

Appendix H

Mine development land capability and
soil assessment



LFB Resources NL ABN: 90 073 478 574



McPhillamys Gold Project

Land Capability and Soil Assessment



**Prepared by
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May, 2019



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Land Capability and Soil Assessment

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Ref No. Cr433

June 2019

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SUMMARY

The McPhillamys Gold Project Area covers 2,513 ha and is approximately 8 km northeast of Blayney. The landform of the Project Area is rolling hills separated by drainage lines less than 1 km apart that generally follow a trellis pattern. Soil in the elevated land had strongly acidic, brown, loamy topsoil over more clayey subsoil, which was classified as a mix of Chromosols and Dermosols. Soil in the drainage lines generally had acidic, light clay topsoil over grey clayey subsoil. Organic matter in the surface 5 to 10 cm appeared to be important in sustainable ecosystems on these soil types. The soil generally had low measured chemical fertility.

The Project Area was mapped as 7 upland soil associations and 1 drainage line associations. Each association contains a number of soil types that vary with position in the landscape and with the underlying geology. Despite this variation, soil properties important to agricultural productivity were more consistent within the associations than between them.

The land had moderate Land and Soil Capability (LSC) 4 to moderately low LSC 5 potential for cropping and intensive pasture production. The most limiting inherent hazards were acidification potential in elevated land and potential for seasonal (winter) waterlogging on lower slopes and near drainage lines. This LSC rating was consistent with the dominant historic landuse over the Project Area of grazing naturalized pasture by cattle and sheep with occasional cultivation.

The Mining Lease Application Area covers 1,825 ha in the east of the Project Area. This location was selected to avoid sites that satisfied the Biophysical Strategic Agricultural Land criteria. A site verification certificate for the Mining Lease Application area was issued on June 18, 2019.

Regis Ltd plan to disturb 1,136 ha within the Mining Lease Application Area to develop and operate an open cut gold mine. This will result in a reduced area of LSC class 5 and an increase in LSC class 6 (Table S1).

Table S1. Summary of change in Land and Soil Capability class as a result of McPhillamys Gold Project.

LSC Class	Capability	Pre-mining area (ha)	Post-mining area (ha)	Change (ha)
Land with a wide range of uses (cropping, grazing, horticulture, nature conservation)				
1 to 3	Extremely high to high	0	0	
Land with a variety of uses (cropping with restricted cultivation, pasture cropping, grazing, some horticulture, forestry, nature conservation)				
4	Moderate	932	920	-12
5	Moderate-low	1491	1080	-411
Land with a limited range of uses (grazing, forestry and nature conservation)				
6	Low	86	422	336
Land generally unable to support agriculture (selective forestry and nature conservation)				
7	Very low	4	21	17
8	Extremely low	0	71	71

A preliminary soil balance indicates that there is adequate topsoil and subsoil to conduct the planned rehabilitation.

1. INTRODUCTION

1.1. OVERVIEW

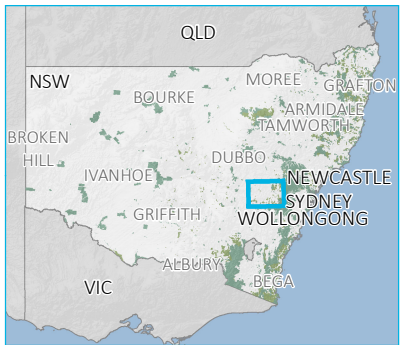
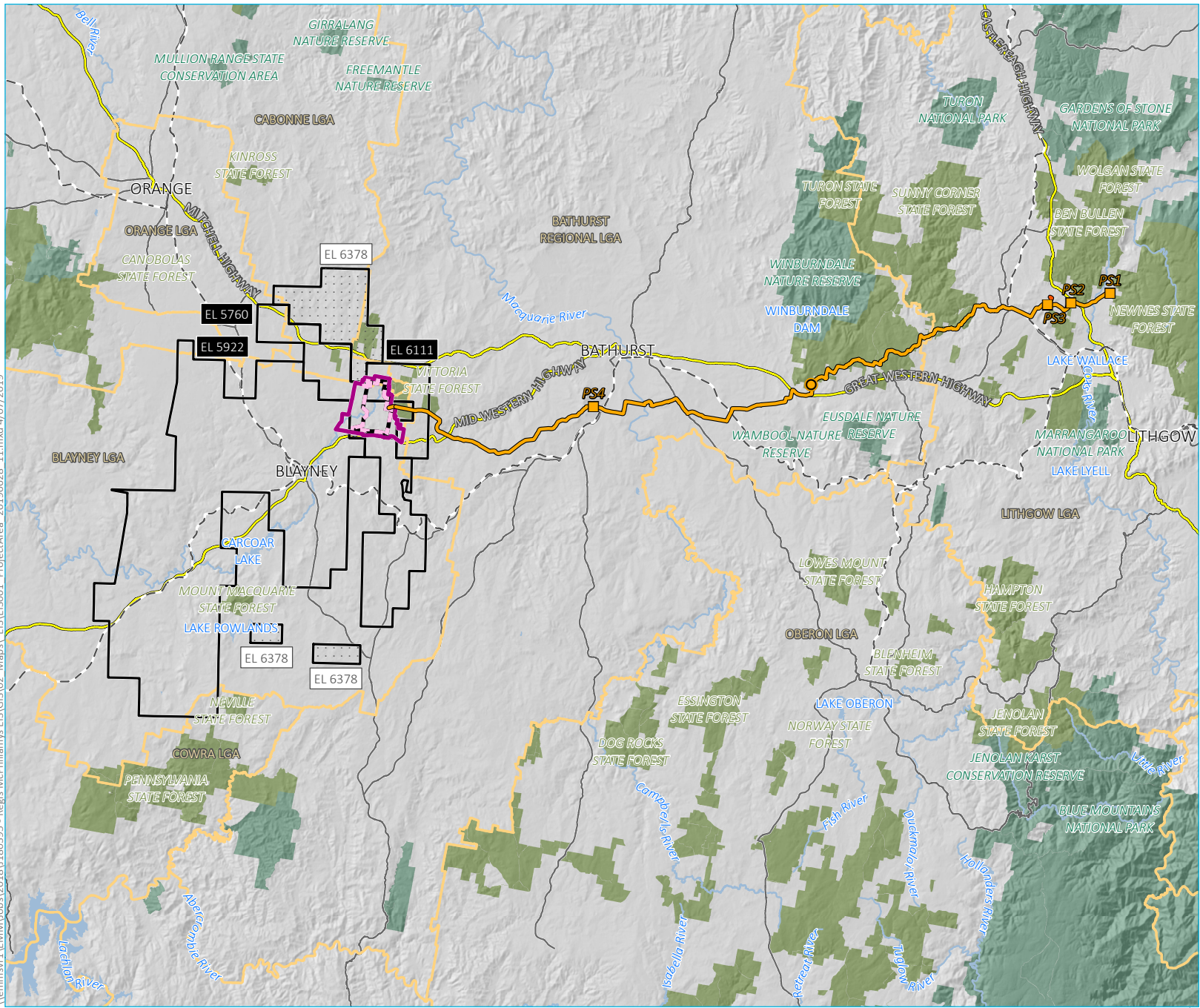
LFB Resources NL, a 100% owned subsidiary of Regis Resources Limited (Regis), is seeking development consent for the construction and operation of the McPhillamys Gold Project, a greenfield open cut gold mine and water supply pipeline in the Central West of New South Wales (NSW). The project application area is illustrated at a regional scale in Figure 1.1.

As shown in Figure 1.1, the McPhillamys Gold Project comprises two key components; the mine site where the ore will be extracted, processed and gold produced for distribution to the market (the mine development), and an associated water pipeline which will enable the supply of water from approximately 90 km away near Lithgow to the mine site (the pipeline development). This report assesses the potential impacts on soils resources and land capability associated with the mine development component of the McPhillamys Gold Project. References to ‘the project’ throughout this report are therefore referring to the mine development only. The potential impacts associated with the pipeline development component are addressed in the main report of the Environmental Impact Statement (EIS) (Volume 1, EMM 2019a)

The mine development is approximately 8 km north-east of Blayney within the Blayney and Cabonne local government areas (LGAs). This locality has a long history of alluvial and hard rock mining, with exploration for gold and base metals occurring since the mid to late 19th century. The mine development project boundary (herein referred to as the Project Area) is illustrated in Figure 1.2 and covers the Mining Lease (ML) application area for the project as well as the parts of the project that do not require a ML.

The mine development is in the upper reaches of the Belubula River catchment, within the greater Lachlan River catchment. Water will be supplied to the mine via a pipeline approximately 90 km long, transferring surplus water from Centennial’s Angus Place Colliery (Angus Place) and Springvale Coal Services Operations (SCSO), and Energy Australia’s (EA) Mt Piper Power Station (MPPS) near Lithgow, to the mine. The supply of water from Angus Place, SCSO and MPPS will enable a beneficial use of otherwise surplus water and provide a reliable water source for the project.

This land and soil capability assessment report forms part of the Environmental Impact Statement (EIS). It documents the assessment methods, results and the initiatives built into the project design to avoid and minimise impacts, and the additional mitigation and management measures proposed to address residual impacts which cannot be avoided.



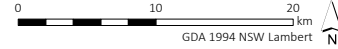
- KEY**
- Mine development project area (2,513.47 ha)
 - Mining lease application area (1,812.99 ha)
(Note: boundary offset for clarity)
 - Pressure reducing system
 - Pumping station facility
 - Pipeline corridor
 - Pipeline corridor (Blowdown Pond)
- Existing environment**
- Rail line
 - Primary road
 - Arterial road
 - River
 - Waterbody
 - NPWS reserve
 - State forest
 - Local government area
- Exploration lease boundaries (of interest)**
- Held by LFB Resources NL (Regis)
 - Held by others

Regional setting - project application area

McPhillamys Gold Project

Figure 1.1

Source: EMM (2019); Regis Resources (2019); DPE (2018); DFSI (2017); GA (2011)



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1.2. PURPOSE OF THIS REPORT

This report has been prepared to address government agency assessment requirements relating to soil and land resources for the Project Area and so provides the following information:

- a description and map of soil types classified according to the Australian Soil Classification System (Section 6).
- an assessment and map of soil and land capability classes (Section 8).
- a summary of the areas of soil that will be disturbed by the project and the proposed soil and land capability during the life of the project and after soil rehabilitation (Section 9).

1.3. ASSESSMENT GUIDELINES AND CRITERIA

1.3.1. Guidelines

The assessment was conducted according to the Land and Soil Capability Assessment Scheme: second approximation (NSW Office of Environment and Heritage, 2012) and the *Interim protocol for site verification and mapping of biophysical strategic agricultural land* (BSAL, OEH and OASFS, 2013). The BSAL assessment is described in a separate report (SSM, 2019b).

1.3.2. Secretary's Environmental Assessment Requirements

Environmental Assessment Requirements (EARs) for the project were issued by the Department of Planning and Environment (DPE) on 24 July 2018 and revised on 19 December 2018. The EARs identify matters which must be addressed in the EIS and essentially form its terms of reference. Table 1 list individual EARs relevant to this report and where they are addressed in this report.

Table 1. Soil and land -related EARS.

Requirement	Section addressed
Department of Planning and Environment	
<u>The EIS must address the following specific issues:</u>	
<ul style="list-style-type: none"> • Land – including an assessment of: <ul style="list-style-type: none"> ○ the likely impacts of the development on the soils and land capability of the site and surrounds, and a description of the mitigation and management measures to prevent, control or minimise impacts of the development; 	This report
<ul style="list-style-type: none"> ○ the likely agricultural impacts of the development, including identification of any strategic agricultural land; 	Addressed in the separate Agricultural Impact Statement prepared for the project (SSM 2019a)
<ul style="list-style-type: none"> ○ the likely impact of the development on landforms (i.e. local topography), including the long term geotechnical stability of any new landforms proposed on site; and 	Addressed in the Rehabilitation and Landscape Strategy for the project (EMM 2019b)
<ul style="list-style-type: none"> ○ the compatibility of the development with other land uses in the vicinity of the development in accordance with the requirements of Clause 12 of <i>State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007</i>, paying particular attention to the agricultural land use in the region; 	See Section 3.5.1 and Chapter 39 of the main report of the EIS (EMM 2019a).
Office of Environment and Heritage	
<p>8. The EIS must map the following features relevant to water and soils including:</p> <ul style="list-style-type: none"> a. Acid sulfate soils (Class 1, 2, 3 or 4 on the Acid Sulfate Soil Planning Map). 	Section 3.3

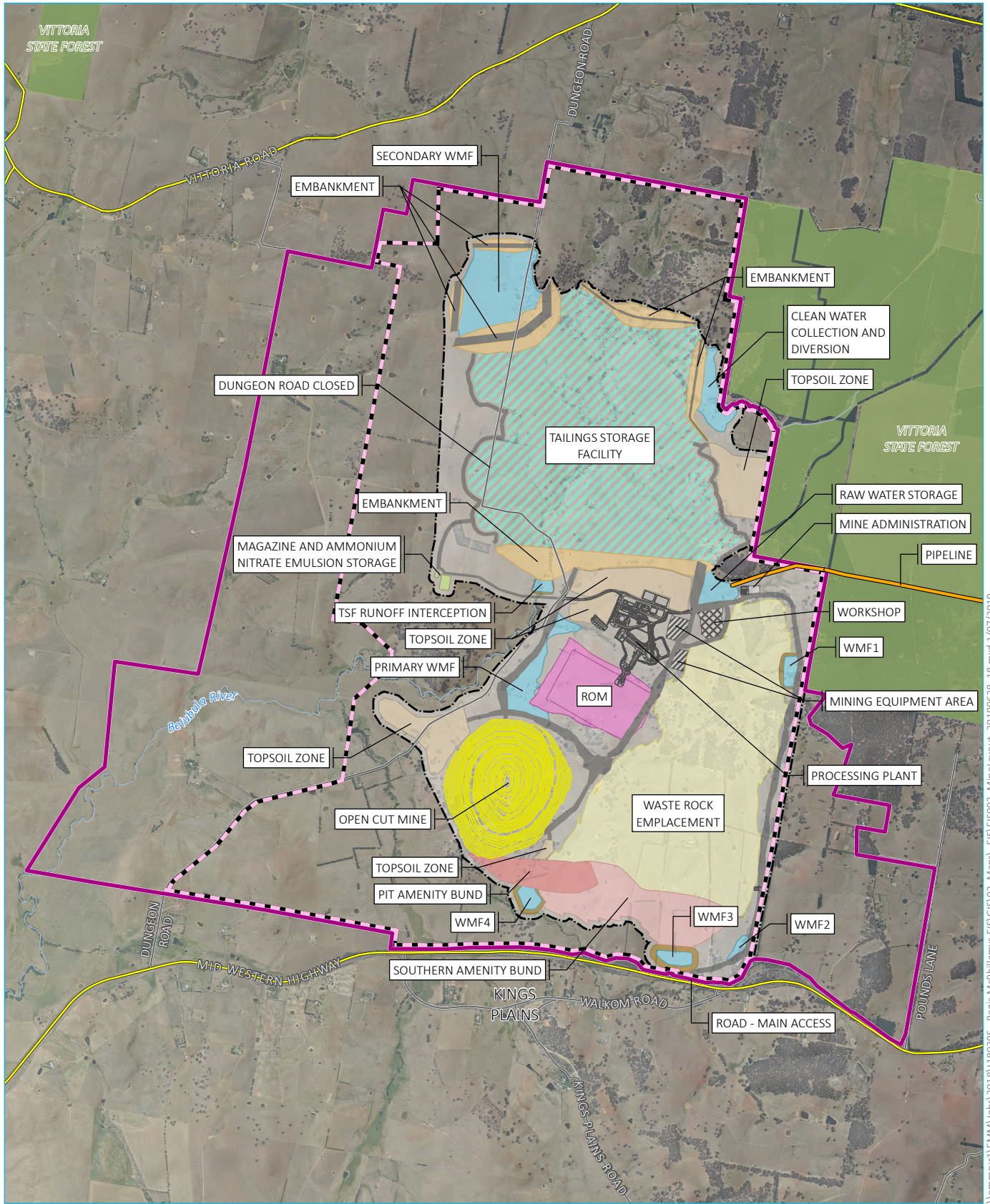
2. PROJECT DESCRIPTION

A full project description is provided in Chapter 2 of the EIS (EMM, 2019a). The key components of the project are as follows:

- Development and operation of an open-cut gold mine, comprising approximately one to two years of construction, approximately 10 years of mining and processing, and a closure period (including the final rehabilitation phase) of approximately three to four years, noting there may be some overlap of these phases. The total project life for which approval is sought is 15 years.
- Development and operation of a single circular open-cut mine with a diameter of approximately 1,050 metres (m) and a final depth of approximately 460 m, developed by conventional open-cut mining methods encompassing drill, blast, load and haul operations. Up to 8.5 million tonnes per annum (Mtpa) of ore will be extracted during the project life.
- Construction and use of a conventional carbon-in-leach processing facility with an approximate processing rate of 7 Mtpa to produce approximately 200,000 ounces, and up to 250,000 ounces, per annum of product gold. The processing facility will comprise a run-of-mine (ROM) pad and crushing, grinding, gravity, leaching, gold recovery, tailings thickening, cyanide destruction and tailings management circuits. Product gold will be taken off-site to customers via road transport.
- Placement of waste rock into a waste rock emplacement which will include encapsulation of material with the potential to produce a low pH leachate. A portion of the waste rock emplacement will be constructed and rehabilitated early in the project to act as an amenity bund.
- Construction and use of an engineered tailings storage facility to store tailings material.
- Construction and operation of associated mine infrastructure including:
 - administration buildings and bathhouse;
 - workshop and stores facilities, including associated plant parking, laydown and hardstand areas, vehicle washdown facilities, and fuel and lubricant storage;
 - internal road network;
 - explosives magazine and ammonium nitrate emulsion storage facilities;
 - topsoil, subsoil and capping stockpiles;
 - ancillary facilities, including fences, access roads, car parking areas and communications infrastructure; and
 - on-site laboratory.
- Establishment and use of a site access road and intersection with the Mid Western Highway.

- Construction and operation of water management infrastructure, including water storages, clean water diversion and sediment control infrastructure.
- A peak construction workforce of approximately 710 full-time equivalent (FTE) workers. During operations, an average workforce of around 260 FTE employees will be required, peaking at approximately 320 FTEs in around years four and five of the project.
- Construction and operation of a water supply pipeline (approximately 90 km long) from Centennial Coal's Angus Place Colliery and Springvale Coal Services Operations, and Energy Australia's Mount Piper Power Station, near Lithgow to the mine Project Area. The pipeline development will include approximately four pumping station facilities, a pressure-reducing system and a communication system. Approximately 13 megalitres per day (ML/day), up to a maximum of 15.6 ML/day, will be transferred for mining and processing operations.
- Installation and use of environmental management and monitoring equipment.
- Progressive rehabilitation throughout the mine life. At the end of mining, mine infrastructure will be decommissioned, and disturbed areas will be rehabilitated to integrate with natural landforms as far as practicable consistent with relevant land use strategies of the relevant local government areas (LGAs).

The project layout is depicted in Figure 2.1



Source: EMM (2019); Regis Resources (2019); Survey Graphics (2019); DPE (2018); DFSI (2017); GA (2011)

KEY

- Project application area
- Mine development project area (2,513.47 ha)
- Mining lease application area (1,812.99 ha) (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline corridor
- Project general arrangement
- Plant layout
- Road
- Water management facility (WMF)
- Sediment basin structure
- Existing environment
- Main road
- Local road
- Belubula River
- State forest

Mine development general arrangement

McPhillamys Gold Project

Figure 2.1

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3. LAND CAPABILITY AND SOIL ASSESSMENT METHODS

3.1. OVERVIEW OF ASSESSMENT PROCESS

The soil and landscape assessment was undertaken as a stratigraphic survey (Hewitt *et al.*, 2008). A stratigraphic soil survey is one in which properties at each location are assumed to be correlated to some extent with the position in the landscape and broad scale variables such as geology and slope. Soil properties between each site observed are then expected to vary with covariates such as slope, soil colour or geology, and these covariates are then used to map soil type boundaries. In situations where the covariates are poor predictors of soil type, an alternative is to assume that the nearest soil pit is the best predictor of soil properties.

The following steps were undertaken to complete the land capability and soil assessment for this report:

- a desktop review and assessment of existing information relating to soils and landforms in the Project Area (Section 4).
- a soil survey that consisted of field description of soil properties and laboratory analysis to assess the range and distribution of soil properties across the Project Area (Section 6).
- use of a different subset of results from the soil survey to assess land and soil capability across the Project Area (Section 8).
- use of a third subset of results from the soil survey to provide soil management and mitigation measures (Section 10).
- use of soil type distribution and land and soil capability and assess the impact of the project on agricultural soil resources (Section 9.2.4).

3.2. DESKTOP ASSESSMENT

The desktop assessment reviewed a range of soil and landscape information across the Project Area. Layers included: aerial image, published soil landscapes and their properties, historic land use, geology, regolith, radiometrics (radiation emitted by the soil), shape of the land surface as indicated by selected indices and some soil properties predicted by the Soil and Landscape Grid of Australia.

The desktop assessment procedure was:

- i. Map regional (1:250,000 scale) soil and landscape properties.
- ii. Map remote sensed data of aerial image, and from a 5 m resolution digital elevation model generated from LiDAR data by NSW Spatial Services.
- iii. Map selected soil properties from Soil and Landscape Grid of Australia. These properties are represented by raster images with 3 arcsecond pixels (approximately 90 x 90 m), and have been generated by a group that includes CSIRO, Geoscience Australia, 8 state and territory government agencies and Sydney University.

- iv. The findings of the desktop assessment, which are presented in Section 4, were used to guide the location of the soil survey sites.

3.3. ACID SULPHATE SOIL DESKTOP ASSESSMENT

A desktop assessment of the potential for occurrence of acid sulphate soil in the Project Area was conducted according to the NSW Government's Acid Sulphate Soils Assessment Guidelines (Ahern *et al.*, 1998).

3.4. FIELD SURVEY

3.4.1. Site Selection

Sample sites were selected using the following system:

- i. A regular grid with rows and columns 375 m apart was created across the Project Area;
- ii. Sample sites in areas with slope steeper than 10% were deleted;
- iii. Sample sites were moved within each cell to avoid watercourses, dams, houses and fence lines;
- iv. Circles of 375 m diameter were drawn for each sample site;
- v. A check was made that, as far as possible, all areas with slope less than 10% were within 375 m of a sample site. Sample sites were moved to cover the areas that were further than 375 m from a sample site. This sometimes resulted in new areas not being within 375 m of a sample site, so steps iii, iv and v were repeated until satisfactory coverage was achieved.

The resulting sample density was 131 sites across the 2,513 Project Area consisting of 126 soil pit profile descriptions and 5 core descriptions; an average of 19 ha per sample site. This sample density is at the low end recommended by Schoknecht *et al.* (2008). However, all these observations were detailed profile descriptions (OEH and OASFS, 2013), and all 5 cores and 122 pits had samples tested in a laboratory.

3.4.2. Survey Observations and Methods

The majority of pits were described in a major soil sampling campaign supplemented by 4 smaller sampling campaigns to sample the Project Area extensions. As a result, we decided to describe all soil pits as detailed sites, and collect sufficient soil from each soil pit to conduct laboratory analysis if required.

Soil properties were described in soil pits that were dug to 1.4 m or refusal by a 5 tonne mini-excavator. The location of each pit was recorded using a hand-held GPS, giving a position accuracy of approximately 5 m.

Field observations for each of the 131 detailed sites were;

- site observations: GPS location, nature of exposure, slope, slope measurement method, aspect, site morphology, slope morphology, landform element, aspect, microrelief type, microrelief depth, microrelief extent, lithology, lithology identification method, rock

outcrop, current land use, predevelopment vegetation community, growth form, ground cover percentage, current land use, site disturbance, current surface condition, predicted dry surface condition and predicted wet surface condition.

- profile observations for each horizon: lower depth, moisture, grade of pedality, fabric, size and shape of dominant and subdominant peds. Type, amount, distribution, orientation, weathering and size of coarse fragments. Type, amount, strength, form and size of segregations. Moist colour of all horizons and dry colour of A2 horizons. Type, abundance, colour and contrast of mottles. Field texture. Field tests for pH, effervescence to dilute hydrochloric acid, slaking, dispersion, EC1:5 for selected horizons. SoilPAK score and boundary distinctness.
- overall profile observation: effective rooting depth, profile permeability, profile drainage, base of observations, substrate.
- photographs of landscape around the site and soil profile.
- Each site was classified to ASC family level according to Isbell (2002). As a result, each pit is allocated to: ASC order, ASC suborder, ASC Great Group, ASC Subgroup, ASC Family properties of Topsoil thickness, gravel and texture, subsoil texture and soil depth.

This gives a total of more than 150 properties recorded for each pit.

The terms used to describe soil properties were applied according to definitions in the eDirt user manual (OEH, 2016), which is based on Australian Soil and Land Survey Field Handbook, third edition (NCST, 2009).

These properties were recorded on field sheets, and entered into a custom soil database. From this database, data were extracted to estimate land and soil capability class and used to construct logs of profile properties.

3.5. LABORATORY TESTING

Laboratory testing was undertaken to assist in the classification of soil types and the determination of land and soil capability classes.

Soil samples were collected from standard depths of 0 to 5 cm, 5 to 15 cm, 15 to 30 cm, 30 to 60 cm and 60 to 100 cm for all detailed sites unless the depth range covered the boundary between the A and B horizons of duplex profiles. In duplex soil where a sample range covered the A to B horizon boundary, the depth range was shortened and only one horizon was sampled.

Samples from 127 of the 131 sites have been subjected to laboratory analysis. Results from 5 cores sampled in the Project Area in 2014 were incorporated into the data set used for this survey.

Samples were tested by Incitec Pivot Laboratories which has NATA accreditation in accordance with ISO/IEC 17025, and ASPAC accreditation against the methods of Rayment and Lyons (2010).

Soil chemical properties that are necessary for completing the BSAL flowchart (OEH and OASFS, 2013) and classifying the soil according to the ASC were measured for all samples tested. These properties were: pH in water and CaCl₂, exchangeable cations of calcium, magnesium, potassium, sodium and aluminium, EC_{1:5} and chloride.

Selected properties relevant to soil management were measured. These were:

0 to 5 and 5 to 15 cm only:

Soil colour and texture, organic carbon, Colwell phosphorus, Phosphorus Buffer Index, KCl sulphur, DTPA copper, DTPA zinc, DTPA manganese, DTPA iron, Hot CaCl₂ boron, extractable molybdenum and Emerson Class.

All depths:

- Nitrate nitrogen, ammonium nitrogen.
- Particle size distribution was measured using the hydrometer method for all depths in 43 pits. The proportion of clay, silt, fine sand and coarse sand was reported for these samples.
- Ratios calculated from the measured properties were: Exchangeable Calcium Percentage, Exchangeable Magnesium Percentage, Exchangeable Potassium Percentage, Exchangeable Sodium Percentage, Exchangeable Aluminium Percentage, Calcium to Magnesium ratio and Electrochemical Stability Index were calculated for each sample tested, as was E_ce (electrical conductivity of saturated extract).

This gives a total of 75 measured chemical properties and 40 calculated ratios in each pit tested, and an additional 25 properties measured where particle size distribution was measured.

The Great Groups of many of the Soil Orders of the ASC of Isbell (2002) rely on an estimate of the base status. This is essentially the Cation Exchange Capacity divided by the clay content expressed as a proportion. This ratio was calculated from the laboratory measured cation exchange capacity and the clay content measured in the particle size distribution where available, or the clay content estimated from field texture in other cases.

Some profiles had the appearance of Ferrosols (Krasnozems) that Kovac *et al.* (1990) reported in the Vittoria-Blayney soil landscape that includes the Project Area, so samples from the subsoil of 6 pits; OM703, OM716, OM737, OM762, OM793 and OM794 were analysed for free iron by SESL Australia.

3.6. SOIL STRIPPING AND RESTORATION OF LAND CAPABILITY

Two soil properties relevant to disturbance during the mine life were assessed at each detailed site assessed. The soil stripping suitability rates the suitability of soil for use as topdressing material (topsoil) during mine rehabilitation. The subsoil settling class is an estimate of the potential for dispersed clay to remain suspended in water in sediment basins. The soil erodibility factor is an estimate of the susceptibility of agricultural soil to water erosion.

3.6.1. Soil Stripping Suitability

The suitability of soil for use as topsoil during rehabilitation was determined while assessing soil pits using the physical assessment method of Elliot and Veness (1981) as presented in NSW Minerals Council (2007) and shown in Figure 3. Inputs to the Elliot and Veness (1981) flowchart were calculated for

all horizons to 50 cm by translating field and laboratory measured properties using the conversions below:

Step 1 Structure grade: Medium or strong structure grade has more than 30% peds, weak structure grade has less than 30% peds, massive structure has no peds (NCST, 2009).

Step 2 Coherence wet: None or partial field slaking of indicates some wet coherence, complete slaking indicates no wet coherence.

Step 3 Mottle: Layers were classified as mottled if there was more than 5% mottle and the mottle type was not biological.

Step 4 Macrostructure: Dimensions classified as greater than 10 cm if both the primary and secondary ped size were larger than 10 cm.

Step 5 Force to disrupt peds: Not assessed because of wide range of subsoil moisture content during field assessment.

Step 6 Texture: Texture and the proportion of coarse fragments and segregations were extracted from the field soil descriptions.

Step 7 pH: pH_{H_2O} from field pH estimates.

Step 8 salinity: From measured electrical conductivity of 1:5 suspension converted to electrical conductivity of saturated extract using texture dependant factors.

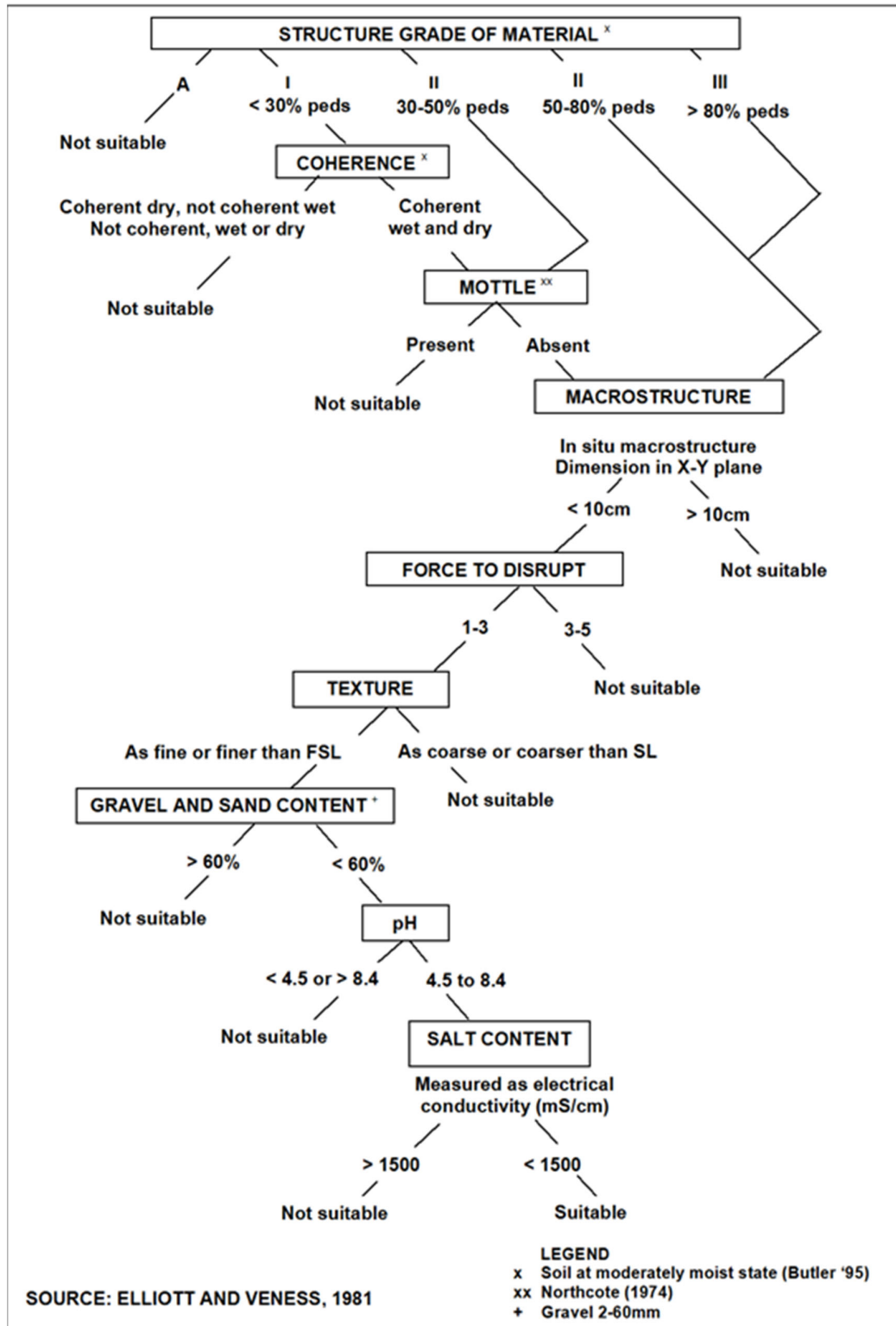


Figure 3. Flowchart for selection of topsoiling material.

3.6.2. Soil Erodibility Factor (K)

The soil erodibility factor (K, t ha h/ha MJ mm) was estimated for 61 sites for which particle size analysis was measured by using the equation:

$$100K = * 2.1 * M^{1.14} * (10^{-4}) * (12-a) + 3.25(b-2) + 2.5(c-3) \quad (1)$$

Where M is (percentage of silt + very fine sand) * (100 – percent clay) a is the percentage of organic matter, b is a soil structure class, and c is a profile permeability class (equation 3 in Wischmeier and Smith, 1978). Wischmeier and Smith (1978) state that this equation provides data for the nomograph in their report, which is reproduced by Landcom (2004) to estimate K .

The inputs used were: organic matter obtained by multiplying organic carbon of 0 to 5 cm layer by 1.72; soil texture estimated in the field or laboratory measured particle size for selected samples, surface soil structure and profile permeability described in the field. These estimates were input to the Landcom (2004) nomograph.

Rosewell (1993) indicates that sites with a K value less than 0.02 have soil with low erodibility, K between 0.02 and 0.04 indicates moderate erodibility, and K greater than 0.04 indicates high erodibility.

3.7. SOIL MAPPING UNIT BOUNDARIES

Soil in the Project Area was easily divided into alluvial soil in valley floors and colluvial soil on elevated areas. The colluvial soil had relatively uniform topsoil properties, but was subdivided into 7 soil mapping units primarily on subsoil properties.

Soil mapping unit boundaries were drawn to group soil pits with similar properties and along changes in land surface shape from the Digital Elevation Model across the Project Area.

3.8. LAND CAPABILITY ASSESSMENT

The land and soil capability was determined according to criteria in *Land and Soil Capability Assessment Scheme: second approximation* (OEH 2012). Capability assessment is based on slope, wind hazard, soil pH, surface structural stability, salinity, rock outcrop, waterlogging potential and existing erosion (OEH, 2012) and is described in more detail in Section 8.

The Land and Soil Capability class was determined for each soil Mapping Unit from the calculated value for each of the 131 detailed profile descriptions across the Project Area. This process is described in more detail in Section 8.

4. REGIONAL SETTING

4.1. INTRODUCTION

The Project Area is in a strongly dissected landscape and contains more than a dozen hills (Map 1). Each of these hills covers between 20 and 150 ha and contains a range of soil types. The valley floors between the hills are generally less than 100 m wide except near the southwestern corner where the Belubula River floodplain is of the order of 1 km wide. The minor valley floors which are generally 300 to 800 m apart follow a dendritic pattern and drain in a generally western direction.

The surface drainage can be divided into 5 subcatchments (Map 1), 3 of which (Northwest, Southeast and Macquarie) include the catchment watershed, whilst the remaining 2 (Northeast and Southwest) also receive runoff from more elevated land.

The dissected nature of the landscape described above indicates that there are unlikely to be large contiguous areas of similar soil, so mapping units will be expected to contain a number of soil types.

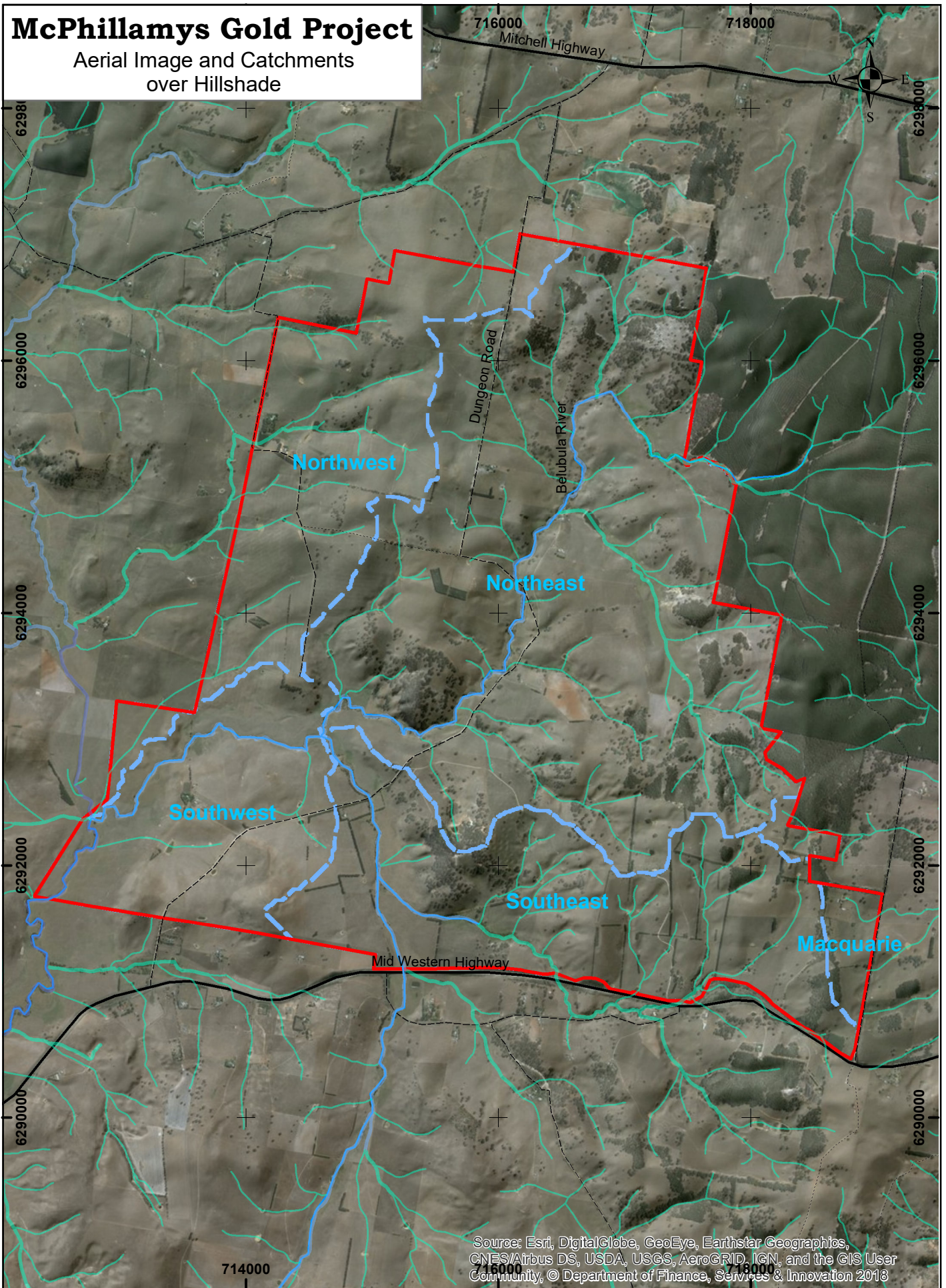
4.2. CLIMATE

The Project Area is located approximately 8 km northeast of Blayney on the Central Tablelands of NSW and has a temperate climate with a warm summer and no dry season (BOM, 2005). The average rainfall is 765 mm (DSITI, 2017) and is distributed relatively evenly throughout the year.

Average rainfall exceeds average potential plant water use for four months of year (Figure 4). There is substantial variation in rainfall in that upper standard deviation exceeds average rainfall by 70 mm in June and July. This would be expected to result in waterlogging of susceptible profiles in many, but not all years.

McPhillamys Gold Project

Aerial Image and Catchments
over Hillshade



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, © Department of Finance, Services & Innovation 2018

Certification

Project Area (2,513 ha)	6 Roads
Catchments	7 CLASS
Hydroline	8
<all other values>	9
1; 2; 3; 4	10
5	2
	3
	4
	5

Draft/Uncontrolled Document
Unless Signed & Dated

Scale 1:40,000 (A4)

0 1250 500 750 1,000
Metres

Job Code: Cr408
Map Printed: 2019
Contact: Sustainable Soils Management
Phone : (02) 68 473367
Roads: NSW LPI
Watercourses: NSW LPI
Hillshade: From NSW Spatial Services
Catchments: From NSW Spatial Services
Datum: WGS 84
Projection: UTM

SSM
Sustainable Soil
Management

Map 1

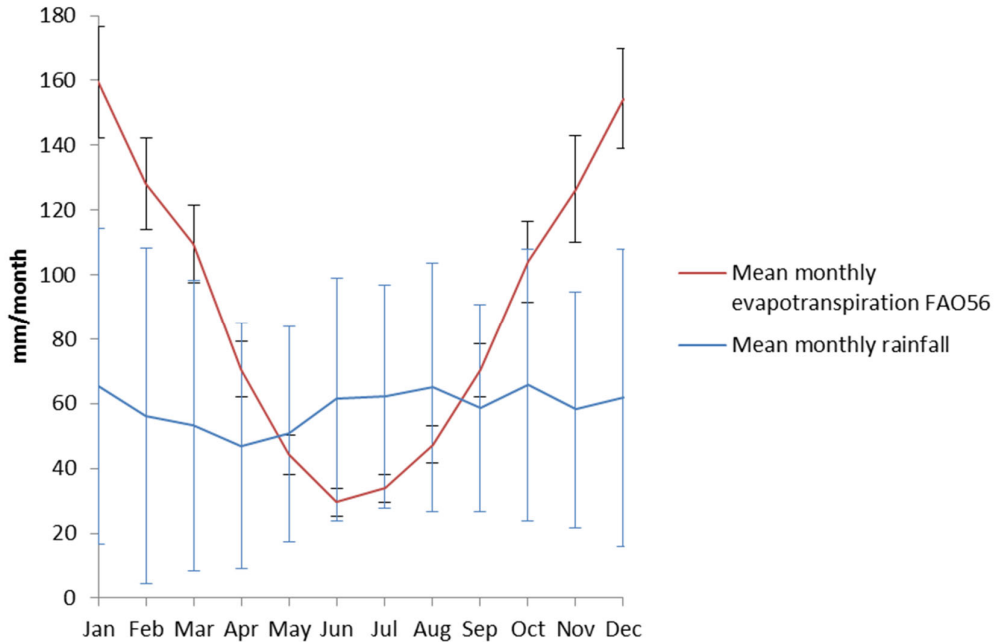


Figure 4. Average monthly rainfall and evapotranspiration for McPhillamys Gold Project (36°30' S, 149°18' E) from 1889 to 2016 (DSITI, 2017).

The Blayney area experiences four distinct seasons with warm summers and cool to cold winters. The annual average monthly maximum temperatures for Blayney range from 26°C in January to 10°C in July and minimum temperatures range from 1°C in July to 12°C in February (Figure 5).

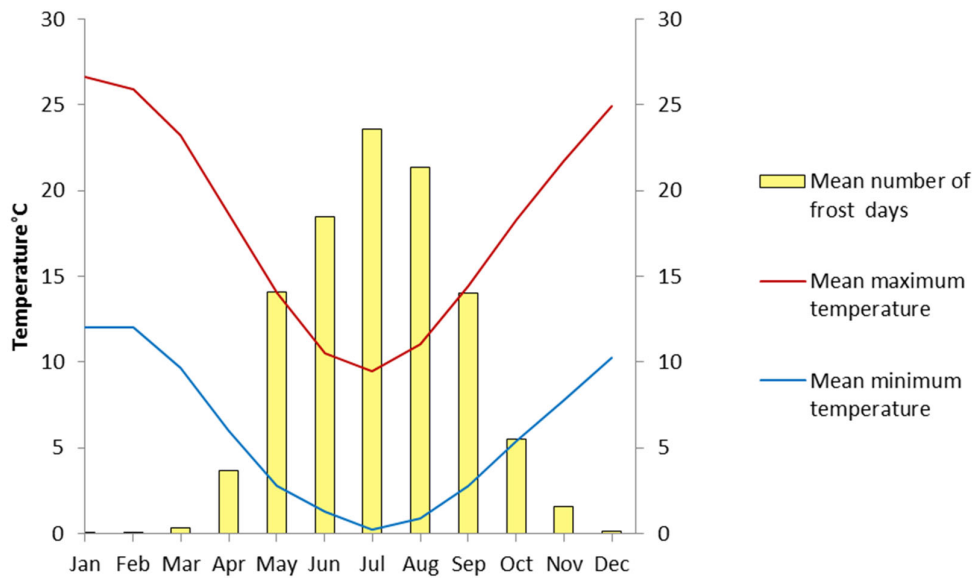


Figure 5. Average monthly maximum and minimum temperatures and frost days per month for McPhillamys Gold Project (36°30' S, 149°18' E) from 1889 to 2016 (DSITI, 2017).

The frequency of frosts was calculated as the number of days when the minimum temperature was estimated to be less than 2.2°C at screen level (1.2 m above ground, BOM, 2014). There are a large number of frosts during the wettest part of the year (Figure 5), which would be expected to restrict plant growth and water use during these wet periods.

4.3. REGIONAL SOIL AND LAND DESCRIPTION

4.3.1. Soil Landscapes

The Project Area was mapped by Kovac *et al.*, (1989) as belonging to two soil landscapes. The elevated and undulating parts of the Project Area were mapped as Vittoria-Blayney Soil Landscape (Map 2a). Soil profiles in the Vittoria-Blayney soil landscape have a consistent pattern of loamy topsoil over clayey subsoil that is red in elevated parts of the landscape and tends to be mottled yellowish brown in lower parts of the landscape (Figure 6). Kovac *et al.*, (1990) rated land capability of all profiles they reported in the Vittoria-Blayney Soil Landscape as Class III, IV or VI; rated 3 of the 4 soil types as low chemical fertility, and rated the soil with yellow subsoil as imperfectly to poorly drained.

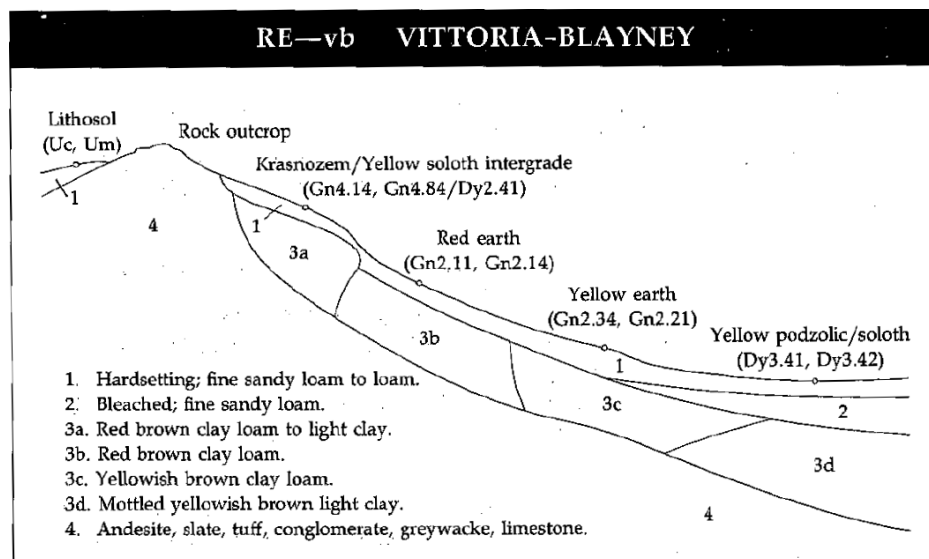
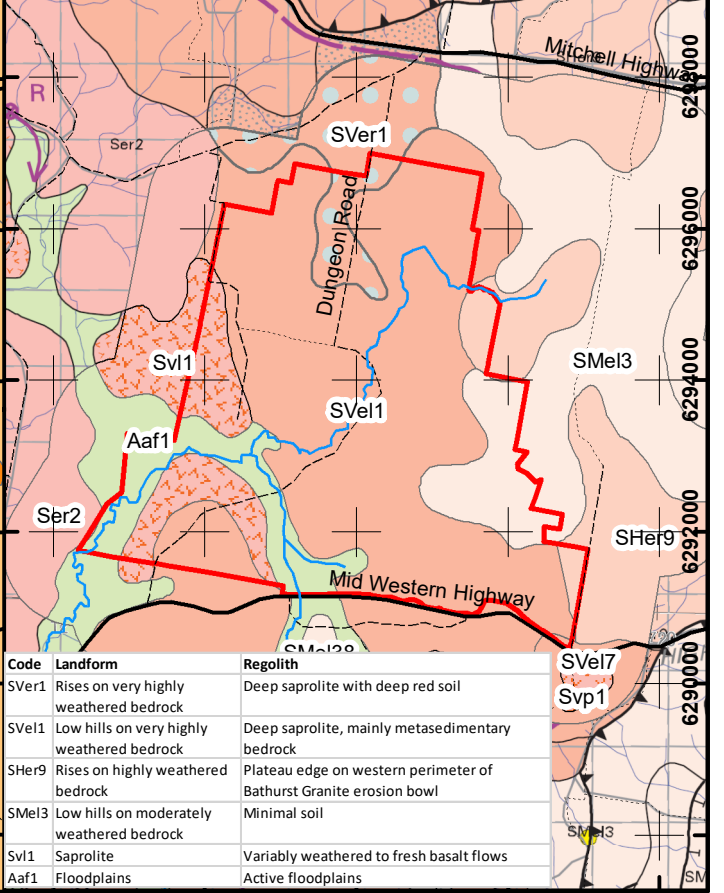
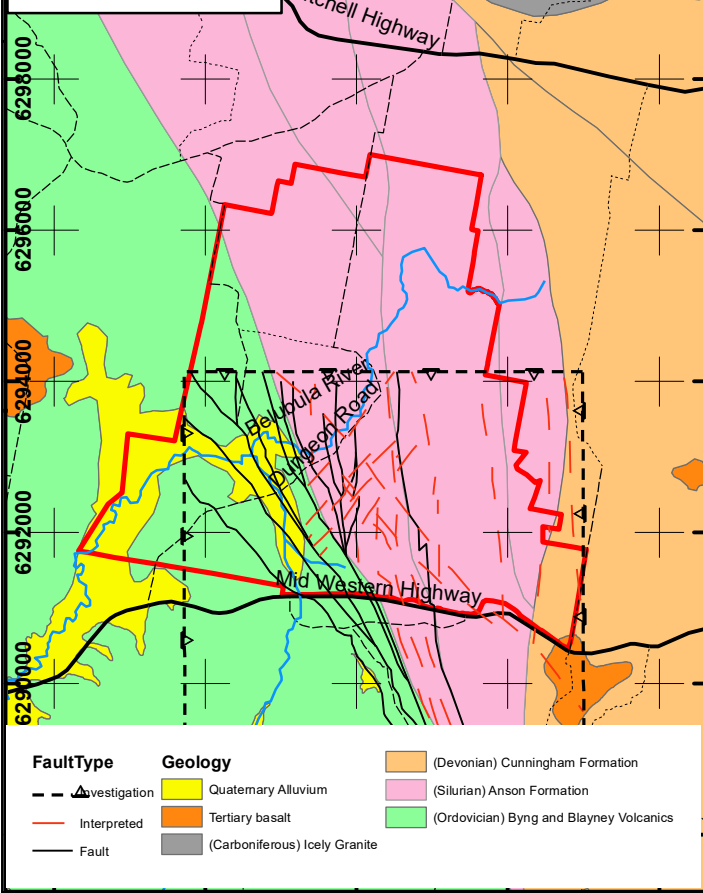
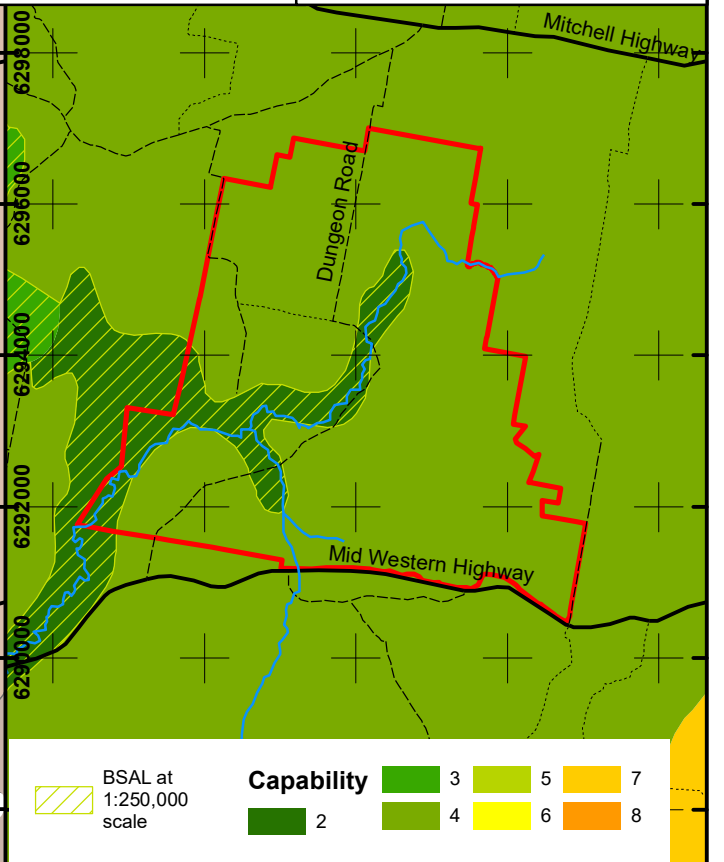
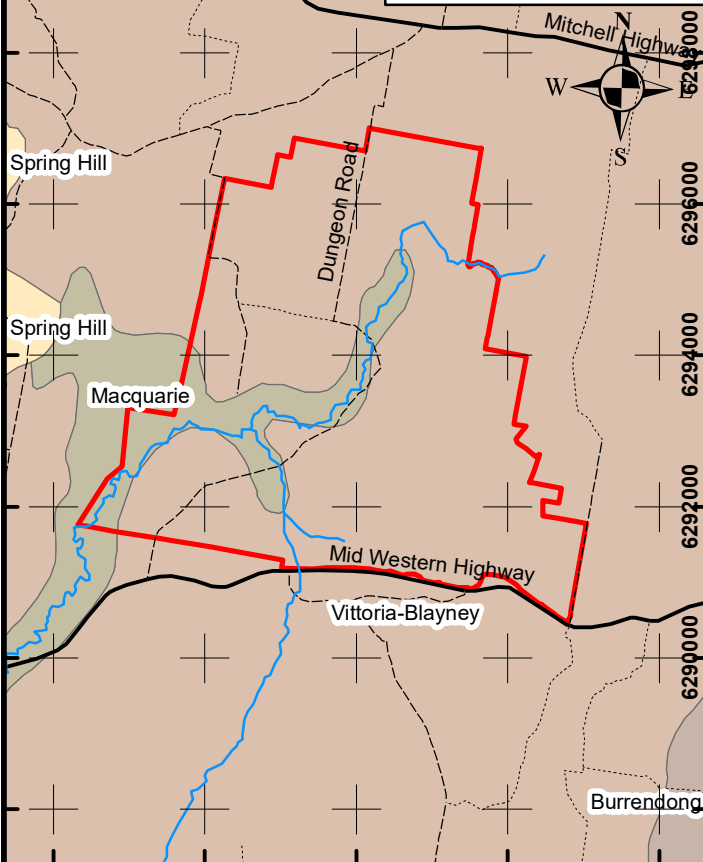


Figure 6. Schematic toposequence of Vittoria-Blayney Soil Landscape (Kovac *et al.*, 1990).

Areas in the floodplain of the Belubula River were mapped by Kovac *et al.*, (1989) as Macquarie Soil Landscape. Although soil types in the Macquarie Soil Landscape are also variable, all 4 soil types described in this landscape were allocated to Land Capability Class I, II and III (Kovac *et al.*, 1990).



Code	Landform	Regolith
SVer1	Rises on very highly weathered bedrock	Deep saprolite with deep red soil
SVE1	Low hills on very highly weathered bedrock	Deep saprolite, mainly metasedimentary bedrock
SHer9	Rises on highly weathered bedrock	Plateau edge on western perimeter of Bathurst Granite erosion bowl
SMel3	Low hills on moderately weathered bedrock	Minimal soil
Svl1	Saprolite	Variably weathered to fresh basalt flows
Aaf1	Floodplains	Active floodplains
SVer17 Svp1		

Certification
Draft/Uncontrolled Document
Unless Signed & Dated

Watercourses Project Area (2,513 ha)

Intermittant
Perennial

Roads --- 3
CLASS --- 4
— 2 5

0 0.5 1 2 3 4 Kilometres

1:100,000 on A4

Job Code: Cr408
Map Printed: 2018
Roads: NSW LPI
Watercourses: Geoscience Australia

SSM
Sustainable Soil Management

Contact: Sustainable Soils Management
Phone : (02) 68 473367
Datum: WGS 84
Projection: UTM

Map 2

4.3.2. Land and Soil Capability and Regional BSAL

The NSW government has mapped the Vittoria Blayney Soil Landscape as Land and Soil Capability (LSC) class 4 and the Macquarie Soil Landscape as LSC class 2 (Map 2b). LSC class 4 land has moderate to severe limitations for some land uses while LSC class 2 land is capable of a wide range of land uses (OEH, 2012).

The Macquarie Soil Landscape was mapped as Biophysical Strategic Agricultural Land (Map 2b) as a result of being mapped as LSC class 2.

4.3.3. Geology

Geology beneath the Project Area becomes gradually older from east to west. The youngest material is the Devonian (359 to 419 million years ago, mya) Cunningham Formation. The majority of the Project Area is underlain by Silurian (440 to 410 mya) Anson Formation, with older Ordovician (500 to 444 mya) Byng Volcanics and Blayney Volcanics along the western side of the Project Area (Map 2c).

The Cunningham Formation is dominated by slates with thin sandstones and conglomerates. The Anson Formation typically contains siltstone, sandstone, interbedded with feldspathic meta-sandstone and some limestone. The Byng Volcanics were deposited as flows of basalt and andesite. The Blayney Volcanics are classified as andesite and basalt and identifiable in the field as they contain crystals (phenocrysts) in a dark green matrix.

The Belubula River floodplain is mapped as Quaternary Alluvium. This unit should correspond to the Macquarie Soil Landscape in Map 2a, but there are differences between the two which can be resolved by the field survey part of this investigation.

Pogson and Watkins (1998) noted that the Cunningham Formation forms rugged and barren ridges which constitute very poor agricultural land.

While the Anson Formation is dominated by siltstone, it contains layers of conglomerate, limestone and thin layers of volcanoclastic (made of small volcanic fragments) rock (Pogson and Watkins, 1998). Exploratory drilling for the McPhillamys Gold Project has found that bedding planes in the Anson Formation are close to vertical (T. Ridges, pers comm.).

The Byng and Blayney Volcanics were laid down as flows of basalt and andesite (Pogson and Watkins, 1998), which was deposited in thicker layers than the Anson and Cunningham Formations.

The geology has two important effects on soil distribution across the Project Area. First, the near vertical bedding planes of sedimentary rock would result in larger short-range variation in soil developed on the Cunningham and Anson Formations. In contrast, it is likely that the Byng and Blayney Volcanics are likely to be more uniform as the lava flows are thicker and more uniform than layers of sedimentary rock. Second, it would be expected that soil developed from weathering of basic and intermediate volcanic rock of the Byng and Blayney Volcanics would be inherently more fertile than soil developed from metamorphosed sedimentary rock in the Cunningham and Anson Formations.

4.3.4. Regolith

Regolith refers to soil and weathered rock that overlies parent rock. As a result, a description of regolith accounts for the parent material, the intensity and duration of weathering of the parent material, and redistribution by erosion, movement and deposition caused by wind or water.

Chan (2003) summarised the processes that result in the present regolith properties in the Bathurst-Orange area as:

- Deposition and folding of ancient (Silurian and Ordovician) rocks
- Erosion to form valleys that drained to the north
- Deposition of sediment beneath rivers and lakes, then possibly marine material that covered the majority of the landscape with younger (Jurassic and Cretaceous) rocks
- Erosion of nearly all the Jurassic and Cretaceous rocks to leave small pockets of Surat Basin sediments (Figure 7)
- Volcanic formation of Mt Canobolas (13 to 11 million years ago) and associated lava plains and radial lava flows
- Erosion of large areas of the lava flows to leave isolated patches of basaltic material (Figure 7b)
- Formation of Quaternary land surface by deposition and redistribution of alluvial and aeolian (wind-blown) material. Aeolian material has been identified as red soil with SiCL topsoil over SiC subsoil 10 km east of Blayney by Hesse *et al.*, (2003).

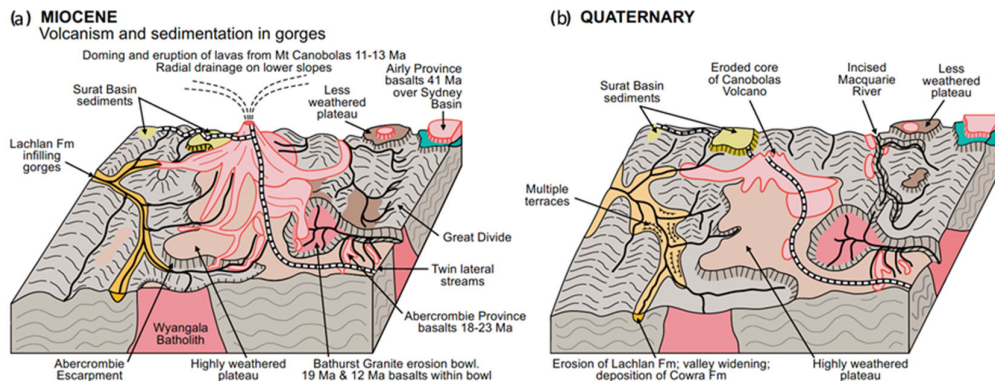


Figure 7. Regolith formation on Bathurst and Forbes 1:250,000 map sheets (from Chan, 2003).

The land in the Project Area is depicted in Figure 7 as part of a highly weathered plateau, which appears to have been weathering and eroding for 10 million years or more. The detail of the regolith map (Map 2d) indicates that the majority of the area mapped as Anson Formation geology is mapped as rises and low hills with a deep layer of weathered rock (saprolite), then parent material of igneous or metamorphic rock (metasedimentary rock or metamorphosed sedimentary rock). The large depth of saprolite in the SVe11 and SVer1 regolith landforms (Map 2d) implies a very long period of weathering that generally results in soil with low fertility. The rises of the SHer9 regolith landform and low hills of the SMel3 regolith landform are

likely to have low capability as they are in erosional parts of the landscape (SHer9) or have shallow soil (SMel3).

In contrast, there is some potential that areas of fertile soil have developed on the Sv11 regolith landform.

The alluvial Aaf1 regolith landform could be fertile. Note that the extent of alluvial material in both the regolith and geology maps does not extend northward past the centre of the Project Area (Map 2d).

4.3.5. Elevation

The elevation surface indicates that there is a 150 m difference from the lowest point of 873 m on the Belubula River floodplain near the south-western corner to highest point of 1025 m on the T-shaped ridge near the eastern boundary of the Project Area (Map 3a). The high points of the Project Area include a T-shaped ridge near the eastern edge of the area and a second ridgeline that starts near the centre of the area and continues to its northern boundary.

Surface drainage patterns are controlled by these ridges and 2 almost conical hills near the south of the Project Area that were noted in Map 1.

4.3.6. Slope

Slope followed a pattern across the Project Area of being relatively flat on top of the hills with steep upper and mid-slopes. The slope became flatter below the mid slope and the flattest land occurred on the valley bottoms (Map 3b). The strip mapped as Macquarie Soil Landscape in Map 2a but not alluvium in either the geology (Map 2c) or regolith (Map 2d) consists of a narrow valley surrounded by steep slopes, so the alluvial Macquarie Soil Landscape is likely to be narrower than is indicated in Map 2b.

When slope is classified according to the LSC criteria half the land has a slope between 3 and 10%, with about 38% of the Project Area steeper than 10% and 13% flatter than 3% (Table 2).

Table 2. Areas of slope classes across McPhillamys Gold Project Area used to derive LSC slope classes. (Calculated from 5 m LiDAR DEM from NSW Spatial Services.)

Slope Range	Description	Area (ha)
>33%	Slope Class 7	5
20 to 33%	Slope Class 6	89
10 to 20%	Slope Class 4 or 5	856
3 to 10%	Slope Class 3	1,245
1 to 3%	Slope Class 2	244
0 to 1%	Slope Class 1	75
Total		2,513

4.3.7. Ternary Radiometrics

Ternary radiometrics delineates areas with similar mineralogy based on radiation emitted from potassium, thorium and uranium in the surface 30 cm of soil. These radioactive elements occur in all rocks and soil (Wilford, 2008).

The ternary radiometrics surface of the Project Area indicates that areas flatter than 10%, are predominantly high in thorium (green, Map 3c). There is a north-south strip of elevated potassium (pink) that is predominantly in areas with slope greater than 10% with an easterly aspect. There are also two smaller patches of elevated potassium on the western side of the two almost conical hills in the south of the Project Area. There are also four patches of elevated uranium in a line from near the southwestern corner of the Project Area to near the centre of the northern boundary. These are also generally in areas where slope is greater than 10%.

Carver (2019) reported that 4,800 assays of samples from McPhillamys Gold Project indicated that Uranium, Thorium and Uranium were present at background levels expected in the observed geology.

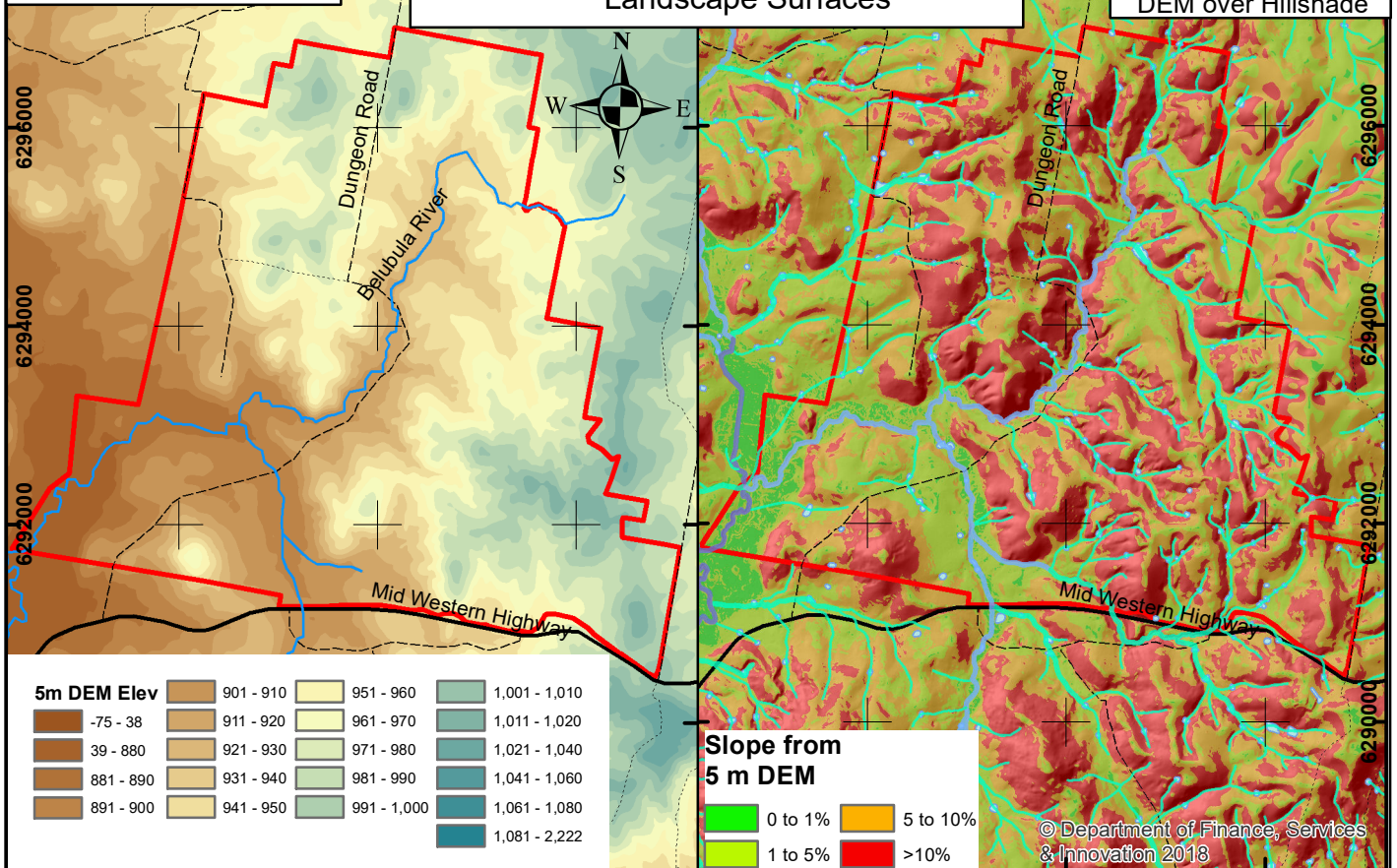
4.3.8. Catchment Scale Land Use

The Catchment Scale Land use maps shows that almost all of the Project Area was used for grazing of native and introduced pasture (Map 3d). Data associated with the map indicates that the northwestern corner designated as cropping was cut for hay. This indicates that current land managers rarely till the soil.

3a. Elevation (NSW Spatial Services 5 m DEM)

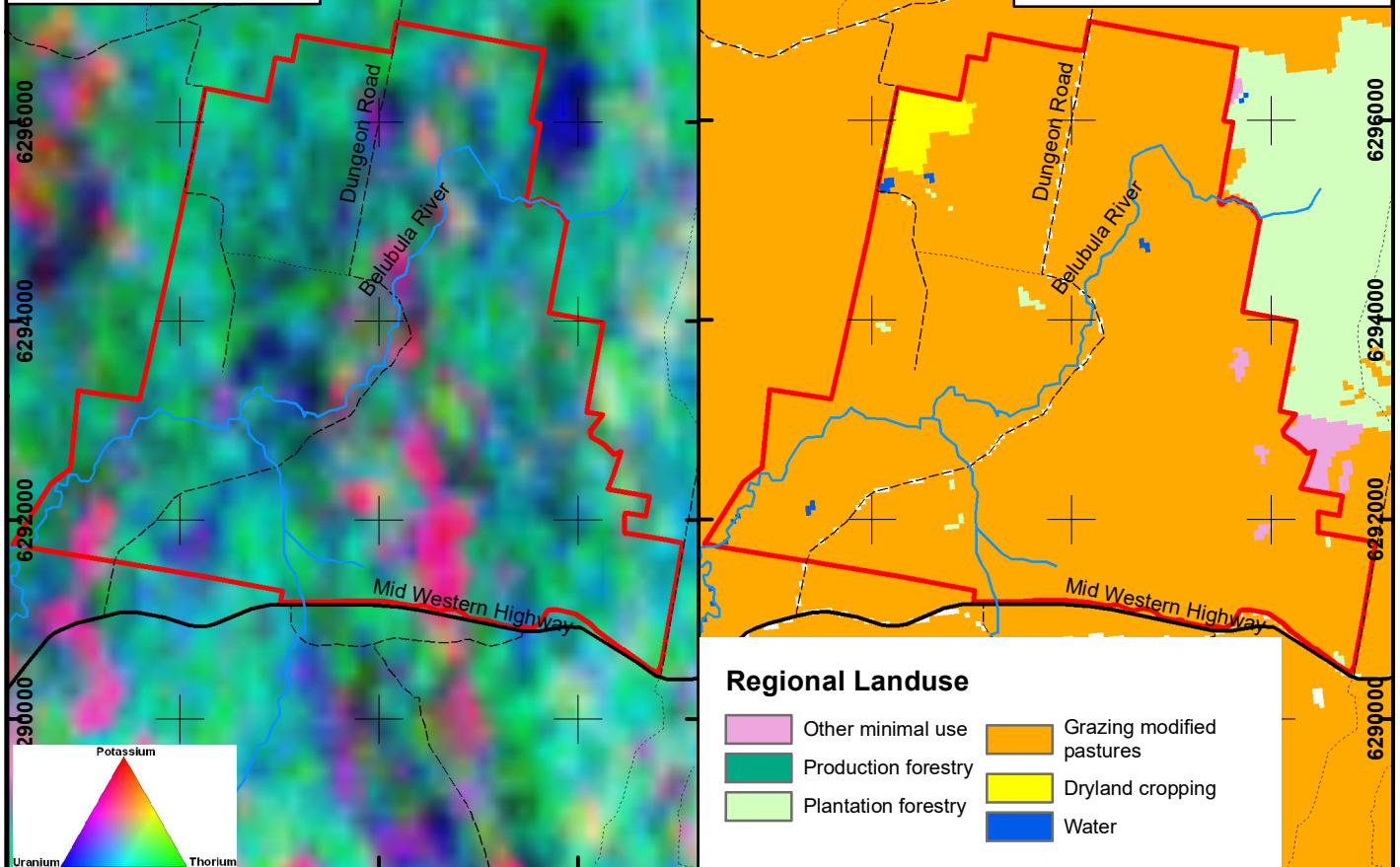
McPhillamy Gold Mine Landscape Surfaces

3b. Slope from NSW Spatial Services DEM over Hillshade



3c. Ternary Radiometrics (NSW Minerals)

3d. Catchment Scale Landuse (ABARES, 2012)



Certification

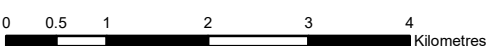
GeoscienceAu... NSWGeologyR... --- 3 Project Area (2,513 ha)

CLASS
 Intermittent
 Perennial

Job Code: Cr408
 Map Printed: 2019
 Roads: NSW LPI
 Watercourses: NSW LPI



Contact: Sustainable Soils Management
 Phone : (02) 68 473367
 Datum: WGS 84
 Projection: UTM



4.3.10. Multiresolution Valley Bottom Flatness Index

The Multiresolution Valley Bottom Flatness index (MrVBF) uses slope and elevation to differentiate valley bottoms from elevated areas. MrVBF is relevant to soil properties in undulating areas such as the Project Area in that soil tends to erode from high and steep areas and be deposited in valley bottoms. As a result, the moderately steep areas that occupy a large proportion of the Project Area (Map 4a) are less likely to be deep and fertile than soil in lower lying areas.

4.3.11. Soil Depth

Soil depth gives an indication of the volume of soil that can store nutrients and water for plants. For a given soil quality, deeper soil provides a larger buffer, principally against water shortages, than shallow soil.

The soil within the Project Area predicted to be deeper than 900 mm was principally in the area mapped as Alluvium in Maps 2b and 2c (Map 4c). The majority of the remainder of the Project Area was predicted to have soil between 750 and 900 mm deep.

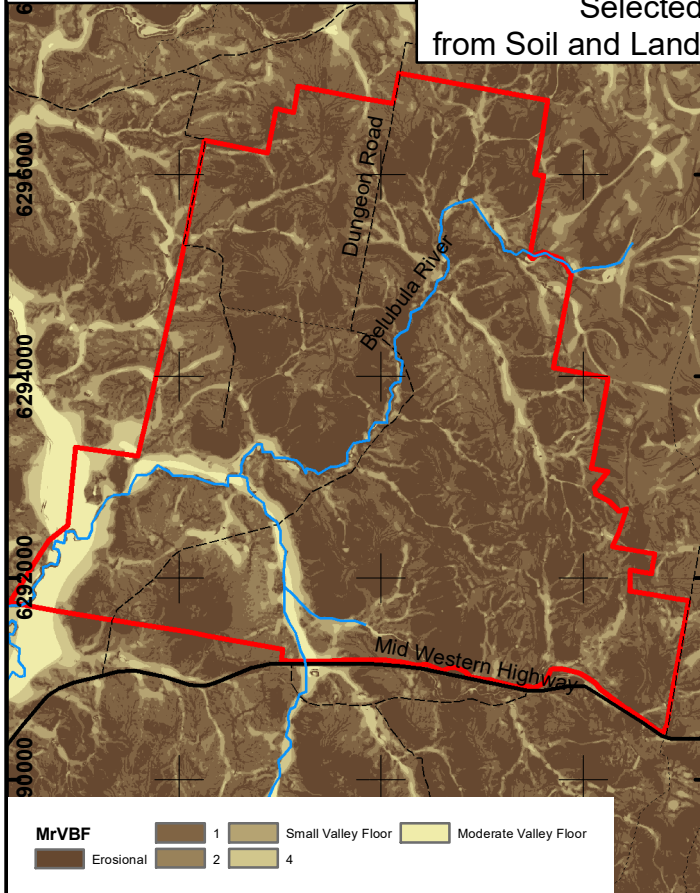
4.3.12. Cation Exchange Capacity

Cation exchange capacity (CEC) is another indicator of potential soil fertility in that soil with a CEC greater than 15 meq/100 g is generally regarded as more likely to be fertile than soil with lower CEC. The whole of the Project Area was predicted to have a CEC less than 10 meq/100 g for the 2 layers downloaded; 30 to 60 cm (Map 4b) and 0 to 5 cm. This indicates that the whole site would be expected to have moderately low chemical fertility.

4.3.13. Soil pH

The proportion of soil-stored nutrients available to plants is greatest for moderate soil pH, between 6 and 7.5. Surfaces from the Soil and Landscape Grid of Australia indicate that $\text{pH}_{\text{CaCl}_2}$ was predicted to be in the range of 4.5 to 5.0 over nearly all of the Project Area in the 0 to 5, 5 to 15 and 15 to 30 cm layers (Map 4d). There were small patches where $\text{pH}_{\text{CaCl}_2}$ was predicted to be greater than 5.0 in the valley floors. Soil $\text{pH}_{\text{CaCl}_2}$ in the 30 to 60 cm layer was predicted to be over 5.0 for most of the Project Area.

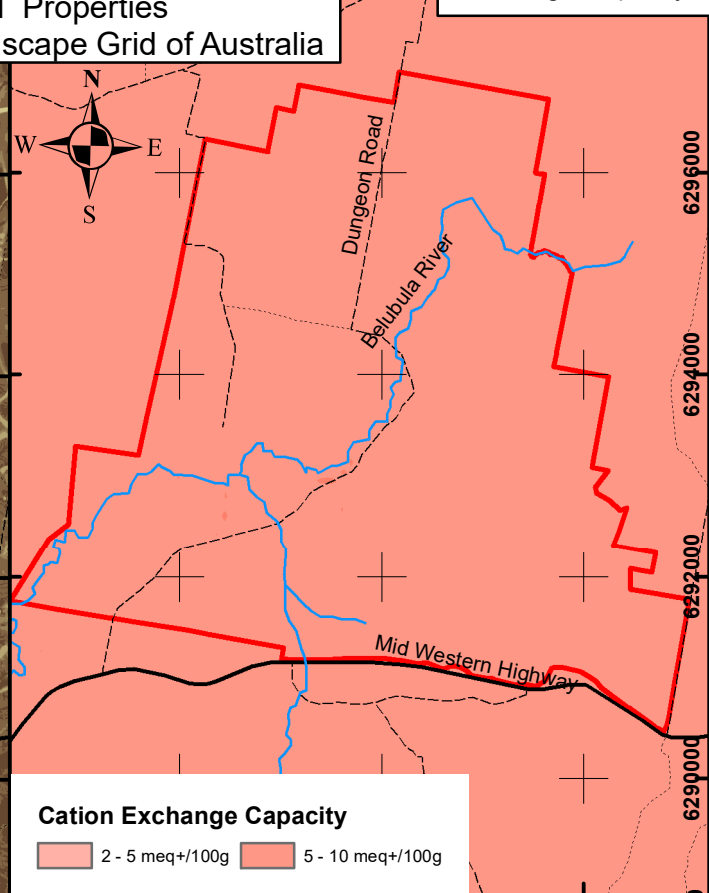
4a. Multiresolution Valley Bottom Flatness (from 5 m pixel LiDAR)



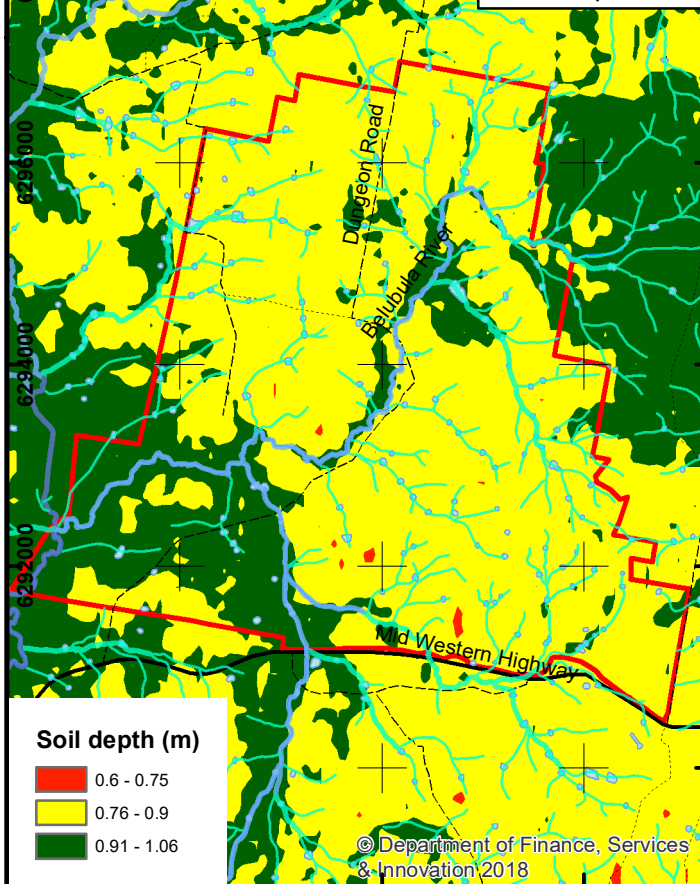
McPhillamys Gold Project

Selected Properties
from Soil and Landscape Grid of Australia

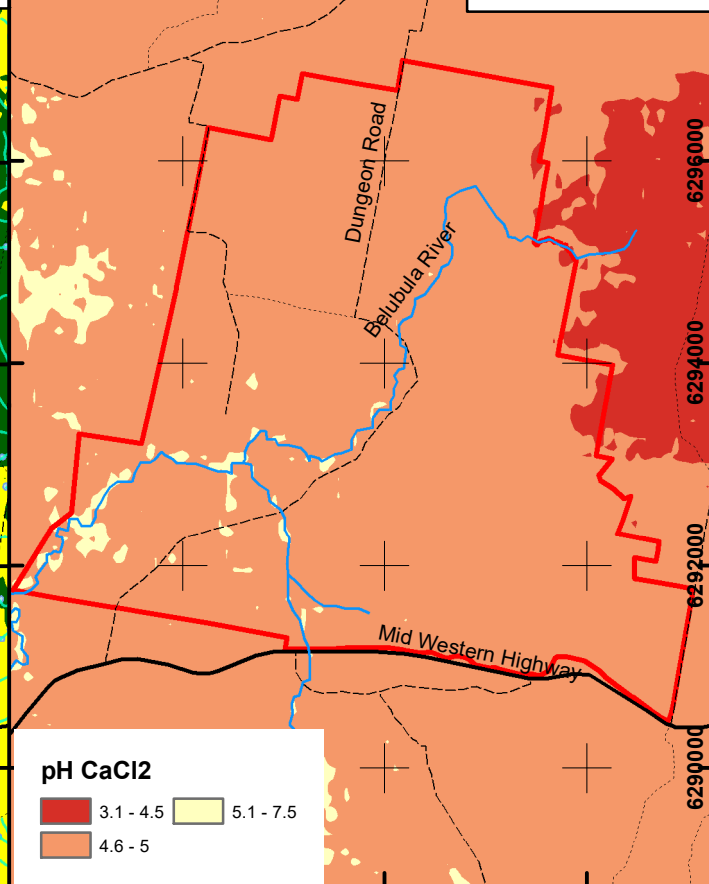
4b. 15 to 30 cm Cation Exchange Capacity



4c. Estimated Soil Depth



4d. 15 to 30 cm pH CaCl2



Certification
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Watercourse
 Intermittant
 Perennial

Roads
 CLASS 3
 CLASS 4
 CLASS 2
 CLASS 5

Project Area (2,513 ha)

Scale 1:75,000 (A4)

0 0.5 1 2 3 4 Kilometres

Job Code: Cr408
 Map Printed: 2019
 Roads: NSW LPI
 Watercourses: NSW LPI

SSM
 Sustainable Soil Management

Contact: Sustainable Soils Management
 Phone: (02) 68 473367
 Datum: WGS 84
 Projection: UTM

Map 4

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4.4. DESKTOP REVIEW SUMMARY

- The Project Area has a temperate climate with warm summer and cold winter temperatures. Frosts are common from May to September. There is an average winter surplus of 80 mm rainfall above evapotranspiration during the winter months, but this surplus can exceed 80 mm a month in June and July. This combination of large sporadic rainfall and low winter temperature indicates that poorly drained areas are likely to be subjected to periodic prolonged waterlogging.
- The soil landscapes (Map 2a), geology (Map 2c) and regolith (Map 2d) indicate that the majority of the Project Area has strongly leached soil (regolith) that has developed on rocks that have undergone regional metamorphism of sedimentary or volcanic rocks. Soil that develops on these rocks in this climate are unlikely to be highly fertile. These maps indicate there is a small patch of alluvial soil that extends from the southwestern corner of the Project Area to the northeast, with a branch to the south.
- The soil properties of soil depth (Map 4c), pH (Map 4d) and cation exchange capacity (Map 4b) were predicted to be reasonably consistent as a result of the influence of a climate with relatively large capacity to leach the soil. Both pH and cation exchange capacity were predicted to be low across the Project Area. The soil is predicted to be more than 75 cm deep across the Project Area and deeper in the low-lying floodplains than on the surrounding elevated land.
- However, the land shape indicators of elevation (Map 3a), slope (Map 3b), land shape (MrVBF, Map 4a), and hillshade (Maps 1 and 3b) show that the Project Area is on a highly dissected landscape. As a result, soil properties are likely to vary widely over short distances within the constraints imposed by the climate and parent material.
- The pattern of slope indicates that the land shape will restrict the majority of the Project Area to be LSC Class 3 or lower capability. The low pH and cation exchange capacity noted are likely to further restrict capability to LSC Class 4 or lower as was allocated in the regional LSC map.

5. ACID SULFATE SOIL ASSESSMENT

NSW OEH Acid Sulfate Soil Risk Map (Figure 8) indicates that the nearest site with a high probability of occurrence of Acid Sulfate Soil is further than 100 km from the Project Area and has 900 m lower elevation. As such, there is little risk of Acid Sulfate Soils in the Project Area.

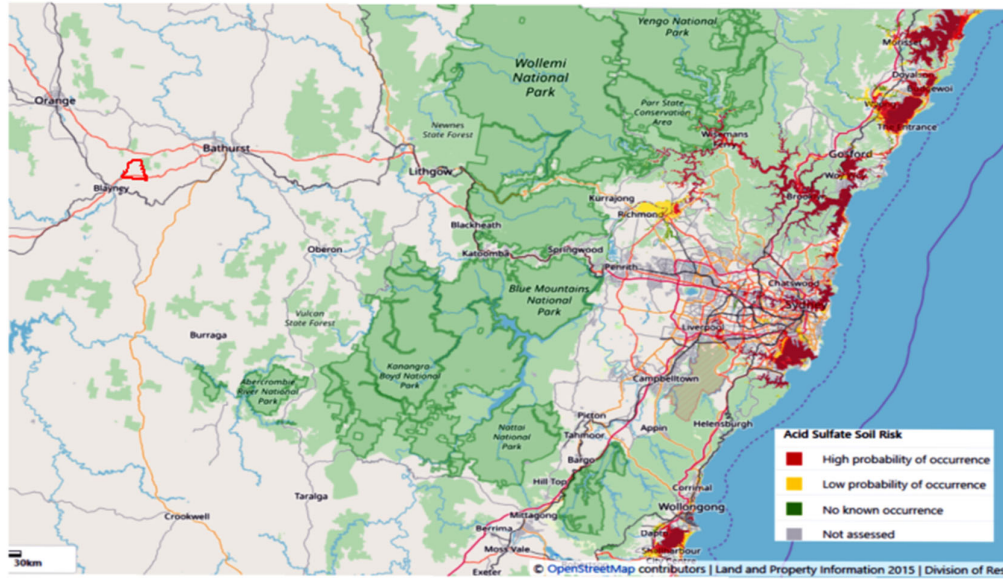


Figure 8. Location of Project Area in relation to NSW OEH Acid Sulfate Soil Risk. (Acid Sulfate Soil Risk downloaded from <https://geo.seed.nsw.gov.au/PublicViewer> on 6/12/2018.)

6. SOIL DISTRIBUTION

6.1. OVERVIEW OF SOIL PROPERTIES

Soil properties observed and measured at 131 sites across the Project Area indicate that soil at the site had consistent topsoil properties in areas away from valley floors, and common indications of waterlogging. The most common soil profile form across the Project Area was brown, acidic, loamy topsoil over mildly acidic clayey subsoil (Map 5d). The subsoil was brown in 60% of cases, with 11% black, 11% red, 11% grey, and 7% yellow subsoil (Map 5b). The sites with red subsoil stood out as having stable soil structure.

The first step in generating soil mapping units across the Project Area was to separate the depositional from the erosional parts of the Project Area. The depositional parts of the Project Area are equivalent to the Macquarie Soil Landscape of Kovac *et al.* (1989) as depicted in Map 2a, but the boundary is closer to that of the Moderate Valley Floor in Map 4a.

The soil distribution across upland parts of the Project Area is not orderly. In an orderly landscape, the soil would consist of zones with uniform properties separated by boundaries where some properties changed rapidly over short distances (McKenzie and Grundy, 2008). The solution adopted in this assessment was to map soil described and sampled from soil test pits across the Project Area as soil associations. A soil association is a mapping unit that has two or more soil types in a regularly repeating pattern that is generally associated with landscape features (Powell, 2008). This is illustrated in Figure 6 in which the Krasnozem Great Soil Group would be mapped as one association, while the Yellow soloth, Red earth and Yellow earth would be mapped as a separate association.

Although there was a strong trend of a large increase in clay content between the topsoil and subsoil, the difference was not consistently large enough for the profiles to be classified as duplex. The profile form in erosional parts of the landscape was split between 48% Chromosols, Sodosols and Kurosols (soils with an abrupt increase in clay), 45% Dermosols (structured soil that is not duplex) and 7% Kandosols (structureless soils that are not duplex). Dermosols were common in the western one third of the Project Area on the Byng and Blayney Volcanics, Sodosols were generally in or near valley floors, while Kurosols and Kandosols were most common in the eastern half of the Project Area (Map 5a). The centre of the Project Area had a mixture of Chromosols and Dermosols.

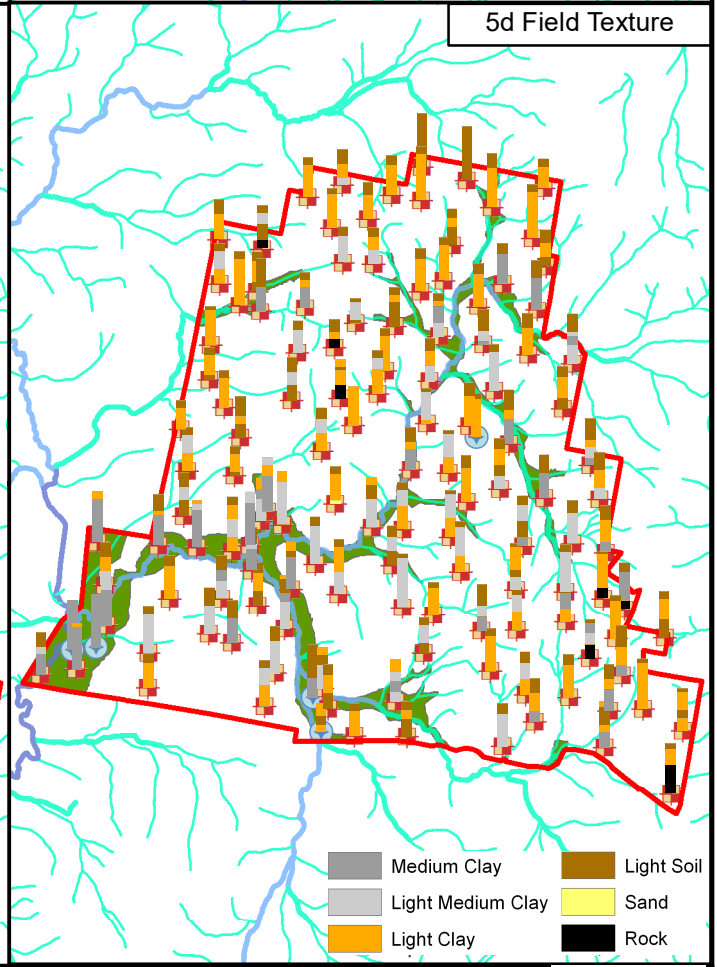
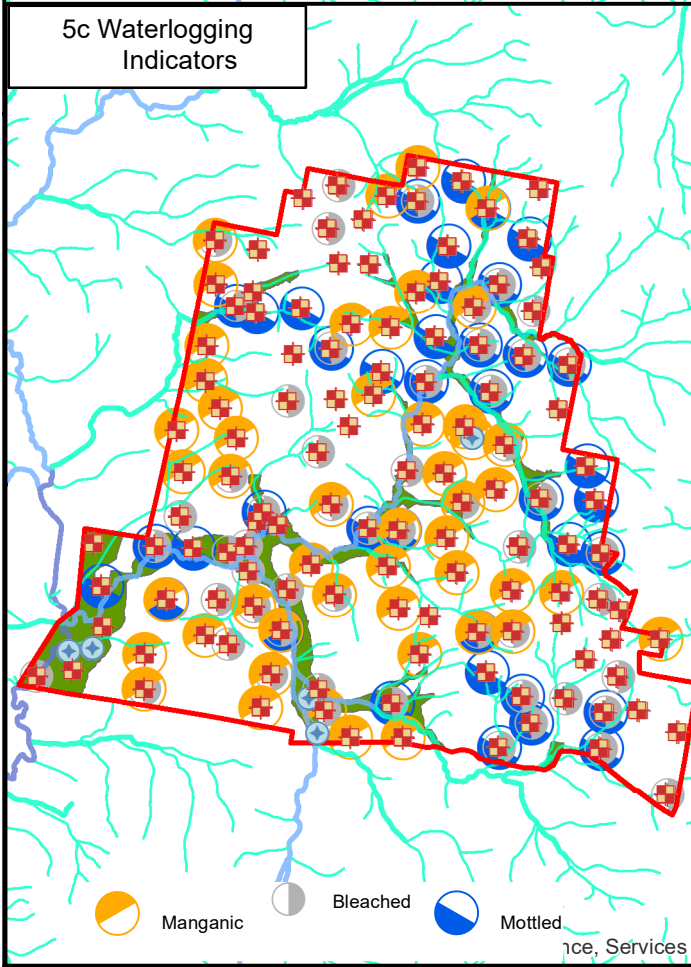
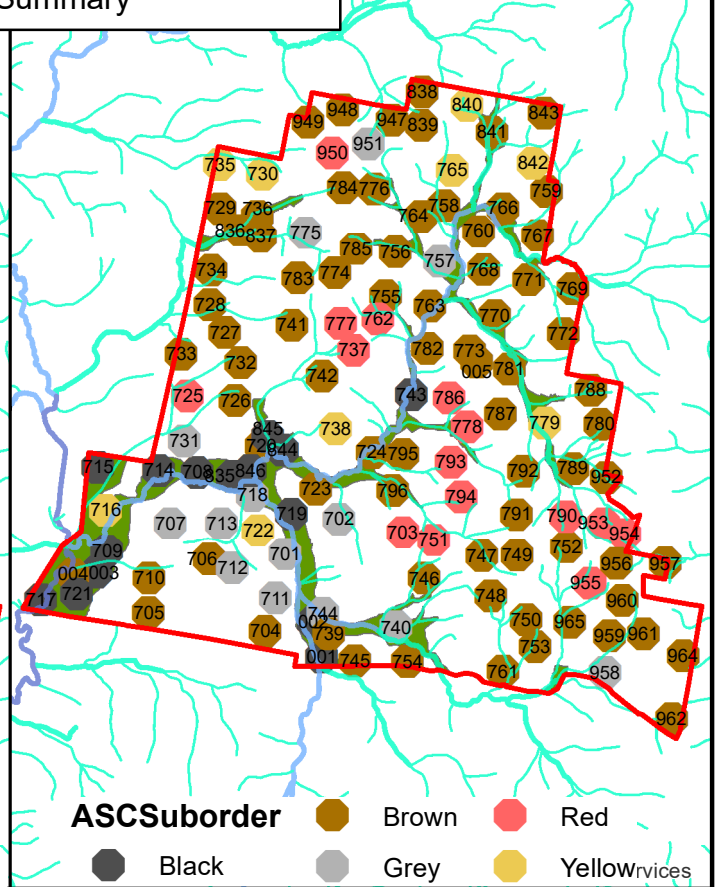
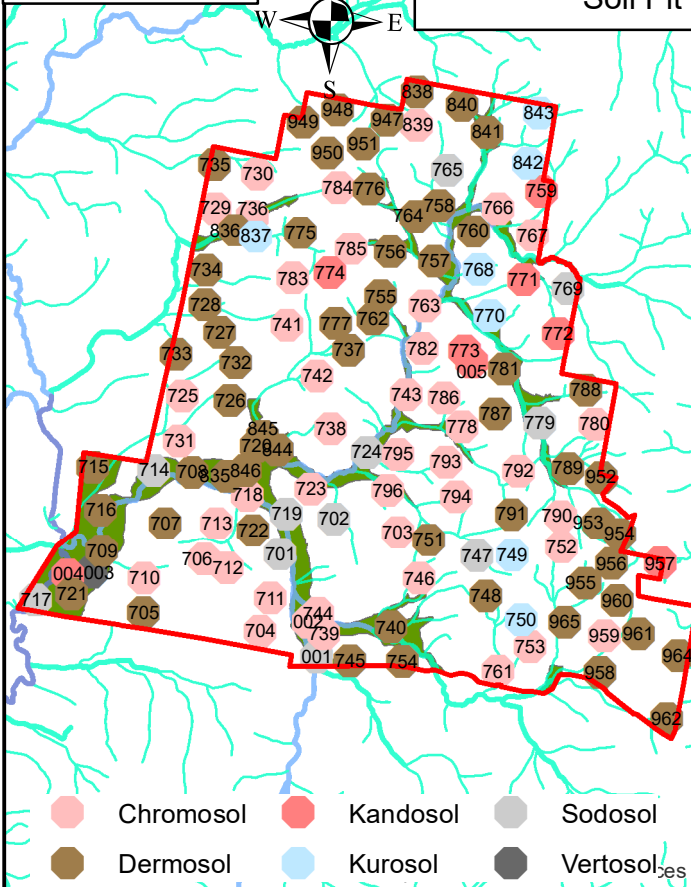
There were a range of indicators of waterlogging (Map 5c). About 37% of pits had a manganic layer (more than 20% manganiferous or ferromanganiferous nodules), 52% of profiles had a bleached A2, and 30% of pits had mottled subsoil. One third of the remaining pits were in drainage lines and had black or grey poorly structured, clayey subsoil. This left 21% of pits that did not have indicators of periodic prolonged waterlogging. These better drained sites were spread across hill crest, midslope and drainage line locations.

5a ASC Order
(Soil Type)

McPhillamys Gold Project

Soil Pit Summary

5b ASC Suborder
(Subsoil Colour)



Certification
Draft/Uncontrolled Document
Unless Signed & Dated

Project Area (2,513 ha)

Association

Alluvium

Scale 1:75,000 (A4)

0 0.5 1 2 3 4 Kilometres

Job Code: Cr408
Surveyed: 2017 to 2019
Map Printed: 2019

Watercourses: LPI

Contact: Sustainable Soils Management
Phone: (02) 68 473367
Datum: WGS 84
Projection: UTM

SSM
Sustainable Soil Management

Map 5

Average soil chemical properties across the Project Area indicated that most of the area could support productive vegetation only if the vegetation is adapted to acidic, low nutrient soil and tolerant of some waterlogging.

Average soil $\text{pH}_{\text{CaCl}_2}$ in the 0 to 5 cm layer of 4.6 (Figure 9) was rated as strongly acidic by Hazelton and Murphy (2007). Average soil pH increased by 1 pH unit to be 5.4 in the 30 to 60 cm and 5.6 in the 60 to 100 cm layers.

The average cation exchange capacity (CEC) of the 0 to 5, 5 to 15 and 15 to 30 cm layers was less than 6 meq/100 g (Figure 9), which is rated as very low and susceptible to acidification by Hazelton and Murphy (2007). Average CEC increased slightly to 8 meq/100 g in the 30 to 60 layer and 10 meq/100 g in the 60 to 100 cm layer. These are still rated as low CEC and indicate that the soil has a small capacity to store nutrients.

The combination of acidic soil with low cation exchange capacity indicates that the average soil in the Project Area would be expected to fall into LSC Class 4 (suitable for cropping with moderate to severe limitations) or LSC 5 (severe limitations for cropping) according to OEH (2012).

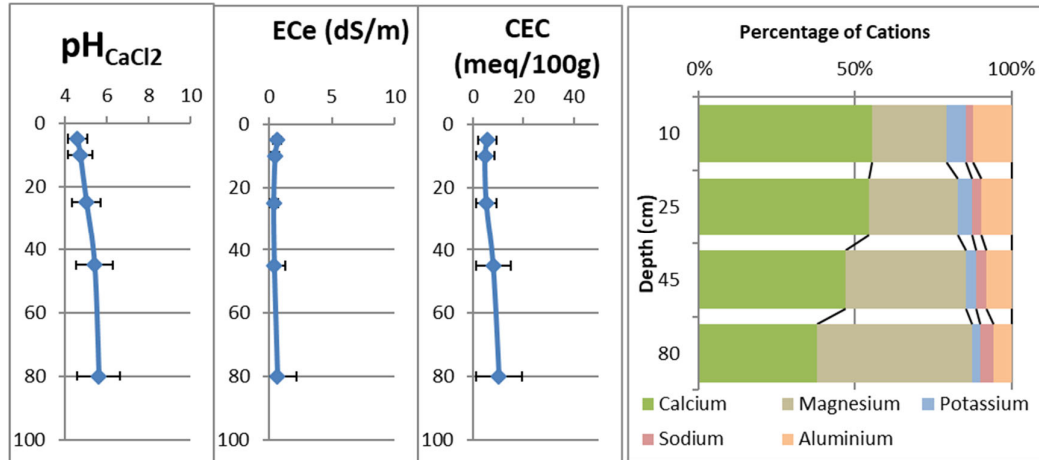


Figure 9. Average values and standard deviations for selected soil chemical properties from 109 sites across the Project Area.

Average soil organic carbon in the 0 to 5 cm layer was 2.0%. This value is expected by Hazelton and Murphy (2007) to be associated with high stability of soil structure. Average soil organic carbon in the 5 to 15 cm layer of 0.9% was less than half that of the layer above it.

Soil salinity was desirably low in 130 of the 131 sites assessed. The average electrical conductivity of saturated extract (ECe) of 0.5 dS/m was in the non-saline range (Hazelton and Murphy, 2007) of less than 2 dS/m.

The ratios of the cations of calcium, magnesium, potassium, sodium and aluminium are suboptimal according to the guidelines of Hazelton and Murphy (2007) in the following ways:

- Exchangeable calcium percentage of 38 to 56% (Figure 9) was less than the lower critical value of 65% for each of the 5 layers tested.
- Exchangeable magnesium percentage of 23 to 50% was far greater than the upper critical value of 15%.

- Exchangeable aluminium percentage in the surface to 15 cm layer of 11 to 12% was undesirably high.

The exchangeable sodium percentage (ESP) increased with depth, but was generally desirably low.

Soil nutrient levels of phosphorous and sulphur were compared to critical values of Gourlay *et al.* (2007). Gourlay *et al.*'s (2007) system requires inputs of Colwell phosphorous and Phosphorous Buffer Index. These tests were conducted on samples from 122 pits, but not the 5 core sites. Only four of these 122 sites had adequate soil phosphorous for pasture growth. This was increased to 21 sites if the critical value was reduced to 50% of the critical phosphorus value.

Only 19 of the 127 sites had adequate sulphur for optimal pasture growth. The measured soil sulphur levels were predicted by Gourlay *et al.* (2007) to reduce pasture growth to an average of 80% of the potential maximum yield.

About half of the 127 sites had adequate potassium for optimal pasture growth. The measured soil potassium levels were also predicted by Gourlay *et al.* (2007) to reduce pasture growth to an average of 80% of the potential maximum yield.

Selected micronutrients were also tested and rated according to critical values in Peverill *et al.* (1999). Copper and boron were present at adequate levels in 90% of samples, while zinc levels were suboptimal in half of the sites tested. Manganese and iron levels were elevated. Laboratory measured soil manganese levels are not a good predictor of manganese toxicity, however, manganese levels were elevated for all 4 sampling times from 2014 for the cores to 2019 when the survey boundary was extended.

Molybdenum, which is important for nodulation of legumes was below the limits of detection in 241 of 244 samples tested. Critical molybdenum values reported in Peverill *et al.* (1999) were far greater than the limits of detection.

In summary, the soil across the Project Area generally had strongly acidic surface soil over slightly acidic subsoil. The cation exchange capacity was very low in the topsoil and low in the subsoil. Both these properties render the soil susceptible to acidity. Calcium makes up a smaller proportion of cations than desired, while both magnesium and aluminium make up a larger proportion of cations than desired. The soil nutrient levels of phosphorous, sulphur, potassium, molybdenum and zinc were present at suboptimal levels while copper was adequate. In contrast, aluminium, manganese and perhaps iron were present at levels that may be high enough to restrict plant growth.

Most of the profiles showed evidence of prolonged periods of waterlogging in the form of either a bleached A2 horizon, manganic layers, or mottled subsoil. These properties are consistent with the low fertility.

Despite these indicators of poor subsoil drainage and low soil fertility, the land in the Project Area seems to be reasonably productive under its current grazing land use. This is likely to be due to a combination of relatively high rainfall, and good drainage of the surface soil. This drainage is facilitated by the common vertical macropores in the form of worm holes to a depth of 50 cm or more in most pits. These worm holes reduce topsoil waterlogging, and mixing of soil by the worms helps to recycle nutrients.

6.2. Description of Soil Associations

Soil associations were mapped across the Project Area using a hierarchical system, based on information from the 131 soil profile descriptions complemented by information from the Regional Soil and Landscape Description presented in Section 4.3.

Soil Association boundaries were fine-tuned using digital soil maps of clay content and exchangeable aluminium percentage of the 30 to 60 cm layer, created using regression kriging (Malone, 2013) with covariates from the Digital Elevation Model used to map slope across the Project Area.

The first subdivision was to map soil in depositional parts of the landscape as the **Alluvium** Association (Map 6).

The remaining 7 soil associations were subdivisions of the Vittoria-Blayney soil landscape mapped by Kovac *et al.*, (1989). Soil on the hills was divided first on the basis of underlying geology. Soil on the Blayney Volcanics in Map 2c was mapped as the **Manganic West** Association because 17 of the 20 profiles described in the association had a manganic B horizon.

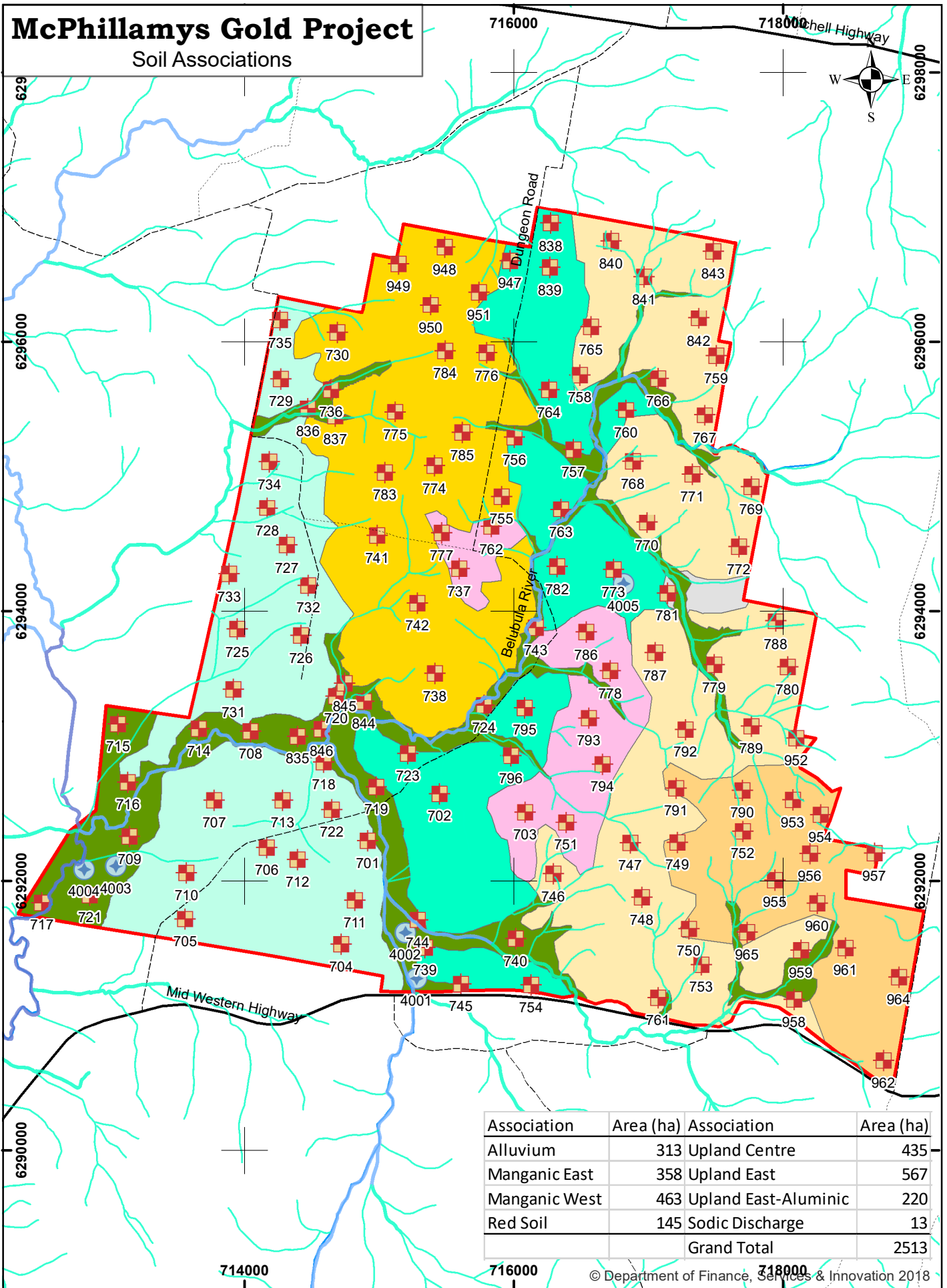
Soil associations mapped on metamorphic rocks of the Anson Formation in Map 2c were grouped on the basis of soil properties. These were:

- **Red Soil** Association, which had red subsoil, and was also strongly acidic, well structured and well drained;
- **Manganic East** Association, which had impeded drainage indicated by 17 of 18 profiles with having a manganic layer in the B horizon, and was generally located on midslopes on Anson Formation parent material;
- **Upland East** Association, which was east of the Belubula River and was strongly leached, indicated by strongly acidic profiles;
- **Aluminic variant of Upland East** Association was near the boundary of the Anson and Cunningham Formations, and had subsoil that was more acidic, and had elevated proportions of exchangeable aluminium and magnesium
- **Upland Centre** Association, which was in more elevated land than the Manganic East association, and was west of the Belubula River;
- **Discharge** Association which was represented by one pit, near an area of scalded soil, and had chemistry that was so different to the 112 remaining sites that it was mapped separately, and;

The consistency of soil types within these boundaries was assessed by examining the patterns of laboratory measured soil chemistry as described below.

