



**Regional Interest Development Approval
Strategic Cropping Area**

CURRAGH EXTENSION PROJECT

WESFARMERS CURRAGH PTY LTD

December 2015

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1. Background

1.1 Curragh Extension Project

Wesfarmers Curragh Pty Ltd (WCPL) operates the existing Curragh Mine Project (Curragh Mine) under Environmental Authority (EA) EPML00643713. The Curragh Mine commenced operation in 1983 and is an open cut coal mining operation located approximately 6 kilometres (km) north of the township of Blackwater in Central Queensland. The Curragh Mine produces a variety of coking, pulverised coal injected and streaming coal products for both export and domestic markets.

The Curragh Extension Project (the Project) is for the extension of open cut coal mining operations at Curragh Mine in four adjacent Mining Lease (ML) areas within Mineral Development License (MDL) 162 tenement and MDL 328 (for ML700006 only) (refer Figure 1). The addition of the Project to the Curragh Mine operation is not planned to increase the annual production but rather extend the life of mine. Based on existing approvals for the Curragh Mine, the expected life of mine is to 2030. The Project is to extend the life of the Curragh Mine to at least 2038.

1.2 Project status

On 15 April 2015 WCPL lodged four Mining Lease applications for the Project with the Queensland Department of Natural Resources and Mines (DNRM):

- ML700006 Curragh South (Pit Z) (1,432 ha)
- ML700007 Curragh Central (Pit X) (1,123 ha)
- ML700008 Curragh Central Extended (Pit X and Pit D) (2,643 ha)
- ML700009 Curragh Extended (Pit J) (797 ha).

Public notification of the Mining Lease applications closed on 16 June 2015. No objections to the Mining Lease applications were received during the public notification period. On the 1 December 2015, ML700008 and ML700009 were granted by the Department of Natural Resources and Mines. ML700006 and ML700008 are pending final approval.

On 15 April 2015 an application to amend EA EPML00643713 was lodged with the Queensland Department of Environment and Heritage Protection (DEHP). No objections to the EA amendment application was received during the public notification period. The application to amend EA EPML00643713, incorporating the Curragh Extension Project, was approved on 31 August 2015.

On 2 July 2015 a referral for a proposed action was made in accordance with the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). No submissions were received from the EPBC Act referral public notification stage. On 12 August 2015, the DoE decided that the controlled action will be assessed by way of preliminary documentation. Public Notification of the EPBC Preliminary Documentation commenced 23 November 2015 and will close 18 December 2015.

1.3 The Proponent

The proponent for the Project, and applicant for this application for a regional interests development approval (RIDA), is Wesfarmers Curragh Pty Ltd (WCPL) (ACN 009 362 565). WCPL is the principal and sole holder of the Curragh Mine mining leases and EA (EPML00643713). The registered address for the proponent is:

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WCPL is a wholly owned subsidiary of Wesfarmers Limited and together with other wholly owned subsidiaries they comprise the resources business of Wesfarmers Limited. The Wesfarmers Limited resources business interests include the Curragh Mine in the Bowen Basin of Queensland and a 40% interest in Bengalla Mine in the Hunter Valley of New South Wales.

Wesfarmers Limited is one of Australia's largest listed companies and employers. It is incorporated and domiciled in Australia and is listed on the Australian Securities Exchange. Its diverse business operations include supermarkets; department stores; home improvement and office supplies; coal mining; chemicals, energy and fertilisers; and industrial safety products.

1.4 Study area

The Curragh Extension Project is located partly within a Strategic Cropping Area (SCA) as defined under the *Regional Planning Interest Act 2014*. For the purpose of this RIDA application, the study area is defined as the following and as shown in Figure 2:

- Area within ML700006
- Combined study area that is within ML700007 and ML700008 plus part of ML80110 (conveyor corridor that currently traverses through ML700007 and ML700008).

For the purpose of this RIDA application, ML80110 (conveyer corridor that intersects ML700007 and ML700008), ML700007 and ML700008 is considered one **combined study area** (as referenced in Figure 2). The overland conveyor as part of existing Curragh Mine operations (part of ML80110) and central access road connecting Curragh North with Curragh, traverses through the ML700007 and ML700008. The development of ML700007 is not proposed to start until all mining operations at Curragh North have ceased and the overland conveyor and central access road are no longer required. Construction of this mining area is proposed to commence in 2022 and operations in 2025 and will be developed as a single mining development with ML700008. Therefore as part of this application, all desk top review and field assessment considered the overland conveyor corridor (part of ML80110).

ML700009 has not been included in this application or the study area for this application as it does not include trigger mapped SCA.

In October 2014 a detailed field sampling program was undertaken for the Curragh Extension Project. Methodology, soil sampling sites and field and laboratory results are presented in Attachment A.

1.5 Proposed outcome

The technical reports presented in Attachment A has been prepared in accordance with the following documentation:

- *Regional Planning Interest Act 2014*
- Regional Planning Interest Act Regulation 2014
- RPI Act Guideline 08/14: How to demonstrate that land in the strategic cropping area does not meet the criteria for strategic cropping land.

As part of this application process a draft report was submitted on the 23 July 2015 to the Department of Infrastructure, Local Government and Planning (DILGP) and the Department of Natural Resources and Mines (DNRM). Subsequent meetings were held (4 August 2015 and 11 September 2015) to discuss comments raised and as response to comments made by DNRM, Attachment A provides a Supplementary Report (SLR November 2015) to the 23 July 2015 version.

Based on the results from the October 2014 detailed soil sampling program (as detailed in Attachment A), it is considered that the Project will not result in any impact on strategic cropping land in the SCA, as land in the study area does not meet the criteria for strategic cropping land. **This application therefore requests that land within the Project's study area relevant to this application, that is, ML700006 plus the combined study area (ie. area within ML700007 and ML700008 combined plus part of ML80110 (conveyor corridor ML80110 that traverses through ML700007 and ML700008)) be assessed as being 'non-SCL' and that the Project be assessed as being compliant with Required Outcome 01 (RO1).**

2. Regional Interest Development Approval – information requirements

2.1 Purpose of this report

The *Regional Planning Interests Act 2014* (RPI Act) and Regional Planning Interests Regulation 2014 (RPI Regulation) commenced on 13 June 2014. The RPI Act identifies and protects areas of Queensland that are of regional interest. In doing this, the RPI Act seeks to manage the impact and support coexistence of resource activities and other regulated activities in areas of regional interest. Four areas of regional interests are identified under the RPI Act:

- priority agricultural areas (PAA): areas of regionally significant agricultural production that are identified in a regional plan
- priority living areas (PLA): areas required for the growth of towns from incompatible resource activities
- strategic environmental areas (SEA). areas containing regionally significant environmental attributes (e.g. bio-diversity, water catchments and ecological function)
- strategic cropping areas (SCA): areas that are, or are likely to be, highly suitable for cropping because of a combination of the land's soil, climate and landscape features, as shown on the Strategic Cropping Land (SCL) Trigger Map.

The Curragh Extension Project is not located within a PAA, PLA or SEA. The Project is however partly located within a SCA (Figure 3). The purpose of this report is to provide supporting information to the application for a RIDA on the basis that the Project meets Required Outcome 01 for SCA under the RPI Regulation.

2.2 Structure of this report

Table 1 provides a cross reference between the information requirements from the RPI Act 'Assessment application form' and the relevant location in this report.

Table 1: Structure of report

RIDA application reference		Location in this report
RIDA Question		
Information requirement		
1	Property description	Section 3 Attachment B
2	Description of proposed activities - Location	Figure 4
2	Description of proposed activities - Activities	Section 5
2	Description of proposed activities - Area of disturbance	Section 5 Attachment B
2	Description of current land use	Section 4
3	Report (addressing matters set out in Section 29(b) of the RPI Act)	Attachment A
4	Applications for resource authorities	Attachment C
4	Current title searches	Attachment D
4	Request for exemption from public notification	Attachment E
5	Land owner details	Attachment B

3. Property description

Attachment B identifies the land the subject of this RIDA application (i.e. those lots or parts of lots on which mining activities are proposed that are shown as strategic cropping land on the SCL trigger map). It includes real property descriptions, maps and areas of disturbance.

Non-mining activities proposed to be undertaken outside the ML application areas, including the proposed relocation of powerlines within the proposed easement, have not been included in this application as they are not regulated by the RPI Act.

4. Current land use

The primary land use within the study area is low intensity cattle grazing on thinned natural vegetation with some small areas used for dryland cropping. Historically, the existing vegetation was largely cleared for agricultural purposes with the exception of some remnant vegetation located along Mackenzie River, Blackwater Creek and their tributaries. The use of the surrounding area includes coal mining and low intensity cattle grazing and is presented in Figure 4.

5. Proposed activities for the Project

MDL 162 is an irregular shaped tenement covering approximately 9,185 hectares (ha) adjacent to the existing Curragh Mine. The footprint for the proposed Curragh Extension Project ML areas is approximately two thirds the area of MDL 162 (as shown in Figure 1).

The Curragh Extension Project is for the extension of open cut coal mining operations within MDL 162 and MDL 328, adjacent to the existing Curragh Mine. The Project is not planned to increase the annual production of the Curragh Mine, but rather extend the life of mine.

The Curragh Extension Project involves four new mining areas – ML700006, ML700007, ML700008 and ML700009 (shown previously in Figure 1 and Figure 2). Based on market conditions and detailed design, the mine scheduling for the Project is anticipated to be as follows:

- **ML700006** Curragh South (Pit Z) – is located in the southern portion of MDL 162 and includes the south-west corner of MDL 328, to the south-west of the current Curragh Mine operations. This mining area is proposed to commence construction in 2023 and operation in 2027.
- **ML700007** Curragh Central (Pit X (west)) – is located in the northern portion of the Project between the current Curragh and Curragh North operations. The existing overland conveyor (part of ML80110) and central access road connecting Curragh North with Curragh, traverses through the Curragh Central and Curragh Central Extended. The development of Curragh Central is not proposed to start until all mining operations at Curragh North have ceased and the overland conveyor and central access road are no longer required. Construction of this mining area is proposed to commence in 2022 and operations in 2025 and will be developed as a single mining development with Curragh Central Extended.
- **ML700008** Curragh Central Extended (Pit X (east) and Pit D) – Pit D extension is located in the central portion of the Project, to the east of the existing Curragh operation. Pit D is the northern extension of the Curragh Mine Pit D which operates under existing ML 80086. Construction of this mining area is proposed to commence in 2017 and operation in 2018. Pit X is proposed to commence construction in 2022 and operation in 2025 to coincide with the development of Curragh Central.
- **ML700009** Curragh Extended (Pit J) – is located in the southern portion of the Project, immediately west of Sagittarius Creek. It is an extension of the existing Curragh Mine (Pit J) to the south. Construction of this mining area is proposed to commence in 2029 and operations in 2030. ML700009 does not include SCA. Reference to ML700009 in this application is included to assist understanding of the scope of the entire project only.

Infrastructure requirements

As the Curragh Extension Project will utilise existing infrastructure within the adjacent Curragh Mine, the Project will require minimal infrastructure being located in the four new mining lease areas. All coal processing, coal stockpiling and train loading will occur at the existing Curragh Mine.

New infrastructure required to support the development of the Project within the proposed mining leases is as shown in Figure 5 and Table 2 and described below.

Table 2 Curragh Extension Project infrastructure requirements

Key infrastructure requirements	ML700008 Curragh Central Extended (Pit D)	ML700009 Curragh Extended (Pit J)	ML700007 Curragh Central and Curragh Central Extended (Pit X)	ML700006 Curragh South (Pit Z)
ROM/Pads/Hardstand (m ²)	--	--	66,370	106,100
HV Roads (km)	--	--	9.1	12.5
LV Roads (km)	--	3.0	5.8	10.5
Levee (m)	--	730	11,100	850
Diversion (km)	--	--	6.9	1.1
Water Management Dams (number required)	--	--	2	2
Water Pipeline (m)	--	--	2,600	2,600
Powerlines (km)	8.1	--	11.9	37.3
Fuel facility (number required)	--	--	1	1
Truck fill (number required)	--	--	1	1
Crib facility (number required)	--	--	1	1

All additional infrastructure not listed in Table 3 will rely on existing Curragh Mine infrastructure.

ROM pad

New ROM stockpiles are proposed at the south western corner of ML700008 and to the north of ML700006 only. Coal will be hauled, via haul trucks, from ML700006 and ML700007 and ML700008 (Pit X) to the new ROM areas where it will be transferred to road trains and transported to the existing Curragh coal handling and preparation plant (CHPP).

Roads

New roads are required to support the development of ML700007 and ML700008 (Pit X) including four mine vehicle haul roads, one road train haul road and two light vehicle access roads.

No new roads are required to support ML700008 (the extension of Pit D only). All haulage and access will be via existing roads and tracks.

One new light vehicle access road is required around the southern, eastern and western perimeter of ML700009 (Pit J), connecting with existing roads.

New roads are required to support the development of ML700006 including two mine vehicle haul roads, one road train haul road and two light vehicle access roads.

Flood protection and water management

Flood protection levees proposed for the Curragh Extension Project include:

- an approximately 11.1 km long flood protection levee around the northern, eastern and western perimeter of ML700007 and ML700008 (Pit X) to protect the pit from flooding
- an approximately 730 m long levee around the south eastern corner of ML700009 (Pit J) for protection against flooding from Sagittarius Creek
- an approximately 850 m long flood protection levee is at the north western corner of the lease boundary surrounding ML700006 to protect the infrastructure from flooding.

Preliminary flood modelling indicates ML700008 (Pit D) is not flooded during the 1:1000 annual exceedance probability (AEP) and therefore flood protection levees are not required.

Creek diversions

The western portion of ML700007 intersects with Minnie Creek. A diversion of Minnie Creek (approximately 6.9 km in length) is proposed around the western perimeter of ML700007 and discharging into Blackwater Creek. In addition, a portion of the mine vehicle haul road along the western perimeter of ML700006 crosses and traverses Bonnie Doon Creek. A diversion of Bonnie Doon Creek (approximately 1.1 km in length) is proposed on the western side of the mine vehicle haul road.

Water management

A water management network of pipes and pumps currently exists within the Curragh Mine. This network collects and transfers water between water storage dams on both the Curragh and Curragh North mines. This water management network for the Curragh Extension Project will incorporate new dams within the ML700007 and ML700006 development areas, and provide supply to the newly constructed facilities.

For ML700007 and ML700008 (Pit X only), one new water management dam is proposed to be located centrally to service the eastern section of the pit and one located on the western boundary to service the western section of the pit. The exact location of the centrally located water management dam has yet to be determined. Water will be managed with a new pump and pipe infrastructure network.

For ML700006, two new water management dams are proposed to store mine affected water. One is proposed to be located on the eastern side of the ROM and one located on the western boundary of the pit area.

No new water management infrastructure is required to support the development of ML700009 (Pit J) or ML700008 (Pit D). Water supply, reticulation and storage will be via existing water management infrastructure.

Mine infrastructure area

A new mine infrastructure area (MIA) is not required to support ML700008 (Pit D) or ML700009 (Pit J); the existing Curragh MIA will be used.

A basic MIA is proposed to be located adjacent to the new ROM areas utilised by both the ML700007 and ML700006. The MIAs will include a fuel facility, crib facilities and a water truck fill. Existing Curragh Mine infrastructure will be utilised (major maintenance facilities, administration etc) to reduce the infrastructure requirements of the Curragh Extension Project.

Power

Existing power supply to Curragh Mine has the capacity to support the Curragh Extension Project, without the need for further allocation of additional capacity.

The development of ML700007 and ML700008 (Pit X) truncates two existing WCPL owned 66 kV power lines which need relocating:

- central line which is truncated by the southern end of the pit. This line is proposed to be relocated south of the southern end of the pit
- eastern line which currently runs parallel with the central access road is proposed to be relocated around the eastern side of the pit.

An existing WCPL owned 66 kilovolt (kV) power line truncates the ML700008 (Pit D). This power line will be relocated to the eastern side of the pit extension.

An existing WCPL owned 66 kV power line truncates ML700009 (Pit J). This power line will be relocated around the southern and eastern sides of the pit.

Two new power lines are required to support the development of ML700006.

Offsite infrastructure

No infrastructure outside of the MLs is required to be relocated or support the development of ML700008 (Pit D), ML700007 or ML700009 mining areas.

An existing water pipeline truncates ML700007 and ML700008 in an east west direction. The relocation of this pipeline is being negotiated with surrounding landowners.

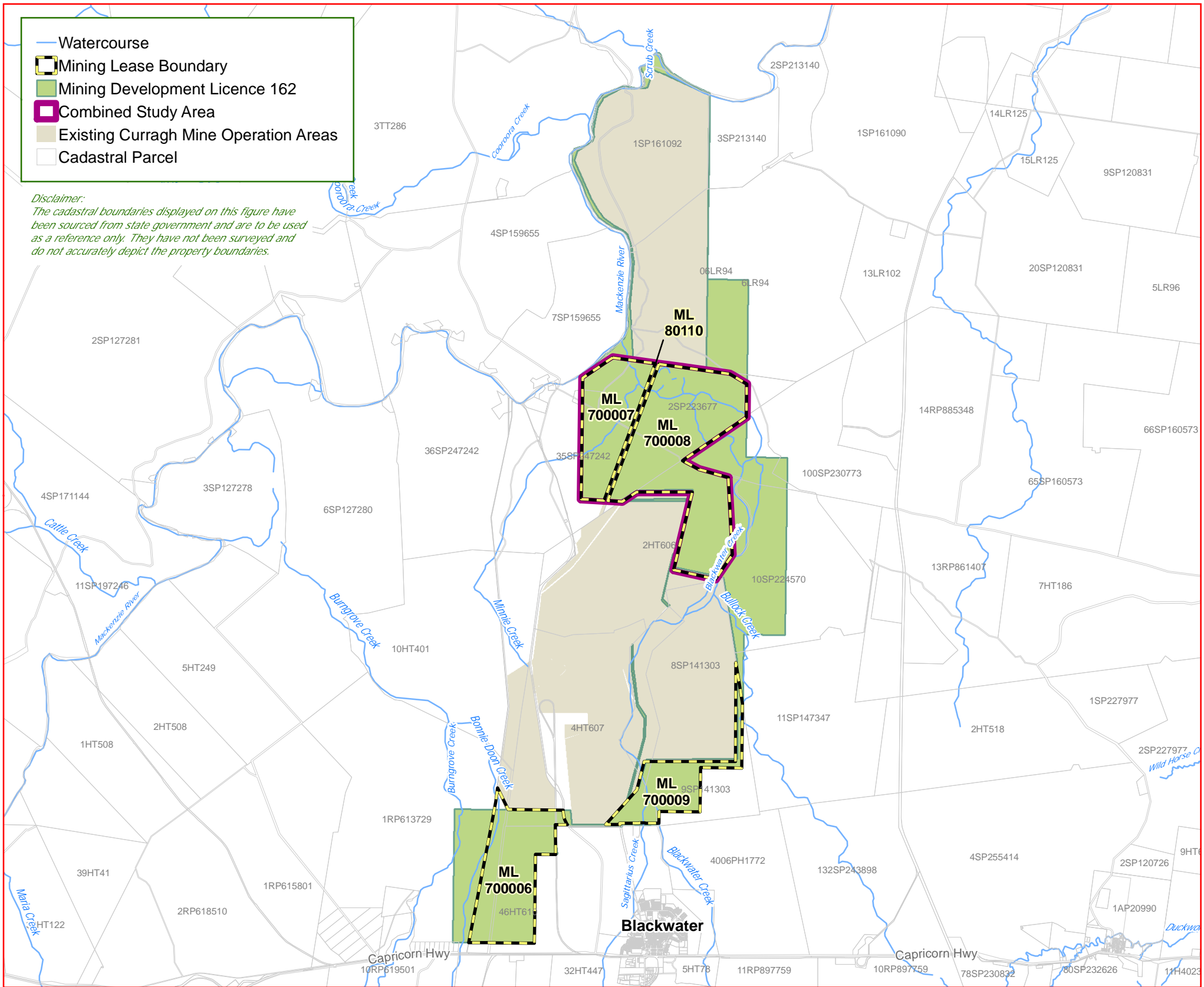
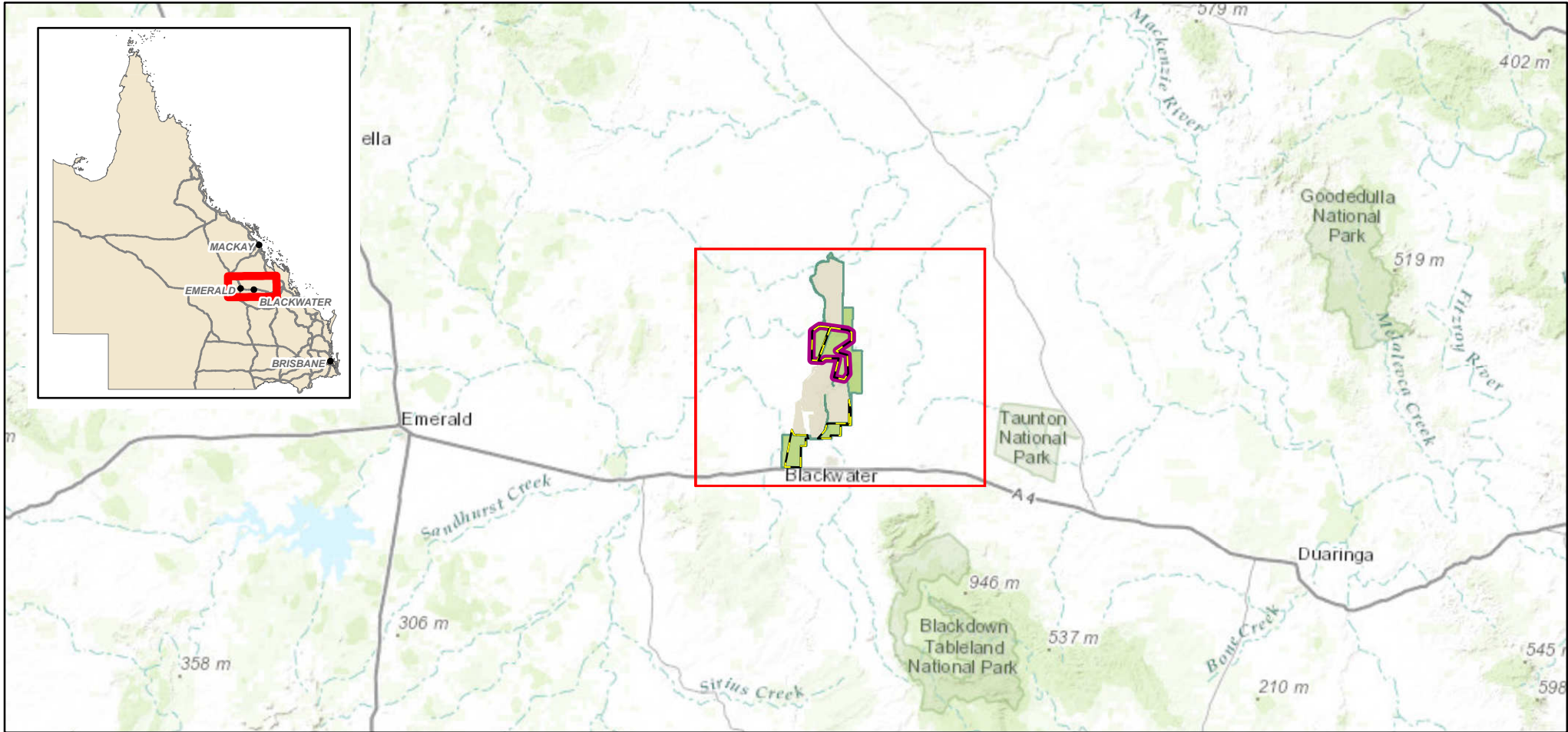
An existing Ergon 66 kV power line truncates the north western corner of ML700007. It is proposed to be relocated around the north western perimeter of the pit.

ML700006 is truncated by a number of existing Ergon and Powerlink lines that will require relocation off-lease. The majority of these relocations will occur outside of the ML700006 and will be negotiated with relevant authorities (Powerlink and Ergon). The relocations are proposed to include the following:

- two 132 kV Powerlink owned lines relocated around the south western corner of the pit
- one 66 kV Ergon owned relocated around the south western corner of the pit
- two 66 kV Ergon owned relocated around the eastern side of the pit
- one 22 kV Ergon owned relocated around the eastern side of the pit.

Environmental assessment and approval requirements for the relocation of powerlines outside the mining lease will be undertaken through a separate process and not part of this Project description. As noted in Section 3, the proposed relocation of powerlines, have not been included in this application as they are not regulated by the RPI Act being outside the proposed mining tenure.

Figure 1: Location of Project



0 0.75 1.5 3 4.5 6 km

Scale 1:185,000
Scale correct when printed at A3 Portrait
(don't resample)
Projection: Transverse Mercator
Coordinate System: GDA 1994 MGA Zone 55



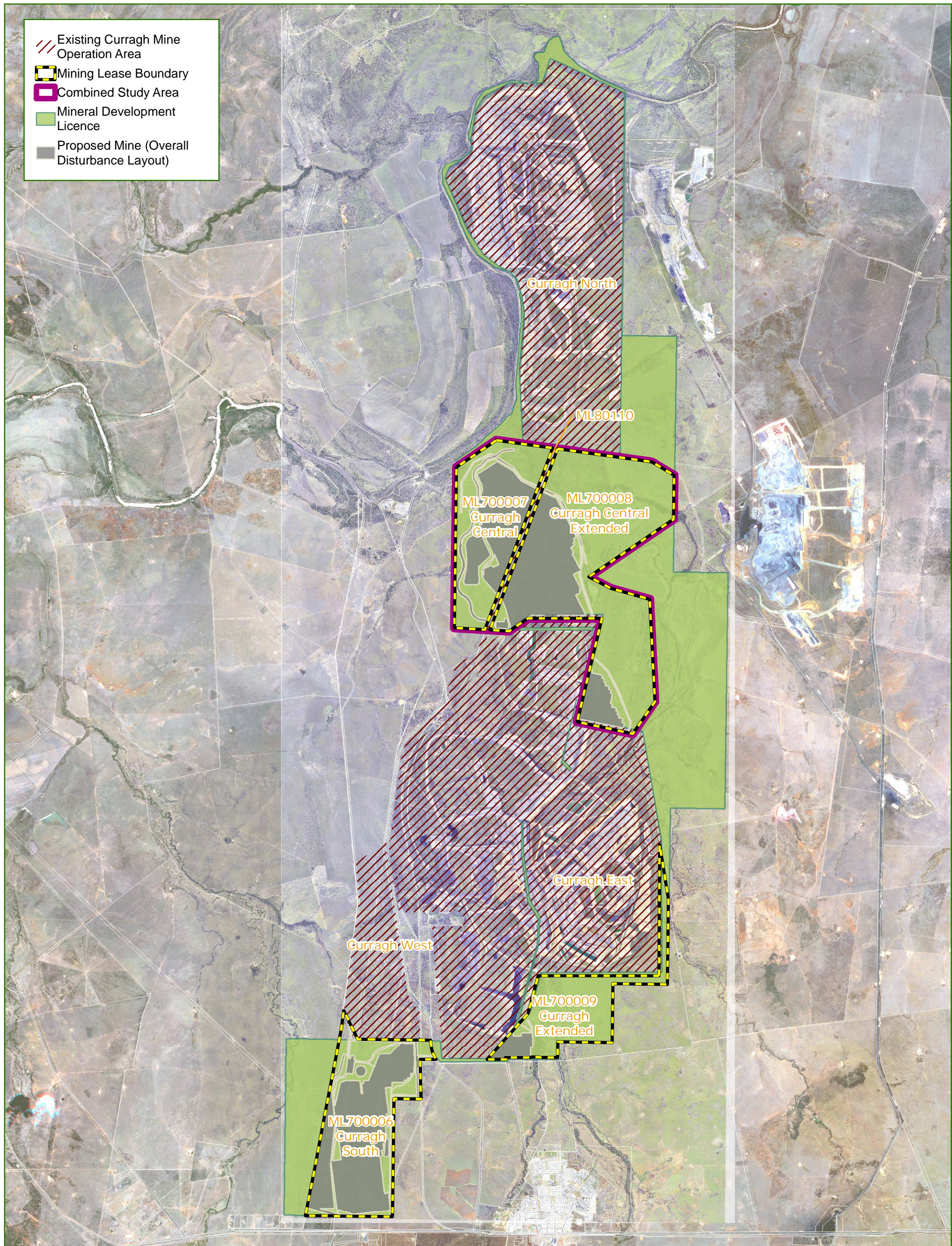
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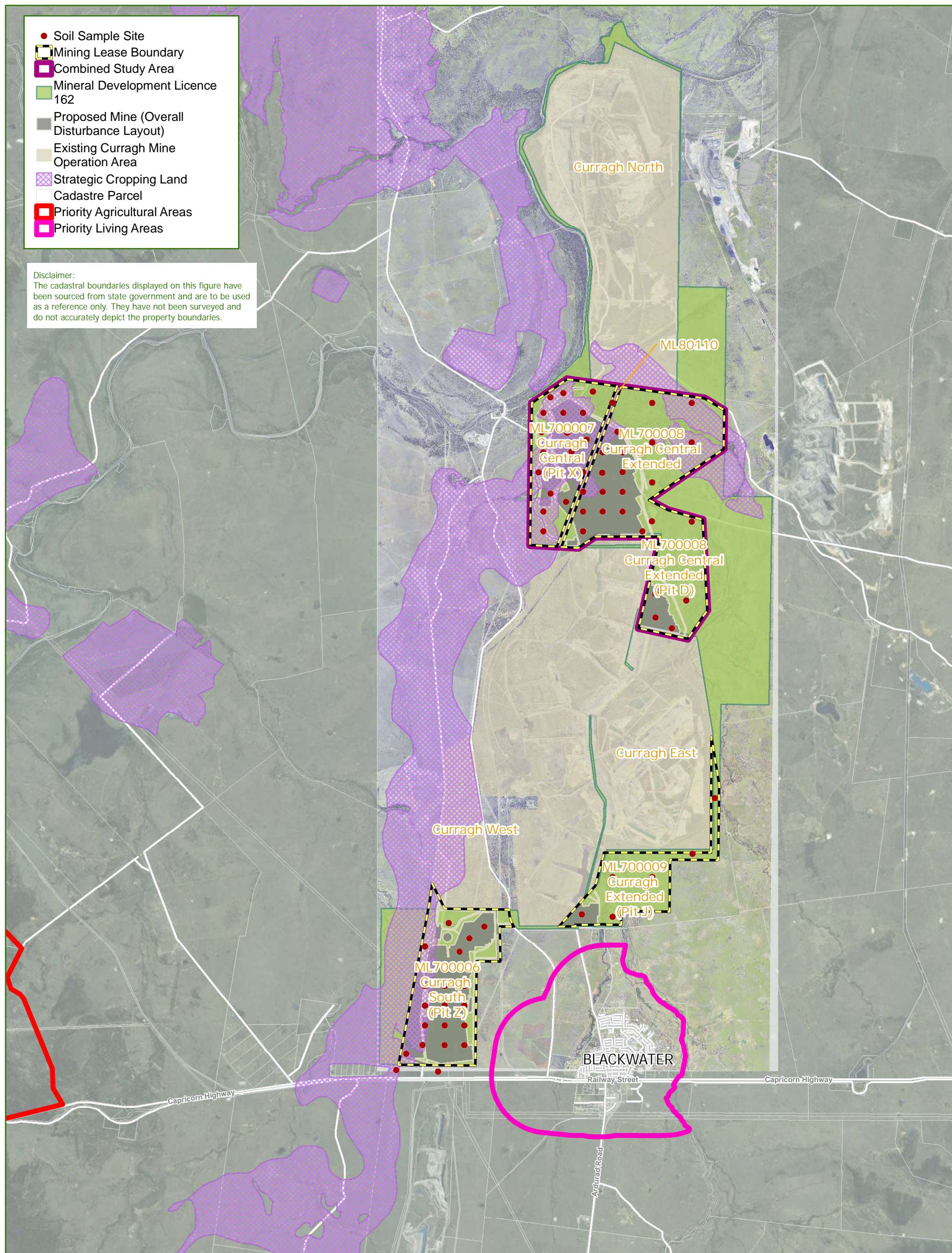
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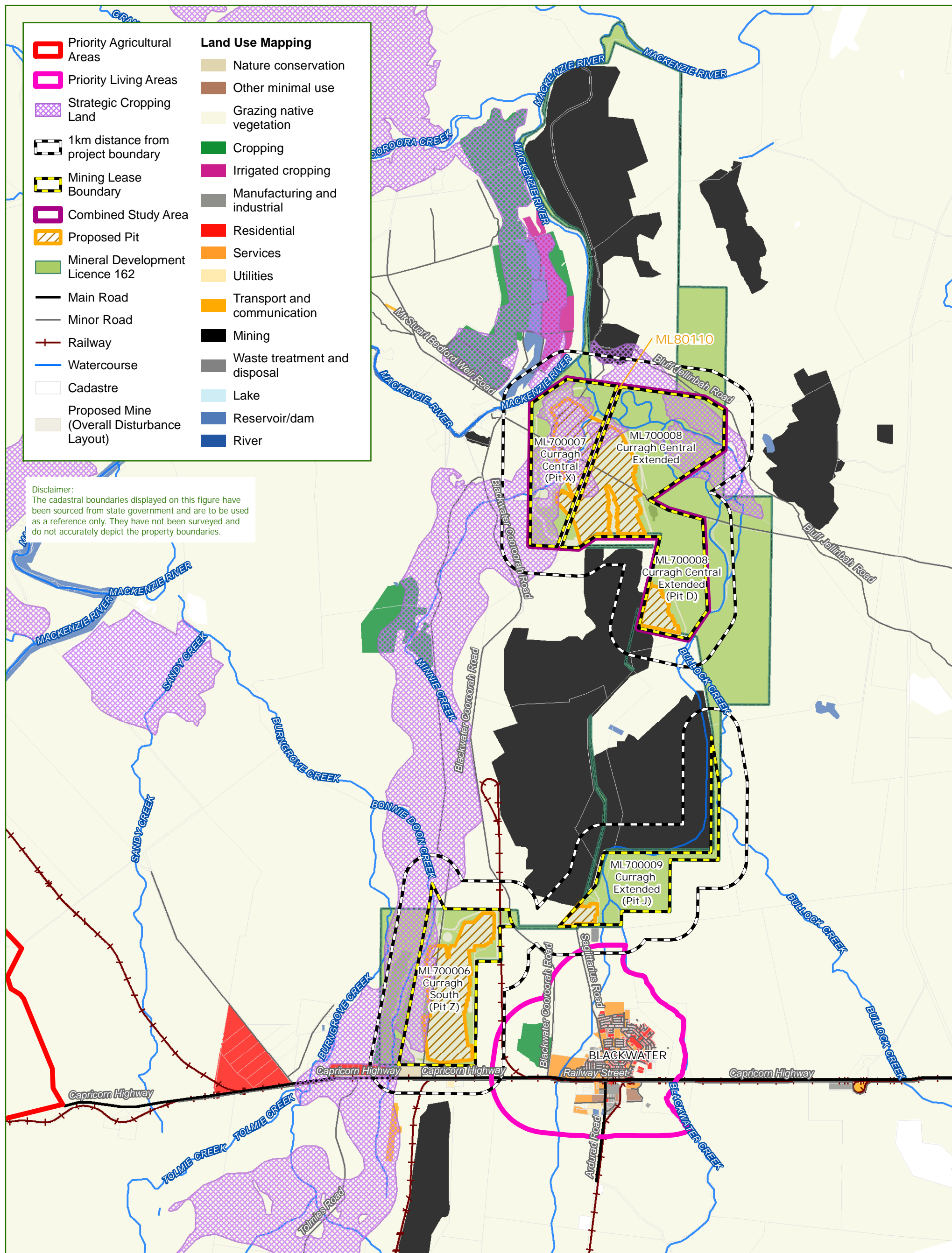
Figure 1
Location of Project

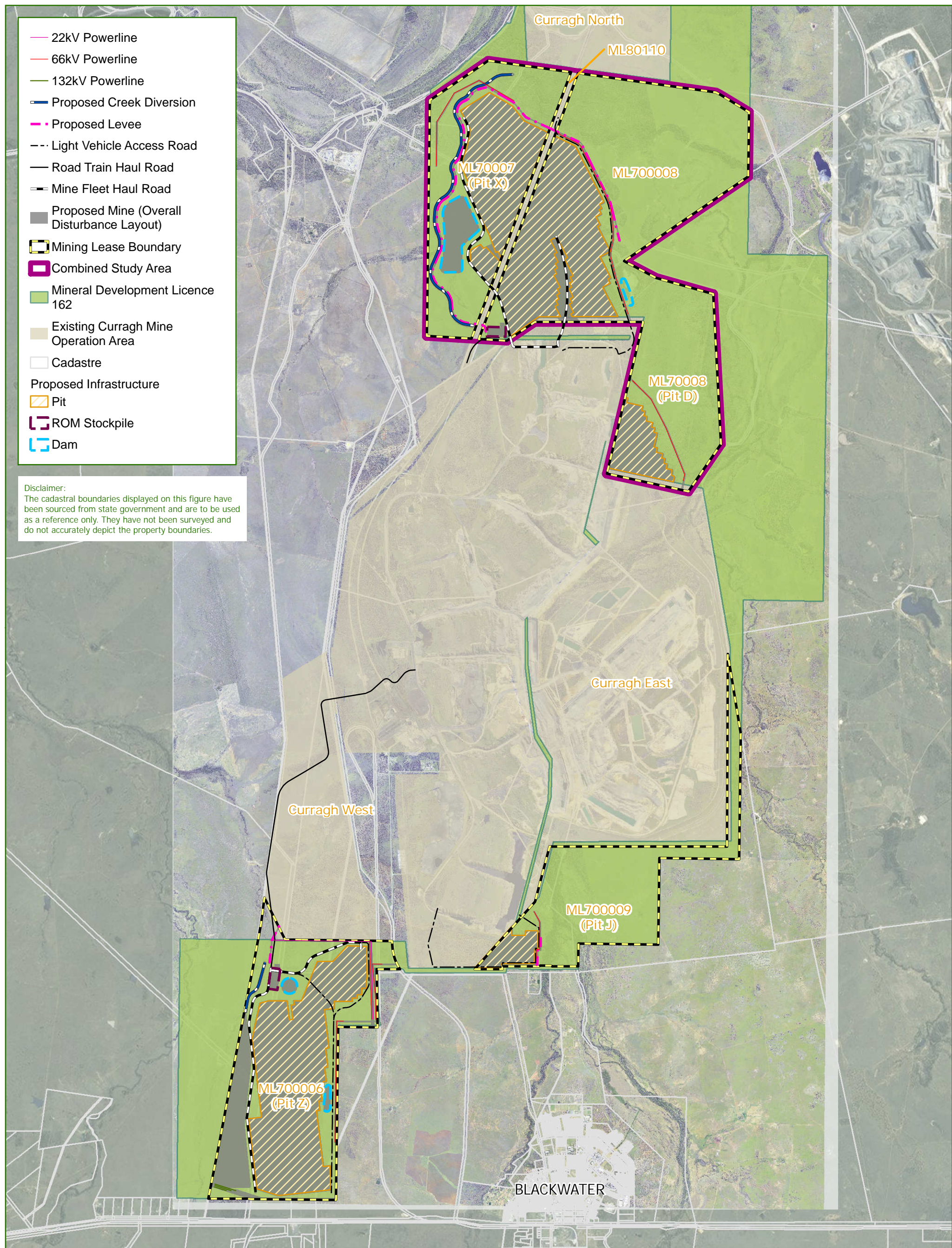
MXD Number: 2172652H_GIS_SCL_F004_A2
Date: 3/12/2015
Author: GL
Approved by: AOK

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Attachment A
Strategic Cropping Land Assessment, SLR July 2015
Supplementary Report, SLR December 2015



global environmental solutions

Strategic Cropping Land Assessment Curragh Extension Project

Report Number 626.10135

22 July 2015

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Version: Revision 0

Strategic Cropping Land Assessment

Curragh Extension Project

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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 WSP / Parsons Brinckerhoff. 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.

