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# Paired site sampling for soil carbon estimation – Western Australia

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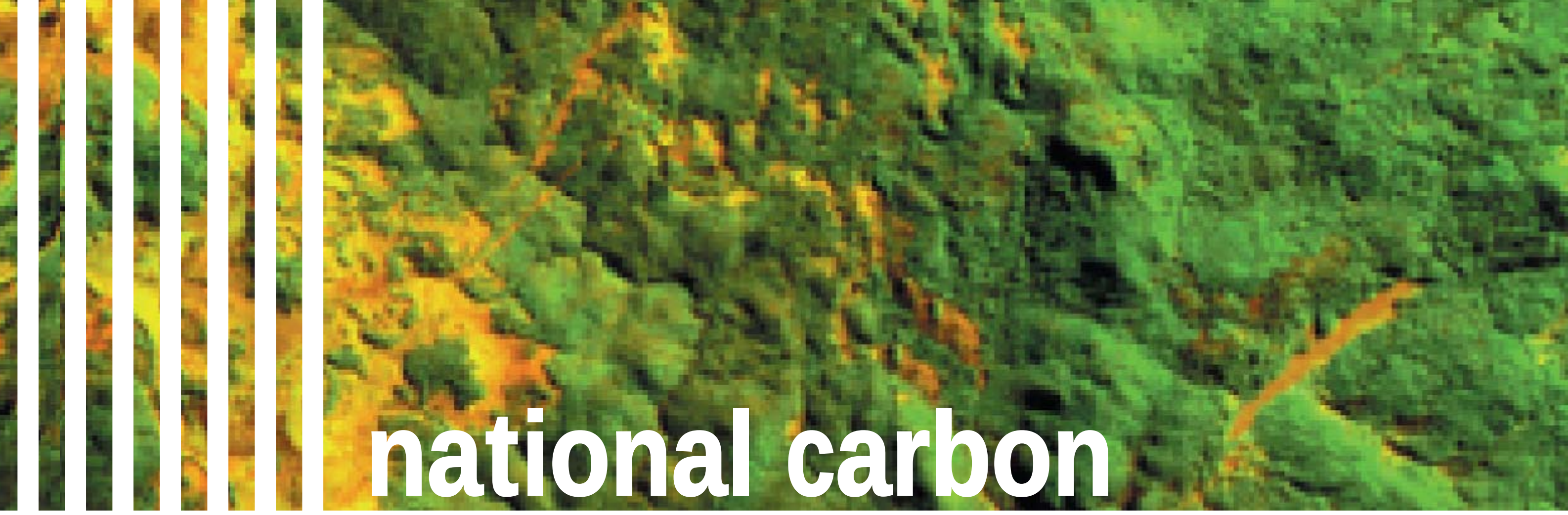

# national carbon accounting system

technical report no. 38

# Paired Site Sampling for Soil Carbon Estimation – Western Australia

E. A. Griffin, W. H. Verboom and D.G. Allen

Australian Government
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# PAIRED SITE SAMPLING FOR SOIL CARBON ESTIMATION – WESTERN AUSTRALIA


E.A. Griffin, W.H. Verboom and D.G. Allen

Department of Agriculture,
Western Australia



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# SUMMARY

This report describes a detailed paired site study at nine locations in the drier parts of south–western Australia representative of areas most recently cleared for agriculture. The pairing was of uncleared, short-term cleared and long-term cleared sites. The study provided samples for modelling soil organic carbon fluxes by CSIRO Land and Water.

Analysis and interpretation of results from the samples collected and detailed soil morphology descriptions provide comprehensive documentation of the soil carbon and other soil parameters. This provides a basis for better understanding factors influencing soil carbon dynamics in soils in Western Australia, particularly in areas with sandy topsoils.

There were no major differences between the soil parameters (such as organic carbon) of the land use pairings. Soil organic carbon in the fine earth appeared to be slightly increased by changing to agricultural systems, especially in the topsoil. Bulk density was usually increased in the topsoil as a result of clearing. Coarse organic matter and coarse mineral fragments, where present, contained significant amounts of organic carbon.

Recommendations are made about future monitoring, including the fate of areas examined in this study.

# ACKNOWLEDGMENTS

Many acknowledgments are in order. In particular, the help and co-operation of the land owners, including those whose properties were not in the end used, made this project possible. A number of people including Mal Harper, Tilwin Westrup, Harry Lauk, Brendan Nicholas and Kelly Holyoake assisted in locating these properties. Phil Goulding assisted in providing digital maps for the initial search for properties.

Field work was conducted by Bill Verboom, Ted Griffin and John Bessell-Browne with the assistance at some locations of Noel Schoknecht, Brendan Nicholas and Surender Mann. Ms Anne Rick provided assistance with botanical knowledge of the Newdegate area.

John Bessell-Browne did the initial sample drying and the measurements of bulk density.

Staff of the Chemistry Centre of Western Australia prepared the samples and performed all analyses.

Hernan Ortiz entered the site and profile data into the soils database.

Phil Goulding prepared the location map for the report.

Noel Schoknecht provided helpful comments on the report.

# TABLE OF CONTENTS

# TABLE OF CONTENTS

# LIST OF FIGURES

# LIST OF TABLES

# 1. INTRODUCTION

This study was designed to assist in determining the changes in the soil carbon pool when land is converted from native vegetation to agricultural uses (such as cropping or grazing). This represents an important part of the Australian Greenhouse Office's National Carbon Accounting System. The focus of this study was to sample representative areas where clearing for agriculture has occurred in Western Australia over the last two decades. This approach was important for the validation of modelling carbon fluxes.

No previous reports systematically document changes in organic carbon in Western Australia after clearing for agriculture. Griffin and Schoknecht (2000) provided estimates of the levels of organic carbon in the native vegetation in a range of soils throughout south-western Australia. These show that organic carbon varies significantly by soil type and climatic region.

The study was principally designed to provide samples and land use history for modelling the changes in the organic carbon pool using the *Roth-C* soil carbon model (Jenkinson, 1990; Jenkinson and Coleman, 1994). The modelling work was supervised by Jan Skjemstad, CSIRO Land and Water, Adelaide.

