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**DURALIE PROJECT**  
**TOPSOIL STRIPPING MANAGEMENT PLAN**

MARCH 2003

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## 1 INTRODUCTION

The Duralie Project Open Cut is being developed by Duralie Coal Pty Ltd (DCPL). The Duralie Coal Mine (DCM) is located in a secluded area of cleared grazing land east of the Bucketts Way, approximately 5 kilometres north of the village of Stroud Road and 8 kilometres south of the village of Wards River in the Gloucester Valley (Figure 1).

This Topsoil Stripping Management Plan (TSMP) provides a description of the existing soils within the Duralie Project area (Figure 1) and soil stripping and stockpiling procedures to minimise soil degradation and maximise availability of suitable soils for rehabilitation.

Topsoil is to be stripped in areas to be disturbed including the pit, out of pit emplacement areas and infrastructure areas (including roads and dams).

## 2 EXISTING TOPSOIL RESOURCES

Soil types within the Duralie Project area were surveyed during preparation of the Duralie Project Environmental Impact Statement (DCPL, 1996) to determine the availability of soil material for rehabilitation works and to formulate topsoil stripping and stockpiling strategies. The soil types were described in accordance with Great Soil Groups (Stace *et al.*, 1968) and mapped accordingly. There were twelve (12) soil types identified, viz:

- yellow podzolics;
- red podzolics;
- chocolate soil;
- prairie soil;
- black earth;
- red earth;
- euchrozem;
- brown clay;
- non-calcic brown;
- podzolic;
- alluvial; and
- structured plastic clay.

Of these soil types, yellow podsolitic and alluvial soils are the most prevalent within the areas to be disturbed. General soil profile descriptions for these soil types are provided below. An indication of the suitability of the described material for rehabilitation purposes is also provided based on material stability, structure, clay content and pH.

### *Yellow Podzolic*

Yellow podsolitic soils are found over the majority of the proposed pit area and have a friable loam with pH 5.0 – 6.0 and a depth of around 5 to 10cm. Soils deeper than this shallow A<sub>1</sub> horizon are not suitable for use as a topsoil material.

### *Alluvial*

Alluvial soils are to found within the Coal Shaft Creek area with the greatest resources available within the section of the creek immediately upstream of the haul road crossing as well as within the associated gully below the Mine Water Dam. The alluvial soil profile has an estimated depth of 1.5 metres. The topsoil is a light clay loam of pH 6.0. The material does not contain stones and has a structure and texture suitable for topdressing.

### *Xanthozem, Black Earth, Prairie Soil*

These soils are expected to be found in more minor proportions relative to both yellow podsollic and alluvial soils.

Xanthozem soil was found in the final void area of the proposed pit and is expected to have a A horizon of approximately 0.5m. This A horizon is suitable for topdressing.

Black earth soil was located within the proposed pit area – in the middle reaches of Coal Shaft Creek. Black earth soil is a uniform brownish black and has a pH of 6.0 to a depth of 10cm with a pH of 7.0 at 2 metres. The soil within both the A and B horizons is suitable for topdressing.

Prairie soil was found adjacent to the mid reaches of Coal Shaft Creek and within the proposed footprint of the creek interception dam. Prairie soil has a pH of 6 to 7 and is a very dark reddish brown. This soil has structure and coherence characteristics which makes it suitable for use in rehabilitation.

## **3 SOIL MANAGEMENT**

The objectives of soil management are to:

- provide sufficient stable topsoil material for rehabilitation;
- optimise the recovery of topsoil for rehabilitation;
- identify soil resources and stripping guidelines;
- identify surface areas requiring stripping (to minimise over clearing);
- manage topsoil reserves so as to not degrade the resource;
- identify stockpile locations and dimensions; and
- identify soil movements for rehabilitation use.

In accordance with the objective of providing sufficient stable soil material for rehabilitation and to optimise soil recovery, the following strategies have been adopted:

- stockpiles to be located outside proposed mine disturbance areas and the lower reaches of Coal Shaft Creek;
- construction of stockpiles by dozers rather than scrapers to minimise structural degradation;
- construction of stockpiles with a “rough” surface condition to reduce erosion hazard, improve drainage and promote revegetation; and

- revegetation of stockpiles with appropriate fertiliser (eg. single superphosphate) and seed (eg. millet (summer) or oats (winter)) in order to minimise weed infestation, maintain soil organic matter levels, soil structure and microbial activity and maximise the vegetative cover of the stockpile.

Disturbance areas will be stripped progressively (ie. only as required) so as to reduce erosion and sediment generation, to reduce the extent of topsoil stockpiles and to utilise stripped topsoil as soon as possible for rehabilitation. Rehabilitation of disturbed areas (ie roads, embankments and batters) will be undertaken as practicable after these structures are completed or as areas are no longer required.

