



# Ulan Coal

## EROSION AND SEDIMENT CONTROL PLAN

<b>Document Information and Revision History</b>	
<b>Document Purpose</b>	<p>To provide guidance to UCML staff and contractors in minimising the potential effects of erosion and its associated impacts as a result of mining operations, land disturbances and subsidence within mining areas. This includes the prevention and management of impacts as well as implementing monitoring/ inspection programs to provide early identification of the potential issues, and remediation and revegetation programs to rehabilitate disturbed areas effectively where required.</p> <p>This management plan has been developed to ensure compliance with DA No. 113-12-98 DA, No. 103-5-2005 and DA No. 16/93 Merriwa Council &amp; DA78/93 Mudgee Council.</p>
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**1.0 Scope**

Ulan Coal Mines Limited (UCML) operates both underground and open cut mining operations near the village of Ulan, approximately 45 kilometres north east of the township of Mudgee. The current operations include a dragline, stockpiles, a coal handling and processing plant (CHPP) conveyors administration buildings, train loading facilities, mine workings with underground access point and associated remote infrastructure. Operation of the open cut mine, coal preparation plant and rail loading facility is contracted and is currently operated by Roche Mining.

UCML has implemented a number of Erosion & Sediment Control initiatives around the operation to mitigate potential impacts on company owned and surrounding lands. The purpose of this Management Plan is to ensure the effectiveness of these initiatives, and that the regulatory obligations are being met.

*HSEC MGP 024 – Erosion and Sediment Control Plan* (“the Plan”) fulfils the requirements of conditions 3.2(d) and 3.5 of Development Consent 113-12-98 and condition 13(b) of development consent DA 103-5-2005.

This Plan is to be applied for the Ulan Mine and therefore is required to be implemented for both the Open Cut and Underground operations at the Ulan Complex.

While this plan has been developed specifically to address the requirements of DA113-12-98 and DA103-5-2005 development consents, the general principles embodied in the Plan are to be applied to all activities at UCML. **Tables 1** and **2** provide summaries of the relevant conditions of the consent and referencing the various elements of this plan where the requirements have been addressed.

**Table 1: Checklist of Consent Conditions (DA No. 113-12-98) (December 2003) which relates to the specific requirements for the preparation of an Erosion & Sediment Control Management Plan.**

Consent Condition	Management Plan Condition	Section
3.5 (a)	The Applicant shall prepare <u>Erosion and Sediment Control Plan</u> for the surface facilities and its holdings within ML1468 in consultation with DIPNR and DEC and to the satisfaction of DIPNR and the Director-General. The Plan shall be prepared and implemented prior to the commencement of construction of surface facilities, and secondary workings in accordance with the Longwall Subsidence Management Plan at least one month prior to the commencement of works associated with any approved modification to DA-113-12-98. The Plan shall be updated to the satisfaction of DIPNR and the Director-General.	Entire Document and the relevant Environmental Procedure
3.5 (b) (i)	The Plan shall include but not be limited to details of temporary and permanent sediment and erosion control systems to be used during both mine construction and operation, including for earthworks associated with landscaping	Section 5.0 Env Proc (6.0)
3.5 (b) (ii)	The Plan shall include the measures proposed to be employed to minimise soil erosion and the discharge of sediment and other pollutants to lands and/or waters during construction and operational activities. The Plan should be consistent with the requirements for such plans outlined in the current Managing Urban Storm water: Soils and Construction (available from the Department of Housing)	Sections 5.0, 9.0 Env Proc (6.0)
3.5 (b) (iii)	Details of salinity management	Section 5.1.11

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3.5 (b) (iv)	Consideration and management of erosion and sedimentation of surface watercourses/water bodies, including the Goulburn River and flow lines within the development consent areas	Section 5.1.4, 5.1.6, 5.1.9 and 6.0
Condition 3.5 (b) (v)	A monitoring and remediation strategy for all earthworks which may be affected by the development, including any existing and future earthworks like contour banks and dams	Env Proc (6.4-6.7)
Condition 3.5 (b) (vi)	A program for reporting on the effectiveness of the sediment and erosion control systems and performance against objectives contained in the approved erosion and sediment control management plans and the EIS.	Sections 7.0

**Table 2: Checklist taken from Consent Condition 13 (DA No. 103-5-2005) (December 2005) which relates to the specific requirements for the preparation of a Water Management Plan.**

Condition	Consent - Management Plan Conditions	Relevant section(s) in this Mgt Plan
13	Within 6 months of this consent, the Applicant shall prepare (and subsequently implement) a Water Management Plan for the Ulan Mine, in consultation with DEC and DNR, and to the satisfaction of the Director-General. This plan must include: b) an Erosion and Sediment Control Plan;	Entire document and the relevant Environmental Procedure



**2.0 Objectives**

The objectives of this Plan include:

- Meeting the requirements of the development consents DA113-12-98 and DA 103-5-2005 relevant to the operations at Ulan Mine;
- Minimising the amount of land utilised for active mining and undertaking rehabilitation activities which commensurate with operational requirements;
- Preventing contamination of clean water by mining activities, particularly with respect to Ulan Creek and the Goulburn River;
- Establishing and maintaining controlled diversion of clean water around mining activities into existing watercourses so as to reduce the volume of sediment laden material;
- Detaining all dirty water by the use of run-off controls and storage;
- Implementing the Erosion and Sediment control program in a manner which meets or exceeds the requirements of all regulatory agencies;
- Establishing responsibilities for the management of Erosion and Sediment Control issues at UCML.