The sampling and analysis programme conducted was also designed to assist in documenting the deeper profile organic carbon pool as well as any apparent changes in soil properties due to changes in land use.

# 2. KEY DELIVERABLES

- Data on soil carbon values at the paired sites;
- Land use history for the paired sites;
- Delivery of selected samples to CSIRO Land and Water;
- Proposal for archiving soil samples; and
- Criteria for selecting sample sites for future monitoring.

# 3. TERMS

To describe the nested sampling areas consistently, the following terms are defined:

- (Study) Location - area containing "paired" sampling sites;
- Site - one part of the Location at which nested sampling occurred. The different sites are identified by their land use history;
- Sample Points – places within a site where sampling occurred; and
- Pits – hole(s) at a sample point from which samples are taken.

## 4. STUDY METHODOLOGY

### 4.1 STUDY LOCATION SELECTION

The documentation of Griffin *et al.* (2000) indicated that the main clearing for agriculture over the last decades occurred in the drier parts of south-western Australia (Geraldton to Esperance) on soils mostly with sandy surfaces.

Building on land use management information provided by Griffin *et al.* (2000), the present study was designed to locate about 10 study locations throughout the drier parts of south-western Australia where significant clearing was taking place. Each of these locations were to have the same representative soil type in parcels of uncleared and cleared land in close proximity.

The choice of locations was limited to alienated land. This was to avoid delays in, or rejection of approval for destructive sampling (excavation soil pits) on Crown reserves. This constrained the choice of locations to private properties that had significant areas of uncleared land of the required soil types. Much of south-western Australia is notorious for having retained little natural bush areas within farming properties. Locating properties with both recently cleared areas and uncleared bush was thus time-consuming.

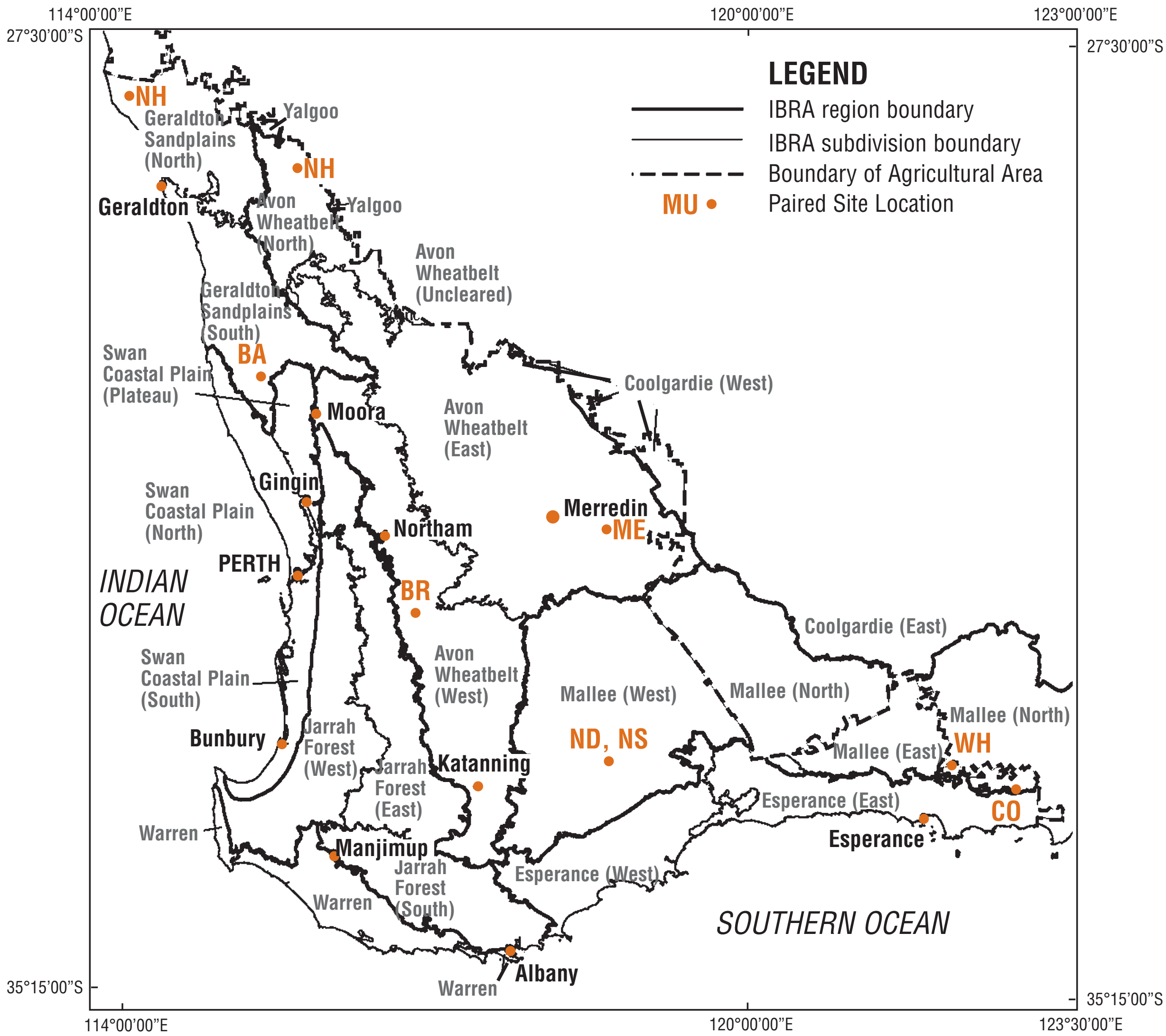
Nine study locations were chosen. Figure 1 shows their locations within the context of IBRA regions (following Thackway and Cresswell, 1995) and the climatic subdivisions devised by Griffin and Schoknecht (2000). Table 1 briefly relates these locations to the IBRA regions and soil units presented in that study. Their estimate of the amount of organic carbon (t/ha) in the fine earth fraction of the top 30 cm of soil in uncleared areas is also provided as background.

Table 2 outlines briefly the nature of the soil and vegetation at each study location.

