



DAUNIA MINE (DNM) – MATERIAL CHARACTERISATION STUDY

November 2022



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1 INTRODUCTION

BHP Mitsubishi Alliance (BMA) has engaged Landloch to provide a material characterisation study of stockpiled materials at the Daunia Mine (DNM). Specifically, the study will evaluate the quality of materials for their use as growth media in rehabilitation.

To ensure rehabilitation success, the materials planned to be placed near the surface of the landforms need to be assessed for their suitability to support the vegetation required to meet the target post-mining land use (PMLU).

This report evaluates the quality of materials for use as growth media for rehabilitation of the mine and identifies any gaps in the available information or resources.

1.1 Project Description

DNM is an open cut metallurgical coal mine operated by BMA. The mine is located south-east of Moranbah in Queensland's Bowen Basin. The project area covers mining leases ML70115, ML1781, ML70116 and ML70312 (Shared train load out and rail link). Operations started in 2013.

The general arrangement of the DNM is provided in Figure A2 (Appendix A).

1.2 Scope of Work

The scope of work involved the following tasks:

- i. Review previous soils and land assessments undertaken at DNM.
- ii. Review available published soil and land data within the region.
- iii. Conduct data gap analysis to determine information required to:
 - a. Develop an inventory of materials available for rehabilitation; and
 - b. Assess the suitability of materials as a plant growth media.
- iv. Collate existing and recent soil laboratory data.
- v. Topsoil stockpile sampling and analysis.
- vi. Interpret data, characterise materials and prepare this report.

2 DESKTOP REVIEW

2.1 Climate

DNM is situated in Queensland's sub-tropical climatic zone, which is characterised by high summer temperatures, warm dry winters and distinct wet and dry seasons.

Average monthly maximum temperatures tend to range from 24°C to 27°C in winter, and from 33°C to 36°C in summer. Summer temperatures can exceed 40°C for short periods (BoM, 2022)

Average monthly minimum temperatures range from 8°C to 10°C in winter and from 20°C to 22°C in summer (BoM, 2022).

Rainfall is concentrated through the summer with approximately 75% of yearly rainfall occurring between November and March. The median annual rainfall for the area, recorded at Moranbah airport, is 520 mm.

2.2 Topography

The pre-mining topography of the study area is dominated by gently undulating grazing lands with low relief ranging from 240 m ADH in the north down to 190 m ADH in the south. The surrounding land is characterised by poorly defined ephemeral drainage lines that only flow immediately after rain, draining into New Chum Creek and eventually the Isaac River.

2.3 Geology and Soils

2.3.1 Regional geology

DNM is located in the northern part of the Permo-Triassic Bowen Basin containing primarily fluvial and some marine sediments (BHP Billiton Mitsubishi Alliance, 2008). The coal deposits are contained in the Late Permian Rangal Coal Measure, which is overlain by the Late Permian to Early Triassic Rewan Group. The geology in the project area is presented in Appendix A Figure A8.

2.3.2 Overburden geology

Overburden geology at DNM can be broadly classified (Landloch Pty Ltd, 2017) into:

- Weathered zone materials: Cainozoic clays, sands, claystones and sandstones. The Weathered Zone materials are typically sodic, highly erodible and prone to clay dispersion. These materials have varying levels of salinity, but their main constraint is their high erosion risk.
- Unweathered zone materials: Permian sandstones, siltstones and mudstones. Carbonaceous zones are present close to the coal seams. The physical and chemical properties of these materials are highly variable. They are generally sodic, alkaline and non-saline, although there are some materials with elevated salinity levels, and some carbonaceous strata are acidic. Erosion risk varies based on physical properties and sodicity, but generally the sandstones are more competent and resistant to weathering and erosion than the siltstones and mudstones.

2.3.3 Regional soils

Soil mapping of the region identifies two broad soil groups across the project area at a regional scale (State of Queensland (Department of Resources), 2021). These include:

- MM7 – Friable earths; and
- Ro9 – Sodosols

Relevant details of these soil groups are provided in Table 1.

Table 1: Summary details of regional soils in the Study Area.

Soil Landscape Code	Soil Landscape Name	Description	Associated Australian Soil Classification (ASC)
MM7	Friable earths	Chief soils are neutral dark and yellow friable earths with friable brown soils.	Vertosol, Dermosol
Ro9	Sodosols	Sodosols. Dominant soils are hard alkaline duplex brown soils.	Sodosol

2.3.4 Recoverable soils

Pre-mining soil and land suitability assessment of the region, that includes the study area, was completed by CSIRO (Gunn et al, 1967) and agricultural management units were described by Bourne and Tuck (1993). Both surveys produced land and soils information at a scale of 1:500 000.

More detailed soil surveys of the infrastructure and mining area were conducted in August 2004 and April 2008. The 2004 survey was conducted as part of the Poitrel Environmental Impact study (EIS) (BHP Billiton, 2005) and covered the shared infrastructure areas. A total of 195 sites were assessed during the 2008 survey, which covered the mining area at DNM (BHP Billiton Mitsubishi Alliance, 2008). Sampling locations and soil mapping from the 2008 survey are provided in Figures A3 and A4.

A topsoil stripping plan was developed in 2012 by GT Environmental Services which included a soil survey of an additional 250 ha of undisturbed land (Figure A5). The assessment identified four main in situ soil types which correlate with the previous soil assessments.

Across all surveys a total of 11 soil mapping units (SMU), including variants, were identified. A summary of all SMU's, including associated Australian Soils Classification (ASC), are provided in Table 2. Land suitability scores defined from the land suitability classes for use in Queensland (Department of Natural Resources and Mines, 2013) are included. Land suitability decreases progressively from Class 1 to Class 5.

A soil map displaying broad ASC soil types for the DNM area is provided in Figure A6 (Appendix A). The soils data used to generate this map were not collected by Landloch. Rather, the mapping units are a synthesis of soils data and mapping sourced from existing soil assessments for the mine area completed by Bourne and Tuck (1993), P. Baker and G. Tuck as part of the EIS (BMA, 2009) and GT Environmental (2012), along with existing land systems information sourced from the QLD Globe online spatial data system (State of Queensland 2022). The map is Landloch's interpretation of the available soils information.

Table 2: Summary details of the SMUs developed in the previous soil assessments for Daunia mine (BHP Billiton Mitsubishi Alliance, 2008) and (GT Environmental Services, 2012).

SMU	Soil Name	Details	Associated Australian Soil Classification (ASC)	Grazing Class (DNRM, 2013)
DB1	Red Brown Brigalow Upland Clays	Hard setting uniform clays with Brigalow with coarse structured subsoils on hard sandstone below 90 cm. Minor variants include surface laterite gravels and fractured sandstone throughout the profile.	Vertosol, Dermosol	3
DB2	Linear Gilgai on Dark Grey Brown Clays	Cracking and non-cracking clays. Brigalow, Bauhinia, Poplar Box and Dawson Gum.	Vertosol, Dermosol	2
DB3	Alluvial Clay Plains on Dark Cracking Clays	Alluvial clay plains on grey cracking Brigalow clays.	Vertosol	2
DB4	Moderately Well-Structured Grey Brown Cracking Clays	Little or no gilgai	Vertosol	2
DB5	Shallow, Gravelly Red Brown Sandy Clays	Similar to DB1 but much shallower and rockier. Prominent surface gravels and occasional sandstone outcrops.	Gravelly Dermosol	4
DB6	Cracking Clays with Poplar Box and Brigalow	Tall Poplar Box with scattered Brigalow on cracking clays with silty clay loam veneer surface.	Vertosol	3
DE1	Mt Coolibah Uplands with Brown Clay over sandstone	Mountain Coolibah uplands with brown clay on sandstone and other sediments	Vertosol, Dermosol	2
DD1	Oper Downs with Grassland on Dark Cracking Clays	Broad lower elevation alluvial areas	Vertosol	2
A2	Alluvial Sandy Hard Duplex	Hard setting sandy loam duplex soils alongside New Chum Creek often with bleached A2 over hard, coarse structured medium yellow clay often heavily mottled. Poplar Box mixed woodlands with associated Brigalow and Blackbutt.	Chromosol, Sodosol	4
B4	Friable Brigalow scrub soil	Deep well-structured black cracking clay with granular surface mulch.	Vertosol	2

SMU	Soil Name	Details	Associated Australian Soil Classification (ASC)	Grazing Class (DNRM, 2013)
B4v	Variant to B4	Fine granular non-cracking red/brown Brigalow scrub soil.	Vertosol, Dermosol	2

2.4 Waste Materials

The waste materials at DNM consist of overburden/interburden materials (spoil) and coal rejects. The overburden generally consists of moderately weak to strong sandstone, siltstone and claystone, with carbonaceous siltstones (Section 2.3.2).

2.4.1 Spoil materials

Characterisation of the overburden was undertaken by P.W. Baker and Associates Pty. Ltd. (2012) and as part of the EIS (BMA, 2009). Generally, spoil materials at DNM were found to be:

- Non-acid forming, with acid neutralising capacity;
- Strongly alkaline;
- Sodic and dispersive;
- Low to moderately saline, but some strata may exhibit high salinity; and
- Potentially elevated in selected metals.

P.W. Baker and Associates Pty. Ltd. (2012) concluded that most spoil material is suitable as growth medium. The fresh Permian wastes between carbonaceous layers were reported to be better suited to rehabilitated batter slopes and to provide a higher quality growth medium.

2.4.2 Coal rejects

The coal rejects are disposed in the mining pits and spoil and covered by spoil as part of operational process. They are currently not used a rehabilitation resource but future studies and testing may identify some reject material that is beneficial for rehabilitation use due to its high organic carbon and coarse physical structure, or strategies may be developed for mixing reject material with spoil to deliver a more suitable growth medium.

2.5 Topsoil Stockpiles

Information on current topsoil stockpile materials and locations was provided by BHP. Approximate volume of available stockpiled material is 3,839,329 m³ (August 2021). Locations of current topsoil stockpiles on DNM are presented in Figure 1.

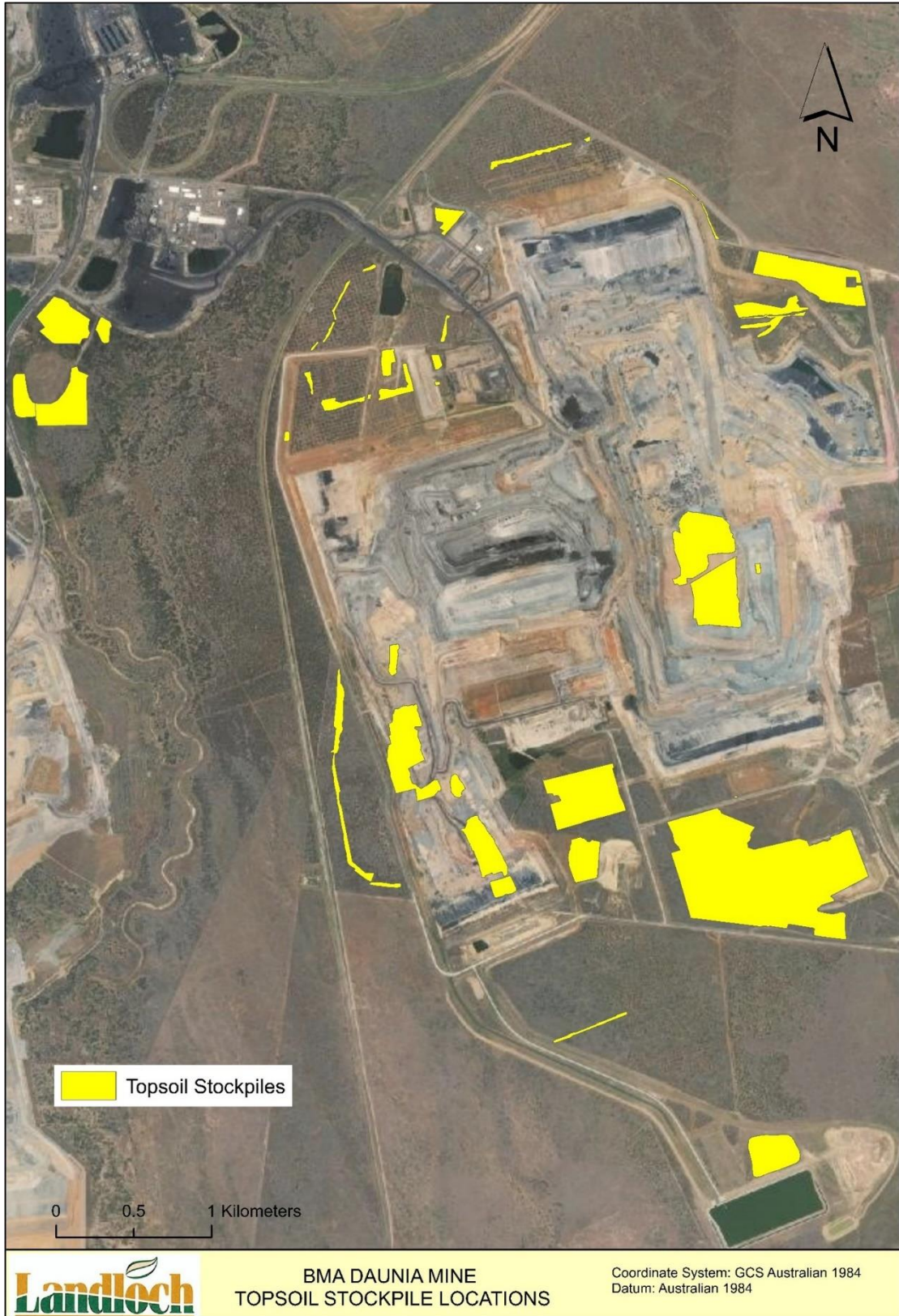


Figure 1: Stockpiled topsoil materials across the Daunia Mine.

2.6 Post Mining Land Uses

The PMLUs are in accordance with the EA and include:

1. Cattle grazing.
2. Woodland habitat.
3. Water storage.
4. Watercourse.

2.7 Revegetation Methodology

The revegetation methods for disturbed land at DNM will normally consist of the following:

- Respreading stockpiled or freshly stripped topsoil, or creating a growth media from spoil;
- Contour ripping;
- Seeding with an appropriate seed mix for the PMLU; and
- Applying appropriate fertiliser and ameliorants for plant establishment if required.

Where available, competent materials will be placed on steeper slopes to aid stability. A suitable seed mix will be used to establish a sustainable vegetation cover.

The material characterisation and landform design studies aim to identify and improve where possible:

- Growth media placement depth and soil profile depths relevant to the PMLU;
- Growth media preparation details;
- Expected growth media amelioration activities.

More details on revegetation can be found in the relevant section of the PRC Plan.

3 METHODOLOGY

3.1 Materials

The following materials were targeted for consideration as potential growth media in the landform design process:

1. Topsoil materials; and
2. Spoil.

When considering the growth media at DNM, the quality of the stockpiled topsoil is more representative of the material available for rehabilitation, compared to the in situ topsoil mapping. Therefore, stockpiled topsoil materials were sampled by Landloch in a field program completed as part of this work.

Spoil data from previous projects was considered in the assessment of spoil as potential growth media in this assessment.

All materials were characterised in terms of basic chemical and physical fertility properties.

Any materials with the potential to be placed at the surface for use as a primary growth media were subjected to additional fertility assessments.

3.2 Topsoil

3.2.1 Field program – topsoil stockpile sampling

The field program was undertaken in two stages on 11–12 February and 15–16 March 2022. Site conditions were wet at the time of inspection, with ponded water observed across the Study Area. For the preceding months, the Bureau of Meteorology recorded Moranbah’s rainfall as 150 mm in November 2021, 84 mm in December 2021, and 97 mm in January 2022.

3.2.2 Sampling plan and intensity

The sampling plan is provided in Table 3 and the stockpiles sampled are presented in Appendix A.

Table 3: Topsoil stockpile sampling program.

