

# Muswellbrook Coal Company Limited



Established 1907

## No.1 Open Cut Extension

**FINAL**

# **SOIL STRIPPING MANAGEMENT PLAN (SSMP)**

December 2010

Version 1

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## 1. INTRODUCTION

Muswellbrook Coal Company (MCC) is a wholly owned subsidiary of the Idemitsu Kosan Company Ltd. Group. Idemitsu Kosan Company Ltd. is a Japanese energy company with commercial interests in various parts of the world.

MCC has a long association with coal mining at Muswellbrook, with underground coal mining commencing in 1907 and open cut operations in 1944. The mine is located on Coal Road, approximately 3 kilometres to the north-east of Muswellbrook.

On the 1<sup>st</sup> of September 2003, Development Consent for DA 205/2002 was granted by Muswellbrook Shire Council (MSC) to extend the former MCC No.1 Open Cut. The No.1 Open Cut Extension commenced operations in March 2005 and has a capacity to produce up to 2,000,000 tonnes coal per annum for domestic and export markets. The No.1 Open Cut Extension has approval to operate until 1 September 2015.

The Development Consent requires the preparation, approval and implementation of an Environmental Management Strategy (EMS) and subordinate Environmental Management Plans (EMP). One of these EMPs is the Soil Stripping Management Plan (SSMP). This plan was originally approved in February 2005 and has now been reviewed and updated to meet the requirements stated in Section 3.2(f) of the Consent (DA 205/2002):

*“The management plans are to be reviewed and updated every 5 years or at other times as directed by MSC, in consultation with the relevant government agencies”.*

## 2. BACKGROUND

The Development Consent requires the development of a Soil Stripping Management Plan (SSMP) in accordance with the following conditions detailed below in Table 1. The Consent Conditions are reproduced in italics:

**Table 1 - Development Consent Requirements**

<b>Development Consent Requirement</b>	<b>Relevant Report Section</b>
<p><i>3.6 Soil Stripping Management</i></p> <p><i>The Applicant shall prepare and implement a Soil Stripping Management Plan to the requirements of DMR that shall include, but not be limited to:</i></p>	Entire document
<p><i>a) demonstration of consistency with the commitments made in documents listed in Condition 1.1 and compliance with the conditions of this consent;</i></p>	Entire document
<p><i>b) details of the management of soil stockpiles, soil stripping techniques and scheduling; and</i></p>	Sections 5
<p><i>c) a program for reporting on the effectiveness of the soil stripping methods and performance against objectives contained in the Soil Stripping Management Plan, and EIS</i></p>	Section 6

Notes:

1. The Department of Mineral Resources (DMR) was incorporated into the Department of Primary Industries (DPI) and was a Division of Mineral Resources. DPI is now known as Investment and Industry NSW. The abbreviation DMR, will continue to be used in this plan to relate to this government agency.
2. The Environment Protection Authority (EPA) was previously incorporated into the Department of Environment and Conservation, then the Department of Environment and Climate Change (DECC) and is now known as the Department of Environment, Climate Change and Water (DECCW). The abbreviation EPA will continue to be used in this plan to relate to this government agency.

### **3. OBJECTIVES**

The objectives of the Soil Stripping Management Plan are to:

- Maintain a soil balance that will achieve rehabilitation requirements throughout the life of the mine;
- Ensure that the topsoil management procedure is followed to remove the maximum volume of topsoil and reduce wastage; and
- Maintain topsoil viability through ensuring the employment of best practices in soil stripping, stockpiling and spreading activities

The objectives of soil stripping outlined in the EIS are:

- The transfer of suitable topsoil will, ideally, be undertaken as a single operation in order to maximise the preservation of soil structure and the micro flora and fauna contained in the soil;
- The topsoil will be respread on rehabilitation sites with low erosion potential;
- Care will be taken to avoid mixing topsoil with the A-2 horizon.

The proficient management of soil stripping will result in the minimisation of soil wastage through best practices in removal and management of topsoil, which will assist in achieving a successful rehabilitation program.

## 4. EXISTING CONDITIONS

A Soils and Land Capability Study was prepared and is found in Appendix G of the EIS. Refer to this Study for further information.