**3.0 Background**

The landscapes in and around UCML vary from the broad valley floors of the Goulburn River and Ulan Creek immediately to the south, through to the undulating land, steep slopes and rocky escarpments in the north, east and west. While the steeper areas are largely undisturbed bushland, flatter areas have generally been cleared for pastoral activities, and for the Ulan open cut mine and operation areas. The visual character of the region is therefore strongly influenced by rural grazing and agricultural activities, set against a background of natural bushland on the steeper and higher lands.

The post mining goal for UCML is to return the areas disturbed by mining to a stable condition which accords with predetermined land use and land capability. The landform should also be compatible with the adjacent areas and blend into the natural topography.

**4.0 Potential Impacts**

An assessment of potential impacts is presented in detail in the Environmental Impact Statement (EIS) (Kinhill Pty Ltd, 1998) and the Statement of Environmental Effects (Umwelt 2005). The following is a description of the activities associated with the Ulan Coal Mine which has the potential to result in Erosion & Sediment Control Issues.

As part of the Environmental Management Strategy (EMS), UCML has completed a detailed Environmental Risk Assessment in order to identify all “aspects and impacts” associated with the open cut and underground mines. During this process all

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activities that were identified as having the potential to impact on erosion and sedimentation were considered. Each activity was then ranked in order of priority (highest risk first) using the UCML environmental risk matrix. Table 3 below shows those aspects of the operation where an impact on Erosion & Sedimentation issues were considered.

**Table 3: Activities undertaken at Ulan Coal Mine identified as having the potential to result in Erosion & Sediment Control Issues / Impacts.**

➤ Vegetation removal / disturbance	➤ The construction of surface facilities
➤ Topsoil stripping	➤ The construction of water management structures.
➤ Construction of access roads and exploration lines	➤ Stockpiling topsoil material
➤ Other earthworks	➤ Overburden dumps
➤ Long-wall Mining (Subsidence)	

**5.0 Mitigation Measures**

The following section outlines the control measures adopted by UCML as part of their commitment to managing the potential Erosion & Sediment impacts within UCML operations.

**5.1 Control Measures**

Detailed control measures for the prevention and control of erosion & sediment are presented in *HSEC PRO 006 – Erosion and Sediment Control* which is maintained on the UCML Intranet in accordance with *HSEC STD 011 – Document Control*.

**5.1.1 Clearing and Surface Disturbances**

Land disturbance for any activity (including for remedial works) must be approved via a Proposed Works Application/Review Form (*HSEC FRM 009 - Proposed Works Review / Application*) prior to commencement of the activity.

Disturbances will be minimised by clearing the smallest practical area of land for the shortest possible times. This will be achieved by:

- limiting the cleared width to that required to accommodate excavation plus areas required for overburden emplacement and topsoil stockpiling; and
- programming the works so that only the areas which are under active excavation are cleared.

General clearing and grubbing will not be undertaken until earthwork operations are ready to commence.

All proposed erosion and sediment control measures will be implemented in advance of, or in conjunction with, clearing and grubbing operations. Prior to

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clearing commencing, the limits of clearing shall be marked by pegs placed at intervals on each side of the disturbed area. All operations will be planned to ensure that there is no damage to any trees outside the limits.

Vegetation control as part of routine maintenance programs within infrastructure corridors will be undertaken to ensure minimal ground disturbance occurs. Chemical control of tall woody vegetation will be utilised to minimise disturbance on under storey species which provide protection to the soil from erosion. Where physical clearing of vegetation is required, approval will be sought from the Environment & Community Manager.

**5.1.2 Stripping of Topsoil**

Topsoil will be stripped ahead of mining (and other associated activities). The area stripped will be minimised to the smallest practical area to avoid exposing unnecessary land to the processes related to erosion and sedimentation.

A range of soil mapping units has been identified within the Ulan open cut mining areas. The distribution of these soil mapping units is shown on Plan 2 of the Mining Operations Plan (MOP). Depth of stripping will be undertaken in accordance with Plan 2 of the MOP.

Prior to stripping operations, the stripping panel will be delineated on a plan and in the field through the use of survey pegs. Topsoil limits and the topsoil stripping depths will be shown on the pegs. Limits specified in any consent or approval (eg: Development Consents, DPI Approvals, DEC Licence, etc) will not be exceeded.