McPhillamys Gold Project

Soil Associations



Association	Area (ha)	Association	Area (ha)
Alluvium	313	Upland Centre	435
Manganic East	358	Upland East	567
Manganic West	463	Upland East-Aluminic	220
Red Soil	145	Sodic Discharge	13
		Grand Total	2513

Certification
Draft/Uncontrolled Document
 Unless Signed & Dated

Roads Sample_Site

CLASS

- 2 Core
- 3 Detail Pit
- 4 Project Area (2,513 ha)
- 5

Association

- Alluvium
- Manganic West
- Manganic East
- Red Soil
- Upland East
- Upland East-Aluminic
- Upland Centre
- Sodic Discharge

Scale 1:37,500 (A4)

0 125250 500 750 1,000 Metres

Job Code: Cr408
 Map Printed: 2019
 Contact: Sustainable Soils Management
 Phone : (02) 68 473367
 Roads: NSW LPI
 Watercourses: NSW LPI

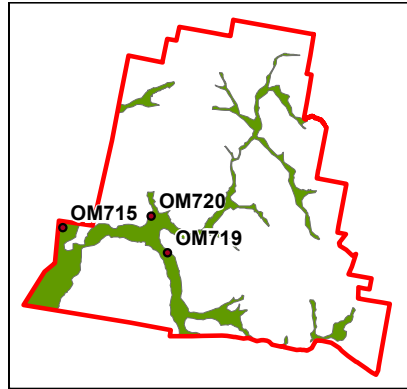
Datum: WGS 84
 Projection: UTM

SSM
 Sustainable Soils Management

Map 6

6.2.1. Alluvium Soil Association (27 sites over 313 ha)

The Alluvium Soil Association was mapped in valley floors that extend upstream from southwestern corner of the Project Area. The floodplain appears to consist of at least two terraces near OM701 (south of OM719 on sketch to right). The boundary between the Alluvium Soil Associations to the mid-slope Soil Associations was gradual.



The Alluvium Soil Association was characterised by 63% of sites with poor drainage, mixed with a relatively small proportion of sites rated as imperfectly drained (22%) or moderately well drained (13%). To simplify description, sites in the Alluvium Soil Association were divided into profiles with mottled subsoil or pale or Bleached A2 horizons, (Grey and Black Poorly Drained Soil), and lighter textured, better drained soil (Brown Alluvium). Both of these soil types occurred throughout the Alluvium Soil Association. This soil variation is common in alluvial landscapes and is too fine to allow individual mapping of these soil types at the 1:25,000 scale mapping of this assessment.

This range of soil types are described below in 3 groups:

1. Black Dermosols (8 sites);
2. Black and Grey Poorly Drained Soil (17 sites) and
3. Brown Alluvium (4 sites).



6.2.1.1. Black Dermosols

Black Dermosols occur on the floodplain of the Belubula River near the southwestern corner of the Project Area. They are intermingled with well-drained soil and soil with impeded drainage indicated by bleached A2 horizons.

The soil had consistently black, clayey subsoil, and the majority of sites were rated as poorly drained). This profile has a large water holding capacity, which is a benefit in prolonged dry periods, but the generally poor drainage would restrict production and access during winter months in the Blayney climate

The soil was rated as moderately to highly erodible.

Representative Soil Test Pit Profile Description: Dermosols

Soil Test Pit: OM715	
	
Soil Test Pit OM719	Landscape view, soil test pit OM715
Australian Soil Classification Order	Dermosol (8)
Australian Soil Classification Sub-order	Black (8)
Representative Soil Test Pits	OM708, OM709, OM715, OM721, OM835, OM844, OM845, OM846, OM4003
Manganic Profiles	None
Bleached A2 Horizon	33%
Mottling	22%
NCST Drainage	Poor (78%), Moderately well (22%)
Erodibility Factor	57% Moderately erodible (OM708, OM835, OM844, OM845), 43% highly erodible (OM715, OM721, OM846)



6.2.1.2. Black and Grey Poorly Drained Soil

This soil type was generally found near the centre of the Alluvium Soil Association; however, it was sampled throughout the extents of this Soil Association, with the northernmost soil test pit location being OM757 (Map 6).

This soil type was poorly drained, generally with a loamy topsoil. The topsoil was often underlain with a bleached A2 horizon over a dark, clayey, often mottled subsoil. The bleached A2 horizon and mottling in this soil type was reinforced by the common presence of pinrushes around the soil test pit. Pinrushes are a sign of excessive wetness. This soil tends to become saturated and not trafficable during prolonged periods of wet weather, so is generally suitable for grazing only during summer months (J. Gordon. pers comm.).

The soil was rated as moderately to highly erodible.

Representative Soil Test Pit Profile Description: Black and Grey Poorly Drained Soil



Soil Test Pit: OM719	
	
Soil Test Pit OM719	Landscape view, soil test pit OM719
Australian Soil Classification Order	Sodosol (5), Dermosol (4), Chromosol (4), Kurosol (1)
Australian Soil Classification Sub-order	Black (6), Grey (4), Brown (3), Yellow (1)
Representative Soil Test Pits	OM714, OM716, OM717, OM718, OM719, OM724, OM740, OM743, OM744, OM757, OM836, OM837, OM958, OM4001, OM4002
Manganic Profiles	None
Bleached A2 Horizon	64%
Mottling	50%
NCST Drainage	Poor (66%), Imperfect (27%), Moderately well (7%)
Erodibility Factor	100% highly erodible (OM714, OM716, OM719, OM740, OM836, OM837, OM958)

6.2.1.3. Brown Alluvium

The Brown Soil in the Alluvium Soil Association is a group that contains soil that has stable structure and no obvious impediment to drainage at the interface between A and B horizons (OM720 and OM736, Appendix I). These were in slightly elevated parts of the floodplain and were sampled from the south to the north of the Project Area (Map 6).

The soil was rated as moderately erodible.

Representative Soil Test Pit Profile Description: Brown Alluvium

Soil Test Pit: OM720	
	
Soil Test Pit OM720	Landscape view, soil test pit OM720
Australian Soil Classification Order	Dermosol (1), Chromosol (1), Kandosol
Australian Soil Classification Sub-order	Brown (3)
Representative Soil Test Pits	OM720, OM736, OM4004
Manganic Profiles	None
Bleached A2 Horizon	None
Mottling	None
NCST Drainage	Imperfect (67%), Moderately well (33%)
Erodibility Factor	OM720, the one site tested was moderately erodible

6.2.1.4. Alluvium Soil Association Chemistry

The summary graphs in Figure 10 show that pH, salinity (measured as EC_e, [deciSiemens per metre, dS/m]) and Cation Exchange Capacity (CEC) increase with depth. There was very large variation in CEC for the 30 to 60 and 60 to 100 cm layers. The cation ratios show an increase in the proportion of sodium and a decrease in the proportion of calcium with depth (Figure 10).

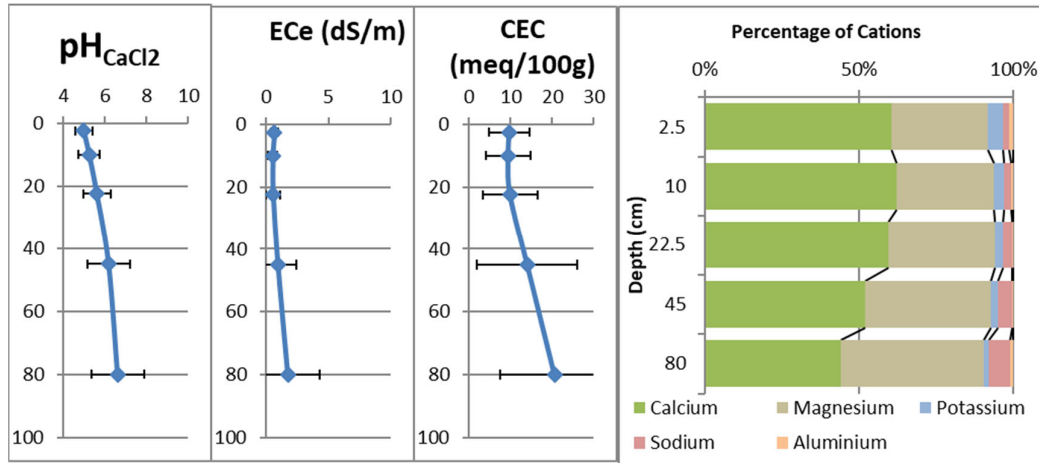


Figure 10. Chemistry Summary for Alluvium Soil Association in the McPhillamys Gold Project.

In the 0 to 10 cm layer, average organic carbon was 2%, (s.d. 0.7%), nitrate nitrogen was 24 mg/kg, (s.d. 24), available phosphorous was 16 mg/kg (s.d. 11) and sulfate sulphur was 7.4 mg/kg (s.d. 10). While the organic carbon content was desirably high, both the available phosphorous and the sulphate sulphur were lower than optimum. The high average soil nitrate reflects limited plant growth in the months before sampling.

Average Exchangeable Aluminium Percentage EAIP in the 0 to 10 cm layer was acceptably low at 1% (s.d. 2%).

Average micronutrient levels in 0 to 10 cm layer were: zinc 1.0 mg/kg, (s.d. 0.9), copper 2.6 mg/kg, (s.d. 1.4), manganese 198 mg/kg (s.d. 84), iron 36 mg/kg (s.d. 24), and boron 0.4 mg/kg (s.d. 0.2). These zinc, copper and boron levels were adequate while the manganese and iron levels were higher than optimum. Soil molybdenum was also tested, but molybdenum concentration was less than the level of detection.

Average laboratory measured clay content was around 20% in the surface to 15 cm layer, and increased to around 30% in the 30 to 100 cm layer. Cation to clay ratio was a moderate 50 meq/100 g of clay. Average Loveday and Pyle (1973) Dispersion Index (where 0 is no dispersion even after remoulding and 16 indicates spontaneous dispersion) increased from 2 in the surface to 5 cm layer to between 4 and 5 from 15 to 100 cm. However, Dispersion Index was greater than 12 in OM715, OM716 and OM717, which are near the southern end of the western boundary of the Project Area, and OM757 which is 1.7 km from the northern boundary of the Project Area.

Laboratory testing was conducted on samples from all soil test pits described in the Alluvium Soil Association with the results presented in Appendix II.

6.2.1.5. Alluvium Soil Association Suitability of Soil for Topdressing

At least 10 cm of soil was found to be suitable for use as topsoil material during rehabilitation at all 24 sites assessed in the Alluvium Soil Association (Table 3). The most common limitations were waterlogging as indicated by mottle and weak, sandy soil as causing a structure limitation.

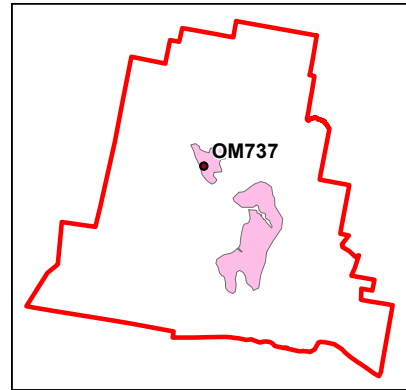
Table 3. Thickness of soil suitable for use as topdressing material in Alluvium Soil Association using Elliot and Veness (1981) procedure.

Site ID	Acidic soil	Depth without Acid	Limitation
Less than 10 cm			
10 to 30 cm			
OM4003		10	Alkaline
OM4004		30	Structure
OM718		20	Structure
OM719		25	Mottle
OM744		20	Structure
OM757		20	Mottle
OM836	0 to 10	10	Mottle
OM845	0 to 20	20	Mottle
OM846		20	Mottle
30 to 50 cm			
OM4001		45	Salinity
OM4002		45	Structure
OM714		40	Structure
OM719		25	Mottle
OM740		35	Structure
OM837	0 to 35	35	Structure
50 cm or thicker			
OM708, OM709, OM715, OM716, OM720, OM721, OM724, OM736, OM743, OM835, OM844, OM958			

Subsoil properties of loam texture with a reactive clay fraction and limited dispersion indicate that the majority of the subsoil assessed in the Alluvium Association could be used for an intermediate layer between topsoil and overburden.

6.2.2. Red Soil Association (9 sites over 145 ha)

The Red Soil Association was mapped in an area near the centre of the Project Area. The Red Soil Association was on upper slopes and the crests of some small hills within the Anson Formation. It generally occurred on sites with an easterly aspect. The elevated position and easterly aspect indicate there is a possibility that the red soil was transported in either as windblown dust, or the soil is the remnants of some basaltic material.





The profile form was generally red or brown clay loam over red light clay to medium clay subsoil. This was split equally between Chromosols (duplex soil) and Dermosols (gradational soil). Although two thirds of the profiles had evidence of previous prolonged waterlogging in the form of manganese nodules, none of the 9 profiles had mottled subsoil and one had a bleached A2 horizon.

The soil properties of this Soil Association indicate that it can support grazing, however the pH of the topsoil was lower than optimum, which restricts the species that can be grown to those tolerant of acidic soil. The exchangeable aluminium percentage was also generally higher than optimum whilst measured nutrient levels were suboptimal. However, the stable soil structure of this Soil Association indicates that it is better able to tolerate cultivation than the other Soil Associations identified across the Project Area.

The soil was rated as moderately to highly erodible.

Representative Soil Test Pit Profile Description: Red Soil

Soil Test Pit: OM737	
	
Soil Test Pit OM737	Landscape view, soil test pit OM737
Australian Soil Classification Order	Chromosol (5), Dermosol (4)
Australian Soil Classification Sub-order	Red (9)
Representative Soil Test Pits	OM703, OM737, OM751, OM762, OM777, OM778, OM786, OM793, OM794
Manganic Profiles	67%
Bleached A2 Horizon	11%
Mottling	None
NCST Drainage	Moderately well (67%), Well (22%), Imperfect (11%)
Erodibility Factor	OM737 was rated as moderately erodible, while OM762 was rated as highly erodible

6.2.2.1. Red Soil Association Chemistry

This soil was rated as having good structure for root growth to 70 cm but laboratory tests indicated that the topsoil was strongly acidic and had elevated Exchangeable Aluminium Percentage. The soil chemistry summary in Figure 11 showed a consistent pattern of strongly acidic topsoil over less acidic subsoil and low CEC throughout. Average pH_{CaCl_2} in the 0 to 5 cm layer was 4.2. Salinity was very low except in the shallowest layer where salinity was slightly elevated. Exchangeable aluminium accounted for an undesirably large 20% of the cations in the 0 to 5 and 10% in the 5 to 15 cm layer.

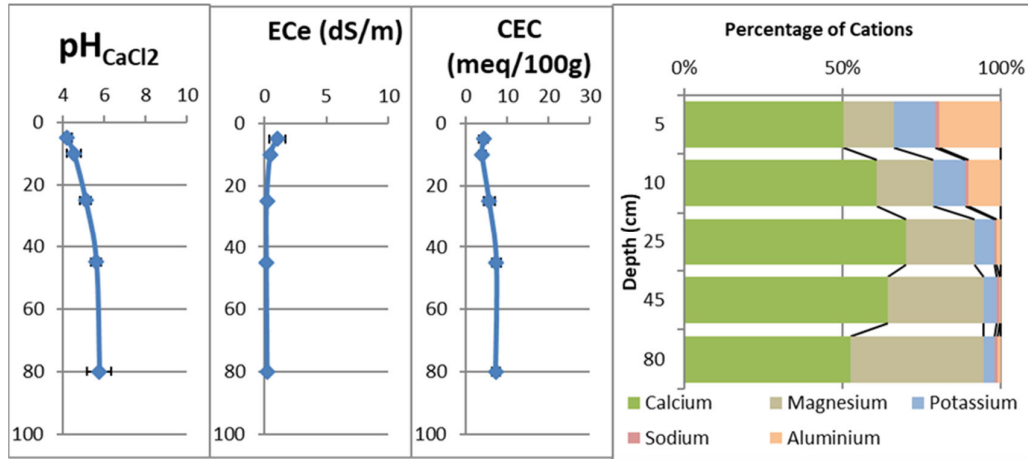


Figure 11. Chemistry Summary for Red Soil Association in the McPhillamys Gold Project.

Macronutrient levels were lower than optimum in the 0 to 10 cm layer. Average available phosphorous was 10 mg/kg (s.d. 7) and sulfate sulphur was 7.0 mg/kg (s.d. 3.5). The high average soil nitrate of 58 mg/kg, (s.d. 25) reflects limited plant growth in the months before sampling. Organic carbon in the 0 to 5 cm layer was high at 1.9% (s.d. 0.7), but low in the 5 to 15 cm layer at 0.9% (s.d. 0.2).

Average micronutrient levels in 0 to 10 cm layer were: zinc 0.7 mg/kg, (s.d. 0.6), copper 2.0 mg/kg, (s.d. 0.8), manganese 130 mg/kg (s.d. 46), iron 90 mg/kg (s.d. 45), and boron 0.4 mg/kg (s.d. 0.1). In this soil, copper and zinc were present at adequate levels, boron was suboptimal, while manganese and iron levels were close to excessive. Soil molybdenum was also tested, but soil concentration was less than the level of detection.

Average laboratory measured clay content was around 18% in the surface to 15 cm layer, and doubled to around 35% in the 30 to 100 cm layer. Average cation to clay ratio was a low 20 meq/100 g of clay in the 5 to 100 cm layer, and substantially higher at 34 meq/100 g of clay in the surface to 5 cm layer. Average Dispersion Index in to surface to 100 cm layer was 2 for all 5 depths tested.

Chemistry of each layer tested in pits in the Red Soil Association is presented in Appendix II.

6.2.2.2. Red Soil Association Suitability of Soil for Topdressing

The majority of the surface 50 cm in the majority of sites in the Red Soil Association was rated as suitable for use as topdressing material (Table 4). This is consistent with observed soil properties.

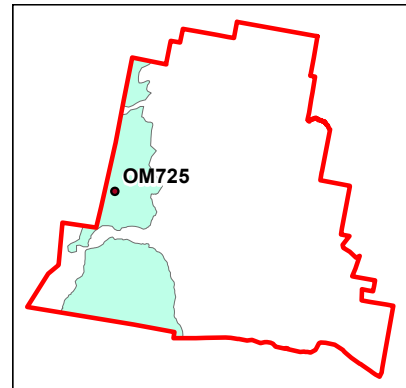
The moderate clay content and low dispersion index indicate that subsoil from the Red Soil Association could be used for an intermediate layer between topsoil and overburden.

Table 4. Thickness of soil suitable for use as topdressing material in Red Soil Association using Elliot and Veness (1981) procedure.

Site ID	Acidic soil	Depth without Acid	Limitation
Less than 10 cm			
OM703		5	Structure
10 to 30 cm			
30 to 50 cm			
50 cm or thicker			
OM737, OM751, OM762, OM777, OM778, OM786, OM793, OM794			

6.2.3. Manganic West Soil Association (20 sites over 463 ha)

The Manganic West Soil Association was mapped in the western third of the Project Area. This Soil Association occurred in elevations above the 2 Alluvium Soil Associations including a large hill and its slopes in the southwestern section and the lower slopes of the western section of the Project Area. This Soil Association coincided with the area mapped as Ordovician (Blayney) Volcanics.





The soil profiles of this Soil Association were relatively consistent and comprised of a brown loamy topsoil with a pale or bleached A2 horizon over a light to light medium clay subsoil. There was evidence of prolonged waterlogging in all pits (Map 5c) in the form of either the A2 horizon, mottled subsoil or common (20 to 50%) to abundant (more than 50%) ferromanganiferous nodules in the subsoil.

The profile form was split equally between duplex (Chromosol, Sodosol and Kurosol) and gradational (Dermosol) texture profiles. A small majority of the subsoil was brown, with grey accounting for half the remainder and a small number with yellow and red subsoil.

The topsoil of this profile appeared to be a good medium for root growth, but root density declined rapidly for layers deeper than 30 cm.

The 2 sites assessed in the Manganic West Soil Association were both rated as very highly erodible. This was associated with a large proportion of silt and fine sand in the topsoil.

Representative Soil Test Pit Profile Description: Manganic West Soil Association

Soil Test Pit: OM725	
	
Soil Test Pit OM725	Landscape view, soil test pit OM725
Australian Soil Classification Order	Dermosol (10), Chromosol (9), Sodosol (1)
Australian Soil Classification Sub-order	Brown (11), Grey (6), Yellow (2), Red (1)
Representative Soil Test Pits	OM701, OM704, OM705, OM706, OM707, OM710, OM711, OM712, OM713, OM722, OM725, OM726, OM727, OM728, OM729, OM731, OM732, OM733, OM734, OM735
Manganic Profiles	85%
Bleached A2 Horizon	45%
Mottling	10%
NCST Drainage	Poor (15%), Imperfect (85%), Moderately well (10%)
Erodibility Factor	OM727 and OM735 were both rated as very highly erodible

6.2.3.1. Manganic West Soil Association Chemistry

The soil chemistry summary in Figure 12 showed a consistent pattern of acidic topsoil over less acidic subsoil, low CEC and very low salinity throughout the profile. Exchangeable aluminium accounted for an undesirably large 12% of cations in the 0 to 5 and 9% in the 5 to 15 cm layer.

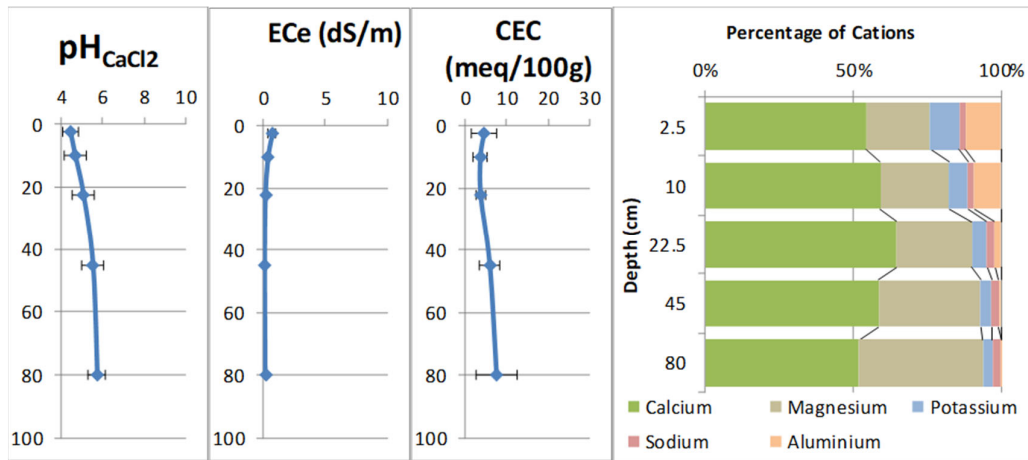


Figure 12. Chemistry Summary for Manganic West Soil Association in the McPhillamys Gold Project.

Macronutrient levels were lower than optimum in the 0 to 10 cm layer. The exception was high average soil nitrate, which reflects limited plant growth in the months before sampling. Average nitrate N was 44 mg/kg, (s.d. 27), available phosphorous was 11 mg/kg (s.d. 5) and sulfate sulphur was 5.3 mg/kg (s.d. 2.3). Organic carbon in the 0 to 5 cm layer was moderate at 1.6% (s.d. 0.6), but low in the 5 to 15 cm layer at 0.6% (s.d. 0.2).

Average micronutrient levels in 0 to 10 cm layer were: zinc 0.4 mg/kg, (s.d. 0.2), copper 1.2 mg/kg, (s.d. 0.5), manganese 163 mg/kg (s.d. 60), iron 61 mg/kg (s.d. 34), and boron 0.2 mg/kg (s.d. 0.1). In this soil, copper was present at adequate levels, zinc and boron were suboptimal, while manganese and iron levels were close to excessive. Soil molybdenum was also tested, but molybdenum concentration was close to or less than the level of detection.

Average laboratory measured clay content was around 12% in the surface to 15 cm layer, and doubled to around 25% in the 30 to 100 cm layer. Average cation to clay ratio was a low 20 meq/100 g of clay in the 5 to 100 cm layer, and substantially higher at 34 meq/100 g of clay in the surface to 5 cm layer. Average Dispersion Index increased from 3 in the surface to 5 cm layer to between 4 and 5 for the 4 layers from 5 to 100 cm. Dispersion Index was greater than 12 for samples deeper than 15 cm in OM701 and OM706, both of which are on the slopes of Sturgeon Hill, in the south of the Project Area.

Chemistry of each layer tested in pits in the Manganic West Soil Association is presented in Appendix II.

6.2.3.2. Manganic West Soil Association Suitability of Soil for Topdressing

The dominant limitation for using the Manganic West Soil Association as topdressing material was the sandy texture of surface soil. Massive and weak structured soil in the A2 horizon failed the Elliot and Veness (1981) procedure and restricted the depth of suitable material in 8 of the pits to less than 50 cm (Table 5). Some stability of soil structure from the concentration of organic material in the surface 10 cm of the profile allowed some sandy material to pass the Elliot and Veness (1981) procedure.

Table 5. Thickness of soil suitable for use as topdressing material in Manganic West Soil Association using Elliot and Venes (1981) procedure.

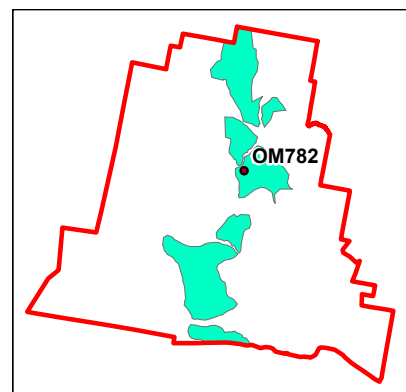
Site ID	Acidic soil	Depth without Acid	Limitation
Less than 10 cm			
OM725		0	Structure
10 to 30 cm			
OM701		20	Structure
OM706		20	Structure
OM707		15	Structure
OM711		10	Structure
OM713	0 to 20	20	Structure
OM722		15	Structure
OM731		20	Structure
30 to 50 cm			
OM712		30	Structure
50 cm or thicker			
OM704, OM705, OM710, OM726, OM727, OM728, OM729, OM732, OM733, OM734, OM735			

The moderate clay content and low dispersion index indicate that subsoil from the Manganic West Association could be used for an intermediate layer between topsoil and overburden, however, the dispersive soil in OM701 and OM707 should be avoided, and the low cation to clay ratio indicates that this clay does not have the capacity to recover from compaction.

6.2.4. Manganic East Soil Association (17 sites over 358 ha)

The Manganic East Soil Association was mapped in the middle and lower slopes of hills in sections of the centre of the Project Area (Map 6). This Soil Association was identified on the basis of a manganic subsoil that was primarily situated on the meta-sediments (siltstone and sandstone) of the Anson Formation.



The soil profiles of this Soil Association had a brown, loamy topsoil over a drab brown light to light medium clay subsoil. There was evidence of prolonged waterlogging in the form of manganese nodules in 15 of 17 profiles, and mottled subsoil in three of the profiles.



The topsoil of this profile was rated as a good medium for root growth, but conditions for root growth deteriorated with depth.

The 6 sites assessed in the Manganic East Soil Association were rated as highly erodible or very highly erodible. This was associated with a large proportion of silt and fine sand in the topsoil.

Representative Soil Test Pit Profile Description: Manganic East Soil Association

Soil Test Pit: OM782	
	
Soil Test Pit OM782	Landscape view, soil test pit OM782
Australian Soil Classification Order	Chromosol (7), Dermosol (7), Kandosol (2), Sodosol (1)
Australian Soil Classification Sub-order	Brown (16), Grey (1)
Representative Soil Test Pits	OM702, OM723, OM739, OM745, OM754, OM756, OM760, OM763, OM764, OM773, OM782, OM795, OM796, OM838, OM839, OM947, OM4005,
Manganic Profiles	88%
Bleached A2 Horizon	35%
Mottling	18%
NCST Drainage	Poor (29%), Imperfect (53%), Moderately well (18%)
Erodibility Factor	OM764 were highly erodible, while OM702, OM739, OM838, OM839 and OM947 were very highly erodible

6.2.4.1. Manganic East Association Chemistry

The soil chemistry summary in Figure 13 showed a consistent pattern of acidic topsoil over less acidic subsoil, low CEC and very low salinity throughout the profile. Exchangeable aluminium accounted for an undesirably large 11% of cations in the 0 to 5 and 5 to 15 cm layers, and exchangeable magnesium was generally greater than desired.

Properties of the Manganic East Soil Association indicate that the soil can support grazing, but nutrient levels are suboptimal, and lime and fertilizer are required for high productivity. Great care would be required if the soil is tilled to protect the thin topsoil from loss by erosion.

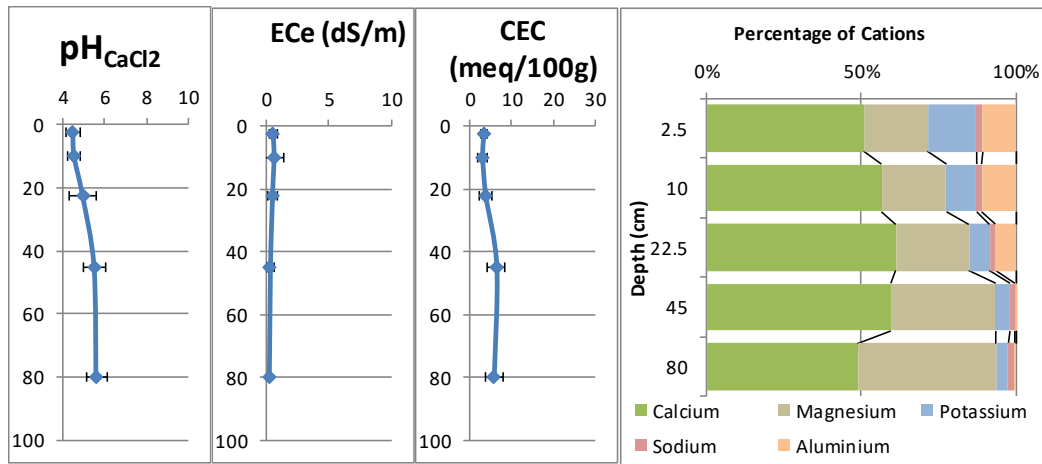


Figure 13. Chemistry Summary for Manganic East Soil Association in the McPhillamys Gold Project.

Macronutrient levels were lower than optimum in the 0 to 10 cm layer. The exception was high average soil nitrate, which reflects limited plant growth in the months before sampling. Average nitrate N was 34 mg/kg, (s.d. 19), available phosphorous was 10 mg/kg (s.d. 3) and sulfate sulphur was 5.7 mg/kg (s.d. 2.4). Organic carbon in the 0 to 5 cm layer was moderate at 1.4% (s.d. 0.4), but low in the 5 to 15 cm layer at 0.7% (s.d. 0.3).

Average micronutrient levels in 0 to 10 cm layer were: zinc 0.9 mg/kg, (s.d. 1.5), copper 1.1 mg/kg, (s.d. 0.4), manganese 150 mg/kg (s.d. 62), iron 59 mg/kg (s.d. 29), and boron 0.2 mg/kg (s.d. 0.1). In this soil, copper and zinc were present at adequate levels, while boron was suboptimal, and manganese and iron levels were close to excessive. Soil molybdenum was also tested, but molybdenum concentration was less than the level of detection.

Average laboratory measured clay content increased from around 11% in the surface to 5 cm layer through 15% in the 5 to 15 cm layer and 19% in the 15 to 30 cm layer to around 30% in the 30 to 100 cm layer. Average cation to clay ratio was a low 20 meq/100 g of clay in the 5 to 100 cm layer, and higher at 30 meq/100 g of clay in the surface to 5 cm layer. Average Dispersion Index was between 3 and 4 for all 5 layers tested. Dispersion Index was greater than 12 in 2 of 3 layers deeper than 15 cm in OM763. This site is near the boundary with the Alluvium Association and 2 form the northern edge of the Project Area.

Chemistry of each layer tested in the Manganic East Soil Association is presented in Appendix II.

6.2.4.2. Manganic East Soil Association Suitability of Soil for Topdressing

At least 10 cm of soil was found to be suitable for use as topsoil material during rehabilitation at all 18 sites assessed in the Manganic East Soil Association (Table 6). Massive and weak structured soil in the A2 horizon failed the Elliot and Veness (1981) procedure and restricted the depth of suitable material in 5 of the pits to less than 50 cm (Table 6). Acidic soil as found in the surface 50 cm of OM792, OM796 and OM838 will require amendment with before it is used as topsoil material.

Table 6. Thickness of soil suitable for use as topdressing material in Manganic East Soil Association using Elliot and Veness (1981) procedure.

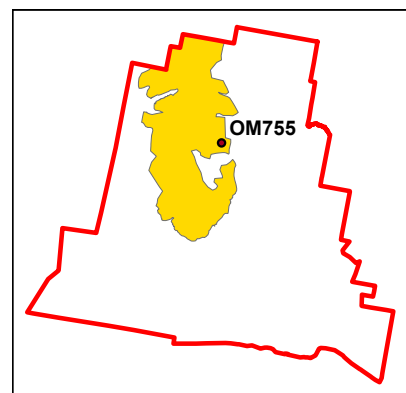
Site ID	Acidic soil	Depth without Acid	Limitation
Less than 10 cm			
OM760		0	Mottle
10 to 30 cm			
OM723		10	Structure
OM739		15	Structure
OM763		15	Structure
OM795		20	Structure
OM839	0 to 10	10	Structure
OM947	0 to 35	27	Large peds
30 to 50 cm			
OM773		35	Coarse fragments
Acidic soil			
OM796	0 to 50	50	
OM838	0 to 50	50	
50 cm or thicker			
OM4005, OM702, OM745, OM754, OM756, OM764, OM782			

The moderate clay content and low dispersion index indicate that subsoil from the Manganic East Association could be used for an intermediate layer between topsoil and overburden, however, the dispersive soil in OM763 should be avoided, and the low cation to clay ratio indicates that this clay does not have the capacity to recover from compaction.

6.2.5. Upland Centre Soil Association (15 sites over 435 ha)

The Upland Centre Soil Association was mapped in elevated sections from the central section to northern edge of the Project Area (Map 6). This Soil Association was situated on the meta-sediments (sandstone and siltstone) of the Anson Formation.

The soil profiles of this Soil Association consisted of 20 to 60 cm of brown, silty topsoil over a generally, drab brown light to medium clay subsoil. The soil test pits of this Soil Association were generally observed as being strongly leached, and many were either mottled or had bleached A2 horizons.



The soil properties of this Soil Association indicate that this soil can support grazing, however, the soil is acidic, has elevated exchangeable aluminium and is deficient in phosphorus and sulphur. Cultivation should be

conducted with great care to preserve the organic material in the upper few centimetres of the topsoil.

The 6 sites assessed in the Upland Centre Soil Association were rated as highly erodible or very highly erodible. This was associated with a large proportion of silt and fine sand in the topsoil.

Representative Soil Test Pit Profile Description: Upland Centre Soil Association

Soil Test Pit: OM755	
	
Soil Test Pit OM755	Landscape view, soil test pit OM755
Australian Soil Classification Order	Dermosol (7), Chromosol (7), Kandosol (1)
Australian Soil Classification Sub-order	Brown (10), Yellow (2), Grey (2), Red (1)
Representative Soil Test Pits	OM730, OM738, OM741, OM742, OM755, OM774, OM775, OM776, OM783, OM784, OM785, OM948, OM949, OM950, OM951
Manganic Profiles	13%
Bleached A2 Horizon	40%
Mottling	20%
NCST Drainage	Poor (33%), Imperfect (40%), Moderately well (27%)
Erodibility Factor	OM783, OM784, OM948, OM949, OM950 and OM951 were all rated as highly erodible

6.2.5.1. Upland Centre Association Chemistry

The soil chemistry summary in Figure 14 shows a consistent pattern of strongly acidic topsoil over less acidic subsoil. Measured CEC was low

throughout the soil profile, but extremely low in the 5 to 15 and 15 to 30 cm layers. Salinity, measured as ECe was also very low throughout the profile. Exchangeable aluminium accounted for an undesirably large 17% of cations in the 0 to 5 and 5 to 15 cm layers, and exchangeable magnesium was generally greater than desired.

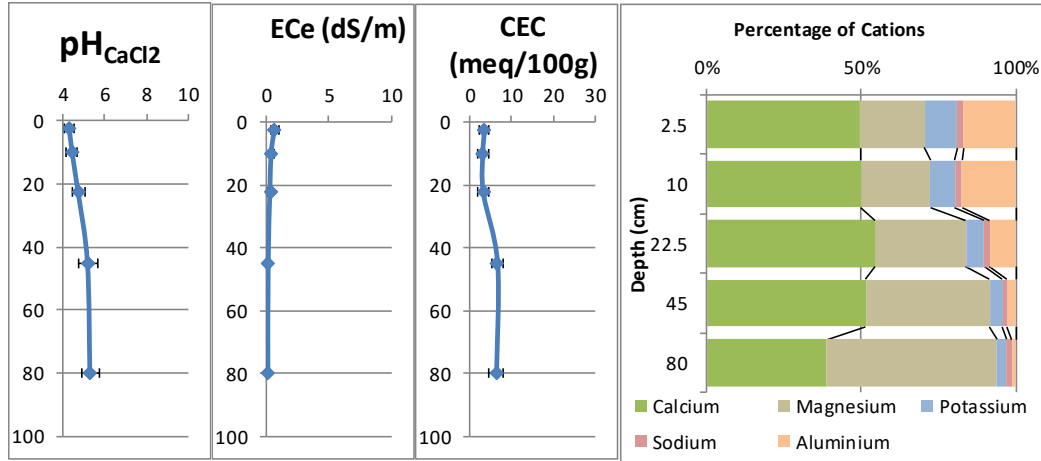


Figure 14. Chemistry Summary for Upland Centre Soil Association in the McPhillamys Gold Project.

Macronutrient levels were lower than optimum in the 0 to 10 cm layer. The exception was high average soil nitrate, which reflects limited plant growth in the months before sampling. Average nitrate nitrogen was 47 mg/kg, (s.d. 41), available phosphorous was 11 mg/kg (s.d. 12) and sulfate sulphur was 5.9 mg/kg (s.d. 3.7). Organic carbon in the 0 to 5 cm layer was moderate at 1.8% (s.d. 0.8), but low in the 5 to 15 cm layer at 0.7% (s.d. 0.2).

Average micronutrient levels in 0 to 10 cm layer were: zinc 0.6 mg/kg, (s.d. 0.7), copper 1.2 mg/kg, (s.d. 0.5), manganese 170 mg/kg (s.d. 73), iron 42 mg/kg (s.d. 28), and boron 0.2 mg/kg (s.d. 0.1). In this soil, copper was present at adequate levels, zinc and boron were suboptimal, while the iron levels were close to excessive and manganese was above the desired level. Soil molybdenum was also tested, but molybdenum concentration was less than the level of detection.

Average laboratory measured clay content was around 20% in the surface to 15 cm layer, and doubled to around 40% in the 30 to 100 cm layer. Average cation to clay ratio was a low 15 meq/100 g of clay in the 5 to 100 cm layer, and substantially higher at 28 meq/100 g of clay in the surface to 5 cm layer. Average Dispersion Index was close to 3 for the surface to 5 and 30 to 100 cm layers, but was 4 for the 5 to 15 and 15 to 30 cm layers. Only 1 of 74 samples had Dispersion Index of 12 or greater.

Chemistry of each layer tested in pits in the Upland Centre Soil Association is presented in Appendix II.

6.2.5.2. Upland Centre Soil Association Suitability of Soil for Topdressing

Sites OM7308 and OM741 in the Upland Centre was rated as having topsoil unsuitable for use as topdressing material because of sand texture (Table 7).

In contrast, there were 8 sites with 50 cm or more of soil that could be used as topdressing material.

Table 7. Thickness of soil suitable for use as topdressing material in Upland Centre Association using Elliot and Veness (1981) procedure.

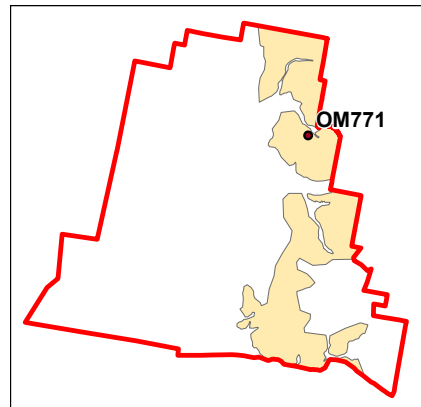
Site ID	Acidic soil	Depth without Acid	Limitation
Less than 10 cm			
OM738		0	Coarse fragments
OM950	0 to 7	7	Mottle
10 to 30 cm			
OM741		10	Sand
OM755		20	Structure
OM948	0 to 10	10	Large peds
OM949	0 to 20	20	Large peds
OM951	0 to 15	15	Large peds
30 to 50 cm			
OM775		40	Mottle
50 cm or thicker			
OM730, OM742, OM774, OM776, OM783, OM784, OM785			

The moderately high clay content and low dispersion index indicate that subsoil from the Upland Centre Association could be used for an intermediate layer between topsoil and overburden, however, the dispersive soil in OM763 should be avoided, and the low cation to clay ratio indicates that this clay does not have the capacity to recover from compaction.

6.2.6. Upland East Soil Association (27 sites over 567 ha)

The Upland East Soil Association was mapped on the elevated, eastern sections of the Project Area (Map 6). This association was situated on the meta-sediments (sandstone and siltstone) of the Anson Formation.

The soil profiles of this Soil Association consisted from 20 to as much as 60 cm of brown, silty topsoil over generally drab brown light to light-medium clay subsoil. The profiles generally had the appearance of being strongly leached, and the majority were either mottled or had bleached A2 horizons.

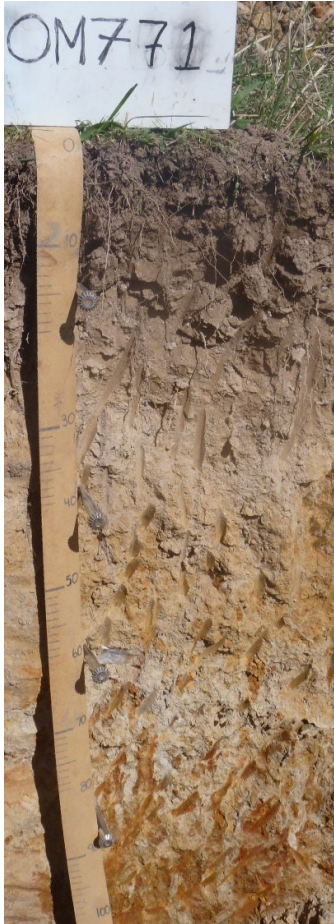



The soil properties of this Soil Association indicate that the soil can support grazing, however, the soil is acidic, has elevated exchangeable aluminium

and deficient in phosphorus and sulphur. Cultivation should be conducted with great care to preserve the organic material in the upper few centimetres of the topsoil.

Erodibility in the 10 sites assessed in the Upland East Soil Association ranged from moderately erodible to very highly erodible.

Representative Soil Test Pit Profile Description: Upland East Soil Association

Soil Test Pit: OM771	
	
Soil Test Pit OM771	Landscape view, soil test pit OM771
Australian Soil Classification Order	Dermosol (8), Chromosol (8), Kurosol (4), Sodosol (4), Kandosol (3)
Australian Soil Classification Sub-order	Brown (23), Yellow (4)
Representative Soil Test Pits	OM746, OM747, OM748, OM753, OM758, OM759, OM761, OM765, OM766, OM767, OM768, OM769, OM770, OM771, OM772, OM779, OM780, OM787, OM788, OM789, OM792, OM840, OM841, OM842, OM843, OM952, OM959
Manganic Profiles	15%
Bleached A2 Horizon	48%
Mottling	74%
NCST Drainage	Poor (55%), Imperfect (33%), Moderately well (11%)
Erodibility Factor	OM843 was moderately erodible, OM761, OM767, OM787, OM792, OM840, OM841, OM842 and OM952 were highly erodible and OM772 was rated as very highly erodible

6.2.6.1. Upland East Association Chemistry

Chemical tests of the Upland East Soil Association followed a consistent pattern that all layers tested were strongly acidic with low CEC and low salinity measured as ECe (Figure 15).

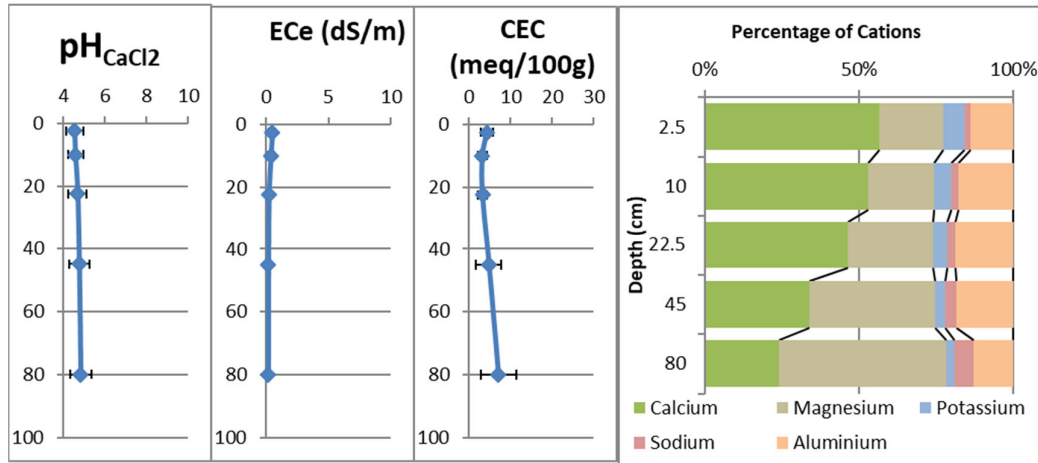


Figure 15. Chemistry Summary for Upland East Association in the McPhillamys Gold Project.

Cation ratios of the Upland Soil Association were undesirable in that exchangeable aluminium percentage was elevated throughout the profile. There was also an undesirably high exchangeable magnesium percentage throughout the profile (Figure 15).

Macronutrient levels were much lower than optimum in the 0 to 10 cm layer. The exception was high average soil nitrate, which reflects limited plant growth in the months before sampling. Average nitrate nitrogen was 31 mg/kg, (s.d. 27), available phosphorous was 12 mg/kg, (s.d. 8) and sulfate sulphur was 4.9 mg/kg (s.d. 2.0). Organic carbon in the 0 to 5 cm layer was high at 2.0% (s.d. 0.8), and low in the 5 to 15 cm layer at 0.9% (s.d. 0.3).

Average micronutrient levels in 0 to 10 cm layer were: zinc 0.6 mg/kg, (s.d. 0.5), copper 0.8 mg/kg, (s.d. 0.6), manganese 231 mg/kg (s.d. 118), iron 25 mg/kg (s.d. 24), and boron 0.2 mg/kg (s.d. 0.1). In this soil, copper was present at adequate levels, while zinc and boron were suboptimal. The iron levels were close to excessive and manganese was above the desired level. Soil molybdenum was also tested, but molybdenum concentration was close to or less than the level of detection.

Average laboratory measured clay content was around 10% in the surface to 15 cm layer, and trebled to around 33% in the 30 to 100 cm layer. Average cation to clay ratio was a low 25 meq/100 g of clay in the 5 to 100 cm layer, and substantially higher at 50 meq/100 g of clay in the surface to 5 cm layer. Average Dispersion Index increased from 3 for the surface to 5 cm to 5 for the 15 to 100 cm layers. Dispersion Index was greater than 12 in more than 2 layers in OM758 and OM765 that were near the boundary with the Alluvium Association and 1 km from the northern edge of the Project Area, and OM747, which was in the southern half of the Project Area.

Chemistry of each layer tested in 24 pits in the Upland East Association is presented in Appendix II.

6.2.6.2. Upland East Soil Association Suitability of Soil for Topdressing

At least 10 cm of soil was found to be suitable for use as topsoil material during rehabilitation at all 27 sites assessed in the Upland East Soil Association, provided acidic soil is treated before the material is spread as topsoil (Table 8). The most common limitation in the surface 20 cm was weak structured sandy soil in A2 horizons.

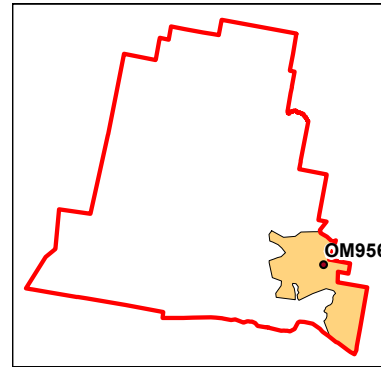
Table 8. Thickness of soil suitable for use as topdressing material in Upland East Association using Elliot and Veness (1981) procedure.

Site ID	Acidic soil	Depth without Acid	Limitation
10 to 30 cm			
OM753		10	Structure
OM759	0 to 20	20	Structure
OM768	0 to 20	20	Structure
OM769		15	
OM771		15	Structure
OM772	0 to 15	15	Structure
OM779		20	
OM787	0 to 15	15	Structure
OM788		25	Structure
OM789		15	Structure
OM952	0 to 10	10	Mottle
OM959	0 to 20	20	Structure
30 to 50 cm			
OM761		30	Mottle
Acidic soil			
OM748	0 to 50	50	
OM770	20 to 50	50	
OM792	0 to 50	50	
OM840	0 to 50	50	
OM841	0 to 50	50	
OM842	20 to 50	50	
OM843	20 to 50	50	
50 cm or thicker			
OM746, OM747, OM758, OM765, OM766, OM767, OM780			

The moderate clay content and low dispersion index indicate that subsoil from the Upland East Association could be used for an intermediate layer between topsoil and overburden, however, the dispersive soil in OM758 and OM765 should be avoided, and the low cation to clay ratio indicates that this clay does not have the capacity to recover from compaction.

6.2.7. Upland East Soil Association Aluminic Variant (15 sites over 220 ha)

The Aluminic variant of the Upland East Soil Association was mapped near the southeastern corner of the Project Area (Map 6) on land mapped as Cunningham and Anson Formations (Map 2c). This association was mapped on the basis of a cluster of pits with elevated exchangeable aluminium and magnesium percentages and very low exchangeable calcium percentage. The land mapped as Upland East Association Aluminic variant also had generally higher elevation than the surrounding Upland Association (Map 3a).





The soil profiles of this Soil Association consisted from 20 to as much as 60 cm of brown, silty topsoil over generally drab brown light to light-medium clay subsoil. Parent material in the form of vertically bedded shale was observed in an around pits on upper slopes.

The soil properties of this Soil Association indicate that the soil can support grazing, however, the soil is acidic, has elevated exchangeable aluminium and deficient in sulphur. There was variation in soil phosphorus that appears to reflect a history of phosphorus fertilizer application. Cultivation should be conducted with great care to preserve the organic material in the upper few centimetres of the topsoil.

Erodibility in the 15 sites assessed in the Upland East Soil Association Aluminic Variant ranged from moderately erodible to very highly erodible.

Representative Soil Test Pit Profile Description: Upland East Soil Association Aluminic Variant

Soil Test Pit: OM956	
	
Soil Test Pit OM956	Landscape view, soil test pit OM956
Australian Soil Classification Order	Dermosol (10), Chromosol (2), Kurosol (2), Kandosol (1)
Australian Soil Classification Sub-order	Brown (11), Red (4)
Representative Soil Test Pits	OM749, OM750, OM752, OM790, OM791, OM953, OM954, OM955, OM956, OM957, OM960, OM961, OM962, OM964, OM965
Manganic Profiles	27%
Bleached A2 Horizon	40%
Mottling	7%
NCST Drainage	Poor (33%), Imperfect (40%), Moderately well (27%)
Erodibility Factor	OM750, OM953 and OM962 were moderately erodible, OM749, OM752, OM790, OM791, OM954, OM955, OM956, OM957, OM960, OM961 and OM964 were highly erodible and OM965 was rated as very highly erodible

6.2.7.1. Upland East Association Aluminic Variant Chemistry

Chemical tests of the Upland East Soil Association Aluminic variant followed a consistent pattern that all layers tested were strongly acidic with low CEC and low salinity measured as ECe (Figure 16).

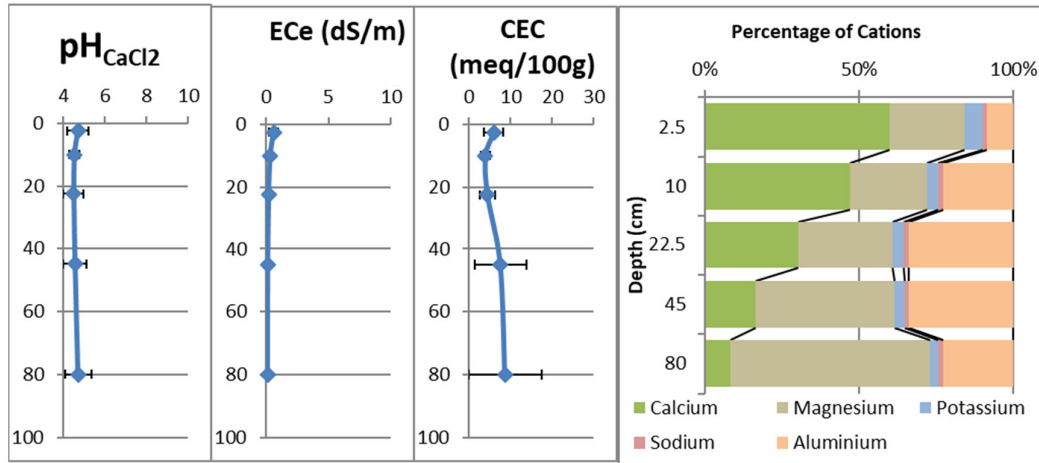


Figure 16. Chemistry Summary for Upland East Association Aluminic Variant in the McPhillamys Gold Project.

Cation ratios of the Upland Soil Association were undesirable in that exchangeable aluminium percentage exchangeable magnesium percentage were undesirably high throughout the profile (Figure 16). Exchangeable calcium declined with depth to be very small in the 60 to 100 cm layer (Figure 16).

Macronutrient levels were much lower than optimum in the 0 to 10 cm layer. The exception was high average soil nitrate, which reflects limited plant growth in the months before sampling. Average nitrate nitrogen was 33 mg/kg, (s.d. 33), available phosphorous was 13 mg/kg, (s.d. 7) and sulfate sulphur was 5.4 mg/kg (s.d. 2.2). Organic carbon in the 0 to 5 cm layer was high at 2.8% (s.d. 0.7), and moderate in the 5 to 15 cm layer at 1.2% (s.d. 0.4).

Average micronutrient levels in 0 to 10 cm layer were: zinc 1.0 mg/kg, (s.d. 0.5), copper 0.7 mg/kg, (s.d. 0.2), manganese 222 mg/kg (s.d. 91), iron 18 mg/kg (s.d. 15), and boron 0.3 mg/kg (s.d. 0.1). In this soil, copper was present at adequate levels, while zinc and boron were suboptimal. The iron levels were close to excessive and manganese was above the desired level. Soil molybdenum was also tested, but molybdenum concentration was close to or less than the level of detection.

Average laboratory measured clay content was around 14% in the surface to 15 cm layer, and trebled to around 40% in the 45 to 100 cm layer. Average cation to clay ratio was a low 16 meq/100 g of clay in the 15 to 100 cm layer, and substantially higher at 50 meq/100 g of clay in the surface to 5 cm layer. Average Dispersion Index decreased from 2 for the surface to 15 cm layers to 0 for the 15 to 100 cm layers. The maximum Dispersion Index of 75 samples was 6.

Chemistry of each layer tested in 15 pits in the Upland East Association Aluminic Variant is presented in Appendix II.

6.2.7.2. Upland East Soil Association Aluminic Variant Suitability of Soil for Topdressing

At least 10 cm of soil was found to be suitable for use as topsoil material during rehabilitation at all 15 sites assessed in the Upland East Soil Association, provided acidic soil is treated before the material is spread as

topsoil (Table 9). The most common limitation in the surface 20 cm was weak structured sandy soil in A2 horizons.

Table 9. Thickness of soil suitable for use as topdressing material in Upland East Association Aluminic Variant using Elliot and Veness (1981) procedure.

Site ID	Acidic soil	Depth without Acid	Limitation
Less than 10 cm			
OM953	5 to 25	5	Large peds
10 to 30 cm			
OM962	0 to 20	15	Mottle
30 to 50 cm			
OM955	10 to 40	40	Large peds
OM956	10 to 40	40	Mottle
OM960		40	Mottle
OM961		40	Mottle
Acidic soil			
OM791	10 to 50	50	
50 cm or thicker			
OM749, OM750, OM752, OM790, OM954, OM957, OM964, OM965			

The moderately high clay content and low dispersion index indicate that subsoil from the Upland East Association Aluminic Variant could be used for an intermediate layer between topsoil and overburden. However, the high concentration of exchangeable aluminium indicates that acid-tolerant species would be required if this subsoil was used for rehabilitation.

6.2.8. Discharge Soil Association (1 site over 13 ha)

Soil properties of pit OM781 were different enough from the remaining 123 sites examined that this site together with the scalded slopes of a hill to the east of OM781 were mapped as a separate Soil Association (Map 6).

The Discharge Soil Association should be managed carefully to minimise the spread of the scalded (bare) soil beyond its current extent. Total grazing pressure should be minimised and strategic tree planting should be considered.

Erodibility of the Sodic Discharge Soil was not calculated.

6.2.8.1. Discharge Soil Association Chemistry

The soil chemistry in Figure 17 showed that the soil was strongly alkaline in contrast to the acidic profiles of the remaining 7 Soil Associations. The soil was also strongly sodic, and with a bulge in the salinity profile below the soil surface that is consistent with discharge of groundwater into the rootzone. Cation exchange capacity in OM781 (Figure 17) was also much higher than in the surrounding Upland East Soil Association (Figure 15).

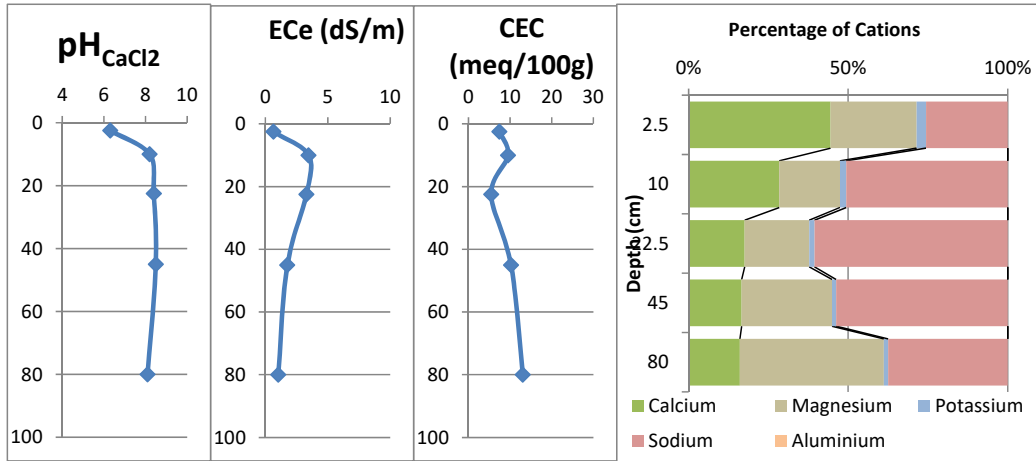


Figure 17. Chemistry Summary for pit OM781 in the Discharge Soil Association in the McPhillamys Gold Project.

Clay content was not measured in OM781, but 4 of the 5 samples tested had Dispersion Index greater than 12.

Chemistry of each layer tested in pit OM781 in the Discharge Soil Association is presented in Appendix II.

6.2.8.2. Discharge Soil Association Suitability of Soil for Topdressing

Soil in the Sodic Discharge Association is too sodic and dispersive to be used either as topdressing material or as an intermediate layer between topsoil and overburden.

6.3. SUMMARY OF SOIL PROPERTIES ACROSS MCPHILLAMYS GOLD PROJECT

The broad division of the Project Area into an alluvium and an upland soil landscape by Kovac *et al.* (1989) was supported by this more detailed survey. The alluvial soil was generally less acidic had more saline subsoil (Table 10) and tended to have more sodium in the subsoil than the remainder of the Project Area except pit OM781 (Discharge Soil Association). The Alluvium Soil Association was dominated by Grey Dermosols and Chromosols, but included a range of soil types from Kandosols (structureless soils) to Vertosols (cracking clays). These were scattered through the Alluvium Soil Association as expected in the narrow floodplain in the Project Area.

The mapping strategy adopted in the Project Area was to divide the land above the Alluvium into seven Soil Associations based on disparate soil profile properties. These were;

Red Soil, which had red subsoil and were found on upper slopes in an arc through the centre of the Project Area. Dominant soil types were Red Chromosols and Dermosols. Profiles in this association generally had much better drainage than the remainder of the Project Area.

Manganic Soil in which the profiles had a manganic layer (more than 20% manganiferous or ferromanganiferous nodules). The Manganic Soil Association was divided into Manganic East and Manganic West on the basis

of 2 classes of parent material. Manganic East was formed on metasediments of the Anson Formation, while Manganic West was formed on Blayney Volcanics. Dominant soil types were Manganic Brown Chromosols and Dermosols. Soil in these 2 associations was similar in many respects, but exchangeable calcium percentage was consistently more than 10% higher in the subsoil of Manganic West, and exchangeable magnesium percentage was consistently 10% higher in the subsoil of Manganic East.

The **Upland Soil** Associations were more elevated than the Manganic soil associations, and had poorer drainage than the Red Soil. Dominant soil types were Brown Dermosols and Chromosols. The Upland Soil Association was divided into Upland Centre, with more clayey subsoil and strongly acidic Upland East. Within the Upland East Association, a cluster of sites with high exchangeable aluminium and magnesium was mapped as the Aluminic variant. Sites in the Upland Associations tended to have lower subsoil pH and higher exchangeable aluminium percentage than the remaining 4 major associations.

Pit OM781 was so different to the remaining 123 in that it was strongly alkaline and strongly sodic that it was allocated to a separate **Discharge** Soil Association.

Table 10. Summary of soil chemical properties of 6 Soil Associations in McPhillamys Gold Project.

Association	pH _{CaCl2}	CEC	Cations	Clay	Macronutrients
Alluvium	5 in topsoil increasing to 6 to 7 in subsoil	10 meq/100 g in topsoil. Increase to 30 meq/100 g in subsoil	EAIP - generally less than 5% in topsoil and lower in subsoil. ECaP - 60% in topsoil reducing to 50% in subsoil EMgP increase from 30 to 45% with depth	Average 20 to 30% through profile	P- 19 for 0 to 5 cm 13 for 5 to 15 cm S – average 7 mg/kg
Red Soil	Less than 4.5 in topsoil increasing to 6 in subsoil	5.5 meq/100 g	EAIP – 20% in topsoil, reducing to low levels in subsoil ECaP – 50% in topsoil increasing to nearly 70% in upper subsoil falling to 55% with depth EMgP – Increasing from 16 to 40% with depth	18% to 20 cm increasing to 35% below 20 cm	P – 14 for 0 to 5 cm 6 for 5 to 15 cm S – Average 7 mg/kg
Manganic West	4.5 in topsoil increasing to 5.5 in subsoil	5 meq/100 g	EAIP – 10 to 15 % in topsoil reducing to low levels in subsoil ECaP – 50% in topsoil increasing to 65% in upper subsoil then falling to 60% EMgP – increase from 20 to 30% with depth	12% in topsoil increasing to over 25% in subsoil	P – 14 for 0 to 5 cm 7 for 5 to 15 cm S – Average 5 mg/kg
Manganic East	4.5 in topsoil increasing to 5.5 in subsoil	4.5 meq/100 g	EAIP - 10 to 15% in topsoil reducing to low levels in subsoil ECaP - 50% through profile EMgP – increased from 20 to 40% with depth	10% in topsoil increasing to 20 to 30% in subsoil	P – 12 for 0 to 5 cm 7 for 5 to 15 cm S – Average 6 mg/kg
Upland Centre	4.3 in topsoil increasing to 5 in subsoil	Less than 5 meq/100 g in topsoil, 6 meq/100 g in subsoil	EAIP – 15 to 25% in topsoil reducing to low levels in subsoil ECaP – 50% through profile EMgP – increase from 20 to 50% with depth	10% to 30 cm increasing to more than 40% below 30 cm	P – 15 for 0 to 5 cm 6 for 5 to 15 cm S – Average 6 mg/kg
Upland East	4.5 in topsoil increasing to 4.8 in subsoil	5 meq/100 g	EAIP – 12 to 20% through profile ECaP – 55% in topsoil falling to 25% with depth EMgP – increase from 20 to 55% with depth	12% in topsoil increasing to over 30% in subsoil	P – 16 for 0 to 5 cm 8 for 5 to 15 cm S – Average 5 mg/kg
Upland East-Aluminic variant	4.7 in topsoil decreasing to 4.5 in subsoil	6 meq/100 g to 5 cm, then 4 meq/100 g to 30 cm, then 8 meq/100 g	EAIP – 8 to 35% through profile ECaP – 60% in topsoil falling to 10% with depth EMgP – increase from 25 to 65% with depth	15% in topsoil increasing to over 40% in subsoil	P – 18 for 0 to 5 cm 9 for 5 to 15 cm S – Average 5 mg/kg
Discharge	6.5 in topsoil, 8 in subsoil	5 to 10 meq/100 g through profile	EAIP - 0% ECaP – decrease from 45% to 20% with depth EMgP - Increase from 20 to 35% with depth	Not tested	P – 14 for 0 to 5 cm 7 for 5 to 15 cm S – 8 for 0 to 5 cm, 49 for 5 to 15 cm

The diagnostic soil chemical properties of the eight Soil Associations are assessed in Appendix II, summarised in Table 10 and can be described as:

- Alluvium Soil Associations – Soil pH 5 in topsoil increasing to 6 to 7 in subsoil, moderately low clay content throughout profile.
- Red Soil Association – Average profile had moderate clay content throughout, but topsoil was acidic with average 20% exchangeable aluminium. Average exchangeable calcium percentage peaked at 60 to 70% in the 15 to 60 cm zone and exchangeable aluminium percentage was desirably low below 15 cm.
- Manganic West Soil Association – Brown and Grey Manganic Acidic topsoil over less acidic subsoil with average 10 to 15% exchangeable aluminium in topsoil and 60% exchangeable calcium and 30% exchangeable magnesium in subsoil.
- Manganic East Soil Association – Acidic topsoil over less acidic subsoil with average 10 to 15 % exchangeable aluminium in topsoil, 50% exchangeable calcium and 40% exchangeable magnesium in subsoil.
- Upland Centre Soil Association – Acidic topsoil over less acidic, clayey subsoil with average 10 to 15% exchangeable aluminium in topsoil and 40% exchangeable calcium and 50% exchangeable magnesium in subsoil.
- Upland East Soil Association – Acidic with an average pH_{CaCl_2} of 4 and 20% average exchangeable aluminium through the profile. Low exchangeable calcium of 20% in 60 to 100 cm layer.
- Upland Macquarie Soil Association – Cunningham Formation parent material.
- Discharge Soil Association – Subsoil pH 9 to 10. Strongly dispersive soil.

The soil properties described above indicate that the soil across the Project Area could support a productive grazing system with the addition of phosphorous fertilizer and lime. The aim of applying lime is to reduce the topsoil exchangeable aluminium percentage and would be beneficial across a large proportion of the Project Area with the exception of the Alluvium Soil Association.

Profiles in the vast majority of the Project Area have indications that the topsoil becomes saturated when rainfall far exceeds evaporation. This is possible in 10% of years in each month of the year, but likely to result in prolonged waterlogging mainly during cooler autumn, winter and spring months. This duration of waterlogging is likely to restrict access required for machinery operations for cropping. This limited access, low fertility and shallow depth of fertile topsoil indicate that grazing would be a better use for the land in the Project Area than annual cropping.

The soil analyses summarised in Appendix III show that the eight Soil Associations mapped across the Project Area have grouped soil profiles with properties that are more similar within the associations than between them.

7. SOIL ASSESSMENT ACCORDING TO BIOPHYSICAL STRATEGIC AGRICULTURAL LAND PROTOCOL

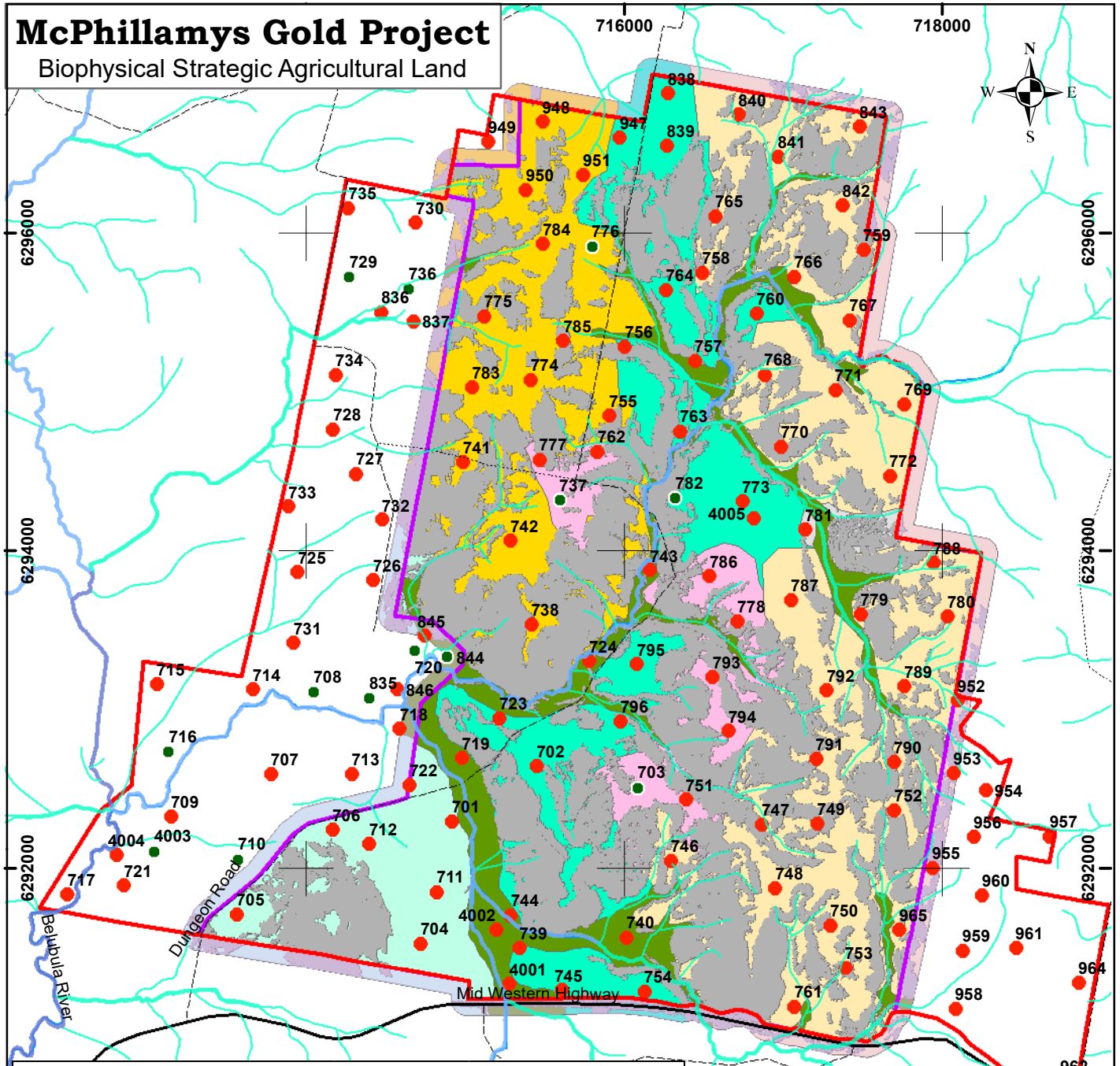
A soil assessment was done in accordance with the Interim Protocol for Site Verification and Mapping of Biophysical Strategic Agricultural Land protocol (OEH and OAFS, 2013) and found no BSAL within the mining lease application area (SSM, 2019b). Subsequently a Site Verification Certificate was issued by the Department of Planning and Environment for the mining lease application area (Figure 2.1) on June 18, 2019.

The proposed Mining Lease boundary was located to avoid Potential BSAL (Map 7).

The clusters of sites that satisfied the BSAL criteria were predominantly on the floodplain of the Belubula River and on Ordovician Byng and Blayney Volcanics geology (Map 2c). No project related disturbance is proposed in the area outside the mining lease application area.

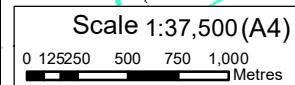
McPhillamys Gold Project

Biophysical Strategic Agricultural Land



BSAL ASSESSMENT SUMMARY

Soil Mapping Unit	Area Flatter than 10% (ha)	BSAL Failure Steps
Alluvial Chromosol, Sodosols and Dermosols	160	7-Fertility, 9-Drainage
Red Chromosols and Dermosols	67	8-Physical, 10-pH
Manganic Chromosols and Dermosols on Byng Volcanics	139	9-Drainage
Manganic Chromosols and Dermosols on Anson Formation	215	8-Physical, 9-Drainage, 10-pH
Mesotrophic and Eutrophic Brown Dermosols and Chromosols	205	9-Drainage, 10-pH
Poorly Drained Brown Chromosols, Dermosols and Kurosols	408	7-Fertility, 9, Drainage, 10-pH, 12-Chemical
Strongly Sodic Dermosol	6	9-Drainage, 10-pH, 12-Chemical, Area



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Certification

Roads CLASS

CLASS

2

3

4

5

Project Area (2,513 ha)

SVC Application Area (1,813 ha)

100 m buffer (211 ha)

Site BSAL Rate Slope Assessment

Fail

OK

Fail. Photogrammetry Slope > 10%

Soil Mapping Unit

Alluvial Chromosols, Sodosols and Dermosols

Red Chromosols and Dermosols

Manganic Chromosols and Dermosols on Byng Volcanics

Manganic Chromosols and Dermosols on Anson Formation

Mesotrophic and Eutrophic Brown Dermosols and Chromosols

Poorly Drained Brown Chromosols, Dermosols and Kurosols

Strongly Sodic Dermosol

Job Code: Cr408

Map Printed: 2019

Contact: Sustainable Soils Management

Phone : (02) 68 473367

Roads: NSW LPI

Watercourses: NSW LPI

Datum: WGS 84

Projection: UTM

SSM
Sustainable Soils Management

Map 7

8. LAND AND SOIL CAPABILITY ASSESSMENT

8.1. LAND AND SOIL CAPABILITY ASSESMENT PROCESS

The Land and Soil Capability (LSC) assessment classifies land into one of eight soil and land capability classes. These classes give an indication of what the land can be used for without causing land and soil degradation (Table 11).

Table 11. Land and Soil Capability Classes – general definitions (OEH, 2012).

LSC class	Description
Land capable of wide variety of uses (cropping, grazing, horticulture, forestry, nature conservation)	
1	Extremely high capability land: Land has no limitations. No special land management practices required. Land capable of all rural uses and land management practices.
2	Very high capability land: Land has slight limitations. These can be managed by readily available, easily implemented management practices. Land is capable of most land uses and land management practices, including intensive cropping with cultivation.
3	High capability land. Land: Has moderate limitations and is capable of sustaining high-impact land uses, such as cropping with cultivation, using more intensive readily available and widely accepted management practices. However, careful management of limitations is required for cropping and intensive grazing to avoid land and environmental limitations
Land capable of a variety of land uses (cropping with restricted cultivation, pasture cropping, grazing, some horticulture, forestry, nature conservation)	
4	Moderate land capability land: Land has moderate to high limitations for high-impact land uses. Will restrict land management options for regular high-impact land uses such as cropping, high-intensity grazing and horticulture. These limitations can only be managed by specialised management practices with a high level of knowledge, expertise, inputs, investment and technology.
5	Moderate-low capability land: Land has high limitations for high-impact land uses. Will largely restrict land use to grazing, some horticulture (orchards), forestry and nature conservation. The limitations will need to be carefully managed to prevent long-term degradation.
Land capable of a limited set of land uses (grazing, forestry, nature conservation and some horticulture)	
6	Low capability land: Land has very high limitations for high-impact land uses. Land use restricted to low-impact land uses such as grazing, forestry and nature conservation. Careful management of limitations is required to prevent severe land and environmental degradation.
Land generally incapable of agriculture land use (selective forestry, nature conservation)	
7	Very low capability land: Land has severe limitations that restrict most land uses and generally cannot be overcome. On-site and off-site impacts of land management practices can be extremely severe if limitations not managed. There should be minimal disturbance of native vegetation.
8	Extremely low capability: Limitations are so severe that land is incapable of sustaining any land use apart from nature conservation. There should be no disturbance of native vegetation.

The Land and Soil Capability (LSC) classes of the Project Area were assessed in accordance with the land and soil capability assessment scheme – second approximation (OEH 2012).

The LSC assessment scheme is a 2 step process. The first step is to assess the LSC based on each of 8 individual hazards (water erosion, wind erosion, soil structure decline, soil acidification, salinity, waterlogging, shallow soils and mass movement) at each of the 124 sites assessed. For each of these hazards,

the area around each site was assigned an LSC class from 1 (least hazard) to 8 (greatest). The final LSC for each site was determined by the highest class assigned to any hazard for that site (Figure 18).

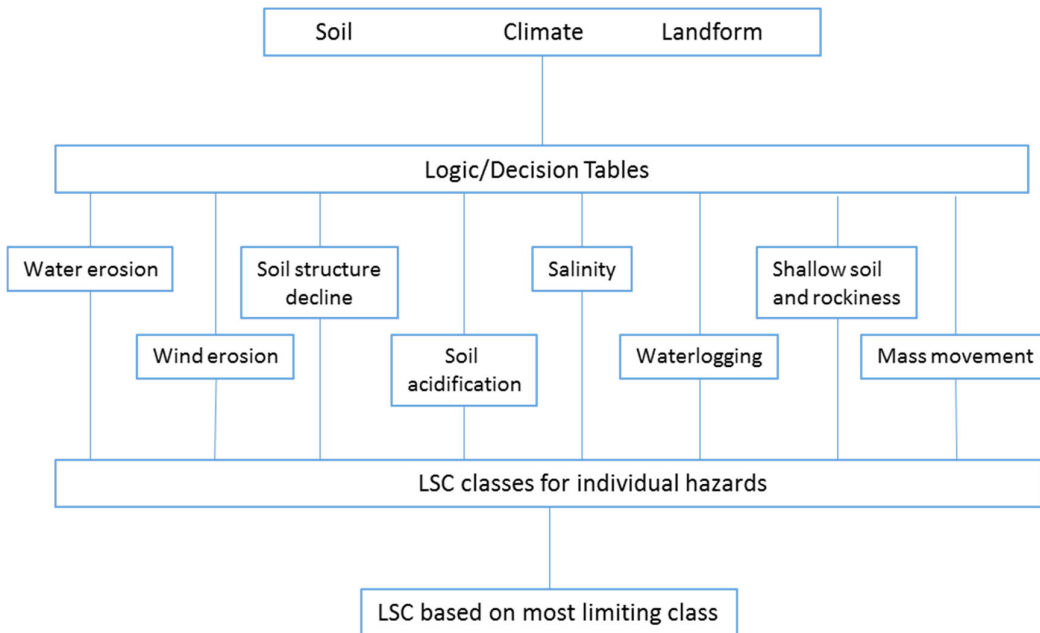


Figure 18. Biophysical information used to determine LSC class (from OEH, 2012).

The assessment of LSC classes for the Project Area was based on data collected during the field survey, laboratory analysis of soil samples and is supplemented with information collected during the desktop assessment.

8.1.1. ASSESSMENT OF INDIVIDUAL HAZARDS

Methods used to assess each of the hazards are summarized below.

8.1.1.1. Water erosion hazard

Assessment of water erosion hazard is based on slope and a lookup table in OEH (2012). This was applied on 2 scales. The slope was measured in the field for each site, and the value input to Table 4 of OEH (2012) to give LSC class of the site described

A slope assessment for the entire Project Area was conducted using a 5 m LiDAR digital elevation model (DEM) from NSW Spatial Services (Map 3b and Table 2). This was combined with the slope classes in Table 4 of OEH (2012) to give LSC class over the whole Project Area. The slope surface covers the whole of the Project Area, allowing the accurate delineation of areas where water erosion is the most limiting hazard.

8.1.1.2. Wind erosion hazard

Calculation of wind erosion hazard considers average rainfall, wind erosivity, site exposure to prevailing wind and soil erodibility to wind. These factors were combined to determine the wind erosion hazard following Tables 5 and 6 in OEH (2012):

- Soil was divided into 3 erodibility classes based on surface soil texture in the pits described, ranging from low for loam to clay texture to high for loamy sand.
- Wind erosive power at this locality is high.
- Site morphology was divided into 3 site exposure classes, ranging from low for sheltered locations to high for hilltops, cols or saddles.
- The high average rainfall of >500 mm is associated with more groundcover than expected for lower rainfall, consequently a lower wind erosion hazard.

8.1.1.3. Soil structure decline

The soil structural decline hazard is determined by properties of the surface soil. The assessment considers surface soil texture, sodicity, degree of self-mulching and presence of organic matter (Table 7, OEH, 2012).

Soil texture and relevant soil structure observations were determined at each site, and exchangeable sodium percentage was determined from laboratory tests.

8.1.1.4. Soil acidification hazard

Acidification hazard is based on a combination of buffering capacity of the soil (surface soil texture), rainfall and pH of the surface soil. Assessment of the acidification hazard is a 3 step process:

- Soil buffering capacity was estimated from field assessed topsoil texture (Table 10, OEH, 2012).
- Surface soil pH_{CaH₂O} was taken from 0 to 5 cm samples analysed in a laboratory.
- Average annual rainfall of 765 mm (BOM, 2017) is between 700 and 900 mm.

These parameters were input to Table 12 (OEH, 2012) to give soil acidification hazard class.

8.1.1.5. Salinity hazard

The salinity hazard assessment was based on the Salinity hazard report for Catchment Action Plan Upgrade – Lachlan Area (Wooldridge *et al.*, 2012) which has mapped the broad locality of the Project Area as having a low salinity hazard due to high rainfall and low levels of salt stored in the landscape (salinity hazard class 1).

8.1.1.6. Waterlogging hazard

Waterlogging hazard is based on the NCST (2009) drainage classes observed during the field survey. The waterlogging hazard class was based on Table 14 in OEH (2012) with one modification. The modification was that poorly drained sites could be either LSC Class 5 if the site was judged to be not waterlogged most years or LSC Class 6 if it appeared that the site was waterlogged in most years.

8.1.1.7. Shallow soils and rockiness hazard

Shallow soils and rockiness hazard was based on field observations of soil depth and observed rock outcrop. The hazard was determined from Table 15 in OEH (2012).

8.1.1.8. Mass movement hazard

Mass movement hazard was based on existing observed mass movement, slope class and rainfall. The hazard was determined from Table 16 in OEH (2012).

8.1.2. DETERMINE LAND AND SOIL CAPABILITY CLASS

The LSC class was determined using a 2 stage process. The first stage was to apply an LSC class to each Soil Association in Map 6. This was based on the LSC class of each of the 124 sites assessed in the Project Area. The LSC class of each of these sites was calculated as the maximum LSC class of each of the 8 hazards described above. The Soil Association LSC class was calculated from the median (average observation) LSC class of the sites assessed within the Soil Association.

The second step was to map areas that were steep enough that the LSC class calculated from the 5 m Lidar DEM was greater than the Soil Association LSC class. Only polygons of 0.4 ha or greater were mapped.

8.2. LSC ASSESSMENT RESULTS

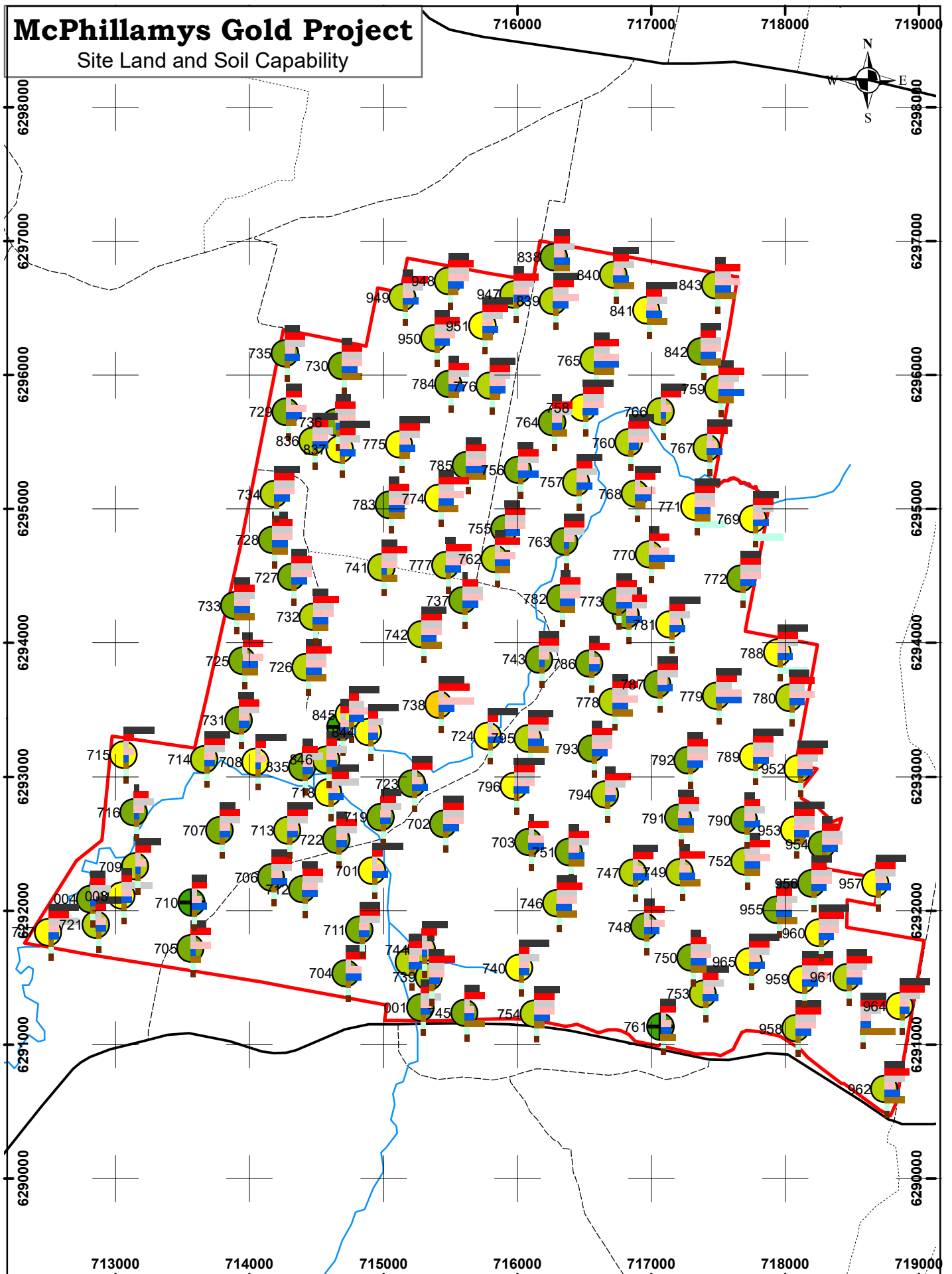
8.2.1. Summary of Individual Hazards

The methodology followed in this assessment found that 2% of the sites examined were LSC 3, 42% LSC 4, 35% LSC 5, 20% LSC 6 and 1% LSC 7. The 3 LSC 3 sites were in mid to lower slope locations in the southern third of the Project Area (Map 7). Each of these sites was in a different association and two of the sites had indications of impeded drainage.

The mid-slope location of these LSC 3 sites reflects a general pattern across the Project Area that sites away from valley floors are generally susceptible to acidifications, while sites in and near valley floors often experience seasonal waterlogging (Map 7).

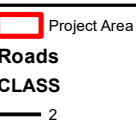
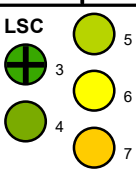
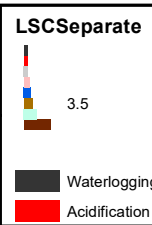
McPhillamys Gold Project

Site Land and Soil Capability

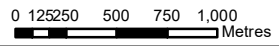


Certification

Draft/Uncontrolled Document
Unless Signed & Dated



Scale 1:37,500 (A4)



Job Code: Cr408
Map Printed: 2018
Contact: Sustainable Soils Management
Phone : (02) 68 473367
Roads: NSW LPI
Watercourses: NSW LPI

Datum: WGS 84
Projection: UTM



The most limiting hazard that determined the LSC class varied with LSC class (Figure 19). For LSC 4, acidification and breakdown of surface structure were the most limiting factor for 80% of sites (Figure 19). Waterlogging and acidification were the most limiting hazards for LSC 5, while waterlogging was the most limiting hazard for LSC 6.

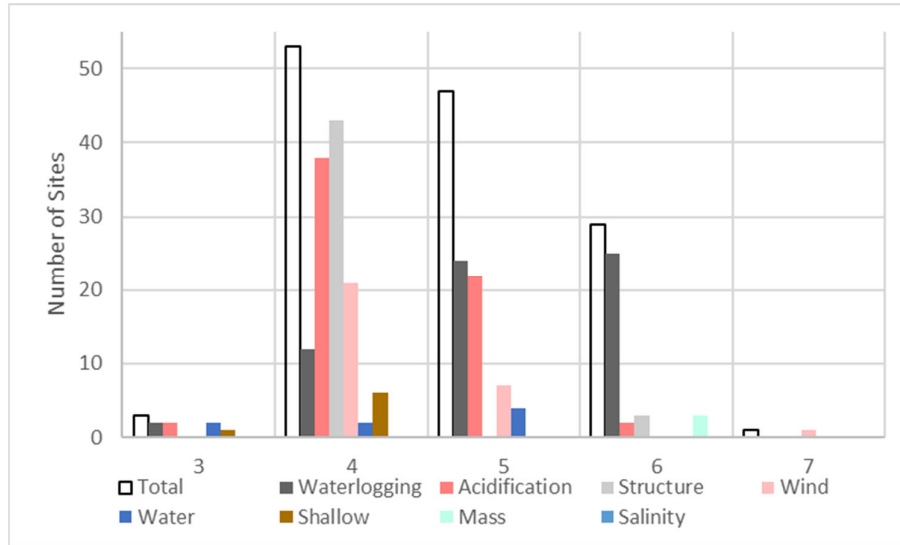


Figure 19. Hazard that limits Land and Soil Capability in each LSC class.

8.2.2. Limiting Hazard within Associations

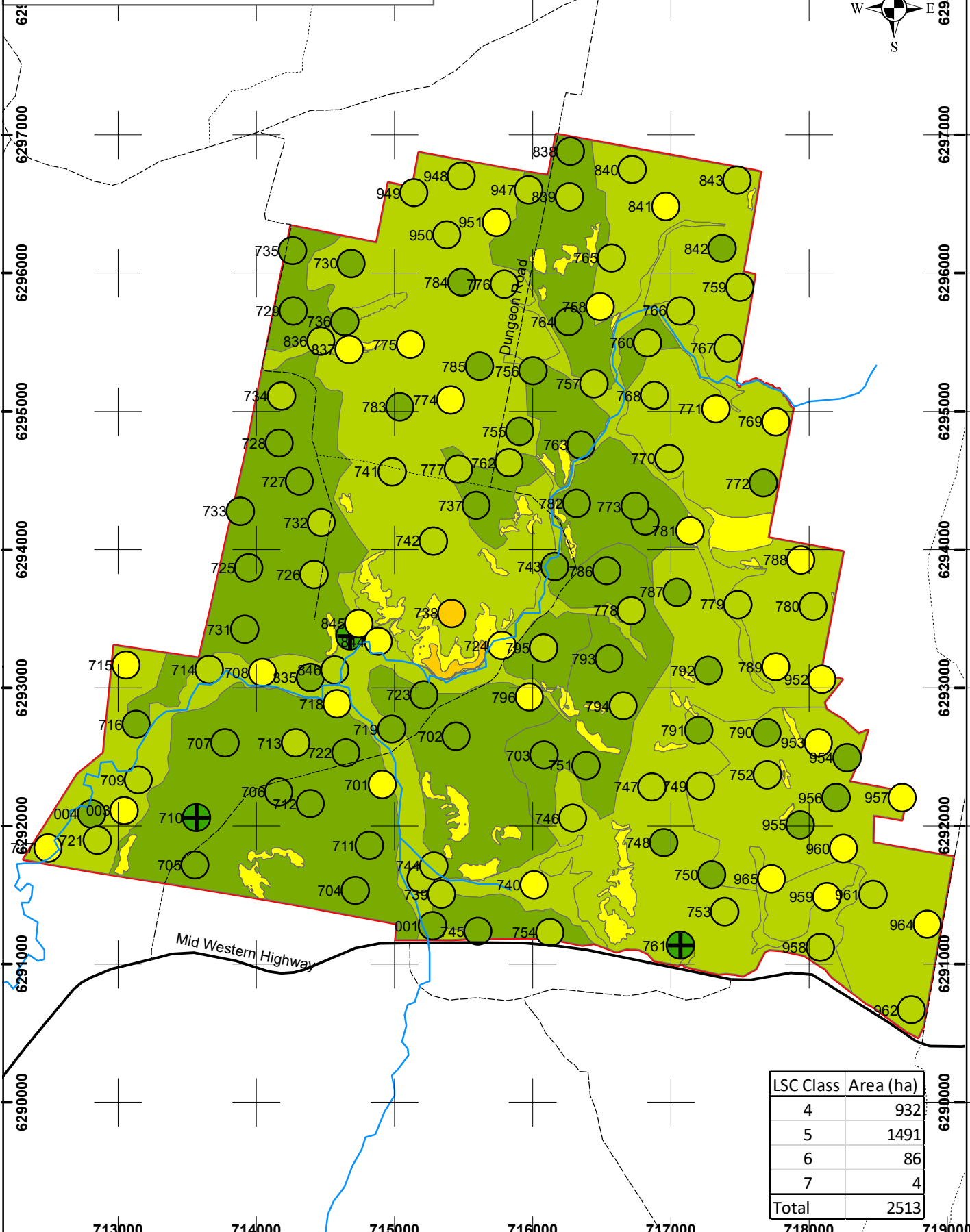
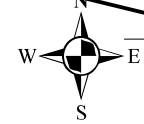
The use of median LSC class to determine Soil Association LSC resulted in 932 ha (Red Soil, Manganic West, Manganic East Associations) being mapped as LSC 4, 1,422 ha (Alluvium, Upland Centre, Upland East and Upland East Aluminic Associations) being mapped as LSC 5, 86 ha (Sodic Discharge and steep parts of other associations) mapped as LSC 6 and a steep 4 ha part of Upland Centre Association being mapped as LSC 7 (Map 8).

Acidification was the most limiting hazard in the Upland Red Soil, Manganic West, Manganic East and Upland Centre Associations (Table 12). Waterlogging was the most limiting hazard in the Alluvium and Sodic Discharge Associations. Short range soil variation in the Upland East and Upland East Aluminic variant Associations was reflected in both acidification and waterlogging being the most limiting hazards.

McPhillamys Gold Project

Land and Soil Capability

716000 717000 718000 719000



LSC Class	Area (ha)
4	932
5	1491
6	86
7	4
Total	2513

713000 714000 715000 716000 717000 718000 719000

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Roads --- 3 LSC CLASS --- 4 --- 2 --- 5

LSC by Association

- 5
- 4
- 3
- 6
- 4
- 7
- 7

Project Area

Scale 1:37,500 (A4)
 0 125250 500 750 1,000
 Metres

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Table 12. Average LSC class for each of the 8 hazards assessed for each Soil Association in McPhillamys Gold Project.

Association	Water logging	Acidification	Structure	Wind	Water	Shallow	Mass	Salinity	Mean LSC
Alluvium	4.6	2.9	3.4	2.3	2.1	1.0	1.0	1.0	5
Red Soil	1.9	4.3	2.9	3.3	2.8	1.8	1.0	1.0	4
Manganic West	3.4	3.9	3.1	3.0	2.7	1.7	1.0	1.0	4
Manganic East	3.6	4.1	3.5	2.9	2.7	1.8	1.0	1.0	4
Upland Centre	3.6	4.6	3.7	3.6	2.9	2.4	1.0	1.0	5
Upland East	4.4	4.1	3.0	3.4	3.2	2.0	1.6	1.0	5
Upland East Aluminic	4.0	4.1	3.7	3.0	2.9	2.1	1.0	1.0	5
Sodic Discharge	6.0	3.0	4.0	2.0	3.0	1.0	1.0	1.0	6
Site Average	3.9	3.9	3.3	3.0	2.7	1.7	1.1	1.0	

Structure decline would have limited LSC of all 8 Soil Associations to class 3 or 4 despite not being the most limiting hazard in any association (Table 12). The low topsoil clay content also rendered the Upland associations susceptible to wind erosion. These associations could also be susceptible to water erosion with frequent cultivation (Table 12).

8.3. IMPLICATIONS OF LSC RATING

The finding that the Project Area is predominantly LSC classes 4 and 5 is consistent with the historic landuse of growing naturalised pasture to support grazing by cattle and sheep.

Although much of the Project Area has been cultivated, use of the land for cropping was constrained in 2 general patterns. Elevated land in the Red Soil, Manganic West, Manganic East, Upland Centre and Upland East associations would be constrained by acidic pH and associated elevated exchangeable aluminium percentage (Table 3). This was associated with topsoil that had limited capacity to store nutrients indicated by CEC around 5 meq/100 g (Table 3).

The less acidic Alluvium association is constrained by seasonal waterlogging in winter months (J. Gordon, pers comm.).

The acidic nature of the soil constrains the range of crops that can be grown without amelioration with an agent such as lime. The low CEC indicates that nutrients should generally be applied as needed rather than being applied in large doses, then using the soil as a nutrient reservoir. The seasonal waterlogging would constrain access for agronomic operations such as topdressing and weed control as well as limiting yield in the areas most affected.

Two biological factors important to plant growth in the Project Area were identified during this assessment. Earthworms were common in the majority of pits examined. These provide macropores to allow rapid movement of water and air into the subsoil, and provide some mixing of the soil. The presence of an active earthworm population also reduces the need for cultivation in undisturbed parts of the Project Area.

The second biological factor is that organic carbon was concentrated in the surface 5 cm of soil. This organic matter increases the capacity to store

nutrients, indicated by consistently higher cation exchange capacity in the 0 to 5 cm layer than 5 to 30 cm layer of soil associations in elevated parts of the Project Area (Figures 11 and 15).

The organic matter in the surface to 10 or 15 cm of soil in disturbed parts of the Project Area can be a significant resource in the successful rehabilitation of these areas.

Common indicators of waterlogging in the form of bleached horizons in duplex (loam over clay) profiles indicate that care should be taken when planning rehabilitation to provide adequate topsoil drainage to reduce waterlogging to a tolerable level. This can be provided by a combination of surface and internal (through the soil) drainage.

8.4. LSC ASSESSMENT CONCLUSIONS

- The majority of the project area comprises LSC class 4 and 5 land. Specifically:
 - o 932 ha of LSC class 4;
 - o 1,491 ha of LSC class 5;
 - o 86 ha of LSC class 6;
 - o 4 ha of class LSC 7.
- The LSC classes across the Project Area are consistent with the current landuse, which is dominated by naturalized pasture with occasional cultivation (Map 3d).
- Waterlogging was the dominant hazard in the low-lying Alluvium and Sodic Discharge Soil Associations, which were rated as LSC Class 5. The seasonal and predicable timing of waterlogging hazard may allow cultivation of more fertile parts of this land in warmer seasons.
- The common occurrence of waterlogging indicates that care will be required during rehabilitation to ensure that the land has either surface or internal (through the profile) drainage.
- Acidification was the dominant hazard in the Red Soil, Manganic West, Manganic East and Upland Centre Soil Associations. This limits the range of crops that can be profitably grown, and is associated with a limited capacity of the soil to store nutrients.
- The biological phase in the form of earthworms and a concentration of organic carbon in the surface 5 to 15 cm are resources that are important to productivity across the Project Area. These factors are important in pasture production, and are likely to be important in successful rehabilitation of the Project Area.
- The LSC class and dominant hazard varied with soil and land shape across the Upland East Soil Association.

9. POTENTIAL IMPACT OF PROJECT ON SOIL RESOURCES

9.1. TYPES OF IMPACTS ON SOIL

One aim when managing agricultural land is to maintain the land's productive potential. The soil assessment described in Section 6 indicates that the soil in the Project Area consists of a 5 to 10 cm thick veneer of relatively stable topsoil that has a much higher concentration of organic matter and nutrients than the soil beneath it. Potential impacts from the McPhillamys Gold Mine to the soil in the Project Area include:

- **Soil compaction** from compaction by heavy vehicles and machinery during the soil stripping, stockpiling and respreading.
- **Loss of soil resource** when areas of soil are removed by construction of the pit, buried under many metres of waste rock or tailings, or moved to level land before construction of infrastructure.
- **Soil erosion** when the stable topsoil is disturbed and when surface drainage is modified by reshaping the land.
- **Soil contamination** from hydrocarbon spills and leaching of chemicals used in the processing of gold.

This section will focus on loss of the soil resource as the major likely impact of McPhillamys Gold Mine on soil in the Project Area.

9.2. DESCRIPTION OF POTENTIAL IMPACTS

The project's potential impact on soil resources in the Project Area are associated with temporary loss of land during construction and operation of mine infrastructure, permanent loss of land in the open cut void, and permanent reduction in productive potential in land used to store waste rock and tailings and divert runoff around rehabilitated land. The assessment focuses on the disturbance footprint within the Project Area.

Soil disturbance will be restricted to land owned by Regis, and predominantly in areas that have been cleared of trees and planted with introduced phalaris and sub-clover pasture. The thin veneer of topsoil in the Project Area means that any disruption of topsoil will expose a layer of less stable loamy soil. For this reason, topsoil will be removed from all soil that is disturbed to construct and operate the mine. Disturbance includes levelling required to form pads for construction of buildings, laydown yards, roads and the Run of Mine pad as well as the more obvious disturbance of the Waste Rock Emplacement and the Tailings Storage Facility. Soil in the floor of water storages should not require topsoil to be stockpiled.

Some areas of soil will be disturbed during decommissioning while infrastructure is dismantled and access and internal roads and other supporting infrastructure are removed. Runoff diversion drains will be constructed and the footprint of the Run of Mine pad will also be expanded during the decommissioning.

All disturbed land except the void will be rehabilitated with stockpiled soil to return the land to a stable state.

Restoration of land will require the restoration of a functional soil profile and a landform with slope to drain excess water. The soil profile should supply water, nutrients, aeration and anchorage for plants, as well as some through drainage of water.

9.2.1. Disturbance Footprint

The footprint of soil disturbance is shown in Figure 2.1. The areas and timing of disturbance are summarized in Table 13. Soil will be disturbed across the Project Area for these purposes:

- excavation of an open cut mine;
- clearing of all trees in disturbance area;
- construction of waste rock emplacement;
- construction of a level pad for a run of mine pad;
- construction of a tailings storage facility and associated embankments;
- construction of an amenity bund;
- construction of topsoil stockpiles;
- construction of water storage embankments;
- storage of water in water storages, including sediment basins;
- construction of level pads for a processing plant and associated infrastructure and laydown yards;
- construction and use of formed roads with engineered subgrade to transport the ore and overburden and to provide access;
- construction of runoff diversion drains.

Table 13. Areas disturbed by components of the McPhillamys Gold Project.
(Note these areas refer to final disturbance, e.g. road during project, then drain during decommissioning is drain in this table.)

Infrastructure	Area (ha)	Timing
Open Cut	71	Project establishment
Waste Rock Emplacement and amenity bunds	275	Progressive construction
Run of Mine pad	65	Project establishment
Tailings Storage Facility and embankments	306	Staged as required
Topsoil Stockpiles	50	Project establishment
Water storage embankments	23	Project establishment
Water storages	54	Project establishment
Processing Plant and associated infrastructure and laydown yards	27	Project establishment
Roads	45	Project establishment
Clear trees, maintain as grassland during project	203	Project establishment
Runoff diversion drains	17	Project decommissioning
Total	1136	

9.2.2. Soil Associations and LSC of Disturbed Areas

Soil disturbance will occur on 7 of the 8 Soil Associations mapped over the Project Area (Map 9). Most disturbance will occur on the Upland East and Manganic East Associations, but the disturbance will account for the largest proportion of the Red Soil.

The disturbance footprint is predominantly on land with LSC classes 4 and 5 (Map 10).

9.2.3. Soil Stripping Depth

Soil will be stripped from the footprint of areas where the elevation of the surface of rehabilitated land will differ from the existing surface. This material will be used to construct a new soil on top of a reshaped surface formed predominantly from disturbed rock. The constructed soil will be required to perform similar functions to the existing soil in order for the rehabilitation to be successful.

Typical soil profiles over the Project Area are strongly stratified and with sandy and weakly structured topsoil that is relatively rich in organic matter.

Two methods to locate a sufficient volume of soil to provide the planned soil depth during rehabilitation are described below.

9.2.3.1. Method 1: Topdressing Material (Elliott and Veness, 1981)

The Elliott and Veness (1981) method of selecting topdressing material assumes that the material will be blended and spread as a single layer. As such Elliott and Veness (1981) requires that all material classified as topdressing material be able to function as the surface soil layer.

Soil assessment at 53 sites in the disturbance area indicated that more than 30 cm of soil was suitable for use as topdressing material in 60% of sites and more 50 cm of soil was suitable for use as topdressing material in 55% of sites (Map 10, Table 14). Applying this methodology would result in an average stripping depth across the disturbance area of 35 cm. This would not provide sufficient material planned landforms during project rehabilitation.



McPhillamys Gold Project

Disturbance Footprint and Soil Associations

716000

717000

718000

6297000



6296000

6296000

6295000

6295000

6294000

6294000

6293000

6293000

6292000

6292000

6291000

6291000

Association	Disturbed Area (ha)
Alluvium	90
Red Soil	144
Manganic East	262
Upland Centre	135
Upland East	410
Upland East-Aluminic	84
Sodic Discharge	10
Total	1136

715000

716000

717000

718000

Certification

- Project Area
- Mining Lease Application Area
- Disturbance Boundary

Association

- Alluvium
- Manganic West
- Manganic East
- Red Soil
- Upland East
- Upland East-Aluminic
- Upland Centre
- Sodic Discharge

Scale 1:25,000 (A4)

0 125 250 500 Metres

Job Code: Cr408
 Map Printed: 2018
 Contact: Sustainable Soils Management
 Phone : (02) 68 473367



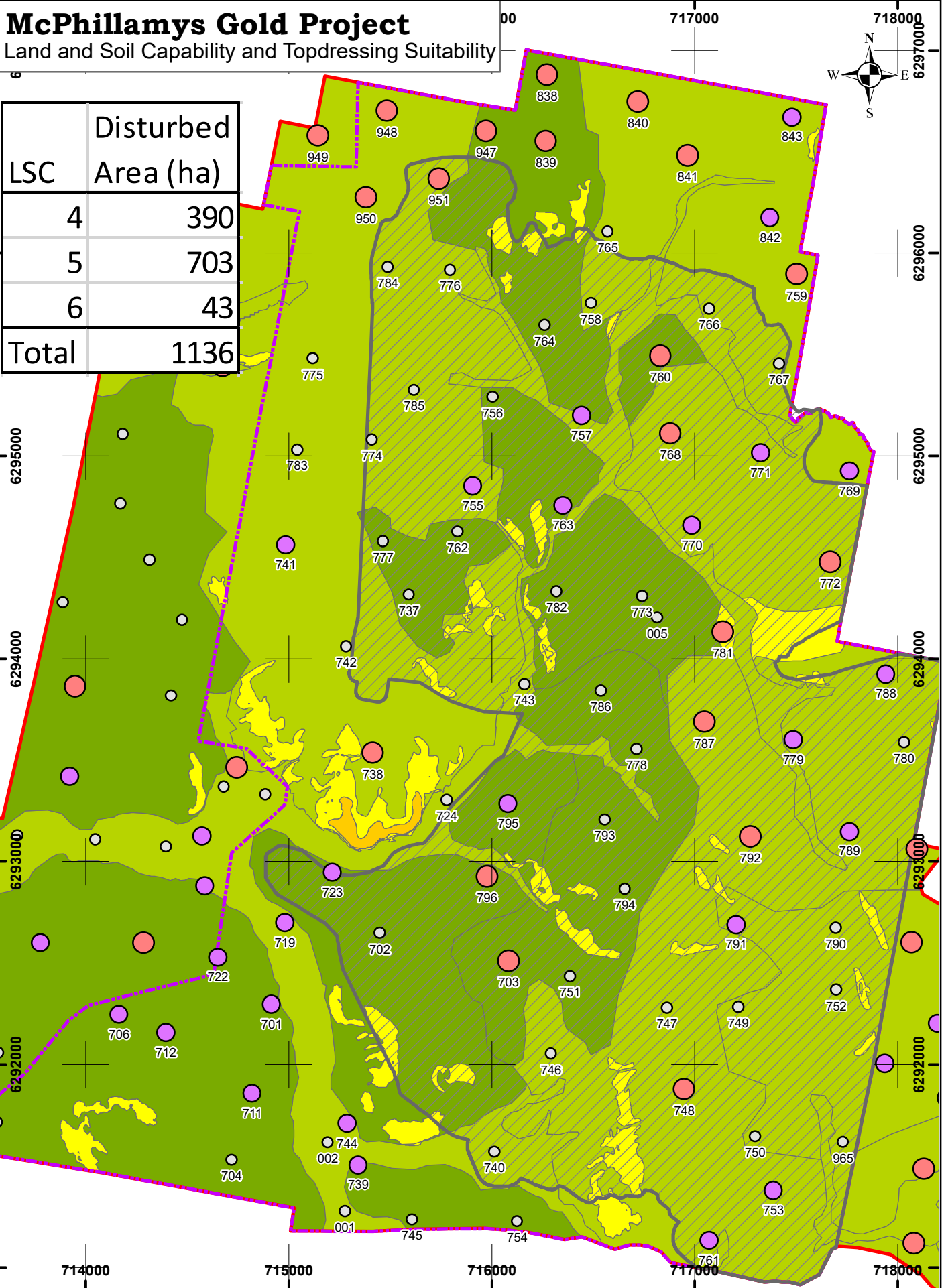
Datum: WGS 84
 Projection: UTM

Map 10

McPhillamys Gold Project

Land and Soil Capability and Topdressing Suitability

LSC	Disturbed Area (ha)
4	390
5	703
6	43
Total	1136



Certification

- Disturbance Boundary
- Mine Lease
- Project Area

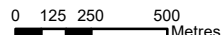
LSC by Association

- 4
- 5
- 6
- 7

Topdressing Material (cm)

- 0 - 10
- 11 - 30
- 31 - 50

Scale 1:25,000 (A4)



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 Watercourses: NSW LPI



Datum: WGS 84
 Projection: UTM

Map 11

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Table 14. Estimated depth of soil suitable for stripping, storage and use as topdressing according to the Elliott and Veness (1981) criteria in the Disturbance footprint in Map 10.

Association	Stripping Depth for use as topdressing (cm)			
	< 15	15 to 30	30 to 50	> 50
Alluvium		757	740	743
Red Soil	703			737, 751, 762, 777, 778, 786, 793, 794
Manganic East	760, 796	763, 795	773	4005, 702, 756, 764, 782
Upland Centre	951	755		774, 776, 784, 785
Upland East	748, 753, 768, 772, 787, 792	770, 771, 779, 788, 789	761	746, 747, 758, 766, 767, 780
Upland East Aluminic	791			749, 750, 752, 790, 965
Sodic Discharge	781			

9.2.3.2. Method 2: Strip and Store Topsoil and Subsoil Separately

The rehabilitation process can take advantage of the 10 to 15 cm thick surface layer with large nutrient and organic matter store by stripping, stockpiling and respreading this layer separately to the underlying subsoil. This surface layer will be described as topsoil in this report. Soil between the topsoil and weathered rock will be described as subsoil in this report.

Material to be used as subsoil can have less favourable soil properties than topsoil. Constraints for use as subsoil material in the Project Area are an elevated sodium, magnesium or soluble aluminium concentration, or is weathered rock. Subsoil with elevated sodium and magnesium concentration tends to have low stability, soil with elevated soluble aluminium is toxic to many plants, while weathered rock is generally a poor medium for root growth.

The presence of weathered rock is an absolute constraint, while the chemical constraints of elevated sodium, magnesium and aluminium can be alleviated with ameliorants of gypsum and lime.

The distribution of subsoil chemical properties was mapped across the site using regression kriging (Malone, 2013) with covariates from the Digital Elevation Model used to map slope across the Project Area and soil chemical properties measured during the soil assessment described in Section 3.