SLR 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
626.10135	Revision 0	22 July 2015	Adam Koppers	Dean Fletcher	Dean Fletcher

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1 INTRODUCTION

SLR Consulting (SLR) was commissioned by WSP / Parsons Brinkerhoff (WSP/PB) on behalf of Wesfarmers Curragh Pty Limited to undertake a Strategic Cropping Land (SCL) Assessment for the Curragh Extension Project (the Project). The Project is located north of Blackwater in Central Western Queensland and is situated in the Central Highland Regional Council Local Government Area (Figure 1).

1.1 Project Background

The Project is comprised of four mining lease applications (ML700006, ML700007, ML700008 and ML700009) which were lodged with the Department of Natural Resources and Mines 15 April 2015. In addition, an Environmental Authority (EA) Amendment application (Curragh Mine's Environmental Authority EPML00643713) for the Project was lodged with the Department of Environment and Heritage Protection (DEHP) on the 15 April 2015, which has received the following assessment level decisions:

- 29 April 2015 – notification from DEHP that the EA amendment application will be assessed as a Major Amendment
- 12 May 2015 – notification from DEHP that the Project does not require an Environmental Impact Statement under the *Environmental Protection Act 1994*.

1.2 Relevant Legislation

This SCL Assessment has been prepared generally in accordance with the requirements of the following relevant strategic land use planning documents:

- *Regional Planning Interests Act 2014* (RPI Act);
- *Regional Planning Interests Regulation 2014* (RPI Regulation); and
- *RPI Act Guideline 08/14: How to demonstrate that land in the strategic cropping area does not meet the criteria for strategic cropping land* (State of Queensland, 2014) (RPI Guideline).

1.2.1 Regional Planning Interests Act 2014

The operative provisions of the RPI Act commenced on 13 June 2014 and replaced the repealed SCL Act. The RPI Act is designed to manage the impact of resource activities and other regulated activities on areas of the State that contribute, or are likely to contribute, to Queensland's economics, social and environmental prosperity. The relevant aspects of the RPI Act, as with regard to this report, are as follows:

- The RPI Act incorporates the current SCL zonal criteria and on-ground guideline for assessing whether a property (or part of a property) is SCL; and
- The RPI Act does not allow the mapping of an Area of Regional Interest (ARI) to be challenged by proponents or third parties. However, through the process of a Regional Impact Development Approval (RIDA) application this will in essence determine if land is SCL or not according to the Assessment Criteria contained in the RPI Guideline. These criteria detailed are generally equivalent to those in the repealed SCL Act.

1.3 Purpose of this Document

The purpose of this document is to provide sufficient evidence that demonstrates that the land mapped as SCL on the SCL trigger map is, or is not SCL. This will include a summary of the fieldwork that has been conducted in relation to this SCL Assessment and will also contain sufficient information and advice regarding the on-ground assessment of SCL.

1.4 Project Area and SCL Study Area

1.4.1 Project Area

SLR understands that four broad Project Domains have been demarcated for this Project (**Figure 2**) and include:

1. Mining Area;
2. Infrastructure Area;
3. Nil Disturbance Area; and
4. Easement Area.

Domains 1, 2 and 3 are located within the Project mining lease application areas covering 5,995.7 ha. The Easement Area required for powerline relocation, is located adjacent but external to the Project mining lease application area ML700006, and covers 61.3 ha. Although the relocation of the powerline within the Easement Area is not considered a mining activity, and therefore not regulated by the RPI Act, this area of land has been included in this SCL Assessment however excluded from the Regional Interest Development Approval application for the Curragh Extension Project.

The collective term for the land covered by the four domains is the Project Area. Therefore, the Project Area that includes all four domains is 6,057.0 ha (**Table 1**). A total of 1,646.8 ha of land is SCL trigger mapped within the Project Area.

Table 1 Project Area Domains

Domain	Area (ha)	SCL Trigger Mapped Area (ha)
Domain 1: Mining Area	1,905.9	410.0
Domain 2: Other Disturbance (including Infrastructure)	669.5	350.9
Domain 3: Nil Disturbance Area	3,420.3	829.6
Domain 4: Easement Areas	61.3	56.3
Total	6,057.0	1,646.8

1.4.2 SCL Study Area

The SCL Study Area is restricted to land within the Project Area which is currently SCL trigger mapped and will be disturbed by mining activities associated with the Project (Domains 1, 2 & 3) and powerline relocation within the easement (Domain 4). In addition some areas of 'Nil Disturbance' adjacent to the proposed disturbance areas that are SCL trigger mapped, have been evaluated to allow for minor changes in the current mine plan. The total SCL Study Area is 1,233.7 ha (**Table 2; Figure 3**).

Table 2 SCL Study Area by Domain

Domain	Area (ha)
Domain 1: Mining Area	410.0
Domain 2: Other Disturbance (including Infrastructure)	350.9
Domain 3: Nil Disturbance Area	416.5
Domain 4: Easement Areas*	56.3*
Total	1,233.7

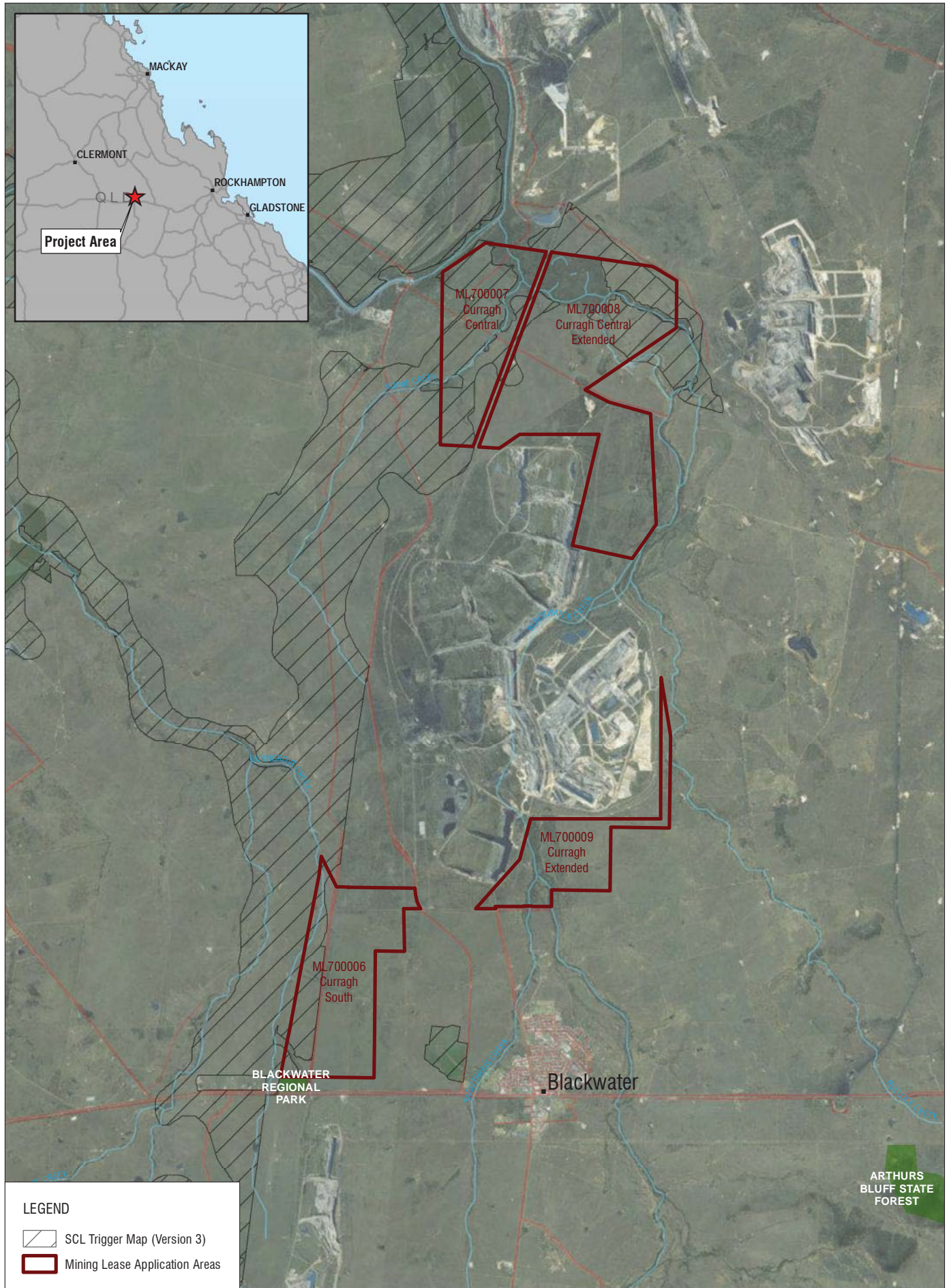
* Note: Domain 4 is excluded from the Curragh Extension Project RIDA application as it is outside the proposed Mining Lease boundaries.

1.5 SCL Assessment Checklist

The RPI Guideline provides information required to be addressed and included in this report. This information is summarised in **Table 3** along with the relevant references to the sections of this report where the information may be found.

Table 3 SCL Assessment Checklist

Information Required	Satisfied	Where in document
Appropriate map unit area	Yes	Table 12 (Section 3.1)
Appropriate site density per map unit	Yes	Table 12 (Section 3.1)
Location and identification of each observation site	Yes	Figure 5
Location of the map units	Yes	Figure 6
Extent of mapped SCL which does not meet criteria	Yes	Figure 7
Certificates of Analysis for all laboratory data	Yes	Appendix A
All soil profile site observations with appropriate information	Yes	Section 3; Appendix B
GPS coordinates of all site observations	Yes	Appendix C



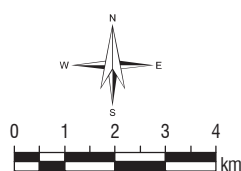
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**Curragh Extension Project
SCL Assessment**

Regional Locality

FIGURE 1

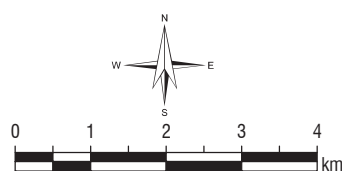
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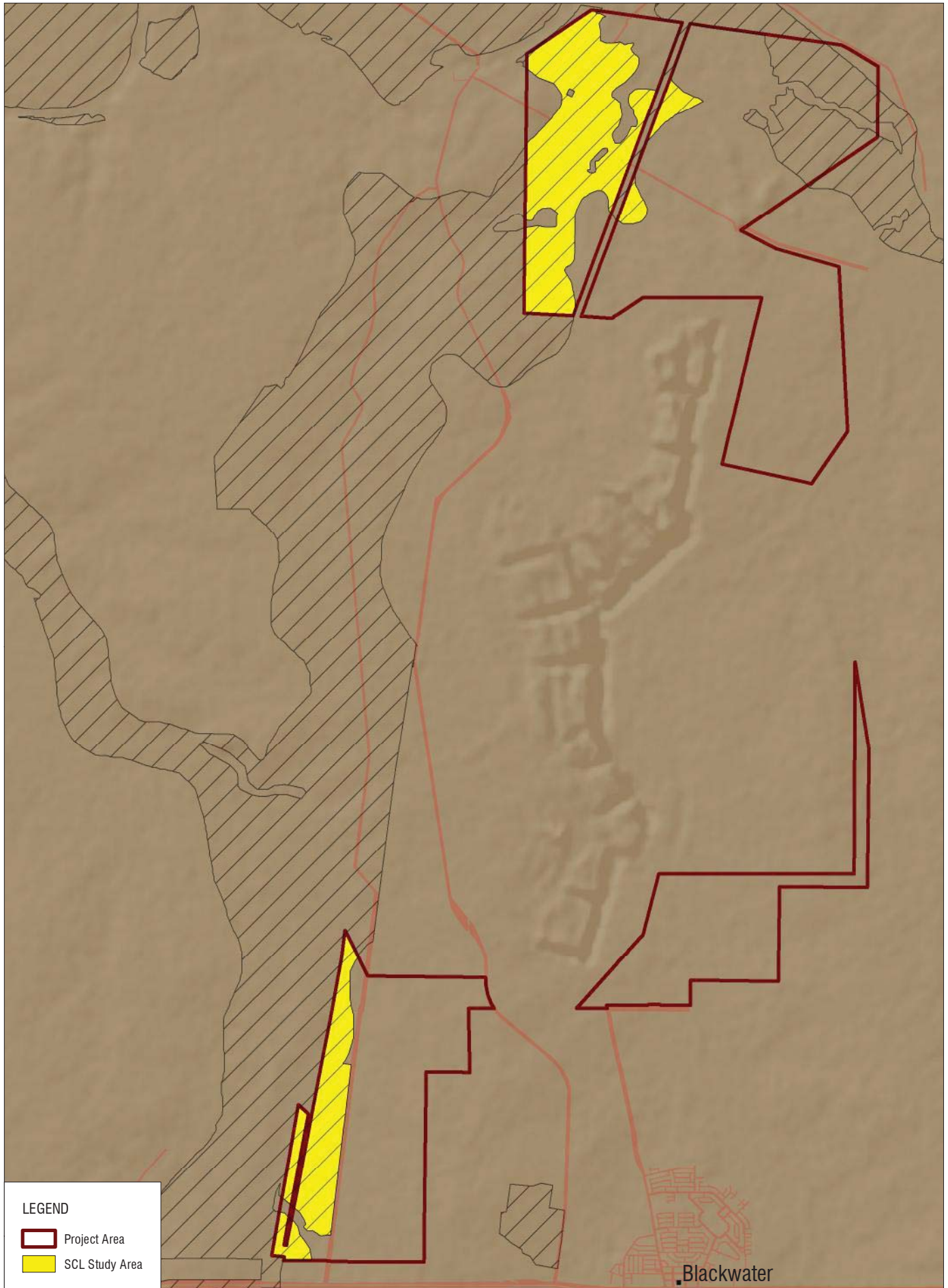


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Curragh Extension Project
SCL Assessment

Project Domains

FIGURE 2



2 METHODOLOGY

2.1 Soil Survey Methodology

2.1.1 Desktop Studies and Reference Mapping

The following resources and techniques were used as an initial examination of the Study Areas:

- Aerial photographs and topographic maps;
Aerial photo and topographic map interpretation was used as a remote sensing technique allowing detailed analysis of the landscape and mapping of features expected to be related to the distribution of soils within the Study Area.
- Reference information;
Source materials, including cadastral data, prior and current physiographic, geological, vegetation, and water resources studies were used to obtain correlations between pattern elements and soil properties that may be observable in the field. An existing soil report for the area, titled *No. 19 Lands of the Isaac-Comet Area, Queensland* (Story et al., 1967) was utilised to assist in defining boundaries of units and classes at a more intensive scale.

2.1.2 Field Survey Type

SLR undertook a field survey to ground truth the SCL Study Area. The soil survey type was in accordance with the *Guidelines for Surveying Soil and Land Resources* (McKenzie et al., 2008). The field survey undertaken was an integrated free survey which assumes that many land characteristics are interdependent and tend to occur in correlated sets (NSCT, 2008). Survey points are irregularly located according to the survey teams' judgement to enable the delineation of soil and SCL boundaries. Soil and SCL boundaries can be abrupt or gradual, and catena and toposequences are used to aid the description of gradual variation.

2.1.3 Survey Observation Types

There are four types of observations that can be used for the SCL Assessment:

- Detailed Sites:
Field observation sites that allows for the identification of any physiographic factors or vegetation associations that characterise the site and associated map unit, the major pedological and structural features of the soil that are of relevance to SCL assessment.
- Analysed Sites
Detailed Sites from which soil samples are collected and sent to NATA accredited laboratory for chemical and or physical analyses;
- Exclusion Sites
Observation sites from which land can quickly and easily be determined as meeting or not meeting criteria relating to slope, rockiness or gilgai; and
- Check Sites
Field observation sites that are examined in sufficient detail to allocate the site to a specific soil type and map unit. Commonly referred to as mapping observations.

Section 2.1.4 summarises the field survey observation types undertaken for the assessment.

2.1.4 Field Survey Observation Sites

Of the 1,233.7 ha of SCL Study Area, the fieldwork program excluded land that exceeded a slope greater than 3% using 'remote and indirect measurement (see **Appendix D** for methodology). Land with slopes greater than 3% is considered non-SCL in the Western Cropping SCL Zone. There are approximately 70 ha of land within the SCL exceeding slopes of 3% and this is listed as an SCL Exclusion Zone (**Figure 4**).

In October 2014, a total of 73 field survey observation sites were completed within the Project Area, of which 24 sites were within the SCL Study Area (**Figure 5**). Only observation sites within the SCL Study Area and therefore relevant to the SCL Assessment are discussed within this document.

In accordance with the RPI Guideline, validating SCL trigger mapping requires one observation every 50 ha. The number of observation survey sites required is shown in **Table 4**.

Table 4 Required Field Observations: SCL Study Area

SCL Study Area	Area (ha)	Survey Scale	Total Required Survey Sites
SCL Inclusion Zone - fieldwork required	1,163.7	1 Site per 50 ha	24
SCL Exclusion Zone - no fieldwork required	70.0	N/A	0
Total	1,233.7	-	24

All 24 observation sites within the SCL Study Area were Detailed Sites or Analysed Sites for the purpose of the RPI Guideline. There were no SCL Exclusion Sites based on rockiness or gilgai or Check Sites (**Table 5**).

Table 5 Field Survey Observations

Area	Observation Sites				
	Detailed	Analysed	Exclusion	Check	Total
SCL Study Area	16	8	0	0	24

Detailed Sites

Soil profiles within the Study Area were assessed in accordance with the Australian *Soil and Land Survey Field Handbook* soil classification procedures (NCST, 2009). Soil profiles were excavated from each Detailed Site using a mechanical non-rotating hydraulic ram soil corer. Each core was excavated to bedrock, equipment refusal or to an approximate depth of 1.2 m. Soil samples were taken for analysis, and the cores were backfilled after the profile was assessed.

Detailed soil profile descriptions recorded information that covered the major assessment parameters that are specified in **Table 6**. Soil profile logging was undertaken in the field using soil data sheets. GPS recordings were taken for all sites and soil exposures from excavated cores were photographed during field operations as colour photography of profile sites is a useful adjunct to description of land attributes.

The soil taxonomic classification system utilised to classify each Detailed Site was the *Australian Soil Classification System* (Isbell, 2002).

Table 6 Detailed Survey Site Assessment Parameters

Assessment Parameters	
Unique ID Number	Pedality structure, grade and consistence
GPS coordinates	Stones including abundance and size
Date	Mottles including amount, size and distinctiveness
Landform pattern and element	Segregations including abundance, nature, form and size
Current land use	Pan presence and form
Horizon depth including distinctiveness and shape	Roots including amount and size
Field texture grade	Permeability and drainage
Field colour (Munsell Colour Chart)	Field pH

Analysed Sites

Soil was generally collected at 10 cm increments throughout the profile. Samples representative of soil horizons were also generally collected at the following soil depths: 0-10 cm, 20-30 cm, 50-60 cm and 90-100 cm. Where horizon mixing was to be avoided, these depths were adjusted accordingly.

A total of 12 survey sites were laboratory analysed for the SCL parameters listed in **Table 7**, of which eight sites were within the SCL Study Area and used for the SCL Assessment (refer **Section 3**). The remaining four survey sites analysed were outside the SCL Study Area but within the SCL trigger mapped area. These sites were tested as a reconnaissance survey in areas of 'Nil Disturbance' should any changes in the Project disturbance footprint be required. Certificates of analysis are contained in **Appendix A**.

Table 7 SCL Laboratory Analysis

Laboratory Suite	Sampling Frequency	Laboratory Analysis
SCL Basic suite	Every sample (0.1 m increments down the profile to a maximum depth of 1.0 m or bedrock)	<ul style="list-style-type: none"> Electrical conductivity (EC) pH Chloride
SCL Major suite	Every major soil horizon	<ul style="list-style-type: none"> Exchangeable cations Cation exchange capacity (CEC) Colour Particle size analysis

2.2 SCL Assessment Methodology

A key part of the RIDA application is demonstrating whether the Project's activities will have an impact on SCL. This requires assessment of the SCL Study Area in accordance with the RPI Guideline.

2.2.1 Strategic Cropping Land Criteria

The SCL criteria assessment relevant for the Western Cropping Zone is shown in **Table 8**. These criteria will be applied as appropriate to the survey observations.

Table 8 Zonal Criteria: Western Cropping Zone

Criteria		Description
1	Slope	Slope is less than or equal to 3%
2	Rockiness	The average density of rocks of greater than 60 mm diameter in the soil surface is less than or equal to 20%
3	Gilgai microrelief	The average density of gilgai microrelief of greater than 500 mm depth is less than 50 per cent of the land surface
4	Soil depth	The soil depth is greater than or equal to 600 mm
5	Soil wetness	The site has favourable drainage
6	Soil pH	For non-rigid soils, the soil at 300 mm and 600 mm soil depth must be greater than pH 5.0.
		For rigid soils, the soil at 300 mm and 600 mm soil depth must be greater than pH 5.1 to pH 8.9 inclusive.
7	Salinity	Chloride < 800 mg/kg within 600 mm of the soil surface
8	Soil water storage	≥ 100 mm to a soil depth or soil physio-chemical limitation of ≤ 1000 mm

2.2.2 Effective Rooting Depth and Soil Water Storage

Criterion 8 of the SCL guideline, soil water storage (SWS), is expressed as mm of water over a specified depth of soil. Soil depth is calculated according to its effective rooting depth (ERD) or to a maximum depth of 1000 mm. **Table 9** shows the ERD thresholds for the Western Cropping Zone in accordance with the RPI Guideline.

Table 9 Effective Rooting Depth Criteria for Western Cropping Zone

Descriptor		ERD occurs where:
Chloride Levels	Cl 1:5	>800 mg/kg
Sodicity	Exchangeable sodium percentage (ESP)	>15%
Cation Exchange Balance	Ca:Mg ratio	≤0.1
pH	Rigid soils	≤5.0 and ≥9.0
	Non-rigid soils	≤5.0
Bedrock	Depth to bedrock	Depth to C horizons

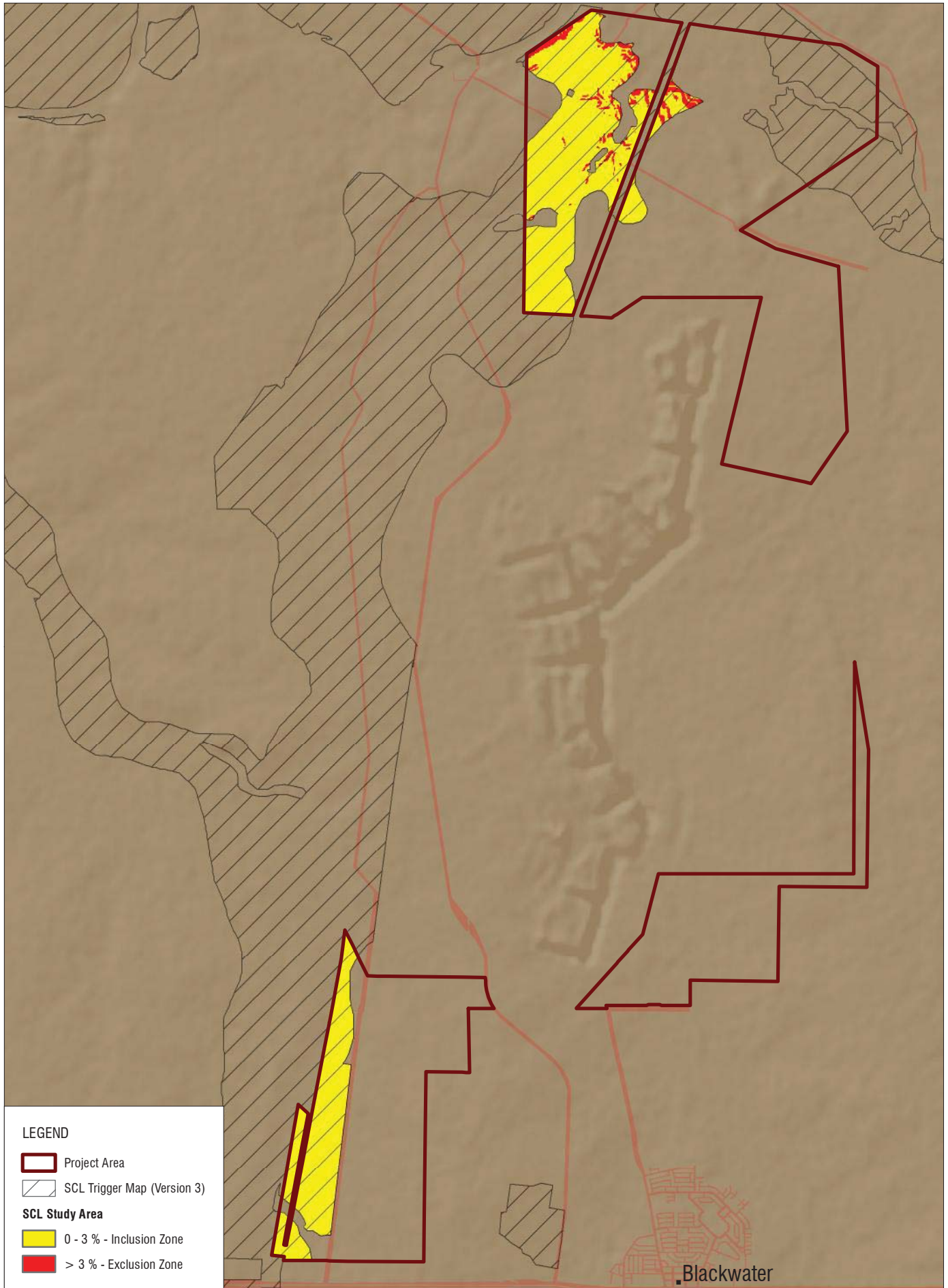
For this assessment, SWS of the soil profile was calculated using the soil texture lookup table method in accordance with the RPI Guideline (**Table 10**). Once the applicable soil textures (using laboratory data) are determined for each soil horizon, the soil water storage value for each layer is applied.

Table 10 Soil Texture Lookup Table

Soil Texture	Soil Water Storage
Sand; clayey sand; loamy sand	4 mm / 100 mm
Sandy loam	5 mm / 100 mm
Loam; silty loam; sandy clay loam	6 mm / 100 mm
Clay loam; clay loam, sandy; silty clay loam	8 mm / 100 mm
Silty clay; clays with <45% clay fraction	10 mm / 100 mm
Clays with ≥45% clay fraction	12 mm / 100 mm

Where the SWS estimate for a soil profile is within 15% of the criterion 8 threshold, a more robust estimate of SWS is required to be calculated using the PAWCER Pedotransfer method including laboratory analysed gravimetric water content at 1.5 MPa, as per the RPI Guideline. No sites analysed failed solely on criterion 8 and therefore additional laboratory analysis for SWS is not required (refer **Table 18**).

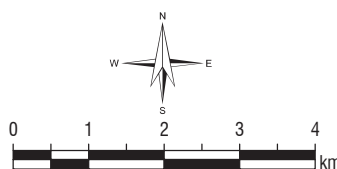
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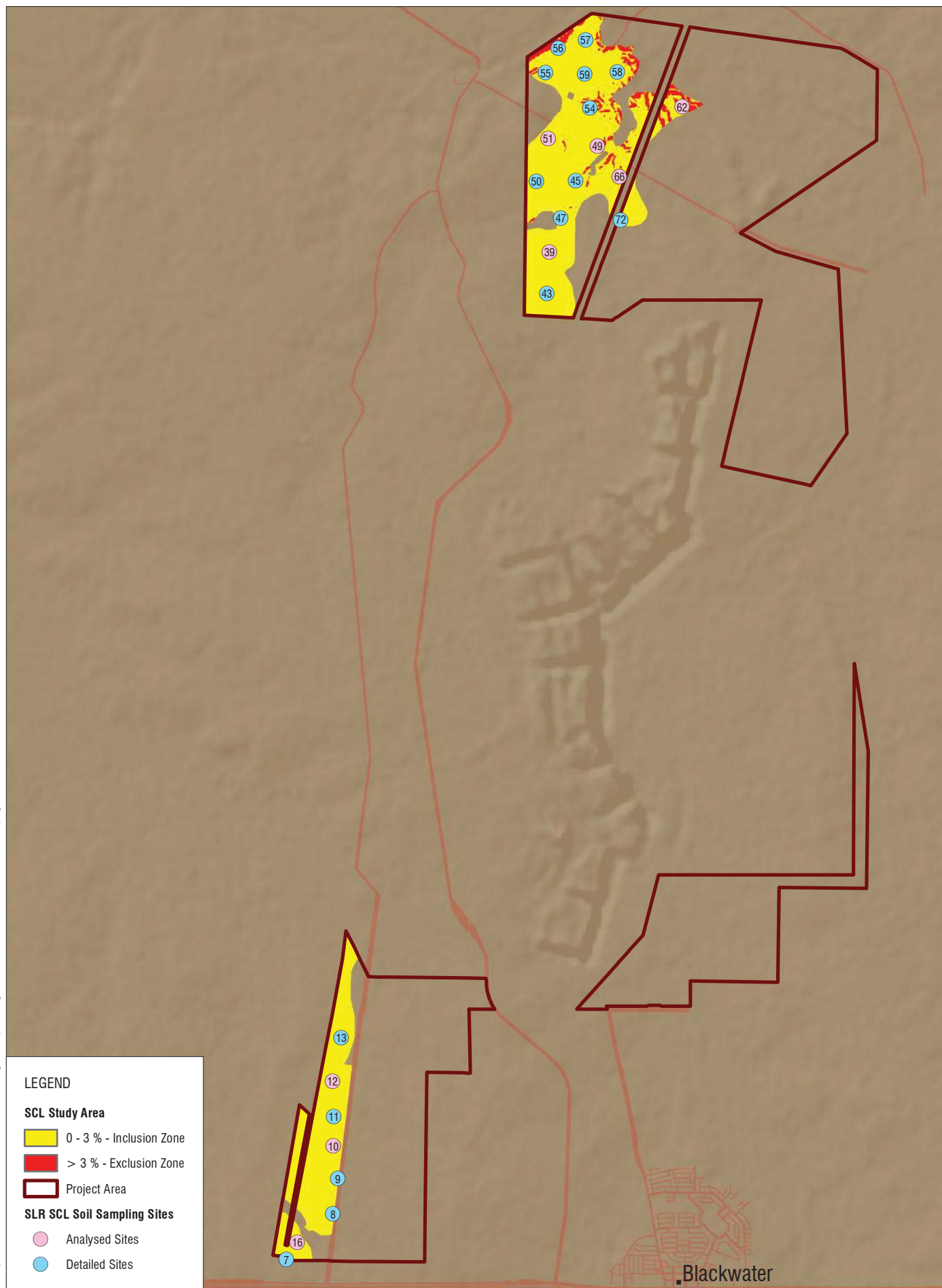
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Curragh Extension Project
SCL Assessment

SCL Exclusion Zone

FIGURE 4

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3 SOIL SURVEY RESULTS

In accordance with the RPI Guideline, a Soil Map Unit may consist of one or more soil types, but will typically only contain a single dominant soil type. Therefore, in a Soil Map Unit there may contain a dominant soil type and a subdominant and/or soil variant that are part of the soil landscape continuum but do not represent the major soil type present. The sub-dominant and/or variant typically occur when the soil type is too small to map as a Soil Map Unit or their presence is minor and part of the typical soil variance expected in a landscape.

Within the Study Area, one soil mapping unit (Soil Map Unit 1) (refer **Figure 6**) was identified that contained three soil types:

- Self-mulching Brown Vertosol (dominant);
- Self-mulching Black Vertosol (sub-dominant) and
- Eutrophic Brown Dermosol (sub-dominant)

3.1 Soil Map Unit 1 – Self-mulching Brown Vertosol

The dominant soil type for Soil Map Unit 1 is a Self-mulching Brown Vertosol. The Self-mulching Black Vertosol and Eutrophic Brown Dermosol do not meet the minimum soil unit map area requirements (10 ha) or number of sites per map unit (**Table 11**), therefore they have been aggregated with the dominant soil type in accordance with the RPI Guideline.

Table 11 Soil Types per Soil Map Unit

Soil Map Unit	Soil Types	Representative Sites
1	Self-Mulching Brown Vertosol	7, 8, 9, 10, 11, 12, 13, 16, 39, 45, 47, 49, 54, 57, 58, 59, 62, 66, 72
	Self-Mulching Black Vertosol	43, 56
	Eutrophic Brown Dermosol	50, 51, 55

The Self-mulching Brown Vertosol is characterised by silty clay grading to heavy clay or uniform heavy clay throughout the profile. This soil type is generally alkaline throughout the profile and exhibits increasing concentrations of chloride with depth, reaching extreme soil salinity levels. The profiles are generally non-sodic in the topsoil and marginally to strongly sodic in the subsoil. The number of observation types within Soil Map Unit 1 is shown in **Table 12**.

Table 12 Number of Survey Sites per Soil Map Unit

Soil Map Unit	SCL Study Area – Inclusion Zone (ha)	Observation Site Type	Site ID	No. of Sites	Required Sites
1	1,163.7	Analysed	10, 12, 16, 39, 49, 51, 62, 66	8	3
		Detailed	7, 8, 9, 11, 13, 43, 45, 47, 48, 50, 54, 55, 56, 57, 58, 72	16	3
		Check	-	0	2^
Total				24	8
Site Density				50 ha / site	50 ha / site

[^] Check sites have been directly substituted for additional detailed sites.

The representative soil profiles for each dominant and sub-dominant soil type are described below (refer **Table 13** to **Table 17**).

3.1.1 Soil Map Unit 1 – Self-mulching Brown Vertisol (Dominant Soil Type)

Table 13 Detailed Description: Site 10

ASC Name	Self-mulching Brown Vertisol
Site No.	10
Inspection Date	29/10/2014
Landform; Element	Flat; Minimal
Microrelief; Component	None; None
Permeability	Slowly
Drainage	Well drained
Dominant Slope	0-1%
Surface Coarse Fragments	Nil
Surface Condition	Self-mulching
Disturbances (Land Use)	Grazing




Profile	Horizon / Depth (m)	Description
	A1 0.0 – 0.10	Dark brown (10YR 3/3) Heavy Clay, Weak structure of 5-10 mm angular blocky peds with a moderate consistence. Nil mottling; <5% <5 mm stone content; Nil segregations; abundant coarse roots; Well drained with a clear and even boundary.
	B21 0.10 – 0.40	Dark brown (10YR 3/3) Heavy Clay, Strong structure of 20-50 mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; 5% calcareous segregations; common fine roots; Well drained with a gradual and even boundary.
	B22 0.40 – 0.80	Very dark grayish brown (10YR 3/2) Heavy Clay, Strong structure of 30-50 mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; 5% calcareous & 5% gypsum segregations; common fine roots; Well drained with a gradual and irregular boundary.
	B23 0.80 – 1.10	Dark brown (10YR 3/3) Heavy Clay, Strong structure of 50-70 mm angular blocky peds with a strong consistence. 30% distinct orange (7.5YR 6/8) mottling; Nil stone content; 5% calcareous & 5% gypsum segregations; few fine roots; Poorly drained.

