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CHAIN VALLEY COLLIERY
MINIWALL S4 EXTRACTION PLAN
(CVC-EP-MWS4)

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1 Title block

Title block requirements	
Name of applicant company	Great Southern Energy Pty Ltd (trading as Delta Coal (DC))
Name of mine	Chain Valley Colliery
Development consent	SSD-5465
Mining lease(s)	ML1632
Extraction Plan title	Miniwall S4 Extraction Plan
Version	1.1
Date	11 March 2020 / 12 May 2020
Reference number	CVC-EP-MWS4
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Steve Gurney Delta Coal Company Secretary	

2 Development of the plan

2.1 Purpose

The primary objective of the Chain Valley Colliery (CVC) Miniwall S4 Extraction Plan (EP) is to satisfy the requirements set out in Condition 7, Schedule 4 of State significant development (SSD) consent SSD-5465 (as modified). This EP outlines the actions and procedures to be undertaken to ensure compliance with CVC's statutory requirements. This EP applies to Miniwall S4 (Appendix 12-Graphical Plans, Plan 1).

Overall, the purpose of this EP is to:

- identify potential environmental impacts associated with the proposed extraction activities within the Miniwall S4 mining area; and
- identify the monitoring and management controls and mitigation measures that will be implemented to minimise the potential environmental impacts.

2.2 Background

CVC is an underground coal mine on the southern side of Lake Macquarie approximately 60 km south of Newcastle and 80 km north of Sydney. The pit-top is located 3 km south of the township of Mannering Park.

Great Southern Energy Pty Ltd (trading as Delta Coal (DC)) commenced as owner and operator of CVC and as the operator of neighbouring Mannering Colliery (MC) on 1 April 2019. Prior to the purchase by Great Southern Energy Pty Ltd, CVC was owned and operated by LakeCoal Pty Ltd (LakeCoal). LakeCoal also operated MC under an agreement with the owners of the mine; Centennial Mannering Pty Limited, a wholly owned subsidiary of Centennial Coal Company (Centennial).

CVC operates under SSD-5465, as modified, which was originally granted on 23 December 2013 by the then Minister for Planning and Infrastructure under Part 4, Division 4.1 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

2.3 Key legislation, policy and guidelines

Both State and Commonwealth environmental legislation applies to DC's operation and activities at CVC. A number of legislative requirements, government policies and guidelines are applicable. Key items of legislation, policy and guidelines relevant to this EP are:

- Draft *Guidelines for the Preparation of Extraction Plans* (DPE no date) – Version 5;
- EP&A Act;
- NSW *Protection of the Environment Operations Act 1997* (POEO Act); and
- NSW *Mining Act 1992* (Mining Act).

2.4 Development consent

In accordance with Schedule 2, Condition 2 and 2A of SSD-5465 (as modified), in addition to carrying out the works in accordance with the conditions of SSD-5465, DC will carry out works generally in accordance with the Environmental Impact Statement (EIS); Statement of Environmental Effects (SEE) (Mod 1); SEE (Mod 2); project layout plans; and Statement of Commitments.

In accordance with Schedule 4, Condition 9 of SSD-5465, DC received Secretary's approval to perform first workings associated with Miniwall S4 on the 10th September 2019 (Appendix 16).

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As required by Schedule 4, Condition 7 of SSD-5465, this EP has been prepared in consultation with NSW Department of Planning, Industry and Environment (DPIE) and by suitably qualified and experienced persons whose appointment was endorsed by the Secretary on 11 September 2019.

The specific requirements within SSD-5465 that are of relevance to this EP and where they have been addressed are listed in **Appendix 2**.

2.5 Consultation

In accordance with Schedule 4, Condition 7 of SSD-5465, as part of the preparation of this EP, DC has consulted with the local community (via the CVC and MC Community Consultative Committee (CCC)) on 13 November 2019 and 19 February 2020, Bonnell's Bay Community Drop in-session on 5 March 2020 and a number of regulatory agencies.

A copy of the draft EP was provided to the following stakeholders on 20 December 2019 for view and downloading on the Delta Coal website:

- DPIE – Resource assessments;
- DPIE – Resources Regulator – Subsidence Engineer;
- DPIE – Resource Regulator – Environment Inspector
- DPIE – Biodiversity and Conservation Division (BCD);
- DPI – Water;
- DPI - Cabinet
- NSW-EPA;
- NSW Department of Primary Industries – Fisheries (DPI – Fisheries);
- Roads and Maritime Services (RMS)
- Lake Macquarie City Council;
- Central Coast Council;
- NSW National Parks and Wildlife Service (NPWS);
- Subsidence Advisory NSW; and
- CVC and MC CCC members

A summary of the comments received and amendments made to the document prior to finalisation will be detailed in **Table 1**. Evidence of consultation is provided in **Appendix 1**.

Table 1: Consultation summary

Stakeholder	Comments	Response
DPIE – Resource Assessments	- No comments received as of the 11 March 2020. - Access provided to DC for the online planning portal to submit the Extraction Plan and associated documents	Document uploaded onto online planning portal on 11th March 2020. Review completed by DPIE 5/5/2020 in portal see Appendix
DPIE – Resource Regulator – Subsidence Engineer	Comments received on Built Features Management Plan (BFMP) and the Public Safety Management Plan (PSMP) which has been included in these plans. Appendix 1	See updated BFMP and PSMP for consultation

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Stakeholder	Comments	Response
DPIE – Resources Regulator – Environment Inspector	- Verification of EP received on 9 January 2020. Reference MAAG0005552. - MOP 2018-2020 Amendment included S4 Miniwall was approved 14 February 2020. Appendix 1 - Reminder by RR to obtain all necessary approvals, consents and permits prior to carrying out S4 operations.	Extraction Plan submission on 11th March 2020
DPIE – BCD	Response received from Robert Gibson (OEH) on the 10th January 2020. BCD has reviewed the draft Extraction Plan and has no comment to make on it. Appendix 1.	Nil required
DPI – Water	No comments received as of the 11 March 2020.	Nil required
DPI Cabinet	No comments received as of the 11 March 2020.	Nil required
NSW EPA	Automated email response. No comments received as of the 11 March 2020.	Nil required
DPI – Fisheries	No comments received as of the 11 March 2020	Nil required
Lake Macquarie City Council	Comments regarding BFMP – no identified features for LMCC jurisdiction for Central Coast council, Seagrass Management Plan (SMP) missing information to include and no comments on the Benthic Communities Management Plan (BCMP) received on 12 December 2019	See updated SMP for identified missing information and additional text to rectify.
Central Coast Council	No comments received as of the 11 March 2020.	Nil required
NPWS	Meeting at Lake Munmorah NPWS office on 8th August 2019	Conservation Risk Assessment and Review of Environmental Factors completed by DC and s151 approval granted by NPWS for Miniwall S4 subsidence foreshore monitoring line
Roads and Maritime Services	Letter received on 8 December 2019. Project identified as having minimal impact to safety on vessels navigating in the area of Pelican Rock Navigational Marker. Appendix 1.	See updated BFMP for consultation
Subsidence Advisory NSW	Site meeting on 11 March 2020 with Matthew Montgomery (Infrastructure Manager)	Nil required
CVC and MC CCC members	Independent chairperson distributed the Extraction plan to CCC members. No comments received on the 19 February 2020 Quarterly Combined Delta Coal CCC meeting.	Nil required

Landholders with registered water bores near Chain Valley Bay were contacted as part of the preparation of the EIS. No currently active water bores were identified at this time as requiring management. No further impacts to landholders are anticipated from the proposed extraction within the Miniwall S4 area and thus no further consultation is required.

Landholders along the foreshore areas adjacent to Miniwall S4 have been consulted via letter box drops and face-to-face meetings as part of the development of the Subsidence Monitoring Program (refer Appendix 9).

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The only infrastructure identified within the Miniwall S4 extraction area of impact, relates to a navigational marker located off Summerland Point. The NSW Roads and Maritime Services (RMS) Project Officer (North Area) was contacted during the development of the EPs for Miniwalls S1/N1 and S2/S3. The officer referred the matter to the RMS Asset Team and no further action was required. Predicted impacts to this marker as a result of extraction in the Miniwall S4 area are managed through the Built Features Management Plan.

2.6 Subsidence predictions and impact review

David Hill from Strata 2 undertook a geotechnical and subsidence prediction assessment in 2019 for Miniwall S4 (Appendix 15). This report built upon the previous nearby subsidence assessments and site subsidence monitoring results,

The original subsidence assessment was completed by Ditton Geotechnical Services in 2015 to support the MOD 2 SEE. This assessment reviewed updated subsidence data for Miniwalls 1–8, along with existing historic subsidence data from surrounding extracted areas. Later, subsidence data over Miniwalls 1–12 revealed that actual subsidence was approximately 0.37 m above the maximum predicted values (DGS 2018a).

It was assessed that time-dependent subsidence associated with chain pillar overloading in soft floor conditions was resulting in subsidence above original predictions (0.78 m maximum predicted), with the data and associated analyses indicating that the subsidence is likely to be driven by the:

- increased span of the Munmorah Conglomerate and subsequent decrease in overburden stiffness; and
- increased stress applied to the central chain pillars by the deflecting conglomerate likely to having exceeded the bearing strength of the moisture sensitive claystone floor strata.

These learnings have subsequently been incorporated into the design of the S2–S4 miniwall panels, namely:

- the subsidence assessment considers the ‘bank’ of Miniwalls S2–S4, thereby assessing the potential increase in subsidence due to the spanning capabilities of the overlying Munmorah Conglomerate; and
- the S3 to S4 inter-panel chain pillar width has been increased from 32.6 m to 40 m to limit pillar system deformation (Strata2 2019).

Updated subsidence predictions have been developed for the revised layout based on empirical modelling techniques (Strata2 2019).

A number of surface and subsurface features of significance were identified from the assessments and inspections within the zone of predicted subsidence (Plan 2 of Appendix 14) as having potential to be affected by far-field movements as a result of the proposed Fassifern Seam workings, including:

- Lake Macquarie and its bed sediments;
- benthic fauna communities;
- seagrass beds;
- groundwater;
- Pelican rock navigational marker (Lake Macquarie) Appendix 13); and
- jetties and moorings.
- high water mark (RL 0 m–2.44 m AHD) along the lake foreshore;
- residential buildings and other built features adjacent the foreshore; and

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These have all been reassessed in terms of the updated subsidence predictions (Strata2 2019), following a similar process to the previous applications and via the Extraction Plan Risk Assessment (Appendix 3).