Stockpile ID	Sample Sites	Stockpile ID	Sample Sites
1	1	19	1
3	4	20	1
5	1	23	1
6	1	27	1
Dam 7	1	28	1
8	1	38	1
12	2	39	1
13	2	41	1
16	1		
Total			22

The sample density for soil cover material is considered to be at a ‘*moderate (detailed)*’ intensity of 1:25,000, based on the *Guidelines for Surveying Soil and Land Resources (2ed)* (McKenzie, Grundy, Webster, & Ringrose-Voase, 2008). This assumes soil will be placed at an average depth of 0.15m at rehabilitation.

Using these criteria, Table 4 shows the sampling intensity on a *stockpile volume* basis; and based on *soil reinstatement* at rehabilitation to an average depth of 0.15m.

Table 4: Sampling intensity for topsoil stockpiles.

Material	Volume (m ³)	Reinstatement Coverage (ha)	Total Samples	Sampling density (volume)	Sampling density (area)	Survey Scale
Topsoil	3,839,329	1,919	88	1/43,000 m ³	1/21 ha	1:25,000

3.2.3 Sample collection

Samples and descriptions of materials were taken from test pits. Depth of excavation was to the base of the topsoil stockpile, or to the limit of excavation (~3–5 m).

Samples were collected from the stockpiles at depth intervals of 0.5–1 m (e.g. 0.5–1.0 m, 1.5–2.0 m, and 2.5–3.0 m etc.).

Sampling included composite and discrete samples. Each composite sample was composed of materials from three discrete samples. Laboratory analyses were as follows:

- Laboratory analysis of composite samples was a 'detailed' suite, to characterise the soil nutrients and physio-chemical parameters of the stockpile.
- Laboratory analysis of discrete samples was a 'basic' suite of pH and salinity. This analysis indicates the variability within the stockpile and exposes the potential for 'extreme' values to be 'masked' in composite samples.

Brief details about the collected materials were recorded in the field.

3.2.4 Laboratory analysis

Laboratory analysis was undertaken by East West EnviroAg, a laboratory with National Association of Testing Authorities (NATA) and Australian Soil and Plant Analysis Council (ASPAC) accreditation. Laboratory analysis involved two different laboratory suites as described below and in Table 5.

Table 5: Laboratory analytical suites.

Analyses	Suite	
	Topsoil	Basic
pH and electrical conductivity	✓	✓
Exchangeable cations (with calculations of effective cation exchange capacity and exchangeable sodium percentage) and chloride	✓	
Total nitrogen and phosphorous; available phosphorous, potassium, and sulphur; trace nutrients (Cu, Zn, Mn, Fe, B), chloride, organic carbon and phosphorus buffer index (PBI), field texture	✓	
Dispersion potential	✓	
Totals	22	66

The 'basic suite' screened for salinity and extremes of pH. This was conducted on all discrete samples from the topsoil stockpiles. Data were used to provide an indication of the heterogeneity of materials within the stockpile. All samples were analysed with the *basic suite*. The 'topsoil suite' extends the *basic suites* to include dispersion, sodicity, exchangeable cations, macro and micronutrients. It was conducted on topsoil materials, as well as samples of any other materials intended to be used as primary growth media.

3.3 Spoil

Geochemical and physical characterisation data for the spoil materials were collated from multiple assessments conducted throughout the project. These included:

- BMA Daunia Coal Mine Project Overburden Assessment (PW Baker & Associates Pty. Ltd., 2012);
- Daunia Mine, One BMA Rehabilitation Monitoring, December 2015 (B. R. Emmerton Pty Ltd, 2015);
- Soil and waste erodibility and landform design: Daunia Mine (Landloch Pty Ltd, 2017). Sampling locations are provided in Figure A7;
- Daunia Coal Mine Project – Environmental Impact Statement (BHP Billiton Mitsubishi Alliance, 2008); and
- BMA ALL SITES_Coal Tailing and Rejects All Sites Earth Systems laboratory data spreadsheet (BHP, 2022).

4 FINDINGS

The two categories of materials available for rehabilitation, characterised as part of this assessment include -

- Topsoil stockpiles; and
- Spoil materials.

Details of these materials are provided below. Site location details are provided in Figure A1 and in Table B1. Stockpile description records and laboratory results are provided in Appendix B.

4.1 Topsoil Stockpiles

The topsoil stockpiles are representative of the material available for rehabilitation once topsoil is stripped and mixed in stockpiles. A total of 88 samples were collected from 22 locations within topsoil stockpiles. A total of 22 samples were analysed for *topsoil suite* and another 66 samples were analysed for *basic suite*.

Their locations are provided in Figure A1 (Appendix A) and laboratory data are presented in Tables B4 and B5 (Appendix B).

Stockpiled topsoil materials for use in rehabilitation were all categorised as Red/Brown Clays and show similar physical properties between stockpiles. The generalised topsoil materials are dark brown, brown or reddish brown with texture of clay loam to medium clay. Gravel content is generally less than 10%, although sometimes gravel content of up to 20% is present. The soils are susceptible to slaking, thereby increasing the risk of erosion. Approximately 20% of stockpiles sampled are sodic. This is likely a result of collecting a portion of sodic subsoil material together with topsoil during the initial stripping.

Erodibility studies (Landloch Pty Ltd, 2017) indicate these soils are comparable to the most stable clay topsoils available for rehabilitation in the region. They are suitable as a topsoil for all rehabilitation areas, provided basic erosion control practices are established and chemical fertility is managed to ensure both initially vigorous vegetation growth and maintenance of suitable levels of surface cover in the longer term. Any sodicity issues will also need to be addressed by incorporating gypsum prior to rehabilitation.

A summary of key chemical and physical properties is presented in Table 6. Figures 2 to 5 are representative of red/brown clay topsoils at DNM.



Figure 2: Soil material at stockpile 1.



Figure 3: Excavated soil at stockpile 6.



Figure 4: Variable soil at stockpile 3.



Figure 5: Soil material at stockpile 19.

Table 6: Summary of key chemical and physical properties for topsoils at Daunia mine.

Analysis	Red/Brown Clay Topsoil
Chemical Properties	
pH _{1:5} (H ₂ O)	Neutral to strongly alkaline (7.8 – 8.7)
EC _{1:5} (dS/m)	Low to moderate (0.15 – 0.43)
ESP (%)	Non-sodic to sodic (1.7 – 7.8)
Total N (mg/kg)	Low to moderate (688 – 1684)
Available P (mg/kg)	Low to moderate (7 – 38)
Available K (mg/kg)	Low (93 – 172)
Organic Carbon (%)	Low to high (0.94 – 1.91)
CEC (meg/100g)	Moderate (13 – 28)
Ca/Mg (ratio)	Low Ca to balanced (2 – 6.5)
Physical Properties	
Clay content (%)	>30
Rock content (%)	<20
Dispersion (EAT)	Slightly dispersive to stable (3b – 7)
Permeability *	Low
Erodibility *	Moderate
Associated regional soil	MM7
Associated mapped soil types	DB2, DB3, DB4, DB6, DE1, DD1, B4, B4V (DB1 and DB5 where gravel content is > 10%)

Note: Chemical properties are based on average 10th and 90th percentile values for all stockpile samples analysed. * Based on measured erodibility parameters (Landloch Pty Ltd, 2017).

4.2 Spoil Materials

From the previous assessments detailed in Section 3.3, broad spoil characteristics were found to be similar across all studies and identify two spoil management groups:

- Unweathered zone materials - Permian spoil; and
- Weathered zone materials - Weathered sediments and spoil.

4.2.1 Fresh Permian spoil

Generally, fresh Permian spoil is a rocky material consisting primarily of sandstone, siltstone and claystone with clay content below 25%, resulting in low water holding capacity. It is generally grey or pale brown in colour. Fresh Permian spoil at the mine, however, can vary depending on the strata location and degree of carbonaceous inclusions present. The materials are sodic and dispersive. A summary of key chemical and physical properties is presented in Table 7.

Of the two spoil materials, fresh Permian is considered the most suitable option for placement close to the final rehabilitated surface. Discrete testing should be conducted

prior to rehabilitation to locate any saline carbonaceous material mixed during stripping. Saline material should only be used as a growth medium if a leachable profile can be constructed.

Fresh or recently stripped Permian sandstone that has not been exposed to extended periods of weathering should be used in the upper soil profile to greatly increase batter slope resistance to erosion while vegetation establishes (Figure 6). Slake durability data indicated that only 25% of Permian samples have a slake durability higher than 70% (Landloch Pty Ltd, 2017). If this material could be isolated, it may be useful to rock armour and stabilise steeper areas. Additional studies and testing for rock properties such as hardness (consolidation and cementation), mineralogy (susceptibility to weathering of the component minerals) and permeability would be useful to locate additional competent material. Figure 7 is representative of Permian sandstone spoil at DNM.



Figure 6: Fresh (<1 month) unweathered Permian sandstone spoil.



Figure 7: Permian spoil material present at Daunia Mine.

4.2.2 Weathered sediments and clay spoil

The weathered sediments and clay spoil is a highly weathered material containing portions of fragile rock and has a clay content of greater than 35%, resulting in moderate to high water holding capacity. It is typically pale orange to orange in colour. The materials are often strongly sodic and dispersive, meaning that – once some leaching of soluble salts occurs – it is likely to be prone to hardsetting and to tunnel and gully erosion. Key chemical and physical properties are summarised in Table 7.

Placement of this material close to the final rehabilitated surface or its use for the construction of flow control structures (e.g. contour banks and drains) is not recommended due its high erodibility. Consideration could only be given to use as a secondary growth medium on flat or very low gradient areas if the intended material has no chemical limitations to vegetation growth.

Figures 8 and 9 are representative of weathered sediments and clay spoil at DNM.



Figure 8: Weathered clay spoil material at Daunia mine.



Figure 9: Weathered sedimentary spoil with increased rock content.

Table 7: Summary of key chemical and physical properties for spoils at Daunia mine.

Analysis	Spoil Material	
	Permian	Weathered Sediments and Clay
Chemical Properties		
pH _{1:5} (H ₂ O)	Moderate to strongly alkaline (8.4 – 9.4)	Slightly acidic to strongly alkaline (6.4 – 8.8)
EC _{1:5} (uS/cm)	Low to moderate (180 – 820)	Moderate to high (510 – 1200)
ANC (H ₂ SO ₄ /t) *	Moderate to high (13 – 56)	Moderate to high (13 – 56)
PAF	No	No
CEC (meq/100g) *	Moderate to high (23 – 32)	Moderate to high (23 – 32)
ESP (%)	Sodic to strongly sodic (10 – 25)	Non-sodic to strongly sodic (4 – 19)
Ca/Mg (ratio)	Imbalanced to low Ca (0.8 – 2.3)	Imbalanced to balanced (0.7 – 7.2)
Metals	Comparable to background levels	Comparable to background levels
Physical Properties		
Clay content (%)	<25	>35
Rock content (%)	>30	<20
Slake durability (%)	Moderate (50 – 75)	Low (<50)
Permeability	Very high	Low to moderate
EAT *	Dispersive (Class 2)	Dispersive (Class 2)
Dispersion risk	Moderate	Moderate

* Chemical properties are based on average 25th and 75th percentile values for all spoil samples analysed.

4.2.3 Excluded material

Chemical analysis identified two stockpile areas with limiting soil properties that would restrict rehabilitation success. Stockpile 5 and an area of stockpiled material near stockpile 13 (nominally named stockpile 13 subsoil) are highly saline and strongly sodic. Groundcover observations indicated limited vegetation has established across the stockpile surfaces at the time of sampling (Figures 10 and 11). The chemical and physical properties indicate the bulk of these stockpiles are likely to be subsoil material.

It is recommended that this material is excluded from use as primary growth media and where possible, buried below a minimum of two metres of non-saline soil.



Figure 10: Saline and sodic soil around stockpile 13.



Figure 11: Saline and sodic soil present a stockpile 5.

5 GROWTH MEDIA SUITABILITY AND AMELIORATION

The materials encountered have been classified according to their ability to support plant growth, as either *primary* or *secondary* growth media.

5.1 Primary Growth Media

Primary growth media infers the ability of materials to be used as a topsoil or topsoil surrogate.

It is the upper-most layer of soil/material placed over the rehabilitated area. It can be various thicknesses depending on the PMLU and consists of surface soil (topsoil) materials recovered prior to mining and applied over the area, or a growth medium developed from spoil, ameliorated to a standard suitable to support sustainable plant growth.

Compared to subsoil and overburden materials, it is typically higher in organic matter and macro- and micronutrients and has low to negligible limitations to plant growth. Its primary purposes are to provide nutrients and a stable surface for vegetation establishment.

If adequate suitable topsoil is not available, an alternative may be derived from high quality spoil with amelioration. If this is required, analysis of macronutrients is to be conducted to determine the fertility stores needed to sustain healthy vegetation growth and identify any additional amelioration requirements for the spoil materials if used as primary growth media. Amelioration products and application rates for the primary growth media should be assessed by a suitably qualified professional prior to rehabilitation and consider the desired PMLU and vegetation.

5.2 Secondary Growth Media

Secondary growth media infers the ability of materials to be used as a substrate or substrate surrogate. It may consist of the spoil material that is capped with the primary growth medium or may be an intermediate layer placed on the spoil material, and then capped with primary growth medium. The main purpose of the secondary growth medium is to increase the soil water storage capacity of the soil profile and/or to meet the soil depth criterion for certain vegetative PMLUs and target vegetation communities. In some circumstances, secondary growth media may be able to be sufficiently improved by the addition of ameliorants (e.g. gypsum, lime, organic matter) to convert them to a primary growth medium.

5.3 Suitability Classification

A four-class suitability system is applied in the evaluation of materials as growth media. These classes are defined as follows:

Class A – Good Quality

- Negligible limitations to plant growth.
- Good quality material for intended purpose.
- *Nil to low* levels of ameliorants will be required.

Class B – Fair Quality

- Minor limitations to plant growth.
- Reasonable quality material for intended purpose.
- *Low to moderate* levels of ameliorants may will be required.

Class C – Marginal Quality

- Moderate limitations to plant growth.
- *Moderate to high* levels of ameliorants may be required to improve material quality to support plant growth.

Class D – Not Suitable

- Severe limitations to plant growth.
- It will generally be uneconomic or unviable to amend these materials to the degree needed to support plant growth.

Suitability of materials as primary or secondary growth media is presented with recommendations in Table 8.

Table 8: Fertiliser and ameliorant treatment rates for materials and growth media suitability classification.

Material	Limitations	Amendments	Growth Media Suitability (Classes)	
			Primary (1)	Secondary (2)
Red/brown clay topsoil	<ul style="list-style-type: none"> • Sometimes strongly alkaline. • Sometimes sodic. • Often low N, P, K, Ca, and TOC. 	<ul style="list-style-type: none"> • Gypsum: approximately 25% of stockpiles, requirements and rates should be calculated for individual stockpile prior to use in rehabilitation. • Fertiliser and/or compost rates are to be determined by a suitably qualified person prior to individual stockpiles being used in rehabilitation. 	1A	2A
Material at stockpile 5 and near stockpile 13 (subsoil)	<ul style="list-style-type: none"> • Strongly alkaline. • High salinity. • Strongly sodic. • Low N, P, K and OC. 	<ul style="list-style-type: none"> • Nil • Soil quality low • Bury all saline material to a depth greater than 2 metres below the surface. 	1D	2C/D
Permian spoil	<ul style="list-style-type: none"> • Strongly alkaline. • Occasionally moderate salinity. • Sodic to strongly sodic and dispersive. • Rock content up to 50 %. 	<ul style="list-style-type: none"> • Gypsum: due to heterogeneity between spoil samples, rates should be calculated for broad spoil areas after placement for rehabilitation. <p>If to be used as a primary growth media then further assessment by a suitably qualified person is required to determine amelioration required.</p>	1B/C	2A
Weathered sediments and clay spoil	<ul style="list-style-type: none"> • Often strongly alkaline. • Moderate to high salinity. • Often sodic to strongly sodic and dispersive. • Slake durability <50%. • Low permeability. 	<ul style="list-style-type: none"> • Gypsum: due to heterogeneity between spoil samples, rates should be calculated for broad spoil areas after placement for rehabilitation. • Bury all saline material to a depth greater than 2 metres below the surface. 	1D	2C

Notes:

Class A – Good Quality: Negligible limitations to plant growth.