**Table 1. Study locations within IBRA regions.**

| Location | Code | IBRA Region | Climate Division | Soil Unit* | OC t/ha** |
|---|---|---|---|---|---|
| Northampton | NH | Geraldton Sandplains | Northern | Coloured sands | 12 |
| Badgingarra | BA | Geraldton Sandplains | Southern | Pale sands | 25 |
| Brookton | BR | Avon Wheatbelt | Western | Pale sands | 22 |
| Mullewa | MU | Avon Wheatbelt | Northern | Coloured sands | 17 |
| Merredin | ME | Avon Wheatbelt | Eastern | Coloured sands | 17 |
| Newdegate (deep) | ND | Mallee | Western | Pale sands | 11 |
| Newdegate (shallow) | NS | Mallee | Western | Sandy duplexes | 19 |
| Wittenoom Hills | WH | Mallee | Eastern | Sandy duplexes | 29 |
| Condingup | CO | Esperance Plains | Eastern | Pale sands | 24 |

* soil unit defined in Griffin and Schoknecht (2000).
** OC (t/ha) estimated organic carbon in fine earth fraction of top 30 cm of soil under uncleared vegetation from Griffin and Schoknecht (2000).




Reference
Datum: Australian Geodetic Datum
Grid: Universal Transverse Mercator Zone 50
Source data: Soil-landscape systems mapping at various scales (1:50,000 - 1:250,000)
Date: April 2002

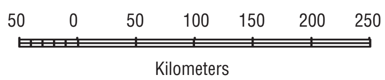



**Figure 1. Map of south-western Australia with soil carbon sampling locations.**

**Table 2. Summary of soil and vegetation at each study location.**

| Location | Soil | ASC* | Vegetation |
|---|---|---|---|
| Northampton | Pale yellow over yellow sand, > 2 m deep | Basic Regolithic Yellow-orthic Tenosol | *Banksia prionotes* woodland with many shrub species |
| Badgingarra | Grey over pale yellow sand, > 2 m deep | Basic Arenic Bleached-Orthic Tenosol | Proteaceae – Myrtaceae species-rich low heath |
| Brookton | Grey sand over sandy gravel over reticulite @ about 1 m | Acidic Ferric-Petroferric Bleached-Orthic Tenosol | Proteaceae – Allocasuarina - species-rich low heath |
| Mullewa | Yellow sand over reticulite @ about 1 m | Acidic Ferric-Reticulate Yellow-orthic Tenosol | *Acacia – Allocasuarina* shrubland |
| Merredin | Yellow sandy earth, > 2 m deep | Acidic Mesotrophic Yellow Kandosol | Shrubland |
| Newdegate (deep) | Shallow grey sand over sandy gravel over reticulite @ about 1 m | Ferric Mottled-Subnatric Yellow Sodosol | Mallee with Proteaceae shrubs |
| Newdegate (shallow) | Shallow grey sand over sodic clay @ < 30 cm | Eutrophic Mottled-Mesonatric Grey Sodosol | Mallee with *Melaleuca* shrubs |
| Wittenoom Hills | Shallow grey sand over sodic clay @ < 30 cm | Hypercalcic Mesonatric Grey Sodosol | Mallee with *Melaleuca* shrubs |
| Condingup | Grey sand over sandy gravel over clay or reticulite @ about 1 m | Ferric Eutrophic Yellow Chromosol | Banksia - species-rich heath |

*Australian Soil Classification (ASC) (following Isbell, 2002)

The existence of reliable land use history was a criterion for location selection. The paucity of suitable locations with good land use history resulted in some locations with poor land use history being selected. The limited land use history in some cases was the result of little prior knowledge by a new owner.

Most locations had three land uses, an uncleared, short- cleared and long-cleared history.
(The adjectives short and long were meant to be locally relative, not absolute as can be seen in Table 3.) The choice of two cleared land uses were in part compensation for the limited land use history, and also for the purpose of a more comprehensive sampling programme,

Table 3 outlines the land use history of the sampling sites.

## 4.2 SITE SELECTION

At each location possible sites were selected by interpreting landscape, vegetation and soil characters. Typically, a soil auger was used to select sites that were matched in terms of A, B and if possible the C horizons, not just the top 30 cm. Variable A horizon depth was the key issue in selecting similar sites. The sites within a location were usually within adjacent paddocks, and rarely more than a few kilometres apart.

## 4.3 SAMPLING METHODOLOGY

The sampling principals outlined by McKenzie *et al.* (2000) were followed as far as practicable. The sites were considered homogeneous if soil morphological characteristics were similar. The vegetation communities at each site were considered as part of a single stand of vegetation, not ecotones. Each site was sampled by a randomly located nest of four sampling points (pits) covering an area of approximately 10 m by 10 m. Soil pits were chosen instead of soil cores as they allow easy access for soil description and sampling.

At each sample point, a pit was excavated by backhoe to a minimum of depth of 1m and up to 2 m, depending on the ease of excavation. This was

