

In accordance with Condition 4, Schedule 5 of PA08_0184 this plan has been subject to updates and revisions submitted to the NSW Department of Planning, Industry and Environment (DPIE) (See Change Information Section 7.4). The Effective date of this document represents the latest acknow ledgement from DPIE that this plan has been prepared to the satisfaction of the Director-General.

Erosion and Sediment Control Plan

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1 Commitment and Policy

1.1 Introduction and Scope

This Erosion and Sediment Control Plan (ESCP) has been developed to facilitate compliance with the conditions of the Project Approval. This ESCP outlines the ESC measures to be implemented to minimise the potential for erosion and sediment impacting the local environment.

The purpose of this ESCP is to:

- address key risks identified in the Ulan Coal Mines Pty Limited (UCMPL) Sustainable Development Risk Register (Appendix B of EMS) in accordance with Environmental Management Strategy (ULNCX- 111515275- 870), and detail the necessary mitigation & management measures;
- align Ulan's operating philosophy with the Glencore Corporate Practice (GCP) and other corporate requirements;
- address the relevant conditions of the Project Approval (PA 08_0184), and Ulan's Environment Protection Licence (EPL) 394;
- provide employees and contractors with a clear and concise description of their responsibilities in relation to ESC during the operation of the mine; and
- address the relevant commitments made within the Ulan Coal Continued Operations Environmental Assessment (EA) (Umwelt, 2009).

1.2 Objectives

This ESCP sets out the procedures and programs of work to assist in:

- Compliance with statutory obligations;
- Assessing soil and water implications of a project during the planning phase;
- Planning of sediment and erosion controls during the design of the works;
- Ensure that the site constraints and design criteria are clearly established prior to commencement of the works;
- Construct sediment and erosion controls at the commencement of works;
- Minimise the area of soil disturbance at any time;
- Conserve topsoil;
- Limit water flows into disturbed areas and
- Rehabilitate/ stabilise disturbed lands as soon as practical.

1.3 Related Documents

Documents within the UCMPL Environmental Management System that relate to, or provide support to this ESCP include:

- Water Management Plan (WMP) (ULNCX-111515275-99);
- Goulburn River Diversion Remediation Program (GRDRP) (ULNCX-111515275-1641)
- Surface Water Monitoring Program (SWMP) (ULNCX- 111515275- 1642);
- Groundwater Monitoring Program (GWMP) (ULNCX- 111515275- 1643);
- Surface Water and Groundwater Response Plan (SWGWRP) (ULNCX- 111515275- 1644);
- Integrated Mining Operations Plan 2017 to 2024 (MOP) (ULNCX- 111515275- 3548);

• Environmental inspections detailed in the Environmental Management Strategy (EMS) (ULNCX- 111515275- 870); and

• Biodiversity Management Plan (ULNCX- 111515275- 225).

This ESCP has also been developed in accordance with the relevant GCP and standards outlined in the *EMS (ULNCX-111515275-870)* including:

- Change Management (GCAA-625378177-11430) Section 2 of EMS;
- Ground Disturbance Permit (GCAA-625378177-10043) Section 3 of EMS;
- Environment (GCAA-625378177-9978) Section 3 of EMS;
- Statutory Approvals NSW (GCAA-625378177-10328 11.20) Section 3 of EMS;
- Environmental Data Collection and Reporting (GCAA-625378177-10274 11.01) Section 3 of EMS and
- Completion Criteria and Rehabilitation Monitoring (GCAA-625378177-10336 11.16) Section 4 of EMS.

2 Planning

2.1 Project Approvals

The Project Approval PA 08_0184 was granted on 15 November 2010. Conditions of the Project Approval relevant to ESC, and an indication of where they are addressed within this plan, are provided in **Table 2.1**.

Table 2.1 Project Approval (08_0184) Conditions

	Project Approval Conditions						
37.	The Erosi	ion and Sediment Control Plan must:	Entire document				
	a)	be consistent with the requirements of the <i>Managing Urban Stormwater: Soils and Construction Manual</i> (Landcom 2004, or its latest version);					
	b)	identify activities that could cause soil erosion and generate sediment;	Section 2.5.3				
	c)	describe measures to minimise soil erosion and the potential for the transport of sediment to downstream waters;	Section 3				
	d)	describe the location, function and capacity of ESC structures; and	Section 3.4				
	e)	describe what measures would be implemented to maintain the structures over time.	Section 4				

2.2 Legislation and Guidelines

The following policies, principles, regulations and guidelines are relevant to the implementation of this ESCP:

- Protection of the Environment Operations Act 1997 (POEO Act) administered by the EPA;
- Water Management Act 2000 (WMA), administered by Department of Primary Industries (DPI) Water;
- Water Act 1912, administered by DPI Water;
- Water Management (General) Regulation 2018 (WMGR), administered by DPI Water;
- Environmental Planning and Assessment Act 1979 (EP&A Act), administered by DPIE;
- Managing Urban Stormwater Soils and Construction, Volume 1 (the Blue Book) (Landcom, 2004);
- Managing Urban Stormwater Soils and Construction, Volume 2A Installation of services (Department of Environment and Climate Change, 2008);
- Managing Urban Stormwater Soils and Construction, Volume 2C Unsealed Roads (DECC, 2008);
- Managing Urban Stormwater Soils and Construction, Volume 2D Main Road Construction (DECC, 2008);
- Managing Urban Stormwater Soils and Construction, Volume 2E Mines and Quarries (DECC, 2008);
- National Water Quality Management Strategy: Australian Freshwater Guidelines for Fresh and Marine Water Quality (ANZECC, 2000); and
- Fish Friendly Waterway Crossings (NSW Fisheries, undated).

2.3 Mining Lease Approval

Specific requirements for ESC in MLs and ELs will be developed in accordance with the requirements of this ESCP

2.4 Consultation

The consultation undertaken during the preparation of the EA is described in Section 3 of the EA (Umwelt 2009).

In accordance with Condition 34(a), Schedule 3 of the Project Approval, this ESCP was submitted to DPIE for review and comment on 31 March 2011.

On 16 May 2011, representatives of UCMPL met with DPIE to discuss the Department's comments on this plan. Comments received from DPIE in May 2011 have been addressed in this version of the plan, as shown in **Table 2.2**. Following further consultation with DPIE and DPI Water on 15 July 2011 the revised ESCP was submitted and was approved on 29 November 2011. The ESCP was resubmitted to DPIE on 28 June 2012, incorporating Mods 1 and 2. Minor changes were advised to DPIE on 17 June 2013. Additional comments were received from the DPIE on 25 March 2014, these were addressed in the ESCP submitted on 30 June 2014. On 9 March 2015 the ESCP was approved with amendments by DPIE. On 06 June 2019 revised ESCP was approved by DPIE with no changes

On 17 February in response to a potential ESC incident, a notification was sent to EPA & DPI after UCMPL were unable to contain erosion and sediment controls at two construction sites due to continued heavy rainfall experienced on the day.

Section 7.3 Change Information outlines further reviews of this plan and the dates when subsequent versions of the plan were approved.

Table 2.2 ESCP feedback from DP&E

DepartmentIssue	Where Addressed
The ESCP relies on site/job specific plans. The Department accepts that this approach, however requires an indication of who is responsible for preparing, reviewing and approving the plans	Section 6.0
There is a lack of formal commitment to specific requirements (see Section 3.3, 3.4.4). Use of language such as "should" needs to be avoided and firm commitments made	Section 3.3
	Section 3.3.3
Section 3.4.5 – needs to indicate what works would require approvals to be sought. This section should reference NSW Fisheries' guidelines "Fish Friendly Waterway Crossings".	Section 3.4.5
Section 4.1 – specify how often inspection will be undertaken	Section 4.1
*Section 3.2 – increased controls applied in those areas that have the potential for off-site discharge.	Section 3.3.3
*Section 3.5.3 – a commitment in time to inspect sediment dams after specified rain event.	4.1
*Section 3.5.3 – review opportunities to use collected sediment affected water (not mine water) for irrigating mine rehabilitation areas.	Section 3.4.3
*Section 3.5.4 – include system for inspecting sediment fences close to off-site points.	Section 4.1
*Section 4.1 - a commitment in time to inspect sediment controls after specified rain event and how often sediment dams are inspected for de-silting.	Section 4.1

Note * - DP&E comments (25 March 2014)

In November 2016, the DP&E, EPA and DRE conducted a an audit of the operations specific to Dam management and the erosion and sediment control processes employed at Ulan. **Table 2.3** provides the findings with relevance to the ESCP:

Table 2.3 ESCP feedback from DP&E

Water Management Plan	Requirement/Commitment	Compliance C/NC/ANC/ NA/V	Evidence Sighted	Observations	Recommendations	Comments	Section of ESCP
5.4.1	5.4.1 Erosion and Sediment Controls The ESCP outlines the inspection and maintenance requirements for erosion and sediment controls and structures that have been implemented at UCMPL. The plan includes the following inspections requirements: monthly erosion and sediment control inspections, including but not limited to: location and integrity of sediment fences; location and integrity of stockpiles; integrity of sediment dams; general conditions of erosion and sediment controls; inspections following the installation of new erosion and sediment controls; and inspections following rainfall events.		Erosion and Sediment Control Plan Version 7.0.	The ESCP does not include these requirements under Section 4.1 – Inspections and Maintenance. Inspections are undertaken of new erosion and sediment controls. They used to be undertaken by area however it is now by topic e.g. Ground Disturbance Permits.	Ensure consistency between the WMP and ESCP.	This will be completed as part of the annual review of management plans and resubmitted to the department by the end of June 2017.	Completed as part of this review
3.4.4	The inspection of sediment fences will be carried out in accordance with the monthly environmental inspections as required by the EMS (ULNCX-111515275-870), areas located adjacent to undisturbed areas will be prioritised.		EMS Version 9	Inspection reports were viewed that indicated that monthly inspection of sediment fences were undertaken. However, it is not clear from the condition whether the inspection is to include 'all' sediment fences or a 'selection'.	Clarity in the relevant documentation the inspection regime for sediment fences.	The ESCP will be updated to state: 'ESCs will be reviewed by GDP permit holders as specified in GDP specific conditions. The Environment and Community Team undertake a monthly GDP inspection which identifies and inspects the GDPs where temporary ESCs are in place (active ESCs). When the temporary ESCs are removed the inspections will be reduced to a frequency that is appropriate, if it is still needed. Active ESCs will be inspected after 30mm or greater rainfall events.' This will be completed as part of the annual review of management plans and resubmitted to the department by the end of June 2017.	4.1

Uncontrolled unless viewed on the intranet

3.4.4	Sediment fences and other temporary controls are to be designed in accordance with the "Blue Book". Where necessary, sediment fences or other temporary controls are installed immediately downstream of the areas to be disturbed. Sediment fences are installed along contours if practicable and the upslope catchment is to have a maximum grade of 1V: 2H (vertical: horizontal). Sediment fences are constructed using geotextile filter fabric with structural posts to be spaced no more than 2.5 metres apart. Sediment fences are not to be installed in high flow areas where the effectiveness of the fences may be impeded (e.g. perpendicular across waterways or drains). Sediment fences will be constructed with a maximum local upstream catchment area of 0.6 hectares.	Non-compliant	Inspection Reports Site Inspection	The Blue Book states that steel star pickets shall be used for sediment fences. Wooden pickets had been used on the sediment fences observed at the drill pad and the Goulburn River Diversion works. The sediment fence installed at the drill pad (EX02) was not installed on the contour and ran down the slope. An inspection of the site indicated that a more effective installation would have been possible (i.e. on the contour). The distance between pickets was not measured and therefore cannot be verified that the spacing's were no more than 15 metres apart. The area disturbed at the time of the audit was not 0.6 hectares, however		Steel pickets will be used going forward. Re-training in the correct design and installation of temporary erosion and sediment controls such as sediment fences will be provided to relevant personnel by 12 July 2017. Slashed areas do not generally require sediment control treatments, though they would be a condition of the GDP if assessed as necessary.	3.6, 3.4.4 & appendix B
				the area slashed was in excess of 0.6 hectares.			
3.4.4	Where practicable, the catchment areas of sediment fences and other temporary controls are limited by constructing the fences or other controls with small returns at 20 metre intervals to create smaller contributing sub catchments. This is necessary as sediment fences and other temporary controls are prone to failure in larger storm events and should be designed to ensure a maximum of 50 L/s passes through the sediment fence during a storm event, as per the "Blue Book" design criteria (Landcom, 2004).	Non-compliant	Site Inspection	Sediment fencing was observed to be installed at the drill pad (EX02) and the Goulburn River Diversion remediation area. No returns were observed to be installed at either location.		The installation of retums will be considered and implemented, where appropriate, going forward.	3.4.4
4.1	Inspections and Maintenance ESCs are maintained until rehabilitation is established. Regular inspections of ESC structures are undertaken and recorded on at least a monthly basis as well as during and directly after high rainfal events (e.g. greater than 20 millimetres of rainfall in 24 hours). Inspections include, but are not limited to: water and sediment levels in sediment dams and sumps; scouring and erosion of drainage structures and drainage lines; water quality and whether it is suitable for discharge; integrity of all installed structures including diversion drains, channels, bunds, chutes, sediment fences, energy dissipaters, access roads and wheel washes; and recommended maintenance works.	Non-compliant	Site Inspection Interviews	It was advised that inspections are undertaken on a monthly basis however this did not cover all erosion and sediment control structures. Evidence was not provided that inspections are undertaken during and directly after high rainfall events. Inspections are undertaken of new erosion and sediment controls. They used to be undertaken by area however it is now by topic e.g. Ground Disturbance Permits.	Clarify this commitment in relevant documentation. Document all inspections as required by commitments.	The ESCP will be updated to state: 'ESCs will be reviewed by GDP permit holders as specified in GDP specific conditions. The Environment and Community Team undertake a monthly GDP inspection which identifies and inspects the GDPs where temporary ESCs are in place (active ESCs). When the temporary ESCs are removed the inspections will be reduced to a frequency that is appropriate, if it is still needed. Active ESCs will be inspected after 30 mm or greater rainfallevents.' This will be completed as part of the annual review of management plans and resubmitted to the department by the end of June 2017.	4.1

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2.5 Baseline Data

2.5.1 Soil Profiles

The main soil units found within the Ulan Mine Complex are the Ulan and Lees Pinch soil landscapes (**Figure 2.2**). These units exhibit moderate to high erosivity and low fertility. The soil landscapes within this Ulan Mine Complex are described in **Table 2.4**.

Table 2.4 Soil Landscapes within the Ulan Mine Complex

Soil Landscape	Age and Stratigraphy	Topography	Soils	Characteristics
Bald Hill (bh)	Tertiary Basalt	Low hillocks. Low to high relief 60 metres to 120 metres. Moderate to steep slopes 10% to 35%.	Crests: Euchrozems. Mid-slopes: Euchrozems- Chocolate Soils, rock outcrops and floaters. Steeper slopes near crests: Shallow stony loams. Lower slopes: Brown Clays.	Erosion: Low, but High on steep slopes. Fertility: Moderate. Topsoil: Slightly acidic to neutral. Drainage: Well drained.
Dexter (dx)	Carboniferous Gulgong Granite	Rolling hills with granite outcropping tors, spherical boulders, sloping pavements. High relief 90 metres to 150 metres. Moderate slopes 10% to 30%.	Upper-mid slopes: Shallow Siliceous sands, Siliceous sands, Earthy sands. Lower slopes and major drainage lines: Yellow Solodic Soils.	Erosion: Low to High. Fertility: Low. Topsoil: Acidic to slightly neutral. Drainage: Moderate to well- drained.
Goonoo (gn)	Jurassic Pilliga Sandstone	Undulating rises and low hills; Very low to low relief 10 metres to 50 metres. Very gentle to gentle slopes 2% to 10%.	Earthy Sands; Siliceous Sands, sandy Red Earths, Yellow and Grey Earths. Lower slopes and drainage lines: Yellow Solodic Soils.	Erosion: Highly Susceptible. Fertility: Low. Topsoil: Moderate to strongly acidic. Drainage: Well drained.
LeesPinch (Ip)	Early Triassic Narrabeen Group; Permian Illawarra Coal Measures	Sandstone plateaux and hill slopes with boulders. Low to high relief 60 metres to 240 metres. Moderate to steep slopes 15% to 40% and cliffs.	Shallow sandy soils, rock outcrop extensive, boulder debris slopes, sandstone cliffs. Lower slopes: Grey or Yellow Earths, Yellow Podzolic Soils, shallow acid loams.	Erosion: Highly Susceptible. Fertility: Low. Topsoil: Slightly acidic. Drainage: Well drained.
Munghom Plateau (mp)	Early Triassic Narrabeen Group	Low undulating hills on sandstone plateaux with rock outcrop. Very low to low relief 20 metres to 60 metres. Gentle slopes 3% to 10%.	Crests and upper slopes: Siliceous sands, shallow soils. Lower slopes and depressions: Yellow Earths, Yellow Podzolic Soils. Some depressions: peats.	Erosion: Moderate. Fertility: Poor. Topsoil: Moderately acidic. Drainage: Good.
Rouse (rs)	Carboniferous Gulgong Botobolar and Havilah Granites	Undulating hills and low hills with granite outcropping tors and sloping pavements. Low relief 50 metres to 90 metres. Gentle to moderate slopes 5% to 15%.	Mid and Upper Slopes: Shallow Siliceous Sands, Earthy Sands. Lower slopes and depressions: Yellow Soloths, Yellow Solodic Soils.	Erosion: Highly susceptible. Fertility: Very low. Topsoil: Slightly acidic. Drainage: Well drained to imperfectly drained.
Talbragar (tb)	Quaternary Alluvium	Alluvial plains and low alluvial terraces. Very low relief 0 metres to 10 metres. Very gentle slopes 0% to 3%.	Lower and mid-terraces: Black Earths and Prairie Soils Higher terraces: Red-brown Earths	Erosion: Moderately susceptible; High along some sections of stream banks Fertility: Moderate to high Topsoil: Slightly alkaline to slightly acidic Drainage: Imperfectly drained to well-drained

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Turill (ti)	Early Triassic Narrabeen Group; Jurassic Purlawaugh Formation	Undulating low hills with small creek flats. Low relief 30 metres to 90 metres. Gentle to moderate slopes 5% to 20%.	Upper-mid slopes: Yellow and brown Earthy sands, Siliceous Sands. Lower slopes: Red Podzolic Soils; Drainage lines: Grey and Yellow Podzolic Soils.	Erosion: Highly Susceptible. Fertility: Low. Topsoil: Slightly acidic. Drainage: Well drained.
Ulan (ul)	Permian Illawarra Coal Measures; Undifferentiated Alluvium	Lower colluvial slopes of sandstone plateaux escarpments; Low undulating rises and creek flats. Very low to low relief 10 metresto 40 metres. Very gentle to gentle slopes 2% to 10%.	Lower slopes and drainage lines: Yellow Podzolic Soils. Salt scalds: Yellow Solodic Soils/Solonetz. Footslopes: Yellow and Brown Earths. Low rises: Minor areasof Earthy Sands.	Erosion: Moderate to high. Fertility: Low. Topsoil: Slightly acidic. Drainage: Imperfectly drained.