Where possible, topsoil will be stripped in moist condition to reduce deterioration in topsoil quality and dust generation and only be stockpiled when no areas of reshaped overburden are available for direct placement and spreading.

All proposed erosion and sediment control measures will be implemented in advance of, or in conjunction with, topsoil stripping operations.

**5.1.3 Topsoil Stockpiling**

Where suitable areas are unavailable for immediate respreading, topsoil will be stockpiled to a maximum depth of three (3) metres and subsequently applied when the areas become available. The period of stockpiling will be minimised in order to reduce the detrimental effects of storage on any native seed in the soil.

Topsoil stockpiles will be constructed so as to minimize the stockpile area in a discrete 3m high (maximum) pile. The working face of the stockpile will be shaped to reduce the angle of the batter. The stockpile will be trimmed then deep ripped to approximately 500mm and immediately sown with permanent

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pasture species (as specified in Table 5) and fertilized to provide stockpile stabilisation.

UCML do not anticipate stockpiling topsoil for periods greater than two (2) years. Maintenance of the stockpiles will include weed control and fertilising.

Stockpile locations and design will be selected for ease of access, minimisation of rehandling, segregation from other mining activities and minimisation of soil structure degradation.

Stockpiles will be clearly identified by a sign to reduce the likelihood of contamination and soil loss. Stockpiles will be inspected in accordance with Appendix 17 – Inspection Protocol of *HSEC MGP 007 – Environmental Management Strategy*, i.e. monthly environmental inspections by the Open Cut Examiner (OCE) and Environment & Community Officer or other nominated person(s), and repaired if needed. Details of these inspections and corrective actions will be recorded in accordance with this protocol.

Topsoil stockpiles are to be maintained only within UCML internal water management system, dirty water system.

#### **5.1.4 Coal Stockpiling**

Coal from the open cut and underground mines is stockpiled in a series of stockpiles:

- Hub Stockpile;
- Underground ROM Stockpile;
- Open Cut ROM Stockpile; and
- CHPP Product Stockpiles.

Runoff generated from these stockpiling areas is diverted to sedimentation basins by a series of bunds, culverts, channels and drains, as shown in **Figure 1**.

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Figure 1: Coal Stockpile Run-off Diagram

### 5.1.5 Subsidence

Erosion control measures may be required to address surface cracking as a result of subsidence. This will involve ripping and seeding of cracks in highly disturbed areas to ensure erosion is not exacerbated by these cracks. Where cracking occurs on sloped areas, sediment control measures will also be used down slope, such as hay bails and silt fences, in accordance with the *Managing Urban Stormwater Soils and Construction* (Blue Book) Volume 1, 4th Edition (Landcom 2004). Prior to any required remedial works being commenced where surface disturbance may occur, a *HSEC FRM 009 - Proposed Works Application/Review Form* is to be submitted and approved in accordance with Section 5.2 of this ESCP to ensure appropriate controls are considered and implemented if and where required (for example areas with heritage sites, protected flora areas etc).

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Control measures may also be required to address erosion issues in water courses as a result of subsidence. Subsidence can impact on a water course in a number of ways, including:

- Surface cracking of the bed and bank, resulting in modification of the flow path, and exposing additional soil surfaces to erosion;
- Decrease in the slope gradient, resulting in new or elevated areas of ponding that may cause erosion of stream banks; and,
- Increase in the slope gradient, which may result in an increase in flow velocity, increasing bank erosion and scouring, as well as sedimentation downstream.

All streams will be monitored so as to identify any changes in flow due to subsidence (the monitoring program for identifying subsidence affected stream systems is detailed in *HSEC MGP 019 – Water Management*. Erosion and sediment control measures which can be used to remediate streams affected by subsidence include the following:

- Cracking of the bed and bank can be remediated by ripping and seeding cracked areas during times of no flow if required (this activity may require a part 3A Application – RFI Act to Department of Natural resources).
- Sediment filters to capture sediment (such as straw bales, woven textile, earth and rock);
- Rock (or other material) check dams can be used to slow concentrated velocities;
- Rock (or other material) armouring of watercourse bed/banks; and
- Lining of concentrated flow paths with erosion control fabric such as jute mesh and other biodegradable materials.

The *Managing Urban Stormwater Soils and Construction* (Blue Book) will be used as a guide to applying the above methods.

**5.1.6 Landform Design**

The proposed final land use for the Ulan Mine includes a combination of grazing and bushland/wildlife habitat. This land use combination is compatible with adjoining lands. The post-mining landscape will be dominated by Class VI and VII bushland habitat, however component to the UCML operation will remain as Class VI Grazing Land.

The post-mining landform design at Ulan Mine has been undertaken in accordance with the Department of Primary Industries (DPI) requirements for Mine Closure.

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Elements such as drainage paths, contour drains, ridgelines, and emplacements will be shaped in undulating informal profiles in keeping with natural landforms of the surrounding environment. The diverse topography will provide opportunities for a greater diversity of plant species over time.