3 Overview

3.1 Mine planning and design

Area covered by this extraction plan

The area adjacent to the proposed workings has been extensively mined over the past 60 years, primarily within the overlying Wallarah Seam and, to a lesser extent, the targeted Fassifern Seam (Plan 4 of Appendix 14). The North Mains first workings access the mining area on the Fassifern Seam, noting that previously extracted miniwall and bord and pillar panels are outside the angle of draw.

As noted previously, the mining area covered by this EP consists of a single miniwall panel (S4) with a surface effect area covering 22 ha wholly beneath Lake Macquarie (Appendix 14). The panel is aligned with the previously approved S2/S3 panels in an east-south-east to west-north-west orientation. Miniwall S4 is planned to be extracted at the completion of mining in the previously approved Miniwall S3 panel.

All extraction and subsidence impacts of relevance to Miniwall S4 are beneath Lake Macquarie. Therefore, surface features are limited to the lake bed. Impacts to the lake foreshore and/or seagrass beds are not predicted.

Mine design has been the primary control to limit impacts and prevent potential for subsidence exceedances. The proposed mine design has included consideration of the high water mark and seagrass communities.

Proposed mine layout

In 2016, CVC encountered large-scale faulting in the Northern Domain. Subsequently, alternative mining areas were required, mine plans needed to be re-evaluated and relevant planning and environmental approvals sought. This has contributed to the mine plan variation in both this and previous EPs. The primary considerations in this plan have been:

- applying the learnings with respect to subsidence resulting from previous miniwall extraction (refer Section 2.6);
- minimising the likely exposure of the miniwall panel to normal faults for safety, productivity and subsidence management purposes; and
- controlling the height of fracturing above the extracted area to meet rockhead thickness constraints.

The location of, and potential impacts associated with, the proposed mine design are generally consistent with SSD-5465. A summary of the mine design changes implemented by DC in the proposed mining area are outlined below in **Table 2**.

Table 2: Mine plan changes

Approved layout changes	Justification for modification
Re-orientation of the panel from SE-NW to ESE-WNW.	- Maximise recovery and improve mining conditions. - Increase seagrass protection barrier (as a result of the increases in the seagrass community, which have extended since previous surveys).

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Increase in S3 to S4 inter-panel chain pillar width from 32.6 m to 40 m (solid).	- Limit pillar system deformation. - Maintain sub-critical overburden caving behaviour.
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These changes are generally consistent with SSD-5465, resulting in an overall reduction in potential impacts and provide examples of adaptive management being applied to extraction within the mining area.

Mining domains

The extraction plan area is covered by mining lease (MLs) ML1632 (Plan 5 of Appendix 14). Historical, approved and proposed workings of relevance to this EP are described below.

3.1.1.1 Overlying Wallarah Seam workings

Partial extraction within the Wallarah Seam (overlying the Fassifern Seam) has been undertaken (Plan 4 of Appendix 14) historically within the vicinity of Miniwall S4. There are no historical workings directly above Miniwall S4. The closest Wallarah Seam first workings are approximately 210 m south of the starting position of Miniwall S4.

Walarah Seam workings are generally 80–85 m above the Fassifern Seam, with the interburden consisting of claystone, sandstone, coal seams and thick conglomerate beds. Due to the large barrier pillar, no subsidence or abutment loading interaction is expected between the Fassifern and Wallarah Seam workings.

3.1.1.2 Existing first workings and secondary extraction

CVC is undertaking extraction in the Fassifern Seam Miniwall S2/S3 areas, south of the proposed Miniwall S4 (Plan 1 of Appendix 14). The first workings currently used to access CVC and the proposed Miniwall S4 adjoin these areas.

Due to the compounding nature of subsidence in adjacent extraction panels, a combined subsidence assessment has been prepared, which considers S2, S3 and S4 (Strata2 2019) in Appendix 15.

3.1.1.3 Proposed mining activities

It is proposed to limit extraction in the approval area to the nominated miniwall panel (ie Miniwall S4). This is intended to enable CVC to:

- gain additional monitoring data to validate subsidence predictions;
- improve knowledge on subsidence development mechanisms and controls; and
- optimise the future layout.

This will provide continuity of operations and minimise risks associated with exceedances of predicted subsidence.

Any extraction beyond Miniwall S4 will be subject to a separate EP.

Mining parameters

Mining within Miniwall S4 will be via miniwall methods with panel widths of 97 m (total extracted void) accessed by a combination of twin gateroads separated by either:

- 24.6 m (solid width) chain pillars in the case of the S2 Tailgate and S4 Maingate; or

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- 40 m (solid width) chain pillars in the case of the S2 and S3 Maingate.

A miniwall is essentially a longwall with a reduced face width. Miniwall methods offer a low operating cost, high production rate and operationally safer alternative to pillar extraction mining methods previously employed at CVC. The reduced panel widths allow for the maintenance of bridging overburden conditions, reducing subsidence and improving face conditions.

The Fassifern Seam in the Miniwall S4 area ranges between 4.5 m and 4.9 m thick, with depth of cover (including sediment) between approximately 165 m and 175 m. It is proposed to extract a maximum of 3.5 m on the miniwall and 3.2 m in development, leaving coal both on the floor and in the immediate roof.

Floor coal provides a protective layer above the underlying claystones, which are highly susceptible to deterioration if exposed to water or atmosphere. They are also readily broken up by mining equipment, greatly impacting roadway conditions (where exposed). The roof coal is of significantly higher ash content and would negatively impact on the saleability of the coal product. Left in place, it contributes to improved roadway roof conditions on development.

A summary of the key mining parameters for Miniwall S4 is provided in Table 3 to Table 6.

Table 3 – Projected coal recovery within S4

Total resource (assumes 22 ha area for S4)	1.3 million tonnes (Mt)
Total development extraction	0.07 Mt
Total miniwall extraction	0.52 Mt
Total reserves extracted	0.59 Mt
Percentage recovery	33%

Table 4 – Miniwall S4 panel geometry

Panel length (m)	Void width (m)	Extraction height (m)	ROM tonnes (Mt)
1098	97	3.5	0.52

Table 5- Miniwall S4 Fassifern Seam parameters and development roadway geometry

Seam thickness (m)	Depth of cover (m)	Drivage width (m)	Drivage height (m)
4.8–5.0	160–171	5.4	3.2

Table 6- Miniwall S4 estimated mining schedule

Start date	End date	Estimated duration (months)
August 2020	December 2020	5

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Consideration of previous working and multi-seam interactions

As part of the preparation of the EP for S2/S3, MSEC (2018) prepared a subsidence assessment, which included consideration of previous Wallarah Seam workings and multi-seam interactions. The assessment acknowledged that:

- Historic partial extraction workings have been carried out south-west of S2/S3 (Plan 4 of Appendix 12). The workings comprise 42-m-wide goafs (ie extracted pillars) between 18 m by 18 m remnant pillars. These historic workings are 300 m from S2 at their closest point (ie twice the depth of cover). At this distance, it was considered very unlikely that the extraction of S2/S3 would affect the load on or the stability of these historic workings.
- Historic first workings have been carried out south-east of S2/S3 and beneath the foreshore of Lake Macquarie (Plan 4 of Appendix 12). These workings were found to be outside the 26.5° and 35° angles of draw. It was therefore considered unlikely that the extraction of S2 and S3 would affect the load on or the stability of these historic first workings.

No further impacts have been identified from overlying Wallarah Seam workings as part of the geotechnical assessment for Miniwall S4 (Strata2, 2019).

Consideration of other features

Thin beds of claystone in the Fassifern Seam floor have been attributed to increases in floor heave under higher pillars loads associated with the extraction of multiple panels. The potential for increased subsidence effects associated with softening and lateral squeezing of the claystone has been noted and accounted for in the updated analyses prepared as part of this EP.

The limited final pillar stresses and high Stability Factors associated with the S2/S3 and S3/S4 panel chain pillars are not anticipated to have any adverse or irregular subsidence effects (Strata2 2019).

3.2 Subsidence predictions

Overview

Subsidence magnitudes and impacts have previously been estimated as part of the preparation of the life of mine design for CVC, which included the Miniwall S4 area covered by this EP (DGS 2015). The methodology used to predict subsidence was originally based on the results of the Australian Coal Industry's Research Program (ACARP) (Ditton and Frith 2003), *Review of industry subsidence data in relation to the influence of overburden lithology on subsidence and an initial assessment of a sub-surface fracturing model for groundwater analysis*, as well as a review of subsidence data from MW 1–9 at CVC and LW17–23 at MC. This information was re-analysed for the MW 1–12 exceedance investigation at CVC (DGS 2018a), leading to a revised subsidence assessment for the S1 and N1 Panels (DGS 2018b).

In assessing factors that could influence subsidence for Miniwall S4, a geotechnical mine design investigation (combining an assessment of pillar stability, surface subsidence and height of connective fracturing) has been completed (Strata2 2019). This document was used to inform the mine design and management plans (refer Chapter 4). This assessment builds on the previous learnings with respect to subsidence impacts from previous miniwall extraction at the mine. As part of the assessment, specific consideration was given to:

- depth of cover,
- rock head cover;
- panel width;
- chain pillar geometry;
- extraction height;
- spanning capabilities of the conglomerate-dominated overburden;
- floor properties (in particular weak and moisture sensitive claystone units);
- potential for additional long-term subsidence/creep;
- the location of the proposed extraction outside of both the high water mark subsidence barrier (HWMSB) and identified seagrass communities (Plan 2 of Appendix 12); and

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- the location of the workings with regard to previous workings in the same seam.

Predicted subsidence effect parameters for Miniwall S4 are summarised in Table 7.

Table 7 - Predicted Subsidence Effects (Strata2 2019)

Subsidence (m)		Angle of draw	Long-term tilt and systematic strain maxima (mm/m)		
Short-term	Long-term		Tilt	Tensile strain	Compressive strain
0.2 m	0.3 m	<26.5°	<4	2	2

Lake bed fracturing

Ditton (2015) indicated that, based on previous experience at nearby mines, it can be assumed that any surface cracking to the rock head below the lake bed sediments is likely to be minor for the predicted range of surface subsidence magnitudes. Tensile strains were predicted to be up to 1.5 mm/m and maximum crack widths were estimated to be <20 mm at rock head. MSEC (2018) arrived at a similar conclusion, with fractures of ≤10 mm at the rock head extending to a depth of up to 3 m.