Class B – Fair Quality: Minor limitations to plant growth.

Class C – Marginal Quality: Moderate limitations to plant growth.

Class D – Not Suitable: Severe limitations to plant growth.

5.4 Fertiliser and Ameliorants

Fertiliser and amelioration rates for soil materials are dependent on the intended PMLU for a rehabilitated area. For example, cattle grazing requires generation of biomass from the growth media and planted grass species. Nitrogen and Phosphorus based amendments would be recommended for these areas. As a guide amelioration application for grazing PMLU should aim to provide:

- Phosphorus (Colwell) content of the growth media to within a target concentration of 25–40 mg/kg.
- An appreciable source of starter nitrogen.
- Adequate macro and micronutrients.
- Reduced potential for dispersion.

Amelioration recommendation for woodland areas should be assessed on a case-by-case basis and represent the specific requirements of the target vegetation community.

5.4.1 Gypsum

Gypsum has been recommended for sodic/dispersive materials or where calcium is low. It should be applied during soil preparation stages, in a manner that allows for as thorough mixing as is practicable of the surface materials. Gypsum should be applied prior to seeding and fertilising. The depth to which sodicity is ameliorated should be dependent upon erosion risk / gradient. For slopes with gradients

- less than approximately 35 %, incorporate gypsum into the upper 0.3 m of sodic materials.
- greater than approximately 35 %, incorporate gypsum into the upper 0.5 m of sodic materials.

Considering the annual rainfall depth at DNM is approximately 520 mm, it is expected that as a 'rule of thumb' gypsum will dissolve at a rate of 0.5–1 t/ha/y. Hence, there is benefit in applying gypsum at recovery of materials, or as soon as is practicable in the rehabilitation program.

5.4.2 Fertiliser

A balanced NPK fertiliser such as Crop King (CK) 55 (N: ~13.5%, P: ~15%, K: 12.5%) and slow-release nitrogen source such as Coated Urea (N: ~46%) or organic compost is recommended to provide a balanced source of nutrients to plants during rehabilitation. Any composted material should comply with the Australian Standard for Composting (AS4454-2012).

Fertiliser and mulch/compost should be applied at seeding. It can be broadcast with a spreader, applied hydraulically, or pneumatically. Spreaders are typically suitable for slopes with gradients less than 35%, and pneumatic or hydraulic applications will be required for steeper slopes. Accurate application rates should be determined by a suitably qualified person prior to use in rehabilitation.

6 SUMMARY AND RECOMMENDATIONS

This material characterisation summary describes and characterises the materials identified on-site for use in rehabilitation, as per the topsoil stockpile assessment, previous soil and spoil assessments and other DNM project related documents.

6.1 Topsoil Quality and Stockpiles

Generally, the topsoil material is considered to be of adequate quality for use as a primary growth medium. Due to the high degree of heterogeneity in topsoil material, the summarised laboratory data should be considered representative of the topsoil materials as a whole, and not representative of individual stockpiles. As such, the sampling program is considered adequate to describe these materials into broad management groups. Therefore, any stockpile not included in this assessment should be sampled and characterised prior to use in rehabilitation.

6.1.1 Topsoil management

The main limitations of topsoil materials for use in rehabilitation are sodicity and low fertility.

Amelioration of sodicity requires the thorough incorporation of gypsum. However, gypsum is only required on approximately 25% of stockpiles sampled. Therefore, it is recommended that individual stockpiles are assessed for gypsum requirements prior to use in rehabilitation.

Generally, chemical fertility of the available topsoils is quite low. A balanced NPK fertiliser or compost should be applied during rehabilitation to provide a starter source of nutrients for initial vegetation growth. Additional applications may be required to maintain adequate fertility levels.

Amelioration products and application rates should be assessed by a suitably qualified professional prior to use for rehabilitation and to complement the desired PMLU.

6.2 Spoil Materials

Generally, Permian spoil materials at the mine are suitable to be used as secondary growth media through varying degrees of amelioration. Fresh Permian spoil is considered the most beneficial for use in the upper soil profile as it offers the highest stability to erosion. Where possible, placing the weathered zone sediments and clay spoil in the upper soil profile should be avoided.

The laboratory analysis and erodibility testing of spoil materials identified there may be limitations for their use as a *primary growth media*. The main limitation of some spoil materials is the tendency to rapidly weather when exposed, making them susceptible to erosion where adequate vegetation cover is not established. However, fresh Permian material may provide suitable growth media for establishment of woodland vegetation with sufficient amelioration. This material has only minor

chemical limitations and is unlikely to significantly reduce growth of most plant species used in rehabilitation. Spoil testing did not consider macro and micro nutrient fertility of the Permian. It is recommended that analysis of macronutrients be conducted to determine the fertility stores needed to sustain healthy vegetation growth and identify any additional amelioration requirements for the spoil materials if used as a primary growth media.

Data suggests that relatively competent rock with a slake durability higher than 70% is present on site. If this material can be isolated, it could be used as a rock armour to greatly increase batter slope resistance to erosion and to stabilise steeper areas in the short-term until vegetation establishes.

6.3 Growth Media for PMLU

Physical and chemical properties of the soil and spoil materials available on site meet the requirements to establish the PMLU for rehabilitated areas of cattle grazing or woodland habitat. It is recommended that the growth media is assessed by an appropriately qualified person prior to rehabilitation, to identify the required ameliorants and fertilisers.

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APPENDIX A: MAPS AND FIGURES

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Figure A1: Distribution of stockpiled topsoil materials and sampling locations at Daunia Mine. All stockpiles sampled are representative of a singular management group.

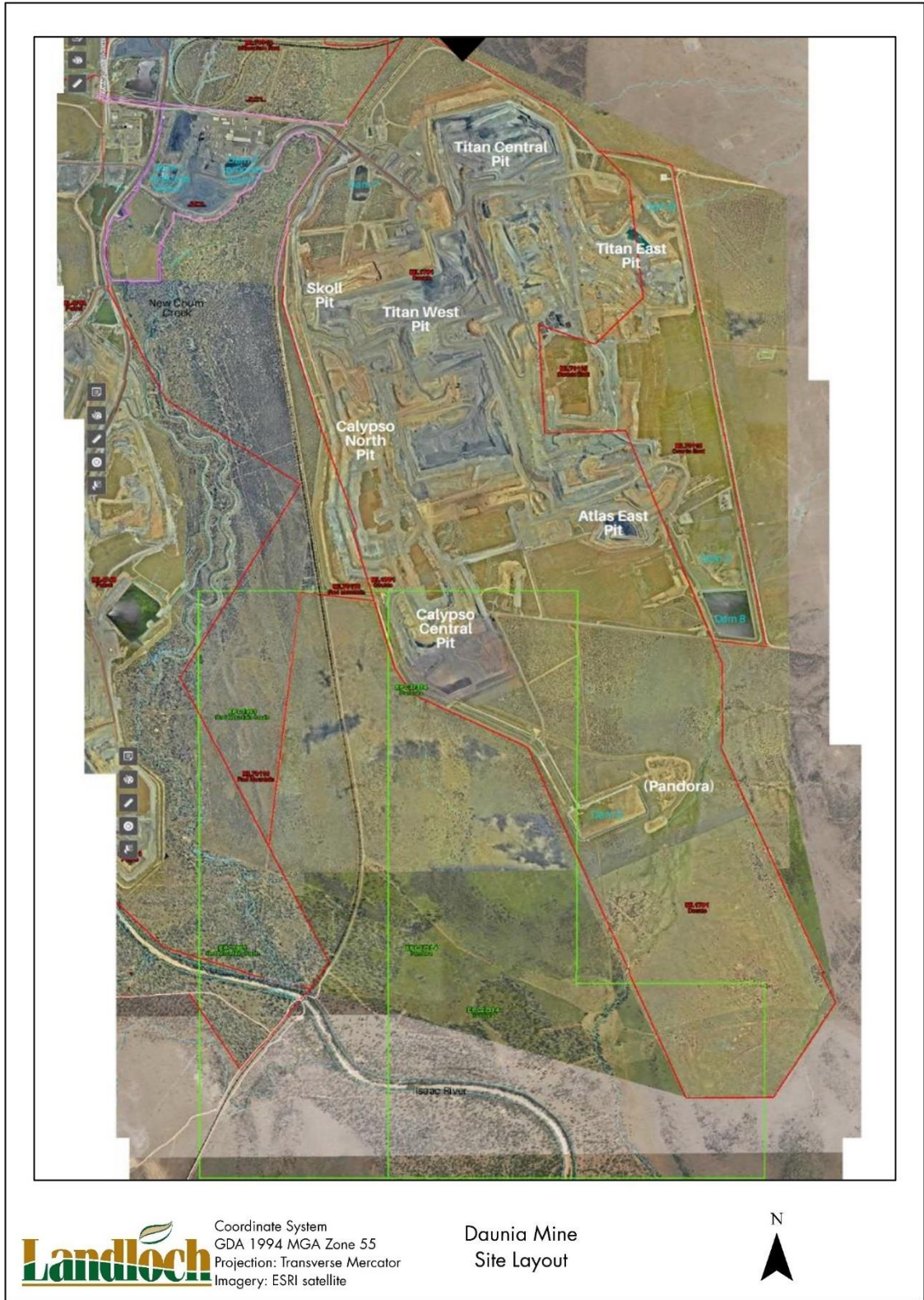


Figure A2: DNM site layout (October 2021).

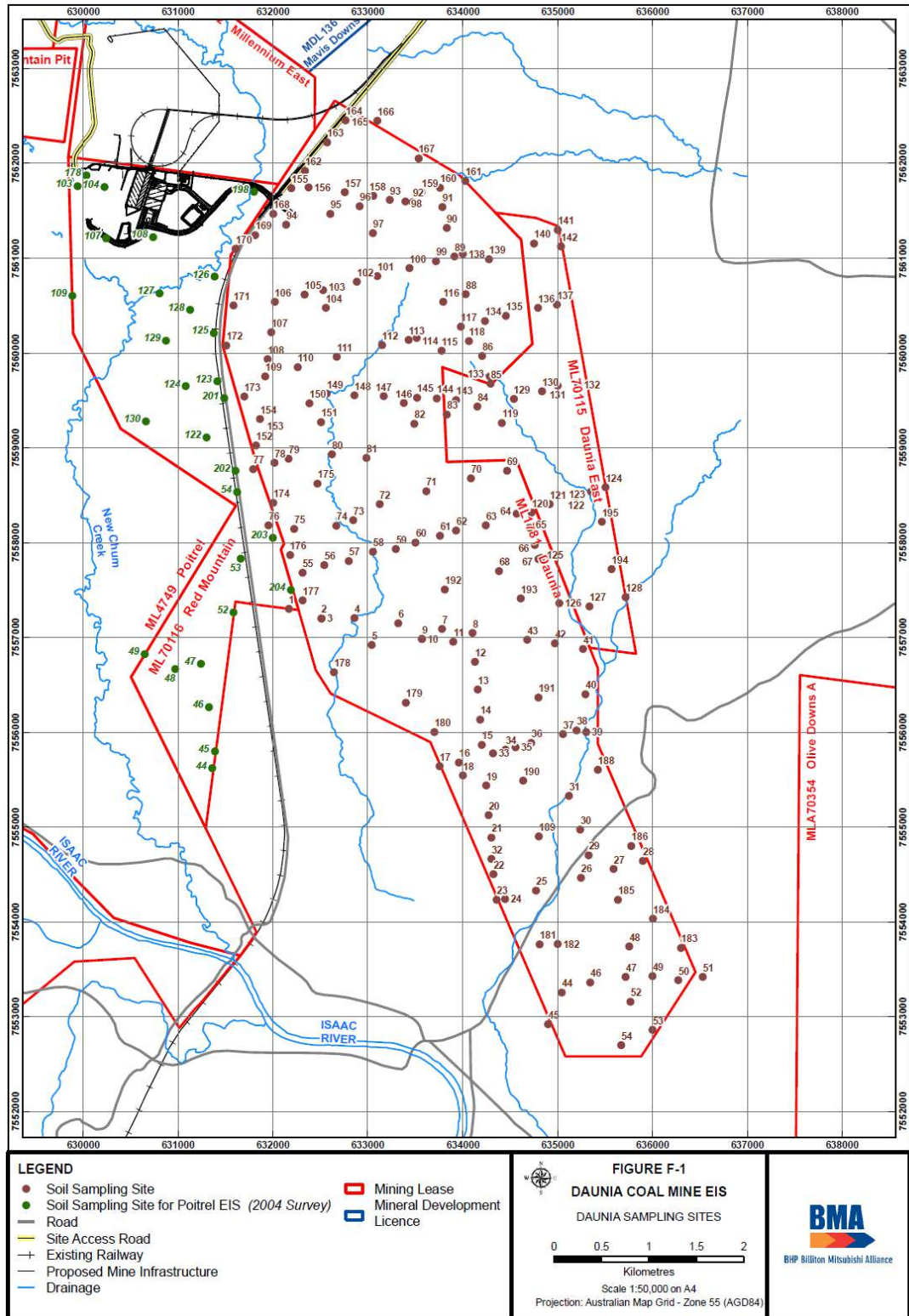


Figure A3: Pre-mined soil survey sampling sites conducted by Peter Baker and Graham Tuck (BHP Billiton Mitsubishi Alliance, 2008).

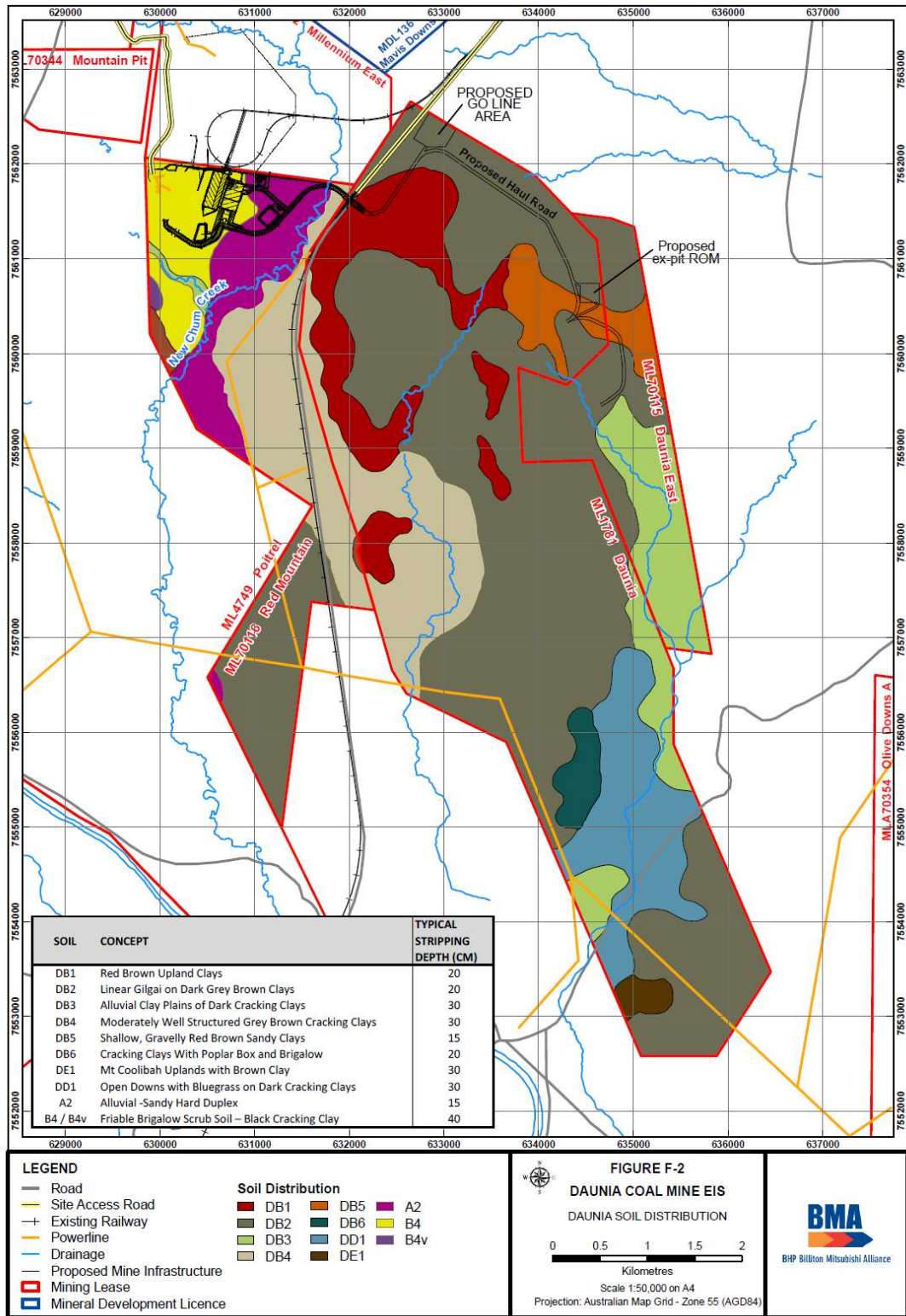


Figure A4: Soil mapping units for the pre-mined soil survey conducted by Peter Baker and Graham Tuck (BHP Billiton Mitsubishi Alliance, 2008).