Drainage characteristics for the site will be developed in accordance with the *Draft Guidelines for Designing Stable Drainage Lines on Rehabilitated Mine Sites* formulated by DIPNR (1999).

The proposed drainage system at UCML provides for the combination of a connected surface drainage network and distributed storage/infiltration. The system integrates surface storage during periods of high runoff and manages deep infiltration to levels which can be safely tolerated and at the same time provide reduced size surface drainage conveyances to remove excess water safely from the system.

**5.1.7 Slope Angles**

Regrading will be undertaken to produce slopes whose angles, lengths and shapes that are compatible with proposed land capability classifications suitable for the proposed land use and not prone to an unacceptable rate of erosion. Integrated with this is a drainage pattern which is capable of conveying runoff from the newly created catchments whilst minimising risk of erosion and sedimentation.

Regrading will be conducted to the design slope gradients outlined in Plans 5 and 6 of the MOP. The majority of overburden areas will be regraded in a conventional manner using dozers. Some of the steep slopes within the void areas will be trimmed using an excavator.

Elevation control will be maintained through the use of a surveyed grid or other appropriate survey methods in the field. Cut / fill stakes will be placed on the grid with instructions describing the required deviation from surface elevation to achieve approved post-mining topography.

Spoil erodibility, frequency and intensity of expected rainfall events, the surrounding landforms, post-mining land use and sensitivity of the downstream environment to siltation are factors that have influenced design slope angles throughout the post-mining landscape at UCML.

Benching or treatment with specialised protective measures to minimise erosion and to facilitate revegetation will generally be implemented for slopes in excess of 1 vertical to 3 horizontal (i.e. approximately 18°). These slopes will generally occur on both high and low wall areas within the proposed void system. Generally, slope angles of approximately 10° or less will be constructed.

**5.1.8 Surface Preparation**

Prior to the commencement of seedbed preparation, spoil characterisation will be undertaken to determine amelioration requirements, for example gypsum

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and/or lime. The spoil surface will generally be sampled at a rate of 1 sample per ha. Each sample will be tested for pH, conductivity and exchangeable sodium percentage (ESP).

Thorough site preparation will be undertaken to ensure rapid early growth of seedlings. All proposed seeding areas will be ripped to a depth of approximately 400 – 500 mm. To minimise erosion potential, ripping will be undertaken on the contour.

Soil ameliorates, for example gypsum and/or lime, will be applied when required to the final surface via agricultural broadcasting machinery. This will occur immediately prior to sowing of all pasture and tree areas. The ameliorants will be incorporated to a nominal depth of approximately 30 to 50 cm.

Topsoil will be spread to the determined depth along the contour of regraded spoil to minimise erosion by dumping at the top of slopes and grading downwards and across the contour. Once topsoil is spread, vehicle traffic will be prevented from entering the area.

All topsoiled areas will be contour ripped (after topsoil spreading) to create a “key” between the soil and the spoil.

The ripped surface may be raked to ensure that rocks greater than 500 mm diameter are removed from the seedbed and stockpiled sporadically on the rehabilitation area surface.

**5.1.9 Construction of Water Management Structures**

**A. Diversions Works**

Diversion and graded banks will be utilised throughout the site to minimise erosion, divert run-on water around the disturbed areas and re-direct contaminated runoff into sediment dams. Clean water diversion banks will also be constructed to separate clean run-on water from contaminated catchments thus minimising the extent of dirty water catchments.

All major diversion banks will be located in accordance with **Figure 2**. Design parameters (e.g. channel width and grade, bank height, batter gradient) will be determined in consultation with UCML’s Environment & Community Manager prior to construction.

All longitudinal drainage will be revegetated upon completion. All banks/drains will be graded to ensure free flow of water and have a grade no greater than 1%. Where drainage gradients exceeds 1%, reinforced grass and/or mitre drainage at approximately 50 to 80 metre intervals will be utilised to reduce flow velocity and increase drain stabilisation.

Runoff from disturbed areas such as overburden dumps will be conveyed to sediment control dams by diversion banks. Contour furrows and graded banks will also be constructed at intervals down the slope of rehabilitation areas to control surface flow and minimize erosion on spoil dumps. The effect of these

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will divide long slopes into a series of short slopes with the catchment area commencing at each bank or furrow. This will prevent runoff from reaching a depth of flow or velocity which would cause erosion. As the slope angle increases, the banks or furrows will be spaced closer together until a point is reached where they are no longer effective. On  $>10^\circ$  slopes the approximate bank spacing will be 40 metres.

Graded banks are essentially a much larger version of contour furrows, with a proportionately greater capacity to store runoff and/or drain it to some chosen discharge point. The banks will be constructed away from the true contour, at a designed gradient (approximately 1% to 2%) so that they drain water from one part of the slope to another; for example, towards a constructed waterway or a sediment control dam. Small bulldozers, for example in the 75 to 100 HP class, equipped with a multi-tine, rear-mounted ripper and a front angle-and-tilt blade will be used to construct all surface water management works on rehabilitation areas.