Constraints depicted in Map 11 are:

- Exchangeable Aluminium Percentage greater than 20% from 30 cm to 100 cm (light blue);
- Exchangeable Sodium Percentage greater than 10% from 60 to 100 cm (light red);
- Calcium to Magnesium ratio less than 1 from 60 to 100 cm (yellow);
- Weathered rock shallower than 75 cm (orange).

These layers show that 60 cm or more can be stripped from much of the Disturbance Area and used as subsoil. Soil from the 30 to 60 cm layer has a range of chemical constraints that vary across the Disturbance Area. This variation should be taken into account when stripping, stockpiling and respreading subsoil.

McPhillamys Gold Project

Subsoil Constraints



Constraint

1 Shallow rock (cm)

- 50 - 90
- 91 - 110
- 111 - 150

Aluminium from 30 cm

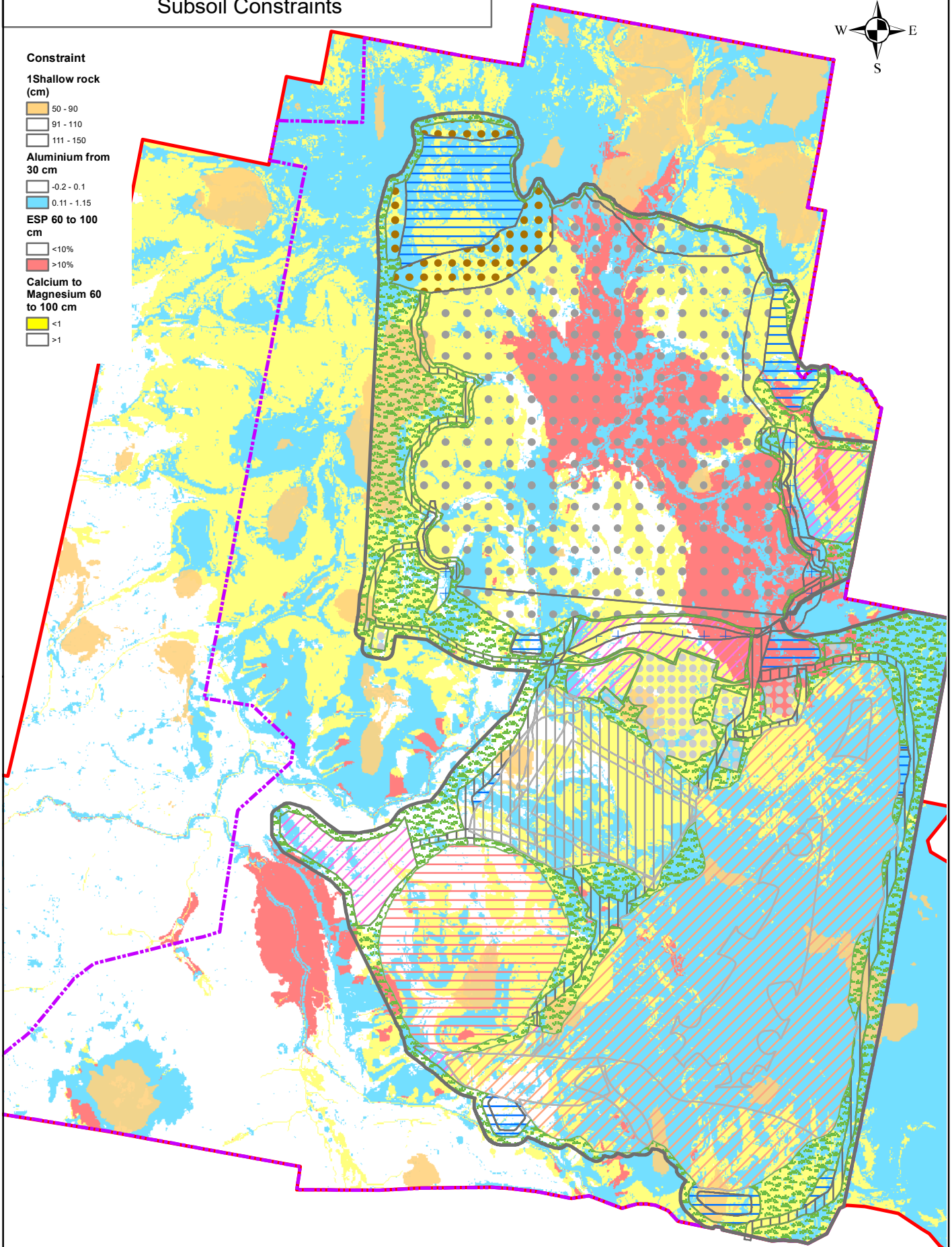
- <0.2 - 0.1
- 0.11 - 1.15

ESP 60 to 100 cm

- <10%
- >10%

Calcium to Magnesium 60 to 100 cm

- <1
- >1



Certification
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Project Area	Waste Rock Emplacement	Water Surface
Mine Lease	Run of Mine pad	Buildings
Disturbance Boundary	Tailings Storage Facility	Road
Disturbance	Topsoil	Drain
Pit	Embankment	Clear Grassland

Scale 1:25,000 (A4)

0 125 250 500
Metres

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Datum: WGS 84
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SSM
Sustainable Soil Management

Map 12

9.2.4. Post Mine Land and Soil Capability

The goal in the project's rehabilitation plan is to return disturbed land to a condition that is stable, non-polluting, and supports the proposed post mining landuse, which is a mixture of grazing of improved pasture, and woodland areas. The final landform shape will be integrated into the current landform.

The Land and Soil Capability class will be constrained by changes in landform as a result of the project. A larger proportion of the land surface will have slope steeper than 20%, and the top surface of the waste rock emplacement will be more exposed to wind than the current undulating landscape. In this project, the soil will be formed from a layer of topsoil placed over a thicker layer of subsoil over either loosened regolith or loosened waste rock.

The predicted LSC class was based on tables in the Land Soil Capability Assessment guidelines (OEH, 2012). Table 15 of OEH (2012) indicates that in areas with <30% rock outcrop, shallow soil with less than 25 cm soil over weathered rock is LSC class 7, while a profile with 25 to 50 cm of soil is rated as LSC 6 and a 50 to 75 cm profile can be LSC 4.

At Blayney, Table 4 of OEH (2012) indicates that water erosion constrains land with slope of 20% to 33% to LSC 6, while land with slope of 10 to 20% can be LSC 4. Similarly, land with 33 to 50% slope will be LSC 7.

With the loamy topsoil at Blayney, wind erosion constrains hilltops to LSC 5, while more protected areas can be LSC 4.

At Blayney, loamy topsoil constrains soil with $\text{pH}_{\text{CaCl}_2}$ between 4.0 and 4.7 to LSC 5, while soil with $\text{pH}_{\text{CaCl}_2}$ between 4.7 and 6.0 can be LSC 4.

Waterlogging was a common constraint in the existing soil in the Project Area. The modified landform post mining will result in a change in water relations. Table 15 of OEH (2012) indicates that areas that are waterlogged for 2 to 3 months each year will be constrained to LSC 5, while areas that are waterlogged for a similar period every 2 to 3 years can be LSC 4.

The guidelines outlined above were applied to the range of disturbance types to give the outcomes listed in Table 16.

Table 15. LSC class changes during the McPhillamys Gold Project.

Infrastructure type	Disturbance and Rehabilitation	Estimated post-mining LSC class
Mine void	Construct pit 800 to 1,000 m across and leave as void	LSC 8. No agricultural use possible
Waste Rock Emplacement and amenity bunds- top surface	Man-made landform with some undulations	LSC 5. Soil requirements include: Topsoil texture sandy loam or finer, stable topsoil structure, soil depth > 50 cm, topsoil pH _{CaCl2} > 4.0, waterlogging occurs less often than 2 to 3 months every year, exposed to wind.
Waste Rock Emplacement and amenity bunds- batters	Waste rock with 10 cm topsoil cover and 25 cm subsoil	LSC 6. Limited by relatively long slope lengths and 1 in 4 batter slope.
Run of Mine pad	Large level area will be constructed by cutting high areas and filling low areas	LSC 6. Based on 25 cm soil and loosened subgrade that can be explored by roots and 1: 4 batter slope
Tailings Storage Facility- top surface	Tailings Storage Facility will be filled, then the tailings will be covered with 60 cm thick trafficking layer, then 60 cm thick subsoil, covered with 10 cm topsoil	LSC 4. Soil requirements include: Topsoil texture sandy loam or finer, stable topsoil structure, soil depth > 50 cm, topsoil pH _{CaCl2} > 4.7, waterlogging occurs less often than 2 to 3 months every 2 to 3 years, medium wind exposure
Tailings Storage Facility- embankments	Earthen embankments with 10 cm topsoil cover and 25 cm subsoil over a rock core	LSC 6. Due to 1:5 batter slope
Topsoil stockpiles	Topsoil will be stockpiled, then removed and respread	LSC should be the same as it was before disturbance provided some amendments are added to restart biological processes that occur in topsoil, but not subsoil
Water storage embankments	Topsoil will be stripped, embankments constructed, remain for life of project, then be entirely removed at end of project before topsoil is replaced.	LSC should be the same as it was before disturbance provided some amendments are added to restart biological processes that occur in topsoil, but not subsoil
Water Storages	Inundated during project. Water drained at end of project.	LSC should be the same as it was before disturbance provided some amendments are added to restart biological processes
Processing Plant and associated infrastructure and laydown yards	Large level areas will be constructed by cutting high areas and filling low areas	LSC 6. Based on 30 cm soil and loosened subgrade that can be explored by roots
Roads	Engineered roads will be constructed by smoothing the land surface, compacting the subgrade, then placing a waterproof gravel or asphalt surface	LSC 6. Based on 30 cm soil and loosened subgrade so that it can be explored by roots
Diversion drains	Drain constructed during Project Closure to divert water around Tailings Storage Facility footprint	LSC 7. Based on 1:2 batter slope
Clear Trees	Clear trees during project establishment. Maintain as grassland during project	LSC should not be changed by project as land will be exposed to minimal disturbance.

Land with LSC class 6 can be used for grazing and improved pasture, but the land will require careful management to prevent severe land and environmental degradation (Table 11, Section 8).

McPhillamys Gold Project is predicted to be associated with a nett reduction of 351 ha of soil with LSC classes 4 and 5 and an increase in the area of LSC class 6 (Table 16). The open cut void post-mining will have no agricultural value.

Table 16. Change in areas of each Land and Soil Capability class over the life of McPhillamys Gold Project.

LSC Class	Capability	Pre-mining area (ha)	Post-mining area (ha)	Change (ha)
Land with a wide range of uses (cropping, grazing, horticulture, nature conservation)				
1	Extremely high	0	0	
2	Very high	0	0	
3	High	0	0	
Land with a variety of uses (cropping with restricted cultivation, pasture cropping, grazing, some horticulture, forestry, nature conservation)				
4	Moderate	932	920	-12
5	Moderate-low	1491	1080	-411
Land with a limited range of uses (grazing, forestry and nature conservation)				
6	Low	86	422	336
Land generally unable to support agriculture (selective forestry and nature conservation)				
7	Very low	4	21	17
8	Extremely low	0	71	71

Land where capability is reduced as a result of the project is predominantly on the batters of the Waste Rock Emplacement and the areas that will be levelled to form foundations for buildings and roads (Map 12).

McPhillamys Gold Project

Post Rehabilitation Land and Soil Capability

716000

718000 Shell Highway



629

6296000

6294000

6292000

6290000

6296000

6294000

6292000

6290000

716000

718000

Mid Western Highway

Post Project	
LSC	Area (ha)
4	920
5	1080
6	422
7	21
8	71
Total	2513

Certification

Project Area (2513 ha)

- Project Area (2513 ha)
- Mine Lease
- Disturbance Area

Watercourse

- Intermittent
- Perennial

Roads CLASS

- 2
- 3
- 4
- 5

LSCbyAssoc

- 4
- 5
- 6
- 7
- 8

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 Roads: NSW LPI
 Watercourses: NSW LPI



Scale 1:37,500 (A4)

0 125250 500 750 1,000 Metres

Datum: WGS 84
 Projection: UTM

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Map 13

10. MANAGEMENT OF DISTURBED SOIL

10.1. MITIGATION MEASURES

10.1.1. Ensure Adequate Soil is Available for Rehabilitation

A preliminary estimate of the soil requirements for rehabilitation is presented in Table 17. The volume of topsoil available was estimated as 15 cm over the area to be stripped. The volume of subsoil was estimated as the shallowest of 1 m or the depth to weathered rock in Map 11 for each disturbance type. The volume required was estimated from the rehabilitation described in Table 15. These estimates should be confirmed before construction begins, but they indicate that there is adequate suitable topsoil and subsoil to construct the planned soil profiles.

Table 17. Estimates of soil available and required during rehabilitation of McPhillamys Gold Mine.

Infrastructure type	Topsoil available		Subsoil available		Topsoil required		Subsoil required	
	Depth (m)	Volume (m ³)	Depth (m)	Volume (m ³)	Depth (m)	Volume (m ³)	Depth (m)	Volume (m ³)
Mine void	0.15	106,000	0.50	353,000		-		-
Waste Rock Emplacement, Amenity Bunds and Run of Mine pad - top surface	0.15	107,000	0.45	321,000	0.115	82,000	0.50	357,000
Waste Rock Emplacement, Amenity Bunds and Run of Mine pad - batters	0.15	402,000	0.45	1,207,000	0.115	308,000	0.25	670,000
Tailings Storage Facility- top surface	0.15	416,000	0.45	1,247,000	0.115	319,000	0.60	1,663,000
Tailings Storage Facility-embankments	0.15	44,000	0.45	131,000	0.115	34,000	0.25	73,000
Topsoil stockpiles	0	-	0	-		-		-
Water storage embankments	0.15	34,000	0	-	0.115	26,000		-
Water storages	0	-	0	-		-		-
Processing Plant and associated infrastructure and laydown yards	0.15	41,000	0	-	0.115	31,000	0.20	54,000
Roads	0.15	67,000	0.15	67,000	0.115	52,000	0.20	90,000
Diversion Drain	0.15	26,000	0.50	86,000	0.115	20,000	0.20	34,000
Clear trees		0		-		-		-
Total		1,243,000		3,412,000		872,000		2,941,000

An inventory of soil stripped should be prepared so that, if any significant deficit is identified, additional material can be sourced prior to rehabilitation.

10.1.2. Manage Soil Erosion and Sediment Transport

The undulating surface and sandy texture of surface soil in the Project Area renders it susceptible to water erosion. As a result, soil erosion minimisation practices should be adopted during construction. In addition, drainage structures should be installed to manage water runoff for the life of the Project.

Vegetation should be established on soil stockpiles expected to be in place for more than 3 months to minimise the risk of water and wind erosion on them.

The greatest risk of soil erosion will be between the time that topsoil is spread and groundcover vegetation is established. Soil erosion and sediment control should be considered where there is potential for off-site impacts as well as impacts to the rehabilitation.

10.1.3. Prevent Soil Contamination

Hydrocarbon management practises will be implemented to prevent hydrocarbon spills during construction, and spill containment materials will be available to clean up spills if they occur.

Waste rock containing Potentially Acid Forming material will be placed in an impermeable envelope in the Waste Rock Emplacement.

Construction material brought on to the site will need to be clean and contaminant and weed free.

10.1.4. Minimise Soil Degradation

Compaction of soil during stripping and stockpiling can be minimised by using appropriate machinery and soil movement practices. For example, it would be preferable to strip and move soil that is moist rather than being wet or dry. When constructing stockpiles, it is generally better to deposit the soil in lifts of 1 metre or more rather than the thin lifts that would be appropriate for constructing embankments or roads.

Degradation of topsoil in the stockpiles is inevitable because deeper layers of the stockpile will have much smaller oxygen supply than is available near the soil surface. Some biological activity in this soil can be maintained by limiting the height of topsoil stockpiles to 3 m and by growing vegetation on these stockpiles.

More than 155 ha will be required to stockpile the soil required for rehabilitation with this constraint. Approximately 60 ha has been allocated to topsoil stockpiles, while the remainder of the soil can be stored in the footprint of the Waste Rock Emplacement.

10.1.5. Principles to Achieve Successful Rehabilitation

The detail of how successful rehabilitation is achieved will vary with the soil and landscape properties and management preferences. However, the detail of what should be achieved varies little. The principles are:

- Minimise weed growth before stripping, during stockpiling and after spreading of soil by using appropriate agronomic management practices such as competition from desired species, tillage, mulch and herbicides.
- Strip and stockpile the soil with as little destruction of soil peds as possible.

- Minimise compaction in stockpiles.
- Establish vegetation on stockpiles to maintain some biological activity in them.
- Shape the subgrade layer to manage runoff and to eliminate blind depressions (saucer shaped surface).
- Loosen the subgrade to facilitate drainage past the rootzone and root growth into this layer.
- Test the stockpiled soil and apply amendments as needed during respreading. The majority of stockpiled soil will be acidic enough to require lime to raise pH above toxic levels.
- Add nutrients appropriate to the desired plant species and level of productivity.
- Inoculate the surface soil with microorganisms as well as planting appropriate grasses, forbs and trees.
- Carefully manage total grazing pressure particularly during the establishment phase.

10.1.6. Contingency Measures

Although the soil balance in Table 17 indicates that there is adequate soil for the planned rehabilitation, shortfalls can still occur. If there is insufficient volume of soil available at the time of rehabilitation, or if the soil has degraded to a greater extent than expected, then the following contingency measures will be implemented:

- Topsoil will be spread at a shallower thickness, or only spread on selected parts of the disturbed area.
- Subsoil will be used as a topsoil substitute rather than be placed as subsoil beneath the topsoil.

Although implementation of these contingency measures would enable satisfactory rehabilitation, it is likely that it will take longer for productivity to reach the target levels. It should be noted that achieving the LSC class in Table 15 is constrained by having the tabulated depth of soil.

10.2. SOIL MANAGEMENT

10.2.1. Soil Volume Required

An estimated total of 4,670,000 m³ soil is required for rehabilitation consisting of 847,000 m³ of topsoil and 3,823,000 m³ of subsoil (Table 17).

10.2.2. Soil Stripping

The surface 15 cm of soil should be stripped and stockpiled separately to the underlying subsoil. This is because the material with the lowest potential to be topsoil is the layer immediately below the topsoil. Bleached A2 horizons were found in 40% of the 42 pits sampled in the area of the proposed disturbance. Bleached A2 horizons were uncommon in the Red Soil Association, but sampled

in 35 to 40% of sites in the Manganic East, Upland centre and Upland East Associations. This bleached layer could be used as subsoil with care.

The following topsoil stripping and handling techniques should be implemented where practicable to minimise soil deterioration:

- The area to be stripped will be clearly defined on the ground. The target depths of topsoil and subsoil to be stripped at each location will be clearly communicated to machinery operators and supervisors.
- A combination of suitable equipment will be used for stripping and placing soil in stockpiles. Machinery circuits will be located to minimise compaction of both undisturbed and stockpiled soil.
- The soil material should be maintained in a slightly moist condition during stripping. Material should not be stripped in either an excessively dry or wet condition.
- All machinery brought onto the site for soil stripping must comply with weed management and biosecurity protocols established for the site.
- Trees present should be cleared and grubbed prior to soil stripping.
- Topsoil and subsoil will be stockpiled separately.
- Handling and rehandling topsoil will be minimised as far as possible.

10.2.3. Soil Stockpiling

The topsoil should be stored in a way that minimises compaction of the whole stockpile, and maximises biological activity. The following techniques should be implemented where practicable to achieve these goals:

- Stockpiles will be located far enough from drainage lines and dams that they are not washed away. If there is uncertainty, the location should be assessed by a surface water consultant.
- Topsoil and subsoil should be stockpiled separately. Where this is not possible, combined topsoil and subsoil stockpiles will be built to the specifications of topsoil stockpiles.
- All soil stockpiles will have batter slope of 1V:4H to limit erosion potential.
- Topsoil stockpiles will be designed and constructed to a depth not greater than 3 m in order to minimise the development of anaerobic conditions and to minimise the deterioration of biota and seed banks.
- Subsoil stockpiles can be 4 m high.
- The surface of soil stockpiles will be left in a rough condition to promote water infiltration rather than runoff. If required, sediment controls will be implemented downslope of stockpiles to capture eroded sediment.
- Overland flow onto and across stockpile sites will be kept to a practical minimum, and not allowed to concentrate to the extent that it causes visible erosion. This will be achieved by placing stockpiles on locally high areas.

- Stockpiles will be seeded with appropriate grasses and forbs to stabilise the surface, limit dust generation, minimise erosion and provide competition for weeds.
- After the stockpiles are established, machinery and vehicles will be excluded from general access. Stockpile location will be marked on site maps to identify them so that they are protected from disturbance.
- Stockpiles will be surveyed and data recorded about the volumes and soil types present.
- Stockpiles will be monitored for the establishment of weeds and control programmes implemented as required.
- Soil transported by dump trucks may be placed directly into storage. Soil transported by bottom dumping scrapers is best pushed to form stockpiles by other equipment (e.g. bulldozer or excavator) to avoid tracking over previously laid soil by the scraper.

10.2.4. Soil Respreading

The aim of respreading is to construct a layered material with properties that can perform similar functions to the undisturbed soil. Topsoil provides a path for entry of water and air, storage of nutrients and water, and plant support. Subsoil should have continuous pores to allow entry of water and air as well as root growth. Subsoil has a larger role in storage of water than nutrients, and is important in supporting plants. The soil should not have large differences between the properties of layers as the discontinuities at these boundaries can slow water movement. The spreading of topsoil and subsoil should be carried out to achieve these aims. The recommended process for spreading of topsoil is as follows:

- A soil balance plan showing the depths and volumes of soil to be spread will be prepared before the soil is spread. The plan will take account of the erodibility of the stockpiled soil, with more erodible soil being placed on flatter areas to minimise the potential for erosion.
- Stockpiled topsoil and subsoil will be tested to determine the required ameliorants.
- After decommissioning, laydown yards, infrastructure areas and roads to be decommissioned will be ripped.
- The land surface will be reshaped to appropriate landforms.
- A second ripping may be required after the surface is reshaped.
- Ameliorants will be mixed with the soil as it is being spread if required.
- If topsoil and subsoil are stockpiled separately subsoil will be spread in even layers at thickness appropriate for the desired land capability, then topsoil will be spread.
- Soil should be moist to just moist rather than wet or dry when being respread.
- Traffic patterns will be managed to minimise compaction of topsoiled areas.

- Soil will be lightly scarified to encourage rainfall infiltration.
- Pasture will be seeded as soon as possible after soil is respread.
- Erosion and sediment controls will be implemented where necessary prior to vegetation establishment.

10.3. MONITORING AND REPORTING

The successful rehabilitation of soil in the Project Area will depend on the following key steps:

1. Stripping and stockpiling sufficient soil to provide topsoil and subsoil for the area to be rehabilitated.
2. Maintaining biological activity and adequate aeration in the stockpiled soil.
3. Preparation of the subgrade and construction of the rehabilitated soil.
4. Establishment of desired plants on the rehabilitated soil.

All these steps would require some degree of monitoring. It is likely that steps 1 and 3 would require the most intensive monitoring, and annual monitoring of vegetation health, groundcover percentage, weed presence, gully erosion presence, soil subsidence and water pooling is recommended.

A detailed rehabilitation management plan should be developed and approved prior to the commencement of the project, and include the following items:

Monitoring of stripping and stockpiling should ensure that the design depth of topsoil is stripped and that the subsoil is soil rather than weathered rock. The volumes of topsoil and subsoil should be checked to ensure that there is sufficient soil to enable the planned rehabilitation.

Maintenance of biological activity will require plants to be grown. The species and vigour of plants growing on the stockpiles should be monitored.

The soil stockpiles should be tested before the soil is spread to determine the ameliorants required to construct a fertile soil profile. It is likely that nutrients will be required in the topsoil, and some lime will be required in most soil that is spread. Some gypsum may also be required, but Map 11 indicates that this is only in the 60 to 100 cm soil layer beneath the tailings storage facility.

Achieving the planned LSC class depends on accurate placement of the subsoil and topsoil. Achieving the desired soil thickness will in turn depend on accurate preparation of the subgrade. As such, an accurate survey of the thickness of the soil layer should be conducted.

The success of rehabilitation will be determined by the plant growth in the rehabilitated landscape. This should be monitored.

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12. LIMITATIONS

The investigations described in this report identified actual conditions only at those locations where sampling occurred. This data has been interpreted and an opinion given regarding the overall physical and chemical conditions at the site.

Although the information in this report has been used to interpret conditions at the site, actual conditions may vary from those inferred, especially between sampling locations. Consequently, this report should be read with the understanding that it is a professional interpretation of conditions at the site based on a set of data. Although the data were considered representative of the site they cannot fully define the conditions across the site.

APPENDIX I:
Soil Profile Description

McPhillamys Gold Project for Regis Resources Ltd
Detail Core Sample OM4001 Melanic Subnatric Black Sodosol

Excavated on: **2/04/2014** Logged by: **PJH** 715278m E, 6291275m N, (WGS84),

Landscape Properties

Landform Element: **valley flat**
 Vegetation Community: **woodland grass understory**
 Growth Form: **sod grass**
 Site Disturbance: **occasional cultivation**
 Land Use: **improved pasture** Groundcover: **90%**
 Surface Condition Wet: **poached** Dry: **poached**

Topography

Slope: **1%** Western Aspect
 Site Morphology: **Flat**
 Slope Morphology: **Waning**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak C (0 to 2 good)	SOILpak N (0 to 2 good)	Proportion Inert Material	SAMPLE
	A11		Dark brown light clay with strong grade of polyhedral structure and rough-faced 1 cm peds, breaking to polyhedral peds of 0.5 cm. Clods were not dispersive, and partially slaked in distilled water. Moist. Clear boundary to:	5	0				
	A12		Dark brown silty clay with moderate grade of granular structure and rough-faced 0.5 cm peds. Clods were not dispersive, and partially slaked in distilled water. Moist. Clear boundary to:	5.5	1				
	A13		Very dark grey fine silty clay loam with moderate grade of subangular blocky structure and rough-faced 2 cm peds, breaking to subangular blocky peds of 0.5 cm. Clods were not dispersive, and partially slaked in distilled water. Moist. Clear boundary to:	6	1.5				
50	2A11		Very dark grey fine silty clay loam with moderate grade of angular blocky structure and earthy 5 cm peds, breaking to angular blocky peds of 1 cm. Few (2-10%), medium (2-6mm), strong, ferruginous nodules. Clods were not dispersive, and partially slaked in distilled water. Moist. Clear boundary to:	6	4				
	2A12		Very dark grey fine silty clay loam with moderate grade of angular blocky structure and earthy 5 cm peds, breaking to angular blocky peds of 1 cm. Few (2-10%), medium (2-6mm), strong, ferruginous nodules. Clods were not dispersive, and partially slaked in distilled water. Moist. Clear boundary to:	6.5	5				
	B2		Dark grey silty clay with moderate grade of angular blocky structure and earthy 2 cm peds. Few (2-10%), medium (2-6mm), strong, ferruginous nodules. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Sharp boundary to: Very dark brown medium clay with strong grade of lenticular structure and smooth-faced 3 cm peds. Clods were not dispersive, and partially slaked in distilled water. Moist.	7	1.4				
100									
COMMENTS: Depth to A horizon varied from 50 to 100 cm over 1.5 m. Described middle core.									

Segregations
 Coarse fragments

Lithology

Substrate: **Alluvium**
 Base of Observations: **Layer Continues at 140 cm**
 Rootzone: **100cm**
Imperfectly drained
 BSAL Drainage: **Poorly drained**
Very slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Core Sample OM4002

Bleached Eutrophic Black Chromosol

Excavated on: 2/04/2014 Logged by: PJH

715193m E, 6291615m N, (WGS84),

Landscape Properties

Landform Element: **valley flat**
 Vegetation Community: **woodland Grass Understory**
 Growth Form: **Sod grass**
 Site Disturbance: **Occasional Cultivation**
 Land Use: **Improved Pasture** Groundcover: **90%**
 Surface Condition Wet: **trampled** Dry: **trampled**

Topography

Slope: **5%** Western Aspect
 Site Morphology: **Lower slope**
 Slope Morphology: **Waning**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak O (0 to 2 good)	Proportion Inert Material	SAMPLE
	A1		Dark yellowish brown silty clay loam with moderate grade of granular structure and earthy 0.5 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Abrupt boundary to:	5	0.1	2	0.5	
	A12		Olive brown silty clay loam with moderate grade of polyhedral structure and rough-faced 1 cm peds. Clods dispersed slightly, and partially slaked in distilled water. Moist. Diffuse boundary to:	5	0.1	1	0.5	
50	A2		Light grey fine loam with weak grade of polyhedral structure and rough-faced 1 cm peds. Few (2-10%), medium (2-6mm), weak, ferruginous nodules. Soil had very few faint, brown, weathered mottles. Clods dispersed slightly, and slaked completely in distilled water. Moderately moist. Sharp boundary to:	5	0.1	1	0.5	
100	B2		Very dark brown medium heavy clay with strong grade of polyhedral structure and smooth-faced 5 cm peds. Soil had very few faint, brown, weathered mottles. Clods dispersed slightly, and slaked completely in distilled water. Moist.	5	0	1	0.5	
150			COMMENTS: 0					

Segregations
 Coarse fragments

Lithology

Substrate: **Alluvium**
 Base of Observations: **Layer Continues at 150 cm**
 Rootzone: **100cm**
Poorly drained
 BSAL Drainage: **Poorly drained**
Very slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd
Detail Core Sample OM4003 Haplic Epipedal Black Vertosol

Excavated on: 2/04/2014 Logged by: PJH 713045m E, 6292108m N, (WGS84),

Landscape Properties

Landform Element: valley flat
 Vegetation Community: woodland Grass Understory
 Growth Form: Sod grass
 Site Disturbance: Occasional Cultivation
 Land Use: Improved Pasture Groundcover: 100%
 Surface Condition Wet: firm Dry: Cracked

Topography

Slope: 1% Western Aspect
 Site Morphology: Lower slope
 Slope Morphology: Waning
 Microrelief: None
 Rock Outcrop: 0

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A11	[Hatched pattern]	Very dark brown medium clay with strong grade of granular structure and earthy 0.5 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5	0			
	A12		Very dark brown medium heavy clay with strong grade of granular structure and smooth-faced 3 cm peds, breaking to granular peds of 0.5 cm. Clods were not dispersive, and partially slaked in distilled water. Moist. Clear boundary to:	8.5	0.4			
50								
	B22	[Hatched pattern]	Very dark brown heavy clay with strong grade of lenticular structure and smooth-faced 2 cm peds. Clods were not dispersive, and partially slaked in distilled water. Moist. Gradual boundary to:	8.5	0.7			
	B23		Very dark grey heavy clay with strong grade of polyhedral structure and smooth-faced 5 cm peds. Few (2-10%), fine (<2mm), weak, calcareous nodules. Clods were not dispersive, and partially slaked in distilled water. Moist.	8.5	0.4			
100								
			COMMENTS: 0					

Legend: [Orange box] Segregations [Grey box] Coarse fragments

Lithology

Substrate: Alluvium
 Base of Observations: Layer Continues at 140 cm
 Rootzone: 130cm
 Moderately well drained
 BSAL Drainage: Moderately well drained
 Very slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd
Detail Core Sample OM4004 Haplic Eutrophic Brown **Kandosol**

Excavated on: **2/04/2014** Logged by: **PJH** 712811m E, 6292084m N, (WGS84),

Landscape Properties

Landform Element: **flood-out**
 Vegetation Community: **woodland Grass Understory**
 Growth Form: **Sod grass**
 Site Disturbance: **Occasional Cultivation**
 Land Use: **Improved Pasture** Groundcover: **100%**
 Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **1%** Western Aspect
 Site Morphology: **Flat**
 Slope Morphology: **Minimal**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Brown loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5	0.1			
50	A3		Brown fine sandy clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Gradual boundary to:	5.5	0.1			
	B11		Brown light clay with weak grade of subangular blocky structure and earthy 1 cm peds. Few (2-10%), extremely coarse (>60mm), weak, ferruginous nodules. Soil had very few distinct, yellow, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Gradual boundary to:	6	0			
100	B12		Dark grey light clay with weak grade of polyhedral structure and earthy 5 cm peds. Few (2-10%), coarse (6-20mm), weak, ferruginous nodules. Soil had few distinct, yellow, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist.	7.5	0			
			COMMENTS: Biopores common in B21 and B22.					

Segregations
 Coarse fragments

Lithology

Substrate: **Alluvium**
 Base of Observations: **Layer Continues** at 140 cm
 Rootzone: **100cm**
Imperfectly drained
 BSAL Drainage: **Imperfectly drained**
Moderately permeable



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McPhillamys Gold Project for Regis Resources Ltd
Detail Core Sample OM4005 Manganic Mesotrophic Brown **Kandosol**

Excavated on: **2/04/2014** Logged by: **PJH** 716814m E, 6294202m N, (WGS84),

Landscape Properties

Landform Element: **hillcrest**
 Vegetation Community: **woodland Grass Understorey**
 Growth Form: **Sod grass**
 Site Disturbance: **Occasional Cultivation**
 Land Use: **Improved Pasture** Groundcover: **100%**
 Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **5%** Eastern Aspect
 Site Morphology: **Upper Slope**
 Slope Morphology: **Waning**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field Ece (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A		Brown fine sandy clay loam with weak grade of angular blocky structure and earthy 2 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Gradual boundary to:	5	0.1	1	0.5	
	B1		Light olive brown light clay with moderate grade of polyhedral structure and rough-faced 2 cm peds. Few (2-10%), coarse (6-20mm), weak, ferromangiferous nodules. Clods were not dispersive, and slaked completely in distilled water. Moist. Gradual boundary to:	5	0	2	0.5	
50								
	B2		Pale brown light clay with moderate grade of polyhedral structure and rough-faced 3 cm peds. Few (2-10%), coarse (6-20mm), weak, ferromangiferous nodules. Soil had very few distinct, yellow, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moist. Abrupt boundary to:	5.5	0	1	0.5	
100								
	C		Light brownish grey light clay with weak grade of polyhedral structure and rough-faced 5 cm peds. Many (20-50%), coarse (6-20mm), weak, ferromangiferous nodules. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. COMMENTS: Vertical biopores common to 1 m.	5.5	0	1	0.5	

Segregations
 Coarse fragments

Lithology

Substrate: **Metamorphic**
 Base of Observations: **equipment refusal at 120 cm**
 Rootzone: **90cm**
Imperfectly drained
 BSAL Drainage: **Imperfectly drained**
Slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM701

Manganic Mottled-Subnatric Grey Sodosol

Excavated on: 20/03/2017 Logged by: GK

714918m E, 6292296m N, (WGS84),

Landscape Properties

Landform Element: **Bench**

Vegetation Community: **Unknown**

Growth Form: **tussock grass, sod grass**

Site Disturbance: **Occasional Cultivation**

Land Use: **Improved Pasture** Groundcover: **80%**

Surface Condition Wet: **Trampled** Dry: **Trampled**

Topography

Slope: **5%** Eastern Aspect

Site Morphology: **Lower slope**

Slope Morphology: **Waning**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A		Dark brown light clay with moderate grade of subangular blocky structure and earthy 2 cm peds. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Clear boundary to:	5	0.4	1		
	2A1		Very dark grey clay loam with weak grade of angular blocky structure and rough-faced 5 cm peds. Clods were not dispersive, and did not slake in distilled water. Dry. Gradual boundary to:	6	0.2	1		
	2A2e			Grey clay loam with massive grade of structure. Clods were moderately dispersive, and slaked completely in distilled water. Dry. Clear boundary to:	6	0.3	1	
50	2B1		Grey medium clay with moderate grade of prismatic structure and smooth-faced 10 cm peds, breaking to angular blocky peds of 5 cm. Clods dispersed slightly, and partially slaked in distilled water. Moderately moist. Gradual boundary to:	6.5	0.7	1		
	2B2		Reddish brown light medium clay with weak grade of lenticular structure and rough-faced 5 cm peds, breaking to subangular blocky peds of 2 cm. Many (20-50%), coarse (6-20mm), weak, manganiferous nodules. Soil had common distinct, yellow, weathered mottles. Clods dispersed slightly, and slaked completely in distilled water. Moderately moist. Diffuse boundary to:	7	0.2	1		
100	2B3		Weak red light medium clay with weak grade of subangular blocky structure and rough-faced 5 cm peds. Common (10-20%), dispersed, reoriented, non-weathered, quartz cobbles (60-200mm). Many (20-50%), coarse (6-20mm), weak, manganiferous nodules. Soil had many distinct, grey, weathered mottles. Clods were moderately dispersive, and slaked completely in distilled water. Moist.	7.5	0.4	1		
150			COMMENTS: Bottom of hole is saturated.					

Segregations
 Coarse fragments

Lithology

Substrate: **Not Identified**

Base of Observations: **Soil**

Continues at 150 cm

Rootzone: **60cm**

Poorly drained

BSAL Drainage: **Poorly drained**

Slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM702

Manganic Subnatric Grey Sodosol

Excavated on: 20/03/2017 Logged by: PJH

715449m E, 6292646m N, (WGS84),

Landscape Properties

Landform Element: **Hillslope**
 Vegetation Community: **Woodland Grass Understorey**
 Growth Form: **Tree, Tussock Grass, Sod Grass**
 Site Disturbance: **Extensive Clearing**
 Land Use: **Improved Pasture** Groundcover: **90%**
 Surface Condition Wet: **Trampled** Dry: **Trampled**

Topography

Slope: **7%** Northern Aspect
 Site Morphology: **Midslope**
 Slope Morphology: **Waxing**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Greyish brown fine sandy clay loam with moderate grade of polyhedral structure and rough-faced 10 cm peds, breaking to subangular blocky peds of 5 cm. Clods were not dispersive, and did not slake in distilled water. Dry. Abrupt boundary to:	5.5				
	A2e		Brown fine sandy loam with weak grade of polyhedral structure and earthy 5 cm peds. Clods were not dispersive, and did not slake in distilled water. Dry. Clear boundary to:	6				
	B1		Brown light clay with weak grade of polyhedral structure and earthy 5 cm peds, breaking to subangular blocky peds of 2 cm. Clods were not dispersive, and did not slake in distilled water. Dry. Gradual boundary to:	7	0			
50	B2		Light brownish grey light clay with weak grade of subangular blocky structure and earthy 2 cm peds. Abundant (>50%), very coarse (20-60mm), strong, manganiferous concretions. Clods dispersed slightly, and slaked completely in distilled water. Dry. Diffuse boundary to:	7.5	0			
100	B3		Yellowish brown light medium clay with moderate grade of subangular blocky structure and earthy 2 cm peds. Many (20-50%), coarse (6-20mm), strong, manganiferous nodules. Soil had common distinct, grey, weathered mottles. Clods were moderately dispersive, and slaked completely in distilled water. Moist.	7.5	0.1			
150			COMMENTS: Good water holding capacity. LSC 3 - capable of cultivation but not highly regularly.					

Segregations
 Coarse fragments

Lithology

Substrate: **Not Identified**
 Base of Observations: **Soil Continues** at 150 cm
 Rootzone: **90cm**
Imperfectly drained
 BSAL Drainage: **Poorly drained**
Slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM703

Manganic Eutrophic Red Chromosol

Excavated on: 21/03/2017 Logged by: GK

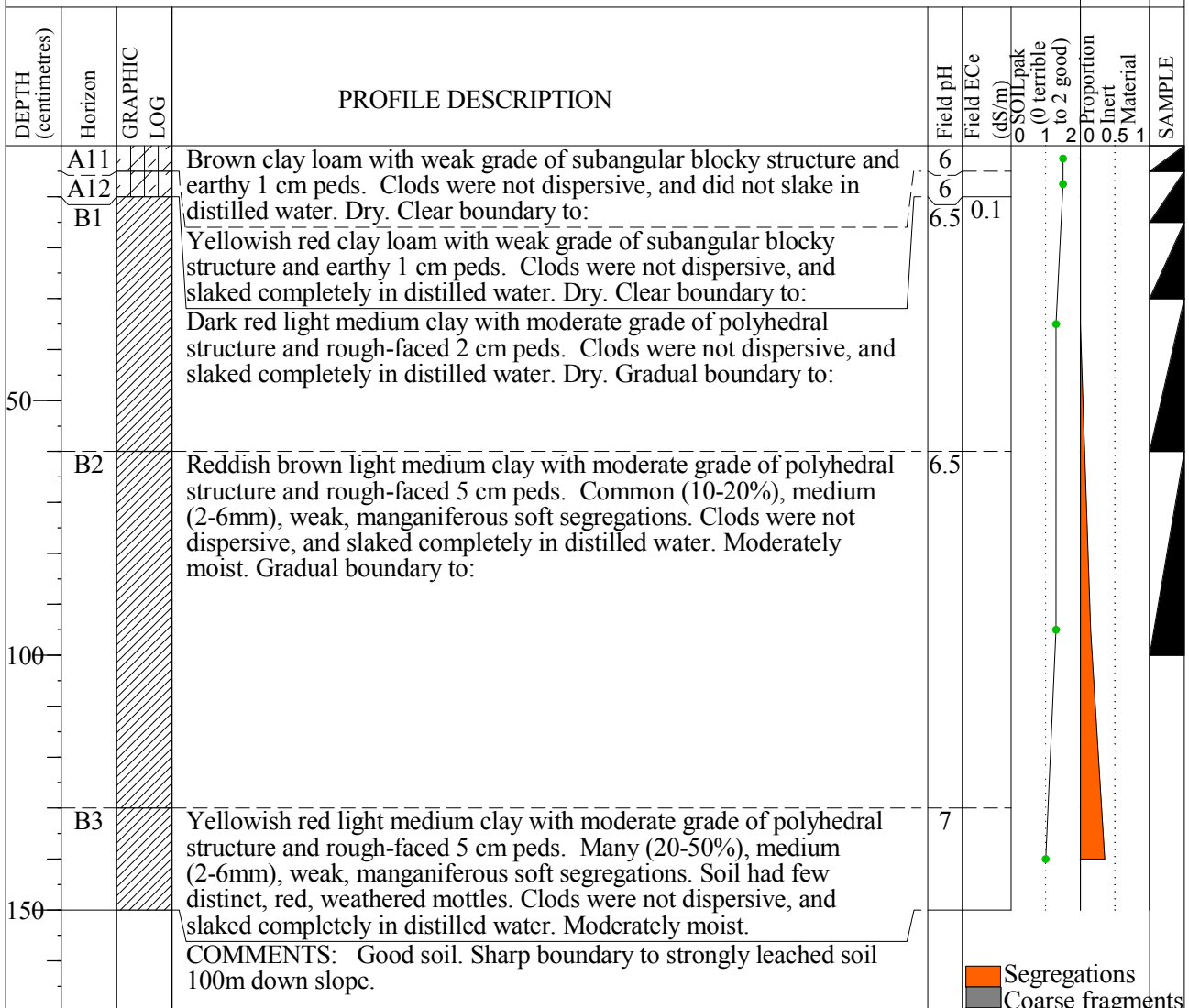
716086m E, 6292506m N, (WGS84),

Landscape Properties

Landform Element: **Hillslope**
 Vegetation Community: **Woodland Grass Understorey**
 Growth Form: **Sod grass**
 Site Disturbance: **Occasional Cultivation**
 Land Use: **Improved Pasture** Groundcover: **90%**
 Surface Condition Wet: **Soft** Dry: **Firm**

Topography

Slope: **7%** Eastern Aspect
 Site Morphology: **Midslope**
 Slope Morphology: **Maximal**
 Microrelief: **None**
 Rock Outcrop: **0**



Lithology

Substrate: **Colluvium**
 Base of Observations: **Soil**
 Continues at 150 cm
 Rootzone: **140cm**
Well drained
 BSAL Drainage: **Well drained**
Moderately permeable



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Legend:
 [Orange] Segregations
 [Grey] Coarse fragments

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Detail Pit OM704

Manganic Eutrophic Brown Chromosol

Excavated on: 21/03/2017 Logged by: GK

714718m E, 6291526m N, (WGS84),

Landscape Properties

Landform Element: **Hillslope**

Vegetation Community: **Unknown**

Growth Form: **tussock grass**

Site Disturbance: **Extensive Clearing**

Land Use: **Improved Pasture** Groundcover: **90%**

Surface Condition Wet: **Soft** Dry: **Firm**

Topography

Slope: **3%** Northeastern Aspect

Site Morphology: **Midslope**

Slope Morphology: **Maximal**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak C (0 to 2 good)	Proportion Inert Material	SAMPLE
0-10	A1		Greyish brown fine clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Dry. Clear boundary to:	5.5				
10-15	A2		Brown fine clay loam with weak grade of polyhedral structure and earthy 1 cm peds. Clods were not dispersive, and partially slaked in distilled water. Dry. Clear boundary to:	6				
15-50	B21		Brown fine light medium clay with moderate grade of polyhedral structure and rough-faced 3 cm peds. Common (10-20%), coarse (6-20mm), weak, manganiferous soft segregations. Clods were not dispersive, and slaked completely in distilled water. Dry. Gradual boundary to:	6	0.1			
50-100	B22		Light brownish grey fine silty clay with moderate grade of lenticular structure and rough-faced 3 cm peds, breaking to polyhedral peds of 2 cm. Many (20-50%), very coarse (20-60mm), strong, manganiferous nodules. Clods were not dispersive, and slaked completely in distilled water. Dry.	6				
			COMMENTS: Profile silty. 4th layer texture lighter. Colluvial origin?					

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**

Base of Observations: **Layer**

Continues at 130 cm

Rootzone: **110cm**

Imperfectly drained

BSAL Drainage: **Poorly drained**

Slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM705

Bleached-Manganic Eutrophic Brown **Dermosol**

Excavated on: **21/03/2017** Logged by: **GK**

713561m E, 6291714m N, (WGS84),

Landscape Properties

Landform Element: **Hillcrest**

Vegetation Community: **Unknown**

Growth Form: **tussock grass, sod grass**

Site Disturbance: **Extensive Clearing**

Land Use: **Improved Pasture** Groundcover: **90%**

Surface Condition Wet: **Soft** Dry: **Firm**

Topography

Slope: **0%**

Site Morphology: **Crest**

Slope Morphology: **Waxing**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good) (1 (0 terrible to 2 good))	Proportion Inert Material	SAMPLE
	A1		Brown fine clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Dry. Clear boundary to:	5.5				
	A2e		Dark greyish brown fine clay loam with weak grade of subangular blocky structure and earthy 2 cm peds. Clods were not dispersive, and partially slaked in distilled water. Dry. Clear boundary to:	5.5				
50	B21		Yellowish brown fine light clay with moderate grade of polyhedral structure and rough-faced 3 cm peds. Clods were not dispersive, and slaked completely in distilled water. Dry. Gradual boundary to:	6	0.1			
	B22		Greyish brown fine silty clay with moderate grade of polyhedral structure and rough-faced 2 cm peds. Many (20-50%), very coarse (20-60mm), strong, manganiferous nodules. Clods were not dispersive, and slaked completely in distilled water. Dry.	6				
100	COMMENTS: Silty throughout profile. Similar to 704. Rock outcrop 500m from site. 100cm depth due to hard Manganese layer							

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**

Base of Observations: **equipment refusal at 100 cm**

Rootzone: **75cm**

Imperfectly drained

BSAL Drainage: **Poorly drained**

Slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM706

Manganic Eutrophic Brown Chromosol

Excavated on: 22/03/2017 Logged by: GK

714165m E, 6292244m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**

Vegetation Community: **unknown**

Growth Form: **tussock grass, sod grass**

Site Disturbance: **Extensive Clearing**

Land Use: **improved pasture** Groundcover: **80%**

Surface Condition Wet: **soft** Dry: **firm**

Topography

Slope: **4%** Northern Aspect

Site Morphology: **Midslope**

Slope Morphology: **Waning**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field EcE (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Dark yellowish brown fine sandy clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Clear boundary to:	5.5				
	A2		Brown fine sandy clay loam with weak grade of angular blocky structure and earthy 2 cm peds. Clods dispersed slightly, and slaked completely in distilled water. Moderately moist. Clear boundary to:	5.5				
	AB		Pale red fine clay loam with weak grade of angular blocky structure and earthy 2 cm peds. Soil had many distinct, yellow, weathered mottles. Clods dispersed slightly, and slaked completely in distilled water. Moderately moist. Clear boundary to:	6				
50	B21		Reddish brown light medium clay with moderate grade of polyhedral structure and rough-faced 3 cm peds. Soil had few distinct, pale, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Gradual boundary to:	6	0.1			
	B22		Greyish brown light medium clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Few (2-10%), coarse (6-20mm), strong, manganiferous nodules. Soil had few distinct, yellow, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Clear boundary to:	6				
100	B3		Greyish brown light medium clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Abundant (>50%), very coarse (20-60mm), strong, manganiferous nodules. Clods were moderately dispersive, and slaked completely in distilled water. Moderately moist.	6				
	COMMENTS: 75 m to rock outcrop in adjacent paddock. Possible equip refusal deeper due to manganese layer. Multiple earthworms in A1-A2 layers.							

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**

Base of Observations: **Layer**

Continues at 130 cm

Rootzone: **60cm**

Imperfectly drained

BSAL Drainage:

Imperfectly drained

Slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM707

Manganic Mesotrophic Grey Dermosol

Excavated on: 22/03/2017 Logged by: GK

713777m E, 6292598m N, (WGS84),

Landscape Properties

Landform Element: **hillcrest**

Vegetation Community: **unknown**

Growth Form: **tussock grass, sod grass**

Site Disturbance: **extensive clearing**

Land Use: **improved pasture** Groundcover: **90%**

Surface Condition Wet: **soft** Dry: **firm**

Topography

Slope: **2%** Northern Aspect

Site Morphology: **Crest**

Slope Morphology: **Minimal**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Brown fine sandy clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5.5				
	A2		Brown fine sandy clay loam with weak grade of polyhedral structure and earthy 2 cm peds. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Clear boundary to:	5.5				
50	B21		Greyish brown light clay with moderate grade of polyhedral structure and rough-faced 3 cm peds. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Gradual boundary to:	5.5	0.1			
	B22		Greyish brown light clay with moderate grade of polyhedral structure and rough-faced 2 cm peds. Many (20-50%), coarse (6-20mm), strong, manganiferous nodules. Soil had many distinct, yellow, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moist. Gradual boundary to:	6				
100	B3		Dark greyish brown light clay with weak grade of subangular blocky structure and rough-faced 1 cm peds. Abundant (>50%), very coarse (20-60mm), strong, manganiferous nodules. Soil had common distinct, yellow, weathered mottles. Clods dispersed slightly, and slaked completely in distilled water. Moderately moist. COMMENTS: Equipment refused 120. Manganese. Witchety grubs and earthworms. Scarab beetle larvae	6				

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**

Base of Observations: **Layer**

Continues at 120 cm

Rootzone: **60cm**

Imperfectly drained

BSAL Drainage: **Poorly drained**

Slowly permeable



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Detail Pit OM708

Mottled-Sodic Calcic Black **Dermosol**

Excavated on: **22/03/2017** Logged by: **GK**

714047m E, 6293107m N, (WGS84),

Landscape Properties

Landform Element: **valley flat**

Vegetation Community: **unknown**

Growth Form: **tussock grass, sod grass**

Site Disturbance: **extensive clearing**

Land Use: **improved pasture** Groundcover: **100%**

Surface Condition Wet: **soft** Dry: **firm**

Topography

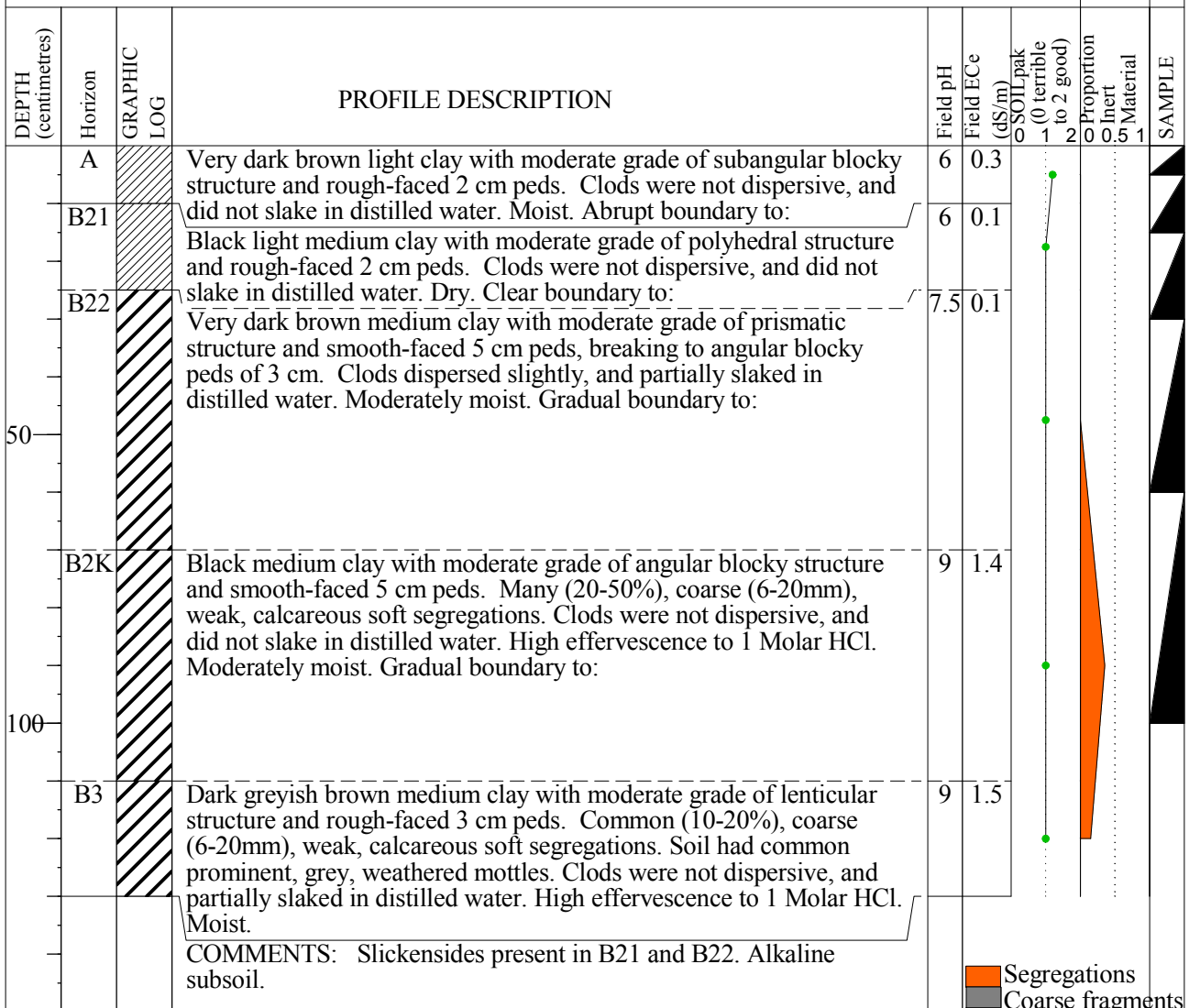
Slope: **0%**

Site Morphology: **Flat**

Slope Morphology: **Minimal**

Microrelief: **None**

Rock Outcrop: **0**



Lithology

Substrate: **Colluvium**

Base of Observations: **Soil**

Continues at 130 cm

Rootzone: **70cm**

Poorly drained

BSAL Drainage:

Imperfectly drained

Very slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd
Detail Pit OM709 Sodic Calcic Black **Dermosol**

Excavated on: **22/03/2017** Logged by: **GK** 713149m E, 6292328m N, (WGS84),

Landscape Properties

Landform Element: **valley flat**
 Vegetation Community: **unknown**
 Growth Form: **tussock grass, sod grass**
 Site Disturbance: **extensive clearing**
 Land Use: **improved pasture** Groundcover: **100%**
 Surface Condition Wet: **soft** Dry: **firm**

Topography

Slope: **0%**
 Site Morphology: **Flat**
 Slope Morphology: **Minimal**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A		Dark greyish brown light clay with moderate grade of subangular blocky structure and rough-faced 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	6	0.3	1	0.5	
	B21		Very dark greyish brown light medium clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Abrupt boundary to:	6.5	0.1	2	0.5	
	B22		Very dark grey medium clay with moderate grade of prismatic structure and rough-faced 5 cm peds, breaking to angular blocky peds of 3 cm. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Clear boundary to:	8	0.6	1	0.5	
50	B2K		Dark grey medium clay with moderate grade of prismatic structure and smooth-faced 5 cm peds, breaking to angular blocky peds of 3 cm. Many (20-50%), medium (2-6mm), weak, calcareous soft segregations. Clods were not dispersive, and partially slaked in distilled water. Very high effervescence to 1 Molar HCl. Moderately moist. Gradual boundary to:	9	1.2	1	0.5	
100	B3		Dark grey medium clay with moderate grade of angular blocky structure and smooth-faced 3 cm peds. Clods dispersed slightly, and partially slaked in distilled water. Moist.	9	1.2	1	0.5	
			COMMENTS: Slickensides in B2k and B3. Similar to 708.					

Segregations
 Coarse fragments

Lithology

Substrate: **Alluvium**
 Base of Observations: **Layer Continues** at 130 cm
 Rootzone: **60cm**
Poorly drained
 BSAL Drainage: **Poorly drained**
Very slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM710

Manganic Eutrophic Brown Chromosol

Excavated on: 22/03/2017 Logged by: GK

713569m E, 6292057m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**

Vegetation Community: **unknown**

Growth Form: **Sod grass, Tussock Grass**

Site Disturbance: **extensive clearing**

Land Use: **improved pasture** Groundcover: **80%**

Surface Condition Wet: **soft** Dry: **firm**

Topography

Slope: **5%** Western Aspect

Site Morphology: **Simple Slope**

Slope Morphology: **Minimal**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Brown fine clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	6				
	B1		Dark brown fine light medium clay with weak grade of subangular blocky structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Clear boundary to:	6.5				
50	B21		Dark yellowish brown light medium clay with moderate grade of polyhedral structure and rough-faced 2 cm peds. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Gradual boundary to:	6.5	0			
	B22		Light olive brown light medium clay with moderate grade of angular blocky structure and rough-faced 2 cm peds. Common (10-20%), medium (2-6mm), strong, manganiferous nodules. Soil had few distinct, grey, weathered mottles. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Gradual boundary to:	7.5				
100	B3		Light olive brown light medium clay with moderate grade of subangular blocky structure and rough-faced 1 cm peds. Abundant (>50%), coarse (6-20mm), strong, manganiferous nodules. Soil had common distinct, grey, weathered mottles. Clods dispersed slightly, and partially slaked in distilled water. Moist.	7				
			COMMENTS: 0					

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**

Base of Observations: **Layer**

Continues at 130 cm

Rootzone: **60cm**

Imperfectly drained

BSAL Drainage:

Imperfectly drained

Moderately permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM711

Bleached-Manganic Eutrophic Grey Chromosol

Excavated on: 21/03/2017 Logged by: PJH

714820m E, 6291854m N, (WGS84),

Landscape Properties

Landform Element: **footslope**
 Vegetation Community: **Woodland Grass Understorey**
 Growth Form: **Sod grass, Tussock Grass, forb**
 Site Disturbance: **occasional cultivation**
 Land Use: **Improved Pasture** Groundcover: **80%**
 Surface Condition Wet: **poached** Dry: **firm**

Topography

Slope: **2%** Eastern Aspect
 Site Morphology: **Lower slope**
 Slope Morphology: **Waning**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A11		Brown fine sandy clay loam with weak grade of subangular blocky structure and earthy 2 cm peds, breaking to subangular blocky peds of 0.5 cm. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Clear boundary to:	5.5				
	A12			4.5				
	A2e		Brown silty clay loam with weak grade of subangular blocky structure and earthy 5 cm peds, breaking to subangular blocky peds of 1 cm. Clods were not dispersive, and slaked completely in distilled water. Dry. Clear boundary to:	5				
50	B22		White silty clay loam with weak grade of subangular blocky structure and earthy 2 cm peds, breaking to subangular blocky peds of 0.5 cm. Clods were not dispersive, and did not slake in distilled water. Dry. Gradual boundary to: Grey light medium clay with moderate grade of prismatic structure and rough-faced 3 cm peds, breaking to subangular blocky peds of 2 cm. Very few (<2%), coarse (6-20mm), weak, manganiferous nodules. Soil had few faint, grey, weathered mottles. Clods dispersed slightly, and slaked completely in distilled water. Moderately moist. Diffuse boundary to:	5	0.1			
100	B23		Grey light medium clay with moderate grade of polyhedral structure and rough-faced 3 cm peds, breaking to subangular blocky peds of 1 cm. Common (10-20%), very coarse (20-60mm), weak, manganiferous nodules. Soil had few distinct, orange, weathered mottles. Clods dispersed slightly, and slaked completely in distilled water. Moderately moist.	5				
			COMMENTS: Earthworms at 110 cm. Grey mottle is around vertical biopores (wormholes).					

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**
 Base of Observations: **Layer**
 Continues at 130 cm
 Rootzone: **80cm**
 Imperfectly drained
 BSAL Drainage: **Poorly drained**
 Slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM712

Bleached Eutrophic Grey Chromosol

Excavated on: 22/03/2017 Logged by: PJH

714395m E, 6292156m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**
 Vegetation Community: **woodland grass understory**
 Growth Form: **sod grass**
 Site Disturbance: **occasional cultivation**
 Land Use: **improved pasture** Groundcover: **75%**
 Surface Condition Wet: **soft** Dry: **hardset**

Topography

Slope: **5%** Northeastern Aspect
 Site Morphology: **Midslope**
 Slope Morphology: **Maximal**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0-1 (0 terrible to 2 good))	Proportion Inert Material	SAMPLE
	A11		Brown silty loam with moderate grade of subangular blocky structure and earthy 2 cm peds, breaking to peds of 1 cm. Clods were not dispersive, and did not slake in distilled water. Moist. Abrupt boundary to:	5				
	A12		Brown silty loam with weak grade of subangular blocky structure and earthy 2 cm peds, breaking to peds of 1 cm. Clods were not dispersive, and partially slaked in distilled water. Moist. Abrupt boundary to:	6				
	A2e		Greyish brown fine sandy loam with weak grade of subangular blocky structure and earthy 5 cm peds, breaking to peds of 2 cm. Clods dispersed slightly, and slaked completely in distilled water. Dry. Abrupt boundary to:	6				
50	B2		Light brown medium clay with moderate grade of prismatic structure and earthy 3 cm peds, breaking to polyhedral peds of 1 cm. Few (2-10%), fine (<2mm), strong, ferruginous nodules. Soil had few distinct, orange, weathered mottles. Clods dispersed slightly, and slaked completely in distilled water. Dry. Gradual boundary to:	6	0.1			
100	B3		Pinkish grey medium clay with strong grade of prismatic structure and rough-faced 2 cm peds, breaking to polyhedral peds of 1 cm. Few (2-10%), fine (<2mm), weak, manganiferous veins. Soil had few distinct, orange, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist.	6				
	COMMENTS: Thickness of A12 varies from 10 cm to 20 cm in the pit. Depth to bottom of A2 is relatively consistent. Few large visible macropores at 120 cm.							

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**
 Base of Observations: **Layer**
Continues at 120 cm
 Rootzone: **80cm**
Imperfectly drained
 BSAL Drainage: **Poorly drained**
Slowly permeable



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Detail Pit OM713

Bleached Eutrophic Grey Chromosol

Excavated on: 22/03/2017 Logged by: PJH

714285m E, 6292598m N, (WGS84),

Landscape Properties

Landform Element: **bench**
 Vegetation Community: **woodland grass understory**
 Growth Form: **sod grass**
 Site Disturbance: **occasional cultivation**
 Land Use: **improved pasture** Groundcover: **100%**
 Surface Condition Wet: **soft** Dry: **hardset**

Topography

Slope: **2%** Eastern Aspect
 Site Morphology: **Midslope**
 Slope Morphology: **Waning**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A11		Greyish brown silty loam with moderate grade of subangular blocky structure and rough-faced 3 cm peds, breaking to angular blocky peds of 1 cm. Clods were not dispersive, and did not slake in distilled water. Moist. Abrupt boundary to:	4.5				
	A12		Grey silty clay loam with moderate grade of subangular blocky structure and rough-faced 7 cm peds, breaking to angular blocky peds of 2 cm. Clods were not dispersive, and partially slaked in distilled water. Moist. Abrupt boundary to:	5				
	A2e		Grey silty clay loam with weak grade of subangular blocky structure and rough-faced 10 cm peds, breaking to angular blocky peds of 3 cm. Very few (<2%), coarse (6-20mm), strong, manganiferous nodules. Soil had very few faint, orange, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Gradual boundary to:	5.5				
50	B2		Grey medium clay with strong grade of polyhedral structure and smooth-faced 5 cm peds, breaking to polyhedral peds of 0.5 cm. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Gradual boundary to:	6	0.1			
	B3		Greyish brown light medium clay with strong grade of polyhedral structure and smooth-faced 10 cm peds, breaking to polyhedral peds of 0.5 cm. Few (2-10%), very coarse (20-60mm), strong, manganiferous nodules. Soil had many distinct, orange, weathered mottles. Clods were not dispersive, and partially slaked in distilled water. Moderately moist.	5.5				
			COMMENTS: Small bench in landscape approx 1 ha. Roots in B horizon are mostly growing through vertical macropores (wormholes). Trace amounts of coarse fragments in B3 - subrounded quartz pebbles.					

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**
 Base of Observations: **Layer**
 Continues at 120 cm
 Rootzone: **70cm**
 Poorly drained
 BSAL Drainage: **Poorly drained**
 Very slowly permeable



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Detail Pit OM714

Eutrophic Mottled-Subnatric Black Sodosol

Excavated on: 22/03/2017 Logged by: PJH

713663m E, 6293128m N, (WGS84),

Landscape Properties

Landform Element: **valley flat**
 Vegetation Community: **woodland grass understory**
 Growth Form: **sod grass**
 Site Disturbance: **occasional cultivation**
 Land Use: **improved pasture** Groundcover: **100%**
 Surface Condition Wet: **soft** Dry: **firm**

Topography

Slope: **1%** Southern Aspect
 Site Morphology: **Flat**
 Slope Morphology: **Maximal**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A11		Brown silty loam with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5				
	A12		Dark greyish brown silty loam with weak grade of subangular blocky structure and rough-faced 5 cm peds. Clods were not dispersive, and partially slaked in distilled water. Dry. Clear boundary to:	5.5				
	A2e		Greyish brown fine sandy loam with massive grade of structure. Clods dispersed slightly, and slaked completely in distilled water. Dry. Abrupt boundary to:	6.5				
50	B1		Black light clay with moderate grade of columnar structure and rough-faced 15 cm peds, breaking to polyhedral peds of 2 cm. Soil had few distinct, orange, weathered mottles. Clods were not dispersive, and partially slaked in distilled water. Moderately moist. Abrupt boundary to:	8				
	B2		Very dark greyish brown medium clay with strong grade of prismatic structure and smooth-faced 5 cm peds, breaking to subangular blocky peds of 2 cm. Very few (<2%), dispersed, reoriented, non-weathered, quartz coarse gravel (20-60mm). Soil had very few distinct, orange, weathered mottles. Clods were not dispersive, and partially slaked in distilled water. Moderately moist. Gradual boundary to:	8	0.8			
100	B3		Grey medium heavy clay with strong grade of polyhedral structure and rough-faced 10 cm peds. Very few (<2%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Few (2-10%), medium (2-6mm), weak, manganiferous soft segregations. Soil had many distinct, orange, weathered mottles. Clods were not dispersive, and partially slaked in distilled water. Moderately moist.	9	0.5			
COMMENTS: 0								

Segregations
 Coarse fragments

Lithology

Substrate: **Alluvium**
 Base of Observations: **Layer**
Continues at 140 cm
 Rootzone: **75cm**
Poorly drained
 BSAL Drainage: **Poorly drained**
Very slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd
Detail Pit OM715 Sodic Eutrophic Black Dermosol

Excavated on: 22/03/2017 Logged by: PJH 713061m E, 6293161m N, (WGS84),

Landscape Properties

Landform Element: valley flat
 Vegetation Community: grassland/herbland
 Growth Form: hummock grass
 Site Disturbance: occasional cultivation
 Land Use: improved pasture Groundcover: 70%
 Surface Condition Wet: soft Dry: firm

Topography

Slope: 0%
 Site Morphology: Flat
 Slope Morphology: Minimal
 Microrelief: None
 Rock Outcrop: 0

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Dark brown light clay with strong grade of subangular blocky structure and rough-faced 3 cm peds, breaking to peds of 1 cm. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5.5				
	B1		Dark grey medium clay with strong grade of polyhedral structure and rough-faced 5 cm peds, breaking to peds of 1 cm. Very few (<2%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Clods were moderately dispersive, and did not slake in distilled water. Dry. Gradual boundary to:	6	0.2			
50	B22		Very dark grey medium clay with strong grade of subangular blocky structure and rough-faced 15 cm peds, breaking to polyhedral peds of 2 cm. Very few (<2%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Few (2-10%), fine (<2mm), weak, calcareous soft segregations. Clods dispersed slightly, and did not slake in distilled water. Dry. Diffuse boundary to:	7	0.7			
	B23		Dark grey medium heavy clay with strong grade of subangular blocky structure and smooth-faced 10 cm peds, breaking to peds of 2 cm. Very few (<2%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Very few (<2%), fine (<2mm), weak, calcareous soft segregations. Clods dispersed slightly, and partially slaked in distilled water. Slight effervescence to 1 Molar HCl. Moderately moist. Clear boundary to:	8	2			
100	B3		Grey medium heavy clay with strong grade of subangular blocky structure and rough-faced 1 cm peds. Few (2-10%), fine (<2mm), strong, calcareous nodules. Clods were not dispersive, and slaked completely in distilled water. Moist.	9	3.2			
COMMENTS: Check ESP. Sodic as indicated by large ped size								

Lithology

Substrate: Alluvium
 Base of Observations: Layer
 Continues at 140 cm
 Rootzone: 70cm
 Poorly drained
 BSAL Drainage: Poorly drained
 Very slowly permeable



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Detail Pit OM716

Mottled Eutrophic Yellow Dermosol

Excavated on: 22/03/2017 Logged by: PJH

713135m E, 6292732m N, (WGS84),

Landscape Properties

Landform Element: **valley flat**
 Vegetation Community: **woodland grass understory**
 Growth Form: **sod grass**
 Site Disturbance: **occasional cultivation**
 Land Use: **improved pasture** Groundcover: **95%**
 Surface Condition Wet: **soft** Dry: **firm**

Topography

Slope: **0%**
 Site Morphology: **Flat**
 Slope Morphology: **Minimal**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A1		Dark brown loam with strong grade of subangular blocky structure and rough-faced 3 cm peds, breaking to peds of 0.5 cm. Clods were not dispersive, and partially slaked in distilled water. Moist. Gradual boundary to:	6				
	A3		Very dark brown silty clay loam with strong grade of prismatic structure and rough-faced 2 cm peds, breaking to subangular blocky peds of 0.5 cm. Clods were not dispersive, and partially slaked in distilled water. Dry. Gradual boundary to:	6.5				
50	B1		Dark greyish brown fine sandy clay with strong grade of lenticular structure and rough-faced 3 cm peds, breaking to subangular blocky peds of 2 cm. Clods were not dispersive, and slaked completely in distilled water. Dry. Diffuse boundary to:	7	0.1			
100	B2		Brownish yellow light medium clay with strong grade of lenticular structure and rough-faced 2 cm peds, breaking to subangular blocky peds of 1 cm. Soil had common distinct, grey, biological mottles. Clods dispersed slightly, and partially slaked in distilled water. Moderately moist.	7				
			COMMENTS: Common vertical macropores from surface to 120 cm and beyond. Small closed depression 50 m west					

Segregations
 Coarse fragments

Lithology

Substrate: **Alluvium**
 Base of Observations: **Layer**
 Continues at **120 cm**
 Rootzone: **120cm**
Well drained
 BSAL Drainage: **Well drained**
Moderately permeable



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Detail Pit OM717

Eutrophic Subnatric Black Sodosol

Excavated on: 23/03/2017 Logged by: PJH

712498m E, 6291837m N, (WGS84),

Landscape Properties

Landform Element: **valley flat**
 Vegetation Community: **woodland grass understory**
 Growth Form: **sod grass**
 Site Disturbance: **occasional cultivation**
 Land Use: **improved pasture** Groundcover: **80%**
 Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **1%** Eastern Aspect
 Site Morphology: **Flat**
 Slope Morphology: **Minimal**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A11		Brown loam with weak grade of subangular blocky structure and rough-faced 4 cm peds, breaking to peds of 1 cm. Clods were not dispersive, and did not slake in distilled water. Moderately moist.	5.5				
	A12		Clear boundary to: Dark brown loam with weak grade of subangular blocky structure and rough-faced 2 cm peds, breaking to peds of 1 cm. Clods were not dispersive, and partially slaked in distilled water. Moderately moist.	5.6				
	A2e		Clear boundary to: Light brownish grey silty loam with weak grade of subangular blocky structure and rough-faced 1 cm peds. Clods dispersed slightly, and partially slaked in distilled water. Dry. Abrupt boundary to:	6				
50	B1		Greyish brown light medium clay with moderate grade of polyhedral structure and rough-faced 5 cm peds, breaking to peds of 2 cm. Soil had many distinct, orange, weathered mottles. Clods dispersed strongly, and did not slake in distilled water. Dry. Clear boundary to:	6.5	0.2			
	B2		Very dark greyish brown medium clay with strong grade of prismatic structure and rough-faced 5 cm peds, breaking to polyhedral peds of 2 cm. Soil had few distinct, yellow, weathered mottles. Clods dispersed strongly, and slaked completely in distilled water. Moderately moist.	8	2			
100								
			COMMENTS: Good topsoil with sharp boundary to poorly drained clay subsoil. Some gleying in B2.					

Segregations
 Coarse fragments

Lithology

Substrate: **Alluvium**
 Base of Observations: **Layer**
 Continues at 120 cm
 Rootzone: **60cm**
Poorly drained
 BSAL Drainage: **Poorly drained**
Very slowly permeable



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Detail Pit OM718

Bleached-Sodic Eutrophic Grey Chromosol

Excavated on: 23/03/2017 Logged by: PJH

714588m E, 6292880m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**
 Vegetation Community: **woodland grass understory**
 Growth Form: **sod grass, forb**
 Site Disturbance: **occasional cultivation**
 Land Use: **improved pasture** Groundcover: **80%**
 Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **4%** Northern Aspect
 Site Morphology: **Lower slope**
 Slope Morphology: **Waning**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A1		Brown loam with weak grade of subangular blocky structure and sandy 3 cm peds, breaking to peds of 0.5 cm. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5.5				
	A2e		Light grey fine sandy loam with weak grade of subangular blocky structure and rough-faced 10 cm peds, breaking to peds of 1 cm. Clods dispersed strongly, and slaked completely in distilled water. Dry. Clear boundary to:	6.5				
50	B1		Grey light medium clay with moderate grade of polyhedral structure and rough-faced 5 cm peds, breaking to peds of 1 cm. Soil had few distinct, orange, weathered mottles. Clods were moderately dispersive, and slaked completely in distilled water. Dry. Gradual boundary to:	6.5				
	B22		Grey medium clay with moderate grade of polyhedral structure and rough-faced 5 cm peds, breaking to peds of 2 cm. Few (2-10%), coarse (6-20mm), weak, ferruginous soft segregations. Soil had few distinct, orange, biological mottles. Clods dispersed slightly, and partially slaked in distilled water. Moderately moist. Gradual boundary to:	6.5	0.1			
100	B23		Grey medium heavy clay with moderate grade of prismatic structure and rough-faced 2 cm peds, breaking to polyhedral peds of 1 cm. Few (2-10%), coarse (6-20mm), weak, ferruginous soft segregations. Soil had few distinct, orange, weathered mottles. Clods were moderately dispersive, and partially slaked in distilled water. Moderately moist.	7	0.2			
			COMMENTS: sporadic cryptogram crust, tillage - furrows from ploughing persisted.					

Segregations
 Coarse fragments

Lithology

Substrate: **Alluvium**
 Base of Observations: **Layer**
 Continues at 120 cm
 Rootzone: **70cm**
 Poorly drained
 BSAL Drainage: **Poorly drained**
 Very slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM719

Eutrophic Subnatric Black Sodosol

Excavated on: 23/03/2017 Logged by: PJH

714980m E, 6292697m N, (WGS84),

Landscape Properties

Landform Element: **valley flat**
 Vegetation Community: **woodland grass understory**
 Growth Form: **sod grass, forb**
 Site Disturbance: **occasional cultivation**
 Land Use: **improved pasture** Groundcover: **90%**
 Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **1%** Western Aspect
 Site Morphology: **Flat**
 Slope Morphology: **Minimal**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A1		Dark brown silty clay with strong grade of subangular blocky structure and rough-faced 2 cm peds, breaking to granular peds of 0.5 cm. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5.5				
	A2e		Brown silty loam with moderate grade of subangular blocky structure and rough-faced 2 cm peds, breaking to peds of 1 cm. Soil had common faint, brown, weathered mottles. Clods dispersed slightly, and partially slaked in distilled water. Dry. Clear boundary to:	6.5				
50	B22		Black medium heavy clay with strong grade of polyhedral structure and smooth-faced 15 cm peds, breaking to lenticular peds of 1 cm. Very few (<2%), medium (2-6mm), weak, calcareous nodules. Clods dispersed slightly, and did not slake in distilled water. Slight effervescence to 1 Molar HCl. Moderately moist. Diffuse boundary to:	7.5	1.2			
100	B23		Very dark greyish brown medium heavy clay with strong grade of polyhedral structure and smooth-faced 10 cm peds, breaking to peds of 5 cm. Very few (<2%), medium (2-6mm), weak, calcareous nodules. Clods were not dispersive, and did not slake in distilled water. Slight effervescence to 1 Molar HCl. Moderately moist. Clear boundary to:	8	2.5			
150	B3		Light olive brown medium heavy clay with strong grade of polyhedral structure and smooth-faced 5 cm peds, breaking to peds of 2 cm. Clods were not dispersive, and partially slaked in distilled water. Moist. COMMENTS: A2 varies from 5 cm to 30 cm across the pit. 50% quartz gravel (1 to 3cm) at bottom of pit. Topsoil is good medium for root growth.	8	3.2			

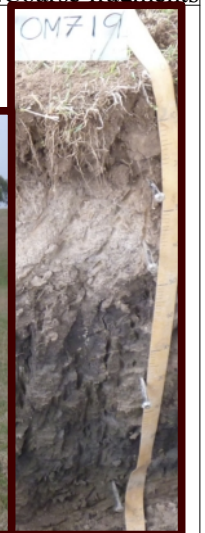
Segregations
 Coarse fragments

Lithology

Substrate: **Igneous**
 Base of Observations: **Soil**
Continues at 130 cm
 Rootzone: **100cm**
Imperfectly drained
 BSAL Drainage: **Poorly drained**
Very slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM720

Haplic Eutrophic Brown Dermosol

Excavated on: 23/03/2017 Logged by: PJH

714681m E, 6293369m N, (WGS84),

Landscape Properties

Landform Element: **footslope**
 Vegetation Community: **woodland grass understory**
 Growth Form: **sod grass, forb**
 Site Disturbance: **occasional cultivation**
 Land Use: **improved pasture** Groundcover: **100%**
 Surface Condition Wet: **firm** Dry: **firm**

Topography

Slope: **6%** Southeastern Aspect
 Site Morphology: **Lower slope**
 Slope Morphology: **Waning**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0-1 (0 terrible to 2 good))	Proportion Inert Material	SAMPLE
	A1		Brown silty clay with strong grade of subangular blocky structure and rough-faced 5 cm peds, breaking to peds of 1 cm. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	6.5				
	B1		Dark brown light clay with strong grade of subangular blocky structure and rough-faced 5 cm peds, breaking to peds of 2 cm. Clods were not dispersive, and partially slaked in distilled water.	6.5				
	B2		Moderately moist. Clear boundary to: Dark brown medium clay with strong grade of polyhedral structure and rough-faced 4 cm peds, breaking to subangular blocky peds of 1 cm. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Gradual boundary to:	6.5				
50	B3		Brown light medium clay with strong grade of polyhedral structure and rough-faced 3 cm peds, breaking to peds of 1 cm. Very few (<2%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Soil had few faint, grey, weathered mottles. Clods were not dispersive, and partially slaked in distilled water. Moderately moist. Gradual boundary to:	6.5	0.1			
100	C		Brown light medium clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds, breaking to peds of 0.5 cm. Few (2-10%), dispersed, undisturbed, strongly weathered, substrate gravel (6-20mm). Soil had few distinct, brown, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. COMMENTS: Common vertical macropores to 120 cm, Strong grade of reasonably fine structure throughout profile. Good soil. BSAL	6.5				

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**
 Base of Observations: **Layer**
 Continues at **120 cm**
 Rootzone: **120cm**
 Moderately well drained
 BSAL Drainage: **Moderately well drained**
 Slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM721

Vertic Eutrophic Black **Dermosol**

Excavated on: **23/03/2017** Logged by: **GK**

712853m E, 6291894m N, (WGS84),

Landscape Properties

Landform Element: **valley flat**

Vegetation Community: **unknown**

Growth Form: **sod grass, tussock grass**

Site Disturbance: **limited clearing**

Land Use: **improved pasture** Groundcover: **90%**

Surface Condition Wet: **firm** Dry: **firm**

Topography

Slope: **1% Flat** Aspect

Site Morphology: **Flat**

Slope Morphology: **Minimal**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A		Very dark brown light clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5.5	0.1			
	B2		Very dark grey medium clay with moderate grade of prismatic structure and smooth-faced 5 cm peds, breaking to angular blocky peds of 2 cm. Clods were not dispersive, and did not slake in distilled water. Moist. Gradual boundary to:	7	0.1			
50	B2K		Dark grey medium clay with moderate grade of prismatic structure and smooth-faced 5 cm peds, breaking to angular blocky peds of 2 cm. Abundant (>50%), very coarse (20-60mm), weak, calcareous soft segregations. Clods were not dispersive, and slaked completely in distilled water. Very high effervescence to 1 Molar HCl. Moist. Gradual boundary to:	9.5	1.2			
100	B3		Dark grey medium clay with moderate grade of prismatic structure and smooth-faced 2 cm peds, breaking to angular blocky peds of 2 cm. Soil had many distinct, grey, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist.	8.5	1.1			
			COMMENTS: Slickensides in all 3 B horizons.					

Segregations
 Coarse fragments

Lithology

Substrate: **Alluvium**

Base of Observations: **Layer**

Continues at 130 cm

Rootzone: **55cm**

Poorly drained

BSAL Drainage: **Poorly drained**

Very slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM722

Bleached-Manganic Mesotrophic Yellow **Dermosol**

Excavated on: **23/03/2017** Logged by: **GK**

714650m E, 6292527m N, (WGS84),

Landscape Properties

Landform Element: **hillcrest**

Vegetation Community: **unknown**

Growth Form: **sod grass, tussock grass**

Site Disturbance: **limited clearing**

Land Use: **improved pasture** Groundcover: **90%**

Surface Condition Wet: **firm** Dry: **firm**

Topography

Slope: **2%** Flat Aspect

Site Morphology: **Crest**

Slope Morphology: **Minimal**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A1		Brown fine sandy clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Clear boundary to:	5.5				
	A2e		Greyish brown fine clay loam with weak grade of subangular blocky structure and earthy 2 cm peds. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Clear boundary to:	6.5				
50	B2		Light yellowish brown light clay with weak grade of polyhedral structure and rough-faced 5 cm peds. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Gradual boundary to:	6.5	0.1			
100	B3		Greyish brown fine clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Many (20-50%), very coarse (20-60mm), strong, manganiferous nodules. Clods were moderately dispersive, and slaked completely in distilled water. Moderately moist.	6.5				
			COMMENTS: Chromosol - dispersive from 80 to 120 cm. Manganese increasing with depth 80 to 120 cm.					

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**

Base of Observations: **Layer**

Continues at 120 cm

Rootzone: **90cm**

Moderately well drained

BSAL Drainage: **Poorly drained**

Moderately permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM723

Manganic Eutrophic Brown Chromosol

Excavated on: 23/03/2017 Logged by: GK

715215m E, 6292945m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**

Vegetation Community: **unknown**

Growth Form: **sod grass, tussock grass**

Site Disturbance: **limited clearing**

Land Use: **improved pasture** Groundcover: **90%**

Surface Condition Wet: **firm** Dry: **firm**

Topography

Slope: **5%** Northern Aspect

Site Morphology: **Midslope**

Slope Morphology: **Minimal**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak C (0 to 2 good)	SOILpak N (0 to 2 good)	Proportion Inert Material	SAMPLE
	A		Brown fine clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Clear boundary to:	5.5					
	A2		Greyish brown fine clay loam with weak grade of subangular blocky structure and earthy 2 cm peds. Clods were moderately dispersive, and slaked completely in distilled water. Moderately moist. Clear boundary to:	5.5					
	B21		Brown light medium clay with moderate grade of polyhedral structure and rough-faced 2 cm peds. Few (2-10%), medium (2-6mm), strong, manganiferous nodules. Soil had few faint, pale, weathered mottles. Clods were moderately dispersive, and did not slake in distilled water. Moderately moist. Diffuse boundary to:	6	0.1				
50	B22		Dark yellowish brown light medium clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Many (20-50%), medium (2-6mm), weak, manganiferous soft segregations. Soil had many distinct, yellow, weathered mottles. Clods were not dispersive, and partially slaked in distilled water. Moderately moist. Diffuse boundary to:	6					
	B23		Yellowish brown light medium clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Many (20-50%), coarse (6-20mm), weak, manganiferous soft segregations. Soil had many distinct, yellow, weathered mottles. Clods dispersed slightly, and slaked completely in distilled water. Moderately moist.	6					
100			COMMENTS: Manganese below topsoil and nodules at 25 to 50 cm.						

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**

Base of Observations: **Soil**

Continues at 130 cm

Rootzone: **90cm**

Imperfectly drained

BSAL Drainage: **Poorly drained**

Moderately permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM724

Eutrophic Mottled-Subnatric Brown Sodosol

Excavated on: 23/03/2017 Logged by: GK

715778m E, 6293303m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**

Vegetation Community: **unknown**

Growth Form: **sod grass, tussock grass**

Site Disturbance: **limited clearing**

Land Use: **improved pasture** Groundcover: **95%**

Surface Condition Wet: **firm** Dry: **firm**

Topography

Slope: **7%** Western Aspect

Site Morphology: **Midslope**

Slope Morphology: **Waning**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak C (0 to 2 good)	SOILpak N (0 to 2 good)	Proportion Inert Material	SAMPLE
	A		Dark yellowish brown light clay with moderate grade of subangular blocky structure and rough-faced 1 cm peds. Few (2-10%), dispersed, reoriented, strongly weathered, quartz coarse gravel (20-60mm). Clods were not dispersive, and did not slake in distilled water.	6.5					
	2A1		Moderately moist. Clear boundary to: Dark yellowish brown fine clay loam with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Clods dispersed slightly, and slaked completely in distilled water.	6.5					
	2A2e		Moderately moist. Clear boundary to: Greyish brown fine sandy clay loam with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Clods were moderately dispersive, and slaked completely in distilled water.	8					
50	2B21		Moderately moist. Clear boundary to: Yellowish brown light medium clay with moderate grade of prismatic structure and rough-faced 5 cm peds, breaking to angular blocky peds of 3 cm. Soil had common distinct, grey, weathered mottles. Clods were not dispersive, and slaked completely in distilled water.	9	0.7				
100	2B22		Brown light medium clay with moderate grade of lenticular structure and rough-faced 4 cm peds, breaking to subangular blocky peds of 3 cm. Common (10-20%), coarse (6-20mm), weak, manganiferous soft segregations. Soil had many distinct, yellow, weathered mottles. Clods were not dispersive, and partially slaked in distilled water. Moist.	9	0.8				
150			COMMENTS: Alluvium over colluvium - physical barrier at 60 cm due to prismatic structure (clay). Chemical barrier due to salinity at 60 cm.						

Segregations
 Coarse fragments

Lithology

Substrate: **Alluvium over colluvium**

Base of Observations: **Layer Continues** at 140 cm

Rootzone: **60cm**

Poorly drained

BSAL Drainage: **Poorly drained**

Slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM725

Manganic Eutrophic Red Chromosol

Excavated on: 23/03/2017 Logged by: GK

713948m E, 6293863m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**

Vegetation Community: **unknown**

Growth Form: **sod grass, tussock grass**

Site Disturbance: **extensive clearing**

Land Use: **improved pasture** Groundcover: **90%**

Surface Condition Wet: **firm** Dry: **firm**

Topography

Slope: **3%** Southwestern Aspect

Site Morphology: **Upper Slope**

Slope Morphology: **Waxing**

Microrelief: **None**

Rock Outcrop: **2**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0-1 (0 terrible to 2 good))	Proportion Inert Material	SAMPLE
	A		Dark brown fine clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Few (2-10%), dispersed, reoriented, strongly weathered, quartz gravel (6-20mm). Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Clear boundary to:	5.5				
	B		Dark reddish brown light medium clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Clear boundary to:	6	0.1			
50	B3		Red light medium clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Many (20-50%), coarse (6-20mm), strong, manganiferous nodules. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Gradual boundary to:	7				
100	C		Red light clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Abundant (>50%), very coarse (20-60mm), strong, manganiferous nodules. Clods were not dispersive, and did not slake in distilled water. Moderately moist.	7.5				
	COMMENTS: Nice red soil, but shallow.							

Segregations
 Coarse fragments

Lithology

Substrate: **Basalt**

Base of Observations: **Layer**

Continues at 120 cm

Rootzone: **80cm**

Moderately well drained

BSAL Drainage: **Moderately**

well drained

Moderately permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM726

Bleached-Manganic Mesotrophic Brown **Dermosol**

Excavated on: **23/03/2017** Logged by: **GK**

714421m E, 6293816m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**

Vegetation Community: **unknown**

Growth Form: **sod grass, tussock grass**

Site Disturbance: **extensive clearing**

Land Use: **improved pasture** Groundcover: **95%**

Surface Condition Wet: **firm** Dry: **firm**

Topography

Slope: **6%** Northern Aspect

Site Morphology: **Upper Slope**

Slope Morphology: **Waxing**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak O (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A		Brown fine sandy clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5.5				
	A2e		Brown fine clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5.5				
	B		Yellowish brown light clay with moderate grade of polyhedral structure and rough-faced 2 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	6	0.1			
50	B3		Brown light clay with moderate grade of subangular blocky structure and rough-faced 1 cm peds. Many (20-50%), coarse (6-20mm), strong, manganiferous nodules. Clods were not dispersive, and slaked completely in distilled water. Moist. Clear boundary to:	6				
	C		Brown clay loam with massive grade of structure. Abundant (>50%), extremely coarse (>60mm), strong, manganiferous nodules. Moderately moist. COMMENTS: 70 to 80 cm manganese hard pan - cemented.					
100								

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**

Base of Observations: **equipment refusal at 80 cm**

Rootzone: **60cm**

Imperfectly drained

BSAL Drainage: **Poorly drained**

Moderately permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM727

Manganic Mesotrophic Brown **Dermosol**

Excavated on: **23/03/2017** Logged by: **GK**

714314m E, 6294488m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**

Vegetation Community: **unknown**

Growth Form: **sod grass, tussock grass**

Site Disturbance: **extensive clearing**

Land Use: **improved pasture** Groundcover: **95%**

Surface Condition Wet: **firm** Dry: **firm**

Topography

Slope: **3%** Southwestern Aspect

Site Morphology: **Midslope**

Slope Morphology: **Waxing**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A1		Brown fine sandy clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods dispersed slightly, and partially slaked in distilled water. Moist. Clear boundary to:	5.5				
	A2		Brown fine clay loam with weak grade of subangular blocky structure and earthy 2 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5.5				
	B2		Yellowish brown light clay with moderate grade of polyhedral structure and rough-faced 3 cm peds. Clods were not dispersive, and partially slaked in distilled water. Moist. Clear boundary to:	6	0			
50								
	B3		Brown light clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Many (20-50%), very coarse (20-60mm), strong, manganiferous nodules. Clods dispersed slightly, and slaked completely in distilled water. Moist.	6.5				
100								
			COMMENTS: 70 - 100 high manganese. Soil moist, so no dry Munsell					

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**

Base of Observations: **equipment refusal at 105 cm**

Rootzone: **70cm**

Imperfectly drained

BSAL Drainage: **Imperfectly drained**

Moderately permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM728

Manganic Eutrophic Brown Dermosol

Excavated on: 24/03/2017 Logged by: GK

714170m E, 6294765m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**

Vegetation Community: **unknown**

Growth Form: **sod grass, tussock grass**

Site Disturbance: **extensive clearing**

Land Use: **improved pasture** Groundcover: **95%**

Surface Condition Wet: **firm** Dry: **firm**

Topography

Slope: **7%** Southeastern Aspect

Site Morphology: **Lower slope**

Slope Morphology: **Waxing**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A1		Dark yellowish brown fine sandy clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5.5				
	A2		Brown fine clay loam with weak grade of subangular blocky structure and earthy 2 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5.5				
	B1		Dark yellowish brown light clay with moderate grade of polyhedral structure and rough-faced 3 cm peds, breaking to subangular blocky peds of 1 cm. Clods were not dispersive, and did not slake in distilled water. Moist. Gradual boundary to:	6.5	0			
50	B3		Yellowish brown light clay with moderate grade of subangular blocky structure and rough-faced 1 cm peds. Many (20-50%), coarse (6-20mm), strong, manganiferous nodules. Clods were not dispersive, and partially slaked in distilled water. Moderately moist. Gradual boundary to:	6.5				
	C		Brown fine clay loam with moderate grade of subangular blocky structure and rough-faced 1 cm peds. Abundant (>50%), extremely coarse (>60mm), strong, ferromangiferous nodules. Clods dispersed slightly, and slaked completely in distilled water. Moderately moist. COMMENTS: 0	6.5				
100								

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**

Base of Observations: **Soil**

Continues at 90 cm

Rootzone: **75cm**

Imperfectly drained

BSAL Drainage:

Imperfectly drained

Moderately permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM729

Manganic Eutrophic Brown Chromosol

Excavated on: 24/03/2017 Logged by: GK

714271m E, 6295724m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**

Vegetation Community: **unknown**

Growth Form: **sod grass, tussock grass**

Site Disturbance: **extensive clearing**

Land Use: **improved pasture** Groundcover: **90%**

Surface Condition Wet: **firm** Dry: **firm**

Topography

Slope: **7%** Southwestern Aspect

Site Morphology: **Midslope**

Slope Morphology: **Waxing**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A1		Brown clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	6				
	B2		Dark yellowish brown light medium clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Many (20-50%), medium (2-6mm), strong, manganiferous concretions. Clods were not dispersive, and did not slake in distilled water. Moist. Gradual boundary to:	6	0.1			
50	B3		Yellowish brown light clay with moderate grade of subangular blocky structure and rough-faced 1 cm peds. Many (20-50%), very coarse (20-60mm), strong, ferromangiferous nodules. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Diffuse boundary to:	6.5				
100	C		Brown light clay with weak grade of subangular blocky structure and rough-faced 0.5 cm peds. Abundant (>50%), extremely coarse (>60mm), strong, ferromangiferous nodules. Clods dispersed slightly, and did not slake in distilled water. Moderately moist. COMMENTS: Bleached layer not obvious.	7				

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**

Base of Observations: **Soil**

Continues at 110 cm

Rootzone: **75cm**

Imperfectly drained

BSAL Drainage:

Imperfectly drained

Slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM730

Haplic Mesotrophic Yellow Chromosol

Excavated on: 24/03/2017 Logged by: GK

714690m E, 6296067m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**

Vegetation Community: **unknown**

Growth Form: **sod grass, tussock grass**

Site Disturbance: **extensive clearing**

Land Use: **improved pasture** Groundcover: **90%**

Surface Condition Wet: **firm** Dry: **firm**

Topography

Slope: **9%** Western Aspect

Site Morphology: **Midslope**

Slope Morphology: **Waxing**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field EcE (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A1		Dark brown fine sandy clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Abrupt boundary to:	6				
	A2		Dark yellowish brown fine clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5.5				
	B		Strong brown light medium clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Gradual boundary to:	5.5	0.1			
50	C		Strong brown silty clay loam with moderate grade of subangular blocky structure and rough-faced 1 cm peds. Abundant (50-90%), stratified, undisturbed, weakly weathered, substrate cobbles (60-200mm). Clods were not dispersive, and partially slaked in distilled water. Moderately moist. Diffuse boundary to:	5.5				
100	R		Very abundant (>90%), stratified, undisturbed, non-weathered, parent material boulders (>600mm).					
			COMMENTS: Shallow soil. Both coarse fragment types are angular platy in shape.					

Segregations
 Coarse fragments

Lithology

Substrate: **Siltstone/Mudstone**

Base of Observations:

bedrock reached at 120 cm

Rootzone: **60cm**

Moderately well drained

BSAL Drainage: **Moderately well drained**

Moderately permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM731

Bleached Mesotrophic Grey Chromosol

Excavated on: 23/03/2017 Logged by: PJH

713920m E, 6293419m N, (WGS84),

Landscape Properties

Landform Element: **ridge**
 Vegetation Community: **woodland grass understory**
 Growth Form: **sod grass, forb**
 Site Disturbance: **occasional cultivation**
 Land Use: **improved pasture** Groundcover: **100%**
 Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **1%** Southwestern Aspect
 Site Morphology: **Flat**
 Slope Morphology: **Maximal**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0-1 (0 terrible to 2 good))	Proportion Inert Material	SAMPLE
	A11		Brown silty loam with weak grade of subangular blocky structure and rough-faced 3 cm peds, breaking to peds of 1 cm. Soil had few faint, orange, weathered mottles. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5				
	A12		Brown loam with weak grade of subangular blocky structure and rough-faced 4 cm peds, breaking to peds of 1 cm. Soil had very few faint, orange, weathered mottles. Clods were not dispersive, and partially slaked in distilled water. Moist. Clear boundary to:	5.5				
	A2e		Pale brown fine sandy loam with weak grade of lenticular structure and sandy 2 cm peds, breaking to peds of 1 cm. Clods dispersed slightly, and slaked completely in distilled water. Dry. Clear boundary to:	6				
50	B2		Light yellowish brown light medium clay with moderate grade of polyhedral structure and rough-faced 3 cm peds, breaking to peds of 1 cm. Soil had very few distinct, grey, biological mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Clear boundary to:	6.5	0.1			
	B3		Light grey silty loam with weak grade of prismatic structure and rough-faced 3 cm peds, breaking to polyhedral peds of 1 cm. Few (2-10%), coarse (6-20mm), weak, ferromangiferous veins. Clods dispersed slightly, and partially slaked in distilled water. Moderately moist.	6.5				
100	COMMENTS: Good structure in that there are common vertical macropores to min 100 cm. Earthworms common. Expect low fertility							

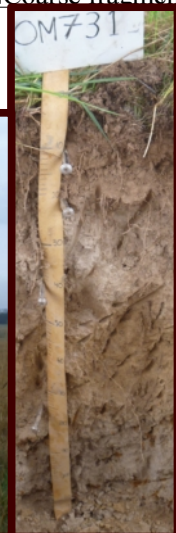
Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**
 Base of Observations: **Layer**
 Continues at 120 cm
 Rootzone: **80cm**
 Imperfectly drained
 BSAL Drainage: **Poorly drained**
 Moderately permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM732

Manganic Mesotrophic Brown **Dermosol**

Excavated on: **23/03/2017** Logged by: **PJH**

714475m E, 6294191m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**
 Vegetation Community: **woodland grass understory**
 Growth Form: **sod grass**
 Site Disturbance: **occasional cultivation**
 Land Use: **improved pasture** Groundcover: **80%**
 Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **8%** Western Aspect
 Site Morphology: **Midslope**
 Slope Morphology: **Waxing**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A11		Dark yellowish brown loam with weak grade of subangular blocky structure and earthy 5 cm peds, breaking to peds of 1 cm. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5				
	A12		Brown loam with weak grade of subangular blocky structure and earthy 3 cm peds, breaking to peds of 1 cm. Clods were not dispersive, and partially slaked in distilled water. Moist. Clear boundary to:	5				
	B22		Dark yellowish brown clay loam with moderate grade of prismatic structure and rough-faced 5 cm peds, breaking to polyhedral peds of 1 cm. Soil had very few distinct, grey, biological mottles. Clods were not dispersive, and partially slaked in distilled water. Moist. Gradual boundary to:	6.5				
50	B23		Red light clay with moderate grade of polyhedral structure and rough-faced 5 cm peds, breaking to subangular blocky peds of 0.5 cm. Very few (<2%), medium (2-6mm), strong, ferruginous nodules. Soil had very few distinct, grey, biological mottles. Clods were not dispersive, and slaked completely in distilled water. Moist. Abrupt boundary to:	7	0.1			
	C		Dark yellowish brown clay loam with weak grade of subangular blocky structure and smooth-faced 0.5 cm peds. Few (2-10%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Abundant (>50%), coarse (6-20mm), strong, manganiferous nodules. Clods dispersed slightly, and partially slaked in distilled water. Moist.	7				
100			COMMENTS: Good structure to 75 cm. Clear physical barrier at this depth.					

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**
 Base of Observations: **Layer**
Continues at 115 cm
 Rootzone: **75cm**
Imperfectly drained
 BSAL Drainage: **Imperfectly drained**
Moderately permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM733

Manganic Eutrophic Brown Dermosol

Excavated on: 23/03/2017 Logged by: PJH

713888m E, 6294275m N, (WGS84),

Landscape Properties

Landform Element: **hillcrest**
 Vegetation Community: **woodland grass understory**
 Growth Form: **sod grass, tussock grass**
 Site Disturbance: **occasional cultivation**
 Land Use: **improved pasture** Groundcover: **95%**
 Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **3%** Northern Aspect
 Site Morphology: **Crest**
 Slope Morphology: **Maximal**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A		Brown loam with weak grade of polyhedral structure and earthy 5 cm peds, breaking to subangular blocky peds of 1 cm. Very few (<2%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Clods were not dispersive, and partially slaked in distilled water. Moist. Gradual boundary to:	5				
	B22		Brown silty clay with moderate grade of lenticular structure and rough-faced 5 cm peds, breaking to subangular blocky peds of 1 cm. Few (2-10%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Soil had very few faint, grey, biological mottles. Clods were not dispersive, and slaked completely in distilled water. Moist. Gradual boundary to:	5.5				
50	B23		Brown silty clay with moderate grade of polyhedral structure and rough-faced 5 cm peds, breaking to subangular blocky peds of 1 cm. Few (2-10%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Few (2-10%), coarse (6-20mm), weak, ferruginous nodules. Soil had few faint, grey, biological mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Clear boundary to:	5.5	0.1			
	C		Light grey light clay with weak grade of polyhedral structure and smooth-faced 10 cm peds. Abundant (>50%), coarse (6-20mm), weak, ferromangiferous nodules. Clods dispersed slightly, and partially slaked in distilled water. Moist. COMMENTS: Reasonable structure, but shallow soil.	6				
100								

Segregations
 Coarse fragments

Lithology

Substrate: **Metamorphic**
 Base of Observations: **equipment refusal at 80 cm**
 Rootzone: **60cm**
Imperfectly drained
 BSAL Drainage: **Poorly drained**
Moderately permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM734

Manganic Mesotrophic Brown **Dermosol**

Excavated on: **24/03/2017** Logged by: **PJH**

714184m E, 6295107m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**
 Vegetation Community: **woodland grass understory**
 Growth Form: **sod grass, forb**
 Site Disturbance: **occasional cultivation**
 Land Use: **improved pasture** Groundcover: **75%**
 Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **7%** Southern Aspect
 Site Morphology: **Upper Slope**
 Slope Morphology: **Waxing**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0-1 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A		Dark brown silty loam with strong grade of subangular blocky structure and rough-faced 5 cm peds, breaking to peds of 0.5 cm. Clods were not dispersive, and partially slaked in distilled water. Wet. Abrupt boundary to:	5				
	B1		Yellowish red light clay with moderate grade of lenticular structure and rough-faced 3 cm peds, breaking to subangular blocky peds of 1 cm. Soil had very few faint, grey, biological mottles. Clods were not dispersive, and partially slaked in distilled water. Moist. Gradual boundary to:	5.5				
	B2		Reddish brown light clay with moderate grade of subangular blocky structure and rough-faced 5 cm peds, breaking to peds of 2 cm. Few (2-10%), coarse (6-20mm), strong, manganiferous nodules. Soil had few faint, grey, biological mottles. Clods were not dispersive, and partially slaked in distilled water. Dry. Clear boundary to:	6	0.1			
50	B31		Strong brown light clay with weak grade of subangular blocky structure and earthy 0.5 cm peds. Abundant (>50%), coarse (6-20mm), weak, manganiferous veins. Soil had few distinct, red, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Gradual boundary to:	7				
	B32		Brown coarse sandy clay with weak grade of polyhedral structure and rough-faced 2 cm peds. Abundant (>50%), coarse (6-20mm), weak, ferromangiferous veins. Soil had many distinct, grey, weathered mottles. Clods were not dispersive, and partially slaked in distilled water. Dry.	7				
100			COMMENTS: Well drained to 50 cm, poorly drained below					

Segregations
 Coarse fragments

Lithology

Substrate: **Metamorphic**
 Base of Observations: **equipment refusal at 110 cm**
 Rootzone: **70cm**
Poorly drained
 BSAL Drainage: **Imperfectly drained**
Moderately permeable



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Detail Pit OM735

Bleached-Manganic Eutrophic Yellow **Dermosol**

Excavated on: **24/03/2017** Logged by: **PJH**

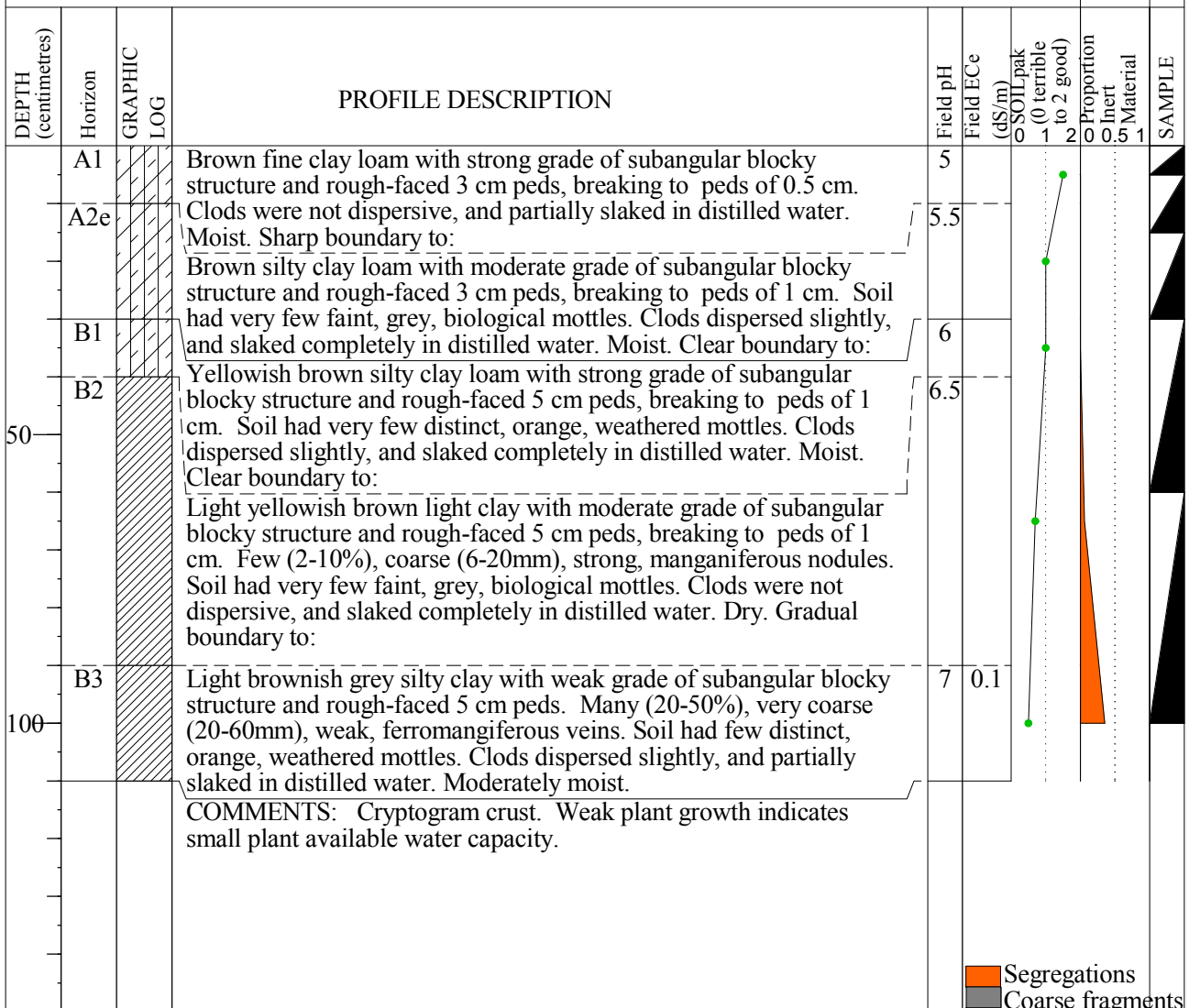
714264m E, 6296158m N, (WGS84),

Landscape Properties

Landform Element: **footslope**
 Vegetation Community: **Woodland Grass Understorey**
 Growth Form: **tussock grass, forb**
 Site Disturbance: **Occasional Cultivation**
 Land Use: **Improved Pasture** Groundcover: **55%**
 Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **5%** Northwestern Aspect
 Site Morphology: **Midslope**
 Slope Morphology: **Waning**
 Microrelief: **None**
 Rock Outcrop: **0**



Lithology

Substrate: **Colluvium**
 Base of Observations: **equipment refusal at 110 cm**
 Rootzone: **60cm**
Imperfectly drained
 BSAL Drainage: **Poorly drained**
Slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM736

Haplic Mesotrophic Brown Chromosol

Excavated on: 24/03/2017 Logged by: PJH

714642m E, 6295645m N, (WGS84),

Landscape Properties

Landform Element: **valley flat**
 Vegetation Community: **Woodland Grass Understorey**
 Growth Form: **hummock grass, forb**
 Site Disturbance: **Occasional Cultivation**
 Land Use: **Improved Pasture** Groundcover: **70%**
 Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **6%** Southwestern Aspect
 Site Morphology: **Midslope**
 Slope Morphology: **Waxing**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A11		Brown fine silty loam with moderate grade of subangular blocky structure and rough-faced 2 cm peds, breaking to peds of 1 cm. Clods were not dispersive, and partially slaked in distilled water. Moist. Clear boundary to:	5.5				
	A12		Yellowish brown fine silty loam with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Soil had few faint, grey, biological mottles. Clods were not dispersive, and partially slaked in distilled water. Moist. Clear boundary to:	6				
	B1		Dark yellowish brown silty clay with moderate grade of subangular blocky structure and rough-faced 5 cm peds. Soil had few distinct, grey, biological mottles. Clods were not dispersive, and partially slaked in distilled water. Dry. Gradual boundary to:	6				
50	B2		Dark yellowish brown light clay with moderate grade of subangular blocky structure and rough-faced 5 cm peds, breaking to peds of 0.5 cm. Few (2-10%), coarse (6-20mm), weak, manganiferous nodules. Soil had few distinct, grey, biological mottles. Clods were not dispersive, and partially slaked in distilled water. Dry. Gradual boundary to:	6	0.1			
100	B3		Pale brown fine silty clay loam with weak grade of subangular blocky structure and earthy 2 cm peds. Very few (<2%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Common (10-20%), coarse (6-20mm), weak, manganiferous veins. Soil had many distinct, orange, weathered mottles. Clods dispersed slightly, and slaked completely in distilled water. Moist.	6				
			COMMENTS: Roots grow through common vertical macropores to 80 cm with some to bottom of pit. Moderately good soil structure in the A horizon. Site represents valley floor, not the hillslopes.					

