Grab sample</td></tr><tr><td>Faecal Coliforms</td><td>colony forming units per 100 millilitres</td><td>Once a month (min. of 4 weeks)</td><td>Grab sample</td></tr><tr><td>pH</td><td>pH</td><td>Once a month (min. of 4 weeks)</td><td>Grab sample</td></tr><tr><td>Total suspended solids</td><td>milligrams per litre</td><td>Once a month (min. of 4 weeks)</td><td>Grab sample</td></tr></tbody></table> Point 27 <table><thead><tr><th>Pollutant</th><th>Units of measure</th><th>Frequency</th><th>Sampling Method</th></tr></thead><tbody><tr><td>Enterococci</td><td>colony forming units per 100 millilitres</td><td>Daily during any discharge</td><td>Grab sample</td></tr><tr><td>Faecal Coliforms</td><td>colony forming units per 100 millilitres</td><td>Daily during any discharge</td><td>Grab sample</td></tr><tr><td>pH</td><td>pH</td><td>Daily during any discharge</td><td>Grab sample</td></tr><tr><td>Total suspended solids</td><td>milligrams per litre</td><td>Daily during any discharge</td><td>Grab sample</td></tr></tbody></table>	Pollutant	Units of measure	Frequency	Sampling Method	Biochemical oxygen demand	milligrams per litre	Once a month (min. of 4 weeks)	Grab sample	Enterococci	colony forming units per 100 millilitres	Once a month (min. of 4 weeks)	Grab sample	Faecal Coliforms	colony forming units per 100 millilitres	Once a month (min. of 4 weeks)	Grab sample	pH	pH	Once a month (min. of 4 weeks)	Grab sample	Total suspended solids	milligrams per litre	Once a month (min. of 4 weeks)	Grab sample	Pollutant	Units of measure	Frequency	Sampling Method	Enterococci	colony forming units per 100 millilitres	Daily during any discharge	Grab sample	Faecal Coliforms	colony forming units per 100 millilitres	Daily during any discharge	Grab sample	pH	pH	Daily during any discharge	Grab sample	Total suspended solids	milligrams per litre	Daily during any discharge	Grab sample	
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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.	Section 5																																												
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G2	Other general conditions																									
G2.1	Completed programs <table> <tr> <th>Program</th><th>Description</th><th>Completed Date</th></tr> <tr> <td>Coal Mine Particulate Matter Control Best Practice</td><td>Requires licensee to conduct a site specific Best Management Practice (BMP) determination to identify ways to reduce particle emissions</td><td>28-September-2012</td></tr> <tr> <td>Assessment of Potential Impacts of Metals in wastewater</td><td>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.</td><td>23-October-2013</td></tr> <tr> <td>Air Quality Monitoring</td><td>The licensee must evaluate best locations and install monitoring devices as defined in Project Approval MP10_0161 under the Environment Planning & Assessment Act 1979.</td><td>31-December-2013</td></tr> <tr> <td>PRP4 - Upgrade to Clean and Dirty Water Management System</td><td>The licensee must review and upgrade separation of the Clean and Dirty Water Management System and review and upgrade bunding.</td><td>14-August-2015</td></tr> <tr> <td>PRP5 - Remediation of Dam Wall and Spillway formalisation</td><td>The licensee must design and remediate the dam wall on the final control pond and formalise a spillway to prevent dam seepage and to ensure that volumetric discharge can be monitored</td><td>27-February-2015</td></tr> <tr> <td>PRP 6 Upgrade to Sewage Treatment Systems</td><td>Assessment of options for improved disinfection of effluent from STP on licenced premises.</td><td>06-January-2015</td></tr> <tr> <td>PRP7 Sewage Treatment System Concept Design</td><td>Provide the EPA with a Concept Design and Timetable for Implementation of Upgrade to the Sewage Treatment System</td><td>19-February-2016</td></tr> </table>	Program	Description	Completed Date	Coal Mine Particulate Matter Control Best Practice	Requires licensee to conduct a site specific Best Management Practice (BMP) determination to identify ways to reduce particle emissions	28-September-2012	Assessment of Potential Impacts of Metals in wastewater	The licensee must conduct an assessment of metals detected in wastewater discharges from the mine in accordance with the ANZECC water quality guidelines.. To obtain a greater understanding of the type and concentration of metals discharged in mine water and entering the receiving waters. To limit the concentration of metals discharged in mine water within ANZECC guidelines.	23-October-2013	Air Quality Monitoring	The licensee must evaluate best locations and install monitoring devices as defined in Project Approval MP10_0161 under the Environment Planning & Assessment Act 1979.	31-December-2013	PRP4 - Upgrade to Clean and Dirty Water Management System	The licensee must review and upgrade separation of the Clean and Dirty Water Management System and review and upgrade bunding.	14-August-2015	PRP5 - Remediation of Dam Wall and Spillway formalisation	The licensee must design and remediate the dam wall on the final control pond and formalise a spillway to prevent dam seepage and to ensure that volumetric discharge can be monitored	27-February-2015	PRP 6 Upgrade to Sewage Treatment Systems	Assessment of options for improved disinfection of effluent from STP on licenced premises.	06-January-2015	PRP7 Sewage Treatment System Concept Design	Provide the EPA with a Concept Design and Timetable for Implementation of Upgrade to the Sewage Treatment System	19-February-2016	Noted
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Appendix 3: Groundwater Management Plan (GwMP)