Reference: Murphy & Lawrie (1998); Yoo et al (2001)

2.5.2 Watercourses, receiving waters and climate

The existing surface water conditions are described in ULNCX-111515275-99 Water Management Plan. The water courses and catchment boundaries are indicated on Figure 2.1. These are the receiving waters for runoff from the site, except within the dirty water catchment system, as indicated on the figure where water is retained within the mine area and either reused or treated prior to discharge.

The average annual rainfall for Ulan is 643.5 mm. The 95% percentile (which corresponds to only 5% of storms being more intense), 5 day storm is 176mm total, average 1.46mm/hr. This is for Ulan using the latest Australian Rainfall and Runoff (Bureau of Meteorology) data from 2016. Averages from 40 to 50mm per month are experienced from April to September and during October to March the average monthly rainfall ranges from 53 to 73 mm, with January having the highest average monthly rainfall. The highest monthly rainfall on record was February 1955 when 331mm was recorded and the highest rainfall in any day was 24 March 1926 when 96 mm was recorded.¹

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¹ Data source: http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_nccObsCode=139&p_display_type=dataFile&p_startYear=&p_c=&p_stn_num=062036



Figure 2.1 Catchment Boundaries

2.5.3 Sources of Erosion and Sediment

Operations at the Ulan Mine Complex may result in the alteration of existing surface water flow patterns and have the potential to create extensive areas of disturbed land. The mining operations and related activities that have the potential to generate sediment and impact on the surrounding catchment areas if not appropriately managed are:

- the clearing of land ahead of mining or for other mining related activities;
- open cut mining including the placement of overburden and topsoil;
- the installation of services and infrastructure;
- changes to drainage lines and/or catchment
- the management and rehabilitation of tailings and coarse reject emplacement areas;
- coal stockpiles and coal handling equipment including mobile equipment, coal crushing equipment and conveyors;
- runoff from the construction and maintenance of haul roads;
- runoff from the construction and maintenance of internal access roads;
- vehicle and equipment movements;
- rehabilitation or preparation of disturbed areas including subsidence remediation works;
- disturbed areas not yet rehabilitated and
- disturbed areas created by natural processes or by previous agricultural land uses.

This ESCP provides control measures appropriate for these activities in order to prevent adverse impacts on surrounding catchment areas.



Figure 2.2 Soil Landscapes

3 Implementation

3.1 Erosion and Sediment Controls

ESCs are to be implemented at Ulan to mitigate the impacts of the proposed development on nearby watercourses and the surrounding environment. This includes, activities associated with the management of subsidence resulting from underground mining. Standard ESC techniques are to be in general accordance with the requirements of *Managing Urban Stormwater: Soils and Construction Volume 1* (Landcom, 2004) and *Volumes 2A, 2C, 2D and 2E* (DECC, 2008) (the Blue Book).

A summary of the general ESC principles employed by UCMPL to limit erosion on site are outlined in **Section 3.2**. Further site specific ESC strategies and structures that will be utilised to control erosion and sedimentation are detailed in **Section 3.3** and **3.4** respectively.

The implementation of the controls outlined in the following sections generally require the preparation of a site specific ESCP as per Ground Disturbance Permit (GCAA-625378177-10043).

3.2 General ESC Principles

The ESC general controls are designed to control and manage erosion and sediment that may result from mining and related activities.² Comprehensive design standards and control options are detailed in *GCAA-625378177-10892 Erosion and Sediment Control Procedure*. Measures include:

- installation of ESC measures as the first step in the process for land disturbance;
- Identifying areas of environment and cultural sensitivity;
- minimising all disturbed areas and stabilisation by progressive rehabilitation/stabilisation as soon as practicable;
- maintaining where possible vegetative buffer zones, the buffer should not be reduced to incorporate constructed controls, the vegetation is more effective;
- a risk assessment process is used to determine appropriate controls, with an emphasis on controls where there is a potential for off-site discharge;
- clearly identifying and delineating areas required to be disturbed and ensuring that disturbance is limited to those areas. Clearing as little vegetation as required and minimising machinery disturbance outside of these areas;
- construction of diversion banks upslope of areas to be disturbed to direct clean water runoff away from disturbed areas where practical. The diversion banks will be designed to ensure effective segregation of sediment-laden runoff and allow clean surface water to return to natural watercourses;
- applying gypsum, where required, to reduce the dispersibility of the subsoils that will be disturbed and to minimise the potential for tunnel erosion and surface rilling of disturbed or reshaped areas. The application rate is to be determined by soil analysis as required;
- construction of catch drains to capture runoff from disturbed areas and direct runoff into sediment dams;
- construction of other ESC measures such as sediment fences and sediment dams within the catchment area (refer to **Section 3.4**);
- construction of drainage controls such as table drains at roadsides and on hardstand areas and toe drains on stockpiles and overburden emplacement areas;
- interception of runoff from disturbed catchment areas in pit floors or sediment dams;
- construction of sediment dams to capture runoff from infrastructure areas (refer to Appendix A of this plan);

² Source: Volume 2E of the Blue Book (DECC, 2008)

- adding flocculent to dams, where required, to aid the settlement of entrained sediment (refer to Section 3.3.3);
- placement of geotextile liners and rock check dams in drains as required to reduce water velocities and prevent scouring (refer to Appendix 3);
- construction of graded banks over final reshaped overburden areas to minimise erosion and re-direct runoff to catch drains and water disposal areas;
- regular maintenance of all controls and inspection of all works will be under taken after storm events to ensure ESCs are performing adequately as per GDP specific conditions;
- topsoil stockpiles to be located away from mining, traffic areas and watercourses;
- level or gently sloping areas will be selected as stockpile sites to minimise erosion and potential soil loss where possible;
- appropriate sediment controls will be installed upslope of stockpiles to divert water around the stockpiles and downslope of stockpiles to prevent soil loss;
- stockpiles will generally be less than three metres high and will be set out in windrows to maximise surface exposure and biological activity;
- vegetation of soil stockpiles if stored for longer than three months;
- revegetation of final stable landforms and disturbed areas (where practical) as soon as possible and
- Immediate repair or redesign of ESCs that are not performing adequately, as identified in field inspections.

3.3 **Construction Principles**

It is anticipated that construction activities associated with construction of ancillary infrastructure will be required at the Ulan, in accordance with the Project Approval.

The general recommendations of the Blue Book in regard to sediment and waste control indicate that where the average annual soil loss from the total area of land disturbance is less than 150 m³ per year a sediment dam may not be required. For these areas, where a sediment dam is potentially not required, other control measures can be used to ensure that pollution does not occur to downslope receiving waters (as per Section 6.3.2 of Volume 1 of the Blue Book (Landform, 2004).

Where a sediment dam is required the design criteria is set out in **Table 2A** of **Appendix A**.

Sediment dams are to be inspected before and after rain fall events and be maintained in a drawn down state as far as practical, where sediment is dispersive, a suitable flocculation system shall be available for use to settle fine particles within the dam. Where discharge is required in order to maintain sufficient capacity, the discharge procedure as outlined in Section 3.8 of the *Water Management Plan (ULNCX-111515275-99)* will apply.

Before ground disturbance activities commence within the proposed disturbance area, the relevant supervisor/contractor shall submit in advance, an ESC Plan to the Environmental department in conjunction with a completed GDP for approval. The ESC Plan will be based on the management and mitigation measures outlined in this ESCP.

No earthworks will be allowed to proceed on any works, until the contractor has implemented the required ESC Plan along with the Site Specific Strategies outlined within the ESC Plan.

3.3.1 Disturbance Minimisation

Land disturbance is minimised by clearing the smallest practical area of land ahead of the mining operation or construction activities and leaving this disturbed for the shortest possible time. All clearing activities are to be undertaken in accordance with EMS (ULNCX-111515275-870) and Ground Disturbance Permit (GCAA-625378177-10043) using the following controls:

 all works to be carried out must be at least 40 metres away from 'waterfront land' (as it is defined under the WMA) unless an exemption from the controlled activity approval requirements applies (refer to section 3.3.6);

- restricting the areas to be cleared of existing vegetation to the areas being actively worked;
- clearly identifying and demarcating areas required to be disturbed and ensuring that disturbance is limited to those areas as per the GDP conditions;
- clearing vegetation only as required to achieve the works and minimising machinery disturbance outside of these areas;
- limiting the number of roads and tracks to be established; and

Identifying and managing habitat trees and Flora and Fauna as per the *Pre Clearing Survey* and *Habitat Tree Felling Procedure (ULNCX-111515275-1635)*.