It is likely that any cracks that occur will be naturally 'filled' by lake bed sediments with no impact on the lake bed itself. The strains at the lake bed surface itself will also be more uniformly distributed and are therefore more likely to be absorbed by the plastic nature of the sediments.

Sub-surface fracturing

Two methods have been adopted for estimating the height of sub-surface fracturing, namely:

- a model developed by Ditton and Merrick (2014) that has been used successfully for all previous miniwall extraction at CVC; and
- a model developed by SCT (2008) as part of an ACARP project investing aquifer inflow predictions above longwall panels.

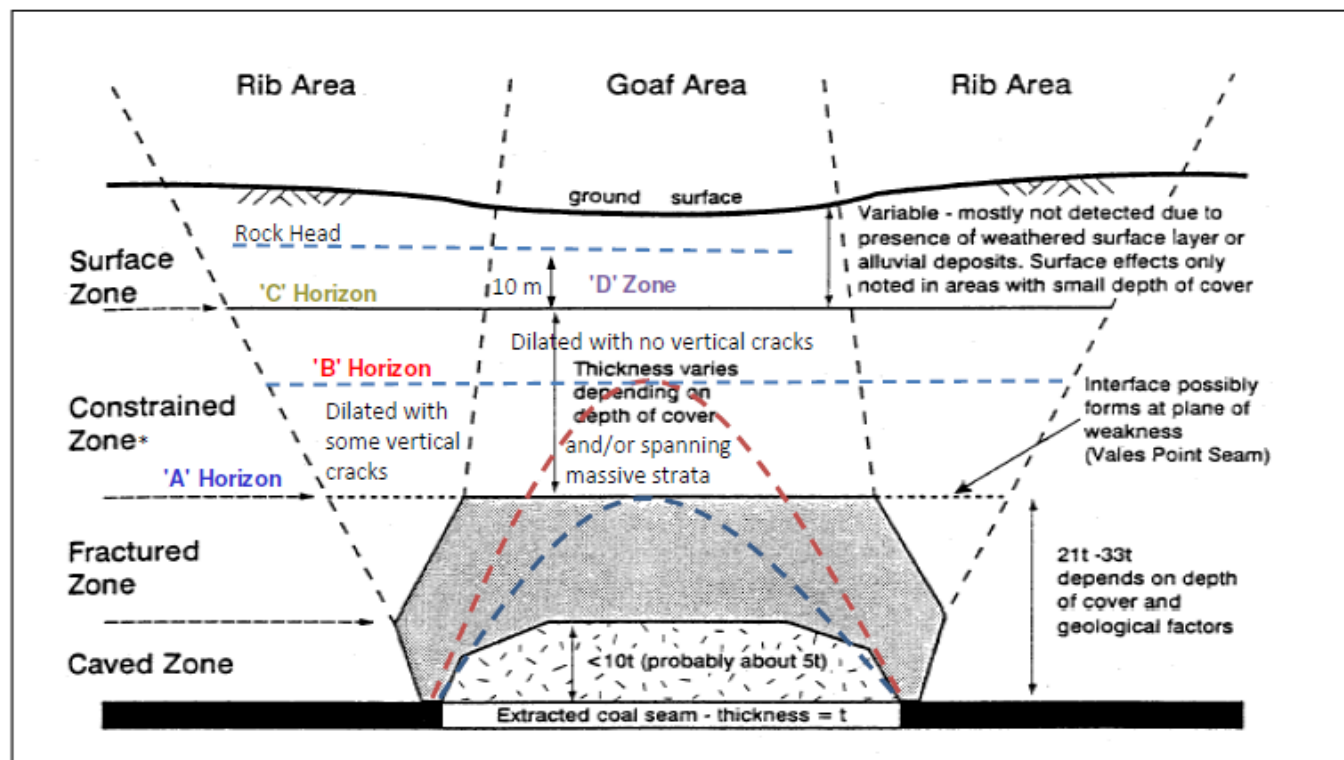
3.2.1.1 Ditton and Merrick (2014)

The approach adopted by Ditton and Merrick (2014) builds on the work of Whittaker and Reddish (1989) and Forster (1995). The nomenclature of the sub-surface fracturing model is described in Figure 1. The predicted height of connective cracking is termed the "A Horizon" (Whittaker and Reddish) or "Fractured Zone" (Forster 1995).

The Ditton & Merrick (2014) model includes data from Forster (1995) and can be used to assess both sub-critical and supercritical panel geometries, whereas the original Forster (1995) work focussed on super-critical panels. DgS (2018b) back analysed sub-critical and supercritical behaviour relating to height of fracturing for previous MC and CVC panels and found these models to provide reliable height of fracturing predictions.

The results for an extraction height (T) of 3.5 m are summarised in Table 8.

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Zones in the Overburden according to Forster (1995)

* - Constrained Zone generally means B-Zone, but may include C-Zone, depending on W/H ratio and geology

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	Drawn: S.Ditton	CHV-002/1
	Date: 23.11.12	Title: Schematic Model of Overburden Fracture Zones in Forster, 1995 Model (based on Piezometric Data Above High Extraction Panels in the Newcastle Coalfield)
	Ditton Geotechnical Services Pty Ltd	Scale: NTS
		Figure No: 34.2

Figure 1 - Overburden fracture zones (Source: Ditton 2013)

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Table 8 - Predicted heights of fracturing above Miniwall S4 (Source: Strata2 2019)

Panel section	Effective cover depth (m)	Rock cover (m)	'A-Zone-height range (m)	12T criterion (m)
Start	170	159	81 - 96	42
Finish	162	147	79 - 94	42

To obtain accurate rock head cover values, the mine conducted a detailed geophysical survey of lake bed sediment thickness over the northern mining domain in early 2018. This survey has shown that the sediment is often thicker than previously estimated, particularly in the central lake area.

In the Miniwalls S2–S4 area, the Ditton and Merrick (2014) model indicates that there is sufficient cover to meet a minimum constrained zoned thickness of 12T (Forster 1995). This is considered acceptable given the quality of the data, the absence of major geological structures and the sub-critical nature of the panels.

This is consistent with the successful application of the model in the MW1-12, CVB1, S1 and N1 areas, noting that MW 11 and 12 involve similar depths of cover and haven't experienced any signs of interconnectivity.

3.2.1.2 SCT (2008)

The approach adopted by SCT (2008) also builds on the work of Whittaker and Reddish (1989) as it links inflow experiences to subsidence and systematic tensile strains. Essentially, no issues are expected at strains of <4 mm/m and major difficulties are anticipated at strains of >10 mm/m (assuming a 'k' value of 0.6). These findings are consistent with those of Whittaker and Reddish (1989), as well as Wardell (1975).

Experience at CVC and MC is consistent with that from elsewhere, with no inflow issues at low strain values. The predicted subsidence and systematic strain values for the proposed Miniwall S4 are at the low end of the database, such that no issues are anticipated.

3.2.1.3 Summary

The maintenance of a sub-critical panel geometry with subsidence at the low end of the historical range for miniwall operations at CVC results in acceptable outcomes in terms of the height of connective fracturing for the combined S2, S3 and S4 panels.

Potential environmental consequences

Based on predicted maximum panel subsidence, tilt and strain values for Miniwall S4, potential subsidence-related impacts and their likely effect on nearby natural and man-made features have been considered, including:

- changes to the lake bed level;
- surface cracking beneath the lake bed;
- height of sub-surface fracturing above the panels (direct and indirect hydraulic connection zones);
- impacts on groundwater; and
- impacts on the foreshore of Lake Macquarie and surrounding natural and man-made features inclusive of public safe risks.

The Extraction Plan Risk Assessment (Appendix 3) evaluated overall environmental risk (as it relates to subsidence impact) for Miniwall S4. From this and via application of mine design controls (refer Section 3.1)

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along with monitoring and response management systems (eg trigger action response plans (TARPs)), the risk of irregular subsidence impacting the foreshore or sensitive environmental features was considered highly unlikely.

Subsidence-related changes to the lake bed level and resultant impacts on benthic and seagrass communities and wave climate were assessed as part of the marine ecology assessments prepared by JSA Environmental in support of the CVC Mod 2 SEE (EMM 2015) and CVC Mine Extension Project EIS (EMM 2013).

As part of the previous Mod 2 Statement of Environment Effects environmental assessment, an aquatic biological survey was conducted, which included consideration of soft bottom benthic communities and seagrass mapping. Ground truthing of the seagrass beds since the original mapping has been utilised along with additional mapping data and satellite imagery to provide the most accurate location of seagrass beds at the time of this EP and inform the location of protection barrier offsets for mine design.

Considering the survey results, the proposed mine plan and the modelled subsidence predictions, JSA Environmental concluded as part of previous assessments that there would be no more than minor impacts on benthic communities and negligible impacts on seagrass levels as a result of proposed mining. This has been supported through the results of ongoing monitoring activities.

Given the additional mine plan controls that have been implemented since the time of the marine ecology assessments, these impacts are not expected to increase. In addition, bathymetric surveys conducted by Astute Surveying have been increased to six monthly intervals to validate and update predictions and control effectiveness (including survey prior to any secondary extraction at CVC). The results of the bathymetric surveys will be used to confirm predicted subsidence levels and mapping of seagrass levels and benthic communities will be ongoing throughout the period of extraction within Miniwall S4. These results will be used to confirm whether subsidence and associated impacts are maintained within predicted levels.

Leading wave climate experts from University of NSW's Water Research Laboratory concluded that the predicted subsidence will not affect the wave climate sufficiently to have adverse shoreline impacts.

In regard to surface cracking beneath the lake bed, the strains at the lake bed surface itself are expected to be more uniformly distributed and are therefore more likely to be absorbed by the plastic nature of the sediments. Any cracks are therefore likely to be naturally filled by lake sediments with no significant impact on the lake bed itself.

The predicted height of continuous and discontinuous fracturing above the proposed miniwall is below the logged rock head thickness above the panels and provides for sufficient constrained zone thickness at the adjusted extraction heights. As such, it is considered very unlikely that hydraulic connection between the lake and the mine workings will occur or that connection between mining-related fractures and the lake will cause significant impacts on the lake. Additional monitoring (including an extension of CVC's subsidence management TARP) will be put in place to monitor for early signs of unexpected subsidence.

In regard to surface features, namely the lake foreshore and features surrounding the foreshore, both the HWMSB and seagrass protection barrier have been applied as part of the mine design process.