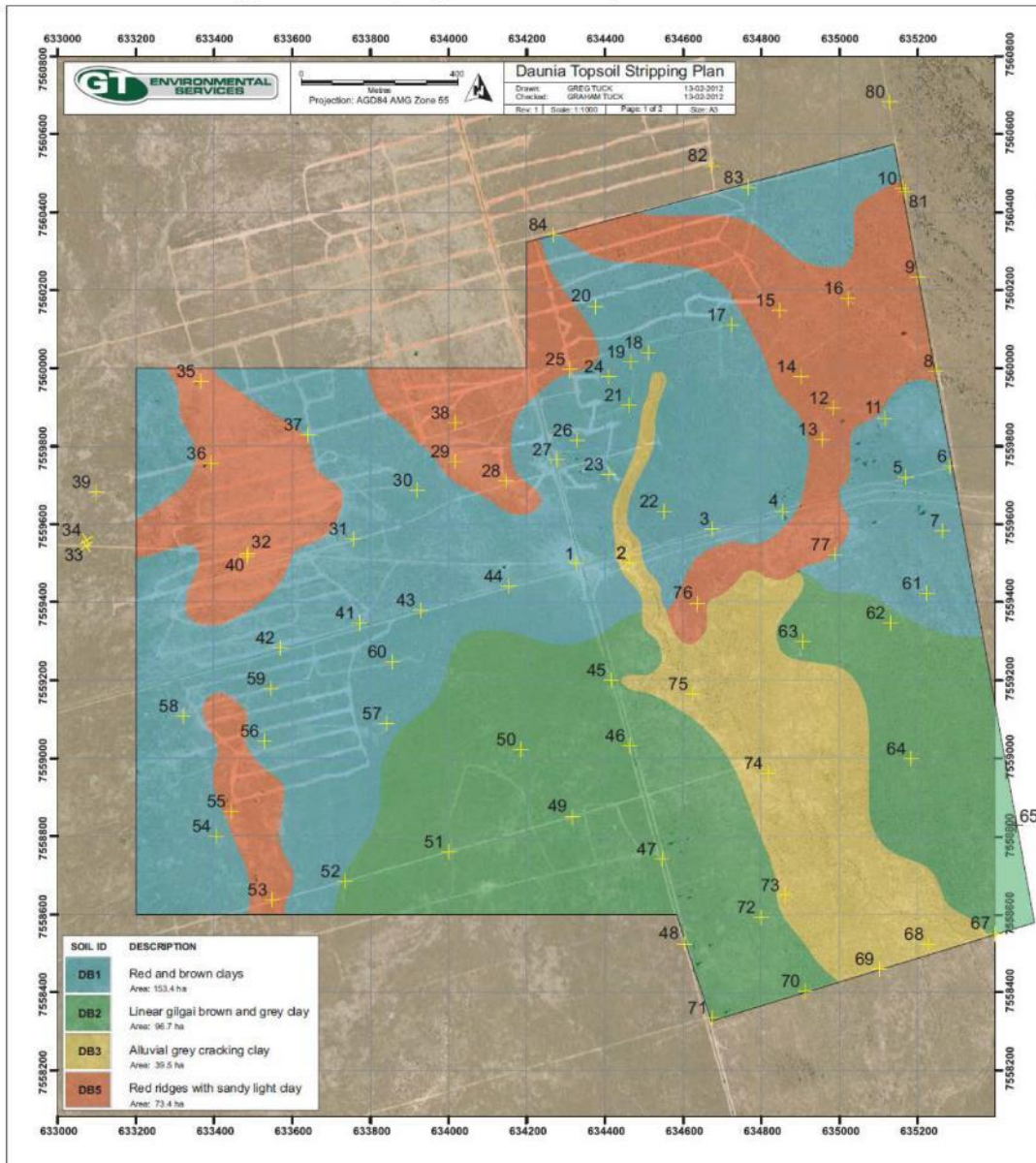


Figure A5: Pre-mined soil mapping units (GT Environmental Services, 2012).

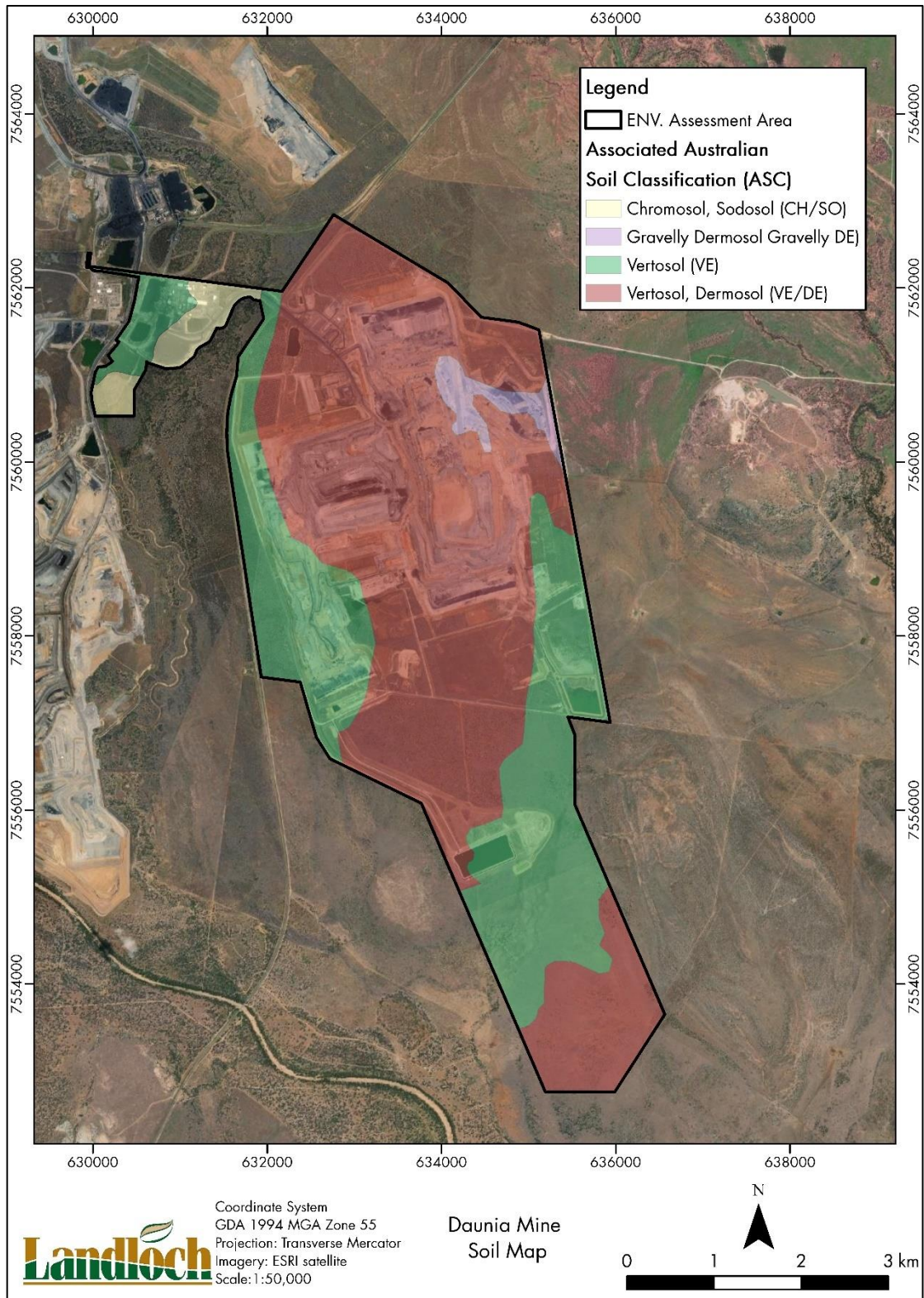


Figure A6: ASC soil mapping synthesised from existing soil assessments (Bourne, G.F. and Tuck, G.A., 1993), (BHP Billiton Mitsubishi Alliance, 2008), (State of Queensland (Department of Resources), 2021) and (GT Environmental Services, 2012).



Figure A7: Topsoil and spoil sampling locations for erodibility studies (Landloch Pty Ltd, 2017) (PW Baker & Associates Pty. Ltd., 2012).

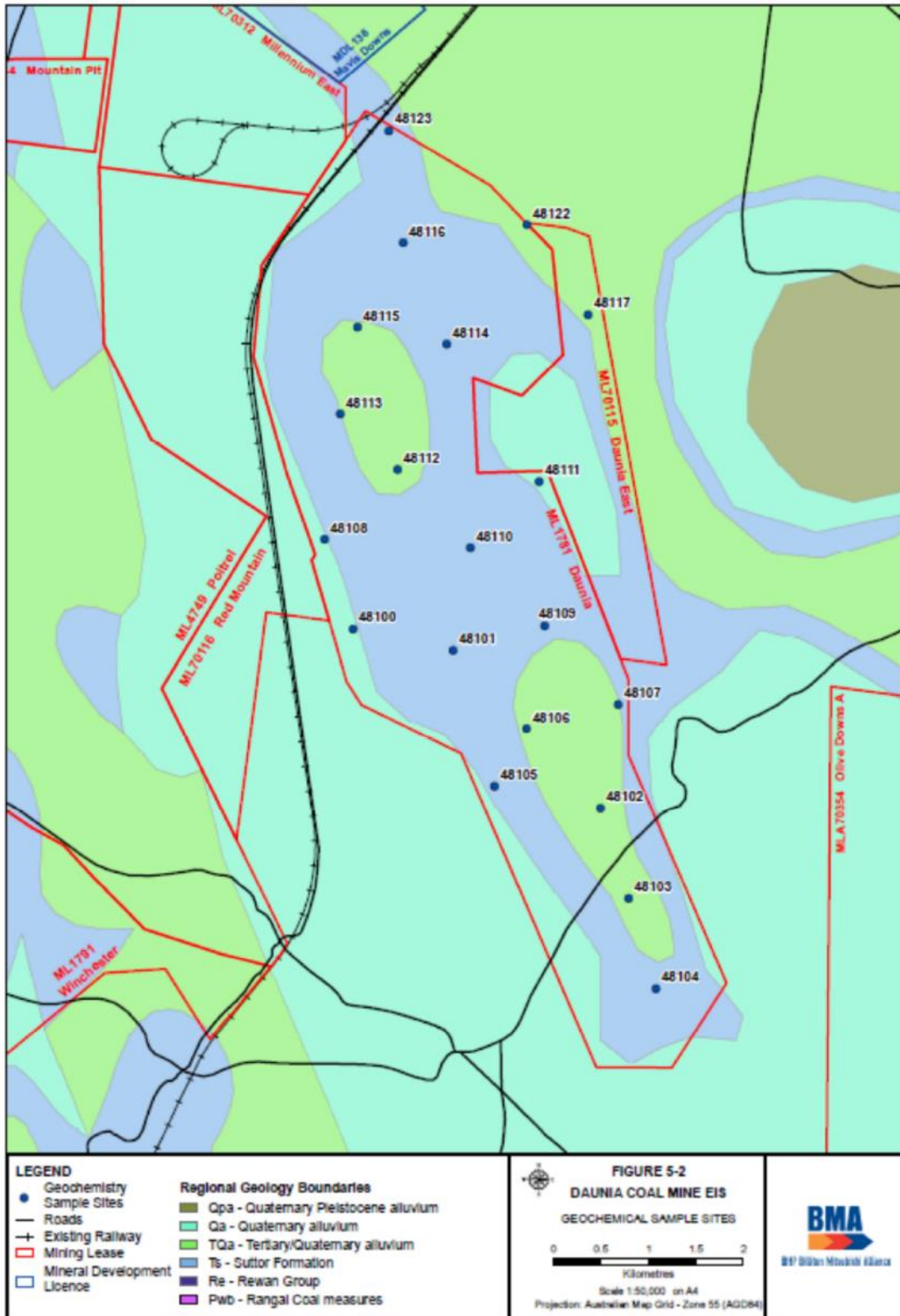


Figure A8: Spoil sampling locations for EIS (BMA, 2009).

APPENDIX B: DATA TABLES

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Table B1: Sampling site locations (February).

Site ID	Type	UTM
1	Topsoil stockpile	55 K 633530.28 7558070.615
8	Topsoil stockpile	55 K 635095.08 7561379.124
19	Topsoil stockpile	55 K 634350.06 7559392.320
5	Topsoil stockpile	55 K 634825.96 7561178.267
38	Topsoil stockpile	55 K 632932.40 7557533.752
39	Topsoil stockpile	55 K 632864.52 7557774.988
3d	Topsoil stockpile	55 K 635063.87 7557744.922
6	Topsoil stockpile	55 K 634441.10 7555788.815
20	Topsoil stockpile	55 K 634105.15 7559594.284
23a	Topsoil stockpile	55 K 634714.18 7561296.627
3a	Topsoil stockpile	55 K 634061.33 7557728.968
3b	Topsoil stockpile	55 K 634032.27 7557471.037
3c	Topsoil stockpile	55 K 634281.98 7557637.969
3e	Topsoil stockpile	55 K 634624.10 7557439.918
41	Topsoil stockpile	55 K 633406.10 7557623.859

Table B2: Sampling site locations (March).

Site ID	Type	UTM
28	Topsoil stockpile	55 K 633101.94 7562220.869
27a	Topsoil stockpile	55 K 632834.16 7562046.001
12	Topsoil stockpile	55 K 632295.27 7560887.451
16	Topsoil stockpile	55 K 632263.90 7558489.322
13	Topsoil stockpile	55 K 631965.91 7557987.506
13 subsoil	Topsoil stockpile	55 K 631955.56 7557974.556
Dam 7	Topsoil stockpile	55 K 632603.74 7561057.809

Table B3: Morphological description of stockpiled soil materials. Part 1 of 2.