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**
 Base of Observations: **Layer**
 Continues at 110 cm
 Rootzone: **60cm**
Imperfectly drained
 BSAL Drainage: **Imperfectly drained**
Moderately permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM737

Haplic Mesotrophic Red Dermosol

Excavated on: 24/03/2017 Logged by: PJH

715593m E, 6294314m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**
 Vegetation Community: **Unknown**
 Growth Form: **Sod grass**
 Site Disturbance: **Occasional Cultivation**
 Land Use: **Improved Pasture** Groundcover: **80%**
 Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **7%** Eastern Aspect
 Site Morphology: **Upper Slope**
 Slope Morphology: **Waxing**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A		Dark reddish brown silty clay with strong grade of subangular blocky structure and rough-faced 5 cm peds, breaking to peds of 0.2 cm. Very few (<2%), dispersed, reoriented, non-weathered, quartz fine gravel (2-6mm). Clods were not dispersive, and partially slaked in distilled water. Moist. Clear boundary to:	5.5				
	B1		Reddish brown silty clay with moderate grade of subangular blocky structure and rough-faced 5 cm peds, breaking to peds of 1 cm. Clods were not dispersive, and partially slaked in distilled water. Moderately moist. Clear boundary to:	7.5				
	B22		Yellowish red silty clay with moderate grade of subangular blocky structure and rough-faced 5 cm peds, breaking to peds of 1 cm. Soil had very few distinct, brown, weathered mottles. Clods were not dispersive, and partially slaked in distilled water. Moderately moist. Gradual boundary to:	7.5	0.2			
50	B23		Yellowish red silty clay with moderate grade of subangular blocky structure and rough-faced 5 cm peds, breaking to peds of 1 cm. Very few (<2%), coarse (6-20mm), weak, manganiferous veins. Soil had few distinct, dark, biological mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist.	7.5				
100								
			COMMENTS: Well drained soil that appears to be productive.					

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**
 Base of Observations: **Layer**
 Continues at **110 cm**
 Rootzone: **110cm**
Well drained
 BSAL Drainage: **Well drained**
Moderately permeable



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Detail Pit OM738

Manganic Eutrophic Yellow Chromosol

Excavated on: 24/03/2017 Logged by: PJH

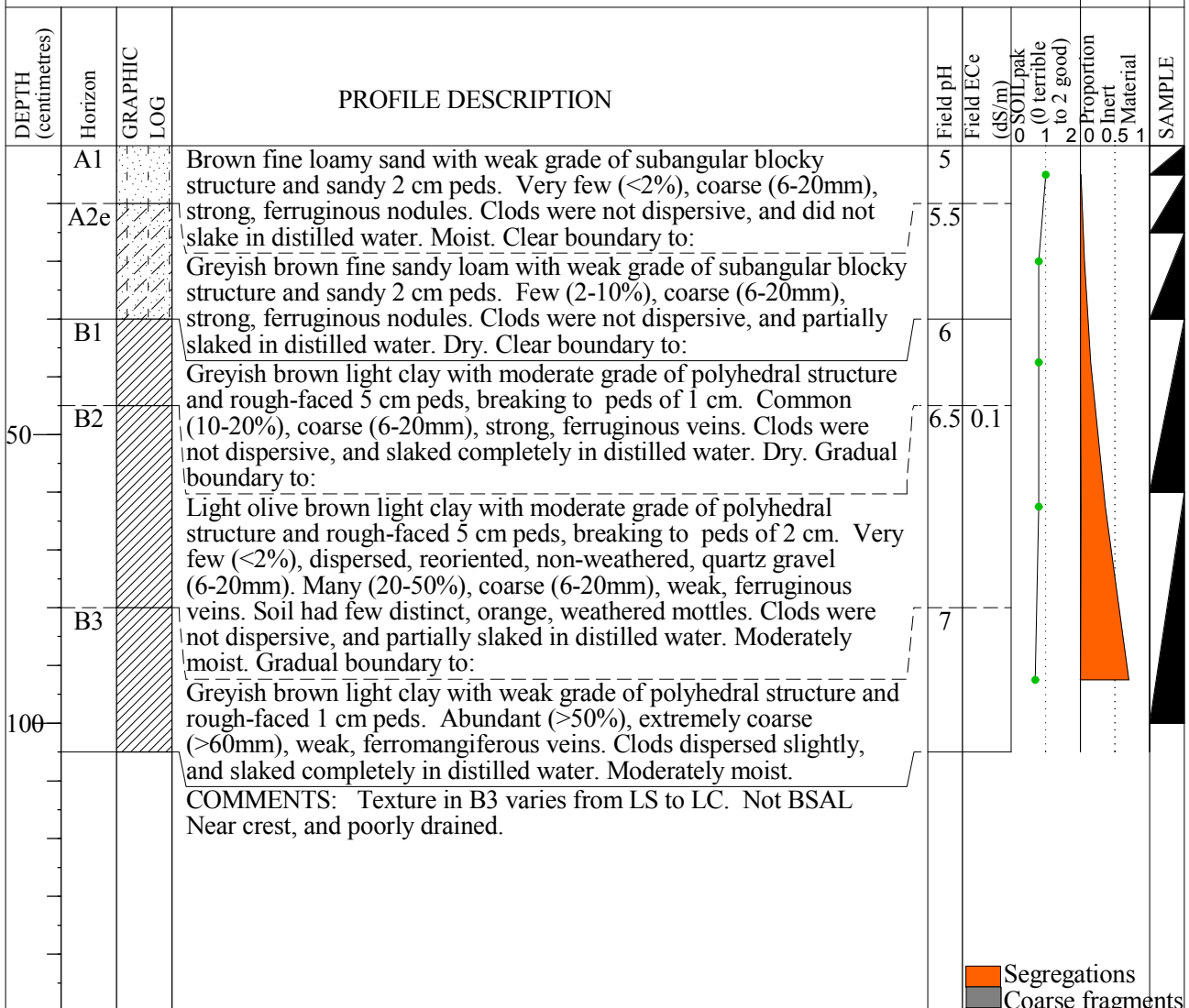
715415m E, 6293536m N, (WGS84),

Landscape Properties

Landform Element: **hillcrest**
 Vegetation Community: **woodland Grass Understorey**
 Growth Form: **Sod grass, forb**
 Site Disturbance: **limited clearing**
 Land Use: **volunteer/native pasture** Groundcover: **100%**
 Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **9%** Southwestern Aspect
 Site Morphology: **Crest**
 Slope Morphology: **Waxing**
 Microrelief: **None**
 Rock Outcrop: **0**



Lithology

Substrate: **Metamorphic**
 Base of Observations: **Layer**
Continues at 105 cm
 Rootzone: **55cm**
Poorly drained
 BSAL Drainage: **Poorly drained**
Slowly permeable



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Detail Pit OM739

Bleached-Manganic Eutrophic Brown Chromosol

Excavated on: 24/03/2017 Logged by: PJH

715342m E, 6291503m N, (WGS84),

Landscape Properties

Landform Element: valley flat

Vegetation Community: Unknown

Growth Form: Sod grass, forb

Site Disturbance: Occasional Cultivation

Land Use: Improved Pasture Groundcover: 75%

Surface Condition Wet: firm Dry: hardset

Topography

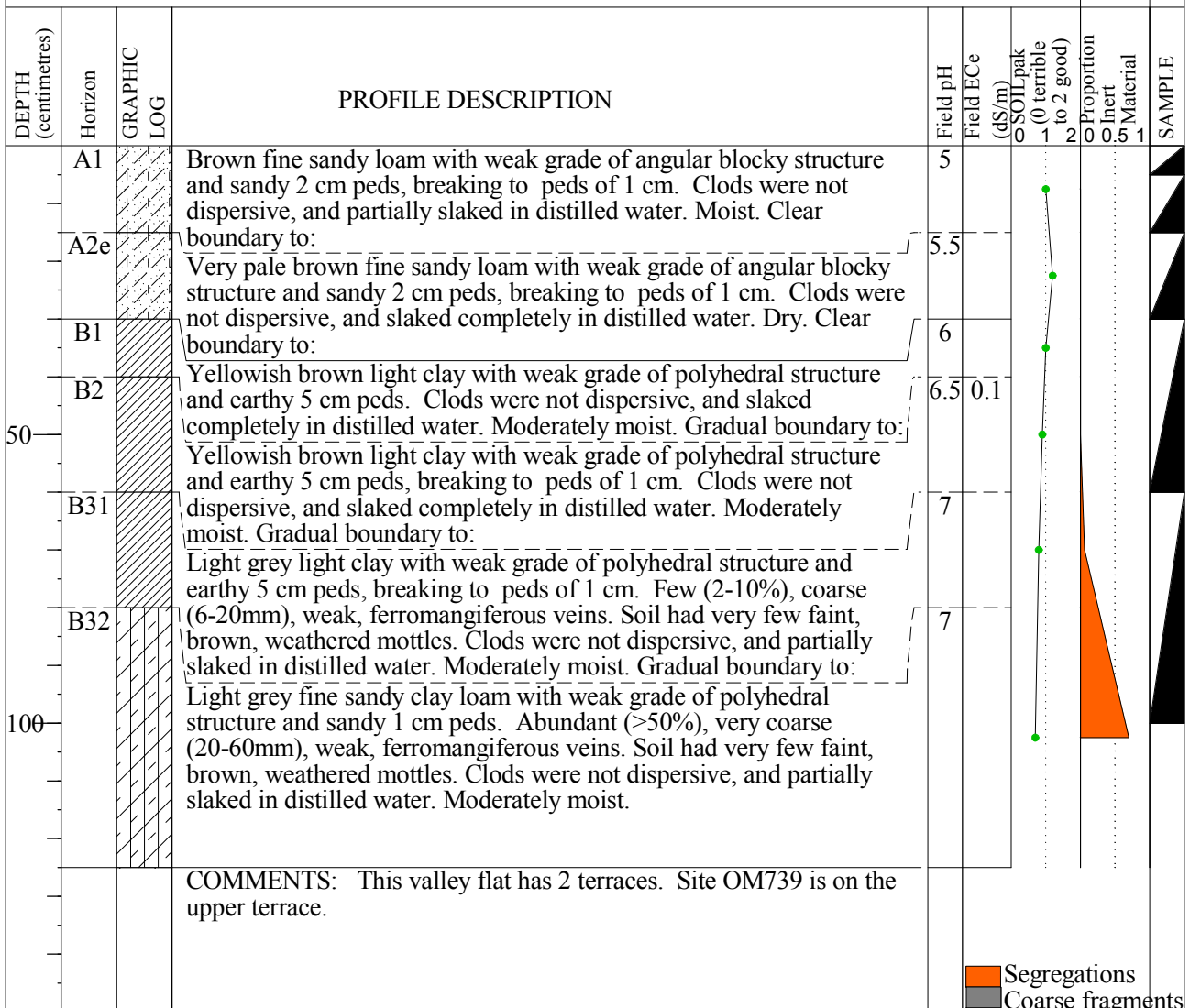
Slope: 1% Western Aspect

Site Morphology: Flat

Slope Morphology: Waning

Microrelief: None

Rock Outcrop: 0



Lithology

Substrate: Alluvium

Base of Observations: Layer

Continues at 125 cm

Rootzone: 70cm

Imperfectly drained

BSAL Drainage: Poorly drained

Moderately permeable



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Detail Pit OM740

Bleached-Mottled Eutrophic Grey Dermosol

Excavated on: 24/03/2017 Logged by: PJH

716013m E, 6291569m N, (WGS84),

Landscape Properties

Landform Element: flood-out

Vegetation Community: swamp complex

Growth Form: tussock grass, forb

Site Disturbance: Occasional Cultivation

Land Use: Improved Pasture Groundcover: 80%

Surface Condition Wet: poached

Dry: poached

Topography

Slope: 2% Southwestern Aspect

Site Morphology: Open Depression

Slope Morphology: Minimal

Microrelief: None

Rock Outcrop: 0

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field EcE (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A1		Dark brown silty clay with moderate grade of polyhedral structure and rough-faced 7 cm peds, breaking to subangular blocky peds of 1 cm. Clods were not dispersive, and partially slaked in distilled water. Moist. Clear boundary to:	6				
	A2e		Brown light clay with weak grade of polyhedral structure and rough-faced 5 cm peds, breaking to peds of 2 cm. Very few (<2%), medium (2-6mm), weak, ferruginous nodules. Soil had very few faint, brown, weathered mottles. Clods were not dispersive, and partially slaked in distilled water. Dry. Clear boundary to:	6				
	B1		Brown light medium clay with weak grade of polyhedral structure and rough-faced 7 cm peds. Few (2-10%), coarse (6-20mm), weak, ferruginous nodules. Soil had very few faint, brown, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Gradual boundary to:	6.5				
50	B22		Grey medium clay with moderate grade of polyhedral structure and rough-faced 2 cm peds, breaking to peds of 1 cm. Few (2-10%), coarse (6-20mm), weak, ferromangiferous nodules. Soil had few faint, brown, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Gradual boundary to:	7	0.1			
	B23		Dark grey light medium clay with moderate grade of polyhedral structure and smooth-faced 10 cm peds, breaking to peds of 1 cm. Very few (<2%), coarse (6-20mm), weak, ferromangiferous nodules. Soil had many faint, brown, weathered mottles. Clods dispersed slightly, and partially slaked in distilled water. Moderately moist.	7	0.1			
100			COMMENTS: Relatively dense stand of pinrushes around pit.					

Segregations
 Coarse fragments

Lithology

Substrate: Colluvium

Base of Observations: Layer

Continues at 120 cm

Rootzone: 50cm

Poorly drained

BSAL Drainage: Poorly drained

Very slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM741

Bleached Mesotrophic Brown Chromosol

Excavated on: 24/03/2017 Logged by: GK

714986m E, 6294560m N, (WGS84),

Landscape Properties

Landform Element: **hillcrest**

Vegetation Community: **Unknown**

Growth Form: **Sod grass, Tussock Grass**

Site Disturbance: **Extensive Clearing**

Land Use: **Improved Pasture** Groundcover: **90%**

Surface Condition Wet: **firm** Dry: **Firm**

Topography

Slope: **0%**

Site Morphology: **Crest**

Slope Morphology: **Minimal**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0-1 (0 terrible to 2 good))	Proportion Inert Material	SAMPLE
	A1		Dark brown fine sandy loam with weak grade of subangular blocky structure and sandy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Gradual boundary to:	5				
	A2e		Pale brown fine sandy loam with weak grade of subangular blocky structure and sandy 2 cm peds. Abundant (50-90%), dispersed, reoriented, strongly weathered, quartz cobbles (60-200mm). Clods were not dispersive, and did not slake in distilled water. Moderately moist. Gradual boundary to:	6				
50	B		Dark yellowish brown light medium clay with moderate grade of columnar structure and rough-faced 3 cm peds, breaking to subangular blocky peds of 2 cm. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Diffuse boundary to:	6	0.1			
100	C		Dark yellowish brown clay loam with moderate grade of subangular blocky structure and rough-faced 1 cm peds. Abundant (50-90%), stratified, undisturbed, strongly weathered, quartz fine gravel (2-6mm). Soil had common distinct, red, weathered mottles. Clods were not dispersive, and partially slaked in distilled water. Moderately moist.	6				
			COMMENTS: Limitations: physical barrier and low fertility.					

Segregations
 Coarse fragments

Lithology

Substrate: **Granite**

Base of Observations: **Soil**

Continues at 120 cm

Rootzone: **80cm**

Imperfectly drained

BSAL Drainage: **Poorly drained**

Slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM742

Bleached Mesotrophic Brown Chromosol

Excavated on: 24/03/2017 Logged by: GK

715283m E, 6294059m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**

Vegetation Community: **Unknown**

Growth Form: **Sod grass, Tussock Grass**

Site Disturbance: **Extensive Clearing**

Land Use: **Improved Pasture** Groundcover: **85%**

Surface Condition Wet: **firm** Dry: **Firm**

Topography

Slope: **7%** Western Aspect

Site Morphology: **Midslope**

Slope Morphology: **Waxing**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0-1 (0 terrible to 2 good))	Proportion Inert Material	SAMPLE
	A1		Dark brown silty clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5.5				
	A2e		Yellowish brown silty clay loam with weak grade of subangular blocky structure and earthy 2 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Abrupt boundary to:	7				
50	B2		Yellowish brown light medium clay with moderate grade of prismatic structure and rough-faced 4 cm peds, breaking to angular blocky peds of 2 cm. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Gradual boundary to:	6	0.1			
	C		Brownish yellow light clay with moderate grade of polyhedral structure and rough-faced 3 cm peds. Many (20-50%), stratified, undisturbed, strongly weathered, parent material coarse gravel (20-60mm). Clods were not dispersive, and slaked completely in distilled water. Dry. Diffuse boundary to:	7				
100	C		Dark yellowish brown light clay with moderate grade of subangular blocky structure and rough-faced 1 cm peds. Abundant (50-90%), stratified, undisturbed, weakly weathered, parent material stones (200-600mm). Clods were not dispersive, and slaked completely in distilled water. Dry. COMMENTS: Slowly permeable because of prismatic structure in B2. Parent material is angular platy in shape.	7				

Segregations
 Coarse fragments

Lithology

Substrate: **Siltstone/Mudstone**

Base of Observations:

bedrock reached at 120 cm

Rootzone: **50cm**

Poorly drained

BSAL Drainage: **Poorly drained**

Slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM743

Bleached Eutrophic Black Chromosol

Excavated on: 24/03/2017 Logged by: GK

716162m E, 6293874m N, (WGS84),

Landscape Properties

Landform Element: valley flat

Vegetation Community: Unknown

Growth Form: Sod grass, Tussock Grass

Site Disturbance: limited clearing

Land Use: Improved Pasture Groundcover: 95%

Surface Condition Wet: firm Dry: Firm

Topography

Slope: 0%

Site Morphology: Flat

Slope Morphology: Minimal

Microrelief: None

Rock Outcrop: 0

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0-1 (0 terrible to 2 good))	Proportion Inert Material	SAMPLE
	A1		Very dark greyish brown silty clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5.5				
	A2e		Very dark grey silty clay loam with weak grade of subangular blocky structure and earthy 2 cm peds. Clods were not dispersive, and partially slaked in distilled water. Dry. Gradual boundary to:	7				
50	A3		Very dark greyish brown light clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Clods were not dispersive, and partially slaked in distilled water. Dry. Abrupt boundary to:	7				
	B11		Very dark grey medium clay with moderate grade of prismatic structure and rough-faced 4 cm peds, breaking to angular blocky peds of 3 cm. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Clear boundary to:	6.5	0			
100	B12		Very dark grey medium clay with moderate grade of prismatic structure and rough-faced 4 cm peds, breaking to angular blocky peds of 3 cm. Soil had common distinct, yellow, weathered mottles. Clods were not dispersive, and partially slaked in distilled water. Moderately moist.	7	0.3			
			COMMENTS: Good root growth but prismatic structure at 50 cm.					

Segregations
 Coarse fragments

Lithology

Substrate: Alluvium

Base of Observations: Layer

Continues at 120 cm

Rootzone: 90cm

Imperfectly drained

BSAL Drainage: Poorly drained

Slowly permeable



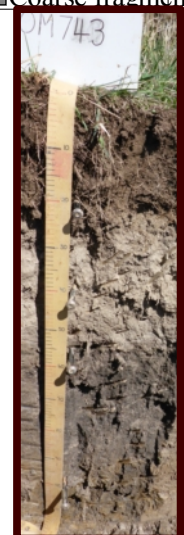
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Detail Pit OM744

Bleached Mesotrophic Grey Chromosol

Excavated on: 24/03/2017 Logged by: GK

715287m E, 6291708m N, (WGS84),

Landscape Properties

Landform Element: valley flat

Vegetation Community: Unknown

Growth Form: Sod grass, Tussock Grass

Site Disturbance: Extensive Clearing

Land Use: Improved Pasture Groundcover: 95%

Surface Condition Wet: soft Dry: Firm

Topography

Slope: 0%

Site Morphology: Flat

Slope Morphology: Minimal

Microrelief: None

Rock Outcrop: 0

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak C (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Dark yellowish brown light clay with moderate grade of subangular blocky structure and rough-faced 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Abrupt boundary to:	5.5				
	2A2e		Greyish brown fine clay loam with weak grade of polyhedral structure and earthy 2 cm peds. Clods dispersed slightly, and slaked completely in distilled water. Moderately moist. Abrupt boundary to:	5.5				
50	2B21		Dark greyish brown light medium clay with moderate grade of prismatic structure and rough-faced 4 cm peds, breaking to angular blocky peds of 3 cm. Clods dispersed slightly, and partially slaked in distilled water. Moderately moist. Gradual boundary to:	6	0			
	2B22		Dark greyish brown light medium clay with moderate grade of prismatic structure and rough-faced 4 cm peds, breaking to angular blocky peds of 3 cm. Soil had many distinct, yellow, weathered mottles. Clods were moderately dispersive, and did not slake in distilled water. Moderately moist.	7	0			
100			COMMENTS: Chemical barrier 85 cm - dispersive.					

Segregations
 Coarse fragments

Lithology

Substrate: Alluvium

Base of Observations: Layer

Continues at 115 cm

Rootzone: 60cm

Poorly drained

BSAL Drainage: Poorly drained

Slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM745

Manganic Mesotrophic Brown **Dermosol**

Excavated on: **24/03/2017** Logged by: **GK**

715606m E, 6291234m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**

Vegetation Community: **Unknown**

Growth Form: **Sod grass, Tussock Grass**

Site Disturbance: **Extensive Clearing**

Land Use: **Improved Pasture** Groundcover: **90%**

Surface Condition Wet: **firm** Dry: **Firm**

Topography

Slope: **1%** Southwestern Aspect

Site Morphology: **Lower slope**

Slope Morphology: **Waning**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A1		Brown fine clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5				
	A2		Brown fine clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Gradual boundary to:	5				
	B		Yellowish brown light clay with moderate grade of subangular blocky structure and rough-faced 3 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Gradual boundary to:	6	0.1			
50	C		Brown light clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Abundant (>50%), very coarse (20-60mm), strong, ferromangiferous nodules. Clods dispersed slightly, and slaked completely in distilled water. Moderately moist.	6.5				
100	COMMENTS: 55-90 cm FM - physical barrier.							

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**

Base of Observations: **Soil**

Continues at 90 cm

Rootzone: **55cm**

Imperfectly drained

BSAL Drainage:

Imperfectly drained

Moderately permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM746

Manganic Mesotrophic Brown Chromosol

Excavated on: 25/03/2017 Logged by: GK

716293m E, 6292052m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**

Vegetation Community: **Unknown**

Growth Form: **Sod grass, rush**

Site Disturbance: **Extensive Clearing**

Land Use: **Improved Pasture** Groundcover: **85%**

Surface Condition Wet: **firm** Dry: **Firm**

Topography

Slope: **8%** Southwestern Aspect

Site Morphology: **Midslope**

Slope Morphology: **Waxing**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak C (0 to 2 good)	Proportion Inert Material	SAMPLE
	A11		Brown fine sandy clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5.5				
	A12		Dark yellowish brown fine clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5.5				
50	B		Dark yellowish brown light medium clay with moderate grade of subangular blocky structure and rough-faced 3 cm peds. Few (2-10%), medium (2-6mm), strong, manganiferous concretions. Clods were not dispersive, and partially slaked in distilled water. Moderately moist. Clear boundary to:	6	0			
100	C		Brown fine clay loam with moderate grade of subangular blocky structure and rough-faced 1 cm peds. Abundant (>50%), very coarse (20-60mm), strong, ferromangiferous nodules. Clods were moderately dispersive, and slaked completely in distilled water. Moderately moist.	6				
	COMMENTS: Pinrushes around pit indicate waterlogging common.							

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**

Base of Observations: **Layer**

Continues at 100 cm

Rootzone: **70cm**

Imperfectly drained

BSAL Drainage:

Imperfectly drained

Moderately permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM747

Manganic Mottled-Subnatric Brown Sodosol

Excavated on: 25/03/2017 Logged by: GK

716864m E, 6292279m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**

Vegetation Community: **Unknown**

Growth Form: **Sod grass, Tussock Grass**

Site Disturbance: **limited clearing**

Land Use: **Improved Pasture** Groundcover: **85%**

Surface Condition Wet: **firm** Dry: **Firm**

Topography

Slope: **6%** Northern Aspect

Site Morphology: **Midslope**

Slope Morphology: **Waning**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A		Dark brown clay loam with weak grade of polyhedral structure and earthy 3 cm peds. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Clear boundary to:	5				
	2A1		Dark grey clay loam with weak grade of polyhedral structure and earthy 3 cm peds. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Clear boundary to:	5				
	2A2e		Light brownish grey fine sandy clay loam with massive grade of structure and earthy. Clods dispersed strongly, and partially slaked in distilled water. Moderately moist. Clear boundary to:	7				
	2A3		Brown silty clay loam with massive grade of structure and earthy. Clods dispersed strongly, and did not slake in distilled water. Moderately moist. Gradual boundary to:	7				
50								
	B21		Dark yellowish brown light medium clay with moderate grade of lenticular structure and rough-faced 3 cm peds, breaking to subangular blocky peds of 2 cm. Soil had common prominent, grey, weathered mottles. Clods were moderately dispersive, and partially slaked in distilled water. Moderately moist. Gradual boundary to:	7	0.1			
	B22		Greyish brown medium clay with moderate grade of lenticular structure and rough-faced 3 cm peds, breaking to subangular blocky peds of 2 cm. Many (20-50%), coarse (6-20mm), weak, manganiferous soft segregations. Soil had common prominent, yellow, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist.	6.5	0.1			
100								
			COMMENTS: Site receives run-on from hill to west.					

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**

Base of Observations: **Layer**

Continues at 130 cm

Rootzone: **60cm**

Poorly drained

BSAL Drainage: **Poorly drained**

Slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM748

Mottled Mesotrophic Brown Dermosol

Excavated on: 25/03/2017 Logged by: GK

716949m E, 6291876m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**

Vegetation Community: **Unknown**

Growth Form: **Sod grass, Tussock Grass**

Site Disturbance: **Extensive Clearing**

Land Use: **Improved Pasture** Groundcover: **85%**

Surface Condition Wet: **firm** Dry: **Firm**

Topography

Slope: **6%** Southern Aspect

Site Morphology: **Upper Slope**

Slope Morphology: **Waxing**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak C (0 to 2 good)	SOILpak N (0 to 2 good)	Proportion Inert Material	SAMPLE
	A11		Dark brown fine clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	4.5					
	A12		Dark yellowish brown fine clay loam with weak grade of subangular blocky structure and earthy 2 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5.5					
	B11		Dark yellowish brown light clay with moderate grade of polyhedral structure and rough-faced 3 cm peds. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Diffuse boundary to:	5.5	0				
50									
	B12		Brown light clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Common (10-20%), coarse (6-20mm), weak, ferromangiferous soft segregations. Soil had common distinct, yellow, weathered mottles. Clods were moderately dispersive, and partially slaked in distilled water. Moderately moist.	5					
100									
			COMMENTS: Dispersion 70 - 120 cm. Acidic soil with low fertility associated with moderately well drained profile.						

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**

Base of Observations: **Layer**

Continues at 120 cm

Rootzone: **70cm**

Moderately well drained

BSAL Drainage: **Poorly drained**

Moderately permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM749

Bleached-Manganic Mesotrophic Brown **Kurosol**

Excavated on: **25/03/2017** Logged by: **GK**

717214m E, 6292284m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**
 Vegetation Community: **Unknown**
 Growth Form: **Sod grass, Tussock Grass, rush**
 Site Disturbance: **limited clearing**
 Land Use: **Improved Pasture** Groundcover: **85%**
 Surface Condition Wet: **soft** Dry: **Firm**

Topography

Slope: **9%** Western Aspect
 Site Morphology: **Lower slope**
 Slope Morphology: **Waning**
 Microrelief: **None**
 Rock Outcrop: **2**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0-1 (0 terrible to 2 good))	Proportion Inert Material	SAMPLE	
	A1		Brown clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Common (10-20%), dispersed, reoriented, weakly weathered, quartz gravel (6-20mm). Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5					
	A2e		Brown clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Common (10-20%), dispersed, reoriented, weakly weathered, quartz gravel (6-20mm). Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5					
50	B2		Brown clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Common (10-20%), dispersed, reoriented, weakly weathered, quartz gravel (6-20mm). Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to: Yellowish brown light medium clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Common (10-20%), stratified, reoriented, weakly weathered, quartz gravel (6-20mm). Clods were not dispersive, and did not slake in distilled water. Moderately moist. Diffuse boundary to:	5.5	0				
100	B3		Brownish yellow silty clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Abundant (>50%), coarse (6-20mm), weak, ferruginous soft segregations. Soil had common distinct, grey, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist.	6	0.1				
			COMMENTS: Quartz band from 50 - 55 cm. Pit is near break in slope from eroding soil with about 2% unattached quartz cobbles upslope and poorly drained valley floor (in site photo) to north.						

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**
 Base of Observations: **Layer Continues** at 120 cm
 Rootzone: **70cm**
Moderately well drained
 BSAL Drainage: **Poorly drained**
Moderately permeable



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Detail Pit OM750

Bleached-Mottled Magnesian Brown **Kurosol**

Excavated on: **25/03/2017** Logged by: **GK**

717297m E, 6291644m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**

Vegetation Community: **Unknown**

Growth Form: **Sod grass, Tussock Grass**

Site Disturbance: **Extensive Clearing**

Land Use: **Improved Pasture** Groundcover: **85%**

Surface Condition Wet: **firm** Dry: **Firm**

Topography

Slope: **6%** Southwestern Aspect

Site Morphology: **Upper Slope**

Slope Morphology: **Waxing**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak C (0 to 2 good)	SOILpak O (0 to 2 good)	Proportion Inert Material	SAMPLE
	A1		Dark brown fine sandy clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Many (20-50%), dispersed, reoriented, weakly weathered, quartz gravel (6-20mm). Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	6.5					
	A2e		Brown fine clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Many (20-50%), dispersed, reoriented, weakly weathered, quartz gravel (6-20mm). Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5					
50	B		Strong brown light medium clay with moderate grade of subangular blocky structure and rough-faced 3 cm peds. Few (2-10%), dispersed, reoriented, weakly weathered, quartz fine gravel (2-6mm). Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Diffuse boundary to:	5.5	0				
100	C		Strong brown silty clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Common (10-20%), stratified, undisturbed, strongly weathered, parent material coarse gravel (20-60mm). Soil had many distinct, grey, weathered mottles. Clods were not dispersive, and did not slake in distilled water. Moderately moist.	5					
	COMMENTS: 75 - 120 cm siltstone, vertical orientation. No BSAL - slope and fertility. pH good in A1. Looks like pasture established 2 months ago, so limed then. About 5% quartz cobbles on surface around pit.								

Segregations
 Coarse fragments

Lithology

Substrate: **Siltstone/Mudstone**

Base of Observations: **Layer**

Continues at 120 cm

Rootzone: **55cm**

Moderately well drained

BSAL Drainage: **Poorly drained**

Moderately permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM751

Haplic Eutrophic Red Dermosol

Excavated on: 25/03/2017 Logged by: PJH

716386m E, 6292434m N, (WGS84),

Landscape Properties

Landform Element: **hillcrest**
 Vegetation Community: **Woodland Grass Understorey**
 Growth Form: **Sod grass**
 Site Disturbance: **Occasional Cultivation**
 Land Use: **Improved Pasture** Groundcover: **60%**
 Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **9%** Western Aspect
 Site Morphology: **Ridge**
 Slope Morphology: **Minimal**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0-10 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A		Brown silty clay loam with weak grade of polyhedral structure and rough-faced 5 cm peds. Very few (<2%), dispersed, reoriented, non-weathered, quartz fine gravel (2-6mm). Clods dispersed slightly, and partially slaked in distilled water. Moist. Clear boundary to:	6				
	B1		Red silty clay with moderate grade of polyhedral structure and rough-faced 15 cm peds, breaking to subangular blocky peds of 1 cm. Common (10-20%), dispersed, reoriented, non-weathered, quartz cobbles (60-200mm). Clods were not dispersive, and partially slaked in distilled water. Dry. Gradual boundary to:	6				
	B2		Red light clay with moderate grade of polyhedral structure and rough-faced 5 cm peds, breaking to peds of 2 cm. Many (20-50%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Clods were not dispersive, and partially slaked in distilled water. Dry.	6.5	0			
50	B3		Gradual boundary to: Red light clay with moderate grade of subangular blocky structure and rough-faced 0.5 cm peds. Many (20-50%), dispersed, reoriented, non-weathered, quartz cobbles (60-200mm). Few (2-10%), coarse (6-20mm), weak, manganiferous soft segregations. Soil had very few distinct, grey, biological mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Gradual boundary to:	6				
100	C		Dry.					
			COMMENTS: C horizon is weathered metamorphic rock based on thin laminations (<5 mm) and presence of mica. Quartz cobbles common in C.					

Segregations
 Coarse fragments

Lithology

Substrate: **Metamorphic**
 Base of Observations:
bedrock reached at 115 cm
 Rootzone: **75cm**
Moderately well drained
 BSAL Drainage: **Moderately well drained**
Slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM752

Haplic Eutrophic Brown Chromosol

Excavated on: 25/03/2017 Logged by: PJH

717698m E, 6292367m N, (WGS84),

Landscape Properties

Landform Element: hillslope

Vegetation Community: Unknown

Growth Form: Sod grass

Site Disturbance: Occasional Cultivation

Land Use: Improved Pasture Groundcover: 90%

Surface Condition Wet: firm Dry: hardset

Topography

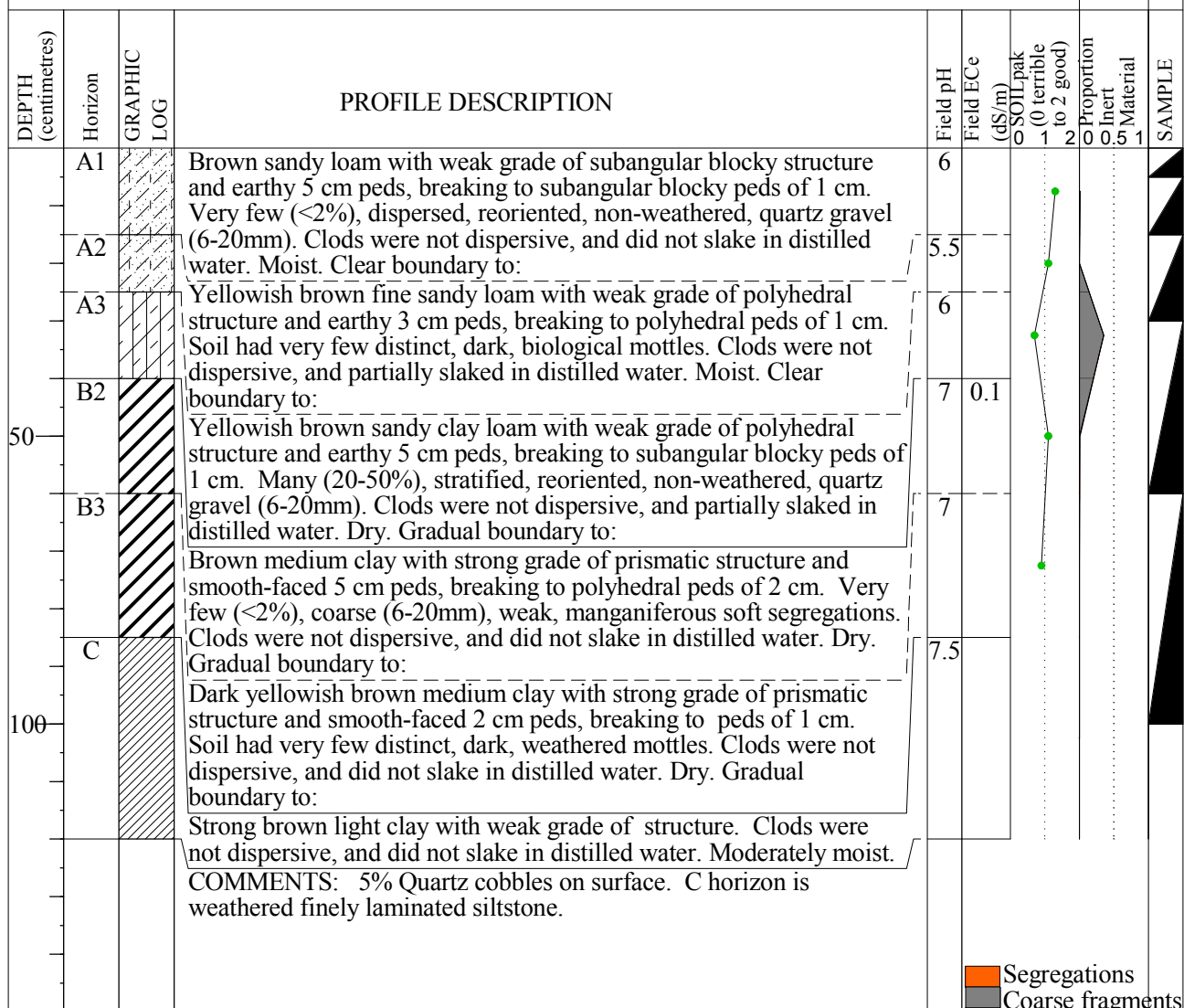
Slope: 8% Southern Aspect

Site Morphology: Upper Slope

Slope Morphology: Waxing

Microrelief: None

Rock Outcrop: 0



Lithology

Substrate: Siltstone/Mudstone

Base of Observations:

bedrock reached at 120 cm

Rootzone: 65cm

Imperfectly drained

BSAL Drainage:

Imperfectly drained

Slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM753

Mottled Mesotrophic Brown Chromosol

Excavated on: 25/03/2017 Logged by: PJH

717389m E, 6291377m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**
 Vegetation Community: **Woodland Grass Understorey**
 Growth Form: **Sod grass**
 Site Disturbance: **Occasional Cultivation**
 Land Use: **Improved Pasture** Groundcover: **90%**
 Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **7%** Western Aspect
 Site Morphology: **Lower slope**
 Slope Morphology: **Waning**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A11		Brown silty loam with weak grade of polyhedral structure and earthy 5 cm peds, breaking to angular blocky peds of 1 cm. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	6.5				
	A12			6				
	A2e		Brown silty loam with weak grade of angular blocky structure and earthy 5 cm peds, breaking to polyhedral peds of 1 cm. Soil had few distinct, orange, weathered mottles. Clods dispersed slightly, and slaked completely in distilled water. Moist. Clear boundary to:	5.5				
50	B1		Pale brown silty loam with weak grade of polyhedral structure and earthy 2 cm peds, breaking to polyhedral peds of 1 cm. Soil had very few distinct, orange, weathered mottles. Clods dispersed slightly, and slaked completely in distilled water. Dry. Clear boundary to: Yellowish brown light clay with moderate grade of polyhedral structure and rough-faced 5 cm peds, breaking to peds of 1 cm. Soil had common distinct, orange, weathered mottles. Clods dispersed slightly, and slaked completely in distilled water. Dry. Gradual boundary to:	6.5	0.1			
100	B23		Brown medium clay with strong grade of polyhedral structure and rough-faced 5 cm peds, breaking to peds of 1 cm. Few (2-10%), stratified, reoriented, non-weathered, quartz gravel (6-20mm). Soil had many faint, red, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist.	6	0.1			
			COMMENTS: Profile strongly leached					

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**
 Base of Observations: **Layer**
 Continues at 120 cm
 Rootzone: **50cm**
 Poorly drained
 BSAL Drainage: **Poorly drained**
 Slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM754

Manganic Eutrophic Brown Dermosol

Excavated on: 25/03/2017 Logged by: PJH

716126m E, 6291226m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**
 Vegetation Community: **Woodland Grass Understorey**
 Growth Form: **Sod grass**
 Site Disturbance: **Occasional Cultivation**
 Land Use: **Improved Pasture** Groundcover: **90%**
 Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **6%** Northeastern Aspect
 Site Morphology: **Upper Slope**
 Slope Morphology: **Waxing**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A11		Brown silty clay loam with weak grade of polyhedral structure and sandy 5 cm peds, breaking to peds of 2 cm. Clods were not dispersive, and did not slake in distilled water. Moist. Gradual boundary to:	5				
	A12		Brown silty clay loam with weak grade of polyhedral structure and sandy 5 cm peds, breaking to subangular blocky peds of 3 cm. Clods were not dispersive, and partially slaked in distilled water. Moist. Gradual boundary to:	5.5				
	B2		Yellowish brown silty clay with moderate grade of polyhedral structure and rough-faced 5 cm peds, breaking to peds of 2 cm. Very few (<2%), medium (2-6mm), weak, manganiferous nodules. Soil had few distinct, grey, biological mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Gradual boundary to:	6				
50	B31		Greyish brown silty clay with moderate grade of polyhedral structure and rough-faced 5 cm peds. Many (20-50%), very coarse (20-60mm), strong, ferromangiferous veins. Soil had very few distinct, orange, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Gradual boundary to:	6	0.2			
	B32		Greyish brown fine sandy loam with weak grade of subangular blocky structure and sandy 5 cm peds. Abundant (>50%), very coarse (20-60mm), strong, ferromangiferous veins. Soil had very few distinct, orange, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Dry.	6.5				
100			COMMENTS: Strongly leached soil					

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**
 Base of Observations: **equipment refusal at 100 cm**
 Rootzone: **50cm**
Poorly drained
 BSAL Drainage: **Poorly drained**
Slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM755

Mottled Mesotrophic Brown Dermosol

Excavated on: 25/03/2017 Logged by: PJH

715907m E, 6294851m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**
 Vegetation Community: **Woodland Grass Understorey**
 Growth Form: **Sod grass**
 Site Disturbance: **Occasional Cultivation**
 Land Use: **Improved Pasture** Groundcover: **80%**
 Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **9%** Eastern Aspect
 Site Morphology: **Upper Slope**
 Slope Morphology: **Waxing**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A1		Brown silty loam with weak grade of subangular blocky structure and earthy 7 cm peds, breaking to peds of 1 cm. Very few (<2%), fine (<2mm), strong, ferruginous nodules. Soil had very few faint, orange, weathered mottles. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5.5				
	B11		Yellowish brown silty clay with weak grade of polyhedral structure and earthy 10 cm peds, breaking to peds of 1 cm. Soil had few faint, grey, biological mottles. Clods were not dispersive, and slaked completely in distilled water. Moist. Gradual boundary to:	6				
50	B12		Yellowish brown silty clay with weak grade of polyhedral structure and earthy 5 cm peds, breaking to peds of 2 cm. Soil had few faint, grey, biological mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Gradual boundary to:	6	0.1			
	B22		Yellowish brown silty clay with moderate grade of polyhedral structure and rough-faced 5 cm peds, breaking to peds of 2 cm. Very few (<2%), medium (2-6mm), strong, ferruginous nodules. Soil had many distinct, red, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Gradual boundary to:	6.5				
100	B23		Yellowish brown silty clay with moderate grade of polyhedral structure and rough-faced 5 cm peds, breaking to peds of 1 cm. Soil had many distinct, red, weathered mottles. Clods were not dispersive, and did not slake in distilled water. Moderately moist.	6				
	COMMENTS: A horizon compacted. Vesicular pores (bubbles) common in B1.							

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**
 Base of Observations: **Layer**
Continues at 120 cm
 Rootzone: **70cm**
Imperfectly drained
 BSAL Drainage: **Poorly drained**
Moderately permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM756

Manganic Mesotrophic Brown Dermosol

Excavated on: 26/03/2017 Logged by: PJH

716004m E, 6295288m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**
 Vegetation Community: **woodland grass understory**
 Growth Form: **sod grass**
 Site Disturbance: **occasional cultivation**
 Land Use: **improved pasture** Groundcover: **90%**
 Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **10%** Northern Aspect
 Site Morphology: **Midslope**
 Slope Morphology: **Waning**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A		Strong brown silty clay loam with weak grade of subangular blocky structure and earthy 3 cm peds, breaking to peds of 1 cm. Clods were not dispersive, and partially slaked in distilled water. Moist. Clear boundary to:	5				
	B22		Yellowish red silty clay with moderate grade of subangular blocky structure and rough-faced 5 cm peds, breaking to peds of 1 cm. Very few (<2%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Very few (<2%), fine (<2mm), strong, ferruginous nodules. Soil had few faint, grey, biological mottles. Clods were not dispersive, and partially slaked in distilled water. Moist. Gradual boundary to:	6				
50	B23		Dark reddish brown silty clay loam with moderate grade of subangular blocky structure and rough-faced 3 cm peds, breaking to peds of 1 cm. Very few (<2%), dispersed, reoriented, non-weathered, quartz coarse gravel (20-60mm). Common (10-20%), fine (<2mm), strong, manganiferous nodules. Soil had few distinct, grey, biological mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Clear boundary to:	6	0.1			
100	B3		Strong brown silty clay loam with weak grade of polyhedral structure and rough-faced 1 cm peds. Very few (<2%), dispersed, reoriented, non-weathered, quartz coarse gravel (20-60mm). Abundant (>50%), fine (<2mm), weak, manganiferous nodules. Soil had very few distinct, grey, biological mottles. Clods were not dispersive, and slaked completely in distilled water. Dry.	6.5				
			COMMENTS: No clay layer. B3 is throttle to water flow.					

Segregations
 Coarse fragments

Lithology

Substrate: **colluvium**
 Base of Observations: **equipment refusal at 110 cm**
 Rootzone: **60cm**
Imperfectly drained
 BSAL Drainage: **Imperfectly drained**
Moderately permeable



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Detail Pit OM757

Mottled-Sodic Eutrophic Grey **Dermosol**

Excavated on: **26/03/2017** Logged by: **PJH**

716443m E, 6295197m N, (WGS84),

Landscape Properties

Landform Element: **valley flat**
 Vegetation Community: **woodland grass understory**
 Growth Form: **sod grass, tussock grass**
 Site Disturbance: **limited clearing**
 Land Use: **improved pasture** Groundcover: **90%**
 Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **3%** Southern Aspect
 Site Morphology: **Flat**
 Slope Morphology: **Waning**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Very dark greyish brown silty clay loam with strong grade of subangular blocky structure and rough-faced 2 cm peds, breaking to peds of 0.5 cm. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5.5				
	A2		Greyish brown light clay with weak grade of polyhedral structure and earthy 5 cm peds, breaking to peds of 1 cm. Few (2-10%), medium (2-6mm), weak, manganiferous nodules. Soil had few distinct, brown, weathered mottles. Clods dispersed slightly, and did not slake in distilled water. Moist. Clear boundary to:	6				
50	B22		Dark greyish brown medium clay with moderate grade of polyhedral structure and rough-faced 2 cm peds. Few (2-10%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Few (2-10%), medium (2-6mm), weak, manganiferous nodules. Soil had few distinct, orange, weathered mottles. Clods dispersed slightly, and partially slaked in distilled water. Moderately moist. Diffuse boundary to:	8	0.4			
100	B23		Very dark greyish brown light medium clay with moderate grade of polyhedral structure and rough-faced 2 cm peds, breaking to peds of 1 cm. Very few (<2%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Soil had common distinct, orange, weathered mottles. Clods dispersed slightly, and slaked completely in distilled water. Moderately moist.	9	1.2			
			COMMENTS: Quartz is angular.					

Segregations
 Coarse fragments

Lithology

Substrate: **alluvium**
 Base of Observations: **Layer**
 Continues at **120 cm**
 Rootzone: **60cm**
 Poorly drained
 BSAL Drainage: **Poorly drained**
 Very slowly permeable



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Detail Pit OM758

Mottled Mesotrophic Brown Dermosol

Excavated on: 26/03/2017 Logged by: PJH

716490m E, 6295752m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**
 Vegetation Community: **woodland grass understory**
 Growth Form: **sod grass**
 Site Disturbance: **cleared no cultivation**
 Land Use: **improved pasture** Groundcover: **80%**
 Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **5%** Western Aspect
 Site Morphology: **Midslope**
 Slope Morphology: **Waxing**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Dark greyish brown clay loam with moderate grade of subangular blocky structure and rough-faced 3 cm peds, breaking to peds of 0.5 cm. Very few (<2%), dispersed, reoriented, non-weathered, quartz fine gravel (2-6mm). Very few (<2%), medium (2-6mm), strong, manganiferous nodules. Clods dispersed slightly, and did not slake in distilled water. Moist. Gradual boundary to:	5.5				
	A3		Greyish brown light clay with moderate grade of polyhedral structure and rough-faced 3 cm peds, breaking to peds of 1 cm. Soil had few faint, orange, weathered mottles. Clods were moderately dispersive, and partially slaked in distilled water. Moist. Gradual boundary to:	5.5				
50	B1		Brownish yellow light clay with moderate grade of lenticular structure and rough-faced 5 cm peds. Common (10-20%), dispersed, reoriented, strongly weathered, substrate fine gravel (2-6mm). Soil had common faint, grey, biological mottles. Clods were moderately dispersive, and partially slaked in distilled water. Dry. Gradual boundary to:	5	0.1			
100	B2		Yellow coarse sandy clay with weak grade of polyhedral structure and rough-faced 5 cm peds. Many (20-50%), dispersed, reoriented, strongly weathered, substrate fine gravel (2-6mm). Soil had common distinct, grey, weathered mottles. Clods were moderately dispersive, and partially slaked in distilled water. Dry.	6				
			COMMENTS: Poor example of a dermosol. Ridge with rock outcrop 20m east of site. Pin rushes common. Some dock noted.					

Segregations
 Coarse fragments

Lithology

Substrate: **colluvium**
 Base of Observations: **Layer**
 Continues at 120 cm
 Rootzone: **40cm**
 Poorly drained
 BSAL Drainage: **Poorly drained**
 Slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM759

Haplic Mesotrophic Brown **Kandosol**

Excavated on: **26/03/2017** Logged by: **PJH**

717502m E, 6295894m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**
 Vegetation Community: **woodland grass understory**
 Growth Form: **sod grass**
 Site Disturbance: **limited clearing**
 Land Use: **volunteer/native pasture** Groundcover: **90%**
 Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **12%** Eastern Aspect
 Site Morphology: **Midslope**
 Slope Morphology: **Maximal**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Brown silty loam with moderate grade of subangular blocky structure and rough-faced 2 cm peds, breaking to peds of 0.5 cm. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	4.5				
	A2		Brown silty loam with weak grade of polyhedral structure and earthy 3 cm peds, breaking to peds of 1 cm. Soil had few distinct, grey, biological mottles. Clods dispersed slightly, and did not slake in distilled water. Moist. Clear boundary to:	5				
	B1		Strong brown silty clay loam with weak grade of polyhedral structure and rough-faced 5 cm peds. Soil had few distinct, grey, biological mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Gradual boundary to:	6				
50	B2		Strong brown silty clay with weak grade of polyhedral structure and earthy 5 cm peds. Soil had few distinct, grey, biological mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Gradual boundary to:	6.5	0.1			
	C		Pink silty loam with weak grade of subangular blocky structure and sandy 0.5 cm peds. Very abundant (>90%), dispersed, undisturbed, strongly weathered, substrate stones (200-600mm). Clods were not dispersive, and slaked completely in distilled water. Dry.	6.5				
100			COMMENTS: 5th layer substrate - grey soil in vertical fissures in weathered rock					

Segregations
 Coarse fragments

Lithology

Substrate: **colluvium**
 Base of Observations: **equipment refusal at 100 cm**
 Rootzone: **75cm**
Imperfectly drained
 BSAL Drainage: **Imperfectly drained**
Slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM760

Bleached-Manganic Mesotrophic Brown **Dermosol**

Excavated on: **26/03/2017** Logged by: **PJH**

716831m E, 6295493m N, (WGS84),

Landscape Properties

Landform Element: **hillcrest**
 Vegetation Community: **woodland grass understory**
 Growth Form: **sod grass, tussock grass**
 Site Disturbance: **occasional cultivation**
 Land Use: **improved pasture** Groundcover: **80%**
 Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **2%** Western Aspect
 Site Morphology: **Crest**
 Slope Morphology: **Waxing**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0-1 (0 terrible to 2 good))	Proportion Inert Material	SAMPLE
	A1		Brown silty loam with weak grade of subangular blocky structure and earthy 1 cm peds, breaking to peds of 0.5 cm. Soil had few faint, orange, weathered mottles. Clods dispersed slightly, and partially slaked in distilled water. Moist. Gradual boundary to:	4.5				
	A2e		Brown silty loam with moderate grade of polyhedral structure and rough-faced 1 cm peds, breaking to peds of 0.5 cm. Soil had very few distinct, grey, biological mottles. Clods dispersed slightly, and partially slaked in distilled water. Moist. Gradual boundary to:	6				
50	B2		Yellowish brown light clay with moderate grade of polyhedral structure and rough-faced 5 cm peds, breaking to peds of 2 cm. Soil had few faint, orange, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Gradual boundary to:	6.5	0.1			
	B3		Dark yellowish brown light clay with moderate grade of subangular blocky structure and rough-faced 1 cm peds. Abundant (>50%), medium (2-6mm), weak, ferromangiferous veins. Soil had many faint, orange, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Dry.	7				
100			COMMENTS: Dark patch at 30cm is infilled tree root. Many pin rushes present. Earthworms throughout profile. Bottom of pit near top of bedrock.					

Segregations
 Coarse fragments

Lithology

Substrate: **colluvium**
 Base of Observations: **Layer**
 Continues at 120 cm
 Rootzone: **60cm**
 Poorly drained
 BSAL Drainage: **Poorly drained**
 Slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM761

Bleached-Mottled Eutrophic Brown Chromosol

Excavated on: 25/03/2017 Logged by: GK

717070m E, 6291131m N, (WGS84),

Landscape Properties

Landform Element: Hillslope

Vegetation Community: Unknown

Growth Form: Sod grass, Tussock Grass

Site Disturbance: extensive clearing

Land Use: Improved Pasture Groundcover: 95%

Surface Condition Wet: firm Dry: firm

Topography

Slope: 2% Northeastern Aspect

Site Morphology: Lower slope

Slope Morphology: Waning

Microrelief: None

Rock Outcrop: 0

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field EcE (dS/m)	SOILpak C (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Brown fine clay loam with weak grade of polyhedral structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Clear boundary to:	6.5				
	A2e		Brown fine clay loam with weak grade of polyhedral structure and earthy 2 cm peds. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Gradual boundary to:	6				
50	B		Yellowish brown light medium clay with moderate grade of prismatic structure and rough-faced 3 cm peds, breaking to angular blocky peds of 2 cm. Few (2-10%), dispersed, reoriented, weakly weathered, quartz gravel (6-20mm). Soil had common distinct, pale, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Diffuse boundary to:	6	0			
100	C		Dark yellowish brown light medium clay with moderate grade of angular blocky structure and rough-faced 2 cm peds. Abundant (50-90%), dispersed, reoriented, weakly weathered, quartz fine gravel (2-6mm). Common (10-20%), coarse (6-20mm), weak, manganiferous nodules. Soil had many distinct, pale, weathered mottles. Clods were not dispersive, and partially slaked in distilled water. Dry.	6.5	0			
			COMMENTS: Relatively shallow soil constrained by abundant gravel below 60 cm..					

Segregations
 Coarse fragments

Lithology

Substrate: Alluvium

Base of Observations: Layer

Continues at 120 cm

Rootzone: 80cm

Imperfectly drained

BSAL Drainage: Poorly

drained

Slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM762

Manganic Eutrophic Red Dermosol

Excavated on: 25/03/2017 Logged by: GK

715832m E, 6294625m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**

Vegetation Community: **Unknown**

Growth Form: **Sod grass, tussock grass**

Site Disturbance: **Extensive Clearing**

Land Use: **Improved Pasture** Groundcover: **85%**

Surface Condition Wet: **firm** Dry: **Firm**

Topography

Slope: **9%** Northeastern Aspect

Site Morphology: **Upper Slope**

Slope Morphology: **Waxing**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A		Reddish brown clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5				
	B21		Reddish brown light medium clay with moderate grade of polyhedral structure and rough-faced 4 cm peds, breaking to polyhedral peds of 2 cm. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Gradual boundary to:	6.5				
50	B22		Yellowish red light clay with moderate grade of subangular blocky structure and rough-faced 3 cm peds, breaking to subangular blocky peds of 2 cm. Clods were not dispersive, and partially slaked in distilled water. Moderately moist. Gradual boundary to:	7	0			
100	C		Strong brown light clay with weak grade of subangular blocky structure and rough-faced 1 cm peds. Abundant (>50%), very coarse (20-60mm), strong, ferromangiferous soft segregations. Clods were not dispersive, and slaked completely in distilled water. Moderately moist.	7.5				
			COMMENTS: Potential BSAL					

Segregations
 Coarse fragments

Lithology

Substrate: **Basalt**

Base of Observations: **Soil**

Continues at 120 cm

Rootzone: **90cm**

Moderately well drained

BSAL Drainage: **Moderately**

well drained

Moderately permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM763

Bleached-Mottled Mesotrophic Brown Chromosol

Excavated on: 26/03/2017 Logged by: GK

716351m E, 6294754m N, (WGS84),

Landscape Properties

Landform Element: valley flat

Vegetation Community: unknown

Growth Form: sod grass, rush

Site Disturbance: extensive clearing

Land Use: improved pasture

Surface Condition Wet: soft

Groundcover: 85%

Dry: firm

Topography

Slope: 0%

Site Morphology: Flat

Slope Morphology: Minimal

Microrelief: None

Rock Outcrop: 0

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak O (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Brown fine sandy clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5				
	A2e		Pale brown fine sandy loam with weak grade of polyhedral structure and earthy 2 cm peds. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Gradual boundary to:	5.5				
50	B2		Yellowish brown light clay with moderate grade of angular blocky structure and rough-faced 4 cm peds. Common (10-20%), coarse (6-20mm), weak, ferromangiferous soft segregations. Soil had common distinct, pale, mechanical mottles. Clods dispersed slightly, and partially slaked in distilled water. Moderately moist. Gradual boundary to:	6				
100	B3		Yellowish brown light medium clay with moderate grade of prismatic structure and rough-faced 4 cm peds, breaking to angular blocky peds of 3 cm. Soil had common prominent, pale, weathered mottles. Clods dispersed slightly, and slaked completely in distilled water. Moist.	5	0			
			COMMENTS: Roots stop at top of B3. Expect low fertility.					

Segregations
 Coarse fragments

Lithology

Substrate: colluvium

Base of Observations: Layer

Continues at 120 cm

Rootzone: 75cm

Imperfectly drained

BSAL Drainage: Poorly drained

Slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM764

Manganic Mesotrophic Brown **Dermosol**

Excavated on: **26/03/2017** Logged by: **GK**

716260m E, 6295644m N, (WGS84),

Landscape Properties

Landform Element: **hillcrest**

Vegetation Community: **unknown**

Growth Form: **sod grass, tussock grass**

Site Disturbance: **extensive clearing**

Land Use: **improved pasture** Groundcover: **90%**

Surface Condition Wet: **firm** Dry: **firm**

Topography

Slope: **1%** Northeastern Aspect

Site Morphology: **Crest**

Slope Morphology: **Minimal**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A1		Dark brown fine sandy clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5				
	A2		Brown fine sandy clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods dispersed slightly, and did not slake in distilled water. Moist. Clear boundary to:	5				
50	B2		Strong brown light clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Common (10-20%), medium (2-6mm), strong, ferromangiferous concretions. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5.5	0.1			
	B3		Strong brown light clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Many (20-50%), coarse (6-20mm), strong, ferromangiferous nodules. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Diffuse boundary to:	5.5				
100	C		Dark yellowish brown light clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Abundant (>50%), very coarse (20-60mm), weak, ferromangiferous nodules. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Diffuse boundary to:	6				
	R		Very abundant (>90%), stratified, undisturbed, non-weathered, parent material stones (200-600mm).					
			COMMENTS: Soil colours indicate poorly drained topsoil over well drained subsoil. Saffron thistles grow around pit and within 200 m of it. This may indicate extent of well drained subsoil.					

Segregations
 Coarse fragments

Lithology

Substrate: **siltstone/mudstone**

Base of Observations:

bedrock reached at 130 cm

Rootzone: **90cm**

Moderately well drained

BSAL Drainage: **Moderately well drained**

Moderately permeable



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McPhillamys Gold Project for Regis Resources Ltd
Detail Pit OM765

Mesotrophic Subnatric Yellow **Sodosol**

Excavated on: **26/03/2017** Logged by: **GK**

716572m E, 6296106m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**
 Vegetation Community: **unknown**
 Growth Form: **sod grass, tussock grass, rush**
 Site Disturbance: **limited clearing**
 Land Use: **improved pasture** Groundcover: **75%**
 Surface Condition Wet: **firm** Dry: **firm**

Topography

Slope: **11%** Western Aspect
 Site Morphology: **Upper slope**
 Slope Morphology: **Waxing**
 Microrelief: **None**
 Rock Outcrop: **2**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
0-10	A1		Very dark brown coarse sandy loam with weak grade of subangular blocky structure and sandy 2 cm peds. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Clear boundary to:	5.5		1	0.5	
10-20	A2		Pale brown coarse sandy clay loam with weak grade of subangular blocky structure and sandy 2 cm peds. Few (2-10%), dispersed, reoriented, weakly weathered, quartz gravel (6-20mm). Clods dispersed slightly, and did not slake in distilled water. Moderately moist. Clear boundary to:	5.5		2	0.5	
20-50	B		Yellowish brown coarse sandy clay with weak grade of columnar structure and rough-faced 3 cm peds. Clods dispersed slightly, and partially slaked in distilled water. Moderately moist. Diffuse boundary to:	5	0		0.5	
50-100	C		Light yellowish brown coarse sandy clay loam with weak grade of lenticular structure and rough-faced 2 cm peds. Abundant (50-90%), dispersed, undisturbed, weakly weathered, quartz fine gravel (2-6mm). Soil had common distinct, yellow, weathered mottles. Clods dispersed slightly, and partially slaked in distilled water. Moderately moist. Gradual boundary to:	5.5			0.5	
100-110	R		Very abundant (>90%), dispersed, undisturbed, non-weathered, parent material stones (200-600mm). COMMENTS: Sand coarse in 50-100 zone, derived from weathered granite. Poor structure. Pasture a mixture of sub and native grasses.				0.5	

Segregations
 Coarse fragments

Lithology

Substrate: **granite**
 Base of Observations: **bedrock reached** at 110 cm
 Rootzone: **40cm**
Imperfectly drained
 BSAL Drainage: **Poorly drained**
Slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM766

Bleached-Mottled Eutrophic Brown Chromosol

Excavated on: **26/03/2017** Logged by: **GK**

717070m E, 6295725m N, (WGS84),

Landscape Properties

Landform Element: **valley flat**
 Vegetation Community: **unknown**
 Growth Form: **sod grass, tussock grass, rush**
 Site Disturbance: **limited clearing**
 Land Use: **improved pasture** Groundcover: **95%**
 Surface Condition Wet: **soft** Dry: **firm**

Topography

Slope: **0%**
 Site Morphology: **Flat**
 Slope Morphology: **Minimal**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Dark brown fine clay loam with weak grade of subangular blocky structure and earthy 2 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5.5				
	A2e		Brown fine clay loam with weak grade of subangular blocky structure and earthy 2 cm peds. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Clear boundary to:	6				
50	B21		Dark yellowish brown medium clay with moderate grade of prismatic structure and smooth-faced 4 cm peds, breaking to angular blocky peds of 3 cm. Clods dispersed slightly, and partially slaked in distilled water. Moderately moist. Diffuse boundary to:	6.5	0			
100	B22		Dark yellowish brown coarse medium clay with moderate grade of prismatic structure and smooth-faced 4 cm peds, breaking to angular blocky peds of 3 cm. Soil had common distinct, yellow, weathered mottles. Clods dispersed slightly, and slaked completely in distilled water. Moderately moist.	6.5	0.1			
			COMMENTS: Roots down ped faces. Constraints: poor drainage, prismatic structure in B Horizons.					

Segregations
 Coarse fragments

Lithology

Substrate: **alluvium**
 Base of Observations: **Layer Continues** at 110 cm
 Rootzone: **80cm**
Poorly drained
 BSAL Drainage: **Poorly drained**
Very slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM767

Vertic Eutrophic Brown Chromosol

Excavated on: 26/03/2017 Logged by: GK

717416m E, 6295453m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**

Vegetation Community: **unknown**

Growth Form: **sod grass, tussock grass**

Site Disturbance: **extensive clearing**

Land Use: **improved pasture** Groundcover: **90%**

Surface Condition Wet: Dry: **firm**

Topography

Slope: **5%** Western Aspect

Site Morphology: **Midslope**

Slope Morphology: **Waning**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A1		Dark brown fine clay loam with weak grade of subangular blocky structure and earthy 2 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Gradual boundary to:	5				
	A2e		Brown fine clay loam with weak grade of subangular blocky structure and earthy 2 cm peds. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Clear boundary to:	5.5				
50	B21		Yellowish brown medium heavy clay with moderate grade of prismatic structure and rough-faced 5 cm peds, breaking to angular blocky peds of 3 cm. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Clear boundary to:	5.5	0.1			
100	B22		Dark yellowish brown medium heavy clay with moderate grade of prismatic structure and rough-faced 5 cm peds, breaking to angular blocky peds of 3 cm. Common (10-20%), fine (<2mm), strong, manganiferous nodules. Clods were not dispersive, and partially slaked in distilled water. Moderately moist.	8.5	0.1			
COMMENTS: Good root growth to 50cm. Roots only growing along ped faces from 50 to 80 cm. Vertic properties.								

Lithology

Substrate: **colluvium**

Base of Observations: **Layer**

Continues at 140 cm

Rootzone: **80cm**

Poorly drained

BSAL Drainage: **Poorly drained**

Very slowly permeable



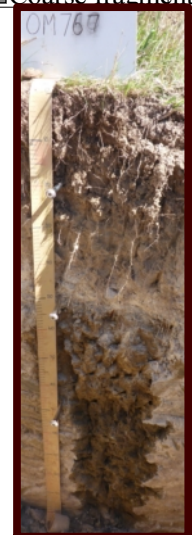
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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM768

Mottled Natric Brown **Kurosol**

Excavated on: **26/03/2017** Logged by: **GK**

716881m E, 6295110m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**

Vegetation Community: **unknown**

Growth Form: **sod grass, tussock grass**

Site Disturbance: **extensive clearing**

Land Use: **improved pasture** Groundcover: **80%**

Surface Condition Wet: **firm** Dry: **firm**

Topography

Slope: **6%** Northwestern Aspect

Site Morphology: **Midslope**

Slope Morphology: **Waxing**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Brown fine clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Gradual boundary to:	4.5				
	A2e		Brown fine clay loam with weak grade of subangular blocky structure and earthy 2 cm peds. Soil had many faint, yellow, weathered mottles. Clods were moderately dispersive, and slaked completely in distilled water. Moderately moist. Clear boundary to:	5				
50								
	B21		Yellowish brown light medium clay with weak grade of columnar structure and rough-faced 3 cm peds, breaking to subangular blocky peds of 2 cm. Soil had common distinct, pale, weathered mottles. Clods dispersed slightly, and slaked completely in distilled water. Moderately moist. Gradual boundary to:	4.5	0			
	B22		Brown medium clay with moderate grade of prismatic structure and rough-faced 3 cm peds, breaking to angular blocky peds of 2 cm. Soil had many prominent, pale, biological mottles. Clods were moderately dispersive, and slaked completely in distilled water. Moderately moist. COMMENTS: Limitations: low pH, dispersive, poor drainage, expect low fertility.	4.5	0.1			
100								

Segregations
 Coarse fragments

Lithology

Substrate: **colluvium**

Base of Observations: **Layer**

Continues at 100 cm

Rootzone: **50cm**

Poorly drained

BSAL Drainage: **Poorly drained**

Slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM769

Mesotrophic Mottled-Subnatric Brown Sodosol

Excavated on: 26/03/2017 Logged by: GK

717762m E, 6294922m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**
 Vegetation Community: **unknown**
 Growth Form: **sod grass, tussock grass, rush**
 Site Disturbance: **extensive clearing**
 Land Use: **improved pasture** Groundcover: **95%**
 Surface Condition Wet: **soft** Dry: **firm**

Topography

Slope: **5%** Southern Aspect
 Site Morphology: **Lower slope**
 Slope Morphology: **Waning**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Brown fine sandy clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Gradual boundary to:	5				
	A2e		Pale brown fine sandy clay loam with weak grade of subangular blocky structure and earthy 2 cm peds. Soil had common distinct, yellow, weathered mottles. Clods dispersed slightly, and slaked completely in distilled water. Moist. Clear boundary to:	5.5				
50	B21		Dark yellowish brown light medium clay with weak grade of columnar structure and rough-faced 3 cm peds. Soil had common distinct, pale, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Gradual boundary to:	5.5	0			
	B22		Brown medium clay with moderate grade of prismatic structure and smooth-faced 4 cm peds, breaking to angular blocky peds of 3 cm. Soil had common prominent, orange, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Gradual boundary to:	5.5	0.1			
	B23		Yellowish brown light medium clay with moderate grade of prismatic structure and smooth-faced 4 cm peds, breaking to angular blocky peds of 3 cm. Soil had common prominent, grey, biological mottles. Clods dispersed slightly, and slaked completely in distilled water. Moderately moist.	5.5				
100	COMMENTS: Limitations: poor dispersive, expect low fertility. Pit in contour bank drain							

Segregations
 Coarse fragments

Lithology

Substrate: **colluvium**
 Base of Observations: **Layer Continues** at 140 cm
 Rootzone: **70cm**
Poorly drained
 BSAL Drainage: **Poorly drained**
Very slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM770

Bleached-Mottled Mesotrophic Brown **Kurosol**

Excavated on: **26/03/2017** Logged by: **GK**

716986m E, 6294656m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**

Vegetation Community: **unknown**

Growth Form: **sod grass, tussock grass**

Site Disturbance: **extensive clearing**

Land Use: **improved pasture** Groundcover: **90%**

Surface Condition Wet: **firm** Dry: **firm**

Topography

Slope: **13%** Southern Aspect

Site Morphology: **Upper slope**

Slope Morphology: **Waxing**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Dark brown fine clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Few (2-10%), dispersed, reoriented, weakly weathered, quartz gravel (6-20mm). Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5				
	A2e		Yellowish brown fine clay loam with weak grade of subangular blocky structure and earthy 2 cm peds. Common (10-20%), dispersed, reoriented, weakly weathered, quartz gravel (6-20mm). Clods dispersed slightly, and did not slake in distilled water. Moist. Clear boundary to:	5.5				
50	B		Strong brown light medium clay with moderate grade of polyhedral structure and rough-faced 3 cm peds. Many (20-50%), dispersed, reoriented, weakly weathered, quartz coarse gravel (20-60mm). Clods were not dispersive, and slaked completely in distilled water. Moist. Clear boundary to:	4.5	0			
100	C		Yellowish brown light medium clay with moderate grade of polyhedral structure and rough-faced 3 cm peds. Few (2-10%), dispersed, reoriented, strongly weathered, parent material coarse gravel (20-60mm). Soil had common distinct, pale, weathered mottles. Clods were not dispersive, and partially slaked in distilled water. Moist.	5	0			
			COMMENTS: Not BSAL - slope is 13%. Also acidic. A lot of quartz gravel between 20 and 75 cm.					

Segregations
 Coarse fragments

Lithology

Substrate: **colluvium**

Base of Observations: **Layer**

Continues at 130 cm

Rootzone: **70cm**

Moderately well drained

BSAL Drainage: **Poorly drained**

Moderately permeable



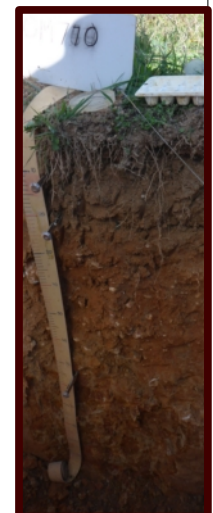
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Detail Pit OM771

Mottled Mesotrophic Brown **Kandosol**

Excavated on: **26/03/2017** Logged by: **PJH**

717325m E, 6295014m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**
 Vegetation Community: **woodland grass understory**
 Growth Form: **sod grass, tussock grass**
 Site Disturbance: **occasional cultivation**
 Land Use: **improved pasture** Groundcover: **90%**
 Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **4%** Northeastern Aspect
 Site Morphology: **Ridge**
 Slope Morphology: **Waxing**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A1		Dark brown silty loam with weak grade of angular blocky structure and earthy 3 cm peds, breaking to polyhedral peds of 1 cm. Very few (<2%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Clods were not dispersive, and did not slake in distilled water. Moist.	5.5				
	A2e		Gradual boundary to: Brown silty loam with weak grade of polyhedral structure and sandy 10 cm peds, breaking to peds of 1 cm. Soil had very few distinct, red, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moist. Clear boundary to:	5				
50	B2		Yellowish brown light clay with weak grade of prismatic structure and rough-faced 10 cm peds, breaking to polyhedral peds of 2 cm. Few (2-10%), dispersed, reoriented, non-weathered, quartz coarse gravel (20-60mm). Soil had few distinct, grey, biological mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Gradual boundary to:	5.5				
	B3		Brownish yellow silty clay with weak grade of polyhedral structure and earthy 2 cm peds. Few (2-10%), stratified, reoriented, non-weathered, quartz coarse gravel (20-60mm). Very few (<2%), fine (<2mm), weak, ferruginous soft segregations. Soil had few distinct, grey, biological mottles. Clods dispersed slightly, and slaked completely in distilled water. Dry. Gradual boundary to:	6	0.1			
100	C		Yellowish brown silty clay with weak grade of polyhedral structure and rough-faced 1 cm peds. Soil had common distinct, red, weathered mottles. Clods were not dispersive, and partially slaked in distilled water. Dry.	6				
			COMMENTS: 5% quartz cobbles around site. C horizon close to weathered rock. Poorly drained. B3 appears to be old surface layer (with quartz) - could be 2A2. Colluvial.					

Segregations
 Coarse fragments

Lithology

Substrate: **colluvium**
 Base of Observations: **Layer**
Continues at 115 cm
 Rootzone: **60cm**
Poorly drained
 BSAL Drainage: **Poorly drained**
Slowly permeable



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Detail Pit OM772

Haplic Eutrophic Brown **Kandosol**

Excavated on: **26/03/2017** Logged by: **PJH**

717668m E, 6294476m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**
 Vegetation Community: **woodland grass understory**
 Growth Form: **sod grass**
 Site Disturbance: **occasional cultivation**
 Land Use: **improved pasture** Groundcover: **90%**
 Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **4%** Northern Aspect
 Site Morphology: **Upper slope**
 Slope Morphology: **Waxing**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A1		Dark yellowish brown silty loam with weak grade of angular blocky structure and sandy 5 cm peds, breaking to peds of 1 cm. Clods were not dispersive, and did not slake in distilled water. Moist. Gradual boundary to:	4.5		1	0.5	
	A2		Brown silty loam with weak grade of polyhedral structure and earthy 3 cm peds, breaking to peds of 1 cm. Soil had few faint, grey, weathered mottles. Clods were not dispersive, and partially slaked in distilled water. Moist. Clear boundary to:	5.5		2	0.5	
50	B1		Yellowish brown silty clay with weak grade of polyhedral structure and earthy 5 cm peds, breaking to peds of 1 cm. Soil had few distinct, grey, biological mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Gradual boundary to:	6		2	0.5	
	B2		Yellowish brown silty clay with weak grade of polyhedral structure and rough-faced 5 cm peds, breaking to peds of 1 cm. Soil had few distinct, red, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Gradual boundary to:	6	0.2	2	0.5	
100	B3		Greyish brown silty clay loam with weak grade of polyhedral structure and rough-faced 5 cm peds, breaking to peds of 1 cm. Very few (<2%), stratified, reoriented, non-weathered, quartz coarse gravel (20-60mm). Few (2-10%), coarse (6-20mm), weak, ferruginous nodules. Soil had very few distinct, orange, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist.	6		2	0.5	
			COMMENTS: Silty texture, weak structure throughout. Quartz (cobbles layer) at bottom of pit.					

Segregations
 Coarse fragments

Lithology

Substrate: **colluvium**
 Base of Observations: **equipment refusal** at 120 cm
 Rootzone: **70cm**
Imperfectly drained
 BSAL Drainage: **Imperfectly drained**
Slowly permeable



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Detail Pit OM773

Manganic Eutrophic Brown **Kandosol**

Excavated on: **26/03/2017** Logged by: **PJH**

716741m E, 6294308m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**

Vegetation Community: **unknown**

Growth Form: **sod grass**

Site Disturbance: **occasional cultivation**

Land Use: **improved pasture** Groundcover: **90%**

Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **4%** Northwestern Aspect

Site Morphology: **Upper slope**

Slope Morphology: **Maximal**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Very dark greyish brown silty loam with weak grade of subangular blocky structure and earthy 4 cm peds, breaking to peds of 1.3 cm. Clods were not dispersive, and partially slaked in distilled water. Moist. Gradual boundary to:	5				
	A3		Dark yellowish brown silty clay loam with weak grade of polyhedral structure and earthy 4 cm peds, breaking to peds of 2 cm. Few (2-10%), dispersed, reoriented, non-weathered, quartz fine gravel (2-6mm). Very few (<2%), medium (2-6mm), strong, ferruginous nodules. Clods were not dispersive, and partially slaked in distilled water. Moist. Gradual boundary to:	5.5				
50	B1		Yellowish brown light clay with moderate grade of polyhedral structure and rough-faced 3 cm peds, breaking to peds of 1 cm. Abundant (50-90%), dispersed, reoriented, non-weathered, quartz fine gravel (2-6mm). Few (2-10%), fine (<2mm), strong, ferruginous nodules. Soil had very few distinct, grey, biological mottles. Clods were not dispersive, and did not slake in distilled water. Dry. Gradual boundary to:	6				
	B2		Yellowish brown light clay with weak grade of subangular blocky structure and rough-faced 5 cm peds. Common (10-20%), fine (<2mm), strong, ferromangiferous veins. Soil had few distinct, grey, biological mottles. Clods were not dispersive, and did not slake in distilled water. Dry. Diffuse boundary to:	6	0.1			
100	B3		Brownish yellow silty clay with weak grade of polyhedral structure and rough-faced 1 cm peds. Abundant (>50%), medium (2-6mm), weak, ferromangiferous veins. Clods were not dispersive, and partially slaked in distilled water. Dry.	6.5				
			COMMENTS: All quartz sub-angular					

Segregations
 Coarse fragments

Lithology

Substrate: **colluvium**

Base of Observations: **Layer**

Continues at **120 cm**

Rootzone: **60cm**

Imperfectly drained

BSAL Drainage:

Imperfectly drained

Slowly permeable



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Detail Pit OM774

Bleached-Mottled Mesotrophic Brown **Kandosol**

Excavated on: **27/03/2017** Logged by: **PJH**

715410m E, 6295079m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**
 Vegetation Community: **woodland grass understory**
 Growth Form: **sod grass, forb**
 Site Disturbance: **occasional cultivation**
 Land Use: **improved pasture** Groundcover: **80%**
 Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **9%** Northwestern Aspect
 Site Morphology: **Upper slope**
 Slope Morphology: **Waxing**
 Microrelief: **None**
 Rock Outcrop: **2**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0-100) (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
0-5	A1		Brown sandy loam with weak grade of subangular blocky structure and earthy 2 cm peds, breaking to peds of 1 cm. Very few (<2%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5		1		
5-50	A2e		Strong brown silty clay loam with weak grade of subangular blocky structure and earthy 2 cm peds, breaking to peds of 1 cm. Very few (<2%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Soil had very few faint, grey, biological mottles. Clods dispersed slightly, and partially slaked in distilled water. Moist. Gradual boundary to:	5.5		2		
50-75	B/C		Yellowish red silty clay with weak grade of subangular blocky structure and earthy 1 cm peds. Soil had very few faint, grey, biological mottles. Clods dispersed slightly, and partially slaked in distilled water. Moderately moist. Gradual boundary to:	6	0.1			
75-100	C		Yellowish red Abundant (50-90%), dispersed, undisturbed, strongly weathered, parent material stones (200-600mm). Clods were not dispersive, and did not slake in distilled water. Moderately moist. COMMENTS: C is extremely weathered, extremely low strength, finely laminated slate.	7				

Segregations
 Coarse fragments

Lithology

Substrate: **metamorphic**
 Base of Observations: **equipment refusal** at 80 cm
 Rootzone: **50cm**
Imperfectly drained
 BSAL Drainage: **Poorly drained**
Very slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM775

Mottled Mesotrophic Grey Dermosol

Excavated on: 27/03/2017 Logged by: PJH

715119m E, 6295479m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**
 Vegetation Community: **woodland grass understory**
 Growth Form: **sod grass**
 Site Disturbance: **occasional cultivation**
 Land Use: **volunteer/native pasture** groundcover: **100%**
 Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **5%** Southern Aspect
 Site Morphology: **Midslope**
 Slope Morphology: **Waning**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A11		Brown silty clay loam with weak grade of subangular blocky structure and sandy 2 cm peds, breaking to peds of 1 cm. Soil had few distinct, orange, weathered mottles. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5.5				
	A3		Greyish brown silty clay with weak grade of polyhedral structure and rough-faced 3 cm peds, breaking to peds of 1 cm. Soil had few distinct, orange, weathered mottles. Clods dispersed slightly, and partially slaked in distilled water. Moist. Gradual boundary to:	6				
50	B2		Greyish brown medium clay with strong grade of polyhedral structure and rough-faced 5 cm peds, breaking to peds of 1 cm. Few (2-10%), coarse (6-20mm), weak, ferruginous nodules. Soil had many distinct, orange, weathered mottles. Clods were not dispersive, and partially slaked in distilled water. Dry. Gradual boundary to:	6.5	0.1			
	B3		Light brownish grey medium clay with strong grade of polyhedral structure and rough-faced 2 cm peds, breaking to peds of 1 cm. Very few (<2%), coarse (6-20mm), strong, ferruginous nodules. Soil had common distinct, orange, weathered mottles. Clods dispersed slightly, and slaked completely in distilled water. Dry.	6.5				
100			COMMENTS: Pin rushes common around pit					

Segregations
 Coarse fragments

Lithology

Substrate: **colluvium**
 Base of Observations: **Layer**
Continues at 100 cm
 Rootzone: **50cm**
Poorly drained
 BSAL Drainage: **Poorly drained**
Very slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM776

Haplic Eutrophic Brown Dermosol

Excavated on: 27/03/2017 Logged by: PJH

715796m E, 6295916m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**
 Vegetation Community: **woodland grass understory**
 Growth Form: **sod grass**
 Site Disturbance: **occasional cultivation**
 Land Use: **improved pasture** Groundcover: **95%**
 Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **4%** Southwestern Aspect
 Site Morphology: **Midslope**
 Slope Morphology: **Maximal**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0-1 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Brown silty clay loam with moderate grade of polyhedral structure and rough-faced 5 cm peds, breaking to peds of 1 cm. Clods were not dispersive, and partially slaked in distilled water. Moist. Clear boundary to:	5.5				
	A2		Light olive brown silty clay loam with weak grade of polyhedral structure and rough-faced 3 cm peds, breaking to peds of 1 cm. Soil had few distinct, orange, weathered mottles. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5.5				
50	B2		Light olive brown silty clay with moderate grade of polyhedral structure and rough-faced 5 cm peds, breaking to peds of 2 cm. Clods were not dispersive, and slaked completely in distilled water. Dry. Gradual boundary to:	6	0.1			
	B3		Yellowish brown light medium clay with moderate grade of subangular blocky structure and rough-faced 1.5 cm peds. Few (2-10%), coarse (6-20mm), weak, ferruginous nodules. Soil had many distinct, red, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Dry.	6.5				
100	COMMENTS: Site receives run-on from hill to west.							

Segregations
 Coarse fragments

Lithology

Substrate: **colluvium**
 Base of Observations: **Layer**
 Continues at 100 cm
 Rootzone: **50cm**
Poorly drained
 BSAL Drainage: **Imperfectly drained**
Slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM777

Haplic Eutrophic Red Dermosol

Excavated on: 27/03/2017 Logged by: PJH

715466m E, 6294578m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**
 Vegetation Community: **woodland grass understory**
 Growth Form: **sod grass, forb**
 Site Disturbance: **extensive clearing**
 Land Use: **improved pasture** Groundcover: **100%**
 Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **8%** Northeastern Aspect
 Site Morphology: **Upper slope**
 Slope Morphology: **Waxing**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak C (0 to 2 good)	Proportion Inert Material	SAMPLE
	A1		Black silty clay with moderate grade of subangular blocky structure and rough-faced 3 cm peds, breaking to peds of 2 cm. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	6				
	A2		Brown silty clay loam with moderate grade of polyhedral structure and rough-faced 5 cm peds, breaking to peds of 2 cm. Very few (<2%), dispersed, reoriented, non-weathered, quartz fine gravel (2-6mm). Soil had very few distinct, grey, biological mottles. Clods were not dispersive, and partially slaked in distilled water. Moist.	6				
	2A		Reddish brown light clay with moderate grade of polyhedral structure and rough-faced 5 cm peds, breaking to subangular blocky peds of 0.5 cm. Common (10-20%), dispersed, reoriented, non-weathered, quartz coarse gravel (20-60mm). Soil had very few distinct, grey, biological mottles. Clods were not dispersive, and partially slaked in distilled water. Moist.	6.5				
	2B		Clear boundary to:	6.5	0.1			
50			Reddish brown light clay with moderate grade of polyhedral structure and rough-faced 5 cm peds, breaking to subangular blocky peds of 0.5 cm. Common (10-20%), dispersed, reoriented, non-weathered, quartz coarse gravel (20-60mm). Soil had very few distinct, grey, biological mottles. Clods were not dispersive, and partially slaked in distilled water. Dry. Clear boundary to:					
	2C		Reddish brown light clay with moderate grade of polyhedral structure and rough-faced 5 cm peds, breaking to subangular blocky peds of 0.5 cm. Many (20-50%), dispersed, reoriented, non-weathered, quartz coarse gravel (20-60mm). Soil had very few distinct, grey, biological mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Gradual boundary to:	6.5				
100			Yellowish red with strong grade of subangular blocky structure and rough-faced 0.5 cm peds. Very abundant (>90%), dispersed, undisturbed, strongly weathered, parent material boulders (>600mm). Clods were not dispersive, and slaked completely in distilled water. Dry.					
			COMMENTS: First A horizon appears colluvial, Second has developed from underlying rock. C horizon is 20% strongly structured (SAB 0.5cm) red light clay & 80% strongly weathered, extremely low strength finely laminated metamorphic rock.					

Segregations
 Coarse fragments

Lithology

Substrate: **colluvial and metamorphic**
 Base of Observations: **Layer Continues** at 110 cm
 Rootzone: **60cm**
Moderately well drained
 BSAL Drainage: **Moderately well drained**
Moderately permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM778

Bleached-Manganic Eutrophic Red Chromosol

Excavated on: 27/03/2017 Logged by: PJH

716713m E, 6293555m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**
 Vegetation Community: **woodland grass understory**
 Growth Form: **sod grass**
 Site Disturbance: **occasional cultivation**
 Land Use: **improved pasture** Groundcover: **90%**
 Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **7%** Southwestern Aspect
 Site Morphology: **Upper slope**
 Slope Morphology: **Waxing**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A1		Dark brown fine sandy loam with weak grade of subangular blocky structure and sandy 3 cm peds, breaking to peds of 1 cm. Very few (<2%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm).	5				
	A2e		Few (2-10%), medium (2-6mm), strong, ferruginous nodules. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	6				
	B1		Brown fine sandy loam with weak grade of subangular blocky structure and sandy 2 cm peds, breaking to peds of 1 cm. Few (2-10%), medium (2-6mm), strong, ferruginous nodules. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	6.5				
	B2		Dark reddish brown light clay with moderate grade of subangular blocky structure and rough-faced 5 cm peds, breaking to peds of 0.5 cm. Few (2-10%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Few (2-10%), coarse (6-20mm), strong, ferruginous nodules. Soil had very few distinct, grey, biological mottles. Clods were not dispersive, and partially slaked in distilled water. Moist. Clear boundary to:	6.5				
50	C		Dark reddish brown clay loam with moderate grade of subangular blocky structure and rough-faced 5 cm peds, breaking to peds of 2 cm. Very few (<2%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Clods were not dispersive, and partially slaked in distilled water. Moist. Clear boundary to:	7.5	0.1			
			Dark reddish brown light clay with moderate grade of subangular blocky structure and rough-faced 5 cm peds, breaking to peds of 0.5 cm. Few (2-10%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Few (2-10%), coarse (6-20mm), strong, ferruginous nodules. Soil had very few distinct, grey, biological mottles. Clods were not dispersive, and partially slaked in distilled water. Moist. Clear boundary to:					
100	R		Brown light clay with moderate grade of subangular blocky structure and rough-faced 0.5 cm peds. Common (10-20%), dispersed, undisturbed, strongly weathered, parent material coarse gravel (20-60mm). Abundant (>50%), coarse (6-20mm), weak, ferromangiferous veins. Clods were not dispersive, and slaked completely in distilled water. Dry. Gradual boundary to:	7.5				
			Light brown light clay Very abundant (>90%), dispersed, undisturbed, strongly weathered, parent material stones (200-600mm). Clods were not dispersive, and partially slaked in					

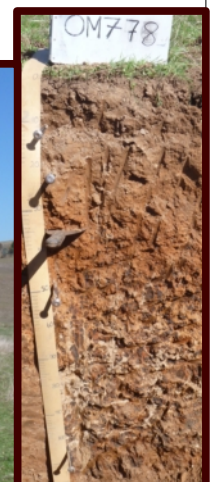
Segregations
 Coarse fragments

Lithology

Substrate: **metamorphic**
 Base of Observations:
bedrock reached at 130 cm
 Rootzone: **50cm**
Imperfectly drained
 BSAL Drainage: **Poorly drained**
Slowly permeable



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Detail Pit OM778

Bleached-Manganic Eutrophic Red Chromosol

Excavated on: 27/03/2017 Logged by: PJH

716713m E, 6293555m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**
 Vegetation Community: **woodland grass understory**
 Growth Form: **sod grass**
 Site Disturbance: **occasional cultivation**
 Land Use: **improved pasture** Groundcover: **90%**
 Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **7%** Southwestern Aspect
 Site Morphology: **Upper slope**
 Slope Morphology: **Waxing**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
200			distilled water. Dry. COMMENTS: Mini-chromosol. Rock is extremely weathered, extremely low strength finely laminated metamorphic rock. B1 contains tree roots from cleared trees. Upslope is flatter. Pin rushes common upslope.					
250								

Segregations
 Coarse fragments

Lithology

Substrate: **metamorphic**
 Base of Observations: **bedrock reached** at 130 cm
 Rootzone: **50cm**
Imperfectly drained
 BSAL Drainage: **Poorly drained**
Slowly permeable



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Detail Pit OM779

Mesotrophic Mottled-Subnatric Yellow Sodosol

Excavated on: 27/03/2017 Logged by: PJH

717486m E, 6293599m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**
 Vegetation Community: **woodland grass understory**
 Growth Form: **sod grass**
 Site Disturbance: **occasional cultivation**
 Land Use: **improved pasture** Groundcover: **100%**
 Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **10%** Southern Aspect
 Site Morphology: **Midslope**
 Slope Morphology: **Waxing**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0-1 (0 terrible to 2 good))	Proportion Inert Material	SAMPLE
	A1		Yellowish brown fine sandy loam with weak grade of angular blocky structure and earthy 5 cm peds. Soil had few faint, orange, weathered mottles. Clods were not dispersive, and did not slake in distilled water. Moist. Abrupt boundary to:	6				
	A2e		Very pale brown fine sandy clay loam with weak grade of polyhedral structure and earthy 5 cm peds. Soil had few faint, orange, weathered mottles. Clods dispersed slightly, and slaked completely in distilled water. Dry. Clear boundary to:	6				
50	B1		Brownish yellow medium clay with moderate grade of prismatic structure and rough-faced 5 cm peds. Soil had many distinct, grey, weathered mottles. Clods were moderately dispersive, and slaked completely in distilled water. Dry. Clear boundary to:	6				
	B22		Brownish yellow medium clay with moderate grade of prismatic structure and rough-faced 5 cm peds. Few (2-10%), medium (2-6mm), weak, ferruginous soft segregations. Soil had common distinct, grey, weathered mottles. Clods were moderately dispersive, and slaked completely in distilled water. Moderately moist. Gradual boundary to:	6	0.1			
	B23		Pale brown medium clay with moderate grade of prismatic structure and rough-faced 3 cm peds. Soil had common distinct, orange, weathered mottles. Clods dispersed strongly, and slaked completely in distilled water. Moderately moist.	7				
100			COMMENTS: Deep topsoil, but common waterlogging indicated by 30 cm deep bleached A2 and strong dispersion in A2 and all 3 B horizons.					

Segregations
 Coarse fragments

Lithology

Substrate: **colluvium**
 Base of Observations: **Layer**
Continues at 120 cm
 Rootzone: **70cm**
Poorly drained
 BSAL Drainage: **Poorly drained**
Slowly permeable



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Detail Pit OM780

Mottled Mesotrophic Brown Chromosol

Excavated on: 27/03/2017 Logged by: PJH

718031m E, 6293586m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**
 Vegetation Community: **woodland grass understory**
 Growth Form: **tussock grass, sod grass**
 Site Disturbance: **extensive clearing**
 Land Use: **volunteer/native pasture** Groundcover: **70%**
 Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **7%** Southeastern Aspect
 Site Morphology: **Midslope**
 Slope Morphology: **Waxing**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE	
	A1		Dark brown fine sandy loam with weak grade of subangular blocky structure and earthy 5 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5					
	A2		Yellowish red sandy clay loam with weak grade of polyhedral structure and earthy 5 cm peds. Soil had very few faint, grey, weathered mottles. Clods were not dispersive, and partially slaked in distilled water. Dry. Clear boundary to:	5.5					
50	B1		Yellowish red light clay with weak grade of prismatic structure and earthy 7 cm peds. Few (2-10%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Soil had few faint, yellow, weathered mottles. Clods were not dispersive, and partially slaked in distilled water. Moist. Gradual boundary to:	6					
	B2		Strong brown light clay with moderate grade of polyhedral structure and rough-faced 10 cm peds, breaking to subangular blocky peds of 2 cm. Soil had many distinct, red, weathered mottles. Clods were not dispersive, and partially slaked in distilled water. Moist. Gradual boundary to:	5.5	0.1				
100	B3		Brown light medium clay with moderate grade of polyhedral structure and rough-faced 5 cm peds. Many (20-50%), stratified, reoriented, non-weathered, quartz cobbles (60-200mm). Soil had common distinct, orange, weathered mottles. Clods were not dispersive, and partially slaked in distilled water. Wet.	5					
			COMMENTS: Soil at bottom of pit is saturated (from 100cm). Pin rushes common around pit. Suspect that groundwater discharges into soil around this pit.						

Segregations
 Coarse fragments

Lithology

Substrate: **colluvium**
 Base of Observations: **Layer**
 Continues at **130 cm**
 Rootzone: **60cm**
 Imperfectly drained
 BSAL Drainage: **Poorly drained**
 Moderately permeable



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Detail Pit OM781

Bleached-Manganic Eutrophic Brown Dermosol

Excavated on: 26/03/2017 Logged by: GK

717138m E, 6294132m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**

Vegetation Community: **unknown**

Growth Form: **sod grass, tussock grass**

Site Disturbance: **extensive clearing**

Land Use: **improved pasture** Groundcover: **95%**

Surface Condition Wet: Dry: **firm**

Topography

Slope: **5%** Northeastern Aspect

Site Morphology: **Lower slope**

Slope Morphology: **Waning**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A1		Brown silty loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	9				
	A2e		Brown silty loam with weak grade of polyhedral structure and earthy 1 cm peds. Clods dispersed slightly, and did not slake in distilled water. Moderately moist. Clear boundary to:	9				
50	B1		Brown silty clay loam with moderate grade of columnar structure and earthy 3 cm peds, breaking to polyhedral peds of 2 cm. Many (20-50%), coarse (6-20mm), weak, manganiferous nodules. Clods were moderately dispersive, and slaked completely in distilled water. Moderately moist. Diffuse boundary to:	9	1.7			
	B22		Brown silty clay with moderate grade of prismatic structure and rough-faced 4 cm peds, breaking to angular blocky peds of 2 cm. Few (2-10%), medium (2-6mm), weak, manganiferous nodules. Clods were moderately dispersive, and slaked completely in distilled water. Moderately moist. Diffuse boundary to:	9	0.8			
100	B23		Yellowish brown medium clay with moderate grade of prismatic structure and rough-faced 4 cm peds, breaking to angular blocky peds of 2 cm. Soil had common prominent, grey, weathered mottles. Clods were moderately dispersive, and slaked completely in distilled water. Moist.	8.5	0.4			
150	COMMENTS: Limitations: Dispersive, alkaline, suspect low fertility, poor drainage. Suspect that saline groundwater discharges into rootzone around this pit.							

Segregations
 Coarse fragments

Lithology

Substrate: **colluvium**

Base of Observations: **Layer**

Continues at 150 cm

Rootzone: **75cm**

Poorly drained

BSAL Drainage: **Poorly drained**

Slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM782

Manganic Mesotrophic Brown Chromosol

Excavated on: 27/03/2017 Logged by: GK

716320m E, 6294330m N, (WGS84),

Landscape Properties

Landform Element: hillslope

Vegetation Community: unknown

Growth Form: sod grass

Site Disturbance: occasional cultivation

Land Use: improved pasture Groundcover: 90%

Surface Condition Wet: firm Dry: hardset

Topography

Slope: 6% Northern Aspect

Site Morphology: Midslope

Slope Morphology: Waxing

Microrelief: None

Rock Outcrop: 0

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A		Dark brown fine sandy clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5.5				
	B21		Strong brown light medium clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Clods were not dispersive, and partially slaked in distilled water. Moderately moist. Gradual boundary to:	5.5	0.1			
	B22		Strong brown light medium clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Common (10-20%), medium (2-6mm), strong, manganiferous concretions. Clods were not dispersive, and partially slaked in distilled water. Moderately moist. Gradual boundary to:	6	0.1			
50	B23		Dark yellowish brown light medium clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Many (20-50%), coarse (6-20mm), strong, ferromangiferous concretions. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Gradual boundary to:	6.5				
100	C		Brown light clay with weak grade of subangular blocky structure and rough-faced 1 cm peds. Abundant (>50%), very coarse (20-60mm), strong, ferromangiferous nodules. Clods were not dispersive, and slaked completely in distilled water. Dry. COMMENTS: Site of abandoned olive grove. Slope increases greatly downslope of pit.	7				

Segregations
 Coarse fragments

Lithology

Substrate: Colluvium

Base of Observations:

equipment refusal at 100 cm

Rootzone: 80cm

Moderately well drained

BSAL Drainage: Moderately

well drained

Moderately permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM783

Haplic Mesotrophic Brown Chromosol

Excavated on: 27/03/2017 Logged by: GK

715043m E, 6295029m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**
Vegetation Community: **unknown**
Growth Form: **sod grass**

Site Disturbance: **occasional cultivation**
Land Use: **improved pasture** Groundcover: **90%**

Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **7%** Northwestern Aspect
Site Morphology: **Upper Slope**
Slope Morphology: **Waxing**
Microrelief: **None**
Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A1		Dark brown fine sandy clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5				
	A2		Brown fine sandy clay loam with weak grade of subangular blocky structure and earthy 2 cm peds. Clods were not dispersive, and partially slaked in distilled water. Moist. Clear boundary to:	5.5				
50	B21		Strong brown light medium clay with moderate grade of polyhedral structure and rough-faced 3 cm peds. Clods were not dispersive, and slaked completely in distilled water. Moist. Gradual boundary to:	6	0.1			
	B22		Strong brown light medium clay with moderate grade of polyhedral structure and rough-faced 3 cm peds. Common (10-20%), medium (2-6mm), weak, ferruginous soft segregations. Clods were not dispersive, and slaked completely in distilled water. Moist.	6.5				
100	COMMENTS: Refusal in ferromanganiferous nodules.							

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**
Base of Observations: **Layer Continues** at 90 cm
Rootzone: **60cm**
Moderately well drained
BSAL Drainage: **Moderately well drained**
Moderately permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM784

Haplic Mesotrophic Brown Chromosol

Excavated on: 27/03/2017 Logged by: GK

715488m E, 6295930m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**

Vegetation Community: **unknown**

Growth Form: **sod grass, tussock grass**

Site Disturbance: **extensive clearing**

Land Use: **improved pasture** Groundcover: **90%**

Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **5%** Northwestern Aspect

Site Morphology: **Lower slope**

Slope Morphology: **Waning**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
0-10	A1		Dark brown fine sandy clay loam with moderate grade of subangular blocky structure and rough-faced 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5				
10-20	A2		Brown fine sandy clay loam with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Clods were not dispersive, and partially slaked in distilled water. Moist. Clear boundary to:	5				
20-50	B21		Strong brown light medium clay with moderate grade of subangular blocky structure and rough-faced 3 cm peds. Clods were not dispersive, and slaked completely in distilled water. Moist. Gradual boundary to:	5.5	0			
50-100	B22		Strong brown light medium clay with moderate grade of subangular blocky structure and rough-faced 3 cm peds. Few (2-10%), dispersed, reoriented, weakly weathered, quartz gravel (6-20mm). Clods were not dispersive, and slaked completely in distilled water. Moist.	6	0			
100+			COMMENTS: Small area of large quartz cobbles 20 m from site. Quartz fragments angular.					

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**

Base of Observations: **Layer**

Continues at 100 cm

Rootzone: **100cm**

Moderately well drained

BSAL Drainage: **Moderately well drained**

Moderately permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM785

Manganic Mesotrophic Brown Chromosol

Excavated on: 27/03/2017 Logged by: GK

715617m E, 6295323m N, (WGS84),

Landscape Properties

Landform Element: hillslope

Vegetation Community: unknown

Growth Form: sod grass

Site Disturbance: extensive clearing

Land Use: improved pasture

Groundcover: 90%

Surface Condition Wet: firm

Dry: hardset

Topography

Slope: 10% Eastern Aspect

Site Morphology: Upper Slope

Slope Morphology: Waxing

Microrelief: None

Rock Outcrop: 0

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Dark brown fine sandy clay loam with weak grade of subangular blocky structure and earthy . Many (20-50%), dispersed, reoriented, weakly weathered, quartz gravel (6-20mm). Clods were not dispersive, and did not slake in distilled water. Moist.	5.5				
	B2		Strong brown light medium clay with moderate grade of subangular blocky structure and rough-faced . Common (10-20%), coarse (6-20mm), strong, ferromangiferous concretions. Clods were not dispersive, and did not slake in distilled water. Moderately moist.	6.5				
50	B3		Strong brown light medium clay with moderate grade of subangular blocky structure and rough-faced . Many (20-50%), coarse (6-20mm), strong, ferromangiferous concretions. Clods were not dispersive, and slaked completely in distilled water. Moderately moist.	7	0.1			
	C		Brown fine sandy loam with weak grade of subangular blocky structure and earthy . Abundant (>50%), very coarse (20-60mm), strong, ferromangiferous nodules. Dry. COMMENTS: Physical restriction at 60 cm. Some quartz in topsoil.					
100								

Segregations
 Coarse fragments

Lithology

Substrate: Colluvium

Base of Observations: Soil

Continues at 70 cm

Rootzone: 60cm

Imperfectly drained

BSAL Drainage:

Imperfectly drained

Moderately permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM786

Manganic Eutrophic Red Chromosol

Excavated on: 27/03/2017 Logged by: GK

716537m E, 6293841m N, (WGS84),

Landscape Properties

Landform Element: **hillcrest**

Vegetation Community: **unknown**

Growth Form: **sod grass**

Site Disturbance: **extensive clearing**

Land Use: **improved pasture**

Groundcover: **90%**

Surface Condition Wet: **firm**

Dry: **firm**

Topography

Slope: **1%** Flat Aspect

Site Morphology: **Ridge**

Slope Morphology: **Minimal**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A		Dark reddish brown clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Few (2-10%), dispersed, reoriented, weakly weathered, quartz coarse gravel (20-60mm). Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5				
	B21		Reddish brown light medium clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Common (10-20%), dispersed, reoriented, weakly weathered, quartz gravel (6-20mm). Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5.5				
50	B31		Reddish brown light medium clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Many (20-50%), coarse (6-20mm), weak, manganiferous soft segregations. Clods were not dispersive, and slaked completely in distilled water. Moist. Diffuse boundary to:	6				
	B32		Yellowish red light clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Many (20-50%), coarse (6-20mm), weak, manganiferous soft segregations. Clods were not dispersive, and slaked completely in distilled water. Moist.	6.5	0.1			
100			COMMENTS: Ridge crest.					

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**

Base of Observations: **Layer**

Continues at 120 cm

Rootzone: **75cm**

Moderately well drained

BSAL Drainage: **Moderately**

well drained

Moderately permeable



Sustainable Soils Management

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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM787

Manganic Mesotrophic Brown **Dermosol**

Excavated on: **27/03/2017** Logged by: **GK**

717047m E, 6293688m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**

Vegetation Community: **unknown**

Growth Form: **sod grass, tussock grass**

Site Disturbance: **extensive clearing**

Land Use: **improved pasture** Groundcover: **90%**

Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **4%** Northern Aspect

Site Morphology: **Midslope**

Slope Morphology: **Minimal**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A1		Brown silty loam with weak grade of subangular blocky structure and earthy 2 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	4.5				
	A2		Brown silty loam with weak grade of subangular blocky structure and earthy 2 cm peds. Soil had few distinct, orange, weathered mottles. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5				
50	B1		Yellowish brown light clay with moderate grade of polyhedral structure and rough-faced 3 cm peds. Few (2-10%), medium (2-6mm), weak, ferruginous soft segregations. Soil had many distinct, pale, biological mottles. Clods were not dispersive, and slaked completely in distilled water. Moist. Gradual boundary to:	5				
	2A		Yellowish brown silty clay loam with moderate grade of polyhedral structure and rough-faced 3 cm peds. Common (10-20%), coarse (6-20mm), weak, ferruginous soft segregations. Soil had few distinct, pale, biological mottles. Clods dispersed slightly, and slaked completely in distilled water. Moist. Gradual boundary to:	5.5				
100	2B		Dark yellowish brown light medium clay with moderate grade of lenticular structure and rough-faced 3 cm peds, breaking to polyhedral peds of 2 cm. Many (20-50%), coarse (6-20mm), weak, ferruginous soft segregations. Soil had many prominent, pale, biological mottles. Clods were not dispersive, and partially slaked in distilled water. Moist.	5.5	0.1			
COMMENTS: Many large earthworms.								

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**

Base of Observations: **Layer**

Continues at 140 cm

Rootzone: **70cm**

Imperfectly drained

BSAL Drainage:

Imperfectly drained

Moderately permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM788

Acidic-Mottled Mesotrophic Brown **Dermosol**

Excavated on: **27/03/2017** Logged by: **GK**

717940m E, 6293923m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**

Vegetation Community: **unknown**

Growth Form: **sod grass**

Site Disturbance: **extensive clearing**

Land Use: **improved pasture** Groundcover: **80%**

Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **6%** Western Aspect

Site Morphology: **Lower slope**

Slope Morphology: **Waning**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Dark brown fine sandy clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5				
	A2		Dark yellowish brown silty loam with weak grade of subangular blocky structure and earthy 2 cm peds. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Gradual boundary to:	5				
50	B11		Yellowish brown silty clay loam with moderate grade of polyhedral structure and rough-faced 3 cm peds. Soil had common faint, pale, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Gradual boundary to:	5.5	0.1			
	B12		Dark yellowish brown light clay with moderate grade of polyhedral structure and rough-faced 3 cm peds. Soil had common distinct, pale, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Gradual boundary to:	5.5	0			
100	B21		Dark yellowish brown light medium clay with moderate grade of lenticular structure and rough-faced 3 cm peds, breaking to polyhedral peds of 2 cm. Soil had common distinct, grey, biological mottles. Clods were not dispersive, and slaked completely in distilled water. Moist. Diffuse boundary to:	5.5	0.1			
	B22		Yellowish brown medium clay with moderate grade of lenticular structure and rough-faced 3 cm peds, breaking to polyhedral peds of 2 cm. Soil had common prominent, grey, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moist.	5	0.1			
			COMMENTS: Pin rushes around site.					

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**

Base of Observations: **Layer**

Continues at 130 cm

Rootzone: **50cm**

Poorly drained

BSAL Drainage: **Poorly drained**

Slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM789

Acidic-Mottled Eutrophic Brown **Dermosol**

Excavated on: **28/03/2017** Logged by: **GK**

717762m E, 6293147m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**

Vegetation Community: **unknown**

Growth Form: **sod grass**

Site Disturbance: **cleared no cultivation**

Land Use: **improved pasture** Groundcover: **80%**

Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **7%** Western Aspect

Site Morphology: **Midslope**

Slope Morphology: **Waxing**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Dark brown fine sandy clay loam with weak grade of subangular blocky structure and earthy 2 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5				
	A2		Brown fine clay loam with weak grade of polyhedral structure and earthy 2 cm peds. Soil had common faint, orange, weathered mottles. Clods were moderately dispersive, and slaked completely in distilled water. Moist. Clear boundary to:	5.5				
50	B21		Yellowish brown light medium clay with moderate grade of lenticular structure and rough-faced 3 cm peds, breaking to polyhedral peds of 2 cm. Soil had common distinct, pale, weathered mottles. Clods dispersed slightly, and slaked completely in distilled water. Moist.	5				
	B22		Clear boundary to: Yellowish brown light medium clay with moderate grade of lenticular structure and rough-faced 3 cm peds, breaking to polyhedral peds of 2 cm. Soil had common distinct, grey, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moist. Gradual boundary to:	5	0			
100	B3		Yellowish brown light medium clay with moderate grade of lenticular structure and rough-faced 3 cm peds, breaking to polyhedral peds of 2 cm. Many (20-50%), dispersed, reoriented, weakly weathered, quartz coarse gravel (20-60mm). Soil had common prominent, grey, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moist.	5	0			
			COMMENTS: Some pin rushes around site.					

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**

Base of Observations: **layer**

Continues at 120 cm

Rootzone: **40cm**

Poorly drained

BSAL Drainage: **Poorly drained**

Slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM790

Manganic Magnesian Red Chromosol

Excavated on: **28/03/2017** Logged by: **GK**

717695m E, 6292672m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**

Vegetation Community: **unknown**

Growth Form: **sod grass**

Site Disturbance: **cleared no cultivation**

Land Use: **improved pasture** Groundcover: **80%**

Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **8%** Western Aspect

Site Morphology: **Upper Slope**

Slope Morphology: **Minimal**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A11		Dark brown fine sandy clay loam with weak grade of subangular blocky structure and earthy 0.5 cm peds. Few (2-10%), dispersed, reoriented, weakly weathered, quartz gravel (6-20mm). Clods were not dispersive, and did not slake in distilled water. Moderately moist.	5				
	A12		Clear boundary to:	5.5				
	B21		Brown fine sandy clay loam with weak grade of subangular blocky structure and earthy 0.5 cm peds. Few (2-10%), dispersed, reoriented, weakly weathered, quartz gravel (6-20mm). Clods were not dispersive, and did not slake in distilled water. Moderately moist.	6.5				
50			Clear boundary to:					
	B22		Brown light medium clay with moderate grade of subangular blocky structure and rough-faced 1 cm peds. Common (10-20%), coarse (6-20mm), weak, manganiferous soft segregations. Clods were not dispersive, and partially slaked in distilled water. Moderately moist.	7	0			
			Diffuse boundary to:					
100			Dark yellowish brown light medium clay with moderate grade of subangular blocky structure and rough-faced 1 cm peds. Many (20-50%), coarse (6-20mm), weak, manganiferous soft segregations. Clods were not dispersive, and partially slaked in distilled water. Moderately moist.					
			COMMENTS: Saffron thistle present, indicating good drainage.					