Routine monitoring and TARPs will continue to be implemented to identify and respond to any unanticipated changes as a result of extraction in Miniwall S4 and further adaptive management and contingency controls will be implemented as required.

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As shown in Table 9, predicted subsidence and tilt for Miniwall S4 are considered manageable at the Pelican Rock Navigational marker and will be monitored via the Subsidence Management TARP (Appendix 4).

Table 9 - Navigation marker predicted subsidence parameters

ID	Predicted subsidence (mm)	Predicted tilt (mm/m)
Pelican Rock Navigational Marker NLM045 (above Tailgate S2)	130mm	1

3.3 Performance objectives

Development consent conditions

Condition 1, Schedule 4 of SSD-5465 states:

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

At present there is no expectation that predicted subsidence levels will be exceeded based on actual subsidence monitoring and recently updated subsidence predictions. The adopted mine design has been developed with the aim of achieving no additional subsidence impact due to Fassifern Seam extraction within the high water mark or seagrass areas. Nonetheless, a Subsidence Management TARP will be implemented as outlined in Section 3.4 to deal with unanticipated subsidence impacts in a proactive manner (in the unlikely event they occur).

Condition 2, Schedule 4 of SSD-5465 states:

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

Biodiversity	
Threatened species or endangered populations	Negligible environmental consequences.
Seagrass beds	Negligible environmental consequences including: - negligible changes in size and distribution of seagrass beds; - negligible change in the function of seagrass beds; and - negligible change to the composition or distribution of seagrass species within seagrass beds.

Benthic communities	Minor environmental consequences, including minor changes to species composition and/or distribution.
Mine workings	
First workings under an approved Extraction Plan beneath any feature where performance measures in this table require negligible environmental consequences	To remain long term stable and non-subsiding
Second workings	To be carried out only in accordance with an approved Extraction Plan.

Notes:

The Applicant will be required to define more detailed performance indicators (including impact assessment criteria) for each of these performance measures in the various management plans that are required under this consent (see Condition 7 below).

Measurement and/or monitoring of compliance with performance measures and performance indicators is to be undertaken using generally accepted methods that are appropriate to the environment and circumstances in which the feature or characteristic is located. These methods are to be fully described in the relevant management plans. In the event of a dispute over the appropriateness of proposed methods, the Secretary will be the final arbiter.

The requirements of this condition only apply to the impacts and consequences of mining operations, construction or demolition undertaken following the date of approval of this consent.

Fassifern Seam first workings in the Miniwall S4 area are not beneath any of the features listed in Table 8 of SSD-5465. Should a change to first workings necessitate this, the first workings will be designed to be long-term stable.

In the unlikely event that greater than negligible/minor impacts occur, the Subsidence Management TARP (Appendix 4) will be implemented. The TARP includes detailed performance indicators.

Condition 4 of Schedule 4 of SSD-5465 states:

The Applicant shall ensure that the development does not cause any exceedances of the performance measures in Table 9, to the satisfaction of the Secretary.

Built features	
Trinity Point Marina Development	- Always safe. - Serviceability should be maintained wherever practicable. Loss of serviceability must be fully compensated.
Other built features	Damage must be fully compensated.
Public safety	
Public safety	Negligible additional risk.

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The Applicant will be required to define more detailed performance indicators (including impact assessment criteria) for each of these performance measures in measures in the Built Features Management Plans or Public Safety Management Plan (see Condition 7 below).

Measurement and/or monitoring of compliance with performance measures and performance indicators is to be undertaken using generally accepted methods that are appropriate to the environment and circumstances in which the feature or characteristic is located. These methods are to be fully described in the relevant management plans. In the event of a dispute over the appropriateness of proposed methods, the Secretary will be the final arbiter.

The requirements of this condition only apply to the impacts and consequences of mining operations, construction or demolition undertaken following the date of approval of this consent.

Requirement's regarding safety or serviceability do not preclude preventative actions or mitigation being taken prior to or during mining in order to achieve or maintain these outcomes.

Requirement's under this condition may be met by measures undertaken in accordance with the Mine Subsidence Compensation Act 1961.

The Miniwall S4 area is outside any zone that may affect the Trinity Point Marina Development.

In the unlikely event that greater than negligible/minor impacts occur, the Subsidence Management TARP (Appendix 4) will be implemented. The TARP includes detailed performance indicators.

Other regulatory requirements

Prior to commencement of extraction activities within Miniwall S4, a Secondary Extraction High Risk Activity Notification is required under Clause 33(1) of the NSW Work Health and Safety (Mines) Regulation 2014.

3.4 Subsidence management strategies and measures

Overview

The overall framework for subsidence monitoring and management of impacts is summarised in Figure 2.

Details of relevant triggers and performance indicators (including measured subsidence and inspections for environmental impact) are provided in relevant component plans. These management plans also include specific information regarding subsidence monitoring requirements (including baseline monitoring), remediation, adaptive management techniques and contingency plans. A summary is provided in the Subsidence Management TARP (Appendix 4), which aims to consolidate all subsidence management requirements into a central location, triggering a response or set of responses commensurate with the nature of the measurement or the impact that has been identified.

Mine design elements

Mine design parameters such as panel start and finish position, panel width, chain pillar width and barrier pillar width in conjunction with an assessment of overlying strata, depth of cover and depth of rock head all contribute to the management of vertical subsidence effect and impacts.

Miniwall S4 has been designed to ensure that no secondary extraction will occur within the HWMSB or seagrass protection barrier. This will help to avoid any potential significant impacts on the foreshore of Lake Macquarie or seagrass communities in shallow foreshore areas.

The outcomes of the updated subsidence predictions have further informed the mine design strategies to be undertaken as outlined in Section 3.1. Adaptive management recommendations have been applied to the final mine design.

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Remediation strategies

Remediation strategies are incorporated into the Subsidence Management TARP (Appendix 4). These also follow the principles outlined in the Rehabilitation Management Plan (Appendix 10).

The current Mining Operations Plan includes Miniwalls S2 and S3 and an amendment was submitted in January 2020 to include Miniwall S4 and was approved on 14 February 2020. A review of the Rehabilitation Management Plan was submitted for comment to applicable stakeholders in November 2019.

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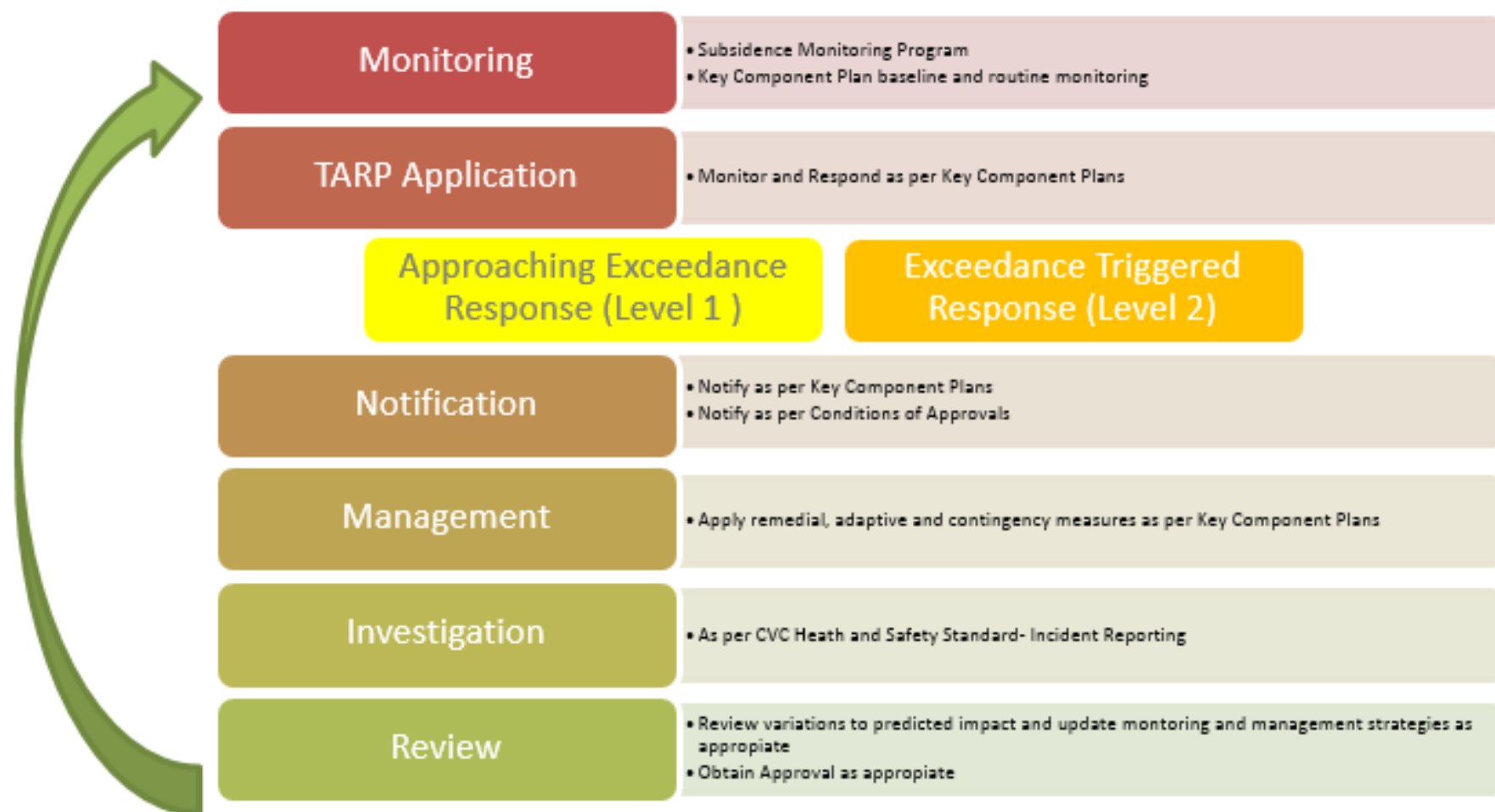


Figure 2 – Subsidence monitoring and management framework

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Adaptive management strategy

CVC's Subsidence Management TARP includes a series of triggers and responses when subsidence levels exceed those predicted.

The extensive mining history in and around CVC's mining area has greatly improved the ability of CVC to predict subsidence levels and allowed CVC to develop mine design guidelines to protect against foreshore, seagrass and lake bed impacts.