Table 14 Analysed Description: Site 10

Horizon	Upper Layer	Lower Layer	pH (1:5)	Chloride	EC (1:5)	CEC	ESP	Ca:Mg	Soil Texture	SWS
	m	m		mg/kg	dS/m	cmol+ /kg	%			mm/100 mm
A1	0.0	0.1	8.7	40	0.137	44.1	1.1	3.9	HC	12
	0.1	0.2	8.9	60	0.153	48.4	1.9	3.7		12
B21	0.2	0.3	9.1	60	0.215	45.5	3.3	3.0	HC	12
	0.3	0.4	9	220	0.379	35.8	8.9	1.8		12
	0.4	0.5	9	500	0.573	35.7	10.1	1.6		12
B22	0.5	0.6	9	460	0.538	37.4	10.2	1.6	HC	12
	0.6	0.7	8.9	700	0.822	38.3	11.5	1.4		12
	0.7	0.8	8.6	840	0.937	38	11.3	1.3		12
B23	0.8	0.9	8.5	1190	1.030	36.6	11.7	1.2	HC	12
	0.9	1.0	7.8	1690	1.510	35.2	11.6	1.0		12
SCL Criteria Compliance										
Effective Rooting Depth			0.7 m							
Total Soil Water Storage			84 mm							
Criterion 6 (pH) Compliance			Yes							
Criterion 7 (Salinity) Compliance			Yes							
Criterion 8 (SWS) Compliance			No							

3.1.2 Soil Map Unit 1 – Self-mulching Black Vertosol (Sub-dominant Soil Type)

Table 15 Detailed Description: Site 56

ASC Name	Self-mulching Black Vertosol
Site No.	56
Inspection Date	2/11/2014
Landform; Element	Lower Slope; Minimal
Microrelief; Component	None; None
Permeability	Slowly
Drainage	Well drained
Dominant Slope	1-3%
Surface Coarse Fragments	Nil
Surface Condition	Crusted / Loose
Disturbances (Land Use)	Grazing



Profile	Horizon / Depth (m)	Description
	A1 0.0 – 0.15	<p>Very dark grey (7.5YR 3/1) Medium Clay, Strong structure of 10-50 mm platy peds with a strong consistence.</p> <p>Nil mottling; Nil stone content; Nil segregations; abundant coarse roots; Well drained with a clear and even boundary.</p>
	B21 0.15 – 0.60	<p>Black (7.5YR 2.5/1) Heavy Clay, Strong structure of 30-40 mm angular blocky peds with a strong consistence.</p> <p>Nil mottling; Nil stone content; Nil segregations; common coarse roots; Well drained with a gradual and even boundary.</p>
	B22 0.60 – 1.00	<p>Black (7.5YR 2.5/1) Heavy Clay, Strong structure of 30-50 mm angular blocky peds with a strong consistence.</p> <p>Nil mottling; Nil stone content; 5% calcareous segregations; common fine and coarse roots; Moderately drained.</p>

3.1.3 Soil Map Unit 1 – Eutrophic Brown Dermosol (Sub-dominant Soil Type)

Table 16 Detailed Description: Site 51

ASC Name	Eutrophic Brown Dermosol
Site No.	51
Inspection Date	1/11/2014
Landform; Element	Lower slope; Minimal
Microrelief; Component	None; None
Permeability	Slowly permeable
Drainage	Well drained
Dominant Slope	0-1%
Surface Coarse Fragments	Nil
Surface Condition	Firm
Disturbances (Land Use)	Grazing




Profile	Horizon / Depth (m)	Description
	A1 0.0 – 0.10	Dark Yellowish-brown (10YR 3/4) Clay Loam, Weak structure of 10-30 mm platy peds with a strong consistence. Nil mottling; 10% 20 mm stone content; Nil segregations; common fine roots; Well drained with a clear and even boundary.
	B21 0.10 – 0.40	Dark Yellowish-brown (10YR 3/4) Light Clay, Strong structure of 30-40 mm angular blocky peds with a strong consistence. Nil mottling; <5% 10 mm stone content; Nil segregations; common fine roots; Well drained with a gradual and even boundary.
	B22 0.40 – 0.60	Dark Yellowish-brown (10YR 3/4) Light Clay, Strong structure of 40+ mm angular blocky peds with a strong consistence. Nil mottling; 10% 40 mm stone content; Nil segregations; few fine roots; Moderately drained with a gradual and even boundary.
	B23 0.60 – 1.00	Dark Yellowish-brown (10YR 4/6) Light Clay, Strong structure of 40+ mm angular blocky peds with a strong consistence. 10% distinct brown (7.5YR 6/6) mottling; Nil stone content; <5% manganiferous segregations; Nil roots; Imperfectly drained.

Table 17 Analysed Description: Site 51

Horizon	Upper Layer	Lower Layer	pH (1:5)	Chloride	EC (1:5)	CEC	ESP	Ca:Mg	Soil Texture	SWS
	m	m		mg/kg	dS/m	cmol+ /kg	%			mm/100 mm
A1	0.0	0.1	7.1	60	0.121	11.7	5.1	0.9	CL	8
	0.1	0.2	7.0	110	0.171	14.3	8.4	0.8	LC	10
B21	0.2	0.3	7.0	430	0.393	15.1	13.2	0.6		10
	0.3	0.4	6.8	1040	0.706	9.9	19.2	0.5	LC	10
B22	0.4	0.5	6.9	1110	0.727	10.7	24.3	0.4		10
	0.5	0.6	7.6	1400	0.829	9.1	26.4	0.3		10
	0.6	0.7	7.1	1900	1.120	8.6	27.9	0.3	LC	10
B23	0.7	0.8	7.3	1480	0.932	6.4	28.1	0.3		10
	0.8	0.9	7.2	1800	1.100	10.8	26.9	0.2		10
	0.9	1.0	6.8	2890	1.490	5.6	30.4	0.2		10
SCL Criteria Compliance										
Effective Rooting Depth			0.3 m							
Total Soil Water Storage			28 mm							
Criterion 6 (pH) Compliance			Yes							
Criterion 7 (Salinity) Compliance			No							
Criterion 8 (SWS) Compliance			No							

3.2 Strategic Cropping Land Assessment

This SCL assessment has been conducted in accordance with the RPI Act and the RPI Guideline (**Table 18; Appendix B**). A key part of the RIDA application is demonstrating whether the Project's activities will be carried out on SCL. A single Soil Map Unit was mapped with the SCL Study Area and this is represented by the dominant soil type, Self-mulching Brown Vertosol. Two sub-dominant soil types, Self-mulching Black Vertosol and Eutrophic Brown Dermosol were also present. In accordance with the RPI Guideline; the SCL assessment is undertaken on the dominant soil type within the mapping unit. As this dominant soil type fails to meet the SCL criteria, the entire Soil Map Unit is assessed as non-SCL (**Figure 7**).

No observation sites of the dominant soil type, within the SCL Study Area, failed SCL Criteria 1 to 5. The majority of laboratory analysed observation sites exhibited SCL constraints for both or either Criterion 7: Salinity (chloride > 800 mg/kg within 600 mm of the surface) and Criterion 8: Soil Water Storage (<100 mm to a soil depth or soil physio-chemical limitation of <1000 mm) (**Figure 8**).

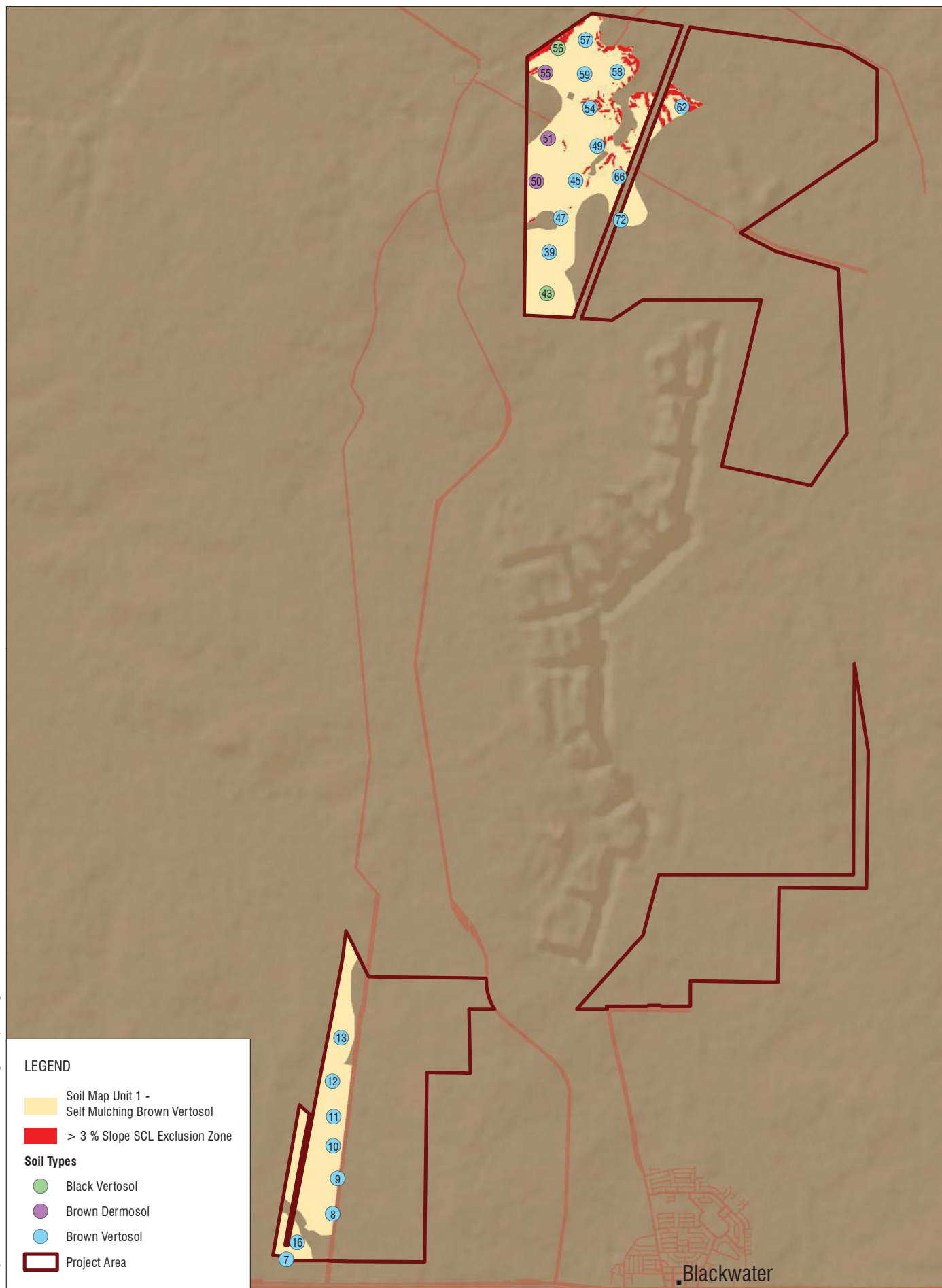
The classification of a Soil Map Unit as 'SCL' or 'non-SCL' is based on the characteristics of the dominant soil type failing one or more SCL criterion. In this case, 5 out of 7 analysed sites (>70%) within the dominant soil type (Self-mulching Brown Vertosol) of Soil Map Unit 1 fail salinity and/or soil water storage criteria.

The two sites that do not fail SCL criteria are not located adjacent to each other and therefore are not suitable to be mapped as separate Soil Map Units as they would not meet the minimum requirements set out by the RPI Guideline in terms of sampling density or map unit area

Based on the evidence provided, Soil Map Unit 1 has been assessed as being 'non-SCL'.

Table 18 Strategic Cropping Land Assessment

Soil Type		SCL Criteria							SCL	
Soil Name	Site No.	Slope	Rockiness	Gilgai	Soil Depth	Soil Wetness	pH	Salinity	Soil Water Storage	
Soil Map Unit 1: Self-Mulching Brown Vertosol										
Dominant Soil Type: Self-mulching Brown Vertosol	10	✓	✓	✓	✓	✓	✓	✓	✗	Not SCL N/A: Detailed Sites not laboratory analysed. Correlated with analysed sites.
	12	✓	✓	✓	✓	✓	✓	✓	✓	
	16	✓	✓	✓	✓	✓	✓	✗	✗	
	39	✓	✓	✓	✓	✓	✓	✗	✗	
	49	✓	✓	✓	✓	✓	✓	✗	✗	
	62	✓	✓	✓	✓	✓	✓	✓	✓	
	66	✓	✓	✓	✓	✓	✓	✗	✗	
	7	✓	✓	✓	✓	✓				
	8	✓	✓	✓	✓	✓				
	9	✓	✓	✓	✓	✓				
	11	✓	✓	✓	✓	✓				
	13	✓	✓	✓	✓	✓				
	45	✓	✓	✓	✓	✓				
	47	✓	✓	✓	✓	✓				
	48	✓	✓	✓	✓	✓				
	54	✓	✓	✓	✓	✓				
	57	✓	✓	✓	✓	✓				
	59	✓	✓	✓	✓	✓				
	72	✓	✓	✓	✗	✓				
Sub-dominant Soil Type: Self-mulching Black Vertosol	43	✓	✓	✓	✗	✓				N/A: Detailed Sites not laboratory analysed. Correlated with analysed sites.
	56	✓	✓	✓	✓	✓				
Sub-dominant Soil Type: Eutrophic Brown Dermosol	51	✓	✓	✓	✓	✓		✗	✗	N/A: Detailed Sites not laboratory analysed. Correlated with analysed sites.
	50	✓	✓	✓	✗	✓				
	55	✓	✓	✓	✗	✓				

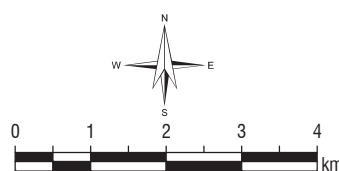




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Sheet Size:	A4
Projection:	GDA 1994 MGA Zone 55



WSP / Parsons Brinckerhoff

**Curragh Extension Project
SCL Assessment**

SCL Assessment

FIGURE 7



LEGEND

Project Area

SCL Limitation

Slope

Salinity and Soil Water Storage



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Project No.: 626.10135

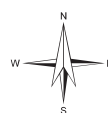
Date: 09/06/2015

Drawn by: NT

Scale: 1:100,000

Sheet Size: A4

Projection: GDA 1994 MGA Zone 55



WSP / Parsons Brinckerhoff

**Curragh Extension Project
SCL Assessment**

SCL Limitations

FIGURE 8

4 CONCLUSION

SLR was commissioned by WSP/Parsons Brinckerhoff on behalf of Wesfarmers Curragh Pty Limited to undertake a SCL Assessment for the Curragh Extension Project. The purpose of this document is to provide sufficient evidence that demonstrates that the land mapped as SCL on the SCL trigger map is or is not SCL.

The results of this SCL Assessment are summarised below:

- A total of 24 survey field observations have been within the SCL Study Area exceeding the required survey density.
- The SCL Assessment has identified only a single Soil Map Unit within the SCL Study Area, comprised of the dominant soil type Self-mulching Brown Vertosol and the sub-dominant soil types Self-mulching Black Vertosol and Eutrophic Brown Dermosol. The Self-mulching Black Vertosol and Eutrophic Brown Dermosol do not meet the minimum soil unit map area requirements (10 ha) or number of sites per map unit, therefore they have been aggregated with the dominant soil type in accordance with the RPI Guideline.
- The majority of analysed SCL sites within Soil Map Unit 1 failed Criterion 7: Salinity (chloride > 800 mg/kg within 600 mm of the surface) and Criterion 8: Soil Water Storage (<100 mm to a soil depth or soil physio-chemical limitation of <1000 mm).
- The land within the SCL Study Area is therefore assessed as being 'non-SCL'.

5 REFERENCES

- Isbell RF (2002) The Australian Soil Classification (rev. edn.). *CSIRO Publishing: Melbourne*.
- McKenzie NJ, Grundy MJ, Webster R, Ringrose-Voase AJ (2008) Guidelines for Surveying Soil and Land Resources (2nd edn). *CSIRO Publishing: Melbourne*.
- National Committee on Soil Terrain (2009) Australian Soil and Land Survey Field Handbook (3rd edn). *CSIRO Publishing: Melbourne*.
- State of Queensland (2011) Strategic Cropping Land Act 2011
- State of Queensland (2014) Regional Planning Interest Act 2014
- State of Queensland (2014) Regional Planning Interests Regulation 2014
- State of Queensland (2014) RPI Act Guideline 08/14: How to demonstrate that land in the strategic cropping area does not meet the criteria for strategic cropping land
- Story R, Fitzpatrick EA, Gunn RH, Galloway RW (1967) No. 19 Lands of the Isaac–Comet Area, Queensland. *Land Research Surveys* 1967 , 1–159.

Appendix A

Certificate of Analyses



Environmental

CERTIFICATE OF ANALYSIS

Work Order	: EB1447096	Page	: 1 of 20
Client	: SLR Consulting Australia Pty Ltd	Laboratory	: Environmental Division Brisbane
Contact	: MS ADELE CALANDRA	Contact	: Customer Services EB
Address	: LEVEL 1, 241 DENNISON STREET BROADMEADOW NSW 2292	Address	: 2 Byth Street Stafford QLD Australia 4053
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Project	: 626.10135.00200 - MDL 162	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number		Date Samples Received	: 26-Nov-2014 09:48
C-O-C number		Date Analysis Commenced	: 27-Nov-2014
Sampler		Issue Date	: 08-Dec-2014 14:32
Site			
Quote number		No. of samples received	: 86
		No. of samples analysed	: 86

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Andrew Epps	Senior Inorganic Chemist	Brisbane Inorganics
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics



Page : 2 of 20
Work Order : EB1447096
Client : SLR Consulting Australia Pty Ltd
Project : 626.10135.00200 - MDL 162

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

Ø = ALS is not NATA accredited for these tests.



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		Client sampling date / time		Site 10: 0-10 cm	Site 10: 10-20 cm	Site 10: 20-30 cm	Site 10: 30-40 cm	Site 10: 40-50 cm
Compound	CAS Number	LOR	Unit	Result	Result	Result	Result	Result	Result	Result
EA002 : pH (Soils)										
pH Value	----	0.1	pH Unit	8.7	8.9	9.1	9.0	9.0	9.0	9.0
EA010: Conductivity										
Electrical Conductivity @ 25°C	----	1	µS/cm	137	153	215	379	573	573	573
EA055: Moisture Content										
^ Moisture Content (dried @ 103°C)	----	1	%	9.1	10.5	10.6	10.3	10.9	10.9	10.9
ED008: Exchangeable Cations										
^ Exchangeable Calcium	----	0.1	meq/100g	34.5	37.2	32.9	20.9	19.8	19.8	19.8
^ Exchangeable Magnesium	----	0.1	meq/100g	8.8	10.0	10.8	11.5	12.1	12.1	12.1
^ Exchangeable Potassium	----	0.1	meq/100g	0.4	0.2	0.2	0.2	0.2	0.2	0.2
^ Exchangeable Sodium	----	0.1	meq/100g	0.5	0.9	1.5	3.2	3.6	3.6	3.6
^ Cation Exchange Capacity	----	0.1	meq/100g	44.1	48.4	45.5	35.8	35.7	35.7	35.7
ED045G: Chloride by Discrete Analyser										
Chloride	16887-00-6	10	mg/kg	40	60	60	220	500	500	500



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID											
		Client sampling date / time		Site 10: 50-60 cm		Site 10: 60-70 cm		Site 10: 70-80 cm		Site 10: 80-90 cm		Site 10: 90-100 cm	
Compound	CAS Number	LOR	Unit	Result	EB1447096-006	Result	EB1447096-007	Result	EB1447096-008	Result	EB1447096-009	Result	EB1447096-010
EA002 : pH (Soils)													
pH Value			0.1	pH Unit	9.0	8.9	8.6	8.5	7.8				
EA010: Conductivity													
Electrical Conductivity @ 25°C			1	µS/cm	538	822	937	1030	1510				
EA055: Moisture Content													
^ Moisture Content (dried @ 103°C)			1	%	11.7	11.2	11.7	12.4	12.1				
ED008: Exchangeable Cations													
^ Exchangeable Calcium			0.1	meq/100g	20.3	19.4	19.0	17.5	15.4				
^ Exchangeable Magnesium			0.1	meq/100g	13.0	14.2	14.5	14.6	15.5				
^ Exchangeable Potassium			0.1	meq/100g	0.2	0.2	0.2	0.2	0.2				
^ Exchangeable Sodium			0.1	meq/100g	3.8	4.4	4.3	4.3	4.1				
^ Cation Exchange Capacity			0.1	meq/100g	37.4	38.3	38.0	36.6	35.2				
ED045G: Chloride by Discrete Analyser													
Chloride		16887-00-6	10	mg/kg	460	700	840	1190	1690				



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		Client sampling date / time		Site 12: 0-10 cm	Site 12: 10-20 cm	Site 12: 20-30 cm	Site 12: 30-40 cm	Site 12: 40-50 cm
Compound	CAS Number	LOR	Unit	Result	Result	Result	Result	Result	Result	Result
EA002 : pH (Soils)										
pH Value	----	0.1	pH Unit	8.1	8.4	8.8	9.0	9.0	9.0	9.0
EA010: Conductivity										
Electrical Conductivity @ 25°C	----	1	µS/cm	51	104	112	177	284		
EA055: Moisture Content										
^ Moisture Content (dried @ 103°C)	----	1	%	6.0	8.8	13.6	9.8	9.0		
ED008: Exchangeable Cations										
^ Exchangeable Calcium	----	0.1	meq/100g	21.1	19.9	19.9	19.2	21.0		
^ Exchangeable Magnesium	----	0.1	meq/100g	9.4	10.4	11.2	11.9	12.4		
^ Exchangeable Potassium	----	0.1	meq/100g	0.2	0.3	0.1	0.1	0.1		
^ Exchangeable Sodium	----	0.1	meq/100g	0.6	1.0	2.1	2.8	3.1		
^ Cation Exchange Capacity	----	0.1	meq/100g	31.3	31.6	33.4	34.1	36.7		
ED045G: Chloride by Discrete Analyser										
Chloride	16887-00-6	10	mg/kg	<10	30	60	60	120		



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID																						
Compound		Client sampling date / time			Site 12: 50-60 cm				Site 12: 60-70 cm				Site 12: 70-80 cm				Site 12: 80-90 cm				Site 12: 90-100 cm			
		CAS Number	LOR	Unit	24-Nov-2014 15:00				24-Nov-2014 15:00				24-Nov-2014 15:00				24-Nov-2014 15:00				24-Nov-2014 15:00			
					EB1447096-016				EB1447096-017				EB1447096-018				EB1447096-019				EB1447096-020			
					Result				Result				Result				Result				Result			
EA002 : pH (Soils)																								
pH Value			0.1	pH Unit	8.9				9.0				8.9				8.8				8.7			
EA010: Conductivity																								
Electrical Conductivity @ 25°C			1	µS/cm	390				513				722				877				1040			
EA055: Moisture Content																								
^ Moisture Content (dried @ 103°C)			1	%	9.2				10.8				9.4				10.0				9.8			
ED008: Exchangeable Cations																								
^ Exchangeable Calcium			0.1	meq/100g	21.1				20.4				25.8				28.0				25.6			
^ Exchangeable Magnesium			0.1	meq/100g	12.2				13.1				14.3				14.7				15.1			
^ Exchangeable Potassium			0.1	meq/100g	0.1				0.1				0.1				0.1				0.1			
^ Exchangeable Sodium			0.1	meq/100g	2.9				3.7				3.6				3.6				3.5			
^ Cation Exchange Capacity			0.1	meq/100g	36.3				37.4				43.8				46.3				44.3			
ED045G: Chloride by Discrete Analyser																								
Chloride		16887-00-6	10	mg/kg	210				330				530				750				880			



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID				Client sampling date / time			
Compound	CAS Number	LOR	Unit	Site 16: 0-10 cm	Site 16: 10-20 cm	Site 16: 20-30 cm	Site 16: 30-40 cm	Site 16: 40-50 cm	
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit	7.9	8.8	8.9	8.6	8.8	
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm	65	296	451	1200	1020	
EA055: Moisture Content									
^ Moisture Content (dried @ 103°C)	----	1	%	6.8	11.4	12.4	11.4	11.3	
ED008: Exchangeable Cations									
^ Exchangeable Calcium	----	0.1	meq/100g	19.5	21.4	24.8	31.7	36.7	
^ Exchangeable Magnesium	----	0.1	meq/100g	7.3	9.8	11.5	12.4	14.2	
^ Exchangeable Potassium	----	0.1	meq/100g	0.8	0.3	0.3	0.3	0.2	
^ Exchangeable Sodium	----	0.1	meq/100g	0.4	1.9	2.7	2.6	3.9	
^ Cation Exchange Capacity	----	0.1	meq/100g	28.0	33.4	39.3	47.0	55.1	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg	20	130	350	880	1190	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		Client sampling date / time		Site 16: 50-60 cm		Site 16: 60-70 cm		Site 16: 70-80 cm		Site 16: 80-90 cm		Site 16: 90-100 cm	
Compound	CAS Number	LOR	Unit			Result	EB1447096-026	Result	EB1447096-027	Result	EB1447096-028	Result	EB1447096-029	Result	EB1447096-030
EA002 : pH (Soils)															
pH Value	-----	0.1	pH Unit			8.5		8.2		6.8		7.2		6.8	
EA010: Conductivity															
Electrical Conductivity @ 25°C	-----	1	µS/cm			1460		1350		2080		1780		1870	
EA055: Moisture Content															
^ Moisture Content (dried @ 103°C)	-----	1	%			11.5		13.1		11.8		12.2		12.7	
ED008: Exchangeable Cations															
^ Exchangeable Calcium	-----	0.1	meq/100g			28.0		26.9		12.6		13.0		13.1	
^ Exchangeable Magnesium	-----	0.1	meq/100g			13.4		14.0		13.4		13.6		14.0	
^ Exchangeable Potassium	-----	0.1	meq/100g			0.2		0.2		0.2		0.2		0.2	
^ Exchangeable Sodium	-----	0.1	meq/100g			3.4		3.1		4.3		4.6		4.7	
^ Cation Exchange Capacity	-----	0.1	meq/100g			45.1		44.3		30.5		31.5		32.0	
ED045G: Chloride by Discrete Analyser															
Chloride	16887-00-6	10	mg/kg			1420		1830		2220		2200		2480	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		Client sampling date / time		Site 39: 0-10 cm		Site 39: 10-20 cm		Site 39: 20-30 cm		Site 39: 30-40 cm		Site 39: 40-50 cm	
Compound	CAS Number	LOR	Unit	Result		Result		Result		Result		Result		Result	
EA002 : pH (Soils)															
pH Value	-----	0.1	pH Unit	8.3		8.7		9.0		9.0		9.0		9.0	
EA010: Conductivity															
Electrical Conductivity @ 25°C	-----	1	µS/cm	233		371		579		941		1050			
EA055: Moisture Content															
^ Moisture Content (dried @ 103°C)	-----	1	%	4.8		9.7		10.2		11.2		10.9			
ED008: Exchangeable Cations															
^ Exchangeable Calcium	-----	0.1	meq/100g	31.3		35.9		27.8		31.6		31.6			
^ Exchangeable Magnesium	-----	0.1	meq/100g	9.4		11.8		12.5		13.0		13.1			
^ Exchangeable Potassium	-----	0.1	meq/100g	0.4		0.2		0.3		0.2		0.2			
^ Exchangeable Sodium	-----	0.1	meq/100g	0.5		1.2		2.7		3.3		3.7			
^ Cation Exchange Capacity	-----	0.1	meq/100g	41.6		49.2		43.3		48.2		48.7			
ED045G: Chloride by Discrete Analyser															
Chloride	16887-00-6	10	mg/kg	50		260		540		1100		1340			



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID																						
			Client sampling date / time																						
			CAS Number	LOR	Unit	Site 39: 50-60 cm		Site 39: 60-70 cm		Site 39: 70-80 cm		Site 39: 80-90 cm		Site 39: 90-100 cm											
Compound						24-Nov-2014 15:00	EB1447096-036	Result		24-Nov-2014 15:00	EB1447096-037	Result		24-Nov-2014 15:00	EB1447096-038	Result		24-Nov-2014 15:00	EB1447096-039	Result		24-Nov-2014 15:00	EB1447096-040	Result	
EA002 : pH (Soils)																									
pH Value			0.1	pH Unit		8.9		8.8		8.7		8.7		8.8		8.7		8.8		8.7		8.8		8.8	
EA010: Conductivity																									
Electrical Conductivity @ 25°C			1	µS/cm		1470		1660		2030		1920		1710											
EA055: Moisture Content																									
^ Moisture Content (dried @ 103°C)			1	%		10.9		11.2		12.2		10.8		9.8											
ED008: Exchangeable Cations																									
^ Exchangeable Calcium			0.1	meq/100g		30.1		27.7		27.2		19.5		13.8											
^ Exchangeable Magnesium			0.1	meq/100g		13.0		13.4		14.0		12.9		12.3											
^ Exchangeable Potassium			0.1	meq/100g		0.2		0.2		0.2		0.2		0.1											
^ Exchangeable Sodium			0.1	meq/100g		3.8		3.8		4.0		3.9		4.0											
^ Cation Exchange Capacity			0.1	meq/100g		47.1		45.1		45.4		36.5		30.3											
ED045G: Chloride by Discrete Analyser																									
Chloride	16887-00-6	10	mg/kg			2000		2430		2900		2700		2580											



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		Client sampling date / time		Site 49: 0-10 cm		Site 49: 10-20 cm		Site 49: 20-30 cm		Site 49: 30-40 cm		Site 49: 40-50 cm	
Compound	CAS Number	LOR	Unit	Result		Result		Result		Result		Result		Result	
EA002 : pH (Soils)															
pH Value	-----	0.1	pH Unit	8.6		8.9		9.0		9.2		9.2		9.2	
EA010: Conductivity															
Electrical Conductivity @ 25°C	-----	1	µS/cm	171		177		234		321		471			
EA055: Moisture Content															
^ Moisture Content (dried @ 103°C)	-----	1	%	14.0		15.1		15.6		16.3		15.4			
ED008: Exchangeable Cations															
^ Exchangeable Calcium	-----	0.1	meq/100g	39.3		44.4		41.9		38.7		39.4			
^ Exchangeable Magnesium	-----	0.1	meq/100g	9.2		11.4		12.2		13.6		14.5			
^ Exchangeable Potassium	-----	0.1	meq/100g	1.5		0.9		0.8		0.7		0.7			
^ Exchangeable Sodium	-----	0.1	meq/100g	0.3		1.1		1.7		3.3		3.8			
^ Cation Exchange Capacity	-----	0.1	meq/100g	50.3		57.8		56.6		56.3		58.4			
ED045G: Chloride by Discrete Analyser															
Chloride	16887-00-6	10	mg/kg	30		30		70		100		320			



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID				Site 49: 50-60 cm		Site 49: 60-70 cm		Site 49: 70-80 cm		Site 49: 80-90 cm		Site 49: 90-100 cm	
Compound	CAS Number	Client sampling date / time		LOR	Unit	Result		Result		Result		Result		Result	
EA002 : pH (Soils)															
pH Value		0.1		pH Unit		9.0		9.0		8.8		8.7		8.6	
EA010: Conductivity															
Electrical Conductivity @ 25°C		1		µS/cm		808		937		1180		1400		1620	
EA055: Moisture Content															
^ Moisture Content (dried @ 103°C)		1		%		15.8		17.0		14.9		15.0		14.7	
ED008: Exchangeable Cations															
^ Exchangeable Calcium		0.1		meq/100g		14.7		35.4		19.7		31.8		32.0	
^ Exchangeable Magnesium		0.1		meq/100g		7.1		14.9		9.5		15.3		15.4	
^ Exchangeable Potassium		0.1		meq/100g		0.3		0.8		0.5		0.8		0.8	
^ Exchangeable Sodium		0.1		meq/100g		3.0		5.3		4.0		5.4		5.4	
^ Cation Exchange Capacity		0.1		meq/100g		25.1		56.3		33.8		53.4		53.7	
ED045G: Chloride by Discrete Analyser															
Chloride	16887-00-6	10		mg/kg		1000		1160		1590		2080		2360	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		Client sampling date / time		Site 51: 0-10 cm		Site 51: 10-20 cm		Site 51: 20-30 cm		Site 51: 30-40 cm		Site 51: 40-50 cm	
Compound	CAS Number	LOR	Unit	Result		Result		Result		Result		Result		Result	
EA002 : pH (Soils)															
pH Value	-----	0.1	pH Unit	7.1		7.0		7.0		6.8		6.9		6.9	
EA010: Conductivity															
Electrical Conductivity @ 25°C	-----	1	µS/cm	121		171		393		706		727		727	
EA055: Moisture Content															
^ Moisture Content (dried @ 103°C)	-----	1	%	1.2		5.0		5.8		6.0		6.1		6.1	
ED008: Exchangeable Cations															
^ Exchangeable Calcium	-----	0.1	meq/100g	5.0		5.8		5.1		2.5		2.1		2.1	
^ Exchangeable Magnesium	-----	0.1	meq/100g	5.5		7.1		7.9		5.4		5.9		5.9	
^ Exchangeable Potassium	-----	0.1	meq/100g	0.6		0.1		0.1		<0.1		<0.1		<0.1	
^ Exchangeable Sodium	-----	0.1	meq/100g	0.6		1.2		2.0		1.9		2.6		2.6	
^ Cation Exchange Capacity	-----	0.1	meq/100g	11.7		14.3		15.1		9.9		10.7		10.7	
ED045G: Chloride by Discrete Analyser															
Chloride	16887-00-6	10	mg/kg	60		110		430		1040		1110		1110	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		Client sampling date / time		Site 51: 50-60 cm		Site 51: 60-70 cm		Site 51: 70-80 cm		Site 51: 80-90 cm		Site 51: 90-100 cm	
Compound	CAS Number	LOR	Unit			Result	EB1447096-056	Result	EB1447096-057	Result	EB1447096-058	Result	EB1447096-059	Result	EB1447096-060
EA002 : pH (Soils)															
pH Value	-----	0.1	pH Unit			7.6		7.1		7.3		7.2		6.8	
EA010: Conductivity															
Electrical Conductivity @ 25°C	-----	1	µS/cm			829		1120		932		1100		1490	
EA055: Moisture Content															
^ Moisture Content (dried @ 103°C)	-----	1	%			14.2		7.7		4.3		7.2		16.7	
ED008: Exchangeable Cations															
^ Exchangeable Calcium	-----	0.1	meq/100g			1.5		1.3		1.0		1.5		0.7	
^ Exchangeable Magnesium	-----	0.1	meq/100g			5.0		4.8		3.6		6.2		3.2	
^ Exchangeable Potassium	-----	0.1	meq/100g			<0.1		<0.1		<0.1		<0.1		<0.1	
^ Exchangeable Sodium	-----	0.1	meq/100g			2.4		2.4		1.8		2.9		1.7	
^ Cation Exchange Capacity	-----	0.1	meq/100g			9.1		8.6		6.4		10.8		5.6	
ED045G: Chloride by Discrete Analyser															
Chloride	16887-00-6	10	mg/kg			1400		1900		1480		1800		2890	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		Client sampling date / time		Site 62: 0-10 cm	Site 62: 10-20 cm	Site 62: 20-30 cm	Site 62: 30-40 cm	Site 62: 40-50 cm
Compound	CAS Number	LOR	Unit	Result	Result	Result	Result	Result	Result	Result
EA002 : pH (Soils)										
pH Value	----	0.1	pH Unit	8.6	8.8	8.9	9.0	9.0	9.0	9.0
EA010: Conductivity										
Electrical Conductivity @ 25°C	----	1	µS/cm	141	158	199	245	292	292	292
EA055: Moisture Content										
^ Moisture Content (dried @ 103°C)	----	1	%	10.9	13.1	14.0	14.2	14.0	14.2	14.0
ED008: Exchangeable Cations										
^ Exchangeable Calcium	----	0.1	meq/100g	37.0	41.4	42.6	38.0	39.4	38.0	39.4
^ Exchangeable Magnesium	----	0.1	meq/100g	10.3	10.7	11.7	12.5	12.7	12.5	12.7
^ Exchangeable Potassium	----	0.1	meq/100g	1.0	0.8	0.7	0.7	0.7	0.7	0.7
^ Exchangeable Sodium	----	0.1	meq/100g	0.5	0.8	1.5	2.6	2.9	2.6	2.9
^ Cation Exchange Capacity	----	0.1	meq/100g	48.9	53.7	56.5	53.8	55.8	53.8	55.8
ED045G: Chloride by Discrete Analyser										
Chloride	16887-00-6	10	mg/kg	<10	20	40	60	120	60	120



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID						
		Client sampling date / time						
Compound	CAS Number	LOR	Unit	Site 62: 50-60 cm	Site 62: 70-80 cm	Site 62: 80-90 cm	Site 62: 90-100 cm	Site 63: 0-10 cm
				24-Nov-2014 15:00	24-Nov-2014 15:00	24-Nov-2014 15:00	24-Nov-2014 15:00	24-Nov-2014 15:00
				EB1447096-066	EB1447096-068	EB1447096-069	EB1447096-070	EB1447096-071
				Result	Result	Result	Result	Result
EA002 : pH (Soils)								
pH Value		0.1	pH Unit	9.0	8.9	9.0	8.8	7.1
EA010: Conductivity								
Electrical Conductivity @ 25°C		1	µS/cm	381	591	582	889	120
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)		1	%	15.2	16.3	15.7	16.1	3.0
ED008: Exchangeable Cations								
^ Exchangeable Calcium		0.1	meq/100g	35.8	33.0	34.7	33.2	5.1
^ Exchangeable Magnesium		0.1	meq/100g	13.6	13.9	13.8	14.0	3.1
^ Exchangeable Potassium		0.1	meq/100g	0.7	0.7	0.7	0.8	1.0
^ Exchangeable Sodium		0.1	meq/100g	3.7	4.2	4.3	4.3	<0.1
^ Cation Exchange Capacity		0.1	meq/100g	53.8	51.9	53.6	52.2	9.3
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	230	590	570	1110	100