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Appendix 5: Standard Erosion and Sediment Controls

Land Clearing Procedures (Clearing and Topsoil Stripping)

Minimise land disturbance to avoid exposing unnecessary land to the processes related to erosion and sedimentation. This is achieved by:

- All operations are planned to ensure that only the areas which are under active excavation are cleared and that there is no damage to any trees and pasture areas outside the limits to be cleared.
- Limiting the cleared width to that required to accommodate excavation plus areas required for topsoil stockpiling.
- General vegetation clearing will not be undertaken until earthwork operations are ready to commence.
- All proposed erosion and sediment control measures are implemented in advance of, or in conjunction with, vegetation clearing and soil stripping operations.
- Prior to vegetation clearing or soil stripping operations, the stripping panel is delineated on a plan and in the field will be marked by survey pegs placed at intervals on each side of the disturbed area. Topsoil limits and the topsoil stripping depths are shown on the pegs.
- Where possible, topsoil is stripped in moist but not wet condition to reduce deterioration in topsoil quality and dust generation and only be stockpiled when no areas of reshaped overburden are available for direct placement and spreading.

Topsoil Stockpiles

Where suitable areas are unavailable for the immediate respreading, topsoil is stockpiled to a maximum depth of three metres and subsequently applied when the areas become available. The period of the stockpiling is minimised in order to reduce the detrimental effects of the storage of any native seed in the soil and damage to the soil structure.

All stockpiles are shaped, trimmed (max batter slope 3H:1V) then ripped and immediately sown with a sterile cover crop and permanent pasture species to provide stockpile stabilisation. Sediment fence is constructed around the downslope perimeter of the stockpiles where required to provide temporary sediment control until vegetation becomes established. Surface drainage in the vicinity of the stockpiles is configured as to direct any runoff around the area so not to cause any potential erosion of the loose material.

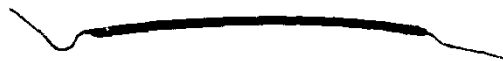
Where topsoil is used as the growing medium, it is re-spread in the reverse sequence to its removal, so that the organic layer, containing any seed or vegetation, is returned to the surface. Re-spreading on the contour aids runoff control and increased moisture retention for subsequent plant growth. Re-spread topsoil should be levelled to achieve an even surface, avoiding a compacted or an over-smooth finish.