The use of engineered waterways using erosion blankets, ballast and/or rip rap may be constructed to safely dispose of runoff downslope.



Figure 2: Diversion and Flow Paths for Water System



**B. Sediment Control Dams**

All proposed surface facilities shall be located at least 100 metres away from creeks. Sediment control dams will be constructed on all areas not draining to pit voids or mine water dams. The dams will be constructed for the purpose of capturing sediment laden runoff prior to off-site release. Sediment control dams will assist in improving water quality throughout the mine site.

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

- Each dam will be located so that runoff may easily be directed to it, without the need for extensive channel excavation or for excessive channel gradient. Channels will discharge into the dam without risk of erosion. Similarly, spillways will be designed and located so as to safely convey the maximum anticipated discharge.
- The material from which the dam is constructed will be stable and be imported from elsewhere on the mine, if necessary. Highly dispersible clays will require treatment with gypsum and/or bentonite to prevent failure.

The number and capacity of dams will be related to the total area of catchment and the anticipated volume of runoff. The capacity of each dam will be derived from the benchmark design reference for sediment control, *Managing Urban Stormwater – Soils & Construction* (Landcom, 2004). Although the reference was initially composed for use in urban erosion and sediment control, the principles are now applied to all sectors (including the mining industry) by regulators. Notwithstanding the provisions outlined in the “Blue Book”, each dam will have a minimum capacity equal to 0.3 ML/ha of receiving catchment area.

When the design capacity of a sediment control dam has been reduced by more than 20%, then the dam shall be de-silted. The silt from the dam must be removed so that it is not able to be washed back into the dam.

**C. Haul Roads**

During construction of haul roads, sediment filter fencing will be strategically located around fill termination points as the road alignment approaches clean water drainage lines. The silt fencing will not be removed until construction of each culvert is completed. Road construction will then continue over the culvert.

Temporary sediment trapping devices may be required during construction to filter sediment-laden runoff from small areas (0.5 ha or less).

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Cut and fill batters associated with haul roads will be formed to a safe slope and stabilised by vegetation. Stabilisation will be assisted by spreading topsoil and/or by applying chemical or organic mulch over the exposed batter surface.

Where haul roads are required to cross any watercourses, they will generally be constructed so that they cross perpendicular to the watercourse, subject to other constraints.

Prior to construction of new trails or roads, a Proposed Works Form must be completed (*HSEC FRM 009 – Proposed Works Application / Review*). This form can be found on the UCML Intranet.

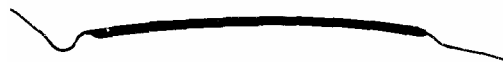
D. **Fire Trails and Access Tracks**

Fire trails and / or access tracks will be upgraded to a crown and/or constructed with crossfall drainage and suitable sized cross banks/spoon drains. Fire trails will be constructed in accordance with appropriate standards as described by the NSW Rural Fire Service.

Cross fall drainage at 3% either side of the road crown will be largely responsible for immediate water shed from the road surface. This will prevent runoff from concentrating and reaching erosive speeds thus ensuring trafficability and minimal sediment movement from the road surface.

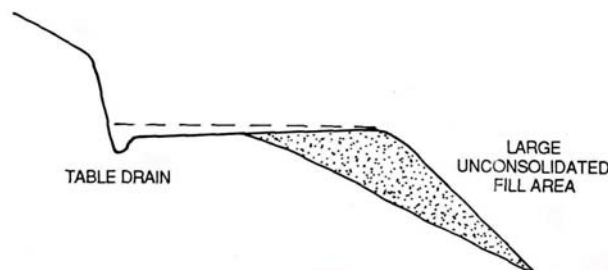
Techniques that could be used to provide crossfall on the track include crowning, infall and outfall:

- Crowning



Crowning allows water to be shed on both sides

- Infall



- Outfall

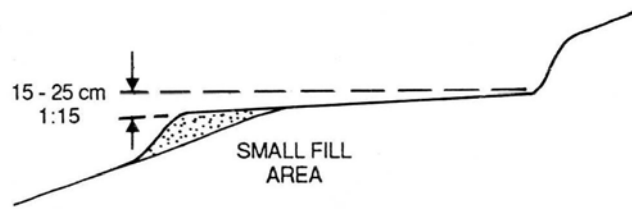


Table Drains, Mitre Drains, Culverts and Batter Drop Downs will be used to safely convey the water from the track surface so to prevent runoff from eroding them or adjacent land.

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

Where access tracks are required to cross any watercourses, they will generally be constructed so that they cross perpendicular to the watercourse, subject to other constraints.

