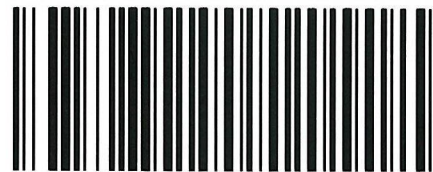




10 April 2015

Mr S. Withington
Department of Planning & Environment
GPO Box 39
SYDNEY NSW 2001



PCU059126

Dear Mr Withington

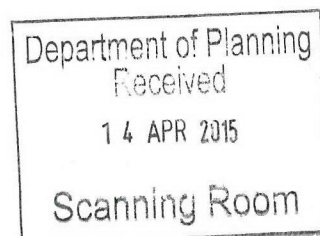
Re: Neubeck Coal Project – Site Verification Application

Centennial Coal has addressed the matters raised by the NSW Office of Environment and Heritage in relation to the Neubeck Coal Project Site Verification Application. Enclosed with this letter is a response from SLR Consulting Pty Limited as to how the issues raised have been addressed, the revised Biophysical Strategic Agricultural Land (BSAL) Verification Assessment report and hard copies of the amended BSAL Soil Data Cards. All relevant files have been provided to you electronically.

If you have any further questions in relation to this matter, please contact me on my mobile 0407 207 530.

Yours sincerely

James Wearne
Group Approvals Manager



Enclosed

- Response from SLR Consulting Pty Limited.
- Revised Biophysical Strategic Agricultural Land (BSAL) Verification Assessment report (SLR 2015).
- BSAL Soil Data Cards for the Neubeck Coal Project.

31st March, 2015

Hello Stuart/Humphrey,

SLR has addressed OEH's comments on the Neubeck Coal Project SVC, please see replies and additional comments below in blue.

1. On the soil map (Figure 3) we note that the proponent has separated areas of 'watercourse and waterlogged areas' as a separate mapped area. However, there are no soil observations within this area to describe the soils. If the soils in this area are not the same as adjoining polygons then it needs to be treated as a separate soil map unit, i.e., at least 3 detailed observations are required. Either way, check sites should be described in this area to confirm the decision.

Amended to be mapped as a Dermosol (concurrent with Checked Site data as there was no access on the southern side of Neubeck Creek.

2. Some of the areas excluded in the spatial data appear to have been mapped on the soil map (FIDs 117 to 125).

Spatial data corrected and areas revised, **Figure 2** has been amended to solid fill rather than hatched fill to avoid confusion.

3. There appears to be no indication of what the slope codes in SLR63010980_SurfaceSlope_100mBuffer_Clip.shp mean.

Slope code is the terminology used in the descriptors, which directly correlates to slope percentage (i.e. slope code 1 equates to slope 0-1%, slope code 2 equates to slope 1-2% etc.). Explanation of slope code has been added into **Appendix C**.

4. Several of the Dermosols with waterlogging problems should probably be classified as Hydrosols, which may change the distribution of soil types.

As per The Australian Soil Classification: Revised Edition (Isbell, 2002) when assessing the classification of a Hydrosol, "the duration and frequency of saturation at a precise section of a profile are not specifically defined". Also, "the extent of soil wetness can seldom be assessed by a single inspection of a particular site".

Using the author and reviewers soil science experience, it is our opinion that whilst there is significant mottling within the profile of the Dermosols to indicate poor drainage, there was insufficient evidence to indicate that the greater part of the soil profile was saturated for at least 2-3 months in most years.

5. Several of the Kurosols (sites 006, 17 and 18) are probably Kandosols (insufficient texture contrast), which may also change the distribution of soil types.

Kurosol sites were re-examined and keyed out again and came out as Dermosols, soil mapping and areas corrected

6. An area of Kandosols has been mapped in the far west of the project area without any sites to describe it. We would recommend at least 1 check site in this area to confirm the soil type(s) there.

At the time of the soil field survey the far western area (approximately 10 ha) was deemed inaccessible due the presence of woodland forest and very limited access due to the haul road, fencing and locked gates. Therefore this section of the Project Application Area has been correlated by soil landscape units (King, 1993) and vegetation type with other mapped areas.

7. The detailed soil profiles were collected using a combination of cores (7) and by auger (3); however the Interim Protocol requires all detailed observations to be soil pits.

The 7 core sites were completed in 2014 in accordance with the Interim Protocol. The 3 auger sites were completed in 2012, prior to the release of the Interim Protocol, however, methodology for the 2012 sampling involved shovel excavation to a depth well into the B horizon (at least 50 cm) and then subsequent hand auguring down to 100 cm, enabling description of a minimum 50 cm in situ (in effect a small pit). The soil profile was then "re-constructed" in the profile display box.

As these 3 sites were sampled out prior to the release of the Interim Protocol photos of the small pits were not taken as the focus of the survey was on the whole soil profile. Soil profile information for the upper horizons mostly assessed using the small in situ pits.

Please see accompanying photos from recently conducted surveys showing the mini pits.





Soil Data Cards have been amended to include Nature of Exposure as both "pit" and "auger"

8. The profiles described seem to consist of 3 separate sets, with overlapping numbers – for example, two detailed observations and one check site were identified as profile 2 on their Soil Data Cards. The proponent should supply the profiles in a single set of sequentially numbered cards so that each site is uniquely identified, can be definitively located on the map and easily linked to its corresponding laboratory soil test data. The report and GIS layers will also need updating accordingly.

See site survey number and Soil Data Card identifier correlation table below and also added into **Appendix A**. Each Soil Data Card has been amended to having one unique identifying number.

Field Survey Date	Site Survey Number	Unique Soil Data Card Identifier
October 2012	Core 006	1
	Core 007	2
	Core 002	3
August 2014	Core 1	4
	Core 2	5
	Core 3	6
	Core 4	7
	Core 5	8
	Core 7	9
	Core 8	10
August 2014	Check 1	11
	Check 2	12
	Check 3	13
	Check 4	14
	Check 5	15
	Check 6	16
	Check 7	17
	Check 8	18
	Check 9	19
	Check 10	20
	Check 11	21
	Check 12	22
	Check 13	23
	Check 14	24
	Check 15	25
	Check 16	26
	Check 17	27
	Check 18	28
	Check 19	29

9. The laboratory data suggests that the samples for some of the profiles were tested in 2012 by a different person and organisation to the one supplying the SVC application; however all of the cards have the same 'Described by' number. Can the proponent confirm who described the profiles from the 2012 batch?

During August 2013, GSS Environmental merged with SLR Consulting; however the same CPSS 2 oversaw both the field surveys and subsequent site verification (Clayton Richards, 1794).

10. Although ECe results have been supplied in the laboratory spreadsheet, the source EC results should also be supplied.

Source EC results were supplied in Appendix B (test C1A/4) on the Scone Research Centre Report sheets. They have also been entered into the Excel spreadsheet.

11. There are several profiles missing key data (profile 2 is missing colours; profile 6 has no layer data; profile 007 has no mottles described but mottles appear to be visible in the photo). This makes it difficult to confirm the soil classification.

Rectified for the three profiles

King regards,

A handwritten signature in black ink, appearing to read 'Murray Fraser', with a stylized flourish at the end.

Murray Fraser
Senior Agronomist



global environmental solutions

Neubeck Coal Project
BSAL Verification Assessment
Centennial Angus Place Pty Limited

Report Number 630.10980

January 2015

Version: Final

Neubeck Coal Project

BSAL Verification Assessment

Centennial Angus Place Pty Limited

PREPARED BY:

SLR Consulting Australia Pty Ltd
ABN 29 001 584 612
10 Kings Road New Lambton NSW 2305 Australia

(PO Box 447 New Lambton NSW 2305 Australia)
T: 61 2 4037 3200 F: 61 2 4037 3201
E: newcastleau@slrconsulting.com www.slrconsulting.com

This report has been prepared by SLR Consulting Australia Pty Ltd with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with the Client. Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of Centennial Angus Place Pty Limited. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR Consulting.

SLR Consulting disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

DOCUMENT CONTROL

Reference	Status	Date	Prepared	Checked	Authorised
630.10980	Draft	22 January 2015	Murray Fraser	Clayton Richards	Clayton Richards
630.10980	Final	30 January 2015	Murray Fraser	Clayton Richards	Clayton Richards

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APPENDICES

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Appendix B	Laboratory Soil Test Results
Appendix C	Slope Analysis Methodology
Appendix D	OEH Assessment Checklist
Appendix E	OEH Comments and SLR Replies

1 INTRODUCTION

1.1 Project Background

Centennial Angus Place Pty Limited engaged SLR Consulting Australia Pty Ltd to undertake a Biophysical Strategic Agricultural Land (BSAL) Verification Assessment for the proposed Neubeck Coal Project (the Project). This BSAL verification assessment is required to be submitted to OEH for a BSAL verification certificate. This report is intended to accompany the online BSAL verification certificate application. Murray Fraser undertook the BSAL Verification Assessment supervised by Clayton Richards (CPSS2). Both Murray Fraser and Clayton Richards are responsible for the soil survey and interpretation of the field and laboratory results.

The Project Application Area is located approximately 18 kilometres north-west of the City of Lithgow and 7 kilometres north of Wallerawang and comprises an of 201 hectares (ha), including a proposed disturbance footprint of approximately 175 ha

1.2 The Gateway Process and BSAL Background

The Strategic Regional Land Use Plans for the Upper Hunter and New England North West (SRLUP) was released by the NSW Government in September 2012; the BSAL mapping for the remainder of the State was released in January 2014. The SRLUPs represent the Government's proposed framework to support growth, protect the environment and respond to competing land uses, whilst preserving key regional values over the next 20 years. An integral component of the plan is the introduction of the new decision making framework, known as the Gateway Process. This process involves the early assessment of potential impacts of mining and coal seam gas development on agricultural land and water resources.

As part of the Gateway Process, areas of particularly high agricultural values have been identified and mapped in consultation with key industry representatives and industry experts for the whole of NSW. These areas are referred to as Strategic Agricultural Land. Two categories of Strategic Agricultural Land have been identified: BSAL and critical industry clusters (CIC). BSAL is land with a rare combination of natural resources highly suitable for agriculture. These lands intrinsically have the best quality landforms, soil and water resources which are naturally capable of sustaining high levels of productivity and require minimal management practices to maintain this high quality.

The criteria used to measure BSAL under the original SRLUP were based on three parameters:

1. Soil Fertility – based on the Draft Inherent General Fertility of NSW (OEH),
2. Land and Soil Capability – based on Land and Soil Capability Mapping of NSW, and
3. Access to reliable water supply.

In April 2013, an Interim Protocol for Site Verification and Mapping of Biophysical Strategic Agricultural Land (Interim Protocol) was released by the NSW Government. This Interim Protocol outlines the process for seeking verification of whether or not land mapped as BSAL meets the BSAL criteria. This report is based on the criteria outlined in the Interim Protocol. The State Environment Planning Policy (mining, Petroleum Production and Extractive Industries) Amendment 2013 requires certain types of developments to verify whether the proposed site is on BSAL. The purpose of the protocol is to assist proponents and landholders to understand what is required to identify the existence of BSAL and outlines the technical requirements for the on-site identification and mapping of BSAL.

2 BSAL VERIFICATION

2.1 Defining BSAL

The Interim Protocol defines BSAL in three different ways:

1. General Commentary: BSAL is land with a rare combination of natural resources highly suitable for agriculture. These lands intrinsically have the best quality landforms, soil and water resources which are naturally capable of sustaining high levels of productivity and require minimal management practices to maintain this high quality. BSAL is able to be used sustainably for intensive agricultural purposes such as cultivation. Such land is inherently fertile and generally lacks significant biophysical constraints. (Interim Protocol: Section 3 Paragraph 1 on page 2).
2. On a regional scale, the maps of BSAL meet the three criteria outlined in the SRLUP (Interim Protocol: Section 3 Insert):
 - a. Access to reliable water supply;
 - b. Inherent General Fertility; and
 - c. Land and Soil Capability (LSC) as mapped for NSW by OEH.
3. On a property scale, the verification criteria include specific measurements of the following parameters: slope; rock outcrop; surface rock fragments; gilgai; soil fertility (based on soil type); effective rooting depth to a physical barrier; soil drainage; soil pH; salinity; and effective rooting depth to a chemical barrier. (Interim Protocol: Section 6 on page 5).

This report assesses BSAL according to the requirements of the third definition.

2.2 Methodology

The site verification and methodology reported in the following sections has been undertaken based on the Interim Protocol for Site Verification and Mapping of BSAL.

Step 1: Identify the project area which will be assessed for BSAL

The assessment area should include the entire project area and include at least a 100 m buffer to take into account minor changes in design, surrounding disturbance and minor expansion. If BSAL is part of a larger contiguous mass of BSAL then the boundary of this area must also be identified.

The area of potential surface disturbance due to mining and associated disturbance for the Project is 175 hectares (ha), within the total Project Application Area of 201 ha. In addition to this disturbance area, a 100 metre (m) buffer surrounding the Project Application Area is included within the assessment area, to account for minor changes in design in accordance with the BSAL protocol. The total BSAL Assessment Area is therefore 276 ha as shown in **Figure 1**.



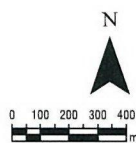
LEGEND

-  Project Application Area
-  100m Project Application Area Buffer



The content contained within this document may be based on third party data. SLR Consulting Australia Pty Ltd does not guarantee the accuracy of such information.

Project No.:	630.10980
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Centennial Angus Place Pty Ltd

Neubeck On-Site BSAL Verification

Project Application Area

FIGURE 1

Step 2: Confirm access to a reliable water supply

BSAL lands must have access to a "reliable water supply".

Representative rainfall data for the area has been obtained from the Bureau of Meteorology (BOM) weather station at Birdwood Street, Lithgow (Station 063224, BOM, 2014). Data shows that the area experiences an average rainfall of 852 millimetres (mm) per year. This rainfall is above the criteria threshold of 350 mm per year, and therefore the site has access to a reliable water supply.

Step 3: Choose the appropriate approach to map the soils information

Access to the project area will define the level of investigation that the proponent can undertake. If the proponent has access to the land then the BSAL verification requirements for on-site soils assessment as described in sections 6 and 9 of the Interim Protocol should be met. If the proponent does not have access then the proponent should develop a model of soils distribution guided by sections 6 and 9 based on landscape characteristics using the information listed in Section 5 of the Interim Protocol.

It is important to note that for either approach, if any criteria indicate that the site is not BSAL, then no further assessment is necessary. The flow chart in Figure 2 is designed to assess the simplest criteria first, to avoid more costly assessments if the site can be easily discounted as BSAL.

The Proponent has access to the entire Project Application Area for site verification of BSAL. Approximately 110 ha of the Project Application Area has been cleared of native vegetation in the past, and now supports a mix of native grasses and introduced weed species. No agricultural activities have been conducted within the Project Application Area in the last 30 years.

Step 4: Risk assessment

The proponent should undertake a risk assessment as this will influence the density of soil sampling required as explained in Section 9.6.1. The proposed activity on parts or all of the project area may be of low risk to agriculture and so may only require a sampling density of 1:100 000. Alternatively other areas may be at higher risk of impact and so should have a sampling density of 1:25 000.

To identify the potential for the Project to impact on agricultural resources and the appropriate level of soil survey required, an evaluation of risk to agricultural resources and enterprises was undertaken. This risk assessment is taken from the Guideline for Agricultural Impact Statements at the Exploration Stage (DTIRIS, 2012) and is based on the probability of occurrence and the consequence of the impact, as described in the Land Use Conflict Risk Assessment Guide (DPI, 2011). Depending on the risk, inspection densities can range from 1 site per 25 – 400 ha for low risk to 1 site per 5 – 25 ha for high risk (Gallant *et. al.*, 2008).

Table 1 Agricultural Impacts Risk Ranking Matrix

Consequence \ PROBABILITY	A Almost Certain	B Likely	C Possible	D Unlikely	E Rare
1. Severe and/or permanent damage. Irreversible impacts	A1 high	B1 high	C1 high	D1 high	E1 medium
2. Significant and/or long term damage. Long term mgt implications. Impacts difficult or impractical to reverse.	A2 high	B2 high	C2 high	D2 medium	E2 medium
3. Moderate damage and/or medium-term impact to agricultural resources or industries. Some ongoing mgt implications which may be expensive to implement. Minor damage or impacts over the long term.	A3 high	B3 high	C3 medium	D3 medium	E3 medium
4. Minor damage and/or short-term impact to agricultural resources or industries. Can be managed as part of routine operations	A4 medium	B4 medium	C4 low	D4 low	E4 low
5. Very minor damage and minor impact to agricultural resources or industries. Can be effectively managed as part of normal operations	A5 low	B5 low	C5 low	D5 low	E5 low

	= low risk
	= medium risk
	= high risk

Table 2 Agricultural Impact Risk Ranking – Probability Descriptors

Level	Descriptor	Description
A	Almost Certain	Common or repeating occurrence
B	Likely	Known to occur or it has happened
C	Possible	Could occur or I've heard of it happening
D	Unlikely	Could occur in some circumstances but not likely to occur
E	Rare	Practically impossible or I've never heard of it happening

Table 3 Agricultural Impact Risk Ranking – Consequence Descriptors

Level: 1	Severe Consequences	Example of Implications
Description	Severe and/or permanent damage to agricultural resources, or industries Irreversible Severe impact on the community	Long term (eg 20 years) damage to soil or water resources Long term impacts (eg 20 years) on a cluster of agricultural industries or important agricultural lands
Level: 2	Major Consequences	Example of Implications
Description	Significant and/or long-term impact to agricultural resources, or industries Long-term management implications Serious detrimental impact on the community	Water and / or soil impacted, possibly in the long term (eg 20 years) Long term (eg 20 years) displacement / serious impacts on agricultural industries
Level: 3	Moderate Consequences	Example of Implications
Description	Moderate and/or medium-term impact to agricultural resources, or industries Some ongoing management implications Minor damage or impacts but over the long term.	Water and/ or soil known to be affected, probably in the short – medium term (eg 1-5 years) Management could include significant change of management needed to agricultural enterprises to continue.
Level: 4	Minor Consequences	Example of Implications
Description	Minor damage and/or short-term impact to agricultural resources, or industries Can be effectively managed as part of normal operations	Theoretically could affect the agricultural resource or industry in short term, but no impacts demonstrated Minor erosion, compaction or water quality impacts that can be mitigated. For example, dust and noise impacts in a 12 month period on extensive grazing enterprises.
Level: 5	Negligible Consequences	Example of Implications
Description	Very minor damage or impact to agricultural resources, or industries Can be effectively managed as part of normal operations	No measurable or identifiable impact on the agricultural resource or industry

The Project consists of an open cut coal mine with a proposed total surface disturbance of approximately 175 ha, within a Project Application Area of 201 ha. Site inspection revealed there were no agricultural enterprises or activities identified in the vicinity or within the Project Application Area. As such the Project was determined to have a risk ranking of:

Consequence: Level 4 – Minor damage and/or short-term impact to agricultural resources or industries which can be effectively managed as part of normal operations

Probability: D – Unlikely. Could occur in some circumstances but unlikely to occur.

The risk matrix result is **D4 (Table 1)** which is considered low risk to agricultural activities. For low risk activities the required inspection density is 1 site observation every 25 – 400 ha. For the purpose of this survey the Project Application Area and 100 m buffer area (276 ha) is included in this inspection density.

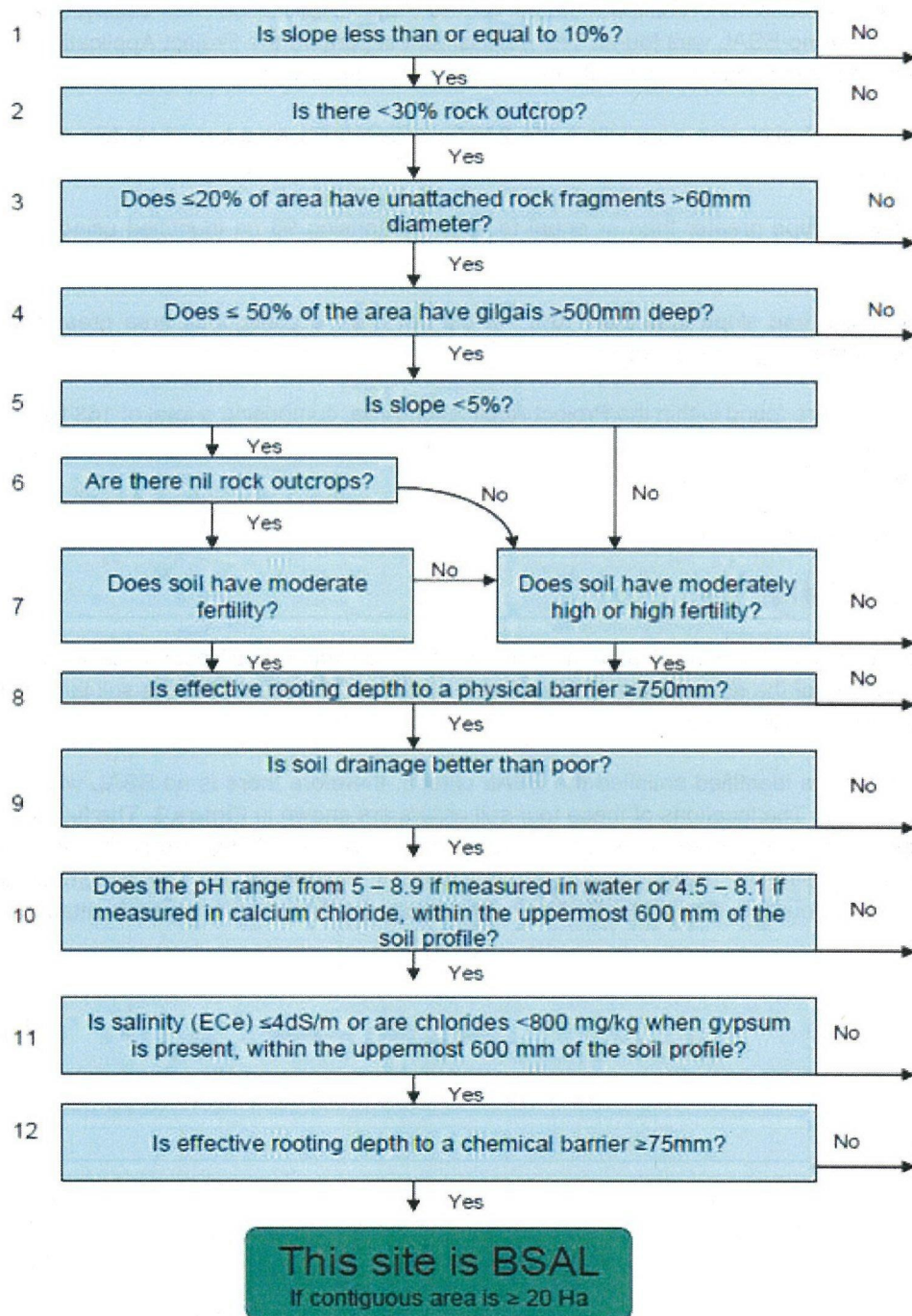
Step 4: Soils and landscape verification criteria

Ten site verification criteria have been identified, with the easy to measure criteria assessed first. They are: slope; rock outcrop; surface rock fragments; gilgai; soil fertility (based on soil type); effective rooting depth to a physical barrier; soil drainage; soil pH; salinity; and effective rooting depth to a chemical barrier. For soil to be classified as BSAL at each representative site it must meet all the criteria outlined in the flow chart shown in **Table 4**. If any criteria are not met, the site is not BSAL and there is no need to continue the assessment. The specific requirement for each parameter to be assessed is outlined in the Interim Protocol.