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**

Base of Observations: **Layer**

Continues at 130 cm

Rootzone: **80cm**

Moderately well drained

BSAL Drainage: **Moderately**

well drained

Moderately permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM791

Manganic-Acidic Mesotrophic Brown Dermosol

Excavated on: 28/03/2017 Logged by: GK

717204m E, 6292688m N, (WGS84),

Landscape Properties

Landform Element: **hillcrest**
 Vegetation Community: **woodland grass understory**
 Growth Form: **sod grass**
 Site Disturbance: **limited clearing**
 Land Use: **volunteer/native pasture** Groundcover: **80%**
 Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **6%** Southeastern Aspect
 Site Morphology: **Crest**
 Slope Morphology: **Minimal**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A		Dark brown fine sandy clay loam with weak grade of polyhedral structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5				
	B21		Dark yellowish brown light clay with moderate grade of subangular blocky structure and rough-faced 3 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Diffuse boundary to:	4.5				
50	B22		Yellowish brown light clay with moderate grade of subangular blocky structure and rough-faced 3 cm peds. Clods were not dispersive, and slaked completely in distilled water. Moist. Clear boundary to:	4.5				
	B3		Light yellowish brown silty clay loam with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Common (10-20%), coarse (6-20mm), weak, ferruginous soft segregations. Clods dispersed slightly, and partially slaked in distilled water. Moist. Gradual boundary to:	5				
100	C		Dark yellowish brown light medium clay with moderate grade of angular blocky structure and rough-faced 2 cm peds. Many (20-50%), very coarse (20-60mm), weak, ferruginous soft segregations. Soil had common prominent, pale, biological mottles. Clods dispersed strongly, and partially slaked in distilled water. Moist.	5	0			
	COMMENTS: Common, continuous vertical macropores in B3							

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**
 Base of Observations: **Layer Continues** at 130 cm
 Rootzone: **75cm**
Imperfectly drained
 BSAL Drainage: **Imperfectly drained**
Slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM792

Bleached Eutrophic Brown Chromosol

Excavated on: 28/03/2017 Logged by: GK

717273m E, 6293172m N, (WGS84),

Landscape Properties

Landform Element: hillslope

Vegetation Community: unknown

Growth Form: sod grass

Site Disturbance: occasional cultivation

Land Use: improved pasture Groundcover: 70%

Surface Condition Wet: firm Dry: hardset

Topography

Slope: 5% Northeastern Aspect

Site Morphology: Midslope

Slope Morphology: Waxing

Microrelief: None

Rock Outcrop: 0

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Brown fine sandy clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	4.5				
	A2e		Brown fine sandy clay loam with weak grade of subangular blocky structure and earthy 2 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5				
	B2		Yellowish brown light medium clay with moderate grade of polyhedral structure and rough-faced 3 cm peds. Clods were not dispersive, and slaked completely in distilled water. Moist. Diffuse boundary to:	6				
50								
	B31		Light yellowish brown silty clay loam with moderate grade of subangular blocky structure and rough-faced 3 cm peds. Common (10-20%), coarse (6-20mm), weak, ferruginous soft segregations. Clods were not dispersive, and slaked completely in distilled water. Moist. Gradual boundary to:	6				
100								
	B32		Dark yellowish brown medium clay with moderate grade of lenticular structure and rough-faced 3 cm peds, breaking to polyhedral peds of 2 cm. Soil had common prominent, grey, weathered mottles. Clods dispersed slightly, and did not slake in distilled water. Moist.	6.5	0.1			
			COMMENTS: 0					

Segregations
 Coarse fragments

Lithology

Substrate: Colluvium

Base of Observations: Layer

Continues at 140 cm

Rootzone: 75cm

Imperfectly drained

BSAL Drainage: Poorly drained

Moderately permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM793

Manganic Eutrophic Red Chromosol

Excavated on: 28/03/2017 Logged by: GK

716556m E, 6293206m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**

Vegetation Community: **unknown**

Growth Form: **sod grass**

Site Disturbance: **extensive clearing**

Land Use: **improved pasture**

Surface Condition Wet: **firm**

Groundcover: **80%**

Dry: **hardset**

Topography

Slope: **6%** Northern Aspect

Site Morphology: **Upper Slope**

Slope Morphology: **Waxing**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A		Dark reddish brown fine sandy clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Few (2-10%), dispersed, reoriented, weakly weathered, quartz coarse gravel (20-60mm). Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5				
	B21		Yellowish red light medium clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Few (2-10%), dispersed, reoriented, weakly weathered, quartz gravel (6-20mm). Clods were not dispersive, and did not slake in distilled water. Moist. Gradual boundary to:	6				
50	B22		Yellowish red light medium clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Few (2-10%), coarse (6-20mm), weak, manganiferous soft segregations. Clods were not dispersive, and partially slaked in distilled water. Moist. Diffuse boundary to:	7				
100	B3		Strong brown light clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Common (10-20%), coarse (6-20mm), weak, manganiferous soft segregations. Clods were not dispersive, and partially slaked in distilled water. Moist. Diffuse boundary to:	7.5	0			
	C		Strong brown light clay with weak grade of subangular blocky structure and rough-faced 1 cm peds. Many (20-50%), very coarse (20-60mm), weak, manganiferous soft segregations. Soil had many distinct, pale, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moist.	6.5				
	COMMENTS: Soil has good structure, but many manganiferous segregations 105+							

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**

Base of Observations: **Soil**

Continues at 130 cm

Rootzone: **70cm**

Moderately well drained

BSAL Drainage: **Moderately well drained**

Moderately permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM794

Manganic Mesotrophic Red Chromosol

Excavated on: 28/03/2017 Logged by: GK

716656m E, 6292865m N, (WGS84),

Landscape Properties

Landform Element: **hillcrest**

Vegetation Community: **unknown**

Growth Form: **sod grass**

Site Disturbance: **occasional cultivation**

Land Use: **improved pasture** Groundcover: **80%**

Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **1% Flat** Aspect

Site Morphology: **Crest**

Slope Morphology: **Minimal**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
0-50	A		Dark reddish brown fine sandy clay loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5				
50-65	B21		Yellowish red light medium clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Gradual boundary to:	6.5				
65-100	B22		Yellowish red light medium clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Few (2-10%), medium (2-6mm), weak, ferromangiferous soft segregations. Clods were not dispersive, and slaked completely in distilled water. Moist. Gradual boundary to:	7				
100-130	B3		Yellowish red light clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds. Many (20-50%), coarse (6-20mm), strong, ferromangiferous nodules. Clods were not dispersive, and partially slaked in distilled water. Moist. Gradual boundary to:	6.5	0			
130-140	C		Reddish brown light clay with moderate grade of subangular blocky structure and rough-faced 1 cm peds. Abundant (>50%), very coarse (20-60mm), strong, ferromangiferous nodules. Clods were not dispersive, and slaked completely in distilled water. Moist.	5.5				
COMMENTS: Good structure, similar to OM793								

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**

Base of Observations: **Soil**

Continues at 140 cm

Rootzone: **70cm**

Moderately well drained

BSAL Drainage: **Moderately well drained**

Moderately permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM795

Bleached-Manganic Eutrophic Brown Chromosol

Excavated on: 28/03/2017 Logged by: GK

716080m E, 6293284m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**

Vegetation Community: **unknown**

Growth Form: **sod grass, tussock grass**

Site Disturbance: **cleared no cultivation**

Land Use: **improved pasture** Groundcover: **90%**

Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **5%** Northwestern Aspect

Site Morphology: **Lower slope**

Slope Morphology: **Waning**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Dark greyish brown silty loam with weak grade of subangular blocky structure and earthy 1 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5				
	A2e		Brown silty loam with weak grade of subangular blocky structure and earthy 2 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	5.5				
	B		Yellowish brown light medium clay with weak grade of columnar structure and rough-faced 3 cm peds, breaking to polyhedral peds of 2 cm. Many (20-50%), coarse (6-20mm), weak, ferromangiferous soft segregations. Soil had common distinct, orange, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moist. Diffuse boundary to:	6.5	0			
50								
	C		Greyish brown silty clay with moderate grade of lenticular structure and rough-faced 3 cm peds, breaking to subangular blocky peds of 2 cm. Many (20-50%), coarse (6-20mm), strong, ferromangiferous soft segregations. Soil had common distinct, orange, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moist.	7	0.1			
100								
			COMMENTS: Roots in subsoil growing down earthworm macropores.					

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**

Base of Observations: **Layer**

Continues at 130 cm

Rootzone: **70cm**

Poorly drained

BSAL Drainage: **Poorly drained**

Slowly permeable



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McPhillamys Gold Project for Regis Resources Ltd

Detail Pit OM796

Manganic Eutrophic Brown Chromosol

Excavated on: 28/03/2017 Logged by: PJH

715977m E, 6292927m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**
 Vegetation Community: **woodland grass understory**
 Growth Form: **sod grass**
 Site Disturbance: **occasional cultivation**
 Land Use: **improved pasture** Groundcover: **100%**
 Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **8%** Northwestern Aspect
 Site Morphology: **Lower slope**
 Slope Morphology: **Waxing**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak C (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Dark brown loam with weak grade of subangular blocky structure and earthy 3 cm peds. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	4.5				
	A2		Brown silty loam with weak grade of polyhedral structure and earthy 3 cm peds. Clods were not dispersive, and partially slaked in distilled water. Moist. Abrupt boundary to:	5.5				
50	B2		Yellowish brown light medium clay with moderate grade of polyhedral structure and rough-faced 3 cm peds, breaking to peds of 1 cm. Few (2-10%), coarse (6-20mm), strong, ferruginous nodules. Soil had very few faint, grey, biological mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Gradual boundary to:	6.5	0.1			
100	B3		Light grey loam with massive grade of structure. Abundant (>50%), very coarse (20-60mm), weak, ferruginous veins. Clods were not dispersive, and slaked completely in distilled water. Dry.	7.5				
			COMMENTS: Poorly drained site.					

Segregations
 Coarse fragments

Lithology

Substrate: **Colluvium**
 Base of Observations: **Layer**
 Continues at 110 cm
 Rootzone: **55cm**
Poorly drained
 BSAL Drainage: **Poorly drained**
Slowly permeable



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BSAL Profile Description

McPhillamys Gold Project for Regis Resources Ltd

Detail Pit

SSMID: OM835

Excavated on: 23/07/2018 Logged by: PJH

Haplic Eutrophic Black Dermosol

714395m E, 6293071m N, (WGS84),

Landscape Properties

Landform Element: valley flat

Vegetation Community: unknown

Growth Form: sod grass

Site Disturbance: occasional cultivation

Land Use: improved pasture Groundcover: 90%

Surface Condition Wet: firm Dry: hardset

Topography

Slope: 1% Southern Aspect

Site Morphology: Open Depression

Slope Morphology: Minimal

Microrelief: Normal Δ height = 500 mm Extent: = 50%

Rock Outcrop: 0

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A		Very dark greyish brown fine silty clay loam with strong grade of subangular blocky structure and rough-faced 4 cm peds, breaking to subangular blocky peds of 0.5 cm. Clods were not dispersive, and did not slake in distilled water. Dry. Clear boundary to:	4.5				
	B1		Very dark brown fine silty clay with strong grade of subangular blocky structure and rough-faced 1.5 cm peds, breaking to subangular blocky peds of 0.5 cm. Clods were not dispersive, and did not slake in distilled water. Dry. Gradual boundary to:	4.5	0.2			
50	B2		Very dark brown light medium clay with strong grade of prismatic structure and rough-faced 2 cm peds, breaking to polyhedral peds of 1 cm. Clods were not dispersive, and did not slake in distilled water. Dry. Clear boundary to:	6				
100	C		Very dark grey light clay with strong grade of polyhedral structure and rough-faced 50 cm peds, breaking to polyhedral peds of 0.5 cm. Few (2-10%), , strong, ferruginous nodules. Soil had few distinct, yellow, weathered mottles. Clods were not dispersive, and partially slaked in distilled water. Dry.	6	0.5			
150			COMMENTS: Roots common to bottom of pit in vertical pores (worm hole).					

Segregations
 Coarse fragments

Lithology

Substrate: alluvium

Base of Observations: Layer

Continues at 150 cm

Rootzone: 100cm

BSAL Drainage: Moderately

well drained

Moderately permeable



Sustainable Soils Management

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BSAL Profile Description

McPhillamys Gold Project for Regis Resources Ltd

Detail Pit

SSMID: OM836

Excavated on: 23/07/2018 Logged by: PJH

Bleached Eutrophic Brown **Dermosol**

714471m E, 6295504m N, (WGS84),

Topography

Slope: **5%** Southwestern Aspect

Site Morphology: **Lower slope**

Slope Morphology: **Maximal**

Microrelief: **None**

Rock Outcrop: **0**

Landscape Properties

Landform Element: **hillslope**

Vegetation Community: **unknown**

Growth Form: **tussock grass**

Site Disturbance: **cleared no cultivation**

Land Use: **improved pasture** Groundcover: **60%**

Surface Condition Wet: **firm** Dry: **hardset**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak C (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Brown fine silty loam with moderate grade of angular blocky structure and rough-faced 2 cm peds, breaking to angular blocky peds of 0.5 cm. Clods were not dispersive, and slaked completely in distilled water. Dry. Gradual boundary to:	4.5				
	A2e		Light brownish grey fine silty loam with moderate grade of polyhedral structure and rough-faced 5 cm peds, breaking to angular blocky peds of 1 cm. Soil had few distinct, orange, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Wet. Clear boundary to:	4.5	0.3			
50	B2		Dark yellowish brown light clay with strong grade of polyhedral structure and rough-faced 2 cm peds, breaking to polyhedral peds of 0.5 cm. Few (2-10%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Soil had few distinct, grey, biological mottles. Clods were not dispersive, and partially slaked in distilled water. Moderately moist. Gradual boundary to:	5				
100	B31		Yellowish brown fine silty clay with weak grade of polyhedral structure and rough-faced 8 cm peds, breaking to polyhedral peds of 1 cm. Common (10-20%), coarse (6-20mm), weak, manganiferous soft segregations. Soil had common distinct, grey, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Gradual boundary to:	5.5	0.2			
150	B32		Yellowish brown silty clay with weak grade of polyhedral structure and rough-faced 10 cm peds, breaking to granular peds of 2 cm. Soil had many distinct, grey, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist.	5.5				
COMMENTS: Worms common in A. Site near discharge (Spring) so wet for prolonged periods.								

Lithology

Substrate: **Metamorphic**

Base of Observations: **Layer**

Continues at 150 cm

Rootzone: **70cm**

BSAL Drainage: **Poorly drained**

Moderately permeable



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BSAL Profile Description

McPhillamys Gold Project for Regis Resources Ltd

Detail Pit

SSMID: OM837

Excavated on: 23/07/2018 Logged by: PJH

Bleached Natric Brown Kurosol

714678m E, 6295443m N, (WGS84),

Landscape Properties

Landform Element: valley flat

Vegetation Community: unknown

Growth Form: tussock grass

Site Disturbance: cleared no cultivation

Land Use: improved pasture

Surface Condition Wet: firm

Groundcover: 70%

Dry: hardset

Topography

Slope: 5% Western Aspect

Site Morphology: Open Depression

Slope Morphology: Minimal

Microrelief: Debil Depth:

Rock Outcrop: 0

Extent:

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A1		Brown fine silty clay loam with moderate grade of polyhedral structure and rough-faced 1 cm peds, breaking to polyhedral peds of 0.2 cm. Soil had few distinct, orange, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Gradual boundary to:	4.5				
50	A2e		Light brownish grey fine silty clay loam with weak grade of polyhedral structure and rough-faced 2 cm peds, breaking to polyhedral peds of 0.5 cm. Few (2-10%), fine (<2mm), weak, ferruginous nodules. Soil had few distinct, orange, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Sharp boundary to:	5	0.9			
100	2A		Dark yellowish brown medium heavy clay with strong grade of polyhedral structure and smooth-faced 2 cm peds, breaking to polyhedral peds of 0.5 cm. Soil had many distinct, grey, weathered mottles. Clods were not dispersive, and partially slaked in distilled water. Moderately moist.	5.5	1.2			
150			COMMENTS: Some layers with reasonable structure in A2. Pinrushes nearby.					

Segregations
 Coarse fragments

Lithology

Substrate: alluvium

Base of Observations: Layer

Continues at 150 cm

Rootzone: 70cm

BSAL Drainage: Poorly drained

Very slowly permeable



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BSAL Profile Description

McPhillamys Gold Project for Regis Resources Ltd

Detail Pit

SSMID: OM838

Excavated on: 23/07/2018 Logged by: PJH

Manganic Eutrophic Brown **Dermosol**

716274m E, 6296877m N, (WGS84),

Topography

Slope: 4% Western Aspect

Site Morphology: **Crest**

Slope Morphology: **Minimal**

Microrelief: **None**

Rock Outcrop: **0**

Landscape Properties

Landform Element: **hillcrest**









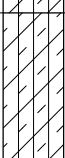

Vegetation Community: **unknown**



Growth Form: **tussock grass**

Site Disturbance: **occasional cultivation**

Land Use: **improved pasture** Groundcover: **60%**

Surface Condition Wet: **firm** Dry: **hardset**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak C (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Brown fine silty loam with weak grade of polyhedral structure and rough-faced 3 cm peds, breaking to polyhedral peds of 1 cm. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Gradual boundary to:	4.5				
	A3		Brown fine silty clay loam with moderate grade of subangular blocky structure and rough-faced 2 cm peds, breaking to subangular blocky peds of 0.5 cm. Clods were not dispersive, and partially slaked in distilled water. Dry. Gradual boundary to:	5	0.1			
	B1		Yellowish brown fine clay loam with strong grade of polyhedral structure and rough-faced 5 cm peds, breaking to subangular blocky peds of 0.5 cm. Few (2-10%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Soil had very few distinct, grey, biological mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Gradual boundary to:	5				
50	B2		Brown fine clay loam with moderate grade of polyhedral structure and rough-faced 10 cm peds, breaking to subangular blocky peds of 0.5 cm. Few (2-10%), medium (2-6mm), strong, ferruginous nodules. Soil had very few distinct, grey, biological mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Gradual boundary to:	5	1.4			
	C		Brown fine silty clay loam with strong grade of polyhedral structure and rough-faced 4 cm peds, breaking to polyhedral peds of 1 cm. Many (20-50%), coarse (6-20mm), weak, ferromangiferous soft segregations. Soil had common brown, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Gradual boundary to:	5.5				
100								
150			COMMENTS: Looks OK for pasture.					

 Segregations
 Coarse fragments

Lithology

Substrate: **not identified**

Base of Observations: **Layer**

Continues at 150 cm

Rootzone: **70cm**

BSAL Drainage:

Imperfectly drained

Slowly permeable



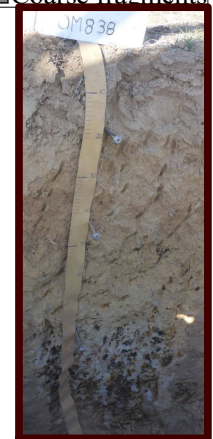
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BSAL Profile Description

McPhillamys Gold Project for Regis Resources Ltd

Detail Pit

SSMID: OM839

Excavated on: 23/07/2018 Logged by: PJH

Bleached Eutrophic Brown Chromosol

716268m E, 6296550m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**

Vegetation Community: **unknown**

Growth Form: **tussock grass**

Site Disturbance: **occasional cultivation**

Land Use: **improved pasture** Groundcover: **40%**

Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **6%** Northern Aspect

Site Morphology: **Midslope**

Slope Morphology: **Waxing**

Microrelief: **None**

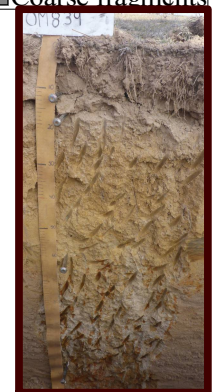
Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Brown fine sandy loam with weak grade of subangular blocky structure and sandy 2 cm peds, breaking to polyhedral peds of 0.2 cm. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Abrupt boundary to:	4.5		1.5	0.5	
	A2e		Brown fine sandy loam with weak grade of polyhedral structure and sandy 5 cm peds, breaking to subangular blocky peds of 1 cm. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Abrupt boundary to:	4.5	0.1	1.5	0.5	
	B2		Yellowish brown light clay with strong grade of polyhedral structure and rough-faced 3 cm peds, breaking to polyhedral peds of 0.5 cm. Soil had few distinct, grey, biological mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Gradual boundary to:	5.5	0.1	1.5	0.5	
50	B23		Pale brown light clay with strong grade of polyhedral structure and rough-faced 10 cm peds, breaking to polyhedral peds of 2 cm. Soil had many distinct, red, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Diffuse boundary to:	5.5	0.1	1.5	0.5	
100	B32		Grey light clay with strong grade of polyhedral structure and rough-faced 10 cm peds, breaking to polyhedral peds of 3 cm. Soil had common distinct, red, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Dry.	5.5		1.5	0.5	
150			COMMENTS: Froth structure (vesicles) to bottom of pit. Reasonable pasture soil.					

Lithology
 Substrate: **not identified**
 Base of Observations: **Layer Continues at 150 cm**
 Rootzone: **60cm**
 BSAL Drainage: **Poorly drained**
 Slowly permeable



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■ Segregations
■ Coarse fragments

BSAL Profile Description

McPhillamys Gold Project for Regis Resources Ltd

Detail Pit

SSMID: OM840

Excavated on: 23/07/2018 Logged by: PJH

Bleached-Acidic Eutrophic Yellow Dermosol

716719m E, 6296745m N, (WGS84),

Landscape Properties

Landform Element: hillslope

Vegetation Community: unknown

Growth Form: tussock grass

Site Disturbance: occasional cultivation

Land Use: improved pasture Groundcover: 50%

Surface Condition Wet: firm Dry: hardset

Topography

Slope: 9% Southern Aspect

Site Morphology: Midslope

Slope Morphology: Waning

Microrelief: None

Rock Outcrop: 5

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good)	Proportion Inert Material	SAMPLE
	A1		Brown fine silty loam with moderate grade of subangular blocky structure and rough-faced 2 cm peds, breaking to subangular blocky peds of 0.5 cm. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Gradual boundary to:	4.5				
	A2e		Pale brown coarse silty loam with moderate grade of polyhedral structure and rough-faced 2 cm peds, breaking to polyhedral peds of 0.5 cm. Clods were not dispersive, and partially slaked in distilled water. Moderately moist. Gradual boundary to:	4.5	0.1			
	B		Light brown coarse sandy clay loam with moderate grade of polyhedral structure and rough-faced 5 cm peds, breaking to polyhedral peds of 0.5 cm. Few (2-10%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Soil had few distinct, red, weathered mottles. Clods dispersed slightly, and partially slaked in distilled water. Dry. Gradual boundary to:	4.5	0.1			
50	C		Pale red coarse sandy loam with moderate grade of polyhedral structure and rough-faced 1 cm peds, breaking to polyhedral peds of 0.5 cm. Abundant (50-90%), stratified, undisturbed, strongly weathered, parent material cobbles (60-200mm). Clods dispersed slightly, and partially slaked in distilled water. Dry.	4.5				
100								
150			COMMENTS: Vesicular porosity in B.					

Segregations
 Coarse fragments

Lithology

Substrate: granite

Base of Observations: Layer

Continues at 150 cm

Rootzone: 50cm

BSAL Drainage: Poorly drained

Slowly permeable



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BSAL Profile Description

McPhillamys Gold Project for Regis Resources Ltd

Detail Pit

SSMID: OM841

Excavated on: 23/07/2018 Logged by: PJH

Bleached-Acidic Mesotrophic Brown **Dermosol**

716966m E, 6296480m N, (WGS84),

Landscape Properties

Landform Element: **valley flat**

Vegetation Community: **unknown**

Growth Form: **tussock grass**

Site Disturbance: **extensive clearing**

Land Use: **voluntary/native pasture** Groundcover: **10%**

Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **7%** Southern Aspect

Site Morphology: **Open Depression**

Slope Morphology: **Waning**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Brown fine silty loam with moderate grade of subangular blocky structure and rough-faced 5 cm peds, breaking to subangular blocky peds of 0.5 cm. Soil had few distinct, orange, weathered mottles. Clods were not dispersive, and did not slake in distilled water.	4.5				
	A2e		Moderately moist. Abrupt boundary to:	5	0.1			
	A3		Brown fine silty loam with strong grade of polyhedral structure and rough-faced 3 cm peds, breaking to subangular blocky peds of 0.5 cm. Soil had few distinct, orange, weathered mottles. Clods were not dispersive, and partially slaked in distilled water. Moderately moist.	5				
50	B		Clear boundary to: Pale brown fine silty clay loam with strong grade of polyhedral structure and rough-faced 4 cm peds, breaking to polyhedral peds of 0.5 cm. Soil had few faint, grey, biological mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Gradual boundary to:	4.5	0			
100	C		Yellowish brown fine silty clay with strong grade of polyhedral structure and rough-faced 10 cm peds, breaking to polyhedral peds of 1 cm. Few (2-10%), coarse (6-20mm), weak, ferruginous soft segregations. Soil had few distinct, grey, biological mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Gradual boundary to: Yellowish brown fine light clay with weak grade of polyhedral structure and rough-faced 1 cm peds, breaking to polyhedral peds of 0.5 cm. Many (20-50%), very coarse (20-60mm), weak, ferruginous nodules. Soil had many distinct, red, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Dry.	4.5				
150			COMMENTS: Qtz cobbles common on nearby hills. Pinrushes common. Vesicular structure in A3.					

Lithology

Substrate: **not identified**

Base of Observations: **Layer**

Continues at 150 cm

Rootzone: **60cm**

BSAL Drainage: **Poorly drained**

Very slowly permeable



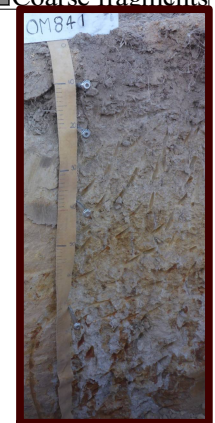
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Segregations
 Coarse fragments

BSAL Profile Description

McPhillamys Gold Project for Regis Resources Ltd

Detail Pit

SSMID: OM842

Excavated on: 23/07/2018 Logged by: PJH

Bleached Magnesian Yellow **Kurosol**

717371m E, 6296173m N, (WGS84),

Landscape Properties

Landform Element: **hillcrest**

Vegetation Community: **woodland grass understory**

Growth Form: **tussock grass**

Site Disturbance: **extensive clearing**

Land Use: **voluntary/native pasture** Groundcover: **20%**

Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **7%** Northern Aspect

Site Morphology: **Upper slope**

Slope Morphology: **Waxing**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak C (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Brown fine silty clay loam with moderate grade of subangular blocky structure and rough-faced 5 cm peds, breaking to polyhedral peds of 0.2 cm. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Clear boundary to:	5		●		
	A2e		0.2 cm. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Clear boundary to:	5		●		
	B		Reddish yellow fine silty clay loam with moderate grade of subangular blocky structure and rough-faced 2 cm peds, breaking to polyhedral peds of 0.2 cm. Soil had few faint, grey, biological mottles. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Clear boundary to:	4.5		●		
50			Reddish yellow silty clay with strong grade of subangular blocky structure and smooth-faced 1 cm peds, breaking to polyhedral peds of 0.5 cm. Many (20-50%), dispersed, undisturbed, strongly weathered, parent material coarse gravel (20-60mm). Soil had few distinct, red, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Gradual boundary to:			●		
	C		Yellowish brown silty clay with strong grade of subangular blocky structure and smooth-faced 0.5 cm peds, breaking to subangular blocky peds of 0.5 cm. Abundant (50-90%), dispersed, undisturbed, strongly weathered, parent material cobbles (60-200mm). Soil had very few distinct, red, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist.	5		●		
100						●		
150			COMMENTS: 10% Qtz cobbles on surface. Pinrushes commom.					

Lithology

Substrate: **Slate**

Base of Observations: **Layer**

Continues at 150 cm

Rootzone: **50cm**

BSAL Drainage: **Poorly drained**

Very slowly permeable



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■ Segregations
■ Coarse fragments

BSAL Profile Description

McPhillamys Gold Project for Regis Resources Ltd

Detail Pit

SSMID: OM843

Excavated on: 23/07/2018 Logged by: PJH

Haplic Mesotrophic Brown Kurosol

717479m E, 6296669m N, (WGS84),

Landscape Properties

Landform Element: **hillslope**

Vegetation Community: **unknown**

Growth Form: **tussock grass**

Site Disturbance: **occasional cultivation**

Land Use: **improved pasture** Groundcover: **10%**

Surface Condition Wet: **firm** Dry: **hardset**

Topography

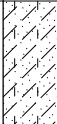


Slope: **8%** Northern Aspect



Site Morphology: **Upper slope**

Slope Morphology: **Waxing**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak C (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A		Brown coarse sandy loam with moderate grade of subangular blocky structure and rough-faced 4 cm peds, breaking to polyhedral peds of 0.5 cm. Common (10-20%), stratified, reoriented, non-weathered, quartz cobbles (60-200mm). Clods were not dispersive, and did not slake in distilled water. Moderately moist. Gradual boundary to:	5.5				
	B		Dark yellowish brown light clay with strong grade of polyhedral structure and rough-faced 2 cm peds, breaking to polyhedral peds of 0.5 cm. Few (2-10%), dispersed, undisturbed, strongly weathered, parent material gravel (6-20mm). Clods were not dispersive, and did not slake in distilled water. Dry. Gradual boundary to:	4.5				
50	C		Dark yellowish brown light clay with strong grade of polyhedral structure and rough-faced 1 cm peds, breaking to polyhedral peds of 0.5 cm. Abundant (50-90%), stratified, undisturbed, strongly weathered, parent material cobbles (60-200mm). Soil had few distinct, red, weathered mottles. Clods were not dispersive, and partially slaked in distilled water. Dry. Diffuse boundary to:	4				
	R		Dry.					
100			COMMENTS: R is XW EL vertically oriented slate. 10% Qtz cobbles on surface.					

 Segregations
 Coarse fragments

Lithology

Substrate: **Slate**

Base of Observations: **Layer**

Continues at 90 cm

Rootzone: **50cm**

BSAL Drainage: **Moderately**

well drained

Slowly permeable



Sustainable Soils Management

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BSAL Profile Description

McPhillamys Gold Project for Regis Resources Ltd

Detail Pit

SSMID: OM844

Excavated on: 23/07/2018 Logged by: PJH

Haplic Eutrophic Black Dermosol

714886m E, 6293330m N, (WGS84),

Landscape Properties

Landform Element: levee

Vegetation Community: unknown

Growth Form: tussock grass

Site Disturbance: occasional cultivation

Land Use: improved pasture Groundcover: 95%

Surface Condition Wet: trampled Dry: trampled

Topography

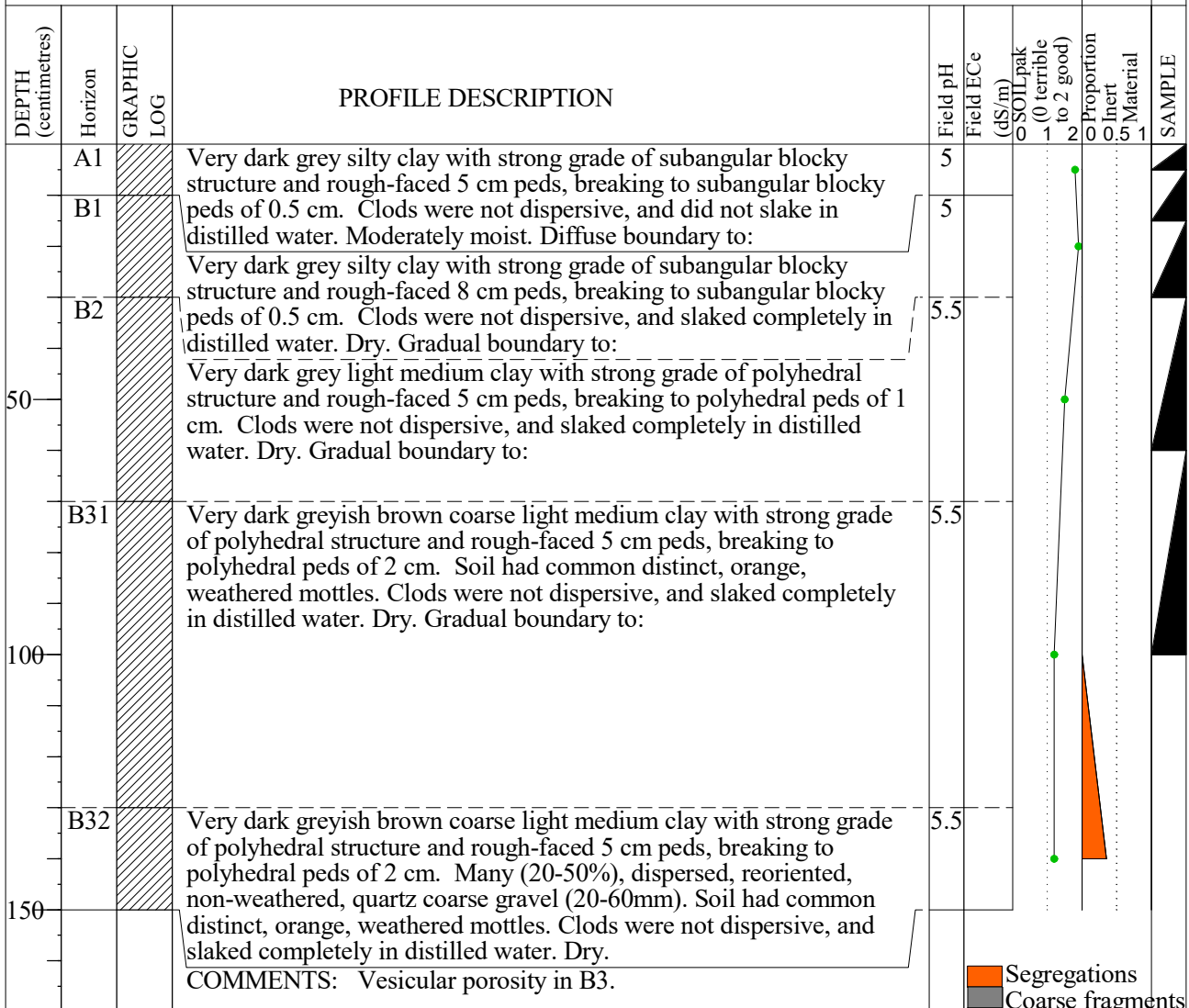
Slope: 2% Southern Aspect

Site Morphology: Open Depression

Slope Morphology: Minimal

Microrelief: None

Rock Outcrop: 0



Lithology

Substrate: alluvium

Base of Observations: Layer

Continues at 150 cm

Rootzone: 90cm

BSAL Drainage:

Imperfectly drained

Slowly permeable



Sustainable Soils Management

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BSAL Profile Description

McPhillamys Gold Project for Regis Resources Ltd

Detail Pit

SSMID: OM845

Excavated on: 23/07/2018 Logged by: PJH

Bleached Eutrophic Black Dermosol

714743m E, 6293463m N, (WGS84),

Landscape Properties

Landform Element: valley flat

Vegetation Community: unknown

Growth Form: tussock grass

Site Disturbance: occasional cultivation

Land Use: improved pasture Groundcover: 90%

Surface Condition Wet: trampled Dry: trampled

Topography

Slope: 4% Southeastern Aspect

Site Morphology: Open Depression

Slope Morphology: Waxing

Microrelief: None

Rock Outcrop: 0

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 to 2 good) (1 (0 terrible to 2 good))	Proportion Inert Material	SAMPLE
0-50	A1		Very dark greyish brown light medium clay with strong grade of subangular blocky structure and rough-faced 7.5 cm peds, breaking to subangular blocky peds of 0.5 cm. Clods dispersed slightly, and partially slaked in distilled water. Moderately moist. Diffuse boundary to:	4.5				
50-100	A2		Dark greyish brown silty clay with moderate grade of polyhedral structure and rough-faced 10 cm peds, breaking to polyhedral peds of 1 cm. Soil had common distinct, brown, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Sharp boundary to:	4.5				
100-150	B2		Very dark grey heavy clay with strong grade of polyhedral structure and smooth-faced 10 cm peds, breaking to polyhedral peds of 1 cm. Clods were not dispersive, and partially slaked in distilled water. Dry. Gradual boundary to:	5				
150-180	B3		Dark grey medium heavy clay with strong grade of polyhedral structure and smooth-faced 4 cm peds, breaking to polyhedral peds of 1 cm. Soil had common faint, orange, weathered mottles. Clods were not dispersive, and did not slake in distilled water. Dry.	8	0.1			
COMMENTS: Thick A2. B2 stiff, very hard digging.								

Lithology

Substrate: alluvium

Base of Observations: Layer

Continues at 150 cm

Rootzone: 60cm

BSAL Drainage: Poorly drained

Very slowly permeable



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■ Segregations
■ Coarse fragments

BSAL Profile Description

McPhillamys Gold Project for Regis Resources Ltd

Detail Pit

SSMID: OM846

Excavated on: 23/07/2018 Logged by: PJH

Haplic Eutrophic Black Dermosol

714573m E, 6293125m N, (WGS84),

Topography

Slope: 2% Southern Aspect
 Site Morphology: **Open Depression**
 Slope Morphology: **Minimal**
 Microrelief: **None**
 Rock Outcrop: **0**

Landscape Properties

Landform Element: **valley flat**
 Vegetation Community: **unknown**
 Growth Form: **sod grass**

Site Disturbance: **occasional cultivation**

Land Use: **improved pasture** Groundcover: **80%**
 Surface Condition Wet: **firm** Dry: **hardset**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak C (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1	/ / / / /	Dark greyish brown light medium clay with strong grade of polyhedral structure and rough-faced 10 cm peds, breaking to subangular blocky peds of 0.2 cm. Clods were not dispersive, and did not slake in distilled water. Dry. Clear boundary to:	5		1	0.5	1
	A2	/ / / / /	Brown light medium clay with strong grade of polyhedral structure and rough-faced 5 cm peds, breaking to polyhedral peds of 0.5 cm.	5		2	0.5	1
	B1	/ / / / /	Soil had few distinct, pale, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Clear boundary to:	6		2	0.5	1
50			Very dark brown medium clay with strong grade of prismatic structure and rough-faced 5 cm peds, breaking to polyhedral peds of 1 cm. Soil had few distinct, grey, biological mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Gradual boundary to:	6.5		2	0.5	1
	B2	/ / / / /	Reddish Black medium heavy clay with strong grade of polyhedral structure and rough-faced 2 cm peds, breaking to polyhedral peds of 0.5 cm. Soil had very few distinct, orange, weathered mottles. Clods were not dispersive, and partially slaked in distilled water. Moderately moist. Gradual boundary to:	6.5		2	0.5	1
100								
	B3	/ / / / /	Reddish Black medium heavy clay with strong grade of polyhedral structure and rough-faced 5 cm peds, breaking to polyhedral peds of 1 cm. Soil had few distinct, orange, weathered mottles. Clods were not dispersive, and did not slake in distilled water. Moderately moist.	6.5		2	0.5	1
150								

COMMENTS: 0

■ Segregations
■ Coarse fragments

Lithology

Substrate: **alluvium**
 Base of Observations: **Layer Continues at 150 cm**
 Rootzone: **90cm**
 BSAL Drainage: **Poorly drained**
Very slowly permeable



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BSAL Profile Description

McPhillamys Gold Project for Regis Resources Ltd

Detail Pit 947

Manganic Eutrophic Brown **Dermosol**

SSMID: OM947

715972m E, 6296600m N, (WGS 84),

Excavated on: **29/01/2019** Logged by: **PJH**

Landscape Properties

Landform Element: **hillslope**
 Vegetation Community: **unknown**
 Growth Form: **tussock grass**
 Site Disturbance: **occasional cultivation**

Topography

Slope: **6%** Western Aspect
 Site Morphology: **Midslope**
 Slope Morphology: **Maximal**
 Microrelief: **None**
 Rock Outcrop: **0**

Land Use: **improved pasture** Groundcover: **30%**
 Surface Condition Wet: **firm** Dry: **hardset**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Brown fine silty loam with moderate grade of angular blocky structure and rough-faced 3 cm peds, breaking to subangular blocky peds of 0.5 cm. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Clear boundary to:	4.5		1.5	0.5	
	A2		Brown fine silty clay loam with moderate grade of lenticular structure and earthy 3 cm peds, breaking to subangular blocky peds of 0.5 cm. Few (2-10%), medium (2-6mm), strong, ferromangiferous nodules. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Clear boundary to:	4.5		1.5	0.5	
50	B1		Strong brown silty clay with strong grade of prismatic structure and earthy 5 cm peds, breaking to subangular blocky peds of 1.5 cm. Soil had few distinct, grey, biological mottles. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Diffuse boundary to:	4.5		1.5	0.5	
100	B2		Yellowish brown silty clay with strong grade of polyhedral structure and smooth-faced 2 cm peds, breaking to polyhedral peds of 0.2 cm. Common (10-20%), coarse (6-20mm), weak, ferromangiferous nodules. Soil had few distinct, grey, biological mottles. Clods were not dispersive, and did not slake in distilled water. Moderately moist.	4.5		1.5	0.5	
			COMMENTS: Should be productive pasture soil. Phalaris common.					

Segregations
 Coarse fragments

Lithology

Substrate: **not identified**
 Base of Observations: **Layer**
 Continues at 110 cm
 Rootzone: **90cm**
 BSAL Drainage: **Moderately well drained**
 Moderately permeable



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BSAL Profile Description

McPhillamys Gold Project for Regis Resources Ltd

Detail Pit 948

SSMID: OM948

Excavated on: 29/01/2019 Logged by: PJH

Bleached Eutrophic Brown Dermosol

715485m E, 6296699m N, (WGS 84),

Landscape Properties

Landform Element: **hillcrest**

Vegetation Community: **unknown**

Growth Form: **tussock grass**

Site Disturbance: **occasional cultivation**

Land Use: **improved pasture**

Surface Condition Wet: **firm**

Groundcover: **20%**

Dry: **hardset**

Topography

Slope: **9%** Northeastern Aspect

Site Morphology: **Upper slope**

Slope Morphology: **Waxing**

Microrelief: **Normal Gilgai = 500 mm** Extent: **> 50%**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Dark yellowish brown fine silty loam with moderate grade of subangular blocky structure and rough-faced 1 cm peds, breaking to subangular blocky peds of 0.5 cm. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Abrupt boundary to:	4.5				
	A2		Dark yellowish brown fine silty loam with weak grade of polyhedral structure and rough-faced 3 cm peds, breaking to polyhedral peds of 1 cm. Soil had very few distinct, grey, biological mottles. Clods were not dispersive, and did not slake in distilled water. Dry. Abrupt boundary to:	4.5				
	B1		Dark yellowish brown fine silty loam with weak grade of polyhedral structure and rough-faced 3 cm peds, breaking to polyhedral peds of 1 cm. Soil had very few distinct, grey, biological mottles. Clods were not dispersive, and did not slake in distilled water. Dry. Abrupt boundary to:	5				
50	B22		Strong brown fine silty clay loam with strong grade of polyhedral structure and rough-faced 5 cm peds, breaking to polyhedral peds of 0.5 cm. Few (2-10%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Soil had few distinct, grey, biological mottles. Clods were not dispersive, and partially slaked in distilled water. Dry. Gradual boundary to:	5				
	B23		Yellowish red light clay with strong grade of polyhedral structure and rough-faced 5 cm peds, breaking to polyhedral peds of 1 cm. Few (2-10%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Soil had few distinct, grey, biological mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Gradual boundary to:	5				
100			Strong brown light medium clay with strong grade of polyhedral structure and rough-faced 1 cm peds, breaking to angular blocky peds of 0.2 cm. Soil had few distinct, grey, biological mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. COMMENTS: Few saffron, phalaris, corkscrew grass??, pattersons curse. Much drier than 947. Gilgai 10 cm deep.					

■ Segregations
■ Coarse fragments

Lithology

Substrate: **not identified**

Base of Observations: **Layer**

Continues at 100 cm

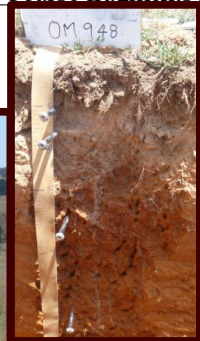
Rootzone: **70cm**

BSAL Drainage: **Poorly drained**

Highly permeable



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BSAL Profile Description

McPhillamys Gold Project for Regis Resources Ltd

Detail Pit 949

Haplic Eutrophic Brown Dermosol

SSMID: OM949

715144m E, 6296577m N, (WGS 84),

Excavated on: 29/01/2019 Logged by: PJH

Landscape Properties

Landform Element: **hillslope**
Vegetation Community: **unknown**
Growth Form: **tussock grass**
Site Disturbance: **occasional cultivation**

Topography

Slope: **4%** Northern Aspect
Site Morphology: **Midslope**
Slope Morphology: **Minimal**
Microrelief: **None**
Rock Outcrop: **0**

Land Use: **improved pasture** Groundcover: **20%**
Surface Condition Wet: **firm** Dry: **hardset**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Dark grey fine silty clay loam with moderate grade of subangular blocky structure and rough-faced 3 cm peds, breaking to subangular blocky peds of 0.5 cm. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Abrupt boundary to:	4.5				
	A2		Reddish brown fine silty clay loam with weak grade of subangular blocky structure and rough-faced 5 cm peds, breaking to subangular blocky peds of 0.5 cm. Clods were not dispersive, and did not slake in distilled water. Dry. Abrupt boundary to:	4.5				
	B1		Yellowish red silty clay with moderate grade of polyhedral structure and rough-faced 3 cm peds, breaking to polyhedral peds of 1 cm. Few (2-10%), dispersed, reoriented, non-weathered, quartz coarse gravel (20-60mm). Soil had very few distinct, grey, biological mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Gradual boundary to:	5				
50	B22		Yellowish red light clay with strong grade of polyhedral structure and rough-faced 5 cm peds, breaking to polyhedral peds of 1 cm. Few (2-10%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Soil had very few distinct, grey, biological mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Gradual boundary to:	5				
	B23		Yellowish red light clay with strong grade of subangular blocky structure and rough-faced 1 cm peds, breaking to subangular blocky peds of 0.2 cm. Few (2-10%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Soil had very few distinct, grey, biological mottles. Clods were not dispersive, and slaked completely in distilled water. Dry.	5				
100			COMMENTS: Small flattish area, midslope. Corkscrew grass, phalaris, patternsons curse, skeleton weed?					

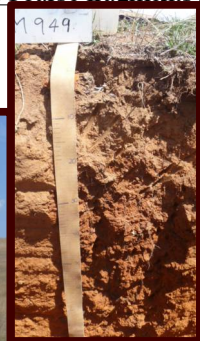
Segregations
 Coarse fragments

Lithology

Substrate: **not identified**
Base of Observations: **Layer**
Continues at 110 cm
Rootzone: **80cm**
BSAL Drainage: **Poorly drained**
Moderately permeable



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BSAL Profile Description

McPhillamys Gold Project for Regis Resources Ltd

Detail Pit 950

Bleached Eutrophic Red Dermosol

SSMID: OM950

715381m E, 6296272m N, (WGS 84),

Excavated on: 29/01/2019 Logged by: PJH

Topography

Slope: **8%** Southern Aspect
 Site Morphology: **Upper slope**
 Slope Morphology: **Waxing**
 Microrelief: **None**
 Rock Outcrop: **0**

Landscape Properties

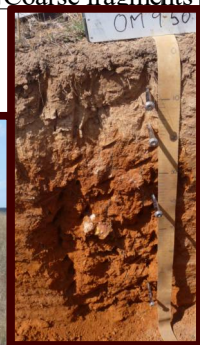
Landform Element: **hillcrest**
 Vegetation Community: **unknown**
 Growth Form: **tussock grass**
 Site Disturbance: **occasional cultivation**
 Land Use: **improved pasture** Groundcover: **20%**
 Surface Condition Wet: **firm** Dry: **hardset**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Dark yellowish brown fine silty loam with moderate grade of angular blocky structure and rough-faced 3 cm peds, breaking to subangular blocky peds of 0.5 cm. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Abrupt boundary to:	4.5		●	0.5	▲
	A2		blocky peds of 0.5 cm. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Abrupt boundary to:	4.5		●	0.5	▲
	B1		Strong brown fine silty loam with moderate grade of angular blocky structure and rough-faced 10 cm peds, breaking to angular blocky peds of 0.2 cm. Soil had few distinct, orange, weathered mottles. Clods were not dispersive, and did not slake in distilled water. Dry. Abrupt boundary to:	5.5		●	0.5	▲
50	B2		Yellowish red light clay with strong grade of polyhedral structure and rough-faced 3 cm peds, breaking to polyhedral peds of 0.5 cm. Few (2-10%), dispersed, reoriented, non-weathered, quartz fine gravel (2-6mm). Soil had very few distinct, grey, biological mottles. Clods were not dispersive, and partially slaked in distilled water. Dry. Gradual boundary to:	6		●	0.5	▲
	B3		Yellowish red light clay with strong grade of polyhedral structure and rough-faced 3 cm peds, breaking to polyhedral peds of 0.2 cm. Few (2-10%), dispersed, reoriented, non-weathered, quartz coarse gravel (20-60mm). Soil had very few distinct, grey, biological mottles. Clods were not dispersive, and partially slaked in distilled water. Dry. Gradual boundary to:	5		●	0.5	▲
100			Yellowish red light clay with moderate grade of polyhedral structure and rough-faced 2 cm peds, breaking to polyhedral peds of 0.2 cm. Few (2-10%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Soil had very few distinct, grey, biological mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. COMMENTS: 3% Qtz boulders within 10 m of pit. Pattersons curse, phalaris, corkscrew.			●	0.5	▲

■ Segregations
■ Coarse fragments

Lithology

Substrate: **not identified**
 Base of Observations: **Layer**
 Continues at 110 cm
 Rootzone: **70cm**
 BSAL Drainage: **Poorly drained**
 Slowly permeable



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BSAL Profile Description

McPhillamys Gold Project for Regis Resources Ltd

Detail Pit 951

SSMID: OM951

Excavated on: 29/01/2019 Logged by: PJH

Bleached Eutrophic Grey Dermosol

715741m E, 6296366m N, (WGS 84),

Landscape Properties

Landform Element: hillslope

Vegetation Community: unknown

Growth Form: tussock grass

Site Disturbance: occasional cultivation

Land Use: improved pasture

Surface Condition Wet: firm

Groundcover: 10%

Dry: hardset

Topography

Slope: 5% Northern Aspect

Site Morphology: Midslope

Slope Morphology: Minimal

Microrelief: None

Rock Outcrop: 0

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Brown fine silty loam with moderate grade of subangular blocky structure and rough-faced 2 cm peds, breaking to subangular blocky peds of 0.5 cm. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Clear boundary to:	4.5		1	0.5	
	A2		Light yellowish brown fine silty loam with moderate grade of subangular blocky structure and rough-faced 5 cm peds, breaking to angular blocky peds of 1 cm. Clods were not dispersive, and did not slake in distilled water. Moderately moist. Abrupt boundary to:	4.5		2	0.5	
50	B1		Dark yellowish brown light clay with strong grade of polyhedral structure and rough-faced 10 cm peds, breaking to polyhedral peds of 2 cm. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Gradual boundary to:	4.5		2	0.5	
	B2		Light brownish grey light clay with strong grade of polyhedral structure and rough-faced 5 cm peds, breaking to subangular blocky peds of 1 cm. Soil had few distinct, orange, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist.	4.5		2	0.5	
100	COMMENTS: Unproductive soil							

Segregations
 Coarse fragments

Lithology

Substrate: not identified

Base of Observations: Layer

Continues at 100 cm

Rootzone: 60cm

BSAL Drainage: Poorly drained

Very slowly permeable



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BSAL Profile Description

McPhillamys Gold Project for Regis Resources Ltd

Detail Pit 952

SSMID: OM952

Excavated on: 5/03/2019 Logged by: PJH

Bleached-Mottled Eutrophic Brown Dermosol

718095m E, 6293059m N, (WGS 84),

Landscape Properties

Landform Element: hillslope

Vegetation Community: woodland grass understory

Growth Form: tussock grass

Site Disturbance: occasional cultivation

Land Use: voluntary/native pasture groundcover: 50%

Surface Condition Wet: firm

Dry: hardset

Topography

Slope: 9% Northwestern Aspect

Site Morphology: Lower slope

Slope Morphology: Maximal

Microrelief: None

Rock Outcrop: 0

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Dark brown fine silty loam with moderate grade of subangular blocky structure and rough-faced 3 cm peds, breaking to subangular blocky peds of 0.5 cm. Soil had few distinct, orange, weathered mottles. Clods were not dispersive, and did not slake in distilled water. Dry.	4.5				
	A2e		Pale brown fine silty loam with weak grade of polyhedral structure and rough-faced 10 cm peds, breaking to polyhedral peds of 1 cm. Soil had few distinct, orange, weathered mottles. Clods were not dispersive, and partially slaked in distilled water. Dry. Sharp boundary to:	4				
50	B1		Strong brown silty clay with moderate grade of polyhedral structure and rough-faced 7 cm peds, breaking to polyhedral peds of 1 cm. Soil had common prominent, grey, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Clear boundary to:	4				
	B22		Strong brown light clay with moderate grade of polyhedral structure and rough-faced 2 cm peds, breaking to polyhedral peds of 0.5 cm. Few (2-10%), dispersed, reoriented, weakly weathered, quartz gravel (6-20mm). Soil had many distinct, grey, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Gradual boundary to:	5				
100	B23		Yellowish brown medium clay with moderate grade of polyhedral structure and rough-faced 2 cm peds, breaking to polyhedral peds of 0.5 cm. Few (2-10%), dispersed, reoriented, weakly weathered, quartz cobbles (60-200mm). Soil had few prominent, grey, weathered mottles. Clods were not dispersive, and partially slaked in distilled water. Moderately moist. Gradual boundary to:	5.5				
	COMMENTS: Vesicular pores in A2 and B1. Mangans in B21. Extremely weathered, extremely low strength vertically bedded shale in B23.							

Segregations
Coarse fragments

Lithology

Substrate: shale

Base of Observations: Bed at 130 cm

Rootzone: 80cm

BSAL Drainage: Poorly drained

Very slowly permeable



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BSAL Profile Description

McPhillamys Gold Project for Regis Resources Ltd

Detail Pit 953

SSMID: OM953

Excavated on: 5/03/2019 Logged by: PJH

Bleached-Acidic Mesotrophic Red Dermosol

718069m E, 6292600m N, (WGS 84),

Landscape Properties

Landform Element: hillslope

Vegetation Community: woodland grass understory

Growth Form: tussock grass

Site Disturbance: cleared no cultivation

Land Use: voluntary/native pasture groundcover: 50%

Surface Condition Wet: firm

Dry: hardset

Topography

Slope: 3% Southwestern Aspect

Site Morphology: Upper slope

Slope Morphology: Waxing

Microrelief: None

Rock Outcrop: 0

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE	
	A11		Dark reddish brown fine silty clay loam with strong grade of subangular blocky structure and rough-faced 2 cm peds, breaking to subangular blocky peds of 0.5 cm. Clods were not dispersive, and did not slake in distilled water. Dry. Abrupt boundary to:	5.5					
	A12		Red silty clay with moderate grade of subangular blocky structure and rough-faced 10 cm peds, breaking to subangular blocky peds of 1 cm. Soil had few distinct, grey, biological mottles. Clods were not dispersive, and did not slake in distilled water. Dry. Abrupt boundary to:	4					
	A2e		Red light clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds, breaking to polyhedral peds of 0.5 cm. Few (2-10%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Clods were not dispersive, and partially slaked in distilled water. Dry. Abrupt boundary to:	4.5					
	B2		Red light clay with strong grade of polyhedral structure and rough-faced 3 cm peds, breaking to polyhedral peds of 0.5 cm. Few (2-10%), dispersed, reoriented, non-weathered, quartz coarse gravel (20-60mm). Clods were not dispersive, and partially slaked in distilled water. Dry. Gradual boundary to:	4.5					
50	B3		Red light clay with strong grade of subangular blocky structure and rough-faced 2 cm peds, breaking to polyhedral peds of 0.5 cm. Soil had common distinct, yellow, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Gradual boundary to:	4.5					
100	C		Red light clay with strong grade of subangular blocky structure and rough-faced 2 cm peds, breaking to polyhedral peds of 0.5 cm. Soil had common distinct, yellow, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Gradual boundary to: Dry.	5					
			COMMENTS: Red grass, a grass with spathed, scattered juncus. C is extremely weathered, extremely low strength, vertically bedded, shale.						

Segregations
 Coarse fragments

Lithology

Substrate: shale

Base of Observations: Bed at 130 cm

Rootzone: 90cm

BSAL Drainage: Poorly drained

Moderately permeable



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BSAL Profile Description

McPhillamys Gold Project for Regis Resources Ltd

Detail Pit 954

SSMID: OM954

Excavated on: 5/03/2019 Logged by: PJH

Acidic Mesotrophic Red Dermosol

718275m E, 6292491m N, (WGS 84),

Landscape Properties

Landform Element: hillslope

Vegetation Community: woodland grass understory

Growth Form: tussock grass

Site Disturbance: occasional cultivation

Land Use: voluntary/native pasture groundcover: 50%

Surface Condition Wet: firm

Dry: hardset

Topography

Slope: 7% Southern Aspect

Site Morphology: Upper slope

Slope Morphology: Waxing

Microrelief: None

Rock Outcrop: 0

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
0-5	A		Dark brown fine silty clay loam with strong grade of polyhedral structure and rough-faced 4 cm peds, breaking to subangular blocky peds of 0.5 cm. Few (2-10%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Clods were not dispersive, and did not slake in distilled water. Dry.	6		1.5	0.5	
5-10	A3		Dark brown fine silty clay loam with strong grade of polyhedral structure and rough-faced 4 cm peds, breaking to subangular blocky peds of 0.5 cm. Few (2-10%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Clods were not dispersive, and did not slake in distilled water. Dry.	6		1.5	0.5	
10-50	B2		Brown silty clay loam with moderate grade of polyhedral structure and rough-faced 3 cm peds, breaking to subangular blocky peds of 0.5 cm. Few (2-10%), dispersed, reoriented, non-weathered, quartz fine gravel (2-6mm). Clods were not dispersive, and did not slake in distilled water. Dry. Abrupt boundary to: Reddish brown medium clay with strong grade of polyhedral structure and rough-faced 2 cm peds, breaking to subangular blocky peds of 0.5 cm. Few (2-10%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Clods were not dispersive, and partially slaked in distilled water. Dry. Abrupt boundary to:	5.5		1.5	0.5	
50-100	BC		Reddish brown medium clay with strong grade of polyhedral structure and rough-faced 1 cm peds, breaking to subangular blocky peds of 0.5 cm. Many (20-50%), stratified, undisturbed, strongly weathered, shale cobbles (60-200mm). Clods were not dispersive, and partially slaked in distilled water. Dry. Gradual boundary to:	5.5		1.5	0.5	
100-130	C		Clods were not dispersive, and in distilled water. Dry. Diffuse boundary to:					
			COMMENTS: Phalaris common, vertical wormholes to 100 cm, about 10 cm apart in pit face. Extremely weathered, extremely low strength, vertically bedded shale.					

Segregations
 Coarse fragments

Lithology

Substrate: shale

Base of Observations: Bed at 130 cm

Rootzone: 80cm

BSAL Drainage: Moderately well drained

Moderately permeable



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BSAL Profile Description

McPhillamys Gold Project for Regis Resources Ltd

Detail Pit 955

Acidic Mesotrophic Red **Dermosol**

SSMID: OM955

717938m E, 6292005m N, (WGS 84),

Excavated on: **5/03/2019** Logged by: **PJH**

Topography

Slope: **7%** Southwestern Aspect

Site Morphology: **Midslope**

Slope Morphology: **Maximal**

Microrelief: **None**

Rock Outcrop: **0**

Landscape Properties

Landform Element: **hillslope**




Vegetation Community: **woodland grass understorey**

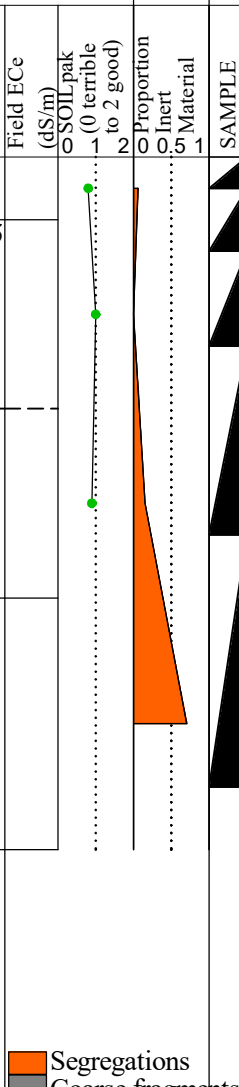
Growth Form: **tussock grass**

Site Disturbance: **occasional cultivation**

Land Use: **voluntary/native pasture** groundcover: **80%**

Surface Condition Wet: **firm** Dry: **hardset**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A		Dark reddish grey fine silty clay loam with moderate grade of polyhedral structure and rough-faced 2 cm peds, breaking to polyhedral peds of 0.5 cm. Few (2-10%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Clods were not dispersive, and did not slake in distilled water. Dry.	6				
	B2		Red medium clay with moderate grade of polyhedral structure and rough-faced 15 cm peds, breaking to subangular blocky peds of 0.5 cm. Clods were not dispersive, and did not slake in distilled water. Moist. Clear boundary to:	4.5				
50	BC		Red light medium clay with moderate grade of polyhedral structure and rough-faced 10 cm peds, breaking to polyhedral peds of 1 cm. Common (10-20%), stratified, undisturbed, strongly weathered, shells gravel (6-20mm). Clods were not dispersive, and did not slake in distilled water. Moist. Diffuse boundary to:	5				
100	C		Abundant (50-90%), stratified, undisturbed, strongly weathered, shale cobbles (60-200mm). Clods were not dispersive, and did not slake in distilled water. Moist. Diffuse boundary to:	5				
			COMMENTS: 5% Qtz cobbles on surface. C is extremely weak, extremely low strength weathered shale.					



Lithology

Substrate: **shale**

Base of Observations: **Bed** at 110 cm

Rootzone: **70cm**

BSAL Drainage: **Poorly drained**

Moderately permeable



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BSAL Profile Description

McPhillamys Gold Project for Regis Resources Ltd

Detail Pit 956

SSMID: OM956

Excavated on: 5/03/2019 Logged by: PJH

Acidic Mesotrophic Brown Dermosol

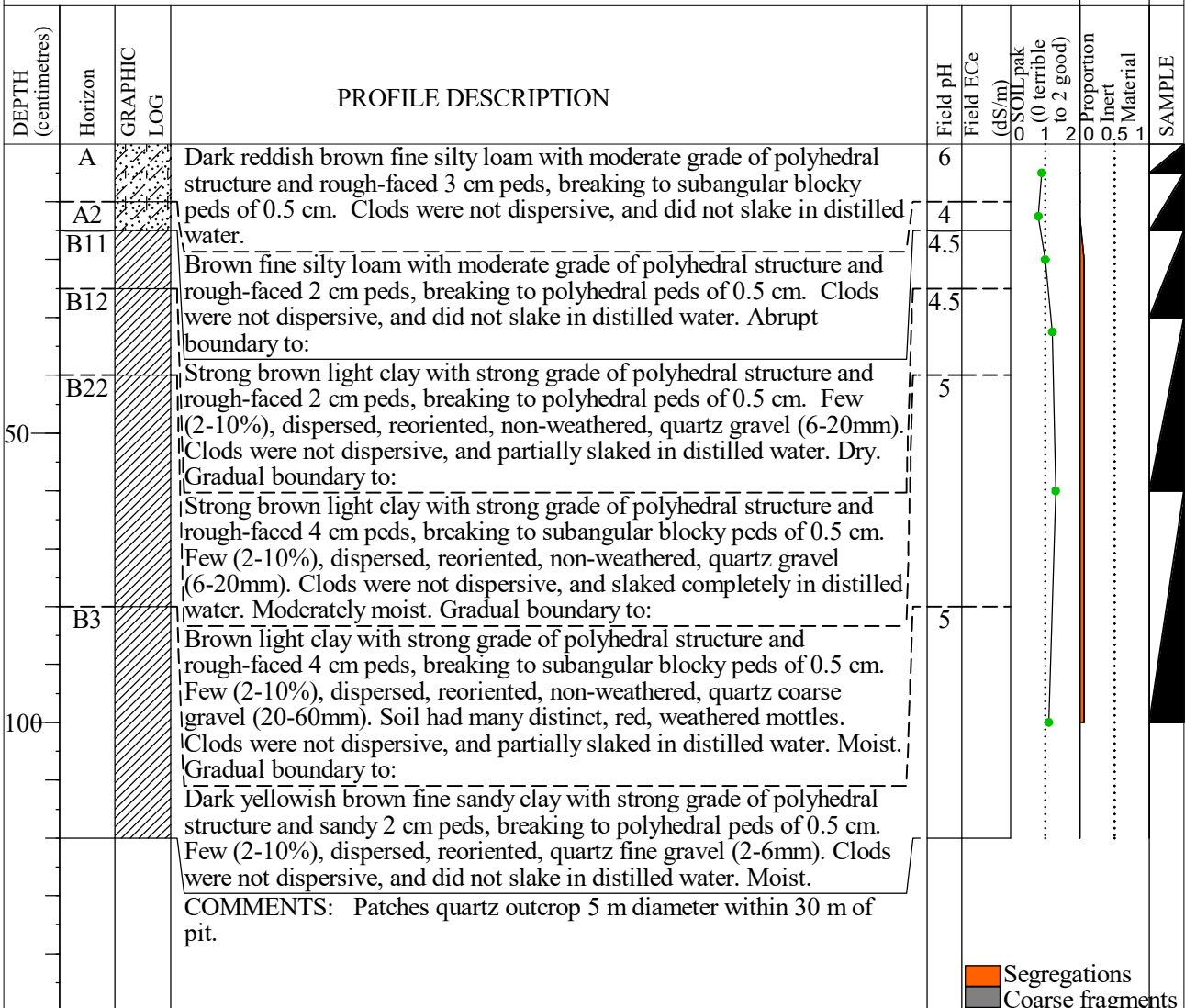
718196m E, 6292201m N, (WGS 84),

Landscape Properties

Landform Element: hillslope
 Vegetation Community: woodland grass understory
 Growth Form: tussock grass
 Site Disturbance: occasional cultivation
 Land Use: voluntary/native pasture groundcover: 40%
 Surface Condition Wet: firm Dry: hardset

Topography

Slope: 4% Northeastern Aspect
 Site Morphology: Upper slope
 Slope Morphology: Waxing
 Microrelief: None
 Rock Outcrop: 0



Lithology
 Substrate: not identified
 Base of Observations: LC at 120 cm
 Rootzone: 70cm
 BSAL Drainage: Imperfectly drained
 Slowly permeable



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BSAL Profile Description

McPhillamys Gold Project for Regis Resources Ltd

Detail Pit 957

SSMID: OM957

Excavated on: 5/03/2019 Logged by: PJH

Manganic-Acidic Eutrophic Brown **Kandosol**

718674m E, 6292203m N, (WGS 84),

Topography

Slope: **8%** Northeastern Aspect

Site Morphology: **Lower slope**

Slope Morphology: **Waning**

Microrelief: **None**

Rock Outcrop: **0**

Landscape Properties

Landform Element: **hillslope**

Vegetation Community: **unknown**

Growth Form: **tussock grass**

Site Disturbance: **occasional cultivation**

Land Use: **improved pasture** Groundcover: **50%**

Surface Condition Wet: **firm** Dry: **hardset**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Brown fine silty clay loam with moderate grade of subangular blocky structure and rough-faced 2 cm peds, breaking to subangular blocky peds of 0.5 cm. Soil had very few distinct, orange, weathered mottles. Clods were not dispersive, and did not slake in distilled water. Dry.	5.5		●	0.5	1
	A2		Clods were not dispersive, and did not slake in distilled water. Dry.	4		●	0.5	1
	B1		Brown fine silty clay loam with moderate grade of polyhedral structure and rough-faced 2 cm peds, breaking to polyhedral peds of 0.5 cm. Clods were not dispersive, and did not slake in distilled water. Dry. Sharp boundary to: Yellowish brown light clay with strong grade of polyhedral structure and rough-faced 3 cm peds, breaking to polyhedral peds of 0.5 cm. Clods were not dispersive, and slaked completely in distilled water. Dry. Sharp boundary to:	4		●	0.5	1
50								
	B22		Brown fine sandy clay loam with weak grade of subangular blocky structure and sandy 5 cm peds, breaking to subangular blocky peds of 0.5 cm. Abundant (>50%), coarse (6-20mm), weak, ferromangiferous soft segregations. Soil had many distinct, orange, weathered mottles. Clods were not dispersive, and partially slaked in distilled water. Dry. Gradual boundary to:	4		●	0.5	1
100								
			COMMENTS: Dominant grass species- phalaris, paspalum. Rusty roof linings in A1. Vesicular pores in B1.					

■ Segregations
■ Coarse fragments

Lithology

Substrate: **not identified**

Base of Observations: LC at 130 cm

Rootzone: **70cm**

BSAL Drainage: **Poorly drained**

Slowly permeable



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BSAL Profile Description

McPhillamys Gold Project for Regis Resources Ltd

Detail Pit 958

SSMID: OM958

Excavated on: 21/03/2019 Logged by: PJH

Bleached-Mottled Eutrophic Grey **Dermosol**

718080m E, 6291118m N, (WGS 84),

Landscape Properties

Landform Element: **hillslope**

Vegetation Community: **unknown**

Growth Form: **tussock grass**

Site Disturbance: **occasional cultivation**

Land Use: **voluntary/native pasture** Groundcover: **50%**

Surface Condition Wet: **firm**

Dry: **hardset**

Topography

Slope: **5%** Western Aspect

Site Morphology: **Lower slope**

Slope Morphology: **Waxing**

Microrelief: **Normal** **Height = 500 mm** Extent: **> 50%**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE	
	A11		Very dark greyish brown fine silty clay with strong grade of subangular blocky structure and rough-faced 5 cm peds, breaking to subangular blocky peds of 0.5 cm. Clods were not dispersive, and did not slake in distilled water. Dry.	4		●	0.5	1	
	A12		Brown fine silty clay loam with strong grade of subangular blocky structure and rough-faced 10 cm peds, breaking to polyhedral peds of 0.5 cm. Soil had many distinct, orange, weathered mottles. Clods were not dispersive, and partially slaked in distilled water. Dry. Gradual boundary to:	4		●	0.5	1	
50	A2e		Brown fine silty clay loam with moderate grade of polyhedral structure and rough-faced 10 cm peds, breaking to polyhedral peds of 0.7 cm. Soil had few distinct, orange, weathered mottles. Clods dispersed slightly, and slaked completely in distilled water. Dry. Gradual boundary to:	4		●	0.5	1	
	B1		Brown light clay with moderate grade of polyhedral structure and rough-faced 10 cm peds, breaking to polyhedral peds of 1 cm. Soil had common distinct, orange, weathered mottles. Clods dispersed slightly, and slaked completely in distilled water. Moderately moist. Gradual boundary to:	4		●	0.5	1	
100	B2		Grey medium clay with moderate grade of subangular blocky structure and rough-faced 10 cm peds, breaking to polyhedral peds of 1 cm. Soil had many distinct, red, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Gradual boundary to:	4		●	0.5	1	
			COMMENTS: Bleached A2 is sporadic. Also 10% Grey weathered mottle in B1 and B2. Phalaris and cocksfoot dominant.						

Segregations
 Coarse fragments

Lithology

Substrate: **colluvium**

Base of Observations: LC at 130 cm

Rootzone: **70cm**

BSAL Drainage: **Poorly drained**

Slowly permeable



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BSAL Profile Description

McPhillamys Gold Project for Regis Resources Ltd

Detail Pit 959

SSMID: OM959

Excavated on: 21/03/2019 Logged by: PJH

Bleached-Mottled Eutrophic Brown Chromosol

718128m E, 6291484m N, (WGS 84),

Landscape Properties

Landform Element: **hillslope**

Vegetation Community: **unknown**

Growth Form: **tussock grass**

Site Disturbance: **occasional cultivation**

Land Use: **voluntary/native pasture** groundcover: **40%**

Surface Condition Wet: **firm**

Dry: **hardset**

Topography






Slope: **6%** Southern Aspect

Site Morphology: **Midslope**

Slope Morphology: **Waxing**

Microrelief: **None**

Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE	
	A1		Dark brown fine sandy loam with moderate grade of subangular blocky structure and sandy 1 cm peds, breaking to subangular blocky peds of 0.5 cm. Clods were not dispersive, and did not slake in distilled water. Dry.	4					
	A2e		Light yellowish brown fine sandy loam with weak grade of platy structure and sandy 2 cm peds, breaking to polyhedral peds of 0.5 cm. Soil had few distinct, orange, weathered mottles. Clods dispersed slightly, and slaked completely in distilled water. Dry. Clear boundary to:	4					
50	B1		Yellowish brown light clay with strong grade of polyhedral structure and rough-faced 5 cm peds, breaking to polyhedral peds of 1 cm. Soil had few distinct, grey, biological mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Clear boundary to:	4					
	B21		Brown medium clay with strong grade of polyhedral structure and smooth-faced 2 cm peds, breaking to polyhedral peds of 0.5 cm. Few (2-10%), coarse (6-20mm), strong, ferromangiferous nodules. Soil had common distinct, orange, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Gradual boundary to:	4					
100	B22		Greyish brown medium heavy clay with strong grade of polyhedral structure and smooth-faced 2 cm peds, breaking to polyhedral peds of 0.5 cm. Few (2-10%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Few (2-10%), coarse (6-20mm), strong, ferromangiferous nodules. Soil had many distinct, orange, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Gradual boundary to:	4					
			COMMENTS: Continuous vertical wormholes to bottom of pit. Mostly phalaris.						

Segregations
 Coarse fragments

Lithology

Substrate: **colluvium**

Base of Observations: **LC** at 130 cm

Rootzone: **90cm**

BSAL Drainage: **Poorly drained**

Very slowly permeable



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BSAL Profile Description

McPhillamys Gold Project for Regis Resources Ltd

Detail Pit 960

SSMID: OM960

Excavated on: 21/03/2019 Logged by: PJH

Bleached Eutrophic Brown Dermosol

718250m E, 6291833m N, (WGS 84),

Landscape Properties

Landform Element: hillslope

Vegetation Community: woodland grass understory

Growth Form: tussock grass

Site Disturbance: occasional cultivation

Land Use: voluntary/native pasture groundcover: 40%

Surface Condition Wet: firm

Dry: hardset

Topography

Slope: 7% Eastern Aspect

Site Morphology: Upper slope

Slope Morphology: Waxing

Microrelief: None

Rock Outcrop: 0

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Dark yellowish brown fine silty loam with moderate grade of subangular blocky structure and rough-faced 1 cm peds, breaking to subangular blocky peds of 0.2 cm. Clods were not dispersive, and did not slake in distilled water. Dry.	4				
	A2e		Yellowish brown fine silty loam with weak grade of subangular blocky structure and rough-faced 5 cm peds, breaking to subangular blocky peds of 0.2 cm. Clods were not dispersive, and did not slake in distilled water. Dry. Clear boundary to:	4				
50	A3		Brownish yellow fine silty clay loam with moderate grade of lenticular structure and rough-faced 3 cm peds, breaking to polyhedral peds of 1 cm. Few (2-10%), very coarse (20-60mm), strong, ferromangiferous nodules. Soil had many distinct, orange, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Gradual boundary to:	4				
	B22		Dark yellowish brown light clay with strong grade of polyhedral structure and smooth-faced 2 cm peds, breaking to polyhedral peds of 0.5 cm. Very few (<2%), coarse (6-20mm), strong, ferromangiferous nodules. Soil had few distinct, orange, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Gradual boundary to:	4.5				
100	B23		Brown medium clay with strong grade of polyhedral structure and smooth-faced 1 cm peds, breaking to polyhedral peds of 0.5 cm. Abundant (>50%), extremely coarse (>60mm), strong, ferromangiferous fragments. Soil had few distinct, orange, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moist. Sharp boundary to:	4.5				
150			COMMENTS: 2% cobbles at surface. Mostly phalaris. Can see evidence of past cultivation in form of small subdued ridges. Grey Biological mottle around worm holes in B22.					

Segregations
 Coarse fragments

Lithology

Substrate: colluvium

Base of Observations: LC at 140 cm

Rootzone: 80cm

BSAL Drainage: Poorly drained

Very slowly permeable



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BSAL Profile Description

McPhillamys Gold Project for Regis Resources Ltd

Detail Pit 961

SSMID: OM961

Excavated on: 21/03/2019 Logged by: PJH

Acidic Eutrophic Brown Dermosol

718461m E, 6291501m N, (WGS 84),

Landscape Properties

Landform Element: hillslope

Vegetation Community: woodland grass understorey

Growth Form: tussock grass

Site Disturbance: occasional cultivation

Land Use: improved pasture

Groundcover: 20%

Surface Condition Wet: firm

Dry: hardset

Topography

Slope: 7% Western Aspect

Site Morphology: Upper slope

Slope Morphology: Maximal

Microrelief: None

Rock Outcrop: 0

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOIL pak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Dark brown fine silty loam with moderate grade of subangular blocky structure and rough-faced 2 cm peds, breaking to subangular blocky peds of 0.5 cm. Clods were not dispersive, and did not slake in distilled water. Dry.	4				
	B1		Strong brown light clay with moderate grade of subangular blocky structure and rough-faced 2 cm peds, breaking to subangular blocky peds of 0.5 cm. Few (2-10%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Soil had many distinct, grey, biological mottles. Clods were not dispersive, and partially slaked in distilled water. Dry. Clear boundary to:	4				
50	B2		Strong brown light clay with moderate grade of subangular blocky structure and rough-faced 5 cm peds, breaking to subangular blocky peds of 0.5 cm. Few (2-10%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Soil had few distinct, red, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Diffuse boundary to:	4				
100	B3		Light reddish brown light clay with weak grade of subangular blocky structure and rough-faced 0.5 cm peds. Soil had common distinct, red, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Moderately moist. Gradual boundary to:	4				
			COMMENTS: Soil looks OK. Pasture does not.					

Segregations
 Coarse fragments

Lithology

Substrate: colluvium

Base of Observations: LC at 140 cm

Rootzone: 80cm

BSAL Drainage: Imperfectly drained

Slowly permeable



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BSAL Profile Description

McPhillamys Gold Project for Regis Resources Ltd

Detail Pit 962

SSMID: OM962

Excavated on: 21/03/2019 Logged by: PJH

Bleached-Acidic Mesotrophic Brown Dermosol

718742m E, 6290665m N, (WGS 84),

Landscape Properties

Landform Element: hillslope

Vegetation Community: woodland grass understory

Growth Form: tussock grass

Site Disturbance: occasional cultivation

Land Use: improved pasture

Groundcover: 60%

Surface Condition Wet: firm

Dry: hardset

Topography

Slope: 4% Northwestern Aspect

Site Morphology: Lower slope

Slope Morphology: Waning

Microrelief: None

Rock Outcrop: 0

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOIL pak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Brown fine silty clay loam with strong grade of subangular blocky structure and rough-faced 2 cm peds, breaking to subangular blocky peds of 0.5 cm. Clods were not dispersive, and did not slake in distilled water. Dry.	4		1	0.5	1
	A2e		Dark yellowish brown fine silty clay with moderate grade of polyhedral structure and rough-faced 3 cm peds, breaking to polyhedral peds of 0.5 cm. Soil had few distinct, red, weathered mottles. Clods were not dispersive, and partially slaked in distilled water. Dry. Clear boundary to:	4		2	0.5	1
50	B2		Yellowish red fine silty clay with strong grade of subangular blocky structure and rough-faced 3 cm peds, breaking to subangular blocky peds of 0.5 cm. Few (2-10%), dispersed, reoriented, strongly weathered, parent material fine gravel (2-6mm). Soil had common faint, orange, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Clear boundary to:	4		2	0.5	1
	R		Dry. Clear boundary to:					
100								
150			COMMENTS: Sporadic bleach in A2. Good root growth to 60 cm, than almost none. Phalaris pasture looks good. Does this mean that 60 cm soil can support 5/dse/ha? C is extremely weathered, extremely low strength, vertically bedded siltstone.					

Segregations
 Coarse fragments

Lithology

Substrate: siltstone/mudstone

Base of Observations: LC at 140 cm

Rootzone: 60cm

BSAL Drainage: Imperfectly drained

Slowly permeable



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BSAL Profile Description

McPhillamys Gold Project for Regis Resources Ltd

Detail Pit 963

SSMID: OM963

Excavated on: **21/03/2019** Logged by: **PJH**


718562m E, 6291117m N, (WGS 84),

Landscape Properties

Landform Element: **hillslope**
 Vegetation Community: **woodland grass understory**
 Growth Form: **tussock grass**
 Site Disturbance: **extensive clearing**
 Land Use: **voluntary/native pasture** groundcover: **50%**
 Surface Condition Wet: **firm** Dry: **hardset**

Topography

Slope: **2%** Northwestern Aspect
 Site Morphology: **Crest**
 Slope Morphology: **Minimal**
 Microrelief: **None**
 Rock Outcrop: **0**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A		Error 2023	4		●	0	
50			COMMENTS: 30% rocks on surface.					
100								

Segregations
 Coarse fragments

Lithology

Substrate:
 Base of Observations: at 20
 cm
 Rootzone: **20cm**
 BSAL Drainage: **Imperfectly
 drained**
 Very slowly permeable



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BSAL Profile Description

McPhillamys Gold Project for Regis Resources Ltd

Detail Pit 964

Acidic Eutrophic Brown **Dermosol**

SSMID: OM964

718854m E, 6291283m N, (WGS 84),

Excavated on: **21/03/2019** Logged by: **PJH**

Topography

Slope: **2%** Northern Aspect

Site Morphology: **Ridge**

Slope Morphology: **Minimal**

Microrelief: **None**

Rock Outcrop: **0**

Landscape Properties

Landform Element: **hillcrest**

Vegetation Community: **unknown**

Growth Form: **tussock grass**

Site Disturbance: **occasional cultivation**

Land Use: **improved pasture** Groundcover: **20%**

Surface Condition Wet: **firm** Dry: **hardset**

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A		Dark brown fine silty clay loam with moderate grade of subangular blocky structure and rough-faced 1.5 cm peds, breaking to subangular blocky peds of 0.5 cm. Clods were not dispersive, and did not slake in distilled water. Dry.	4.5		●	0.5	1
	B2		Yellowish brown light clay with strong grade of polyhedral structure and rough-faced 3 cm peds, breaking to polyhedral peds of 0.5 cm. Few (2-10%), dispersed, reoriented, non-weathered, quartz fine gravel (2-6mm). Clods were not dispersive, and partially slaked in distilled water. Dry. Clear boundary to:	4		●	0.5	1
50								
	2A		Dark yellowish brown clay loam with strong grade of polyhedral structure and rough-faced 2 cm peds, breaking to polyhedral peds of 0.5 cm. Few (2-10%), dispersed, reoriented, non-weathered, quartz gravel (6-20mm). Few (2-10%), coarse (6-20mm), weak, manganiferous soft segregations. Clods were not dispersive, and partially slaked in distilled water. Moderately moist. Gradual boundary to:	4		●	0.5	1
	2B		Yellowish brown light clay with strong grade of polyhedral structure and smooth-faced 5 cm peds, breaking to polyhedral peds of 1 cm. Soil had common prominent, red, weathered mottles. Clods were not dispersive, and partially slaked in distilled water. Moderately moist. Gradual boundary to:	4		●	0.5	1
100								
	COMMENTS: Phalaris dominated. 2B has bleached soil and red mottle. Believe that texture reflects permeability (quick, slow, quick, slow). Certain of colluvial soil movement.							

Segregations
 Coarse fragments

Lithology

Substrate: **colluvium**

Base of Observations: **LC** at 120 cm

Rootzone: **60cm**

BSAL Drainage: **Imperfectly drained**

Very slowly permeable



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BSAL Profile Description

McPhillamys Gold Project for Regis Resources Ltd

Detail Pit 965

SSMID: OM965

Excavated on: 21/03/2019 Logged by: PJH

Bleached-Acidic Eutrophic Brown Dermosol

717730m E, 6291616m N, (WGS 84),

Topography

Slope: 3% Western Aspect
 Site Morphology: Lower slope
 Slope Morphology: Waning
 Microrelief: None
 Rock Outcrop: 0

Landscape Properties

Landform Element: hillslope
 Vegetation Community: unknown
 Growth Form: tussock grass
 Site Disturbance: occasional cultivation
 Land Use: improved pasture Groundcover: 60%
 Surface Condition Wet: firm Dry: hardset

DEPTH (centimetres)	Horizon	GRAPHIC LOG	PROFILE DESCRIPTION	Field pH	Field ECe (dS/m)	SOILpak (0 terrible to 2 good)	Proportion Inert Material	SAMPLE
	A1		Dark yellowish brown fine silty loam with moderate grade of polyhedral structure and rough-faced 2 cm peds, breaking to polyhedral peds of 0.5 cm. Clods were not dispersive, and did not slake in distilled water. Dry.	5		1		
	A2e		Pale brown fine silty loam with weak grade of lenticular structure and rough-faced 2 cm peds, breaking to polyhedral peds of 0.5 cm. Clods were not dispersive, and did not slake in distilled water. Dry. Clear boundary to:	5		1		
	B1		Yellowish brown light clay with moderate grade of polyhedral structure and rough-faced 1 cm peds, breaking to polyhedral peds of 0.5 cm. Clods were not dispersive, and slaked completely in distilled water. Dry. Clear boundary to:	5.5		1		
50	B2		Yellowish brown light clay with moderate grade of polyhedral structure and rough-faced 2 cm peds, breaking to polyhedral peds of 0.5 cm. Soil had few distinct, orange, weathered mottles. Clods were not dispersive, and slaked completely in distilled water. Dry. Gradual boundary to:	5.5		1		
100	B3		Light reddish brown silty clay with weak grade of polyhedral structure and rough-faced 0.5 cm peds. Abundant (>50%), coarse (6-20mm), strong, ferromangiferous soft segregations. Clods were not dispersive, and slaked completely in distilled water. Dry. Gradual boundary to:	5.5		1		
			COMMENTS: Poor soil.					

Segregations
 Coarse fragments

Lithology

Substrate: colluvium
 Base of Observations: LC at 120 cm
 Rootzone: 60cm
 BSAL Drainage: Poorly drained
 Very slowly permeable



Sustainable Soils Management
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APPENDIX II:
RESULTS OF LABORATORY TESTS:
Conducted by Incitec Laboratories

MGP Soil Laboratory Chemical Tests

RATING



Pit	OM701					OM702				
	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	Brown	Grey				Grey	Grey			
Colour										
Texture	Clay	Clay				Clay	Clay			
CEC (meq/100g)	15.7	8.7	2.3	3.5	16.5	2.7	2.7	7.3	9.4	6.1
pH water	5.7	7.3	8.2	8.5	7.7	5.5	5.6	7.3	7.7	7.4
pH CaCl ₂	5.2	6.4	6.9	6.9	6.5	4.8	5.0	6.9	7.2	6.9
Organic C (%)	2.8	0.6				0.9	0.6			
Nitrate N (mg/kg)	160.0	9.3	3.2	2.0	2.3	21.0	35.0	7.8	5.8	2.9
Ammonium N (mg/kg)	16.0	2.5	0.7	<0.6	1.7	1.4	2.0	0.8	<0.6	<0.6
Phosphorus Colwell (mg/kg)	27	<5				12	8			
Phosphorus Buffer Index	86	49				51	40			
Sulphate S-KCl (mg/kg)	8.9	1.7				7.2	7.7			
Potassium (meq/100 g)	0.6	0.3	0.1	0.1	0.5	0.2	0.1	0.2	0.3	0.3
Calcium (meq/100 g)	8.7	4.7	1.0	1.4	6.1	1.5	1.8	4.8	5.7	3.4
Magnesium (meq/100 g)	5.9	3.4	0.9	1.5	7.7	0.5	0.5	2.0	2.9	2.1
Aluminium (meq/100 g)	<0.10	<0.10	<0.10	<0.10	<0.10	0.4	0.1	<0.1	<0.1	<0.1
Sodium (meq/100 g)	0.5	0.3	0.3	0.6	2.2	0.1	0.1	0.3	0.6	0.3
Chloride (mg/kg)	65	15	26	11	87	<10	12	15	44	13
Electrical Conductivity (1:5)	0.34	0.06	0.04	0.04	0.12	0.07	0.09	0.14	0.22	0.11
Electrical Conductivity _{se} (dS/m)	1.5	0.3				0.39	0.48	0.63	1.13	0.53
Copper (mg/kg)	2.2	1.0				1.2	1.1			
Zinc (mg/kg)	0.7	0.1				0.3	0.2			
Manganese (mg/kg)	42	11				74	67			
Iron (mg/kg)	200	43				170	75			
Boron (mg/kg)	0.4	0.1				0.2	0.2			
Molybdenum (mg/kg)	<0.01	0.01				<0.01	<0.01			

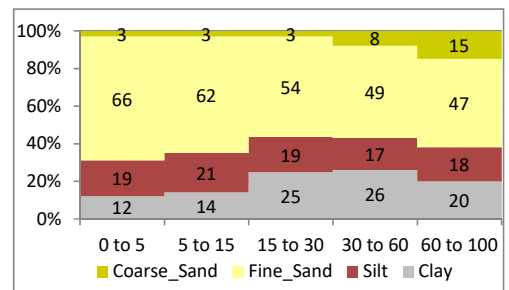
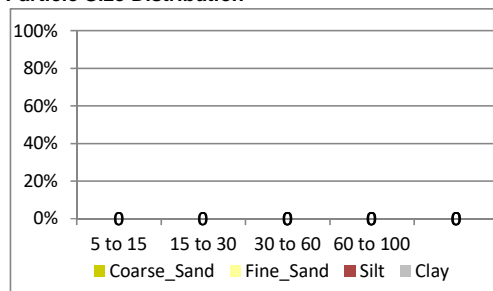
Percentages of Exchangeable Cations

ECaP (Calcium)	55.3%	54.2%	44.1%	39.5%	36.9%	55.8%	67.4%	65.9%	60.5%	55.8%
EMgP (Magnesium)	37.5%	39.2%	38.8%	42.4%	46.6%	18.2%	20.2%	27.5%	30.8%	34.5%
EKP (Potassium)	3.9%	3.2%	2.2%	2.3%	3.1%	7.8%	5.2%	2.7%	2.7%	4.1%
ESP (Sodium)	3.2%	3.3%	15.0%	15.8%	13.3%	4.8%	2.6%	3.8%	6.1%	5.6%
EAIP (Aluminium)	0.0%	0.0%	0.0%	0.0%	0.0%	13.4%	4.5%	0.0%	0.0%	0.0%

Ca/Mg ratio	1.5	1.4	1.1	0.9	0.8	3.1	3.3	2.4	2.0	1.6
K/Mg ratio										

Electrochemical Stability Index	0.11	0.02	0.00	0.00	0.01	0.01	0.03	0.04	0.04	0.02
Loveday and Pyle Dispersion										
Emerson Class	7	8	1	1	1	7	8	2	2	8

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



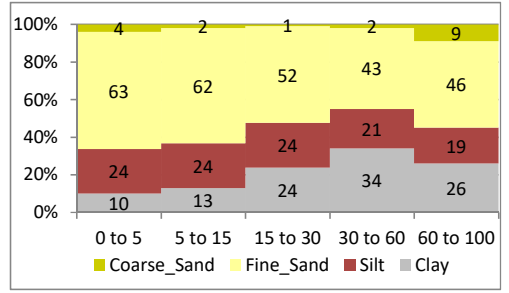
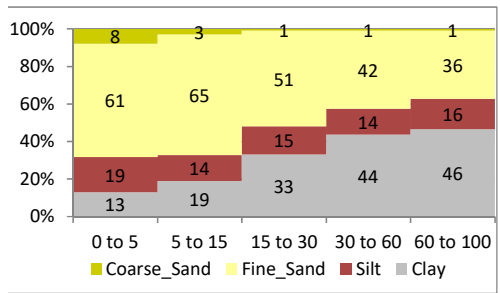
Pit	OM703					OM704				
	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	Brown					Grey				
Colour	Brown					Grey				
Texture	Clay Loam					Clay				
CEC (meq/100g)	5.1	4.2	5.5	6.0	6.9	4.1	3.1	4.4	7.1	5.8
pH water	5.1	6.0	6.3	6.5	7.0	5.5	5.6	6.3	6.5	7.0
pH CaCl ₂	4.5	5.1	5.4	5.8	6.2	4.8	4.8	5.4	5.5	6.3
Organic C (%)	2.9	0.9				1.7	0.7			
Nitrate N (mg/kg)	87.0	5.6	2.2	<0.5	<0.5	27.0	16.0	2.0	1.6	0.5
Ammonium N (mg/kg)	71.0	1.4	<0.6	<0.6	<0.6	3.0	<0.6	0.6	<0.6	<0.6
Phosphorus Colwell (mg/kg)	17	8				11	7			
Phosphorus Buffer Index	60	45				46	34			
Sulphate S-KCl (mg/kg)	21.0	6.1				5.4	4.0			
Potassium (meq/100 g)	1.3	0.8	0.7	0.3	0.3	0.4	0.4	0.2	0.2	0.1
Calcium (meq/100 g)	2.6	2.5	3.6	3.9	3.6	2.8	1.8	2.7	3.7	3.0
Magnesium (meq/100 g)	0.9	0.9	1.2	1.7	2.9	0.8	0.6	1.4	2.9	2.4
Aluminium (meq/100 g)	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	0.1	<0.1
Sodium (meq/100 g)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2
Chloride (mg/kg)	130	20	<10	<10	<10	<10	15	<10	<10	<10
Electrical Conductivity (1:5)	0.31	0.06	0.04	0.04	0.03	0.07	0.06	0.03	0.03	0.04
Electrical Conductivity _{se} (dS/m)	2.34	0.39	0.20	0.19	0.15	0.40	0.38	0.18	0.16	0.22
Copper (mg/kg)	1.9	2.2				0.8	0.9			
Zinc (mg/kg)	3.5	0.7				0.7	0.2			
Manganese (mg/kg)	190	76				40	37			
Iron (mg/kg)	210	67				180	130			
Boron (mg/kg)	0.5	0.4				0.3	0.1			
Molybdenum (mg/kg)	<0.01	<0.01				<0.01	<0.01			

Percentages of Exchangeable	OM703					OM704				
	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
ECaP (Calcium)	51.1%	59.2%	65.3%	65.0%	52.1%	69.1%	59.0%	61.6%	52.3%	51.9%
EMgP (Magnesium)	17.9%	20.9%	21.8%	28.3%	42.0%	20.2%	19.0%	32.0%	41.0%	41.5%
EKP (Potassium)	25.5%	18.7%	12.0%	4.7%	4.3%	9.1%	13.8%	4.6%	2.7%	2.4%
ESP (Sodium)	1.8%	1.2%	0.9%	2.0%	1.6%	1.5%	1.6%	1.8%	2.4%	4.2%
EAIP (Aluminium)	3.7%	0.0%	0.0%	0.0%	0.0%	0.0%	6.6%	0.0%	1.6%	0.0%

Ca/Mg ratio	2.9	2.8	3.0	2.3	1.2	3.4	3.1	1.9	1.3	1.3
K/Mg ratio										

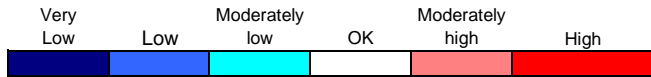
Electrochemical Stability Index	0.18	0.05	0.04	0.02	0.02	0.05	0.04	0.02	0.01	0.01
Loveday and Pyle Dispersion										
Emerson Class	7	8	8	6	2	7	7	2	6	2

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



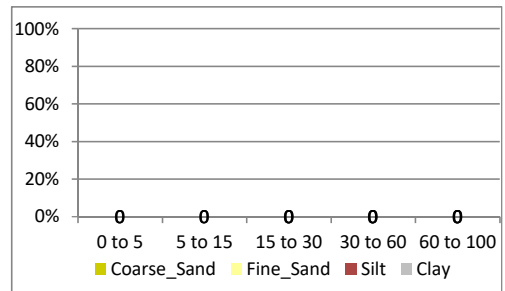
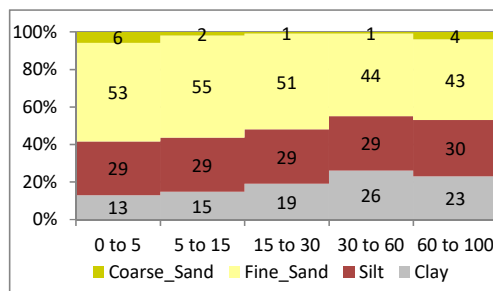
	OM705					OM706				
	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Pit										
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Grey	Grey				Brown	Brown			
Texture	Clay	Clay				Clay	Clay			
CEC (meq/100g)	5.2	3.9	4.1	6.1	4.4	3.5	2.7	2.3	3.0	7.5
pH water	5.3	5.7	6.0	6.9	6.8	4.7	5.2	5.7	6.4	6.2
pH CaCl ₂	4.7	4.8	4.9	5.7	5.6	4.2	4.6	5.0	5.3	5.0
Organic C (%)	2.5	0.8				1.1	0.5			
Nitrate N (mg/kg)	88.0	14.0	5.4	2.1	3.3	69.0	38.0	14.0	3.4	3.9
Ammonium N (mg/kg)	20.0	1.1	0.8	0.8	0.8	3.7	0.9	0.7	0.7	0.8
Phosphorus Colwell (mg/kg)	12	<5				17	8			
Phosphorus Buffer Index	39	36				57	43			
Sulphate S-KCl (mg/kg)	8.1	1.6				11.0	4.0			
Potassium (meq/100 g)	0.8	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.2
Calcium (meq/100 g)	3.2	2.7	2.9	4.3	2.9	1.8	1.7	1.6	1.6	2.9
Magnesium (meq/100 g)	1.0	0.7	0.8	1.5	1.3	1.0	0.8	0.6	1.3	4.2
Aluminium (meq/100 g)	0.1	0.1	0.1	<0.10	<0.10	0.5	0.1	<0.10	<0.10	0.1
Sodium (meq/100 g)	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2
Chloride (mg/kg)	26	<10.0	<10.0	<10.0	<10.0	13	14	13	<10.0	<10.0
Electrical Conductivity (1:5)	0.20	0.04	0.02	0.02	0.02	0.16	0.09	0.05	0.02	0.03
Electrical Conductivity _{se} (dS/m)	1.07	0.25	0.15	0.14	0.14	0.59	0.38			
Copper (mg/kg)	0.9	0.8				1.2	0.6			
Zinc (mg/kg)	1.3	0.0				0.5	0.1			
Manganese (mg/kg)	56	40				42	22			
Iron (mg/kg)	120	50				240	91			
Boron (mg/kg)	0.5	0.2				0.2	0.1			
Molybdenum (mg/kg)	<0.01	<0.01				<0.01	<0.01			

	Percentages of Exchangeable									
	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
ECaP (Calcium)	62.0%	69.9%	71.4%	71.0%	65.9%	51.0%	62.3%	69.0%	52.6%	38.5%
EMgP (Magnesium)	18.4%	19.2%	20.2%	24.8%	29.5%	26.9%	27.8%	25.0%	42.8%	55.7%
EKP (Potassium)	15.9%	6.7%	4.4%	3.1%	3.4%	6.2%	3.7%	3.4%	3.0%	2.5%
ESP (Sodium)	1.2%	0.8%	1.0%	1.2%	1.1%	2.8%	1.8%	2.6%	1.6%	2.0%
EAIP (Aluminium)	2.5%	3.4%	3.0%	0.0%	0.0%	13.0%	4.4%	0.0%	0.0%	1.3%

Ca/Mg ratio	3.4	3.6	3.5	2.9	2.2	1.9	2.2	2.8	1.2	0.7
K/Mg ratio										

Electrochemical Stability Index	0.17	0.05	0.02	0.02	0.02	0.06	0.05	0.02	0.01	0.02
Loveday and Pyle Dispersion										
Emerson Class	7	8	2	2	2	2	2	2	2	2

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



	OM707					OM708				
	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Pit										
Depth (cm)										
Colour	Grey					Brown				
Texture	Clay					Clay				
CEC (meq/100g)	3.5	2.3	3.8	6.3	4.1	12.1	12.7	13.9	31.5	41.1
pH water	4.9	5.1	5.9	5.9	6.0	6.0	6.9	7.2	8.6	9.4
pH CaCl ₂	4.2	4.3	4.8	4.8	4.9	5.1	5.7	6.2	7.7	8.5
Organic C (%)	2.1	0.7				2.3	1.4			
Nitrate N (mg/kg)	58.0	24.0	5.6	2.6	4.4	23.0	8.5	2.9	1.0	<0.5
Ammonium N (mg/kg)	10.0	1.5	0.8	0.9	1.5	2.0	2.1	1.1	0.7	<0.6
Phosphorus Colwell (mg/kg)	11	<5				9	7			
Phosphorus Buffer Index	43	36				69	47			
Sulphate S-KCl (mg/kg)	8.5	2.6				1.2	<1.0			
Potassium (meq/100 g)	0.7	0.4	0.4	0.4	0.3	0.4	0.2	0.2	0.5	0.4
Calcium (meq/100 g)	1.6	1.1	2.3	3.5	2.0	6.4	7.2	7.1	12.0	18.0
Magnesium (meq/100 g)	0.7	0.5	1.0	2.0	1.6	5.0	5.0	6.1	17.0	19.0
Aluminium (meq/100 g)	0.4	0.3	0.1	0.2	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sodium (meq/100 g)	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.5	2.0	3.7
Chloride (mg/kg)	10	13	<10	<10	<10	43	14	16	100	390
Electrical Conductivity (1:5)	0.14	0.06	0.03	0.03	0.03	0.09	0.05	0.06	0.27	0.48
Electrical Conductivity _{se} (dS/m)						0.61	0.28	0.33	1.60	3.90
Copper (mg/kg)	1.6	1.1				1.2	1.3			
Zinc (mg/kg)	1.1	0.1				0.7	0.2			
Manganese (mg/kg)	64	69				54	78			
Iron (mg/kg)	270	120				190	82			
Boron (mg/kg)	0.4	0.3				0.3	0.2			
Molybdenum (mg/kg)	<0.01	<0.01				<0.01	<0.01			

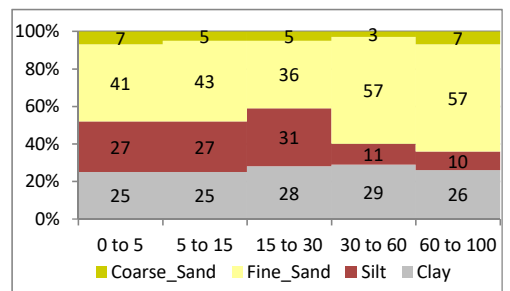
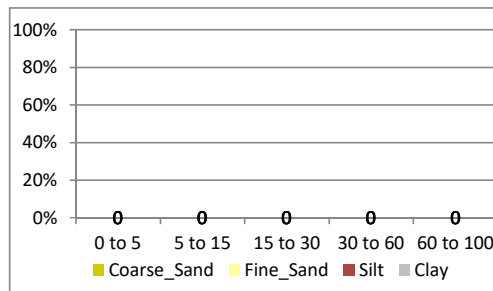
Percentages of Exchangeable

ECaP (Calcium)	45.7%	47.0%	59.9%	56.0%	49.3%	53.1%	56.7%	51.1%	38.1%	43.8%
EMgP (Magnesium)	21.1%	20.1%	25.8%	32.0%	39.4%	41.5%	39.4%	43.9%	54.0%	46.3%
EKP (Potassium)	20.6%	16.7%	9.4%	7.0%	6.4%	3.6%	1.4%	1.4%	1.5%	0.9%
ESP (Sodium)	1.4%	2.1%	1.8%	1.9%	2.5%	1.8%	2.5%	3.7%	6.4%	9.0%
EAIP (Aluminium)	11.1%	14.1%	3.1%	3.0%	2.5%	0.0%	0.0%	0.0%	0.0%	0.0%

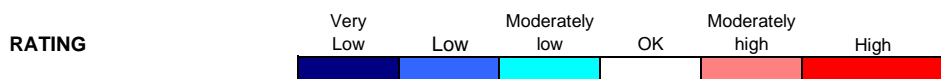
Ca/Mg ratio	2.2	2.3	2.3	1.8	1.3	1.3	1.4	1.2	0.7	0.9
K/Mg ratio										

Electrochemical Stability Index	0.10	0.03	0.02	0.02	0.01	0.05	0.02	0.02	0.04	0.05
Loveday and Pyle Dispersion										
Emerson Class	3	3	2	2	8	7	7	7	7	6

Particle Size Distribution



MGP Soil Laboratory Chemical Tests



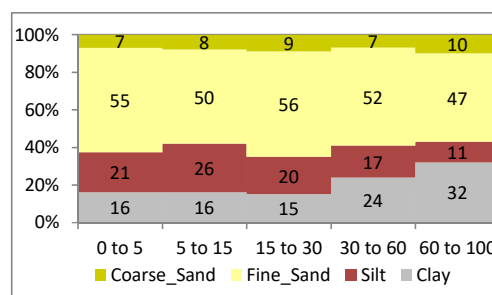
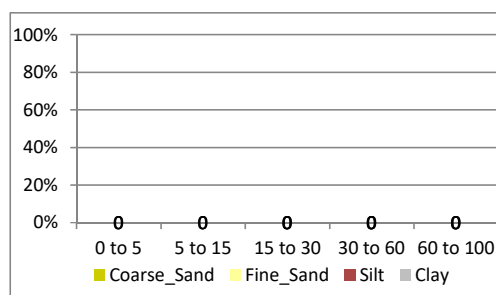
Pit	OM709					OM710				
	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	Grey	Grey				Brown	Brown			
Colour										
Texture	Clay	Clay				Clay	Clay			
CEC (meq/100g)	10.2	9.9	18.6	39.9	41.1	7.7	5.1	4.4	8.3	15.3
pH water	5.4	6.1	7.4	9.1	9.3	6.1	5.9	6.2	6.7	7.1
pH CaCl ₂	4.8	5.3	6.3	8.2	8.4	5.4	5.0	5.0	5.6	6.4
Organic C (%)	2.6	1.3				2.3	1.0			
Nitrate N (mg/kg)	98.0	40.0	6.8	<0.5	<0.5	39.0	24.0	7.3	2.9	0.6
Ammonium N (mg/kg)	3.4	1.3	1.8	1.9	1.6	6.1	2.2	0.7	<0.6	<0.6
Phosphorus Colwell (mg/kg)	16	7				11	6			
Phosphorus Buffer Index	42	38				73	56			
Sulphate S-KCl (mg/kg)	8.2	3.7				3.4	1.5			
Potassium (meq/100 g)	0.8	0.6	0.4	0.4	0.4	0.5	0.2	0.1	0.2	0.3
Calcium (meq/100 g)	5.6	5.4	7.9	19.0	18.0	4.7	3.0	2.5	4.2	7.3
Magnesium (meq/100 g)	3.6	3.8	9.7	18.0	19.0	2.4	1.8	1.7	3.7	7.3
Aluminium (meq/100 g)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1
Sodium (meq/100 g)	0.1	0.2	0.7	2.5	3.7	0.2	0.1	0.1	0.2	0.4
Chloride (mg/kg)	36	15	<10.0	120	270	20	<10	<10	<10	<10
Electrical Conductivity (1:5)	0.24	0.11	0.07	0.30	0.42	0.11	0.06	0.02	0.03	0.06
Electrical Conductivity _{se} (dS/m)	1.00	0.45				0.62	0.33	0.16	0.18	0.28
Copper (mg/kg)	1.8	1.8				1.1	0.9			
Zinc (mg/kg)	0.4	0.1				0.4	0.1			
Manganese (mg/kg)	28	18				56	38			
Iron (mg/kg)	190	93				220	92			
Boron (mg/kg)	0.4	0.4				0.2	0.1			
Molybdenum (mg/kg)	<0.01	<0.01				<0.01	<0.01			

Percentages of Exchangeable	OM709					OM710				
	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
ECaP (Calcium)	55.0%	54.4%	42.5%	47.7%	43.8%	60.7%	58.7%	56.6%	50.7%	47.9%
EMgP (Magnesium)	35.4%	38.3%	52.1%	45.2%	46.3%	31.0%	35.2%	38.5%	44.6%	47.9%
EKP (Potassium)	8.3%	5.8%	1.9%	0.9%	0.9%	6.1%	3.7%	2.9%	2.5%	1.8%
ESP (Sodium)	1.4%	1.5%	3.5%	6.3%	9.0%	2.2%	2.3%	2.0%	2.2%	2.4%
EAIP (Aluminium)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Ca/Mg ratio	OM709					OM710				
	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
K/Mg ratio	1.6	1.4	0.8	1.1	0.9	2.0	1.7	1.5	1.1	1.0

Electrochemical Stability Index	OM709					OM710				
	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Loveday and Pyle Dispersion	0.17	0.07	0.02	0.05	0.05	0.05	0.03	0.01	0.01	0.02
Emerson Class	2	2	8	8	8	7	2	2	8	6

Particle Size Distribution



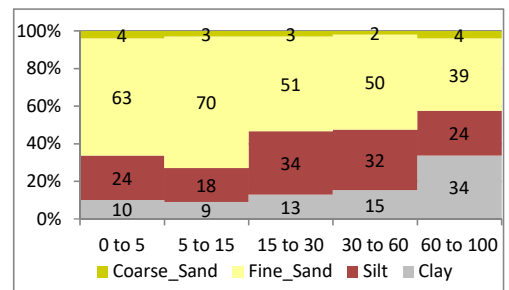
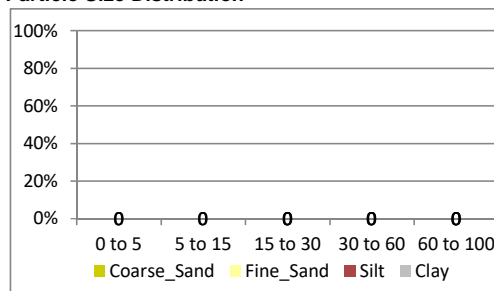
MGP Soil Laboratory Chemical Tests

RATING

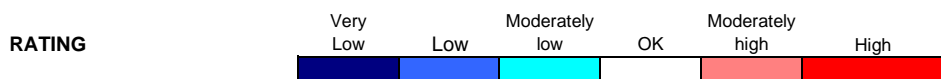


Pit	OM711					OM712				
	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	Grey					Grey				
Colour	Grey					Grey				
Texture	Clay Loam					Clay				
CEC (meq/100g)	4.5	2.6	3.2	6.6	7.4	4.9	4.0	2.6	3.5	8.7
pH water	5.2	5.4	6.1	6.7	6.8	5.5	5.9	6.6	7.0	6.9
pH CaCl ₂	4.7	4.6	5.0	5.4	5.5	4.9	5.0	5.6	6.3	6.1
Organic C (%)	1.8	0.6				1.5	1.0			
Nitrate N (mg/kg)	64.0	22.0	6.2	2.4	2.1	39.0	7.0	2.4	1.2	<0.5
Ammonium N (mg/kg)	10.0	3.2	2.3	1.1	1.1	9.8	<0.6	<0.6	<0.6	<0.6
Phosphorus Colwell (mg/kg)	17	7				11	6			
Phosphorus Buffer Index	46	34				49	43			
Sulphate S-KCl (mg/kg)	7.8	2.6				12.0	3.0			
Potassium (meq/100 g)	0.5	0.2	0.1	0.2	0.2	0.4	0.2	0.1	0.1	0.2
Calcium (meq/100 g)	2.7	1.6	2.1	3.8	3.9	2.7	2.6	1.8	2.1	4.4
Magnesium (meq/100 g)	1.1	0.6	1.0	2.5	3.1	1.4	1.1	0.6	1.2	3.8
Aluminium (meq/100 g)	0.1	0.1	<0.10	<0.10	<0.10	0.2	<0.1	<0.1	<0.1	<0.1
Sodium (meq/100 g)	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.4
Chloride (mg/kg)	11	<10.0	<10.0	<10.0	<10.0	51	11	<10	<10	<10
Electrical Conductivity (1:5)	0.16	0.06	0.03	0.02	0.02	0.14	0.04	0.02	0.04	0.06
Electrical Conductivity _{se} (dS/m)	0.62	0.26				1.05	0.28	0.16	0.25	0.27
Copper (mg/kg)	1.0	0.8				0.9	1.0			
Zinc (mg/kg)	1.1	0.2				0.4	0.3			
Manganese (mg/kg)	73	32				31	40			
Iron (mg/kg)	210	94				230	230			
Boron (mg/kg)	0.3	0.1				0.2	0.2			
Molybdenum (mg/kg)	<0.01	<0.01				<0.01	<0.01			
Percentages of Exchangeable										
ECaP (Calcium)	60.5%	62.3%	64.8%	57.3%	53.1%	55.4%	64.7%	68.4%	60.0%	50.5%
EMgP (Magnesium)	24.7%	24.9%	29.9%	37.7%	42.2%	28.7%	27.4%	24.3%	34.3%	43.6%
EKP (Potassium)	10.8%	6.2%	3.7%	3.2%	2.6%	8.0%	4.0%	3.8%	2.6%	1.9%
ESP (Sodium)	1.8%	1.9%	1.5%	1.8%	2.2%	4.7%	4.0%	3.4%	3.1%	4.0%
EAIP (Aluminium)	2.2%	4.7%	0.0%	0.0%	0.0%	3.1%	0.0%	0.0%	0.0%	0.0%
Ca/Mg ratio	2.5	2.5	2.2	1.5	1.3	1.9	2.4	2.8	1.8	1.2
K/Mg ratio										
Electrochemical Stability Index	0.09	0.03	0.02	0.01	0.01	0.03	0.01	0.01	0.01	0.01
Loveday and Pyle Dispersion										
Emerson Class	7	2	2	2	2	7	7	2	2	3