The tracks will be inspected following heavy traffic usage or exceptionally large storm events, to determine maintenance requirements. Periodic maintenance will include checking the drainage systems to remove any debris that may block culverts, cross rain outlets and table drains.

Planning and construction of new tracks should be undertaken in accordance with the Guidelines for Planning, construction and maintenance of tracks (DLWC 1994) or guidance material as supplied by the NSW Rural Fire Service. Prior to construction of new trails or roads, a Proposed Works Form must be completed (*HSEC FRM 009 – Proposed Works Application / Review*). This form can be found on the UCML Intranet.

#### 5.1.10 **Revegetation**

Both trees and pasture will be utilised in the revegetation program. A majority of all future areas requiring revegetation will be sown with native tree seed.

##### **A. Tree Seeding**

The tree species mix (and seeding rates) will generally be in accordance with the specification provided in **Table 4** below:

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**Table 4: Tree species specification generally used for Rehabilitation at the Ulan Coal Mine.**

TABLE 4 TREE SPECIFICATION	
Species	Rate (kg/ha)
<i>Acacia buxifolia</i>	0.1
<i>Acacia botryocephala</i>	0.1
<i>Acacia dorataxylon</i>	0.3
<i>Acacia gladiiformis</i>	0.3
<i>Acacia implexa</i>	0.3
<i>Acacia linearifolia</i>	0.3
<i>Acacia myrtifolia</i>	0.3
<i>Acacia penninervis</i>	0.2
<i>Acacia rubida</i>	0.2
<i>Acacia spectabilis</i>	0.2
<i>Acacia terminalis</i>	0.1
<i>Allocasuarina distyla</i>	0.1
<i>Allocasuarina stricta</i>	0.1
<i>Dodonea viscosa</i>	0.2
<i>Eucalyptus agglomerata</i>	0.3
<i>Eucalyptus blakelyi</i>	0.2
<i>Eucalyptus crebra</i>	0.3
<i>Eucalyptus dwyeri</i>	0.3
<i>Eucalyptus fibrosa</i>	0.3
<i>Eucalyptus goniocalyx</i>	0.3
<i>Eucalyptus mannifera</i>	0.4
<i>Eucalyptus punctata</i>	0.1
<i>Eucalyptus rossii</i>	0.3
<i>Eucalyptus rubida</i>	0.3
<i>Eucalyptus tereticornis</i>	0.2
<i>Hakea dactyloides</i>	0.3
<i>Pultanea fibrosa</i>	0.2

Tree seed will be applied at a total rate of 6.3 kg/ha. All seed will be appropriately pre-treated to ensure germination and will be evenly mixed and spread.

**B. Pasture Seeding**

The pasture species mix will generally be in accordance with the specification provided in **Table 5** below:



**Table 5: Pasture species specification generally used for Rehabilitation at the Ulan Coal Mine.**

TABLE 5. PASTURE SPECIFICATION		
Species	Rate (kg/ha)	
	Spring/Summer	Autumn/Winter
Japanese Millet	20	5
Ryecorn/Oats	5	20
Wimmera Ryegrass	5	10
White Clover	8	
Lucerne	5	
Sub Clover	8	
Serradella	10	
Consol	2	-
Starter Fertiliser (sowing)	300	300
Maintenance fertiliser (following autumn / spring)	100	100

All legumes will be inoculated and lime pelleted prior to seeding.

**C. Sowing Time**

Revegetation activities will generally be undertaken in Spring and Autumn, however, opportunistic revegetation will be practiced if areas become available for sowing in Summer and Winter.

**D. Sowing Methods**

After surface soil amelioration and tillage is completed for any given area, revegetation will commence as soon as practicable. The proposed method of sowing will be via conventional spreading using agricultural broadcasting equipment.

**E. Steep Slope Treatment**

Slope stabilising techniques such as hydroseeding and straw mulching, will be undertaken on slopes exceeding 18<sup>0</sup> for enhancement of pasture germination.



**F. Fertiliser Application**

Fertiliser application will be undertaken simultaneously with both tree and pasture seeding. Maintenance fertilising will be conducted as required. Fertiliser type and application rates will be determined by prior soil analysis.

**5.1.11 Salinity Management**

The controls within this plan to minimise clearing (Section 5.1.1) and undertake progressive revegetation (Section 5.1.8) and rehabilitation (including soil amelioration if required) will contribute toward the management of salinity, however salinity management is more specifically dealt with in *HSEC MGP 025 - Biodiversity and Land Management*.

**5.2 Proposed Works Plan / Review Form**

Prior to any disturbance or clearing of land within the mining lease area, including for *remedial works* such as repair of subsidence cracks or infrastructure (roads, tracks, fences, phone lines etc), a Proposed Works Application / Review (*HSEC FRM 009 – Proposed Works Application / Review*) is to be completed. This process incorporates a review of all environmental factors, including but not limited to, the following key areas:

- Environmental Risks;
- Land Ownership and Title;
- Land Zoning;
- Relevant development consent conditions;
- Lease and Colliery Boundaries
- Protected lands
- Aboriginal and Cultural heritage issues;
- Flora & Fauna
- Erosion & Sediment Control;
- Noise
- Air & Water Quality; and
- Visual Amenity.