**Table 3. Land use history for sites at each location.**

| Location | Land Use | Age* | Land Use Notes |
|---|---|---|---|
| Northampton | Long | >20 | Lupins-annual pasture occasional cereals |
| Northampton | Short | 10 | Approx age lupins-annual pasture occasional cereals |
| Northampton | Uncleared | 0 | Fenced |
| Badgingarra | Long | >25 | Mostly annual pasture, crop cereals or lupins about 1 in 5 |
| Badgingarra | Short | 4 | Fallow, and 2 cereal. poor annual pasture |
| Badgingarra | Uncleared | 0 | Fenced, burnt at time of clearing |
| Brookton | Long | >20 | Currently lupins, mostly cereal-lupin-annual pasture, however last 4 years lupins-cereals |
| Brookton | Uncleared | 0 | Slightly modified by stock but fenced off for several decades |
| Mullewa | Long | >40 | Cereal-lupins-annual pasture, currently annual pasture |
| Mullewa | Short | 10 | Cereal-lupins-annual pasture, currently poor lupins |
| Mullewa | Uncleared | 0 | Fenced, little stock damage evident |
| Merredin | Long | >40 | Cereal-lupins-annual pasture, currently annual pasture |
| Merredin | Short | 10 | Approx age only cereal-lupins-annual pasture, currently annual pasture |
| Merredin | Uncleared | 0 | Unfenced slight stock damage since clearing |
| Newdegate (deep) | Long | 17 | Cereal-annual pasture occasional lupins |
| Newdegate (deep) | Short | 5 | Cereal-lupins |
| Newdegate (deep) | Uncleared | 0 | Fenced |
| Newdegate (shallow) | Long | 11 | Mostly cereal-lupins, 2 years annual pasture wind eroded prior to sampling |
| Newdegate (shallow) | Short | 5 | Cereal-lupins |
| Newdegate (shallow) | Uncleared | 0 | Fenced |
| Wittenoom Hills | Long | >20 | Cereal-annual pasture |
| Wittenoom Hills | Short | 10 | Cereal-annual pasture |
| Wittenoom Hills | Uncleared | 0 | Fenced, in fire buffer strip but no evidence of degradation |
| Condingup | Long | 31 | Continuous annual pasture, with occasional barley @ about 1 in 5-7 |
| Condingup | Short | 11 | Continuous crop about 2 lupins, 1 cereal |
| Condingup | Uncleared | 0 | Unfenced, little stock damage |

*Age indicates years since clearing.

deeper than the 30 cm sampling depth required for the project. In all cases the pit depth was adequate to provide all necessary characterisation of the major morphological properties of the soil. The faces of the pits were used to obtain representative samples.

Additional sampling of the top 30 cm of the soil was undertaken due to higher concentrations and variability of organic carbon. This was achieved by a nest of four satellite shallow pits being dug within 1 m of the face of each deep pit. This provided 5 samples of the top 30 cm per sample point. Such sampling was intended to improve the representativeness of the samples rather than to obtain a measure of the variation at the micro-scale. The corresponding samples from these 5 pits were bulked in the field.

## 4.4 SAMPLING TIME

Sampling at each location occurred over less than a week, however, the sampling for whole project spanned about 6 months between September 2000 and February 2001. Thus, the sampling spanned the active growing to senescent phases of annual pasture and cropping systems. While this is less important for the uncleared native vegetation that consists mainly of perennial plants, there are still seasonal growth cycles. The importance of this issue stems from the seasonal variation in the amount of decaying roots. Samples from under an actively growing cereal would have most roots excluded from the fine earth fraction, while many roots in those samples from beneath a senescent crop could find their way into the fine earth fraction. This issue should be taken into consideration when interpreting differences between locations from this study.

## 4.5 SITE AND PIT DESCRIPTIONS

The landform characters of each site and soil profile characters were described in terms used by McDonald *et al.* (1990). As the sample points were very close together, the site characteristics were considered the same for each.

At each sample point (pit) the horizons (and sample intervals) were determined independently and recorded. For one pit at each site (usually the one at which a photograph was most easy to take), the profile was described in detail.

## 4.6 SAMPLE COLLECTION

This project was primarily focused on sampling the top 30 cm, however, sampling of the whole profile provided important characterisation of the organic carbon distribution at greater depth. Samples were contiguous and largely taken within morphological horizons, although the sample interval was limited to 10 cm at the surface and about 30 cm in the deeper layers. The sample depths were usually the same for each sample point (pit) in each site, unless there was a variation in the morphological boundary depths.

Morphological boundaries were relatively horizontal. The top of the domed clays (at Newdegate (shallow) and Wittenoom Hills) provided the only concern for the sampling. In these cases, samples were taken from portions of the pits of the appropriate depth.

The presence of coarse fragments (up to 90% by weight) was not a significant influence on the sampling approach. This was because the coarse fragments were gravel or at largest cobble-sized and could be sampled with the fine earth without loss of representativeness. The variation in coarse fragment content conformed to the morphological horizons.

The presence of coarse organic matter, especially live roots, needed some consideration. According to the sampling protocol, live roots were not part of the soil organic carbon pool and thus should be excluded from the sampling. Dead roots were the opposite. Distinguishing between live and dead root material proved an impossible task, primarily because the mainly fine roots present were too small or numerous to distinguish their living status. The limited life of annual roots also confounded this sampling problem. The occasional presence of larger roots (5–10 mm diameter) appeared to influence variation in some of the bulk density sampling. Also by chance, one sample intercepted a decaying large root. In all cases, roots, dead or alive were included in the samples.

## 4.7 SAMPLE TYPES

Samples were taken for two primary purposes, organic carbon and bulk density determination. As the bulk density samples needed to be dried at 105ºC, a temperature at which some organic carbon compounds volatilise, one sample could not satisfy both purposes. A dual sampling strategy was adopted, with one sample taken for bulk density and another sample taken for all other analyses.

For the majority of bulk density samples, cores 81 mm diameter and 100 mm long were hammered vertically into the mid-point of the sampling interval. Representative clods were taken for layers such as reticulite[1] that were too hard for the coring technique. One bulk density sample was taken from each sample interval at each sampling point. (Note no bulk density samples were taken from the shallow satellite pits.)

For the organic carbon samples, the samples from depths greater than 30 cm were taken from the pit face spanning the sample interval which each sample was meant to represent. For the top 30 cm, equal volume samples were taken from the four satellite pits and centre of the deep pit and bulked into three 10 cm depth intervals. The organic carbon samples were used for all analyses other than bulk density.

## 4.8 SAMPLE PREPARATION

Samples were collected in plastic bags and stored in the shade until transportation. Drying was initiated within a day of returning from the field.

The bulk density core samples were dried at 105ºC for at least 48 hours and weighed when cool. Bulk density measurements for clods were obtained by the wax coating method. Unfortunately, most of the results obtained by the clod technique were much higher than could be expected (some greater than the specific gravity of silica) and the results were discarded as unreliable and estimates were made from a limited number of core samples.

The organic carbon samples were dried for at least five days at 40ºC to moisture content mostly less than 2%. The fine earth fraction (< 2 mm) of the dried samples was separated from the coarse fraction by screening, and the coarse fragments were then segregated into organic and mineral fragments. These three fractions were retained for separate analysis.