Access Tracks

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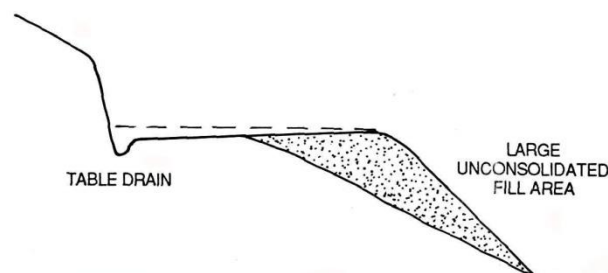
Access tracks are constructed in accordance with appropriate standards such as those described in *Managing Urban Stormwater: Soils and Construction Vol. C - Unsealed Roads*. Surface drainage is optimised and stabilised, thereby reducing roadside erosion and sedimentation. Appropriate control measures are constructed on all access roads with cross fall drainage at 3% either side of the road crown to be largely responsible for immediate water shed from the road surface. Techniques that could be used to provide crossfall on the track include crowning, infall and outfall

- Crowning



Crowning allows water to be shed on both sides

- Infall



- Outfall

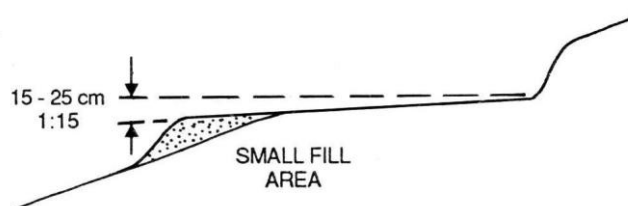


Table Drains, Mitre Drains, Culverts and Cross Drains are used where required to safely convey the water from the track surface so to prevent runoff from eroding them or adjacent land. Mitre Drain spacing should not exceed 50m even on soils with low erodibility. Cross Drains are placed every 20m to 90m depending on the road grade and soil erodibility as required. Refer to Table 5.2 of Vol2C – Unsealed Roads of the 'Blue Book' for more detail.

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Cut and fill batters associated with service tracks are formed to a safe slope and stabilised by vegetation. Where cut batters are greater than 1.5m, stabilisation methods are applied to these areas such as laying back, revegetation and drainage. Stabilisation is assisted by spreading topsoil and/or by applying chemical or organic mulch over the exposed batter surface. Where fill batters are greater than 2:1, re-grading may be required.

Planning and construction of new tracks is undertaken in accordance with the guidelines presented Vol. 2C - Unsealed Roads of the 'Blue Book'.

Haul Roads

Run off from haul roads to be constructed within Chain Valley Colliery is to be contained within the mine water management system. The ultimate goal for the site is that water is not allowed to discharge from the site unless through a LDP. If the runoff from future haul road constructions are not contained within the existing mine water system, dams will be constructed to contain this water and allow it to be pumped back into the mine water management system for release through the LDPs.

During any construction of haul roads, temporary erosion and sediment controls (see **Section 1.1.8**) will be implemented. Sediment fencing will be strategically located around fill termination points as the road alignment approaches clean water drainage lines. The silt fencing will not be removed until construction of the appropriate drainage and culverts are completed. Temporary sediment trapping devices may be required during construction to treat sediment-laden runoff from small areas (0.5 ha or less). Where haul roads are required to cross any watercourses, they will generally be constructed so that they cross perpendicular to the watercourse, subject to other constraints. Once constructed, long term sediment controls such as mine water sediment dams will be constructed at the outlet points of the storm water drains to contain water within the mine water management system. However haul roads at Chain Valley are currently sealed bitumen surfaces and erosion of the permanent structures may be effectively controlled by regular cleaning to prevent the accumulation of coal fines.