The application for a Proposed Works Application / review is made to the Environment & Community Officer for approval. Where an activity is determined likely to have a potentially significant erosion & sediment impact (or other environmental impact), it is identified prior to the activity being undertaken and an appropriate management control and/or formal approvals obtained if required.

**5.3 Complaints Management**

Community complaints management includes receipt of complaints, investigation, and implementation of appropriate remedial action, feedback to the complainant, communication to site management or personnel and notification to the external bodies where necessary.

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Complaints received at the Ulan Mine will be managed in accordance with *HSEC PRO 001 – Complaints Procedure*. A register of complaints is retained in accordance with this procedure.

Details of all community complaints are to be recorded and reported in accordance with *HSEC MGP 007 – Environmental Management Strategy*.

**5.4 Community Consultation**

UCML actively encourages engagement with its various stakeholders in accordance with *HSEC MGP 035 – Social Involvement Plan*. For comprehensive details of UCML’s Community engagement system, reference should be made to *HSEC MGP 035 – Social Involvement Plan*. In general, the manner in which UCML engage stakeholders is detailed below:

- Face to Face meetings upon request;
- Newsletters (internal for employees and external for adjacent residents or local community);
- Community Consultative Committee Meetings;
- Community information sheets on key environmental issues (e.g. NSW Minerals Council);
- Fact Sheets;
- Community education strategies including open days, participation in school excursion programs or teacher training programs, information sessions around key issues etc;
- Seminars and presentations;
- Web site (located at [www.ulancoal.com.au](http://www.ulancoal.com.au));
- Annual Xstrata plc HSEC report;
- Employee tool box talks;
- Media statements; and;
- Community Support Programs; and
- Community Surveys

**5.5 Training and Awareness**

UCML recognises that training and awareness is an integral part of *HSEC MGP 007 – Environmental Management Strategy*. This is the means by which personnel are informed about the components of this Plan and how it is implemented on the sites. The training also includes detail on people’s specific responsibilities with respect to the management of Erosion & Sediment Control related issues on the mining lease.

UCML’s environmental training and awareness program is defined within *HSEC MGP 007 – Environmental Management Strategy* (and more specifically in Appendix 12 – Environment and Community Training Needs Analysis). Generally training at UCML consists of induction training for new starters and contractors along with annual refresher and ongoing “toolbox” training for all permanent employees as required.

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**6.0 Monitoring & Measurement**

The followings section outlines the monitoring and measurement requirements which have been adopted as part of the Plan. In essence, the main mechanism for monitoring and measurement within this Plan is the regular inspection and maintenance of both the rehabilitated areas along with the sediment control structures in accordance with Appendix 17 of *HSEC MGP 007 – Environmental Management Strategy*. Monitoring for erosion and sediment control and related surface water quality aspects is undertaken in accordance with HSEC MGP 017 – Environmental Monitoring Program and the HSEC MGP 017 Water Management Plan.

**6.1 Maintenance**

The following section details the various maintenance activities that are undertaken by UCML as part of their commitment to controlling erosion and sediment on the site. Inspections are to be recorded in accordance with requirements described in **Section 7.2**.

**6.1.1 Rehabilitation**

Maintenance applications of fertilizer will be broadcast to all pasture areas on an “as needs” basis. No maintenance fertilizer will be required for tree areas. Effective control of weed species within rehabilitated areas will be a critical and essential component of proposed revegetation plan. Weed control will be undertaken on all rehabilitation areas according to relevant state and local government legislation and policy.

**6.1.2 Erosion & Sediment Control Structures**

All erosion and sediment control measures will be maintained in a functioning condition until individual areas have been deemed “successfully” rehabilitated. Structural soil conservation works will be inspected after high intensity rainfall so that de-silting and prompt repairs and/or replacement of damaged works can be initiated.

The Environmental and Community Officer will ensure that a monthly visual inspection of the mine lease area is carried out. These inspections will cover all existing erosion and sediment control works, rehabilitation areas and any works in progress (eg: topsoil stripping, stockpiling, replacement, surface preparation and seeding). Copies of the inspection report marked with required actions, responsibilities and schedules, will be forwarded to the UCML’s Environmental Department.

**6.1.3 Subsidence and Remedial Works**

Monitoring of remediation works will be undertaken at 6-monthly intervals within the first year following undermining or immediately following intense rainfall events where remedial works are likely to be impacted. General subsidence monitoring will be conducted via regular monthly field inspections, land survey, review of satellite imagery and comparison with pre-mining baseline photographic survey. Details of survey monitoring will be determined in consultation with DPI and is likely to include monitoring above each of the longwall panels with a particular focus being given to the Country Energy power line, Bobadeen Road and both Ulan and Bobadeen Creeks.