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		Client sampling date / time		Site 63: 10-20 cm		Site 63: 20-30 cm		Site 63: 30-40 cm		Site 63: 40-50 cm		Site 63: 50-60 cm	
Compound	CAS Number	LOR	Unit	Result		Result		Result		Result		Result		Result	
EA002 : pH (Soils)															
pH Value	-----	0.1	pH Unit	7.2		7.5		7.4		7.5		7.7			
EA010: Conductivity															
Electrical Conductivity @ 25°C	-----	1	µS/cm	20		23		24		40		45			
EA055: Moisture Content															
^ Moisture Content (dried @ 103°C)	-----	1	%	4.0		4.1		2.9		1.7		3.9			
ED008: Exchangeable Cations															
^ Exchangeable Calcium	-----	0.1	meq/100g	7.1		5.4		6.6		3.8		4.2			
^ Exchangeable Magnesium	-----	0.1	meq/100g	2.5		3.7		3.2		3.6		3.0			
^ Exchangeable Potassium	-----	0.1	meq/100g	0.2		0.1		0.1		0.1		0.1			
^ Exchangeable Sodium	-----	0.1	meq/100g	<0.1		0.3		0.1		0.5		0.3			
^ Cation Exchange Capacity	-----	0.1	meq/100g	9.8		9.6		10.1		8.0		7.7			
ED045G: Chloride by Discrete Analyser															
Chloride	16887-00-6	10	mg/kg	<10		<10		<10		20		20			



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID						
		Client sampling date / time						
Compound	CAS Number	LOR	Unit	Site 63: 60-70 cm	Site 63: 70-80 cm	Site 63: 80-90 cm	Site 63: 90-100 cm	Site 64: 0-10 cm
				24-Nov-2014 15:00	24-Nov-2014 15:00	24-Nov-2014 15:00	24-Nov-2014 15:00	24-Nov-2014 15:00
				EB1447096-077	EB1447096-078	EB1447096-079	EB1447096-080	EB1447096-081
				Result	Result	Result	Result	Result
EA002 : pH (Soils)								
pH Value	-----	0.1	pH Unit	7.8	7.8	8.1	8.6	8.4
EA010: Conductivity								
Electrical Conductivity @ 25°C	-----	1	µS/cm	45	61	75	166	136
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	-----	1	%	2.7	2.2	2.9	8.1	10.6
ED008: Exchangeable Cations								
^ Exchangeable Calcium	-----	0.1	meq/100g	3.2	3.9	4.0	5.0	34.2
^ Exchangeable Magnesium	-----	0.1	meq/100g	3.1	3.6	4.0	5.2	7.1
^ Exchangeable Potassium	-----	0.1	meq/100g	<0.1	0.1	0.2	0.2	1.6
^ Exchangeable Sodium	-----	0.1	meq/100g	0.4	0.5	0.6	0.8	0.2
^ Cation Exchange Capacity	-----	0.1	meq/100g	6.8	8.1	8.8	11.2	43.2
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	20	30	40	110	<10



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		Client sampling date / time		Site 64: 10-20 cm		Site 64: 20-30 cm		Site 64: 30-40 cm		Site 64: 40-50 cm		Site 64: 50-60 cm	
Compound	CAS Number	LOR	Unit	Result		Result		Result		Result		Result		Result	
EA002 : pH (Soils)															
pH Value	-----	0.1	pH Unit	8.7		8.9		9.0		9.0		9.0		9.0	
EA010: Conductivity															
Electrical Conductivity @ 25°C	-----	1	µS/cm	160		186		278		327		447			
EA055: Moisture Content															
^ Moisture Content (dried @ 103°C)	-----	1	%	17.0		25.6		14.9		14.7		14.5			
ED008: Exchangeable Cations															
^ Exchangeable Calcium	-----	0.1	meq/100g	35.4		39.7		39.8		37.7		36.6			
^ Exchangeable Magnesium	-----	0.1	meq/100g	8.0		10.4		11.0		11.6		12.3			
^ Exchangeable Potassium	-----	0.1	meq/100g	0.9		0.8		0.7		0.8		0.8			
^ Exchangeable Sodium	-----	0.1	meq/100g	0.6		1.3		1.8		2.4		3.0			
^ Cation Exchange Capacity	-----	0.1	meq/100g	44.9		52.3		53.3		52.4		52.7			
ED045G: Chloride by Discrete Analyser															
Chloride	16887-00-6	10	mg/kg	20		40		130		130		330			



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID				Site 10: 100-110 cm	
		Client sampling date / time				24-Nov-2014 15:00	
Compound	CAS Number	LOR	Unit	EB1447096-087			
				Result	Result	Result	Result
EA002 : pH (Soils)							
pH Value		0.1	pH Unit	8.2			
EA010: Conductivity							
Electrical Conductivity @ 25°C		1	µS/cm	1030			
EA055: Moisture Content							
^ Moisture Content (dried @ 103°C)		1	%	21.1			
ED008: Exchangeable Cations							
^ Exchangeable Calcium		0.1	meq/100g	14.9			
^ Exchangeable Magnesium		0.1	meq/100g	15.0			
^ Exchangeable Potassium		0.1	meq/100g	0.2			
^ Exchangeable Sodium		0.1	meq/100g	4.5			
^ Cation Exchange Capacity		0.1	meq/100g	34.7			
ED045G: Chloride by Discrete Analyser							
Chloride	16887-00-6	10	mg/kg	1370			

CERTIFICATE OF ANALYSIS

Work Order	: EB1447095	Page	: 1 of 9
Client	: SLR Consulting Australia Pty Ltd	Laboratory	: Environmental Division Brisbane
Contact	: MS ADELE CALANDRA	Contact	: Customer Services EB
Address	: LEVEL 1, 241 DENNISON STREET BROADMEADOW NSW 2292	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: acalandra@slrconsulting.com	E-mail	: ALSEnviro.Brisbane@alsglobal.com
Telephone	: +61 02 4920 3000	Telephone	: +61-7-3243 7222
Facsimile	: +61 02 4961 3360	Facsimile	: +61-7-3243 7218
Project	: 626.10135.00200 - MDL 162	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	:	Date Samples Received	: 26-Nov-2014 08:10
C-O-C number	:	Date Analysis Commenced	: 27-Nov-2014
Sampler	:	Issue Date	: 08-Dec-2014 13:22
Site	:	No. of samples received	: 34
Quote number	:	No. of samples analysed	: 34

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.



Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Andrew Epps	Senior Inorganic Chemist	Brisbane Inorganics
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics
Matt Frost	Senior Organic Chemist	Brisbane Inorganics



Page : 2 of 9
Work Order : EB1447095
Client : SLR Consulting Australia Pty Ltd
Project : 626.10135.00200 - MDL 162

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

Ø = ALS is not NATA accredited for these tests.

- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl (Method 15G1) is a more suitable method for the determination of exchange acidity (H⁺ + Al³⁺).



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID				Client sampling date / time		Site 64: 60-70 cm	Site 64: 70-80 cm	Site 64: 80-90 cm	Site 64: 90-100 cm	Site 65: 0-10 cm
Compound	CAS Number	LOR	Unit					Result	Result	Result	Result	Result
EA002 : pH (Soils)												
pH Value	----	0.1	pH Unit					8.9	8.8	8.8	8.6	7.2
EA010: Conductivity												
Electrical Conductivity @ 25°C	----	1	µS/cm					627	813	994	1340	44
EA055: Moisture Content												
^ Moisture Content (dried @ 103°C)	----	1	%					15.3	15.2	15.6	14.7	6.3
ED008: Exchangeable Cations												
^ Exchangeable Calcium	----	0.1	meq/100g					37.4	36.6	36.6	36.1	13.4
^ Exchangeable Magnesium	----	0.1	meq/100g					12.9	13.8	14.0	14.3	5.0
^ Exchangeable Potassium	----	0.1	meq/100g					0.8	0.8	0.9	0.9	1.0
^ Exchangeable Sodium	----	0.1	meq/100g					3.2	3.6	3.6	3.5	<0.1
^ Cation Exchange Capacity	----	0.1	meq/100g					54.3	54.8	55.1	54.8	19.4
ED045G: Chloride by Discrete Analyser												
Chloride	16887-00-6	10	mg/kg					630	960	1280	1850	20



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID																	
		Client sampling date / time																	
Compound	CAS Number	LOR	Unit	Site 65: 10-20 cm		Site 65: 20-30 cm		Site 65: 30-40 cm		Site 65: 40-50 cm		Site 65: 50-60 cm							
				24-Nov-2014 15:00	24-Nov-2014 15:00	24-Nov-2014 15:00	24-Nov-2014 15:00	24-Nov-2014 15:00	24-Nov-2014 15:00	24-Nov-2014 15:00	24-Nov-2014 15:00								
				EB1447095-006	EB1447095-007	EB1447095-008	EB1447095-009	EB1447095-010											
EA002 : pH (Solis)																			
pH Value		0.1	pH Unit	7.8	7.9	8.6	8.6	8.6											
EA010: Conductivity																			
Electrical Conductivity @ 25°C		1	µS/cm	35	46	117	124	125											
EA055: Moisture Content																			
^ Moisture Content (dried @ 103°C)		1	%	8.6	8.9	8.4	15.4	8.4											
ED008: Exchangeable Cations																			
^ Exchangeable Calcium		0.1	meq/100g	17.0	20.4	32.5	31.3	27.4											
^ Exchangeable Magnesium		0.1	meq/100g	6.7	6.5	6.5	6.6	6.7											
^ Exchangeable Potassium		0.1	meq/100g	0.4	0.4	0.3	0.3	0.3											
^ Exchangeable Sodium		0.1	meq/100g	<0.1	<0.1	<0.1	<0.1	<0.1											
^ Cation Exchange Capacity		0.1	meq/100g	24.2	27.4	39.3	38.2	34.4											
ED045G: Chloride by Discrete Analyser																			
Chloride	16887-00-6	10	mg/kg	20	20	20	20	10											



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID				Client sampling date / time		Site 65: 60-70 cm	Site 65: 70-80 cm	Site 65: 80-90 cm	Site 65: 90-100 cm	Site 66: 0-10 cm
Compound	CAS Number	LOR	Unit					Result	Result	Result	Result	Result
EA002 : pH (Soils)												
pH Value	----	0.1	pH Unit					8.6	8.6	8.4	8.4	8.0
EA010: Conductivity												
Electrical Conductivity @ 25°C	----	1	µS/cm					109	108	102	92	101
EA055: Moisture Content												
^ Moisture Content (dried @ 103°C)	----	1	%					8.7	6.8	4.1	3.8	17.2
ED008: Exchangeable Cations												
^ Exchangeable Calcium	----	0.1	meq/100g					16.4	16.2	12.1	9.3	20.9
^ Exchangeable Magnesium	----	0.1	meq/100g					7.4	6.7	4.7	4.4	6.4
^ Exchangeable Potassium	----	0.1	meq/100g					0.3	0.3	0.3	0.3	0.4
^ Exchangeable Sodium	----	0.1	meq/100g					<0.1	<0.1	<0.1	<0.1	0.2
^ Cation Exchange Capacity	----	0.1	meq/100g					24.1	23.2	17.1	14.0	28.0
ED045G: Chloride by Discrete Analyser												
Chloride	16887-00-6	10	mg/kg					<10	<10	10	<10	20



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID						
		Client sampling date / time						
Compound	CAS Number	LOR	Unit	Site 66: 10-20 cm	Site 66: 20-30 cm	Site 66: 30-40 cm	Site 66: 40-50 cm	Site 66: 50-60 cm
				24-Nov-2014 15:00	24-Nov-2014 15:00	24-Nov-2014 15:00	24-Nov-2014 15:00	24-Nov-2014 15:00
				EB1447095-016	EB1447095-017	EB1447095-018	EB1447095-019	EB1447095-020
				Result	Result	Result	Result	Result
EA002 : pH (Soils)								
pH Value		0.1	pH Unit	8.5	8.7	8.7	8.7	8.5
EA010: Conductivity								
Electrical Conductivity @ 25°C		1	µS/cm	191	345	519	564	763
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)		1	%	10.1	10.7	11.1	11.7	11.5
ED008: Exchangeable Cations								
^ Exchangeable Calcium		0.1	meq/100g	22.0	25.2	18.5	15.2	11.5
^ Exchangeable Magnesium		0.1	meq/100g	7.0	10.1	12.2	12.1	12.0
^ Exchangeable Potassium		0.1	meq/100g	0.2	0.2	0.2	0.2	0.2
^ Exchangeable Sodium		0.1	meq/100g	0.3	0.9	1.6	2.0	2.7
^ Cation Exchange Capacity		0.1	meq/100g	29.6	36.5	32.5	29.6	26.5
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	50	170	440	460	780



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID				Client sampling date / time		Site 66: 60-70 cm	Site 66: 70-80 cm	Site 66: 80-90 cm	Site 66: 90-100 cm	Site 70: 0-10 cm
Compound	CAS Number	LOR	Unit					Result	Result	Result	Result	Result
EA002 : pH (Soils)												
pH Value	----	0.1	pH Unit					8.3	8.2	8.3	8.1	8.5
EA010: Conductivity												
Electrical Conductivity @ 25°C	----	1	µS/cm					864	1050	901	1060	157
EA055: Moisture Content												
^ Moisture Content (dried @ 103°C)	----	1	%					11.7	12.0	19.4	18.7	10.1
ED008: Exchangeable Cations												
^ Exchangeable Calcium	----	0.1	meq/100g					9.6	9.0	9.4	8.6	43.4
^ Exchangeable Magnesium	----	0.1	meq/100g					12.1	12.0	12.2	12.6	9.4
^ Exchangeable Potassium	----	0.1	meq/100g					0.2	0.2	0.2	0.2	2.0
^ Exchangeable Sodium	----	0.1	meq/100g					3.0	3.4	3.1	3.2	0.1
^ Cation Exchange Capacity	----	0.1	meq/100g					24.9	24.7	25.0	24.7	54.9
ED045G: Chloride by Discrete Analyser												
Chloride	16887-00-6	10	mg/kg					1090	1340	1080	1690	20



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID																									
Compound	CAS Number	Client sampling date / time		LOR	Unit	Site 70: 10-20 cm		Site 70: 20-30 cm		Site 70: 30-40 cm		Site 70: 40-50 cm		Site 70: 50-60 cm													
		Result				EB1447095-026		24-Nov-2014 15:00		EB1447095-027		24-Nov-2014 15:00		EB1447095-028		24-Nov-2014 15:00		EB1447095-029		24-Nov-2014 15:00		EB1447095-030		24-Nov-2014 15:00			
		Result				EB1447095-026		24-Nov-2014 15:00		EB1447095-027		24-Nov-2014 15:00		EB1447095-028		24-Nov-2014 15:00		EB1447095-029		24-Nov-2014 15:00		EB1447095-030		24-Nov-2014 15:00			
EA002 : pH (Soils)																											
pH Value		0.1		pH Unit		8.7		8.8		9.0		9.1		9.1		9.1		9.1		9.1		9.1		9.1		9.1	
EA010: Conductivity																											
Electrical Conductivity @ 25°C		1		µS/cm		189		207		254		311		332		332		332		332		332		332		332	
EA055: Moisture Content																											
^ Moisture Content (dried @ 103°C)		1		%		13.9		13.9		13.3		14.5		14.8		14.8		14.8		14.8		14.8		14.8		14.8	
ED008: Exchangeable Cations																											
^ Exchangeable Calcium		0.1		meq/100g		44.2		44.3		40.9		40.7		37.8		37.8		37.8		37.8		37.8		37.8		37.8	
^ Exchangeable Magnesium		0.1		meq/100g		11.3		12.3		13.9		14.5		13.0		13.0		13.0		13.0		13.0		13.0		13.0	
^ Exchangeable Potassium		0.1		meq/100g		1.0		0.9		0.8		0.9		0.7		0.7		0.7		0.7		0.7		0.7		0.7	
^ Exchangeable Sodium		0.1		meq/100g		0.5		0.8		2.0		2.5		3.0		3.0		3.0		3.0		3.0		3.0		3.0	
^ Cation Exchange Capacity		0.1		meq/100g		56.9		58.4		57.7		58.5		54.6		54.6		54.6		54.6		54.6		54.6		54.6	
ED045G: Chloride by Discrete Analyser																											
Chloride		16887-00-6		10		mg/kg		40		50		60		90		110		110		110		110		110		110	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID													
		Client sampling date / time			Site 70: 60-70 cm		Site 70: 70-80 cm		Site 70: 80-90 cm		Site 70: 90-100 cm				
Compound	CAS Number	LOR	Unit	24-Nov-2014 15:00		24-Nov-2014 15:00		24-Nov-2014 15:00		24-Nov-2014 15:00		24-Nov-2014 15:00			
				EB1447095-031	Result	EB1447095-032	Result	EB1447095-033	Result	EB1447095-034	Result				
EA002 : pH (Soils)															
pH Value		0.1	pH Unit	9.1		8.6		8.4		8.7					
EA010: Conductivity															
Electrical Conductivity @ 25°C		1	µS/cm	508		1040		1430		1120					
EA055: Moisture Content															
^ Moisture Content (dried @ 103°C)		1	%	16.1		15.8		14.9		14.9					
ED008: Exchangeable Cations															
^ Exchangeable Calcium		0.1	meq/100g	38.6		39.2		33.4		36.5					
^ Exchangeable Magnesium		0.1	meq/100g	14.5		14.3		11.8		12.9					
^ Exchangeable Potassium		0.1	meq/100g	0.8		0.8		0.6		0.7					
^ Exchangeable Sodium		0.1	meq/100g	3.7		3.7		3.6		3.6					
^ Cation Exchange Capacity		0.1	meq/100g	57.6		58.0		49.5		53.8					
ED045G: Chloride by Discrete Analyser															
Chloride	16887-00-6	10	mg/kg	150		450		320		990					

SOIL TEST REPORT

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Scone Research Centre

REPORT NO: SCO14/246R1

REPORT TO: Adele Calandra
SLR Consulting
10 Kings Rd
New Lambton NSW 2305

REPORT ON: Forty-nine samples
Your ref: 626.10135.00200

PRELIMINARY RESULTS
ISSUED: Not issued

REPORT STATUS: Final

DATE REPORTED: 3 December 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

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Report No: SCO14/246R1
Client Reference: Adele Calandra
SLR Consulting
10 Kings Rd
New Lambton NSW 2305

Lab No	Method	P7B/2 Particle Size Analysis (%)					Colour	
	Sample Id	clay	silt	f sand	c sand	gravel	Dry	Moist
1	Site 10 0-10 cm	55	14	27	4	<1	10YR 4/2	10YR 3/3
2	Site 10 20-30 cm	61	13	20	6	<1	10YR 4/2	10YR 3/3
3	Site 10 50-60 cm	66	9	18	6	1	10YR 4/2	10YR 3/2
4	Site 10 85-95 cm	68	8	18	5	1	10YR 4/2	10YR 3/3
5	Site 12 0-5 cm	47	17	31	5	<1	10YR 4/2	10YR 3/3
6	Site 12 15-25 cm	53	16	26	5	<1	10YR 4/2	10YR 3/3
7	Site 12 45-55 cm	58	15	22	5	0	10YR 4/2	10YR 3/2
8	Site 12 65-75 cm	65	11	20	4	<1	10YR 4/2	10YR 3/2
9	Site 12 85-95 cm	62	10	22	5	1	10YR 4/3	10YR 4/3
10	Site 16 0-5 cm	43	21	29	6	1	10YR 4/3	10YR 3/3
11	Site 16 15-25 cm	62	15	19	4	<1	10YR 4/2	10YR 3/3
12	Site 16 50-60 cm	72	6	18	4	<1	10YR 4/3	10YR 3/3
13	Site 16 80-90 cm	64	15	18	3	0	10YR 4/4	10YR 3/4
14	Site 39 0-10 cm	45	16	21	16	2	10YR 4/2	10YR 3/3
15	Site 39 20-30 cm	51	16	18	14	1	10YR 4/3	10YR 4/3
16	Site 39 50-60 cm	50	16	18	16	<1	10YR 4/3	10YR 4/3
17	Site 39 80-90 cm	46	14	19	20	1	10YR 5/4	10YR 4/4
18	Site 49 0-10 cm	74	14	7	4	1	10YR 4/2	10YR 3/3
19	Site 49 20-30 cm	78	11	7	4	<1	10YR 4/2	10YR 3/3
20	Site 49 50-60 cm	82	8	6	3	1	10YR 4/3	10YR 3/3
21	Site 49 80-90 cm	87	6	5	2	<1	10YR 3/3	10YR 3/3
22	Site 51 0-10 cm	26	11	25	33	5	10YR 4/3	10YR 3/4
23	Site 51 20-30 cm	35	8	22	30	5	10YR 4/3	10YR 3/4
24	Site 51 45-55 cm	30	7	20	34	9	10YR 4/4	10YR 3/4
25	Site 51 75-85 cm	36	10	21	30	3	10YR 5/4	10YR 3/6



SOIL CONSERVATION SERVICE
Scone Research Centre

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Report No: SCO14/246R1
Client Reference: Adele Calandra
SLR Consulting
10 Kings Rd
New Lambton NSW 2305

Lab No	Method	P7B/2 Particle Size Analysis (%)					Colour	
	Sample Id	clay	silt	f sand	c sand	gravel	Dry	Moist
26	Site 62 0-10 cm	68	24	7	1	0	10YR 4/2	10YR 3/4
27	Site 62 20-30 cm	79	16	4	1	<1	10YR 4/3	10YR 3/4
28	Site 62 50-60 cm	78	16	4	2	0	10YR 4/3	10YR 3/4
29	Site 62 80-90 cm	78	17	3	2	<1	10YR 3/4	10YR 3/4
30	Site 63 0-10 cm	25	6	42	27	<1	10YR 3/4	10YR 3/3
31	Site 63 35-45 cm	25	8	34	32	1	10YR 4/4	10YR 3/4
32	Site 63 70-80 cm	24	6	36	33	1	10YR 4/4	10YR 3/4
33	Site 63 90-100 cm	22	4	42	32	<1	10YR 4/4	10YR 3/4
34	Site 64 0-5 cm	50	28	17	5	<1	10YR 4/3	10YR 3/3
35	Site 64 15-25 cm	64	20	13	3	<1	10YR 4/3	10YR 3/4
36	Site 64 45-55 cm	66	18	13	3	<1	10YR 4/3	10YR 3/4
37	Site 64 80-90 cm	69	14	14	3	0	10YR 5/4	10YR 4/4
38	Site 65 0-10 cm	18	7	66	9	0	10YR 4/4	10YR 3/3
39	Site 65 20-30 cm	41	21	36	2	0	10YR 4/3	10YR 3/3
40	Site 65 50-60 cm	36	22	40	2	<1	10YR 5/4	10YR 4/4
41	Site 65 85-95 cm	23	12	60	5	<1	10YR 5/4	10YR 4/4
42	Site 66 0-10 cm	43	20	27	6	4	10YR 5/3	10YR 4/3
43	Site 66 15-25 cm	58	17	19	6	<1	10YR 5/4	10YR 4/4
44	Site 66 45-55 cm	55	15	21	7	2	10YR 5/4	10YR 4/3
45	Site 66 75-85 cm	60	18	17	4	1	10YR 5/4	10YR 4/3
46	Site 70 0-10 cm	56	35	7	2	<1	10YR 4/2	10YR 3/3
47	Site 70 20-30 cm	70	22	7	1	0	10YR 4/3	10YR 3/3
48	Site 70 50-60 cm	69	23	7	1	<1	10YR 4/3	10YR 3/4
49	Site 70 80-90 cm	74	17	8	1	<1	10YR 4/3	10YR 3/4



END OF TEST REPORT


Appendix B

Profile Descriptions of Observation Sites

Soil Map Unit 1 – Self-mulching Brown Vertosol (Dominant Soil Type)

Table B1 Detailed Description: Site 7

ASC Name	Self-mulching Brown Vertosol
Site No.	7
Inspection Date	29/10/2014
Landform; Element	Flat; Minimal
Microrelief; Component	None; None
Permeability	Slowly permeable
Drainage	Well drained
Dominant Slope	0-1%
Surface Coarse Fragments	Nil
Surface Condition	Self-mulching
Disturbances (Land Use)	Grazing




Profile	Horizon / Depth (m)	Description
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A1 0.0 – 0.10	Dark grey (10YR 4/1) Medium Clay, Weak structure of 5-20 mm subangular blocky peds with a moderate consistence. Nil mottling; Nil stone content; Nil segregations; abundant coarse roots; Well drained with a clear and wavy boundary.
B21 0.10 – 0.25	Brown (7.5YR 4/3) Heavy Clay, Strong structure of 20-40 mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; <10% calcareous segregations; many coarse roots; Well drained with a gradual and wavy boundary
B22 0.25 – 0.45	Brown (10YR 4/3) Heavy Clay, Strong structure of 20-60 mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; <10% calcareous segregations; common fine roots; Well drained with a gradual and irregular boundary.
B23 0.45 – 1.00	Brown (10YR 4/3) Heavy Clay, Strong structure of 20-40 mm angular blocky peds with a strong consistence. 15% distinct yellow (7.5YR 6/6) mottling; Nil stone content; <10% calcareous segregations; few fine roots; Moderately drained.

Table B2 Detailed Description: Site 8

ASC Name	Self-mulching Brown Vertosol		
Site No.	8		
Inspection Date	29/10/2014		
Landform; Element	Flat; Minimal		
Microrelief; Component	None; None		
Permeability	Slowly permeable		
Drainage	Well drained		
Dominant Slope	0-1%		
Surface Coarse Fragments	5%	50-300 mm	fragments
Surface Condition	Self-mulching		
Disturbances (Land Use)	Grazing		





Profile	Horizon / Depth (m)	Description
	A1 0.0 – 0.05	Dark brown (7.5YR 3/3) Silty Clay, Weak structure of 5-00 mm platy peds with a moderate consistence.
	B21 0.05 – 0.40	Brown (7.5YR 4/4) Medium Clay, Strong structure of 10-30 mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; Nil segregations; common coarse roots; Well drained with an abrupt and even boundary
	B22 0.40 – 0.65	Brown (7.5YR 4/4) Heavy Clay, Strong structure of 25-50 mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; 5% calcareous segregations; common fine roots; Well drained with a gradual and irregular boundary
	B23 0.65 – 1.00	Strong brown (7.5YR 4/6) Heavy Clay, Strong structure of 50+ mm angular blocky peds with a strong consistence. 10% faint yellow mottling; 10% <5 mm stone content; 10% calcareous segregations; few fine roots; Moderately drained.

Table B3 Detailed Description: Site 9

ASC Name	Self-mulching Brown Vertosol		
Site No.	9		
Inspection Date	29/10/2014		
Landform; Element	Flat; Minimal		
Microrelief; Component	None; None		
Permeability	Slowly permeable		
Drainage	Well drained		
Dominant Slope	0-1%		
Surface Coarse Fragments	Nil		
Surface Condition	Self-mulching		
Disturbances (Land Use)	Grazing		




Profile	Horizon / Depth (m)	Description
	<p>A1 0.0 – 0.05</p>	<p>Brown (7.5YR 4/3) Silty Clay, Weak structure of 5-10 mm platy peds with a weak consistence.</p> <p>Nil mottling; Nil stone content; Nil segregations; abundant coarse roots; Well drained with an abrupt and even boundary.</p>
	<p>B21 0.05 – 0.30</p>	<p>Brown (7.5YR 4/3) Medium Clay, Strong structure of 20-30 mm angular blocky peds with a strong consistence.</p> <p>Nil mottling; 5% <5mm stone content; Nil segregations; many coarse roots; Well drained with a gradual and even boundary</p>
	<p>B22 0.30 – 0.60</p>	<p>Brown (7.5YR 4/4) Heavy Clay, Strong structure of 20-50 mm angular blocky peds with a strong consistence.</p> <p>Nil mottling; 5% <5mm stone content; 10% < 5mm calcareous segregations; many fine roots; Well drained with a gradual and irregular boundary.</p>
	<p>B23 0.60 – 1.00</p>	<p>Strong brown (7.5YR 4/6) Heavy Clay, Strong structure of 40-60 mm angular blocky peds with a strong consistence.</p> <p>10% faint red mottling; 5% <10mm stone content; 5% < 5mm calcareous segregations; few fine roots; Moderately drained.</p>

Table B4 Detailed Description: Site 10

ASC Name	Self-mulching Brown Vertosol
Site No.	10
Inspection Date	29/10/2014
Landform; Element	Flat; Minimal
Microrelief; Component	None; None
Permeability	Slowly
Drainage	Well drained
Dominant Slope	0-1%
Surface Coarse Fragments	Nil
Surface Condition	Self-mulching
Disturbances (Land Use)	Grazing




Profile	Horizon / Depth (m)	Description
	A1 0.0 – 0.10	Dark brown (10YR 3/3) Heavy Clay, Weak structure of 5-10 mm angular blocky peds with a moderate consistence. Nil mottling; <5% <5 mm stone content; Nil segregations; abundant coarse roots; Well drained with a clear and even boundary.
	B21 0.10 – 0.40	Dark brown (10YR 3/3) Heavy Clay, Strong structure of 20-50 mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; 5% calcareous segregations; common fine roots; Well drained with a gradual and even boundary.
	B22 0.40 – 0.80	Very dark grayish brown (10YR 3/2) Heavy Clay, Strong structure of 30-50 mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; 5% calcareous & 5% gypsum segregations; common fine roots; Well drained with a gradual and irregular boundary.
	B23 0.80 – 1.10	Dark brown (10YR 3/3) Heavy Clay, Strong structure of 50-70 mm angular blocky peds with a strong consistence. 30% distinct orange (7.5YR 6/8) mottling; Nil stone content; 5% calcareous & 5% gypsum segregations; few fine roots; Poorly drained.

Table B5 Analysed Description: Site 10

Horizon	Upper Layer	Lower Layer	pH (1:5)	Chloride	EC (1:5)	CEC	ESP	Ca:Mg	Soil Texture	SWS
	m	m		mg/kg	dS/m	cmol+ /kg	%			mm/100 mm
A1	0.0	0.1	8.7	40	0.137	44.1	1.1	3.9	HC	12
B21	0.1	0.2	8.9	60	0.153	48.4	1.9	3.7	HC	12
	0.2	0.3	9.1	60	0.215	45.5	3.3	3.0		12
	0.3	0.4	9	220	0.379	35.8	8.9	1.8		12
B22	0.4	0.5	9	500	0.573	35.7	10.1	1.6	HC	12
	0.5	0.6	9	460	0.538	37.4	10.2	1.6		12
	0.6	0.7	8.9	700	0.822	38.3	11.5	1.4		12
	0.7	0.8	8.6	840	0.937	38	11.3	1.3		12
B23	0.8	0.9	8.5	1190	1.030	36.6	11.7	1.2	HC	12
	0.9	1.0	7.8	1690	1.510	35.2	11.6	1.0		12
SCL Criteria Compliance										
Effective Rooting Depth			0.7 m							
Total Soil Water Storage			84 mm							
Criterion 6 (pH) Compliance			Yes							
Criterion 7 (Salinity) Compliance			Yes							
Criterion 8 (SWS) Compliance			No							

Table B6 Detailed Description: Site 11

ASC Name	Self-mulching Brown Vertosol
Site No.	11
Inspection Date	29/10/2014
Landform; Element	Open depression
Microrelief; Component	None; None
Permeability	Slowly permeable
Drainage	Well drained
Dominant Slope	0-1%
Surface Coarse Fragments	Nil
Surface Condition	Self-mulching
Disturbances (Land Use)	Grazing




Profile	Horizon / Depth (m)	Description
	A1 0.0 – 0.10	Dark brown (7.5YR 3/4) Medium Clay, Weak structure of 5-10 mm platy peds with a moderate consistence. Nil mottling; Nil stone content; Nil segregations; abundant coarse roots; Well drained with a clear and even boundary.
	B21 0.10 – 0.60	Dark brown (7.5YR 3/4) Heavy Clay, Strong structure of 10-50 mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; Nil segregations; common coarse roots; Well drained with a gradual and even boundary
	B22 0.60 – 0.80	Dark brown (7.5YR 3/4) Heavy Clay, Strong structure of 20-50 mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; 5% <5mm calcareous segregations; common coarse and fine roots; Well drained with a gradual and even boundary.
	B23 0.80 – 1.00	Dark brown (7.5YR 3/3) Heavy Clay, Strong structure of 50-100 mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; 5% <5mm calcareous segregations; few fine roots; Well drained.

Table B7 Detailed Description: Site 12

ASC Name	Self-mulching Brown Vertosol
Site No.	12
Inspection Date	29/10/2014
Landform; Element	Flat; Minimal
Microrelief; Component	None; None
Permeability	Slowly permeable
Drainage	Well drained
Dominant Slope	0-1%
Surface Coarse Fragments	Nil
Surface Condition	Self-mulching
Disturbances (Land Use)	Grazing




Profile	Horizon / Depth (m)	Description
	A1 0.0 – 0.05	Dark brown (10YR 3/3) Medium Clay, Weak structure of 5-20 mm platy peds with a moderate consistence. Nil mottling; Nil stone content; Nil segregations; abundant coarse roots; Well drained with a clear and wavy boundary.
	B21 0.05 – 0.60	Very dark grayish brown (10YR 3/2) Heavy Clay, Strong structure of 20-50 mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; Nil segregations; common fine roots; Well drained with a gradual and wavy boundary
	B22 0.60 – 0.80	Very dark grayish brown (10YR 3/2) Heavy Clay, Strong structure of 50-70 mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; 10% calcareous segregations; common fine roots; Well drained with a gradual and wavy boundary.
	B23 0.80 – 1.00	Brown (10YR 4/3) Heavy Clay, Strong structure of 70+ mm angular blocky peds with a strong consistence. 30% distinct orange (7.5YR 6/8) mottling; Nil stone content; 5% calcareous segregations; few fine roots; Poorly drained.

Table B8 Analysed Description: Site 12

Horizon	Upper Layer	Lower Layer	pH (1:5)	Chloride	EC (1:5)	CEC	ESP	Ca:Mg	Soil Texture	SWS
	m	m		mg/kg	dS/m	cmol+ /kg	%			mm/100 mm
A1	0.0	0.05	8.1	<10	0.051	31.3	1.9	2.2	MC	12
	0.05	0.2	8.4	30	0.104	31.6	3.2	1.9		12
	0.2	0.3	8.8	60	0.112	33.4	6.3	1.8		12
B21	0.3	0.4	9.0	60	0.177	34.1	8.2	1.6	HC	12
	0.4	0.5	9.0	120	0.284	36.7	8.4	1.7		12
	0.5	0.6	8.9	210	0.390	36.3	8.0	1.7		12
B22	0.6	0.7	9.0	330	0.513	37.4	9.9	1.6	HC	12
	0.7	0.8	8.9	530	0.722	43.8	8.2	1.8		12
B23	0.8	0.9	8.8	750	0.877	46.3	7.8	1.9	HC	12
	0.9	1.0	8.7	880	1.040	44.3	7.9	1.7		12
SCL Criteria Compliance										
Effective Rooting Depth			0.9 m							
Total Soil Water Storage			108 mm							
Criterion 6 (pH) Compliance			Yes							
Criterion 7 (Salinity) Compliance			Yes							
Criterion 8 (SWS) Compliance			Yes							

Table B9 Detailed Description: Site 13




ASC Name	Self-mulching Brown Vertosol	
Site No.	13	
Inspection Date	29/10/2014	
Landform; Element	Flat; Minimal	
Microrelief; Component	None; None	
Permeability	Slowly permeable	
Drainage	Well drained	
Dominant Slope	0-1%	
Surface Coarse Fragments	Nil	
Surface Condition	Self-mulching	
Disturbances (Land Use)	Grazing	
Profile	Horizon / Depth (m)	Description
	A1 0.0 – 0.10	Dark grayish brown (10YR 4/2) Medium Clay, strong structure of 5-20 mm subangular peds with a strong consistence. Nil mottling; Nil stone content; Nil segregations; abundant coarse roots; Well drained with a clear and even boundary.
	B21 0.10 – 0.40	Dark brown (10YR 3/3) Heavy Clay, Strong structure of 25-35 mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; Nil segregations; common coarse roots; Well drained with a gradual and even boundary
	B22 0.40 – 0.70	Dark brown (10YR 3/3) Heavy Clay, Strong structure of 540-50 mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; 5% <5mm calcareous segregations; common coarse roots; Moderately drained with a gradual and even boundary.
	B23 0.70 – 1.00	Brown (10YR 4/3) Heavy Clay, Strong structure of 50+ mm angular blocky peds with a strong consistence. 10% faint yellow mottling; Nil stone content; 5% <5mm calcareous and 10% <5mm manganiferous segregations; few fine roots; Moderately drained.

Table B10 Detailed Description: Site 16

ASC Name	Self-mulching Brown Vertosol		
Site No.	16		
Inspection Date	30/10/2014		
Landform; Element	Flat; Minimal		
Microrelief; Component	None; None		
Permeability	Slowly permeable		
Drainage	Moderately drained		
Dominant Slope	0-1%		
Surface Coarse Fragments	Nil		
Surface Condition	Self-mulching		
Disturbances (Land Use)	Grazing		




Profile	Horizon / Depth (m)	Description
	A1 0.0 – 0.05	Dark brown (10YR 3/3) Light-medium Clay, Strong structure of 5-20 mm subangular blocky peds with a strong consistence. Nil mottling; Nil stone content; Nil segregations; abundant coarse roots; Well drained with an abrupt and irregular boundary.
	B21 0.05 – 0.40	Dark brown (10YR 3/3) Heavy Clay, Strong structure of 20-50 mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; 5% calcareous & 5% gypsum segregations; abundant coarse roots; Well drained with a gradual and irregular boundary.
	B22 0.40 – 0.70	Dark brown (10YR 3/3) Heavy Clay, Strong structure of 50+ mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; 5% calcareous & 10% gypsum segregations; common fine roots; Moderately drained with a gradual and irregular boundary.
	B23 0.70 – 1.00	Dark Yellowish-brown (10YR 3/4) Heavy Clay, Strong structure of 50+ mm angular blocky peds with a strong consistence. 30% distinct grey (5YR 3/1) mottling; Nil stone content; 10% gypsum segregations; few fine roots; Moderately drained.