It is the Task Coordinator's responsibility to ensure that there is no damage to any vegetation outside the limits to be cleared.

3.3.2 Topsoil and Stockpile Management

In accordance with Ulan's Mining Operations Plan (MOP), topsoil stripping within areas proposed to be disturbed is to be undertaken (where practicable) when the soil is in a slightly moist condition thus reducing damage to soil structure and dust emissions. Prior to topsoil stripping operations, the area to be stripped will be delineated on a plan and in the field through the use of survey pegs and flagging.

Stripped topsoil to be transported to completed sections of the final landform for immediate spreading if operational sequences, equipment scheduling and weather conditions permit. Where this is not possible, topsoil to be transferred to stockpiles within the perimeter of the GDP disturbance area and seeded, depending on expected stockpile life. The location and extent of topsoil stockpiles is then recorded in the survey database. Diversion of water around the stockpiles must be considered.

If topsoil is to be stockpiled for longer than three months, stockpiles are to be a maximum height of three metres and a maximum batter slope of 1:2 (vertical: horizontal) is to be maintained to preserve biological viability and reduce soil deterioration where possible. Topsoil will preferentially be stored in previously cleared areas. The stockpiles will be grassed with sterile grass species. Vegetation stockpiles can be established adjacent to topsoil stockpiles to provide additional erosion protection. Maintenance of the stockpiles will include weed control and fertilising if required. Stockpiles will be clearly identified with enough signage to reduce the likelihood of vehicular interaction, contamination and soil loss.

Details regarding the re-spreading of topsoil in rehabilitation areas associated with biodiversity offset and management programs are included in the MOP and Land Clearing and Topsoil Stripping Procedure (ULNCX-111515275-2953).

3.3.3 Management of Runoff Water

Runoff water that is generated on site in dirty water catchments is either treated or diverted through Ulan's water management system to minimise the impact on the environment. Details regarding the management of runoff water from disturbed areas are outlined further in the *WMP (ULNCX-111515275-99)*. Licensing and Project Approval restrictions on transfers and discharges of water are also detailed in the *WMP (ULNCX-111515275-99)*.

The "Blue Book" states that "...ensuring that pollution does not occur to downslope receiving water is essential. To this end, treated discharge waters should not contain more than 50 milligrams per litre of suspended solids in the design rainfall event. More stringent requirements might be necessary in particularly sensitive environments or, where applicable, can be required by Council's stormwater management plan. Of course, all practical measures to reduce pollution should be taken for storm events beyond the design event" (refer to Chapter 6 - Sediment and Waste Control, Blue Book (Landform, 2004)).

In addition, the "Blue Book" states that " The actual discharge load should be considerate of the loads normally carried in the receiving waters, including those during and following storm events. Any fluvial processes within these waters will have reached equilibrium considerate of those loads. Reducing them significantly below these levels can cause streams to become "hungry" and erode their own bed and banks; whilst increasing them significantly can result in degradation to ecosystems" (refer to Chapter 6 - Sediment and Waste Control, Blue Book (Landcom, 2004))

If necessary, flocculation will be used to improve the quality of sediment laden water to less than 50 mg/L of Total Suspended Solids (TSS) prior to discharge (in accordance with the "Blue Book"). All

discharges from the site will be managed in accordance with the processes outlined in the WMP (ULNCX-111515275-99) and water quality parameters outlined in the SWMP (ULNCX-111515275-1642).

3.3.4 Soil Types and appropriate Sediment Controls

Sediment controls need to be selected based on their ability to trap a specified sediment grain size (**Table 3.1**) as set out below.

Type 1 sediment containment systems are designed to collect sediment particles less than 0.045 mm in size. These sediment controls include sediment basins and dams.

Type 2 sediment containment systems are designed to capture sediments down to a particle size of between 0.045 and 0.14 mm. Type 2 sediment controls include rock filter dams, sediment weirs and filter ponds.

Type 3 sediment containment systems are primarily designed to trap sediment particles larger than 0.14 mm. These controls include sediment fences, grass buffer zones, and certain stormwater inlet protection systems.

Dispersive soils are highly susceptible to deep, narrow rilling (fluting) on slopes and drains and have a high risk of tunnel erosion if water pathways are not managed properly.

Classification	Minimum particle size	Typical trapped particles
Type 1	<0.045mm	Clay, silt and sand
Туре 2	0.045 to 0.14mm	Silt and sand ^[1]
Туре 3	>0.14mm	Sand
Supplementary	>0.42mm	Coarse sand

Table 3.1 Classification of Soil Types

3.3.5 Works within Watercourses

Works within watercourses and riparian zones will only commence after the necessary approvals have been sought (where required). When work is required within watercourses, work will be in accordance with guidelines from *Managing Urban Stormwater: Soils and Construction Volume 1* (Landcom, 2004) and *Volumes 2A, 2C, 2D and 2E* (DECC, 2008) (the Blue Book), including:

- works are undertaken at least 40 metres away from 'waterfront land' (as it is defined under the WMA) and in accordance with controlled activity approval requirements, unless an exemption from the controlled activity approval requirements applies (refer to section 3.3.6);
- works within the riparian zone will maximise, where possible the preservation of any existing vegetation and minimise site disturbance;
- designs for works within or near water bodies will ensure the retention of natural functions and maintenance of fish passage in accordance with NSW Fisheries Guidelines (undated) *Fish Friendly Waterway Crossings*;
- when designing individual catchment configurations, retain naturally functioning streams and drainage lines, avoid aggregation of several sub catchments and clearly define maintenance requirements prior to construction;
- hay bales will not be used for sediment control as hay bales can promote weed growth within waterways;
- where works are to be undertaken within the 2 year flood level, measures will be incorporated to ensure C-factors (i.e. factor relating to vegetation coverage as outlined in Appendix A of Volume 1 of the Blue Book (Landcom, 2004)) are always below 0.05 during possible erosion events;
- planned works will be scheduled for forecasted dry weather periods and
- planned works within or near watercourses will have inspections completed as per GDP specific conditions.

3.3.6 Controlled activity approvals and exemptions

The WMA broadly defines a 'controlled activity' as the erection of a building, the carrying out of work, the removal of material or vegetation from land, the deposition of material on land and the carrying out of any other activity that affects the quantity or flow of water in a water source. These works, if carried out within 40 metres of a river, lake or estuary, require a controlled activity approval (CAA) under the WMA, unless any of the below exemptions apply.

A CAA will not be granted unless the Minister is satisfied that adequate arrangements are in force to ensure that no more than *minimal harm* will be done to any waterfront land.

Under the WMA, a 'controlled activity' can be undertaken without a CAA in circumstances where:

- the activity is undertaken in accordance with a water management work approval or an aquifer interference approval and each term of the approval is complied with (section 91E of the WMA);
- the activity is carried out in accordance with a lease, licence, permit or other right under the *Mining Act 1992, Crown Lands Management Act 2016* or a petroleum title *under Petroleum (Onshore) Act 1991* (Schedule 4, Part 2, clause 18 of the WMGR);
- the activity is for the purpose of facilitating the use of a water supply work in accordance with the conditions of a water supply work approval (Schedule 4, Part 2, clause 20 of the WMGR);
- the activity is in, on or under a minor stream or within a rural zone under a planning instruction and which is connected with the construction or use of fencing, vehicular crossing or an access track that does not impound water (Schedule 4, Part 2, clause 23 of the WMGR);
- the activity involves the removal of vegetation where there has been no removal or disturbance of soil or other extractive materials (Schedule 4, Part 2, clause 25 of the WMGR);
- the activity is carried out on waterfront land where a channel of the river is fully concrete lined or is a fully enclosed pipe channel (Schedule 4, Part 2, clause 28 of the WMGR);
- the activity relates to minor streams or third order streams which is separated by a public road or hard stand space (Schedule 4, Part 2, clause 31 of the WMGR); or
- the activity involves the maintenance of existing lawful works (but not additions or enhancements to the existing works) or the repair and restoration of lawful works after storms (Schedule 4, Part 2, clause 33 and 34 of the WMGR).

In addition to the above exemptions, projects approved under previous Part 3A or Division 4.1 of the EP&A Act do not require a CAA due to the operation of section 4.41 of the EP&A Act. The PA was originally granted pursuant to Part 3A of the EP&A Act. Although Part 3A of the EP&A Act has now been repealed, transitional arrangements in the *Environmental Planning and Assessment (Savings, Transitional and Other Provisions) Regulation 2017* (NSW) mean that the Project does not require approvals under section 89, 90 and 91 of the WMA in respect of works or activities that are approved under the PA (ie, it does not require a CAA for those works or activities).

3.3.7 Temporary Waterway Crossings

Works within watercourse and riparian zones will only commence after the necessary approvals have been sought (where required). Where temporary waterway crossings are required construction of these will be in accordance with guidelines outlined in *Managing Urban Stormwater: Soils and Construction Volume 1* (Landcom, 2004) and *Volumes 2A, 2C, 2D and 2E* (DECC, 2008) (the Blue Book and NSW Fisheries Guidelines (undated) *Fish Friendly Waterway Crossings*).