Field Order	Date	Site ID	Layer (m)	Lower Depth (m)	Texture Group 1 ^o	Texture Field	Colour (rapid)		Total Coarse Fragment %	Origin (i.e topsoil, subsoil, overburden); Parent Materials; and Proportions	Comments
							Primary	Secondary			
13	12.2.22	st.1	0.5		CLAY	Light Medium Clay	Brown	Red	<2	topsoil	topsoil bulked. cracking crust surface. weed and some grass cover.
			1.5		CLAY	Light Medium Clay	Brown	Red	<2	topsoil	
			2.5		CLAY	Light Medium Clay	Brown	Red	<2	topsoil	
8	11.2.22	st.3a	0.5		CLAY	Medium Clay	Dark Grey	Brown	<2	topsoil	carbonates in soil, smooth and silty to touch, formed ribbon like pottery clay.
			1.5		CLAY	Medium Clay	Dark Grey	Dark Brown	<2	topsoil	
			2+		CLAY	Medium Clay	Dark Grey	Red	<2	topsoil	
7	11.2.22	st.3b	0.5		CLAY	Medium Clay	Grey	Brown	0	topsoil	bulk topsoil .
			1.5		CLAY	Medium Clay	Grey	Brown	0	topsoil	
			2m		CLAY	Medium Clay	Grey	Brown	0	topsoil	
9	11.2.22	st.3c	0.5		CLAY	Medium Clay	Grey	Brown	<2	topsoil	caco3, smooth silt, high clay content
			1.5		CLAY	Heavy Clay	Grey	Brown	<2	topsoil	
6	11.2.22	st.3d	0.5		CLAY	Light Medium Clay	Red	Brown	0	topsoil	very smooth. clay dominant. area well covered in grass.
			1.5		CLAY	Light Medium Clay	Red	Brown	0	topsoil	
			2.5		CLAY	Light Medium Clay	Red	Brown	0	topsoil	
10	11.2.22	st.3e	0.5		CLAY	Medium Heavy Clay	Red	Brown	0	topsoil bulked.	well covered in grass, bulked soils, caco3 present, heavy clay, lot of pressure to manipulate
			1.5		CLAY	Medium Heavy Clay	Dark Grey	Red	0	topsoil bulked.	
			2.5		CLAY	Medium Heavy Clay	Dark Grey	Dark Brown	0	topsoil bulked.	
3	11.2.22	st.5	0.5		CLAY	Medium Clay	Brown		20-30	topsoil	rocky surface. weed growth on piles, silky to touch. rock throughout profile
			1.5		CLAY	Medium Clay	Brown		20-30	topsoil	
			2.5		CLAY	Medium Clay	Brown		20-30	topsoil	
12	11.2.22	st.6	0.5		CLAY	Medium Clay	Dark Grey	Grey	0	topsoil.	grassed covered. carbonates present.
			1.5		CLAY	Medium Clay	Dark Brown	Grey	0	topsoil.	
			2.5		CLAY	Medium Clay	Dark Brown		0	topsoil.	
1	11.2.22	st.8	0.5		CLAY	Clay Loam	Red	Brown	0	topsoil	area well grassed
			1.5		CLAY	Clay Loam	Red	Brown	0	topsoil	
5	11.2.22	st.19	2		CLAY	Clay Loam	Red	Brown	10-20	topsoil	very high stock piles, sampled from edge. grass cover and rocks on surface.
			3		CLAY	Clay Loam	Red	Brown	10-20	topsoil	
			4		CLAY	Clay Loam	Red	Brown	10-20	topsoil	
4	11.2.22	st.20	0.5		CLAY	Light Medium Clay	Grey	Brown	<2	topsoil	moisture throughout, well grassed over top
			1.5		CLAY	Light Medium Clay		Red	<2	topsoil	
			2.5		CLAY	Light Medium Clay		Brown	<2	topsoil	
2	11.2.22	st.23A	0.5		CLAY	Loam	Grey	Brown	0	topsoil	rocky surface weed growth across piles
			1.5		CLAY	Loam	Grey	Brown	0	topsoil	

Table B3: Morphological description of stockpiled soil materials. Part 2 of 2.

Field Order	Date	Site ID	Layer (m)	Lower Depth (m)	Texture Group 1°	Texture Field	Colour (rapid)		Total Coarse Fragment %	Origin (i.e topsoil, subsoil, overburden); Parent Materials; and Proportions	Comments
							Primary	Secondary			
15	12.2.22	st.38	0.5		CLAY	Light Clay	Grey	Red	0	topsoil.	topsoil piles. little grass cover. few weeds.
			1.5		CLAY	Light Clay	Grey	Red	0	topsoil.	
			2.5		CLAY	Light Clay	Grey	Red	<2	topsoil.	
14	12.2.22	st.39.	0.5		CLAY	Light Medium Clay	Brown	Red	0	topsoil	discrete topsoil piles. weeds across piles. some grasses. topsoil stockpiles ontop of previously dumped and flattered tps.
			1.5		CLAY	Light Medium Clay	Red	Brown	0	topsoil	
			2.5		CLAY	Light Medium Clay	Red	Brown	0	topsoil	
11	11.2.22	st.41	0.5		CLAY	Medium Heavy Clay	Dark Grey	Dark Brown	0	topsoil	cracking surface, crusting, covered with grass, soil bulked
			1.5		CLAY	Medium Heavy Clay	Dark Grey	Dark Brown	0	topsoil	
			2.5		CLAY	Medium Heavy Clay	Dark Grey	Dark Brown	0	topsoil	
1	15.3.22	st28	0.5	1	CLAY	Light Medium Clay	Red	Brown	0	topsoil	fe stone present, weeds over stockpile.
			1.5	2	CLAY	Light Medium Clay	Red	Brown	0	topsoil	
			2.5	3	CLAY	Light Medium Clay	Red	Brown	0	topsoil	
2	15.3.22	st12a	0.5	1	CLAY	Light Clay	Red	Brown	2-5	topsoil	fe stone and shale like sediments weeds over top
			1.5	2	CLAY	Light Clay	Red	Brown	2-5	topsoil	
3	15.2.22	st.12b	0.5	1	CLAY	Light Clay	Red	Yellow	0	topsoil	fe stone, vry dry like talc
			1.5	2	CLAY	Light Clay	Red	Yellow	0	topsoil	
4	15.3.22	st27	0.5	1	CLAY	Light Clay	Red	Brown	2-5	topsoil	high percentage grass cover
			1.5	2	CLAY	Light Clay	Red	Brown	0	topsoil	
			2.5	3	CLAY	Light Clay	Red	Yellow	0	topsoil	
5	15.2.22	st16	0.5	1	CLAY	Light Medium Clay	Brown	Red	20-30	topsoil	areas are well covered in grasses and weeds. stony throughout. sample from topsoil banded up.
			1.5	2	CLAY	Light Medium Clay	Brown	Red	20-30	topsoil	
6	15.3.22	st13	2	2.5	CLAY	Medium Clay	Brown	Red	<2	topsoil	indicative only at site
			3	3.5	CLAY	Medium Clay	Brown	Red	0	topsoil	
			4	4.5	CLAY	Medium Clay	Brown	Red	0	topsoil	
			0.5	1	CLAY	Medium Clay	Brown	Red	0	topsoil	
7	15.3.22	st13 subsoil	0.5	1	CLAY	Medium Clay	Pale Grey	Brown	0	subsoil	very bare. accessed on foot
			1.5	2	CLAY	Medium Clay	Pale Grey	Brown	0	subsoil	
			2.5	3	CLAY	Medium Clay	Pale Grey	Brown	0	subsoil	
8	15.3.22	dam 7	0.5	1	CLAY	Light Clay	Red	Brown	2-5	topsoil	accessed on foot
			1.5	2	CLAY	Light Clay	Red	Brown	0	topsoil	
			2.5	3	CLAY	Light Clay	Red	Brown	0	topsoil	

Table B4: Laboratory analysis data for topsoil stockpiles. Part 1 of 4.

TABLE B4. Laboratory Results ALL SITES													
	Lab No	220789-4		220789-8		220789-11		220789-15		220789-20		220789-24	
	Sample ID	St.1		St.3a		St.3c		St.3d		St.3e		St.5	
	Sample Depth (m)	Composite		Composite		Composite		Composite		Composite		Composite	
	Field Texture	MC		MC		LMC		LMC		LMC		MC	
Analyses	Unit												
pH - Water	pH units	8.59	<i>H.Alk</i>	8.42	<i>M.Alk</i>	8.47	<i>M.Alk</i>	8.32	<i>M.Alk</i>	8.64	<i>H.Alk</i>	8.87	<i>H.Alk</i>
Electrical Conductivity	dS/m	0.33	<i>M.Sal</i>	0.22	<i>L.Sal</i>	0.15	<i>L.Sal</i>	0.17	<i>L.Sal</i>	0.21	<i>L.Sal</i>	0.85	<i>H.Sal</i>
Chloride	mg/kg	252.0	<i>L.Sal</i>	59.9	<i>VL.Sal</i>	33.0	<i>VL.Sal</i>	59.8	<i>VL.Sal</i>	49.4	<i>VL.Sal</i>	927.0	<i>H.Sal</i>
Total Nitrogen - Kjeldahl	mg/kg	792.0	<i>L</i>	1153.0	<i>L</i>	1155.0	<i>L</i>	1685.0	<i>M</i>	916.0	<i>L</i>	332.0	<i>VL</i>
Total Phosphorus - Nitric/Perchloric	mg/kg	207.0	*	218.0	*	262.0	*	368.0	*	239.0	*	254.0	*
Phosphorus - Colwell extr	mg/kg	6.7	<i>L</i>	8.5	<i>L</i>	33.2	<i>M</i>	83.2	<i>H</i>	10.0	<i>L</i>	5.1	<i>L</i>
Potassium - Colwell ext	mg/kg	96.80	<i>VL</i>	113.00	<i>VL</i>	104.00	<i>VL</i>	173.00	<i>L</i>	89.50	<i>VL</i>	103.00	<i>VL</i>
Sulphur - KCl	mg/kg	18.9	<i>H</i>	11.5	<i>M</i>	8.2	<i>M</i>	10.6	<i>M</i>	8.9	<i>M</i>	4.6	<i>L</i>
Organic Carbon	%	1.14	<i>M</i>	1.16	<i>M</i>	1.21	<i>M</i>	1.83	<i>H</i>	1.02	<i>M</i>	0.31	<i>EL</i>
Copper	mg/kg	0.90	<i>M</i>	0.74	<i>M</i>	1.09	<i>M</i>	1.02	<i>M</i>	0.94	<i>M</i>	0.42	<i>M</i>
Iron	mg/kg	4.18	*	3.38	*	6.89	*	4.18	*	3.88	*	2.86	*
Manganese	mg/kg	3.84	<i>M</i>	2.84	<i>M</i>	5.47	<i>M</i>	5.90	<i>M</i>	4.18	<i>M</i>	2.00	<i>M</i>
Zinc	mg/kg	0.56	<i>L</i>	0.34	<i>L</i>	0.37	<i>L</i>	0.48	<i>L</i>	0.38	<i>L</i>	0.30	<i>L</i>
Boron	mg/kg	1.50	<i>M</i>	0.82	<i>L</i>	0.78	<i>L</i>	1.32	<i>M</i>	1.08	<i>M</i>	1.46	<i>M</i>
Cation Extraction Method	Rayment & Lyons	15C1	*	15C1	*	15C1	*	15C1	*	15C1	*	15C1	*
Cation Exchange Capacity	meq/100g	20.9	<i>M</i>	31.3	<i>H</i>	34.7	<i>H</i>	28.2	<i>H</i>	23.8	<i>M</i>	20.9	<i>M</i>
Ex Calcium Percent	%	60.92	<i>L</i>	76.74	<i>Normal</i>	82.93	<i>H</i>	83.66	<i>H</i>	79.62	<i>Normal</i>	44.22	<i>L</i>
Ex Magnesium Percent	%	31.57	<i>H</i>	18.67	<i>H</i>	13.59	<i>Normal</i>	13.18	<i>Normal</i>	15.67	<i>H</i>	36.83	<i>H</i>
Ex Potassium Percent	%	0.91	<i>L</i>	0.88	<i>L</i>	0.81	<i>L</i>	1.28	<i>Normal</i>	0.65	<i>L</i>	0.76	<i>L</i>
Ex Sodium Percent	%	6.55	<i>Sodic</i>	3.68	<i>N.Sodic</i>	2.52	<i>N.Sodic</i>	1.84	<i>N.Sodic</i>	4.02	<i>N.Sodic</i>	18.13	<i>H.Sodic</i>
Ex Aluminium Percent	%	0.05	<i>VL</i>	0.04	<i>VL</i>	0.15	<i>VL</i>	0.04	<i>VL</i>	0.05	<i>VL</i>	0.05	<i>VL</i>
Exchangeable Calcium	meq/100g	12.74	<i>H</i>	24.02	<i>VH</i>	28.78	<i>VH</i>	23.59	<i>VH</i>	18.93	<i>H</i>	9.24	<i>M</i>
Exchangeable Magnesium	meq/100g	6.60	<i>H</i>	5.84	<i>H</i>	4.72	<i>H</i>	3.72	<i>H</i>	3.73	<i>H</i>	7.69	<i>H</i>
Exchangeable Potassium	meq/100g	0.19	<i>VL</i>	0.27	<i>L</i>	0.28	<i>L</i>	0.36	<i>M</i>	0.15	<i>VL</i>	0.16	<i>VL</i>
Exchangeable Sodium	meq/100g	1.37	<i>H</i>	1.15	<i>H</i>	0.87	<i>H</i>	0.52	<i>M</i>	0.96	<i>H</i>	3.79	<i>VH</i>
Exchangeable Aluminium	meq/100g	0.01	<i>H</i>	0.01	<i>H</i>	0.05	<i>E</i>	0.01	<i>H</i>	0.01	<i>H</i>	0.01	<i>H</i>
Calcium/Magnesium Ratio	-	1.9	<i>Low Ca</i>	4.1	<i>Balanced</i>	6.1	<i>Balanced</i>	6.3	<i>Balanced</i>	5.1	<i>Balanced</i>	1.2	<i>Low Ca</i>
Emerson Aggregate	Class	7.0	<i>Stable</i>	7.0	<i>Stable</i>	4.0	<i>Slaking</i>	4.0	<i>Slaking</i>	3b	<i>Slight Disp</i>	4.0	<i>Slaking</i>
Phosphorus Buffer Index	mg/kg	98.5	*	102.0	*	109.0	*	109.0	*	94.3	*	72.5	*

Highly acidic	Extremely alkaline	High salinity	Sodic	Strongly sodic
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Table B4: Laboratory analysis data for topsoil stockpiles. Part 2 of 4.