Bulked samples of the fine earth fraction for each sample point over the 0-30 cm depth interval were prepared for Jan Skjemstad, CSIRO Adelaide. In the field the soils were sampled every 10 cm over this 30 cm interval, and hence bulking an equal weight of fine earth from each 10 cm sample without considering the initial bulk density and coarse fragment % of sample would lead to bias. The formula for determining the weight of each fine earth sample used for creating a bulked 0-30 cm sample was determined as follows:

weight for each 10 cm sample = 25*bulk density*fine earth %/100 grams

## 4.9 ANALYTICAL METHODS

Except for the bulk density calculations, all sample preparation and analyses were performed by the Chemistry Centre of Western Australia under the supervision of Dave Allan. These were standard methods and are not documented here. Table 4 outlines the analyses conducted, the soil fractions on which they were conducted and the proportion of samples analysed.

**1. Reticulite**

A reddish, yellowish, grey and white mottled horizon common in the wheatbelt below surface gravels. The mottling has a reticulate (net-like) pattern. It has a ‘gritty’ field texture of sandy loam to sandy clay loam, but until textured often looks like a clayey horizon. Clay content usually increases with depth. When moist it is usually hard and brittle and can be augured or hand cut with a spade, however, it often hardens further on drying. Some ironstone gravel may be present but this feature is not diagnostic.

**Table 4. Analyses and soil fractions analysed.**

| Analysis | Whole | Fine Earth | Coarse Mineral | Coarse Organic |
|---|---|---|---|---|
| Fine earth % | all | | | |
| Coarse mineral % | all | | | |
| Coarse organic % | all | | | |
| Moisture | | all | some | some |
| Organic Carbon (W&B) | | all | some | some |
| Mechanical analysis - sand, silt & clay | | all | | |
| Mechanical analysis – sand fractions | | some | | |
| Total N | | | some | some |
| Total P | | | some | some |
| Total K | | | some | |
| Total Fe | | | some | |
| Total Al | | | some | |
| EC (1:5) | | some | | |
| pH (1:5 water) | | some | | |
| pH (1:5 $CaCl_2$) | | some | | |
| Al (1:5 $CaCl_2$) | | some | | |
| $Fe_2O_3$ | | some | | |
| $Al_2O_3$ | | some | | |
| $CaCO_3$ | | some | | |
| CEC | | some | | |
| Exchangeable Ca | | some | | |
| Exchangeable Mg | | some | | |
| Exchangeable Na | | some | | |
| Exchangeable K | | some | | |
| Exchangeable Al | | some | | |
| Exchangeable Mn | | some | | |
| Saturation extract, Moisture | | some | | |
| Saturation extract, pH | | some | | |
| Saturation extract, ECe | | some | | |
| Saturation extract, Ca | | some | | |
| Saturation extract, Mg | | some | | |
| Saturation extract, Na | | some | | |
| Saturation extract, K | | some | | |
| Saturation extract, S | | some | | |
| Saturation extract, SAR | | some | | |

W&B, represents Walkley and Black; N, Nitrogen; P, Phosphorus; K, Potassium; Fe, Iron; Al, Aluminium; EC,Electrical conductivity; Ca, calcium; CEC, Cation Exchange Capacity; Mg, Magnesium; Na, Sodium; Mn, Manganese; ECe, Electrical conductivity of saturation extract; S, Sulphur; and SAR, Sodium Absorption Ratio.

# 5. RESULTS

Appendix 1 provides the description of the study locations and sites and the morphology of each of the pits. Variations in the depths of samples between the sampling points (pits) at each location are provided in Appendix 2. This appendix also provides the data for bulk density of the sample, the organic carbon (following methods by Walkley and Black) of the several fractions and the clay content of the fine earth fraction. Appendix 3 provides data on the basic chemistry of the fractions (e.g. N, P, pH etc.) from the selection of samples for which there was more detailed analysis. Appendix 4 provides exchangeable cations and some saturation extract data from a selection of samples analysed.

## 5.1 COMPARISON OF ANALYTICAL RESULTS

This report provides data analysed in a commercial analytical laboratory, Chemistry Centre of Western Australia. The Chemistry Centre of Western Australia used the Walkley and Black method for organic carbon and mechanical analysis for clay content. Bulked samples of 0-30 cm provided to CSIRO Land and Water were analysed independently. These were analysed by CSIRO using the LECO method for organic carbon, and clay was estimated by mid infra-red method (MIR). A comparison of the results from the two laboratories is given below.

To allow comparison of the results over the 0-30 cm sampling interval, the Chemistry Centre of Western Australia data were mathematically bulked in the same way as the samples were bulked and provided to CSIRO (see sample preparation section above).

### Organic Carbon

A previous study (Skjemstad *et al.* 2000) showed a close correlation between the results from these two methods and the same laboratories. The present data demonstrate a very similar correlation between the values from the composite samples (LECO) and the mathematically computed results from the component samples (W&B)(Figure 2). There is a strong linear correlation between the results of the two methods but the correlation is slightly worse than reported by Skjemstad *et al.* 2000. The discrepancy in correlation is probably related to the composite samples being used. The LECO results are a few percent higher than the Walkley and Black derived data. This is in accord with Skjemstad *et al.* 2000 who suggested a conversion factor of 1.12 to be applied to the Walkley and Black results from the Chemistry Centre of Western Australia.

### Clay

The mid-infrared (MIR) estimates of clay content were commonly higher and sometimes much higher than those estimated by mechanical analysis. The measurements were strongly correlated in a curvilinear fashion (Figure 3).

Except for samples from the Wittenoom Hills location, all samples contributing to the 0-30 cm bulking were determined to be sand or sandy loams by field texturing methods. In this range of clay content, experience has shown the correlation between field texture and the Chemistry Centre of Western Australia mechanical analysis is typically good. We conclude that the MIR clay data are questionably high for many of the samples.