Diversion Structures (Clean Water)

In order to minimise the volume of dirty and mine water to be treated, all clean run-on water is diverted where possible into clean water drainage lines to be directed off-site. This not only reduces the potential for erosion to occur on disturbed areas, but also reduces the pressure on the dirty and mine water management controls which are required to treat sediment-laden runoff to an acceptable standard for discharge. Suitably designed and constructed diversion drains are implemented where practical around the Chain Valley Colliery in accordance with 'Blue Book' standards relating to channel design. In general, the drains should be trapezoidal in shape with maximum side slopes of 1V:2H. Where peak design water velocities exceed 1.5m/s, the drains should be protected from scour using either erosion channel liners and/or geofabric with rock rip-rap armouring.

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Diversion Structures (Mine and Dirty Water)

Catch drains are utilised throughout the site to minimise erosion and re-direct potentially contaminated runoff into dirty water sediment dams and mine water dams. Runoff from disturbed areas, such as stockpile areas, is conveyed to these dams by catch drains and bunds.

Bunds shall be constructed similar to top soil emplacement areas, bunds shall be shaped, trimmed (max batter slope 3H:1V) then ripped and immediately sown with a cover crop and permanent pasture species to provide bund stabilization.

For runoff from rehabilitation areas, the water management structures should be appropriately designed before layout and construction. Typically the water management structures include contour banks, which are constructed at intervals down the slope of rehabilitation areas to control surface flow and minimize erosion. The effect of these is to divide long slopes into a series of short slopes with the catchment area commencing at each bank. This prevents runoff from reaching a depth of flow or velocity which would cause erosion. As the slope angle of the landform increases, the banks are spaced closer together. Bank spacing is determined based on the surrounding catchment layout and the bench spacing guide contained in Table 4.1 of *Vol2E – Mines and Quarries* of the 'Blue Book'. The banks should have a longitudinal grade of 1.2%. Where peak design water velocities exceed 1.5m/s, the drains should be protected from scour using either erosion channel liners and/or geofabric with rock rip-rap armouring.

Control Devices

Mine water dams and mine water sediment dams (generally smaller structures) are used at Chain Valley Colliery to contain potentially contaminated 'mine' water. This water has the potential to contain elevated salinity concentrations and/or potential hydrocarbon contamination as a result of runoff from haul roads, workshop areas and areas exposed to carbonaceous material. They also function as sediment dams for sediment control but are not allowed to spill into neighbouring watercourses unless released through a LDP.

Dirty Water sediment dams are intended to catch runoff from disturbed areas that are not exposed to potential contamination of hydrocarbons or carbonaceous material. These include general construction areas and rehabilitation areas. In general dirty water sediment dams should be constructed on all disturbed areas not draining to mine water dams. The dams are constructed for the purpose of capturing sediment-laden runoff prior to off-site release. Dirty water sediment dams assist in improving water quality throughout the mine site.

The number and capacity of dams will be related to the total area of catchment, the duration of disturbance and the anticipated soil loss. The capacity of each dam is derived from the benchmark design reference for sediment control, *Managing Urban Stormwater: Soils and Construction Vol. 1* and *Vol. 2E Mines and Quarries* (the Blue Book) (Landcom, 2004 and DECC, 2008). The dams are constructed to at least the recommended minimum design criteria as presented in Table 6.1 of Vol 2E Mines and Quarries of the Blue Book. For most areas, this is the 90th percentile, 5 day rainfall event for a Type F/D basin (soils that are fine textured and possibly dispersive).

The following points will be considered when selecting future sites for sediment dams:

- Each dam will be located so that runoff may easily be directed to it, without the need for extensive channel excavation or for excessive channel gradient. Channels will discharge into the dam without

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risk of erosion. Similarly, spillways will be designed and located so as to safely convey the maximum anticipated discharge.

- The material from which the dam is constructed will be stable and be imported from elsewhere on the mine, if necessary. Highly dispersible clays will require treatment with gypsum and/or bentonite to prevent failure.

Temporary Erosion and Sediment Controls

Prior to any construction activity (including soil stripping, road construction, bulk earthworks), temporary erosion and sediment control measures are installed. The following sub-sections include temporary erosion and sediment control features that may be utilized at the site.