Using LIDAR, areas of greater than or equal to 10% slope were excluded from the BSAL site verification assessment area, as were areas of less than 10% slope which had a contiguous area of less than 20 ha. The slope exclusion areas are shown in **Figure 2**:

The BSAL verification fieldwork was undertaken in August 2014 and mapped 29 observations. This information was further supplemented by 3 detailed observations from a previous a SLR soil survey conducted in October 2012.

Table 4 Flow Chart for Site Assessment of BSAL



This site is not BSAL. There is no need to do further assessment.

2.3 Results

The BSAL verification assessment resulted in no part of the Project Application Area satisfying all the BSAL criteria, therefore no BSAL was found. The assessment separated the Project Application Area according to exclusion areas and soil types into the following discrete areas:

1. There was 113 ha of exclusion area within the 276 ha assessment area based on two separate criteria:
 - a. Land with slope greater than or equal to 10%, comprising 96 ha identified using LIDAR Data,
 - b. Land which had slope less than 10% but did not have a contiguous area greater than 20 ha, comprising 17 ha in total.
2. Three soil orders were found within the Project Application Area, comprising a total of 163 ha:
 - a. Chromosol (31 ha)
 - b. Dermosol (76 ha)
 - c. Kandosol (56 ha)

The 56 ha of Kandosol includes a 10 ha area in the far west of the Project Application Area which was inaccessible at the time of the assessment and was correlated as a Kandosol from the soil landscape unit previously mapped by King (1993).

None of these soil orders identified satisfied the BSAL criteria, therefore there is no BSAL within the Project Application Area. The locations of these four soil orders are shown in **Figure 3**. The findings of the on-site assessment are summarised below in **Table 5** and **Table 6**, the detailed BSAL Soil Data Cards and associated support documentation are attached in **Appendix A**. The accompanying laboratory data can be found in **Appendix B**. The methodology for the slope analysis is attached in **Appendix C**.

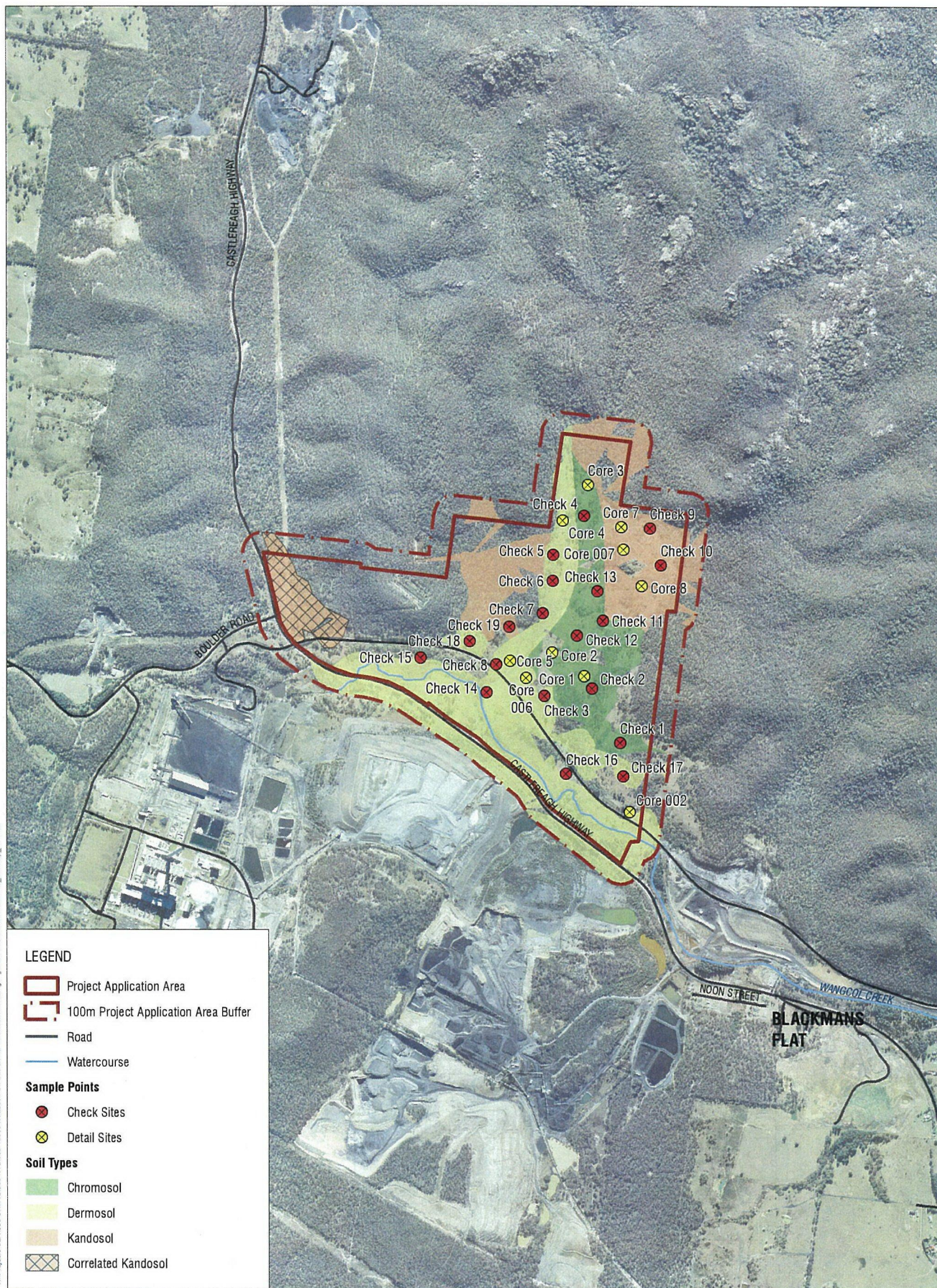


Table 5 Detailed Site BSAL Verification Summary

Site Number	Inspection Site Type	Australian Soil Classification (to ASC Great Group)	1. Is slope < 10%?	2. Is there < 30% Rock Outcrop?	3. < 20% unattached Rock Fragments > 60mm?	4. Does < 50% have Gilgais > 500mm deep?	5. Is Slope < 5%?	6. Are there nil rock outcrops?	7a. Does Soil Have Moderate fertility?	7b. Does soil have Moderately High or High fertility?	8. Is ERD to a physical barrier > 750mm?	9. Is drainage better than poor?	10. Is pH between 5.0 and 8.9?	11. Is salinity (ECe) < 4 dS/m?	12. Is ERD to a chemical barrier > 750mm?	Is the Site BSAL?
Core 1	Detailed	Mesotrophic Yellow Chromosol	Yes	Yes	Yes	Yes	Yes		N/A	Yes	Yes					No
Core 2	Detailed	Mesotrophic Yellow Chromosol	Yes	Yes	Yes	Yes	Yes		N/A	Yes	No	No				No
Core 3	Detailed	Mesotrophic Grey Chromosol	Yes	Yes	Yes	Yes	Yes		N/A	Yes	No	No				No
Core 4	Detailed	Eutrophic Black Dermosol	Yes	Yes	Yes	Yes	Yes		N/A	Yes	No	No				No
Core 5	Detailed	Mesotrophic Red Dermosol	Yes	Yes	Yes	Yes	Yes		N/A	Yes	No	No				No
Core 006	Detailed	Mesotrophic Brown Dermosol	Yes	Yes	Yes	Yes	Yes		Yes	No	No	No				No
Core 7	Detailed	Mesotrophic Red Kandosol	Yes	Yes	Yes	Yes	Yes		No	No						No
Core 8	Detailed	Eutrophic Brown Kandosol	Yes	Yes	Yes	Yes	Yes		No	No						No
Core 007	Detailed	Eutrophic Yellow Kandosol	Yes	Yes	Yes	Yes	Yes		No	No						No
Core 002	Detailed	Eutrophic Brown Dermosol	Yes	Yes	No											No

Table 6 Checked Site BSAL Verification Summary

Site Number	Inspection Site Type	Australian Soil Classification (to ASC Great Group)	1. Is slope < 10%?	2. Is there < 30% Rock Outcrop?	3. < 20% unattached Rock Fragments > 60mm?	4. Does < 50% have Gilgals > 500mm deep?	5. Is Slope < 5%?	6. Are there nil rock outcrops?	7a. Does Soil Have Moderate fertility?	7b. Does soil have Moderately High or High fertility?	8. Is ERD to a physical barrier > 750mm?	9. Is drainage better than poor?	10. Is pH between 5.0 and 8.9?	11. Is salinity (ECe) < 4 dS/m	12. Is ERD to a chemical barrier > 750mm?	Is the Site BSAL?
Check 1	Checked	Mesotrophic Yellow Chromosol	Yes	Yes	Yes	Yes	Yes		N/A	Yes	No	No				No
Check 2	Checked	Mesotrophic Yellow Chromosol	Yes	Yes	Yes	Yes	Yes		N/A	Yes	No	No				No
Check 3	Checked	Mesotrophic Brown Dermosol	Yes	Yes	No											No
Check 4	Checked	Mesotrophic Grey Chromosol	Yes	Yes	Yes	Yes	Yes		N/A	Yes	No	No				No
Check 5	Checked	Eutrophic Black Dermosol	Yes	Yes	Yes	Yes	Yes		N/A	Yes	No	No				No
Check 6	Checked	Eutrophic Black Dermosol	Yes	Yes	Yes	Yes	Yes		N/A	Yes	No	No				No
Check 7	Checked	Eutrophic Black Dermosol	Yes	Yes	Yes	Yes	Yes		N/A	Yes	No	No				No
Check 8	Checked	Mesotrophic Red Dermosol	Yes	Yes	Yes	Yes	Yes		N/A	Yes	No	No				No
Check 9	Checked	Mesotrophic Red Kandosol	Yes	Yes	Yes	Yes	Yes		No	No						No
Check 10	Checked	Eutrophic Yellow Kandosol	Yes	Yes	Yes	Yes	Yes		No	No						No
Check 11	Checked	Mesotrophic Yellow Chromosol	Yes	Yes	No											No
Check 12	Checked	Mesotrophic Yellow Chromosol	Yes	Yes	Yes	Yes	Yes		N/A	Yes	No	No				No
Check 13	Checked	Mesotrophic Yellow Chromosol	Yes	Yes	Yes	Yes	Yes		N/A	Yes	No	No				No
Check 14	Checked	Eutrophic Black Dermosol	Yes	Yes	Yes	Yes	Yes		N/A	Yes	No	No				No
Check 15	Checked	Eutrophic Black Dermosol	Yes	Yes	Yes	Yes	Yes		N/A	Yes	No	No				No
Check 16	Checked	Eutrophic Brown Dermosol	Yes	Yes	Yes	Yes	Yes		N/A	Yes	No	No				No
Check 17	Checked	Mesotrophic Brown Dermosol	Yes	Yes	No											No
Check 18	Checked	Mesotrophic Brown Dermosol	Yes	Yes	Yes	Yes	Yes		Yes	No	No	No				No
Check 19	Checked	Eutrophic Brown Kandosol	Yes	Yes	Yes	Yes	Yes		No	No						No

On-Site BSAL Verification

Portions of the Project Application Area were previously mapped by SLR during October 2012 as part of a preliminary soil survey, these detailed sites have the prefix "00" in their site number, and represent 3 of the detailed sites within this BSAL Verification (Sites 002, 006 and 007).

Soil Types

There were 9 different great soil groups found at the 10 detailed sample sites within the Project Application Area:

- Mesotrophic Yellow Chromosol
- Mesotrophic Grey Chromosol
- Eutrophic Black Dermosol
- Eutrophic Brown Dermosol
- Mesotrophic Red Dermosol
- Mesotrophic Brown Dermosol
- Mesotrophic Red Kandosol
- Eutrophic Brown Kandosol
- Eutrophic Yellow Kandosol

Following are physical descriptions and laboratory analysis for each of the detailed sites within the BSAL Verification Assessment Area.

Detailed Site 1 – Yellow Chromosol

Table 7 Site 1 – Yellow Chromosol (Summary)

Site Description	
 Plate 1 – Profile Core 1	 Plate 2 – Landscape Looking North-West
ASC Name	Mesotrophic Yellow Chromosol
Representative Check Sites	1, 2, 11, 12, 13
Dominant Slope Association	Gently to moderately inclined (3 – 5%)
Land Use	Open Grassland
Soil Fertility	Moderately High
Drainage	Poor
BSAL	No

Table 8 Site 1 – Yellow Chromosol (Analysis)

Horizon	Depth (m)	Description		
A1	0.00 – 0.15	Brown silty loam with moderate pedality and firm consistence. Moderately acidic, non-saline and non-sodic. Very low CEC with 10% coarse fragments <10 mm. Well drained with many coarse roots. Clear boundary.		
A2	0.15 – 0.25	Yellowish-brown loam with weak pedality and consistence. Strongly acidic, non-saline and non-sodic. Moderately acidic, non-saline and non-sodic. Moderately acidic, non-saline and non-sodic. Very low CEC with 10% coarse fragments <10 mm. Well drained with many coarse roots. Gradual boundary.		
B2	0.25 – 0.75	Light yellowish-brown heavy clay with strong pedality and consistence. Moderately acidic, non-saline and non-sodic. Moderate CEC with no coarse fragments. Poorly drained with 50% grey mottles and few very fine roots. Clear boundary.		
C	+0.75	Weathered bedrock (not laboratory tested)		
Horizon	ECe		Laboratory pH	
	dS/m	Rating	Value	Rating
A1	0.1	Non-Saline	5.7	Moderately Acidic
A2	0.1	Non-Saline	5.6	Moderately Acidic
B2	0.1	Non-Saline	5.8	Moderately Acidic
Horizon	CEC		ESP	
	cmol/kg	Rating	%	Rating
A1	5.9	Very Low	1.7	Non-Sodic
A2	5.2	Very Low	2.4	Non-Sodic
B2	18.0	Moderate	3.9	Non-Sodic

Detailed Site 2 – Yellow Chromosol

Table 9 Site 2 – Yellow Chromosol (Summary)

Site Description	
 Plate 3 – Profile Core 2	 Plate 4 – Landscape looking North
ASC Name	Mesotrophic Yellow Chromosol
Representative Check Sites	1, 2, 11, 12, 13
Dominant Slope Association	Gently to moderately inclined (3 – 5%)
Land Use	Open grassland
Soil Fertility	Moderately High
Drainage	Poor
BSAL	No

Table 10 Site 2 – Yellow Chromosol (Analysis)

Horizon	Depth (m)	Description		
A1	0.00 – 0.20	Dark greyish-brown silty clay loam with moderate pedality and firm consistence. Moderately acidic, non-saline and non-sodic. Moderate CEC with no coarse fragments. Well drained with fine roots common. Clear and boundary.		
A2	0.20 – 0.35	Brown silty clay loam with moderate pedality and firm consistence. Moderately acidic, non-saline and non-sodic. Low CEC with no coarse fragments. Well drained with fine roots common. Clear boundary.		
B2	0.35 – 1.0	Brownish-yellow heavy clay with strong pedality and consistence. Moderately acidic, non-saline and non-sodic. Moderate CEC with 10% coarse fragments <20 mm. Poorly drained with 50% orange mottles and few very fine roots to 0.60 m.		
Horizon	ECe		Laboratory pH	
	dS/m	Rating	Value	Rating
A1	0.3	Non-Saline	5.7	Moderately Acidic
A2	0.1	Non-Saline	5.7	Moderately Acidic
B2	0.1	Non-Saline	5.6	Moderately Acidic
Horizon	CEC		ESP	
	cmol/kg	Rating	%	Rating
A1	14.7	Moderate	2.0	Non-Sodic
A2	10.6	Low	1.9	Non-Sodic
B2	12.4	Moderate	1.6	Non-Sodic

Detailed Site 3 –Grey Chromosol

Table 11 Site 3 – Grey Chromosol (Summary)

Site Description	
 Plate 5 – Profile Core 3	 Plate 6 – Landscape looking South-West
ASC Name	Mesotrophic Grey Chromosol
Representative Check Sites	4
Dominant Slope Association	Flat to Gently inclined (1 – 3%)
Land Use	Open grassland
Soil Fertility	Moderately High
Drainage	Poor
BSAL	No

Table 12 Site 3 – Grey Chromosol (Analysis)

Horizon	Depth (m)	Description		
A1	0.00 – 0.20	Very dark brown silty clay loam with moderate pedality and firm consistence. Strongly acidic, non-saline and non-sodic. Moderate CEC with no coarse fragments. Well drained with medium roots common. Gradual boundary.		
A2	0.20 – 0.50	Dark greyish-brown silty heavy clay with moderate pedality and firm consistence. Strongly acidic, non-saline and non-sodic. Low CEC with no coarse fragments. Well drained with medium roots common. Gradual boundary.		
B	0.50 – 1.00	Greyish-brown silty clay with moderate pedality and firm consistence. Strongly acidic, non-saline and non-sodic. Low CEC with no coarse fragments. Poorly drained with 20% orange mottles and few very fine roots.		
Horizon	ECe		Laboratory pH	
	dS/m	Rating	Value	Rating
A1	0.4	Non-Saline	5.1	Strongly Acidic
A2	0.1	Non-Saline	5.5	Strongly Acidic
B	0.1	Non-Saline	5.5	Strongly Acidic
Horizon	CEC		ESP	
	cmol/kg	Rating	%	Rating
A1	14.2	Moderate	1.4	Non-Sodic
A2	10.8	Low	1.9	Non-Sodic
B	9.1	Low	1.1	Non-Sodic

Detailed Site 4 – Black Dermosol

Table 13 Site 4 – Black Dermosol (Summary)

Site Description	
 Plate 5 – Profile Core 4	 Plate 6 – Landscape looking North
ASC Name	Eutrophic Black Dermosol
Representative Check Sites	5, 6, 7, 14, 15
Dominant Slope Association	Flat to Gently inclined (1 – 3%)
Land Use	Open Grassland
Soil Fertility	Moderately High
Drainage	Poor
BSAL	No

Table 14 Site 4 – Black Dermosol (Analysis)

Horizon	Depth (m)	Description		
A1	0.00 – 0.10	Black light medium clay with moderate pedality and firm consistence. Moderately acidic, non-saline and non-sodic. Moderate CEC with nil coarse fragments. Well drained with many coarse roots. Gradual boundary.		
B21	0.10 – 0.40	Very dark grey heavy clay with strong pedality and firm consistence. Moderately acidic, non-saline and non-sodic. Moderate CEC with nil coarse fragments. Poorly drained with 30% orange mottles and fine roots common. Gradual boundary.		
B22	0.40 – 1.00	Very dark greyish-brown silty clay with strong pedality and firm consistence. Slightly acidic, non-saline and non-sodic. Moderate CEC with nil coarse fragments. Poorly drained with 30% orange mottles and few very fine roots.		
Horizon	ECe		Laboratory pH	
	dS/m	Rating	Value	Rating
A1	0.3	Non-Saline	5.7	Moderately Acidic
B21	0.1	Non-Saline	5.9	Moderately Acidic
B22	0.3	Non-Saline	6.1	Slightly Acidic
Horizon	CEC		ESP	
	cmol/kg	Rating	%	Rating
A1	22.7	Moderate	1.3	Non-Sodic
B21	24.7	Moderate	2.0	Non-Sodic
B22	16.5	Moderate	3.6	Non-Sodic

Detailed Site 5 – Red Dermosol

Table 15 Site 5 – Red Dermosol (Summary)

Site Description	
 Plate 7 – Profile Core 5	 Plate 8 – Landscape looking South-West
ASC Name	Mesotrophic Red Dermosol
Representative Check Sites	8
Dominant Slope Association	Flat to Gently inclined (1 – 3%)
Land Use	Open grassland
Soil Fertility	Moderately High
Drainage	Poor
BSAL	No

Table 16 Site 5 – Red Dermosol (Analysis)

Horizon	Depth (m)	Description		
A1	0.00 – 0.20	Dark greyish-brown silty loam with moderate pedality and firm consistence. Moderately acidic, non-saline and non-sodic. Moderate CEC with no coarse fragments. Well drained with fine roots common. Clear boundary.		
A2	0.20 – 0.35	Light reddish-brown silty loam with moderate pedality and firm consistence. Moderately acidic, non-saline and non-sodic. Very low CEC with no coarse fragments. Moderately drained with fine roots common. Clear boundary.		
B2	0.35 – 1.0	Light reddish-brown clay loam with strong pedality and firm consistence. Moderately acidic, non-saline and marginally sodic. Very low CEC with <5% coarse fragments <5 mm. Poorly drained with 50% grey mottles and few very fine roots common.		
Horizon	ECe		Laboratory pH	
	dS/m	Rating	Value	Rating
A1	0.2	Non-Saline	5.7	Moderately Acidic
A2	0.1	Non-Saline	5.7	Moderately Acidic
B2	0.2	Non-Saline	5.6	Moderately Acidic
Horizon	CEC		ESP	
	cmol/kg	Rating	%	Rating
A1	7.6	Low	0.7	Non-Sodic
A2	4.5	Very Low	2.2	Non-Sodic
B2	3.2	Very Low	9.4	Marginally Sodic