Particle Size Distribution



MGP Soil Laboratory Chemical Tests



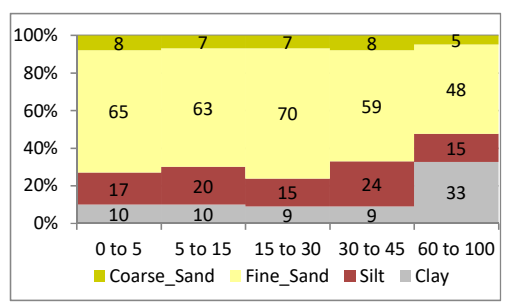
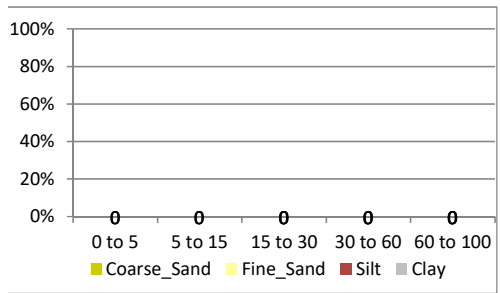
	OM713					OM714				
	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 45	60 to 100
Pit										
Depth (cm)										
Colour	Grey					Brown				
Texture	Clay Loam					Clay				
CEC (meq/100g)	5.1	3.8	3.3	6.8	12.4	4.8	4.4	4.7	2.5	26.0
pH water	4.7	5.4	6.0	6.5	6.4	5.5	5.5	6.0	7.2	8.8
pH CaCl ₂	4.2	4.7	5.0	5.3	5.1	4.6	4.9	5.3	6.6	8.0
Organic C (%)	2.0	0.8				1.6	1.1			
Nitrate N (mg/kg)	110.0	46.0	13.0	3.1	2.0	21.0	49.0	24.0	4.0	<0.5
Ammonium N (mg/kg)	2.7	1.2	0.9	0.8	0.9	2.5	2.6	1.1	<0.6	<0.6
Phosphorus Colwell (mg/kg)	20	10				14	12			
Phosphorus Buffer Index	91	46				42	44			
Sulphate S-KCl (mg/kg)	7.9	3.2				2.8	2.7			
Potassium (meq/100 g)	0.5	0.3	0.2	0.3	0.5	0.5	0.4	0.3	0.1	0.9
Calcium (meq/100 g)	2.7	2.4	2.1	3.9	6.1	2.6	2.5	2.9	1.5	12.0
Magnesium (meq/100 g)	1.3	1.0	0.9	2.5	5.4	1.5	1.2	1.3	0.7	11.0
Aluminium (meq/100 g)	0.5	<0.10	<0.10	<0.10	<0.10	0.1	0.1	<0.1	<0.1	<0.1
Sodium (meq/100 g)	0.2	0.1	0.1	0.2	0.4	0.2	0.1	0.2	0.2	2.1
Chloride (mg/kg)	34	31	<10.0	<10.0	<10.0	17	56	110	37	190
Electrical Conductivity (1:5)	0.23	0.11	0.04	0.03	0.04	0.07	0.14	0.13	0.06	0.27
Electrical Conductivity _{se} (dS/m)	1.04	0.53				0.46	1.09	1.40	0.56	1.90
Copper (mg/kg)	1.5	1.2				1.0	1.0			
Zinc (mg/kg)	1.3	0.3				0.2	0.1			
Manganese (mg/kg)	170	69				39	34			
Iron (mg/kg)	210	78				100	65			
Boron (mg/kg)	0.3	0.3				0.2	0.2			
Molybdenum (mg/kg)	<0.01	<0.01				<0.01	<0.01			

	Percentages of Exchangeable									
	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 45	60 to 100
ECaP (Calcium)	52.8%	63.2%	63.3%	57.2%	49.3%	53.8%	57.1%	61.8%	60.7%	46.1%
EMgP (Magnesium)	25.4%	26.3%	27.4%	36.7%	43.7%	31.1%	27.4%	27.7%	28.3%	42.3%
EKP (Potassium)	10.0%	7.6%	6.9%	3.7%	3.6%	9.3%	9.6%	6.2%	4.9%	3.6%
ESP (Sodium)	2.9%	2.9%	2.4%	2.5%	3.4%	3.3%	3.0%	4.3%	6.1%	8.1%
EAIP (Aluminium)	8.8%	0.0%	0.0%	0.0%	0.0%	2.5%	3.0%	0.0%	0.0%	0.0%

Ca/Mg ratio	2.1	2.4	2.3	1.6	1.1	1.7	2.1	2.2	2.1	1.1
K/Mg ratio										

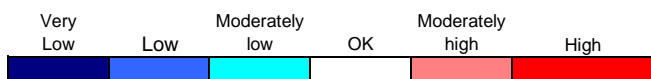
Electrochemical Stability Index	0.08	0.04	0.02	0.01	0.01	0.02	0.05	0.03	0.01	0.03
Loveday and Pyle Dispersion										
Emerson Class	7	8	2	2	2	7	7	7	2	3

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



	OM715					OM716				
	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Pit										
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Grey	Grey				Brown	Grey			
Texture	Clay	Clay				Clay	Clay			
CEC (meq/100g)	11.6	10.2	17.9	29.0	41.4	7.6	6.4	6.3	7.8	9.4
pH water	6.5	6.7	7.7	8.5	9.0	6.1	5.7	6.3	7.0	7.8
pH CaCl ₂	5.6	5.8	6.6	7.5	8.2	5.3	4.9	5.2	5.6	6.4
Organic C (%)	1.6	1.2				1.9	1.6			
Nitrate N (mg/kg)	37.0	20.0	4.8	1.2	<0.5	25.0	27.0	9.9	2.2	1.0
Ammonium N (mg/kg)	<0.6	1.0	0.7	1.0	0.7	2.2	2.0	1.3	0.8	0.8
Phosphorus Colwell (mg/kg)	11	12				12	10			
Phosphorus Buffer Index	56	44				69	54			
Sulphate S-KCl (mg/kg)	4.7	2.7				3.1	1.9			
Potassium (meq/100 g)	0.1	0.1	0.2	0.3	0.3	0.4	0.1	0.1	0.1	0.2
Calcium (meq/100 g)	5.8	4.7	5.7	7.3	11.0	4.6	4.5	4.5	5.3	6.0
Magnesium (meq/100 g)	5.2	5.0	11.0	19.0	25.0	2.3	1.6	1.5	2.1	2.8
Aluminium (meq/100 g)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sodium (meq/100 g)	0.4	0.4	1.0	2.4	5.1	0.3	0.1	0.2	0.2	0.5
Chloride (mg/kg)	35	19	<10	28	310	26	16	<10	<10	14
Electrical Conductivity (1:5)	0.11	0.08	0.08	0.18	0.49	0.10	0.07	0.04	0.03	0.04
Electrical Conductivity _{se} (dS/m)	0.66	0.45	0.36	0.85	3.48	0.63	0.44	0.25	0.20	0.25
Copper (mg/kg)	1.8	1.7				1.6	2.0			
Zinc (mg/kg)	0.6	0.5				0.4	0.2			
Manganese (mg/kg)	19	16				20	20			
Iron (mg/kg)	320	220				240	160			
Boron (mg/kg)	0.3	0.3				0.5	0.6			
Molybdenum (mg/kg)	<0.01	<0.01				<0.01	<0.01			

Percentages of Exchangeable

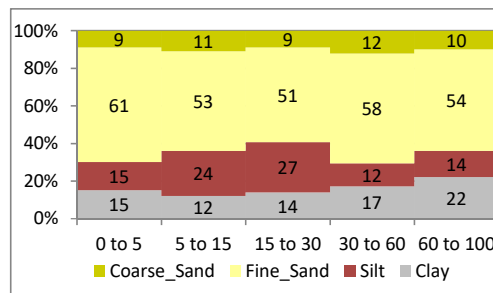
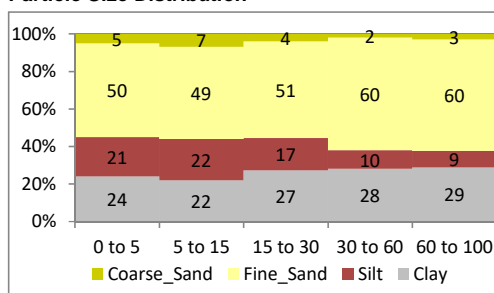
	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
ECaP (Calcium)	50.2%	46.3%	31.8%	25.2%	26.6%	60.8%	70.6%	71.7%	68.1%	63.8%
EMgP (Magnesium)	45.0%	49.2%	61.5%	65.5%	60.3%	30.4%	25.1%	23.9%	27.0%	29.8%
EKP (Potassium)	1.2%	1.0%	1.2%	1.1%	0.8%	4.8%	2.0%	1.9%	1.8%	1.7%
ESP (Sodium)	3.5%	3.5%	5.5%	8.3%	12.3%	4.0%	2.2%	2.5%	3.1%	4.8%
EAIP (Aluminium)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Ca/Mg ratio	1.1	0.9	0.5	0.4	0.4	2.0	2.8	3.0	2.5	2.1
K/Mg ratio										

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Electrochemical Stability Index	0.03	0.02	0.01	0.02	0.04	0.03	0.03	0.02	0.01	0.01

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Loveday and Pyle Dispersion Emerson Class	7	7	8	8	2	7	7	8	2	2

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



Pit	OM717					OM718				
	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 45	60 to 100
Depth (cm)	Brown					Grey				
Colour	Brown					Grey				
Texture	Clay Loam Clay Loam					Clay Clay				
CEC (meq/100g)	5.0	2.6	1.7	7.4	21.3	3.8	2.7	1.8	1.5	10.7
pH water	5.0	5.8	6.3	7.4	8.5	5.2	5.5	5.9	6.5	7.4
pH CaCl ₂	4.3	4.6	4.9	5.9	7.4	4.4	4.7	4.9	5.2	6.0
Organic C (%)	1.5	0.3				1.7	0.6			
Nitrate N (mg/kg)	44.0	9.5	4.4	2.0	<0.5	22.0	26.0	8.5	1.8	1.3
Ammonium N (mg/kg)	5.1	0.7	0.6	0.7	1.2	2.4	1.6	1.2	0.8	1.0
Phosphorus Colwell (mg/kg)	11	11				19	6			
Phosphorus Buffer Index	75	38				49	37			
Sulphate S-KCl (mg/kg)	4.8	1.3				5.1	2.2			
Potassium (meq/100 g)	0.2	0.1	0.1	0.1	0.3	0.5	0.2	0.2	0.1	0.4
Calcium (meq/100 g)	2.7	1.5	1.0	2.9	7.0	1.9	1.6	1.0	0.8	4.3
Magnesium (meq/100 g)	1.5	0.7	0.5	3.1	9.1	1.2	0.9	0.6	0.5	5.4
Aluminium (meq/100 g)	0.4	0.1	<0.10	<0.10	<0.10	0.2	<0.1	<0.1	<0.1	<0.1
Sodium (meq/100 g)	0.2	0.1	0.1	1.3	4.9	0.1	0.1	0.0	0.0	0.6
Chloride (mg/kg)	12	<10.0	<10.0	27	390	<10	19	<10	<10	<10
Electrical Conductivity (1:5)	0.10	0.03	0.02	0.07	0.41	0.08	0.07	0.03	0.01	0.03
Electrical Conductivity _{se} (dS/m)	0.43	0.17								
Copper (mg/kg)	1.2	0.8				1.5	1.2			
Zinc (mg/kg)	0.3	0.1				1.0	0.1			
Manganese (mg/kg)	19	5				68	29			
Iron (mg/kg)	320	130				480	130			
Boron (mg/kg)	0.1	0.1				0.3	0.2			
Molybdenum (mg/kg)	<0.01	<0.01				<0.01	<0.01			

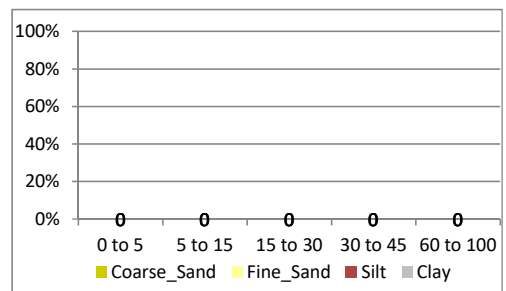
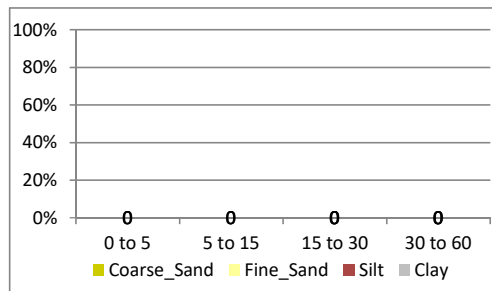
Percentages of Exchangeable

ECaP (Calcium)	54.4%	58.6%	58.1%	39.1%	32.9%	50.1%	58.6%	56.8%	52.7%	40.3%
EMgP (Magnesium)	30.2%	27.0%	29.7%	41.8%	42.8%	31.7%	31.9%	31.8%	36.0%	50.7%
EKP (Potassium)	4.0%	4.7%	4.1%	1.5%	1.2%	12.4%	7.7%	9.7%	8.7%	3.8%
ESP (Sodium)	4.2%	5.1%	8.1%	17.5%	23.1%	1.3%	1.8%	1.7%	2.7%	5.3%
EAIP (Aluminium)	7.1%	4.7%	0.0%	0.0%	0.0%	4.5%	0.0%	0.0%	0.0%	0.0%

Ca/Mg ratio	1.8	2.2	2.0	0.9	0.8	1.6	1.8	1.8	1.5	0.8
K/Mg ratio										

Electrochemical Stability Index	0.02	0.01	0.00	0.00	0.02	0.06	0.04	0.02	0.00	0.01
Loveday and Pyle Dispersion										
Emerson Class	2	2	2	8	1	3	8	8	8	8

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



	OM719					OM720				
	0 to 5	5 to 15	15 to 30	40 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Pit										
Depth (cm)	0 to 5	5 to 15	15 to 30	40 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Grey	Grey				Brown	Brown			
Texture	Clay	Clay				Clay	Clay			
CEC (meq/100g)	9.5	9.9	8.4	36.9	39.1	13.5	20.1	16.9	24.8	30.7
pH water	5.4	6.1	6.4	7.7	8.5	6.2	6.9	6.6	7.1	7.2
pH CaCl ₂	4.7	5.1	5.2	6.9	7.9	5.4	5.8	5.6	5.9	6.0
Organic C (%)	2.9	1.7				2.0	0.8			
Nitrate N (mg/kg)	48.0	14.0	6.2	<0.5	<0.5	10.0	0.7	3.3	<0.5	<0.5
Ammonium N (mg/kg)	3.7	2.1	3.3	2.2	1.5	2.5	1.3	1.5	2.4	1.8
Phosphorus Colwell (mg/kg)	13	6				14	59			
Phosphorus Buffer Index	88	86				69	85			
Sulphate S-KCl (mg/kg)	7.4	2.5				2.4	<1.0			
Potassium (meq/100 g)	0.3	0.2	0.2	0.4	0.4	0.6	0.7	0.7	0.7	0.6
Calcium (meq/100 g)	5.5	5.6	4.5	11.0	9.0	8.8	12.0	11.0	14.0	17.0
Magnesium (meq/100 g)	3.5	3.8	3.4	21.0	23.0	4.1	7.3	5.1	10.0	13.0
Aluminium (meq/100 g)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sodium (meq/100 g)	0.3	0.3	0.3	4.5	6.7	0.1	0.1	0.0	0.1	0.1
Chloride (mg/kg)	41	15	<10	510	1300	29	<10	12	<10	<10
Electrical Conductivity (1:5)	0.15	0.06	0.04	0.42	0.95	0.08	0.04	0.05	0.03	0.03
Electrical Conductivity _{se} (dS/m)	0.93	0.35	0.23	3.23	9.05	0.52	0.20	0.28	0.16	0.17
Copper (mg/kg)	3.9	3.6				0.6	3.5			
Zinc (mg/kg)	1.3	0.5				0.1	0.1			
Manganese (mg/kg)	85	36				14	30			
Iron (mg/kg)	300	190				38	92			
Boron (mg/kg)	0.4	0.3				0.4	0.2			
Molybdenum (mg/kg)	<0.01	<0.01				<0.01	<0.01			

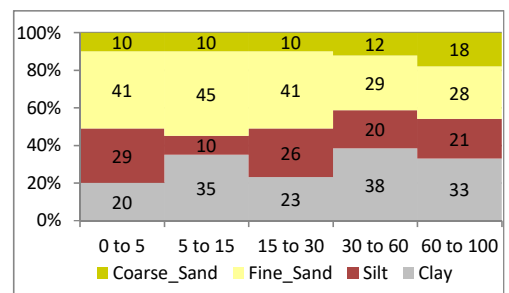
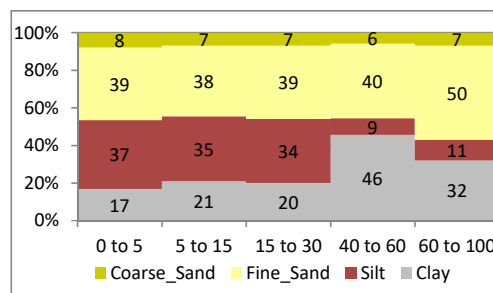
Percentages of Exchangeable

ECaP (Calcium)	57.9%	56.6%	53.9%	29.8%	23.0%	65.1%	59.7%	65.3%	56.4%	55.4%
EMgP (Magnesium)	36.8%	38.4%	40.7%	56.9%	58.9%	30.3%	36.3%	30.3%	40.3%	42.3%
EKP (Potassium)	2.6%	2.2%	1.9%	1.1%	0.9%	4.2%	3.6%	4.2%	2.9%	1.9%
ESP (Sodium)	2.6%	2.8%	3.5%	12.2%	17.2%	0.4%	0.4%	0.2%	0.4%	0.4%
EAIP (Aluminium)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Ca/Mg ratio	1.6	1.5	1.3	0.5	0.4	2.1	1.6	2.2	1.4	1.3
K/Mg ratio										

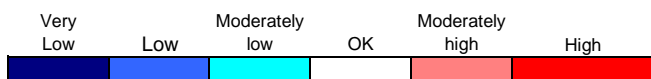
Electrochemical Stability Index	0.06	0.02	0.01	0.03	0.06	0.22	0.10	0.21	0.07	0.08
Loveday and Pyle Dispersion										
Emerson Class	7	7	7	8	7	7	7	7	2	2

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



Pit

OM721

OM722

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	Grey	Grey				Grey	Grey			
Colour										
Texture	Clay	Clay				Clay	Clay			
CEC (meq/100g)	10.7	11.0	20.6	38.0	36.0	2.9	2.7	2.7	6.2	3.5
pH water	6.0	6.0	7.0	8.9	9.4	5.0	5.3	5.9	6.5	6.6
pH CaCl ₂	4.9	5.1	6.0	8.0	8.4	4.2	4.6	5.2	5.5	5.5
Organic C (%)	2.3	1.6				1.2	0.6			
Nitrate N (mg/kg)	10.0	5.2	1.2	0.5	<0.5	23.0	18.0	7.3	1.3	1.1
Ammonium N (mg/kg)	2.6	1.7	1.0	0.7	<0.6	3.3	1.3	1.0	1.0	0.9
Phosphorus Colwell (mg/kg)	13	11				12	7			
Phosphorus Buffer Index	49	45				54	36			
Sulphate S-KCl (mg/kg)	1.9	1.8				9.8	7.7			
Potassium (meq/100 g)	0.1	0.2	0.3	0.2	0.1	0.4	0.1	0.1	0.2	0.1
Calcium (meq/100 g)	6.7	6.7	9.0	17.0	14.0	1.1	1.4	1.5	3.1	1.5
Magnesium (meq/100 g)	3.7	3.9	11.0	20.0	20.0	0.8	0.9	0.9	2.6	1.7
Aluminium (meq/100 g)	<0.1	<0.1	<0.1	<0.1	<0.1	0.5	0.2	<0.1	<0.1	<0.1
Sodium (meq/100 g)	0.2	0.2	0.4	0.8	1.9	0.1	0.2	0.2	0.3	0.1
Chloride (mg/kg)	<10	26	<10	10	41	15	70	71	24	17
Electrical Conductivity (1:5)	0.04	0.05	0.05	0.18	0.26	0.08	0.10	0.08	0.05	0.03
Electrical Conductivity _{se} (dS/m)	0.25	0.38	0.28	0.72	1.31					
Copper (mg/kg)	0.6	3.5				1.4	1.0			
Zinc (mg/kg)	0.1	0.1				0.6	0.2			
Manganese (mg/kg)	14	30				52	34			
Iron (mg/kg)	38	92				370	130			
Boron (mg/kg)	0.4	0.2				0.2	0.1			
Molybdenum (mg/kg)	<0.01	<0.01				<0.01	<0.01			

Percentages of Exchangeable

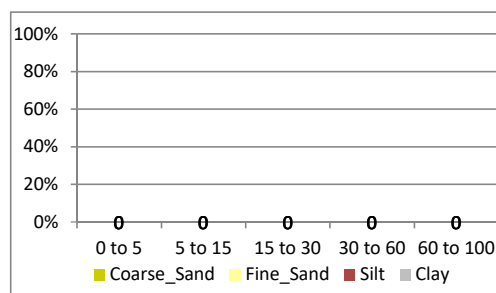
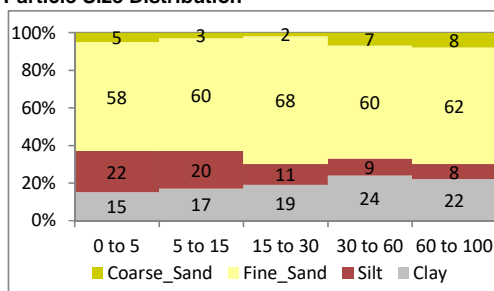
ECaP (Calcium)	62.6%	61.1%	43.6%	44.7%	38.9%	38.6%	51.1%	56.6%	50.2%	43.4%
EMgP (Magnesium)	34.5%	35.6%	53.3%	52.6%	55.5%	27.0%	31.4%	33.2%	42.1%	49.1%
EKP (Potassium)	1.3%	1.7%	1.3%	0.5%	0.3%	12.6%	4.7%	3.4%	2.9%	3.5%
ESP (Sodium)	1.6%	1.6%	1.8%	2.2%	5.3%	3.9%	6.9%	6.8%	4.9%	4.0%
EAIP (Aluminium)	0.0%	0.0%	0.0%	0.0%	0.0%	17.9%	5.8%	0.0%	0.0%	0.0%

Ca/Mg ratio	1.8	1.7	0.8	0.9	0.7	1.4	1.6	1.7	1.2	0.9
K/Mg ratio										

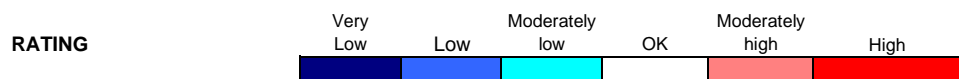
Electrochemical Stability Index	0.03	0.03	0.03	0.08	0.05	0.02	0.01	0.01	0.01	0.01
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Loveday and Pyle Dispersion Emerson Class	7	7	2	6	6	3	8	2	2	8
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Particle Size Distribution



MGP Soil Laboratory Chemical Tests



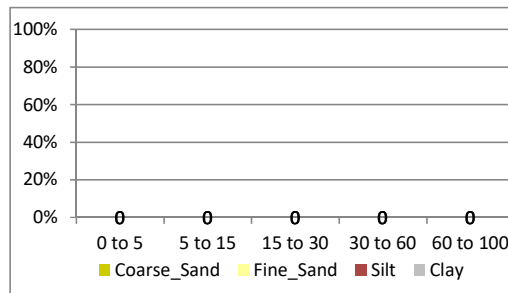
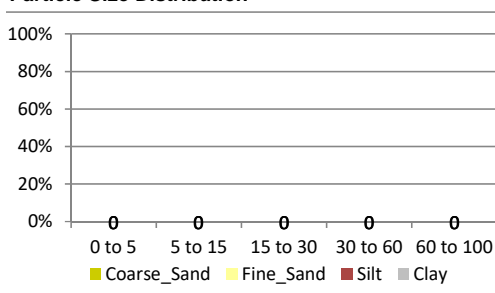
Pit	OM723					OM724				
	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	Brown					Brown				
Colour	Brown					Brown				
Texture	Clay Loam					Clay				
CEC (meq/100g)	3.3	2.6	4.6	8.5	6.1	12.1	13.1	10.9	3.0	10.5
pH water	5.0	5.0	6.4	6.8	6.7	5.9	6.9	7.4	8.4	8.4
pH CaCl ₂	4.3	4.4	5.6	5.8	5.7	5.3	6.3	6.8	7.5	7.7
Organic C (%)	1.2	0.8				2.1	1.0			
Nitrate N (mg/kg)	66.0	43.0	12.0	3.6	2.6	54.0	14.0	6.4	2.0	1.9
Ammonium N (mg/kg)	2.3	1.6	1.0	1.0	0.9	2.8	1.6	2.5	0.7	0.7
Phosphorus Colwell (mg/kg)	13	8				15	12			
Phosphorus Buffer Index	39	42				110	89			
Sulphate S-KCl (mg/kg)	13.0	5.6				60.0	46.0			
Potassium (meq/100 g)	1.3	0.5	0.2	0.3	0.2	0.2	0.2	0.1	0.0	0.2
Calcium (meq/100 g)	1.2	1.4	3.1	5.4	3.3	6.9	7.4	5.8	1.6	4.3
Magnesium (meq/100 g)	0.6	0.4	1.2	2.7	2.5	4.4	5.0	4.5	1.3	5.2
Aluminium (meq/100 g)	0.2	0.2	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium (meq/100 g)	0.0	0.0	0.1	0.1	0.1	0.6	0.6	0.5	0.1	0.8
Chloride (mg/kg)	33	34	<10.0	<10.0	<10.0	110	74	60	<10.0	59
Electrical Conductivity (1:5)	0.19	0.12	0.04	0.03	0.03	0.27	0.18	0.14	0.04	0.15
Electrical Conductivity _{se} (dS/m)	0.82	0.64				1.45	0.97			
Copper (mg/kg)	1.2	1.3				4.6	3.2			
Zinc (mg/kg)	0.9	0.5				0.7	0.3			
Manganese (mg/kg)	61	47				28	19			
Iron (mg/kg)	190	130				250	63			
Boron (mg/kg)	0.2	0.2				0.3	0.2			
Molybdenum (mg/kg)	<0.01	<0.01				<0.01	<0.01			

Percentages of Exchangeable	OM723					OM724				
	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
ECaP (Calcium)	35.9%	54.7%	67.5%	63.2%	53.8%	56.8%	56.3%	53.3%	52.6%	41.0%
EMgP (Magnesium)	17.1%	16.0%	26.1%	31.6%	40.8%	36.2%	38.1%	41.3%	42.8%	49.5%
EKP (Potassium)	38.9%	21.1%	5.2%	3.5%	3.3%	2.0%	1.3%	1.2%	0.7%	1.5%
ESP (Sodium)	1.2%	1.2%	1.1%	1.6%	2.1%	4.9%	4.3%	4.2%	3.9%	8.0%
EAIP (Aluminium)	6.9%	7.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Ca/Mg ratio	2.1	3.4	2.6	2.0	1.3	1.6	1.5	1.3	1.2	0.8
K/Mg ratio										

Electrochemical Stability Index	0.16	0.10	0.04	0.02	0.01	0.05	0.04	0.03	0.01	0.02
Loveday and Pyle Dispersion										
Emerson Class	2	7	8	2	2	7	8	8	8	2

Particle Size Distribution



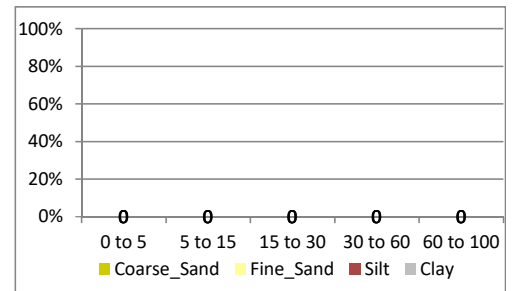
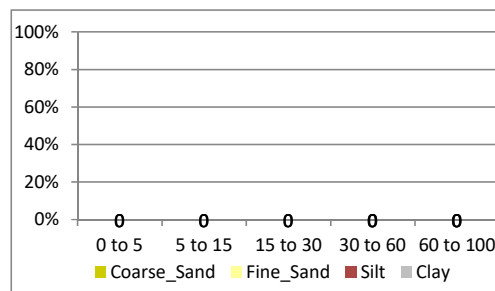
MGP Soil Laboratory Chemical Tests

RATING



	OM725					OM726				
	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Pit										
Depth (cm)	Brown					Grey				
Colour	Brown					Grey				
Texture	Clay Loam					Clay				
CEC (meq/100g)	6.9	6.9	8.2	15.0	19.6	2.7	2.7	4.4	4.7	4.4
pH water	4.8	5.3	6.2	7.0	7.2	4.5	4.7	5.5	6.6	6.8
pH CaCl ₂	4.3	4.8	5.4	6.0	6.1	4.0	4.1	4.7	5.4	5.6
Organic C (%)	2.5	1.1				1.4	0.7			
Nitrate N (mg/kg)	110.0	64.0	14.0	2.8	2.8	56.0	46.0	28.0	2.2	2.4
Ammonium N (mg/kg)	25.0	1.7	1.3	1.5	0.9	6.7	1.5	10.0	1.1	0.6
Phosphorus Colwell (mg/kg)	27	12				13	5			
Phosphorus Buffer Index	190	170				63	47			
Sulphate S-KCl (mg/kg)	8.0	2.7				8.3	4.1			
Potassium (meq/100 g)	0.5	0.2	0.2	0.4	0.5	0.3	0.2	0.3	0.2	0.2
Calcium (meq/100 g)	4.2	4.9	5.3	7.4	8.0	1.1	1.3	2.8	2.9	2.6
Magnesium (meq/100 g)	1.6	1.7	2.6	7.1	11.0	0.3	0.4	1.0	1.5	1.5
Aluminium (meq/100 g)	0.5	<0.10	<0.10	<0.10	<0.10	0.9	0.7	0.2	<0.1	<0.1
Sodium (meq/100 g)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Chloride (mg/kg)	11	22	<10.0	<10.0	<10.0	<10	<10	12	<10	<10
Electrical Conductivity (1:5)	0.23	0.13	0.04	0.03	0.03	0.12	0.11	0.07	0.02	0.02
Electrical Conductivity _{se} (dS/m)	0.83	0.56								
Copper (mg/kg)	3.2	2.9				1.2	1.0			
Zinc (mg/kg)	0.7	0.2				0.4	0.2			
Manganese (mg/kg)	200	120				93	89			
Iron (mg/kg)	200	84				240	140			
Boron (mg/kg)	0.4	0.3				0.3	0.2			
Molybdenum (mg/kg)	<0.01	<0.01				<0.01	<0.01			
Percentages of Exchangeable (
ECaP (Calcium)	61.3%	71.4%	64.7%	49.5%	40.9%	40.3%	48.9%	64.4%	62.0%	59.6%
EMgP (Magnesium)	23.4%	24.8%	31.7%	47.5%	56.3%	12.1%	15.4%	23.0%	32.1%	34.4%
EKP (Potassium)	7.2%	2.8%	2.7%	2.4%	2.4%	9.2%	6.0%	6.2%	4.5%	4.1%
ESP (Sodium)	0.9%	1.0%	0.9%	0.7%	0.5%	4.8%	4.5%	1.1%	1.5%	1.8%
EAIP (Aluminium)	7.3%	0.0%	0.0%	0.0%	0.0%	33.7%	25.2%	5.3%	0.0%	0.0%
Ca/Mg ratio	2.6	2.9	2.0	1.0	0.7	3.3	3.2	2.8	1.9	1.7
K/Mg ratio										
Electrochemical Stability Index	0.26	0.13	0.05	0.04	0.07	0.03	0.02	0.06	0.01	0.01
Loveday and Pyle Dispersion										
Emerson Class	2	2	2	2	7	8	8	2	2	2

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



Pit

Depth (cm)

Colour

Texture

CEC (meq/100g)

pH water

pH CaCl₂

Organic C (%)

Nitrate N (mg/kg)

Ammonium N (mg/kg)

Phosphorus Colwell (mg/kg)

Phosphorus Buffer Index

Sulphate S-KCl (mg/kg)

Potassium (meq/100 g)

Calcium (meq/100 g)

Magnesium (meq/100 g)

Aluminium (meq/100 g)

Sodium (meq/100 g)

Chloride (mg/kg)

Electrical Conductivity (1:5)

Electrical Conductivity_{se} (dS/m)

Copper (mg/kg)

Zinc (mg/kg)

Manganese (mg/kg)

Iron (mg/kg)

Boron (mg/kg)

Molybdenum (mg/kg)

OM727

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Brown	Brown			
Texture	Clay	Clay			
CEC (meq/100g)	2.8	2.3	3.7	3.9	3.8
pH water	5.0	5.0	5.5	5.7	6.7
pH CaCl ₂	4.2	4.3	4.4	4.5	5.5
Organic C (%)	1.7	0.6			
Nitrate N (mg/kg)	36.0	32.0	6.4	2.7	1.1
Ammonium N (mg/kg)	1.4	0.9	1.0	0.7	0.7
Phosphorus Colwell (mg/kg)	23	11			
Phosphorus Buffer Index	45	26			
Sulphate S-KCl (mg/kg)	5.3	4.3			
Potassium (meq/100 g)	0.4	0.3	0.4	0.3	0.2
Calcium (meq/100 g)	1.4	1.1	2.3	2.5	2.2
Magnesium (meq/100 g)	0.5	0.5	0.5	0.7	1.4
Aluminium (meq/100 g)	0.4	0.4	0.4	0.4	<0.1
Sodium (meq/100 g)	0.0	0.0	<0.02	<0.02	<0.02
Chloride (mg/kg)	15	19	<10	<10	<10
Electrical Conductivity (1:5)	0.10	0.08	0.03	0.02	0.02
Electrical Conductivity _{se} (dS/m)					
Copper (mg/kg)	1.1	1.0			
Zinc (mg/kg)	0.6	0.2			
Manganese (mg/kg)	61	64			
Iron (mg/kg)	230	91			
Boron (mg/kg)	0.3	0.3			
Molybdenum (mg/kg)	<0.01	<0.01			

OM728

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Brown	Brown			
Texture	Clay	Clay			
CEC (meq/100g)	2.0	1.9	4.0	3.7	3.6
pH water	5.0	5.0	5.9	6.8	6.9
pH CaCl ₂	4.1	4.1	5.0	5.6	5.7
Organic C (%)	1.2	0.8			
Nitrate N (mg/kg)	15.0	13.0	11.0	<0.5	<0.5
Ammonium N (mg/kg)	1.4	0.8	0.6	1.4	1.2
Phosphorus Colwell (mg/kg)	8	5			
Phosphorus Buffer Index	72	90			
Sulphate S-KCl (mg/kg)	3.9	2.9			
Potassium (meq/100 g)	0.2	0.1	0.1	0.1	0.1
Calcium (meq/100 g)	0.8	0.8	2.9	2.5	2.3
Magnesium (meq/100 g)	0.2	0.2	0.9	1.1	1.2
Aluminium (meq/100 g)	0.8	0.8	0.1	<0.1	<0.1
Sodium (meq/100 g)	<0.02	0.0	0.0	<0.02	<0.02
Chloride (mg/kg)	<10	<10	11	<10	<10
Electrical Conductivity (1:5)	0.04	0.04	0.04	0.01	0.01
Electrical Conductivity _{se} (dS/m)	0.26	0.26	0.23	0.09	0.10
Copper (mg/kg)	1.4	1.4			
Zinc (mg/kg)	0.3	0.2			
Manganese (mg/kg)	59	64			
Iron (mg/kg)	250	200			
Boron (mg/kg)	0.2	0.2			
Molybdenum (mg/kg)	<0.01	<0.01			

Percentages of Exchangeable ()

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
ECaP (Calcium)	49.6%	47.0%	63.0%	64.4%	57.3%
EMgP (Magnesium)	18.8%	19.2%	14.8%	18.3%	36.5%
EKP (Potassium)	15.6%	14.5%	10.1%	7.0%	6.3%
ESP (Sodium)	1.4%	1.3%			
EAIP (Aluminium)	14.5%	17.9%	12.1%	10.3%	0.0%

Ca/Mg ratio

K/Mg ratio

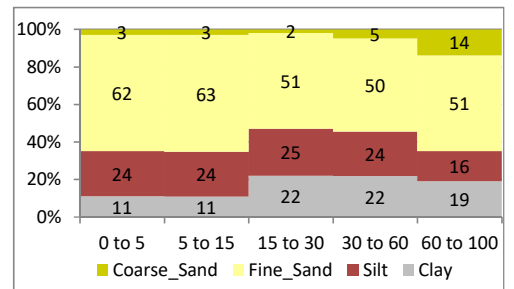
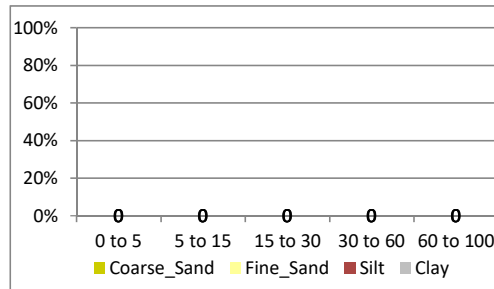
Electrochemical Stability Index

Loveday and Pyle Dispersion

Emerson Class

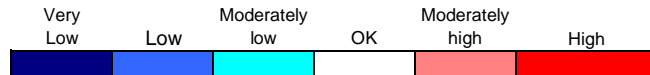
Ca/Mg ratio	2.6	2.4	4.3	3.5	1.6
K/Mg ratio					
Electrochemical Stability Index	0.07	0.06			
Loveday and Pyle Dispersion	3	2	8	2	2
Emerson Class	8	7	8	2	8

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



Pit

Depth (cm)

Colour

Texture

CEC (meq/100g)

pH water

pH CaCl₂

Organic C (%)

Nitrate N (mg/kg)

Ammonium N (mg/kg)

Phosphorus Colwell (mg/kg)

Phosphorus Buffer Index

Sulphate S-KCl (mg/kg)

Potassium (meq/100 g)

Calcium (meq/100 g)

Magnesium (meq/100 g)

Aluminium (meq/100 g)

Sodium (meq/100 g)

Chloride (mg/kg)

Electrical Conductivity (1:5)

Electrical Conductivity_{se} (dS/m)

Copper (mg/kg)

Zinc (mg/kg)

Manganese (mg/kg)

Iron (mg/kg)

Boron (mg/kg)

Molybdenum (mg/kg)

Percentages of Exchangeable ()

ECaP (Calcium)

EMgP (Magnesium)

EKP (Potassium)

ESP (Sodium)

EAIP (Aluminium)

Ca/Mg ratio

K/Mg ratio

Electrochemical Stability Index

Loveday and Pyle Dispersion

Emerson Class

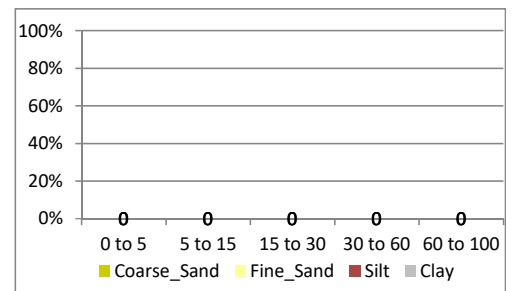
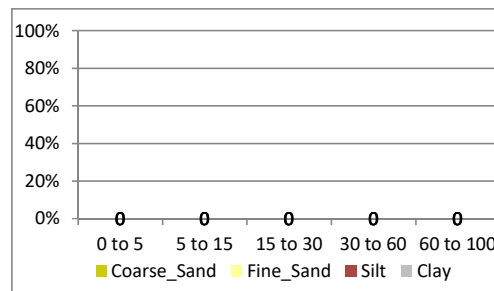
OM729

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Brown	Orange/Y			
Texture	Clay	Clay			
CEC (meq/100g)	3.3	5.1	3.2	5.7	3.9
pH water	5.7	6.1	5.6	6.6	6.7
pH CaCl ₂	4.8	5.3	4.9	5.4	5.5
Organic C (%)	1.1	0.3			
Nitrate N (mg/kg)	19.0	23.0	39.0	1.0	0.8
Ammonium N (mg/kg)	2.3	1.3	1.4	1.2	1.3
Phosphorus Colwell (mg/kg)	6	<5			
Phosphorus Buffer Index	38	66			
Sulphate S-KCl (mg/kg)	3.9	1.6			
Potassium (meq/100 g)	0.2	0.1	0.1	0.2	0.1
Calcium (meq/100 g)	2.6	3.7	2.5	3.5	2.1
Magnesium (meq/100 g)	0.5	1.2	0.5	2.0	1.6
Aluminium (meq/100 g)	<0.1	<0.1	<0.1	<0.1	<0.1
Sodium (meq/100 g)	0.0	0.1	0.0	0.0	0.0
Chloride (mg/kg)	12	16	17	<10	11
Electrical Conductivity (1:5)	0.06	0.06	0.08	0.02	0.01
Electrical Conductivity _{se} (dS/m)					
Copper (mg/kg)	1.4	0.8			
Zinc (mg/kg)	0.3	0.1			
Manganese (mg/kg)	71	43			
Iron (mg/kg)	120	19			
Boron (mg/kg)	0.3	0.3			
Molybdenum (mg/kg)	<0.01	<0.01			

OM730

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Brown	Orange/Y			
Texture	Clay Loam	Clay			
CEC (meq/100g)	6.6	3.0	4.9	6.3	3.7
pH water	5.1	5.2	5.5	5.8	6.1
pH CaCl ₂	4.6	4.6	4.7	4.9	4.7
Organic C (%)	2.5	0.5			
Nitrate N (mg/kg)	160.0	47.0	27.0	8.6	2.4
Ammonium N (mg/kg)	2.0	1.1	0.8	1.1	0.7
Phosphorus Colwell (mg/kg)	25	<5			
Phosphorus Buffer Index	53	48			
Sulphate S-KCl (mg/kg)	12.0	5.7			
Potassium (meq/100 g)	0.7	0.2	0.3	0.2	0.1
Calcium (meq/100 g)	4.8	2.0	3.0	3.5	0.5
Magnesium (meq/100 g)	1.1	0.4	1.1	2.3	2.8
Aluminium (meq/100 g)	<0.10	0.3	0.5	0.3	0.2
Sodium (meq/100 g)	0.1	0.1	0.1	0.1	0.1
Chloride (mg/kg)	<10.0	20	<10.0	<10.0	<10.0
Electrical Conductivity (1:5)	0.29	0.11	0.06	0.04	0.01
Electrical Conductivity _{se} (dS/m)	1.00	0.48			
Copper (mg/kg)	1.0	0.9			
Zinc (mg/kg)	1.0	0.1			
Manganese (mg/kg)	27	13			
Iron (mg/kg)	170	45			
Boron (mg/kg)	0.5	0.2			
Molybdenum (mg/kg)	<0.01	<0.01			

Particle Size Distribution



MGP Soil Laboratory Chemical Tests



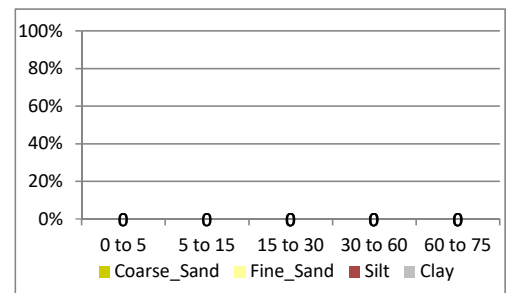
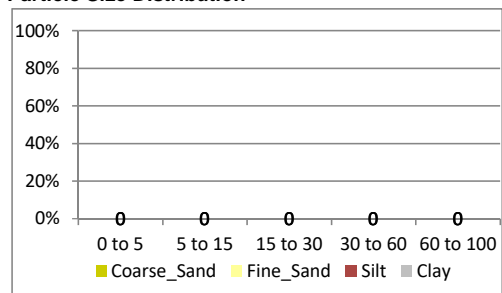
	OM731					OM732				
	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 75
Pit										
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 75
Colour	Grey	Brown				Brown	Brown			
Texture	Clay Loam	Clay				Clay	Clay			
CEC (meq/100g)	3.8	3.3	2.5	6.2	7.2	2.7	2.4	3.8	6.3	5.8
pH water	4.8	4.9	5.1	6.4	6.8	4.3	4.5	5.7	6.4	6.9
pH CaCl ₂	4.2	4.3	4.4	5.3	5.8	3.9	4.1	4.9	5.6	5.8
Organic C (%)	1.3	0.9				1.5	0.7			
Nitrate N (mg/kg)	63.0	41.0	30.0	4.5	5.9	78.0	66.0	20.0	16.0	2.4
Ammonium N (mg/kg)	1.9	1.1	1.4	0.9	0.9	5.8	1.3	0.7	0.7	<0.6
Phosphorus Colwell (mg/kg)	14	13				19	15			
Phosphorus Buffer Index	55	41				55	42			
Sulphate S-KCl (mg/kg)	11.0	7.5				10.0	6.5			
Potassium (meq/100 g)	0.7	0.3	0.6	0.4	0.2	0.4	0.3	0.2	0.3	0.2
Calcium (meq/100 g)	1.7	1.6	1.1	3.6	4.0	1.1	1.2	2.7	3.9	3.1
Magnesium (meq/100 g)	1.0	1.0	0.6	2.1	2.8	0.3	0.4	0.9	2.1	2.4
Aluminium (meq/100 g)	0.4	0.3	0.2	<0.10	<0.10	0.7	0.5	<0.10	<0.10	<0.10
Sodium (meq/100 g)	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.0	0.1	0.1
Chloride (mg/kg)	21	23	23	<10.0	14	12	19	15	<10.0	17
Electrical Conductivity (1:5)	0.15	0.11	0.09	0.03	0.03	0.18	0.15	0.05	0.05	0.02
Electrical Conductivity _{se} (dS/m)	0.67	0.50				0.64	0.61			
Copper (mg/kg)	0.8	0.7				0.7	0.7			
Zinc (mg/kg)	0.3	0.2				0.7	0.4			
Manganese (mg/kg)	37	32				73	45			
Iron (mg/kg)	310	190				280	160			
Boron (mg/kg)	0.2	0.1				0.2	0.2			
Molybdenum (mg/kg)	<0.01	<0.01				<0.01	<0.01			

	OM731					OM732				
	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 75
Percentages of Exchangeable ()										
ECaP (Calcium)	44.7%	48.9%	44.2%	58.3%	55.4%	41.5%	50.6%	70.3%	61.6%	53.4%
EMgP (Magnesium)	26.3%	30.6%	22.1%	34.0%	38.8%	12.5%	15.6%	23.2%	33.2%	41.4%
EKP (Potassium)	17.4%	9.5%	22.1%	5.7%	3.2%	16.2%	11.4%	5.7%	4.3%	4.0%
ESP (Sodium)	1.6%	1.8%	2.0%	1.9%	2.6%	1.9%	2.1%	0.8%	0.9%	1.2%
EAIP (Aluminium)	10.0%	9.2%	9.6%	0.0%	0.0%	27.9%	20.3%	0.0%	0.0%	0.0%

Ca/Mg ratio	1.7	1.6	2.0	1.71	1.43	3.3	3.2	3.0	1.9	1.3
K/Mg ratio										

Electrochemical Stability Index	0.10	0.06	0.04	0.02	0.01	0.10	0.07	0.06	0.05	0.02
Loveday and Pyle Dispersion										
Emerson Class	2	2	2	6	2	8	8	8	2	2

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



Pit

Depth (cm)

Colour

Texture

CEC (meq/100g)

pH water

pH CaCl₂

Organic C (%)

Nitrate N (mg/kg)

Ammonium N (mg/kg)

Phosphorus Colwell (mg/kg)

Phosphorus Buffer Index

Sulphate S-KCl (mg/kg)

Potassium (meq/100 g)

Calcium (meq/100 g)

Magnesium (meq/100 g)

Aluminium (meq/100 g)

Sodium (meq/100 g)

Chloride (mg/kg)

Electrical Conductivity (1:5)

Electrical Conductivity_{se} (dS/m)

Copper (mg/kg)

Zinc (mg/kg)

Manganese (mg/kg)

Iron (mg/kg)

Boron (mg/kg)

Molybdenum (mg/kg)

OM733

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Brown	Brown			
Texture	Clay	Clay			
CEC (meq/100g)	2.2	2.7	4.1	4.5	
pH water	5.0	5.0	5.8	6.3	
pH CaCl ₂	4.3	4.4	4.9	5.1	
Organic C (%)	1.0	0.4			
Nitrate N (mg/kg)	26.0	37.0	13.0	2.3	
Ammonium N (mg/kg)	1.7	1.5	1.2	1.4	
Phosphorus Colwell (mg/kg)	9	6			
Phosphorus Buffer Index	36	41			
Sulphate S-KCl (mg/kg)	3.6	1.5			
Potassium (meq/100 g)	0.1	0.1	0.1	0.1	
Calcium (meq/100 g)	1.1	1.5	2.8	2.9	
Magnesium (meq/100 g)	0.4	0.6	1.0	1.3	
Aluminium (meq/100 g)	0.5	0.5	0.2	0.1	
Sodium (meq/100 g)	<0.02	0.0	0.0	0.0	
Chloride (mg/kg)	13	25	14	<10	
Electrical Conductivity (1:5)	0.06	0.09	0.04	0.02	
Electrical Conductivity _{se} (dS/m)	0.38	0.55	0.25	0.14	
Copper (mg/kg)	0.8	0.8			
Zinc (mg/kg)	0.4	0.1			
Manganese (mg/kg)	38	58			
Iron (mg/kg)	230	53			
Boron (mg/kg)	0.2	0.1			
Molybdenum (mg/kg)	<0.01	<0.01			

OM734

	0 to 5	5 to 15	15 to 30	30 to 50	50 to 80
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 50	50 to 80
Colour	Orange/Y	Orange/Y			
Texture	Clay	Clay			
CEC (meq/100g)	3.4	4.4	5.0	4.5	4.8
pH water	4.8	5.5	6.4	6.8	7.1
pH CaCl ₂	4.2	4.8	5.4	5.7	6.0
Organic C (%)	1.1	0.5			
Nitrate N (mg/kg)	59.0	33.0	5.3	2.8	1.4
Ammonium N (mg/kg)	2.5	0.9	0.8	0.8	1.0
Phosphorus Colwell (mg/kg)	11	<5			
Phosphorus Buffer Index	62	67			
Sulphate S-KCl (mg/kg)	4.6	1.8			
Potassium (meq/100 g)	0.2	0.1	0.2	0.2	0.2
Calcium (meq/100 g)	1.8	3.2	3.8	3.4	3.2
Magnesium (meq/100 g)	0.7	0.9	1.0	1.0	1.4
Aluminium (meq/100 g)	0.7	0.1	<0.10	<0.10	<0.10
Sodium (meq/100 g)	0.1	0.1	0.1	0.0	0.0
Chloride (mg/kg)	<10.0	35	<10.0	<10.0	<10.0
Electrical Conductivity (1:5)	0.12	0.08	0.02	0.02	0.02
Electrical Conductivity _{se} (dS/m)	0.45	0.44			
Copper (mg/kg)	1.1	0.9			
Zinc (mg/kg)	0.4	0.1			
Manganese (mg/kg)	65	38			
Iron (mg/kg)	110	28			
Boron (mg/kg)	0.3	0.3			
Molybdenum (mg/kg)	<0.01	<0.01			

Percentages of Exchangeable I

ECaP (Calcium)	50.9%	55.4%	68.5%	64.7%	53.1%	73.6%	76.3%	74.9%	66.7%
EMgP (Magnesium)	19.9%	22.1%	24.0%	29.0%	19.5%	19.5%	19.3%	20.9%	29.2%
EKP (Potassium)	5.6%	3.3%	2.9%	3.1%	6.2%	2.8%	3.2%	3.3%	3.5%
ESP (Sodium)	1.1%	1.1%	0.5%	0.7%	1.5%	1.1%	1.2%	0.9%	0.6%
EAIP (Aluminium)	23.6%	18.1%	4.2%	2.5%	19.8%	3.0%	0.0%	0.0%	0.0%

Ca/Mg ratio

K/Mg ratio

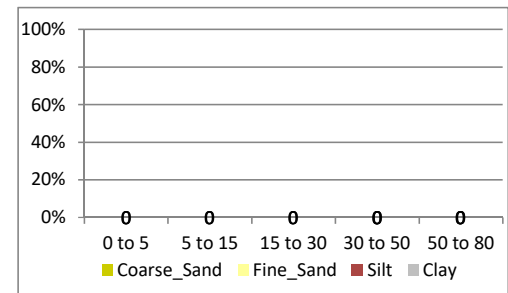
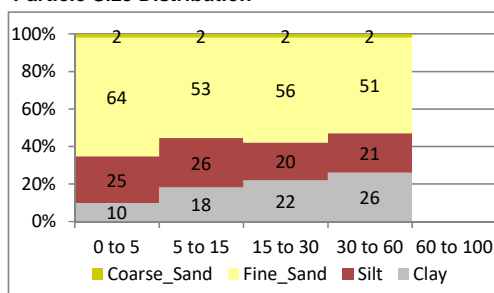
Electrochemical Stability Index

Loveday and Pyle Dispersion

Emerson Class

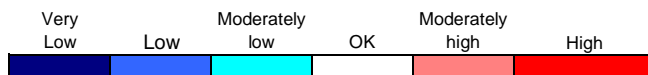
Ca/Mg ratio	2.6	2.5	2.9	2.2	2.7	3.8	4.0	3.6	2.3
K/Mg ratio									
Electrochemical Stability Index		0.08	0.08	0.03	0.08	0.07	0.02	0.02	0.03
Loveday and Pyle Dispersion	3	8	2	2	3	6	2	2	2

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



Pit

Depth (cm)

Colour

Texture

CEC (meq/100g)

pH water

pH CaCl₂

Organic C (%)

Nitrate N (mg/kg)

Ammonium N (mg/kg)

Phosphorus Colwell (mg/kg)

Phosphorus Buffer Index

Sulphate S-KCl (mg/kg)

Potassium (meq/100 g)

Calcium (meq/100 g)

Magnesium (meq/100 g)

Aluminium (meq/100 g)

Sodium (meq/100 g)

Chloride (mg/kg)

Electrical Conductivity (1:5)

Electrical Conductivity_{se} (dS/m)

Copper (mg/kg)

Zinc (mg/kg)

Manganese (mg/kg)

Iron (mg/kg)

Boron (mg/kg)

Molybdenum (mg/kg)

OM735

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Brown	Brown			
Texture	Clay	Clay			
CEC (meq/100g)	3.6	2.7	2.8	7.2	5.7
pH water	5.4	5.3	5.4	6.5	6.8
pH CaCl ₂	4.6	4.6	4.6	5.4	5.7
Organic C (%)	1.2	0.6			
Nitrate N (mg/kg)	22.0	30.0	22.0	0.8	<0.5
Ammonium N (mg/kg)	2.0	1.8	1.4	2.4	2.0
Phosphorus Colwell (mg/kg)	11	<5			
Phosphorus Buffer Index	65	47			
Sulphate S-KCl (mg/kg)	5.2	1.3			
Potassium (meq/100 g)	0.1	0.1	0.1	0.2	0.2
Calcium (meq/100 g)	2.9	2.2	2.3	4.8	3.0
Magnesium (meq/100 g)	0.4	0.2	0.3	2.1	2.5
Aluminium (meq/100 g)	0.2	0.2	0.1	<0.1	<0.1
Sodium (meq/100 g)	0.0	0.0	0.1	0.1	0.1
Chloride (mg/kg)	10	22	14	<10	<10
Electrical Conductivity (1:5)	0.06	0.06	0.05	0.02	0.02
Electrical Conductivity _{se} (dS/m)	0.33	0.42	0.33	0.12	0.12
Copper (mg/kg)	1.8	1.3			
Zinc (mg/kg)	0.3	0.2			
Manganese (mg/kg)	110	72			
Iron (mg/kg)	200	79			
Boron (mg/kg)	0.4	0.2			
Molybdenum (mg/kg)	<0.01	<0.01			

OM736

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Grey	Grey			
Texture	Clay	Clay			
CEC (meq/100g)	3.9	3.5	3.2	6.1	6.8
pH water	5.5	5.3	6.0	6.3	6.5
pH CaCl ₂	4.5	4.5	5.1	5.2	5.2
Organic C (%)	1.6	1.2			
Nitrate N (mg/kg)	21.0	31.0	13.0	2.1	1.5
Ammonium N (mg/kg)	6.7	2.3	1.9	1.0	1.9
Phosphorus Colwell (mg/kg)	9	8			
Phosphorus Buffer Index	83	74			
Sulphate S-KCl (mg/kg)	5.2	4.0			
Potassium (meq/100 g)	0.1	0.1	0.1	0.2	0.2
Calcium (meq/100 g)	2.6	2.1	2.1	3.3	3.4
Magnesium (meq/100 g)	0.8	0.9	0.8	2.5	3.1
Aluminium (meq/100 g)	0.2	0.3	0.1	<0.1	<0.1
Sodium (meq/100 g)	0.2	0.1	0.1	0.1	0.2
Chloride (mg/kg)	<10	14	<10	<10	<10
Electrical Conductivity (1:5)	0.06	0.08	0.03	0.02	0.02
Electrical Conductivity _{se} (dS/m)					
Copper (mg/kg)	3.2	5.1			
Zinc (mg/kg)	0.9	1.3			
Manganese (mg/kg)	82	140			
Iron (mg/kg)	220	220			
Boron (mg/kg)	0.3	0.3			
Molybdenum (mg/kg)	<0.01	<0.01			

Percentages of Exchangeable (

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
ECaP (Calcium)	81.2%	83.0%	81.0%	67.0%	52.5%
EMgP (Magnesium)	10.9%	8.3%	9.9%	29.3%	43.8%
EKP (Potassium)	2.5%	1.9%	2.1%	2.4%	2.6%
ESP (Sodium)	0.8%	1.1%	2.1%	1.3%	1.1%
EAIP (Aluminium)	4.5%	5.7%	4.9%	0.0%	0.0%

Ca/Mg ratio

K/Mg ratio

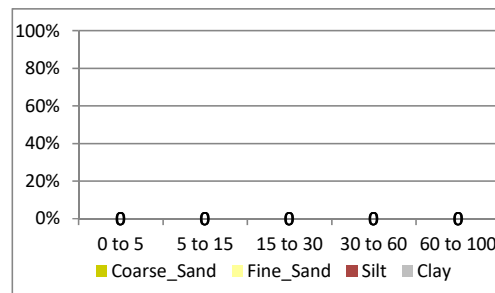
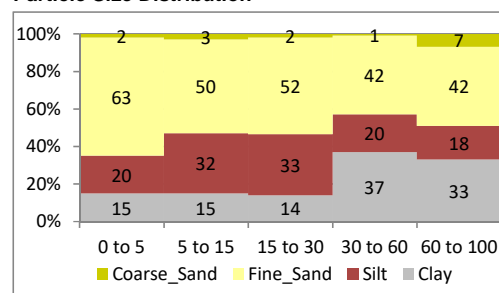
Electrochemical Stability Index

Loveday and Pyle Dispersion

Emerson Class

Ca/Mg ratio	7.4	10.0	8.2	2.3	1.2
K/Mg ratio					
Electrochemical Stability Index	0.07	0.05	0.02	0.02	0.02
Loveday and Pyle Dispersion	2	2	2	2	2
Emerson Class	3	8	8	6	6

Particle Size Distribution

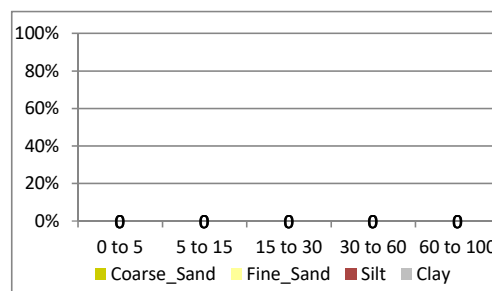
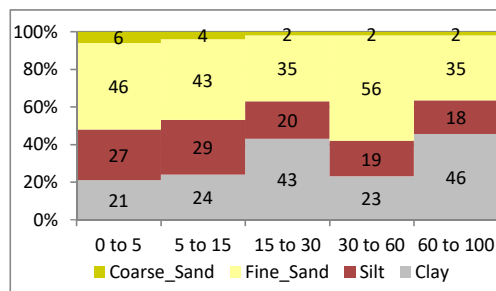


MGP Soil Laboratory Chemical Tests



	OM737					OM738				
	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Pit										
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Red	Red				Grey	Grey			
Texture	Clay	Clay				Clay	Clay			
CEC (meq/100g)	6.7	5.3	7.0	6.7	5.4	2.5	1.7	2.5	8.7	7.9
pH water	5.1	5.2	5.7	6.2	5.5	4.5	4.7	5.4	6.8	6.9
pH CaCl ₂	4.5	4.5	4.8	5.4	4.7	3.8	4.1	4.3	5.7	5.8
Organic C (%)	2.3	1.4				2.0	0.5			
Nitrate N (mg/kg)	87.0	40.0	9.6	4.6	4.8	21.0	16.0	3.8	1.6	1.9
Ammonium N (mg/kg)	3.1	1.3	0.8	1.1	2.8	3.4	1.8	1.2	2.7	1.5
Phosphorus Colwell (mg/kg)	12	<5				14	<5			
Phosphorus Buffer Index	66	71				52	53			
Sulphate S-KCl (mg/kg)	8.3	4.1				6.4	3.4			
Potassium (meq/100 g)	1.3	1.0	0.9	0.4	0.2	0.4	0.2	0.2	0.3	0.2
Calcium (meq/100 g)	3.6	2.9	4.4	4.1	2.4	0.6	0.3	1.2	4.4	3.4
Magnesium (meq/100 g)	1.4	1.0	1.5	2.0	2.3	0.3	0.2	0.6	4.0	4.2
Aluminium (meq/100 g)	0.3	0.3	0.2	0.1	0.4	1.3	1.0	0.5	<0.1	<0.1
Sodium (meq/100 g)	0.1	0.1	0.1	0.1	0.1	<0.02	<0.02	<0.02	0.1	0.1
Chloride (mg/kg)	34	24	<10.0	<10.0	34	<10	15	21	<10	<10
Electrical Conductivity (1:5)	0.20	0.11	0.04	0.03	0.03	0.08	0.06	0.02	0.02	0.02
Electrical Conductivity _{se} (dS/m)	1.04	0.59	0.19	0.18	0.22					
Copper (mg/kg)	3.3	3.3				1.4	1.7			
Zinc (mg/kg)	1.2	0.3				0.7	0.2			
Manganese (mg/kg)	160	130				46	110			
Iron (mg/kg)	130	64				370	86			
Boron (mg/kg)	0.4	0.4				0.2	0.1			
Molybdenum (mg/kg)	<0.01	<0.01				<0.01	<0.01			
Percentages of Exchangeable (
ECaP (Calcium)	53.8%	55.2%	62.5%	61.4%	44.7%	24.0%	17.4%	48.4%	50.3%	43.0%
EMgP (Magnesium)	20.9%	18.9%	21.3%	29.9%	42.8%	10.6%	12.2%	23.8%	45.8%	53.1%
EKP (Potassium)	19.4%	18.7%	12.1%	6.3%	3.4%	14.2%	12.2%	8.9%	2.9%	2.7%
ESP (Sodium)	1.3%	1.1%	0.7%	0.9%	1.1%				1.0%	1.3%
EAIP (Aluminium)	4.5%	6.1%	3.4%	1.5%	8.0%	51.2%	58.1%	19.0%	0.0%	0.0%
Ca/Mg ratio	2.6	2.9	2.9	2.1	1.04	2.3	1.4	2.0	1.1	0.8
K/Mg ratio										
Electrochemical Stability Index	0.15	0.10	0.06	0.03	0.03				0.02	0.02
Loveday and Pyle Dispersion										
Emerson Class	7	7	3	2	2	8	8	8	6	2

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



Pit

OM739

OM740

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	Grey	Grey				Grey	Grey			
Colour	Grey	Grey				Grey	Grey			
Texture	Clay	Clay				Clay	Clay			
CEC (meq/100g)	4.7	2.9	2.2	7.0	3.8	5.2	5.1	4.9	7.5	9.4
pH water	5.0	5.0	5.5	6.1	6.5	5.6	6.1	6.5	6.7	6.8
pH CaCl ₂	4.4	4.3	4.5	4.9	5.2	4.8	5.1	5.3	5.5	5.6
Organic C (%)	1.8	0.8				1.9	1.1			
Nitrate N (mg/kg)	67.0	30.0	8.7	2.3	1.9	27.0	4.6	1.9	0.7	0.8
Ammonium N (mg/kg)	2.2	1.2	0.8	0.6	<0.6	2.3	1.4	1.5	1.6	1.3
Phosphorus Colwell (mg/kg)	19	6				17	8			
Phosphorus Buffer Index	63	40				72	68			
Sulphate S-KCl (mg/kg)	9.8	5.2				7.6	3.1			
Potassium (meq/100 g)	0.7	0.3	0.2	0.6	0.2	0.4	0.2	0.2	0.3	0.5
Calcium (meq/100 g)	2.3	1.5	1.2	3.5	1.7	3.4	3.5	3.0	4.2	4.8
Magnesium (meq/100 g)	1.3	0.7	0.6	2.6	1.8	1.3	1.4	1.6	2.8	4.0
Aluminium (meq/100 g)	0.3	0.4	0.2	0.2	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1
Sodium (meq/100 g)	0.1	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.2	0.2
Chloride (mg/kg)	62	18	<10.0	<10.0	<10.0	34	<10	<10	<10	<10
Electrical Conductivity (1:5)	0.18	0.08	0.03	0.03	0.02	0.08	0.04	0.02	0.02	0.03
Electrical Conductivity _{se} (dS/m)	1.31	0.52	0.22	0.17	0.15	0.59	0.25	0.14	0.12	0.15
Copper (mg/kg)	1.1	0.8				4.3	4.0			
Zinc (mg/kg)	0.8	0.2				2.3	1.4			
Manganese (mg/kg)	56	39				36	29			
Iron (mg/kg)	330	150				280	170			
Boron (mg/kg)	0.2	0.2				0.4	0.2			
Molybdenum (mg/kg)	<0.01	<0.01				<0.01	<0.01			

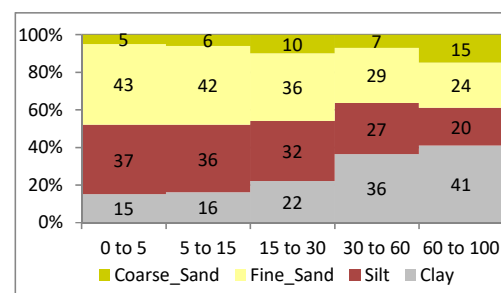
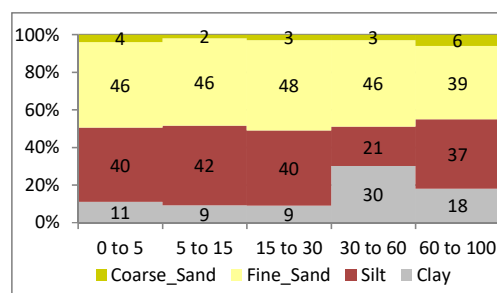
Percentages of Exchangeable (

ECaP (Calcium)	48.6%	52.4%	54.5%	50.1%	44.7%	65.8%	68.2%	61.5%	56.3%	50.8%
EMgP (Magnesium)	27.5%	24.1%	25.9%	37.2%	47.4%	25.1%	27.3%	32.8%	37.5%	42.4%
EKP (Potassium)	15.0%	9.8%	9.1%	8.9%	6.1%	8.5%	3.5%	4.3%	4.2%	5.0%
ESP (Sodium)	1.9%	1.4%	1.4%	1.0%	1.8%	0.6%	1.0%	1.4%	2.0%	1.8%
EAIP (Aluminium)	7.0%	12.2%	9.1%	2.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Ca/Mg ratio	1.8	2.2	2.1	1.3	0.9	2.6	2.5	1.9	1.5	1.2
K/Mg ratio										

Electrochemical Stability Index	0.09	0.06	0.02	0.03	0.01	0.14	0.04	0.01	0.01	0.02
Loveday and Pyle Dispersion										
Emerson Class	7	8	2	6	8	8	8	8	8	8

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



Pit

Depth (cm)

Colour

Texture

CEC (meq/100g)

pH water

pH CaCl₂

Organic C (%)

Nitrate N (mg/kg)

Ammonium N (mg/kg)

Phosphorus Colwell (mg/kg)

Phosphorus Buffer Index

Sulphate S-KCl (mg/kg)

Potassium (meq/100 g)

Calcium (meq/100 g)

Magnesium (meq/100 g)

Aluminium (meq/100 g)

Sodium (meq/100 g)

Chloride (mg/kg)

Electrical Conductivity (1:5)

Electrical Conductivity_{se} (dS/m)

Copper (mg/kg)

Zinc (mg/kg)

Manganese (mg/kg)

Iron (mg/kg)

Boron (mg/kg)

Molybdenum (mg/kg)

OM741

0 to 5 5 to 15 15 to 30 30 to 60 60 to 100

Grey Brown

Clay Loam Clay Loam

CEC (meq/100g)	4.9	1.4	1.0	5.4	6.1
pH water	4.7	4.8	5.4	5.6	5.7
pH CaCl ₂	4.2	4.3	4.6	4.4	4.8
Organic C (%)	4.2	0.4			
Nitrate N (mg/kg)	260.0	23.0	15.0	3.5	3.1
Ammonium N (mg/kg)	110.0	2.7	<0.6	<0.6	<0.6
Phosphorus Colwell (mg/kg)	88	11			
Phosphorus Buffer Index	48	34			
Sulphate S-KCl (mg/kg)	28.0	5.4			
Potassium (meq/100 g)	1.0	0.3	0.3	1.2	0.5
Calcium (meq/100 g)	2.4	0.3	0.3	1.7	2.1
Magnesium (meq/100 g)	1.2	0.2	0.2	1.5	3.3
Aluminium (meq/100 g)	0.3	0.6	0.3	1.0	0.1
Sodium (meq/100 g)	<0.02	<0.02	<0.02	0.0	0.1
Chloride (mg/kg)	13	63	17	<10.0	42
Electrical Conductivity (1:5)	0.50	0.10	0.05	0.05	0.04
Electrical Conductivity _{se} (dS/m)	1.65	0.68			
Copper (mg/kg)	0.7	0.3			
Zinc (mg/kg)	5.6	0.2			
Manganese (mg/kg)	75	23			
Iron (mg/kg)	290	110			
Boron (mg/kg)	0.5	0.1			
Molybdenum (mg/kg)	<0.01	<0.01			

OM742

0 to 5 5 to 15 15 to 30 30 to 60 60 to 100

Brown Brown

Clay Clay

CEC (meq/100g)	4.4	3.1	3.2	6.2	4.9
pH water	5.0	5.3	5.9	6.6	6.7
pH CaCl ₂	4.5	4.6	5.1	5.4	5.6
Organic C (%)	1.9	0.9			
Nitrate N (mg/kg)	120.0	48.0	16.0	1.6	<0.5
Ammonium N (mg/kg)	9.4	1.4	0.6	0.9	0.7
Phosphorus Colwell (mg/kg)	19	9			
Phosphorus Buffer Index	54	53			
Sulphate S-KCl (mg/kg)	9.7	4.5			
Potassium (meq/100 g)	0.2	0.1	0.1	0.1	0.1
Calcium (meq/100 g)	2.7	2.0	2.3	3.5	2.1
Magnesium (meq/100 g)	1.2	0.8	0.8	2.5	2.6
Aluminium (meq/100 g)	0.2	0.2	<0.10	<0.10	<0.10
Sodium (meq/100 g)	0.1	0.1	0.0	0.1	0.1
Chloride (mg/kg)	10	<10.0	15	<10.0	<10.0
Electrical Conductivity (1:5)	0.24	0.10	0.05	0.02	0.02
Electrical Conductivity _{se} (dS/m)	0.80	0.39			
Copper (mg/kg)	1.1	1.0			
Zinc (mg/kg)	1.0	0.2			
Manganese (mg/kg)	45	38			
Iron (mg/kg)	200	110			
Boron (mg/kg)	0.3	0.2			
Molybdenum (mg/kg)	<0.01	<0.01			

Percentages of Exchangeable ()

ECaP (Calcium)

EMgP (Magnesium)

EKP (Potassium)

ESP (Sodium)

EAIP (Aluminium)

ECaP (Calcium)	49.5%	21.7%	30.4%	31.3%	34.5%
EMgP (Magnesium)	24.7%	12.6%	19.6%	27.6%	54.2%
EKP (Potassium)	20.0%	22.4%	25.5%	22.1%	7.7%
ESP (Sodium)				0.7%	1.5%
EAIP (Aluminium)	5.8%	43.4%	24.5%	18.2%	2.1%

ECaP (Calcium)	61.9%	64.5%	71.2%	56.3%	42.9%
EMgP (Magnesium)	27.5%	25.8%	25.7%	40.2%	53.1%
EKP (Potassium)	4.8%	3.2%	2.2%	2.3%	2.7%
ESP (Sodium)	1.6%	1.6%	0.9%	1.3%	1.4%
EAIP (Aluminium)	4.1%	4.8%	0.0%	0.0%	0.0%

Ca/Mg ratio

K/Mg ratio

Ca/Mg ratio	2.0	1.7	1.6	1.1	0.6
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Ca/Mg ratio	2.3	2.5	2.8	1.4	0.8
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Electrochemical Stability Index

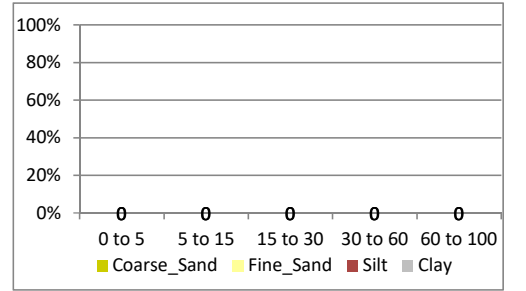
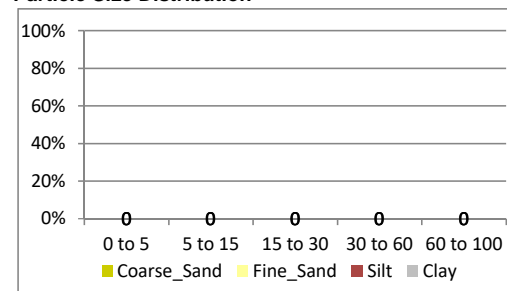
Loveday and Pyle Dispersion

Emerson Class

Electrochemical Stability Index				0.07	0.03
Loveday and Pyle Dispersion	3	2	1	2	6

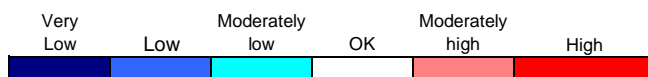
Electrochemical Stability Index	0.15	0.06	0.05	0.02	0.01
Loveday and Pyle Dispersion	3	6	2	2	2

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



Pit

OM743

OM744

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	Grey	Grey				Brown	Brown			
Colour										
Texture	Clay	Clay				Clay	Clay			
CEC (meq/100g)	6.4	6.1	6.6	9.0	15.2	8.1	6.8	2.4	1.6	9.5
pH water	4.9	5.6	6.4	6.8	6.8	5.4	5.6	6.1	6.5	6.7
pH CaCl ₂	4.5	4.9	5.3	5.6	5.6	4.7	4.8	5.0	5.2	5.0
Organic C (%)	2.5	1.4				1.5	1.1			
Nitrate N (mg/kg)	150.0	45.0	3.9	<0.5	<0.5	50.0	25.0	5.4	1.9	<0.5
Ammonium N (mg/kg)	13.0	1.3	<0.6	1.0	1.4	1.9	3.1	<0.6	<0.6	0.7
Phosphorus Colwell (mg/kg)	30	12				10	13			
Phosphorus Buffer Index	79	59				79	64			
Sulphate S-KCl (mg/kg)	11.0	6.6				8.8	4.6			
Potassium (meq/100 g)	0.4	0.2	0.2	0.2	0.3	0.2	0.2	0.1	0.1	0.2
Calcium (meq/100 g)	3.9	4.1	4.6	6.1	8.3	4.9	4.2	1.4	0.8	3.1
Magnesium (meq/100 g)	1.9	1.8	1.8	2.6	6.3	2.8	2.4	0.9	0.7	5.7
Aluminium (meq/100 g)	0.1	<0.10	<0.10	<0.10	<0.10	0.1	<0.10	<0.10	<0.10	0.1
Sodium (meq/100 g)	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.0	0.0	0.3
Chloride (mg/kg)	19	17	<10.0	<10.0	<10.0	19	12	<10.0	<10.0	<10.0
Electrical Conductivity (1:5)	0.31	0.11	0.03	0.02	0.04	0.12	0.07	0.02	0.01	0.02
Electrical Conductivity _{se} (dS/m)	1.10	0.46				0.51	0.30			
Copper (mg/kg)	2.7	3.1				2.0	1.7			
Zinc (mg/kg)	3.9	2.8				0.7	0.5			
Manganese (mg/kg)	69	73				35	31			
Iron (mg/kg)	320	150				210	130			
Boron (mg/kg)	0.5	0.4				0.3	0.2			
Molybdenum (mg/kg)	<0.01	<0.01				<0.01	<0.01			

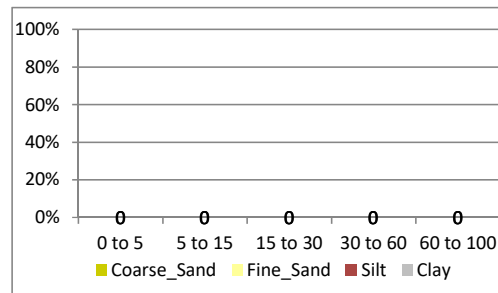
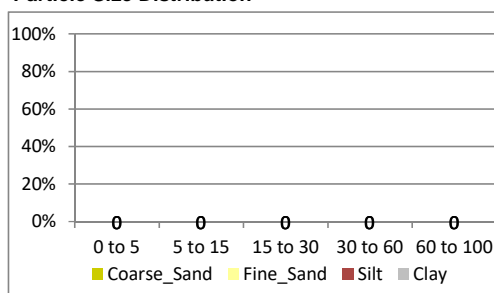
Percentages of Exchangeable ()

ECaP (Calcium)	60.7%	66.8%	69.6%	67.9%	54.7%	60.6%	61.6%	59.6%	51.0%	32.6%
EMgP (Magnesium)	29.6%	29.3%	27.2%	28.9%	41.5%	34.7%	35.2%	36.6%	43.9%	60.0%
EKP (Potassium)	6.9%	2.9%	2.3%	2.1%	2.2%	2.6%	2.5%	2.6%	3.2%	2.3%
ESP (Sodium)	0.8%	1.0%	0.9%	1.1%	1.5%	0.6%	0.7%	1.3%	1.9%	3.6%
EAIP (Aluminium)	2.0%	0.0%	0.0%	0.0%	0.0%	1.5%	0.0%	0.0%	0.0%	1.5%

Ca/Mg ratio	2.1	2.3	2.6	2.3	1.3	1.8	1.8	1.6	1.2	0.5
K/Mg ratio										

Electrochemical Stability Index	0.40	0.11	0.03	0.02	0.03	0.19	0.10	0.02	0.01	0.01
Loveday and Pyle Dispersion										
Emerson Class	7	6	2	8	3	6	2	2	2	2

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



Pit

Depth (cm)

Colour

Texture

CEC (meq/100g)

pH water

pH CaCl₂

Organic C (%)

Nitrate N (mg/kg)

Ammonium N (mg/kg)

Phosphorus Colwell (mg/kg)

Phosphorus Buffer Index

Sulphate S-KCl (mg/kg)

Potassium (meq/100 g)

Calcium (meq/100 g)

Magnesium (meq/100 g)

Aluminium (meq/100 g)

Sodium (meq/100 g)

Chloride (mg/kg)

Electrical Conductivity (1:5)

Electrical Conductivity_{se} (dS/m)

Copper (mg/kg)

Zinc (mg/kg)

Manganese (mg/kg)

Iron (mg/kg)

Boron (mg/kg)

Molybdenum (mg/kg)

Percentages of Exchangeable ()

ECaP (Calcium)

EMgP (Magnesium)

EKP (Potassium)

ESP (Sodium)

EAIP (Aluminium)

Ca/Mg ratio

K/Mg ratio

Electrochemical Stability Index

Loveday and Pyle Dispersion

Emerson Class

OM745

0 to 5 5 to 15 15 to 30 30 to 60 60 to 100

Brown Grey

Clay Clay

2.9 2.3 3.6 3.1 3.9

5.1 5.1 5.8 6.2 6.4

4.3 4.4 4.8 5.2 5.4

1.4 0.6

22.0 23.0 2.2 1.7 3.2

1.7 1.6 0.9 1.3 10.0

21 9

68 48

5.3 1.9

0.3 0.2 0.2 0.1 0.2

1.7 1.4 2.3 1.9 2.0

0.5 0.4 1.0 1.1 1.7

0.4 0.3 0.2 <0.1 <0.1

0.0 <0.02 0.0 <0.02 0.0

<10 <10 <10 <10 <10

0.06 0.06 0.02 0.02 0.02

1.1 0.9

0.6 0.2

54 39

260 96

0.3 0.2

<0.01 <0.01

58.2% 60.6% 63.5% 60.5% 51.2%

16.8% 18.6% 26.8% 35.0% 43.5%

10.3% 6.9% 4.7% 4.5% 4.6%

1.0% 0.6% 0.6% 0.8% 0.8%

13.7% 13.9% 4.4% 0.0% 0.0%

3.5 3.3 2.4 1.7 1.18

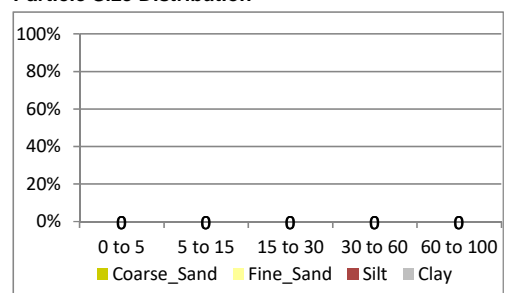
0.06 0.04 0.03

8 8 2 2 8

8 8 2 2 8

8 8 2 2 8

Particle Size Distribution



OM746

0 to 5 5 to 15 15 to 30 30 to 60 60 to 100

Brown Brown

Clay Clay

2.9 2.9 4.0 4.5 3.6

4.6 4.9 6.0 6.0 6.1

4.1 4.2 4.8 4.7 4.7

1.4 0.8

61.0 45.0 4.6 2.5 2.0

2.0 1.2 0.9 1.0 1.3

14 8

87 57

6.5 3.8

0.3 0.2 0.2 0.2 0.2

1.1 1.4 2.2 2.2 1.6

0.5 0.7 1.4 1.8 1.5

1.0 0.6 0.2 0.2 0.3

<0.02 0.0 0.1 0.1 0.1

<10.0 14 <10.0 <10.0 <10.0

0.12 0.09 0.02 0.01 0.01

0.45 0.38

3.2 2.8

1.1 0.9

68 74

190 110

0.3 0.2

<0.01 <0.01

38.1% 49.1% 54.6% 48.7% 44.4%

17.6% 22.8% 34.7% 39.8% 41.7%

10.7% 5.6% 4.5% 4.9% 5.6%

1.4% 1.5% 1.3% 1.4%

33.6% 21.1% 4.7% 5.3% 6.9%

2.2 2.2 1.6 1.2 1.1

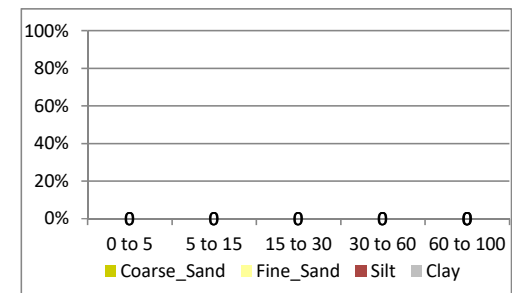
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2 2 2 2 8

2 2 2 2 8

2 2 2 2 8

Particle Size Distribution

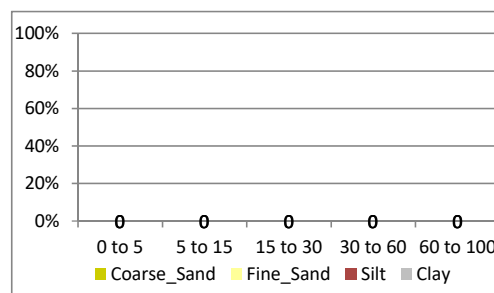
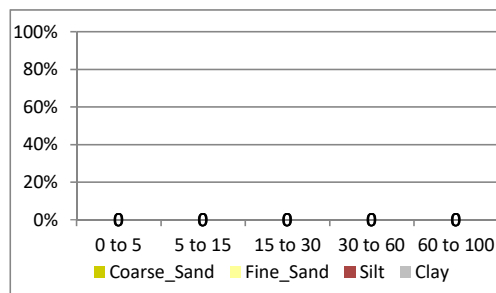


MGP Soil Laboratory Chemical Tests



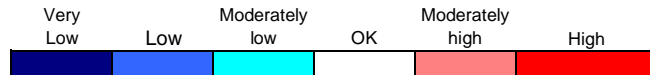
	OM747					OM748				
	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Pit										
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Grey	Grey				Brown	Brown			
Texture	Clay	Clay				Clay	Clay			
CEC (meq/100g)	3.7	2.3	3.5	4.2	8.2	3.1	2.7	3.8	4.3	3.2
pH water	5.2	5.2	6.0	7.0	7.1	5.5	5.4	5.9	6.0	6.2
pH CaCl ₂	4.4	4.3	4.8	5.5	5.5	4.8	4.7	4.9	4.8	4.8
Organic C (%)	2.5	1.0				0.9	0.7			
Nitrate N (mg/kg)	37.0	16.0	12.0	1.2	1.0	38.0	22.0	6.2	2.8	1.6
Ammonium N (mg/kg)	4.0	2.7	1.4	0.9	1.7	1.2	1.1	<0.6	0.7	<0.6
Phosphorus Colwell (mg/kg)	14	6				11	8			
Phosphorus Buffer Index	86	77				58	45			
Sulphate S-KCl (mg/kg)	7.9	3.5				7.1	5.5			
Potassium (meq/100 g)	0.6	0.4	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Calcium (meq/100 g)	1.8	0.9	2.3	0.9	1.0	2.2	1.8	2.2	2.1	1.2
Magnesium (meq/100 g)	1.0	0.6	0.8	2.8	6.0	0.5	0.4	1.2	1.7	1.5
Aluminium (meq/100 g)	0.2	0.4	<0.1	<0.1	<0.1	0.1	0.3	0.2	0.2	0.2
Sodium (meq/100 g)	0.1	0.0	0.1	0.3	0.9	0.1	0.1	0.1	0.1	0.1
Chloride (mg/kg)	13	<10	<10	<10	<10	11	23	<10.0	10	<10.0
Electrical Conductivity (1:5)	0.11	0.05	0.04	0.02	0.03	0.10	0.07	0.03	0.03	0.02
Electrical Conductivity _{se} (dS/m)						0.39	0.35			
Copper (mg/kg)	1.8	2.0				1.2	1.2			
Zinc (mg/kg)	3.1	1.1				0.1	0.3			
Manganese (mg/kg)	43	35				19	35			
Iron (mg/kg)	620	350				120	67			
Boron (mg/kg)	0.4	0.2				0.2	0.2			
Molybdenum (mg/kg)	<0.01	<0.01				<0.01	<0.01			
Percentages of Exchangeable I										
ECaP (Calcium)	49.3%	40.2%	65.2%	21.6%	12.3%	70.3%	67.2%	57.6%	48.6%	38.0%
EMgP (Magnesium)	27.4%	24.8%	21.5%	67.1%	73.6%	16.6%	15.7%	31.4%	39.4%	47.5%
EKP (Potassium)	15.3%	15.0%	11.9%	4.1%	2.7%	7.0%	5.6%	5.2%	5.3%	5.1%
ESP (Sodium)	1.6%	1.7%	1.4%	7.2%	11.4%	1.9%	2.2%	1.8%	2.1%	3.2%
EAIP (Aluminium)	6.3%	18.4%	0.0%	0.0%	0.0%	4.2%	9.3%	3.9%	4.6%	6.3%
Ca/Mg ratio	1.8	1.6	3.0	0.3	0.2	4.2	4.3	1.8	1.2	0.8
K/Mg ratio										
Electrochemical Stability Index	0.07	0.03	0.03	0.00	0.00	0.05	0.03	0.02	0.01	0.01
Loveday and Pyle Dispersion										
Emerson Class	8	2	8	1	8	8	2	2	2	2

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



Pit

Depth (cm)

Colour

Texture

CEC (meq/100g)

pH water

pH CaCl₂

Organic C (%)

Nitrate N (mg/kg)

Ammonium N (mg/kg)

Phosphorus Colwell (mg/kg)

Phosphorus Buffer Index

Sulphate S-KCl (mg/kg)

Potassium (meq/100 g)

Calcium (meq/100 g)

Magnesium (meq/100 g)

Aluminium (meq/100 g)

Sodium (meq/100 g)

Chloride (mg/kg)

Electrical Conductivity (1:5)

Electrical Conductivity_{se} (dS/m)

Copper (mg/kg)

Zinc (mg/kg)

Manganese (mg/kg)

Iron (mg/kg)

Boron (mg/kg)

Molybdenum (mg/kg)

OM749

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Grey	Brown			
Texture	Clay Loam	Clay			
CEC (meq/100g)	6.6	2.5	2.7	5.0	6.0
pH water	4.5	5.2	5.4	5.6	6.0
pH CaCl ₂	4.2	4.3	4.3	4.2	4.3
Organic C (%)	4.5	1.2			
Nitrate N (mg/kg)	210.0	14.0	5.3	2.8	2.9
Ammonium N (mg/kg)	17.0	1.3	1.3	0.9	0.9
Phosphorus Colwell (mg/kg)	33	7			
Phosphorus Buffer Index	150	120			
Sulphate S-KCl (mg/kg)	7.0	5.0			
Potassium (meq/100 g)	0.7	0.2	0.2	0.3	0.3
Calcium (meq/100 g)	3.8	0.8	0.5	0.4	0.1
Magnesium (meq/100 g)	1.3	0.6	0.8	2.1	3.5
Aluminium (meq/100 g)	0.7	0.9	1.2	2.1	1.8
Sodium (meq/100 g)	0.1	0.0	0.0	0.1	0.3
Chloride (mg/kg)	34	16	<10.0	<10.0	11
Electrical Conductivity (1:5)	0.46	0.05	0.02	0.02	0.02
Electrical Conductivity _{se} (dS/m)	1.80	0.25			
Copper (mg/kg)	0.6	0.5			
Zinc (mg/kg)	2.3	0.2			
Manganese (mg/kg)	35	5			
Iron (mg/kg)	390	180			
Boron (mg/kg)	0.9	0.3			
Molybdenum (mg/kg)	<0.01	0.0			

OM750

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Grey	Grey			
Texture	Clay	Clay			
CEC (meq/100g)	8.4	2.9	2.8	7.9	5.9
pH water	6.0	5.1	5.2	5.4	5.6
pH CaCl ₂	5.4	4.6	4.5	4.2	4.3
Organic C (%)	3.2	1.0			
Nitrate N (mg/kg)	48.0	55.0	20.0	2.6	5.6
Ammonium N (mg/kg)	3.8	7.6	5.9	2.5	2.0
Phosphorus Colwell (mg/kg)	14	<5			
Phosphorus Buffer Index	57	61			
Sulphate S-KCl (mg/kg)	5.5	1.9			
Potassium (meq/100 g)	0.3	0.1	0.1	0.2	0.1
Calcium (meq/100 g)	7.0	1.6	1.2	0.6	0.2
Magnesium (meq/100 g)	1.1	0.5	0.5	2.1	2.6
Aluminium (meq/100 g)	<0.1	0.7	0.9	5.0	2.9
Sodium (meq/100 g)	0.0	0.0	0.0	0.1	0.1
Chloride (mg/kg)	<10	19	20	<10	<10
Electrical Conductivity (1:5)	0.11	0.12	0.06	0.02	0.02
Electrical Conductivity _{se} (dS/m)	0.56	0.67	0.39	0.10	0.11
Copper (mg/kg)	0.9	0.3			
Zinc (mg/kg)	1.7	0.2			
Manganese (mg/kg)	7	3			
Iron (mg/kg)	170	85			
Boron (mg/kg)	0.5	0.2			
Molybdenum (mg/kg)	<0.01	<0.01			

Percentages of Exchangeable I

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
ECaP (Calcium)	57.7%	30.5%	17.2%	7.2%	2.0%
EMgP (Magnesium)	19.7%	24.4%	30.4%	42.2%	58.4%
EKP (Potassium)	10.2%	6.9%	7.0%	6.4%	5.0%
ESP (Sodium)	1.2%	1.6%	1.5%	2.0%	4.5%
EAIP (Aluminium)	11.2%	36.6%	44.0%	42.2%	30.1%

Ca/Mg ratio

K/Mg ratio

Electrochemical Stability Index

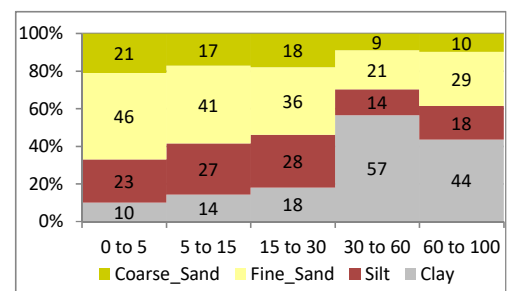
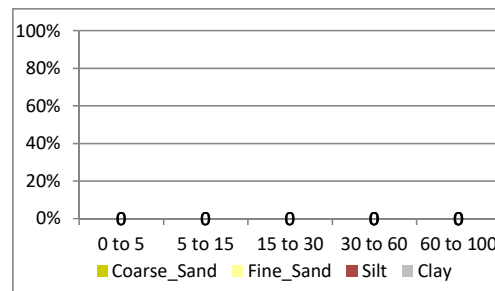
Loveday and Pyle Dispersion

Emerson Class

Ca/Mg ratio	2.9	1.3	0.6	0.2	0.0
K/Mg ratio					
Electrochemical Stability Index	0.38	0.03	0.01	0.01	0.00
Loveday and Pyle Dispersion	2	8	2	6	2

Ca/Mg ratio	6.4	3.0	2.2	0.3	0.1
K/Mg ratio					
Electrochemical Stability Index	0.31	0.12	0.04	0.02	0.01
Loveday and Pyle Dispersion	2	2	3	6	3

Particle Size Distribution



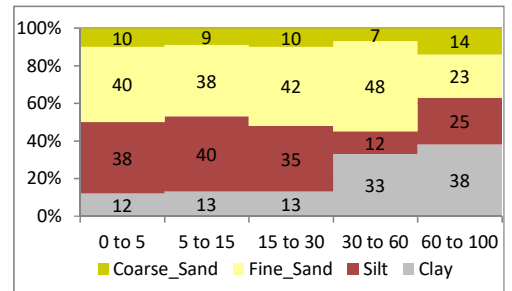
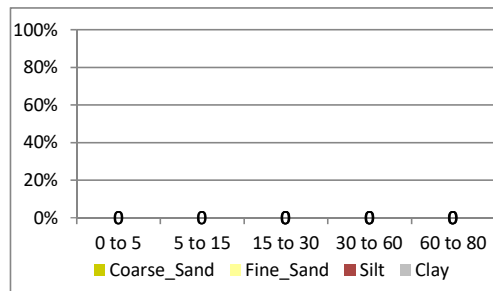
MGP Soil Laboratory Chemical Tests

RATING



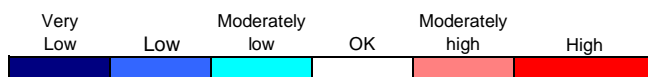
	OM751					OM752				
	0 to 5	5 to 15	15 to 30	30 to 60	60 to 80	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Pit										
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 80	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Brown	Brown				Brown	Grey			
Texture	Clay	Clay				Clay	Clay			
CEC (meq/100g)	3.0	2.8	3.9	7.9	7.4	8.3	7.1	6.4	29.3	37.8
pH water	4.7	4.9	6.0	6.2	6.3	5.1	5.4	6.3	6.8	7.1
pH CaCl ₂	4.2	4.3	4.9	5.2	5.2	4.4	4.7	5.2	5.6	5.9
Organic C (%)	1.0	0.7				2.8	1.4			
Nitrate N (mg/kg)	64.0	44.0	6.6	4.0	3.0	67.0	39.0	6.4	1.2	<0.5
Ammonium N (mg/kg)	3.6	1.5	0.6	1.3	0.7	2.1	1.8	0.9	1.5	0.8
Phosphorus Colwell (mg/kg)	8	<5				10	<5			
Phosphorus Buffer Index	62	45				100	60			
Sulphate S-KCl (mg/kg)	5.8	4.4				7.5	3.1			
Potassium (meq/100 g)	0.2	0.1	0.1	0.3	0.4	0.2	0.1	0.1	0.4	0.4
Calcium (meq/100 g)	1.3	1.5	2.6	4.8	3.9	3.9	3.2	1.9	3.7	3.1
Magnesium (meq/100 g)	0.6	0.5	1.0	2.6	3.1	3.6	3.4	4.4	25.0	34.0
Aluminium (meq/100 g)	0.8	0.6	0.1	0.1	<0.10	0.5	0.3	<0.10	<0.10	0.1
Sodium (meq/100 g)	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.2	0.2
Chloride (mg/kg)	<10.0	<10.0	<10.0	<10.0	<10.0	10	15	<10.0	<10.0	<10.0
Electrical Conductivity (1:5)	0.14	0.09	0.02	0.02	0.02	0.13	0.09	0.02	0.03	0.03
Electrical Conductivity _{se} (dS/m)	0.51	0.35				0.62	0.51	0.16	0.17	0.16
Copper (mg/kg)	1.0	1.1				1.4	1.2			
Zinc (mg/kg)	0.5	0.2				2.1	1.0			
Manganese (mg/kg)	36	44				45	28			
Iron (mg/kg)	120	70				440	190			
Boron (mg/kg)	0.3	0.2				0.3	0.2			
Molybdenum (mg/kg)	<0.01	<0.01				<0.01	<0.01			
Percentages of Exchangeable (
ECaP (Calcium)	43.9%	54.5%	66.7%	60.9%	52.6%	47.2%	45.4%	29.5%	12.6%	8.2%
EMgP (Magnesium)	20.9%	19.3%	25.6%	33.0%	41.8%	43.6%	48.2%	68.4%	85.4%	89.9%
EKP (Potassium)	7.8%	5.1%	3.6%	4.1%	5.1%	2.5%	1.7%	1.4%	1.5%	1.1%
ESP (Sodium)	0.7%	1.1%	1.0%	0.8%	0.5%	0.8%	0.7%	0.6%	0.5%	0.4%
EAIP (Aluminium)	26.7%	20.0%	3.1%	1.3%	0.0%	5.8%	4.0%	0.0%	0.0%	0.3%
Ca/Mg ratio	2.1	2.8	2.6	1.8	1.3	1.1	0.9	0.4	0.1	0.1
K/Mg ratio										
Electrochemical Stability Index	0.21	0.08	0.02	0.03	0.04	0.15	0.13	0.03	0.06	0.07
Loveday and Pyle Dispersion										
Emerson Class	2	2	2	7	2	7	7	2	7	8

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



Pit

Depth (cm)

Colour

Texture

CEC (meq/100g)

pH water

pH CaCl₂

Organic C (%)

Nitrate N (mg/kg)

Ammonium N (mg/kg)

Phosphorus Colwell (mg/kg)

Phosphorus Buffer Index

Sulphate S-KCl (mg/kg)

Potassium (meq/100 g)

Calcium (meq/100 g)

Magnesium (meq/100 g)

Aluminium (meq/100 g)

Sodium (meq/100 g)

Chloride (mg/kg)

Electrical Conductivity (1:5)

Electrical Conductivity_{se} (dS/m)

Copper (mg/kg)

Zinc (mg/kg)

Manganese (mg/kg)

Iron (mg/kg)

Boron (mg/kg)

Molybdenum (mg/kg)

OM753

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Brown	Brown			
Texture	Clay	Clay			
CEC (meq/100g)	5.9	3.2	2.7	5.0	7.0
pH water	6.0	6.1	6.2	6.8	6.5
pH CaCl ₂	5.4	5.4	5.5	5.7	5.0
Organic C (%)	1.5	0.6			
Nitrate N (mg/kg)	68.0	24.0	23.0	2.5	2.6
Ammonium N (mg/kg)	1.4	0.7	0.7	<0.6	0.7
Phosphorus Colwell (mg/kg)	12	10			
Phosphorus Buffer Index	49	42			
Sulphate S-KCl (mg/kg)	8.1	4.3			
Potassium (meq/100 g)	0.1	0.1	0.0	0.1	0.1
Calcium (meq/100 g)	4.9	2.6	2.0	2.6	2.6
Magnesium (meq/100 g)	0.8	0.5	0.6	2.1	3.6
Aluminium (meq/100 g)	<0.10	<0.10	<0.10	0.1	0.3
Sodium (meq/100 g)	0.1	0.1	0.1	0.1	0.4
Chloride (mg/kg)	<10.0	14	46	<10.0	<10.0
Electrical Conductivity (1:5)	0.14	0.07	0.08	0.02	0.03
Electrical Conductivity _{se} (dS/m)	0.51	0.31			
Copper (mg/kg)	0.4	0.2			
Zinc (mg/kg)	0.2	0.1			
Manganese (mg/kg)	8	9			
Iron (mg/kg)	180	86			
Boron (mg/kg)	0.3	0.2			
Molybdenum (mg/kg)	<0.01	<0.01			

OM754

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Brown	Grey			
Texture	Clay	Clay			
CEC (meq/100g)	3.4	3.1	5.0	5.7	4.1
pH water	5.0	5.1	5.9	6.3	6.2
pH CaCl ₂	4.4	4.5	4.9	5.4	5.4
Organic C (%)	1.0	0.6			
Nitrate N (mg/kg)	60.0	58.0	11.0	2.6	2.7
Ammonium N (mg/kg)	1.3	1.0	1.0	1.2	0.7
Phosphorus Colwell (mg/kg)	11	8			
Phosphorus Buffer Index	48	47			
Sulphate S-KCl (mg/kg)	4.9	4.7			
Potassium (meq/100 g)	0.1	0.1	0.2	0.2	0.1
Calcium (meq/100 g)	2.2	2.1	3.8	4.1	2.7
Magnesium (meq/100 g)	0.7	0.6	1.0	1.4	1.2
Aluminium (meq/100 g)	0.3	0.3	<0.10	<0.10	<0.10
Sodium (meq/100 g)	0.1	0.1	0.1	0.1	0.1
Chloride (mg/kg)	<10.0	32	<10.0	<10.0	<10.0
Electrical Conductivity (1:5)	0.13	0.13	0.04	0.03	0.03
Electrical Conductivity _{se} (dS/m)	0.48	0.61			
Copper (mg/kg)	0.7	0.8			
Zinc (mg/kg)	0.3	0.2			
Manganese (mg/kg)	61	62			
Iron (mg/kg)	100	62			
Boron (mg/kg)	0.2	0.2			
Molybdenum (mg/kg)	<0.01	<0.01			

Percentages of Exchangeable (

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
ECaP (Calcium)	82.8%	80.5%	73.0%	52.0%	37.0%
EMgP (Magnesium)	13.5%	16.1%	23.4%	42.0%	51.3%
EKP (Potassium)	1.7%	1.5%	1.5%	2.0%	1.7%
ESP (Sodium)	2.0%	1.9%	2.2%	2.0%	5.8%
EAIP (Aluminium)	0.0%	0.0%	0.0%	2.0%	4.1%

Ca/Mg ratio

K/Mg ratio

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Ca/Mg ratio	6.1	5.0	3.1	1.2	0.7
K/Mg ratio					

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Ca/Mg ratio	3.3	3.8	4.0	2.9	2.3
K/Mg ratio					

Electrochemical Stability Index

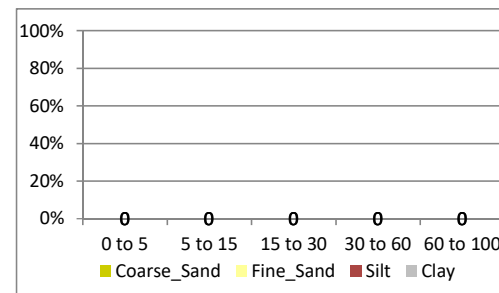
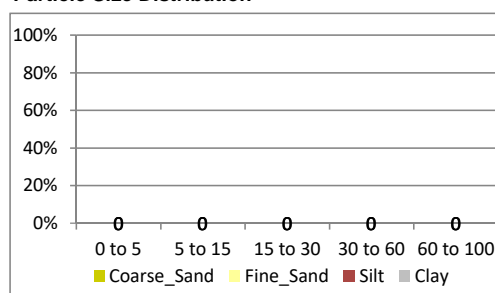
Loveday and Pyle Dispersion

Emerson Class

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Electrochemical Stability Index	0.07	0.04	0.04	0.01	0.01
Loveday and Pyle Dispersion	6	8	2	2	2
Emerson Class					

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Electrochemical Stability Index	0.06	0.06	0.03	0.02	0.02
Loveday and Pyle Dispersion	2	2	2	2	2
Emerson Class					

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



Pit

Depth (cm)

Colour

Texture

CEC (meq/100g)

pH water

pH CaCl₂

Organic C (%)

Nitrate N (mg/kg)

Ammonium N (mg/kg)

Phosphorus Colwell (mg/kg)

Phosphorus Buffer Index

Sulphate S-KCl (mg/kg)

Potassium (meq/100 g)

Calcium (meq/100 g)

Magnesium (meq/100 g)

Aluminium (meq/100 g)

Sodium (meq/100 g)

Chloride (mg/kg)

Electrical Conductivity (1:5)

Electrical Conductivity_{se} (dS/m)

Copper (mg/kg)

Zinc (mg/kg)

Manganese (mg/kg)

Iron (mg/kg)

Boron (mg/kg)

Molybdenum (mg/kg)

OM755

0 to 5 5 to 15 15 to 30 30 to 60 60 to 100

Brown Brown

Clay Clay

2.9 2.6 4.3 4.2 3.0

5.0 5.0 5.6 5.8 5.9

4.3 4.3 4.5 4.6 4.7

1.9 0.9

30.0 41.0 6.7 1.4 2.4

3.2 2.7 2.2 0.9 1.2

6 <5

50 34

4.3 2.6

0.1 0.1 0.1 0.1 0.1

1.6 1.3 2.2 2.0 1.2

0.7 0.7 1.4 1.6 1.5

0.4 0.4 0.5 0.4 0.2

0.1 0.1 0.1 0.1 0.1

13 14 <10 <10 <10

0.08 0.09 0.03 0.02 0.02

0.9 0.8

0.8 0.3

19 19

330 200

0.3 0.2

<0.01 <0.01

OM757

0 to 5 5 to 15 15 to 30 30 to 60 60 to 100

Brown Grey

Clay Clay

4.4 4.3 3.7 9.2 19.0

5.6 6.0 6.8 7.3 9.1

4.6 4.8 5.1 5.6 7.9

1.6 0.9

15.0 4.4 1.1 <0.5 <0.5

2.9 1.2 0.8 0.8 <0.6

7 6

77 67

2.5 1.5

0.5 0.2 0.1 0.2 0.2

2.8 3.1 2.2 2.9 3.3

0.8 0.8 1.2 5.1 9.7

0.2 0.1 <0.1 <0.1 0.1

0.1 0.1 0.2 1.0 5.7

<10 <10 <10 <10 310

0.05 0.03 0.02 0.04 0.32

2.8 2.8

1.2 0.7

70 39

200 110

0.3 0.2

<0.01 <0.01

Percentages of Exchangeable ()

ECaP (Calcium)

EMgP (Magnesium)

EKP (Potassium)

ESP (Sodium)

EAIP (Aluminium)

54.8% 51.0% 51.8% 48.2% 39.5%

25.3% 25.9% 32.9% 38.6% 49.3%

4.5% 4.3% 2.8% 2.7% 3.0%

2.1% 2.4% 1.6% 1.7% 2.3%

13.4% 16.5% 10.8% 8.9% 5.9%

63.2% 71.9% 59.1% 31.6% 17.4%

18.1% 18.1% 32.3% 55.6% 51.2%

11.3% 3.7% 2.2% 1.9% 0.8%

2.0% 3.0% 6.5% 10.9% 30.1%

5.4% 3.2% 0.0% 0.0% 0.5%

Ca/Mg ratio

K/Mg ratio

2.2 2.0 1.6 1.3 0.8

3.5 4.0 1.8 0.6 0.3

Electrochemical Stability Index

Loveday and Pyle Dispersion

Emerson Class

0.04 0.04 0.02 0.01 0.01

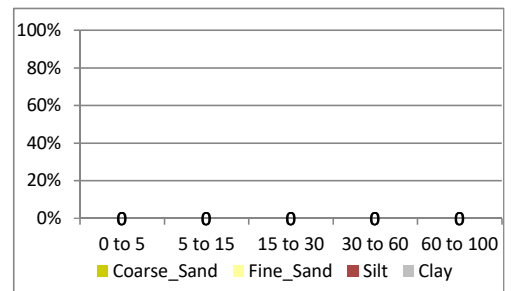
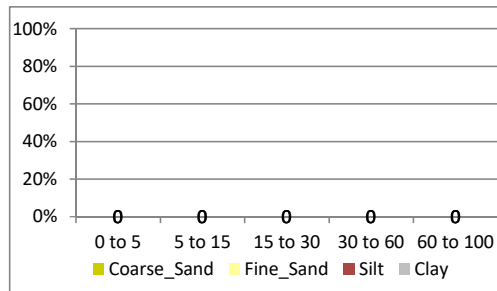
7 8 2 2 2

7 7 2 8 2

0.02 0.01 0.00 0.00 0.01

7 7 2 8 2

Particle Size Distribution

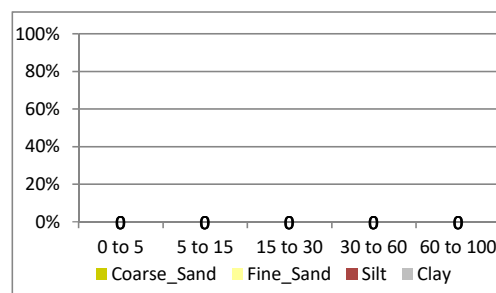
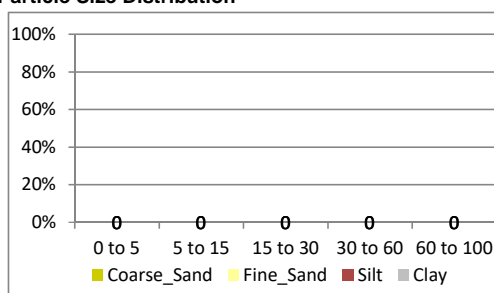