3.3.8 Subsidence Impacts

ESC measures may be required to address surface cracking or altered drainage paths as a result of subsidence. Monitoring of these impacts are outlined in the *SWMP (ULNCX-111515275-1642)*. The management measures and controls that may be implemented to address these impacts are detailed in the *SWGWRP (ULNCX-111515275-1644)*.

3.3.9 Access Tracks

Access zones and controls are to be designated for each GDP where required. Construction of new access tracks will only commence after the necessary approvals have been sought through the Ground Disturbance Permit process and all GDP specific conditions have been met. Where new access tracks are required, construction of these in accordance with *Guidelines for the planning, construction and maintenance of tracks* published by Department of Land and Water Conservation (1994), including:

- construction of access tracks along the contour where possible (i.e. limit grade changes);
- minimising disturbance of existing ground, e.g. where possible limiting works to slashing vegetation when constructing tracks;
- limiting construction of access tracks across existing drainage lines;
- maintaining vegetation buffers between access tracks and watercourses where possible;
- ensuring tracks are free draining and
- include cross fall and outfall drainage, where required, to prevent concentration of runoff.

3.3.10 Stable Final Landforms

In accordance with the MOP, the conceptual final landform has been designed to maintain consistency with the local area and predominantly consist of an undulating landform reflecting the dominant features of the existing environment. All areas disturbed for mining will be backfilled with overburden, reshaped, covered with topsoil (where available) or an alternative surface ameliorant, prior to revegetation. Elements such as drainage paths, contour drains, ridgelines and emplacements will be shaped in an undulating informal profile, keeping with the natural landforms of the surrounding environment. The conceptual final land form is provided in the MOP.

The final landform will be designed and constructed as a self-draining landscape and should minimise the slope gradients and lengths. In particular, cut and fill batters for access road and earthworks should be constructed at a maximum slope of 1:3 (vertical: horizontal), where possible, to maximise long term stability. As outlined in the EA, the final landform of overburden emplacement areas will predominantly consist of slopes of 10 degrees or less and increase up to a maximum of 18 degrees, consistent with DTIRIS guidelines. Long slopes are to be stepped to reduce the effective slope length.

Further details regarding the design of final landforms and the slope requirements are detailed in the MOP.

3.3.11 Progressive Rehabilitation

All disturbed areas will be progressively stabilised and revegetated, including:

- progressively stripping and stockpiling topsoil where it is a suitable quality for later use in rehabilitation;
- reshaping, topsoiling and vegetating of road cut, fill batters and other disturbed areas as soon as practical;
- characterisation of soil to determine the ameliorant requirements (e.g. gypsum and/or lime); and
- seeding and, where required, controlled fertilising of all disturbed areas to provide for rapid grass cover.

Rehabilitation areas are to be deep ripped (where possible) and roughened to increase infiltration and reduce rainwater runoff. Vegetative cover will be established over all disturbed areas such as road side verges, cut and fill batters around site roads and hard stand areas and other temporary areas of disturbance such as soil stockpiles. The ESCs are not removed until establishment of the rehabilitation meets a standard where the erosion risk is resolved prior to removal.

3.4 Site Specific Control Measures

The Water Management System has been designed to control and manage sediment through the construction and maintenance of a range of permanent structures designed to prevent the uncontrolled discharge of surplus water off site. The structures used at the Ulan Mine Complex include:

- clean water diversion drains;
- catch drains;
- sediment dams and
- sediment fences and other temporary controls.

The objective of these controls is to maximise similarities between pre-development and postdevelopment drainage networks. That is, the sediment loading and flowrates from disturbed catchment areas will not exceed those that would have occurred from the pre-developed catchment areas. Where implemented, the adequacy of any controls will continually be assessed by the task coordinator and the Environmental Department (refer to **Section 4**). Further details on the above mentioned controls are provided in the following sections and design details and drawings of typical ESC structures are provided in **Appendix B**. As built evidence including photos are to be kept for evidence of correct installation of structures.

3.4.1 Clean Water Diversion Drains

Clean water diversions will be constructed upslope of areas to be disturbed to convey clean water runoff away from disturbed areas and prevent water from entering active areas and the dirty water systems, **Figure 3.1**. This clean water runoff will be diverted into nearby watercourses.

All permanent diversions are to be designed in accordance with the Blue Book to have capacity for a critical duration 100 year Average Recurrence Interval (ARI) storm event and be non-scouring in a critical duration 20 year ARI storm event. Further detailed design calculations are provided in **Appendix A**.

Temporary diversions are to be designed to criteria as specified in Appendix A.



Figure 3.1 Ulan Complex Water Management Systems

3.4.2 Catch Drains

Catch drains will be established to convey runoff from the disturbed areas to sediment dams.

All permanent catch drains will be designed to have capacity for a critical duration 100 year ARI storm event and be non-scouring in a critical duration 20 year ARI storm event. Further design details and a typical cross-section are included in **Appendix B**.

Temporary catch drains are to be designed to criteria as specified in Appendix A.

3.4.3 Sediment Dams

Sediment dams are to be constructed within dirty water catchments to capture and treat sediment laden water for treatment prior to discharge. Sediment dams will be installed where appropriate prior to any land disturbance activities occurring and maintained following completion. The design of each sediment dam will take into consideration the topsoil and overburden characteristics of the catchment, as well as any other potential pollutants (e.g. Coal fines) (refer to **Appendix A**).

Permanent sediment dams are designed and constructed within the infrastructure areas to capture sediment laden water for treatment prior to reuse or discharge. These dams are discussed in further within the *WMP (ULNCX-111515275-99)*.

Type D and F sediment dams (refer to **Appendix A**) will be maintained in a drawn down state as far as practicable. This will be achieved by ensuring that water in the sediment dams is transferred to the water management system. Where sediment is known/expected to be dispersive, sediment dams will include a flocculation system to assist in settling fine particles (refer to **Section 3.3**). Clean water is re-used on mine rehabilitation where possible, if evaluation proves its suitability. The dosing and controls for the sediment dams should be recorded in the site specific ESCP, along with water transfer, if proposed.

3.4.4 Temporary Controls

Sediment fences, sediment traps, rock check dams and other temporary ESC measures (**Figure 3.2**) from the "Blue Book" will be installed in advance of, or in conjunction with, earthworks to prevent sediment laden water leaving the site or entering clean water systems (refer to **Appendix A**). These temporary controls are intended to be used for short periods whilst more permanent ESC structures are being implemented or during emergency scenarios where permanent structures are not deemed appropriate. The inspection of sediment controls will be carried out in accordance with the monthly environmental inspections as required by the *EMS* (*ULNCX- 111515275- 870*) and as specified in *GDP conditions*, areas located adjacent to undisturbed areas will be prioritised.

Sediment fences and other temporary controls are to be designed in accordance with the "Blue Book". Where necessary, sediment fences or other temporary controls are installed immediately downstream of the areas to be disturbed. Sediment fences are installed along contours if practicable and the upslope catchment is to have a maximum grade of 1V: 2H (vertical: horizontal). Sediment fences are constructed using geotextile filter fabric with steel pickets to be spaced no more than 2.5 metres apart. Sediment fences are not to be installed in high flow areas where the effectiveness of the fences may be impeded (e.g. perpendicular across waterways or drains). Sediment fences will be constructed with a maximum local upstream catchment area of 0.6 hectares. Slashed areas do not generally require sediment control treatments, though they would be a condition of the GDP if assessed as necessary.

Where practicable, the catchment areas of sediment fences and other temporary controls are limited by constructing the fences or other controls with small returns at 20 metre intervals to create smaller contributing sub catchments. This is necessary as sediment fences and other temporary controls are prone to failure in larger storm events and should be designed to ensure a maximum of 50 L/s passes through the sediment fence during a storm event, as per the "Blue Book" design criteria (Landcom, 2004). The installation of returns will be considered and implemented, where appropriate.



Figure 3.2 Temporary Sediment controls

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Ground Disturbance Permits 3_5

ESC Plans are prepared by the Task Coordinator for proposed construction and/or clearing activities detailing the ESC measures to be implemented for that activity as part of the Ground Disturbance Permits (GDP) (GCAA-625378177-10043).³ For large construction/clearing activities, the site is to be separated into smaller areas (construction envelopes) to enable the detailed documentation of ESC measures for the different elements of construction/clearing and different catchment areas and staging of activities to minimise areas exposed to runoff.

The site specific ESCPs are reviewed and approved by the Environment and Community Coordinator (or delegate) prior to the commencement of any surface disturbance works. The ESCP should detail each stage/area of the activity and include:

- a map (to scale) of the construction site including topographical and other natural and man-. made features;
- information on soil type and compaction requirements;
- sediment controls selected, based on soil type within the disturbance area.
- rehabilitation requirements (e.g. seeding and fertiliser rates);
- information on ground cover;
- construction diagrams for sediment and erosion control features (including specific details of material requirements e.g. rock size, type of sediment filter) that are appropriate to construction activities, landforms, drainage paths and other conditions;
- design calculations for sediment control features such as sediment basins;
- an activity and inspection schedule (show implementation of erosion, and sediment control features prior to commencement of works):
- clearly identified legend to indicate the features of the plan, include buildings and refuelling facilities, if applicable;
- date plan was developed;
- name of person developing the plan and responsibilities for implementation, inspections and maintenance:
- version number of the plan; and .
- name of the plan to verify the location.