Detailed Site 006 – Brown Dermosol

Table 17 Site 006 – Brown Dermosol (Summary)

Site Description	
 Plate 9 – Profile Core 006	 Plate 10 – Landscape looking North-East
ASC Name	Mesotrophic Brown Dermosol
Representative Check Sites	3, 17, 18
Dominant Slope Association	Flat to Gently inclined (1 – 3%)
Land Use	Open grassland
Soil Fertility	Moderate
Drainage	Poor
BSAL	No

Table 18 Site 006 – Brown Dermosol (Analysis)

Horizon	Depth (m)	Description		
A1	0.00 – 0.20	Dark brown silty loam with weak pedality and weak consistence. Moderately acidic, non-saline and non-sodic. Moderate CEC with no coarse fragments. Well drained with coarse roots common. Gradual boundary.		
A2	0.20 – 0.40	Brown silty clay loam with weak pedality and weak consistence. Strongly acidic, non-saline and non-sodic. Low CEC with no coarse fragments. Well drained with coarse roots common. Gradual boundary.		
B1	0.40 – 0.60	Yellowish-brown silty clay loam with weak pedality and weak consistence. Strongly acidic, non-saline and non-sodic. Low CEC with no coarse fragments. Moderately drained with few coarse roots. Clear boundary.		
B2	0.60 – 0.90	Yellowish-brown silty clay loam with moderate pedality and weak consistence. Moderately acidic, non-saline and non-sodic. Low CEC with <10% coarse fragments <20 mm. Poorly drained with 25% grey mottles and few very fine roots		
Horizon	ECe		Laboratory pH	
	dS/m	Rating	Value	Rating
A1	0.3	Non-Saline	5.7	Moderately Acidic
A2	<0.1	Non-Saline	5.4	Strongly Acidic
B1	0.1	Non-Saline	5.4	Strongly Acidic
B2	0.3	Non-Saline	5.2	Strongly Acidic
Horizon	CEC		ESP	
	cmol/kg	Rating	%	Rating
A1	12.2	Moderate	2.5	Non-Sodic
A2	6.7	Low	3.0	Non-Sodic
B1	6.1	Low	4.9	Non-Sodic
B2	6.6	Low	4.5	Non-Sodic

Detailed Site 7 – Red Kandosol

Table 19 Site 7 – Red Kandosol (Summary)

Site Description	
 Plate 11 – Profile Core 7	 Plate 12 – Landscape looking North
ASC Name	Mesotrophic Red Kandosol
Representative Check Sites	9
Dominant Slope Association	Gently to moderately inclined (3 – 5%)
Land Use	Open grassland
Soil Fertility	Moderately Low
Drainage	Poor
BSAL	No

Table 20 Site 7 – Red Kandosol (Analysis)

Horizon	Depth (m)	Description		
A	0.00 – 0.10	Very dark greyish-brown loam with moderate pedality and firm consistence. Moderately acidic, non-saline and non-sodic. Low CEC with <5% coarse fragments <10 mm. Well drained with coarse roots common. Gradual boundary.		
B1	0.10 – 0.40	Brown loam with weak pedality and consistence. Moderately acidic, non-saline and non-sodic. Very low CEC with <10% coarse fragments <10 mm. Moderately drained with fine roots common. Gradual boundary.		
B2	0.40 – 0.80	Light reddish-brown clay loam with weak pedality and consistence. Moderately acidic, non-saline and non-sodic. Very low CEC with 10% coarse fragments <20 mm. Poorly drained with 40 % orange mottles and few fine roots. Clear boundary.		
BC	+0.80	Weathered bedrock (not laboratory tested)		
Horizon	ECe		Laboratory pH	
	dS/m	Rating	Value	Rating
A	0.2	Non-Saline	6.0	Moderately Acidic
B1	0.1	Non-Saline	5.9	Moderately Acidic
B2	0.1	Non-Saline	5.7	Moderately Acidic
Horizon	CEC		ESP	
	cmol/kg	Rating	%	Rating
A	9.2	Low	3.3	Non-Sodic
B1	5.6	Very Low	1.8	Non-Sodic
B2	5.7	Very Low	0.9	Non-Sodic

Detailed Site 8 – Brown Kandosol

Table 21 Site 8 – Brown Kandosol (Summary)

Site Description	
 Plate 13 – Profile Core 8	 Plate 14 – Landscape looking West
ASC Name	Eutrophic Brown Kandosol
Representative Check Sites	19
Dominant Slope Association	Gently to moderately inclined (3 – 5%)
Land Use	Open grassland
Soil Fertility	Moderate
Drainage	Poor
BSAL	No

Table 22 Site 8 – Brown Kandosol (Analysis)

Horizon	Depth (m)	Description		
A	0.00 – 0.30	Black loam with moderate pedality and firm consistence. Moderately acidic, non-saline and non-sodic. Moderate CEC with 20% coarse fragments <10 mm. Well drained with coarse roots common. Gradual boundary.		
B1	0.30 – 0.50	Dark brown loam with weak pedality and consistence. Moderately acidic, non-saline and non-sodic. Low CEC with 25% coarse fragments <20 mm. Moderately drained with fine roots common. Gradual boundary.		
B2	0.40 – 0.80	Yellowish-brown loam with weak pedality and consistence. Moderately acidic, non-saline and non-sodic. Very low CEC with 20% coarse fragments <20 mm. Poorly drained with 50 % orange mottles and few fine roots. Clear boundary.		
BC	+0.80	Weathered bedrock (not laboratory tested)		
Horizon	ECe		Laboratory pH	
	dS/m	Rating	Value	Rating
A	0.1	Non-Saline	6.0	Moderately Acidic
B1	0.1	Non-Saline	6.0	Moderately Acidic
B2	0.4	Non-Saline	6.0	Moderately Acidic
Horizon	CEC		ESP	
	cmol/kg	Rating	%	Rating
A	14.7	Moderate	0.3	Non-Sodic
B1	7.6	Low	1.3	Non-Sodic
B2	5.7	Very Low	1.8	Non-Sodic

Detailed Site 007 – Yellow Kandosol

Table 23 Site 007 – Yellow Kandosol (Summary)

Site Description	
 Plate 15 – Profile Core 007	 Plate 16 – Landscape looking South-East
ASC Name	Eutrophic Yellow Kandosol
Representative Check Sites	10
Dominant Slope Association	Gently to moderately inclined (3 – 5%)
Land Use	Open grassland
Soil Fertility	Moderate
Drainage	Poor
BSAL	No

Table 24 Site 007 – Yellow Kandosol (Analysis)

Horizon	Depth (m)	Description		
A1	0.00 – 0.25	Very dark greyish-brown loamy sand with moderate pedality and weak consistence. Moderately acidic, non-saline and marginally sodic. Very low CEC with <5% coarse fragments <10 mm. Well drained with coarse roots common. Clear boundary.		
A2	0.25 – 0.60	Light olive brown loamy sand with weak pedality and consistence. Moderately acidic, non-saline and non-sodic. Very low CEC with <15% coarse fragments <20 mm. Moderately drained with fine roots common. Clear boundary.		
B2	0.60 – 0.80	Brownish-yellow loam with moderate pedality and weak consistence. Moderately acidic, non-saline and non-sodic. Very low CEC with 10% coarse fragments <20 mm. Poorly drained with 40 % orange mottles and few fine roots. Diffuse boundary.		
BC	+0.80	Weathered bedrock (not laboratory tested)		
Horizon	ECe		Laboratory pH	
	dS/m	Rating	Value	Rating
A1	0.2	Non-Saline	5.6	Moderately Acidic
A2	0.1	Non-Saline	6.0	Moderately Acidic
B2	<0.1	Non-Saline	5.9	Moderately Acidic
Horizon	CEC		ESP	
	cmol/kg	Rating	%	Rating
A1	2.7	Very Low	7.4	Marginally Sodic
A2	1.8	Very Low	5.6	Non-Sodic
B2	3.6	Very Low	2.8	Non-Sodic

Detailed Site 002 – Brown Dermosol

Table 25 Site 002 – Brown Dermosol (Summary)

Site Description	
 Plate 17 – Profile Core 002	 Plate 18 – Landscape looking South-West
ASC Name	Eutrophic Brown Dermosol
Representative Check Sites	16
Dominant Slope Association	Gently to moderately inclined (3 – 5%)
Land Use	Open grassland
Soil Fertility	Moderately High
Drainage	Poor
BSAL	No

Table 26 Site 002 – Brown Dermosol (Analysis)

Horizon	Depth (m)	Description		
A1	0.00 – 0.25	Dark brown silty loam with moderate pedality and weak consistence. Moderately acidic, non-saline and non-sodic. Low CEC with <5% coarse fragments <10 mm. Well drained with coarse roots common. Clear boundary.		
B1	0.25 – 0.60	Dark yellowish-brown silty loam with moderate pedality and weak consistence. Moderately acidic, non-saline and non-sodic. Very low CEC with <10% coarse fragments <20 mm. Moderately drained with fine roots common. Gradual boundary.		
B2	0.60 – 0.90	Dark yellowish-brown clay loam with moderate pedality and weak consistence. Moderately acidic, non-saline and non-sodic. Very low CEC with <5% coarse fragments <20 mm. Poorly drained with 40 % orange mottles and few fine roots.		
Horizon	ECe		Laboratory pH	
	dS/m	Rating	Value	Rating
A1	0.3	Non-Saline	5.7	Moderately Acidic
B1	<0.1	Non-Saline	5.9	Moderately Acidic
B2	<0.1	Non-Saline	5.7	Moderately Acidic
Horizon	CEC		ESP	
	cmol/kg	Rating	%	Rating
A1	8.7	Low	1.1	Marginally Sodic
B1	5.0	Very Low	2.0	Non-Sodic
B2	5.0	Very Low	2.0	Non-Sodic

3 CONCLUSION

The Neubeck Project BSAL Verification Assessment was undertaken in August 2014 by SLR's Murray Fraser and supervised by Clayton Richards (CPSS 2). The assessment area was defined as the proposed Project Application Area totalling approximately 201 ha, as well as the required 100 m buffer (75 ha). The Project Application Area was assessed in accordance with the Interim Protocol and it was found that no BSAL existed within the 276 ha comprising the BSAL Verification Assessment Area.

4 REFERENCES

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Appendix A



Neubeck Coal Project

BSAL Verification Assessment

Supporting Documentation & BSAL Soil Data Cards

Table 1 Site Survey Number and Soil Data Card Identifier Correlation Table

Field Survey Date	Site Survey Number	Unique Soil Data Card Identifier
October 2012	Core 006	1
	Core 007	2
	Core 002	3
August 2014	Core 1	4
	Core 2	5
	Core 3	6
	Core 4	7
	Core 5	8
	Core 7	9
	Core 8	10
August 2014	Check 1	11
	Check 2	12
	Check 3	13
	Check 4	14
	Check 5	15
	Check 6	16
	Check 7	17
	Check 8	18
	Check 9	19
	Check 10	20
	Check 11	21
	Check 12	22
	Check 13	23
	Check 14	24
	Check 15	25
	Check 16	26
	Check 17	27
	Check 18	28
	Check 19	29

Neubeck Coal Project
BSAL Verification Assessment

Detailed Sites

Soil Core 1: Yellow Chromosol



Core 1 – Landscape looking North-West



Core 1 – Soil surface



Core 1 – Soil Profile Yellow Chromosol

Soil Core 2: Yellow Chromosol



Core 2 – Landscape looking North



Core 2 – Soil surface



Core 2 – Soil Profile Yellow Chromosol

Soil Core 3: Grey Chromosol



Core 3 – Landscape looking West



Core 3 – Soil surface



Core 3 – Soil Profile Grey Chromosol

Soil Core 4: Black Dermosol



Core 4 – Landscape looking North-East



Core 4 – Mottling at 60 cm



Core 4 – Soil Profile Black Dermosol

Soil Core 5: Red Dermosol



Core 5 – Landscape looking North-East



Core 5 – Landscape looking South-West



Core 5 – Soil Profile Red Dermosol

Soil Core 006: Brown Dermosol



Core 006 – Landscape looking South-West



Core 006 – Landscape looking North-West



Core 006 – Soil Profile Brown Dermosol

Soil Core 7: Red Kandosol



Core 7 – Landscape looking North



Core 7 – Landscape looking East towards Quarry Area 1



Core 7 – Soil Profile Red Kandosol

Soil Core 8: Brown Kandosol



Core 8 – Landscape looking North-East



Core 8 – Landscape looking West



Core 8 – Soil Profile Brown Kandosol

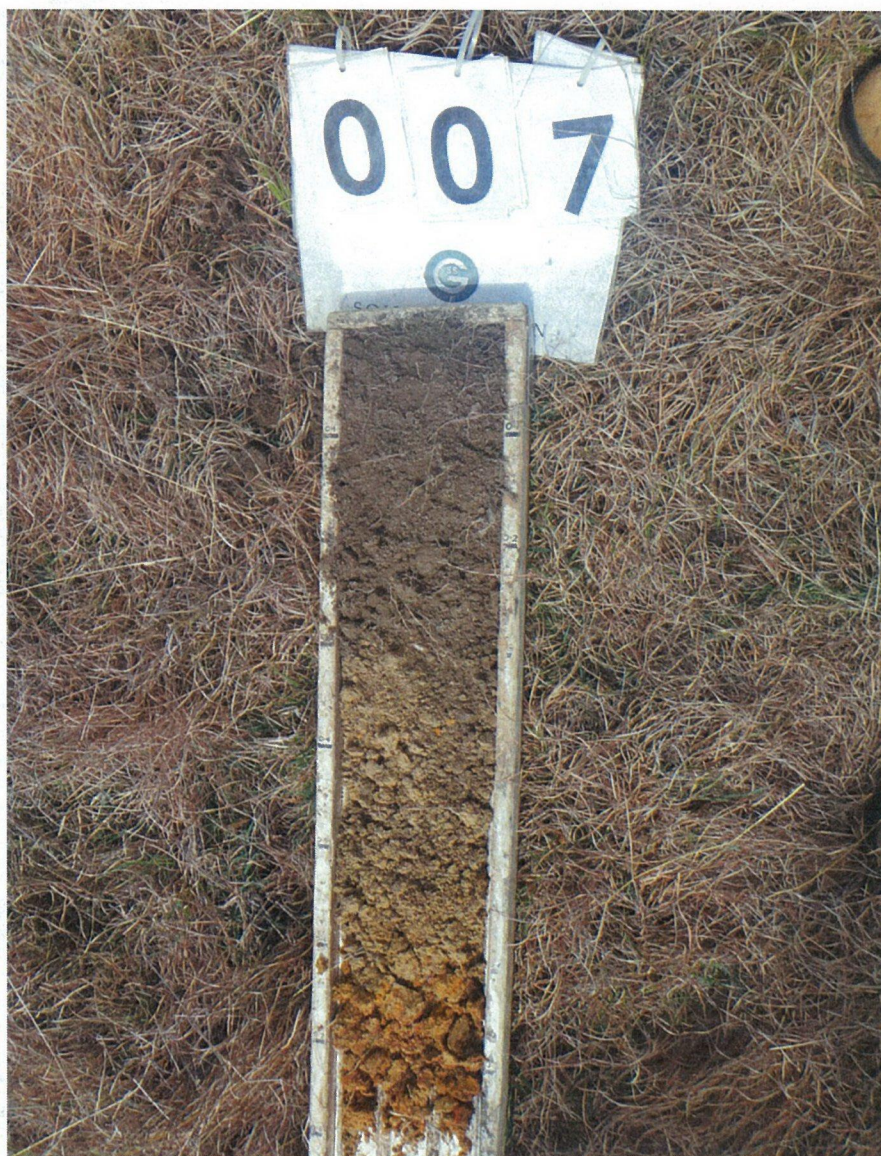
Soil Core 007: Yellow Kandosol



Core 007 – Landscape looking South-East



Core 007 – Landscape looking South-West



Core 007 – Soil Profile Yellow Kandosol

Soil Core 002: Brown Dermosol



Core 002 – Landscape looking South



Core 002 – Surface rock



Core 002 – Soil Profile Brown Dermosol



Check Site 1 – Landscape looking West



Check Site 1 – Yellow Chromosol



Check Site 2 – Landscape looking West



Check Site 2 –Yellow Chromosol



Check Site 3 – Landscape looking South



Check Site 3 – Surface rock on Brown Dermosol



Check Site 4 – Landscape looking East



Check Site 4 – Grey Chromosol



Check Site 5 – Landscape looking North-East



Check Site 5 –Black Dermosol



Check Site 6 – Landscape looking North



Check Site 6 –Black Dermosol



Check Site 7 – Landscape looking East



Check Site 7 –Black Dermosol



Check Site 8 – Landscape looking North-East



Check Site 8 –Red Dermosol



Check Site 9 – Looking South to Quarry Area 1



Check Site 9 –Red Kandosol



Check Site 10 – Landscape looking North-East



Check Site 10 –Yellow Kandosol



Check Site 11 – Quarry Area 2 looking West



Check Site 11 – Yellow Chromosol



Check Site 12 – Landscape looking North-East



Check Site 12 – Yellow Chromosol



Check Site 13 – Landscape looking North-East



Check Site 13 – Yellow Chromosol



Check Site 14 – Landscape looking North



Check Site 14 –Black Dermosol



Check Site 15 – Landscape looking South-West



Check Site 15 – Waterlogged Black Dermosol



Check Site 16 – Landscape looking North-West



Check Site 16 – Brown Dermosol



Check Site 17 – Landscape looking East



Check Site 17 – Brown Dermosol



Check Site 18 – Landscape looking South



Check Site 18 – Brown Dermosol



Check Site 19 – Landscape looking South



Check Site 19 – Brown Kandosol

SURVEY TITLE:

NEUBECK COAL PROJECT

SITE LOCATION:

BLACKMANS FLAT

DETAIL 006



NSW SOIL
AND LAND
INFORMATION
SYSTEM

Please MARK
LIKE THIS ONLY:

- Use 2B pencil
- No pen or biro
- Fully erase mistakes
- Make no stray marks
- Numbers in () show max. entries allowed

PROFILE MAP DETAILS										SURVEY DETAILS									
Profile No.	Map Sheet No.	Eastings					Northings					Described By	Profile Date	Photo Taken (1)	No. of Layers				
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2			
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3			
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4			
5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5			
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6			
7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7			
8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8			
9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9			
10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10			

Potential BSAL? (1)	Site type (1)	BIOPHYSICAL STRATEGIC AGRICULTURAL LAND SOIL DATA CARD	
yes ☐ no ☒	checked ☐ detailed ☒ exclusion ☐		

SOIL TYPE	VEGETATION	LANDFORM ELEMENT (1)									
A.S.C.	Vegetation Community (1)	alcove ☐	cone ☐	footslope ☐	ox-bow ☐	sink hole/doline ☐					
O	unknown ☐	backplain ☐	crater ☐	foredune ☐	pan/playa ☐	stream channel ☐					
SO	rainforest ☐	bank ☐	cut face ☐	gully ☐	pediment ☐	streambed ☐					
GG	wet sclerophyll forest ☐	bar ☐	cut-over surface ☐	hillcrest ☐	pit ☐	summit surface ☐					
SG	dry sclerophyll forest ☐	beach ☐	dam ☐	hillslope ☐	plain ☐	swale ☐					
FAMILY	woodland grass u'storey ☐	beach ridge ☐	drainage depression ☐	lagoon ☐	prior stream ☐	swamp ☐					
M	woodland shrub u'storey ☐	bench ☐	dune ☐	lake ☐	rock flat ☐	talus ☐					
N	tall shrubland ☐	berm ☐	embankment ☐	landslide ☐	rock platform ☐	tidal creek ☐					
W	low shrubland ☐	blow-out ☐	estuary ☐	levee ☐	scald ☐	tidal flat ☐					
Y	heath ☐	channel bench ☐	fan ☐	lunette ☐	scarp ☐	tor ☐					
1	grassland/herbland ☐	cirque ☐	fill top ☐	maar ☐	scree ☐	trench ☐					
2	swamp complex ☐	cliff ☐	flood-out ☐	mound ☐	scroll ☐	valley flat ☐					
3	littoral complex ☐										
4	no vegetation ☐										

LITHOLOGY										TOPOGRAPHY									
Substrate (3)					Slope Percent					Site Morphology (1)									
not identified ☐	limestone ☐	coarse-basic ☐	Slope Percent			flat ☐													
unconsolidated ☐	tuff ☐	fine-acidic ☐	Slope Percent			crest ☐													
gravel ☐	breccia ☐	fine-intermediate ☐	Slope Percent			hillock ☐													
sand ☐	greywacke ☐	fine-basic ☐	Slope Percent			ridge ☐													
silt ☐	arkose ☐	serpentine ☐	Slope Percent			upper slope ☐													
clay ☐	dolomite ☐	gabbro ☐	Slope Percent			midslope ☐													
organic material ☐	calcrete ☐	dolerite ☐	Slope Percent			simple slope ☐													
alluvium ☐	aeolianite ☐	diorite ☐	Slope Percent			lower slope ☐													
colluvium ☐	chert ☐	syenite ☐	Slope Percent			open depression ☐													
sedge ☐	lacustrine ☐	granodiorite ☐	Slope Percent			closed depression ☐													
rush ☐	aeolian ☐	adamellite ☐	Slope Percent																
forb ☐	marine ☐	granite ☐	Slope Percent																
fern/cycad ☐	calcareous sand ☐	aplite ☐	Slope Percent																
moss ☐	fill ☐	quartz porphyry ☐	Slope Percent																
lichen ☐	mud ☐	basalt ☐	Slope Percent																
liverwort ☐	till ☐	andesite ☐	Slope Percent																
vine ☐	sedimentary ☐	trachyte ☐	Slope Percent																
	shale ☐	ryholite ☐	Slope Percent																
	siltstone/mudstone ☐	obsidian ☐	Slope Percent																
	sandstone-quartz ☐	scoria ☐	Slope Percent																
	sandstone-lithic ☐	ash ☐	Slope Percent																
	conglomerate ☐	agglomerate ☐	Slope Percent																
		other ☐	Slope Percent																

LAND USE (1)										HYDROLOGY									
national/state parks ☐					Identification Method (1)					Profile Drainage (1)					Permeability (1)				
timber/scrub/unused ☐					personal assessment ☐					very poorly drained ☐					very slowly permeable ☐				
logged native forest ☐					geology map ☐					poorly drained ☐					slowly permeable ☐				
hardwood plantation ☐					both assessment & map ☐					imperfectly drained ☐					moderately permeable ☐				
softwood plantation ☐					Rock Outcrop % (1)					mod. well-drained ☐					highly permeable ☐				
volun./native pasture ☐					nil ☐ >20-30% ☐					well-drained ☐									
improved pasture ☐					<2% ☐ >30-50% ☐					rapidly drained ☐									
cropping ☐					2-10% ☐ >50% ☐														
orchard/vineyard ☐					>10-20% ☐														
vegetables/flowers ☐																			
urban ☐																			
industrial ☐																			
quarry/mining ☐																			
other ☐																			

SITE CONDITION										Surface Condition										SITE FIELD NOTES														
Site Disturbance(s) (2)					Ground Cover %					Current (2)					Expected					BROWN DERMO SOL														
natural disturbance ☐										cracked ☐					Wet (2)															Dry (2)				
no effective disturbance ☐										self-mulched ☐																								
limited clearing ☐										loose ☐																								
extensive clearing ☐										soft ☐																								
cleared, no cultivation ☐										firm ☐																								
occasional cultivation ☐										hardset ☐																								
rainfed cultivation ☐										surface crust ☐																								
irrigated cultivation ☐										trampled ☐																								
highly disturbed ☐										poached ☐																								
										recently cultivated ☐																								
										water repellent ☐																								
										gravelly ☐																								
										other ☐																								

Please do not mark this space.