Sediment Filter Fences

There may, on occasion, be a disturbance area which is either not protected by existing structures or requires additional temporary protection against erosion and sedimentation. In these cases it may be suitable to install sediment filter fencing. Sediment filter fences filter run-off leaving the site, trapping sediment and allowing filtered water to pass. Sediment filter fences are constructed around the base of any areas of exposed land that are not subject to concentrated overland flow, that are not adequately protected by existing structures and that are not within the mine water management system. Sediment filter fencing is installed around the extent of the disturbance areas where sediment-laden water could potentially enter clean downstream receiving waters.

Sediment filter fences are normally placed on the contour or slightly convex to the contour. The contour on each end of the fence should be turned to create a stilling dam up slope of the fence. Where possible, a silt fence system should consist of a series of overlapping fences. Each fence should be NO longer than about 40 metres. They should not intercept large concentrated or channelised flows. The fences are constructed in accordance with the Sediment Fence Standard Drawing (SD6-8) of the 'Blue Book'. Silt fences require regular maintenance. Trapped sediments should be removed, pickets straightened, filter cloth re-secured and tightened.

Sandbag Weirs

Sandbag weirs are sometimes installed within existing swale drains or existing drainage channels, which are not able to be regularly graded. The use of these devices is limited to temporary erosion and sediment control in channels during construction or high disturbance phase mining.

The weirs are typically installed at a minimum of 40 metre intervals. As with sediment filter fences, sandbag weirs may be installed prior to any works commencing on the site in existing channels and immediately after the construction of new channels. Inspections of the sandbag weirs after rain should take place with removal of the collected sediment as required. Damaged/shifted bags should be repaired or replaced.

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Temporary Drains

Runoff from areas exposed during the works is to be controlled by construction of temporary contour and diversion drains. These drains generally take the form of channels constructed across a slope, with a ridge of the lower side. They should be implemented immediately after a construction site is cleared to intercept and divert runoff from the site to nearby stable areas at non-erosive velocities. The drains should be formed with a gentle grade of approximately 1.2%