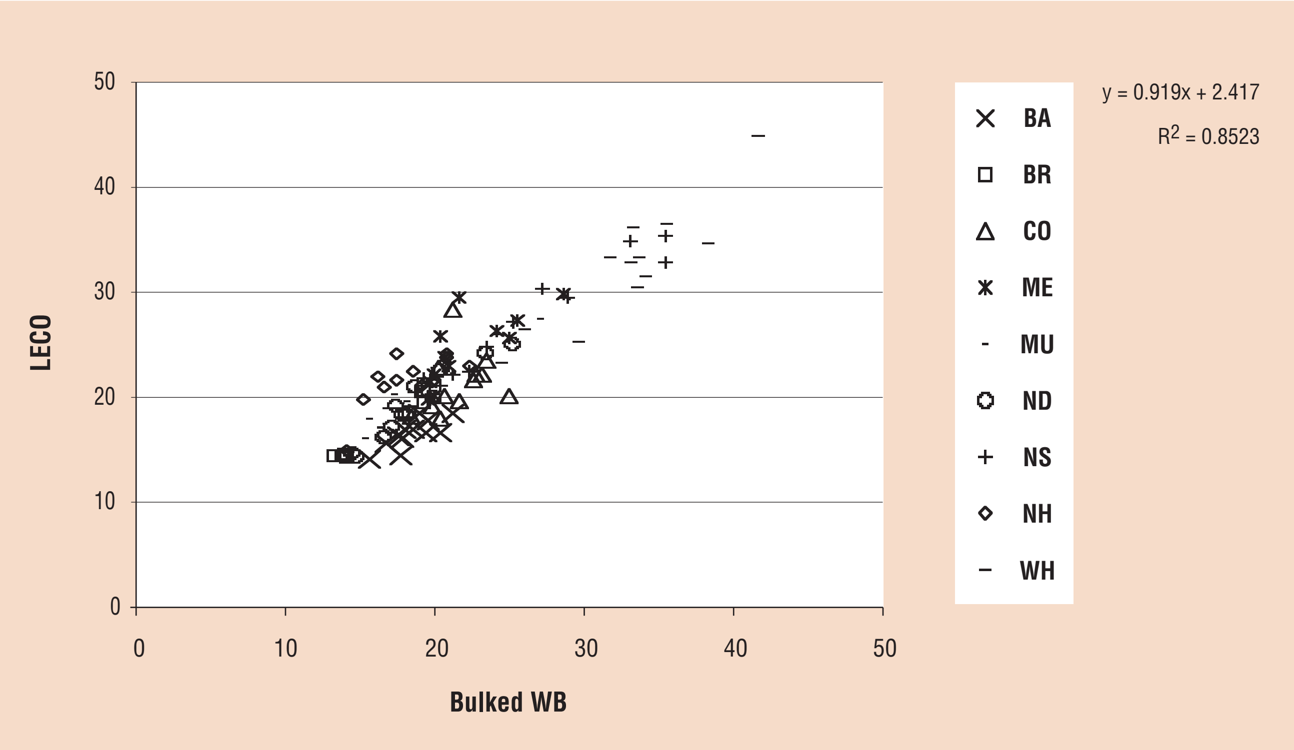



**Figure 2. Comparison of results from CSIRO and CCWA laboratories respectively. Organic Carbon measured by LECO and Walkley and Black (%).**

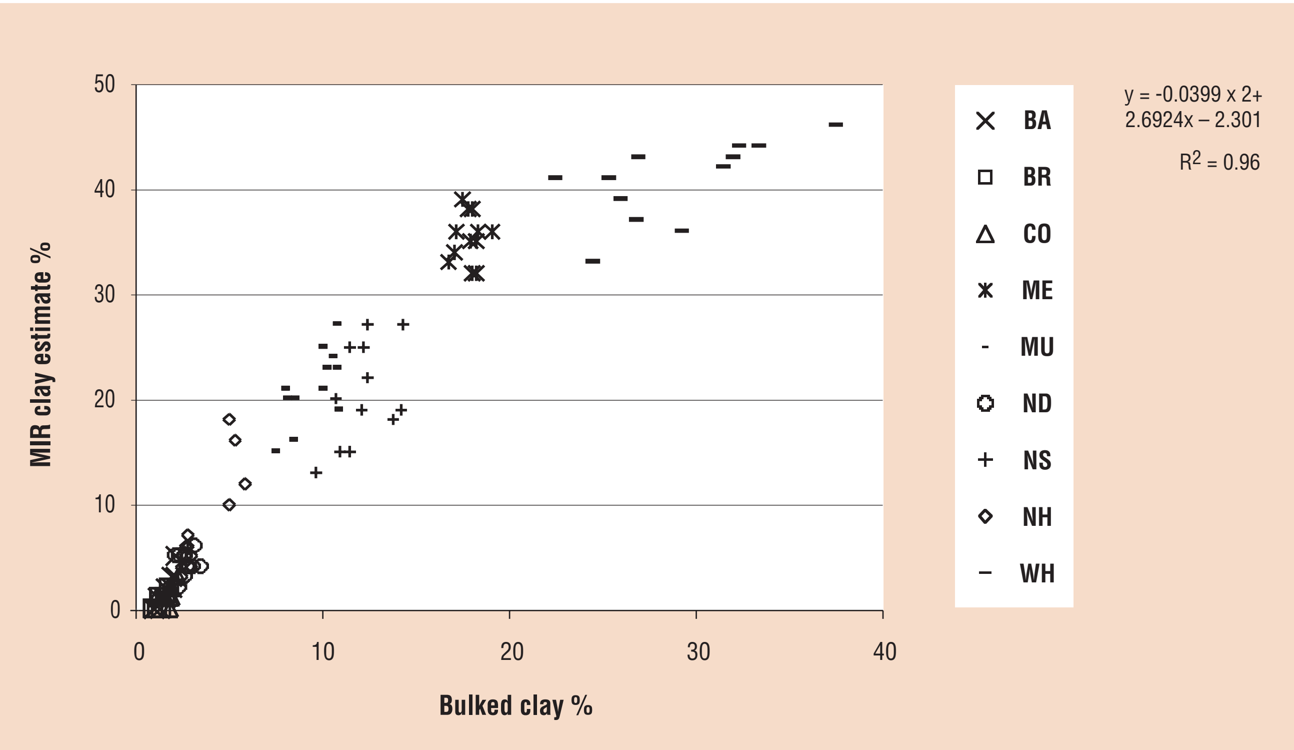



**Figure 3. Comparison of results from CSIRO and CCWA laboratories respectively. Clay estimated by MIR compared to clay measured by mechanical analysis (%).**

## 5.2 SIMILARITY OF SITES AT EACH LOCATION

There were some difference between soils at different sites within a location. Some of these differences were unavoidable due to the spatial separation of the sites and some were due to land use. A comparison of the soil characteristics independent of land use is briefly outlined below.