4571

DETAIL 007

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4572

[illegible]

cm		mm		0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
1		LAYER STATUS		COLOUR (Munsell, 1994)		Field pH		LAYER NOTES		Field pH Test Method (1)												
		Lower	Horizon	Moist Munsell	Dry Munsell	(1 per layer)	1															
2										Raupach test strip (2)												
3										no effervescence (1)												
4										audible/slight efferv. (2)												
5										strong effervescence (3)												
6										Boundary Distinctiveness												
7										(1 per layer) 1 2 3 4 5												
8										not evident (1)												
9										sharp (<5 mm) (2)												
10										abrupt (5-20 mm) (3)												
11										clear (20-50 mm) (4)												
12										gradual (50-100 mm) (5)												
13										diffuse (>100 mm) (6)												
14										STRUCTURE												
15										Grade of Pedality (1) 1 2 3 4 5												
16										single-grained (1)												
17										massive (2)												
18										weak pedality (3)												
19										moderate pedality (4)												
20										strong pedality (5)												
21										Fabric (1) 1 2 3 4 5												
22										sandy (1)												
23										earthy (2)												
24										rough-faced peds (3)												
25										smooth-faced peds (4)												
26										Dominant (1) 1 2 3 4 5		Ped Shape		Sub-dominant (1) 1 2 3 4 5								
27										1 2 3 4 5		platy		1 2 3 4 5								
28										1 2 3 4 5		lenticular		1 2 3 4 5								
29										1 2 3 4 5		prismatic		1 2 3 4 5								
30										1 2 3 4 5		columnar		1 2 3 4 5								
31										1 2 3 4 5		angular blocky		1 2 3 4 5								
32										1 2 3 4 5		sub-ang. blocky		1 2 3 4 5								
33										1 2 3 4 5		polyhedral		1 2 3 4 5								
34										1 2 3 4 5		granular		1 2 3 4 5								
35										1 2 3 4 5		crumb		1 2 3 4 5								
36										1 2 3 4 5		round		1 2 3 4 5								
37										Dominant (1) 1 2 3 4 5		Ped Size		Sub-dominant (1) 1 2 3 4 5								
38										1 2 3 4 5		<2 mm		1 2 3 4 5								
39										1 2 3 4 5		2-5 mm		1 2 3 4 5								
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41										1 2 3 4 5		10-20 mm		1 2 3 4 5								
42										1 2 3 4 5		20-50 mm		1 2 3 4 5								
43										1 2 3 4 5		50-100 mm		1 2 3 4 5								
44										1 2 3 4 5		100-200 mm		1 2 3 4 5								
45										1 2 3 4 5		200-500 mm		1 2 3 4 5								
46										1 2 3 4 5		> 500 mm		1 2 3 4 5								
47										SEGREGATIONS		Soil Water Status (1 each per layer) 1 2 3 4 5										
48										Type (1 per layer) 1 2 3 4 5		dry (1)										
49										not evident (1)		mod. moist (2)										
50										calcareous (2)		moist (3)										
51										gypseous (3)		wet (4)										
52										manganiferous (4)												
53										ferruginous (5)												
54										ferromanganiferous (5)												
55										organic (6)												
56										not identified (7)												
57										other (8)												
58										Amount (1 per layer) 1 2 3 4 5												
59										none (1)												
60										very few (<2%) (2)												
61										few (2-10%) (3)												
62										common (10-20%) (4)												
63										many (20-50%) (5)												
64										abundant (50-90%) (6)												
65										very abundant (>90%) (7)												
66										Strength (1 per layer) 1 2 3 4 5												
67										weak (1)												
68										strong (2)												
69										Form (1 per layer) 1 2 3 4 5												
70										soft segregations (1)												
71										nodules (2)												
72										fragments (3)												
73										crystals (4)												
74										veins (5)												
75										concretions (6)												
76										root linings (7)												
77										tubules (8)												
78										Size (1 per layer) 1 2 3 4 5												
79										fine (<2 mm) (1)												
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82										v coarse (20-60 mm) (4)												
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84										Sand Fraction 1 2 3 4 5												
85										coarse (1)												
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87										Clay Fraction 1 2 3 4 5												
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Please MARK LIKE THIS ONLY:

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- Use 2B pencil
- No pen or biro
- Fully erase mistakes
- Make no stray marks
- Numbers in () show max. entries allowed

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Please do not mark this space.

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SURVEY TITLE:

NEUBECK COAL PROJECT

SITE LOCATION:

BLACKMANS FLAT

DETAIL 2



NSW SOIL
AND LAND
INFORMATION
SYSTEM

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entries allowed

PROFILE MAP DETAILS				SURVEY DETAILS			
Profile No.	Map Sheet No.	Eastings	Northings	Described By	Profile Date	Photo Taken (1)	No. of Layers
1	1	1	1	1	1	profile	1
2	2	2	2	2	2	site	1
3	3	3	3	3	3	both profile & site	1
4	4	4	4	4	4	Nature of Exposure (2)	2
5	5	5	5	5	5	auger	1
6	6	6	6	6	6	pit	1
7	7	7	7	7	7	batter	1
8	8	8	8	8	8	gully	1
9	9	9	9	9	9	core sample	1
10	10	10	10	10	10	other	1

Potential BSAL? (1)	Site type (1)	BIOPHYSICAL STRATEGIC AGRICULTURAL LAND SOIL DATA CARD	
yes ☐ no ☒	checked ☐ detailed ☒ exclusion ☐		

SOIL TYPE	VEGETATION	LANDFORM ELEMENT (1)			
A.S.C.	Vegetation Community (1)	alcove ☐	cone ☐	footslope ☐	ox-bow ☐
O	unknown ☐	backplain ☐	crater ☐	foredune ☐	pan/playa ☐
SO	rainforest ☐	bank ☐	cut face ☐	gully ☐	pediment ☐
GA	wet sclerophyll forest ☐	bar ☐	cut-over surface ☐	hillcrest ☐	pit ☐
DO	dry sclerophyll forest ☐	beach ☐	dam ☐	hillslope ☐	plain ☐
BN	woodland grass u/storey ☐	beach ridge ☐	drainage depression ☐	lagoon ☐	prior stream ☐
OW	woodland shrub u/storey ☐	bench ☐	dune ☐	lake ☐	rock flat ☐
C	tall shrubland ☐	berm ☐	embankment ☐	landslide ☐	rock platform ☐
I	low shrubland ☐	blow-out ☐	estuary ☐	levee ☐	scald ☐
G.S.G.	heath ☐	channel bench ☐	fan ☐	lunette ☐	scarp ☐
	grassland/herbland ☐	cirque ☐	fill top ☐	maar ☐	scree ☐
	swamp complex ☐	cliff ☐	flood-out ☐	mound ☐	scroll ☐
	littoral complex ☐				
	no vegetation ☐				

LITHOLOGY		TOPOGRAPHY	
Growth Forms (4)	Substrate (3)	Slope Percent	Site Morphology (1)
tree ☐	not identified ☐	☐ ☐ ☐	flat ☐
tree mallee ☐	unconsolidated ☐	☐ ☐ ☐	crest ☐
shrub ☐	limestone ☐	☐ ☐ ☐	hillock ☐
mallee shrub ☐	tuff ☐	☐ ☐ ☐	ridge ☐
heath shrub ☐	breccia ☐	☐ ☐ ☐	upper slope ☐
chenopod shrub ☐	greywacke ☐	☐ ☐ ☐	midslope ☐
hummock grass ☐	silt ☐	☐ ☐ ☐	simple slope ☐
tussock grass ☐	clay ☐	☐ ☐ ☐	lower slope ☐
sod grass ☐	organic material ☐	☐ ☐ ☐	open depression ☐
sedge ☐	alluvium ☐	☐ ☐ ☐	closed depression ☐
rush ☐	colluvium ☐	☐ ☐ ☐	
forb ☐	lacustrine ☐	☐ ☐ ☐	
fern/cycad ☐	aeolian ☐	☐ ☐ ☐	
moss ☐	marine ☐	☐ ☐ ☐	
lichen ☐	calcareous sand ☐	☐ ☐ ☐	
liverwort ☐	fill ☐	☐ ☐ ☐	
vine ☐	mud ☐	☐ ☐ ☐	
	till ☐	☐ ☐ ☐	
	sedimentary ☐	☐ ☐ ☐	
	shale ☐	☐ ☐ ☐	
	siltstone/mudstone ☐	☐ ☐ ☐	
	sandstone-quartz ☐	☐ ☐ ☐	
	sandstone-lithic ☐	☐ ☐ ☐	
	conglomerate ☐	☐ ☐ ☐	
	coarse-acidic ☐	☐ ☐ ☐	
	coarse-intermediate ☐	☐ ☐ ☐	

HYDROLOGY		SITE FIELD NOTES	
Profile Drainage (1)	Permeability (1)	4564 Photo file name/s: DETAILED SITE 2	
very poorly drained ☐	very slowly permeable ☐		
poorly drained ☐	slowly permeable ☐		
imperfectly drained ☐	moderately permeable ☐		
mod. well-drained ☐	highly permeable ☐		
well-drained ☐			
rapidly drained ☐			

SITE CONDITION		Surface Condition	
Site Disturbance(s) (2)	Ground Cover %	Current (2)	Expected Wet (2) Dry (2)
natural disturbance ☐	☐ ☐	cracked ☐	☐ ☐
no effective disturbance ☐	☐ ☐	self-mulched ☐	☐ ☐
limited clearing ☐	☐ ☐	loose ☐	☐ ☐
extensive clearing ☐	☐ ☐	soft ☐	☐ ☐
cleared, no cultivation ☐	☐ ☐	firm ☐	☐ ☐
occasional cultivation ☐	☐ ☐	hardset ☐	☐ ☐
rainfed cultivation ☐	☐ ☐	surface crust ☐	☐ ☐
irrigated cultivation ☐	☐ ☐	trampled ☐	☐ ☐
highly disturbed ☐	☐ ☐	poached ☐	☐ ☐
		recently cultivated ☐	☐ ☐
		water repellent ☐	☐ ☐
		gravelly ☐	☐ ☐
		other ☐	☐ ☐

Please do not mark this space.

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SURVEY TITLE: NEUBECK COAL PROJECT
SITE LOCATION: BLACKMANS FLAT

DETAIL 3



NSW SOIL
AND LAND
INFORMATION
SYSTEM

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entries allowed

PROFILE MAP DETAILS				SURVEY DETAILS			
Profile No.	Map Sheet No.	Eastings	Northings	Described By	Profile Date	Photo Taken (1)	No. of Layers
1	1	1	1	1	1	profile	1
2	2	2	2	2	2	site	1
3	3	3	3	3	3	both profile & site	1
4	4	4	4	4	4	Nature of Exposure (2)	2
5	5	5	5	5	5	auger	1
6	6	6	6	6	6	pit	1
7	7	7	7	7	7	batter	1
8	8	8	8	8	8	gully	1
9	9	9	9	9	9	core sample	1
10	10	10	10	10	10	other	1

Potential BSAL? (1)	Site type (1)	BIOPHYSICAL STRATEGIC AGRICULTURAL LAND SOIL DATA CARD	
yes ☐ no ☒	checked ☐ detailed ☒ exclusion ☐		

SOIL TYPE	VEGETATION	LANDFORM ELEMENT (1)			
A.S.C.	Vegetation Community (1)	alcove	cone	footslope	ox-bow
O	unknown	backplain	crater	foredune	pan/playa
SO	rainforest	bank	cut face	gully	pediment
AS	wet sclerophyll forest	bar	cut-over surface	hillcrest	pit
S	dry sclerophyll forest	beach	dam	hillslope	plain
GG	woodland grass u'storey	beach ridge	drainage depression	lagoon	prior stream
SG	woodland shrub u'storey	bench	dune	lake	rock flat
F	tall shrubland	berm	embankment	landslide	rock platform
W	low shrubland	blow-out	estuary	levee	scald
N	heath	channel bench	fan	lunette	scarp
O	grassland/herbland	cirque	fill top	maar	scree
B	swamp complex	cliff	flood-out	mound	scroll
E	littoral complex				
N	no vegetation				
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I					
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LITHOLOGY		TOPOGRAPHY	
Substrate (3)		Slope Percent	Site Morphology (1)
not identified	limestone	0-10	flat
unconsolidated	tuff	11-20	crest
gravel	breccia	21-30	hillock
sand	greywacke	31-40	ridge
silt	arkose	41-50	upper slope
clay	dolomite	51-60	midslope
organic material	calcrete	61-70	simple slope
alluvium	aeolianite	71-80	lower slope
colluvium	chert	81-90	open depression
lacustrine	jasper	91-100	closed depression
aeolian	metamorphic		
marine	gneiss		
calcareous sand	schist/phylite		
fill	slate		
mud	hornfels		
till	quartzite		
sedimentary	greenstone		
shale	amphibolite		
siltstone/mudstone	marble		
sandstone-quartz	igneous		
sandstone-lithic	coarse-acidic		
conglomerate	coarse-intermediate		

HYDROLOGY	
Profile Drainage (1)	Permeability (1)
very poorly drained	very slowly permeable
poorly drained	slowly permeable
imperfectly drained	moderately permeable
mod. well-drained	highly permeable
well-drained	
rapidly drained	

SITE FIELD NOTES	
GREY CHROMO SOL	

SITE CONDITION		Surface Condition	
Site Disturbance(s) (2)	Ground Cover %	Current (2)	Expected
		Wet (2)	Dry (2)
natural disturbance		cracked	
no effective disturbance		self-mulched	
limited clearing		loose	
extensive clearing		soft	
cleared, no cultivation		firm	
occasional cultivation		hardset	
rainfed cultivation		surface crust	
irrigated cultivation		trampled	
highly disturbed		poached	
		recently cultivated	
		water repellent	
		gravelly	
		other	

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DETA 114

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NSW SOIL
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LAND SOIL DATA CARD

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Aspect (1)	Shape Morphology (1)
	flat (1)
	crest (2)
	hillcock (3)
	ridge (4)
	upper slope (5)
	midslope (6)
	simple slope (7)
	lower slope (8)
	open depression (9)
	closed depression (10)

(H) (H)						
(S) (S)	shale	(18)	amphibolite	(20)	rhynolite	(22)
(S) (S)	siltstone/mudstone	(19)	marble	(21)	chert	(23)
	LAND USE (1)				Microrelief Type (1)	

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cm	LAYER STATUS					COLOUR (Munsell, 1994)					Field pH					LAYER NOTES					Field pH Test Method (1)				
	Lower	Horizon	Moist Munsell	Dry Munsell	Field pH (1 per layer)	Moist Munsell	Dry Munsell	Field pH	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5		
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NEUMBECK COAL PROJECT BLACKMANS FLAT

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BIOPHYSICAL STRATEGIC AGRICULTURAL
LAND SOIL DATA CARD

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Detail 7

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LAYER STATUS		COLOUR (Munsell, 1994)					Field pH	LAYER NOTES					Field pH Test Method (1)				
		Moist Munsell		Dry Munsell			(1 per layer)										
Lower	Horizon	1	2	3	4	5	1										
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SURVEY TITLE:
SITE LOCATION:

NEUBECK COAL PROJECT
BLACKMAN'S FLAT

DETAIL 8

PROFILE MAP DETAILS										SURVEY DETAILS									
Profile No.	Map Sheet No.	Eastings					Northings					Described By	Profile Date	Photo Taken (1)	No. of Layers				
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Potential BSAL? (1) Site type (1)										BIOPHYSICAL STRATEGIC AGRICULTURAL LAND SOIL DATA CARD									
yes (1) no (2) checked (1) detailed (2) exclusion (3)																			
SOIL TYPE										VEGETATION									
A.S.C.										Vegetation Community (1)									
0										unknown (1)									
1										rainforest (2)									
2										wet sclerophyll forest (3)									
3										dry sclerophyll forest (4)									
4										woodland grass viney (5)									
5										woodland shrub viney (6)									
6										low shrubland (7)									
7										heath (8)									
8										grassland/heathland (9)									
9										swamp complex (10)									
10										littoral complex (11)									
11										no vegetation (12)									
12										Growth Forms (4)									
13										tree (1)									
14										tree mallee (2)									
15										mallee shrub (3)									
16										heath shrub (4)									
17										chaparral shrub (5)									
18										hummock grass (6)									
19										tussock grass (7)									
20										sedge (8)									
21										rush (9)									
22										lomb (10)									
23										templewood (11)									
24										moss (12)									
25										lichen (13)									
26										liverwort (14)									
27										vine (15)									
28										LAND USE (1)									
29										national/state parks (1)									
30										timber/scribbled (2)									
31										logged native forest (3)									
32										hardwood plantation (4)									
33										softwood plantation (5)									
34										volcanic/native pasture (6)									
35										improved pasture (7)									
36										cropping (8)									
37										orchard/vineyard (9)									
38										vegetables/flowers (10)									
39										urban (11)									
40										industrial (12)									
41										quarry/mining (13)									
42										other (14)									
43										Identification Method (1)									
44										personal assessment (2)									
45										geology map (3)									
46										both assessment & map (4)									
47										Rock Outcrop % (1)									
48										nil (2)									
49										<2% (3)									
50										2-10% (4)									
51										>10-20% (5)									
52										>20-30% (6)									
53										>30-50% (7)									
54										>50% (8)									
55										Surface Condition									
56										Current (2)									
57										Expected									
58										Wet (2)									
59										Dry (2)									
60										cracked (1)									
61										self-mulched (2)									
62										loose (3)									
63										soft (4)									
64										firm (5)									
65										hardset (6)									
66										surface crust (7)									
67										trampled (8)									
68										poached (9)									
69										recently cultivated (10)									
70										water repellent (11)									
71										gravely (12)									
72										other (13)									
73										HYDROLOGY									
74										Profile Drainage (1)									
75										very poorly drained (1)									
76										poorly drained (2)									
77										imperfectly drained (3)									
78										mod. well-drained (4)									
79										well-drained (5)									
80										rapidly drained (6)									
81										Permeability (1)									
82										very slowly permeable (1)									
83										slowly permeable (2)									
84										moderately permeable (3)									
85										highly permeable (4)									
86										Depth (1) & Extent (1)									
87										< 500 mm depth (1)									
88										> 500 mm depth (2)									
89										< 50% area (3)									
90										> 50% area (4)									
91										microlith Type (1)									
92										none (1)									
93										normal gylai (2)									
94										crabhole gylai (3)									
95										linear gylai (4)									
96										lattice gylai (5)									
97										melonhole gylai (6)									
98										other (7)									
99										Slope Measurement Method (1)									
100										inclinometer (1)									
101										Abney level (2)									
102										total station (3)									
103										RTK GPS (4)									
104										LIDAR (5)									
105										Aspect (1)									
106										waxing (1)									
107										waning (2)									
108										maximal (3)									
109										minimal (4)									
110										Slope Morphology (1)									
111										flat (1)									
112										crest (2)									
113										hillock (3)									
114										ridge (4)									
115										upper slope (5)									
116										mid-slope (6)									
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119										open depression (9)									
120										closed depression (10)									
121										Site Morphology (1)									
122										flat (1)									
123										crest (2)									
124										hillock (3)									
125										ridge (4)									
126										upper slope (5)									
127										mid-slope (6)									
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129										lower slope (8)									
130										open depression (9)									
131										closed depression (10)									
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300										valley flat (179)									

[illegible]

SURVEY TITLE:
SITE LOCATION:

NEURECK COAL PROJECT
BLACKMANS FLAT

CHECK 1

PROFILE MAP DETAILS										SURVEY DETAILS			
Profile No.	Map Sheet No.	Eastings		Northings		Described By		Profile Date		Photo Taken (1)		No. of Layers	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	
(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	
(27)	(28)	(29)	(30)	(31)	(32)	(33)	(34)	(35)	(36)	(37)	(38)	(39)	
(40)	(41)	(42)	(43)	(44)	(45)	(46)	(47)	(48)	(49)	(50)	(51)	(52)	
(53)	(54)	(55)	(56)	(57)	(58)	(59)	(60)	(61)	(62)	(63)	(64)	(65)	
(66)	(67)	(68)	(69)	(70)	(71)	(72)	(73)	(74)	(75)	(76)	(77)	(78)	
(79)	(80)	(81)	(82)	(83)	(84)	(85)	(86)	(87)	(88)	(89)	(90)	(91)	
(92)	(93)	(94)	(95)	(96)	(97)	(98)	(99)	(100)	(101)	(102)	(103)	(104)	
(105)	(106)	(107)	(108)	(109)	(110)	(111)	(112)	(113)	(114)	(115)	(116)	(117)	
(118)	(119)	(120)	(121)	(122)	(123)	(124)	(125)	(126)	(127)	(128)	(129)	(130)	
(131)	(132)	(133)	(134)	(135)	(136)	(137)	(138)	(139)	(140)	(141)	(142)	(143)	
(144)	(145)	(146)	(147)	(148)	(149)	(150)	(151)	(152)	(153)	(154)	(155)	(156)	
(157)	(158)	(159)	(160)	(161)	(162)	(163)	(164)	(165)	(166)	(167)	(168)	(169)	
(170)	(171)	(172)	(173)	(174)	(175)	(176)	(177)	(178)	(179)	(180)	(181)	(182)	
(183)	(184)	(185)	(186)	(187)	(188)	(189)	(190)	(191)	(192)	(193)	(194)	(195)	
(196)	(197)	(198)	(199)	(200)	(201)	(202)	(203)	(204)	(205)	(206)	(207)	(208)	
(209)	(210)	(211)	(212)	(213)	(214)	(215)	(216)	(217)	(218)	(219)	(220)	(221)	
(222)	(223)	(224)	(225)	(226)	(227)	(228)	(229)	(230)	(231)	(232)	(233)	(234)	
(235)	(236)	(237)	(238)	(239)	(240)	(241)	(242)	(243)	(244)	(245)	(246)	(247)	
(248)	(249)	(250)	(251)	(252)	(253)	(254)	(255)	(256)	(257)	(258)	(259)	(260)	
(261)	(262)	(263)	(264)	(265)	(266)	(267)	(268)	(269)	(270)	(271)	(272)	(273)	
(274)	(275)	(276)	(277)	(278)	(279)	(280)	(281)	(282)	(283)	(284)	(285)	(286)	
(287)	(288)	(289)	(290)	(291)	(292)	(293)	(294)	(295)	(296)	(297)	(298)	(299)	
(300)	(301)	(302)	(303)	(304)	(305)	(306)	(307)	(308)	(309)	(310)	(311)	(312)	
(313)	(314)	(315)	(316)	(317)	(318)	(319)	(320)	(321)	(322)	(323)	(324)	(325)	
(326)	(327)	(328)	(329)	(330)	(331)	(332)	(333)	(334)	(335)	(336)	(337)	(338)	
(339)	(340)	(341)	(342)	(343)	(344)	(345)	(346)	(347)	(348)	(349)	(350)	(351)	
(352)	(353)	(354)	(355)	(356)	(357)	(358)	(359)	(360)	(361)	(362)	(363)	(364)	
(365)	(366)	(367)	(368)	(369)	(370)	(371)	(372)	(373)	(374)	(375)	(376)	(377)	
(378)	(379)	(380)	(381)	(382)	(383)	(384)	(385)	(386)	(387)	(388)	(389)	(390)	
(391)	(392)	(393)	(394)	(395)	(396)	(397)	(398)	(399)	(400)	(401)	(402)	(403)	
(404)	(405)	(406)	(407)	(408)	(409)	(410)	(411)	(412)	(413)	(414)	(415)	(416)	
(417)	(418)	(419)	(420)	(421)	(422)	(423)	(424)	(425)	(426)	(427)	(428)	(429)	
(430)	(431)	(432)	(433)	(434)	(435)	(436)	(437)	(438)	(439)	(440)	(441)	(442)	
(443)	(444)	(445)	(446)	(447)	(448)	(449)	(450)	(451)	(452)	(453)	(454)	(455)	
(456)	(457)	(458)	(459)	(460)	(461)	(462)	(463)	(464)	(465)	(466)	(467)	(468)	
(469)	(470)	(471)	(472)	(473)	(474)	(475)	(476)	(477)	(478)	(479)	(480)	(481)	
(482)	(483)	(484)	(485)	(486)	(487)	(488)	(489)	(490)	(491)	(492)	(493)	(494)	
(495)	(496)	(497)	(498)	(499)	(500)	(501)	(502)	(503)	(504)	(505)	(506)	(507)	
(508)	(509)	(510)	(511)	(512)	(513)	(514)	(515)	(516)	(517)	(518)	(519)	(520)	
(521)	(522)	(523)	(524)	(525)	(526)	(527)	(528)	(529)	(530)	(531)	(532)	(533)	
(534)	(535)	(536)	(537)	(538)	(539)	(540)	(541)	(542)	(543)	(544)	(545)	(546)	
(547)	(548)	(549)	(550)	(551)	(552)	(553)	(554)	(555)	(556)	(557)	(558)	(559)	
(560)	(561)	(562)	(563)	(564)	(565)	(566)	(567)	(568)	(569)	(570)	(571)	(572)	
(573)	(574)	(575)	(576)	(577)	(578)	(579)	(580)	(581)	(582)	(583)	(584)	(585)	
(586)	(587)	(588)	(589)	(590)	(591)	(592)	(593)	(594)	(595)	(596)	(597)	(598)	
(599)	(600)	(601)	(602)	(603)	(604)	(605)	(606)	(607)	(608)	(609)	(610)	(611)	
(612)	(613)	(614)	(615)	(616)	(617)	(618)	(619)	(620)	(621)	(622)	(623)	(624)	
(625)	(626)	(627)	(628)	(629)	(630)	(631)	(632)	(633)	(634)	(635)	(636)	(637)	
(638)	(639)	(640)	(641)	(642)	(643)	(644)	(645)	(646)	(647)	(648)	(649)	(650)	
(651)	(652)	(653)	(654)	(655)	(656)	(657)	(658)	(659)	(660)	(661)	(662)	(663)	
(664)	(665)	(666)	(667)	(668)	(669)	(670)	(671)	(672)	(673)	(674)	(675)	(676)	
(677)	(678)	(679)	(680)	(681)	(682)	(683)	(684)	(685)	(686)	(687)	(688)	(689)	
(690)	(691)	(692)	(693)	(694)	(695)	(696)	(697)	(698)	(699)	(700)	(701)	(702)	
(703)	(704)	(705)	(706)	(707)	(708)	(709)	(710)	(711)	(712)	(713)	(714)	(715)	
(716)	(717)	(718)	(719)	(720)	(721)	(722)	(723)	(724)	(725)	(726)	(727)	(728)	
(729)	(730)	(731)	(732)	(733)	(734)	(735)	(736)	(737)	(738)	(739)	(740)	(741)	
(742)	(743)	(744)	(745)	(746)	(747)	(748)	(749)	(750)	(751)	(752)	(753)	(754)	
(755)	(756)	(757)	(758)	(759)	(760)	(761)	(762)	(763)	(764)	(765)	(766)	(767)	
(768)	(769)	(770)	(771)	(772)	(773)	(774)	(775)	(776)	(777)	(778)	(779)	(780)	
(781)	(782)	(783)	(784)	(785)	(786)	(787)	(788)	(789)	(790)	(791)	(792)	(793)	
(794)	(795)	(796)	(797)	(798)	(799)	(800)	(801)	(802)	(803)	(804)	(805)	(806)	
(807)	(808)	(809)	(810)	(811)	(812)	(813)	(814)	(815)	(816)	(817)	(818)	(819)	
(820)	(821)	(822)	(823)	(824)	(825)	(826)	(827)	(828)	(829)	(830)	(831)	(832)	
(833)	(834)	(835)	(836)	(837)	(838)	(839)	(840)	(841)	(842)	(843)	(844)	(845)	
(846)	(847)	(848)	(849)	(850)	(851)	(852)	(853)	(854)	(855)	(856)	(857)	(858)	
(859)	(860)	(861)	(862)	(863)	(864)	(865)	(866)	(867)	(868)	(869)	(870)	(871)	
(872)	(873)	(874)	(875)	(876)	(877)	(878)	(879)	(880)	(881)	(882)	(883)	(884)	
(885)	(886)	(887)	(888)	(889)	(890)	(891)	(892)	(893)	(894)	(895)	(896)	(897)	
(898)	(899)	(900)	(901)	(902)	(903)	(904)	(905)	(906)	(907)	(908)	(909)	(910)	
(911)	(912)	(913)	(914)	(915)	(916)	(917)	(918)	(919)	(920)	(921)	(922)	(923)	
(924)	(925)	(926)	(927)	(928)	(929)	(930)	(931)	(932)	(933)	(934)	(935)	(936)	
(937)	(938)	(939)	(940)	(941)	(942)	(943)	(944)	(945)	(946)	(947)	(948)	(949)	
(950)	(951)	(952)	(953)	(954)	(955)	(956)	(957)	(958)	(959)	(960)	(961)	(962)	
(963)	(964)	(965)	(966)	(967)	(968)	(969)	(970)	(971)	(972)	(973)	(974)	(975)	
(976)	(977)	(978)	(979)	(980)	(981)	(982)	(983)	(984)	(985)	(986)	(987)	(988)	
(989)	(990)	(991)	(992)	(993)	(994)	(995)	(996)	(997)	(998)	(999)	(1000)	(1001)	
(1002)	(1003)	(1004)	(1005)	(1006)	(1007)	(1008)	(1009)	(1010)	(1011)	(1012)	(1013)	(1014)	
(1015)	(1016)	(1017)	(1018)	(1019)	(1020)	(1021)	(1022)	(1023)	(1024)	(1025)	(1026)	(1027)	
(1028)	(1029)	(1030)	(1031)	(1032)	(1033)	(1034)	(1035)	(1036)	(1037)	(1038)	(1039)	(1040)	
(1041)	(1042)	(1043)	(1044)	(1045)	(1046)	(1047)	(1048)	(1049)	(1050)	(1051)	(1052)	(1053)	
(1054)	(1055)	(1056)	(1057)	(1058)	(1059)	(1060)	(1061)	(1062)	(1063)	(1064)	(1065)	(1066)	
(1067)	(1068)	(1069)	(1070)	(1071)	(1072)	(1073)	(1074)	(1075)	(1076)	(1077)	(1078)	(1079)	
(1080)	(1081)	(1082)	(1083)	(1084)	(1085)	(1086)	(1087)	(1088)	(1089)	(1090)	(1091)	(1092)	
(1093)	(1094)	(1095)	(1096)	(1097)	(1098)	(1099)	(1100)	(1101)	(1102)	(1103)	(1104)	(1105)	
(1106)	(1107)	(1108)	(1109)	(1110)	(1111)	(1112)	(1113)	(1114)	(1115)	(1116)	(1117)	(1118)	
(1119)	(1120)	(1121)	(1122)	(1123)	(1124)	(1125)	(1126)	(1127)	(1128)	(1129)	(1130)	(1131)	
(1132)	(1133)	(1134)	(1135)	(1136)	(1137)	(1138)	(1139)	(1140)	(1141)	(1142)	(1143)	(1144)	
(1145)	(1146)	(1147)	(1148)	(1149)	(1150)	(1151)	(1152)	(1153)	(1154)	(1155)	(1156)	(1157)	
(1158)	(1159)	(1160)	(1161)	(1162)	(1163)	(1164)	(1165)	(1166)	(1167)	(1168)	(1169)	(1170)	
(1171)	(1172)	(1173)	(1174)	(1175)	(1176)	(1177)	(1178)	(1179)	(1180)	(1181)	(1182)	(1183)	
(1184)	(1185)	(1186)	(1187)	(1188)	(1189)	(1190)	(1191)	(1192)	(1193)	(1194)	(1195)	(1196)	
(1197)	(1198)	(1199)	(1200)	(1201)	(1202)	(1203)	(1204)	(1205)	(1206)	(1207)	(1208)	(1209)	
(1210)	(1211)	(1212)	(1213)	(1214)	(1215)	(1216)	(1217)	(1218)	(1219)	(1220)	(1221)	(1222)	
(1223)	(1224)	(1225)	(1226)	(1227)	(1228)	(1229)	(1230)	(1231)	(1232)	(1233)	(1234)	(1235)	
(1236)	(1237)	(1238)	(1239)	(1240)	(1241)	(1242)	(1243)	(1244)	(1245)	(1246)	(1247)	(1248)	
(1249)	(1250)	(1251)	(1252)	(1253)	(1254)	(1255)	(1256)	(1257)	(1258)	(1259)	(1260)	(1261)	
(1262)	(1263)	(1264)	(1265)	(1266)	(1267)	(1268)	(1269)	(1270)	(1271)	(1272)	(1273)	(1274)	
(1275)	(1276)	(1277)	(1278)	(1279)	(1280)	(1281)	(1282)	(1283)	(1284)	(1285)	(1286)	(1287)	
(1288)	(1289)	(1290)	(1291)	(1292)	(1293)	(1294)	(1295)	(1296)	(1297)	(1298)	(1299)	(1300)	
(1301)	(1302)	(1303)	(1304)	(1305)	(1306)	(1307)	(1308)	(1309)	(1310)	(1311)	(1312)	(1313)	
(1314)	(1315)	(1316)	(1317)	(1318)	(1319)	(1320)	(1321)	(1322)	(1323)	(1324)	(1325)	(1326)	
(1327)	(1328)	(1329)	(1330)	(1331)	(1332)	(1333)	(1334)	(1335)	(1336)	(1337)	(1338)	(1339)	
(1340)	(1341)	(1342)	(1343)	(1344)	(1345)	(1346)	(1347)	(1348)	(1349)	(1350)	(1351)	(1352)	
(1353)	(1354)	(1355)	(1356)	(1357)	(1358)	(1359)	(1360)	(1361)	(1362)	(1363)	(1364)	(1365)	
(1366)	(1367)	(1368)	(1369)	(1370)	(1371)	(1372)	(1373)	(1374)	(1375)	(1376)	(1377)	(1378)	
(1379)	(1380)	(1381)	(1382)	(1383)	(1384)	(1385)	(1386)	(1387)	(1388)	(1389)	(1390)	(1391)	
(1392)	(1393)	(1394)	(1395)	(1396)	(1397)	(1398)	(1399)	(1400)	(1401)	(1402)	(1403)	(1404)	
(1405)	(1406)	(1407)	(1408)	(1409)	(1410)	(1411)	(1412)	(1413)	(1414)	(1415)	(1416)	(1417)	
(1418)	(1419)	(1420)	(1421)										

cm	LAYER STATUS					COLOUR (Munsell, 1994)					Field pH					LAYER NOTES					Field pH Test Method (1)													
	Lower	Horizon	Moist Munsell	Dry Munsell	Field pH (1 per layer)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
1	Lower	Horizon	Moist Munsell	Dry Munsell	Field pH (1 per layer)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
2	Lower	Horizon	Moist Munsell	Dry Munsell	Field pH (1 per layer)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
3	Lower	Horizon	Moist Munsell	Dry Munsell	Field pH (1 per layer)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
4	Lower	Horizon	Moist Munsell	Dry Munsell	Field pH (1 per layer)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
5	Lower	Horizon	Moist Munsell	Dry Munsell	Field pH (1 per layer)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
6	Lower	Horizon	Moist Munsell	Dry Munsell	Field pH (1 per layer)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
7	Lower	Horizon	Moist Munsell	Dry Munsell	Field pH (1 per layer)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
8	Lower	Horizon	Moist Munsell	Dry Munsell	Field pH (1 per layer)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
9	Lower	Horizon	Moist Munsell	Dry Munsell	Field pH (1 per layer)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
10	Lower	Horizon	Moist Munsell	Dry Munsell	Field pH (1 per layer)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
11	Lower	Horizon	Moist Munsell	Dry Munsell	Field pH (1 per layer)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
12	Lower	Horizon	Moist Munsell	Dry Munsell	Field pH (1 per layer)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
13	Lower	Horizon	Moist Munsell	Dry Munsell	Field pH (1 per layer)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
14	Lower	Horizon	Moist Munsell	Dry Munsell	Field pH (1 per layer)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
15	Lower	Horizon	Moist Munsell	Dry Munsell	Field pH (1 per layer)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
16	Lower	Horizon	Moist Munsell	Dry Munsell	Field pH (1 per layer)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
17	Lower	Horizon	Moist Munsell	Dry Munsell	Field pH (1 per layer)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
18	Lower	Horizon	Moist Munsell	Dry Munsell	Field pH (1 per layer)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
19	Lower	Horizon	Moist Munsell	Dry Munsell	Field pH (1 per layer)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
20	Lower	Horizon	Moist Munsell	Dry Munsell	Field pH (1 per layer)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
21	Lower	Horizon	Moist Munsell	Dry Munsell	Field pH (1 per layer)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
22	Lower	Horizon	Moist Munsell	Dry Munsell	Field pH (1 per layer)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
23	Lower	Horizon	Moist Munsell	Dry Munsell	Field pH (1 per layer)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
24	Lower	Horizon	Moist Munsell	Dry Munsell	Field pH (1 per layer)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
25	Lower	Horizon	Moist Munsell	Dry Munsell	Field pH (1 per layer)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
26	Lower	Horizon	Moist Munsell	Dry Munsell	Field pH (1 per layer)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
27	Lower	Horizon	Moist Munsell	Dry Munsell	Field pH (1 per layer)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
28	Lower	Horizon	Moist Munsell	Dry Munsell	Field pH (1 per layer)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
29	Lower	Horizon	Moist Munsell	Dry Munsell	Field pH (1 per layer)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29

SEGREGATIONS

Type (1 per layer) 1 2 3 4 5

not evident

calcareous

gypseous

manganiferous

ferruginous

ferromanganiferous

organic

not identified

other

Amount (1 per layer) 1 2 3 4 5

very few (<2%)

few (2-10%)

common (10-20%)

many (20-50%)

abundant (>50%)

Strength (1 per layer) 1 2 3 4 5

weak

strong

Form (1 per layer) 1 2 3 4 5

soil segregations

nodules

fragments

crystals

veins

concretions

root linings

tubules

Size (1 per layer) 1 2 3 4 5

fine (<2 mm)

medium (2-6 mm)

coarse (6-20 mm)

very coarse (20-60 mm)

ext coarse (>60 mm)

SOIL WATER STATUS

(1 each per layer)

dry

mod. moist

moist

wet

Texture (1 each per layer)

loamy sand

clayey sand

sandy loam

loam

silty loam

sandy clay loam

clay loam

clay loam sandy

silty clay loam

sandy clay

silty clay

clay

fibric peat

hemic peat

sapric peat

coarse

fine

light

medium

medium heavy

heavy

SURVEY TITLE:
SITE LOCATION:

NEWBECK COAL PROJECT
BLACKMAN'S FLAT

CHECK 2

PROFILE MAP DETAILS										SURVEY DETAILS									
Profile No.	Map Sheet No.	Easings	Northings	Described By	Profile Date	Photo Taken (1)	No. of Layers												
(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27) (28) (29) (30) (31) (32) (33) (34) (35) (36) (37) (38) (39) (40) (41) (42) (43) (44) (45) (46) (47) (48) (49) (50) (51) (52) (53) (54) (55) (56) (57) (58) (59) (60) (61) (62) (63) (64) (65) (66) (67) (68) (69) (70) (71) (72) (73) (74) (75) (76) (77) (78) (79) (80) (81) (82) (83) (84) (85) (86) (87) (88) (89) (90) (91) (92) (93) (94) (95) (96) (97) (98) (99) (100)																			

BIOPHYSICAL STRATEGIC AGRICULTURAL LAND SOIL DATA CARD									
SOIL TYPE		VEGETATION		LANDFORM ELEMENT (1)		TOPOGRAPHY		Please MARK LIKE THIS ONLY:	
A.S.C.	Vegetation Community (1)	alcove (30)	cone (31)	footslope (21)	ox-bow (32)	sink hole/doline (32)		Use 2B pencil	
0	unknown (32)	backplain (30)	crater (31)	foredune (32)	paraplaya (32)	stream channel (32)		No pen or biro	
4	rainforest (32)	bark (30)	cut face (30)	gully (32)	pediment (32)	streambed (32)		Fully erase	
4	wet sclerophyll forest (32)	bar (30)	out-over surface (30)	hillcrest (32)	pit (30)	summit surface (32)		Make no mistakes	
SO	dry sclerophyll forest (32)	beach (30)	beach ridge (30)	hillslope (32)	prior stream (32)	swamp (32)		stray marks	
4	woodland grass u/stony (32)	beach (30)	beach ridge (30)	lagoon (32)	rock flat (32)	swamp (32)		Numbers in ()	
4	woodland shrub u/stony (32)	beach (30)	beach ridge (30)	lake (32)	rock platform (32)	swamp (32)		show max. enties allowed	
SG	low shrubland (32)	beach (30)	beach ridge (30)	landslide (32)	scald (32)	tidal creek (32)			
	heath (32)	beach (30)	beach ridge (30)	levee (32)	scarp (32)	for (32)			
	grassland/heathland (32)	beach (30)	beach ridge (30)	lunette (32)	scarp (32)	tranch (32)			
	swamp complex (32)	beach (30)	beach ridge (30)	mar (32)	scree (32)	valley flat (32)			
	floral complex (32)	beach (30)	beach ridge (30)	round (32)	scroll (32)				
	no vegetation (32)	beach (30)	beach ridge (30)						
LITHOLOGY									
Substrate (3)									
not identified (30)									
unconsolidated (30)									
limestone (30)									
tuff (30)									
breccia (30)									
greywacke (30)									
arkose (30)									
dolomite (30)									
calcrete (30)									
aeolianite (30)									
chert (30)									
jasper (30)									
metamorphic (30)									
gneiss (30)									
schistophyllite (30)									
slate (30)									
horfels (30)									
quartzite (30)									
greenstone (30)									
amphibolite (30)									
mafic (30)									
igneous (30)									
coarse-acidic (30)									
coarse-intermediate (30)									
agglomerate (30)									
other (30)									
HYDROLOGY									
Profile Drainage (1)									
very poorly drained (30)									
poorly drained (30)									
imperfectly drained (30)									
mod. well-drained (30)									
well-drained (30)									
rapidly drained (30)									
Permeability (1)									
very slowly permeable (30)									
slowly permeable (30)									
moderately permeable (30)									
highly permeable (30)									
Depth (1) & Extent (1)									
≤ 500 mm depth (30)									
> 500 mm depth (30)									
≤ 50% area (30)									
> 50% area (30)									
Microrelief Type (1)									
none (30)									
normal giga (30)									
crabhole giga (30)									
linear giga (30)									
lattice giga (30)									
melonhole giga (30)									
other (30)									
Aspect (1)									
waxing (30)									
waning (30)									
maximal (30)									
minimal (30)									