Based on recent history at CVC (using similarly-designed miniwall panels), exceedances of predicted subsidence effects and impacts are unlikely. However, the routine collection of data such as regular bathymetric surveys, foreshore subsidence surveys, groundwater assessments, seagrass mapping and benthic community surveys will allow rapid and proactive verification of both initial and final subsidence effects and impacts such that adaptive measures (eg mine design changes, increased barrier pillars, widening of protection zones, etc) can be undertaken in a timely manner to mitigate against and minimise the impact of any unforeseen exceedances.

Procedure for investigation of incidents

In accordance with Condition 7 of Schedule 6 of Development Consent SSD-5465, CVC will notify the Secretary and other relevant agencies of any incident, non-compliance or exceedance of performance criteria associated with this EP as soon as practicable after CVC becomes aware of the incident.

Within 7 days of the date of the incident or non-compliance, CVC will provide a detailed report on the incident to the Secretary and other relevant agencies. The incident investigation will follow CVC's Incident Reporting and Investigation Policy

Procedure for quality assurance and review

The results of monitoring undertaken as part of the implementation of this EP will be provided to CVC's CCC at each meeting (occur quarterly).

Regular review of the EP and component plans is required by the conditions in Schedule 6 of SSD-5465. CVC is required to review and, if necessary, revise, the EP and relevant strategies, plans and programs within three months of the submission of:

- an audit under Condition 9 of Schedule 6 of SSD-5465;
- an incident report under Condition 7 of Schedule 6 of SSD-5465;
- an annual review under Condition 4 of Schedule 6 of SSD-5465; or
- any modification to the conditions of SSD-5465.

Any revisions to this EP (including component plans) must be completed to the satisfaction of the Secretary.

Complaints

Complaints in relation to the management of subsidence will be managed using the established protocols in Delta Coal's *Environmental Management System*.

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4 Extraction Plan Guidelines and Component plans

4.1 Overview

The Draft *Guidelines for the Preparation of Extraction Plans* (DPE) specify that six component plans should be prepared as part of an EP.

The high-level structure for the extraction plan should be as key component plans/programs (in bold) listed in the draft Guidelines and include the following :

- **Water Management Plan** (Appendix 5);
- **Land Management Plan** (Omitted as not required in consent and Extraction area is located under Lake Macquarie);
- **Biodiversity Management Plan** (Appendix 6)
- Benthic Communities Management Plan (Appendix 7)
- Seagrass Management Plan (Appendix 8);
- **Heritage Management Plan** (Appendix 9);
- **Built Features Management Plan** (Appendix 10)
- **Public Safety Management Plan** (Appendix 11)
- Rehabilitation Management Plan (Appendix 12)
- **Subsidence Monitoring Program** (Appendix 13)
- **Implementation -**
- **Graphical Plans** (Appendix 14); and
- **Attachments –**
- Extraction Plan Risk Assessment (Appendix 3)
- Subsidence Prediction Report (Appendix 15)

As Miniwall S4 Extraction area is located beneath Lake Macquarie there is some different plans and attachments for the marine environment. A Benthic Communities Management Plan and Seagrass Management Plan are included.

Management of impacts identified via the Subsidence Monitoring Program (Chapter 5) are commensurate with the nature of the measurement or the identified impact. This EP relies on the aforementioned component plans to address these impacts to particular environmental or built features within the Miniwall S4 area.

A summary of the intent of each component plan and how it relates to Miniwall S4 is provided below.

4.2 Water Management Plan

CVC's Water Management Plan (Appendix 5) which includes the updated Groundwater Management Plan considers the potential for extraction within Miniwall S4 to contribute to regional groundwater drawdown and a reduction of private water bore yields.

Due to the existing large extent of depressurisation from historical mining, impacts from mining within Miniwall S4 are considered negligible. Nonetheless, controls have been adopted, which include:

- continuation of the groundwater monitoring program;

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- faults or dykes within Miniwall S4 are to be assessed case-by-case as to whether an extraction barrier is required to prevent hydraulic connection; and
- where access is available, monitoring of bore yields, saturated thickness and quality (if mining-related impacts can be proven, an alternative water supply will be provided until the bore recovers).

The Groundwater Management Plan has been updated as part of this EP. Other potential water-related impact risks due to extraction are either not applicable due to the extraction being contained wholly below Lake Macquarie or not relevant due to no risk of impact.

4.3 Biodiversity Management Plan

CVC's Biodiversity Management Plan (Appendix 6) was reviewed in 2016 and a draft for consultation was provided to stakeholders on the 1 December 2019. Only the Benthic Communities Management Plan (Appendix 7) and Seagrass Management Plan (Appendix 8) components are applicable to this EP. The Seagrass Management Plan also includes consideration of potential biodiversity impacts to sea turtles.

Both of these plans have been reviewed and updated as a part of this EP, including the addition of new control and sample monitoring sites. Both of these management plans have been submitted for consultation with the relevant stakeholders as required by SSD-5465. Evidence of this consultation is provided at the back of each management plan.

Bathymetric surveys and benthic and seagrass monitoring will be undertaken prior to and post extraction. Monitoring locations are tailored to confirm that negligible changes are being recorded as required by SSD-5465.

If impacts are identified that are outside CVC's approved performance criteria, DC will investigate and undertake an assessment of the impacts. If the impacts cannot be remediated, a suitable offset will be provided in accordance with Condition 3 of Schedule 4 of SSD-5465.

4.4 Heritage Management Plan

CVC's Heritage Management Plan was reviewed and a draft for consultation was provided to stakeholders on the 1 December 2019 (Appendix 9).

The Heritage Management Plan includes location and consideration of potential impacts to indigenous and non-heritage items.

All mining activities within Miniwall S4 will occur beneath Lake Macquarie and as such will have no predicted direct impact on surface features.

4.5 Built Features Management Plan

CVC's Built Features Management Plan (Appendix 10) was reviewed and updated as a part of this EP. This management plan was submitted for consultation with the relevant stakeholders as required by SSD-5465. Evidence of this consultation is provided in the management plan. Survey monitoring will be undertaken as per the Subsidence Monitoring Program. There are no built features identified above Miniwall S4.

If impacts are identified that are outside CVC's approved performance criteria, DC will investigate and undertake an assessment of the impacts.

4.6 Public Safety Management Plan

All mining activities within Miniwall S4 will occur beneath Lake Macquarie and as such will have no direct impact on surface facilities and infrastructure.

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One navigational marker (Plan 2 of Appendix 14) is predicted to have negligible subsidence impacts from Miniwall S4. As noted previously, RMS has been consulted in relation to this and have concluded that no direct management will be required and the marker will be able to be monitored as a part of routine inspections.

All proposed secondary extraction is outside of the HWMSB and Seagrass Protection Barrier and as such, no adverse impacts are anticipated on the immediate foreshore of Lake Macquarie as a result of extraction in Miniwall S4.

Based on CVC's approved mine design, mining is not expected to result in any noticeable impacts along foreshore areas. Despite this, CVC will monitor the foreshore zone for any sign of change and if impacts as a result of mining are observed, a review of public safety measures will be triggered via the Subsidence Management TARP (Appendix 4).

Actions will be implemented by DC to reduce the risk to the public in the unlikely circumstance that impacts are identified outside those predicted and approved.

No other immediate increase in public safety risks have been identified.

4.7 Rehabilitation Management Plan

All mining activities within Miniwall S4 will occur beneath Lake Macquarie and as such will have no direct impact on surface facilities and infrastructure.

See **Appendix 12** for the CVC Rehabilitation Management Plan.

4.8 Risk assessment

A risk assessment was conducted on the 4th July 2019 and prepared as part of this EP (Appendix 3).

Each of the component management plans prepared for this EP include consideration of risk management.

4.9 Compensation and offsets

Based on predicted impacts, no compensation and/or offset requirements are anticipated.

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5 Subsidence monitoring program

5.1 Overview

A copy of the Subsidence Monitoring Program is appended to this EP (Appendix 13) and environmental monitoring programs are provided in each of the relevant component plans. The proposed shoreline subsidence monitoring locations are shown on Plan 7 of Appendix 15.

Subsidence management at CVC is achieved through a combination of mine design and continual monitoring of key subsidence-related effects and impacts via the Subsidence Management TARP (Appendix 4). Regular and routine monitoring of the foreshore, lake bed, seagrass communities and benthic communities provide a means to verify and validate that predicted subsidence levels are not being exceeded and that the resultant levels of subsidence are not resulting in excessive impacts beyond those predicted. The mine design can be adapted and refined (as required) if exceedances occur or are likely to occur.

Bathymetric surveys of the lake bed and surveys of the foreshore will be used to validate and confirm predicted vertical subsidence around Miniwall S4. Ongoing environmental monitoring (benthic and seagrass community surveys) will ensure that resultant vertical subsidence levels are not resulting in greater impacts than predicted.

As Lake Macquarie lies above Miniwall S4, measurement of sub-surface fracture heights above the proposed miniwall is not recommended due to risks associated with drilling from a barge and potential intersection with goafs from barge-mounted drilling rigs after mining a given panel. However, monitoring of groundwater inflow rates will be utilised to provide an indirect measure of connectivity between the lake and mine workings.

Ongoing inspections, monitoring and mapping of the stability of underground workings will continue along with assessments of groundwater monitoring data. In particular, the presence of a fault, dyke or joint shear zone that may have the potential to cause a hydraulic connection between the fracture zones, resulting in abnormal inflows, will be assessed on a case-by-case basis.

As stated previously, any strains at the lake bed surface itself will likely be more uniformly distributed and are therefore more likely to be absorbed by the plastic nature of the sediments. Accordingly, no monitoring or remediation for the potential minor cracking will be required as may be undertaken for land based cracking.

5.2 Monitoring frequency and review

As described in the Subsidence Monitoring Program, subsidence monitoring will include a combination of bathymetric surveys and foreshore level monitoring. Subsidence monitoring frequencies are defined in Table 11 and will be established to:

- validate model outcomes;
- enable early detection of subsidence impacts over those predicted; and
- allow early application of containment, adaptive and contingency measures to prevent impacts outside approved (particularly any potential increased impacts to the foreshore).

Table 11: Subsidence monitoring frequency

Monitoring type	Pre-extraction	During extraction	Post extraction
Bathymetric surveys	Single baseline survey prior to extraction.	End of panel survey for Miniwall S4.	Annual for 3 years unless TARP triggered.
Foreshore level monitoring	Baseline survey prior to commencement of extraction.	Monthly intervals	Annual for 3 years unless TARP triggered.