TABLE B4. Laboratory Results ALL SITES													
	Lab No	220789-28		220789-31		220789-35		220789-40		220789-43		220789-47	
	Sample ID	St.6		St.8		St19		St.20		St23a		St38	
	Sample Depth (m)	Composite		Composite		Composite		Composite		Composite		Composite	
	Field Texture	MC		MC		LMC		MC		MC		MC	
Analyses	Unit												
pH - Water	pH units	8.19	<i>M.Alk</i>	8.12	<i>M.Alk</i>	8.05	<i>M.Alk</i>	8.54	<i>H.Alk</i>	8.6	<i>H.Alk</i>	8.32	<i>M.Alk</i>
Electrical Conductivity	dS/m	0.21	<i>L.Sal</i>	0.23	<i>L.Sal</i>	0.29	<i>M.Sal</i>	0.31	<i>M.Sal</i>	0.44	<i>M.Sal</i>	0.23	<i>L.Sal</i>
Chloride	mg/kg	52.2	<i>VL.Sal</i>	69.8	<i>VL.Sal</i>	59.4	<i>VL.Sal</i>	134.0	<i>L.Sal</i>	394.0	<i>M.Sal</i>	80.6	<i>VL.Sal</i>
Total Nitrogen - Kjeldahl	mg/kg	962.0	<i>L</i>	1919.0	<i>M</i>	1124.0	<i>L</i>	1024.0	<i>L</i>	685.0	<i>L</i>	1379.0	<i>L</i>
Total Phosphorus - Nitric/Perchloric	mg/kg	197.0	*	421.0	*	303.0	*	205.0	*	399.0	*	288.0	*
Phosphorus - Colwell extr	mg/kg	12.9	<i>L</i>	28.5	<i>L</i>	30.8	<i>M</i>	21.1	<i>L</i>	22.6	<i>L</i>	69.2	<i>M</i>
Potassium - Colwell ext	mg/kg	84.20	<i>VL</i>	162.00	<i>L</i>	194.00	<i>M</i>	113.00	<i>VL</i>	104.00	<i>VL</i>	123.00	<i>L</i>
Sulphur - KCl	mg/kg	8.8	<i>M</i>	14.8	<i>H</i>	17.1	<i>H</i>	18.7	<i>H</i>	19.1	<i>H</i>	11.5	<i>M</i>
Organic Carbon	%	1.07	<i>M</i>	1.88	<i>H</i>	1.12	<i>M</i>	1.19	<i>M</i>	1.07	<i>M</i>	1.48	<i>M</i>
Copper	mg/kg	0.46	<i>M</i>	1.06	<i>M</i>	1.26	<i>M</i>	0.7	<i>M</i>	0.82	<i>M</i>	0.9	<i>M</i>
Iron	mg/kg	5.38	*	6.16	*	7.00	*	3.48	*	4.20	*	7.98	*
Manganese	mg/kg	4.86	<i>M</i>	7.20	<i>M</i>	7.14	<i>M</i>	3.46	<i>M</i>	2.12	<i>M</i>	4.84	<i>M</i>
Zinc	mg/kg	0.34	<i>L</i>	0.72	<i>L</i>	0.70	<i>L</i>	0.36	<i>L</i>	0.50	<i>L</i>	0.42	<i>L</i>
Boron	mg/kg	0.76	<i>L</i>	0.86	<i>L</i>	0.86	<i>L</i>	1.36	<i>M</i>	0.92	<i>L</i>	1.24	<i>M</i>
Cation Extraction Method	Rayment & Lyons	15C1	*	15C1	*	15C1	*	15C1	*	15C1	*	15C1	*
Cation Exchange Capacity	meq/100g	14.2	<i>M</i>	16.7	<i>M</i>	15.2	<i>M</i>	24.6	<i>M</i>	14.8	<i>M</i>	15.1	<i>M</i>
Ex Calcium Percent	%	68.40	<i>Normal</i>	79.67	<i>Normal</i>	82.71	<i>H</i>	79.72	<i>Normal</i>	69.37	<i>Normal</i>	78.03	<i>Normal</i>
Ex Magnesium Percent	%	27.00	<i>H</i>	17.02	<i>H</i>	12.78	<i>Normal</i>	15.84	<i>H</i>	22.51	<i>H</i>	18.56	<i>H</i>
Ex Potassium Percent	%	0.65	<i>L</i>	1.55	<i>Normal</i>	2.26	<i>Normal</i>	0.61	<i>L</i>	0.85	<i>L</i>	0.82	<i>L</i>
Ex Sodium Percent	%	3.87	<i>N.Sodic</i>	1.69	<i>N.Sodic</i>	2.15	<i>N.Sodic</i>	3.79	<i>N.Sodic</i>	7.19	<i>Sodic</i>	2.52	<i>N.Sodic</i>
Ex Aluminium Percent	%	0.08	<i>VL</i>	0.07	<i>VL</i>	0.10	<i>VL</i>	0.05	<i>VL</i>	0.08	<i>VL</i>	0.07	<i>VL</i>
Exchangeable Calcium	meq/100g	9.69	<i>M</i>	13.30	<i>H</i>	12.57	<i>H</i>	19.59	<i>H</i>	10.27	<i>H</i>	11.81	<i>H</i>
Exchangeable Magnesium	meq/100g	3.83	<i>H</i>	2.84	<i>M</i>	1.94	<i>M</i>	3.89	<i>H</i>	3.33	<i>H</i>	2.81	<i>M</i>
Exchangeable Potassium	meq/100g	0.09	<i>VL</i>	0.26	<i>L</i>	0.34	<i>M</i>	0.15	<i>VL</i>	0.13	<i>VL</i>	0.12	<i>VL</i>
Exchangeable Sodium	meq/100g	0.55	<i>M</i>	0.28	<i>L</i>	0.33	<i>M</i>	0.93	<i>H</i>	1.07	<i>H</i>	0.38	<i>M</i>
Exchangeable Aluminium	meq/100g	0.01	<i>H</i>	0.01	<i>H</i>	0.02	<i>H</i>	0.01	<i>H</i>	0.01	<i>H</i>	0.01	<i>H</i>
Calcium/Magnesium Ratio	-	2.5	<i>Low Ca</i>	4.7	<i>Balanced</i>	6.5	<i>Balanced</i>	5.0	<i>Balanced</i>	3.1	<i>Low Ca</i>	4.2	<i>Balanced</i>
Emerson Aggregate	Class	7	<i>Stable</i>	7	<i>Stable</i>	7	<i>Stable</i>	7	<i>Stable</i>	4	<i>Slaking</i>	4	<i>Slaking</i>
Phosphorus Buffer Index	mg/kg	58.4	*	88.6	*	83.2	*	98.4	*	67.8	*	107	*

Highly acidic	Extremely alkaline	High salinity	Sodic	Strongly sodic
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Table B4: Laboratory analysis data for topsoil stockpiles. Part 3 of 4.

TABLE B4. Laboratory Results													
ALL SITES													
	Lab No	220789-51		220789-55		220789-59		220789-62		220789-65		220789-69	
	Sample ID	St39		St.41		St.28		St.12a		St12b		St.27	
	Sample Depth (m)	Composite		Composite		Composite		Composite		Composite		Composite	
	Field Texture	LMC		MC		LMC		LC		LMC		MC	
Analyses	Unit												
pH - Water	pH units	8.31	<i>M.Alk</i>	8.7	<i>H.Alk</i>	8.54	<i>H.Alk</i>	7.81	<i>L.Alk</i>	8.41	<i>M.Alk</i>	7.77	<i>L.Alk</i>
Electrical Conductivity	dS/m	0.18	<i>L.Sal</i>	0.29	<i>M.Sal</i>	0.13	<i>L.Sal</i>	0.19	<i>M.Sal</i>	0.22	<i>L.Sal</i>	0.31	<i>M.Sal</i>
Chloride	mg/kg	29.0	<i>VL.Sal</i>	202.0	<i>L.Sal</i>	46.4	<i>VL.Sal</i>	52.2	<i>VL.Sal</i>	121.0	<i>L.Sal</i>	49.6	<i>VL.Sal</i>
Total Nitrogen - Kjeldahl	mg/kg	1041.0	<i>L</i>	711.0	<i>L</i>	1099.0	<i>L</i>	1671.0	<i>M</i>	999.0	<i>L</i>	1603.0	<i>M</i>
Total Phosphorus - Nitric/Perchloric	mg/kg	304.0	*	169.0	*	290.0	*	697.0	*	435.0	*	264.0	*
Phosphorus - Colwell extr	mg/kg	28.4	<i>L</i>	11.2	<i>L</i>	38	<i>M</i>	24.8	<i>M</i>	30.2	<i>M</i>	11.9	<i>L</i>
Potassium - Colwell ext	mg/kg	122.00	<i>L</i>	92.10	<i>VL</i>	99.80	<i>VL</i>	218.00	<i>M</i>	122.00	<i>L</i>	98.30	<i>VL</i>
Sulphur - KCl	mg/kg	11.6	<i>M</i>	17.2	<i>H</i>	6.9	<i>L</i>	14.1	<i>H</i>	19.8	<i>H</i>	20.0	<i>FALSE</i>
Organic Carbon	%	0.94	<i>L</i>	0.97	<i>L</i>	1.25	<i>M</i>	2.36	<i>H</i>	1.5	<i>M</i>	1.91	<i>H</i>
Copper	mg/kg	0.88	<i>M</i>	0.8	<i>M</i>	0.98	<i>M</i>	1.94	<i>M</i>	1.22	<i>M</i>	0.94	<i>M</i>
Iron	mg/kg	5.01	*	4.08	*	4.86	*	8.42	*	4.84	*	4.58	*
Manganese	mg/kg	4.98	<i>M</i>	7.26	<i>M</i>	5.92	<i>M</i>	11.40	<i>M</i>	6.72	<i>M</i>	13.80	<i>M</i>
Zinc	mg/kg	0.43	<i>L</i>	0.30	<i>L</i>	0.44	<i>L</i>	1.42	<i>M</i>	0.92	<i>M</i>	0.62	<i>L</i>
Boron	mg/kg	0.91	<i>L</i>	2.44	<i>H</i>	1.04	<i>M</i>	0.74	<i>L</i>	0.78	<i>L</i>	0.87	<i>L</i>
Cation Extraction Method	Rayment & Lyons	15C1	*	15C1	*	15C1	*	15C1	*	15C1	*	15C1	*
Cation Exchange Capacity	meq/100g	17.8	<i>M</i>	20.7	<i>M</i>	17.4	<i>M</i>	13.6	<i>M</i>	14.1	<i>M</i>	13.3	<i>M</i>
Ex Calcium Percent	%	82.04	<i>H</i>	63.00	<i>L</i>	80.67	<i>H</i>	83.91	<i>H</i>	82.17	<i>H</i>	83.62	<i>H</i>
Ex Magnesium Percent	%	14.76	<i>Normal</i>	28.45	<i>H</i>	16.04	<i>H</i>	11.86	<i>Normal</i>	12.54	<i>Normal</i>	14.01	<i>Normal</i>
Ex Potassium Percent	%	1.11	<i>Normal</i>	0.59	<i>L</i>	0.87	<i>L</i>	2.46	<i>Normal</i>	1.73	<i>Normal</i>	1.12	<i>Normal</i>
Ex Sodium Percent	%	2.02	<i>N.Sodic</i>	7.90	<i>Sodic</i>	2.35	<i>N.Sodic</i>	1.69	<i>N.Sodic</i>	3.15	<i>N.Sodic</i>	1.17	<i>N.Sodic</i>
Ex Aluminium Percent	%	0.07	<i>VL</i>	0.06	<i>VL</i>	0.06	<i>VL</i>	0.08	<i>VL</i>	0.41	<i>VL</i>	0.08	<i>VL</i>
Exchangeable Calcium	meq/100g	14.64	<i>H</i>	13.07	<i>H</i>	14.04	<i>H</i>	11.44	<i>H</i>	11.58	<i>H</i>	11.14	<i>H</i>
Exchangeable Magnesium	meq/100g	2.63	<i>M</i>	5.90	<i>H</i>	2.79	<i>M</i>	1.62	<i>M</i>	1.77	<i>M</i>	1.87	<i>M</i>
Exchangeable Potassium	meq/100g	0.20	<i>VL</i>	0.12	<i>VL</i>	0.15	<i>VL</i>	0.34	<i>M</i>	0.24	<i>L</i>	0.15	<i>VL</i>
Exchangeable Sodium	meq/100g	0.36	<i>M</i>	1.64	<i>H</i>	0.41	<i>M</i>	0.23	<i>L</i>	0.44	<i>M</i>	0.16	<i>L</i>
Exchangeable Aluminium	meq/100g	0.01	<i>H</i>	0.01	<i>H</i>	0.01	<i>H</i>	0.01	<i>H</i>	0.06	<i>E</i>	0.01	<i>H</i>
Calcium/Magnesium Ratio	-	5.6	<i>Balanced</i>	2.2	<i>Low Ca</i>	5.0	<i>Balanced</i>	7.1	<i>Balanced</i>	6.6	<i>Balanced</i>	6.0	<i>Balanced</i>
Emerson Aggregate	Class	4	<i>Slaking</i>	4	<i>Slaking</i>	4	<i>Slaking</i>	5	<i>Slaking</i>	4	<i>Slaking</i>	5	<i>Slaking</i>
Phosphorus Buffer Index	mg/kg	93.5	*	96.2	*	118	*	72.8	*	80.4	*	84	*

Highly acidic	Extremely alkaline	High salinity	Sodic	Strongly sodic
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Table B4: Laboratory analysis data for topsoil stockpiles. Part 4 of 4.

TABLE B4. Laboratory Results ALL SITES											Mean		Min	Max
Lab No	220789-72		220789-76		220789-80		220789-84							
Sample ID	St16		St13		St13 subsoil		Dam 7							
Sample Depth (m)	Composite		Composite		Composite		Composite							
Field Texture	MC		LMC		MC		LMC							
Analyses	Unit													
pH - Water	pH units	8.76	<i>H.Alk</i>	8.67	<i>H.Alk</i>	8.46	<i>M.Alk</i>	7.73	<i>L.Alk</i>	8.4	<i>M.Alk</i>	7.7	8.9	
Electrical Conductivity	dS/m	0.25	<i>M.Sal</i>	0.11	<i>VL.Sal</i>	1.41	<i>VH.Sal</i>	0.3	<i>M.Sal</i>	0.32	<i>M.Sal</i>	0.11	1.41	
Chloride	mg/kg	143.0	<i>L.Sal</i>	12.2	<i>VL.Sal</i>	1275.0	<i>H.Sal</i>	131.0	<i>L.Sal</i>	192	<i>L.Sal</i>	12	1275	
Total Nitrogen - Kjeldahl	mg/kg	803.0	<i>L</i>	1086.0	<i>L</i>	371.0	<i>VL</i>	1704.0	<i>M</i>	1101	<i>L</i>	332	1919	
Total Phosphorus - Nitric/Perchloric	mg/kg	286.0	*	240.0	*	215.0	*	333.0	*	300	*	169	697	
Phosphorus - Colwell extr	mg/kg	14.6	<i>L</i>	15.2	<i>L</i>	3.86	<i>L</i>	25.8	<i>L</i>	24		4	83	
Potassium - Colwell ext	mg/kg	110.00	<i>VL</i>	119.00	<i>VL</i>	118.00	<i>VL</i>	149.00	<i>L</i>	123		84	218	
Sulphur - KCl	mg/kg	19.6	<i>H</i>	5.7	<i>L</i>	164.0	<i>VH</i>	29.5	<i>VH</i>	20.97	<i>VH</i>	4.64	164.00	
Organic Carbon	%	1.2	<i>M</i>	1.3	<i>M</i>	0.41	<i>VL</i>	2.8	<i>H</i>	1.32	<i>M</i>	0.31	2.80	
Copper	mg/kg	0.86	<i>M</i>	1.08	<i>M</i>	1.14	<i>M</i>	1.18	<i>M</i>	0.97	<i>M</i>	0.42	1.94	
Iron	mg/kg	3.82	*	3.10	*	3.56	*	5.16	*	5	*	3	8	
Manganese	mg/kg	4.00	<i>M</i>	3.58	<i>M</i>	4.84	<i>M</i>	13.20	<i>M</i>	5.89	<i>M</i>	2.00	13.80	
Zinc	mg/kg	0.54	<i>L</i>	0.38	<i>L</i>	0.28	<i>VL</i>	0.96	<i>M</i>	0.53	<i>L</i>	0.28	1.42	
Boron	mg/kg	0.79	<i>L</i>	0.89	<i>L</i>	3.13	<i>H</i>	0.57	<i>L</i>	1.14	<i>M</i>	0.57	3.13	
Cation Extraction Method	Rayment& Lyons	15C1	*	15C1	*	15C1	*	15C1	*	*	*	*	*	
Cation Exchange Capacity	meq/100g	17.6	<i>M</i>	18.4	<i>M</i>	24.4	<i>M</i>	10.0	<i>L</i>	19.4	<i>M</i>	10.0	34.7	
Ex Calcium Percent	%	76.28	<i>Normal</i>	79.35	<i>Normal</i>	54.72	<i>L</i>	85.19	<i>H</i>	75.3	<i>Normal</i>	44.2	85.2	
Ex Magnesium Percent	%	18.63	<i>H</i>	17.46	<i>H</i>	28.69	<i>H</i>	10.08	<i>Normal</i>	18.9	<i>H</i>	10.1	36.8	
Ex Potassium Percent	%	0.95	<i>L</i>	1.06	<i>Normal</i>	1.02	<i>Normal</i>	2.01	<i>Normal</i>	1.1	<i>Normal</i>	0.6	2.5	
Ex Sodium Percent	%	4.00	<i>N.Sodic</i>	2.07	<i>N.Sodic</i>	15.40	<i>H.Sodic</i>	2.53	<i>N.Sodic</i>	4.6	<i>N.Sodic</i>	1.2	18.1	
Ex Aluminium Percent	%	0.14	<i>VL</i>	0.06	<i>VL</i>	0.16	<i>VL</i>	0.18	<i>VL</i>	0.1	<i>VL</i>	0.0	0.4	
Exchangeable Calcium	meq/100g	13.44	<i>H</i>	14.58	<i>H</i>	13.37	<i>H</i>	8.52	<i>M</i>	14.6	<i>H</i>	8.5	28.8	
Exchangeable Magnesium	meq/100g	3.28	<i>H</i>	3.21	<i>H</i>	7.01	<i>H</i>	1.01	<i>M</i>	3.7	<i>H</i>	1.0	7.7	
Exchangeable Potassium	meq/100g	0.17	<i>VL</i>	0.19	<i>VL</i>	0.25	<i>L</i>	0.20	<i>L</i>	0.2	<i>L</i>	0.1	0.4	
Exchangeable Sodium	meq/100g	0.70	<i>H</i>	0.38	<i>M</i>	3.76	<i>VH</i>	0.25	<i>L</i>	0.9	<i>H</i>	0.2	3.8	
Exchangeable Aluminium	meq/100g	0.03	<i>VH</i>	0.01	<i>H</i>	0.04	<i>E</i>	0.02	<i>VH</i>	0.0	<i>H</i>	0.0	0.1	
Calcium/Magnesium Ratio	-	4.1	<i>Balanced</i>	4.5	<i>Balanced</i>	1.9	<i>Low Ca</i>	8.4	<i>Low Mg</i>	4.6	<i>Balanced</i>	1.2	8.4	
Emerson Aggregate	Class	7	<i>Stable</i>	4	<i>Slaking</i>	4	<i>Slaking</i>	4	<i>Slaking</i>	*	*	*	*	
Phosphorus Buffer Index	mg/kg	92.1	*	114	*	110	*	68.9	*	*	*	*	*	

Highly acidic	Extremely alkaline	High salinity	Sodic	Strongly sodic
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Table B5: Laboratory analysis data for discrete topsoil stockpile samples. Part 1 of 2.