SITE CONDITION		Surface Condition		SITE FIELD NOTES	
Site Disturbance(s) (2)	Ground Cover %	Current (2)	Expected Wet (2) Dry (2)		
natural disturbance (30)	cracked (30)	(30)	(30)		
no effective disturbance (30)	self-munched (30)	(30)	(30)		
limited clearing (30)	loose (30)	(30)	(30)		
extensive clearing (30)	soft (30)	(30)	(30)		
cleared, no cultivation (30)	firm (30)	(30)	(30)		
occasional cultivation (30)	hardset (30)	(30)	(30)		
rained cultivation (30)	surface crust (30)	(30)	(30)		
irrigated cultivation (30)	trampled (30)	(30)	(30)		
highly disturbed (30)	poached (30)	(30)	(30)		
	recently cultivated (30)	(30)	(30)		
	water repellent (30)	(30)	(30)		
	gravely (30)	(30)	(30)		
	other (30)	(30)	(30)		

Photo file names: CHECK SITE 2

4574

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[illegible]

SURVEY TITLE: NEWBECK COAL PROJECT
SITE LOCATION: BLACKMANS FLAT

CHECK 3

PROFILE MAP DETAILS				SURVEY DETAILS			
Profile No.	Map Sheet No.	Eastings	Northings	Described By	Profile Date	Photo Taken (1)	No. of Layers
(01) (02) (03) (04) (05) (06) (07) (08) (09) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27) (28) (29) (30) (31) (32) (33) (34) (35) (36) (37) (38) (39) (40) (41) (42) (43) (44) (45) (46) (47) (48) (49) (50) (51) (52) (53) (54) (55) (56) (57) (58) (59) (60) (61) (62) (63) (64) (65) (66) (67) (68) (69) (70) (71) (72) (73) (74) (75) (76) (77) (78) (79) (80) (81) (82) (83) (84) (85) (86) (87) (88) (89) (90) (91) (92) (93) (94) (95) (96) (97) (98) (99) (00)							

BIOPHYSICAL STRATEGIC AGRICULTURAL LAND SOIL DATA CARD			
SOIL TYPE	VEGETATION	LANDFORM ELEMENT (1)	
		Substrate (3)	TOPOGRAPHY
A.S.C	Vegetation Community (1) unknown (C1) rainforest (C2) wet sclerophyll forest (C3) dry sclerophyll forest (C4) woodland grass u story (C5) woodland shrub u story (C6) tall shrubland (C7) low shrubland (C8) heath (C9) grassland/heathland (C10) swamp complex (C11) littoral complex (C12) no vegetation (C13)	alcove (C20) backplain (C21) bark (C22) bar (C23) beach (C24) beach ridge (C25) bench (C26) berm (C27) blow-out (C28) channel bench (C29) cirque (C30) cliff (C31) cone (C32) crater (C33) cut face (C34) cut-over surface (C35) dam (C36) depression (C37) dune (C38) embankment (C39) estuary (C40) fill top (C41) flood-out (C42) footslope (C43) foredune (C44) gully (C45) hillock (C46) hillslope (C47) lagoon (C48) lake (C49) landslide (C50) levee (C51) lunette (C52) mar (C53) mound (C54) ox-bow (C55) pan/plateau (C56) pediment (C57) pit (C58) plain (C59) prior stream (C60) rock flat (C61) rock platform (C62) scald (C63) scarp (C64) scree (C65) scroll (C66) sink hole/doline (C67) stream channel (C68) streambed (C69) summit surface (C70) swale (C71) swamp (C72) talus (C73) tidal creek (C74) tidal flat (C75) for (C76) trench (C77) valley flat (C78)	Slope Percent (C1) (C2) (C3) (C4) (C5) (C6) (C7) (C8) (C9) (C10) (C11) (C12) (C13) (C14) (C15) (C16) (C17) (C18) (C19) (C20) (C21) (C22) (C23) (C24) (C25) (C26) (C27) (C28) (C29) (C30) (C31) (C32) (C33) (C34) (C35) (C36) (C37) (C38) (C39) (C40) (C41) (C42) (C43) (C44) (C45) (C46) (C47) (C48) (C49) (C50) (C51) (C52) (C53) (C54) (C55) (C56) (C57) (C58) (C59) (C60) (C61) (C62) (C63) (C64) (C65) (C66) (C67) (C68) (C69) (C70) (C71) (C72) (C73) (C74) (C75) (C76) (C77) (C78) (C79) (C80) (C81) (C82) (C83) (C84) (C85) (C86) (C87) (C88) (C89) (C90) (C91) (C92) (C93) (C94) (C95) (C96) (C97) (C98) (C99) (C00)

HYDROLOGY			
Identification Method (1)	Profile Drainage (1)	Permeability (1)	Depth (1) & Extent (1)
Personal assessment (C1) geology map (C2) both assessment & map (C3) Rock Outcrop % (1) nil (C1) >20-30% (C2) <2% (C3) >30-50% (C4) 2-10% (C5) >50% (C6) >10-20% (C7) rapidly drained (C8)	very poorly drained (C1) poorly drained (C2) imperfectly drained (C3) mod. well-drained (C4) well-drained (C5) rapidly drained (C6)	very slowly permeable (C1) slowly permeable (C2) moderately permeable (C3) highly permeable (C4)	≤ 500 mm depth (C1) > 500 mm depth (C2) ≤ 50% area (C3) > 50% area (C4)

SITE FIELD NOTES			
Surface Condition			
Current (2)	Expected	Wet (2) Dry (2)	
cracked (C1) self-mulched (C2) loose (C3) soft (C4) firm (C5) hardset (C6) surface crust (C7) trampled (C8) poached (C9) recently cultivated (C10) water repellent (C11) gravely (C12) other (C13)	(C1) (C2) (C3) (C4) (C5) (C6) (C7) (C8) (C9) (C10) (C11) (C12) (C13)	(C1) (C2) (C3) (C4) (C5) (C6) (C7) (C8) (C9) (C10) (C11) (C12) (C13)	(C1) (C2) (C3) (C4) (C5) (C6) (C7) (C8) (C9) (C10) (C11) (C12) (C13)

SITE CONDITION			
Site Disturbance(s) (2)			
natural disturbance (C1) no effective disturbance (C2) limited clearing (C3) extensive clearing (C4) cleared, no cultivation (C5) occasional cultivation (C6) rainfed cultivation (C7) irrigated cultivation (C8) highly disturbed (C9)	Ground Cover % (C1) (C2) (C3) (C4) (C5) (C6) (C7) (C8) (C9)	Photo file names: CHECK SITE 3	

4575

Please do not mark this space.



PLEASE MARK LIKE THIS ONLY:

- Use 2B pencil
- No pen or biro
- Fully erase mistakes
- Make no stray marks
- Numbers in () show max. entries allowed

TOPOGRAPHY
 Slope Morphology (1)
 flat (C1)
 crest (C2)
 hillock (C3)
 ridge (C4)
 upper slope (C5)
 mid-slope (C6)
 simple slope (C7)
 lower slope (C8)
 open depression (C9)
 closed depression (C10)
 Slope Morphology (1)
 waxy (C1)
 waxy (C2)
 waxy (C3)
 waxy (C4)
 waxy (C5)
 waxy (C6)
 waxy (C7)
 waxy (C8)
 waxy (C9)
 waxy (C10)

cm	LAYER STATUS					COLOUR (Munsell, 1994)					LAYER NOTES					Field pH Test Method (1)				
	Lower					Horizon					Field pH (1 per layer)					Raupach test strip				
1	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
2	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
3	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
4	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
6	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
7	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
8	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
9	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
10	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
11	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
12	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
13	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
14	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
15	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
16	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
17	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
18	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
19	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
20	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
21	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
22	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
23	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
24	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
25	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
26	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
27	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
28	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
29	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5

SUBSTRATE										Upper										Estimated Effective Rooting Depth (m)										Sample Taken										COARSE FRAGMENTS										SEGREGATIONS										Soil Water Status (1 each per layer)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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SURVEY TITLE: NEUBECK COAL PROJECT
SITE LOCATION: BLACKMAN'S FLAT CHECK 4

PROFILE MAP DETAILS				SURVEY DETAILS			
Profile No.	Map Sheet No.	Eastings	Northings	Described By	Profile Date	Photo Taken (1)	No. of Layers
(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27) (28) (29) (30) (31) (32) (33) (34) (35) (36) (37) (38) (39) (40) (41) (42) (43) (44) (45) (46) (47) (48) (49) (50) (51) (52) (53) (54) (55) (56) (57) (58) (59) (60) (61) (62) (63) (64) (65) (66) (67) (68) (69) (70) (71) (72) (73) (74) (75) (76) (77) (78) (79) (80) (81) (82) (83) (84) (85) (86) (87) (88) (89) (90) (91) (92) (93) (94) (95) (96) (97) (98) (99) (100)							
				BIOPHYSICAL STRATEGIC AGRICULTURAL LAND SOIL DATA CARD			
Potential BSAL? (1)		Site type (1)					
yes (1) no (2)		checked (1) detailed (2) exclusion (3)					
SOIL TYPE		VEGETATION		LANDFORM ELEMENT (1)			
A.S.C.		Vegetation Community (1)					
0		unknown (1)					
1		rainforest (2)					
2		wet sclerophyll forest (3)					
3		dry sclerophyll forest (4)					
4		woodland grass v storey (5)					
5		woodland shrub v storey (6)					
6		tall shrubland (7)					
7		low shrubland (8)					
8		heath (9)					
9		grassland/herbland (10)					
10		swamp complex (11)					
11		littoral complex (12)					
12		no vegetation (13)					
13		Growth Forms (4)					
14		tree (1)					
15		tree mallee (2)					
16		shrub (3)					
17		mallee shrub (4)					
18		heath shrub (5)					
19		chenopod shrub (6)					
20		hummock grass (7)					
21		tussock grass (8)					
22		sod grass (9)					
23		sedge (10)					
24		rush (11)					
25		lily (12)					
26		fern/cyad (13)					
27		moss (14)					
28		lichen (15)					
29		liverwort (16)					
30		vine (17)					
31		LAND USE (1)					
32		national/state parks (1)					
33		timber/scrub/unused (2)					
34		logged native forest (3)					
35		hardwood plantation (4)					
36		softwood plantation (5)					
37		volun./native pasture (6)					
38		improved pasture (7)					
39		cropping (8)					
40		orchard/vineyard (9)					
41		vegetables/flowers (10)					
42		urban (11)					
43		industrial (12)					
44		quarry/mining (13)					
45		other (14)					
46		affinity with (1)					
47		Identification Method (1)					
48		personal assessment (2)					
49		geology map (3)					
50		both assessment & map (4)					
51		Rock Outcrop % (1)					
52		hill (1) <20-30% (2)					
53		hill (2) >30-50% (3)					
54		hill (3) 2-10% (4)					
55		hill (4) >50% (5)					
56		Surface Condition					
57		Current (2)					
58		Extracted					
59		Wet (2) Dry (2)					
60		cracked (1)					
61		self-mulched (2)					
62		loose (3)					
63		soil (4)					
64		firm (5)					
65		hardset (6)					
66		surface crust (7)					
67		trampled (8)					
68		poached (9)					
69		recently cultivated (10)					
70		water repellent (11)					
71		gravelly (12)					
72		other (13)					
73		HYDROLOGY					
74		Profile Drainage (1)					
75		very poorly drained (2)					
76		poorly drained (3)					
77		imperfectly drained (4)					
78		mod. well-drained (5)					
79		well-drained (6)					
80		rapidly drained (7)					
81		Permeability (1)					
82		very slowly permeable (2)					
83		slowly permeable (3)					
84		moderately permeable (4)					
85		highly permeable (5)					
86		Depth (1) & Extent (1)					
87		≤ 500 mm depth (2)					
88		> 500 mm depth (3)					
89		≤ 50% area (4)					
90		> 50% area (5)					
91		SITE FIELD NOTES					
92		GREEN CHROMOSOME					
93		Photo file names: CHECK SITE 4					

4576

[illegible]

MEUBÉCK COAL PROJECT

BLACKMANS FLAT

CHECK 5

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cm		LAYER STATUS										COLOUR (Munsell, 1994)										Field pH					LAYER NOTES										Field pH Test Method (1)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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NEURECK COAL PROJECT

BLACKMAN'S ELIXIR

CHECK 6

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CHECK 2



NSW
GOVERNMENT



NSW SOIL
AND LAND
INFORMATION

RED DERMOGOL

file name/s: CHECK SITE &

4580

cm 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29

LAYER STATUS					COLOUR (Munsell, 1994)					Field pH					LAYER NOTES					Field pH Test Method (1)				
Lower					Horizon					(1 per layer)					1					Raupach pH meter				
1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
2	3	4	5	6	2	3	4	5	6	2	3	4	5	6	2	3	4	5	6	2	3	4	5	6
3	4	5	6	7	3	4	5	6	7	3	4	5	6	7	3	4	5	6	7	3	4	5	6	7
4	5	6	7	8	4	5	6	7	8	4	5	6	7	8	4	5	6	7	8	4	5	6	7	8
5	6	7	8	9	5	6	7	8	9	5	6	7	8	9	5	6	7	8	9	5	6	7	8	9
6	7	8	9	10	6	7	8	9	10	6	7	8	9	10	6	7	8	9	10	6	7	8	9	10
7	8	9	10	11	7	8	9	10	11	7	8	9	10	11	7	8	9	10	11	7	8	9	10	11
8	9	10	11	12	8	9	10	11	12	8	9	10	11	12	8	9	10	11	12	8	9	10	11	12
9	10	11	12	13	9	10	11	12	13	9	10	11	12	13	9	10	11	12	13	9	10	11	12	13
10	11	12	13	14	10	11	12	13	14	10	11	12	13	14	10	11	12	13	14	10	11	12	13	14
11	12	13	14	15	11	12	13	14	15	11	12	13	14	15	11	12	13	14	15	11	12	13	14	15
12	13	14	15	16	12	13	14	15	16	12	13	14	15	16	12	13	14	15	16	12	13	14	15	16
13	14	15	16	17	13	14	15	16	17	13	14	15	16	17	13	14	15	16	17	13	14	15	16	17
14	15	16	17	18	14	15	16	17	18	14	15	16	17	18	14	15	16	17	18	14	15	16	17	18
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24	25	26	27	28	24	25	26	27	28	24	25	26	27	28	24	25	26	27	28	24	25	26	27	28
25	26	27	28	29	25	26	27	28	29	25	26	27	28	29	25	26	27	28	29	25	26	27	28	29
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28	29				28	29				28	29				28	29				28	29			
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CHECK 9

**Please MARK
LIKE THIS ONLY:**

[illegible]

4581

[illegible]

NEUBECK COAL PROJECT

BLACKMAN'S FLAT

CHECK 10

[illegible]

cm	LAYER STATUS		COLOUR (Munsell, 1994)		Field pH (1 per layer)	LAYER NOTES					Field pH Test Method (1)	
	Lower	Horizon	Moist Munsell	Dry Munsell		1	2	3	4	5	Raupach pH meter	test strip
1												
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cm	LAYER STATUS		COLOUR (Munsell, 1994)		Field pH (1 per layer)	LAYER NOTES					Field pH Test Method (1)	
	Lower	Horizon	Moist Munsell	Dry Munsell		1	2	3	4	5	Raupach pH meter	test strip
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
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28												

cm	LAYER STATUS		COLOUR (Munsell, 1994)		Field pH (1 per layer)	LAYER NOTES					Field pH Test Method (1)	
	Lower	Horizon	Moist Munsell	Dry Munsell		1	2	3	4	5	Raupach pH meter	test strip
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
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NEUBECK COAL PROJECT

BLACKMAN'S FLAT

CHECK 11

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Please do not mark this space.

4583

[illegible]

SURVEY TITLE: NEUBECK COAL PROJECT
SITE LOCATION: BLACKMANS FLAT CHECK 12

PROFILE MAP DETAILS										SURVEY DETAILS																																																																																									
Profile No.	Map Sheet No.	Eastings					Northings					Described By					Profile Date					Photo Taken (1)					No. of Layers																																																																								
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)	(34)	(35)	(36)	(37)	(38)	(39)	(40)	(41)	(42)	(43)	(44)	(45)	(46)	(47)	(48)	(49)	(50)	(51)	(52)	(53)	(54)	(55)	(56)	(57)	(58)	(59)	(60)	(61)	(62)	(63)	(64)	(65)	(66)	(67)	(68)	(69)	(70)	(71)	(72)	(73)	(74)	(75)	(76)	(77)	(78)	(79)	(80)	(81)	(82)	(83)	(84)	(85)	(86)	(87)	(88)	(89)	(90)	(91)	(92)	(93)	(94)	(95)	(96)	(97)	(98)	(99)	(100)
BIOPHYSICAL STRATEGIC AGRICULTURAL LAND SOIL DATA CARD																																																																																																			
Potential BSAL2 (1) Site type (1) checked (2) detailed (2) exclusion (2)																																																																																																			
yes (2) no (2)																																																																																																			
SOIL TYPE VEGETATION																																																																																																			
A.S.C. (1) Vegetation Community (1)																																																																																																			
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4 (1) wet sclerophyll forest (1)																																																																																																			
4 (1) dry sclerophyll forest (1)																																																																																																			
4 (1) woodland grass u/story (1)																																																																																																			
4 (1) woodland shrub u/story (1)																																																																																																			
4 (1) tall shrubland (1)																																																																																																			
4 (1) low shrubland (1)																																																																																																			
4 (1) heath (1)																																																																																																			
4 (1) grassland/herbland (1)																																																																																																			
4 (1) swamp complex (1)																																																																																																			
4 (1) littoral complex (1)																																																																																																			
4 (1) no vegetation (1)																																																																																																			
Growth Forms (4)																																																																																																			
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tree mallee (1)																																																																																																			
shrub (1)																																																																																																			
mallee shrub (1)																																																																																																			
heath shrub (1)																																																																																																			
chenopod shrub (1)																																																																																																			
hummock grass (1)																																																																																																			
tussock grass (1)																																																																																																			
sod grass (1)																																																																																																			
sedge (1)																																																																																																			
rush (1)																																																																																																			
lob (1)																																																																																																			
fern/cad (1)																																																																																																			
moss (1)																																																																																																			
lichen (1)																																																																																																			
liverwort (1)																																																																																																			
vine (1)																																																																																																			
LAND USE (1)																																																																																																			
national/state parks (1)																																																																																																			
timber/scrub/unused (1)																																																																																																			
logged native forest (1)																																																																																																			
hardwood plantation (1)																																																																																																			
softwood plantation (1)																																																																																																			
volun./native pasture (1)																																																																																																			
improved pasture (1)																																																																																																			
cropping (1)																																																																																																			
orchard/vineyard (1)																																																																																																			
vegetables/flowers (1)																																																																																																			
urban (1)																																																																																																			
industrial (1)																																																																																																			
quarry/mining (1)																																																																																																			
other (1)																																																																																																			
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geology map (1)																																																																																																			
both assessment & map (1)																																																																																																			
Rock Outcrop % (1)																																																																																																			
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>30-50% (1)																																																																																																			
>50% (1)																																																																																																			
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Dry (2)																																																																																																			
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self-mulched (1)																																																																																																			
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soft (1)																																																																																																			
firm (1)																																																																																																			
hardset (1)																																																																																																			
surface crust (1)																																																																																																			
trampled (1)																																																																																																			
poached (1)																																																																																																			
recently cultivated (1)																																																																																																			
water repellent (1)																																																																																																			
gravely (1)																																																																																																			
other (1)																																																																																																			
HYDROLOGY																																																																																																			
Profile Drainage (1)																																																																																																			
Permeability (1)																																																																																																			
Depth (1) & Extent (1)																																																																																																			
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very slowly permeable (1)																																																																																																			
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moderately permeable (1)																																																																																																			
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rapidly drained (1)																																																																																																			
Site Field Notes																																																																																																			
yellow chromosol																																																																																																			
Photo file name/s: CHECK SITE 12																																																																																																			
Slope Percent																																																																																																			
Site Morphology (1)																																																																																																			
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waning (1)																																																																																																			
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Please MARK LIKE THIS ONLY:

- Use 2B pencil
- No pen or biro
- Fully erase mistakes
- Make no stray marks
- Numbers in () show max. entries allowed

Please do not mark this space.