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6 Implementation

6.1 Reporting

Incident reporting

The results of monitoring undertaken as part of the implementation of this EP will be provided to CVC's CCC at each meeting (occur quarterly).

Regular review of the EP and component plans is required by the conditions in Schedule 6 of SSD-5465. CVC is required to review and, if necessary, revise, the EP and relevant strategies, plans and programs within three months of the submission of:

- an audit under Condition 9 of Schedule 6 of SSD-5465;
- an incident report under Condition 7 of Schedule 6 of SSD-5465;
- an annual review under Condition 4 of Schedule 6 of SSD-5465; or
- any modification to the conditions of SSD-5465.

Any revisions to this EP (including component plans) must be completed to the satisfaction of the Secretary.

Regular reporting

Regular reporting will be undertaken in accordance with the conditions within SSD-5465 and the relevant component management plans. Reports will be provided to DPIE and relevant agencies and will be posted on DC's website and discussed at CCC meetings.

Annual reporting

As per Condition 4 of Schedule 6 of SSD-5465, by the end of March each year (or other timing as may be agreed by the Secretary), DC will review environmental performance at CVC for the previous year and submit an annual review, including:

- a description of the development (including any rehabilitation) that was carried out in the past calendar year, and the development that is proposed to be carried out over the current calendar year;
- a comprehensive review of the monitoring results (including subsidence) and complaints records of the development over the past calendar year, which includes a comparison of these results against the:
 - o relevant statutory requirements, limits or performance measures/criteria;
 - o requirements of any plan or program required under this consent (including this EP and the component plans);
 - o monitoring results of previous years; and relevant predictions in the EIS;
- any non-compliance over the past calendar year and a description of what actions were (or are being) taken to ensure compliance;
- any trends in the monitoring data over the life of the development;
- any discrepancies between the predicted and actual impacts of the development (including with regards to subsidence) and an analysis of the potential cause of any significant discrepancies; and
- a description of what measures will be implemented over the coming year to improve the environmental performance of the development.

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6.2 Document review

In addition to routine auditing and review of environmental management plans, environmental management systems at CVC will be independently reviewed every three years by external experts suitably qualified to undertake such a review.

6.3 Responsibilities

The overall responsibility for the implementation of this extraction plan sits with the Manager of Mining Engineering; however, other DC employees will have responsibilities under this EP to ensure that it is effectively implemented (Table 12).

Table 12: Roles and responsibilities for the implementation of this EP

Role	Responsibilities
Managing Director	- Ensure that adequate financial and personnel resources are made available for the implementation of the EP.
Manager of Mining Engineering	- Maintain overall responsibility for environmental compliance with Mining Lease, EPL, SSD-5465 and other mining approvals as they pertain to subsidence management - Ensure all operations are undertaken in accordance with this EP - Ensure all mining is undertaken in accordance with approved mine plans
Technical Services Manager	- Provide adequate resources for the activities required under this EP - Provide technical review and assistance during the development of the EP and appendices - Coordinate technical sub consultants used as part of this EP
Environment Compliance Officer	- Coordinate and undertake all environmental monitoring required under this EP - Ensure all reporting and monitoring is completed to an appropriate standard and in a timely manner - Ensure any discrepancies between actual monitoring results and predicted outcomes are reported to appropriate stakeholders as soon as practicable - Manage the implementation of all environmental management plans under this EP - Be responsible for all environmental reports, management plans, community consultation and communication with stakeholders and regulatory authorities
Mine Surveyor	- Preparation of the Subsidence Monitoring Program - Coordinate and undertake all subsidence monitoring requirements - Maintain plans and records of all subsidence monitoring - Distribute survey data to relevant stakeholders within agreed timeframes - Report any discrepancies and/or exceedances of actual survey results from expected/predicted data to the Environment and Community Coordinator and Manager of Mining Engineering - Prepare all subsidence-related reporting to an appropriate standard
All employees and contractors	- Comply with the requirements of this EP

7 Document control

7.1 Records

Generally, the Environment and Community 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;
- 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 four years or as otherwise required under any legislation, licence, lease, permit or approval.

7.2 Document control

This document and all others associated with CVC's Environmental Management System shall be maintained in a document control system which is in compliance with CVC's Document Control Standard. Any proposed changes to this document will be via the Environment and Community Coordinator.

Details on document revisions are provided in Table 13.

Table 13: Document revision details

Version	Date	Details of revision	Company	Reviewed by/ Authorised by
1	20/12/2019 -	Original EP was based on S2/S3 Extraction Plan template with updates to included conducting a gap analysis with the Extraction Plan guidelines	Delta Coal / EMM Consulting	C. Armit T. Chisholm D.Richards
1.1	11/3/2020	EP updated for consultation with external stakeholders	EMM consulting / Delta Coal	C.Armit / D McLean
1.2	12/5/2020	EP updated for consultation with DPIE-Resource Assessments	Delta Coal	C.Armit

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9 Abbreviations

ACARP	Australian Coal Industry Research Program
CCC	Community Consultative Committee
CVC	Chain Valley Colliery
DC	Delta Coal
DPIE	NSW Department of Planning, Industry and Environment
EIS	Environmental impact statement
EMS	Environmental Management System
EP	extraction plan
EPA	NSW Environment Protection Authority
EPL	Environment Protection Licence
EP&A Act	NSW <i>Environmental Planning and Assessment Act 1979</i>
MC	Mannering Colliery
Mining Act	NSW <i>Mining Act 1992</i>
POEO Act	NSW <i>Protection of the Environment Operations Act 1997</i>
ROM	run-of-mine
Secretary	Secretary of DPIE (or nominee)
SEE	Statement of environmental effects
SSD	State significant development

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Appendix 1 Consultation

From: Chris Armit
To: 'rog.hcc@environment.nsw.gov.au'; 'Resources Regulator'; 'Margaret MacDonald-Hill'; 'scott.carter@dpi.nsw.gov.au'; 'Geoffrey Keech'; 'Melissa Sawatske'; 'dpi.cabinet@dpi.nsw.gov.au'; 'cassandra.mcnamara@dpi.nsw.gov.au'; 'Matthew.Montgomery@finance.nsw.gov.au'; 'Ray Ramage'; 'dan.adams@planning.nsw.gov.au'; 'Robert Gibson'; 'Joanna Pajkowska'; 'landuse.enquiries@industry.nsw.gov.au'; 'water.referrals@dpi.nsw.gov.au'; 'Mitchell Isaacs'; 'Daniele.Allen@centralcoast.nsw.gov.au'; 'EPA RSD Hunter Region Mailbox'; 'Steve Clair'
Cc: Tim Chisholm; David Richards; Chris Nicholas; David Hill; Dave McLean; Flood; Justin; Everett; Greg; Colin Phillips; Gurney, Steve; Joel Curran; Katie Weekes
Subject: Miniwall S4 Extraction Plan draft for comment and associated MP status

Sent: Fri 20/12/2019 4:57 AM

Dear All,

The draft Miniwall S4 Extraction Plan document has been uploaded onto the Delta Coal website (<https://www.deltacoal.com.au/environment/chain-valley-colliery/ch>) for your comment.

After 28 days and the inclusion/consideration of your comments the S4 Extraction Plan document will be uploaded onto the DPIE planning portal.

The associated management plans were submitted on the below dates to the relevant stakeholders and comments have been received, thank you for your comments on these.

The management plan review for comment process nominally ends December 31 and the management plans will be updated with comments and added to the planning portal for assessment/approval.

Associated Management Plan	Date submitted to stakeholders
CVC Public Safety MP	25/11/19
CVC Built Features MP	20/11/19
CVC Water MP	1/12/19
CVC Rehabilitation MP	19/11/19
CVC Benthic Communities MP	17/11/19
CVC Seagrass MP	14/11/19
CVC Heritage MP	1/12/19
CVC EMS	1/12/19
CVC Biodiversity MP	1/12/19

As always, happy to go through any comments you have in person or over the phone.

Thanks for your collective assistance over 2019 and look forward to working with you all again in 2020. Happy Holidays !

Regards,
Chris



Resources Regulator

Our ref: MAAG0005800
LETT0003617

Great Southern Energy Pty Ltd
Level 7, 287 Elizabeth Street
SYDNEY NSW 2000
Attn: Chris Nicholas

Dear Chris Nicholas

ML 1051, ML 1052, ML 1308, MPL 1349, MPL 1389, MPL 1400 (1906), Part CCL 706, CCL 707, MPL 337 (1973), Great Southern Energy Pty Ltd, ML 1370 & ML 1632 (1992) (held by Centennial Myuna Pty Ltd); CCL 719 & CCL 721 (1973) (held by Centennial Mannerly Pty Ltd), CCL 722 (1973) (held by Centennial Munmorah Pty Ltd) - Approval of Mining Operations Plan

NOTICE OF APPROVAL

Pursuant to the relevant Condition of ML 1051 (1906), ML 1052 (1906), ML 1308 (1906), MPL 1349 (1906), MPL 1389 (1906), MPL 1400 (1906), Part CCL 706 (1973), CCL 707 (1973), MPL 337 (1973), CCL 719 (1973), CCL 721 (1973), CCL 722 (1973) the Mining Operations Plan (MOP) that was submitted to the Resources Regulator within the Department of Planning, Industry & Environment (Resources Regulator) on 8 January 2020 (Department Reference: MAAG0005800) is approved for the period from the date of this approval until 31 December 2020.

The Regulator notes that workings associated with S4 Miniwall are included in MOP with the extraction plan not yet currently endorsed by the Department of Planning, Industry & Environment. The Regulator reminds Great Southern Energy Pty Ltd of the obligation to ensure the relevant extraction plan has been endorsed by the prior to commencement.

It is the responsibility of the Authorisation Holder to ensure that all mining and mining related operations described in this MOP are as approved within the relevant Project Approval or Development Consent and all necessary approvals, consents or permits required under the relevant NSW or Commonwealth regulations have been obtained prior to carrying out the operations.

It is the responsibility of the Authorisation Holder to fulfil their obligations and commitments to the rehabilitation outcomes and performance standards as approved by the relevant consent authority to ensure the rehabilitation outcomes identified are achieved.

ASSESSED DEPOSIT

Approval of this MOP has triggered a review of the assessment of the security deposit required to secure funding for the fulfilment of rehabilitation obligations under the listed Mining Authorisation Number(s). Notice of the change in the security deposit condition related to this MOP approval will be provided separately.