TABLE B5. Laboratory Results																					
ALL SITES																					
	Lab No	220789-1	220789-2	220789-3	220789-5	220789-6	220789-7	220789-9	220789-	220789-	220789-										
	Sample ID	St.1	St.1	St.1	St.3a	St.3a	St.3a	St.3c	St.3c	St.3d	St.3d										
	Sample Depth (m)	0.5 -1.0	1.5- 2.0	2.5 -3	0.5-1.0	1.5-2.0	2.0 +	0.5-1.0	1.5-2.0	0.5 -1.0	1.5-2.0										
	Field Texture	LMC	LMC	LMC	MC	MC	MC	MC	MC	HC	LMC										
Analyses	Unit																				
pH - Water	pH units	8.40	M.Alk	8.67	H.Alk	8.72	H.Alk	8.77	H.Alk	8.47	M.Alk	8.44	M.Alk	8.56	H.Alk	8.34	M.Alk	8.35	M.Alk	8.56	H.Alk
Electrical Conductivity	dS/m	0.35	M.Sal	0.36	M.Sal	0.19	L.Sal	0.11	VL.Sal	0.20	L.Sal	0.24	M.Sal	0.14	L.Sal	0.16	L.Sal	0.09	VL.Sal	0.13	L.Sal
	Lab No	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	
	Sample ID	St.3d	St.3e	St.3e	St.3e	St.3e	St.5	St.5	St.5	St.5	St.5	St.5	St.5	St.5	St.5	St.5	St.5	St.5	St.5	St.5	
	Sample Depth (m)	2.0-2.5	0.5-1.0	1.0 -1.5	1.5-2.0	2.5-3.0	0.5-1.0	1.5-2.0	2.5-3.0	0.5-1.0	1.5-2.0	2.5-3.0	0.5-1.0	1.5-2.0	2.5-3.0	0.5-1.0	1.5-2.0	0.5-1.0	1.5-2.0	1.5-2.0	
	Field Texture	LMC	MHC	MHC	MHC	MHC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	
Analyses	Unit																				
pH - Water	pH units	8.27	M.Alk	8.78	H.Alk	-	FALSE	8.76	H.Alk	8.65	H.Alk	8.99	H.Alk	8.75	H.Alk	8.98	H.Alk	8.74	H.Alk	8.12	M.Alk
Electrical Conductivity	dS/m	0.32	M.Sal	0.14	L.Sal	-	FALSE	0.20	L.Sal	0.23	L.Sal	0.90	H.Sal	0.87	H.Sal	0.82	H.Sal	0.15	L.Sal	0.25	M.Sal
	Lab No	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	
	Sample ID	St.6	St.8	St.8	St19	St19	St19	St19	St19	St19	St19	St19	St19	St19	St19	St19	St19	St19	St19	St19	
	Sample Depth (m)	2.5-3.0	0.5-1.0	1.5-2.0	2 - 2.5	3 - 3.5	3.5 - 4.0	0.5-1.0	1.5- 2.0	2.5 - 3	3.5-4.0	0.5-1.0	1.5- 2.0	2.5 - 3	3.5-4.0	0.5-1.0	1.5- 2.0	2.5 - 3	3.5-4.0	0.5-1.0	
	Field Texture	MC	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	
Analyses	Unit																				
pH - Water	pH units	8.11	M.Alk	8.06	M.Alk	8.15	M.Alk	8	M.Alk	7.88	L.Alk	7.84	L.Alk	8.48	M.Alk	8.49	M.Alk	8.52	H.Alk	8.45	M.Alk
Electrical Conductivity	dS/m	0.2	L.Sal	0.3	M.Sal	0.19	M.Sal	0.32	M.Sal	0.23	M.Sal	0.23	M.Sal	0.39	M.Sal	0.39	M.Sal	0.3	M.Sal	0.33	M.Sal
	Lab No	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	
	Sample ID	St23a	St23a	St38	St38	St38	St38	St38	St38	St38	St38	St38	St38	St38	St38	St38	St38	St38	St38	St38	
	Sample Depth (m)	0.5-1.0	1.5-2.0	0.5-1.0	1.5-2.0	2.5-3.0	0.5-1.0	1.5-2.0	2.5-3.0	0.5-1.0	1.5-2.0	2.5-3.0	0.5-1.0	1.5-2.0	2.5-3.0	0.5-1.0	1.5- 2.0	2.5-3.0	0.5-1.0	1.5-2.0	
	Field Texture	L	L	LC	LC	LC	LC	LC	LC	LC	LC	LC	LC	LC	LC	LC	LC	LC	LC	LC	
Analyses	Unit																				
pH - Water	pH units	8.46	M.Alk	8.45	M.Alk	8.33	M.Alk	8.32	M.Alk	8.27	M.Alk	8.17	M.Alk	8.13	M.Alk	8.01	M.Alk	8.72	H.Alk	8.48	M.Alk
Electrical Conductivity	dS/m	0.45	H.Sal	0.41	M.Sal	0.25	M.Sal	0.26	M.Sal	0.35	M.Sal	0.21	L.Sal	0.24	M.Sal	0.21	L.Sal	0.31	M.Sal	0.22	L.Sal

Highly acidic	Extremely alkaline	High salinity	Sodic	Strongly sodic
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Table B5: Laboratory analysis data for discrete topsoil stockpile samples. Part 2 of 2.

TABLE B5. Laboratory Results																					
ALL SITES																					
	Lab No	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	
	Sample ID	St.41	St.28	St.28	St.28	St.12a	St.12a	St.12b	St.12b	St.12b	St.12b	St.12b	St.12b	St.12b	St.12b	St.12b	St.12b	St.12b	St.12b	St.12b	
	Sample Depth (m)	2.5-3.0	0.5-1.0	1.5-2.0	2.5-3.0	0.5-1.0	1.5-2.0	0.5-1.0	1.5-2.0	0.5-1.0	1.5-2.0	0.5-1.0	1.5-2.0	0.5-1.0	1.5-2.0	0.5-1.0	1.5-2.0	0.5-1.0	1.5-2.0	1.5-2.0	
	Field Texture	MHC	LMC	LMC	LMC	LC	LC	LC	LC	LC	LC	LC	LC	LC	LC	LC	LC	LC	LC	LC	
Analyses	Unit																				
pH - Water	pH units	8.71	<i>H.Alk</i>	8.44	<i>M.Alk</i>	8.4	<i>M.Alk</i>	8.43	<i>M.Alk</i>	7.81	<i>L.Alk</i>	7.48	<i>L.Alk</i>	8.3	<i>M.Alk</i>	8.49	<i>M.Alk</i>	8.08	<i>M.Alk</i>	7.69	<i>L.Alk</i>
Electrical Conductivity	dS/m	0.35	<i>M.Sal</i>	0.14	<i>L.Sal</i>	0.11	<i>VL.Sal</i>	0.13	<i>L.Sal</i>	0.19	<i>M.Sal</i>	0.14	<i>L.Sal</i>	0.2	<i>M.Sal</i>	0.21	<i>M.Sal</i>	0.26	<i>M.Sal</i>	0.33	<i>M.Sal</i>
	Lab No	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	220789-	
	Sample ID	St.27	St16	St16	St13	St13	St13	St13	St13	St13	St13	St13	St13	St13	St13	St13	St13	St13	St13	Dam 7	
	Sample Depth (m)	2.5-3.0	0.5-1.0	1.5-2.0	2-2.5	3-3.5	4-4.5	0.5-1.0	1.5-2.0	2.5-3.0	0.5-1.0	1.5-2.0	2.5-3.0	0.5-1.0	1.5-2.0	2.5-3.0	0.5-1.0	1.5-2.0	2.5-3.0	0.5-1.0	
	Field Texture	LC	LMC	LMC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	
Analyses	Unit																				
pH - Water	pH units	8.04	<i>M.Alk</i>	8.73	<i>H.Alk</i>	8.66	<i>H.Alk</i>	8.63	<i>H.Alk</i>	8.45	<i>M.Alk</i>	8.8	<i>H.Alk</i>	8.36	<i>M.Alk</i>	8.69	<i>H.Alk</i>	8.65	<i>H.Alk</i>	7.77	<i>L.Alk</i>
Electrical Conductivity	dS/m	0.28	<i>M.Sal</i>	0.27	<i>M.Sal</i>	0.24	<i>M.Sal</i>	0.12	<i>L.Sal</i>	0.11	<i>VL.Sal</i>	0.11	<i>VL.Sal</i>	1.61	<i>E.Sal</i>	0.96	<i>VH.Sal</i>	1.11	<i>VH.Sal</i>	0.38	<i>M.Sal</i>
	Lab No	220789-	220789-																		
	Sample ID	Dam 7	Dam 7																		
	Sample Depth (m)	1.5-2.0	2.5-3.0																		
	Field Texture	LC	LC																		
Analyses	Unit																				
pH - Water	pH units	7.91	<i>M.Alk</i>	7.94	<i>M.Alk</i>																
Electrical Conductivity	dS/m	0.26	<i>M.Sal</i>	0.31	<i>M.Sal</i>																

Highly acidic	Extremely alkaline	High salinity	Sodic	Strongly sodic
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Table B6: Laboratory analysis data for discrete heavy loam and clay topsoils. Part 1 of 2.

TABLE B8. Laboratory Results ALL SITES																					
	Lab No	220725-13	220725-15	220725-16	220725-34	220725-35	220725-36	220725-46	220725-47	220725-48	220725-50										
	Sample ID	SRM_36	SRM_36	SRM_36	SRM_34	SRM_34	SRM_34	SRM_94	SRM_94	SRM_94	SRM_85										
	Sample Depth (m)	0.5	1.5	2.5	0.5	1.5	2.5	0.5	1.5	2.5	0.5										
Analyses	Unit																				
pH - Water	pH units	8.22	M.Alk	8.01	M.Alk	8.55	H.Alk	8.11	M.Alk	8.76	H.Alk	8.70	H.Alk	8.39	M.Alk	8.63	H.Alk	7.83	L.Alk	8.38	M.Alk
Electrical Conductivity	dS/m	0.13	L.Sal	0.03	VL.Sal	0.04	VL.Sal	0.04	VL.Sal	0.08	L.Sal	0.08	L.Sal	0.04	VL.Sal	0.06	VL.Sal	0.08	L.Sal	0.03	VL.Sal
	Lab No	220725-51	220725-52	220725-54	220725-55	220725-56	220725-58	220725-59	220725-60	220725-62	220725-63										
	Sample ID	SRM_85	SRM_85	SRM_108	SRM_108	SRM_108	SRM_90	SRM_90	SRM_90	SRM_109	SRM_109										
	Sample Depth (m)	1.5	2.5	0.5	1.5	2.5	0.5	1.5	2.5	0.5	1.5										
Analyses	Unit																				
pH - Water	pH units	7.46	L.Alk	6.88	Neutral	6.85	Neutral	7.59	L.Alk	7.66	L.Alk	8.5	H.Alk	8.17	M.Alk	7.86	L.Alk	6.79	Neutral	6.60	Neutral
Electrical Conductivity	dS/m	0.11	L.Sal	0.05	VL.Sal	0.02	VL.Sal	0.02	VL.Sal	0.05	VL.Sal	0.06	VL.Sal	0.06	VL.Sal	0.08	L.Sal	0.02	VL.Sal	0.03	VL.Sal
	Lab No	220725-64	220725-70	220725-71	220725-72	220725-74	220725-75	220725-76	220725-78	220725-79	220725-80										
	Sample ID	SRM_109	SRM_88	SRM_88	SRM_88	SRM_63	SRM_63	SRM_63	SRM_63	SRM_89	SRM_89										
	Sample Depth (m)	2.5	0.5	1.5	2.5	0.5	1.5	2.5	0.5	1.5	2.5										
Analyses	Unit																				
pH - Water	pH units	9.74	E.Alk	6.50	L.Acid	6.88	Neutral	6.71	Neutral	5.88	M.acid	5.72	M.acid	5.64	M.acid	8.58	H.Alk	8.67	H.Alk	7.89	L.Alk
Electrical Conductivity	dS/m	0.05	VL.Sal	0.02	VL.Sal	0.01	VL.Sal	0.03	VL.Sal	0.02	VL.Sal	0.03	VL.Sal	0.02	VL.Sal	0.08	L.Sal	0.09	L.Sal	0.06	VL.Sal
	Lab No	220725-82	220725-83	220725-84	220725-84	220725-95	220725-96	220725-102	220725-103	220725-104	220725-106										
	Sample ID	SRM_36	SRM_36	SRM_36	SRM_106	SRM_106	SRM_106	SRM_74	SRM_74	SRM_74	SRM_70										
	Sample Depth (m)	0.5	1.5	2.5	0.5	1.5	2.5	0.5	1.5	2.5	0.5										
Analyses	Unit																				
pH - Water	pH units	6.68	Neutral	6.28	L.Acid	6.35	L.Acid	6.94	Neutral	6.72	Neutral	6.57	L.Acid	7.76	L.Alk	6.50	L.Acid	6.66	Neutral	8.78	H.Alk
Electrical Conductivity	dS/m	0.03	VL.Sal	0.05	VL.Sal	0.06	VL.Sal	0.02	VL.Sal	0.06	VL.Sal	0.05	VL.Sal	0.05	VL.Sal	0.11	L.Sal	0.04	VL.Sal	0.08	L.Sal
	Lab No	220725-107	220725-108	220725-110	220725-111	220725-112	220725-114	220725-115	220725-116	220725-118	220725-119										
	Sample ID	SRM_70	SRM_70	SRM_83	SRM_83	SRM_83	SRM_24	SRM_24	SRM_24	SRM_28	SRM_28										
	Sample Depth (m)	1.5	2.5	0.5	1.5	2.5	0.5	1.5	2.5	0.5	1.5										
Analyses	Unit																				
pH - Water	pH units	8.83	H.Alk	8.49	M.Alk	6.84	Neutral	7.37	Neutral	7.95	M.Alk	7.01	Neutral	6.72	Neutral	6.51	L.Acid	8.39	M.Alk	7.59	L.Alk
Electrical Conductivity	dS/m	0.09	L.Sal	0.08	L.Sal	0.02	VL.Sal	0.02	VL.Sal	0.03	VL.Sal	0.01	VL.Sal	0.02	VL.Sal	0.07	L.Sal	0.09	L.Sal	0.15	M.Sal
	Lab No	220725-120	220725-122	220725-123	220725-124	220725-126	220725-127	220725-128	220725-130	220725-131	220725-132										
	Sample ID	SRM_28	SRM_46	SRM_46	SRM_46	SRM_49	SRM_49	SRM_49	SRM_31	SRM_31	SRM_31										
	Sample Depth (m)	2.5	0.5	1.5	2.5	0.5	1.5	2.5	0.5	1.5	2.5										
Analyses	Unit																				
pH - Water	pH units	7.58	L.Alk	8.42	M.Alk	7.18	Neutral	7.82	L.Alk	6.53	L.Acid	8.32	M.Alk	6.54	L.Acid	6.11	L.Acid	6.48	L.Acid	5.59	H.Alk
Electrical Conductivity	dS/m	0.10	L.Sal	0.18	M.Sal	0.25	M.Sal	0.34	H.Sal	0.03	VL.Sal	0.07	L.Sal	0.02	VL.Sal	0.07	L.Sal	0.07	L.Sal	0.09	L.Sal
	Lab No	220725-134	220725-135	220725-136	220725-138	220725-139	220725-140	220725-142	220725-143	220725-144	220725-146										
	Sample ID	SRM_51	SRM_51	SRM_51	SRM_73	SRM_73	SRM_73	SRM_135	SRM_135	SRM_135	SRM_41										
	Sample Depth (m)	0.5	1.5	2.5	0.5	1.5	2.5	0.5	1.5	2.5	0.5										
Analyses	Unit																				
pH - Water	pH units	8.79	H.Alk	8.77	H.Alk	7.21	Neutral	7.11	Neutral	6.97	Neutral	7.22	Neutral	7.45	L.Alk	8.13	M.Alk	7.13	Neutral	6.96	Neutral
Electrical Conductivity	dS/m	0.06	VL.Sal	0.04	VL.Sal	0.19	M.Sal	0.02	VL.Sal	0.02	VL.Sal	0.06	VL.Sal	0.06	VL.Sal	0.03	VL.Sal	0.09	L.Sal	0.02	VL.Sal
	Lab No	220725-147	220725-148	220725-158	220725-159	220725-160	220725-170	220725-171	220725-172	220725-174	220725-175										
	Sample ID	SRM_41	SRM_41	SRM_13	SRM_13	SRM_13	SRM_160	SRM_160	SRM_160	SRM_70	SRM_70										
	Sample Depth (m)	1.5	2.5	0.5	1.5	2.5	0.5	1.5	2.5	0.5	1.5										
Analyses	Unit																				
pH - Water	pH units	6.12	L.Acid	6.00	M.acid	7.06	Neutral	7.11	Neutral	7.05	Neutral	6.10	L.Acid	6.23	L.Acid	6.28	L.Acid	5.67	M.acid	5.87	M.acid
Electrical Conductivity	dS/m	0.08	L.Sal	0.10	L.Sal	0.21	M.Sal	0.14	L.Sal	0.15	M.Sal	0.07	L.Sal	0.11	L.Sal	0.13	L.Sal	0.06	VL.Sal	0.07	L.Sal