Table B11 Analysed Description: Site 16

Horizon	Upper Layer	Lower Layer	pH (1:5)	Chloride	EC (1:5)	CEC	ESP	Ca:Mg	Soil Texture	SWS
	m	m		mg/kg	dS/m	cmol+ /kg	%			mm/100 mm
A1	0.0	0.05	7.9	20	0.065	28	1.4	2.7	LMC	10
B21	0.05	0.2	8.8	130	0.296	33.4	5.7	2.2	HC	12
	0.2	0.3	8.9	350	0.451	39.3	6.9	2.2		12
	0.3	0.4	8.6	880	1.200	47.0	5.5	2.6	HC	12
B22	0.4	0.5	8.8	1190	1.020	55.1	7.1	2.6		12
	0.5	0.6	8.5	1420	1.460	45.1	7.5	2.1		12
	0.6	0.7	8.2	1830	1.350	44.3	7.0	1.9		12
B23	0.7	0.8	6.8	2220	2.080	30.5	14.1	0.9	HC	12
	0.8	0.9	7.2	2200	1.780	31.5	14.6	1.0		12
	0.9	1.0	6.8	2480	1.870	32.0	14.7	0.9		12
SCL Criteria Compliance										
Effective Rooting Depth			0.3 m							
Total Soil Water Storage			34 mm							
Criterion 6 (pH) Compliance			Yes							
Criterion 7 (Salinity) Compliance			No							
Criterion 8 (SWS) Compliance			No							

Table B12 Detailed Description: Site 39




ASC Name	Self-mulching Brown Vertosol	
Site No.	39	
Inspection Date	31/10/2014	
Landform; Element	Lower Slope; Minimal	
Microrelief; Component	None; None	
Permeability	Slowly permeable	
Drainage	Moderately drained	
Dominant Slope	1-3%	
Surface Coarse Fragments	Nil	
Surface Condition	Self-mulching	
Disturbances (Land Use)	Grazing	
Profile	Horizon / Depth (m)	Description
	A1 0.0 – 0.10	Dark brown (10YR 3/3) Medium Clay, Strong structure of 50-100 mm platy peds with a strong consistence. Nil mottling; 5% 5 mm stone content; Nil segregations; abundant coarse roots; Well drained with a gradual and wavy boundary.
	B21 0.10 – 0.40	Brown (10YR 4/3) Heavy Clay, Strong structure of 20-40 mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; Nil segregations; common coarse roots; Well drained with a gradual and wavy boundary.
	B22 0.40 – 0.70	Brown (10YR 4/3) Medium Clay, Strong structure of 40+ mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; 10% calcareous segregations; common coarse roots; Moderately drained with a gradual and wavy boundary.
	B23 0.70 – 1.00	Dark Yellowish-brown (10YR 4/4) Medium Clay, Strong structure of 40+ mm angular blocky peds with a strong consistence. 10% faint grey (5YR 3/2) mottling; Nil stone content; 10% calcareous segregations; few fine and coarse roots; Poorly drained.

Table B13 Analysed Description: Site 39

Horizon	Upper Layer	Lower Layer	pH (1:5)	Chloride	EC (1:5)	CEC	ESP	Ca:Mg	Soil Texture	SWS
	m	m		mg/kg	dS/m	cmol+ /kg	%			mm/100 mm
A1	0.0	0.1	8.3	50	0.233	41.6	1.2	3.3	MC	12
B21	0.1	0.2	8.7	260	0.371	49.2	2.4	3.0	HC	12
	0.2	0.3	9.0	540	0.579	43.3	6.2	2.2		12
	0.3	0.4	9.0	1100	0.941	48.2	6.8	2.4		12
B22	0.4	0.5	9.0	1340	1.050	48.7	7.6	2.4	HC	12
	0.5	0.6	8.9	2000	1.470	47.1	8.1	2.3		12
	0.6	0.7	8.8	2430	1.660	45.1	8.4	2.1		12
B23	0.7	0.8	8.7	3900	2.030	45.4	8.8	1.9	HC	12
	0.8	0.9	8.7	2700	1.920	36.5	10.7	1.5		12
	0.9	1.0	8.8	2580	1.710	30.3	13.2	1.1		12
SCL Criteria Compliance										
Effective Rooting Depth			0.3 m							
Total Soil Water Storage			36 mm							
Criterion 6 (pH) Compliance			Yes							
Criterion 7 (Salinity) Compliance			No							
Criterion 8 (SWS) Compliance			No							

Table B14 Detailed Description: Site 45

ASC Name	Self-mulching Brown Vertosol		
Site No.	45		
Inspection Date	1/11/2014		
Landform; Element	Open depression		
Microrelief; Component	None; None		
Permeability	Slowly permeable		
Drainage	Well drained		
Dominant Slope	0-1%		
Surface Coarse Fragments	Nil		
Surface Condition	Loose		
Disturbances (Land Use)	Grazing		




Profile	Horizon / Depth (m)	Description
	A1 0.0 – 0.10	Dark brown (10YR 3/4) Medium Clay, Moderate structure of 2-5 mm crumb peds with a moderate consistence. Nil mottling; 15% 20 mm stone content; Nil segregations; abundant coarse roots; Well drained with a clear and wavy boundary.
	B21 0.10 – 0.30	Dark brown (10YR 3/4) Heavy Clay, Strong structure of 20-50 mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; Nil segregations; common coarse roots; Well drained with a clear and wavy boundary
	B22 0.30 – 0.70	Dark brown (10YR 3/4) Heavy Clay, Strong structure of 50-100 mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; Nil segregations; common coarse and few fine roots; Moderately drained with a gradual and wavy boundary.
	B23 0.70 – 1.00	Light brown (10YR 6/3) Heavy Clay, Strong structure of 50-100+ mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; 5% <5mm calcareous segregations; few fine roots; Moderately drained.

Table B15 Detailed Description: Site 47

ASC Name	Self-mulching Brown Vertosol
Site No.	47
Inspection Date	1/11/2014
Landform; Element	Flat; Minimal
Microrelief; Component	None; None
Permeability	Slowly permeable
Drainage	Well drained
Dominant Slope	0-1%
Surface Coarse Fragments	Nil
Surface Condition	Self-mulching
Disturbances (Land Use)	Grazing





Profile	Horizon / Depth (m)	Description
	A1 0.0 – 0.10	Very dark brown (10YR 2.5/3) Medium Clay, Moderate structure of <5 mm crumb peds with a moderate consistence. Nil mottling; Nil stone content; Nil segregations; abundant coarse roots; Well drained with a clear and wavy boundary.
	B21 0.10 – 0.50	Very dark brown (10YR 2.5/3) Heavy Clay, Strong structure of 20-40 mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; Nil segregations; common coarse roots; Well drained with a gradual and wavy boundary
	B22 0.50 – 0.80	Dark brown (10YR 3/3) Heavy Clay, Strong structure of 40+ mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; 5% <5mm calcareous segregations; common coarse roots; Moderately drained with a gradual and wavy boundary.
	B23 0.80 – 1.00	Dark brown (10YR 3/3) Heavy Clay, Strong structure of 40+ mm angular blocky peds with a strong consistence. 30% distinct very dark brown (10YR 2.5/2) mottling; Nil stone content; Nil segregations; few coarse and fine roots; Poorly drained.

Table B16 Detailed Description: Site 48

ASC Name	Self-mulching Brown Vertosol		
Site No.	48		
Inspection Date	1/11/2014		
Landform; Element	Flat; Minimal		
Microrelief; Component	None; None		
Permeability	Slowly permeable		
Drainage	Well drained		
Dominant Slope	0-1%		
Surface Coarse Fragments	Nil		
Surface Condition	Self-mulching		
Disturbances (Land Use)	Grazing		




Profile	Horizon / Depth (m)	Description
	A1 0.0 – 0.05	Dark brown (10YR 3/3) Medium Clay, Moderate structure of 5-30 mm platy peds with a moderate consistence. Nil mottling; <5% <10 mm stone content; Nil segregations; abundant coarse roots; Well drained with a clear and even boundary.
	B21 0.05 – 0.30	Dark brown (10YR 3/3) Heavy Clay, Strong structure of 30-40 mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; Nil segregations; common coarse roots; Well drained with a gradual and even boundary
	B22 0.30 – 0.60	Dark brown (10YR 3/3) Heavy Clay, Strong structure of 40+ mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; <5% <5mm calcareous segregations; common coarse and fine roots; Moderately drained with a gradual and irregular boundary.
	B23 0.60 – 1.00	Dark brown (10YR 3/3) Heavy Clay, Strong structure of 40+ mm angular blocky peds with a strong consistence. 20% faint orange mottling; Nil stone content; 10% <5mm calcareous segregations; few coarse and fine roots; Poorly drained.

Table B17 Detailed Description: Site 49



ASC Name	Self-mulching Brown Vertosol	
Site No.	49	
Inspection Date	1/11/2014	
Landform; Element	Midslope; Minimal	
Microrelief; Component	None; None	
Permeability	Slowly permeable	
Drainage	Well drained	
Dominant Slope	1-3%	
Surface Coarse Fragments	Nil	
Surface Condition	Crusted & loose	
Disturbances (Land Use)	Grazing	
Profile	Horizon / Depth (m)	Description
	A1 0.0 – 0.10	Dark brown (10YR 3/3) Heavy Clay, Moderate structure of 5-20 mm crumb peds with a moderate consistence. Nil mottling; <5% 10 mm stone content; Nil segregations; abundant coarse roots; Well drained with a clear and even boundary.
	B21 0.10 – 0.40	Dark brown (10YR 3/3) Heavy Clay, Strong structure of 30-40 mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; 5% <5 mm calcareous segregations; common coarse roots; Well drained with a gradual and even boundary.
	B22 0.40 – 0.70	Dark brown (10YR 3/3) Heavy Clay, Strong structure of 40+ mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; Nil segregations; common fine and coarse roots; Well drained with a gradual and even boundary.
	B23 0.70 – 1.00	Dark brown (10YR 3/3) Heavy Clay, Strong structure of 40+ mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; Nil segregations; few fine and coarse roots; Well drained.

Table B18 Analysed Description: Site 49

Horizon	Upper Layer	Lower Layer	pH (1:5)	Chloride	EC (1:5)	CEC	ESP	Ca:Mg	Soil Texture	SWS
	m	m		mg/kg	dS/m	cmol+ /kg	%			mm/100 mm
A1	0.0	0.1	8.6	30	0.171	50.3	0.6	4.3	HC	12
B21	0.1	0.2	8.9	30	0.177	57.8	1.9	3.9	HC	12
	0.2	0.3	9	70	0.234	56.6	3.0	3.4		12
	0.3	0.4	9.2	100	0.321	56.3	5.9	2.8		12
B22	0.4	0.5	9.2	320	0.471	58.4	6.5	2.7	HC	12
	0.5	0.6	9.0	1000	0.808	25.1	12.0	2.1		12
	0.6	0.7	9.0	1160	0.937	56.3	9.4	2.4		12
B23	0.7	0.8	8.8	1590	1.180	33.8	11.8	2.1	HC	12
	0.8	0.9	8.7	2080	1.400	53.4	10.1	2.1		12
	0.9	1.0	8.6	2360	1.620	53.7	10.1	2.1		12
SCL Criteria Compliance										
Effective Rooting Depth			0.5 m							
Total Soil Water Storage			60 mm							
Criterion 6 (pH) Compliance			Yes							
Criterion 7 (Salinity) Compliance			No							
Criterion 8 (SWS) Compliance			No							

Table B19 Detailed Description: Site 54

ASC Name	Self-mulching Brown Vertosol
Site No.	54
Inspection Date	1/11/2014
Landform; Element	Flat; Minimal
Microrelief; Component	None; None
Permeability	Slowly permeable
Drainage	Well drained
Dominant Slope	0-1%
Surface Coarse Fragments	5% 50 mm fragments
Surface Condition	Self-mulching
Disturbances (Land Use)	Grazing





Profile	Horizon / Depth (m)	Description
	A1 0.0 – 0.10	Dark grayish brown (7.5YR 4/2) Medium Clay, Moderate structure of 2-10 mm crumb peds with a strong consistence. Nil mottling; <5% 10 mm stone content; Nil segregations; abundant coarse roots; Well drained with a clear and wavy boundary.
	B21 0.10 – 0.50	Very dark grayish brown (10YR 3/2) Heavy Clay, Strong structure of 20-40 mm angular blocky peds with a strong consistence. Nil mottling; <5% 10 mm stone content; Nil segregations; common coarse roots; Well drained with a gradual and wavy boundary
	B23 0.50 – 1.00	Brown (10YR 4/3) Heavy Clay, Strong structure of 40+ mm angular blocky peds with a strong consistence. Nil mottling; <5% 10 mm stone content; 5% calcareous segregations; common coarse roots; Moderately drained.

Table B20 Detailed Description: Site 57

ASC Name	Self-mulching Brown Vertosol		
Site No.	57		
Inspection Date	2/11/2014		
Landform; Element	Flat; Minimal		
Microrelief; Component	None; None		
Permeability	Slowly permeable		
Drainage	Well drained		
Dominant Slope	0-1%		
Surface Coarse Fragments	Nil		
Surface Condition	Crusted		
Disturbances (Land Use)	Grazing		




Profile	Horizon / Depth (m)	Description
	A1 0.0 – 0.05	Very dark grayish brown (10YR 3/2) Medium Clay, Moderate structure of 10-50 mm platy peds with a moderate consistence. Nil mottling; Nil stone content; Nil segregations; abundant coarse roots; Well drained with a clear and even boundary.
	B21 0.05 – 0.30	Dark brown (10YR 3/3) Heavy Clay, Strong structure of 20-40 mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; Nil segregations; common coarse roots; Well drained with a gradual and even boundary
	B22 0.30 – 0.70	Dark brown (10YR 3/3) Heavy Clay, Strong structure of 40+ mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; 5% <5mm calcareous segregations; common coarse roots; Moderately drained with a gradual and even boundary.
	B23 0.70 – 1.00	Dark brown (10YR 3/3) Heavy Clay, Strong structure of 40+ mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; 10% <5m calcareous segregations; common coarse and fine roots; Moderately drained.

Table B21 Detailed Description: Site 59



ASC Name	Self-mulching Brown Vertosol	
Site No.	59	
Inspection Date	2/11/2014	
Landform; Element	Flat; Minimal	
Microrelief; Component	None; None	
Permeability	Slowly permeable	
Drainage	Well drained	
Dominant Slope	0-1%	
Surface Coarse Fragments	Nil	
Surface Condition	Crusted	
Disturbances (Land Use)	Grazing	
Profile	Horizon / Depth (m)	Description
	A1 0.0 – 0.05	Dark brown (7.5YR 3/2) Medium Clay, Moderate structure of 10-60 mm platy peds with a moderate consistence. Nil mottling; Nil stone content; Nil segregations; abundant coarse roots; Well drained with a clear and even boundary.
	B21 0.05 – 0.30	Dark brown (7.5YR 3/3) Heavy Clay, Strong structure of 20-30 mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; <5% <5mm calcareous segregations; common coarse roots; Well drained with a gradual and even boundary
	B22 0.30 – 0.65	Dark brown (7.5YR 3/3) Heavy Clay, Strong structure of 40+ mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; 5% <5mm calcareous segregations; common coarse and fine roots; Moderately drained with a gradual and even boundary.
	B23 0.65 – 1.00	Dark brown (7.5YR 3/3) Heavy Clay, Strong structure of 40+ mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; 15% <5mm calcareous segregations; nil roots; Moderately drained.

Table B22 Detailed Description: Site 62

ASC Name	Self-mulching Brown Vertosol
Site No.	62
Inspection Date	2/11/2014
Landform; Element	Flat; Minimal
Microrelief; Component	None; None
Permeability	Slowly permeable
Drainage	Moderately drained
Dominant Slope	0-1%
Surface Coarse Fragments	Nil
Surface Condition	Self-mulching
Disturbances (Land Use)	Grazing




Profile	Horizon / Depth (m)	Description
	A1 0.0 – 0.10	Dark Yellowish-brown (10YR 3/4) Heavy Clay, Moderate structure of 2-10 mm crumb peds with a strong consistence. Nil mottling; Nil stone content; Nil segregations; abundant coarse roots; Well drained with a clear and even boundary.
	B21 0.10– 0.40	Dark Yellowish-brown (10YR 3/4) Heavy Clay, Strong structure of 15-30 mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; Nil segregations; abundant coarse roots; Well drained with a gradual and even boundary.
	B22 0.40 – 0.70	Dark Yellowish-brown (10YR 3/4) Heavy Clay, Strong structure of 40+ mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; Nil segregations; common coarse roots; Moderately drained with a gradual and even boundary.
	B23 0.70 – 1.00	Dark Yellowish-brown (10YR 3/4) Heavy Clay, Strong structure of 40+ mm angular blocky peds with a strong consistence. Nil mottling; Nil stone content; 5% calcareous segregations; Nil roots; Moderately drained.

Table B23 Analysed Description: Site 62

Horizon	Upper Layer	Lower Layer	pH (1:5)	Chloride	EC (1:5)	CEC	ESP	Ca:Mg	Soil Texture	SWS
	m	m		mg/kg	dS/m	cmol+ /kg	%			mm/100 mm
A1	0.0	0.1	8.6	5	0.141	48.9	1.0	3.6	HC	12
B21	0.1	0.2	8.8	20	0.158	53.7	1.5	3.9	HC	12
	0.2	0.3	8.9	40	0.199	56.5	2.7	3.6		12
	0.3	0.4	9.0	60	0.245	53.8	4.8	3.0		12
B22	0.4	0.5	9.0	120	0.292	55.8	5.2	3.1	HC	12
	0.5	0.6	9.0	230	0.381	53.8	6.9	2.6		12
	0.6	0.7	*	*	*	*	*	*		12
B23	0.7	0.8	8.9	590	0.591	51.9	8.1	2.4	HC	12
	0.8	0.9	9	570	0.582	53.6	8.0	2.5		12
	0.9	1.0	8.8	1110	0.889	52.2	8.2	2.4		12
SCL Criteria Compliance										
Effective Rooting Depth			0.9 m							
Total Soil Water Storage			108 mm							
Criterion 6 (pH) Compliance			Yes							
Criterion 7 (Salinity) Compliance			Yes							
Criterion 8 (SWS) Compliance			Yes							

* Not laboratory analysed

Table B24 Detailed Description: Site 66

ASC Name	Self-mulching Brown Vertosol
Site No.	66
Inspection Date	2/11/2014
Landform; Element	Flat; Minimal
Microrelief; Component	None; None
Permeability	Slowly permeable
Drainage	Moderately drained
Dominant Slope	0-1%
Surface Coarse Fragments	<10% <10 mm
Surface Condition	Self-mulching
Disturbances (Land Use)	Grazing





Profile	Horizon / Depth (m)	Description
	A1 0.0 – 0.10	Brown (10YR 4/3) Light-medium Clay, Moderate structure of 20-50 mm platy peds with a strong consistence. Nil mottling; <10% <10 mm stone content; Nil segregations; abundant coarse roots; Well drained with a clear and even boundary.
	B21 0.10 – 0.35	Dark Yellowish-brown (10YR 4/4) Heavy Clay, Strong structure of 40+ mm angular blocky peds with a strong consistence. Nil mottling; <10% <10 mm stone content; Nil segregations; abundant coarse roots; Well drained with a gradual and even boundary.
	B22 0.35 – 0.60	Brown (10YR 4/3) Heavy Clay, Strong structure of 40+ mm angular blocky peds with a strong consistence. Nil mottling; <10% <10 mm stone content; <5% manganiferous segregations; common coarse roots; Moderately drained with a gradual and even boundary.
	B23 0.60 – 1.00	Brown (10YR 4/3) Heavy Clay, Strong structure of 40+ mm angular blocky peds with a strong consistence. 15% prominent orange mottling; <10% <10 mm stone content; <5% manganiferous segregations; few fine and coarse roots; Poorly drained.


Table B25 Analysed Description: Site 66

Horizon	Upper Layer	Lower Layer	pH (1:5)	Chloride	EC (1:5)	CEC	ESP	Ca:Mg	Soil Texture	SWS
	m	m		mg/kg	dS/m	cmol+ /kg	%			mm/100 mm
A1	0.0	0.10	8.0	20	0.101	28.0	0.7	3.3	LMC	10
B21	0.10	0.2	8.5	50	0.191	29.6	1.0	3.1	HC	12
	0.2	0.35	8.7	170	0.345	36.5	2.5	2.5		12
B22	0.35	0.4	8.7	440	0.519	32.5	4.9	1.5	HC	12
	0.4	0.5	8.7	460	0.564	29.6	6.8	1.3		12
	0.5	0.6	8.5	780	0.763	26.5	10.2	1.0		12
B23	0.6	0.7	8.3	1090	0.864	24.9	12.0	0.8	HC	12
	0.7	0.8	8.2	1340	1.050	24.7	13.8	0.8		12
	0.8	0.9	8.3	1080	0.901	25.0	12.4	0.8		12
	0.9	1.0	8.1	1690	1.060	24.7	13.0	0.7		12
SCL Criteria Compliance										
Effective Rooting Depth			0.6 m							
Total Soil Water Storage			70 mm							
Criterion 6 (pH) Compliance			Yes							
Criterion 7 (Salinity) Compliance			No							
Criterion 8 (SWS) Compliance			No							

Table B26 Detailed Description: Site 72

ASC Name	Self-mulching Brown Vertosol		
Site No.	72		
Inspection Date	3/11/2014		
Landform; Element	Flat; Minimal		
Microrelief; Component	None; None		
Permeability	Slowly permeable		
Drainage	Well drained		
Dominant Slope	0-1%		
Surface Coarse Fragments	Nil		
Surface Condition	Firm		
Disturbances (Land Use)	Grazing		




Profile	Horizon / Depth (m)	Description
	A1 0.0 – 0.05	Brown (7.5YR 4/3) Sandy Clay, Moderate structure of 10-30 mm platy peds with a moderate consistence. Nil mottling; Nil stone content; Nil segregations; common coarse roots; Well drained with an abrupt and even boundary.
	B21 0.05 – 0.25	Brown (7.5YR 4/3) Sandy Clay, Strong structure of 20-30 mm angular blocky peds with a strong consistence. Nil mottling; <5% <10mm stone content; Nil segregations; common coarse roots; Moderately drained with a clear and wavy boundary
	B22 0.25 – 0.60	Strong brown (7.5YR 5/6) Sandy Clay, Strong structure of 40+ mm angular blocky peds with a strong consistence. Nil mottling; 5% <10mm stone content; 20% <5mm calcareous segregations; few fine roots; Moderately drained with a gradual and wavy boundary.
	B23 0.60 – 0.90	Strong brown (7.5YR 5/6) Sandy Clay, Strong structure of 40+ mm angular blocky peds with a strong consistence. Nil mottling; 5% <10mm stone content; 20% <5mm calcareous segregations; few fine roots; Moderately drained.

Soil Map Unit 1 – Self-mulching Black Vertosol (Sub-dominant Soil Type)

Table B27 Detailed Description: Site 43

ASC Name	Self-mulching Black Vertosol
Site No.	43
Inspection Date	1/11/2014
Landform; Element	Flat; Minimal
Microrelief; Component	None; None
Permeability	Slowly
Drainage	Well drained
Dominant Slope	0-1%
Surface Coarse Fragments	Nil
Surface Condition	Crusted
Disturbances (Land Use)	Grazing



Profile	Horizon / Depth (m)	Description
---------	---------------------	-------------



A1
0.0 – 0.15

Very dark grey (7.5YR 3/1) Medium Clay, Strong structure of 2-10 mm crumb peds with a strong consistence.

Nil mottling; 10% <10 mm stone content; Nil segregations; abundant coarse roots; Well drained with a clear and irregular boundary.

B2
0.15 – 0.70

Black (7.5YR 2.5/1) Heavy Clay, Strong structure of 20-30 mm angular blocky peds with a strong consistence.

Nil mottling; 10% <10 mm stone content; Nil segregations; common coarse roots; Well drained with an abrupt and even boundary.

BC
0.70 – 1.00

Weathering bedrock

Table B2819 Detailed Description: Site 56

ASC Name	Self-mulching Black Vertosol
Site No.	56
Inspection Date	2/11/2014
Landform; Element	Lower Slope; Minimal
Microrelief; Component	None; None
Permeability	Slowly
Drainage	Well drained
Dominant Slope	1-3%
Surface Coarse Fragments	Nil
Surface Condition	Crusted / Loose
Disturbances (Land Use)	Grazing




Profile	Horizon / Depth (m)	Description
	<p>A1</p> <p>0.0 – 0.15</p>	<p>Very dark grey (7.5YR 3/1) Medium Clay, Strong structure of 10-50 mm platy peds with a strong consistence.</p> <p>Nil mottling; Nil stone content; Nil segregations; abundant coarse roots; Well drained with a clear and even boundary.</p>
	<p>B21</p> <p>0.15 – 0.60</p>	<p>Black (7.5YR 2.5/1) Heavy Clay, Strong structure of 30-40 mm angular blocky peds with a strong consistence.</p> <p>Nil mottling; Nil stone content; Nil segregations; common coarse roots; Well drained with a gradual and even boundary.</p>
	<p>B22</p> <p>0.60 – 1.00</p>	<p>Black (7.5YR 2.5/1) Heavy Clay, Strong structure of 30-50 mm angular blocky peds with a strong consistence.</p> <p>Nil mottling; Nil stone content; 5% calcareous segregations; common fine and coarse roots; Moderately drained.</p>

Soil Map Unit 1 – Eutrophic Brown Dermosol (Sub-dominant Soil Type)

Table B29 Detailed Description: Site 50

ASC Name	Brown Dermosol
Site No.	50
Inspection Date	1/11/2014
Landform; Element	Upper slope; Minimal
Microrelief; Component	None; None
Permeability	Slowly permeable
Drainage	Well drained
Dominant Slope	1-3%
Surface Coarse Fragments	Nil
Surface Condition	Firm
Disturbances (Land Use)	Grazing




Profile	Horizon / Depth (m)	Description
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A1 0.0 – 0.07	<p>Brown (7.5YR 4/4) Sandy Clay Loam, Weak structure of 10-20 mm angular blocky peds with a strong consistence.</p> <p>Nil mottling; 10% 10 mm stone content; Nil segregations; common fine roots; Well drained with a gradual and even boundary.</p>
B21 0.07 – 0.22	<p>Brown (7.5YR 4/4) Light Clay, Strong structure of 30-40 mm angular blocky peds with a strong consistence.</p> <p>Nil mottling; <5% 10 mm stone content; Nil segregations; common fine roots; Well drained with a gradual and wavy boundary.</p>
B22 0.22 – 0.60	<p>Strong brown (7.5YR 4/6) Medium Clay, Strong structure of 40+ mm angular blocky peds with a strong consistence.</p> <p>Nil mottling; 5% <10 mm stone content; 20% <5mm calcareous segregations; common fine and coarse fine roots; Moderately drained with a gradual and wavy boundary.</p>
BC 0.60 – 1.00+	Weathered bedrock

Table B30 Detailed Description: Site 51

ASC Name	Eutrophic Brown Dermosol		
Site No.	51		
Inspection Date	1/11/2014		
Landform; Element	Lower slope; Minimal		
Microrelief; Component	None; None		
Permeability	Slowly permeable		
Drainage	Well drained		
Dominant Slope	0-1%		
Surface Coarse Fragments	Nil		
Surface Condition	Firm		
Disturbances (Land Use)	Grazing		





Profile	Horizon / Depth (m)	Description
	A1 0.0 – 0.10	Dark Yellowish-brown (10YR 3/4) Clay Loam, Weak structure of 10-30 mm platy peds with a strong consistence. Nil mottling; 10% 20 mm stone content; Nil segregations; common fine roots; Well drained with a clear and even boundary.
	B21 0.10 – 0.40	Dark Yellowish-brown (10YR 3/4) Light Clay, Strong structure of 30-40 mm angular blocky peds with a strong consistence. Nil mottling; <5% 10 mm stone content; Nil segregations; common fine roots; Well drained with a gradual and even boundary.
	B22 0.40 – 0.60	Dark Yellowish-brown (10YR 3/4) Light Clay, Strong structure of 40+ mm angular blocky peds with a strong consistence. Nil mottling; 10% 40 mm stone content; Nil segregations; few fine roots; Moderately drained with a gradual and even boundary.
	B23 0.60 – 1.00	Dark Yellowish-brown (10YR 4/6) Light Clay, Strong structure of 40+ mm angular blocky peds with a strong consistence. 10% distinct brown (7.5YR 6/6) mottling; Nil stone content; <5% manganiferous segregations; Nil roots; Imperfectly drained.

Table B31 Analysed Description: Site 51

Horizon	Upper Layer	Lower Layer	pH (1:5)	Chloride	EC (1:5)	CEC	ESP	Ca:Mg	Soil Texture	SWS
	m	m		mg/kg	dS/m	cmol+ /kg	%			mm/100 mm
A1	0.0	0.1	7.1	60	0.121	11.7	5.1	0.9	CL	8
B21	0.1	0.2	7.0	110	0.171	14.3	8.4	0.8	LC	10
	0.2	0.3	7.0	430	0.393	15.1	13.2	0.6		10
	0.3	0.4	6.8	1040	0.706	9.9	19.2	0.5		10
B22	0.4	0.5	6.9	1110	0.727	10.7	24.3	0.4	LC	10
	0.5	0.6	7.6	1400	0.829	9.1	26.4	0.3		10
	0.6	0.7	7.1	1900	1.120	8.6	27.9	0.3		10
B23	0.7	0.8	7.3	1480	0.932	6.4	28.1	0.3	LC	10
	0.8	0.9	7.2	1800	1.100	10.8	26.9	0.2		10
	0.9	1.0	6.8	2890	1.490	5.6	30.4	0.2		10
SCL Criteria Compliance										
Effective Rooting Depth			0.3 m							
Total Soil Water Storage			28 mm							
Criterion 6 (pH) Compliance			Yes							
Criterion 7 (Salinity) Compliance			No							
Criterion 8 (SWS) Compliance			No							

Table B32 Detailed Description: Site 55

ASC Name	Brown Dermosol
Site No.	55
Inspection Date	2/11/2014
Landform; Element	Midslope; Minimal
Microrelief; Component	None; None
Permeability	Slowly permeable
Drainage	Well drained
Dominant Slope	1-3%
Surface Coarse Fragments	Nil
Surface Condition	Crusted & loose
Disturbances (Land Use)	Grazing



Profile	Horizon / Depth (m)	Description
---------	---------------------	-------------



A1 0.0 – 0.15	<p>Dark Yellowish-brown (10YR 3/4) Medium Clay, strong structure of 5-20 mm angular blocky peds with a strong consistence.</p> <p>Nil mottling; 10% 5 mm stone content; Nil segregations; abundant coarse roots; Well drained with a clear and wavy boundary.</p>
B21 0.15 – 0.40	<p>Dark Yellowish-brown (10YR 3/4) Medium Clay, Strong structure of 5-20 mm angular blocky peds with a strong consistence.</p> <p>Nil mottling; <5% 10 mm stone content; 15% <5mm calcareous segregations; abundant coarse roots; Well drained with a gradual and wavy boundary.</p>
B22 0.40 – 0.70	<p>Reddish yellow (7.5YR 6/6) Medium Clay, Strong structure of 5-20 mm angular blocky peds with a strong consistence.</p> <p>Nil mottling; 10% 40 mm stone content; 30% <5mm calcareous segregations; few coarse roots; Well drained with a gradual and wavy boundary.</p>
BC 0.70 – 1.00	<p>Weathering bedrock</p>

Appendix C

GPS Coordinates of Observation Sites

Table C1 GPS Coordinates of Observation Sites

Site No.	GPS Coordinates		
	Spatial Datum	Eastings	Northings
7	GDA 1994 MGA Zone 55	684513	7390913
8	GDA 1994 MGA Zone 55	685417	7391806
9	GDA 1994 MGA Zone 55	685505	7392494
10	GDA 1994 MGA Zone 55	685428	7393127
11	GDA 1994 MGA Zone 55	685434	7393702
12	GDA 1994 MGA Zone 55	685407	7394389
13	GDA 1994 MGA Zone 55	685581	7395235
16	GDA 1994 MGA Zone 55	684719	7391255
39	GDA 1994 MGA Zone 55	689632	7410539
43	GDA 1994 MGA Zone 55	689585	7409729
45	GDA 1994 MGA Zone 55	690144	7411926
47	GDA 1994 MGA Zone 55	689849	7411198
49	GDA 1994 MGA Zone 55	690566	7412601
50	GDA 1994 MGA Zone 55	689382	7411912
51	GDA 1994 MGA Zone 55	689610	7412746
54	GDA 1994 MGA Zone 55	690417	7413336
55	GDA 1994 MGA Zone 55	689553	7414021
56	GDA 1994 MGA Zone 55	689805	7414504
57	GDA 1994 MGA Zone 55	690335	7414669
58	GDA 1994 MGA Zone 55	690949	7414044
59	GDA 1994 MGA Zone 55	690319	7413997
62	GDA 1994 MGA Zone 55	692212	7413362
66	GDA 1994 MGA Zone 55	690994	7412002
72	GDA 1994 MGA Zone 55	691018	7411166

Appendix D

Methodology for remote and indirect measurement of slope

Methodology for remote and indirect measurement of slope

Slope analysis for the Project Area was determined using remote and indirect Slope Determination methodology as describe in the *RPI Act Guideline 08/14 – How to demonstrate that land in the strategic cropping are does not meet the criteria for strategic cropping land*.

SLR Consulting uses ESRI's ArcGIS software including the 3D Analyst extension for spatial analysis operations. SLR were provided detailed 1 m elevation contour data for some of the Project Area, these contours were supplemented with '10 m Contours for the Blackwater Region' from DNRM. The two vector data sources were combined and used to generate a DEM for the region. The data was resampled to a 20m x 20m grid size in order to optimize the slope analysis as per the guideline.

The DEM used to undertake a slope analysis using the default parameters of the 3D Analyst Raster Surface Slope tool.

Vector regions were generated based on the raster slopes and these were used in area calculations and in the generation of exclusion area polygons.



global environmental solutions

SCL Supplementary Report
Curragh Extension Project
Strategic Cropping Land Assessment

Report Number 634.10046

8 December 2015

Version: Final

SCL Supplementary Report

Curragh Extension Project

Strategic Cropping Land Assessment

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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.

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DOCUMENT CONTROL

Reference	Status	Date	Prepared	Checked	Authorised
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1 INTRODUCTION

A Strategic Cropping Land (SCL) assessment was undertaken by SLR in late 2014 for the Curragh Extension Project (the Project). The SCL assessment report was provided to Queensland Department of Natural Resources and Mines (DNRM) in July 2015 for pre lodgement comment. The comments made during this process have been discussed via e-mails and phone meetings between DNRM (Peter Binns), SLR (Clayton Richards) and Wesfarmers (Amanda O'Kane) on several occasions as listed in the Section below.

This SCL Supplementary Report is aimed at addressing the comments raised by DNRM, and is to be read as an addendum to the July 2015 SCL report. Further desktop mapping work and laboratory analysis of samples obtained and stored from the SLR 2014 fieldwork, has been undertaken to provide additional data on the assessment findings.

2 TIMELINE OF EVENTS

The following timeline of events records the SCL assessment and feedback process to provide a background to this document.

- October 2014 – SLR was engaged to undertake a soil assessment suitable to fulfill the requirements of an Environmental Impact Statement and SCL assessment for the Curragh Extension Project. SLR representatives undertook the fieldwork in October 2014, including sampling and sending samples for laboratory analysis to ALS Brisbane and Scone Research Centre, both NATA labs.
- April 2015 – Notification from QLD Department of Environment and Heritage Protection (DEHP) that the EA amendment application will be assessed as a Major Amendment.
- May 2015 – Notification from DEHP that the Project does not require an EIS under the *Environment Protection Act 1994*.
- July 2015 – Final version of the SCL Assessment Report was sent to DNRM for pre-lodgement review and comment.
- August 2015 – DNRM responds with Pre-lodgement comments (Appendix 1). SLR reviewed comments and provide initial responses to the DNRM (Appendix 2) and requested a meeting to discuss details of both comments and responses.
- September 2015 – DNRM provides further comments (Appendix 3) prior to the phone meeting to discuss the SCL Assessment Report and associated issues raised to date in the pre-lodgement review process. Meeting is held between DNRM (Peter Binns), SLR (Clayton Richards), DILPN (Mitzi Venn) and Wesfarmers (Amanda O'Kane).
- November 2015 – SLR was engaged to undertake further desktop mapping and sample analysis, from stored samples taken in the October 2014 fieldwork, and provide a supplementary report in relation to the issues raised during the pre-lodgement review process.

3 SCOPE OF SUPPLEMENTARY WORK

3.1 Revised Slope Exclusion Analysis

The issue of slope exclusion was raised in the initial pre-lodgement review. Following discussions with DNRM it was decided that all areas less than 10ha contiguous of slope greater than 3% would not be considered a part of the slope exclusion. Further details of the methodology undertaken by SLR to create the slope exclusion is also provided below.

3.2 Mapping of Gilgai in Study Area

The historical satellite imagery and aerial photos DNRM used in the pre-lodgement review process indicated some areas within the mapped Vertosols as having normal and linear gilgai. It was noted in discussions between SLR and DNRM that the areas of gilgai were obvious in the historical imagery due to these areas having not been cultivated, compared to adjacent land. Therefore the gilgai was more developed and pronounced where no cultivation had taken place.

As part of this supplement, SLR has mapped out the areas of gilgai in revised figures to indicate cultivation has not taken place within these soils and therefore may be considered a sub-dominant soil map unit within the existing mapped Vertosols, which are the dominant soil map unit within the study area.

3.3 Laboratory Testing of Existing Soil Samples

SLR had collected and stored samples taken from the October 2014 fieldwork and were able to have the relevant samples sent to ALS Brisbane for targeted testing which would provide additional evidence of soil analysis for sites considered only check sites or detailed sites in the original report.