4584

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CHECK 13

CHECK 13

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SURVEY TITLE: NEUBECK COAL PROJECT
SITE LOCATION: BLACKMANS FLAT CHECK 14

PROFILE MAP DETAILS				SURVEY DETAILS			
Profile No.	Map Sheet No.	Eastings	Northings	Described By	Profile Date	Photo Taken (1)	No. of Layers
(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27) (28) (29) (30) (31) (32) (33) (34) (35) (36) (37) (38) (39) (40) (41) (42) (43) (44) (45) (46) (47) (48) (49) (50) (51) (52) (53) (54) (55) (56) (57) (58) (59) (60) (61) (62) (63) (64) (65) (66) (67) (68) (69) (70) (71) (72) (73) (74) (75) (76) (77) (78) (79) (80) (81) (82) (83) (84) (85) (86) (87) (88) (89) (90) (91) (92) (93) (94) (95) (96) (97) (98) (99) (100)	(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27) (28) (29) (30) (31) (32) (33) (34) (35) (36) (37) (38) (39) (40) (41) (42) (43) (44) (45) (46) (47) (48) (49) (50) (51) (52) (53) (54) (55) (56) (57) (58) (59) (60) (61) (62) (63) (64) (65) (66) (67) (68) (69) (70) (71) (72) (73) (74) (75) (76) (77) (78) (79) (80) (81) (82) (83) (84) (85) (86) (87) (88) (89) (90) (91) (92) (93) (94) (95) (96) (97) (98) (99) (100)	(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27) (28) (29) (30) (31) (32) (33) (34) (35) (36) (37) (38) (39) (40) (41) (42) (43) (44) (45) (46) (47) (48) (49) (50) (51) (52) (53) (54) (55) (56) (57) (58) (59) (60) (61) (62) (63) (64) (65) (66) (67) (68) (69) (70) (71) (72) (73) (74) (75) (76) (77) (78) (79) (80) (81) (82) (83) (84) (85) (86) (87) (88) (89) (90) (91) (92) (93) (94) (95) (96) (97) (98) (99) (100)	(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27) (28) (29) (30) (31) (32) (33) (34) (35) (36) (37) (38) (39) (40) (41) (42) (43) (44) (45) (46) (47) (48) (49) (50) (51) (52) (53) (54) (55) (56) (57) (58) (59) (60) (61) (62) (63) (64) (65) (66) (67) (68) (69) (70) (71) (72) (73) (74) (75) (76) (77) (78) (79) (80) (81) (82) (83) (84) (85) (86) (87) (88) (89) (90) (91) (92) (93) (94) (95) (96) (97) (98) (99) (100)	(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27) (28) (29) (30) (31) (32) (33) (34) (35) (36) (37) (38) (39) (40) (41) (42) (43) (44) (45) (46) (47) (48) (49) (50) (51) (52) (53) (54) (55) (56) (57) (58) (59) (60) (61) (62) (63) (64) (65) (66) (67) (68) (69) (70) (71) (72) (73) (74) (75) (76) (77) (78) (79) (80) (81) (82) (83) (84) (85) (86) (87) (88) (89) (90) (91) (92) (93) (94) (95) (96) (97) (98) (99) (100)	(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27) (28) (29) (30) (31) (32) (33) (34) (35) (36) (37) (38) (39) (40) (41) (42) (43) (44) (45) (46) (47) (48) (49) (50) (51) (52) (53) (54) (55) (56) (57) (58) (59) (60) (61) (62) (63) (64) (65) (66) (67) (68) (69) (70) (71) (72) (73) (74) (75) (76) (77) (78) (79) (80) (81) (82) (83) (84) (85) (86) (87) (88) (89) (90) (91) (92) (93) (94) (95) (96) (97) (98) (99) (100)	(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27) (28) (29) (30) (31) (32) (33) (34) (35) (36) (37) (38) (39) (40) (41) (42) (43) (44) (45) (46) (47) (48) (49) (50) (51) (52) (53) (54) (55) (56) (57) (58) (59) (60) (61) (62) (63) (64) (65) (66) (67) (68) (69) (70) (71) (72) (73) (74) (75) (76) (77) (78) (79) (80) (81) (82) (83) (84) (85) (86) (87) (88) (89) (90) (91) (92) (93) (94) (95) (96) (97) (98) (99) (100)	(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27) (28) (29) (30) (31) (32) (33) (34) (35) (36) (37) (38) (39) (40) (41) (42) (43) (44) (45) (46) (47) (48) (49) (50) (51) (52) (53) (54) (55) (56) (57) (58) (59) (60) (61) (62) (63) (64) (65) (66) (67) (68) (69) (70) (71) (72) (73) (74) (75) (76) (77) (78) (79) (80) (81) (82) (83) (84) (85) (86) (87) (88) (89) (90) (91) (92) (93) (94) (95) (96) (97) (98) (99) (100)

BIOPHYSICAL STRATEGIC AGRICULTURAL LAND SOIL DATA CARD			
SOIL TYPE		VEGETATION	
A.S.C.	Vegetation Community (1)	LANDFORM ELEMENT (1)	
0	unknown	alcove (23)	cone (2)
1	rainforest (2)	bark (25)	crater (2)
2	wet sclerophyll forest (3)	bar (26)	cut face (25)
3	dry sclerophyll forest (4)	beach (27)	cut-over surface (26)
4	woodland grass (5)	beach ridge (28)	dam (27)
5	woodland shrub (6)	beech (29)	drainage depression (28)
6	tall shrubland (7)	berm (30)	dune (29)
7	low shrubland (8)	blow-out (31)	embankment (30)
8	heath (9)	channel beach (32)	esuary (31)
9	grassland/herbland (10)	swamp complex (33)	fan (32)
10	littoral complex (11)	cliff (34)	fill top (33)
11	no vegetation (12)		flood-out (34)
12	tree (13)		
13	tree mallee (14)		
14	shrub (15)		
15	mallee shrub (16)		
16	heath shrub (17)		
17	cheerupod shrub (18)		
18	hummock grass (19)		
19	tussock grass (20)		
20	sod grass (21)		
21	sedge (22)		
22	rush (23)		
23	loft (24)		
24	fern/cycad (25)		
25	moss (26)		
26	lichen (27)		
27	liverwort (28)		
28	wine (29)		
29			
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LANDFORM ELEMENT (1)			
LITHOLOGY		TOPOGRAPHY	
Substrate (3)	Slope Percent	Slope Morphology (1)	Site Morphology (1)
not identified (1)	coarse-basic (25)	flat (2)	crest (2)
unconsolidated (2)	fine-acidic (26)	crest (2)	hillock (2)
gravel (3)	fine-intermediate (27)	crest (2)	ridge (2)
sand (4)	fine-basic (28)	crest (2)	upper slope (2)
silt (5)	serpentine (29)	crest (2)	mid-slope (2)
clay (6)	gabro (30)	crest (2)	simple slope (2)
organic material (7)	dolerite (31)	crest (2)	lower slope (2)
alluvium (8)	diorite (32)	crest (2)	open depression (2)
colluvium (9)	syenite (33)	crest (2)	closed depression (2)
lacustrine (10)	granodiorite (34)	crest (2)	
aeolian (11)	adamelite (35)	crest (2)	
marine (12)	granite (36)	crest (2)	
calcareous sand (13)	aplite (37)	crest (2)	
fill (14)	quartz porphyry (38)	crest (2)	
mud (15)	basalt (39)	crest (2)	
hill (16)	trachyte (40)	crest (2)	
sedimentary (17)	andesite (41)	crest (2)	
silstone/mudstone (18)	trachyte (42)	crest (2)	
sandstone-quartz (19)	trachyte (43)	crest (2)	
sandstone-litic (20)	trachyte (44)	crest (2)	
conglomerate (21)	trachyte (45)	crest (2)	
	trachyte (46)	crest (2)	
	trachyte (47)	crest (2)	
	trachyte (48)	crest (2)	
	trachyte (49)	crest (2)	
	trachyte (50)	crest (2)	
	trachyte (51)	crest (2)	
	trachyte (52)	crest (2)	
	trachyte (53)	crest (2)	
	trachyte (54)	crest (2)	
	trachyte (55)	crest (2)	
	trachyte (56)	crest (2)	
	trachyte (57)	crest (2)	
	trachyte (58)	crest (2)	
	trachyte (59)	crest (2)	
	trachyte (60)	crest (2)	
	trachyte (61)	crest (2)	
	trachyte (62)	crest (2)	
	trachyte (63)	crest (2)	
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	trachyte (65)	crest (2)	
	trachyte (66)	crest (2)	
	trachyte (67)	crest (2)	
	trachyte (68)	crest (2)	
	trachyte (69)	crest (2)	
	trachyte (70)	crest (2)	
	trachyte (71)	crest (2)	
	trachyte (72)	crest (2)	
	trachyte (73)	crest (2)	
	trachyte (74)	crest (2)	
	trachyte (75)	crest (2)	
	trachyte (76)	crest (2)	
	trachyte (77)	crest (2)	
	trachyte (78)	crest (2)	
	trachyte (79)	crest (2)	
	trachyte (80)	crest (2)	
	trachyte (81)	crest (2)	
	trachyte (82)	crest (2)	
	trachyte (83)	crest (2)	
	trachyte (84)	crest (2)	
	trachyte (85)	crest (2)	
	trachyte (86)	crest (2)	
	trachyte (87)	crest (2)	
	trachyte (88)	crest (2)	
	trachyte (89)	crest (2)	
	trachyte (90)	crest (2)	
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	trachyte (97)	crest (2)	
	trachyte (98)	crest (2)	
	trachyte (99)	crest (2)	
	trachyte (100)	crest (2)	

HYDROLOGY			
Profile Drainage (1)	Permeability (1)	Depth (1) & Extent (1)	Aspect (1)
very poorly drained (1)	very slowly permeable (1)	≤ 500 mm depth (1)	waxing (1)
poorly drained (2)	slowly permeable (2)	> 500 mm depth (2)	waxing (1)
imperfectly drained (3)	moderately permeable (3)	≤ 500 mm depth (3)	waxing (1)
mod. well-drained (4)	highly permeable (4)	> 500 mm depth (4)	waxing (1)
well-drained (5)			waxing (1)
rapidly drained (6)			waxing (1)

SITE FIELD NOTES			
BLACK DEERMOSEL			
Photo file names: CHECK SITE 14			

SITE CONDITION			
Site Disturbance(s) (2)	Ground Cover %	Current (2)	Expected Wet (2) Dry (2)
natural disturbance (1)	cracked (2)	(2)	(2)
no effective disturbance (2)	self-mulched (2)	(2)	(2)
limited clearing (3)	loose (2)	(2)	(2)
extensive clearing (4)	soft (2)	(2)	(2)
cleared, no cultivation (5)	firm (2)	(2)	(2)
occasional cultivation (6)	hardset (2)	(2)	(2)
rainfed cultivation (7)	surface crust (2)	(2)	(2)
irrigated cultivation (8)	trampled (2)	(2)	(2)
highly disturbed (9)	poached (2)	(2)	(2)
	recently cultivated (2)	(2)	(2)
	water repellent (2)	(2)	(2)
	gravelly (2)	(2)	(2)
	other (2)	(2)	(2)

[illegible]

CHECK 16

SURVEY DETAILS


NSW SOIL
AND LAND
INFORMATION

SYSTEM

Please MARK
LIKE THIS ONLY

Use 2B pencil
No pen or blue
Fully erase
mistakes
Make no
stray marks
Numbers in ()
show max.
entries allow

Morphology (1)

flat
crest
hillcock
ridge
upper slope
midslope
simple slope
lower slope
when depression
meets depression

Morphology (1)

waxing
waning
maximal
minimal

Aspect (1)

NED NED
SED SED
SED SED



4588

[illegible]

CHECK 17

CHECK 17

[illegible]

4589

CHECK 10

[illegible]

4590

cm		LAYER STATUS										COLOUR (Munsell, 1994)										Field pH (1 per layer)										LAYER NOTES										Field pH Test Method (1)																																																																					
		Lower					Horizon					Moist Munsell					Dry Munsell					Field pH					1										Raupach pH meter					test strip																																																																					
1	mm 0																																																																																																														
2	10																																																																																																														
3	20																																																																																																														
4	30																																																																																																														
5	40																																																																																																														
6	50																																																																																																														
7	60																																																																																																														
8	70																																																																																																														
9	80																																																																																																														
10	90																																																																																																														
11	100																																																																																																														
12	110																																																																																																														
13	120																																																																																																														
14	130																																																																																																														
15	140																																																																																																														
16	150																																																																																																														
17	160																																																																																																														
18	170																																																																																																														
19	180																																																																																																														
20	190																																																																																																														
21	200																																																																																																														
22	210																																																																																																														
23	220																																																																																																														
24	230																																																																																																														
25	240																																																																																																														
26	250																																																																																																														
27	260																																																																																																														
28	270																																																																																																														
29	280																																																																																																														

SEGREGATIONS

Type (1 per layer)		1					2					3					4					5				
not evident																										
calcareous																										
gypseous																										
manganiferous																										
ferruginous																										
ferromanganiferous																										
organic																										
not identified																										
other																										
Amount (1 per layer)		1					2					3					4					5				
very few (<2%)																										
few (2-10%)																										
common (10-20%)																										
many (20-50%)																										
abundant (>50%)																										
Strength (1 per layer)		1					2					3					4					5				
weak																										
strong																										
Form (1 per layer)		1					2					3					4					5				
soft segregations																										
nodules																										
fragments																										
crystals																										
veins																										
concretions																										
root linings																										
tubules																										
Size (1 per layer)		1					2					3					4					5				
fine (<2 mm)																										
medium (2-6 mm)																										
coarse (6-20 mm)																										
very coarse (20-60 mm)																										
ext coarse (>60 mm)																										

Estimated Effective Rooting Depth (m)

Sample Taken		Type (1 per layer)					Sur					1					2					3					4					5				
not evident																																				
not identified																																				
as substrate																																				
as rock outcrop																																				
as parent material																																				
quartz																																				
feldspar																																				
silicate																																				
ironstone																																				
bauxite																																				
charcoal																																				
pumice																																				
opalised wood																																				
other																																				
Amount (1 per layer)		1					2					3					4					5														
very few (<2%)																																				
few (2-10%)																																				
common (10-20%)																																				
many (20-50%)																																				
abundant (50-90%)																																				
very abundant (>90%)																																				
Size (1 per layer)		1					2					3					4					5														
fine gravel (2-6 mm)																																				
gravel (6-20 mm)																																				
coarse gravel (20-60 mm)																																				
cobbles (60-200 mm)																																				
stones (200-600 mm)																																				
boulders (>600 mm)																																				

Base of Observation (1)

Sample Taken		Type (1 per layer)					Sur					1					2					3					4					5				
layer continues																																				
soil continues																																				
equipment refusal																																				
bedrock reached																																				

Estimated Effective Rooting Depth (m)

Sample Taken		Type (1 per layer)					Sur					1					2					3					4					5				
not evident																																				
not identified																																				
as substrate																																				
as rock outcrop																																				
as parent material																																				
quartz																																				
feldspar																																				
silicate																																				
ironstone																																				
bauxite																																				
charcoal																																				
pumice																																				
opalised wood																																				
other																																				
Amount (1 per layer)		1					2					3					4					5														
very few (<2%)																																				
few (2-10%)																																				
common (10-20%)																																				
many (20-50%)																																				
abundant (50-90%)																																				
very abundant (>90%)																																				
Size (1 per layer)		1					2					3					4					5														
fine gravel (2-6 mm)																																				
gravel (6-20 mm)																																				
coarse gravel (20-60 mm)																																				
cobbles (60-200 mm)																																				
stones (200-600 mm)																																				
boulders (>600 mm)																																				

Base of Observation (1)

Sample Taken		Type (1 per layer)					Sur					1					2					3					4					5				
layer continues																																				
soil continues																																				
equipment refusal																																				
bedrock reached																																				

Estimated Effective Rooting Depth (m)

Sample Taken		Type (1 per layer)					Sur					1					2					3					4					5				
not evident																																				
not identified																																				
as substrate																																				
as rock outcrop																																				
as parent material																																				
quartz																																				
feldspar																																				
silicate																																				
ironstone																																				
bauxite																																				
charcoal																																				
pumice																																				
opalised wood																																				
other																																				
Amount (1 per layer)		1					2					3					4					5														
very few (<2%)																																				

CHECK 19

CHECK 19

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Appendix B



Neubeck Coal Project

BSAL Verification Assessment

Laboratory Soil Test Results

SOIL TEST REPORT

Page 1 of 3

Scone Research Centre

REPORT NO: SCO14/155R1

REPORT TO: Murray Fraser
SLR Consulting
10 Kings Road
New Lambton NSW 2305

REPORT ON: Twenty-one soil samples
Your ref: Neubeck

PRELIMINARY RESULTS
ISSUED: Not issued

REPORT STATUS: Final

DATE REPORTED: 5 September 2014

METHODS: Information on test procedures can be obtained from Scone
Research Centre

TESTING CARRIED OUT ON SAMPLE AS RECEIVED
THIS DOCUMENT MAY NOT BE REPRODUCED EXCEPT IN FULL



SR Young
(Laboratory Manager)

SOIL CONSERVATION SERVICE
Scone Research Centre

Page 2 of 3

Report No:
Client Reference:

SCO14/155R1
Murray Fraser
SLR Consulting
10 Kings Road
New Lambton NSW 2305

Lab No	Method	P7B/2 Particle Size Analysis (%)					C1A/5	C2A/4	C2B/4
	Sample Id	clay	silt	f. sand	c. sand	gravel	EC (dS/m)	pH	pH (Cacl2)
1	Neubeck 1 14/7 0-10 cm	10	24	30	26	10	0.01	5.7	4.6
2	Neubeck 1 14/7 15-25 cm	19	17	29	24	11	0.01	5.6	4.4
3	Neubeck 1 14/7 50-60 cm	58	24	11	6	1	0.02	5.8	4.1
4	Neubeck 2 14/7 0-10 cm	33	30	24	13	<1	0.04	5.7	4.7
5	Neubeck 2 14/7 20-30 cm	39	30	23	8	<1	0.01	5.7	4.4
6	Neubeck 2 14/7 50-60 cm	46	19	15	10	10	0.01	5.6	4.4
7	Neubeck 3 14/7 0-10 cm	36	25	24	15	0	0.05	5.1	4.2
8	Neubeck 3 14/7 30-40 cm	52	22	19	7	0	0.01	5.5	4.2
9	Neubeck 3 14/7 50-60 cm	52	26	17	5	0	0.01	5.5	4.3
10	Neubeck 4 15/7 0-10 cm	41	24	20	15	0	0.04	5.7	4.7
11	Neubeck 4 15/7 20-30 cm	74	15	9	2	0	0.02	5.9	4.6
12	Neubeck 4 15/7 50-60 cm	56	28	16	0	0	0.04	6.1	4.8
13	Neubeck 5 15/7 0-10 cm	21	31	27	21	<1	0.02	5.7	4.7
14	Neubeck 5 15/7 20-30 cm	26	25	25	24	<1	0.01	5.7	4.4
15	Neubeck 5 15/7 50-60 cm	28	16	18	36	2	0.02	5.6	4.4
16	Neubeck 7 15/7 0-10 cm	19	24	24	31	2	0.02	6.0	5.0
17	Neubeck 7 15/7 20-30 cm	24	23	19	30	4	0.01	5.9	4.7
18	Neubeck 7 15/7 50-60 cm	23	15	18	35	9	0.01	5.7	4.7
19	Neubeck 8 15/7 0-10 cm	12	18	25	28	17	0.01	6.0	4.9
20	Neubeck 8 15/7 30-40 cm	10	12	20	33	25	0.01	6.0	4.7
21	Neubeck 8 15/7 50-60 cm	11	10	21	39	19	0.01	6.0	4.8

SLR

SOIL CONSERVATION SERVICE
Scone Research Centre

Page 3 of 3

Report No: SCO14/155R1

Client Reference: Murray Fraser

SLR Consulting

10 Kings Road

New Lambton NSW 2305

Lab No	Method Sample Id	C5A/4 CEC & exchangeable cations (me/100g)						Colour	
		CEC	Na	K	Ca	Mg	Al	Dry	Moist
1	Neubeck 1 14/7 0-10 cm	5.9	0.1	0.2	3.0	0.9	<0.5	10YR 6/3	10YR 4/3
2	Neubeck 1 14/7 15-25 cm	4.2	0.1	<0.1	1.2	0.8	<0.2	10YR 7/3	10YR 5/6
3	Neubeck 1 14/7 50-60 cm	18.0	0.7	0.2	0.9	3.9	7.7	10YR 7/3	10YR 6/4
4	Neubeck 2 14/7 0-10 cm	14.7	0.3	0.7	7.2	3.1	<0.5	10YR 5/2	10YR 4/2
5	Neubeck 2 14/7 20-30 cm	10.6	0.2	0.2	3.7	2.4	0.8	10YR 6/2	10YR 5/3
6	Neubeck 2 14/7 50-60 cm	12.4	0.2	0.1	2.8	3.4	0.9	10YR 7/6	10YR 6/8
7	Neubeck 3 14/7 0-10 cm	14.2	0.2	0.6	3.0	2.2	3.5	10YR 4/2	10YR 2/2
8	Neubeck 3 14/7 30-40 cm	10.8	0.2	0.2	1.5	2.4	3.3	10YR 6/2	10YR 4/2
9	Neubeck 3 14/7 50-60 cm	9.1	0.1	0.2	1.3	2.6	2.4	10YR 6/2	10YR 5/2
10	Neubeck 4 15/7 0-10 cm	22.7	0.3	1.2	11.4	5.7	<0.5	10YR 4/1	10YR 2/1
11	Neubeck 4 15/7 20-30 cm	24.7	0.5	0.5	10.8	8.1	0.8	10YR 4/2	10YR 3/1
12	Neubeck 4 15/7 50-60 cm	16.5	0.6	0.3	6.9	5.9	<0.5	10YR 5/2	10YR 3/2
13	Neubeck 5 15/7 0-10 cm	7.6	<0.1	0.2	3.6	1.3	<0.5	10YR 6/2	10YR 4/2
14	Neubeck 5 15/7 20-30 cm	4.6	0.1	<0.1	1.9	1.0	<0.5	2.5YR 7/3	2.5YR 6/4
15	Neubeck 5 15/7 50-60 cm	3.2	0.3	<0.1	1.2	1.5	0.5	2.5YR 7/3	2.5YR 6/4
16	Neubeck 7 15/7 0-10 cm	9.2	0.3	0.5	4.6	1.5	<0.5	10YR 5/2	10YR 3/2
17	Neubeck 7 15/7 20-30 cm	5.6	0.1	0.2	2.5	0.9	<0.5	10YR 6/3	10YR 5/3
18	Neubeck 7 15/7 50-60 cm	5.7	<0.1	0.1	1.8	1.0	<0.5	2.5YR 7/3	2.5YR 6/4
19	Neubeck 8 15/7 0-10 cm	14.7	<0.1	0.5	7.5	2.4	<0.5	10YR 4/2	10YR 2/1
20	Neubeck 8 15/7 30-40 cm	7.6	0.1	0.2	2.7	1.6	<0.5	10YR 5/3	10YR 3/3
21	Neubeck 8 15/7 50-60 cm	5.7	0.1	0.1	2.1	1.1	<0.5	10YR 7/3	10YR 5/6

S. Young

END OF TEST REPORT

SOIL TEST REPORT

Page 1 of 4

Scone Research Centre

REPORT NO: SCO12/344R1

REPORT TO: Andrew Regan
GSS Environmental
PO Box 907
Hamilton NSW 2303

REPORT ON: Fourteen soil samples
Ref: CCC25-002

PRELIMINARY RESULTS
ISSUED: 26 October 2012

REPORT STATUS: Preliminary

DATE REPORTED: 26 October 2012

METHODS: Information on test procedures can be obtained from Scone
Research Centre

TESTING CARRIED OUT ON SAMPLE AS RECEIVED
THIS DOCUMENT MAY NOT BE REPRODUCED EXCEPT IN FULL

A handwritten signature in blue ink, appearing to read "SR Young", written over a horizontal line.