DEFINITIONS

Resources Regulator
516 High Street MAITLAND NSW 2320 Australia | PO Box 344 HRMC NSW 2310 Australia
Tel: 1300 814 609

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In this letter, words have the meaning given to those terms in the Mining Act 1992, unless otherwise specified below.

Authorisation Holder means the holder of the relevant authorisation(s).

Mining Operations Plan means the project, mining and mining related operations described in the Mining Operations Plan - Amendment 1 prepared by Great Southern Energy Pty Ltd and dated 23 December 2019.

Signed under delegation from the Minister for Resources and the Secretary of the NSW Department of Planning, Industry and Environment

If you require additional information, please contact the Resources Regulator on 1300 814 609 (Option 2, then 5), or via email at nswresourcesregulator@service-now.com.

Yours sincerely,

Peter Ainsworth
Manager Environmental Operations
Mining Act Inspectorate
Resources Regulator
NSW Department of Planning, Industry & Environment

14 February 2020

Other copies provided by email to: Chris Armit

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From: Geoffrey Keech [mailto:gkeech@lakemac.nsw.gov.au]
Sent: Thursday, 12 December 2019 3:41 PM
To: Chris Armit
Cc: Melissa Sawatske
Subject: LMCC response to Delta Coal Mannering Colliery and Chain Valley Colliery management plans consultation

Hi Chris,

Thankyou for providing Council the opportunity to comment on your management plans. I provide the following feedback:

Plan	LMCC Comments
CVC Rehabilitation Management Plan	Any infrastructure (slabs, pits, pipes, etc.) that is to be abandoned and covered over should be mapped and this map made available to any future user or purchaser of the site. Spelling mistake "mircobat"
CVC Benthic Communities Management Plan	No comments
CVC Seagrass Management Plan	Page 25, Table 5 – Environment and Community Coordinator 'Send annual Seagrass Monitoring Reports to DPI Fisheries and.....' there is information missing here with respect to who the reports would be sent to.
CVC Built Features Management Plan	No comments – no identified built features fall within the LMCC boundary or jurisdiction. Central Coast Council should provide comment for the dwellings at Summerland Point.

For future iterations of these plans, could you please send the plans to Council@lakemac.nsw.gov.au addressed to "Development Assessment and Certification officer." The plans will be allocated to a DAC officer to coordinate comments from the relevant sections of Council.
It would help us if you can include a note about the purpose of the consultation (as per the "Audit and Review" section of the management plans), and ideally send a copy that has been marked up with the changes that have occurred, as this allows us to focus quickly on the relevant changes.

Geoffrey Keech
Development Planner
 T 02 4921 0025 M 0429 124 904
E gkeech@lakemac.nsw.gov.au
lakemac.com.au
f in @

From: Ray Ramage <ray.ramage@planning.nsw.gov.au> Sent: Wed 27/11/2019 9:00:00 AM
To: Chris Armit
Cc: Phil Stewart
Subject: RE: Miniwall S4 Draft Public Safety Management Plan

Chris,

I have reviewed the draft Public Safety Management Plan (PSMP). I believe my comments in relation to the navigational marker also apply to the PSMP.

1. Potential subsidence outside the angle of draw could occur should there be any interaction with overlying workings, therefore the location of such workings should be considered.
2. Another issue, which I failed to mention previously in relation to the marker, is that should CVC elect to use components of the extraction plan in the HRA notification there should therefore be consistency with the WHS laws. Most importantly selection of risk controls (management plans) should be based on hazard identification and risk assessment. It is not clear from the two management plans I have reviewed that a risk assessment has been undertaken.
3. Related to the point above if the PSMP (or any other management plan from the EP) are to be used in a HRA notification then references to "Statutory Requirements" should also include WHS law. Planning law does not modify obligations under WHS law and consequently should the PSMP fail in its purpose regulatory action would be undertaken by RR under WHS law regardless of any planning approval.

Regards

Ray Ramage
Senior Mine Safety Officer (Subsidence Engineering)
Resources Regulator | Department of Planning, Industry and Environment
T 02 40636485 | M 0422 551 293 | E ray.ramage@planning.nsw.gov.au
8 Hartley Drive, Thornton NSW 2322
www.resourcesregulator.nsw.gov.au

From: Ray Ramage <ray.ramage@planning.nsw.gov.au> Sent: Mon 25/11/2019 10:19:00 AM
To: Chris Armit
Cc: Phil Stewart; Gang Li
Subject: RE: CVC MWS4 Built Features Management Plan - Lake Macquarie (NLM045)

Chris,

Thanks for the update, particularly the info on tiltmeters.

I have reviewed the built features management plan for the purposes of consultation under SSD-5465.

The only comment I would make is that as houses & moorings along the shoreline have been identified and the critical control for these is mine layout and associated predicted angle of draw it would be beneficial to include the Wallarah Seam workings (refer in Fig 5 of the BFMP). It has been discussed at length in the past that the overlying workings have the potential to create subsidence outside the angle of draw.

Regards

Ray Ramage
Senior Mine Safety Officer (Subsidence Engineering)
Resources Regulator | Department of Planning, Industry and Environment
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From: Robert Gibson <Robert.Gibson@environment.nsw.gov.au> Sent: Fri 10/01/2020 4:40 PM
To: Chris Armit
Cc: Nicole Davis
Subject: RE: Miniwall S4 Extraction Plan draft for comment and associated MP status

Dear Chris,

Thank you for your e-mail of 20 December 2019 with a copy of the draft Miniwall S4 Extraction Plan for the Chain Valley Colliery for comment. Biodiversity and Conservation Division (BCD) notes that this document has been prepared to meet the requirements of Condition 7, Schedule 4 of the consent for SSD-5465, and is to be prepared in consultation with several Government agencies, including BCD. BCD has reviewed the draft Extraction Plan and has no comment to make on it.

If you have any questions about this advice then please call me on 4927 3154 to discuss.

Kind regards,

Robert

Robert Gibson
Regional Biodiversity Conservation Officer, Hunter Central Coast Branch

Biodiversity and Conservation Division | Department of Planning, Industry and Environment
T 02 4927 3154 | E.robert.gibson@environment.nsw.gov.au
Level 4, 26 Honeysuckle Drive, Newcastle, NSW 2300
www.dpie.nsw.gov.au

Our ref: DOC19/1013208-1
Your ref: SSD-5465 (MOD 2)

Chris Armit

Environmental and Community Coordinator
Chain Valley Colliery
Delta Coal
Off Construction Road (Off Ruttleys Road)
MANNERING PARK NSW 2259
CArmit@deltacoal.com.au

Dear Mr Armit

Chain Valley Colliery (SSD-5465 MOD 2) – review of the Benthic Communities Management Plan, Seagrass Management Plan and Rehabilitation Management Plan

I refer to your e-mails dated 14, 17, and 19 November 2019 in which the Delta Coal provided the Biodiversity and Conservation Division (BCD) of Department of Planning, Industry and Environment (The Department) with copies of three updated management plans for the Chain Valley Colliery. These management plans must be prepared '...in consultation with...' BCD to meet Schedule 3, Condition 27; Schedule 4, Condition 7(h & i); and Table 8 of the current consent for the mine (SSD-5465 MOD 2). The management plans are the:

- Chain Valley Colliery Benthic Communities Management Plan: Environmental Management Plan (dated 14 November 2019)
- Chain Valley Colliery Seagrass Management Plan: Environmental Management Plan (dated 17 November 2019), and
- Chain Valley Colliery Rehabilitation Management Plan (dated 19 November 2019)

BCD makes no comment on the Chain Valley Colliery Benthic Communities Management Plan or the Chain Valley Colliery Seagrass Management Plan. However, in relation to the Chain Valley Colliery Rehabilitation Management Plan BCD makes one recommendation: that the bushland rehabilitation is targeted to create recognisable Plant Community Types from the local or adjoining Interim Biogeographical Regionalisation of Australia region. This will further refine the completion criteria for species diversity, plant density and plant cover; contained in Table 4 of the plan.

If you require any further information regarding this matter, please contact Robert Gibson, Regional Biodiversity Conservation Officer, on 4927 3154 or via email at rog.hcc@environment.nsw.gov.au

Yours sincerely

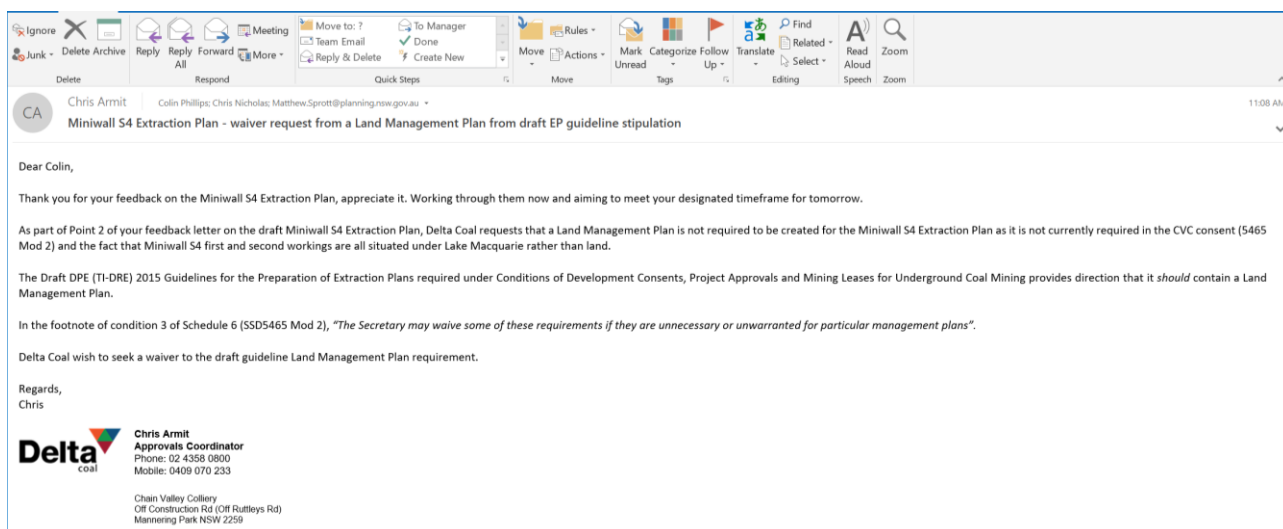


NICOLE DAVIS
A/Senior Team Leader Planning
Hunter Central Coast Branch
Biodiversity and Conservation Division
3 December 2019