Table 1 below shows the site, sample depths and laboratory analysis requested. All samples were tested for Chloride as this was the common limitation for the dominant soil (Vertosol) within the study area. Chloride proved a limitation either directly by Criteria 7 Salinity or by Criteria 8 Soil Water Storage. The samples from site 50 and 55 were additionally tested for CEC and exchangeable cations as these were mapped as the sub dominant soil map unit (Dermosol), however had not fulfilled the requirements of an analysed site.

Table 1 Supplementary Soil Analysis

Site	Layer Depths	Laboratory Analysis Requested
50	0-7, 7-22, 40-50, 75-85	EC Chloride pH CEC Exchange Cations
55	0-10, 20-30, 50-60, 80-90	EC Chloride pH CEC Exchange Cations
7	0-10, 15-25, 30-40, 50-60, 80-90	EC Chloride
8	0-5, 15-25, 50-60, 80-90	EC Chloride
13	0-10, 25-35, 55-65, 90-100	EC Chloride
43	0-10, 20-30, 50-60, 80-90	EC Chloride
47	0-10, 25-35, 60-70, 85-95	EC Chloride
48	0-5, 15-25, 40-50, 75-85	EC Chloride
57	0-5, 15-25, 45-55, 80-90	EC Chloride

4 RESULTS OF SUPPLEMENTARY WORK

4.1 Revised Slope Exclusion Analysis

Slope analysis for the Project Area was determined using remote and indirect Slope Determination methodology as describe in the *RPI Act Guideline 08/14 – How to demonstrate that land in the strategic cropping are does not meet the criteria for strategic cropping land*. SLR Consulting uses ESRI's ArcGIS software including the 3D Analyst extension for spatial analysis operations. SLR were provided detailed 1 m elevation contour data for the entire Project Area by the client. The two shapefiles in question were received in a Zipfile name 1912299273.zip on the 1st December 2014 and were named:

- Contours1m_derived, and
- Contours_1m_2013

The two shapefiles then underwent some manipulation whereby the contours in the shapefile 'Contours_1m_2013' were cut into the 'Contours1m_derived' contours. The '10 m Contours for the Blackwater Region' from DNRM were used as a visual reference dataset only.

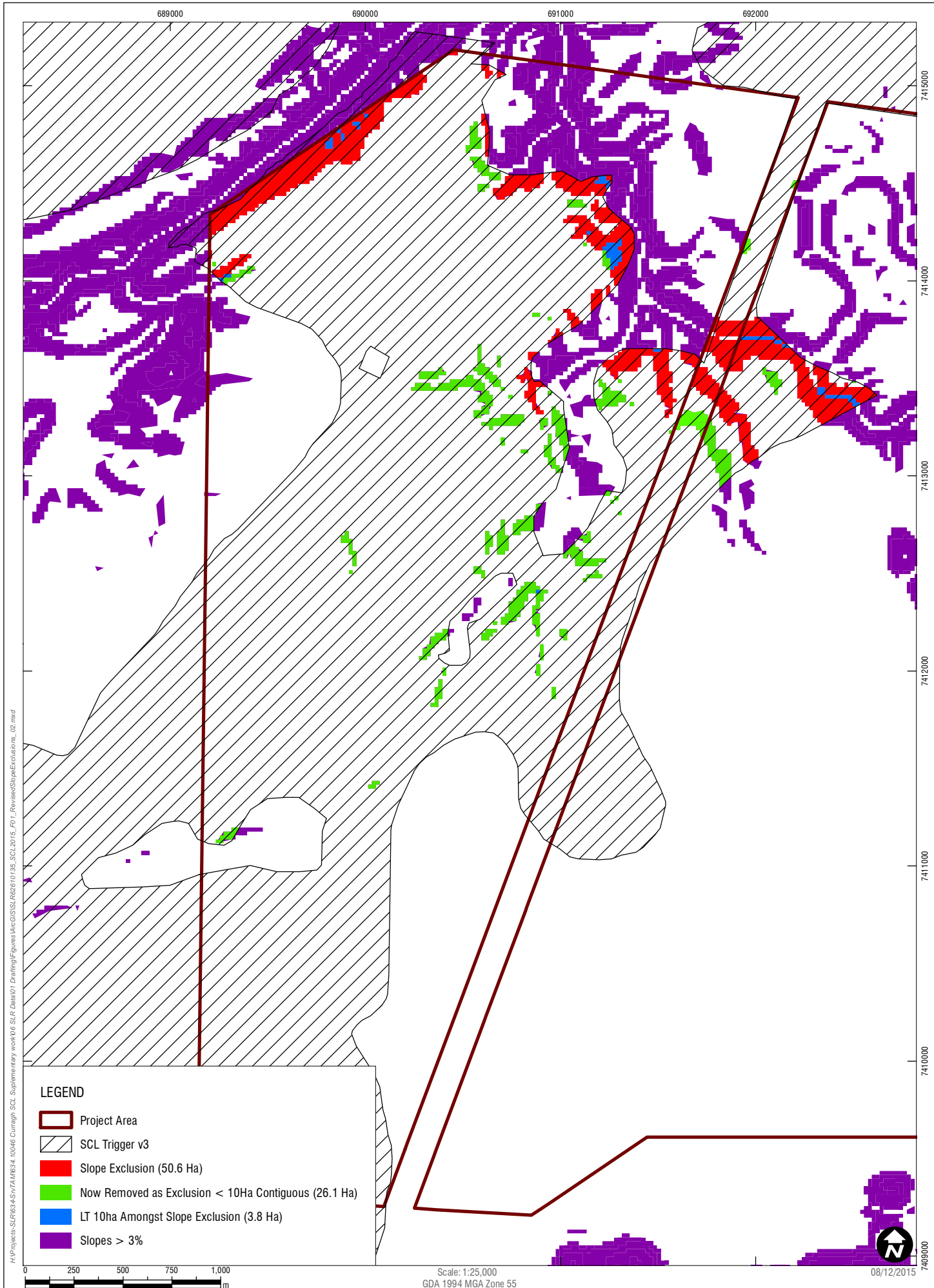
The modified set of contours were then combined and used to generate a raster DEM for the region. The data was resampled to a 20m x 20m grid size using ESRI's Topo to Raster Tool (<http://resources.arcgis.com/EN/HELP/MAIN/10.2/index.html#/009z00000006s000000/>). This resampling was performed in order to optimize the slope analysis as per the guideline.

The DEM was then used to undertake a slope analysis using the default parameters of the 3D Analyst Raster Surface Slope tool (<http://resources.arcgis.com/EN/HELP/MAIN/10.2/index.html#/Slope/00q9000000058000000/>).

Vector regions were generated based on the raster slopes using the Raster to Polygon Tool (http://resources.arcgis.com/EN/HELP/MAIN/10.2/index.html#/Raster_to_Polygon/00120000000080000000/).

The generated polygons were then classified according to slope category and area and then used for area calculations and in the generation of exclusion area polygons. A full MXD containing source, derived, classified and final result data has been prepared. Data can be included to assist in replication of the process.

SLR deleted the slopes less than 10 ha contiguous area from the original SCL Figures and recalculated the remaining study area. The areas deleted are shown in **Figure 1**. An additional 4.6 ha was excluded from the SCL study area within the ML80110 conveyor corridor.



4.2 Mapping of Gilgai in Study Area

SLR originally surveyed the soils within the Study area in October 2014 and mapped the dominant soil type as Self Mulching Brown Vertosol located throughout the majority of the Study Area. Two other sub dominant soil types were observed as Self Mulching Black Vertosol at sites 43 and 56, and Eutrophic Brown Dermosol at sites 51, 50 and 55. The field study team did not note significant gilgai development located within the investigation sites during the fieldwork, however following discussions and satellite imagery shared by DNRM it is obvious that some areas of normal gilgai and linear gilgai exist within the Study Area.

Below is an extract from *RPI Act Guideline 08/14 - How to demonstrate that land in the strategic cropping area does not meet the criteria for strategic cropping land*, outlining some issues associated with gilgai and the impact on achieving SCL with developed gilgai:

Gilgai

Gilgai are a form of microrelief that is a natural feature in certain non-rigid soils in Queensland. These non-rigid soils are commonly called cracking clays, and under the Australian Soil Classification (Isbell, 2002), are classified as Vertosols. Importantly though, not all Vertosol soils will have gilgai present.

Gilgai consist of mounds and depressions, sometimes separated by an almost planar ground surface (NCST 2009). There is often significant variation in soil properties between the mound and depression.

Gilgai can take various forms, with melon-hole, linear and 'normal' forms being the more common types found in Queensland. While the precise mechanism by which gilgai form is still debatable, it almost certainly involves some form of moisture-induced soil heaving.

Gilgai depressions capture and retain surface runoff. In the more severe forms of gilgai the resultant ponding and soil wetness in these depressions frequently impede cultivation, crop growth and harvesting operations, and so reduce the productivity of the affected cropland. The overall effect on productivity is generally in direct proportion to the areal extent and depth of the gilgai depressions. Consequently these are the two factors used as the basis for the criteria thresholds.

Aside from the wetness and physical impediments, since the soil in gilgai mounds tends to have attributes similar to the subsoil, the salinity and sodicity levels are often elevated in mounds. This can further affect crop yields. Attempts to land-plane areas having very severe gilgai can exacerbate these undesirable soil characteristics and further compromise crop yields, rather than increase them. Consequently, the effects of gilgai that are more severe than the threshold levels normally represent a major limitation on successful cropping, and one which is not readily ameliorated.

With cultivation and the resultant steady movement of soil, the milder forms of gilgai generally become less pronounced, and typically represent a minor problem in most seasons. Nonetheless, the underlying soil characteristics that cause gilgai may still remain and they can reform if regular cultivation ceases.

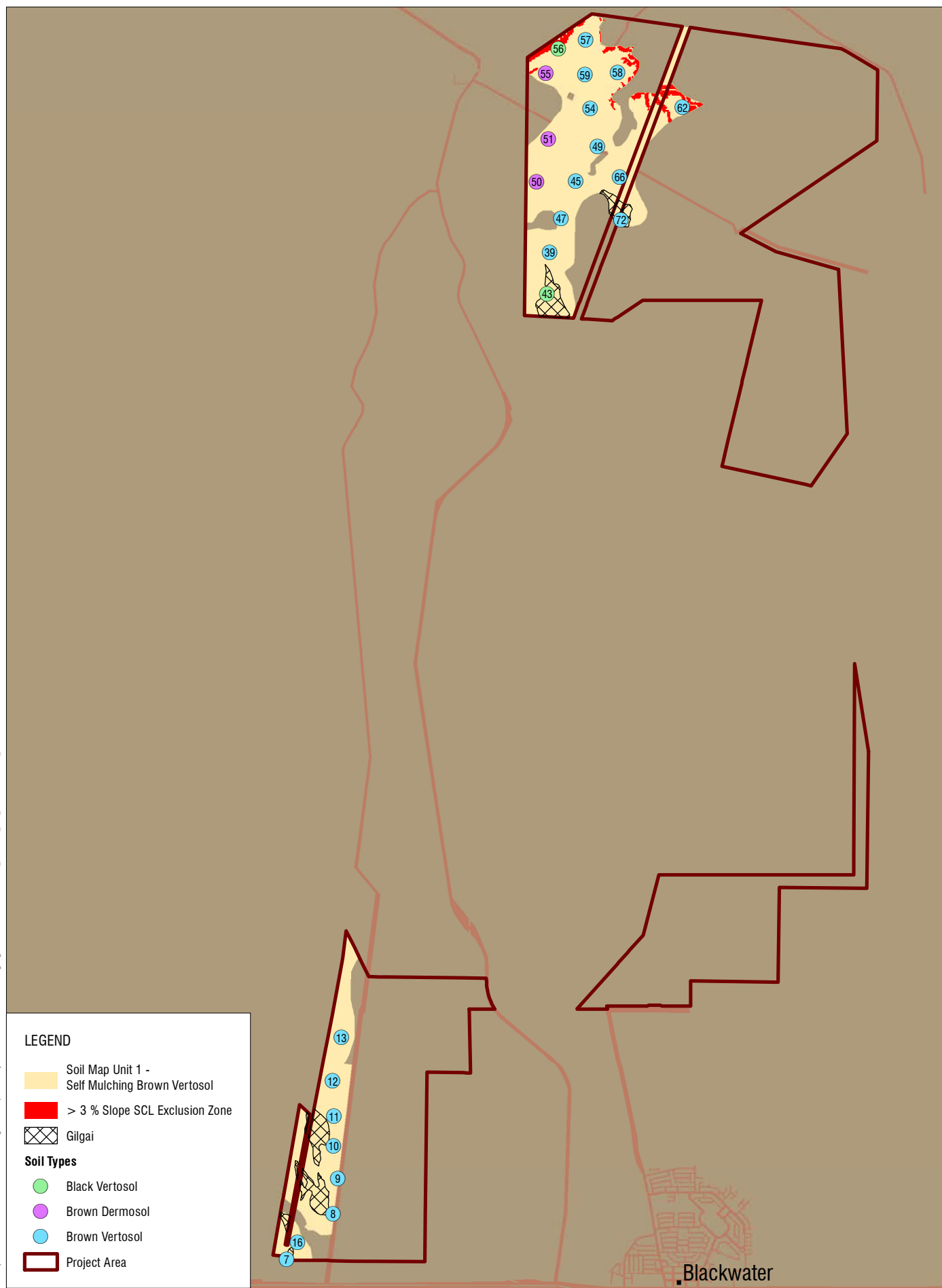
Following the pre lodgement meetings and discussions with DNRM, SLR has reviewed historical Google Earth satellite imagery to map out the existing gilgai within the Study Area. The years 2004, 2006 and 2013 were reviewed to ensure consistency of gilgai locations across years. **Figure 2** shows the extent of gilgai observed using remote sensing techniques from this supplementary study. A total of nine separate areas were mapped totalling 107 ha within the dominant soil map unit area. An additional 5.6ha was mapped within the ML80110 conveyor corridor.

Evident in the 2004 satellite imagery, was the impact of cultivation on the study area. It appears the land owner excluded from cultivation, the areas where gilgai depressions were most developed therefore 'cultivating in' other areas where gilgai was less developed. It is assumed, given the Vertosol soil unit dominates the study area, that gilgai was present to varying degrees prior to impacts of cultivation, which levels out gilgai mounds and depressions, and mixes the top layers together initially creating more of a uniform surface horizon. It is assumed this is the reason why obvious gilgai was not evident at the selected inspection sites during fieldwork.

Given the nature of normal gilgai observed via satellite imagery during this supplementary work, it is not expected that these areas would meet the SCL criteria, for the following reasons:

1. The Soil Map Unit – Self Mulching Brown Vertosol, failed SCL Criteria 8 - Soil Water Storage at 11 out of 14 sites (78.6%) within the study area. The five sub dominant soil sites all failed Criteria 8 as well. This ratio includes the supplementary analysis results shown in **Section 4.3** of this report. Furthermore, 8 out of 13 sites (61.5%) within this soil Map Unit failed Criteria 7 Salinity. Therefore SLR have assumed the areas with more developed gilgai within the Self Mulching Brown Vertosol would remain consistent with these findings.
2. Typically, the upper horizons of the mounds of normal and linear gilgai consist of material dominated by subsoil layers as the mound pushes upwards and develops, then erodes washing the topsoil into the depressions. Therefore the mounds typically have a more subsoil type limitations such as elevated salinity, ESP, carbonates etc within the surface soil, than the depressions. Notwithstanding, the depressions also have limitations, especially during ponding and the associated effects. However, from the satellite imagery it appears the depressions account for approximately less than 20% of the hatched areas shown on **Figure 2**. This leads SLR to the assumption that 80% of these areas are considered either mounds or natural surface plane consistent with the surrounding Self Mulching Brown Vertosol soil map unit, which is demonstrated to be non SCL.

Whilst SLR mapped the soil map units based on dominant soil type according to the Australian Soil Classification to the Great Group level, the mapping could also be assessed based on SCL limitation, which would yield the same results given 15 out of 18 tested sites (83.3%) within the study area failed SCL Criteria 8 Soil Water Storage.



LEGEND

- Soil Map Unit 1 - Self Mulching Brown Vertosol
- > 3 % Slope SCL Exclusion Zone
- Gilgai

Soil Types

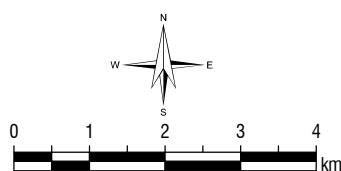
- Black Vertosol
- Brown Dermosol
- Brown Vertosol
- Project Area



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Date: 08/12/2015
Drawn by: NT
Scale: 1:100,000
Sheet Size: A4
Projection: GDA 1994 MGA Zone 55



WSP / Parsons Brinckerhoff

Curragh Extension Project
SCL Assessment

Revised Soil Map Units

FIGURE 2

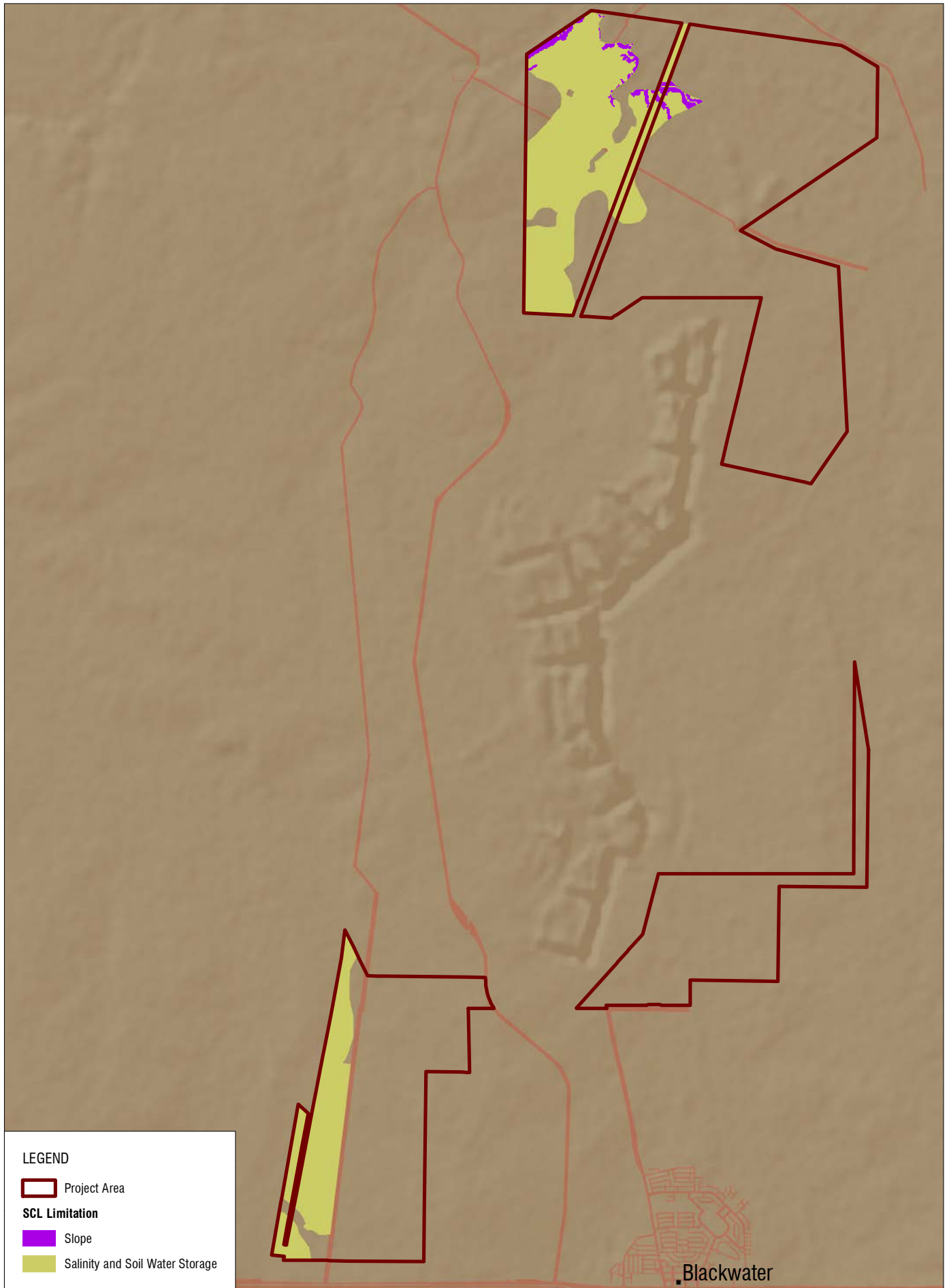
4.3 Laboratory Testing of Existing Samples

As detailed in **Section 3.3** above, soil samples previously collected during the original fieldwork and stored at SLR facilities, were sent to ALS Brisbane for analysis as per **Table 1**. The results of the supplementary analysis are provided in Appendix 1, with the SCL implications highlighted in Table 2 below.

It is evident in **Table 2**, that seven out of eight of the sites which underwent supplementary analysis, failed SCL Criteria 8 Soil Water Storage, which was the dominant SCL limitation across the study area in the original report. SCL criteria 7 Salinity was also a limiting factor in four out of the eight sites tested, again consistent with previous analysis results. **Figure 3** shows the revised mapping of SCL Limitations based on supplementary analysis and revised slope exclusion areas.

Table 2 Supplementary Lab Analysis SCL Results

Soil Type		SCL Criteria								SCL	
Soil Name	Site No.	Slope	Rockiness	Gilgai	Soil Depth	Soil Wetness	pH	Salinity	Soil Water		
Soil Map Unit 1: Self-Mulching Brown Vertosol											
Dominant Soil Type: Self-mulching Brown Vertosol	10	✓	✓	✓	✓	✓	✓	✓	✗	Not SCL	
	12	✓	✓	✓	✓	✓	✓	✓	✓		
	16	✓	✓	✓	✓	✓	✓	✗	✗		
	39	✓	✓	✓	✓	✓	✓	✗	✗		
	49	✓	✓	✓	✓	✓	✓	✗	✗		
	62	✓	✓	✓	✓	✓	✓	✓	✓		
	66	✓	✓	✓	✓	✓	✓	✗	✗		
	7	✓	✓	✓	✓	✓	N/A: Detailed Sites not laboratory analysed. Correlated with analysed sites.	✗	✗		
	8	✓	✓	✓	✓	✓		✓	✗		
	9	✓	✓	✓	✓	✓					
	11	✓	✓	✓	✓	✓					
	13	✓	✓	✓	✓	✓		✗	✗		
	45	✓	✓	✓	✓	✓					
	47	✓	✓	✓	✓	✓		✓	✓		
	48	✓	✓	✓	✓	✓		✗	✗		
	54	✓	✓	✓	✓	✓					
	57	✓	✓	✓	✓	✓		✗	✗		
	59	✓	✓	✓	✓	✓					
	72	✓	✓	✓	✓	✗		✓			
Sub-dominant: Self Mulching Black Vertosol	43	✓	✓	✓	✗	✓	N/A: Detailed Sites not laboratory analysed. Correlated with analysed sites.	✓	✗		
	56	✓	✓	✓	✓	✓					
Sub-dominant: Eutrophic Brown Dermosol	51	✓	✓	✓	✓	✓	✓	✗	✗		
	50	✓	✓	✓	✗	✓	✗	✓	✗		
	55	✓	✓	✓	✗	✓	✓	✓	✗		



LEGEND

Project Area

SCL Limitation

Slope

Salinity and Soil Water Storage

Blackwater



21 RIVER STREET
MACKAY
QUEENSLAND 4740
AUSTRALIA
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Project No.: 626.10135

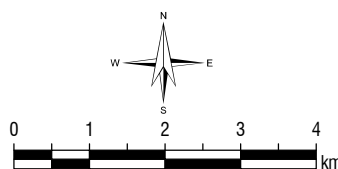
Date: 08/12/2015

Drawn by: NT

Scale: 1:100,000

Sheet Size: A4

Projection: GDA 1994 MGA Zone 55



WSP / Parsons Brinckerhoff

Curragh Extension Project
SCL Assessment

Revised SCL Limitations

FIGURE 3

5 CONCLUSIONS OF SUPPLEMENTARY WORK

This SCL supplementary report for the Curragh Extension Project has been prepared following pre-lodgement feedback and discussions with DNRM. The issues raised in those meetings have been addressed in this report using remote sensing, desktop information and additional laboratory analysis of stored soil samples.

The methodology used to determine the revised SCL slope exclusion area was detailed in **Section 4.1**. The results of the revised slope analysis show a reduction in area excluded due to <10 ha criteria of 24.4 ha as shown in **Figure 1**.

The presence of gilgai within the study area was discussed in detail with DNRM and a review of historical imagery has captured the areas of well developed normal gilgai (75.6 ha) and linear gigai (31.4 ha). An additional 5.6 ha of gilgai was located in the ML80110 conveyor corridor. The locations of the nine separate areas of gilgai are shown as hatching in **Figure 2**. The presence of these areas of gilgai has not altered the SCL mapping due to the consistent soil map unit and the nature of gilgai resulting in such micro-releif being an inhibitor to cropping and cropping production.

The additional laboratory analysis undertaken on the stored soil samples as shown in **Table 2**, showed a consistency of SCL limitations of salinity and soil water storage, and therefore did not impact on the SCL limitations mapping, however further supported the original mapping. The dominant soil map unit: Self Mulching Brown Vertosol, including the sub dominant soil types within the soil map unit: Self Mulching Black Vertosol and Eutrophic Brown Dermosol, all showed consistant results from the additional analysis work, with soil water storage being the consistent SCL limitation.

Appendix 1 – SLR/DNRM Correspondence

DNRM preliminary Pre-lodgement Comments 14th August 2015

Subject: CURRAGH RIDA APPLICATION RO1

DNRM have reviewed the Curragh report and made a comparison against available satellite imagery, data for nearby sites in the SALI database, and available DEM data, and has identified a number of potential inadequacies in the submitted report that may require further explanation or possibly more field data. Central to these are:

- The department requires a broader area than just the areas of disputed mapped SCL, to be mapped in accordance with the guidelines prior to the mapped SCL being determined as SCL or not. This report concentrates only on giving us data inside the SCL area.
- The soil landscape in the proposed decision area would appear more complex than the report suggests (i.e. there may well be mappable units of other soils within the areas of SCL in the project area)
- It would appear that there are gilgai of some form present within close proximity to the mapped SCL areas and this would need to be accounted for in site selection
- It would appear likely the methodology used to identify the area non-compliant with the slope criteria is inconsistent with the guideline requirements
- If as suggested the two main aggregations of individual areas of SCL (i.e. those at the north western and south western ends of the project area) are to be treated as a single soil unit, it will necessary to demonstrate not only that the soil units are indeed homogeneous (refer dot point 2 above), but that the unit is continuous (i.e. the intervening areas will need to be investigated and mapped to demonstrate that continuity, with the appropriate number and type of investigation sites in that extra area)
- While nothing precludes having a subdominant soil in a map unit in a RIDA application addressing RO1, it is however necessary to demonstrate that the nominally subdominant unit does not exist as a mappable unit in its own right, as well as (a) the numbers and densities of investigation sites in the dominant soil type in that unit meeting the RPI Guideline requirements; and (b) investigation sites are consistent in not meeting a common criterion (e.g. while some might fail the salinity criterion and others the pH criterion, all need to fail a single, common criterion, such as soil water storage).

In regard to demonstrating non-compliance with the actual SCL criteria comments are as follows:

Criteria 1

- Insufficient information has been provided in respect to the methodology applied to process the elevation data used and to establish the size and extents of areas claimed to be non-compliant with the slope criterion (i.e. have been unable to replicate the submitted mapping with DEM data the Dept has to hand).

- Evidence has also not been provided to demonstrate those areas mapped as exclusion areas meet the minimum size requirements for mappable units in the Western Cropping Zone (i.e. each unit >10 ha).
- If the applicant contends that the submitted mapping is correct, they will need to provide their data for DNRm to analyse and confirm that is the case.

Criteria 4 – 8

It would appear that certain requirements specified in RPI Act Guideline 08/14 have not always been fully considered in the selection of observation sites, including some or all of the following:

- Ordinarily sites should be located in cleared areas and preferably within active cropping or pasture land (i.e. not on headlands, fence lines, in remnant vegetation or within watercourses or drainage lines) – with any exceptions needing to adequately explained and justified;
- In areas having gilgai (1) the extents and depths of gilgai depressions should be stated: (2) the sampled element of that microrelief (e.g. mound or depression) identified; and (3) where necessary (i.e. gilgai depressions represent a significant component of the area), site and soil descriptions and soil sampling should be undertaken on both the mounds and the depressions – so providing a complementary pair of datasets for each detailed or analysed site;
- Sites should not be selected in areas disturbed by existing physical infrastructure (contour and diversion banks, road verges, table/spoon drains, grassed waterways, terraces, fences, stockyards, gateways, pipelines, rights-of-ways, etc.);
- Sites should not be selected in areas affected by land degradation (e.g. soil erosion, salt scalds, seepages, etc.); and
- The sites in a nominally non-complaint soil map unit have to demonstrate consistent noncompliance with at least one of the criteria (i.e. if non-compliant with different criteria this would normally be indicative of different soil map units).

For further discussion, explanation and resolution of the above technical issues, the Dept would prefer the applicant consult directly with Senior Land Resource Officer Mr Peter Binns at the following email address Peter.Binns@dnrm.qld.gov.au

28 August 2015

626.10135_Response to Comments_D1.docx

Attention: Peter Binns

Dear Peter Binns

Strategic Cropping Land Assessment Curragh Extension Project Response to Comments

1 Introduction

SLR provided a *Strategic Cropping Land (SCL) Assessment* (SLR, 2015), to accompany the Curragh Extension Project (the Project). Please find below SLRs initial response and proposed actions to comments regarding the SCL Assessment by the Queensland Department of Natural Resource Management (DNRM), dated 14 August 2015. SLR would request to meet with representatives from DNRM to discuss the comments and feedback and to ensure agreement on methodology and reporting outcomes is reached.

2 Response to Comments

- **Comment 1:** The department requires a broader area than just the areas of disputed mapped SCL, to be mapped in accordance with the guidelines prior to the mapped SCL being determined as SCL or not. This report concentrates only on giving us data inside the SCL area.

Response 1: As stated in the RPI Act Guideline 08/14:

“The Regional Planning Interests Regulation 2014 (RPI Regulation) provide criteria for the assessment or decision to be addressed by applicants in their application for a RIDA for an activity on the land in the SCA”

Furthermore, Strategic Cropping Area (SCA) is defined in the Regional Planning Interest Act 2014, Part 1, Division 3, Subdivision 2, 10 Strategic cropping area (1) *The strategic cropping area consists of the areas shown on the SCL trigger map as strategic cropping land.* (page 10). Therefore, as per the RPI Act Guideline 08/14 the scope of this SCL Assessment is limited to the mapped SCL (SCA).

Action 1: None recommended

- **Comment 2:** The soil landscape in the proposed decision area would appear more complex than the report suggests (i.e. there may well be mappable units of other soils within the areas of SCL in the project area)

Response 2: The land system mapping for the Project area (No. 19 Lands of the Isaac-Comet Area, Queensland; CSIRO, 1967) is based on soil survey conducted at a broad scale.

The three land systems mapped with the SCL Study Area are Comet, Girrah and Blackwater. **Table 1** below summarises the soil types found within these broad land systems. From the information provided, it

is expected that the majority of sites within SCL Study Area were identified as Vertosols as per the *Strategic Cropping Land (SCL) Assessment* (SLR, 2015).

Table 1 Land Systems within SCL Study Area

Land System	Soil Family	Soil Features
Comet	Vermont	Dark brown to very dark grey medium to heavy cracking clays (Vertosols)
Girrah	Tevoit	Dark brown to very dark grey cracking clays (Vertosols)
	Bruce	Reddish-brown to very dark grey cracking clays (Vertosols)
Blackwater	Rolleston	Dark brown to grey-brown cracking clays (Vertosols)
	Taurus	Dark brown to grey-brown sandy loam overlying brown light to medium clay subsoils (Chromosols)

Action 2: None recommended

- **Comment 3:** It would appear that there are gilgai of some form present within close proximity to the mapped SCL areas and this would need to be accounted for in site selection

Response 3:

As stated above in Response 1, the scope of this SCL Assessment is limited to the trigger mapped SCL.

Additionally, no significant microrelief was observed during the fieldwork.

Action 3: None recommended

- **Comment 4:** It would appear likely the methodology used to identify the area non-compliant with the slope criteria is inconsistent with the guideline requirements

Response 4: SLR maintains that the methodology used to identify areas of land that are non-compliant based on slope is consistent with the RPI Act Guideline 08/14, except that areas that were greater than 3% slope but less than 10 ha were also excluded.

Action 4: An updated detailed methodology will be provided by SLR and included in the report to clearly demonstrate that the methodology is consistent with the RPI Act Guideline 08/14.

- **Comment 5:** If as suggested the two main aggregations of individual areas of SCL (i.e. those at the north western and south western ends of the project area) are to be treated as a single soil unit, it will necessary to demonstrate not only that the soil units are indeed homogeneous (refer dot point 2 above), but that the unit is continuous (i.e. the intervening areas will need to be investigated and mapped to demonstrate that continuity, with the appropriate number and type of investigation sites in that extra area)

Response 5: There is approximately 15 kilometres between the two individual areas of SCL. However the field observations and laboratory analysis shows these two areas are classified as the same dominant soil type (Vertosol) with similar soil properties and constraints (salinity and soil water storage). Ample soil investigation sites were assessed to ensure adequate representative sites were used to classify these areas separately.

Action 5: As there is no provision for mapping of two separate SCL areas within the RPI Act Guideline 08/14, SLR maintains that if the two areas contain the same soil type than they can be mapped as a single Soil Map Unit. Otherwise there may be multiple soil map units with duplicate soils.

However, if preferred SLR will update the SCL Assessment and report the two areas as separate Soil Map Units with the same dominant soil type.

- **Comment 6:** While nothing precludes having a subdominant soil in a map unit in a RIDA application addressing RO1, it is however necessary to demonstrate that the nominally subdominant unit does not exist as a mappable unit in its own right, as well as (a) the numbers and densities of investigation sites in the dominant soil type in that unit meeting the RPI Guideline requirements; and (b) investigation sites are consistent in not meeting a common criterion (e.g. while some might fail the salinity criterion and others the pH criterion, all need to fail a single, common criterion, such as soil water storage).

Response 6: The survey scale for this assessment met the minimum requirements for survey density (1 site per 50 ha). Whilst SLR acknowledges that only the minimum survey scale was conducted, we also believe the comment to demonstrate that all subdominant soil types must be mapped separately or shown to be smaller than a mappable unit as somewhat contradictory.

The RPI Act Guideline 08/14 states that:

"The size of the map unit polygons and the reliability with which they can be delineated depends on the scale or intensity of the survey."

Therefore whilst the guidelines state that the ability to map soil units accurately is dependent on survey scale, there is a significant difference in the minimum survey density set out by the Guideline (1 site per 50 ha) and the request to be able to determine if a soil type is less than 10 ha.

SLR agrees that the Dermosols identified in the SCL Study Area would constitute a mappable Soil Unit (i.e. greater than 10 ha); however, three analysed sites were not completed during the field survey as they were considered borderline between Dermosols and Vertosols at the time. SLR considers it be quite impractical to be required to map out every sub dominant soil type identified as a separate new soil unit, as often the exact soil type is not confirmed until after laboratory analysis.

Action 6: SLR would like discuss this comment so that a suitable outcome to the satisfaction of the DNRM and the proponent can be achieved.

- **Comment 7:** Insufficient information has been provided in respect to the methodology applied to process the elevation data used and to establish the size and extents of areas claimed to be non-compliant with the slope criterion (i.e. have been unable to replicate the submitted mapping with DEM data the Dept has to hand).

Response & Action 7: See 'Response 4', additionally any DEM data used to determine the slope analysis will be provided by SLR for review.

- **Comment 8:** Evidence has also not been provided to demonstrate those areas mapped as exclusion areas meet the minimum size requirements for mappable units in the Western Cropping Zone (i.e. each unit >10 ha).

Response 8: Originally, areas that were greater than 3% slope but less than 10 ha were excluded. SLR has revised its Exclusion Area so that only land areas greater than 10 ha have been excluded. It should be noted however that SLR has still excluded areas that are less than 10 ha within the SCL Study Area boundary but are a part of large contiguous exclusion area outside the SCL Study Area

SLR can provide a GIS file (shapefile) to provide evidence that the areas mapped as exclusion areas meet the minimum size requirements for mappable units, including areas outside the SCL Study Area.

Action 8: SLR to update its report regarding the SCL Exclusion Area and provide GIS files of exclusion areas for review by DNRM.

- **Comment 9:** If the applicant contends that the submitted mapping is correct, they will need to provide their data for DNRM to analyse and confirm that is the case.

Response & Action 9: See 'Response 8'

- **Comments 10-14:** It would appear that certain requirements specified in RPI Act Guideline 08/14 have not always been fully considered in the selection of observation sites, including some or all of the following:
- **Comment 10:** Ordinarily sites should be located in cleared areas and preferably within active cropping or pasture land (i.e. not on headlands, fence lines, in remnant vegetation or within watercourses or drainage lines) – with any exceptions needing to adequately explained and justified;

Response 10: Only two sites (out of 24) were not located in cleared areas, these were taken adjacent drainage lines to capture the representative soil of the alluvials. These sites were also selected based on a possible change in soil type.

The RPI Act Guideline 08/14 does not specifically state sites cannot be located within or adjacent open drainage lines.

Action 10: None recommended

- **Comment 11:** In areas having gilgai (1) the extents and depths of gilgai depressions should be stated; (2) the sampled element of that microrelief (e.g. mound or depression) identified; and (3) where necessary (i.e. gilgai depressions represent a significant component of the area), site and soil descriptions and soil sampling should be undertaken on both the mounds and the depressions – so providing a complementary pair of datasets for each detailed or analysed site;

Response 11: Not applicable as no areas of significant gilgai (greater than 0.1m) were observed, as shown in each site description appended to the *Strategic Cropping Land (SCL) Assessment* (SLR, 2015).