### Northampton

These sites were in three separate paddocks and not very close to each other. From old aerial photographs, the vegetation appears similar. The short-cleared site appears to have been in reasonably good condition prior to clearing.

The clay content of the long-cleared site from 30–100 cm is about twice that of short-cleared and uncleared. This seems to be reflected in the exchangeable cations, total iron (Fe), total aluminium (Al), total potassium (K) and to a lesser degree total nitrogen (N) and total phosphorus (P) and coarse fragments.

The coarse fragment contents were very low in all samples, and the uncleared site had none. The pH below 1 m was lower for long-cleared than short-cleared or uncleared. This may be related to the clay content but it might also be due to the land use.

One sample point in the uncleared site intercepted a large decaying root. Consequently, higher organic carbon and lower bulk density were recorded for this pit. No detailed analyses were undertaken on this pit.

### Badgingarra

The uncleared and short-cleared sites were in adjacent paddocks. From inspection of aerial photographs, the vegetation prior to clearing appeared quite similar in type and condition. The long-cleared site was somewhat removed, but it is assumed from the soil, landscape position and knowledge of the area that the vegetation had been similar.

The long-cleared site had about half the clay content (5–10%) at 1 m depth as the short-cleared and uncleared sites. As a consequence it had lower exchangeable cations and possibly total Al at 1 m depth.

The long-cleared site had about 15% coarse fragments content, the short-cleared had about 8% coarse fragments content at depth, and the uncleared had none. This seemed to be paralleled by the total P values, which were very low for all. P content for the uncleared site was consistently two-thirds that of long-cleared and short-cleared.

The uncleared site had slightly higher pH values at depth than long-cleared and short-cleared sites. While this might be an effect of land use for long-cleared sites, it seems unlikely for short-cleared sites because of the short time since clearing.

### Brookton

The sites were quite close together. However, the condition of the uncleared site provided evidence that this area had been grazed at some time in the past and was recovering. There is no indication of what the long-cleared site was like before clearing.

The long-cleared site had a higher clay content at depth than the uncleared site, although this is not reflected consistently in the exchangeable cations.

The long-cleared site also had higher P and K values at depth than the uncleared site.

### Mullewa

The short-cleared and uncleared sites were close together. The short-cleared site had very similar vegetation and condition prior to clearing. The long-cleared site was somewhat remote, but apparently similar vegetation existed prior to clearing, given the evidence of the vegetation adjacent to this site.

The coarse fragments were closer to the surface for long-cleared than short-cleared or uncleared sites.

### Merredin

All sites were quite close together and probably had similar vegetation. The uncleared site was in a narrow vegetated strip between paddocks with evidence of slight disturbance. It is likely that the short-cleared site was in similar condition to uncleared areas prior to clearing. All were quite similar in the soil properties measured.

### Newdegate (deep)

The short-cleared and uncleared sites were close to each other and had very similar vegetation prior to clearing. The long-cleared site appeared to have similar vegetation from the evidence of adjacent remnant vegetation. From discussions with the land owner, the native vegetation prior to clearing appears to have been natural with little or no disturbance.

The clay B horizon was closer to the surface for short-cleared and uncleared sites than long-cleared sites, as was the peak values of total Fe and total Al. The EC of the uncleared site at depth was much greater than that of long-cleared or short-cleared sites.

### Newdegate (shallow)

The long-cleared and uncleared sites were close together and the short-cleared site somewhat remote. The short-cleared site appeared to have similar vegetation from the evidence of adjacent remnants. The condition prior to clearing appears to have been natural with little or no disturbance. The clay content was similar at all sites. Total Al was higher at depth for short-cleared than long-cleared or uncleared sites. A narrow band of coarse fragments occurred at about 15 cm in the long-cleared sample.

The uncleared site has much lower $CaCO_3$ at depth than long-cleared or short-cleared sites, even though pH values were similar. The salt levels (as measured by electrical conductivity –EC) was lower in uncleared sites at depth than long-cleared or short-cleared sites.

### Wittenoom Hills

The long-cleared, short-cleared and uncleared sites were all close together and probably had very similar vegetation. The condition prior to clearing appears to have been good.

The short-cleared site had slightly higher clay content in the A and upper part of the B horizon. There was much higher exchangeable Ca in the A horizon of long-cleared land. Other exchangeable cations were similar between sites.

The coarse fragments fraction was slightly deeper for uncleared than long-cleared or short-cleared sites.

The long-cleared site had higher $CaCO_3$ content in upper subsoil than short-cleared or uncleared sites, but the pH was only slightly higher. Higher exchangeable Ca for long-cleared might be related to the $CaCO_3$ values. The EC was higher in the uncleared site at depth than in long-cleared or short-cleared sites.

### Condingup

The uncleared and short-cleared sites were quite close together. The short-cleared site appeared to have had similar vegetation and to have been in similar condition prior to clearing. The long-cleared site was more remote. While there is no direct evidence of what the vegetation was, it is likely that it was of a similar good condition prior to clearing.

The B horizon (and highest clay content layer) is closer to the surface in the long-cleared than the short-cleared site, which is slightly closer to the surface than uncleared sites. This is reflected in the exchangeable cations data.

The coarse fragments fraction total Fe, total Al, total K and possibly total P follows similar patterns. The EC of the uncleared site at depth was much greater than among long-cleared or short-cleared sites.

## 5.3 COMPARISON BETWEEN LOCATIONS

Some of the differences between the sites (land use pairs) in terms of other parameters will be covered in discussion on the apparent impact of changing land use.