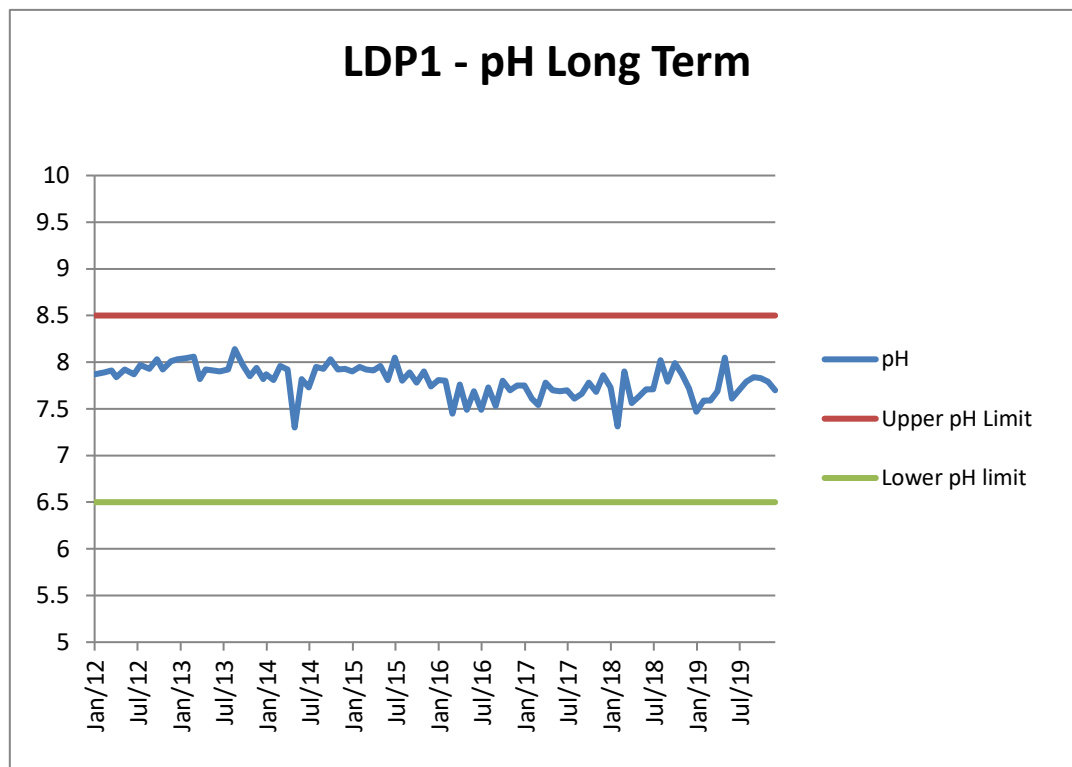
Temporary Silt Traps

Temporary sediment trapping devices may be required during construction to trap and filter sediment-laden runoff from small areas (0.5 ha or less) prior to discharge. They are used to trap small amounts of run-off water and filter sediment from runoff before entering the