It should also be noted that only a 20 m radius surrounding each soil profile was considered for micro-relief during the field survey as per the landform element definition in the *Australian Soil and Land Survey Field Handbook* (2009).

Action 11: None recommended

- **Comment 12:** Sites should not be selected in areas disturbed by existing physical infrastructure (contour and diversion banks, road verges, table/spoon drains, grassed waterways, terraces, fences, stockyards, gateways, pipelines, rights-of-ways, etc.);

Response 12: No sites were present in the areas listed above.

Action 12: None recommended

- **Comment 13:** Sites should not be selected in areas affected by land degradation (e.g. soil erosion, salt scalds, seepages, etc.);

Response 13: No sites were present in the areas listed above.

Action 13: None recommended

- **Comment 14:** The sites in a nominally non-complaint soil map unit have to demonstrate consistent noncompliance with at least one of the criteria (i.e. if non-compliant with different criteria this would normally be indicative of different soil map units).

Response 14: All non-compliant sites of the dominant soil type, within Soil Map Unit 1, demonstrate non-compliance with Criteria 8: Soil Water Storage due to an ERD limitation represented by chloride content >800 mg/kg. All but one of these sites (Site 10) also demonstrated non-compliance with Criteria 7: Salinity, however, Site 10 also displayed the same increasing trend in chloride concentration. This clearly demonstrates that all sites within the dominant soil type within Soil Map Unit 1 are the same soil type and have the same limiting factors.

Action 14: None recommended

Yours sincerely,

A handwritten signature in cursive script, appearing to read 'C. Richards'.

Clayton Richards

From: Regional Planning Interests Act [<mailto:RPIAct@dilgp.qld.gov.au>]
Sent: Thursday, 10 September 2015 11:51 AM
To: O'Kane, Amanda
Cc: James Ross; RPIA@dnrm.qld.gov.au
Subject: DNRM RESPONSE TO PRELODGEEMENT COMMENTS - CURRAGH RO1 RIDA APPLICATION

Hi Amanda

In preparation for our meeting on Friday 11 September 2015, please find below a preliminary review from DNRM on the comments provided by SLR in respect to the proposed Curragh RIDA application.

Regards,

Mitzi Venn

Manager: RPI Development Assessment

Department of Infrastructure, Local Government and Planning
Level 6, 63 George St Brisbane QLD 4000
p. 07 3452 7609 | e. mitzi.venn@dilgp.qld.gov.au

Customers first | **Ideas into action** | **Unleash potential** | **Be courageous** | **Empower people**

From: BINNS Peter [<mailto:Peter.Binns@dnrm.qld.gov.au>]
Sent: Wednesday, 9 September 2015 2:07 PM
To: Mitzi Venn
Cc: SANDER Errol; BOURNE George
Subject: RESPONSE TO PRELODGEEMENT COMMENTS - CURRAGH RO1 RIDA APPLIATION

Hi Mitzi,

I have reviewed the comments provided by SLR, through Westfarmers, in respect to the proposed Curragh RIDA application.

While the SLR response is noted 'attention Peter Binns', I only provided part of the input to the original DNRM review and will limit feedback largely to those particular matters. My comments are as follows:

1. Gilgai

- The initial departmental comment regarding the possible presence of gilgai was not without some basis.
- The extent or degree of gilgai development sufficient to result in marked variability in the physical and chemical attributes of soils over short spatial spans can be relatively minor, and bears no direct relationship to the extent of development that would disqualify the land on the basis of non-compliance with Criteria 3 (gilgai).
- Figures 1 to 4 (below) show historic – and publicly accessible – satellite imagery covering the southern part of Lot 1 RP613729. The area within that part of the lot

subject to this RIDA application is outlined in green. The applicant's investigation sites are also shown by green markers, numbered according to the IDs provided in the submitted report.



Figure 1: 12 September 2004



Figure 2: 13 November 2004



Figure 3: 6 October 2006



Figure 4: 20 July 2010

- While remotely captured imagery cannot be considered conclusive evidence, the areas to the west of investigation sites 8, 9 and 10, and within the area of SCL under application, show what looks very suspiciously like some form of gilgai development.
- These same patterns are also evident in departmental aerial photography covering the period back to 1973. In the next oldest scanned aerial photographs readily accessible (i.e. B&W imagery from 1960), the area shown in Figures 1 to 4 had not been cleared, but what appears to be gilgai were evident in adjoining cleared land.
- Not dissimilar, but generally less pronounced patterns are evident in some areas in the northern part of the area in the proposed RIDA application (i.e. parts of Lot 2 SP223677 and Lot 35 SP247242)
- Figure 5 provides a copy of recent (c. 2013) satellite imagery held by the department – and possibly not in the public domain. This imagery covers the area between and to the west of investigation sites 10 and 11 on Lot 1 RP613729, and again within the area under application. That imagery shows what would appear to be ponded water in what would appear to be gilgai.



Figure 5: Departmental SPOT satellite imagery (2013 imagery)

- Figure 6 (below) illustrates the difference in soil attributes with profile depth typically observed in adjacent gilgai mounds and depressions. While these plots are for a site near Emerald, similar results can be found in Vertosol soils throughout the area, and throughout the Brigalow Belt in general. Accordingly, the applicant needs to supply additional information to establish that the inconsistent compliance of investigation sites in what has been identified as the 'Self-mulching Brown Vertosol' soil unit – or any other soil unit – is neither (1) the result of sampling disparate elements of gilgai microrelief, nor (2) indicative of there being other mappable soil units (i.e. polygons >10 ha) present within the existing map unit – see Points 2 and 3 (below).

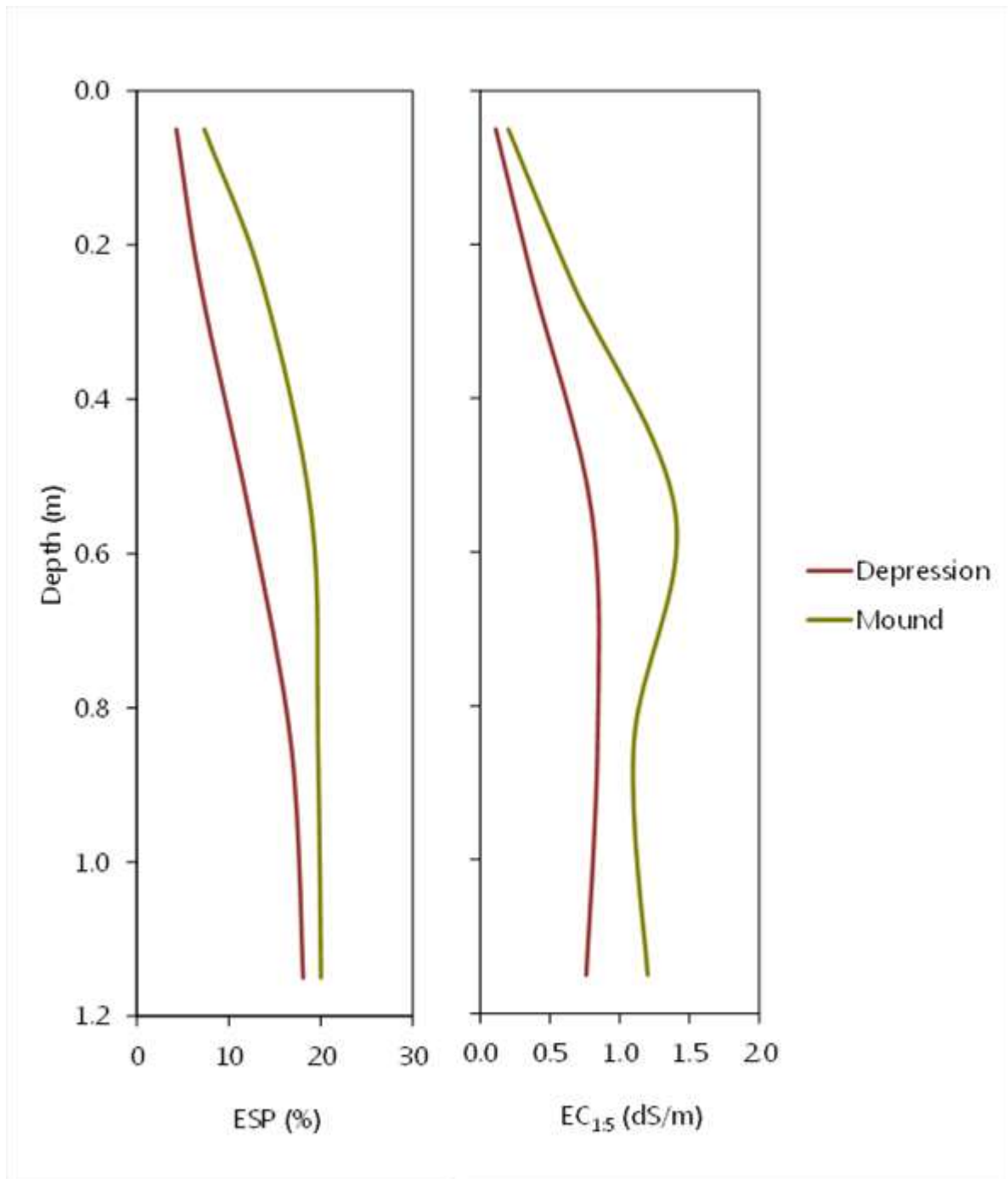


Figure 6: Changes in ESP and EC_{1.5} with profile depth in adjacent gilgai mound and depression in a Vertosol soil in the Emerald area

- While it would ultimately depend on the outcome of matters raised above, as well as the proportional areas of gilgai mounds and depressions on any affected land, the suggestion on page 20 of the RPI Act Guideline 08/14 may be worth considering:

'In any areas having gilgai or other microrelief, including areas where the depth of the gilgai is less than the zonal criteria threshold of 500 mm, site and soil descriptions and soil sampling should be undertaken on both the mounds and

the depressions, so providing a complementary pair of datasets for each detailed or analysed site.'

2. Soil landscape complexity

- Figures 1, 2 and 3 (above) show what would appear to be markedly different surficial colours within the areas on Lot 1 RP613729 in the proposed application– certainly different enough to warrant some further investigation.
- It is noted that some of the more marked colour differences are associated with areas away from the investigation sites used in this application (refer above figures). If these colour differences correlate with significant differences in soil characteristics or attributes, it is then quite possible that there are areas within the area under application that (1) are greater than 10 ha; and (2) have significantly different soil attributes; and are therefore able to be represented as discrete mappable soil units under the RPI Act Guideline 08/14.
- The applicant needs to provide further data and information to either (1) demonstrate the above is not the case (i.e. that there are no other mappable soil units present); or (2) identify any other mappable soil units and evaluate their compliance with the SCL criteria.

3. Soil unit identification

- Soil units need to be characterised primarily on the basis of the commonality of soil attributes relevant to the SCL Zonal Criteria. Their similarities with named or archetypal soils or their Australian Soil Classification are unlikely to be of any direct relevance in determining compliance with the criteria.
- It should also be noted that the sites used to type or name soils are often in areas subject to minimal or no prior disturbance. Consequently the relevance of named or archetypal soils to soils on developed or disturbed land can often be of only limited significance – particularly when it comes to the SCL Zonal Criteria (e.g. a characteristic subsoil chloride 'bulge' might have been leached from the upper metre of the soil profile under long-term cropping or following pasture development.)
- The CSIRO Isaac-Comet mapping referred to in the response is broadscale 8 miles to the inch (1:500 000) land systems mapping. While those land systems might have 'soil families' associated with them, the concepts applicable to the individual soil families are too broad to be the primary basis for delineating map units when assessing compliance with the SCL Zonal Criteria. For example, the concept of the Teviot soil family, of dark brown to very dark grey cracking clays found in the Girrah land system, is so broad that the range of soils fitting that concept are quite likely to include some soils that might meet and some that might fail to meet the SCL Zonal Criteria.

- A similar situation to the above applies to mapping based on classification to a single ASC order (e.g. Vertosol).

4. Slope based exclusion areas

- Exclusion area map units need to be single map units of at least 10 ha in size (i.e. not an aggregation of smaller discrete areas having a total area >10 ha).
- The DEM data currently available to the Department does not identify any discrete areas of a mappable size within the area under application where the slope exceeds the 3% threshold – although there are very likely adjoining areas and a small number of isolated areas of less than 10 ha within the subject land that have slopes exceeding 3%. To satisfactorily demonstrate otherwise, the applicant might consider supplying the department with the 'raw' DEM data used in the slope analysis. Photographs of the affected areas would also be very useful/necessary.

5. Soil map units and soil types

- The map unit size and investigation site density requirements set out in Table 3 of RPI Guidelines 08/147 apply to map units and not soil types.
- The two areas under application are several kilometres apart. Unless the applicant wants to map the intervening areas to demonstrate they are part of a single, continuous soil map unit – using the soil characterisation and map unit requirements discussed above – similar soils in the two areas must logically represent separate soil map units (even if they are supposedly of the same soil type). The investigation site density and other spatial requirements will then apply separately to those areas.

6. Soil profile description and data

- The applicant needs to submit all the information, data and imagery for all the investigation sites, as set out in the RPI Act Guideline 08/14, and not just those for sites characterising the applicant-identified soil units (e.g. not just for sites 10, 56 and 51 in the submitted report).

7. Investigation site selection

- Concerns previously expressed about the selection and distribution of investigation sites are reiterated – particularly in view of matters raised in points 1 to 5 above.

Regards,
Peter Binns

Peter Binns

Senior Land Resource Officer
Department of Natural Resources and Mines
PO Box 318 TOOWOOMBA QLD 4350
Phone: 07 4529 1214
Email: Peter.Binns@dnrm.qld.gov.au

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Appendix 2 – Supplementary Laboratory Results

CERTIFICATE OF ANALYSIS

Work Order : **EB1534446**
Client : **SLR Consulting Australia Pty Ltd**
Contact : **MR CLAYTON RICHARDS**
Address : **10 KINGS ROAD**
NEW LAMBTON NSW, AUSTRALIA 2305
E-mail : **crichards@slrconsulting.com**
Telephone : **+61 02 4920 3000**
Facsimile : **+61 02 4961 3360**
Project : **634.10046 Curragh SCL**
Order number : **634.10046**
C-O-C number : **----**
Sampler : **MURRAY FRASER**
Site : **----**
Quote number : **----**

Page : 1 of 10
Laboratory : Environmental Division Brisbane
Contact :
Address : 2 Byth Street Stafford QLD Australia 4053
E-mail :
Telephone : +61-7-3243 7222
Facsimile : +61-7-3243 7218
QC Level : NEPM 2013 B3 & ALS QC Standard
Date Samples Received : 12-Nov-2015 09:30
Date Analysis Commenced : 18-Nov-2015
Issue Date : 27-Nov-2015 09:31
No. of samples received : 37
No. of samples analysed : 37

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Andrew Epps	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils
Andrew Epps	Senior Inorganic Chemist	Brisbane Inorganics
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	Site 50, sample 0-7	Site 50, sample 7-22	Site 50, sample 40-50	Site 50, sample 75-85	Site 55, sample 0-10
Client sampling date / time					[16-Nov-2015]	[16-Nov-2015]	[16-Nov-2015]	[16-Nov-2015]	[16-Nov-2015]
Compound	CAS Number	LOR	Unit		EB1534446-001	EB1534446-002	EB1534446-003	EB1534446-004	EB1534446-005
					Result	Result	Result	Result	Result
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		6.8	8.3	9.3	9.5	7.8
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		61	151	405	673	52
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1	%		2.9	5.5	6.0	5.4	3.8
ED006: Exchangeable Cations on Alkaline Soils									
Exchangeable Calcium	----	0.2	meq/100g		----	6.4	4.4	2.1	9.9
Exchangeable Magnesium	----	0.2	meq/100g		----	3.5	4.1	3.2	2.6
Exchangeable Potassium	----	0.2	meq/100g		----	<0.2	<0.2	<0.2	0.4
Exchangeable Sodium	----	0.2	meq/100g		----	<0.2	1.1	2.3	<0.2
Cation Exchange Capacity	----	0.2	meq/100g		----	10.0	9.6	7.7	12.8
ED007: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		11.8	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g		5.2	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g		0.9	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g		0.2	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g		18.1	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		<10	20	270	730	<10



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	Site 55, sample 20-30	Site 55, sample 50-60	Site 55, sample 80-90	Site 7, sample 0-10	Site 7, sample 15-25
Client sampling date / time					[16-Nov-2015]	[16-Nov-2015]	[16-Nov-2015]	[16-Nov-2015]	[16-Nov-2015]
Compound	CAS Number	LOR	Unit		EB1534446-006	EB1534446-007	EB1534446-008	EB1534446-009	EB1534446-010
					Result	Result	Result	Result	Result
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		8.6	8.7	8.9	----	----
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		76	66	59	110	1420
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1	%		6.4	5.3	3.7	5.7	12.8
ED006: Exchangeable Cations on Alkaline Soils									
Exchangeable Calcium	----	0.2	meq/100g		7.3	6.0	6.8	----	----
Exchangeable Magnesium	----	0.2	meq/100g		1.8	2.2	3.1	----	----
Exchangeable Potassium	----	0.2	meq/100g		<0.2	<0.2	<0.2	----	----
Exchangeable Sodium	----	0.2	meq/100g		<0.2	<0.2	<0.2	----	----
Cation Exchange Capacity	----	0.2	meq/100g		9.1	8.2	9.8	----	----
ED007: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		----	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g		----	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g		----	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g		----	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g		----	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		<10	<10	<10	20	240



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	Site 7, sample 30-40	Site 7, sample 50-60	Site 7, sample 80-90	Site 8, sample 0-5	Site 8, sample 15-25
Client sampling date / time					[16-Nov-2015]	[16-Nov-2015]	[16-Nov-2015]	[16-Nov-2015]	[16-Nov-2015]
Compound	CAS Number	LOR	Unit		EB1534446-011	EB1534446-012	EB1534446-013	EB1534446-014	EB1534446-015
				Result	Result	Result	Result	Result	Result
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit	----	----	----	----	----	----
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm	2020	2020	2150	38	272	
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1	%	13.7	13.0	13.1	2.7	8.5	
ED006: Exchangeable Cations on Alkaline Soils									
Exchangeable Calcium	----	0.2	meq/100g	----	----	----	----	----	----
Exchangeable Magnesium	----	0.2	meq/100g	----	----	----	----	----	----
Exchangeable Potassium	----	0.2	meq/100g	----	----	----	----	----	----
Exchangeable Sodium	----	0.2	meq/100g	----	----	----	----	----	----
Cation Exchange Capacity	----	0.2	meq/100g	----	----	----	----	----	----
ED007: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g	----	----	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	----	----	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	----	----	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	----	----	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	----	----	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg	610	1360	2030	<10	120	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	Site 8, sample 50-60	Site 8, sample 80-90	Site 13, sample 0-10	Site 13, sample 25-35	Site 13, sample 55-65
Client sampling date / time					[16-Nov-2015]	[16-Nov-2015]	[16-Nov-2015]	[16-Nov-2015]	[16-Nov-2015]
Compound	CAS Number	LOR	Unit		EB1534446-016	EB1534446-017	EB1534446-018	EB1534446-019	EB1534446-020
				Result	Result	Result	Result	Result	Result
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit	----	----	----	----	----	----
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		565	765	30	180	709
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1	%		10.2	9.7	4.3	8.2	8.9
ED006: Exchangeable Cations on Alkaline Soils									
Exchangeable Calcium	----	0.2	meq/100g	----	----	----	----	----	----
Exchangeable Magnesium	----	0.2	meq/100g	----	----	----	----	----	----
Exchangeable Potassium	----	0.2	meq/100g	----	----	----	----	----	----
Exchangeable Sodium	----	0.2	meq/100g	----	----	----	----	----	----
Cation Exchange Capacity	----	0.2	meq/100g	----	----	----	----	----	----
ED007: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g	----	----	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	----	----	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	----	----	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	----	----	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	----	----	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		630	1180	<10	140	970



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				Site 13, sample 90-100	Site 43, sample 0-10	Site 43, sample 20-30	Site 43, sample 50-60	Site 43, sample 80-90
Client sampling date / time				[16-Nov-2015]	[16-Nov-2015]	[16-Nov-2015]	[16-Nov-2015]	[16-Nov-2015]
Compound	CAS Number	LOR	Unit	EB1534446-021	EB1534446-022	EB1534446-023	EB1534446-024	EB1534446-025
				Result	Result	Result	Result	Result
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	----	----	----	----	----
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	958	30	48	163	184
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	9.0	6.6	11.8	13.1	5.2
ED006: Exchangeable Cations on Alkaline Soils								
Exchangeable Calcium	----	0.2	meq/100g	----	----	----	----	----
Exchangeable Magnesium	----	0.2	meq/100g	----	----	----	----	----
Exchangeable Potassium	----	0.2	meq/100g	----	----	----	----	----
Exchangeable Sodium	----	0.2	meq/100g	----	----	----	----	----
Cation Exchange Capacity	----	0.2	meq/100g	----	----	----	----	----
ED007: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	----	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	----	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	----	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	----	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	----	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	1380	<10	<10	40	120



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	Site 47, sample 0-10	Site 47, sample 25-35	Site 47, sample 60-70	Site 47, sample 85-95	Site 48, sample 0-5
Client sampling date / time					[16-Nov-2015]	[16-Nov-2015]	[16-Nov-2015]	[16-Nov-2015]	[16-Nov-2015]
Compound	CAS Number	LOR	Unit		EB1534446-026	EB1534446-027	EB1534446-028	EB1534446-029	EB1534446-030
					Result	Result	Result	Result	Result
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		----	----	----	----	----
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		98	288	557	821	38
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1	%		7.8	13.4	14.5	15.3	3.3
ED006: Exchangeable Cations on Alkaline Soils									
Exchangeable Calcium	----	0.2	meq/100g		----	----	----	----	----
Exchangeable Magnesium	----	0.2	meq/100g		----	----	----	----	----
Exchangeable Potassium	----	0.2	meq/100g		----	----	----	----	----
Exchangeable Sodium	----	0.2	meq/100g		----	----	----	----	----
Cation Exchange Capacity	----	0.2	meq/100g		----	----	----	----	----
ED007: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		----	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g		----	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g		----	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g		----	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g		----	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		<10	70	490	1080	<10



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	Site 48, sample 15-25	Site 48, sample 40-50	Site 48, sample 75-85	Site 57, sample 0-5	Site 57, sample 15-25
Client sampling date / time					[16-Nov-2015]	[16-Nov-2015]	[16-Nov-2015]	[16-Nov-2015]	[16-Nov-2015]
Compound	CAS Number	LOR	Unit		EB1534446-031	EB1534446-032	EB1534446-033	EB1534446-034	EB1534446-035
					Result	Result	Result	Result	Result
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		----	----	----	----	----
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		311	923	1130	74	136
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1	%		9.9	11.3	11.1	5.2	10.9
ED006: Exchangeable Cations on Alkaline Soils									
Exchangeable Calcium	----	0.2	meq/100g		----	----	----	----	----
Exchangeable Magnesium	----	0.2	meq/100g		----	----	----	----	----
Exchangeable Potassium	----	0.2	meq/100g		----	----	----	----	----
Exchangeable Sodium	----	0.2	meq/100g		----	----	----	----	----
Cation Exchange Capacity	----	0.2	meq/100g		----	----	----	----	----
ED007: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		----	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g		----	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g		----	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g		----	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g		----	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		290	1760	2280	<10	30



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	Site 57, sample 45-55	Site 57, sample 80-90	----	----	----
Client sampling date / time					[16-Nov-2015]	[16-Nov-2015]	----	----	----
Compound	CAS Number	LOR	Unit		EB1534446-036	EB1534446-037	-----	-----	-----
					Result	Result	Result	Result	Result
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		----	----	----	----	----
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		274	728	----	----	----
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1	%		12.0	10.7	----	----	----
ED006: Exchangeable Cations on Alkaline Soils									
Exchangeable Calcium	----	0.2	meq/100g		----	----	----	----	----
Exchangeable Magnesium	----	0.2	meq/100g		----	----	----	----	----
Exchangeable Potassium	----	0.2	meq/100g		----	----	----	----	----
Exchangeable Sodium	----	0.2	meq/100g		----	----	----	----	----
Cation Exchange Capacity	----	0.2	meq/100g		----	----	----	----	----
ED007: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		----	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g		----	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g		----	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g		----	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g		----	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		200	1100	----	----	----

Attachment B

Lot on Plan maps and description of areas within SCA area

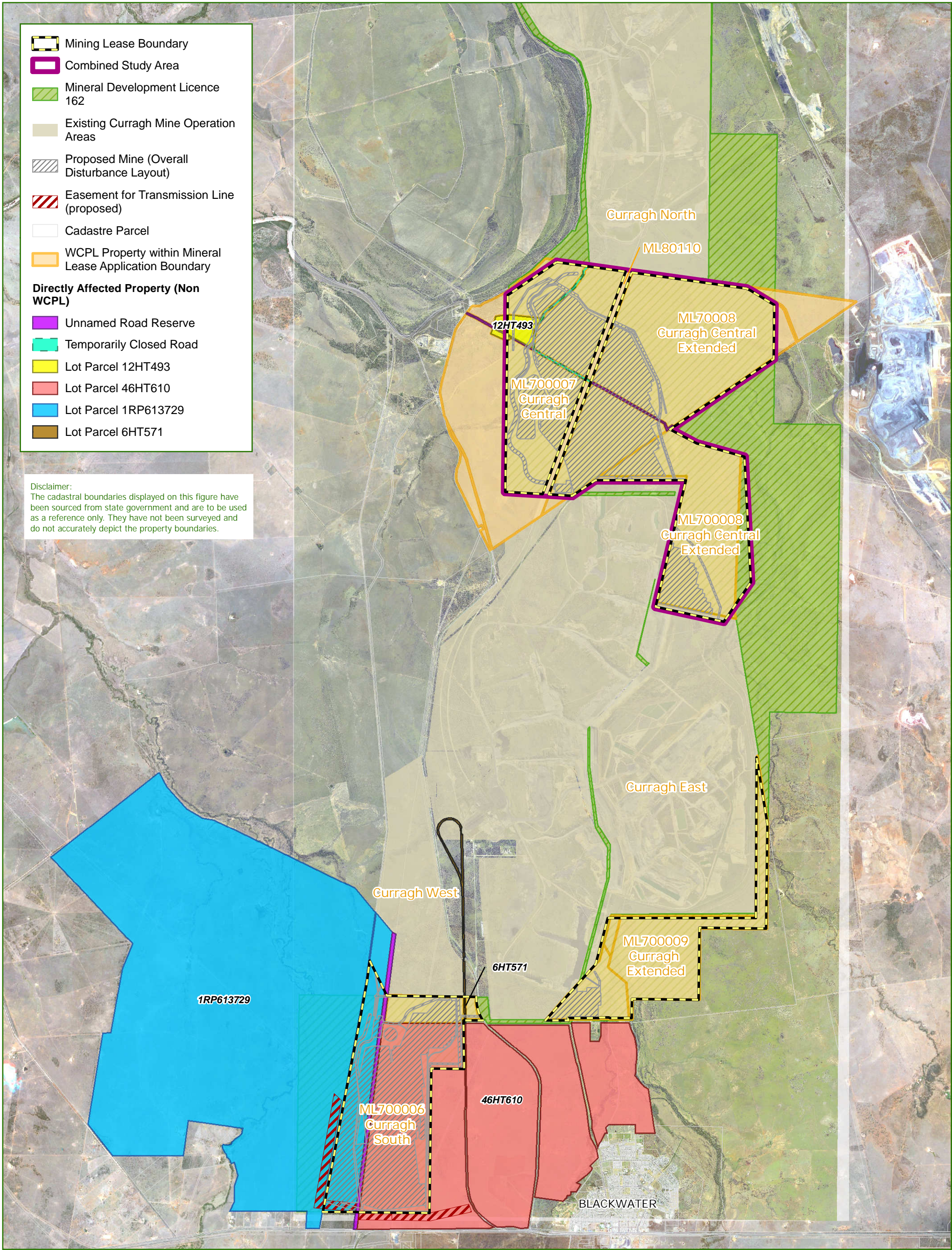
Attachment B: Lot on Plan maps and description of areas within SCA area

Study area (Mining Lease reference)	Lot on plan description of areas within SCA mapped area (include all easements)*	Name of landowner	Street address/ suburb/ locality and postcode (where known)	Contact details: phone/ email. (where known)	SCL trigger map area within Application area (Ha) ¹	SCL trigger map area within Application area that will be disturbed (Ha) ¹	Compensati on agreement in place	Map reference
ML700006	Unnamed Road on Lot 1 on Plan RP613729	Central Highlands Regional Council	Corner of Egerton and Borilla Street, PO Box 21, Emerald QLD 4720	07 49887248 miningliaison@chrc.qld.gov.au	3.55	--	Yes	Figure B1
ML700006	Lot 1 on Plan RP613729	John Perrott Acton & Judy Margaret Acton	PO Box 504, Blackwater, QLD, 4717	07 3031 7793 sdowns@wesresources.com.au	335.50	230.44	Yes	Figure B1
ML700007	Lot 35 on Plan SP247242	Wesfarmers Curragh Pty Ltd	GPO Box 51 Brisbane QLD 4000	07 3031 7793 sdowns@wesresources.com.au	728.99	455.23	n/a	Figure B2
ML700007	Lot 12 on Plan HT493	The State of Queensland (Represented by Department of Agriculture, Fisheries and Forestry)	GPO Box 46, Brisbane QLD 4001	07 4095 7053 andy.page@daff.qld.gov.au	7.36	4.49	Pending final agreement	Figure B2
ML700007	Unnamed road reserve in Lot 12 on HT493 and Lot 35 on SP247242 (<i>Unnamed Road Reserve//parcel# 37480064</i>)	Central Highlands Regional Council	Corner of Egerton and Borilla Street, PO Box 21, Emerald QLD 4720	07 49887248 miningliaison@chrc.qld.gov.au	0.75	0.41	Yes	Figure B2
ML700007	Temporarily closed roads in Lot 35 on Plan SP247242	Central Highlands Regional Council	Corner of Egerton and Borilla Street, PO Box 21, Emerald QLD 4720	07 49887248	0.17	0.07	Yes	Figure B2

Study area (Mining Lease reference)	Lot on plan description of areas within SCA mapped area (include all easements)*	Name of landowner	Street address/ suburb/ locality and postcode (where known)	Contact details: phone/ email. (where known)	SCL trigger map area within Application area (Ha) ¹	SCL trigger map area within Application area that will be disturbed (Ha) ¹	Compensation agreement in place	Map reference
	<i>(Temp Closed Road segment/parcel# 37480070)</i>			miningliaison@chrc.qld.gov.au				
ML700007	Temporarily closed roads in Lot 35 on Plan SP247242 <i>(Temp Closed Road segment/parcel# 37480071)</i>	Central Highlands Regional Council	Corner of Egerton and Borilla Street, PO Box 21, Emerald QLD 4720	07 49887248 miningliaison@chrc.qld.gov.au	6.22	6.20	Yes	Figure B2
ML700007	Temporarily closed roads in Lot 35 on Plan SP247242 <i>(Temp Closed Road segment/parcel# 37480133)</i>	Central Highlands Regional Council	Corner of Egerton and Borilla Street, PO Box 21, Emerald QLD 4720	07 49887248 miningliaison@chrc.qld.gov.au	7.72	6.07	Yes	Figure B2
ML80110	Lot 35 on Plan SP247242	Wesfarmers Curragh Pty Ltd	GPO Box 51 Brisbane QLD 4000	07 3031 7793 sdowns@wesresources.com.au	57.64	90.96	N/A	Figure B2
ML700008	Lot 2 on Plan SP223677	Wesfarmers Curragh Pty Ltd	GPO Box 51 Brisbane QLD 4000	07 3031 7793 sdowns@wesresources.com.au	474.56	61.97	N/A	Figure B2
Total area (Hectare)					1655.78Ha	822.52Ha²		

1) Minor discrepancies between individual and total areas to those presented in Attachment A technical report, are due to rounding.

2) Attachment A: SLR report, page 6 Table 2: Domain 1 + Domain 2 = 760.9 Ha



- Mining Lease Boundary
- Combined Study Area
- Mineral Development Licence 162
- Existing Curragh Mine Operation Areas
- Proposed Mine (Overall Disturbance Layout)
- Easement for Transmission Line (proposed)
- Cadastre Parcel
- WCPL Property within Mineral Lease Application Boundary
- Directly Affected Property (Non WCPL)**
 - Unnamed Road Reserve
 - Temporarily Closed Road
 - Lot Parcel 12HT493
 - Lot Parcel 46HT610
 - Lot Parcel 1RP613729
 - Lot Parcel 6HT571

Disclaimer:
The cadastral boundaries displayed on this figure have been sourced from state government and are to be used as a reference only. They have not been surveyed and do not accurately depict the property boundaries.



Wesfarmers

0 0.4 0.8 1.6 2.4 3.2 km

Scale 1:90,000
Scale correct when printed at A3 Portrait
Projection: Transverse Mercator
Coordinate System: AGD 1984 AMG Zone 55



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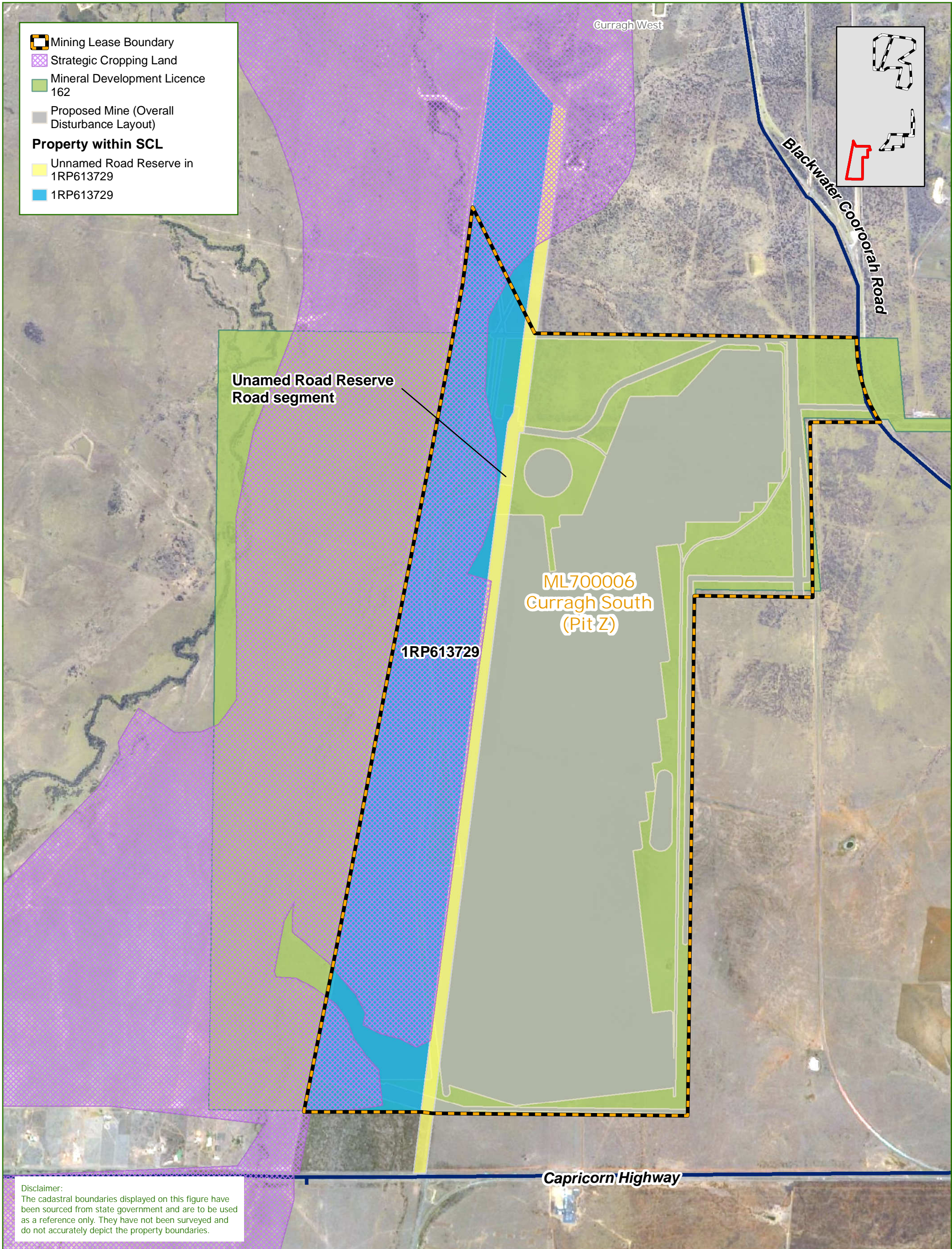
Data Source:
Cadastre from DNRM (2014)
Imagery from Wesfarmers (2014)

MXD Number: 2172652H_GIS_SCL_F006_A2
Date: 3/12/2015
Author: GL

Approved by:AOK

\\apnbnf003\proj\W\wesfarmers_resources\2172652H_Curragh_Extension_Phase_2\10_GIS\Projects\Maps\SCL_application\2172652H_GIS_SCL_F006_A2.mxd

Property Map



Scale 1:25,000

Scale correct when printed at A3 Portrait
Projection: Transverse Mercator
Coordinate System: AGD 1984 AMG Zone 55



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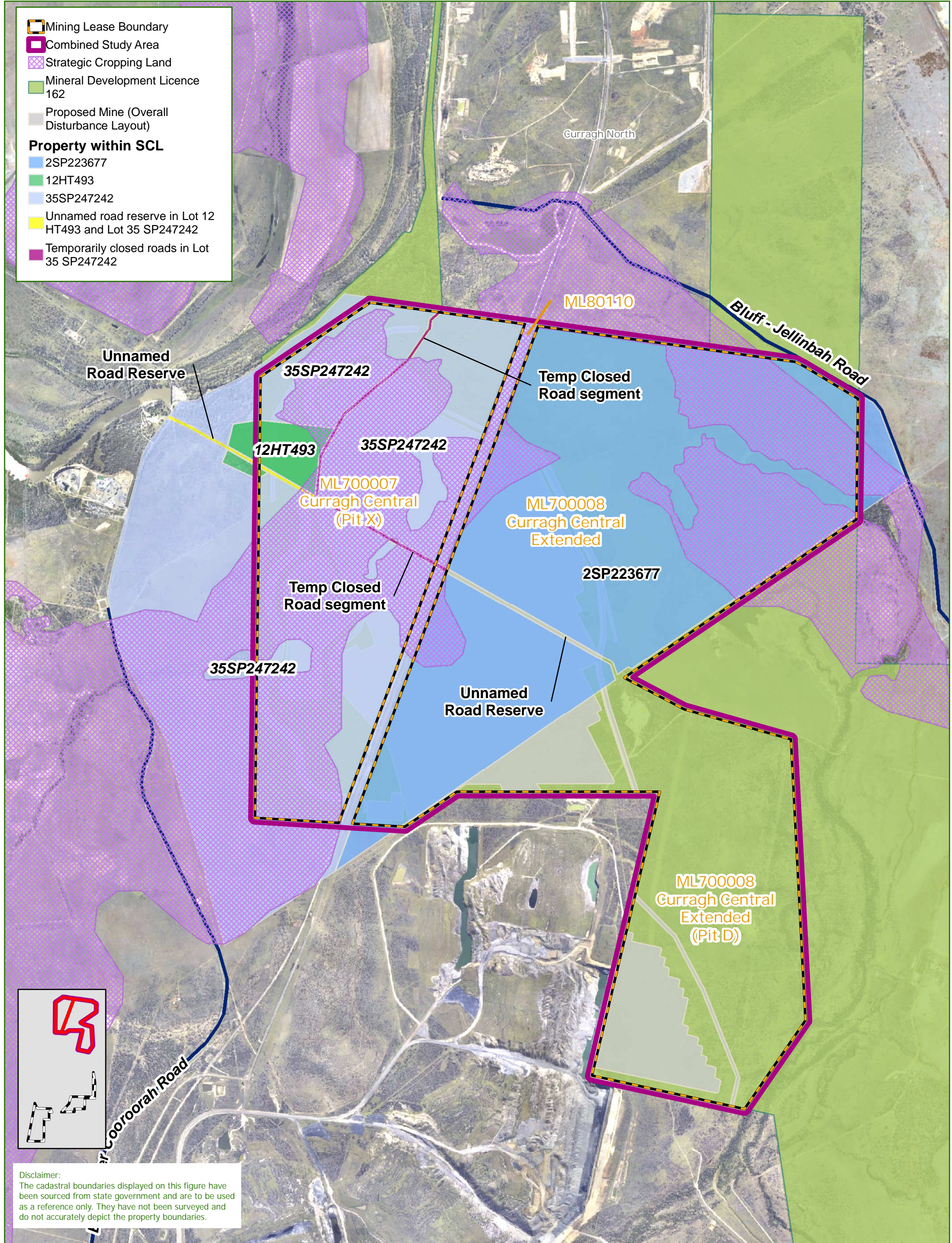
Figure B1
Property intersect Strategic Cropping Area
ML700006

Data Source:
Cadastre from DNRM (2014)
Imagery from Wesfarmers (2014)

MXD Number: 2172652H_GIS_SCL_F001_A2
Date: 3/12/2015
Author: GL

Approved by: AOK

\\apbnef003\proj\W\wesfarmers_resources\2172652H_Curragh_Extension_Phase_2\10_GIS\Projects\Maps\SCL_application\2172652H_GIS_SCL_F001_A2.mxd



Attachment C
Resource applications

On the 15 April 2015, Wesfarmers Curragh Pty Ltd lodged four mining lease applications with the Department of Natural Resources and Mines. The four mining lease applications are (as shown on Figure 2):

- ML700006
- ML700007
- ML700008
- ML700009 (note: not relevant to this RIDA application).