### 3.1 SOIL STRIPPING

Soil surveys over the open cut area, beneath proposed mine waste emplacements and other infrastructure areas have determined the depth of topsoil to be generally around 5 to 10 cm with the exception of the deeper profile alluvial soils present within the Coal Shaft Creek area. It should be noted that it is important that topsoil recovered from the areas over which only the upper 10cm is required that underlying material is not inadvertently collected since it is unsuitable for reuse in rehabilitation.

Figure 1 (Topsoil Stripping Plan) illustrates major areas of soil stripping during the Duralie Project mine life. Annual soil stripping and stockpiling volumes will be reported within the Duralie Annual Environmental Management Report (AEMR).

Based on the final void (to be situated at the northern limit of the excavation) having a considerable surface area relative to the total area mined and topsoil being recovered from all areas to be mined, it is considered that a topsoil surplus over the life of mine will occur. However, the Project topsoil budget will be reviewed following completion of topsoil recovery from the deeper alluvial profiles within Coal Shaft Creek. If the quantity of alluvial soils is substantial it may remove the need to recover the poorer yellow podsollic soils in the northern arm of the excavation.

Covering vegetation can make the removal of specific topsoil depths difficult and excessive quantities of vegetative matter in long term stockpiles may promote chemical and biological degradation of the seed reserves that are a future source of regeneration during rehabilitation. Prior to stripping, vegetation will be removed or reduced by grazing and/or clearing in accordance with protocols detailed in the Vegetation Clearance Protocol (VCP).

A general protocol for soil handling is presented below and includes soil handling measures which optimise the retention of soil characteristics (in terms of nutrients and micro-organisms) favourable to plant growth:

- The surface of the completed stockpiles will be left in a “rough” condition to help promote water infiltration and minimise erosion prior to vegetation establishment;
- Topsoil stockpiles to have a maximum height of 3m in order to limit the potential for anaerobic conditions to develop within the soil pile;
- Topsoil stockpiles to have an embankment grade of approximately 1V:4H (to limit the potential for erosion of the outer pile face);
- Topsoil stockpiles will be seeded and fertilised; and

- Soil rejuvenation practices will be undertaken if required prior to respreading as part of rehabilitation works.

### **3.2 SOIL STRIPPING FIELD PRACTICE**

Prior to any soil stripping activities, the HWE site engineer/open cut examiner (OCE) will ensure that the appropriate clearance approvals have been obtained (refer Vegetation Clearance Protocol, Aboriginal Heritage Management Protocol). Through all stages of soil stripping and stockpiling, operations will be closely supervised to determine recovery depths and to identify suitable soils. The OCE will direct and control the recovery, handling and management of site soils. HWE site engineer/OCE responsibilities (in conjunction with Duralie Coal's environmental officer as appropriate) will include:

- delineation of areas to be stripped for daily stripping operations;
- field truthing of mapped soil types;
- delineation of suitable stockpile areas;
- ensuring dust generated during topsoil stripping is not at unacceptable levels; and
- recording volumes stored.

Topsoil stockpile locations, volumes and date of soil stripping will be recorded in the DCPL database.

The means of topsoil placement within storage locations shall consider the economic implications of dozer pushing relative to load and truck haul with consideration also given to access constraints, machine availability and ground conditions.

## **4 LONG TERM SOIL STOCKPILE MANAGEMENT**

Stockpiles will have sediment control measures installed as required (refer to the Erosion and Sediment Control Plan). This will involve, where practical and applicable, placement of the stockpiles within the catchment of a sediment control dam or use of silt fencing.

The following soil stockpile maintenance procedures will be conducted where on-going monitoring indicates the need:

- topdress with fertiliser;
- seed resowing; and
- weed control.

## **5 REFERENCES**

Duralie Coal Pty Ltd (1996) *Duralie Coal Mine – Environmental Impact Statement*  
Duralie Coal Pty Ltd (1998) *Duralie Coal Mine – Statement of Environmental Effects*  
Stace, C.T., Hubble, G.D., Brewer, R., Northcote, K.H., Sleeman, J.R., Mulcahy, M.J. and Hallworth, E.G. (1968) *A Handbook of Australian Soils*. Rellim Technical Publications, South Australia.