natural watercourses or to protect adjacent lands. These would typically be used at the discharge point of mitre drains and other similar devices.

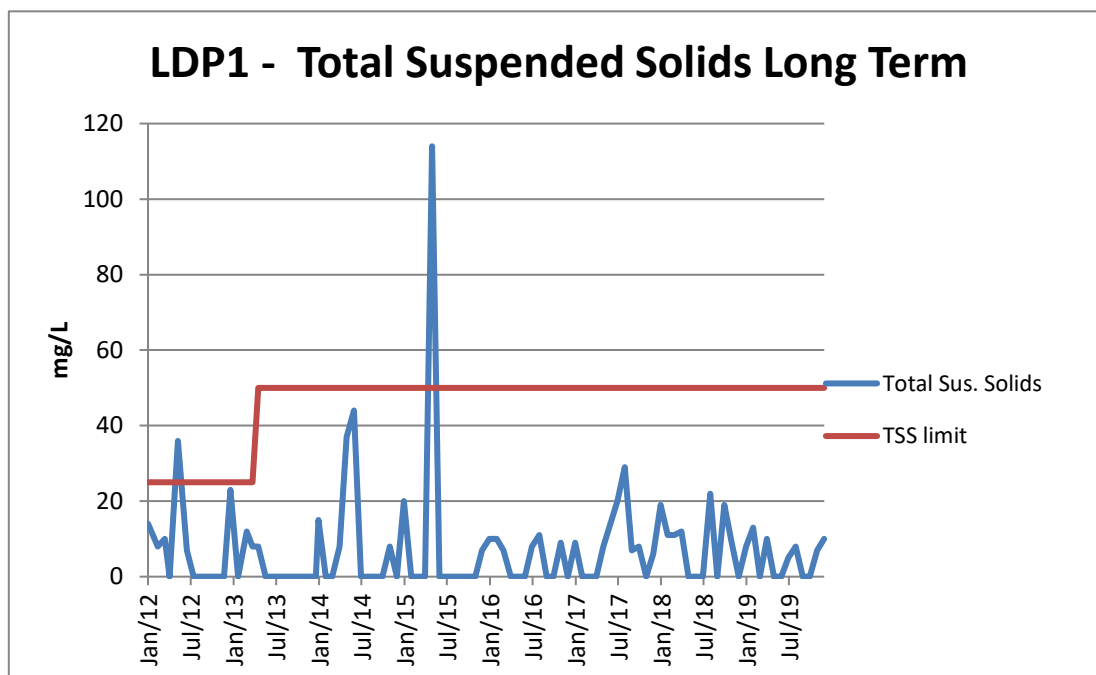
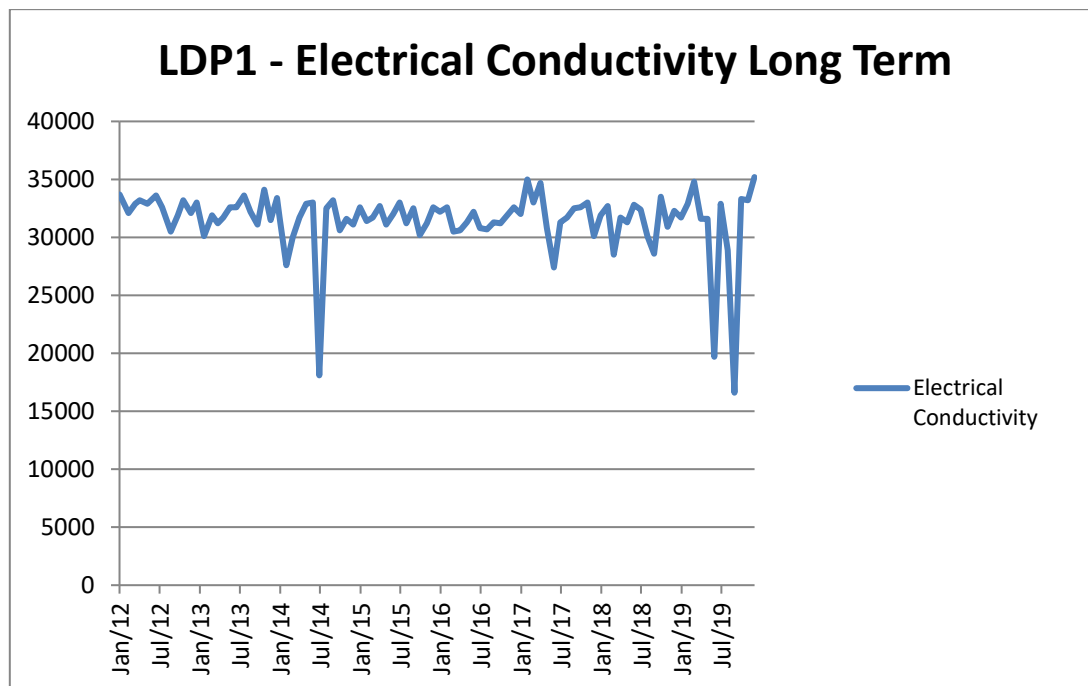
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Appendix 4: EPL 1770 Water Quality Monitoring Results