### Landform Units

Terrain of the No.1 open Cut Extension area was assessed using MCC aerial photography and subsequent field checking. Landform units have been plotted and are shown in **Figure 1**. Soil profiles were assessed in the field using various excavations as well as observations of exposed soil profiles in gully walls.

### Soil Suitability

An analysis of soil suitability for rehabilitation was undertaken during the Environmental Impact Assessment (EIS) process. According to the EIS (2002), the method for assessing topdressing material in mine rehabilitation was carried out using the method described by Elliott and Veness (1981). This method analyses the critical properties of soil through soil structure, coherence, mottling, macrostructure, ped strength, texture, sand and gravel, salt content and pH.

The quantities of topsoil material and their constraints are outlined in **Table 2**. The topsoil estimates are included as a guide to quantities of topsoil dressing material that will be available.

Soil Type	Average Depth (cm) A1 Horizon	Area (ha)	Volume (m <sup>3</sup> )	Constraints
<b>Yellow Duplex Soils Mottled Subsoils</b>	5	25.5	12,800	Weak structure sand and gravel
<b>Yellow Duplex Soils Whole Coloured Subsoils</b>	5	24.7	12,350	Structure, consistence, pH
<b>Mining and Infrastructure Areas</b>	-	30.4	-	Structure
<b>Brown Subsoils on Ridgelines</b>	5	14.4	7,200	Structure, salinity consistence

Refer to **Figure 2** for the location of different soil units.

The results indicate the soils in the mining area of the No.1 Open Cut Extension are largely the *in situ* soils formed from the weathering of the sedimentary rocks of Greta Coal Measures. All soils have deep (20-30cm) A2-horizons that are bleached and generally dispersible. This material is erodible and unstable on the surface and if possible, should be collected separately from the stripped topsoil (A1-horizon).

The A-1 horizon material is organically enriched giving it a darker colour, and contains micro-organisms and seeds of native plants which will enhance rehabilitation following mining. Stripping of the A1 horizon shall be done carefully to separate it from the A-2 horizon material. Any sealing or construction use on the site must avoid using the A-2 and subsoil material.

## 5. SOIL MANAGEMENT

An essential part of the rehabilitation program is the management of the soil resources of the site. The separation and maintenance of topsoil on the site is important to ensure a successful rehabilitation program. Topsoil has essential nutrients and contains seed loads that will significantly aid in the rehabilitation of disturbed mine sites.

Stripping and stockpiling of topsoil materials shall be undertaken generally in accordance with the principles in **Appendix A**.

### Stripping

Soil stripping operations will be conducted in accordance with *in situ* conditions. The stripping of topsoil will be undertaken in two stages to reduce the inadvertent cross contamination of the A-1 and A-2 horizons. This will ensure that the removal and salvage of topsoil is maximised and reduces the possibility of contamination with the A-2 horizon subsoil.

### Stockpiling

Where possible, topsoil material stripped will be directly re-spread on reshaped surfaces in a single operation. However, if this is not possible, topsoil will be stockpiled.

Stockpiled topsoil material will be located away from mining operations and drainage lines. Contour banks and divergent drains will be implemented around the stockpiles to prevent erosion. Topsoil stockpiles will be limited to a height of no more than three (3) metres. The A1 and A2 soil horizons will be segregated into designated stockpile areas.

Stockpiles will be revegetated as soon as possible to minimise loss of soil quality. This will ensure that erosion and weed infestations are minimised. Stockpiles will be inspected regularly by the Environmental Officer to monitor the stockpiles for weed infestation and success of erosion control measures. Mitigation measures will be applied, as they are required. This may include weed control measures or additional drainage works.

### Topsoil Spreading

Prior to the re-spreading of topsoil material, the prepared surface of the overburden spoil will be rock raked to remove all rocks that are greater than 200mm in diameter.

The transfer of topsoil will, ideally, be undertaken as a single operation in order to maximise the preservation of soil structure and the micro flora and fauna contained within the soil. However, if this cannot be achieved, MCC will direct earthmoving operators to the designated topsoil stockpile.

Selective placement of topsoil material will be done in accordance with the properties of the soil. The A-2 horizon will form the underlying capping material, with the A-1 horizon topsoil forming the surface soil structure, where

practicable. In addition, the use of the A-2 horizon subsoil will be avoided, where practicable, on sloping or high erosion potential areas. Topsoil material will be respread in even layers of thickness, to a nominal 10cm in thickness, according to the landform and land capability of the area to be rehabilitated. Soil treatments will be added to address deficiencies or irregularities where necessary. This may include the application of gypsum, lime or biosolids as required.