MGP Soil Laboratory Chemical Tests



	OM758					OM760				
	0 to 5	5 to 15	15 to 30	30 to 60	60 to 80	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Pit										
Depth (cm)	Grey					Brown				
Colour	Clay					Clay				
Texture	Clay					Clay				
CEC (meq/100g)	4.9	4.4	4.0	2.9	4.4	2.7	2.0	3.5	6.2	5.3
pH water	5.2	5.4	5.2	6.3	6.7	4.9	4.9	5.7	6.8	6.9
pH CaCl ₂	4.5	4.5	4.5	4.6	4.7	4.2	4.2	4.8	5.6	5.7
Organic C (%)	1.6	1.2				1.4	0.6			
Nitrate N (mg/kg)	51.0	30.0	36.0	3.8	2.5	32.0	21.0	16.0	1.1	0.6
Ammonium N (mg/kg)	1.9	1.4	1.4	<0.6	1.0	5.8	1.2	1.4	1.1	1.2
Phosphorus Colwell (mg/kg)	14	8				7	5			
Phosphorus Buffer Index	66	73				48	41			
Sulphate S-KCl (mg/kg)	5.1	4.1				5.3	2.3			
Potassium (meq/100 g)	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1
Calcium (meq/100 g)	2.7	2.5	2.1	1.0	0.9	1.3	1.0	2.7	4.7	3.6
Magnesium (meq/100 g)	1.4	1.2	1.1	1.2	2.5	0.5	0.3	0.6	1.3	1.5
Aluminium (meq/100 g)	0.5	0.4	0.6	0.4	0.5	0.6	0.6	<0.1	<0.1	<0.1
Sodium (meq/100 g)	0.1	0.1	0.1	0.2	0.5	0.1	0.1	0.1	0.1	0.1
Chloride (mg/kg)	26	19	19	<10.0	<10.0	11	11	<10	<10	<10
Electrical Conductivity (1:5)	0.12	0.08	0.08	0.02	0.03	0.09	0.05	0.05	0.02	0.02
Electrical Conductivity _{se} (dS/m)	0.54	0.37								
Copper (mg/kg)	0.5	0.4				0.8	0.5			
Zinc (mg/kg)	0.8	0.1				0.6	0.2			
Manganese (mg/kg)	28	23				81	96			
Iron (mg/kg)	200	120				270	120			
Boron (mg/kg)	0.2	0.2				0.2	0.2			
Molybdenum (mg/kg)	<0.01	<0.01				<0.01	<0.01			
Percentages of Exchangeable (
ECaP (Calcium)	54.8%	57.1%	52.2%	34.6%	19.4%	48.5%	48.3%	77.1%	75.6%	68.1%
EMgP (Magnesium)	28.4%	27.4%	27.4%	41.5%	56.9%	19.8%	15.8%	18.0%	20.9%	28.4%
EKP (Potassium)	3.2%	3.0%	3.5%	2.4%	2.1%	4.9%	3.9%	2.9%	2.4%	2.3%
ESP (Sodium)	2.8%	2.5%	2.7%	6.2%	11.2%	4.1%	3.0%	2.0%	1.1%	1.3%
EAIP (Aluminium)	10.8%	10.0%	14.2%	15.2%	10.5%	22.8%	29.1%	0.0%	0.0%	0.0%
Ca/Mg ratio	1.9	2.1	1.9	0.8	0.3	2.5	3.1	4.3	3.6	2.4
K/Mg ratio										
Electrochemical Stability Index	0.04	0.03	0.03	0.00	0.00	0.02	0.02	0.03	0.02	0.02
Loveday and Pyle Dispersion										
Emerson Class	2	8	8	1	1	7	3	2	3	2

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



Pit

Depth (cm)

Colour

Texture

CEC (meq/100g)

pH water

pH CaCl₂

Organic C (%)

Nitrate N (mg/kg)

Ammonium N (mg/kg)

Phosphorus Colwell (mg/kg)

Phosphorus Buffer Index

Sulphate S-KCl (mg/kg)

Potassium (meq/100 g)

Calcium (meq/100 g)

Magnesium (meq/100 g)

Aluminium (meq/100 g)

Sodium (meq/100 g)

Chloride (mg/kg)

Electrical Conductivity (1:5)

Electrical Conductivity_{se} (dS/m)

Copper (mg/kg)

Zinc (mg/kg)

Manganese (mg/kg)

Iron (mg/kg)

Boron (mg/kg)

Molybdenum (mg/kg)

OM761

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Brown	Brown			
Texture	Clay	Clay			
CEC (meq/100g)	6.2	4.6	4.2	8.0	10.0
pH water	5.9	6.1	6.3	6.2	6.9
pH CaCl ₂	5.1	5.3	5.2	5.0	5.7
Organic C (%)	1.9	0.8			
Nitrate N (mg/kg)	23.0	23.0	7.3	1.0	<0.5
Ammonium N (mg/kg)	2.1	1.8	1.5	3.6	1.5
Phosphorus Colwell (mg/kg)	8	<5			
Phosphorus Buffer Index	50	25			
Sulphate S-KCl (mg/kg)	4.0	3.6			
Potassium (meq/100 g)	0.3	0.1	0.1	0.2	0.2
Calcium (meq/100 g)	4.7	3.0	2.0	2.5	3.0
Magnesium (meq/100 g)	1.2	1.5	2.0	5.0	6.7
Aluminium (meq/100 g)	<0.1	<0.1	<0.1	0.2	<0.1
Sodium (meq/100 g)	0.0	0.0	0.1	0.0	0.1
Chloride (mg/kg)	<10	<10	<10	<10	<10
Electrical Conductivity (1:5)	0.07	0.06	0.03	0.02	0.02
Electrical Conductivity _{se} (dS/m)	0.39	0.35	0.20	0.13	0.13
Copper (mg/kg)	1.0	0.9			
Zinc (mg/kg)	0.9	0.4			
Manganese (mg/kg)	11	10			
Iron (mg/kg)	290	100			
Boron (mg/kg)	0.3	0.2			
Molybdenum (mg/kg)	<0.01	<0.01			

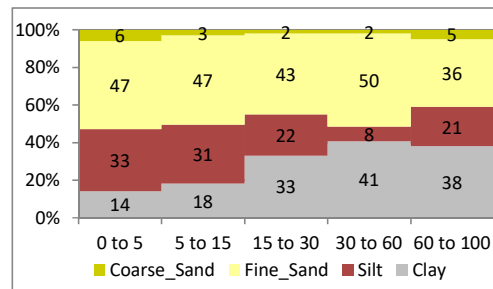
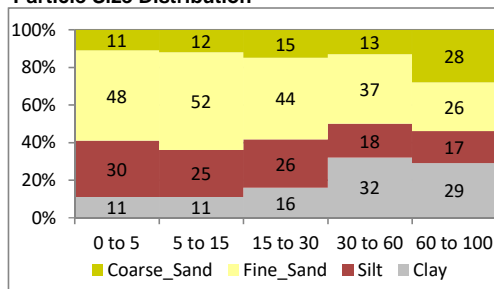
OM762

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Brown	Brown			
Texture	Clay	Clay			
CEC (meq/100g)	4.4	3.8	6.6	7.7	8.2
pH water	4.6	4.8	6.1	6.3	7.3
pH CaCl ₂	4.0	4.2	5.0	5.3	6.4
Organic C (%)	2.4	1.1			
Nitrate N (mg/kg)	85.0	57.0	6.6	2.4	1.2
Ammonium N (mg/kg)	8.2	1.3	<0.6	<0.6	<0.6
Phosphorus Colwell (mg/kg)	15	<5			
Phosphorus Buffer Index	66	49			
Sulphate S-KCl (mg/kg)	11.0	8.3			
Potassium (meq/100 g)	1.0	0.9	0.6	0.5	0.2
Calcium (meq/100 g)	2.0	1.7	4.3	5.3	5.1
Magnesium (meq/100 g)	0.7	0.6	1.5	1.8	2.8
Aluminium (meq/100 g)	0.7	0.7	0.1	<0.10	<0.10
Sodium (meq/100 g)	<0.02	0.0	0.0	0.0	0.1
Chloride (mg/kg)	<10.0	31	<10.0	<10.0	37
Electrical Conductivity (1:5)	0.18	0.14	0.03	0.03	0.05
Electrical Conductivity _{se} (dS/m)	0.79	0.81	0.17	0.15	0.34
Copper (mg/kg)	1.7	1.8			
Zinc (mg/kg)	1.5	0.4			
Manganese (mg/kg)	110	110			
Iron (mg/kg)	250	130			
Boron (mg/kg)	0.4	0.3			
Molybdenum (mg/kg)	<0.01	<0.01			

Percentages of Exchangeable ()

ECaP (Calcium)	76.1%	64.7%	48.2%	31.4%	30.0%	45.1%	44.3%	65.4%	69.1%	62.0%
EMgP (Magnesium)	19.4%	32.3%	48.2%	62.7%	67.0%	15.8%	15.1%	22.8%	23.5%	34.0%
EKP (Potassium)	4.2%	2.4%	2.4%	3.0%	2.1%	22.6%	22.9%	9.7%	6.9%	2.9%
ESP (Sodium)	0.3%	0.6%	1.2%	0.5%	0.9%		0.8%	0.5%	0.5%	1.1%
EAIP (Aluminium)	0.0%	0.0%	0.0%	2.4%	0.0%	16.5%	16.9%	1.5%	0.0%	0.0%
Ca/Mg ratio	3.9	2.0	1.0	0.5	0.4	2.9	2.9	2.9	2.9	1.8
Electrochemical Stability Index	0.22	0.09	0.02	0.04	0.02		0.18	0.07	0.06	0.05
Loveday and Pyle Dispersion Emerson Class	7	7	8	2	2	7	7	3	6	2

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



Pit

Depth (cm)

Colour

Texture

CEC (meq/100g)

pH water

pH CaCl₂

Organic C (%)

Nitrate N (mg/kg)

Ammonium N (mg/kg)

Phosphorus Colwell (mg/kg)

Phosphorus Buffer Index

Sulphate S-KCl (mg/kg)

Potassium (meq/100 g)

Calcium (meq/100 g)

Magnesium (meq/100 g)

Aluminium (meq/100 g)

Sodium (meq/100 g)

Chloride (mg/kg)

Electrical Conductivity (1:5)

Electrical Conductivity_{se} (dS/m)

Copper (mg/kg)

Zinc (mg/kg)

Manganese (mg/kg)

Iron (mg/kg)

Boron (mg/kg)

Molybdenum (mg/kg)

OM763

0 to 5 5 to 15 15 to 30 30 to 60 60 to 100

Brown Brown

Clay Clay

3.1 2.6 1.2 3.3 8.1

4.8 5.0 5.4 6.6 6.4

4.2 4.3 4.6 5.2 4.6

1.7 1.0

60.0 32.0 14.0 2.9 2.3

1.8 1.7 0.7 0.8 0.9

16 8

46 45

5.5 5.1

0.2 0.1 0.1 0.1 0.2

1.7 1.4 0.7 1.7 3.1

0.7 0.5 0.3 1.4 3.9

0.5 0.5 0.2 <0.10 0.4

0.1 0.1 0.1 0.1 0.5

<10.0 <10.0 12 <10.0 <10.0

0.13 0.08 0.04 0.02 0.02

0.48 0.32

0.7 0.6

0.1 0.3

16 18

270 190

0.1 0.1

<0.01 <0.01

OM764

0 to 5 5 to 15 15 to 30 30 to 60 60 to 100

Brown Brown

Clay Clay

2.8 2.7 1.6 4.2 3.9

5.3 5.3 5.1 6.0 6.4

4.4 4.4 4.3 5.0 5.5

1.3 1.2

19.0 18.0 20.0 2.3 0.8

1.6 2.0 1.3 1.2 1.6

8 8

41 39

4.8 4.1

0.7 0.7 0.5 0.7 0.3

1.0 1.0 0.4 2.0 1.4

0.7 0.7 0.3 1.4 2.1

0.3 0.3 0.4 <0.1 <0.1

<0.02 <0.02 <0.02 0.0 0.1

<10 <10 18 10 18

0.07 0.07 0.07 0.04 0.03

0.40 0.39 0.46 0.21 0.21

1.2 1.1

1.3 1.3

22 19

240 230

0.3 0.2

<0.01 <0.01

Percentages of Exchangeable ()

ECaP (Calcium)

EMgP (Magnesium)

EKP (Potassium)

ESP (Sodium)

EAIP (Aluminium)

54.8% 54.3% 56.9% 50.9% 38.4%

21.3% 19.4% 21.1% 41.9% 48.3%

7.7% 3.9% 4.1% 3.0% 2.2%

1.6% 2.3% 5.7% 4.2% 5.9%

14.5% 20.2% 12.2% 0.0% 5.1%

35.9% 37.2% 25.5% 48.1% 36.4%

25.7% 26.4% 19.9% 33.7% 54.5%

26.4% 26.0% 28.0% 17.3% 7.8%

1.0% 1.3%

12.0% 10.4% 26.7% 0.0% 0.0%

Ca/Mg ratio

K/Mg ratio

2.6 2.8 2.7 1.2 0.8

1.4 1.4 1.3 1.4 0.7

Electrochemical Stability Index

Loveday and Pyle Dispersion

Emerson Class

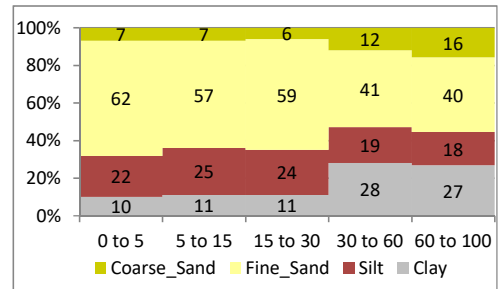
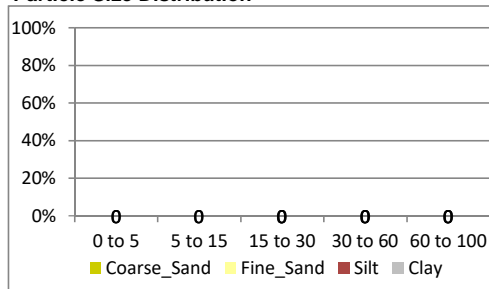
0.08 0.03 0.01 0.00 0.00

0.04 0.02

2 8 1 2 1

7 7 8 8 2

Particle Size Distribution

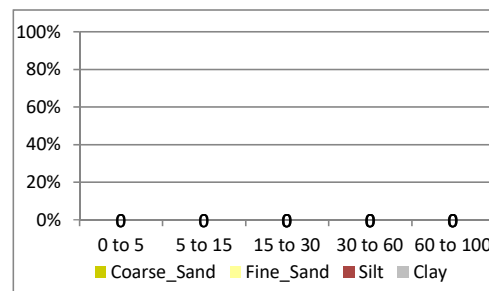
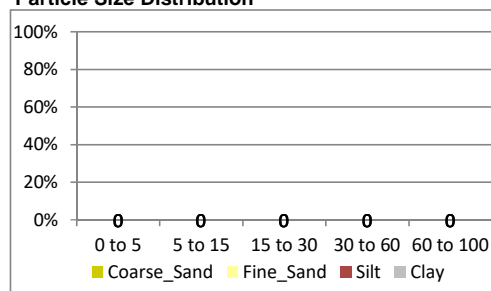


MGP Soil Laboratory Chemical Tests



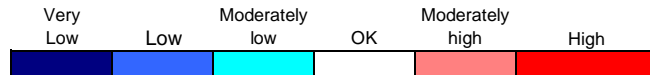
	OM765					OM766				
	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Pit										
Depth (cm)	Grey					Grey				
Colour	SandyLoarr					Clay				
Texture	Clay					Clay				
CEC (meq/100g)	2.9	2.1	4.1	4.6	5.4	6.9	5.8	5.9	17.1	20.4
pH water	5.0	5.9	6.1	6.3	6.7	5.2	5.7	6.5	6.9	7.2
pH CaCl ₂	4.1	4.5	4.5	4.5	4.6	4.6	4.9	5.5	5.6	5.9
Organic C (%)	1.8	0.3				1.7	0.9			
Nitrate N (mg/kg)	15.0	3.2	4.2	1.5	<0.5	92.0	36.0	8.2	2.9	2.2
Ammonium N (mg/kg)	1.7	0.8	1.1	0.7	0.7	1.4	0.9	1.0	3.3	2.2
Phosphorus Colwell (mg/kg)	11	<5				18	13			
Phosphorus Buffer Index	77	41				83	61			
Sulphate S-KCl (mg/kg)	5.7	<1.0				8.0	2.8			
Potassium (meq/100 g)	0.1	0.1	0.1	0.1	0.1	0.3	0.2	0.1	0.4	0.4
Calcium (meq/100 g)	1.3	0.8	1.3	1.3	0.9	4.2	3.8	3.9	10.0	12.0
Magnesium (meq/100 g)	0.5	0.5	1.6	2.1	3.2	2.2	1.7	1.8	6.5	7.8
Aluminium (meq/100 g)	0.9	0.5	0.8	0.8	0.4	0.1	<0.10	<0.10	<0.10	<0.10
Sodium (meq/100 g)	0.1	0.1	0.3	0.3	0.8	0.1	0.0	0.1	0.2	0.2
Chloride (mg/kg)	12	<10	<10.0	<10	11	11	11	28	<10.0	10
Electrical Conductivity (1:5)	0.06	0.02	0.03	0.02	0.03	0.18	0.08	0.04	0.03	0.03
Electrical Conductivity _{se} (dS/m)						0.64	0.33			
Copper (mg/kg)	0.2	0.1				1.5	1.2			
Zinc (mg/kg)	0.5	0.1				0.1	0.5			
Manganese (mg/kg)	12	1				44	33			
Iron (mg/kg)	360	83				250	150			
Boron (mg/kg)	0.1	0.1				0.2	0.1			
Molybdenum (mg/kg)	<0.01	<0.01				<0.01	<0.01			
Percentages of Exchangeable I										
ECaP (Calcium)	45.3%	40.0%	31.8%	28.1%	16.4%	61.2%	66.0%	66.3%	58.4%	58.9%
EMgP (Magnesium)	18.1%	24.8%	39.1%	45.4%	59.7%	32.1%	29.5%	30.6%	38.0%	38.3%
EKP (Potassium)	4.2%	4.8%	2.4%	1.7%	1.3%	3.9%	3.8%	2.2%	2.5%	2.1%
ESP (Sodium)	2.1%	5.2%	7.3%	7.1%	15.5%	1.0%	0.7%	0.9%	1.1%	0.7%
EAIP (Aluminium)	30.3%	25.2%	19.3%	17.7%	7.1%	1.7%	0.0%	0.0%	0.0%	0.0%
Ca/Mg ratio	2.5	1.6	0.8	0.6	0.3	1.9	2.2	2.2	1.5	1.5
K/Mg ratio										
Electrochemical Stability Index	0.03	0.00	0.00	0.00	0.00	0.18	0.12	0.05	0.03	0.04
Loveday and Pyle Dispersion										
Emerson Class	7	8	1	2	8	8	8	2	8	8

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



Pit

Depth (cm)

Colour

Texture

CEC (meq/100g)

pH water

pH CaCl₂

Organic C (%)

Nitrate N (mg/kg)

Ammonium N (mg/kg)

Phosphorus Colwell (mg/kg)

Phosphorus Buffer Index

Sulphate S-KCl (mg/kg)

Potassium (meq/100 g)

Calcium (meq/100 g)

Magnesium (meq/100 g)

Aluminium (meq/100 g)

Sodium (meq/100 g)

Chloride (mg/kg)

Electrical Conductivity (1:5)

Electrical Conductivity_{se} (dS/m)

Copper (mg/kg)

Zinc (mg/kg)

Manganese (mg/kg)

Iron (mg/kg)

Boron (mg/kg)

Molybdenum (mg/kg)

OM767

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	Grey	Grey			
Colour	Grey	Grey			
Texture	Clay	Clay			
CEC (meq/100g)	4.6	3.6	2.9	2.3	17.0
pH water	5.5	5.8	5.9	6.0	6.4
pH CaCl ₂	4.5	4.5	4.6	4.7	4.8
Organic C (%)	2.1	1.0			
Nitrate N (mg/kg)	13.0	4.9	2.2	1.6	<0.5
Ammonium N (mg/kg)	3.2	1.9	0.8	1.7	1.7
Phosphorus Colwell (mg/kg)	8	<5			
Phosphorus Buffer Index	120	74			
Sulphate S-KCl (mg/kg)	4.5	1.8			
Potassium (meq/100 g)	0.6	0.6	0.4	0.1	0.3
Calcium (meq/100 g)	2.1	1.5	1.3	0.9	3.3
Magnesium (meq/100 g)	1.6	1.0	0.9	1.0	12.0
Aluminium (meq/100 g)	0.3	0.4	0.2	0.2	0.6
Sodium (meq/100 g)	0.1	0.0	0.0	0.1	0.7
Chloride (mg/kg)	14	<10	<10	<10	<10
Electrical Conductivity (1:5)	0.06	0.03	0.02	0.02	0.03
Electrical Conductivity _{se} (dS/m)	0.38	0.22	0.16	0.16	0.15
Copper (mg/kg)	0.7	0.5			
Zinc (mg/kg)	0.8	0.3			
Manganese (mg/kg)	13	8			
Iron (mg/kg)	530	300			
Boron (mg/kg)	0.3	0.2			
Molybdenum (mg/kg)	<0.01	<0.01			

OM768

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	Brown	Brown			
Colour	Brown	Brown			
Texture	Clay	Clay			
CEC (meq/100g)	2.5	2.0	1.5	1.1	4.4
pH water	4.8	5.1	5.6	6.2	6.3
pH CaCl ₂	4.1	4.3	4.4	4.7	4.3
Organic C (%)	1.4	0.8			
Nitrate N (mg/kg)	37.0	18.0	6.8	2.9	2.2
Ammonium N (mg/kg)	1.7	1.3	0.9	<0.6	1.1
Phosphorus Colwell (mg/kg)	14	6			
Phosphorus Buffer Index	93	74			
Sulphate S-KCl (mg/kg)	4.5	2.8			
Potassium (meq/100 g)	0.1	0.1	0.1	0.1	0.1
Calcium (meq/100 g)	1.0	0.8	0.7	0.5	0.4
Magnesium (meq/100 g)	0.4	0.3	0.3	0.3	2.5
Aluminium (meq/100 g)	0.9	0.7	0.3	0.1	0.8
Sodium (meq/100 g)	0.1	0.1	0.1	0.1	0.7
Chloride (mg/kg)	11	13	<10.0	<10.0	14
Electrical Conductivity (1:5)	0.09	0.05	0.03	0.01	0.03
Electrical Conductivity _{se} (dS/m)	0.36	0.24			
Copper (mg/kg)	0.4	0.3			
Zinc (mg/kg)	0.0	0.1			
Manganese (mg/kg)	10	7			
Iron (mg/kg)	310	190			
Boron (mg/kg)	0.1	0.1			
Molybdenum (mg/kg)	<0.01	<0.01			

Percentages of Exchangeable ()

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
ECaP (Calcium)	46.1%	41.8%	45.0%	39.2%	19.5%
EMgP (Magnesium)	35.1%	27.9%	32.5%	43.1%	70.8%
EKP (Potassium)	12.3%	17.8%	12.8%	6.0%	1.9%
ESP (Sodium)	1.1%	1.1%	1.4%	3.4%	4.4%
EAIP (Aluminium)	5.5%	11.4%	8.3%	8.2%	3.5%

Ca/Mg ratio

K/Mg ratio

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Ca/Mg ratio	1.3	1.5	1.4	0.9	0.3
K/Mg ratio	2.2	2.4	2.8	1.5	0.1

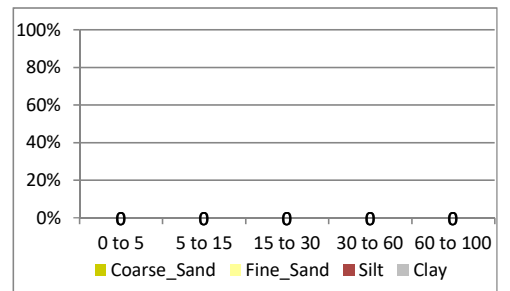
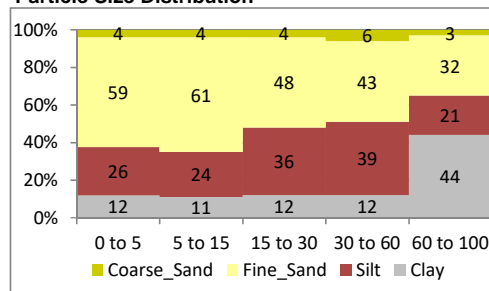
Electrochemical Stability Index

Loveday and Pyle Dispersion

Emerson Class

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Electrochemical Stability Index	0.05	0.03	0.01	0.01	0.01
Loveday and Pyle Dispersion	7	7	8	8	2
Emerson Class	7	8	2	2	2

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



Pit

Depth (cm)

Colour

Texture

CEC (meq/100g)

pH water

pH CaCl₂

Organic C (%)

Nitrate N (mg/kg)

Ammonium N (mg/kg)

Phosphorus Colwell (mg/kg)

Phosphorus Buffer Index

Sulphate S-KCl (mg/kg)

Potassium (meq/100 g)

Calcium (meq/100 g)

Magnesium (meq/100 g)

Aluminium (meq/100 g)

Sodium (meq/100 g)

Chloride (mg/kg)

Electrical Conductivity (1:5)

Electrical Conductivity_{se} (dS/m)

Copper (mg/kg)

Zinc (mg/kg)

Manganese (mg/kg)

Iron (mg/kg)

Boron (mg/kg)

Molybdenum (mg/kg)

OM769

0 to 5 5 to 15 15 to 30 30 to 60 60 to 100

Brown Brown

Clay Clay

4.3 3.3 2.6 2.0 7.4

4.7 4.9 5.5 6.1 6.3

4.2 4.3 4.6 4.6 4.4

2.7 1.5

110.0 60.0 16.0 3.3 2.5

15.0 2.0 0.9 0.8 1.3

46 29

86 90

8.1 9.0

0.4 0.2 0.1 0.1 0.2

2.3 1.8 1.7 1.1 2.9

1.1 0.8 0.6 0.5 2.4

0.4 0.5 0.2 0.2 1.2

0.1 0.1 0.1 0.1 0.8

<10.0 12 <10.0 <10.0 <10.0

0.22 0.12 0.04 0.02 0.03

0.74 0.46

1.0 0.9

2.1 0.8

31 20

440 360

0.3 0.2

<0.01 <0.01

OM771

0 to 5 5 to 15 15 to 30 30 to 60 60 to 100

Grey Grey

Clay Clay

3.2 2.3 1.7 3.1 4.0

5.4 5.6 5.7 5.7 6.3

4.5 4.6 4.5 4.3 4.5

1.5 0.8

16.0 10.0 4.9 1.8 0.8

2.0 1.6 0.7 1.0 0.7

<5 <5

77 51

3.4 2.3

0.2 0.2 0.1 0.2 0.2

1.9 1.3 0.7 0.7 0.4

0.6 0.5 0.5 1.0 2.6

0.4 0.3 0.4 1.1 0.6

0.1 0.1 0.1 0.1 0.3

11 17 <10 <10 <10

0.05 0.04 0.02 0.02 0.02

0.5 0.3

0.3 0.1

10 6

330 170

0.2 0.1

<0.01 <0.01

Percentages of Exchangeable (

ECaP (Calcium)

53.9% 54.2% 65.6% 56.1% 39.0%

59.9% 55.8% 38.4% 22.9% 9.0%

EMgP (Magnesium)

25.8% 23.5% 21.6% 24.5% 32.3%

19.6% 20.6% 27.3% 30.6% 65.3%

EKP (Potassium)

8.7% 5.1% 2.3% 2.6% 2.2%

7.3% 6.9% 7.6% 7.7% 4.3%

ESP (Sodium)

1.9% 2.4% 2.7% 5.1% 10.4%

2.2% 3.0% 4.1% 3.2% 7.5%

EAIP (Aluminium)

9.8% 14.8% 7.7% 11.7% 16.2%

11.0% 13.7% 22.7% 35.5% 13.8%

Ca/Mg ratio

2.1 2.3 3.0 2.3 1.2

3.1 2.7 1.4 0.7 0.1

K/Mg ratio

Electrochemical Stability Index

0.12 0.05 0.01 0.00 0.00

0.02 0.01 0.00 0.01 0.00

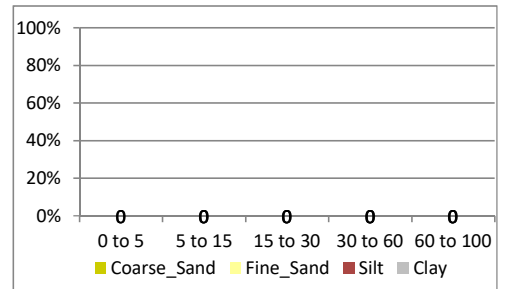
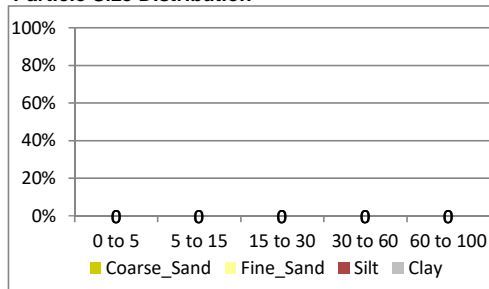
Loveday and Pyle Dispersion

Emerson Class

7 3 2 2 2

7 7 8 2 2

Particle Size Distribution



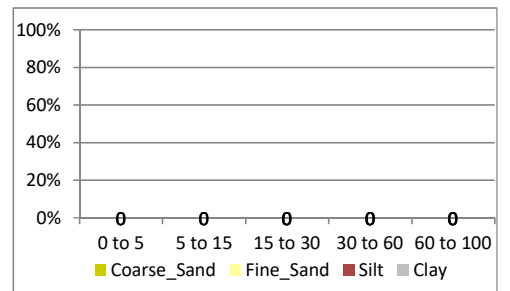
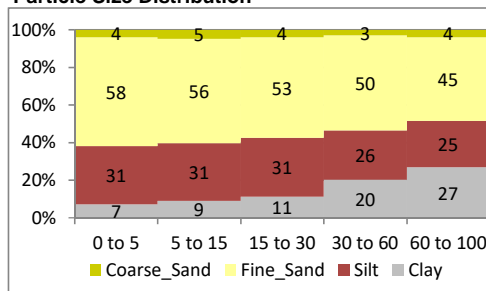
MGP Soil Laboratory Chemical Tests

RATING



	OM772					OM773				
	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Pit										
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Grey	Grey				Brown	Brown			
Texture	Clay	Clay				Clay	Clay			
CEC (meq/100g)	2.6	2.1	2.4	4.4	5.5	4.0	3.9	5.6	8.1	8.8
pH water	4.9	4.8	5.4	6.2	6.1	4.8	5.1	5.2	6.2	6.7
pH CaCl ₂	4.1	4.2	4.6	5.1	5.0	4.2	4.4	4.5	5.2	5.7
Organic C (%)	1.2	0.7				1.4	0.7			
Nitrate N (mg/kg)	20.0	35.0	16.0	3.2	1.9	65.0	28.0	28.0	2.6	<0.5
Ammonium N (mg/kg)	8.8	1.7	3.5	1.2	0.9	9.8	2.4	1.7	1.5	1.2
Phosphorus Colwell (mg/kg)	10	7				13	<5			
Phosphorus Buffer Index	54	39				86	80			
Sulphate S-KCl (mg/kg)	7.8	4.8				6.1	1.7			
Potassium (meq/100 g)	0.4	0.3	0.1	0.1	0.1	0.5	0.2	0.3	0.3	0.3
Calcium (meq/100 g)	1.1	0.9	1.4	2.6	2.4	1.9	2.3	3.4	4.9	4.0
Magnesium (meq/100 g)	0.5	0.4	0.7	1.6	2.7	0.8	0.9	1.4	2.8	4.5
Aluminium (meq/100 g)	0.6	0.5	0.2	<0.1	0.1	0.7	0.5	0.4	<0.10	<0.10
Sodium (meq/100 g)	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.1	0.1
Chloride (mg/kg)	<10	20	<10	<10	<10	<10.0	14	<10.0	<10.0	<10.0
Electrical Conductivity (1:5)	0.07	0.09	0.05	0.02	0.03	0.13	0.07	0.06	0.03	0.02
Electrical Conductivity _{se} (dS/m)	0.42	0.59	0.31	0.15	0.18	0.48	0.31			
Copper (mg/kg)	0.9	0.7				1.5	1.2			
Zinc (mg/kg)	0.8	0.4				0.7	0.4			
Manganese (mg/kg)	78	93				84	76			
Iron (mg/kg)	270	170				120	52			
Boron (mg/kg)	0.3	0.2				0.4	0.4			
Molybdenum (mg/kg)	<0.01	<0.01				<0.01	<0.01			
Percentages of Exchangeable (
ECaP (Calcium)	42.1%	43.2%	58.6%	59.2%	43.6%	47.7%	58.5%	60.5%	60.8%	45.4%
EMgP (Magnesium)	20.7%	20.2%	27.2%	36.4%	49.1%	21.1%	22.1%	24.9%	34.7%	51.1%
EKP (Potassium)	14.6%	13.1%	5.4%	2.5%	2.5%	13.3%	5.9%	6.0%	3.2%	2.8%
ESP (Sodium)	1.5%	1.9%	1.7%	1.8%	2.5%	0.8%	1.5%	0.9%	1.2%	0.7%
EAIP (Aluminium)	21.1%	21.6%	7.1%	0.0%	2.2%	17.1%	12.0%	7.7%	0.0%	0.0%
Ca/Mg ratio	2.0	2.1	2.2	1.6	0.9	2.3	2.6	2.4	1.8	0.9
K/Mg ratio										
Electrochemical Stability Index	0.05	0.05	0.03	0.01	0.01	0.17	0.05	0.07	0.02	0.03
Loveday and Pyle Dispersion										
Emerson Class	8	8	8	2	2	7	3	3	6	3

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



Pit

Depth (cm)

Colour

Texture

CEC (meq/100g)

pH water

pH CaCl₂

Organic C (%)

Nitrate N (mg/kg)

Ammonium N (mg/kg)

Phosphorus Colwell (mg/kg)

Phosphorus Buffer Index

Sulphate S-KCl (mg/kg)

Potassium (meq/100 g)

Calcium (meq/100 g)

Magnesium (meq/100 g)

Aluminium (meq/100 g)

Sodium (meq/100 g)

Chloride (mg/kg)

Electrical Conductivity (1:5)

Electrical Conductivity_{se} (dS/m)

Copper (mg/kg)

Zinc (mg/kg)

Manganese (mg/kg)

Iron (mg/kg)

Boron (mg/kg)

Molybdenum (mg/kg)

OM774

	0 to 5	5 to 15	15 to 30	30 to 60	to
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	to
Colour	Brown	Brown			
Texture	Clay	Clay			
CEC (meq/100g)	3.5	2.5	2.5	5.1	
pH water	4.5	4.7	5.3	6.0	
pH CaCl ₂	4.0	4.1	4.5	4.9	
Organic C (%)	1.6	0.9			
Nitrate N (mg/kg)	84.0	46.0	25.0	7.2	
Ammonium N (mg/kg)	3.3	1.7	1.1	0.9	
Phosphorus Colwell (mg/kg)	15	8			
Phosphorus Buffer Index	82	65			
Sulphate S-KCl (mg/kg)	10.0	5.8			
Potassium (meq/100 g)	0.2	0.1	0.1	0.2	
Calcium (meq/100 g)	1.3	1.0	1.3	2.6	
Magnesium (meq/100 g)	0.6	0.4	0.7	2.0	
Aluminium (meq/100 g)	1.3	0.9	0.4	0.3	
Sodium (meq/100 g)	0.1	0.1	0.1	0.1	
Chloride (mg/kg)	<10.0	<10.0	<10.0	<10.0	
Electrical Conductivity (1:5)	0.16	0.10	0.06	0.03	
Electrical Conductivity _{se} (dS/m)	0.57	0.39			
Copper (mg/kg)	1.2	1.1			
Zinc (mg/kg)	0.4	0.2			
Manganese (mg/kg)	34	25			
Iron (mg/kg)	200	120			
Boron (mg/kg)	0.3	0.2			
Molybdenum (mg/kg)	<0.01	<0.01			

OM775

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Brown	Grey			
Texture	Clay	Clay			
CEC (meq/100g)	2.3	2.2	2.7	7.4	7.6
pH water	4.7	5.0	5.7	6.1	6.6
pH CaCl ₂	4.1	4.2	4.6	4.9	5.0
Organic C (%)	1.1	0.7			
Nitrate N (mg/kg)	45.0	33.0	9.6	4.0	1.8
Ammonium N (mg/kg)	1.6	0.7	<0.6	0.7	0.8
Phosphorus Colwell (mg/kg)	9	7			
Phosphorus Buffer Index	71	54			
Sulphate S-KCl (mg/kg)	6.8	4.0			
Potassium (meq/100 g)	0.1	0.1	0.1	0.2	0.2
Calcium (meq/100 g)	1.0	1.1	1.6	3.6	3.1
Magnesium (meq/100 g)	0.4	0.5	0.8	3.3	4.0
Aluminium (meq/100 g)	0.8	0.5	0.2	0.2	0.1
Sodium (meq/100 g)	0.1	0.1	0.1	0.1	0.2
Chloride (mg/kg)	<10.0	<10.0	<10.0	<10.0	<10.0
Electrical Conductivity (1:5)	0.09	0.07	0.03	0.02	0.02
Electrical Conductivity _{se} (dS/m)	0.35	0.29			
Copper (mg/kg)	1.4	1.1			
Zinc (mg/kg)	0.2	0.2			
Manganese (mg/kg)	22	21			
Iron (mg/kg)	220	130			
Boron (mg/kg)	0.1	0.1			
Molybdenum (mg/kg)	<0.01	<0.01			

Percentages of Exchangeable I

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
ECaP (Calcium)	37.1%	40.0%	52.6%	50.9%	
EMgP (Magnesium)	17.4%	17.2%	27.5%	39.1%	
EKP (Potassium)	6.3%	4.4%	3.2%	3.1%	
ESP (Sodium)	2.0%	2.4%	2.0%	1.6%	
EAIP (Aluminium)	37.1%	36.0%	14.6%	5.3%	

Ca/Mg ratio

K/Mg ratio

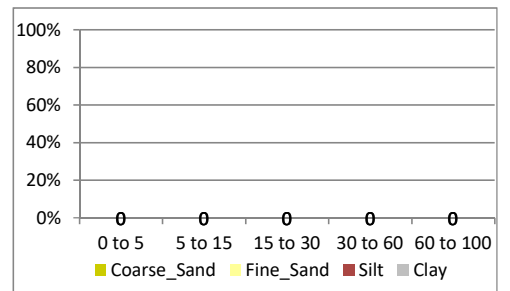
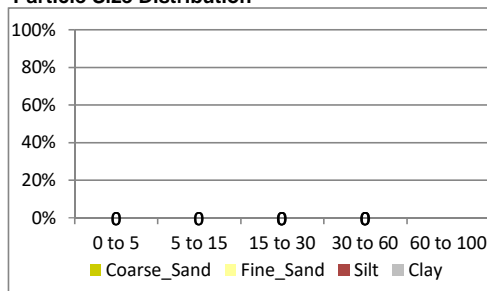
Electrochemical Stability Index

Loveday and Pyle Dispersion

Emerson Class

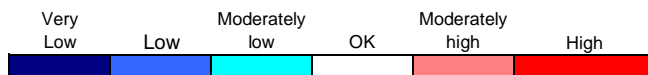
Ca/Mg ratio	2.1	2.3	1.9	1.3	
K/Mg ratio					
Electrochemical Stability Index	0.08	0.04	0.03	0.02	
Loveday and Pyle Dispersion	7	7	2	2	8

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



Pit

Depth (cm)

Colour

Texture

CEC (meq/100g)

pH water

pH CaCl₂

Organic C (%)

Nitrate N (mg/kg)

Ammonium N (mg/kg)

Phosphorus Colwell (mg/kg)

Phosphorus Buffer Index

Sulphate S-KCl (mg/kg)

Potassium (meq/100 g)

Calcium (meq/100 g)

Magnesium (meq/100 g)

Aluminium (meq/100 g)

Sodium (meq/100 g)

Chloride (mg/kg)

Electrical Conductivity (1:5)

Electrical Conductivity_{se} (dS/m)

Copper (mg/kg)

Zinc (mg/kg)

Manganese (mg/kg)

Iron (mg/kg)

Boron (mg/kg)

Molybdenum (mg/kg)

OM776

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Brown	Brown			
Texture	Clay	Clay			
CEC (meq/100g)	3.7	3.4	4.0	5.8	6.1
pH water	5.4	5.6	6.0	6.3	6.5
pH CaCl ₂	4.7	4.9	5.0	5.0	5.2
Organic C (%)	1.1	0.7			
Nitrate N (mg/kg)	40.0	39.0	16.0	3.0	2.0
Ammonium N (mg/kg)	1.1	0.9	0.6	1.0	0.8
Phosphorus Colwell (mg/kg)	6	<5			
Phosphorus Buffer Index	59	47			
Sulphate S-KCl (mg/kg)	5.5	4.3			
Potassium (meq/100 g)	0.1	0.1	0.1	0.1	0.1
Calcium (meq/100 g)	2.2	2.0	1.9	2.0	1.7
Magnesium (meq/100 g)	1.2	1.2	1.9	3.5	4.1
Aluminium (meq/100 g)	0.1	<0.10	<0.10	<0.10	<0.10
Sodium (meq/100 g)	0.1	0.1	0.1	0.1	0.2
Chloride (mg/kg)	<10.0	13	12	<10.0	<10.0
Electrical Conductivity (1:5)	0.08	0.08	0.04	0.02	0.02
Electrical Conductivity _{se} (dS/m)	0.32	0.34			
Copper (mg/kg)	1.5	1.2			
Zinc (mg/kg)	0.4	0.2			
Manganese (mg/kg)	15	8			
Iron (mg/kg)	190	120			
Boron (mg/kg)	0.1	0.1			
Molybdenum (mg/kg)	<0.01	<0.01			

OM777

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Brown	Brown			
Texture	Clay	Clay			
CEC (meq/100g)	4.2	3.5	4.1	7.0	6.6
pH water	4.4	5.2	6.1	6.6	6.7
pH CaCl ₂	3.9	4.5	5.2	5.7	5.7
Organic C (%)	2.0	0.8			
Nitrate N (mg/kg)	100.0	48.0	18.0	3.9	3.8
Ammonium N (mg/kg)	4.7	0.8	<0.6	<0.6	2.1
Phosphorus Colwell (mg/kg)	15	12			
Phosphorus Buffer Index	110	50			
Sulphate S-KCl (mg/kg)	11.0	5.2			
Potassium (meq/100 g)	0.3	0.1	0.1	0.2	0.2
Calcium (meq/100 g)	1.6	2.5	3.2	4.9	3.5
Magnesium (meq/100 g)	0.5	0.6	0.7	1.9	2.9
Aluminium (meq/100 g)	1.8	0.3	<0.10	<0.10	<0.10
Sodium (meq/100 g)	0.1	0.0	0.0	0.0	<0.02
Chloride (mg/kg)	<10.0	<10.0	<10.0	<10.0	<10.0
Electrical Conductivity (1:5)	0.19	0.09	0.04	0.03	0.02
Electrical Conductivity _{se} (dS/m)	0.65	0.35			
Copper (mg/kg)	1.6	1.2			
Zinc (mg/kg)	0.5	0.1			
Manganese (mg/kg)	110	40			
Iron (mg/kg)	170	69			
Boron (mg/kg)	0.3	0.2			
Molybdenum (mg/kg)	<0.01	<0.01			

Percentages of Exchangeable I

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
ECaP (Calcium)	59.5%	59.0%	47.6%	34.7%	27.9%
EMgP (Magnesium)	32.4%	35.4%	47.6%	60.8%	67.3%
EKP (Potassium)	2.7%	2.4%	2.3%	2.4%	2.3%
ESP (Sodium)	2.7%	3.2%	2.5%	2.1%	2.5%
EAIP (Aluminium)	2.7%	0.0%	0.0%	0.0%	0.0%

Ca/Mg ratio

K/Mg ratio

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Ca/Mg ratio	1.8	1.7	1.0	0.6	0.4
K/Mg ratio	3.4	4.2	4.3	2.6	1.2

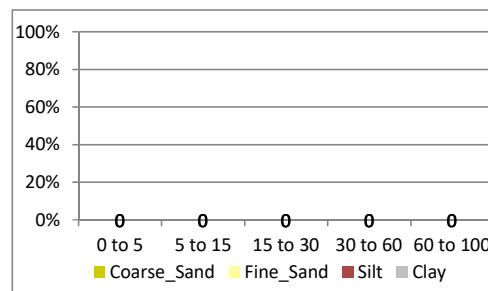
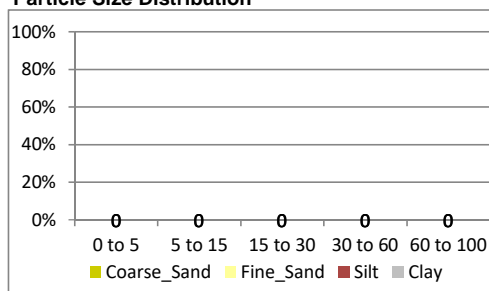
Electrochemical Stability Index

Loveday and Pyle Dispersion

Emerson Class

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Electrochemical Stability Index	0.03	0.02	0.02	0.01	0.01
Loveday and Pyle Dispersion	7	8	8	2	2
Emerson Class	8	2	2	2	2

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



Pit

Depth (cm)

Colour

Texture

CEC (meq/100g)

pH water

pH CaCl₂

Organic C (%)

Nitrate N (mg/kg)

Ammonium N (mg/kg)

Phosphorus Colwell (mg/kg)

Phosphorus Buffer Index

Sulphate S-KCl (mg/kg)

Potassium (meq/100 g)

Calcium (meq/100 g)

Magnesium (meq/100 g)

Aluminium (meq/100 g)

Sodium (meq/100 g)

Chloride (mg/kg)

Electrical Conductivity (1:5)

Electrical Conductivity_{se} (dS/m)

Copper (mg/kg)

Zinc (mg/kg)

Manganese (mg/kg)

Iron (mg/kg)

Boron (mg/kg)

Molybdenum (mg/kg)

Percentages of Exchangeable I

ECaP (Calcium)

EMgP (Magnesium)

EKP (Potassium)

ESP (Sodium)

EAIP (Aluminium)

Ca/Mg ratio

K/Mg ratio

Electrochemical Stability Index

Loveday and Pyle Dispersion

Emerson Class

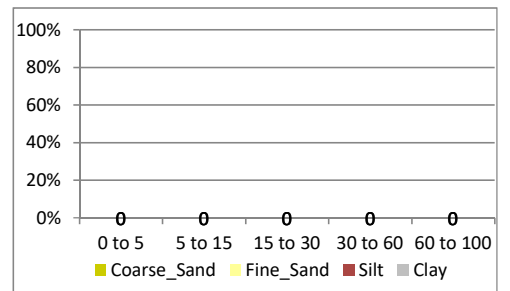
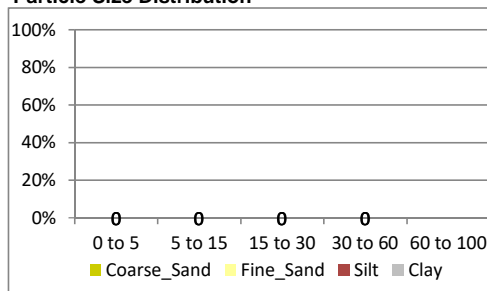
OM778

	0 to 5	5 to 15	15 to 30	30 to 50	to
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 50	to
Colour	Brown	Brown			
Texture	Clay	Clay			
CEC (meq/100g)	4.5	3.3	3.7	6.2	
pH water	4.7	5.4	5.8	6.6	
pH CaCl ₂	4.3	4.7	5.1	5.7	
Organic C (%)	1.8	0.8			
Nitrate N (mg/kg)	140.0	57.0	38.0	7.2	
Ammonium N (mg/kg)	2.2	0.7	<0.6	0.8	
Phosphorus Colwell (mg/kg)	18	8			
Phosphorus Buffer Index	54	40			
Sulphate S-KCl (mg/kg)	8.5	3.5			
Potassium (meq/100 g)	0.3	0.1	0.1	0.3	
Calcium (meq/100 g)	3.1	2.5	2.9	3.8	
Magnesium (meq/100 g)	0.7	0.5	0.6	2.1	
Aluminium (meq/100 g)	0.4	0.1	<0.10	<0.10	
Sodium (meq/100 g)	0.1	0.0	0.0	0.0	
Chloride (mg/kg)	<10.0	<10.0	<10.0	<10.0	
Electrical Conductivity (1:5)	0.24	0.11	0.07	0.03	
Electrical Conductivity _{se} (dS/m)	0.80	0.42			
Copper (mg/kg)	1.1	1.1			
Zinc (mg/kg)	0.6	0.2			
Manganese (mg/kg)	55	22			
Iron (mg/kg)	150	78			
Boron (mg/kg)	0.4	0.2			
Molybdenum (mg/kg)	<0.01	<0.01			

OM780

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Brown	Brown			
Texture	Clay	Clay			
CEC (meq/100g)	3.9	3.6	3.3	4.3	6.8
pH water	5.1	5.0	5.3	5.5	5.6
pH CaCl ₂	4.3	4.2	4.2	4.1	4.2
Organic C (%)	2.3	1.6			
Nitrate N (mg/kg)	18.0	26.0	4.8	1.9	2.1
Ammonium N (mg/kg)	1.9	2.4	0.8	1.6	0.8
Phosphorus Colwell (mg/kg)	5	<5			
Phosphorus Buffer Index	190	190			
Sulphate S-KCl (mg/kg)	3.3	2.0			
Potassium (meq/100 g)	0.2	0.2	0.1	0.2	0.2
Calcium (meq/100 g)	1.2	0.9	0.4	0.2	0.3
Magnesium (meq/100 g)	0.9	0.9	0.7	1.2	2.4
Aluminium (meq/100 g)	1.5	1.6	2.0	2.6	3.8
Sodium (meq/100 g)	0.1	0.1	0.1	0.1	0.1
Chloride (mg/kg)	18	36	<10	<10	<10
Electrical Conductivity (1:5)	0.06	0.07	0.02	0.02	0.02
Electrical Conductivity _{se} (dS/m)					
Copper (mg/kg)	0.4	0.4			
Zinc (mg/kg)	0.5	0.3			
Manganese (mg/kg)	11	6			
Iron (mg/kg)	340	270			
Boron (mg/kg)	0.4	0.3			
Molybdenum (mg/kg)	<0.01	<0.01			

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



Pit

Depth (cm)

Colour

Texture

CEC (meq/100g)

pH water

pH CaCl₂

Organic C (%)

Nitrate N (mg/kg)

Ammonium N (mg/kg)

Phosphorus Colwell (mg/kg)

Phosphorus Buffer Index

Sulphate S-KCl (mg/kg)

Potassium (meq/100 g)

Calcium (meq/100 g)

Magnesium (meq/100 g)

Aluminium (meq/100 g)

Sodium (meq/100 g)

Chloride (mg/kg)

Electrical Conductivity (1:5)

Electrical Conductivity_{se} (dS/m)

Copper (mg/kg)

Zinc (mg/kg)

Manganese (mg/kg)

Iron (mg/kg)

Boron (mg/kg)

Molybdenum (mg/kg)

OM781

0 to 5 5 to 15 15 to 30 30 to 60 60 to 100

Grey Grey

Clay Clay

7.4 9.5 5.5 10.2 13.1

7.6 9.4 9.7 9.8 9.5

6.3 8.2 8.4 8.5 8.1

2.1 0.8

26.0 6.5 1.8 1.0 0.8

4.1 1.6 0.7 0.6 0.7

19 <5

44 51

8.0 49.0

0.2 0.2 0.1 0.1 0.2

3.3 2.7 1.0 1.7 2.1

2.0 1.8 1.1 2.9 5.9

<0.1 <0.1 <0.1 <0.1 <0.1

1.9 4.8 3.3 5.5 4.9

27 460 280 140 68

0.15 0.48 0.32 0.30 0.19

0.5 0.7

1.1 0.3

37 21

120 29

0.4 0.2

<0.01 0.0

OM782

0 to 5 5 to 15 15 to 30 30 to 60 60 to 100

Brown Brown

Clay Clay

4.2 5.3 5.2 4.7 4.4

5.5 5.6 6.2 6.8 7.0

4.5 4.7 5.5 5.8 6.0

2.0 0.6

26.0 6.1 3.3 2.8 <0.5

2.6 1.1 1.0 1.0 <0.6

13 6

51 85

7.5 9.7

1.0 1.0 0.7 0.4 0.3

2.1 2.7 3.1 2.7 2.3

0.8 1.3 1.4 1.5 1.8

0.2 0.2 <0.1 <0.1 <0.1

0.1 0.0 0.0 0.1 0.1

20 17 13 11 <10

0.09 0.06 0.05 0.03 0.02

1.7 1.5

1.3 0.2

80 38

230 26

0.6 0.6

<0.01 <0.01

Percentages of Exchangeable (

ECaP (Calcium)

44.5% 28.5% 17.6% 16.6% 16.1%

50.0% 51.3% 59.5% 58.1% 51.8%

EMgP (Magnesium)

27.0% 19.0% 20.2% 28.3% 45.1%

19.8% 24.7% 26.9% 32.3% 40.5%

EKP (Potassium)

3.0% 2.0% 1.7% 1.3% 1.3%

23.8% 19.0% 12.9% 8.6% 6.5%

ESP (Sodium)

25.6% 50.6% 60.6% 53.8% 37.5%

1.7% 0.6% 0.8% 1.1% 1.1%

EAIP (Aluminium)

0.0% 0.0% 0.0% 0.0% 0.0%

4.8% 4.4% 0.0% 0.0% 0.0%

Ca/Mg ratio

1.7 1.5 0.9 0.6 0.4

2.5 2.1 2.2 1.8 1.3

K/Mg ratio

Electrochemical Stability Index

0.01 0.01 0.01 0.01 0.01

0.05 0.11 0.07 0.03 0.02

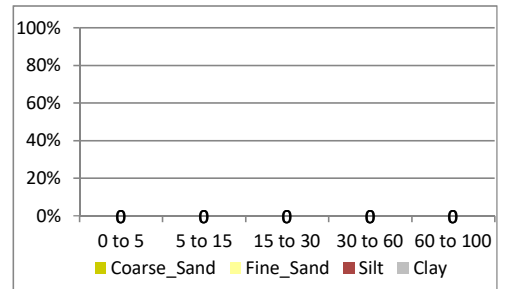
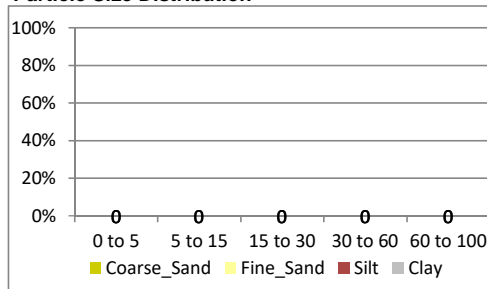
Loveday and Pyle Dispersion

8 8 2 1 8

7 3 6 7 6

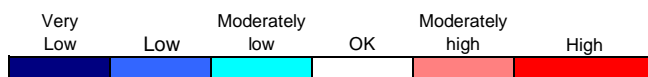
Emerson Class

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



Pit

Depth (cm)

Colour

Texture

CEC (meq/100g)

pH water

pH CaCl₂

Organic C (%)

Nitrate N (mg/kg)

Ammonium N (mg/kg)

Phosphorus Colwell (mg/kg)

Phosphorus Buffer Index

Sulphate S-KCl (mg/kg)

Potassium (meq/100 g)

Calcium (meq/100 g)

Magnesium (meq/100 g)

Aluminium (meq/100 g)

Sodium (meq/100 g)

Chloride (mg/kg)

Electrical Conductivity (1:5)

Electrical Conductivity_{se} (dS/m)

Copper (mg/kg)

Zinc (mg/kg)

Manganese (mg/kg)

Iron (mg/kg)

Boron (mg/kg)

Molybdenum (mg/kg)

OM783

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Brown	Brown			
Texture	Clay	Clay			
CEC (meq/100g)	4.3	2.5	2.1	7.9	8.8
pH water	5.0	4.9	5.5	6.8	7.0
pH CaCl ₂	4.3	4.2	4.7	5.8	6.0
Organic C (%)	2.2	0.9			
Nitrate N (mg/kg)	61.0	57.0	28.0	3.7	1.4
Ammonium N (mg/kg)	2.7	0.9	8.2	0.6	<0.6
Phosphorus Colwell (mg/kg)	9	<5			
Phosphorus Buffer Index	39	37			
Sulphate S-KCl (mg/kg)	7.9	5.5			
Potassium (meq/100 g)	0.6	0.2	0.1	0.3	0.2
Calcium (meq/100 g)	2.5	1.3	1.4	4.6	4.0
Magnesium (meq/100 g)	0.7	0.4	0.5	2.8	4.4
Aluminium (meq/100 g)	0.3	0.4	<0.1	<0.1	<0.1
Sodium (meq/100 g)	0.2	0.2	0.1	0.2	0.2
Chloride (mg/kg)	14	25	20	<10	<10
Electrical Conductivity (1:5)	0.13	0.12	0.07	0.04	0.05
Electrical Conductivity _{se} (dS/m)	0.70	0.75	0.48	0.18	0.21
Copper (mg/kg)	0.7	0.6			
Zinc (mg/kg)	1.7	0.4			
Manganese (mg/kg)	60	46			
Iron (mg/kg)	250	160			
Boron (mg/kg)	0.5	0.3			
Molybdenum (mg/kg)	<0.01	<0.01			

OM784

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Brown	Brown			
Texture	Clay	Clay			
CEC (meq/100g)	3.0	2.3	3.5	7.0	7.8
pH water	5.2	5.2	6.1	6.2	6.5
pH CaCl ₂	4.4	4.3	4.7	4.9	5.1
Organic C (%)	1.7	0.8			
Nitrate N (mg/kg)	15.0	17.0	2.4	1.0	0.8
Ammonium N (mg/kg)	1.3	1.0	0.9	1.2	<0.6
Phosphorus Colwell (mg/kg)	<5	<5			
Phosphorus Buffer Index	98	83			
Sulphate S-KCl (mg/kg)	6.5	2.4			
Potassium (meq/100 g)	0.2	0.2	0.1	0.2	0.2
Calcium (meq/100 g)	1.7	1.1	1.8	3.2	2.9
Magnesium (meq/100 g)	0.6	0.4	1.2	3.3	4.5
Aluminium (meq/100 g)	0.5	0.6	0.3	0.2	<0.1
Sodium (meq/100 g)	0.1	0.1	0.1	0.2	0.3
Chloride (mg/kg)	27	24	<10	<10	<10
Electrical Conductivity (1:5)	0.06	0.05	0.02	0.02	0.02
Electrical Conductivity _{se} (dS/m)	0.48	0.39	0.13	0.11	0.10
Copper (mg/kg)	1.3	1.1			
Zinc (mg/kg)	0.4	0.2			
Manganese (mg/kg)	21	26			
Iron (mg/kg)	440	230			
Boron (mg/kg)	0.3	0.2			
Molybdenum (mg/kg)	<0.01	<0.01			

Percentages of Exchangeable ()

ECaP (Calcium)	58.3%	52.0%	68.3%	58.3%	45.3%	55.9%	47.0%	51.3%	45.5%	37.2%
EMgP (Magnesium)	16.1%	15.6%	23.4%	35.5%	49.8%	19.1%	15.8%	34.2%	46.9%	57.7%
EKP (Potassium)	14.2%	9.2%	5.4%	4.1%	2.3%	5.6%	6.8%	3.4%	2.3%	1.9%
ESP (Sodium)	3.5%	6.8%	2.9%	2.2%	2.6%	2.6%	3.4%	2.8%	2.8%	3.2%
EAIP (Aluminium)	7.9%	16.4%	0.0%	0.0%	0.0%	16.8%	26.9%	8.3%	2.4%	0.0%

Ca/Mg ratio

K/Mg ratio

Ca/Mg ratio	3.6	3.3	2.9	1.6	0.9	2.9	3.0	1.5	1.0	0.6
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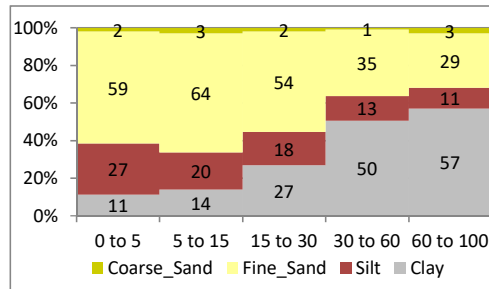
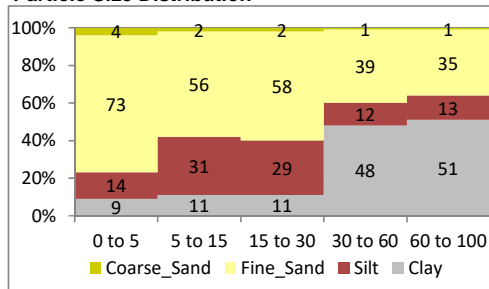
Electrochemical Stability Index

Loveday and Pyle Dispersion

Emerson Class

Electrochemical Stability Index	0.04	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01
Loveday and Pyle Dispersion	7	8	2	6	6	7	8	2	6	6

Particle Size Distribution

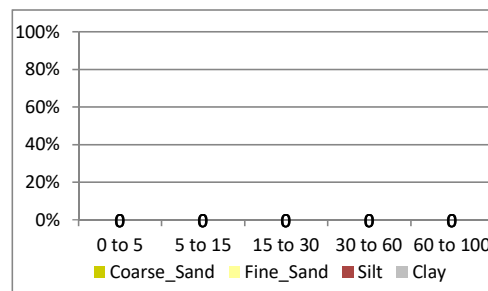
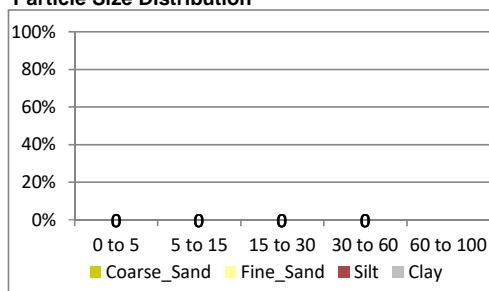


MGP Soil Laboratory Chemical Tests



	OM785				OM786				
	0 to 5	5 to 15	15 to 30	30 to 60	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Pit									
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Brown	Brown			Brown	Brown			
Texture	Clay	Clay			Clay	Clay			
CEC (meq/100g)	2.7	3.2	5.2	5.5	4.0	3.9	5.8	9.0	7.8
pH water	5.0	5.2	6.2	6.7	5.0	5.0	5.6	6.5	6.9
pH CaCl ₂	4.1	4.4	5.3	5.6	4.3	4.3	4.7	5.6	6.0
Organic C (%)	1.0	0.8			1.4	1.0			
Nitrate N (mg/kg)	23.0	39.0	17.0	4.2	37.0	41.0	14.0	2.4	3.0
Ammonium N (mg/kg)	1.8	0.9	11.0	0.7	1.2	2.1	0.9	0.8	0.8
Phosphorus Colwell (mg/kg)	<5	6			8	6			
Phosphorus Buffer Index	60	62			84	94			
Sulphate S-KCl (mg/kg)	3.0	2.0			3.1	2.9			
Potassium (meq/100 g)	0.2	0.1	0.1	0.2	0.3	0.2	0.2	0.3	0.2
Calcium (meq/100 g)	1.1	1.7	3.1	3.1	2.3	2.4	4.1	6.0	4.6
Magnesium (meq/100 g)	0.6	0.9	1.9	2.2	0.7	0.7	1.2	2.7	2.9
Aluminium (meq/100 g)	0.8	0.4	<0.1	<0.1	0.7	0.6	0.2	<0.1	<0.1
Sodium (meq/100 g)	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1
Chloride (mg/kg)	<10	14	<10	<10	12	<10	<10	<10	<10
Electrical Conductivity (1:5)	0.05	0.08	0.05	0.02	0.08	0.08	0.04	0.02	0.02
Electrical Conductivity _{se} (dS/m)									
Copper (mg/kg)	1.6	1.7			2.5	2.5			
Zinc (mg/kg)	0.6	0.4			0.4	0.2			
Manganese (mg/kg)	80	80			140	110			
Iron (mg/kg)	150	96			130	59			
Boron (mg/kg)	0.2	0.2			0.4	0.4			
Molybdenum (mg/kg)	<0.01	<0.01			<0.01	<0.01			
Percentages of Exchangeable I									
ECaP (Calcium)	40.9%	53.6%	59.5%	56.1%	58.2%	61.4%	70.9%	66.4%	59.1%
EMgP (Magnesium)	21.6%	29.0%	36.5%	39.8%	17.0%	17.9%	20.8%	29.9%	37.3%
EKP (Potassium)	5.6%	3.5%	2.7%	2.7%	6.6%	5.4%	3.6%	3.1%	3.0%
ESP (Sodium)	1.9%	1.9%	1.3%	1.4%	1.5%	1.0%	0.9%	0.7%	0.6%
EAIP (Aluminium)	30.1%	12.0%	0.0%	0.0%	16.7%	14.3%	3.8%	0.0%	0.0%
Ca/Mg ratio	1.9	1.8	1.6	1.4	3.4	3.4	3.4	2.2	1.6
K/Mg ratio									
Electrochemical Stability Index	0.03	0.04	0.04	0.01	0.05	0.08	0.05	0.03	0.03
Loveday and Pyle Dispersion									
Emerson Class	7	2	2	2	8	6	6	6	2

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



Pit

Depth (cm)

Colour

Texture

CEC (meq/100g)

pH water

pH CaCl₂

Organic C (%)

Nitrate N (mg/kg)

Ammonium N (mg/kg)

Phosphorus Colwell (mg/kg)

Phosphorus Buffer Index

Sulphate S-KCl (mg/kg)

Potassium (meq/100 g)

Calcium (meq/100 g)

Magnesium (meq/100 g)

Aluminium (meq/100 g)

Sodium (meq/100 g)

Chloride (mg/kg)

Electrical Conductivity (1:5)

Electrical Conductivity_{se} (dS/m)

Copper (mg/kg)

Zinc (mg/kg)

Manganese (mg/kg)

Iron (mg/kg)

Boron (mg/kg)

Molybdenum (mg/kg)

OM787

0 to 5 5 to 15 15 to 30 30 to 60 60 to 100

Grey Brown

Clay Clay

3.6 3.4 1.7 4.7 2.8

4.9 4.9 5.5 5.5 5.8

4.3 4.3 4.6 4.6 4.8

1.9 1.4 5.5 5.5 5.8

93.0 96.0 17.0 8.5 12.0

4.4 1.5 1.3 1.4 0.9

15 10

51 50

10.0 7.7

0.5 0.4 0.2 0.2 0.1

2.2 2.1 1.0 2.0 0.9

0.6 0.6 0.4 2.0 1.5

0.2 0.3 0.1 0.4 0.1

0.1 0.1 0.1 0.2 0.2

21 38 <10 <10 <10

0.19 0.19 0.05 0.05 0.04

1.03 1.19 0.31 0.26 0.24

0.6 0.5

0.8 0.5

30 23

350 350

0.3 0.3

<0.01 <0.01

OM788

0 to 5 5 to 15 15 to 30 30 to 60 60 to 100

Brown Brown

Clay Clay

3.4 3.4 2.9 2.6 5.0

5.2 5.4 5.7 6.0 6.2

4.2 4.2 4.1 4.1 4.1

1.6 1.3 5.7 6.0 6.2

4.3 2.8 2.7 2.3 1.9

4.3 3.3 <0.6 <0.6 <0.6

13 6

150 140

5.0 4.8

0.1 0.1 0.1 0.1 0.1

1.0 0.9 0.3 0.1 0.1

0.5 0.5 0.4 0.4 1.1

1.7 1.8 2.0 1.9 3.2

0.1 0.1 0.1 0.2 0.6

30 10 <10.0 <10.0 <10.0

0.04 0.03 0.02 0.02 0.02

0.26 0.15

0.8 0.7

0.2 0.2

14 10

200 170

0.2 0.1

<0.01 <0.01

Percentages of Exchangeable (

ECaP (Calcium)

60.6% 61.2% 55.9% 42.4% 31.8%

29.2% 25.9% 11.5% 5.3% 1.4%

EMgP (Magnesium)

17.4% 18.1% 21.8% 42.4% 54.2%

14.3% 14.1% 12.8% 13.7% 22.0%

EKP (Potassium)

12.9% 10.5% 10.6% 3.6% 4.0%

2.9% 3.5% 2.1% 1.9% 1.6%

ESP (Sodium)

2.5% 2.6% 3.5% 3.4% 5.4%

4.1% 3.5% 4.2% 6.8% 11.2%

EAIP (Aluminium)

6.6% 7.6% 8.2% 8.3% 4.7%

49.6% 52.9% 69.4% 72.2% 63.9%

Ca/Mg ratio

3.5 3.4 2.6 1.0 0.6

2.0 1.8 0.9 0.4 0.1

K/Mg ratio

Electrochemical Stability Index

0.08 0.07 0.01 0.01 0.01

0.01 0.01 0.00 0.00 0.00

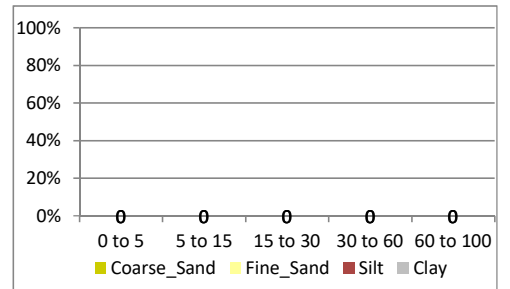
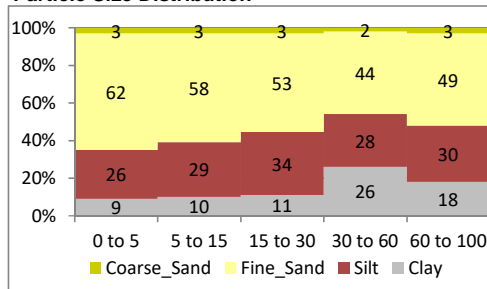
Loveday and Pyle Dispersion

7 7 2 2 2

7 8 2 2 2

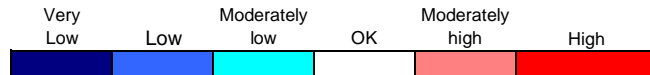
Emerson Class

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



Pit

Depth (cm)

Colour

Texture

CEC (meq/100g)

pH water

pH CaCl₂

Organic C (%)

Nitrate N (mg/kg)

Ammonium N (mg/kg)

Phosphorus Colwell (mg/kg)

Phosphorus Buffer Index

Sulphate S-KCl (mg/kg)

Potassium (meq/100 g)

Calcium (meq/100 g)

Magnesium (meq/100 g)

Aluminium (meq/100 g)

Sodium (meq/100 g)

Chloride (mg/kg)

Electrical Conductivity (1:5)

Electrical Conductivity_{se} (dS/m)

Copper (mg/kg)

Zinc (mg/kg)

Manganese (mg/kg)

Iron (mg/kg)

Boron (mg/kg)

Molybdenum (mg/kg)

OM789

0 to 5 5 to 15 15 to 30 30 to 60 60 to 100

Brown Brown

Clay Clay

3.6 3.0 1.6 3.4 7.3

4.9 4.8 5.4 6.0 6.2

4.2 4.2 4.4 4.4 4.5

1.3 1.1

52.0 52.0 11.0 3.9 4.2

1.3 1.8 <0.6 <0.6 <0.6

8 21

100 89

4.9 5.3

0.1 0.1 0.1 0.1 0.1

1.5 1.4 0.7 0.5 0.5

0.9 0.8 0.6 2.1 5.5

1.0 0.7 0.2 0.6 0.8

0.2 0.1 0.1 0.2 0.5

14 <10.0 <10.0 <10.0 <10.0

0.10 0.10 0.03 0.02 0.02

0.41 0.39

0.4 0.3

0.3 0.2

8 10

310 290

0.2 0.1

<0.01 <0.01

OM790

0 to 5 5 to 15 15 to 30 30 to 60 60 to 100

Brown Orange/Y

Clay Clay

5.1 3.8 9.5 9.5 13.4

5.7 5.8 6.6 6.9 7.1

4.7 4.9 5.5 5.9 6.1

2.3 0.7

17.0 20.0 2.8 1.6 <0.5

3.0 1.8 1.0 1.3 1.0

8 <5

44 25

4.5 2.0

0.5 0.3 0.7 0.5 0.3

2.5 1.5 1.9 1.3 1.0

1.9 1.8 6.8 7.7 12.0

0.1 0.1 0.1 <0.1 <0.1

0.0 0.1 0.0 0.0 0.0

<10 <10 <10 <10 <10

0.06 0.06 0.03 0.03 0.02

0.35 0.35 0.15 0.15 0.12

0.8 0.6

1.6 0.2

12 3

180 75

0.4 0.2

<0.01 <0.01

Percentages of Exchangeable (

ECaP (Calcium)

41.6% 46.4% 46.2% 15.5% 6.4%

EMgP (Magnesium)

24.4% 25.5% 34.8% 61.2% 75.3%

EKP (Potassium)

2.5% 2.6% 3.8% 2.0% 1.6%

ESP (Sodium)

4.2% 2.6% 3.2% 5.0% 6.2%

EAIP (Aluminium)

27.4% 22.8% 12.0% 16.3% 10.4%

49.0% 40.0% 20.0% 13.6% 7.5%

37.3% 48.0% 71.6% 80.8% 89.7%

10.4% 7.2% 6.9% 5.2% 2.5%

0.6% 1.6% 0.4% 0.3% 0.3%

2.7% 3.2% 1.1% 0.0% 0.0%

Ca/Mg ratio

1.7 1.8 1.3 0.3 0.1

K/Mg ratio

1.3 0.8 0.3 0.2 0.1

Electrochemical Stability Index

0.02 0.04 0.01 0.00 0.00

Loveday and Pyle Dispersion

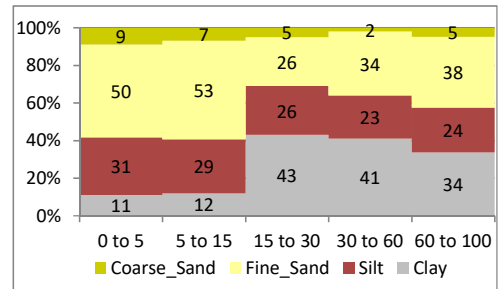
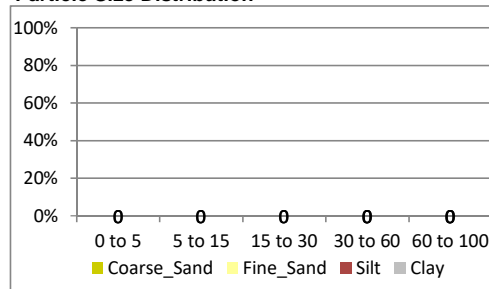
0.10 0.04 0.07 0.10 0.07

Emerson Class

7 7 2 2 2

7 7 8 6 3

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



Pit

Depth (cm)

Colour

Texture

CEC (meq/100g)

pH water

pH CaCl₂

Organic C (%)

Nitrate N (mg/kg)

Ammonium N (mg/kg)

Phosphorus Colwell (mg/kg)

Phosphorus Buffer Index

Sulphate S-KCl (mg/kg)

Potassium (meq/100 g)

Calcium (meq/100 g)

Magnesium (meq/100 g)

Aluminium (meq/100 g)

Sodium (meq/100 g)

Chloride (mg/kg)

Electrical Conductivity (1:5)

Electrical Conductivity_{se} (dS/m)

Copper (mg/kg)

Zinc (mg/kg)

Manganese (mg/kg)

Iron (mg/kg)

Boron (mg/kg)

Molybdenum (mg/kg)

OM791

0 to 5 5 to 15 15 to 30 30 to 60 60 to 100

Brown Orange/Y

Clay Clay

3.4 3.8 3.6 3.1 2.7

4.7 5.0 5.1 5.0 5.9

4.1 4.1 4.1 4.1 4.3

1.8 0.3

82.0 5.9 4.2 5.9 2.2

6.3 1.1 0.8 0.8 0.7

19 9

88 140

7.2 3.4

0.2 0.1 0.1 0.1 0.1

1.7 0.9 0.7 0.4 0.1

0.6 0.6 0.5 0.4 1.7

0.9 2.2 2.3 2.1 0.8

0.1 0.0 0.0 0.0 0.1

<10.0 <10.0 <10.0 <10.0 <10.0

0.16 0.03 0.02 0.02 0.01

0.57 0.15

0.4 0.5

0.5 0.1

36 2

150 85

0.4 0.5

<0.01 <0.01

OM792

0 to 5 5 to 15 15 to 30 30 to 60 60 to 100

Brown Brown

Clay Clay

2.2 1.0 4.2 5.4 3.3

5.1 5.3 5.9 6.2 6.7

4.2 4.4 4.8 5.2 5.5

1.6 0.2

10.0 6.2 1.5 1.1 1.3

2.9 0.8 0.9 0.9 0.7

41 <5

55 18

6.1 2.8

0.1 0.1 0.1 0.1 0.1

1.2 0.5 2.4 3.0 1.5

0.3 0.2 1.5 2.2 1.6

0.5 0.3 0.2 <0.1 <0.1

0.1 <0.02 0.1 0.1 0.1

<10 <10 <10 <10 <10

0.04 0.02 0.03 0.03 0.02

0.28 0.18 0.18 0.17 0.15

0.6 0.2

0.6 0.1

28 11

450 64

0.2 0.1

<0.01 <0.01

Percentages of Exchangeable ()

ECaP (Calcium)

EMgP (Magnesium)

EKP (Potassium)

ESP (Sodium)

EAIP (Aluminium)

49.4% 23.2% 19.3% 13.0% 2.9%

16.9% 15.6% 13.3% 14.0% 62.0%

4.9% 3.1% 3.0% 3.6% 2.6%

2.6% 0.8% 0.8% 1.0% 2.2%

26.2% 57.3% 63.5% 68.4% 30.3%

54.3% 49.5% 56.6% 55.2% 45.9%

14.9% 19.8% 35.4% 40.5% 48.9%

5.9% 5.0% 2.6% 2.4% 2.4%

2.3% 1.7% 1.8% 2.8%

22.6% 25.7% 3.8% 0.0% 0.0%

Ca/Mg ratio

K/Mg ratio

2.9 1.5 1.5 0.9 0.0

3.6 2.5 1.6 1.4 0.9

Electrochemical Stability Index

Loveday and Pyle Dispersion

Emerson Class

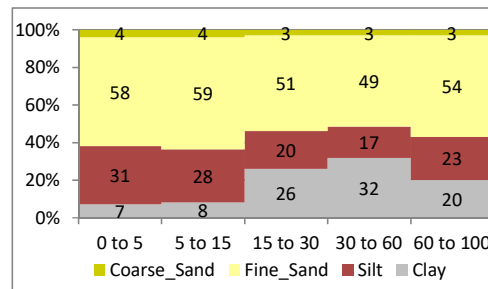
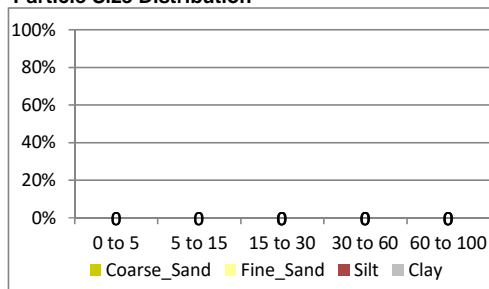
0.06 0.04 0.02 0.02 0.00

0.02 0.02 0.02 0.01

7 2 2 2 2

7 2 2 2 2

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



Pit

Depth (cm)

Colour

Texture

CEC (meq/100g)

pH water

pH CaCl₂

Organic C (%)

Nitrate N (mg/kg)

Ammonium N (mg/kg)

Phosphorus Colwell (mg/kg)

Phosphorus Buffer Index

Sulphate S-KCl (mg/kg)

Potassium (meq/100 g)

Calcium (meq/100 g)

Magnesium (meq/100 g)

Aluminium (meq/100 g)

Sodium (meq/100 g)

Chloride (mg/kg)

Electrical Conductivity (1:5)

Electrical Conductivity_{se} (dS/m)

Copper (mg/kg)

Zinc (mg/kg)

Manganese (mg/kg)

Iron (mg/kg)

Boron (mg/kg)

Molybdenum (mg/kg)

Percentages of Exchangeable ()

ECaP (Calcium)

EMgP (Magnesium)

EKP (Potassium)

ESP (Sodium)

EAIP (Aluminium)

Ca/Mg ratio

K/Mg ratio

Electrochemical Stability Index

Loveday and Pyle Dispersion

Emerson Class

OM793

0 to 5 5 to 15 15 to 30 30 to 60 60 to 100

Brown Orange/Y

Clay Clay

3.6 5.4 6.9 8.7 8.3

4.7 5.8 6.4 7.0 7.2

4.1 4.9 5.5 6.0 6.2

1.7 0.6

54.0 11.0 5.0 1.1 0.6

1.5 13.0 0.9 0.7 0.7

14 <5

60 72

5.8 7.4

0.4 0.4 0.4 0.3 0.2

1.9 3.7 4.8 5.6 4.7

0.5 1.2 1.6 2.7 3.3

0.8 <0.1 <0.1 <0.1 <0.1

<0.02 0.0 0.1 0.1 0.1

12 <10 <10 <10 <10

0.13 0.05 0.04 0.04 0.03

3.2 3.0

0.8 0.1

87 69

300 28

0.4 0.4

<0.01 <0.01

OM794

0 to 5 5 to 15 15 to 30 30 to 60 60 to 100

Brown Brown

Clay Clay

3.0 3.4 7.2 7.2 6.7

4.6 4.9 6.4 6.6 6.7

4.0 4.2 5.2 5.7 5.6

1.4 0.8

57.0 26.0 3.8 1.4 0.7

1.4 1.1 0.9 0.7 0.8

16 6

85 57

6.4 4.0

0.4 0.2 0.3 0.2 0.2

1.2 1.9 5.2 4.3 2.7

0.3 0.4 1.7 2.6 3.7

1.1 0.8 <0.1 <0.1 <0.1

0.0 0.0 0.1 0.1 0.1

<10 <10 <10 <10 <10

0.13 0.07 0.03 0.03 0.02

1.7 1.3

0.7 0.4

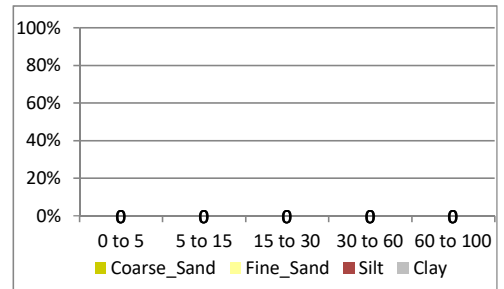
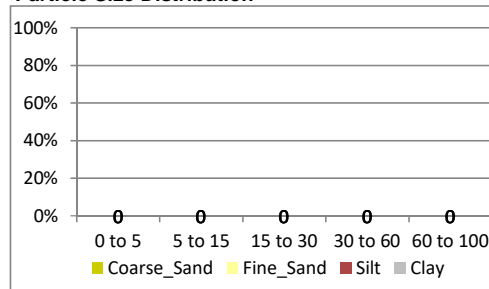
160 110

210 110

0.4 0.3

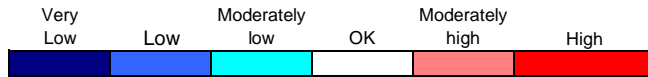
<0.01 <0.01

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



Pit

Depth (cm)

Colour

Texture

CEC (meq/100g)

pH water

pH CaCl₂

Organic C (%)

Nitrate N (mg/kg)

Ammonium N (mg/kg)

Phosphorus Colwell (mg/kg)

Phosphorus Buffer Index

Sulphate S-KCl (mg/kg)

Potassium (meq/100 g)

Calcium (meq/100 g)

Magnesium (meq/100 g)

Aluminium (meq/100 g)

Sodium (meq/100 g)

Chloride (mg/kg)

Electrical Conductivity (1:5)

Electrical Conductivity_{se} (dS/m)

Copper (mg/kg)

Zinc (mg/kg)

Manganese (mg/kg)

Iron (mg/kg)

Boron (mg/kg)

Molybdenum (mg/kg)

Percentages of Exchangeable I

ECaP (Calcium)

EMgP (Magnesium)

EKP (Potassium)

ESP (Sodium)

EAIP (Aluminium)

Ca/Mg ratio

K/Mg ratio

Electrochemical Stability Index

Loveday and Pyle Dispersion

Emerson Class

OM795

0 to 5 5 to 15 15 to 30 30 to 60 60 to 100

Brown Grey

Clay Clay

2.6 2.3 2.3 9.1 8.6

5.4 5.7 5.7 6.6 6.8

4.5 4.7 4.8 5.5 5.7

0.8 0.4

11.0 6.9 7.4 0.6 <0.5

1.5 1.5 0.9 1.1 0.9

7 <5

47 25

5.1 1.8

0.2 0.1 0.1 0.3 0.3

1.6 1.5 1.6 5.6 4.8

0.5 0.5 0.6 3.1 3.4

0.2 0.1 <0.1 <0.1 <0.1

0.1 0.0 0.1 0.1 0.1

13 12 15 <10 <10

0.05 0.03 0.03 0.02 0.02

2.9 0.9

0.5 0.2

62 29

180 65

0.1 0.1

<0.01 <0.01

OM796

0 to 5 5 to 15 15 to 30 30 to 60 to

Grey Grey

Clay Clay

4.1 5.1 4.1 8.5

4.8 5.4 6.0 7.0

4.1 4.6 5.1 5.9

1.3 1.0

57.0 40.0 13.0 1.9

2.2 1.0 <0.6 <0.6

15 9

63 45

6.2 6.4

0.1 0.1 0.1 0.3

2.4 4.2 3.4 6.1

0.7 0.7 0.6 2.1

0.7 <0.10 <0.10 <0.10

0.1 0.1 0.0 0.0

<10.0 <10.0 <10.0 <10.0

0.10 0.09 0.04 0.02

0.39 0.35

1.3 1.3

5.7 7.3

66 57

190 100

0.3 0.2

<0.01 <0.01

61.5% 64.9% 68.4% 61.7% 56.0%

20.8% 23.4% 23.9% 34.2% 39.7%

6.5% 4.8% 5.6% 3.0% 3.3%

2.3% 1.7% 2.1% 1.1% 1.1%

8.8% 5.2% 0.0% 0.0% 0.0%

3.0 2.8 2.9 1.8 1.4

0.02 0.02 0.01 0.02 0.02

8 2 2 6 6

59.3% 83.2% 82.1% 72.0%

17.0% 13.5% 15.0% 24.8%

3.2% 1.8% 2.2% 3.0%

2.7% 1.6% 0.7% 0.2%

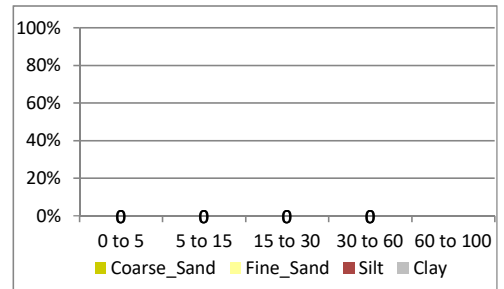
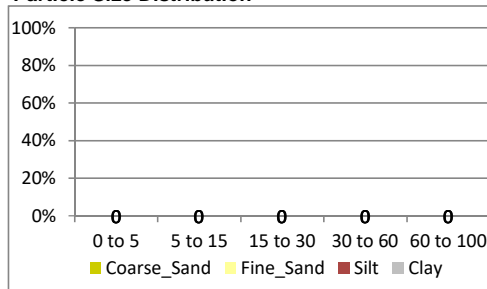
17.8% 0.0% 0.0% 0.0%

3.5 6.2 5.5 2.9

0.04 0.06 0.06 0.08

8 2 2 2

Particle Size Distribution

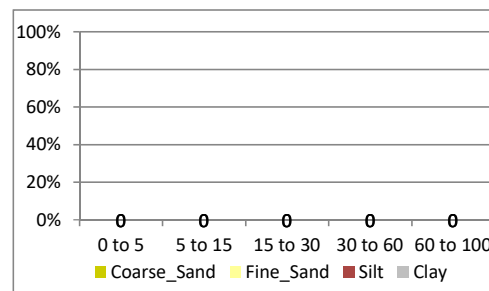
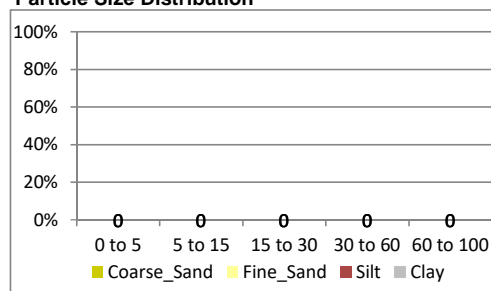


MGP Soil Laboratory Chemical Tests



	OM4001					OM4002				
	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Pit										
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Grey	Grey	Grey	Grey	Grey	Orange/Y Clay	Orange/Y Clay	Orange/Y Clay	Orange/Y Clay	Grey Clay
Texture	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay
CEC (meq/100g)	18.8	16.9	16.7	15.1	27.7	14.1	12.6	10.9	9.7	7.4
pH water	6.3	6.5	7.0	7.2	7.2	6.0	6.1	6.5	6.6	6.5
pH CaCl ₂	5.5	5.7	6.4	6.8	6.9	5.2	5.2	5.5	5.3	4.9
Organic C (%)	3.9	2.0				4.1	2.6			
Nitrate N (mg/kg)	8.4	3.1	0.9	1.2	0.5	12.0	5.7	1.6	1.1	1.0
Ammonium N (mg/kg)										
Phosphorus Colwell (mg/kg)	30	12				32	25			
Phosphorus Buffer Index										
Sulphate S-KCl (mg/kg)	8.5	14.0	38.0	100.0	120.0	8.1	5.1	1.2	<1.0	<1.0
Potassium (meq/100 g)	0.4	0.2	0.2	0.1	0.3	0.6	0.4	0.2	0.2	0.1
Calcium (meq/100 g)	10.0	8.5	7.5	6.5	11.0	8.5	7.5	6.5	5.5	3.9
Magnesium (meq/100 g)	8.2	7.7	8.1	6.8	14.0	4.8	4.5	4.0	3.7	3.0
Aluminium (meq/100 g)	0.0	0.0	0.0	0.0	0.0	0.1	0.1		0.1	0.1
Sodium (meq/100 g)	0.3	0.4	1.0	1.7	2.4	0.1	0.1	0.1	0.2	0.3
Chloride (mg/kg)	25	63	320	890	840	17	10	10	16	10
Electrical Conductivity (1:5)	0.10	0.13	0.32	0.74	0.82	0.10	0.06	0.03	0.03	0.02
Electrical Conductivity _{se} (dS/m)	0.47	0.74	2.35	5.88	6.07	0.43	0.26	0.15	0.17	0.11
Copper (mg/kg)	4.0	3.9				2.7	2.5			
Zinc (mg/kg)	2.7	1.5				3.3	1.9			
Manganese (mg/kg)	36	36				33	24			
Iron (mg/kg)	340	160				290	230			
Boron (mg/kg)	0.6	0.4				0.6	0.5			
Molybdenum (mg/kg)										
Percentages of Exchangeable I										
ECaP (Calcium)	53.1%	50.4%	44.9%	43.1%	39.8%	60.2%	59.7%	59.9%	56.8%	52.6%
EMgP (Magnesium)	43.5%	45.6%	48.4%	45.1%	50.6%	34.0%	35.8%	36.9%	38.2%	40.4%
EKP (Potassium)	1.9%	1.4%	1.0%	0.6%	0.9%	4.2%	2.9%	2.0%	1.7%	1.8%
ESP (Sodium)	1.4%	2.6%	5.7%	11.3%	8.7%	0.9%	0.8%	1.2%	2.4%	3.9%
EAIP (Aluminium)	0.0%	0.0%	0.0%	0.0%	0.0%	0.7%	0.8%	0.0%	1.0%	1.3%
Ca/Mg ratio	1.2	1.1	0.9	1.0	0.8	1.8	1.7	1.6	1.5	1.3
K/Mg ratio										
Electrochemical Stability Index	0.07	0.05	0.06	0.07	0.09	0.12	0.08	0.03	0.01	0.01
Loveday and Pyle Dispersion Emerson Class	1	1	0	0	0	1	2	4	5	6

Particle Size Distribution

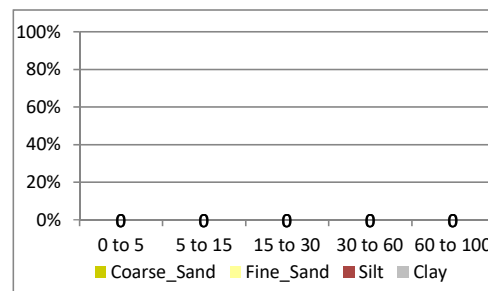
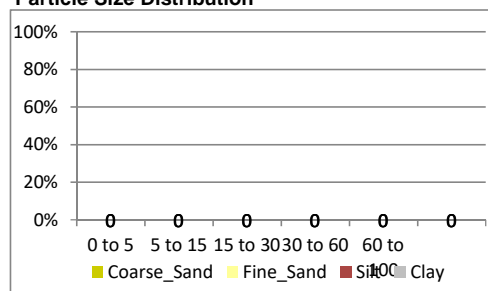


MGP Soil Laboratory Chemical Tests



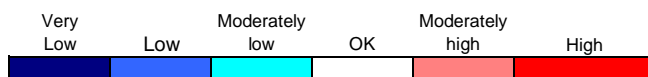
	OM4003					OM4004				
	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Pit										
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Grey	Grey	Grey	Grey	Grey	Brown	Brown	Brown	Orange/Y	Orange/Y
Texture	Clay	Clay	Clay	Clay	Clay	Clay Loam	Clay	Clay	Clay	Clay
CEC (meq/100g)	24.9	24.9	28.8	28.8	46.1	8.2	7.6	6.7	6.8	8.0
pH water	6.7	7.2	8.1	8.6	8.6	5.7	5.6	5.8	6.7	7.3
pH CaCl ₂	5.9	6.4	7.3	7.9	8.1	5.0	4.8	5.0	5.5	6.1
Organic C (%)	4.3	2.7				2.7	2.1			
Nitrate N (mg/kg)	2.2	1.4	0.5	0.5	0.5	39.0	18.0	18.0	2.0	1.4
Ammonium N (mg/kg)										
Phosphorus Colwell (mg/kg)	17	7				41	28			
Phosphorus Buffer Index										
Sulphate S-KCl (mg/kg)	12.0	3.1	3.9	5.7	30.0	5.2	8.4	7.8	2.6	4.8
Potassium (meq/100 g)	0.4	0.5	0.3	0.2	0.3	0.7	0.5	0.3	0.2	0.2
Calcium (meq/100 g)	16.0	15.0	19.0	15.0	22.0	5.5	5.5	5.0	5.0	5.5
Magnesium (meq/100 g)	8.2	9.1	9.1	12.0	21.0	1.8	1.5	1.2	1.5	2.1
Aluminium (meq/100 g)	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0
Sodium (meq/100 g)	0.2	0.3	0.4	1.6	2.8	0.1	0.1	0.1	0.1	0.2
Chloride (mg/kg)	23	23	27	260	520	28	17	54	12	10
Electrical Conductivity (1:5)	0.11	0.10	0.13	0.30	0.63	0.13	0.08	0.09	0.02	0.03
Electrical Conductivity _{se} (dS/m)	0.50	0.46	0.58	2.08	4.28	0.64	0.36	0.55	0.12	0.15
Copper (mg/kg)	2.5	2.5				2.4	2.7			
Zinc (mg/kg)	0.9	0.4				1.4	1.0			
Manganese (mg/kg)	23	14				41	37			
Iron (mg/kg)	60	42				260	280			
Boron (mg/kg)	0.9	0.7				0.6	0.6			
Molybdenum (mg/kg)										
Percentages of Exchangeable I										
ECaP (Calcium)	64.3%	60.3%	65.9%	52.0%	47.7%	67.2%	72.1%	74.9%	73.5%	69.2%
EMgP (Magnesium)	33.0%	36.6%	31.6%	41.6%	45.5%	22.0%	19.7%	18.0%	22.1%	26.4%
EKP (Potassium)	1.8%	2.0%	1.1%	0.8%	0.7%	8.9%	6.2%	4.5%	3.1%	2.5%
ESP (Sodium)	1.0%	1.1%	1.4%	5.5%	6.1%	0.6%	0.8%	1.2%	1.3%	1.9%
EAIP (Aluminium)	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	1.3%	1.5%	0.0%	0.0%
Ca/Mg ratio	2.0	1.6	2.1	1.3	1.0	3.1	3.7	4.2	3.3	2.6
K/Mg ratio										
Electrochemical Stability Index	0.11	0.09	0.09	0.05	0.10	0.21	0.10	0.08	0.02	0.02
Loveday and Pyle Dispersion	1	0	0	0	0	2	2	2	4	6
Emerson Class										

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



Pit

OM4005

OM835

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	Grey	Grey	Grey	Grey		Grey	Grey			
Colour	Grey	Grey	Grey	Grey		Grey	Grey			
Texture	Clay	Clay	Clay	Clay		Clay	Clay			
CEC (meq/100g)	3.7	2.9	3.5	8.6		10.1	12.5	13.6	14.1	16.0
pH water	5.3	5.2	5.4	6.1		5.6	6.2	6.7	7.0	7.7
pH CaCl ₂	4.4	4.2	4.4	5.1		4.8	5.4	5.7	6.0	6.6
Organic C (%)	2.1	1.1				3.3	2.3			
Nitrate N (mg/kg)	19.0	7.9	1.1	1.5		13.0	7.4	2.2	<0.5	<0.5
Ammonium N (mg/kg)						5.5	4.1	3.0	2.3	1.7
Phosphorus Colwell (mg/kg)	13	13				20	11			
Phosphorus Buffer Index						79	77			
Sulphate S-KCl (mg/kg)	5.0	8.0	6.6	9.3		6.8	5.1			
Potassium (meq/100 g)	0.5	0.5	0.2	0.2		0.8	0.6	0.3	0.3	0.3
Calcium (meq/100 g)	2.0	1.3	1.9	4.9		6.2	8.1	9.0	8.8	8.8
Magnesium (meq/100 g)	0.9	0.5	0.8	3.3		3.0	3.8	4.2	4.9	6.7
Aluminium (meq/100 g)	0.3	0.6	0.6	0.1		<0.10	<0.10	<0.10	<0.10	<0.10
Sodium (meq/100 g)	0.0	0.0	0.1	0.1		0.1	0.1	0.1	0.1	0.2
Chloride (mg/kg)	12	10	20	11		27	53	21	15	21
Electrical Conductivity (1:5)	0.06	0.05	0.03	0.03		0.10	0.10	0.06	0.05	0.06
Electrical Conductivity _{se} (dS/m)	0.27	0.22	0.19	0.16		0.60	0.74	0.36	0.28	0.32
Copper (mg/kg)	1.2	1.4				3.4	3.7			
Zinc (mg/kg)	1.4	0.5				2.1	1.6			
Manganese (mg/kg)	110	82				33	23			
Iron (mg/kg)	160	160				420	240			
Boron (mg/kg)	0.3	0.2				0.7	0.6			
Molybdenum (mg/kg)						<0.01	<0.01			

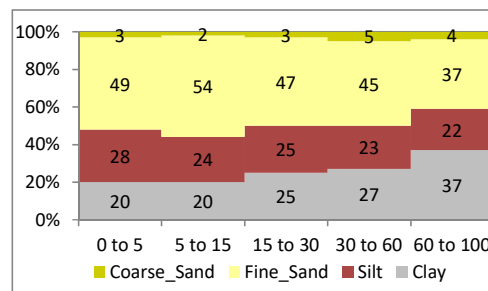
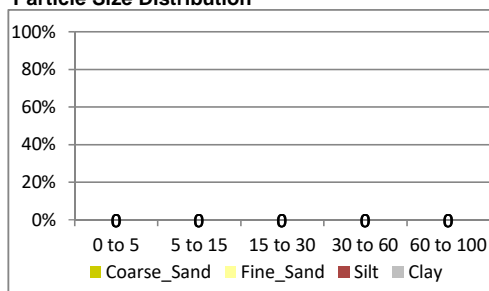
Percentages of Exchangeable I

ECaP (Calcium)	53.6%	45.0%	53.8%	57.0%		61.5%	64.7%	66.2%	62.5%	55.1%
EMgP (Magnesium)	24.4%	17.0%	22.9%	38.4%		29.8%	30.4%	30.9%	34.8%	41.9%
EKP (Potassium)	13.7%	16.3%	4.2%	2.2%		8.1%	4.4%	2.3%	1.8%	1.8%
ESP (Sodium)	0.8%	1.0%	1.7%	0.8%		0.6%	0.6%	0.7%	0.9%	1.2%
EAIP (Aluminium)	7.5%	20.8%	17.3%	1.5%		0.0%	0.0%	0.0%	0.0%	0.0%

Ca/Mg ratio	2.2	2.7	2.3	1.5		2.1	2.1	2.1	1.8	1.3
K/Mg ratio										

Electrochemical Stability Index	0.07	0.05	0.02	0.04		0.17	0.18	0.09	0.05	0.05
Loveday and Pyle Dispersion	2	2	2	0						
Emerson Class						7	7	7	3	6

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



Pit

Depth (cm)

Colour

Texture

CEC (meq/100g)

pH water

pH CaCl₂

Organic C (%)

Nitrate N (mg/kg)

Ammonium N (mg/kg)

Phosphorus Colwell (mg/kg)

Phosphorus Buffer Index

Sulphate S-KCl (mg/kg)

Potassium (meq/100 g)

Calcium (meq/100 g)

Magnesium (meq/100 g)

Aluminium (meq/100 g)

Sodium (meq/100 g)

Chloride (mg/kg)

Electrical Conductivity (1:5)

Electrical Conductivity_{se} (dS/m)

Copper (mg/kg)

Zinc (mg/kg)

Manganese (mg/kg)

Iron (mg/kg)

Boron (mg/kg)

Molybdenum (mg/kg)

OM836

0 to 5 5 to 15 15 to 30 30 to 60 60 to 100

Brown Brown

Clay Clay

4.6 3.2 4.8 7.4 4.9

5.7 5.9 6.2 6.7 6.7

4.8 5.1 5.3 5.5 5.6

2.5 0.6

7.9 19.0 7.7 1.2 <0.5

9.4 1.3 1.1 0.9 0.7

17 7

71 44

4.9 2.5

0.2 0.1 0.1 0.2 0.1

3.2 2.3 3.1 4.1 2.4

1.0 0.7 1.5 3.0 2.2

0.1 <0.10 <0.10 <0.10 <0.10

0.1 0.1 0.1 0.1 0.1

<10.0 11 11 <10.0 18

0.05 0.06 0.04 0.02 0.03

0.30 0.34 0.23 0.12 0.21

1.3 1.1

1.5 0.2

34 14

260 100

0.3 0.1

<0.01 <0.01

OM837

0 to 5 5 to 15 15 to 30 30 to 60 80 to 100

Brown Brown

Clay Clay

8.8 8.8 6.2 3.1 13.5

6.1 6.4 6.8 7.0 5.3

5.4 5.8 6.1 6.0 4.3

2.4 1.2

22.0 18.0 3.2 <0.5 <0.5

2.6 2.4 1.9 0.8 1.5

14 9

87 74

6.3 2.6

0.2 0.1 0.1 0.0 0.2

5.5 5.5 3.5 1.4 2.8

2.6 2.6 1.9 1.2 6.8

<0.10 <0.10 <0.10 <0.10 2.8

0.5 0.6 0.7 0.4 0.9

52 110 160 79 98

0.13 0.15 0.16 0.08 0.10

0.98 1.34 1.53 0.79 0.70

4.0 3.6

2.7 0.8

24 22

290 110

0.4 0.3

<0.01 <0.01

Percentages of Exchangeable (

ECaP (Calcium)

69.6% 72.1% 64.7% 55.4% 49.5%

EMgP (Magnesium)

21.7% 22.9% 31.3% 40.5% 45.4%

EKP (Potassium)

4.6% 2.8% 2.5% 2.7% 2.5%

ESP (Sodium)

1.5% 2.2% 1.5% 1.4% 2.7%

EAIP (Aluminium)

2.6% 0.0% 0.0% 0.0% 0.0%

62.8% 62.3% 56.7% 45.9% 20.8%

29.7% 29.4% 30.8% 39.3% 50.4%

1.9% 1.4% 1.3% 1.3% 1.7%

5.6% 6.9% 11.2% 13.4% 6.3%

0.0% 0.0% 0.0% 0.0% 20.8%

Ca/Mg ratio

3.2 3.2 2.1 1.4 1.1

K/Mg ratio

2.1 2.1 1.8 1.2 0.4

Electrochemical Stability Index

0.03 0.03 0.03 0.01 0.01

Loveday and Pyle Dispersion

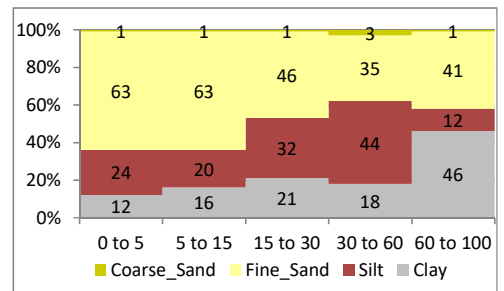
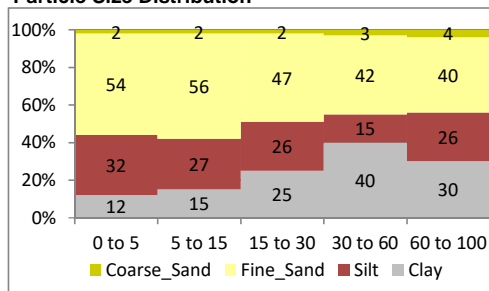
0.02 0.02 0.01 0.01 0.02

Emerson Class

7 3 3 6 6

3 7 8 2 6

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



Pit

Depth (cm)

Colour

Texture

CEC (meq/100g)

pH water

pH CaCl₂

Organic C (%)

Nitrate N (mg/kg)

Ammonium N (mg/kg)

Phosphorus Colwell (mg/kg)

Phosphorus Buffer Index

Sulphate S-KCl (mg/kg)

Potassium (meq/100 g)

Calcium (meq/100 g)

Magnesium (meq/100 g)

Aluminium (meq/100 g)

Sodium (meq/100 g)

Chloride (mg/kg)

Electrical Conductivity (1:5)

Electrical Conductivity_{se} (dS/m)

Copper (mg/kg)

Zinc (mg/kg)

Manganese (mg/kg)

Iron (mg/kg)

Boron (mg/kg)

Molybdenum (mg/kg)

OM838

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Brown	Brown			
Texture	Clay Loam	Clay			
CEC (meq/100g)	3.6	2.4	3.4	5.3	4.2
pH water	6.8	4.7	4.9	6.7	6.9
pH CaCl ₂	5.6	4.5	4.4	5.7	5.9
Organic C (%)	1.8	0.5			
Nitrate N (mg/kg)	13.0	16.0	15.0	<0.5	<0.5
Ammonium N (mg/kg)	140.0	21.0	3.1	1.2	1.2
Phosphorus Colwell (mg/kg)	14	5			
Phosphorus Buffer Index	42	40			
Sulphate S-KCl (mg/kg)	8.6	6.6			
Potassium (meq/100 g)	1.4	0.2	0.2	0.2	0.2
Calcium (meq/100 g)	1.6	1.2	1.8	3.1	1.6
Magnesium (meq/100 g)	0.6	0.5	0.6	1.9	2.3
Aluminium (meq/100 g)	<0.10	0.4	0.6	<0.10	<0.10
Sodium (meq/100 g)	<0.02	0.1	0.1	0.1	0.1
Chloride (mg/kg)	18	310	120	<10.0	<10.0
Electrical Conductivity (1:5)	0.14	0.28	0.14	0.02	0.02
Electrical Conductivity _{se} (dS/m)	0.78	3.09	1.19	0.12	0.13
Copper (mg/kg)	0.9	0.7			
Zinc (mg/kg)	1.4	0.2			
Manganese (mg/kg)	88	90			
Iron (mg/kg)	160	50			
Boron (mg/kg)	0.5	0.2			
Molybdenum (mg/kg)	<0.01	<0.01			

OM839

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Brown	Brown			
Texture	Clay Loam	Clay			
CEC (meq/100g)	2.8	1.4	4.2	4.4	2.9
pH water	5.8	6.2	6.3	6.6	7.0
pH CaCl ₂	4.9	5.3	5.2	5.5	5.7
Organic C (%)	1.8	0.3			
Nitrate N (mg/kg)	6.9	6.3	1.9	<0.5	<0.5
Ammonium N (mg/kg)	4.6	1.3	1.0	0.7	0.7
Phosphorus Colwell (mg/kg)	9	5			
Phosphorus Buffer Index	29	9			
Sulphate S-KCl (mg/kg)	5.6	2.6			
Potassium (meq/100 g)	0.4	0.1	0.1	0.1	0.1
Calcium (meq/100 g)	1.8	1.0	2.3	2.2	1.0
Magnesium (meq/100 g)	0.6	0.3	1.5	2.0	1.7
Aluminium (meq/100 g)	<0.10	<0.10	0.1	<0.10	<0.10
Sodium (meq/100 g)	0.0	0.0	0.1	0.1	0.1
Chloride (mg/kg)	<10.0	<10.0	<10.0	<10.0	<10.0
Electrical Conductivity (1:5)	0.04	0.03	0.02	0.02	0.02
Electrical Conductivity _{se} (dS/m)	0.27	0.22	0.14	0.13	0.14
Copper (mg/kg)	0.6	0.3			
Zinc (mg/kg)	1.1	0.1			
Manganese (mg/kg)	16	8			
Iron (mg/kg)	210	43			
Boron (mg/kg)	0.3	0.1			
Molybdenum (mg/kg)	<0.01	<0.01			

Percentages of Exchangeable

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
ECaP (Calcium)	45.1%	49.6%	53.6%	58.7%	38.4%
EMgP (Magnesium)	15.5%	21.5%	19.0%	36.0%	55.2%
EKP (Potassium)	39.4%	8.7%	6.5%	3.2%	4.6%
ESP (Sodium)	2.1%	1.8%	1.8%	2.1%	1.9%
EAIP (Aluminium)	0.0%	18.2%	19.0%	0.0%	0.0%

Ca/Mg ratio

K/Mg ratio

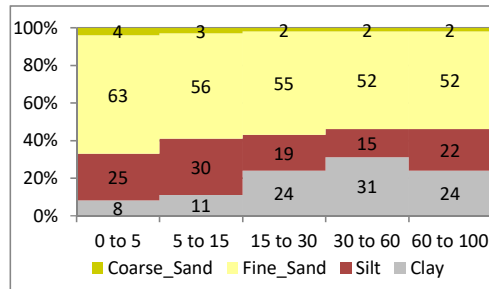
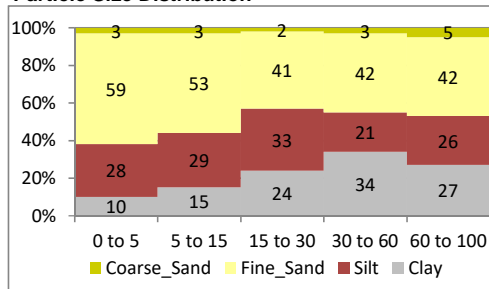
Electrochemical Stability Index

Loveday and Pyle Dispersion

Emerson Class

Ca/Mg ratio	2.9	2.3	2.8	1.6	0.7
K/Mg ratio					
Electrochemical Stability Index		0.14	0.08	0.01	0.01
Loveday and Pyle Dispersion	8	8	6	6	6
Emerson Class	7	8	3	6	3

Particle Size Distribution



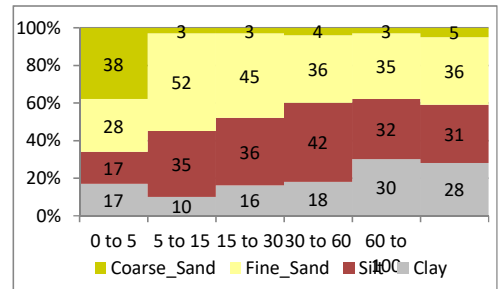
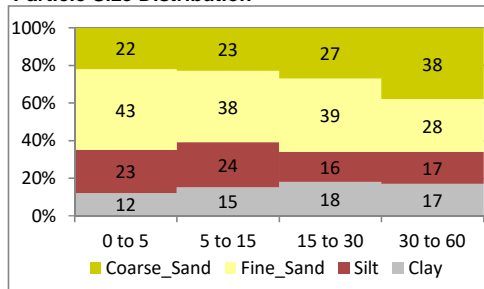
MGP Soil Laboratory Chemical Tests