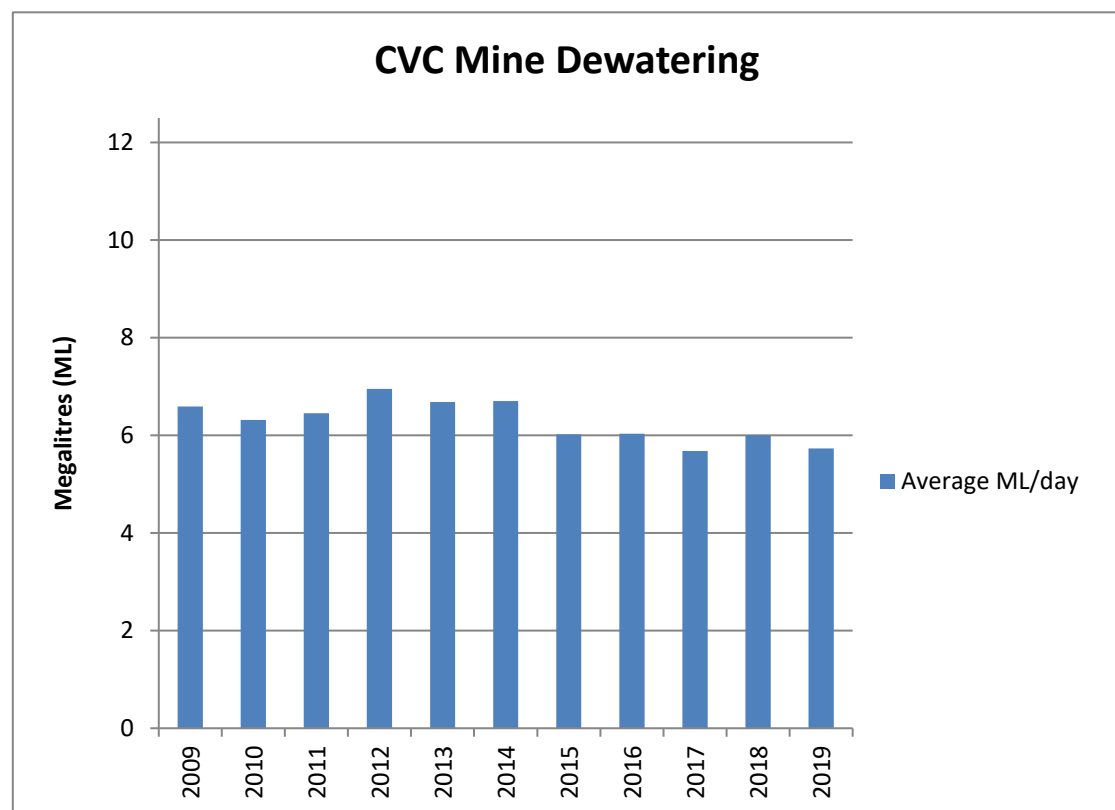
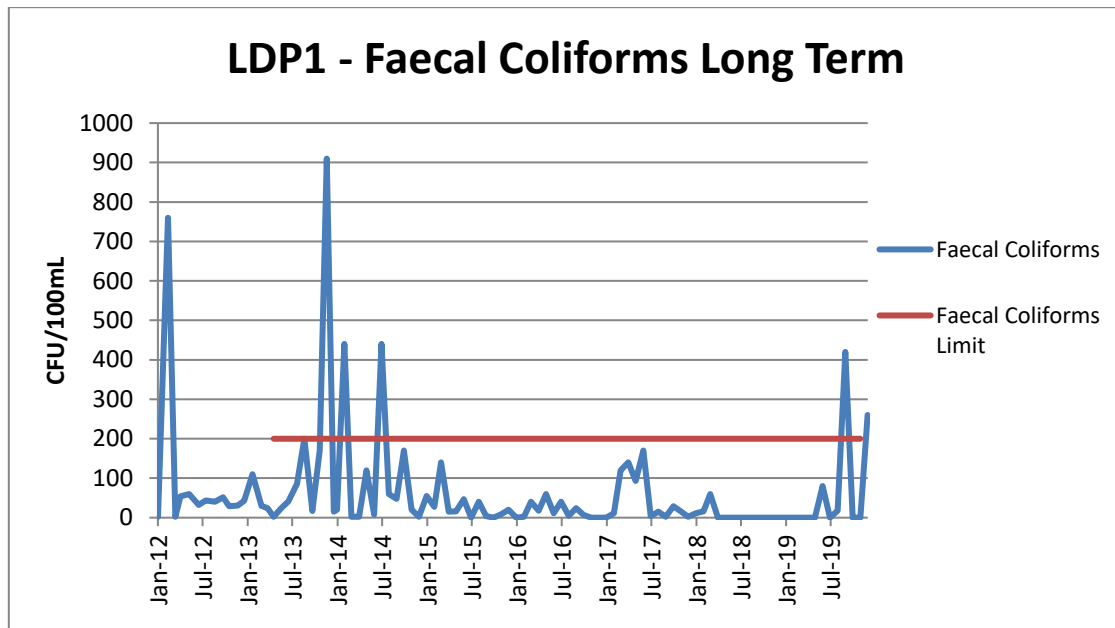
Long term monitoring results from the 2019 Annual review detailed below.



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Appendix 6: DPIE Approval Letter

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