The GDP (and ESCP) are incorporated into the work plan and implementation of the ESCP may be a hold point for sign prior to implementation of the disturbance activity.

Training 3.6

Environment awareness training is provided to new employees and contractors as part of the Ulan Site Specific Induction program.⁴ The Training Needs Analysis (skill code 10525) identifies ESC training including design standards and application of erosion and sediment methodologies for specific roles including Supervisors and Managers within the surface operations, the Major projects/contract engineering /construction projects staff and supervisors and environmental personnel every two years.

GDP process to capture train requirements as per TNA and Damstra records.

GCAA-625378177-10043, Ground Disturbance Procedure

Training and Competency Management Standard (ULNOC-1105874907-1747, ULNUG-849165555-5762, ULWUG-729531900-105)

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4 Measurement and Evaluation

4.1 Inspections and Maintenance

ESCs are maintained until rehabilitation is established. ESCs controls need to be inspected by GDP permit holders as per GDP specific conditions. The Environment and Community Team undertake a monthly GDP inspection which identifies and inspects the GDPs where temporary ESCs are in place (active ESCs). When the temporary ESCs are removed the inspections will be reduced to a frequency that is appropriate, if it is still needed. Active ESCs and sediment Dams will be inspected after a 30mm rainfall event or greater in a 24 hour period or as out lined in the GDP specific conditions.

Inspections include, but are not limited to:

- water and sediment levels in sediment dams and sumps;
- scouring and erosion of drainage structures and drainage lines;
- water quality and whether it is suitable for discharge;
- Integrity of sediment fences paying particular attention to offsite discharge points
- integrity of topsoil stockpiles and installed structures including diversion drains, channels, bunds, rock check drains, chutes, energy dissipaters, access roads and wheel washes and
- recommended maintenance works.

Site specific ESCPs define key maintenance tasks and include inspection sheets for all phases of works. Inspections are recorded, maintenance actions assigned and where there is a significant risk that failure of the controls could cause a non-compliance with the licence conditions these need to be reported to the Environment and Community Manager.

Water quality monitoring, detailed in the SWMP (ULNCX-111515275-1642), includes sediment dams with the potential to discharge off site.

ESC structures are desilted before the efficiency of the structure is impeded. The sediment levels in the structures and the need for desilting is determined through a visual assessment. Where practical, sediment dams are maintained at the lowest level to maximise the available storage capacity. The need for reducing water levels is assessed as part of the regular inspections of ESCs as per GDP specific conditions.

If inspections identify that the type, location or condition of the ESC structures are ineffective, the control structure many need to be modified, repaired or replaced. If the ineffective ESC structures cannot be addressed immediately, the timeframe for the modification, repair or replacement of the structures is based on an assessment of the risk to the surrounding environment.

4.2 **Corrective Actions**

Where a failure of ESC structures has occurred or an inspection identifies a non-compliance with this plan, the incident/non-compliance will be handled in accordance with the 3.4.11 Incident Management Process within EMS (ULNCX- 111515275- 870). Any potentially high risk non-conformances identified during inspections will be reported immediately to the Environment and Community Manager and supervisor of the area in question, for urgent action. The Environment and Community Officer will assess the effectiveness of any remedial actions at the next site inspection. All reportable incidents will be undertaken in accordance with **Section 4.3**.

All non-conformances identified through the environmental inspection program need to be recorded and entered into CMO by the Environment and Community Officer, to monitor completion and the effectiveness of the action.

4.3 **Reporting Requirements**

4.3.1 Environmental Incidents

The Secretary, NSW DPIE, the EPA and other relevant agencies must be notified immediately⁵ if an environment incident, including off-site discharge of sediments occurs. A report is prepared within 7 days for DPIE and the EPA detailing:

- the date, time and nature of the exceedance/incident;
- identify the likely cause of the exceedance/incident;
- description of the response action that has been undertaken to date; and
- description of the proposed measures to address the exceedance/incident.

4.3.2 Internal Reporting

The Environment and Community Manager is responsible for preparing information for internal communication and reporting as per Section 4.3.3 of the EMS (ULNCX-111515275-870).

4.3.3 External Reporting

For more information regarding external reporting refer to Section 4.3.3 of the EMS (ULNCX-111515275-870).

4.3.4 Community Complaints

Community complaints management includes receipt of complaints, investigation, implementation of appropriate remedial action, and feedback to the complainant as well as communication to site management or personnel and notification to external bodies, such as the EPA, where necessary. Further information on complaints management is provided in Complaints Procedure (ULNCX-111515275-3376).

5 Review and Improvement

The Environment and Community Manager (or delegate) will review the ESCP and supporting plans annually and after an incident or audit, ⁶ incorporating changes in environmental requirements, technology and operational procedures as required. The revised ESCP is re-submitted to NSW DPIE for Secretary approval (at least once every 3 years). The approved ESCP is publicly available at <u>www.ulancoal.com.au.</u>

The performance of ESCP in achieving the objectives, including any Annual Plan targets is reviewed annually by the Environment and Community Manager and reported to the Operations Managers. Non-conformances and corrective actions are identified where objectives are not being met.⁷

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⁵ PA08_0184, Schedule 5, condition 6 and Pollution Incident Response Management Plan (PIRMP) (ULNCX-111515275-2432) ⁶ PA08_0184, Schedule 5, condition 4 ⁷ Fruitment Management System ULNCX 44445275, 970

⁷ Environment Management System ULNCX-111515275-870

6

Accountabilities

Role	Accountabilities for this document
Operations Manager	Approve appropriate resources for the effective implementation of this Plan.
	• Ensure the effective implementation of strategies designed to reduce surface water impacts from the operation.
	• Ensure any potential or actual erosion and sediment control issue is reported in accordance with legal requirements and the corporate standard.
	Authorise internal and external reporting requirements of this Plan.
	• Approve subsequent revisions of this Plan.

Role	Accountabilities for this document
Environment and Community Manager	Provide that sufficient resources are allocated for the implementation of this Plan.
	• Ensure appropriate resources are budgeted for to enable appropriate management of erosion and sediment control
	• Ensure that erosion and sediment control considerations are undertaken in the installation of all new infrastructure to be installed at the operation, where applicable.
	• Identify water management risks and impacts to the environment and assess resources required to mitigate identified risks and impacts within the site.
	• Ensure that surface water management controls are implemented in accordance with this Plan.
	• Ensure that the results of monitoring are evaluated and reported to senior management and to relevant personnel for consideration as part of ongoing mine planning.
	• Ensure any potential or actual surface water issue is reported in accordance with legal requirements and the corporate standard.
	• Provide visible and proactive leadership in relation to the erosion and sediment control management.
	• Ensure that operational changes consider the potential impacts on erosion and sediment control in the surrounding environment and adjacent private landholders
	• Ensure all internal and external reporting requirements are met, including incident reporting in accordance with EMS.
	• Ensure all reporting complies with internal and external monitoring standards, protocols and regulations.
	Proactively engage government and community as required.
	Coordinate the ongoing review of this Plan.
	• Review and approve external reports e.g. Annual Review Report, prior to final approval by the Operations Manager.
	Contact point for Community Complaints in accordance with Complaints Procedure ULNCX-111515275-3376.
	• Ensure effective management of all community complaints.

Role	Accountabilities for this document
Environment & Community	• Manage and maintain the water monitoring programs in accordance with this Plan.
Coordinator	• Ensure monitoring equipment is operated in accordance with relevant industry standards and protocols.
	• Ensure that all monitoring records are effectively maintained on site in accordance with the EMS.
	Coordinate the collation and evaluation of monitoring data.
	• Conduct periodic environmental inspections in accordance with the EMS.
	• Ensure any potential or actual water management issue, including incidents and non conformances is reported to the ECM.
	• Coordinate incident investigation processes including associated reporting requirements, in accordance with the EMS.
	• Coordinate the implementation of corrective actions and evaluate their effectiveness.
	• Provide visible and proactive leadership in relation to surface water management and erosion and sediment control.
	Participate in the ongoing review of this Plan.
	• Ensure the adequacy of ESC Plans in accordance with the Ground Disturbance Permit.
	• Ensure all relevant employees and contractors receive general awareness training in accordance with this Plan.
	Conduct periodic environmental inspections of UCMPL's buffer lands to identify any water management issues.
	Manage access and lease agreements for ongoing management of water management system.
	Proactively engage government and community as required.

Role	Accountabilities for this document
Environment &	• Upload copies of updated management plans to the UCMPL website.
Community Onicer	Update monitoring data on the UCMPL internet site.
	Regularly report environmental performance to ECM.
	Prepare internal and external reports for review by ECM.
	• Ensure that all monitoring records are effectively maintained on site in accordance with the EMS.
	Coordinate the collation and evaluation of monitoring data.
	• Ensure any potential or actual water management issue, including incidents and non conformances is reported to the ECM.