Highly acidic	Extremely alkaline	High salinity
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Table B6: Laboratory analysis data for discrete heavy loam and clay topsoils. Part 2 of 2.

TABLE B8. Laboratory Results ALL SITES																					
	Lab No	220725-176	220725-178	220725-179	220725-180	220725-190	220725-191	220725-192	220725-194	220725-195	220725-196										
	Sample ID	SRM_70	SRM_176	SRM_176	SRM_176	SRM_129a	SRM_129a	SRM_129a	SRM_129b	SRM_129b	SRM_129b										
	Sample Depth (m)	2.5	0.5	1.5	2.5	0.5	1.5	2.5	0.5	1.5	2.5										
Analyses	Unit																				
pH - Water	pH units	5.38	H.Acid	5.21	H.Acid	5.64	M.Acid	5.47	H.Acid	8.02	M.Aik	7.69	L.Aik	6.85	Neutral	7.90	M.Aik	6.87	Neutral	8.63	H.Aik
Electrical Conductivity	dS/m	0.06	VL.Sal	0.05	VL.Sal	0.04	VL.Sal	0.07	L.Sal	0.07	L.Sal	0.08	L.Sal	0.06	VL.Sal	0.07	L.Sal	0.09	L.Sal	0.12	L.Sal
	Lab No	220725-198	220725-199	220725-200	220725-202	220725-203	220725-204	220725-210	220725-211	220725-212	220725-214										
	Sample ID	SRM_113	SRM_113	SRM_113	SRM_119	SRM_119	SRM_119	SRM_128	SRM_128	SRM_128	SRM_149										
	Sample Depth (m)	0.5	1.5	2.5	0.5	1.5	2.5	0.5	1.5	2.5	0.5										
Analyses	Unit																				
pH - Water	pH units	8.43	M.Aik	6.40	L.Acid	6.64	Neutral	7.86	L.Aik	7.43	L.Aik	7.22	Neutral	7.25	Neutral	7.21	Neutral	7.34	Neutral	7.26	Neutral
Electrical Conductivity	dS/m	0.04	VL.Sal	0.07	L.Sal	0.13	L.Sal	0.03	VL.Sal	0.12	L.Sal	0.11	L.Sal	0.02	VL.Sal	0.05	VL.Sal	0.05	VL.Sal	0.03	VL.Sal
	Lab No	220725-215	220725-216	220725-306	220725-307	220725-308	220725-310	220725-311	220725-312	220725-314	220725-315										
	Sample ID	SRM_149	SRM_149	SRM_10b	SRM_10b	SRM_10b	SRM_10a	SRM_10a	SRM_10a	SRM_10c	SRM_10c										
	Sample Depth (m)	1.5	2.5	0.5	1.5	2.5	0.5	1.5	2.5	0.5	1.5										
Analyses	Unit																				
pH - Water	pH units	7.34	Neutral	7.90	M.Aik	8.37	M.Aik	8.38	M.Aik	8.81	H.Aik	7.96	M.Aik	7.24	Neutral	7.77	L.Aik	8.88	H.Aik	8.29	M.Aik
Electrical Conductivity	dS/m	0.23	M.Sal	0.33	M.Sal	0.16	M.Sal	0.20	M.Sal	0.09	L.Sal	0.04	VL.Sal	0.04	VL.Sal	0.17	M.Sal	0.08	L.Sal	0.24	M.Sal
	Lab No	220725-316	220725-318	220725-319	220725-320	220725-322	220725-323	220725-324	220725-374	220725-375	220725-376										
	Sample ID	SRM_10c	SRM_169	SRM_169	SRM_169	SRM_17	SRM_17	SRM_17	SRM_7	SRM_7	SRM_7										
	Sample Depth (m)	2.5	0.5	1.5	2.5	0.5	1.5	2.5	0.5	1.5	2.5										
Analyses	Unit																				
pH - Water	pH units	8.56	H.Aik	6.51	L.Acid	6.48	L.Acid	6.58	L.Acid	6.18	L.Acid	6.06	M.Acid	6.17	L.Acid	6.48	L.Acid	6.8	Neutral	6.59	L.Acid
Electrical Conductivity	dS/m	0.19	M.Sal	0.02	VL.Sal	0.03	VL.Sal	0.02	VL.Sal	0.10	L.Sal	0.10	L.Sal	0.12	L.Sal	0.05	VL.Sal	0.03	VL.Sal	0.31	M.Sal

	Highly acidic		Extremely alkaline		High salinity
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Table B7: Laboratory analysis data for discrete cracking clay topsoils.

TABLE B9. Laboratory Results																				
ALL SITES																				
	Lab No	220725-154	220725-155	220725-156	220725-162	220725-163	220725-164	220725-166	220725-167	220725-168	220725-218									
	Sample ID	SRM_58	SRM_58	SRM_58	SRM_131	SRM_131	SRM_131	SRM_178	SRM_178	SRM_178	SRM_133									
	Sample Depth (m)	0.5	1.5	2.5	0.5	1.5	2.5	0.5	1.5	2.5	0.5									
Analyses	Unit																			
pH - Water	pH units	7.41	L.Alk 8.32	M.Alk 7.83	L.Alk 8.58	H.Alk 7.60	L.Alk 6.88	Neutral 6.97	Neutral 6.63	Neutral 7.18	Neutral 8.11	M.Alk								
Electrical Conductivity	dS/m	0.30	M.Sal 0.39	H.Sal 0.17	M.Sal 0.25	M.Sal 0.26	M.Sal 0.27	M.Sal 0.45	H.Sal 0.57	H.Sal 0.58	H.Sal 0.14	L.Sal								
	Lab No	220725-219	220725-220	220725-242	220725-243	220725-244	220725-246	220725-247	220725-248	220725-250	220725-251									
	Sample ID	SRM_133	SRM_133	SRM_21b	SRM_21b	SRM_21b	SRM_21a	SRM_21a	SRM_21a	SRM_144b	SRM_144b									
	Sample Depth (m)	1.5	2.5	0.5	1.5	2.5	0.5	1.5	2.5	0.5	1.5									
Analyses	Unit																			
pH - Water	pH units	8.13	L.Acid 8.41	M.Alk 7.35	Neutral 7.53	L.Alk 7.50	L.Alk 8.86	H.Alk 8.85	H.Alk 8.89	H.Alk 8.58	H.Alk 8.83	H.Alk								
Electrical Conductivity	dS/m	0.19	L.Sal 0.26	M.Sal 0.15	M.Sal 0.15	M.Sal 0.14	L.Sal 0.13	L.Sal 0.18	M.Sal 0.17	M.Sal 0.13	L.Sal 0.16	M.Sal								
	Lab No	220725-252	220725-254	220725-255	220725-256	220725-258	220725-259	220725-260	220725-262	220725-263	220725-264									
	Sample ID	SRM_144b	SRM_144a	SRM_144a	SRM_144a	SRM_163d	SRM_163d	SRM_163d	SRM_163b	SRM_163b	SRM_163b									
	Sample Depth (m)	2.5	0.5	1.5	2.5	0.5	1.5	2.5	0.5	1.5	2.5									
Analyses	Unit																			
pH - Water	pH units	8.69	H.Alk 8.76	H.Alk 8.97	H.Alk 8.97	H.Alk 7.89	L.Alk 8.87	H.Alk 8.32	M.Alk 8.58	H.Alk 8.96	H.Alk 8.43	M.Alk								
Electrical Conductivity	dS/m	0.19	M.Sal 0.14	L.Sal 0.21	M.Sal 0.19	M.Sal 0.16	M.Sal 0.22	M.Sal 0.34	H.Sal 0.26	M.Sal 0.19	M.Sal 0.31	M.Sal								
	Lab No	220725-266	220725-267	220725-268	220725-270	220725-271	220725-272	220725-274	220725-275	220725-276	220725-278									
	Sample ID	SRM_163a	SRM_163a	SRM_163a	SRM_45	SRM_45	SRM_45	SRM_142	SRM_142	SRM_142	SRM_123									
	Sample Depth (m)	0.5	1.5	2.5	0.5	1.5	2.5	0.5	1.5	2.5	0.5									
Analyses	Unit																			
pH - Water	pH units	7.90	M.Alk 8.89	H.Alk 8.49	M.Alk 8.7	H.Alk 8.44	M.Alk 8.47	M.Alk 8.91	H.Alk 9.13	E.Alk 9.05	E.Alk 8.70	H.Alk								
Electrical Conductivity	dS/m	0.14	L.Sal 0.21	M.Sal 0.30	M.Sal 0.14	L.Sal 0.16	M.Sal 0.16	M.Sal 0.48	H.Sal 0.33	M.Sal 0.38	H.Sal 0.12	L.Sal								
	Lab No	220725-279	220725-280	220725-282	220725-283	220725-284	220725-286	220725-287	220725-288	220725-290	220725-291									
	Sample ID	SRM_123	SRM_123	SRM_64	SRM_64	SRM_64	SRM_134	SRM_134	SRM_134	SRM_145	SRM_145									
	Sample Depth (m)	1.5	2.5	0.5	1.5	2.5	0.5	1.5	2.5	0.5	1.5									
Analyses	Unit																			
pH - Water	pH units	8.40	M.Alk 8.53	H.Alk 8.39	M.Alk 8.16	M.Alk 8.26	M.Alk 7.99	M.Alk 8.17	M.Alk 8.09	M.Alk 8.86	H.Alk 8.49	M.Alk								
Electrical Conductivity	dS/m	0.20	M.Sal 0.18	M.Sal 0.12	L.Sal 0.13	L.Sal 0.12	L.Sal 0.23	M.Sal 0.20	M.Sal 0.18	M.Sal 0.22	M.Sal 0.28	M.Sal								
	Lab No	220725-292	220725-294	220725-295	220725-296	220725-302	220725-303	220725-304	220725-304	220725-326	220725-328									
	Sample ID	SRM_145	SRM_154	SRM_154	SRM_154	SRM_148	SRM_148	SRM_148	SRM_148	SRM_52	SRM_52									
	Sample Depth (m)	2.5	0.5	1.5	2.5	0.5	1.5	2.5	0.5	1.5	2.5									
Analyses	Unit																			
pH - Water	pH units	8.57	H.Alk 8.11	M.Alk 8.14	M.Alk 7.97	M.Alk 8.51	H.Alk 8.22	M.Alk 8.52	H.Alk 8.98	H.Alk 7.53	L.Alk 8.25	M.Alk								
Electrical Conductivity	dS/m	0.26	M.Sal 0.28	M.Sal 0.25	M.Sal 0.24	M.Sal 0.35	H.Sal 0.13	L.Sal 0.30	M.Sal 0.20	M.Sal 0.31	M.Sal 0.29	M.Sal								
	Lab No	220725-330	220725-331	220725-332	220725-334	220725-335	220725-336	220725-338	220725-339	220725-340	220725-342									
	Sample ID	SRM_139	SRM_139	SRM_139	SRM_152a	SRM_152a	SRM_152a	SRM_152b	SRM_152b	SRM_152b	SRM_152c									
	Sample Depth (m)	0.5	1.5	2.5	0.5	1.5	2.5	0.5	1.5	2.5	0.5									
Analyses	Unit																			
pH - Water	pH units	8.81	H.Alk 8.49	M.Alk 8.50	H.Alk 8.65	H.Alk 8.46	M.Alk 8.62	H.Alk 9.02	E.Alk 8.68	H.Alk 8.54	H.Alk 8.86	H.Alk								
Electrical Conductivity	dS/m	0.33	M.Sal 0.3	M.Sal 0.23	M.Sal 0.25	M.Sal 0.21	M.Sal 0.21	M.Sal 0.29	M.Sal 0.33	M.Sal 0.36	H.Sal 0.24	M.Sal								
	Lab No	220725-343	220725-344	220725-346	220725-347	220725-348	220725-350	220725-351	220725-352											
	Sample ID	SRM_152c	SRM_152c	SRM_152g	SRM_152g	SRM_152g	SRM_153	SRM_153	SRM_153											
	Sample Depth (m)	1.5	2.5	0.5	1.5	2.5	0.5	1.5	2.5											
Analyses	Unit																			
pH - Water	pH units	8.43	M.Alk 8.49	M.Alk 7.62	L.Alk 8.62	H.Alk 8.62	H.Alk 8.31	M.Alk 7.87	L.Alk 7.89	L.Alk										
Electrical Conductivity	dS/m	0.25	M.Sal 0.14	L.Sal 0.09	L.Sal 0.29	M.Sal 0.26	M.Sal 0.14	L.Sal 0.13	L.Sal 0.12	L.Sal										

Highly acidic	Extremely alkaline	High salinity
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