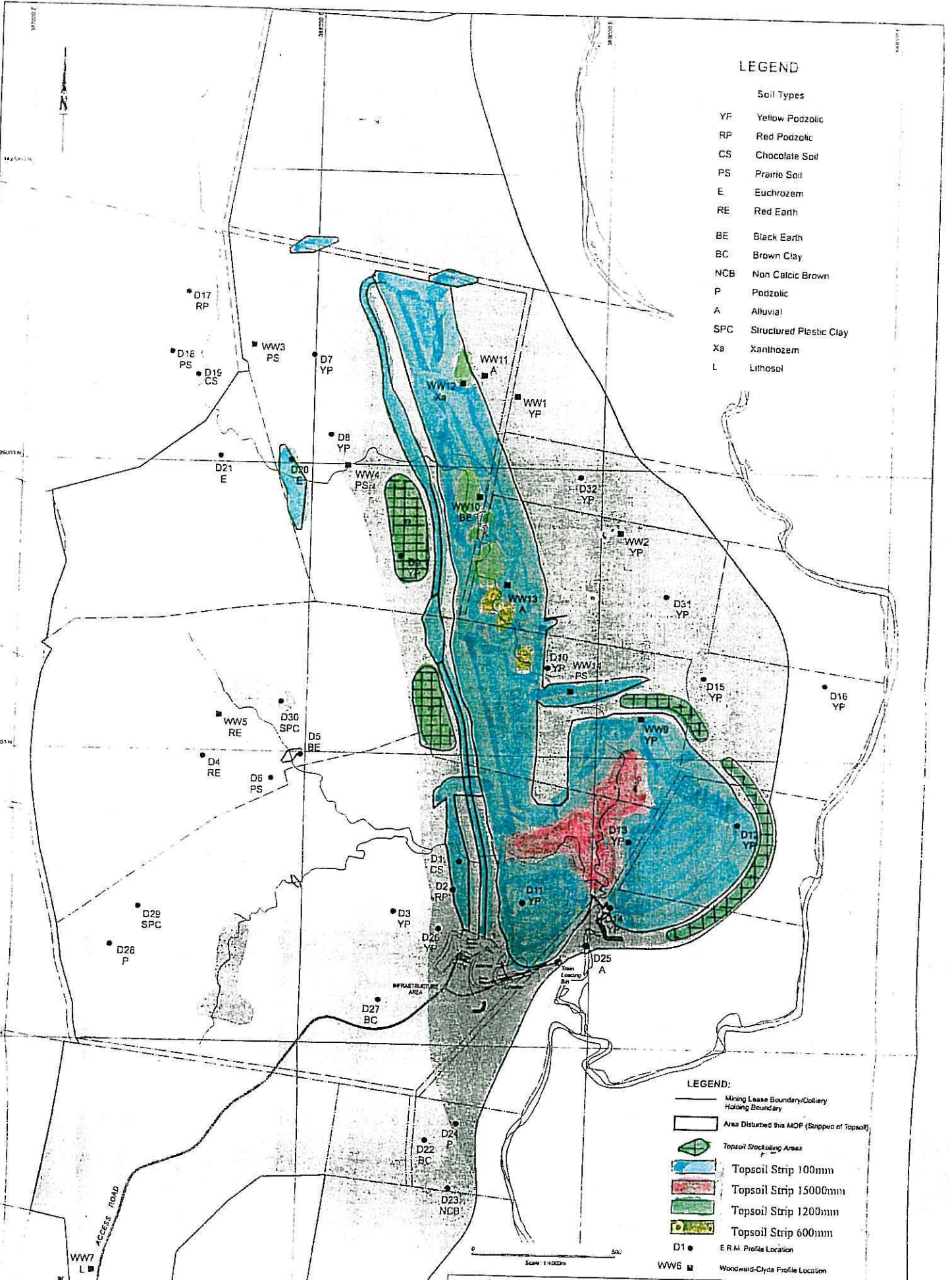
FIGURE

### LEGEND

- Soil Types
- YP Yellow Podzolic
  - RP Red Podzolic
  - CS Chocolate Soil
  - PS Prairie Soil
  - E Euchrozem
  - RE Red Earth
  - BE Black Earth
  - BC Brown Clay
  - NCB Non Calcic Brown
  - P Podzolic
  - A Alluvial
  - SPC Structured Plastic Clay
  - Xa Xanthozem
  - L Lithosol

### LEGEND:

- Mining Lease Boundary/Cottary Holding Boundary
- Area Disturbed this MOP (Stripped of Topsoil)
- Topsoil Stockpiling Areas
- Topsoil Strip 100mm
- Topsoil Strip 15000mm
- Topsoil Strip 1200mm
- Topsoil Strip 600mm
- D1 ERM Profile Location
- WW6 Woodward-Clyde Profile Location



An extract presented here, supplied by Cloudburst Consulting Engineers and Geotechnical Engineers, is intended to provide a true representation of the project in hand. I believe it to be a true representation of the project in hand.

Signed: *[Signature]*

Figure 1 - Topsoil Stripping Plan

### DURALIE OPERATIONS

Name of mine	DURALIE
Mining Title/Lease	M/L 1437
MSP Commencement date	1 JUL 2006 (MSP Commencement date (initial)) 11/11/2016
Name of leaseholders	DURALIE OYAL PTY LTD
Name of mine operator if different	See Section 1
Reporting officer	See Section 1
Title	OPERATIONS MANAGER
Signature	<i>[Signature]</i>
Date	22/11/2016