RATING



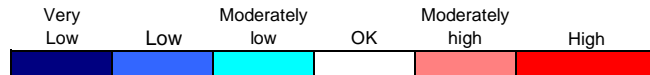
	OM840					OM841				
	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Pit										
Depth (cm)	Grey					Grey				
Colour	Clay Loam					Clay				
Texture	Clay					Clay				
CEC (meq/100g)	4.8	2.7	2.8	3.5	9.0	4.7	2.3	2.2	3.5	3.4
pH water	6.1	6.2	5.5	6.2	6.3	5.6	5.9	5.7	6.0	6.2
pH CaCl ₂	5.2	5.1	4.5	4.4	4.2	4.8	4.7	4.5	4.4	4.5
Organic C (%)	2.2	0.8				2.8	0.6			
Nitrate N (mg/kg)	5.8	3.3	11.0	0.7	<0.5	15.0	1.2	0.8	<0.5	<0.5
Ammonium N (mg/kg)	6.2	4.2	2.2	1.0	0.7	7.5	3.2	1.5	0.9	1.0
Phosphorus Colwell (mg/kg)	11	6				20	8			
Phosphorus Buffer Index	20	42				75	52			
Sulphate S-KCl (mg/kg)	2.9	2.7				5.3	3.2			
Potassium (meq/100 g)	0.3	0.1	0.1	0.1	0.1	0.3	0.1	0.1	0.1	0.1
Calcium (meq/100 g)	3.8	1.9	1.2	1.1	1.8	3.3	1.5	0.9	0.9	0.7
Magnesium (meq/100 g)	0.7	0.5	0.6	1.0	3.4	0.9	0.3	0.6	1.4	1.5
Aluminium (meq/100 g)	0.1	0.1	0.9	1.1	3.4	0.1	0.3	0.6	1.0	0.9
Sodium (meq/100 g)	<0.02	0.0	0.0	0.2	0.3	0.1	0.1	0.1	0.1	0.1
Chloride (mg/kg)	<10.0	<10.0	21	11	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Electrical Conductivity (1:5)	0.04	0.03	0.04	0.02	0.01	0.06	0.02	0.02	0.01	0.01
Electrical Conductivity _{se} (dS/m)	0.27	0.21	0.32	0.16	0.10	0.36	0.15	0.15	0.08	0.09
Copper (mg/kg)	0.4	0.3				1.4	0.9			
Zinc (mg/kg)	0.7	0.1				2.0	0.2			
Manganese (mg/kg)	25	8				58	26			
Iron (mg/kg)	73	34				220	69			
Boron (mg/kg)	0.3	0.1				0.5	0.2			
Molybdenum (mg/kg)	<0.01	<0.01				<0.01	<0.01			
Percentages of Exchangeable (
ECaP (Calcium)	78.5%	71.2%	42.7%	31.9%	20.0%	71.0%	65.5%	42.7%	26.7%	22.0%
EMgP (Magnesium)	13.8%	18.7%	20.6%	29.0%	37.7%	18.7%	14.4%	25.2%	39.8%	44.6%
EKP (Potassium)	5.6%	4.1%	3.9%	2.6%	1.0%	6.7%	3.9%	3.2%	3.7%	3.9%
ESP (Sodium)	0.7%	1.4%	1.4%	4.6%	3.7%	1.1%	3.5%	2.8%	1.4%	2.4%
EAIP (Aluminium)	2.1%	5.2%	31.3%	31.9%	37.7%	2.6%	12.7%	26.1%	28.4%	27.1%
Ca/Mg ratio	5.7	3.8	2.1	1.1	0.5	3.8	4.5	1.7	0.7	0.5
K/Mg ratio										
Electrochemical Stability Index		0.04	0.03	0.00	0.00	0.06	0.01	0.01	0.01	0.00
Loveday and Pyle Dispersion										
Emerson Class	7	8	3	3	3	7	8	2	6	6

Particle Size Distribution



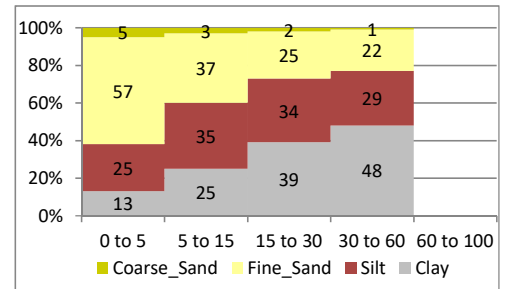
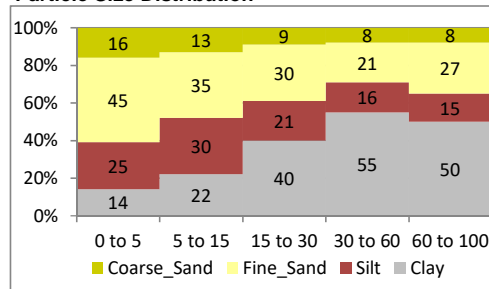
MGP Soil Laboratory Chemical Tests

RATING



	OM842					OM843				
	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	to
Pit										
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	to
Colour	Brown	Brown				Grey	Brown			
Texture	Clay Loam	Clay				Clay Loam	Clay			
CEC (meq/100g)	4.8	3.5	4.5	6.0	6.9	7.8	4.4	5.5	5.7	
pH water	5.9	5.8	5.7	5.9	6.3	5.4	5.1	5.2	5.5	
pH CaCl ₂	5.0	4.8	4.5	4.5	4.7	4.8	4.3	4.2	4.3	
Organic C (%)	2.7	1.2				4.8	1.0			
Nitrate N (mg/kg)	7.0	5.6	2.2	1.0	2.1	58.0	14.0	8.4	4.8	
Ammonium N (mg/kg)	3.1	1.5	1.0	<0.6	0.8	7.4	1.7	1.5	0.9	
Phosphorus Colwell (mg/kg)	13	6				38	<5			
Phosphorus Buffer Index	59	64				71	140			
Sulphate S-KCl (mg/kg)	4.4	3.2				11.0	3.3			
Potassium (meq/100 g)	0.5	0.3	0.4	0.3	0.2	0.8	0.2	0.2	0.2	
Calcium (meq/100 g)	3.2	1.8	0.7	0.1	0.0	5.4	1.1	0.7	0.3	
Magnesium (meq/100 g)	1.0	0.8	1.5	3.5	5.8	1.5	0.5	0.7	1.2	
Aluminium (meq/100 g)	0.1	0.5	1.9	1.9	0.5	0.1	2.6	3.8	4.0	
Sodium (meq/100 g)	<0.02	0.1	0.1	0.1	0.4	0.0	0.1	0.1	0.1	
Chloride (mg/kg)	<10.0	<10.0	<10.0	15	12	22	12	<10.0	<10.0	
Electrical Conductivity (1:5)	0.04	0.04	0.02	0.02	0.02	0.17	0.05	0.03	0.02	
Electrical Conductivity _{se} (dS/m)	0.25	0.23	0.12	0.12	0.11	0.91	0.27	0.16	0.11	
Copper (mg/kg)	0.3	0.4				0.5	0.6			
Zinc (mg/kg)	0.7	0.2				1.8	0.3			
Manganese (mg/kg)	6	1				29	2			
Iron (mg/kg)	150	190				150	330			
Boron (mg/kg)	0.4	0.3				0.7	0.3			
Molybdenum (mg/kg)	<0.01	<0.01				<0.01	<0.01			
Percentages of Exchangeable ()										
ECaP (Calcium)	67.4%	52.2%	15.3%	1.7%	0.4%	69.1%	24.9%	12.1%	5.1%	
EMgP (Magnesium)	20.6%	23.8%	33.2%	58.5%	83.7%	19.2%	11.3%	13.4%	21.0%	
EKP (Potassium)	9.7%	7.5%	8.2%	5.7%	2.6%	9.6%	3.6%	3.9%	2.6%	
ESP (Sodium)		1.4%	1.3%	2.3%	5.6%		1.1%	0.9%	1.4%	
EAIP (Aluminium)	2.3%	15.1%	42.0%	31.8%	7.6%	1.5%	59.0%	69.7%	69.9%	
Ca/Mg ratio	3.3	2.2	0.5	0.0	0.0	3.6	2.2	0.9	0.2	
K/Mg ratio										
Electrochemical Stability Index		0.03	0.02	0.01	0.00	0.33	0.04	0.03	0.01	
Loveday and Pyle Dispersion										
Emerson Class	7	7	6	6	6	7	7	6	6	

Particle Size Distribution



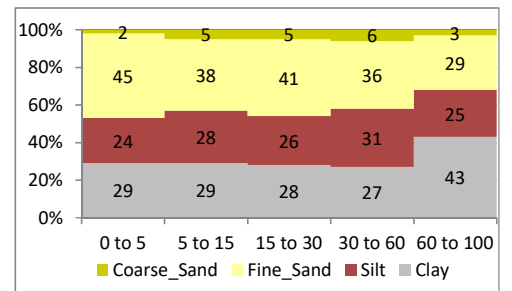
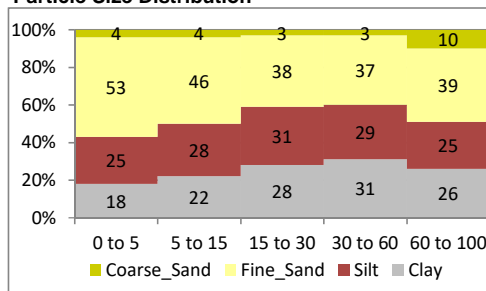
MGP Soil Laboratory Chemical Tests

RATING



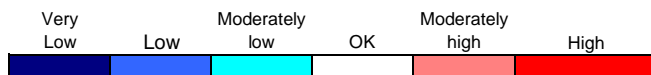
	OM844					OM845				
	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Pit										
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Grey	Grey				Brown	Grey			
Texture	Clay	Clay				Clay	Clay			
CEC (meq/100g)	10.3	9.6	11.4	13.4	11.8	14.6	12.0	9.8	7.0	28.8
pH water	5.6	5.4	6.0	6.5	6.7	5.6	6.4	6.4	6.9	8.0
pH CaCl ₂	4.9	4.9	5.3	5.6	6.0	5.1	5.5	5.6	5.8	6.7
Organic C (%)	3.5	2.1				4.4	1.6			
Nitrate N (mg/kg)	16.0	59.0	29.0	9.3	1.2	53.0	6.6	7.5	1.8	<0.5
Ammonium N (mg/kg)	3.9	17.0	9.6	1.7	1.5	8.4	2.6	2.6	1.3	1.7
Phosphorus Colwell (mg/kg)	27	13				60	15			
Phosphorus Buffer Index	42	46				130	100			
Sulphate S-KCl (mg/kg)	9.1	28.0				16.0	5.6			
Potassium (meq/100 g)	0.5	0.5	0.3	0.2	0.2	0.6	0.6	0.3	0.1	0.5
Calcium (meq/100 g)	7.1	6.8	8.6	9.9	8.1	8.0	6.7	5.6	3.2	8.8
Magnesium (meq/100 g)	2.6	2.0	2.3	3.0	3.1	5.7	4.5	3.7	3.5	19.0
Aluminium (meq/100 g)	<0.10	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium (meq/100 g)	0.2	0.1	0.2	0.3	0.4	0.3	0.2	0.2	0.2	0.5
Chloride (mg/kg)	24	86	36	14	<10.0	62	20	30	16	11
Electrical Conductivity (1:5)	0.11	0.25	0.13	0.07	0.12	0.22	0.08	0.07	0.04	0.05
Electrical Conductivity _{se} (dS/m)	0.63	1.57	0.71	0.34	0.51	1.20	0.42	0.44	0.25	0.23
Copper (mg/kg)	3.4	3.4				6.3	5.9			
Zinc (mg/kg)	2.8	1.8				1.3	0.5			
Manganese (mg/kg)	29	77				52	29			
Iron (mg/kg)	260	190				430	160			
Boron (mg/kg)	0.5	0.4				0.4	0.3			
Molybdenum (mg/kg)	<0.01	<0.01				<0.01	<0.01			
Percentages of Exchangeable ()										
ECaP (Calcium)	68.8%	71.2%	75.4%	74.1%	68.6%	54.9%	56.0%	57.3%	45.7%	30.5%
EMgP (Magnesium)	25.2%	20.9%	20.2%	22.5%	26.3%	39.1%	37.6%	37.8%	50.0%	65.9%
EKP (Potassium)	4.4%	5.2%	2.8%	1.5%	1.5%	4.1%	4.6%	3.1%	2.0%	1.7%
ESP (Sodium)	1.6%	1.5%	1.6%	1.9%	3.6%	1.9%	1.8%	1.8%	2.3%	1.8%
EAIP (Aluminium)	0.0%	1.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Ca/Mg ratio	2.7	3.4	3.7	3.3	2.6	1.4	1.5	1.5	0.9	0.5
K/Mg ratio										
Electrochemical Stability Index	0.07	0.17	0.08	0.04	0.03	0.12	0.05	0.04	0.02	0.03
Loveday and Pyle Dispersion										
Emerson Class	7	7	7	3	3	7	8	8	3	8

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



Pit

Depth (cm)

Colour

Texture

CEC (meq/100g)

pH water

pH CaCl₂

Organic C (%)

Nitrate N (mg/kg)

Ammonium N (mg/kg)

Phosphorus Colwell (mg/kg)

Phosphorus Buffer Index

Sulphate S-KCl (mg/kg)

Potassium (meq/100 g)

Calcium (meq/100 g)

Magnesium (meq/100 g)

Aluminium (meq/100 g)

Sodium (meq/100 g)

Chloride (mg/kg)

Electrical Conductivity (1:5)

Electrical Conductivity_{se} (dS/m)

Copper (mg/kg)

Zinc (mg/kg)

Manganese (mg/kg)

Iron (mg/kg)

Boron (mg/kg)

Molybdenum (mg/kg)

Percentages of Exchangeable (

ECaP (Calcium)

EMgP (Magnesium)

EKP (Potassium)

ESP (Sodium)

EAIP (Aluminium)

Ca/Mg ratio

K/Mg ratio

Electrochemical Stability Index

Loveday and Pyle Dispersion

Emerson Class

OM846

0 to 5 5 to 15 15 to 30 30 to 60 60 to 100

Brown Brown

Clay Clay

9.7 10.0 9.4 12.0 13.8

6.1 6.2 6.6 6.9 7.2

5.4 5.4 5.7 5.7 5.9

2.7 1.6

8.1 6.6 3.6 2.3 1.0

4.2 2.9 2.1 1.9 2.2

16 8

53 54

5.8 5.3

0.4 0.3 0.2 0.2 0.3

6.3 6.7 6.2 7.8 8.2

2.9 2.9 2.9 3.9 5.2

<0.10 <0.10 <0.10 <0.10 <0.10

0.1 0.1 0.1 0.1 0.2

40 44 11 <10.0 <10.0

0.09 0.08 0.04 0.03 0.03

0.64 0.59 0.23 0.18 0.17

3.6 3.4

1.6 1.0

26 24

260 150

0.4 0.3

<0.01 <0.01

64.7% 67.3% 66.1% 64.9% 59.3%

29.8% 29.1% 30.9% 32.5% 37.6%

4.2% 2.5% 2.1% 1.7% 1.9%

1.2% 1.1% 0.9% 0.8% 1.2%

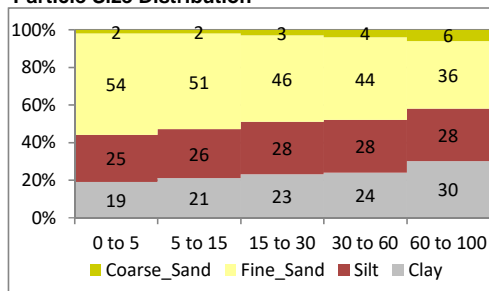
0.0% 0.0% 0.0% 0.0% 0.0%

2.2 2.3 2.1 2.0 1.6

0.07 0.07 0.05 0.04 0.03

7 7 7 8 2

Particle Size Distribution



OM947

0 to 5 5 to 15 15 to 30 30 to 60 60 to 100

Brown Brown

Clay Loam Clay Loam

2.5 2.9 5.0 6.4 6.7

5.2 5.1 5.6 6.3 6.4

4.4 4.4 4.7 5.3 5.4

1.0 0.6

26.0 30.0 15.0 4.5 1.4

2.8 1.0 <0.6 <0.6 <0.6

5 <5

56 57

5.2 3.0

0.6 0.4 0.4 0.2 0.2

0.9 1.2 2.8 3.7 3.0

0.5 0.7 1.5 2.4 3.4

0.5 0.5 0.2 <0.10 <0.10

0.0 0.1 0.1 0.1 0.1

<10.0 22 12 <10.0 <10.0

0.08 0.09 0.05 0.03 0.02

1.1 1.3

0.5 0.2

72 120

110 50

0.3 0.2

<0.01 <0.01

35.4% 41.8% 56.6% 57.8% 44.9%

21.3% 24.7% 30.3% 37.5% 50.9%

24.0% 14.3% 8.1% 3.6% 3.1%

1.2% 2.1% 1.4% 1.1% 1.0%

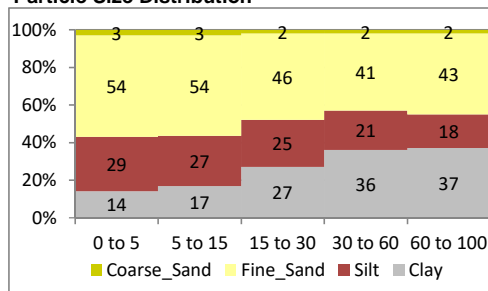
18.1% 17.1% 3.6% 0.0% 0.0%

1.7 1.7 1.9 1.5 0.9

0.07 0.04 0.04 0.03 0.02

7 8 6 6 6

Particle Size Distribution

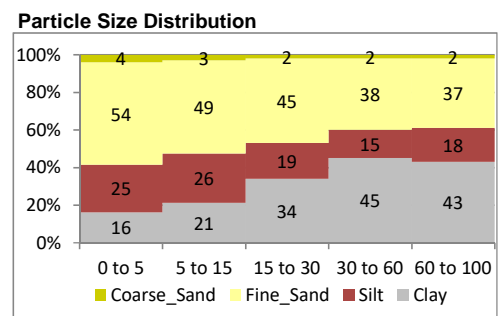
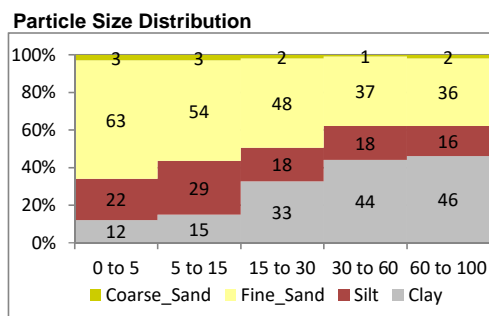


MGP Soil Laboratory Chemical Tests

RATING



	OM948					OM949				
	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Pit										
Depth (cm)	Brown					Brown				
Colour	Brown					Brown				
Texture	Clay Loam Clay Loam					Clay Loam Clay Loam				
CEC (meq/100g)	3.3	2.9	5.7	7.6	7.3	4.0	4.1	6.3	8.2	8.0
pH water	5.4	5.3	6.0	6.7	6.5	5.3	5.4	6.0	6.8	6.8
pH CaCl ₂	4.5	4.5	4.9	5.7	5.5	4.5	4.5	5.0	5.7	5.8
Organic C (%)	1.8	0.8				1.2	0.7			
Nitrate N (mg/kg)	19.0	19.0	5.6	<0.5	<0.5	37.0	22.0	5.4	<0.5	<0.5
Ammonium N (mg/kg)	2.4	0.9	1.0	0.7	<0.6	1.5	0.6	<0.6	<0.6	<0.6
Phosphorus Colwell (mg/kg)	8	<5				5	<5			
Phosphorus Buffer Index	55	49				57	65			
Sulphate S-KCl (mg/kg)	2.9	3.1				5.9	2.2			
Potassium (meq/100 g)	0.5	0.3	0.2	0.2	0.2	0.8	0.6	0.5	0.2	0.2
Calcium (meq/100 g)	1.8	1.5	3.5	4.2	2.8	2.2	2.4	4.4	5.5	4.7
Magnesium (meq/100 g)	0.9	0.8	1.9	3.1	4.1	0.7	0.9	1.4	2.4	3.0
Aluminium (meq/100 g)	0.2	0.3	<0.10	<0.10	<0.10	0.3	0.3	<0.10	<0.10	<0.10
Sodium (meq/100 g)	0.0	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1
Chloride (mg/kg)	<10.0	11	14	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Electrical Conductivity (1:5)	0.07	0.06	0.04	0.02	0.03	0.11	0.07	0.04	0.02	0.02
Electrical Conductivity _{se} (dS/m)										
Copper (mg/kg)	1.0	1.0				2.5	2.5			
Zinc (mg/kg)	1.4	0.3				0.4	0.2			
Manganese (mg/kg)	53	44				94	97			
Iron (mg/kg)	130	85				100	46			
Boron (mg/kg)	0.4	0.3				0.5	0.3			
Molybdenum (mg/kg)	<0.01	<0.01				<0.01	<0.01			
Percentages of Exchangeable (
ECaP (Calcium)	54.2%	51.2%	61.2%	55.2%	38.5%	55.0%	58.3%	69.4%	66.7%	58.8%
EMgP (Magnesium)	25.6%	28.3%	33.2%	40.7%	56.4%	16.8%	20.9%	22.1%	29.1%	37.5%
EKP (Potassium)	14.2%	8.9%	4.2%	2.5%	3.2%	21.0%	13.3%	7.6%	2.9%	2.8%
ESP (Sodium)	0.9%	1.7%	1.4%	1.6%	1.9%	1.0%	1.2%	0.9%	1.2%	1.0%
EAIP (Aluminium)	5.1%	9.9%	0.0%	0.0%	0.0%	6.3%	6.3%	0.0%	0.0%	0.0%
Ca/Mg ratio	2.1	1.8	1.8	1.4	0.7	3.3	2.8	3.1	2.3	1.6
K/Mg ratio										
Electrochemical Stability Index	0.08	0.04	0.03	0.01	0.02	0.11	0.06	0.04	0.02	0.02
Loveday and Pyle Dispersion										
Emerson Class	7	3	8	6	2	8	8	6	6	6



MGP Soil Laboratory Chemical Tests

RATING



Pit

Depth (cm)

Colour

Texture

CEC (meq/100g)

pH water

pH CaCl₂

Organic C (%)

Nitrate N (mg/kg)

Ammonium N (mg/kg)

Phosphorus Colwell (mg/kg)

Phosphorus Buffer Index

Sulphate S-KCl (mg/kg)

Potassium (meq/100 g)

Calcium (meq/100 g)

Magnesium (meq/100 g)

Aluminium (meq/100 g)

Sodium (meq/100 g)

Chloride (mg/kg)

Electrical Conductivity (1:5)

Electrical Conductivity_{se} (dS/m)

Copper (mg/kg)

Zinc (mg/kg)

Manganese (mg/kg)

Iron (mg/kg)

Boron (mg/kg)

Molybdenum (mg/kg)

Percentages of Exchangeable ()

ECaP (Calcium)

EMgP (Magnesium)

EKP (Potassium)

ESP (Sodium)

EAIP (Aluminium)

Ca/Mg ratio

K/Mg ratio

Electrochemical Stability Index

Loveday and Pyle Dispersion

Emerson Class

OM950

0 to 5 5 to 15 15 to 30 30 to 60 60 to 100

Brown Brown

Clay Loam Clay Loam

2.8 2.4 4.9 5.6 5.7

4.7 4.8 5.3 6.0 6.3

4.1 4.2 4.4 5.1 5.2

1.5 0.6

42.0 29.0 20.0 3.3 1.6

3.0 <0.6 <0.6 1.1 0.8

6 <5

50 43

7.7 3.1

0.3 0.2 0.3 0.2 0.2

1.1 0.9 2.5 3.2 2.0

0.6 0.6 1.3 2.1 3.5

0.8 0.8 0.7 <0.10 <0.10

0.0 0.0 0.1 0.1 0.1

<10.0 <10.0 13 <10.0 <10.0

0.11 0.08 0.06 0.03 0.02

0.8 0.6

0.5 0.1

22 17

210 100

0.3 0.2

<0.01 <0.01

OM951

0 to 5 5 to 15 15 to 30 30 to 60 60 to 100

Grey Grey

Clay Loam Clay Loam

2.4 2.5 3.2 6.8 4.5

5.2 5.4 5.4 6.3 6.6

4.4 4.4 4.5 5.3 5.6

1.0 0.7

36.0 17.0 11.0 2.0 1.3

4.0 1.3 1.7 0.7 0.6

6 <5

44 43

5.2 2.0

0.5 0.3 0.3 0.2 0.1

0.9 1.1 1.7 3.9 2.1

0.6 0.6 0.9 2.6 2.2

0.3 0.3 0.3 <0.10 <0.10

0.1 0.1 0.1 0.1 0.1

35 37 44 28 <10.0

0.11 0.07 0.06 0.04 0.02

1.0 1.0

0.5 0.3

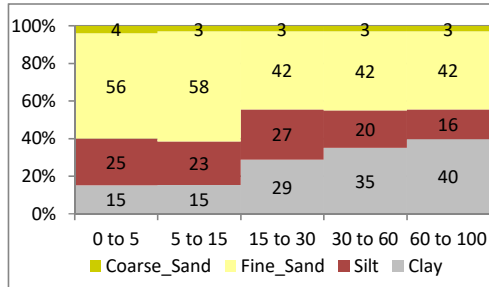
43 43

120 87

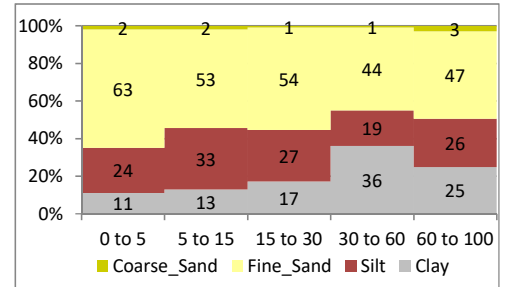
0.2 0.2

<0.01 <0.01

Particle Size Distribution



Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



Pit

Depth (cm)

Colour

Texture

CEC (meq/100g)

pH water

pH CaCl₂

Organic C (%)

Nitrate N (mg/kg)

Ammonium N (mg/kg)

Phosphorus Colwell (mg/kg)

Phosphorus Buffer Index

Sulphate S-KCl (mg/kg)

Potassium (meq/100 g)

Calcium (meq/100 g)

Magnesium (meq/100 g)

Aluminium (meq/100 g)

Sodium (meq/100 g)

Chloride (mg/kg)

Electrical Conductivity (1:5)

Electrical Conductivity_{se} (dS/m)

Copper (mg/kg)

Zinc (mg/kg)

Manganese (mg/kg)

Iron (mg/kg)

Boron (mg/kg)

Molybdenum (mg/kg)

OM952

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Brown	Grey			
Texture	Clay Loam	Clay			
CEC (meq/100g)	6.4	4.0	3.1	6.5	8.4
pH water	6.1	6.1	5.9	6.5	7.0
pH CaCl ₂	5.2	5.0	4.4	4.6	5.3
Organic C (%)	2.5	1.0			
Nitrate N (mg/kg)	<0.5	<0.5	<0.5	0.7	<0.5
Ammonium N (mg/kg)	4.4	2.3	0.7	1.1	0.8
Phosphorus Colwell (mg/kg)	7	10			
Phosphorus Buffer Index	67	76			
Sulphate S-KCl (mg/kg)	3.5	2.7			
Potassium (meq/100 g)	0.2	0.1	0.1	0.1	0.2
Calcium (meq/100 g)	5.1	2.8	1.0	0.8	0.9
Magnesium (meq/100 g)	1.1	0.9	1.3	4.7	6.6
Aluminium (meq/100 g)	<0.10	0.2	0.6	0.6	0.1
Sodium (meq/100 g)	0.0	0.1	0.1	0.4	0.6
Chloride (mg/kg)	<10.0	<10.0	<10.0	<10.0	<10.0
Electrical Conductivity (1:5)	0.04	0.03	0.01	0.02	0.03
Electrical Conductivity _{se} (dS/m)	0.26	0.16	0.10	0.13	0.16
Copper (mg/kg)	0.7	0.6			
Zinc (mg/kg)	0.7	0.2			
Manganese (mg/kg)	19	10			
Iron (mg/kg)	190	120			
Boron (mg/kg)	0.3	0.2			
Molybdenum (mg/kg)	<0.01	<0.01			

OM953

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Brown	Orange/Y			
Texture	Clay Loam	Clay			
CEC (meq/100g)	9.8	4.4	4.2	4.5	4.8
pH water	6.1	5.7	5.5	5.5	5.6
pH CaCl ₂	5.3	4.6	4.4	4.3	4.4
Organic C (%)	3.7	1.1			
Nitrate N (mg/kg)	<0.5	<0.5	<0.5	<0.5	0.9
Ammonium N (mg/kg)	5.5	1.8	1.2	2.2	1.4
Phosphorus Colwell (mg/kg)	8	<5			
Phosphorus Buffer Index	76	100			
Sulphate S-KCl (mg/kg)	6.9	1.1			
Potassium (meq/100 g)	0.3	0.1	0.1	0.1	0.1
Calcium (meq/100 g)	7.7	2.7	1.7	0.6	0.3
Magnesium (meq/100 g)	1.6	0.8	1.0	1.4	3.2
Aluminium (meq/100 g)	0.1	0.8	1.4	2.4	1.2
Sodium (meq/100 g)	0.1	0.0	<0.02	<0.02	0.0
Chloride (mg/kg)	11	<10.0	<10.0	<10.0	<10.0
Electrical Conductivity (1:5)	0.06	0.02	0.02	0.01	0.01
Electrical Conductivity _{se} (dS/m)	0.34	0.15	0.13	0.08	0.09
Copper (mg/kg)	0.7	0.6			
Zinc (mg/kg)	2.9	0.4			
Manganese (mg/kg)	26	7			
Iron (mg/kg)	150	100			
Boron (mg/kg)	0.5	0.2			
Molybdenum (mg/kg)	<0.01	<0.01			

Percentages of Exchangeable I

ECaP (Calcium)	79.8%	70.4%	32.6%	11.8%	10.8%	78.7%	60.9%	40.9%	13.5%	6.8%
EMgP (Magnesium)	17.2%	21.9%	42.3%	72.2%	78.7%	16.3%	18.7%	24.0%	31.4%	66.4%
EKP (Potassium)	2.3%	2.0%	2.0%	1.7%	1.8%	3.0%	1.6%	1.4%	1.3%	1.0%
ESP (Sodium)	0.6%	2.0%	3.3%	5.5%	7.0%	0.7%	0.7%			0.8%
EAIP (Aluminium)	0.0%	3.8%	19.9%	8.8%	1.7%	1.3%	18.1%	33.7%	53.8%	24.9%

Ca/Mg ratio

K/Mg ratio

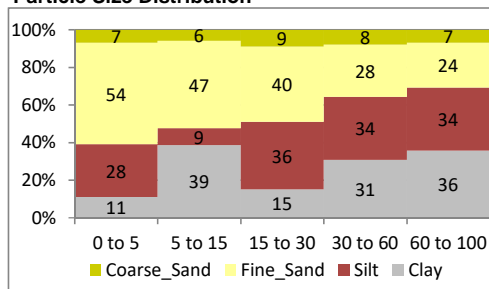
Electrochemical Stability Index

Loveday and Pyle Dispersion

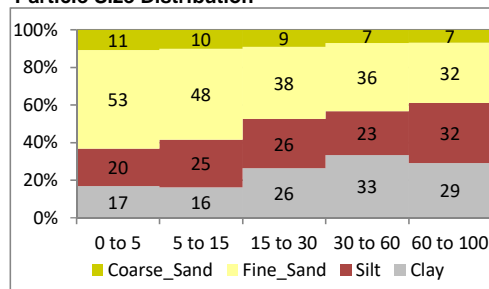
Emerson Class

Ca/Mg ratio	4.6	3.2	0.8	0.2	0.1	4.8	3.3	1.7	0.4	0.1
K/Mg ratio										
Electrochemical Stability Index	0.06	0.01	0.00	0.00	0.00	0.08	0.03			0.01
Loveday and Pyle Dispersion	7	7	3	3	2	7	8	3	6	2

Particle Size Distribution



Particle Size Distribution

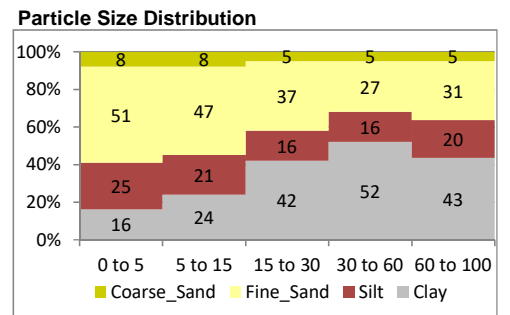
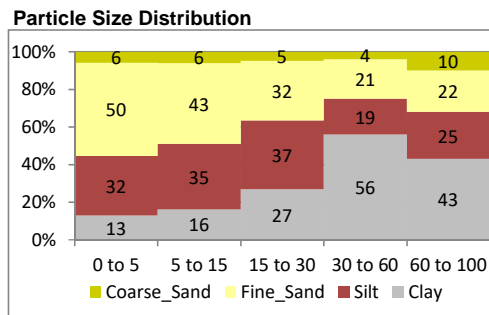


MGP Soil Laboratory Chemical Tests

RATING



Pit	OM954					OM955				
	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Brown	Brown				Brown	Orange/Y			
Texture	Clay Loam	Clay				Clay	Clay			
CEC (meq/100g)	4.7	4.9	4.6	7.2	6.0	10.9	4.3	4.7	5.3	4.5
pH water	5.4	5.4	5.3	5.2	5.2	6.8	5.5	5.1	5.1	5.4
pH CaCl ₂	4.7	4.6	4.3	4.3	4.3	6.0	4.6	4.2	4.2	4.3
Organic C (%)	3.1	1.9				2.3	1.3			
Nitrate N (mg/kg)	19.0	8.0	2.2	3.1	4.8	4.8	4.6	6.3	4.2	2.0
Ammonium N (mg/kg)	3.9	2.9	1.9	1.1	2.0	1.6	1.5	2.2	1.9	0.9
Phosphorus Colwell (mg/kg)	11	12				<5	<5			
Phosphorus Buffer Index	110	120				83	130			
Sulphate S-KCl (mg/kg)	5.6	3.6				3.2	3.5			
Potassium (meq/100 g)	0.2	0.2	0.3	0.3	0.2	0.2	0.1	0.2	0.2	0.1
Calcium (meq/100 g)	3.4	3.0	1.8	1.7	0.5	7.9	2.4	1.2	0.7	0.2
Magnesium (meq/100 g)	0.8	0.8	0.7	2.2	2.7	2.8	1.0	0.7	1.3	2.2
Aluminium (meq/100 g)	0.3	0.8	1.8	2.9	2.6	<0.10	0.8	2.6	3.1	2.0
Sodium (meq/100 g)	0.0	0.1	0.0	0.0	0.0	<0.02	<0.02	<0.02	<0.02	0.0
Chloride (mg/kg)	17	11	<10.0	<10.0	12	<10.0	<10.0	<10.0	<10.0	<10.0
Electrical Conductivity (1:5)	0.08	0.06	0.03	0.03	0.02	0.06	0.03	0.03	0.02	0.01
Electrical Conductivity _{se} (dS/m)	0.49	0.34	0.18	0.14	0.12	0.33	0.18	0.15	0.11	0.07
Copper (mg/kg)	0.6	0.6				0.4	0.6			
Zinc (mg/kg)	1.2	0.5				0.4	0.4			
Manganese (mg/kg)	18	9				3	1			
Iron (mg/kg)	210	220				110	280			
Boron (mg/kg)	0.5	0.3				0.3	0.2			
Molybdenum (mg/kg)	<0.01	<0.01				<0.01	<0.01			
Percentages of Exchangeable (
ECaP (Calcium)	71.9%	61.6%	39.3%	23.7%	7.8%	72.5%	56.2%	25.5%	13.0%	4.4%
EMgP (Magnesium)	17.8%	15.8%	14.6%	30.7%	44.8%	25.7%	23.4%	15.7%	24.8%	48.5%
EKP (Potassium)	4.2%	4.5%	6.1%	4.6%	3.8%	1.7%	2.6%	3.4%	3.2%	2.4%
ESP (Sodium)	0.6%	1.0%	0.7%	0.4%	0.5%					0.7%
EAIP (Aluminium)	5.5%	17.0%	39.3%	40.5%	43.1%	0.0%	17.8%	55.3%	59.0%	44.1%
Ca/Mg ratio	4.0	3.9	2.7	0.8	0.2	2.8	2.4	1.6	0.5	0.1
K/Mg ratio										
Electrochemical Stability Index	0.13	0.06	0.05	0.07	0.04					0.02
Loveday and Pyle Dispersion										
Emerson Class	7	7	8	6	6	7	8	8	6	6



MGP Soil Laboratory Chemical Tests

RATING



Pit

Depth (cm)

Colour

Texture

CEC (meq/100g)

pH water

pH CaCl₂

Organic C (%)

Nitrate N (mg/kg)

Ammonium N (mg/kg)

Phosphorus Colwell (mg/kg)

Phosphorus Buffer Index

Sulphate S-KCl (mg/kg)

Potassium (meq/100 g)

Calcium (meq/100 g)

Magnesium (meq/100 g)

Aluminium (meq/100 g)

Sodium (meq/100 g)

Chloride (mg/kg)

Electrical Conductivity (1:5)

Electrical Conductivity_{se} (dS/m)

Copper (mg/kg)

Zinc (mg/kg)

Manganese (mg/kg)

Iron (mg/kg)

Boron (mg/kg)

Molybdenum (mg/kg)

OM956

0 to 5 5 to 15 15 to 30 30 to 60 60 to 100

Brown Brown

Clay Loam Clay

4.4 4.1 4.5 6.0 6.0

5.3 5.4 5.3 5.5 5.6

4.7 4.6 4.3 4.4 4.4

2.1 1.2

35.0 27.0 9.3 4.2 3.7

3.2 2.8 1.6 0.6 0.8

8 <5

98 88

6.1 2.5

0.2 0.2 0.2 0.4 0.3

3.3 2.7 1.3 1.1 0.3

0.5 0.8 1.6 3.2 4.0

0.3 0.4 1.4 1.3 1.2

<0.02 0.0 0.1 0.1 0.2

<10.0 <10.0 <10.0 <10.0 <10.0

0.09 0.07 0.04 0.03 0.02

0.48 0.37 0.21 0.15 0.11

0.7 0.6

0.5 0.4

8 6

260 290

0.2 0.2

<0.01 <0.01

OM957

0 to 5 5 to 15 15 to 30 30 to 60 60 to 100

Grey Brown

Clay Loam Clay

4.0 3.4 4.1 5.6 5.9

5.5 5.3 5.4 5.4 5.6

4.6 4.2 4.2 4.3 4.3

2.1 1.0

1.7 <0.5 <0.5 0.7 1.4

6.7 2.8 2.0 1.8 0.9

7 <5

110 120

3.8 2.1

0.1 0.1 0.1 0.1 0.2

2.5 1.3 1.3 1.3 0.9

0.9 0.6 1.2 2.5 3.3

0.4 1.4 1.4 1.6 1.5

0.1 0.1 0.1 0.0 0.1

<10.0 <10.0 <10.0 <10.0 <10.0

0.04 0.02 0.02 0.02 0.01

0.27 0.16 0.14 0.12 0.08

1.2 1.0

2.0 0.7

54 58

240 160

0.3 0.2

<0.01 <0.01

Percentages of Exchangeable (

ECaP (Calcium)

EMgP (Magnesium)

EKP (Potassium)

ESP (Sodium)

EAIP (Aluminium)

75.9% 66.2% 28.6% 18.2% 5.4%

12.0% 18.6% 35.2% 53.0% 67.1%

5.5% 3.7% 4.2% 6.0% 4.9%

0.7% 1.1% 1.3% 2.5%

6.7% 10.8% 30.8% 21.5% 20.1%

62.3% 38.1% 32.1% 23.3% 14.4%

22.9% 16.7% 29.6% 44.9% 55.9%

3.0% 2.3% 2.2% 2.5% 2.5%

1.5% 1.8% 1.5% 0.5% 1.7%

10.2% 41.1% 34.6% 28.7% 25.4%

Ca/Mg ratio

K/Mg ratio

6.3 3.6 0.8 0.3 0.1

2.7 2.3 1.1 0.5 0.3

Electrochemical Stability Index

Loveday and Pyle Dispersion

Emerson Class

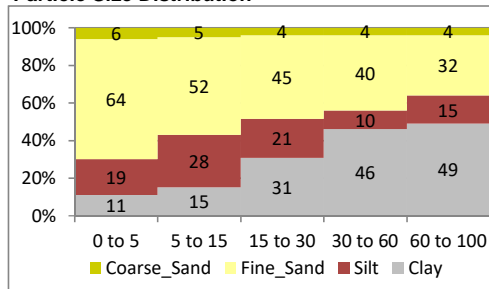
0.10 0.04 0.02 0.01

0.03 0.01 0.01 0.04 0.01

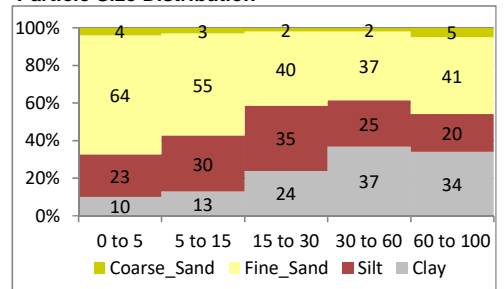
7 3 6 6 6

7 8 8 8 6

Particle Size Distribution



Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



Pit

Depth (cm)

Colour

Texture

CEC (meq/100g)

pH water

pH CaCl₂

Organic C (%)

Nitrate N (mg/kg)

Ammonium N (mg/kg)

Phosphorus Colwell (mg/kg)

Phosphorus Buffer Index

Sulphate S-KCl (mg/kg)

Potassium (meq/100 g)

Calcium (meq/100 g)

Magnesium (meq/100 g)

Aluminium (meq/100 g)

Sodium (meq/100 g)

Chloride (mg/kg)

Electrical Conductivity (1:5)

Electrical Conductivity_{se} (dS/m)

Copper (mg/kg)

Zinc (mg/kg)

Manganese (mg/kg)

Iron (mg/kg)

Boron (mg/kg)

Molybdenum (mg/kg)

OM958

0 to 5 5 to 15 15 to 30 30 to 60 60 to 100

Brown Brown Brown Brown Brown

Clay Loam Clay Loam Clay Loam Clay Loam Clay

9.3 9.1 7.4 6.3 11.2

6.0 5.9 5.9 5.9 6.6

5.0 4.9 4.7 4.7 5.3

1.7 1.3

7.2 4.8 2.0 0.8 1.4

3.2 2.1 1.9 1.2 1.3

13 9

69 74

8.3 4.9

0.1 0.1 0.1 0.1 0.2

6.9 6.6 4.8 3.3 4.5

2.1 2.2 2.2 2.5 5.9

<0.10 <0.10 0.2 0.3 <0.10

0.2 0.1 0.1 0.1 0.6

17 <10.0 <10.0 <10.0 20

0.07 0.05 0.03 0.03 0.06

0.42 0.28 0.18 0.19 0.31

0.7 0.7

0.3 0.2

13 11

210 160

0.2 0.2

<0.01 <0.01

OM959

0 to 5 5 to 15 15 to 30 30 to 60 60 to 100

Brown Brown Brown Brown Orange/Y

Clay Loam Clay Loam Clay Loam Clay Loam Clay

3.7 3.4 2.3 6.0 10.0

5.1 5.7 6.8 6.9 6.6

4.3 4.9 5.9 5.9 5.6

2.5 1.0

25.0 32.0 4.8 1.7 0.6

7.2 3.0 0.8 1.1 1.1

25 8

73 51

8.2 4.4

0.1 0.0 0.0 0.1 0.2

2.4 2.7 1.9 4.0 3.7

0.8 0.6 0.4 1.8 5.8

0.4 <0.10 <0.10 <0.10 <0.10

0.1 0.1 <0.02 0.1 0.3

<10.0 20 11 25 <10.0

0.08 0.09 0.03 0.04 0.04

0.47 0.58 0.24 0.31 0.19

0.5 0.4

2.2 0.6

94 49

300 110

0.2 0.2

<0.01 <0.01

Percentages of Exchangeable (

ECaP (Calcium)

74.1% 72.9% 65.1% 52.5% 40.1%

64.2% 78.5% 82.3% 67.2% 37.1%

EMgP (Magnesium)

22.6% 24.3% 29.9% 39.8% 52.6%

20.9% 17.4% 16.9% 30.3% 58.2%

EKP (Potassium)

1.2% 1.2% 1.4% 1.6% 1.6%

3.7% 0.9% 0.9% 1.3% 1.9%

ESP (Sodium)

2.1% 1.5% 1.1% 2.1% 5.6%

1.3% 3.2% 0.0% 1.2% 2.7%

EAIP (Aluminium)

0.0% 0.0% 2.6% 4.0% 0.0%

9.9% 0.0% 0.0% 0.0% 0.0%

Ca/Mg ratio

3.3 3.0 2.2 1.3 0.8

3.1 4.5 4.9 2.2 0.6

K/Mg ratio

Electrochemical Stability Index

0.03 0.03 0.03 0.01 0.01

0.06 0.03 0.03 0.01

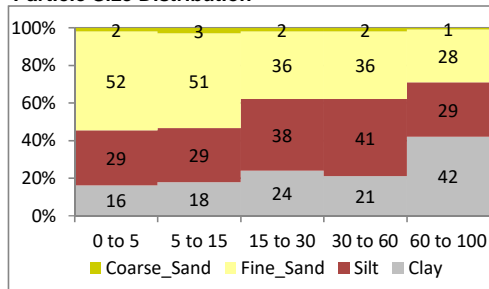
Loveday and Pyle Dispersion

Emerson Class

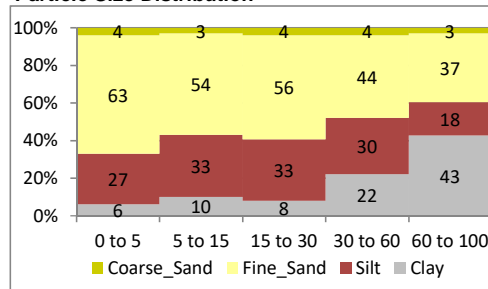
7 8 8 3 6

7 7 3 3 6

Particle Size Distribution

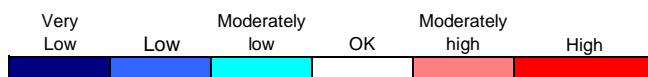


Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



Pit

Depth (cm)

Colour

Texture

CEC (meq/100g)

pH water

pH CaCl₂

Organic C (%)

Nitrate N (mg/kg)

Ammonium N (mg/kg)

Phosphorus Colwell (mg/kg)

Phosphorus Buffer Index

Sulphate S-KCl (mg/kg)

Potassium (meq/100 g)

Calcium (meq/100 g)

Magnesium (meq/100 g)

Aluminium (meq/100 g)

Sodium (meq/100 g)

Chloride (mg/kg)

Electrical Conductivity (1:5)

Electrical Conductivity_{se} (dS/m)

Copper (mg/kg)

Zinc (mg/kg)

Manganese (mg/kg)

Iron (mg/kg)

Boron (mg/kg)

Molybdenum (mg/kg)

OM960

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Brown	Brown	Brown	Orange/Y	Orange/Y
Texture	Clay Loam	Clay Loam	Clay Loam	Clay Loam	Clay
CEC (meq/100g)	3.5	2.4	2.1	4.5	7.6
pH water	5.0	4.9	5.0	5.8	6.1
pH CaCl ₂	4.2	4.1	4.2	4.6	5.0
Organic C (%)	2.8	0.9			
Nitrate N (mg/kg)	25.0	12.0	11.0	2.4	4.7
Ammonium N (mg/kg)	15.0	3.4	2.8	0.9	1.4
Phosphorus Colwell (mg/kg)	35	14			
Phosphorus Buffer Index	74	76			
Sulphate S-KCl (mg/kg)	8.8	5.5			
Potassium (meq/100 g)	0.3	0.1	0.1	0.1	0.1
Calcium (meq/100 g)	1.5	0.7	0.5	0.8	0.7
Magnesium (meq/100 g)	0.9	0.5	0.5	3.2	6.7
Aluminium (meq/100 g)	0.8	1.2	1.0	0.3	<0.10
Sodium (meq/100 g)	0.0	<0.02	<0.02	<0.02	0.0
Chloride (mg/kg)	31	<10.0	<10.0	<10.0	<10.0
Electrical Conductivity (1:5)	0.10	0.05	0.04	0.02	0.02
Electrical Conductivity _{se} (dS/m)	0.72	0.31	0.26	0.14	0.11
Copper (mg/kg)	0.7	0.6			
Zinc (mg/kg)	1.2	0.3			
Manganese (mg/kg)	33	10			
Iron (mg/kg)	350	190			
Boron (mg/kg)	0.2	0.1			
Molybdenum (mg/kg)	<0.01	<0.01			

OM961

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Brown	Brown	Orange/Y	Orange/Y	Orange/Y
Texture	Clay Loam	Clay Loam	Clay	Clay	Clay
CEC (meq/100g)	6.1	4.4	5.1	6.5	6.0
pH water	5.4	5.4	5.4	5.4	5.6
pH CaCl ₂	4.7	4.4	4.3	4.3	4.3
Organic C (%)	3.6	1.5			
Nitrate N (mg/kg)	36.0	12.0	3.1	2.5	2.5
Ammonium N (mg/kg)	12.0	1.6	1.2	1.2	0.8
Phosphorus Colwell (mg/kg)	31	15			
Phosphorus Buffer Index	92	97			
Sulphate S-KCl (mg/kg)	8.5	4.1			
Potassium (meq/100 g)	0.3	0.1	0.1	0.2	0.2
Calcium (meq/100 g)	3.6	2.2	1.8	1.6	0.7
Magnesium (meq/100 g)	1.8	1.1	1.3	2.2	2.9
Aluminium (meq/100 g)	0.3	1.0	1.8	2.4	2.2
Sodium (meq/100 g)	0.1	0.0	0.1	0.1	0.1
Chloride (mg/kg)	26	<10.0	<10.0	<10.0	<10.0
Electrical Conductivity (1:5)	0.12	0.05	0.03	0.03	0.02
Electrical Conductivity _{se} (dS/m)	0.72	0.27	0.17	0.16	0.12
Copper (mg/kg)	0.7	0.7			
Zinc (mg/kg)	1.6	0.5			
Manganese (mg/kg)	21	9			
Iron (mg/kg)	300	250			
Boron (mg/kg)	0.4	0.2			
Molybdenum (mg/kg)	<0.01	<0.01			

Percentages of Exchangeable I

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
ECaP (Calcium)	42.6%	28.3%	24.5%	18.9%	9.4%
EMgP (Magnesium)	25.3%	19.3%	24.5%	71.9%	88.5%
EKP (Potassium)	9.7%	3.3%	2.9%	1.8%	1.6%
ESP (Sodium)	0.9%				0.5%
EAIP (Aluminium)	21.6%	49.2%	48.1%	7.4%	0.0%

Ca/Mg ratio

K/Mg ratio

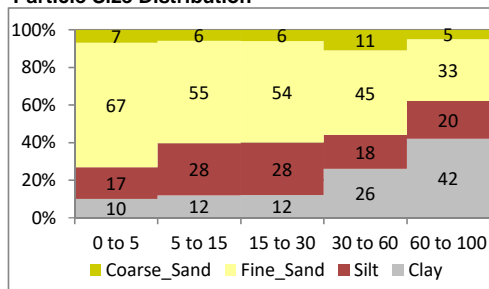
Electrochemical Stability Index

Loveday and Pyle Dispersion

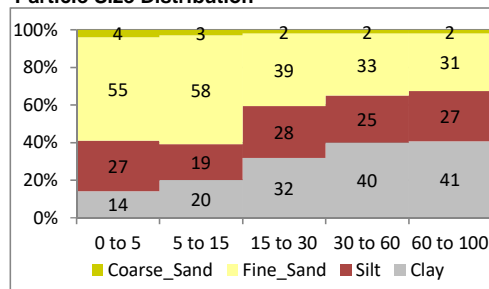
Emerson Class

Ca/Mg ratio	1.7	1.5	1.0	0.3	0.1
K/Mg ratio	2.0	2.0	1.4	0.7	0.2
Electrochemical Stability Index	0.12			0.04	
Loveday and Pyle Dispersion	7	7	7	6	6
Emerson Class	7	8	2	6	6

Particle Size Distribution

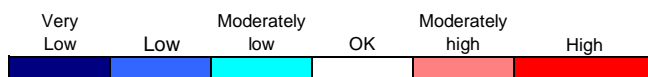


Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING



Pit

Depth (cm)

Colour

Texture

CEC (meq/100g)

pH water

pH CaCl₂

Organic C (%)

Nitrate N (mg/kg)

Ammonium N (mg/kg)

Phosphorus Colwell (mg/kg)

Phosphorus Buffer Index

Sulphate S-KCl (mg/kg)

Potassium (meq/100 g)

Calcium (meq/100 g)

Magnesium (meq/100 g)

Aluminium (meq/100 g)

Sodium (meq/100 g)

Chloride (mg/kg)

Electrical Conductivity (1:5)

Electrical Conductivity_{se} (dS/m)

Copper (mg/kg)

Zinc (mg/kg)

Manganese (mg/kg)

Iron (mg/kg)

Boron (mg/kg)

Molybdenum (mg/kg)

OM962

0 to 5 5 to 15 15 to 30 30 to 60 to

Brown Brown Brown Orange/Y

Clay Loam Clay Loam Clay Loam Clay Loam

5.2 4.4 4.0 4.7

5.1 5.5 5.1 5.3

4.5 4.7 4.1 4.1

3.1 2.0

22.0 16.0 4.0 2.2

7.9 4.5 1.0 0.9

16 8

150 150

10.0 5.7

0.2 0.2 0.1 0.2

2.6 2.3 0.9 0.7

1.3 1.0 0.6 0.9

0.9 0.9 2.3 2.9

0.1 0.1 0.1 0.1

26 22 <10.0 <10.0

0.10 0.07 0.03 0.02

0.60 0.43 0.17 0.12

0.9 0.8

1.1 1.1

22 9

280 200

0.3 0.3

<0.01 <0.01

OM964

0 to 5 5 to 15 15 to 30 30 to 60 60 to 100

Brown Brown Brown Brown Orange/Y

Clay Loam Clay Loam Clay Clay Loam Clay Loam

5.4 3.8 4.6 6.2 7.4

5.1 5.2 5.3 5.5 6.0

4.4 4.4 4.2 4.3 4.5

3.0 1.3

46.0 17.0 5.0 2.9 2.4

9.9 2.4 <0.6 0.9 0.7

27 14

120 100

13.0 7.2

0.5 0.1 0.1 0.2 0.2

2.6 1.6 1.5 1.2 0.6

1.6 1.1 1.2 3.0 5.2

0.6 0.8 1.7 1.7 1.1

0.1 0.1 0.1 0.1 0.3

<10.0 <10.0 <10.0 <10.0 <10.0

0.12 0.06 0.03 0.03 0.03

0.60 0.33 0.18 0.16 0.15

0.7 0.5

2.5 0.7

29 7

420 290

0.3 0.2

<0.01 <0.01

Percentages of Exchangeable I

ECaP (Calcium)

EMgP (Magnesium)

EKP (Potassium)

ESP (Sodium)

EAIP (Aluminium)

50.2% 52.0% 22.0% 14.1%

25.1% 21.7% 15.8% 18.8%

4.4% 4.1% 3.5% 4.1%

2.1% 2.5% 1.3% 1.1%

18.1% 19.7% 57.5% 62.0%

48.5% 42.4% 32.4% 19.4% 8.0%

29.9% 29.2% 25.9% 48.4% 70.2%

8.6% 3.2% 3.0% 2.6% 3.0%

2.2% 2.9% 1.9% 2.3% 4.0%

10.8% 22.3% 36.7% 27.4% 14.8%

Ca/Mg ratio

K/Mg ratio

2.0 2.4 1.4 0.8

1.6 1.5 1.3 0.4 0.1

Electrochemical Stability Index

Loveday and Pyle Dispersion

Emerson Class

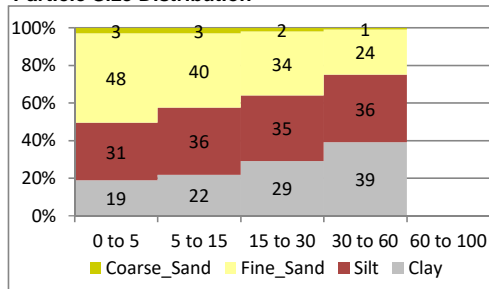
0.05 0.03 0.02 0.02

0.05 0.02 0.02 0.01 0.01

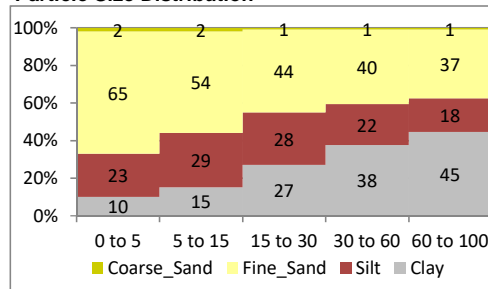
7 2 3 6

7 7 3 6 6

Particle Size Distribution



Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING	Very Low	Low	Moderately low	OK	Moderately high	High

Pit

OM965

	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Depth (cm)	0 to 5	5 to 15	15 to 30	30 to 60	60 to 100
Colour	Brown	Brown	Brown	Brown	Brown
Texture	Clay Loam	Clay Loam	Clay Loam	Clay	Clay Loam
CEC (meq/100g)	4.5	2.5	3.0	8.2	7.5
pH water	5.4	5.7	6.2	6.4	6.5
pH CaCl ₂	4.6	4.9	5.4	5.4	5.5
Organic C (%)	2.0	0.5			
Nitrate N (mg/kg)	39.0	28.0	18.0	1.4	1.4
Ammonium N (mg/kg)	11.0	2.8	1.3	1.0	1.2
Phosphorus Colwell (mg/kg)	18	7			
Phosphorus Buffer Index	57	33			
Sulphate S-KCl (mg/kg)	11.0	4.0			
Potassium (meq/100 g)	0.6	0.1	0.1	0.2	0.1
Calcium (meq/100 g)	2.3	1.5	1.3	2.1	1.9
Magnesium (meq/100 g)	1.3	0.8	1.5	5.8	5.4
Aluminium (meq/100 g)	0.2	<0.10	<0.10	<0.10	<0.10
Sodium (meq/100 g)	0.1	0.1	0.1	0.1	0.1
Chloride (mg/kg)	11	11	15	<10.0	<10.0
Electrical Conductivity (1:5)	0.11	0.07	0.06	0.03	0.03
Electrical Conductivity _{se} (dS/m)	0.59	0.43	0.38	0.17	0.17
Copper (mg/kg)	0.6	0.5			
Zinc (mg/kg)	2.1	0.5			
Manganese (mg/kg)	34	8			
Iron (mg/kg)	310	95			
Boron (mg/kg)	0.2	0.1			
Molybdenum (mg/kg)	<0.01	<0.01			

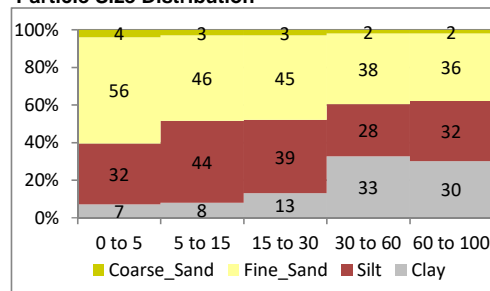
Percentages of Exchangeable I

ECaP (Calcium)	51.7%	60.0%	43.5%	25.7%	25.2%
EMgP (Magnesium)	29.2%	32.8%	50.2%	71.1%	71.6%
EKP (Potassium)	13.5%	3.2%	2.0%	1.8%	1.9%
ESP (Sodium)	2.0%	4.0%	4.3%	1.3%	1.3%
EAIP (Aluminium)	3.6%	0.0%	0.0%	0.0%	0.0%

Ca/Mg ratio	1.8	1.8	0.9	0.4	0.4
K/Mg ratio					

Electrochemical Stability Index	0.05	0.02	0.01	0.02	0.02
Loveday and Pyle Dispersion					
Emerson Class	7	8	8	6	6

Particle Size Distribution



MGP Soil Laboratory Chemical Tests

RATING	Very Low	Low	Moderately low	OK	Moderately high	High

OM746

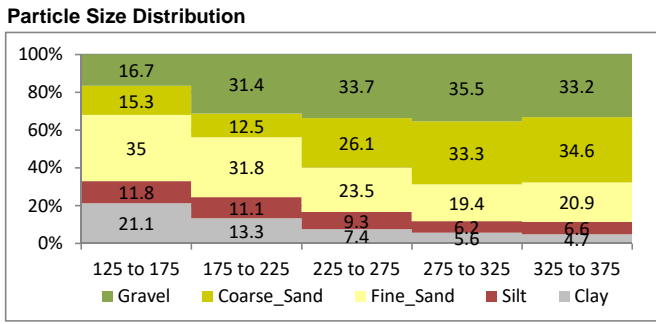
	125 to 175	175 to 225	225 to 275	275 to 325	325 to 375
Pit					
Depth (cm)	125 to	175 to	225 to	275 to	325 to
Colour					
Texture	LC	LC	SCL	SCL	SL
CEC (meq/100g)	5.9	4.8	7.2	9.9	11.4
pH water	5.5	5.8	5.6	6.0	6.7
pH CaCl ₂					
Organic C (%)					
Nitrate N (mg/kg)					
Ammonium N (mg/kg)					
Phosphorus Colwell (mg/kg)					
Phosphorus Buffer Index					
Sulphate S-KCl (mg/kg)					
Potassium (meq/100 g)	0.6	0.3	0.2	0.2	0.2
Calcium (meq/100 g)	2.2	1.3	0.9	1.2	1.4
Magnesium (meq/100 g)	2.7	2.8	5.8	8.0	9.3
Aluminium (meq/100 g)	0.0	0.0	0.0	0.0	0.0
Sodium (meq/100 g)	0.4	0.3	0.3	0.5	0.5
Chloride (mg/kg)					
Electrical Conductivity (1:5)	0.06	0.03	0.02	0.02	0.02
Electrical Conductivity _{se} (dS/m)					
Copper (mg/kg)					
Zinc (mg/kg)					
Manganese (mg/kg)					
Iron (mg/kg)					
Boron (mg/kg)					
Molybdenum (mg/kg)					

Percentages of Exchangeable Ions

ECaP (Calcium)	37.6%	27.1%	12.2%	12.5%	12.4%
EMgP (Magnesium)	45.2%	58.9%	80.2%	80.7%	81.6%
EKP (Potassium)	10.5%	6.7%	2.8%	2.0%	1.7%
ESP (Sodium)	6.6%	7.1%	4.6%	4.7%	4.3%
EAIP (Aluminium)	0.2%	0.2%	0.3%	0.1%	0.1%

Ca/Mg ratio	0.8	0.5	0.2	0.2	0.2
K/Mg ratio					

Electrochemical Stability Index	0.01	0.00	0.00	0.00	0.00
Loveday and Pyle Dispersion					
Emerson Class	5	5	5	5	5



RATING

Pit	OM703							
	125 to	175 to	225 to	275 to	325 to	375 to	425 to	475 to
Depth (cm)								
Colour								
Texture	LMC	LCC	LC	LMC	LC	LC	LC	LC
CEC (meq/100g)	6.8	6.0	5.9	6.3	6.3	6.1	7.0	7.1
pH water	6.1	6.5	5.1	5.3	5.4	5.3	5.5	5.4
pH CaCl ₂								
Organic C (%)								
Nitrate N (mg/kg)								
Ammonium N (mg/kg)								
Phosphorus Colwell (mg/kg)								
Phosphorus Buffer Index								
Sulphate S-KCl (mg/kg)								
Potassium (meq/100 g)	0.5	0.4	0.2	0.2	0.2	0.2	0.3	0.3
Calcium (meq/100 g)	2.7	2.1	1.0	1.0	1.1	1.3	1.7	2.1
Magnesium (meq/100 g)	3.4	3.2	3.8	4.0	4.0	3.7	4.1	4.0
Aluminium (meq/100 g)	0.0	0.0	0.5	0.5	0.4	0.2	0.2	0.1
Sodium (meq/100 g)	0.4	0.4	0.5	0.5	0.5	0.7	0.7	0.6
Chloride (mg/kg)								
Electrical Conductivity (1:5)	0.03	0.02	0.02	0.02	0.02	0.03	0.03	0.03
Electrical Conductivity _{se} (dS/m)								
Copper (mg/kg)								
Zinc (mg/kg)								
Manganese (mg/kg)								
Iron (mg/kg)								
Boron (mg/kg)								
Molybdenum (mg/kg)								

Percentages of Exchangeable I

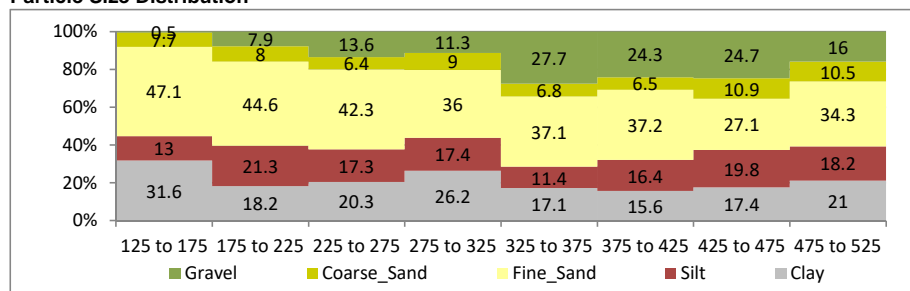
ECaP (Calcium)	38.7%	34.8%	16.2%	16.6%	17.9%	21.6%	24.0%	29.9%
EMgP (Magnesium)	49.4%	53.2%	63.1%	64.2%	63.2%	60.2%	58.7%	56.0%
EKP (Potassium)	6.6%	5.8%	2.9%	3.2%	3.5%	3.6%	4.0%	3.9%
ESP (Sodium)	5.1%	6.0%	8.8%	8.4%	8.6%	10.7%	10.4%	9.0%
EAIP (Aluminium)	0.1%	0.2%	9.1%	7.6%	6.7%	3.9%	2.9%	1.3%

Ca/Mg ratio	0.8	0.7	0.3	0.3	0.3	0.4	0.4	0.5
K/Mg ratio								

Electrochemical Stability Index	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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Loveday and Pyle Dispersion Emerson Class	5	5	5	5	5	5	5	5
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Particle Size Distribution

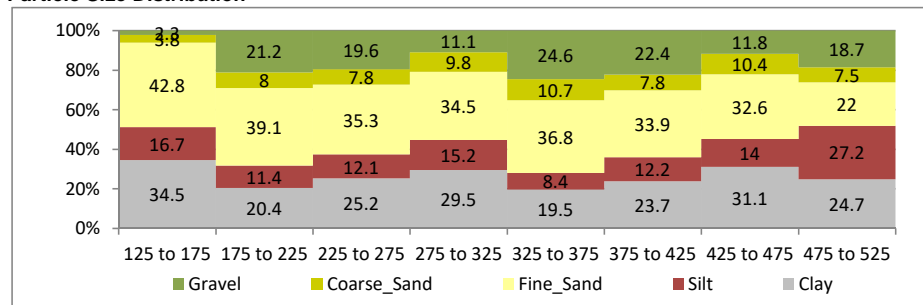


MGP Soil Laboratory Chemical Tests

RATING

	OM702							
	125 to	175 to	225 to	275 to	325 to	375 to	425 to	475 to
Pit								
Depth (cm)								
Colour								
Texture	LMC	LC	LC	LC	LC	LC	LMC	LC
CEC (meq/100g)	5.7	5.6	5.2	6.2	6.7	7.9	6.8	2.7
pH water	5.7	5.5	5.4	5.4	5.2	5.1	5.3	4.9
pH CaCl ₂								
Organic C (%)								
Nitrate N (mg/kg)								
Ammonium N (mg/kg)								
Phosphorus Colwell (mg/kg)								
Phosphorus Buffer Index								
Sulphate S-KCl (mg/kg)								
Potassium (meq/100 g)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1
Calcium (meq/100 g)	1.9	0.8	0.5	0.6	0.9	1.4	1.4	0.6
Magnesium (meq/100 g)	3.2	4.1	3.8	4.2	4.3	4.8	4.1	1.4
Aluminium (meq/100 g)	0.0	0.1	0.2	0.7	0.7	0.7	0.5	0.2
Sodium (meq/100 g)	0.4	0.5	0.4	0.5	0.6	0.8	0.7	0.4
Chloride (mg/kg)								
Electrical Conductivity (1:5)	0.03	0.02	0.01	0.02	0.03	0.03	0.03	0.04
Electrical Conductivity _{se} (dS/m)								
Copper (mg/kg)								
Zinc (mg/kg)								
Manganese (mg/kg)								
Iron (mg/kg)								
Boron (mg/kg)								
Molybdenum (mg/kg)								
Percentages of Exchangeable I								
ECaP (Calcium)	33.1%	14.4%	10.2%	9.8%	12.8%	18.3%	19.8%	23.6%
EMgP (Magnesium)	56.3%	72.2%	73.6%	67.1%	65.2%	60.6%	59.8%	53.6%
EKP (Potassium)	4.0%	3.9%	3.8%	2.9%	2.7%	2.8%	2.9%	2.6%
ESP (Sodium)	6.3%	8.7%	7.9%	8.5%	9.5%	9.5%	9.8%	14.2%
EAIP (Aluminium)	0.2%	0.9%	4.6%	11.6%	9.9%	8.8%	7.6%	6.0%
Ca/Mg ratio	0.6	0.2	0.1	0.1	0.2	0.3	0.3	0.4
K/Mg ratio								
Electrochemical Stability Index	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Loveday and Pyle Dispersion								
Emerson Class	5	5	5	5	5	5	5	5

Particle Size Distribution



APPENDIX III:
Comparison of Soil Association Chemical
Properties

Introduction

The patterns of selected soil chemical properties were overlaid on soil association boundaries and a basic Analysis of Variance was conducted on separate depths. The average values are discussed where they are significantly different.

Soil Association Soil Chemical Properties

Soil $\text{pH}_{\text{CaCl}_2}$ showed a general pattern that the soil became less acidic with depth (Map A3.1a). The exceptions were OM750 and OM837 to OM843 which had neutral surface soil over acidic deeper subsoil. Field observations indicate that OM750 appeared to have been limed a short time before the soil was examined (Appendix I). It is possible that OM838 to OM843 also have a history of liming.

The average $\text{pH}_{\text{CaCl}_2}$ of the Alluvium Associations were 0.5 to 1.0 units greater than the remaining four soil associations in the surface three layers (Figure A3.1). Average soil pH increased much more in the 30 to 60 and 60 to 100 cm layers in the Alluvium Downstream than in the Alluvium Association. Soil pH tended to be lowest in the 0 to 5 cm layer in the Red Soil Association, while pH in the Upland Soil Associations tended to be lowest for soil deeper than 30 cm. Soil pH in OM781 (Discharge Soil Association) was vastly greater than the remainder of the soil sampled in the Project Area.

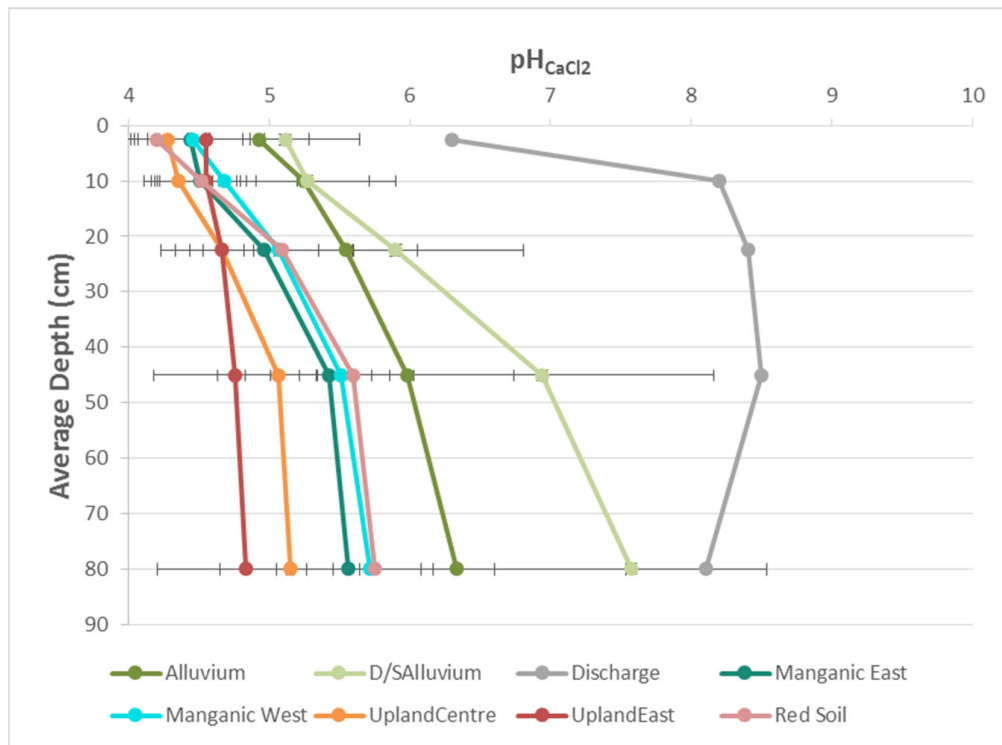
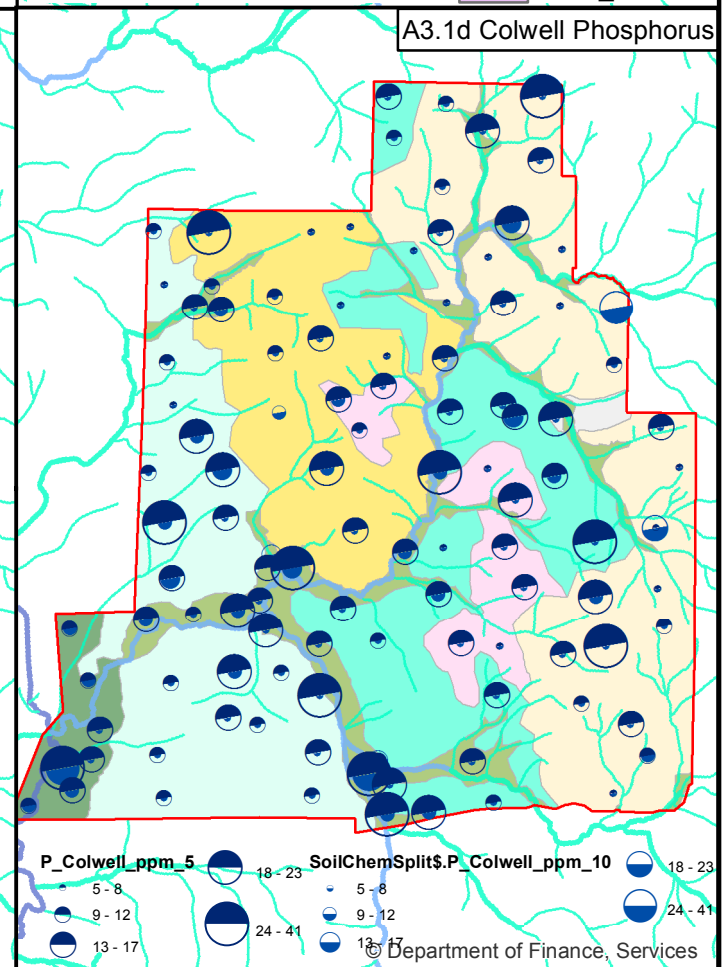
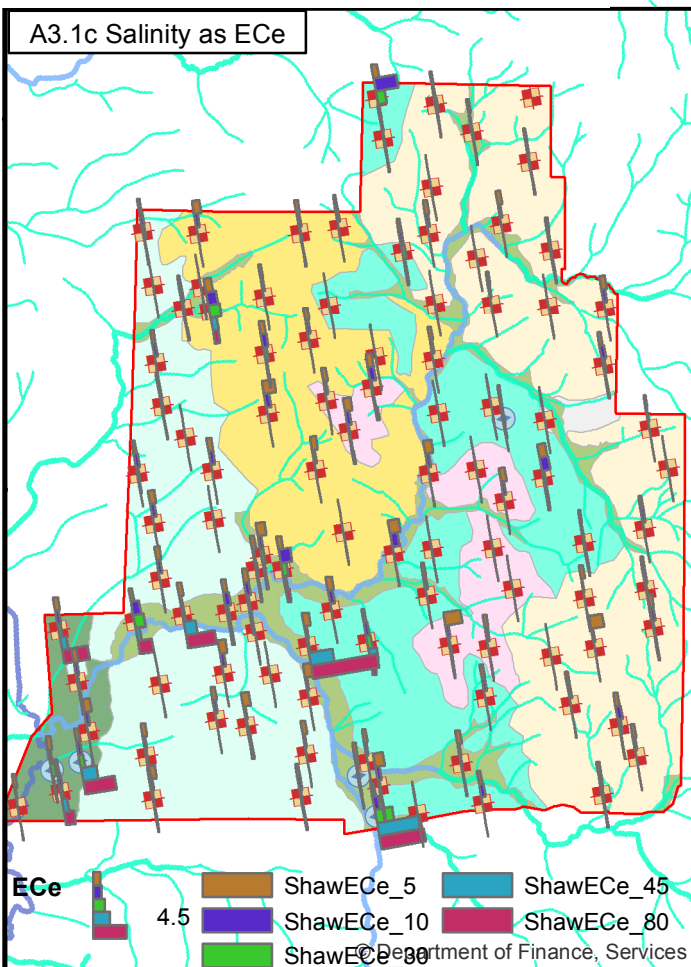
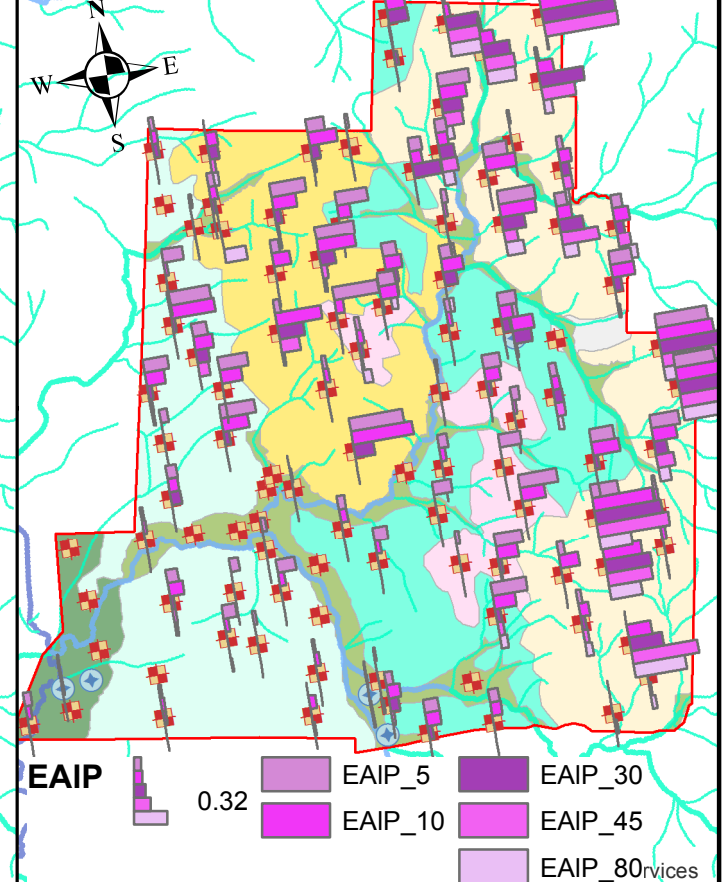
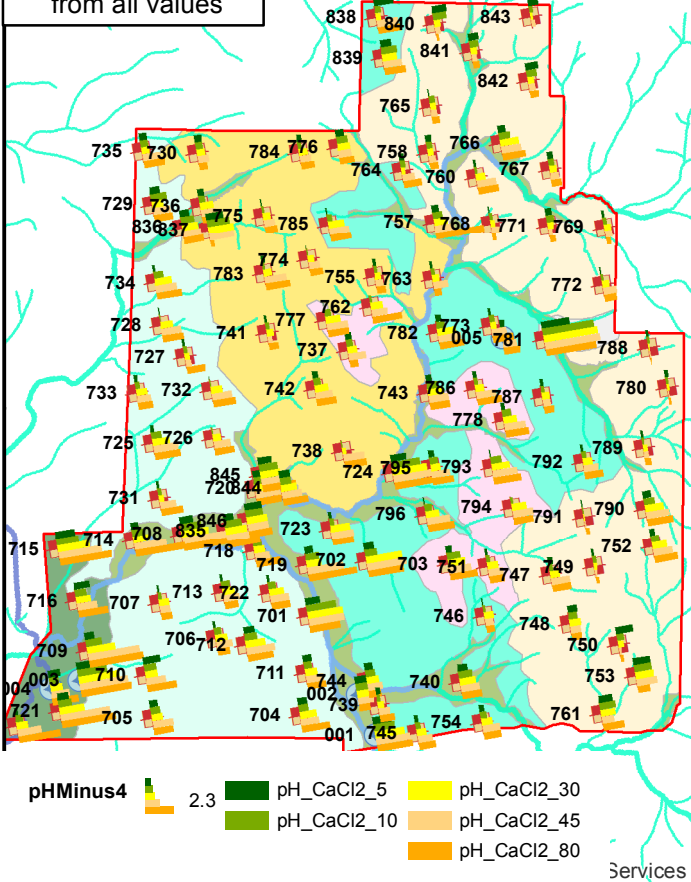


Figure A3.1. Average $\text{pH}_{\text{CaCl}_2}$ profiles for 8 Soil Associations across the McPhillamys Gold Project.

A3.1a Soil pH_{CaCl2}
4 pH units subtracted
from all values

McPhillamys Gold Project Soil Chemistry Summary

A3.1b Exchangeable Aluminium



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Site_Type	Association	Manganic West
Core	Red Soil	Alluvium
Detail Pit	Upland East	Alluvium Downstream
Property Boundary	Upland Centre	Sodic Discharge
	Manganic East	

0 0.5 1 2 3 4 Kilometres

Job Code: Cr408
Surveyed: 2017 and 2018
Map Printed: 2018

Watercourses: LPI

Contact: Sustainable Soils Management
Phone: (02) 68 473367
Datum: WGS 84
Projection: UTM

SSM
Sustainable Soil Management

Department of Finance, Services

Map A3.1

Exchangeable Aluminium Percentage (EAlP) varied widely across the Project Area, and down most profiles (Map A3.1b). Average EAlP in the surface to 5 cm layer in 61 pits in an area southwest of a line from the northwestern corner to the southeastern corner of the Project Area was 8% which was about half that of 48 pits in the northeastern half of the Project Area (Map A3.1b).

Eight of the 61 pits in the southwestern half of the Project Area had one or more layers with EAlP greater than 20%. This increased to 25 of 48 pits in the northeastern half of the Project Area. The most common EAlP profile was elevated EAlP in the surface layers declining to very low or zero for layers deeper than 30 cm. EAlP increased with depth in OM749, OM750, OM764, OM771, OM788, OM780 and OM845. This may be associated with movement of aluminium in groundwater.

The EAlP of Soil Associations could be divided into three broad groups (Figure A3.2). EAlP tended to be greatest in the Upland East Soil Association for all layers deeper than 5 cm. Average EAlP remained high for all five depths in Upland East Soil Association. The EAlP profile in the Manganic West, Manganic East and the Red Soil Associations tended to decrease from 15% in the 0 to 5 cm layer to less than 5% for the two layers deeper than 30 cm. EAlP was consistently low in the Alluvium Soil Associations and in OM781 (the Discharge Soil Association).

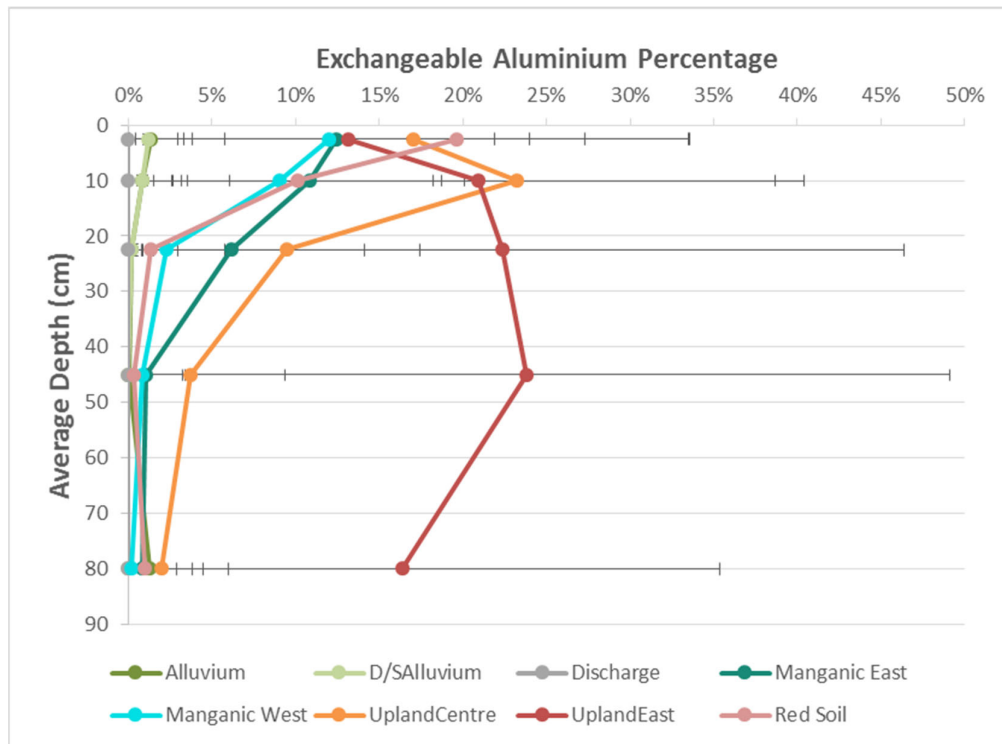


Figure A3.2. Average Exchangeable Aluminium Percentage profiles for 8 Soil Associations across the McPhillamys Gold Project.

Salinity was calculated as electrical conductivity of saturated extract (EC_e) using a formula proposed by Shaw (1999) that includes clay content and soil chloride. This shows that soil salinity was generally low across the Project Area (Map A3.1c). The exception was that salinity tended to increase towards the bottom of the profile in some sites in the Alluvium Soil Associations (Map

A3.1c). The pattern that salinity was consistently very low except in the Alluvium Soil Association is shown by the ECe profiles in Figure A3.3.

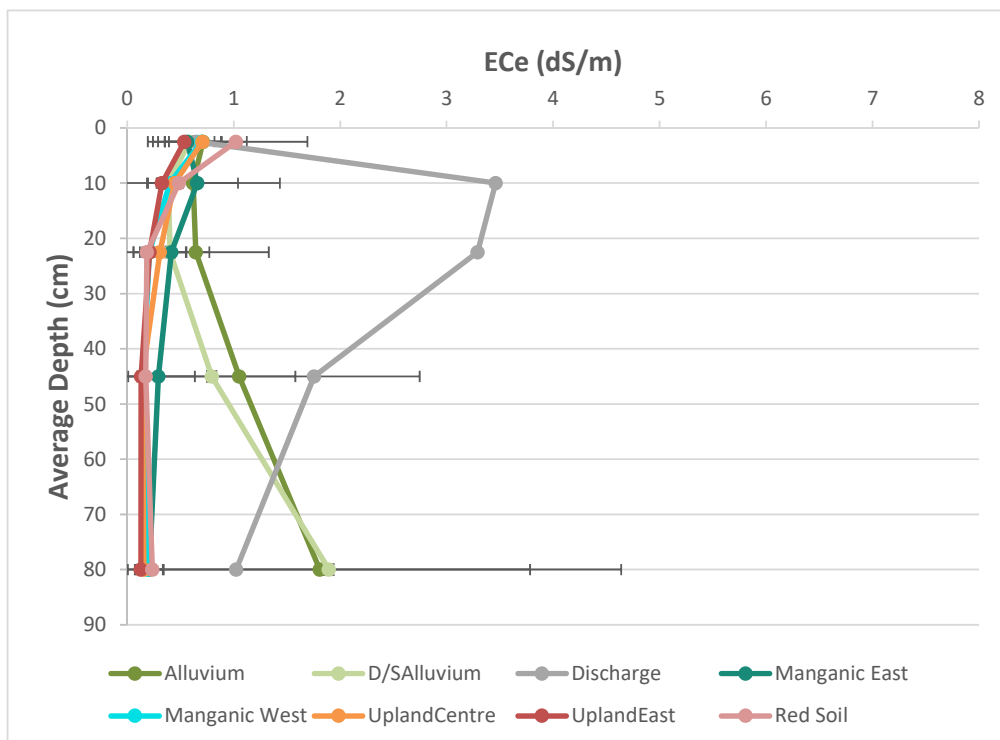


Figure A3.3. Average salinity profiles measured as electrical conductivity of saturated extract (ECe) for 8 Soil Associations across the McPhillamys Gold Project.

Soil phosphorous is a key nutrient in the productivity of farming systems and was generally present at low levels across the Project Area (Map A3.1d). There appeared to be a general trend that Colwell phosphorous was lowest in the Upland Soil Association, at intermediate, but still low levels in the Red Soil and Manganic (East and West) Soil Associations, and highest in the Alluvium Soil Association. The biggest difference between phosphorous levels in the Alluvium Soil Association and the rest was that the elevated phosphorous levels persisted into the 5 to 15 cm layer only in the Alluvium Soil Association (Table A3.1).

Table A3.1. Average values of macronutrients sampled across 8 Soil Associations in McPhillamys Gold Project.

Depth	Alluviu m	D/S Alluviu m	Discha rge	Manga nic East	Manga nic West	Red Soil	Uplan d East	Uplan d Centre	Stand ard Error
Colwell Phosphorous									
0 to 5	19.6	17.3	19.0	14.3	14.5	13.7	14.8	19.3	10.6
5 to 15	13.1	12.3	5.0	7.3	7.4	6.7	8.1	6.6	5.0
KCl Sulphur									
0 to 5	9.4	5.7	8.0	6.7	7.3	9.0	5.9	9.3	5.0
5 to 15	7.5	3.3	49.0	4.8	3.3	5.1	3.5	4.4	3.3

Sulphate sulphur levels were consistently low across all Soil Associations except the 5 to 15 cm layer of pit OM781 (the Discharge Soil Association).

The cation summary in Map A3.2 is collated from more than 1400 data points and was generated to provide an overview. It shows both general patterns and exceptions to these patterns. General patterns include:

- Exchangeable Calcium Percentage was greater than 50% in the 0 to 5 and 5 to 15 cm layers in most pits.
- Most of the pits in the western 40% of the Project Area had more than 50% calcium in the 30 to 60 and 60 to 100 cm layer. Less than half the pits in the eastern 60% had more than 50% calcium in the 30 to 100 cm zone.
- There was very little evidence of elevated exchangeable sodium percentage (ESP).
- Most pits away from the Alluvium Soil Associations had a cation exchange capacity (CEC) less than 15 meq/100 g to 100 cm.
- There were a scattering of pits with elevated exchangeable potassium for depths shallower than 15 cm. This did not persist below 30 cm.
- Most of the pits with elevated exchangeable aluminium that persisted into the subsoil are near the eastern edge of the Project Area.
- Magnesium accounted for more than 50% of exchangeable cations in the 60 to 100 cm layer in much of the northern half of the Project Area.

Exceptions include:

- Consistently high ESP occurred only in OM781. This is different enough to justify a separate Soil Association.
- CEC of 25 meq/100 g or greater occurred outside the Alluvium Soil Association only in OM757. This is near the eastern boundary of the Project Area and is a stony soil near the top of a hill. It could be a remnant from an earlier landform.

The average cation ratio profiles tended to vary with parent material in that Red Soil and Manganic West Association tended to have higher exchangeable calcium percentage (ECaP, Figure A3.4) and lower exchangeable magnesium percentage (EMgP, Figure A3.5) than the Manganic East Soil Association. The Upland East Soil Association tended to have very low ECaP (Figures A3.4, A3.5).

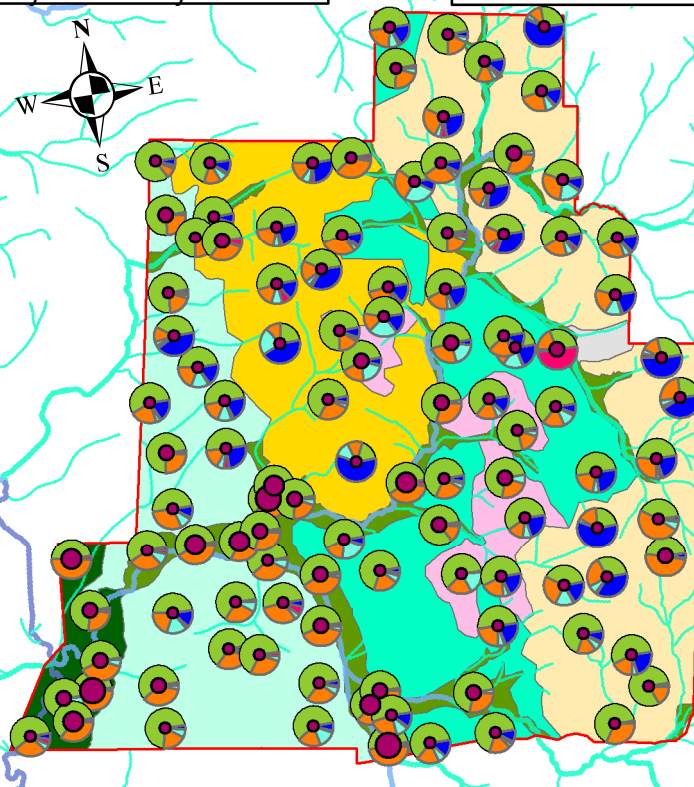
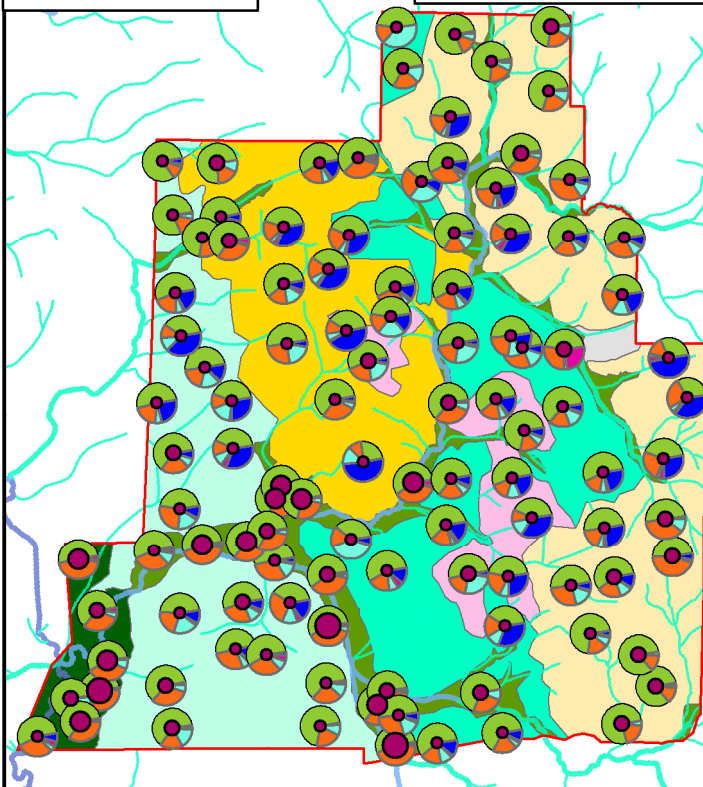
The lower ECaP in the Upland East Soil Association tended to be compensated with higher EAIP than the remaining soil associations (Figure A3.4). The Alluvium Soil Associations had higher EMgP and ECaP than the other Associations in the surface two layers, but cation ratios in the subsoil were similar to the Manganic East Soil Association (Figures A3.4, A3.5).

A3.2a 0 to 5 cm

McPhillamys Gold Project

Soil Chemistry Summary

A3.2b 5 to 15 cm

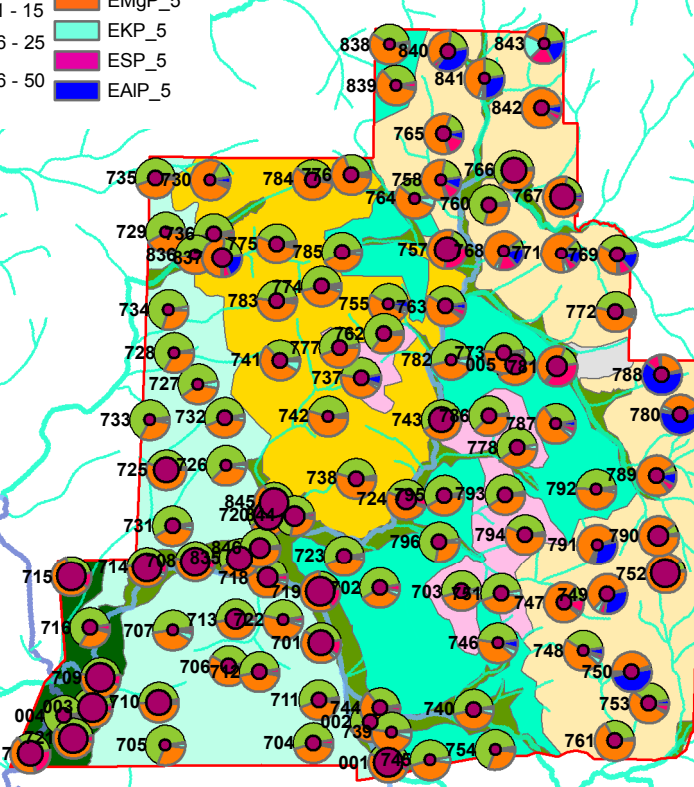
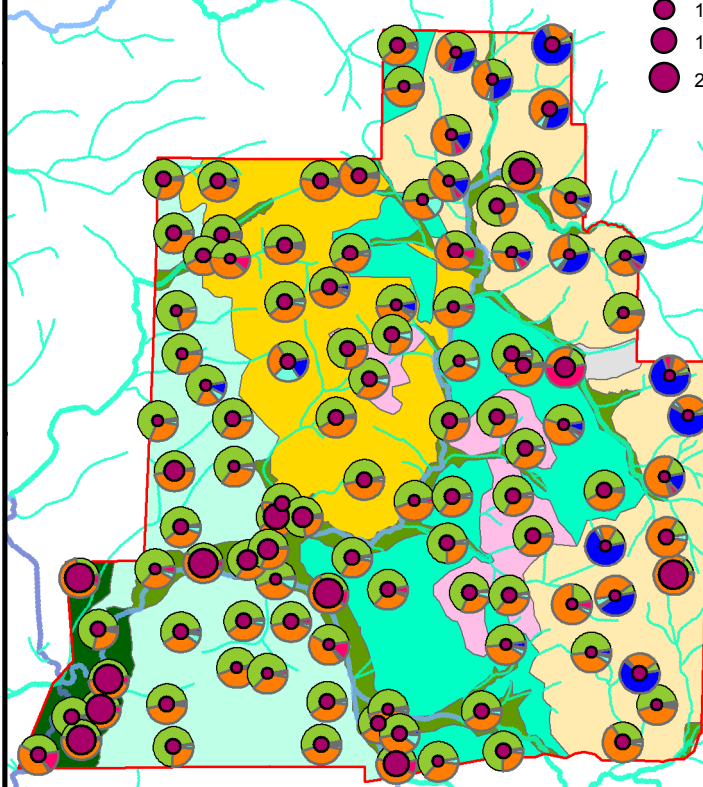


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A3.2c 30 to 60 cm

A3.2d 60 to 100 cm



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Certification

Property Boundary Association

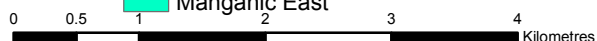
- Red Soil
- Upland East
- Upland Centre
- Manganic East
- Manganic West
- Alluvium
- Alluvium Downstream
- Sodic Discharge

Job Code: Cr408
 Surveyed: 2017 and 2018
 Map Printed: 2018
 Watercourses: LPI
 Contact: Sustainable Soils Management
 Phone: (02) 68 473367
 Datum: WGS 84
 Projection: UTM



Map A3.2

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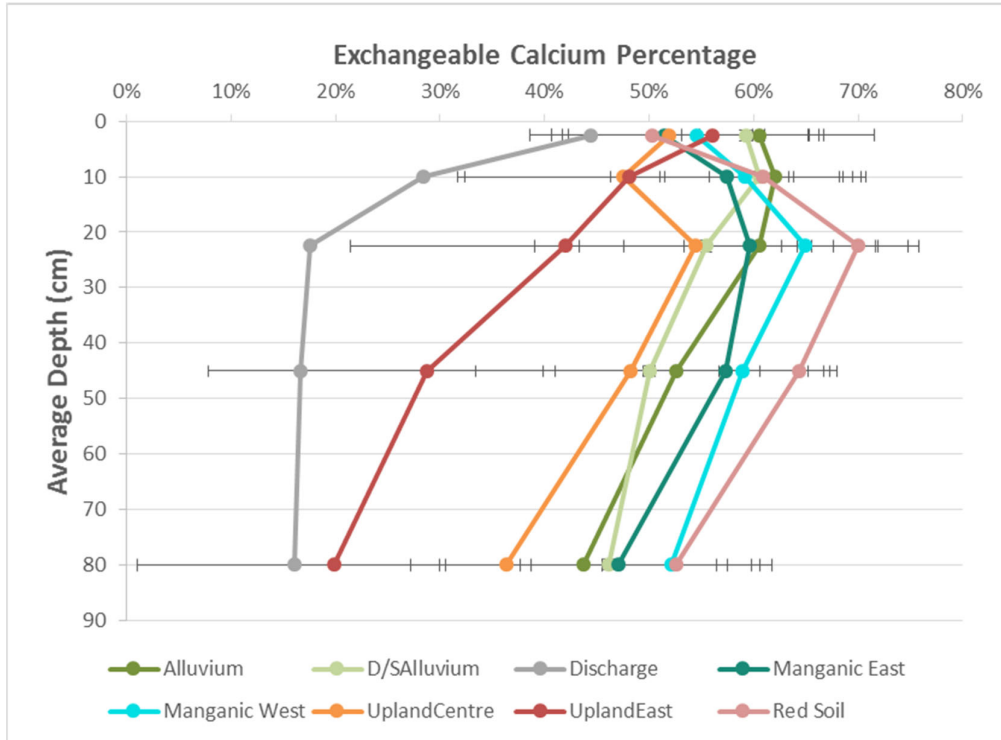


Figure A3.4. Average Exchangeable Calcium Percentage profiles for 8 Soil Associations across the McPhillamys Gold Project.

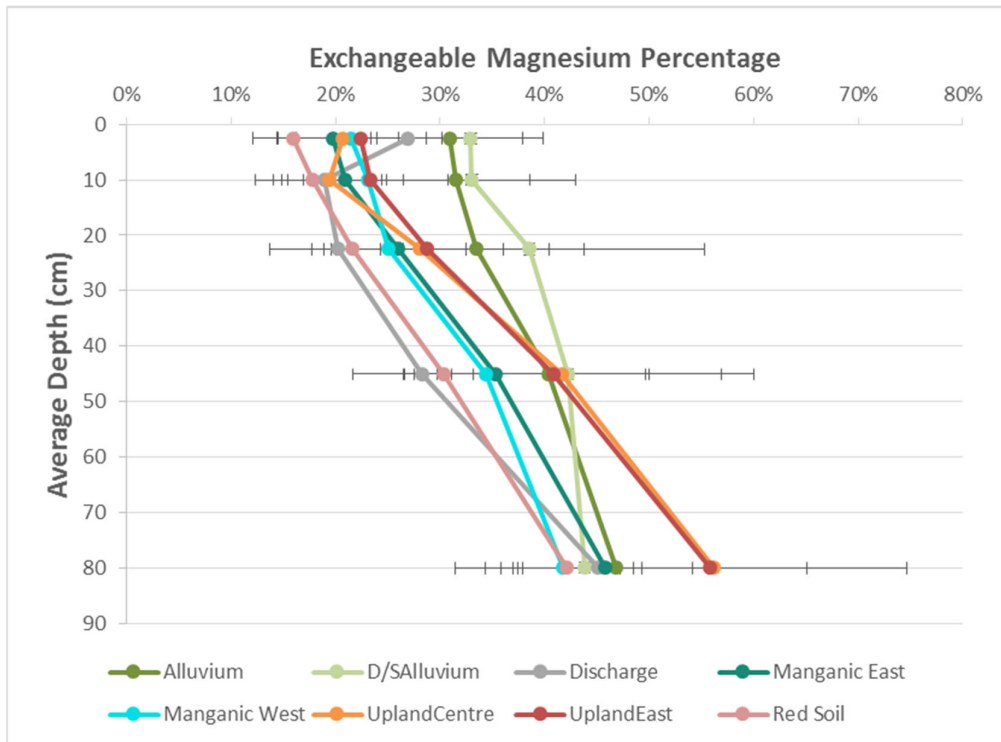


Figure A3.5. Average Exchangeable Magnesium Percentage profiles for 8 Soil Associations across the McPhillamys Gold Project.

Laboratory particle size distribution was measured on 43 of the 109 profiles tested. It showed that the texture of 4 of the 5 associations above the alluvium had very similar texture. The exception was the Red Soil Association, which had similar topsoil texture to the Alluvium Associations (Figure A3.6). The comparison showed that the Upland and Red Associations had more than 30% clay in the 30 to 100 cm samples while than Manganic Associations had closer to 20% clay.

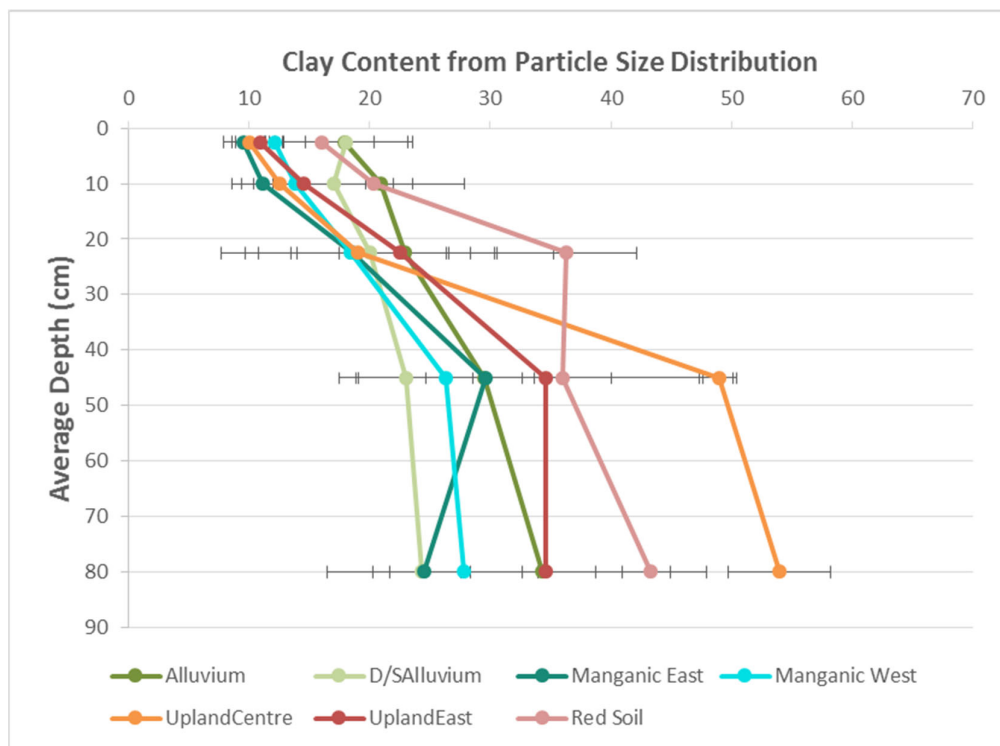


Figure A3.6. Average Clay profiles for 7 Soil Associations across the McPhillamys Gold Project.

This analysis reaffirmed that the ratio between clay content of the subsoil of the Manganic East and West Soil Associations was on average double that of the topsoil. This reinforces the likelihood that similar soil profiles may be classified as either duplex (Chromosol, Sodosol or Kurosol) or gradational (Dermosol or Kandosol) depending on the detail of this texture change. Samples tested from the Upland Soil Associations showed a clearer difference between the topsoil and subsoil clay content, so more duplex profiles would be expected in this association.

The cation to clay ratio (CCR) is an indicator of the capacity of the clay fraction to store nutrients. Soil profiles are divided by the ASC (Isbell, 2002) into three classes on the basis of CCR of the major part of the B Horizon. They are: Dystrophic, with a CCR of less than 0.05, Mesotrophic with a CCR of 0.05 to 0.15 and Eutrophic with a CCR greater than 0.15.

The average Cation to Clay Ratio (CCR) across the Project Area indicate that most profiles in all associations except the Upland east Association are likely to be Eutrophic (CCR greater than 15, (Figure A3.7). It is likely that the slightly elevated CCR in the 0 to 5 cm layer of all Soil Associations is related to organic matter in the shallow part of the topsoil.

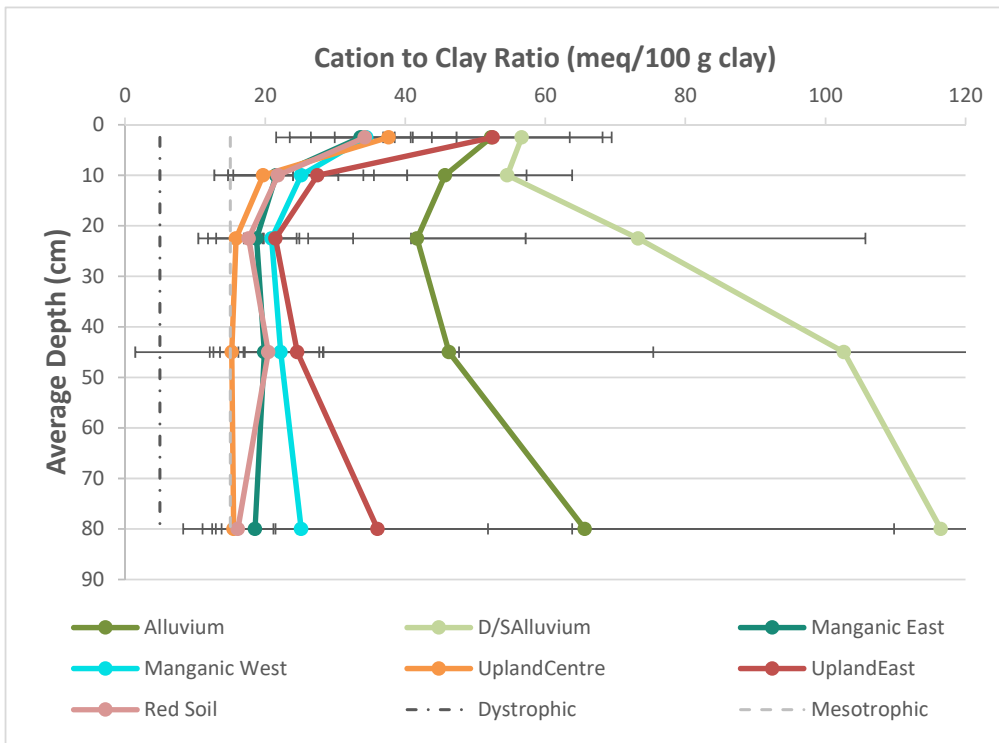


Figure A3.7. Average Cation to Clay Ratio profiles for 7 Soil Associations across the McPhillamys Gold Project.

Soil Association Chemical Properties Summary

The soil analyses summarised above show that the eight Soil Associations mapped across the Project Area have grouped soil profiles with properties that are more similar within the associations between them.

The diagnostic features of the eight Soil Associations are:

- Alluvium Soil Associations – Soil pH 5 in topsoil increasing to 6 to 7 in subsoil, moderately low clay content throughout profile. Alluvium Downstream Association less clayey than Alluvium Association.
- Red Soil Association – Average profile had moderate clay content throughout, but topsoil was acidic with average 20% exchangeable aluminium. Average exchangeable calcium percentage peaked at 60 to 70% in the 15 to 60 cm zone and exchangeable aluminium percentage was desirably low below 15 cm.
- Manganic West Soil Association – Acidic topsoil over less acidic subsoil with average 10 to 15% exchangeable aluminium in topsoil and 60% exchangeable calcium and 30% exchangeable magnesium in subsoil.
- Manganic East Soil Association – Acidic topsoil over less acidic subsoil with average 10 to 15% exchangeable aluminium in topsoil and 50% exchangeable calcium and 40% exchangeable magnesium in subsoil.
- Upland Centre Soil Association – Acidic topsoil over less acidic, clayey subsoil with average 10 to 15% exchangeable aluminium in topsoil and 40% exchangeable calcium and 50% exchangeable magnesium in subsoil.
- Upland East Soil Association – Acidic with an average $\text{pH}_{\text{CaCl}_2}$ of 4 and 20% average exchangeable aluminium through the profile. Low exchangeable calcium of 20% in 60 to 100 cm layer.
- Discharge Soil Association – Subsoil pH 9 to 10.

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- Isbell, R.F., 2002. The Australian Soil Classification. Revised Edition. CSIRO Publishing, Australia. 144 pp.
- Shaw, R.J., 1999. Soil salinity - Electrical conductivity and chloride. In "Soil Analysis: An Interpretation Manual", Eds. K.I. Peverill, L.A. Sparrow, and D.J. Reuter. CSIRO, Melbourne. pp. 129-145.