Role	Accountabilities for this document		
Project Manager	• Provide that sufficient resources are allocated for the implementation of this Plan, as required.		
	• Ensure adequate resources are budgeted for in relation to water monitoring or erosion and sediment control for their task/project.		
	Implement and manage changes to UCMPL's water management system through UCMPL's Change Management process.		
	• Ensure the any work requiring ground disturbance is approved prior to disturbance in accordance with EMS (where relevant).		
	• Ensure that operational changes consider the potential impacts on erosion and sediment control in the surrounding environment and adjacent private landholders.		
	Monitor that team members and contractors carry out work appropriate monitoring and maintenance tasks.		
	• Ensure any potential or actual water management issue is controlled, or otherwise isolated.		
	• Ensure any potential or actual water management issues, including environmental incidents, are reported to the ECM.		
	• Conduct environmental inspections including monitoring of erosion and sediment control structures prior to and following high rainfall events.		
	• Provide input to management on the adequacy and effectiveness of this Plan.		
	Complete maintenance and repair work on erosion and sediment control structures as identified in field inspections.		
	• Provide visible and proactive leadership in relation to surface water management and erosion and sediment control.		
	• Ensure personnel working at the operation are aware of any water monitoring obligations for their task/project.		
	• Ensure all erosion and sediment controls are in place in accordance with ESC Plans.		

Role	Accountabilities for this document
Surface Projects Coordinator	Provide that sufficient resources are allocated for the implementation of this Plan, as required.
	• Ensure adequate resources are budgeted for in relation to water monitoring or erosion and sediment control for their task/project.
	 Implement and manage changes to UCMPL's water management system through UCMPL's Change Management process.
	• Ensure the any work requiring ground disturbance is approved prior to disturbance in accordance with EMS (where relevant).
	• Ensure that operational changes consider the potential impacts on erosion and sediment control in the surrounding environment and adjacent private landholders.
	Monitor that team members and contractors carry out work appropriate monitoring and maintenance tasks.
	• Ensure any potential or actual water management issue is controlled, or otherwise isolated.
	• Ensure any potential or actual water management issues, including environmental incidents, are reported to the ECM.
	• Conduct environmental inspections including monitoring of erosion and sediment control structures prior to and following high rainfall events.
	• Provide input to management on the adequacy and effectiveness of this Plan.
	Complete maintenance and repair work on erosion and sediment control structures as identified in field inspections.
	• Provide visible and proactive leadership in relation to surface water management and erosion and sediment control.
	• Ensure personnel working at the operation are aware of any water monitoring obligations for their task/project.
	• Ensure all erosion and sediment controls are in place in accordance with ESC Plans.

Role Accountabilities for this document			
All Supervisors	• Provide that sufficient resources are allocated for the implementation of this Plan, as required.		
	• Ensure adequate resources are budgeted for in relation to water monitoring or erosion and sediment control for their task/project.		
	Implement and manage changes to UCMPL's water management system through UCMPL's Change Management process.		
	• Ensure the any work requiring ground disturbance is approved prior to disturbance in accordance with EMS (where relevant).		
	• Ensure that operational changes consider the potential impacts on erosion and sediment control in the surrounding environment and adjacent private landholders.		
	Monitor that team members and contractors carry out work appropriate monitoring and maintenance tasks.		
	• Ensure any potential or actual water management issue is controlled, or otherwise isolated.		
	• Ensure any potential or actual water management issues, including environmental incidents, are reported to the ECM.		
	• Conduct environmental inspections including monitoring of erosion and sediment control structures prior to and following high rainfall events.		
	• Provide input to management on the adequacy and effectiveness of this Plan.		
	• Complete maintenance and repair work on erosion and sediment control structures as identified in field inspections.		
	• Provide visible and proactive leadership in relation to surface water management and erosion and sediment control.		
	• Ensure personnel working at the operation are aware of any water monitoring obligations for their task/project.		
	• Ensure all erosion and sediment controls are in place in accordance with ESC Plans.		
All Employees & Contractors	• Ensure the effective implementation of this plan with respect to their work area.		
	• Ensure any potential or actual water management issues, including environmental incidents, are reported to the Project Manager, Supervisor or Task Coordinator.		
	Seek approval from the Project Manager, Supervisor or Task Coordinator prior to making changes to the water management system.		

7 **Document Information**

Relevant legislation, standards and other reference information must be regularly reviewed and monitored for updates and should be included in the site management system. Related documents and reference information in this section provides the linkage and source to develop and maintain site compliance information.

7.1 Definitions

Definitions, listed in Error! Reference source not found. below, are directly related to or referenced from this document.

Term	Definition		
ANZECC	The Australian and New Zealand Guidelines for Fresh and Marine Water Quality		
ARI	Average Recurrence Interval - the average, or expected, value of the periods between exceed ances of a given rainfall total accumulated over a given duration.		
Blue Book	Managing Urban Stormwater: Soils and Construction		
DPI	Department of Primary Industries		
DPIE	Department of Planning, Industry & Environment		
EA	Environmental Assessment		
EMS	Environmental Management Strategy		
EP&A Act	Environmental Planning and Assessment Act 1979		
EPA	Environmental Protection Authority		
EPL	Environment Protection Licence 394		
ESC(P)	Erosion and Sediment Control (Plan)		
(G)CAA	(Glencore) Coal Assets Australia		
GCP	Glencore Corporate Practice		
GRDRP	Goulburn River Diversion Remediation Plan		
GWMP	Groundwater Monitoring Program		
LGA	Local Government Area		
ML	MiningLease		
МОР	MiningOperationsPlan, as in Integrated Mining OperationsPlan 2017-2024		
Mtpa	Million tonnesper annum		
MWRC	Mid-Western Regional Council		
OEH	Office of Environment and Heritage		
РА	Project Approval (08_0184)		
POEO Act	Protection of the Environment Operations Act 1997		
SMP	Subsidence Management Plan		
SWGWRP	Surface Water and Groundwater Response Plan		
SWMP	Surface Water Monitoring Program		
TSS	Total Suspended Solids - a measure of the mass of fine inorganic particles suspended in the water.		
UCMPL	Ulan Coal Mines Pty Limited		
WMA	Water Management Act 2000 (NSW)		
WMGR	Water Management (General) Regulations 2018 (NSW)		
WMP	Water Management Plan		

Table 7.1 Related documents

7.2 Reference Information

Reference information, listed in **Table 7.2** below, is information that is directly related to the development of this document or referenced from within this document.

Table 7.2 Reference informatio

Reference	Title			
Legislation	 Protection of the Environment Operations Act 1997 Water Management Act 2000 Water Act 1912 Environmental Planning and Assessment Act 1979 			
Glencore Coal Assets Australia	 Statutory Approvals - NSW (GCAA-625378177-10328 11.20) Environmental Data Collection and Reporting (GCAA-625378177-10274 11.01) Ground Disturbance Permit (GCAA-625378177-10043) 			
UCMPL	 Records Management Standard (ULNUG-849165555-5689) Environmental Management Strategy (ULNCX-111515275-870) Water Management Plan (ULNCX-111515275-99) Surface Water Monitoring Program (ULNCX- 111515275- 1642) Groundw ater Monitoring Program (ULNCX- 111515275- 1643) Goulburn River Diversion Remediation Program (ULNCX-111515275- 1644) Surface Water and Groundw ater Response Plan (ULNCX- 111515275- 1644) Biodiversity Management Plan (ULNCX- 111515275- 225) Integrated Mining Operations Plan 2017 to 2024 (ULNCX- 111515275- 3548) Pre Clearance Survey and Tree Felling Procedure (ULNCX-111515275-1635) Land Clearing and Topsoil Stripping Procedure (ULNCX-111515275-2953); Training and Competency Management Standards Ulan Surface Operations – ULNOC-1105874907-1747 Ulan No.3 Underground – ULNUG-849165555-5762 Ulan West – ULWUG-729531900-105 Ulan Coal Incident Report & Investigation Form (GCAA-625378177-10394) Complaints Procedure (ULNCX-111515275-3376) 			
External	 ANZECC/A RMCA NZ, 2000. National Water Quality Management Strategy: Australian Guidelines for Fresh and Marine Water Quality. Landcom, 2004. Managing Urban Stormw ater – Soils and Construction, Volume (the Blue Book). Department of Environment and Climate Change (DECC), 2008. Managing Urba Stormw ater – Soils and Construction, Volume 2A – Installation of Services. Department of Environment and Climate Change (DECC), 2008. Managing Urba Stormw ater – Soils and Construction, 2C – Unsealed Roads. Department of Environment and Climate Change (DECC), 2008. Managing Urba Stormw ater – Soils and Construction, 2D – Main Road Construction. Department of Environment and Climate Change (DECC), 2008. Managing Urba Stormw ater – Soils and Construction, 2D – Main Road Construction. Department of Environment and Climate Change (DECC), 2008. Managing Urba Stormw ater – Soils and Construction, Volume 2E – Mines and Quarries. Department of Land and Water Conservation (1994), <i>Guidelines for the planning</i> <i>construction and maintenance of tracks</i>. IE Aust, 1987. Australian Rainfall and Runoff (AR&R). Landcom, 2004. Managing Urban Stormw ater – Soils and Construction, Volume 4th Edition. NSW Fisheries, undated, Fish Friendly Waterw ay Crossings Umw elt (Australia) Pty Ltd, 2009. Ulan Coal – Continued Operations Environmer Assessment Penared for ICMP 			

 Umw elt (2011) Ulan Coal Continued Operations North 1 Underground Mining Area, Minor Modification to Ulan No.3 & Ulan West Mine Plans & Proposed Concrete Batching Plant
 Umw elt (May 2012) Environmental Assessment Modification to Ulan Coal Continued Operations, Ulan West Mine Plan (Approved Panels 1 – 4) and Construction Blasting.
 Catchments & Creeks, 2010. Erosion and Sediment Control – A Field Guide for Construction Site Managers.