ML700008 and ML700009 was granted 1 December 2015. ML700006 and ML700007 is pending final approval.

ML80110 was granted 22 July 2004 and is part of the existing operational area of the Curragh Mine.

Receipt of each application relevant to this RIDA application is provided below.

Application for Mining Lease

Mineral Resource Act 1989

Form MMOL-14 Version 1

Permit Application (ID: 10001559) - COMPLETE

Lodge On: 15/04/2015 07:12 AM

PERMIT DETAILS

Permit name:	Curragh South
Permit type:	Mining Lease - Coal or oil shale
Permit term:	30 Years
General locality of the application:	Approximately 4km west of the existing township of Blackwater
Specific minerals:	Coal

PERMIT PRE-REQUISITE DETAILS

Pre-requisite permits

Permit type	Permit number	Authorised holder	Expiry date
MDL	162	WESFARMERS CURRAGH PTY LTD	28/02/2018
MDL	328	WESFARMERS CURRAGH PTY LTD	31/08/2016

PERMIT HOLDER DETAILS

Client name	Percent holding	Authorised
WESFARMERS CURRAGH PTY LTD	100.000000000000	Yes

Holder address details:

Holder:	WESFARMERS CURRAGH PTY LTD	Address:	Private Mail Bag
ACN:	009362565	Town/City:	Blackwater
Email address:		State:	QLD
Business number:		Postcode:	4717
Mobile number:		Country:	Australia

Authorised Holder Representative (AHR) Details

Name:	Stephen Downs	Address:	GPO Box 51
		Town/City:	Brisbane
Email address:	sdowns@wesresources.com.au	State:	QLD
Business number:	30317793	Postcode:	4000
Mobile number:		Country:	Australia

PERMIT AREA

Size of area applied for (ha): 1432.4000
Size of surface area applied for (ha): 1432.4000
Local government area(s): Central Highlands Regional Council
Which datum standard have you used? MGA94
Provide coordinates for the datum post: (MGA94 - Zone 55) 685673.50 E
7397324.94 N
When was the land marked out? 15/04/2015 07:00 AM
Is surface area within the permit area required? Whole.
Provide the name of the dedicated road: Blackwater Cooroorah Road

Internal boundary permits

Permit type	Permit number	Authorised holder	Expiry date
MDL	162	WESFARMERS CURRAGH PTY LTD	28/02/2018
MDL	328	WESFARMERS CURRAGH PTY LTD	31/08/2016

LAND INFORMATION DETAILS

Does this application involve the surrender of a granted permit in favour of whole or part of this application?	No
Is there any restricted land associated with this permit application?	Yes
Is the lease area within the surface of reserve?	Yes
Are you making this application jointly with the holder of the ATP permit?	No
Are you making this application with the consent of that holder?	No
Is the land applied for situated within an area of a greenhouse gas (GHG) permit?	No

Land details

Description	Proposed usage	Current usage	Compensation required?
Lot 1 on plan RP613729 - Freehold Par Tullarch Ard	Mining	Grazing	Yes
Lot 46 on plan HT610 - Other Par Sagittarius	Mining	Grazing	Yes
Lot 4 on plan HT607 - Leasehold Par Unknown	Mining	Industrial	No
Lot 6 on plan HT571 - Other Par Not applicable	Mining	Transport	Yes
Lot 1 on plan RP613729 - Road reserve - unnamed road on 1RP613729	Mining	Transport	Yes

ENVIRONMENTAL AUTHORITY

The environmental authority application is: Application for amendment of an environmental authority

Suitable registered operator details

Holder	Suitable Operator Status	Registered No.
WESFARMERS CURRAGH PTY LTD	Registered	293585

NATIVE TITLE

Native title process:	Exclusive Land (100%)
I confirm that when a full assessment is completed, if native title must be addressed, a native title process will be required and advertising fees will be requested by the department:	Yes

PROPOSED PROGRAM AND PLAN

Duration:	5 Years
------------------	---------

OBLIGATIONS

As the authorised holder representative, I understand and agree to the obligations associated with the permit: Yes

PAYMENT DETAILS

Fee type	Details	Amount (\$)
EPAMAM	Application for amendment of an environmental authority	285.60
APPMLCOAL	Mining Lease - Coal or Shale Oil	3,996.00
Total Fee:		4,281.60

UPLOADED DOCUMENTS

Section	File name	Uploaded by	Date uploaded
AHR	Letter of authority - AHR	sdowns@wesresources.com.au	14/04/2015 04:11 PM
Environmental authority	Amendment Application	sdowns@wesresources.com.au	14/04/2015 04:33 PM
Financial Capability	Financial capability statement	sdowns@wesresources.com.au	14/04/2015 04:42 PM
Financial Capability	Financial Commitment	sdowns@wesresources.com.au	14/04/2015 04:42 PM
Land availability	Land details	sdowns@wesresources.com.au	14/04/2015 04:29 PM
Land availability	Coal Seam Gas (CSG) statement	sdowns@wesresources.com.au	14/04/2015 04:28 PM
Land availability	CSG criteria statement	sdowns@wesresources.com.au	14/04/2015 04:28 PM
Land availability	Restricted land feature details	sdowns@wesresources.com.au	10/04/2015 03:43 PM
Permit area	Map of boundaries and access	sdowns@wesresources.com.au	14/04/2015 04:18 PM
Permit area	Statement justifying the area	sdowns@wesresources.com.au	14/04/2015 04:18 PM
Permit area	Area file	sdowns@wesresources.com.au	14/04/2015 04:18 PM
Permit area	Graphic representation of area	sdowns@wesresources.com.au	14/04/2015 04:18 PM
Permit area	Surface area justification statement	sdowns@wesresources.com.au	14/04/2015 04:18 PM
Permit details	Permit term justification statement	sdowns@wesresources.com.au	08/04/2015 06:58 PM
Technical capability	Other resource commitment statement	sdowns@wesresources.com.au	14/04/2015 04:42 PM
Technical capability	Technical capability statement	sdowns@wesresources.com.au	14/04/2015 04:42 PM
Work program	Proposed development plan	sdowns@wesresources.com.au	14/04/2015 04:39 PM

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Application for Mining Lease

Mineral Resource Act 1989

Form MMOL-14 Version 1

Permit Application (ID: 10001556) - COMPLETE

Lodge On: 15/04/2015 07:06 AM

PERMIT DETAILS

Permit name:	Curragh Central
Permit type:	Mining Lease - Coal or oil shale
Permit term:	30 Years
General locality of the application:	Approximately 18.3km north of the township of Blackwater
Specific minerals:	Coal

PERMIT PRE-REQUISITE DETAILS

Pre-requisite permits

Permit type	Permit number	Authorised holder	Expiry date
MDL	162	WESFARMERS CURRAGH PTY LTD	28/02/2018

PERMIT HOLDER DETAILS

Client name	Percent holding	Authorised
WESFARMERS CURRAGH PTY LTD	100.00000000000000	Yes

Holder address details:

Holder:	WESFARMERS CURRAGH PTY LTD	Address:	Private Mail Bag
ACN:	009362565	Town/City:	Blackwater
Email address:		State:	QLD
Business number:	0749869211	Postcode:	4717
Mobile number:		Country:	Australia

Authorised Holder Representative (AHR) Details

Name:	Stephen Downs	Address:	GPO Box 51
		Town/City:	Brisbane
Email address:	sdowns@wesresources.com.au	State:	QLD
Business number:	30317793	Postcode:	4000
Mobile number:		Country:	Australia

PERMIT AREA

Size of area applied for (ha): 1123.2100
Size of surface area applied for (ha): 1123.2100
Local government area(s): Central Highlands Regional Council
Which datum standard have you used? MGA94
Provide coordinates for the datum post: MDA94-Zone55) 692218.46 E 7414939.74 N

When was the land marked out? 15/04/2015 07:00 AM
Is surface area within the permit area required? Whole.
Provide the name of the dedicated road: Road reserve crossing Lot 12 on HT 493 and Lot 35 on SP247242

Internal boundary permits

Permit type	Permit number	Authorised holder	Expiry date
MDL	162	WESFARMERS CURRAGH PTY LTD	28/02/2018

LAND INFORMATION DETAILS

Does this application involve the surrender of a granted permit in favour of whole or part of this application?	No
Is there any restricted land associated with this permit application?	Yes
Is the lease area within the surface of reserve?	Yes
Are you making this application jointly with the holder of the ATP permit?	No
Are you making this application with the consent of that holder?	No
Is the land applied for situated within an area of a greenhouse gas (GHG) permit?	No

Land details

Description	Proposed usage	Current usage	Compensation required?
Lot 35 on plan SP247242 - Freehold Par Not applicable	Mining	Grazing	No
Lot 12 on plan HT493 - Reserve Par Not applicable	Mining	Other	Yes
Lot 12 on plan HT493 - Road reserve - Temporarily closed road in Lot12 on HT493	Mining	Transport	Yes
Lot 35 on plan SP247242 - Road reserve - Temporarily closed road in Lot35 on SP247242	Mining	Transport	Yes

ENVIRONMENTAL AUTHORITY

The environmental authority application is: Application for amendment of an environmental authority

Suitable registered operator details

Holder	Suitable Operator Status	Registered No.
WESFARMERS CURRAGH PTY LTD	Registered	293585

NATIVE TITLE

Native title process:	Exclusive Land (100%)
I confirm that when a full assessment is completed, if native title must be addressed, a native title process will be required and advertising fees will be requested by the department:	Yes

PROPOSED PROGRAM AND PLAN

Duration:	5 Years
------------------	---------

OBLIGATIONS

As the authorised holder representative, I understand and agree to the obligations associated with the permit: Yes

PAYMENT DETAILS

Fee type	Details	Amount (\$)
EPAMAM	Application for amendment of an environmental authority	285.60
APPMLCOAL	Mining Lease - Coal or Shale Oil	3,996.00
Total Fee:		4,281.60

UPLOADED DOCUMENTS

Section	File name	Uploaded by	Date uploaded
AHR	Letter of authority - AHR	sdowns@wesresources.com.au	14/04/2015 02:14 PM
Environmental authority	Amendment Application	sdowns@wesresources.com.au	14/04/2015 02:39 PM
Financial Capability	Financial capability statement	sdowns@wesresources.com.au	14/04/2015 02:53 PM
Financial Capability	Financial Commitment	sdowns@wesresources.com.au	14/04/2015 02:53 PM
Land availability	Land details	sdowns@wesresources.com.au	14/04/2015 02:30 PM
Land availability	Coal Seam Gas (CSG) statement	sdowns@wesresources.com.au	14/04/2015 02:30 PM
Land availability	CSG criteria statement	sdowns@wesresources.com.au	14/04/2015 02:30 PM
Land availability	Restricted land feature details	sdowns@wesresources.com.au	10/04/2015 06:01 PM
Permit area	Map of boundaries and access	sdowns@wesresources.com.au	14/04/2015 02:23 PM
Permit area	Statement justifying the area	sdowns@wesresources.com.au	14/04/2015 02:22 PM
Permit area	Area file	sdowns@wesresources.com.au	14/04/2015 02:22 PM
Permit area	Graphic representation of area	sdowns@wesresources.com.au	14/04/2015 02:23 PM
Permit area	Surface area justification statement	sdowns@wesresources.com.au	10/04/2015 05:48 PM
Permit details	Permit term justification statement	sdowns@wesresources.com.au	14/04/2015 02:06 PM
Technical capability	Other resource commitment statement	sdowns@wesresources.com.au	14/04/2015 02:53 PM
Technical capability	Technical capability statement	sdowns@wesresources.com.au	14/04/2015 02:53 PM
Work program	Proposed development plan	sdowns@wesresources.com.au	14/04/2015 02:46 PM

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ML 700008 Resource authority public report

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Purpose and minerals	4
Related permits	4
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▼ Permit details

Permit ID:	ML 700008
Permit name:	Curragh Central Extended
Status:	Granted
Lodged date:	15/04/2015
Grant date:	12/11/2015
Commencement date:	01/12/2015
Expiry date:	30/11/2040
Plan/program expiry date:	30/11/2020
Current term:	25 years
Certificate of application:	04/05/2015
Certificate of public notice:	04/05/2015
Conditions:	
Locality:	Approximately 15.3 km north of the township of Blackwater.
Remarks:	Curragh Central Extended
Act permit granted under:	Mineral Resources Act 1989
Act now administered under:	Mineral Resources Act 1989

▼ Holders

Authorised holder representative (AHR)

DOWNS, Stephen
GPO Box 51 Brisbane QLD 4000

Holders

	Holder name	Share %	Status	Held from	Held to	Authorised holder
*	WESFARMERS CURRAGH PTY LTD Private Mail Bag Blackwater QLD 4717	100.000000000000	Current	01/12/2015		Yes
	WESFARMERS CURRAGH PTY LTD	100.000000000000	Former	10/04/2015	15/04/2015	

Tenancy type: Sole Holder

Area

Location: [View Map](#)

Mining district: Rockhampton

Local authority: Central Highlands Regional Council

Area: 2643.0000 Hectares

Surface area: 2643.0000

Exclusions:

Marked out date: 15/04/2015 07:00

Sub-blocks

No data available

Background land

Land identifier	Land usage	Compensation required	Finalised
Temporarily Closed Road	Permit	Y	22/09/2015
LOT 2 ON HT606	Permit	N	15/04/2015
LOT 2 ON SP223677	Permit	N	15/04/2015

Survey plans

No data available

Relinquishment details

No data available

Sub-blocks retained

No data available

Term history

Term	Date notice issued	Date lodged	Date approved	Date commenced	Date term ends	Term	Act granted under
2015 - 2040		15/04/2015	12/11/2015	01/12/2015	30/11/2040	25 years	Mineral Resources Act 1989

Native title

Current process	Description
Exclusive Land (100%)	

Purpose and minerals

Minerals
Coal

Related permits

Pre-requisite permits: MDL 162

▼ Financial

Rent details

Area units:	2643 Hectares
Rate/unit area:	\$56.20

▼ Activities

No data available

ML 700009 Resource authority public report

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Area	4
Term history	4
Native title	4
Purpose and minerals	4
Related permits	4
Financial	5
Activities	5

▼ P e r m i t d e t a i l s

Permit ID:	ML 700009
Permit name:	Curragh Extended
Status:	Granted
Lodged date:	15/04/2015
Grant date:	12/11/2015
Commencement date:	01/12/2015
Expiry date:	30/11/2040
Plan/program expiry date:	30/11/2020
Current term:	25 years
Certificate of application:	04/05/2015
Certificate of public notice:	04/05/2015
Conditions:	
Locality:	Approximately 4.7 km north of the township of Blackwater.
Remarks:	Curragh Extended
Act permit granted under:	Mineral Resources Act 1989
Act now administered under:	Mineral Resources Act 1989

▼ H o l d e r s

Authorised holder representative (AHR)

DOWNS, Stephen
GPO Box 51 Brisbane QLD 4000

Holders

	Holder name	Share %	Status	Held from	Held to	Authorised holder
*	WESFARMERS CURRAGH PTY LTD Private Mail Bag Blackwater QLD 4717	100.000000000000	Current	01/12/2015		Yes
	WESFARMERS CURRAGH PTY LTD	100.000000000000	Former	10/04/2015	15/04/2015	

Tenancy type: Sole Holder

Area

Location: [View Map](#)

Mining district: Rockhampton

Local authority: Central Highlands Regional Council

Area: 797.3000 Hectares

Surface area: 797.3000

Exclusions:

Marked out date: 15/04/2015 07:00

Sub-blocks

No data available

Background land

Land identifier	Land usage	Compensation required	Finalised
LOT 4 ON HT607	Permit	N	15/04/2015
LOT 7 ON HT607	Permit	N	15/04/2015
LOT 9 ON SP141303	Permit	N	15/04/2015

Survey plans

No data available

Relinquishment details

No data available

Sub-blocks retained

No data available

Term history

Term	Date notice issued	Date lodged	Date approved	Date commenced	Date term ends	Term	Act granted under
2015 - 2040		15/04/2015	12/11/2015	01/12/2015	30/11/2040	25 years	Mineral Resources Act 1989

Native title

Outcome	Process
100% exclusive land	Exclusive Land (100%)

Purpose and minerals

Minerals
Coal

Related permits

Pre-requisite permits: MDL 162

▼ Financial

Rent details

Area units:	798 Hectares
Rate/unit area:	\$56.20

▼ Activities

No data available

Attachment D
Current Title Search (dated 9 December 2015)

CURRENT TITLE SEARCH

DEPT OF NATURAL RESOURCES AND MINES, QUEENSLAND

Request No: 22410820

Search Date: 09/12/2015 10:30

Title Reference: 30462038

Date Created: 18/07/1979

Previous Title: 30460090

30460091

REGISTERED OWNER

Interest

Dealing No: 708589272 18/04/2005

JOHN PERROTT ACTON

1/2

JUDY MARGARET ACTON

1/2

AS TENANTS IN COMMON

ESTATE AND LAND

Estate in Fee Simple

LOT 1 REGISTERED PLAN 613729

Local Government: CENTRAL HIGHLANDS

For exclusions / reservations for public purposes refer to
Plan RP 613729

EASEMENTS, ENCUMBRANCES AND INTERESTS

1. Rights and interests reserved to the Crown by
Deed of Grant No. 30460090 (POR 45)
Deed of Grant No. 30460091 (POR 45)
2. EASEMENT IN GROSS No 601523883 (C406818) 14/11/1980
BURDENING THE LAND
TO THE QUEENSLAND ELECTRICITY GENERATING BOARD
OVER EASEMENT A ON RP13902
3. TRANSFER No 703630291 14/10/1999 at 08:19
EASEMENT IN GROSS: 601523883 (C406818)
QUEENSLAND ELECTRICITY TRANSMISSION CORPORATION LIMITED
A.C.N. 078 849 233
4. SEC 147A NOTATION No 601083730 (147A) 31/12/1984
THE PROVISIONS OF SECTION 147A OF THE LAND ACT 1962-1990
REFER TO SECTION 174 OF THE LAND ACT 1994
APPLY TO A TRANSFER OF THE WHOLE OR PART OF THE LAND
5. MORTGAGE No 708589275 18/04/2005 at 11:13
NATIONAL AUSTRALIA BANK LIMITED A.B.N. 12 004 044 937

ADMINISTRATIVE ADVICES

Dealing	Type	Lodgement Date	Status
713179128	VEG NOTICE	15/04/2010 14:14	CURRENT
	VEGETATION MANAGEMENT ACT 1999		

CURRENT TITLE SEARCH

DEPT OF NATURAL RESOURCES AND MINES, QUEENSLAND

Request No: 22410820

Search Date: 09/12/2015 10:30

Title Reference: 30462038

Date Created: 18/07/1979

UNREGISTERED DEALINGS - NIL

CERTIFICATE OF TITLE ISSUED - No

Corrections have occurred - Refer to Historical Search

Caution - Charges do not necessarily appear in order of priority

**** End of Current Title Search ****

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Requested By: D-ENQ QLD GLOBE

CURRENT TITLE SEARCH

DEPT OF NATURAL RESOURCES AND MINES, QUEENSLAND

Request No: 22413419

Search Date: 09/12/2015 12:49

Title Reference: 50804353

Date Created: 08/03/2010

Previous Title: 50351635

REGISTERED OWNER

Dealing No: 715799192 28/05/2014

WESFARMERS CURRAGH PTY LIMITED A.C.N. 009 362 565

ESTATE AND LAND

Estate in Fee Simple

LOT 2 SURVEY PLAN 223677
Local Government: CENTRAL HIGHLANDS

EASEMENTS, ENCUMBRANCES AND INTERESTS

1. Rights and interests reserved to the Crown by
Deed of Grant No. 30516157 (POR 9)
2. MORTGAGE No 707283927 10/12/2003 at 11:53
WESFARMERS CURRAGH PTY LTD A.C.N. 009 362 565
3. AMENDMENT No 713077971 24/02/2010 at 11:17
MORTGAGE: 707283927

ADMINISTRATIVE ADVICES

Dealing	Type	Lodgement Date	Status
711867411	VEG NOTICE	19/08/2008 15:39	CURRENT
VEGETATION MANAGEMENT ACT 1999			

UNREGISTERED DEALINGS - NIL

CERTIFICATE OF TITLE ISSUED - No

Caution - Charges do not necessarily appear in order of priority

** End of Current Title Search **

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Requested By: D-ENQ QLD GLOBE

CURRENT RESERVE SEARCH

DEPT OF NATURAL RESOURCES AND MINES, QUEENSLAND

Request No: 22413280

Search Date: 09/12/2015 12:39

Title Reference: 49016601

Date GAZETTED: 23/01/1982

PAGE: 152-3

Opening Ref: GHFL 3733 SPRINGSURE

Purpose: QUARRY

Sub-Purpose:

Local Name:

Address:

File Ref: RES 21952

TRUSTEES

THE STATE OF QUEENSLAND (REPRESENTED BY DEPARTMENT OF
AGRICULTURE AND FISHERIES) AMENDED on 15/12/2014

LAND DESCRIPTION

LOT 12 CROWN PLAN HT493 GAZETTED ON 23/01/1982 PAGE 152-3
Local Government: CENTRAL HIGHLANDS

Area: 65.810000 Ha. (SURVEYED)

EASEMENTS AND ENCUMBRANCES

ADMINISTRATIVE ADVICES - NIL

UNREGISTERED DEALINGS - NIL

CERTIFICATE OF TITLE ISSUED - No

** End of Current Reserve Search **

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Requested By: D-ENQ QLD GLOBE

CURRENT TITLE SEARCH

DEPT OF NATURAL RESOURCES AND MINES, QUEENSLAND

Request No: 22411831

Search Date: 09/12/2015 11:17

Title Reference: 50919293

Date Created: 18/07/2013

Previous Title: 50804354

REGISTERED OWNER

Dealing No: 716410676 02/04/2015

WESFARMERS CURRAGH PTY LTD A.B.N. 90 009 362 565

ESTATE AND LAND

Estate in Fee Simple

LOT 35 SURVEY PLAN 247242
Local Government: CENTRAL HIGHLANDS

EASEMENTS, ENCUMBRANCES AND INTERESTS

1. Rights and interests reserved to the Crown by
Deed of Grant No. 30516157 (POR 9)
2. COVENANT No 715961461 19/08/2014 at 12:53
restricts dealings over
LOT 35 ON SP247242 AND LOT B ON CROWN PLAN AP19980

ADMINISTRATIVE ADVICES

Dealing	Type	Lodgement Date	Status
711867411	VEG NOTICE	19/08/2008 15:39	CURRENT
VEGETATION MANAGEMENT ACT 1999			

UNREGISTERED DEALINGS - NIL

CERTIFICATE OF TITLE ISSUED - No

Caution - Charges do not necessarily appear in order of priority

** End of Current Title Search **

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Requested By: D-ENQ QLD GLOBE

Attachment E

Letter providing justification for not requiring Public Notification

7 December 2015

Chief Executive
Department of Infrastructure, Local Government and Planning
RPI Act Development Assessment Team DILGP
PO Box 15009
CITY EAST QLD 4002
RPIAct@dilgp.qld.gov.au
Email and post

Dear Chief Executive,

**Regional Planning Interests Act assessment application –
Wesfarmers Curragh Pty Ltd – Public notification**

This letter accompanies an assessment application made by Wesfarmers Curragh Pty Ltd (WCPL) for a regional interest's development approval (RIDA) for the Curragh Extension Project (the Project).

The assessment application is not notifiable under section 34(2) of the *Regional Planning Interests Act 2014*. We are writing to set out reasons why the application should not in our view be the subject of a requirement notice from the chief executive, on the basis that there has already been sufficient notification of the Project to the public.

The reasons for this request are detailed below:

- A Combined Public Notification (*Mineral Resources Act 1989*, Section 252B and the *Environmental Protection Act 1994* Section 152) was issued on the 4 May 2015, closing 16 June 2015 of which no objections to both the Mining Lease applications and Environmental Authority amendment application were received. A copy of the public notice (Combined Public Notification) is attached. Full page advertisements were placed in the following media:
 - ▶ 19 May 2015 – Blackwater Herald
 - ▶ 20 May 2015 – Emerald Central Queensland News.
- During the public notification period, electronic copies of the Project information were placed on the following websites:
 - ▶ Department of Natural Resources and Mines (DNRM) website: www.business.qld.gov.au/industry/mining
 - ▶ Department of Environment and Heritage Protection (DEHP) website: <http://www.ehp.qld.gov.au/management/non-mining/current-ea-applications.html>
 - ▶ Wesfarmers Resources Limited website: www.wesresources.com.au.

- A referral application was submitted to the Commonwealth Department of the Environment in accordance with requirements under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on the 2 July 2015. All documentation was provided for public comment until the 27 August 2015 in which no submission was received. Further requirements under Preliminary Documentation assessment was provided to the Department of the Environment on the 27 October 2015, in which public notification commenced 23 November and closes 18 December 2015. Advertisements were placed in the following media:

- ▶ 20 November 2015 – Queensland Courier Mail
- ▶ 20 November 2015 – Emerald Central Queensland News.

Hard copies of the Preliminary Documentation is currently placed at Central Highlands Regional Council Emerald office, the Blackwater Regional Library and the Department of Environment and Heritage Protection Emerald office. An electronic copy of all documentation is available at www.wesresources.com.au.

- For the Curragh Extension Project, as presented in this RIDA application, there is no change to Project description, surface area activities and area disturbance from what was notified to the public in the recent Combined Public Notification. The supporting document¹ to the Environmental Authority Amendment application contained all relevant information relating to SCA trigger mapped data for the Project. As SCA occurs only within ML700006, ML700007, ML700008, these are the only mining leases that are the subject of this RIDA application. The Project description contained within this application however for completeness, also includes details of ML700009, which does not include any trigger mapped SCA.
- WCPL currently owns, or has compensation agreements in place with approximately 90% of the underlying land tenure for the Curragh Extension Project.
- Mining Lease numbers 700008 and 700009 were granted 1 December 2015.
- An extensive stakeholder engagement program has been undertaken as part of the Project. The following consultation with the wider community has also been achieved:
 - ▶ To date, three Landholder events (open to surrounding landholders via invitation) have been held which presented information on the Project, on 26 March 2014 (34 attendees), 24 October 2014 (28 attendees) and 30 April 2015 (21 attendees). The soil sampling field survey was discussed at the October 2014 landholder dinner.
 - ▶ Over the last 18 months, six Project information sheets have been prepared and distributed to key Project stakeholders.

1. Document Reference: 2172652F-ENV-REP-001 RevC AOK: *Curragh Extension Project – Supporting Information for Environmental Authority Amendment Application*. 15 April 2015. Section 5.3.9 Soils; Section 6.1.1.3 Land Use; Section 6.1.2.1 Strategic Cropping Area; Figure 6.3 Strategic Cropping Area.

- Land access notification was undertaken in accordance with the Queensland Government's Land Access Code (November 2010) for the October 2014 detailed soil sampling program. The results from the October 2014 program form the technical basis for this RIDA application.
- Through the existing Curragh Mine operations, WCPL have a well-established stakeholder consultation program built around their standing relationship in the local area. The stakeholder consultation program will continue and be extended to address the Project.

Given the extensive public notification already undertaken for the Project pursuant to the *Mineral Resources Act 1989*, *Environmental Protection Act 1994*, we trust that a requirement notice will not be given for this assessment application.

Please do not hesitate to contact the undersigned if we can be of any further assistance.

Yours sincerely,

Stephen Downs
Senior Manager – Infrastructure Development

Telephone (07) 3031 7793
Mobile 0419 713 132
Email SDowns@wesresources.com.au

Enclosed

1. Document Reference: 2172652F-ENV-REP-001 RevC AOK: *Curragh Extension Project – Supporting Information for Environmental Authority Amendment Application*. 15 April 2015. Section 5.3.9 Soils; Section 6.1.1.3 Land Use; Section 6.1.2.1 Strategic Cropping Area; Figure 6.3 Strategic Cropping Area.

Curragh Extension Project, Blackwater Queensland EPBC2015/7508

INVITATION FOR PUBLIC COMMENT

Wesfarmers Curragh Pty Ltd (ACN 009 362 565) proposes the Curragh Extension Project (EPBC 2015/7508) (**the proposed action**) to extend the existing Curragh Coal Mine to access an additional 67 million tonnes of coal reserve across 4 new pits. The proposed action is not planned to increase the annual production of the Curragh Mine but rather extend the life of the Curragh Mine. The proposed action is located north of the township of Blackwater in Central Queensland.

The proposed action has been referred under the *Environment Protection and Biodiversity Conservation Act 1999* (**EPBC Act**) and determined to be a "controlled action" under the EPBC Act to be assessed by way of Preliminary Documentation.

The controlling provisions under the EPBC Act are:

- Sections 18 and 18A (listed threatened species and communities).
- Sections 24D and 24E (a water resource, in relation to coal seam gas development and large coal mining development).

Pursuant to Section 95A(3) of the EPBC Act, the preliminary documentation is available for viewing in hard copy at the following locations:

Blackwater Regional Library

Wey Street, Blackwater QLD 4717.

Department of Environment and Heritage Protection

99 Hospital Road, Emerald QLD 4720.

Central Highlands Regional Council

Corner of Egerton and Borilla Streets, Emerald QLD 4720.

The documents can also be viewed or downloaded free of charge at the following websites:

Department of the Environment:

<https://www.environment.gov.au/epbc/public-notice/>

Wesfarmers Curragh Pty Ltd:

<http://www.wesresources.com.au/media-centre/publications/>

Interested persons are invited to comment on the preliminary documentation. The preliminary documentation is available for comment for 20 business days from Monday 23 November 2015 to Friday 18 December 2015. The closing date for all submissions is 5.00pm (Queensland time) on Friday 18 December 2015. Submissions should be made in writing and addressed to:

Stephen Downs, Senior Manager – Infrastructure Development

Wesfarmers Curragh Pty Ltd

Level 31, Central Plaza One, 345 Queen Street (GPO Box 51) Brisbane, QLD, 4000

Or by email to MDL162@wesresources.com.au

Note: Persons with any special needs (including those for whom English is a second language or with a vision impairment) may contact Amanda O'Kane on the details below for assistance in accessing the documentation.

Amanda O'Kane, WSP | Parsons Brinckerhoff

Email: MDL162@wesresources.com.au.

Phone: 07 3854 6226



Australian Government
Department of the Environment

EPBC Ref: 2015/7508

Mr Steven Downs
Senior Manager Infrastructure Development
Wesfarmers Curragh Pty Ltd
GPO Box 51
Brisbane QLD 4001

Dear Mr Downs

Direction to publish and amended fee schedule
Curragh Extension Project, Blackwater, Queensland (2015/7508)

I am writing to you in relation to your proposal to extend the existing Curragh Mine to access an additional 67 million tonnes of coal reserve across four new pits, north of Blackwater, Queensland.

On 31 August 2015, a delegate for the Minister for the Environment requested further information to be able to assess the relevant impacts of the proposed action. On 27 October 2015, the relevant information was provided to the Department. I have now decided that the information provided fulfils the requirements for publication under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

You are now required to publish the information you have provided on the proposed action (as outlined above) **within 20 business days of the date of this decision**. This allows for public consultation on the potential impacts of your project. The information must be available for comment for no less than 20 business days and during this time any third parties can comment on the proposed action. Detailed directions on what information you need to publish and where to publish are attached to this letter.

Public comments will come directly to you so that you have an opportunity to address any issues raised. You are then required to provide the Department with:

- a copy of all public comments received (if any);
- a summary of each of the comments (if any) and how you have addressed each of them; and
- a revised version of your documentation with any changes or additions needed to take account of the public comments (if any); or
- if no public comments are received, a written statement to that effect.

Once you have provided the Department with this information, you will then need to publish the summary of comments and your responses, together with the original documentation including any changes or additions made in response to the public comments (or a notice) **within 10 business days**.

This means that we will be assessing your project using:

- the information contained in your original referral;
- the further information you have provided on the impacts of the proposed action and the strategies to mitigate and/or offset that impact;
- the advice provided by the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development; and

- any other relevant information regarding the matters of national environmental significance protected by the EPBC Act.

Amended fee schedule

Please find attached the amended fee schedule for your proposal and note that these fees have reduced as a result of the further information provided in your preliminary documentation. Invoices for Stage 3 and Stage 4 are enclosed.

You may qualify for an exemption under section 502(4C)(e)(v) of the EPBC Act or apply under Schedule 1 5.21A of the EPBC Regulations for a waiver of the contingency fees. An exemption/waiver from fees form is enclosed.

If you qualify for an exemption or would like to apply for a waiver, please return this form completed to me within 10 business days of the date of this letter. Further details regarding waivers and exemptions can be found on the Department's website at:

<http://www.environment.gov.au/epbc/cost-recovery>.

Further details on cost recovery are available on the Department's website at:

<http://www.environment.gov.au/epbc/cost-recovery>.

If you disagree with the fee schedule provided, you may apply under section 514Y of the EPBC Act for reconsideration of the method used to work out the fee. The application for reconsideration must be made within 30 business days of the date of the fee schedule and can only be made once in respect of a fee. Further details regarding the reconsideration process and an application form for reconsideration can be found on the Department's website at: <http://www.environment.gov.au/epbc/cost-recovery>.

The assessment process will commence once we have received any public comments, your responses to them and payment of Stage 3 fees. A decision on whether the proposed action can be approved or not would generally be expected within 40 business days of that time, unless further information is required. Stage 4 must be paid before the Department can decide on whether the proposed action can be approved or not.

If you have any questions about the assessment process or this decision, please contact the project manager, Arvid Pluschke, by email to arvid.pluschke@environment.gov.au, or telephone (02) 6275 9183 and quote the EPBC Act reference number shown at the beginning of this letter.

Yours sincerely



Deb Callister
Assistant Secretary
Assessment and Policy Implementation Branch

16 November 2015

Enc: Information relating to the direction to publish
Amended fee schedule
Invoices for fees relating to Stages 3 and 4