**7.0 Reporting and Reviewing**

The following section of the Plan includes the Reporting and Reviewing requirements relating to the management of Erosion and Sediment related issues at UCML

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**7.1 Reporting**

All external and internal reporting is undertaken in accordance with the reporting requirements of *HSEC MGP 007 – Environmental Management Strategy*.

A summary of any Erosion & Sediment Control management issues and actions arising throughout the year will generally be presented in the Annual Environmental Management Report (AEMR). This also includes a summary of the monitoring and measurement outcomes.

**7.2 Inspections**

UCML will conduct regular inspections in accordance with Appendix 17 of *HSEC MGP 007 – Environmental Management Strategy*. Details of the inspections are to be recorded in accordance with *HSEC STD 010 – Records Management* within the XstraSafe database. Action for improvement will be recorded and appropriately allocated to accountable persons within XstraSafe.

Where non-conformances are observed the person responsible for the area is notified immediately and the issue is rectified. Any non-conformances resulting from these inspections are recorded by the Environmental and Community Officer in the XstraSafe for follow-up action.

Additional audits are undertaken by Xstrata Coal NSW at a corporate level. The various regulatory agencies (e.g. DPI, DoP, DWE and DECC) also undertake statutory inspections when required.

**7.3 Review**

The Plan will be reviewed and updated regularly in accordance with the Document Control provisions of *HSEC MGP 007 – Environmental Management Strategy*. This will be generally as follows:

- at least every two (2) years ;
- following the issue of new or modified approval conditions for all relevant SMP Approvals, Development Consents, Mining Leases or Licences (EPL);
- when there is a change to the mining operation such that it is likely to change the impacts related to Erosion and Sediment Control; and/or
- as otherwise directed by the Director General in consultation with relevant government agencies.

The plan will be reviewed and updated to ensure compliance with all new and existing statutory approvals and conditions relevant to the mining areas.

Notwithstanding the above, in accordance with the Development Consent 113-12-98, this Plan is to be revised / updated at least every seven (7) years or as otherwise directed by the Director General in consultation with the relevant government agencies. The changes will reflect changing environmental requirements or changes in technology/operational practices. The changes as referred shall be made and approved in the same manner as the initial environmental management plan submitted in 2000 by UCML. The plans shall also be made publicly available at Mid Western Regional Council within two weeks of approval of the relevant government authority.

**8.0 Accountability / Responsibilities**

The Environment & Community Manager (ECM) is responsible for implementation of *HSEC MGP 024 - Erosion & Sediment Control Plan*, while the Operations Managers of the Underground and Open Cut Operations are responsible for ensuring that adequate resources are available for the implementation of the Plan. Notwithstanding this, specific individual responsibilities are provided

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in *HSEC PRO 006 – Erosion and Sediment Control Procedure*. The Manager(s) will allocate responsibility for specific tasks where necessary.

The ECM and the Environment & Community Officer (ECO) are to provide technical support to the Manager(s) for all Erosion & Sediment Control related issues where required.

**9.0 Relevant documents and Legislation**

The following section lists the relevant documentation as applicable to the Erosion & Sediment Control Management Plan for the Ulan Coal Mine. A summary of the relevant legislation has been noted below, however a more comprehensive list are included in the legal register of *HSEC MGP 007 – Environmental Management Strategy*.

**Relevant Documents:**

- Umwelt (2005) *Ulan Coal Mines Limited Statement of Environmental Effects for proposed Additional Works*;
- ML1468 Development Consent (As amended Dec 2003);
- Kinhill Pty Ltd (1998) *Mining Lease Application No. 80 – Development Application and Environmental Impact Statement, Ulan Coal Mines Limited*;
- *Environmental Protection Licence No. 394 – DEC (FORMERLY EPA)*
- *Mining Operations Plan Ulan Open Cut 2006*;
- *Mining Operations Plan for Ulan No 2 Underground Mine 2000*
- *Subsidence Management Plan*,
- GSS Environmental (2003) *Environmental Risk Assessment (ERA) & Establishment of a Risk Register for the Ulan Open Cut and Underground Coal Mines, October 2003*;
- Pelican Environment and Business Solutions (2003) *Ulan Coal Mines Limited – Environmental Management System*;
- *Managing Urban Stormwater – Soils & Construction* (Landcom, 2004), known as "the Blue Book"; and,
- *Draft Guidelines for Designing Stable Drainage Lines on Rehabilitated Mine Sites* formulated by DIPNR (1999).
- *Guidelines for Planning, Construction and Maintenance of Tracks* (DLWC 1994)

**Relevant Legislation:**

- *Coal Mines Regulations Act (2000)*;
- *Environmental Planning and Assessment Act (1979)*; and

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- *Protection of the Environment Operations Act (1997);*

**Relevant XCN Standards**

- *HSEC STD1.03 Management Plans, Approvals and Licences.*