7.3 Change Information

Full details of the document history are recorded in the document control register, by version. A summary of the current change is provided in **Table 7.3** below. Example detail shown below.

Version	Date	Reviewteam (consultation)	Change Summary
1	31 December 2010	XCN ГГ	Document transferred into new Intranet platform
2	31 March 2011	Jamie Lees Cheryl Henriques Matt New ton (Umw elt) Susan Shield (Umw elt)	Review of Erosion & Sediment Control Plan following Project Approval 08-0184 being granted by the DoP.
3	1 April 2011	Cheryl Henriques	Formatting – no change to content
4	19 July 2011	Susan Shield (Umw elt), Cheryl Henriques, Jamie Lees	Updates to plan following DP&E comments
5	21 July 2011	Eliza LeBrocq	Formatting - No change to content
6	21 July 2011	Eliza LeBrocq	Formatting - No change to content
6.1	15 June 2012	Robyn Stoney, lan Flood, Susan Shield (Umwelt), Rachel Murray	Annual Review & updated based on MOD 1 & EPL 394 variation
6.2	24 June 2014	Susan Shield, Ian Flood, Robyn Stoney and Stephen Bragg	 Update Figures and Tables and table of contents; Formatting; Align document to Glencore requirements; Update legislative requirements; and Address DP&E comments.
7	30 June 2015	Robyn Stoney, Stephen Bragg	Glencore format
8	30 June 2016	Robyn Stoney	Clarification of expectations for inspections. Comments from dam audit
9.0	12 November 2017	Glencore Admin	New Intranet Template
9.1	12 February 2019	Robyn Stoney Stephen Haw kins	Update Figures and Tables of contents; removed reference to WMP where not applicable added 3.3.4 Soil types; added section 3.3.4 Soil Types
10.0	April 2019	Robyn Stoney Stephen Haw kins	Minor revision to address DP&E feedback. Version Approved by DP&E 6/06/2019.

Table 7.3 Change information

Owner: Environment & Community Manager

Status: Draft Version: 10.3

10.1	July 2019	Tara Stokes, legal requirements provided by McCullough Robertson	Minor Revision in response to IEA 2019, infrastructure proximity to creek requirements included, Section 3.6.6
10.2	May 2020	Stephen Haw kins	Minor Revision in response to reported potential ESC incident 17/02/20, Update Maps to include MOD4 approval and replace UCML to UCMPL to reflect name change
10.3	September 2020	Jake Haw kins	MOD 5 administrative changes, inclusion of MOD5 approval and updated operations plan layout Updated Department of Planning and Environment to Department of Planning, Industry and Environment.

Appendix A - Construction Design Matrix for ESC Structures

The following matrix provides design details for the construction of ESC structures outlined in the ESCP.

Table 1A – Drain Design Criteria

Drain Type	Location	ARI Storm Event	Storm Duration	Freeboard	Typical Grade	Side Batters	Comments
Diversion (permanent)	Entire site	100 year	Time of concentration ¹	Minimum of 0.5 metres	0.5% to 1.0%	No steeper than 1:2 (v:h)	Where velocity > 1.5 m/s in 20 year ARI storm event place rock bars every 100 metres to reduce scour potential. All drains to be designed/constructed to be stable. Level spreaders to be located at ends of all drains.
Diversion (temporary <12 months)	Entire site	5 year	Time of concentration ¹	Minimum of 0.5 metres	0.5% to 1.0%	No steeper than 1:2 (v:h)	Where velocity > 1.5 m/s in 5 year ARI storm event place rock bars every 100 metres to reduce scour potential. All drains to be designed/constructed to be stable. Level spreaders to be located at ends of all drains.
Catch (permanent)	Entire site	20 year	Time of concentration ¹	Minimum of 0.5 metres	0.5% to 1.0%	No steeper than 1:2 (v:h)	Where velocity > 1.5 m/splace rockbarsevery 100 metres to reduce scour potential. All drains to be designed/constructed to be stable. Level spreaders to be located at ends of all drains.
Catch (temporary) <12 months)	Entire site	5 year	Time of concentration ¹	Minimum of 0.5 metres	0.5% to 1.0%	No steeper than 1:2 (v:h)	Where velocity > 1.5 m/splace rockbarsevery 100 metres to reduce scour potential. All drains to be designed/constructed to be stable. Level spreaders to be located at ends of all drains.
Catch	Final Landform	100 year	Time of concentration ¹	Minimum of 0.5 metres	0.5% to 1.0%	No steeper than 1:2 (v:h)	Where velocity > 1.5 m/s in 20 year ARI storm event place rock bars every 100 metres to reduce scour potential. All drains to be designed/constructed to be stable. Level spreaders to be located at ends of all drains.

Note 1: To be determined based on methods outlined in Australian Rainfall & Runoff (AR&R) (Institution of Engineers, 1987) – Time of concentration for storm event and Mannings Equation for flow rate.

Location	Soil Turo	Method	Sediment Zone	Runoff Coefficient	Freeboard	Treatment and Pump Out	
Location	Son Type				Freeboard	Overflow Pathway	Requirement
Overburden emplacement area above active pit	Overburden	100 year ARI 24 hour storm event ³	Sediment zone = 50% of settling zone	As per AR&R ³	Design for minimum of 1 metre	Mine Water Management System	Ability to pump out in 10 days and sufficient dow nstream volume to contain spills
						Dow nstream creek systems	Ability to treat and pump out full dam volume in 5 days
Overburden emplacement area not above active	Overburden	Blue Book ⁴ Type D (dispersive) for 5 day 95 th	Sediment zone = 50% of settling zone	Runoff coefficient (C_v) = 0.9 (hardstand) Runoff coefficient (other areas) = 0.74	Design for minimum of 1 metre	Mine Water Management System	Ability to pump out in 10 days and sufficient dow nstream volume to contain spills
pit		percentile rainfall event for Scone of 51.3 mm				Dow nstream creek systems	Ability to treat and pump out full dam volume in 5 days
Other disturbed areas	Dispersive	Blue Book ⁴ Type D (dispersive) for 5 day 95 th	Sediment zone = 50% of settling zone	Runoff coefficient (C_v) = 0.9 (hardstand) Runoff coefficient (other areas) = 0.74	Design for minimum of 1 metre	Mine Water Management System	Ability to pump out in 10 days and sufficient dow nstream volume to contain spills
		percentile rainfall event for Scone of 51.3 mm				Dow nstream creek systems	Ability to treat and pump out full dam volume in 5 days
Other disturbed areas	Non- dispersive	Blue Book4Sediment :Type F (fine) for= 50% of s5 day 95thzonepercentilerainfall event forScone of 51.3mm	Sediment zone = 50% of settling zone	Runoff coefficient (Cv) = 0.9 (hardstand) Runoff coefficient (other areas) = 0.74	Design for minimum of 1 metre	Mine Water Management System	Ability to pump out in 10 days and sufficient dow nstream volume to contain spills
						Dow nstream creek systems	Ability to treat and pump out full dam volume in 5 days

Table 2A – Sediment Dam Design Criteria

Note 1: Total dam volume = Settling Zone + Sediment Zone (Blue Book – Landcom 2004)

Note 2: Treat suitable for discharge or pump out to mine water management system dams – refer to Site Water Management Plan.

Note 3: To be determined based on methods outlined in Australian Rainfall & Runoff (AR&R) (Institution of Engineers, 1987) – Time of concentration for storm event

Note 4: Managing Urban Stormwater: Soils and Construction (the Blue Book) - Volume 1 (Landcom, 2004) and Volume 2E (DECC, 2004)

Appendix B - Drawings of Typical ESC Structures



FIGURE 1

Typical Catch / Diversion Drain

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Sediment fence (type 3)



Silt fence bottom anchoring



Silt fence installed with Bobcat installing tool

- Post can be star picket or wooden stake (50mm x 50mm) if using wood a star picket to be used on ends and at approximately 18m intervals
- Spacing 2.5 to 3mm (if going to 3m a support wire must be ran and fabric clipped to wire to prevent sage
- The support post must be placed down-slop of the fabric
- The ends of sediment fence must be turned up the slope to prevent water going around fence
- Posts can be secured to the fence fabric using plastic ties, wire twists or staples (for wood posts). Fabric should be secured near the top of the post and more than one fastener should be used per post.
- Note: Sed fencing is only suitable for coarse and fine grained soils but not for turbidity control



Inappropriate anchorage of fabric



If Silt fence is placed across a drain a spill point needs to be installed



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Rock Chek Dams Type 2 Sediment Traps



- Rock filter dams are used in locations where it is impractical to construct a formal Sediment Basin.
- The critical design parameter is the surface area of the settling pond, which must be maximised.
- The incorporation of filter cloth is the preferred construction technique if the removal of fine-grained sediment is critical.
- Aggregate-based filtration systems are best used in sandy soil areas.
- Aggregate filters generally rely on the effects of partial sediment blockage to achieve their optimum filtration

Sediment Basins Type 1 Sediment Traps







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Level Spreader