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DPIE Review	Response
The Department's review of the Extraction Plan for Chain Valley Colliery Miniwall S4 has identified several areas requiring clarification or correction. I would be grateful if you would attend to the identified matters, revise the Extraction Plan and re-submit it to the Department via the Planning Portal.	Track changed doc and pdf documents revised and resubmitted via the portal on 12 May 2020.
1. Page 22, Section 4.1 - Three management plans are stated as being relevant to this Extraction Plan and then four management plans are listed. This anomaly needs to be corrected. However, the Extraction Plan contains more than four management plans and this section of the Extraction Plan must align with the content of its appendices.	Section 4.1 revised.
2. Section 4.1 - This section requests the Planning Secretary's approval that the Land MP, Heritage MP and the Built Features MP are not required for this Extraction Plan. It is not appropriate to bury such a request in the body of the Extraction Plan. The Planning Secretary's approval not to include certain MPs is usually a reasonable request, but approval must be obtained prior to submitting an Extraction Plan.	Section 4.1 revised. Requested for waiver from Land Management Plan (11/05/2020) Appendix 1
3. Section 4.1 - In relation to Item 2 the request not to produce a Built Features MP is inconsistent with the actual provision of a Built Features MP within the Extraction Plan (due to the Pelican Rock navigational marker). (see also Table 10 which lists the Built Features MP).	Section 4.1 - Inconsistency removed
4. Appendix 2 lists where the requirements for the conditions of consent for an Extraction Plan are satisfied. The author of the Extraction Plan must check that all references in this appendix are correct. As an example, the requirement for the provision of detailed plans of first and second workings is stated as being provided in Section 3.4. This is not so. It may be that Appendix 12 which contains mine plans is a more appropriate reference. Please check all references before the resubmission of this Extraction Plan.	Cross referencing and reference list checked
5. Appendix 4 TARP - While not affecting the utility of the TARP, there are two terms used that could probably be better expressed. The term "shifty" may be replaced by "each shift". The term "Mining inducted impact" may be replaced by "Mining induced impact".	Appendix 4 updated including dated government body acronyms
6. Appendices 6, 8 and 9. In Section 1.2 of the Benthic Communities MP, Public Safety MP and Built Features MP the first line of text is almost completely repeated in the second line of text.	Text removed in applicable management plans

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7. Appendices 6 and 7 - Benthic Communities MP and Seagrass MP (Section 3.4) contains several references of subsidence of up to 1230 mm (or 1.23 m) in areas of the mine where former mine workings exist in seams overlying the Fassifern Seam. These references must be removed.	References removed from Benthic Communities Management Plan and Seagrass Management Plan
8. Appendix 7 Seagrass MP - Section 3.4 states that the Seagrass Protection Barrier is further described in Section 3.1. This is not so. Maybe this description is located in Section 4.1 or 4.2??	Referencing to 4.2
9. Appendix 9 Built Features MP - Should Section 7.1 be more targeted to reporting against any impacts to built features?	Built Features Management Plan updated
10. Appendix 10 - The version of Appendix 10 as supplied has several "Error Reference source not Found" messages in the text.	Subsidence Monitoring Program updated for Error references
11. Appendix 11 Rehabilitation Plan. Section 4.2 The Department requires that the detailed Mine Closure Plan be in place at least 12 months prior to mine closure.	Rehabilitation Management Plan updated to reflect Statement of Commitments
12. Appendix 11 Section 4.3 Table 3. Please update reference to COAL MINE SUBSIDENCE COMPENSATION ACT 2017 .	Rehabilitation Management Plan updated
13. Appendix 11 Section 4.7.1. Is flyash as recycled organic material?	Rehabilitation Management Plan updated
14. Appendix 12 Plans. Please explain why the 20 mm subsidence contour for miniwalls S2/S3 passes over the starting edge of Miniwall S3, while the 20 mm contour line gives the start end of S4 a wide berth? What is different in the ground conditions or mine layout to give this difference?	Explanation from Mine Surveyor and Consultant Geotechnical Engineer
15 Appendix 13 Subsidence Report. Section 6.3 states that the High Water Mark is defined by the 2.44 m AHD land contour. This is incorrect. The High Water Mark is on the Lake shore, not 9 feet higher.	Subsidence report updated
This misinterpretation flows through to Figure 21 where it is shown with the lakeside boundary of the HWMSB as expressed in the seam being the intersection of a line drawn at 35 degrees from the 2.44 m AHD contour to the Fassifern seam. This line needs to be drawn from the lake shore to the seam.	Subsidence report updated
This then brings into play the question of whether the calculation of the lake side HWMSB edge has been correctly calculated. On the methodology presented in Appendix 13, the calculations are most likely incorrect and will have implications as the boundary of second workings in the vicinity of the proposed starting position of Miniwall S4.	Subsidence report updated
Please investigate this matter and revise these aspects of the Miniwall S4 Extraction Plan before resubmitting to the Department for consideration.	Subsidence report updated

Appendix 2 Development consent requirements

Relevant sections of SSD-5465 that detail the requirements of the EP are reproduced in **Table A2** below along with identification of where the requirements are addressed in this document.

Table A2: Requirements from SSD-5465

Condition No.	Requirement	Relevant section of this document
	Schedule	
8	<i>The Applicant shall prepare an Extraction Plan for all second workings on site, to the satisfaction of the Secretary. Each Extraction Plan must:</i>	This document
	<i>Be prepared by suitably qualified and experienced persons whose appointment has been endorsed by the Secretary</i>	Section 2.4
	<i>Be approved by the Secretary before the Applicant carries out any second workings covered by the plan</i>	Section 2.4 Appendix 16
	<i>Include detailed plans of existing and proposed first and secondary workings and any associated surface development, including any applicable adaptive management measures</i>	Section 3.4
	<i>Include detailed performance indicators for each of the performance measures in Tables 8 and 9</i>	Sections 3.3 & 4.0
	<i>Provide revised predictions of the potential subsidence effects, subsidence impacts and environmental consequences of the proposed second workings, incorporating any relevant information obtained since this consent</i>	Section 2.5 and 3.2 Appendix 12
	<i>Describe the measures that would be implemented to ensure compliance with the performance measures in Tables 8 and 9, and manage or remediate any impacts and/or environmental consequences</i>	Sections 3.4 & 4.0
	<i>Include a Built Features Management Plan, which has been prepared in consultation with DRE and the owners of affected public infrastructure, to manage the potential subsidence impacts and/or environmental consequences of the proposed second workings, and which</i>	Section 4
	<i>Addresses in appropriate detail all items of public infrastructure and other public infrastructure and all classes of other built features</i>	Appendix 9
	<i>Has been prepared following appropriate consultation with the owner/s of potentially affected feature/s</i>	
	<i>Recommends appropriate remedial measures and includes commitments to mitigate, repair, replace or compensate all predicted impacts on potentially affected built features in a timely manner</i>	
	<i>Include a Built Features Management Plan, which has been prepared in consultation with DRE and the owners of affected public infrastructure, to manage the potential subsidence impacts and/or environmental consequences of the proposed second workings, and which</i>	Section 9
	<i>Addresses in appropriate detail all items of public infrastructure and other public infrastructure and all classes of other built features</i>	Appendix 9
	<i>Has been prepared following appropriate consultation with the owner/s of potentially affected feature/s</i>	

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	<i>Recommends appropriate remedial measures and includes commitments to mitigate, repair, replace or compensate all predicted impacts on potentially affected built features in a timely manner</i>	
	<i>Include a Benthic Communities Management Plan, which has been prepared in consultation with OEH, LMCC, and DPI Fisheries, which provides for the management of the potential impacts and/or environmental consequences of the proposed second workings on benthic communities, which includes:</i> <i>Surveys of the lake bed to enable contours to be produced and changes in depth following subsidence to be accurately measured</i> <i>Benthic species surveys within the area subject to second workings, as well as control sites outside of the area subject to second workings (at similar depths) to establish baseline data on species number and composition within the communities</i> <i>A program of ongoing seasonal monitoring of benthic species in both control and impact sites</i> <i>Development of a model to predict subsidence impact of increased depth and associated subsidence impacts and effects, including but not limited to light reduction and sediment disturbance, on benthic species number and benthic communities composition, incorporating the monitoring and survey data collected; and</i> <i>Updating the model every 2 years using the most recent monitoring and survey data</i>	Section 4.3 Appendix 7
	<i>Include a Seagrass Management Plan, which has been prepared in consultation with OEH, LMCC, and DPI Fisheries, which provides for the management of the potential impacts and/or environmental consequences of the proposed second workings on seagrass beds, and which includes:</i> <i>A program of ongoing monitoring of seagrasses in both control and impact sites</i> <i>A program to predict and manage subsidence impacts and environmental consequences to seagrass beds to ensure the performance measures in Table 8 are met</i>	Section 4.3 Appendix 8
	<i>Include a Public Safety Management Plan, which has been prepared in consultation with DRE, to ensure public safety</i>	Appendix 10
	<i>Include a Subsidence Monitoring Program which has been prepared in consultation with DRE, to:</i> <i>Provide data to assist with the management of the risks associated with subsidence</i> <i>Validates the subsidence predictions</i> <i>Analyses the relationship between the predicted and resulting subsidence effects and predicted and resulting impacts under the plan and any ensuing environmental consequences</i> <i>Inform the contingency plan and adaptive management process</i>	Section 5 Appendix 13
	<i>Include a contingency plan that expressly provides for adaptive management where monitoring indicates that there has been an exceedance of any performance measures in Tables 8 and 9, or where any such exceedance appears likely</i>	Section 3.4.2 Appendix 4
	<i>Include appropriate revisions to the Rehabilitation Management Plan required under Condition 28 of Schedule 3</i>	Appendix 12
	<i>Include a program to collect sufficient baseline data for future Extraction Plans</i>	Section 5

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Appendix 3 Extraction Plan Risk Assessment

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Appendix 4 Subsidence Management Trigger Action Response Plan

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Appendix 5 Water Management Plan

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Appendix 6 Biodiversity Management Plan

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Appendix 7 Benthic Communities Management Plan

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Appendix 8 Seagrass Management Plan

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Appendix 9 Heritage Management Plan

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Appendix 10 Built Features Management Plan

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Appendix 11 Public Safety Management Plan

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Appendix 12 Rehabilitation Management Plan

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Appendix 13 Subsidence Monitoring Program

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Appendix 14 Graphical Plans

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Appendix 15 Subsidence Prediction Report

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Appendix 16 First Workings Letter and Endorsement

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