Topsoil stripped from cleared and pastured areas will be used for traditional pasture rehabilitation, where possible. However, topsoil stripped from remnant vegetation areas will be, where possible, used in habitat re-instatement areas. The aim of this is to maximise the occurrence of native tree seeds in the topsoil mix designated for the habitat areas, and to prevent grass germination from out competing the tree seedlings.

### ***Erosion and Sediment Control***

The process of removal of vegetation and stripping of the soil will result in areas of exposed soil material. Full details on the management of erosion and sediment control are addressed in the ESCP for the MCC No.1 Open Cut Extension.



## **6. REPORTING AND REVIEW**

### **Reporting**

The reporting of the effectiveness of the soil stripping methods and performance against objectives contained in this SSMP will be detailed in the Annual Environmental Management Report (AEMR). Results of the assessments will be incorporated into future rehabilitation planning to continually improve the success of the program.

The AEMR report will include the following:

- areas of soil stripped;
- volume of soil recovered;
- volume of soil directly respread on rehabilitated areas;
- volume of soil stockpiles;
- volume of soil recovered from stockpiles and spread on rehabilitated areas;
- results of soil stockpile inspections and monitoring;
- weed control measures;
- recommendations for any future improvements in soil stripping management.

### **Review**

The SSMP shall be the subject of review and updating every five (5) years or at times as directed by Muswellbrook Shire Council, in consultation with the relevant government agencies, in accordance with Development Consent Condition 3.2 (f).

This review is the first 5-year review of this document as advised to MSC in January 2010.

## 7. REFERENCES

The soil stripping and replacement management design principles are based on standard design principles and methods outlined in:

- Department of Mineral Resources Synoptic Plan – *Integrated Landscapes for Minesite Rehabilitation (1999) for the Upper Hunter*;
- Hannan, J. (1984) – *Mine Rehabilitation: A Handbook for the Coal Mining Industry*;
- Department of Mineral Resources - Guidelines to the Mining, Rehabilitation and Environmental Management Process, 1998.
- Department of Mineral Resources – Best Practice and Reference Documents 1998;
- Department of Sustainable Resources – Stripping and Stockpiling of Suitable Top-Dressing Material.

## **APPENDIX A**

## **APPENDIX A: STRIPPING AND STOCKPILING OF SUITABLE TOP-DRESSING MATERIAL**

The method used and timing of stripping and stockpiling top-dressing materials will directly affect the quality of the final material use in the rehabilitation program.

Where possible the management of any stripped soil will aim for it to be spread directly onto overburden, lightly ripped and revegetated as soon as practicable.

In cases where the mining conditions do not allow this the recovered topsoil material will be stockpiled. The quality of stockpiled top-dressing materials can be expected to diminish if the soil is stockpiled for a long period of time. The viability of seeds and soil flora and fauna in stockpiled material decreases after storage for long periods of time.

Implementation of the following principles is recommended, where practicable, in order to minimise soil deterioration and maintain viability of the soil material:

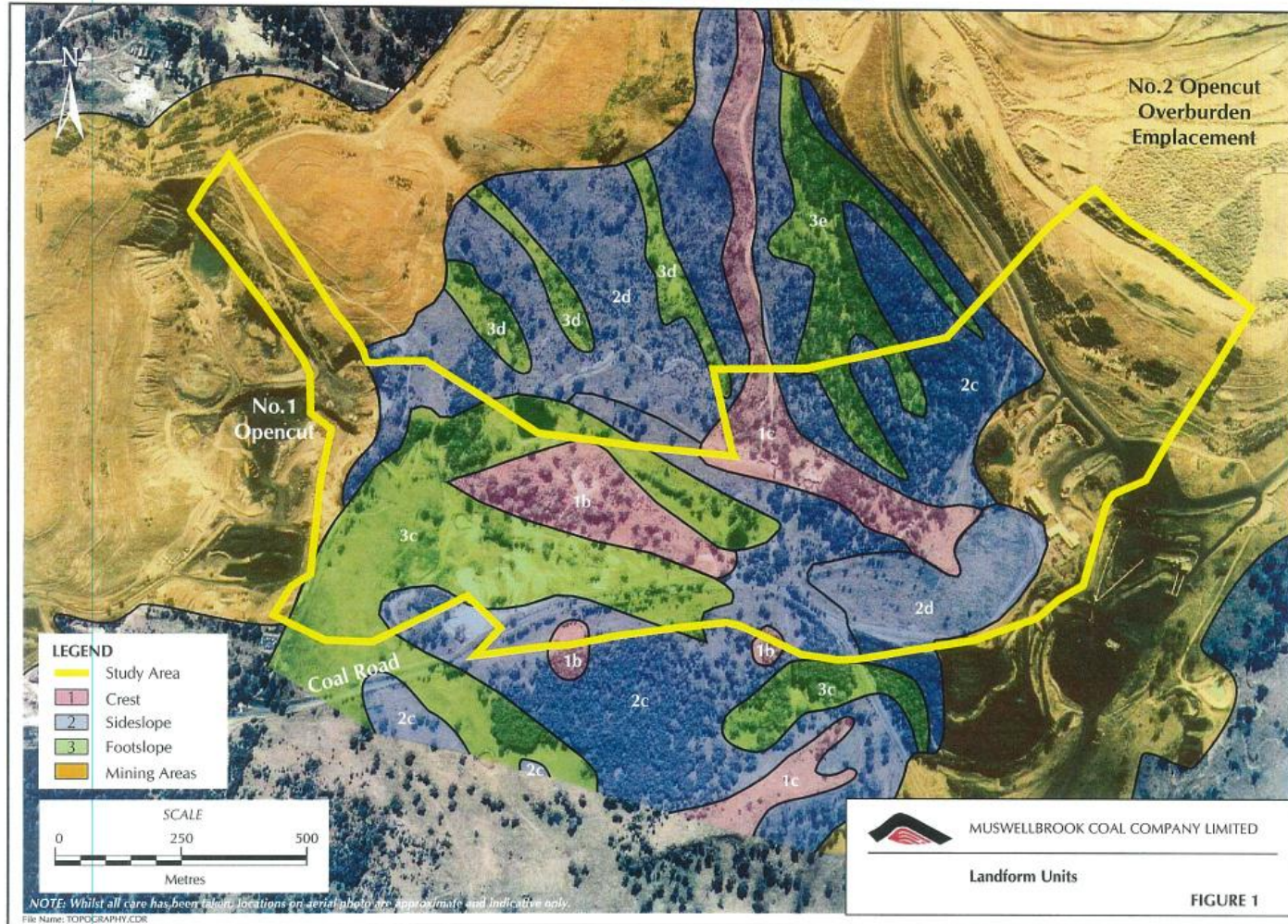
1. Keep vehicular traffic to a minimum on the soils to be stripped.
2. During the stripping process there may be some unexpected changes in the depth and the nature of the soil. Avoid where practical the inclusion of obviously poorer quality material such as sub-soil clay with mottles, saline material and material dominated with stones.
3. Use a combination of dozer/grader and front-end loader, or less preferably a scraper, to strip soil material. A self elevating scraper should not be used due to its detrimental effect on soil structure.
4. Where possible, place soil material directly onto the overburden and spread immediately to maximise the retention of soil quality.
5. Stockpiles should be no deeper than 3 metres in height in order to minimise problems with anaerobic conditions.
6. Protect and re-vegetate all stockpiles as soon as possible to minimise loss of soil quality. The minimum works involve placement of a surface mulch or sowing of a cover crop for temporary stockpiles where the final revegetation seed mixture is not used. It is recommended that longer term stockpiles should be revegetated with the final revegetation seed mixture of grasses and legumes.
7. Locate stockpiles in areas away from drainage lines or windy areas in order to minimise the risk of soil and wind erosion.
8. Ensure a good vegetative cover is maintained on stock piles and on topdressed areas until ground cover is well established by excluding stock and by controlling weed growth.
9. Implement appropriate weed control strategies particularly for any noxious weeds and/or galenia. Immediate revegetation will provide vegetative competition to assist with the control of undesirable plant species.
10. Designate each topsoil stockpile with appropriate signage (eg 'Topsoil Stockpile') to ensure the resource is identifiable to all mine staff.

## **FIGURES**

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Appendices





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Appendices