SR Young
(Laboratory Manager)

**SOIL CONSERVATION SERVICE
Scone Research Centre**

Report No: SCO12/344R1
Client Reference: Andrew Regan
GSS Environmental
PO Box 907
Hamilton NSW 2303

Lab No	Method	C1A/4	C2A/3	C2B/3	C5A/3 CEC & exchangeable cations (me/100g)					
	Sample Id	EC (DS/m)	pH	pH (CaCl ₂)	CEC	Na	K	Ca	Mg	Al
1	Site 6 0-20	0.03	5.7	4.8	12.2	0.3	0.9	6.4	3.1	0.3
2	Site 6 20-40	<0.01	5.4	4.2	6.7	0.2	0.2	2.8	1.9	0.9
3	Site 6 40-60	0.01	5.4	4.2	6.1	0.3	0.2	2.2	2.0	0.3
4	Site 6 60-90	0.03	5.2	4.3	6.6	0.3	0.2	2.3	2.5	0.1
5	Site 3 0-3	0.03	5.1	4.3	7.1	0.2	0.2	4.8	1.8	0.3
6	Site 3 3-15	0.02	5.8	4.5	1.9	0.2	0.1	1.2	0.5	0.2
7	Site 6 0-15	0.01	5.8	4.8	12.7	0.2	0.5	8.1	1.8	0.1
8	Site 5 15-35	0.02	5.1	4.5	3.5	0.3	0.1	1.2	0.8	0.7
9	Site 7 0-25	0.01	5.9	4.7	2.7	0.2	0.2	1.8	0.7	0.3
10	Site 7 25-60	<0.01	6.0	4.8	1.8	0.1	0.1	1.4	0.5	0.2
11	Site 7 60-80	<0.01	5.9	4.7	3.6	0.1	0.3	1.8	1.1	0.5
12	Site 2 0-25	0.03	5.7	4.8	8.7	0.1	0.3	6.3	1.5	0.5
13	Site 2 25-60	<0.01	5.9	4.7	5.0	0.1	0.3	3.1	1.7	0.4
14	Site 2 60-90	<0.01	5.7	4.5	5.0	0.1	0.3	2.5	2.1	0.3

nt = not tested

8/8/2012

SOIL CONSERVATION SERVICE
Scone Research Centre

Report No: SCO12/334R1
Client Reference: Andrew Regan
GSS Environmental
PO Box 907
Hamilton NSW 2303

Page 3 of 4

	Method	P7B/2 Particle Size Analysis (%)					P9B/2
	Sample Id	clay	silt	f sand	c sand	gravel	EAT
1	Site 6 0-20	33	33	24	10	0	8
2	Site 6 20-40	39	28	21	12	0	tba
3	Site 6 40-60	36	20	21	23	<1	tba
4	Site 6 60-90	49	18	13	17	3	tba
5	Site 3 0-3	8	3	28	59	10	8
6	Site 3 3-15	18	7	19	57	7	8
7	Site 5 0-15	14	19	24	24	19	8
8	Site 5 15-35	18	23	20	22	17	8
9	Site 7 0-25	8	12	30	45	5	8
10	Site 7 25-60	11	11	28	37	13	3(1)
11	Site 7 60-80	28	12	16	33	11	tba
12	Site 2 0-25	23	23	31	20	3	8
13	Site 2 25-60	28	19	28	19	6	tba
14	Site 2 60-90	32	18	27	19	4	tba

tba = to be advised

SR Young

SOIL CONSERVATION SERVICE
Scone Research Centre

Report No: SCO12/334R1
Client Reference: Andrew Regan
GSS Environmental
PO Box 907
Hamilton NSW 2303

	Method	P7C/2 Particle Size Analysis mech dis (%)							C6A/2	Colour	
		Sample Id	clay	silt	f sand	c sand	gravel	OC (%)	Dry	Moist	
1	Site 6 0-20	22	33	28	17	0	1.75	10YR 5/3	10YR 3/3		
2	Site 6 20-40	32	34	22	12	0	0.65	10YR 6/2	10YR 4/3		
3	Site 6 40-60	28	28	21	23	<1	0.26	10YR 6/3	10YR 5/4		
4	Site 6 60-90	37	30	13	17	3	0.28	10YR 6/6	10YR 5/6		
5	Site 5 0-5	5	5	21	59	18	3.98	10YR 6/2	10YR 4/3		
6	Site 5 5-15	8	9	19	57	7	1.17	10YR 6/3	10YR 5/4		
7	Site 5 0-15	1	21	21	55	19	5.95	10YR 6/2	10YR 5/3		
8	Site 5 15-35	9	29	28	22	17	1.71	10YR 6/3	10YR 5/3		
9	Site 7 0-25	2	18	31	44	5	1.12	10YR 6/2	10YR 3/2		
10	Site 7 25-60	4	18	30	35	13	0.40	10YR 7/3	2.5Y 5/3		
11	Site 7 60-80	19	19	16	35	11	0.29	10YR 7/4	10YR 6/8		
12	Site 2 0-25	16	29	31	21	3	2.25	10YR 6/3	10YR 3/3		
13	Site 2 25-60	22	25	28	19	6	0.57	10YR 6/4	10YR 4/6		
14	Site 2 60-90	25	23	29	19	4	0.26	10YR 7/4	10YR 4/6		

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END OF TEST REPORT

Appendix C



Neubeck Coal Project

BSAL Verification Assessment

Slope Analysis Methodology

16 January 2015

Neubeck Coal Project

SLR Slope Analysis Methodology

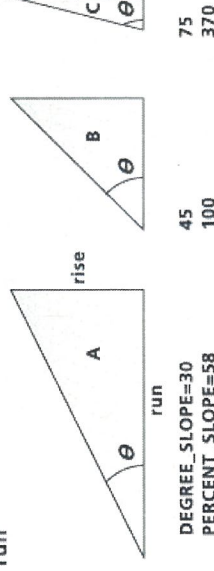
1. Acquire appropriate elevation information. In this case, LIDAR data provided by Centennial Angus Place.
2. Load Contours into ArcMap 10.1
3. Using 3D Analyst Extension - Create a TIN Surface based on the contours (http://resources.arcgis.com/en/help/main/10.1/index.html#/Create_TIN/00q900000001v0000000/)
4. Using 3D Analyst Extension – Run the Surface Slope Tool (<http://resources.arcgis.com/en/help/main/10.1/index.html#/00q90000000760000000/>) using a custom Break File (attached).
5. Using a Spatial Join, correlate the Surface Slope at the Soil Survey coordinates.

The Surface Slope Tool:

Surface Slope creates an output polygon feature class containing polygons that classify an input TIN or terrain dataset by slope. The slope is the angle of inclination between the surface and a horizontal plane, which may be analysed in degrees or percent. Slope in degrees is given by calculating the arctangent of the ratio of the change in height (dZ) to the change in horizontal distance (dS), or $\text{slope} = \text{Arctan} (dZ/dS)$. Percent slope is equal to the change in height divided by the change in horizontal distance multiplied by 100, or $(dZ/dX) * 100$.

$$\text{DEGREE_SLOPE} = \theta \qquad \text{DEGREE_SLOPE} = \frac{\text{rise}}{\text{run}} * 100$$

$$\frac{\text{rise}}{\text{run}} = \tan \theta$$



The {**slope_field**} is the name of attribute field used to record the polygon aspect codes. Its default value is SlopeCode.

Each triangle is classified into a slope class. Contiguous triangles belonging to the same class are merged during the formation of output polygons. The {units} parameter can be set to use PERCENT or DEGREES. The default is PERCENT. The default percent slope class breaks are 1.00, 2.15, 4.64, 10.00, 21.50, 46.40, 100.00, 1000.00. Optionally, DEGREES may be used to classify slope. The default degree slope class breaks are 0.57, 1.43, 2.66, 5.71, 12.13, 24.89, 45.0, 90.0.

The {class_breaks_table} is used to define custom slope classes. The table can be either a TXT or DBF file for a Windows environment, and a DBF file in a UNIX environment. Each record in the table needs to contain two values that are used to represent the slope range of the class and its corresponding class code.

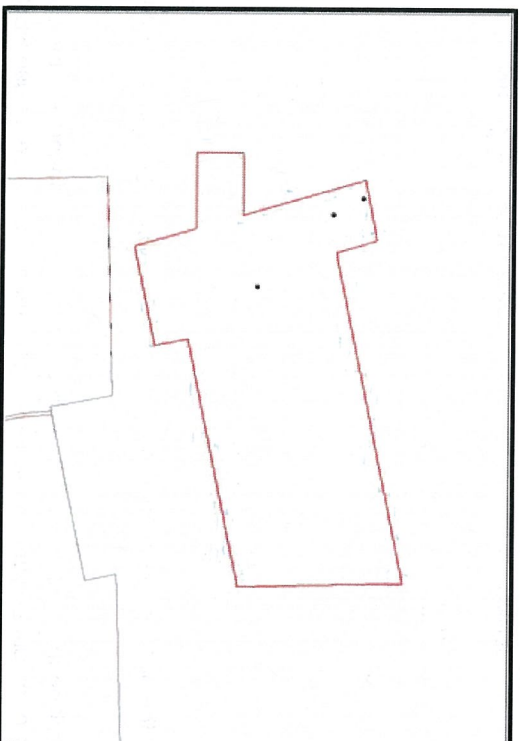
Table example:

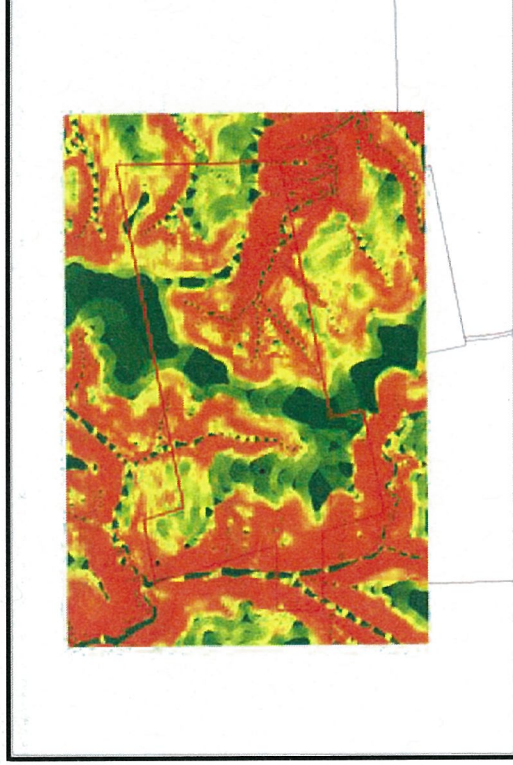
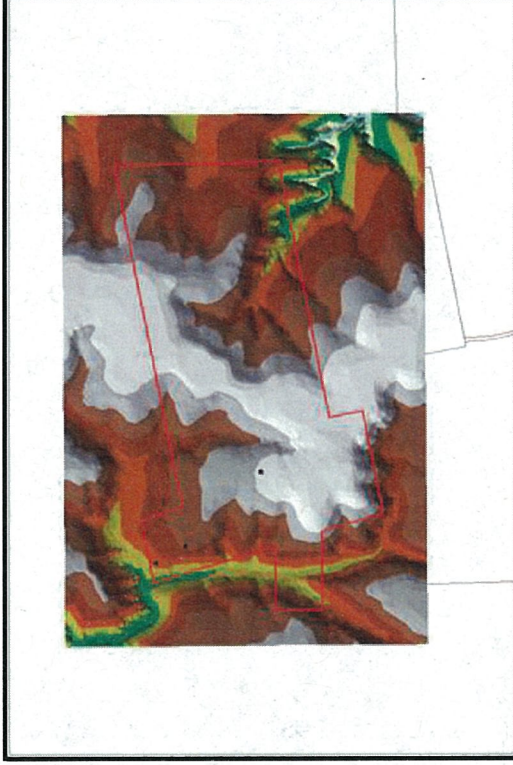
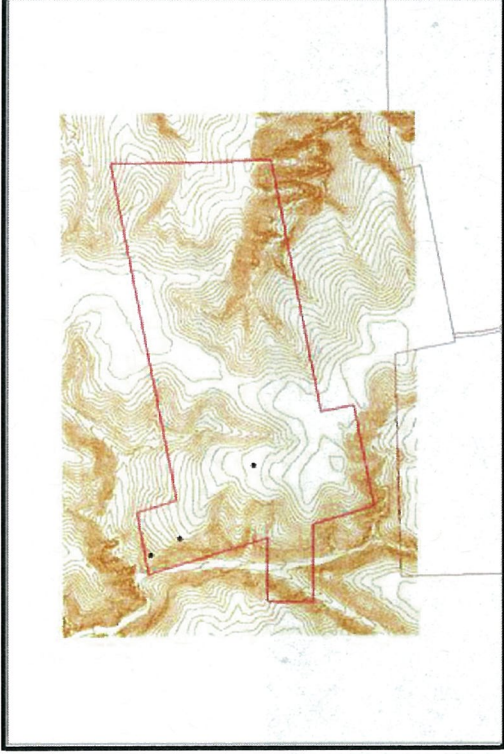
break, code
10.0, 11
25.0, 22
40.0, 33
70.0, 44

Note the comma delineation and use of decimals in the first field. Field names are needed but are ignored. The first field represents the breaks and values need to be decimal, the second field represents codes and values need to be integer. The units of the slope range are defined by the {units}. When this argument is not specified, the default classification is used.

Slope code is the terminology used in the descriptors, which directly correlates to slope percentage (i.e. slope code 1 equates to slope 0-1%, slope code 2 equates to slope 1-2% etc.).

And here is how we do it pictographically:





Appendix D



Neubeck Coal Project

BSAL Verification Assessment

OEI Assessment Checklist

OEH BSAL Verification Assessment Checklist

Personnel		
Assessment supervised by CPSS II or III Soil Scientist	Yes	Clayton Richards CPSS II
Maps		
Geographically accurate base map at 1:25,000 in GIS format	Yes	Figure 1 & data package
Soil map with observation sites at 1:25,000 in GIS format	Yes	Figure 3 & data package
BSAL map with exclusion areas at 1:25,000 in GIS format	Yes	Figures 2, 3 & data package, no BSAL present
Maps presented in correct datum with appropriate symbology	Yes	
Metadata for spatial datasets provided as per Interim Protocol	Yes	Compiled by Louise Hibbert
Lodgement of Site & Laboratory Data		
All site observations lodged on BSAL Soil Data Cards	Yes	29 observations in total
All laboratory data supplied on SALIS Lab Data Template	Yes	10 detailed sites
Model of Soil Distribution		
Model of soil distribution provided with methodology if proponent did not have access to the land	Yes	10 ha area in the far west of the Project Application Area correlated as a Kandosol from soil landscape unit mapping
Site Assessment		
Assessment of all land of >20 hectares contiguous area, with minimum three sites per soil type	Yes	At least three detailed sites for each major soil type Chromosol, Dermosol and Kandosol
Sampling density as specified in the Interim Protocol	Yes	1 site per 25 – 400 ha required for low risk
Site observations recorded as specified in the Interim Protocol	Yes	
Observation sites are evenly distributed across the survey area	Yes	

Site Assessment (Continued)		
Each soil type identified has at least three detailed sites	Yes	Three detailed sites for each major soil types Chromosol, Dermosol and Kandosol
All relevant data presented for all detailed sites	Yes	
Detailed sites are representative of the soil type being assessed	Yes	
Detailed sites are accompanied by photo of profile and site	Yes	
Appropriate information collected for all exclusion sites	Yes	Excluded with LIDAR slope and <20 ha contiguous area
At least two exclusion sites per polygon	N/A	No exclusion sites
Adequate number of check sites used to allocate soil type	Yes	19 check sites for 10 detailed sites
Cross Reference With OEH Soil Data		
Mapping and attributes appear consistent with OEH soil landscape data and anticipated soil types	Yes	Podzolics, Earths and Soloths found on the Pipers Flat and Cullen Bullen soil landscapes (Wallerawang 1:100,000 sheet)

Appendix E



OEH Comments & SLR Replies



31st March, 2015

Hello Stuart/Humphrey,

SLR has addressed OEH's comments on the Neubeck Coal Project SVC, please see replies and additional comments below in blue.

1. On the soil map (Figure 3) we note that the proponent has separated areas of 'watercourse and waterlogged areas' as a separate mapped area. However, there are no soil observations within this area to describe the soils. If the soils in this area are not the same as adjoining polygons then it needs to be treated as a separate soil map unit, i.e., at least 3 detailed observations are required. Either way, check sites should be described in this area to confirm the decision.

Amended to be mapped as a Dermosol (concurrent with Checked Site data as there was no access on the southern side of Neubeck Creek.

2. Some of the areas excluded in the spatial data appear to have been mapped on the soil map (FIDs 117 to 125).

Spatial data corrected and areas revised, **Figure 2** has been amended to solid fill rather than hatched fill to avoid confusion.

3. There appears to be no indication of what the slope codes in SLR63010980_SurfaceSlope_100mBuffer_Clip.shp mean.

Slope code is the terminology used in the descriptors, which directly correlates to slope percentage (i.e. slope code 1 equates to slope 0-1%, slope code 2 equates to slope 1-2% etc.). Explanation of slope code has been added into **Appendix C**.

4. Several of the Dermosols with waterlogging problems should probably be classified as Hydrosols, which may change the distribution of soil types.

As per The Australian Soil Classification: Revised Edition (Isbell, 2002) when assessing the classification of a Hydrosol, "the duration and frequency of saturation at a precise section of a profile are not specifically defined". Also, "the extent of soil wetness can seldom be assessed by a single inspection of a particular site".

Using the author and reviewers soil science experience, it is our opinion that whilst there is significant mottling within the profile of the Dermosols to indicate poor drainage, there was insufficient evidence to indicate that the greater part of the soil profile was saturated for at least 2-3 months in most years.

5. Several of the Kurosols (sites 006, 17 and 18) are probably Kandosols (insufficient texture contrast), which may also change the distribution of soil types.

Kurosol sites were re-examined and keyed out again and came out as Dermosols, soil mapping and areas corrected

6. An area of Kandosols has been mapped in the far west of the project area without any sites to describe it. We would recommend at least 1 check site in this area to confirm the soil type(s) there.

At the time of the soil field survey the far western area (approximately 10 ha) was deemed inaccessible due the presence of woodland forest and very limited access due to the haul road, fencing and locked gates. Therefore this section of the Project Application Area has been correlated by soil landscape units (King, 1993) and vegetation type with other mapped areas.

7. The detailed soil profiles were collected using a combination of cores (7) and by auger (3); however the Interim Protocol requires all detailed observations to be soil pits.

The 7 core sites were completed in 2014 in accordance with the Interim Protocol. The 3 auger sites were completed in 2012, prior to the release of the Interim Protocol, however, methodology for the 2012 sampling involved shovel excavation to a depth well into the B horizon (at least 50 cm) and then subsequent hand auguring down to 100 cm, enabling description of a minimum 50 cm in situ (in effect a small pit). The soil profile was then "re-constructed" in the profile display box.

As these 3 sites were sampled out prior to the release of the Interim Protocol photos of the small pits were not taken as the focus of the survey was on the whole soil profile. Soil profile information for the upper horizons mostly assessed using the small in situ pits.

Please see accompanying photos from recently conducted surveys showing the mini pits.





Soil Data Cards have been amended to include Nature of Exposure as both "pit" and "auger"

8. The profiles described seem to consist of 3 separate sets, with overlapping numbers – for example, two detailed observations and one check site were identified as profile 2 on their Soil Data Cards. The proponent should supply the profiles in a single set of sequentially numbered cards so that each site is uniquely identified, can be definitively located on the map and easily linked to its corresponding laboratory soil test data. The report and GIS layers will also need updating accordingly.

See site survey number and Soil Data Card identifier correlation table below and also added into **Appendix A**. Each Soil Data Card has been amended to having one unique identifying number.

Field Survey Date	Site Survey Number	Unique Soil Data Card Identifier
October 2012	Core 006	1
	Core 007	2
	Core 002	3
August 2014	Core 1	4
	Core 2	5
	Core 3	6
	Core 4	7
	Core 5	8
	Core 7	9
	Core 8	10
	Check 1	11
	Check 2	12
	Check 3	13
August 2014	Check 4	14
	Check 5	15
	Check 6	16
	Check 7	17
	Check 8	18
	Check 9	19
	Check 10	20
	Check 11	21
	Check 12	22
	Check 13	23
	Check 14	24
	Check 15	25
	Check 16	26
	Check 17	27
	Check 18	28
	Check 19	29

9. The laboratory data suggests that the samples for some of the profiles were tested in 2012 by a different person and organisation to the one supplying the SVC application; however all of the cards have the same 'Described by' number. Can the proponent confirm who described the profiles from the 2012 batch?

During August 2013, GSS Environmental merged with SLR Consulting; however the same CPSS 2 oversaw both the field surveys and subsequent site verification (Clayton Richards, 1794).

10. Although ECe results have been supplied in the laboratory spreadsheet, the source EC results should also be supplied.

Source EC results were supplied in Appendix B (test C1A/4) on the Scone Research Centre Report sheets. They have also been entered into the Excel spreadsheet.

11. There are several profiles missing key data (profile 2 is missing colours; profile 6 has no layer data; profile 007 has no mottles described but mottles appear to be visible in the photo). This makes it difficult to confirm the soil classification.

Rectified for the three profiles

King regards,



Murray Fraser
Senior Agronomist