Most of the sites are reasonably well matched in terms of the soil properties. There is reasonable confidence that the vegetation condition prior to clearing was similar to that of the uncleared vegetation sampled for all sites but Brookton. At Brookton, it is likely that the condition of the native vegetation was better (less modified) in the areas now cleared than the area sampled for this study.

The main focus of this report is to present the organic carbon data from the paired sites and describe the degree of consistency between the locations in terms of the variations in some parameters between locations. Other apparent changes due to land use differences are also reported and discussed.

There are some key differences between locations that might be pertinent in considering the possible effects of land use.

The soils at all the locations studied have a sandy surface (at least 20 cm deep), however, that is where the similarity ends. The Badgingarra and Northampton soils are deep sand to less than 2 m, (Basic Arenic Bleached-orthic Tenosol, and Basic Regolithic Yellow-orthic Tenosol, respectively). The Mullewa soil is a moderately deep acid sand over gravel and reticulite at about 1 m, (Acidic Ferric-Reticulate Yellow-orthic Tenosol).

The Merredin soil is a deep sandy earth, with acid subsoil, (Acidic Mesotrophic Yellow Kandosol).

The Brookton, Newdegate (deep) and Condingup soils are shallow sand over gravels with generally clayey reticulite at about 1 m; Newdegate (deep) had a sodic subsoil (Acidic Ferric-petroferric Bleached-orthic Tenosol, Ferric Mottled-subnatric Yellow Sodosol and Ferric Eutrophic Yellow Chromosol, respectively).

The Newdegate (shallow) and Wittenoom Hills soils are shallow sandy duplexes, both sodic and alkaline subsoils , (Eutrophic Mottled-mesonatric Grey Sodosol and Hypercalcic Mesonatric Grey Sodosol or Hypercalcic Subnatric Grey Sodosol, respectively).

The Badgingarra, Brookton, Condingup, Merredin, Mullewa, Northampton soils have acid soil reaction trends (surface soil has pH value lower than 7.0 and the deep subsoil has a pH less than 6.5, Northcote 1984), whereas the Newdegate (shallow), Newdegate (deep) and Wittenoom Hills have alkaline soil reaction trends (surface soil has a pH higher ten 5.0 and the deep subsoil has a pH value higher than pH 8.0). Amongst those with acid soil reaction trends, there were big differences with the Mullewa, Merredin and to a lesser extent the Brookton soils being very acid (pH $CaCl_2 < 4.5$) at depth. These low acid values can have a significant effect on crop or pasture production.

The clay B horizons of the Wittenoom Hills, Newdegate (shallow) and Newdegate (deep) soils have moderate electrical conductivity values at depth of 50 –150 mS/m. These values and the sodicity may affect crop and pasture growth. Other locations have negligible soluble salts.

The level of macronutrients (N, P, K) are low in most locations. Total K has the greatest variation between locations, which seems partly related to the variation in clay content, but is probably also related to the degree of weathering. Exchangeable cations vary greatly between location. This also is mainly because of the variation in clay content. The organic carbon dominates the exchangeable cations in the surface 10 – 20 cm, with Ca being the dominant cation. The subsoil exchangeable cations are dominated by clay. The base status varied greatly from 0.5 to 5 me/kg clay between locations. Those locations with sodic subsoils (Condingup, Newdegate (shallow), Newdegate (deep) and Wittenoom Hills) had higher base status values.

## 5.4 BULK DENSITY TRENDS

Before reporting the principal results, apparent changes in bulk density need to be considered. This is an aspect that can influence the validity of the comparison as well as how the comparison is made. In a case study, McKenzie *et al.* (2000) indicate that where there are bulk density changes and loss of soil (both likely results of changing land use from native vegetation to cultivated agricultural systems), direct comparisons of apparent paired sites may not be entirely valid. They show that equal depth comparisons can give an apparent difference in the organic carbon data, even if the only real difference is a change in the bulk density, e.g. by compaction. They argue that equivalent mass comparisons are more reliable.

Soil loss is a different issue that can be confounded with changes in bulk density. It is sometimes not possible to distinguish from bulk density results alone between a soil which has been compacted and one which has lost top soil. This is because on the one hand, compaction increases the bulk density of surface layers, while on the other hand, the lower bulk density surface soil has been lost, leaving higher density layers in its place.

It was concluded that adjustments to either the sampling methodology or comparison of results were fraught with uncertainties. The important issue is that the possibility of an apparent result being the product of changes in the degree of compaction needs to be pointed out. To that end, any changes in the bulk density are presented first.

Typically, the bulk density was lower at the surface than in the deeper layers (Appendix 5). There was a large variation in the measured bulk density from samples at the same depth at the same site and the same location. While this representation might appear reasonable, some of the presented variation will be due to the profiles from each replicate in each land use at each location not being perfectly matched. For example, the depth to gravel layers varied slightly, as did the amount of gravel and the depth to texture contrast layers. Care should be taken in inferring anything about the variation in bulk density in a single profile or the variation in determining the bulk density from this presentation of the data.

These provisos aside, it appears that sandy and earthy soils (Northampton, Badgingarra and Merredin locations) generally had more consistent bulk density values than soils in other locations, especially in the subsoil. The heavier textured subsoils were commonly reticulite, heterogeneous to some degree and often had evidence of root channels and/or preferential flow channels. The surface layers of all soils had a moderate variation in bulk density values. Subsoils with significant coarse mineral fraction appeared to have the greatest variation.

There were also some apparently consistent differences between land uses, mainly for surface layers. The bulk density for uncleared sites is mostly (except for Wittenoom Hills) lower than that of short-cleared or long-cleared sites. Differences in soil variables between land uses appear to be minimal by 20–30.

Bulk density values can be influenced by a number of parameters including the amount of organic matter, clay, coarse mineral fragments and structure of the soil layers.

These data, both from most individual locations and across locations, suggest that the bulk density is negatively related to the organic carbon and coarse organic matter content. However, in these data the bulk density, organic carbon and coarse organic matter are all correlated with depth; the bulk density positively and the others negatively. Looking more closely, the apparent relationships seem to differ for the different land uses, with the uncleared sites having lower bulk density values for the same level of organic carbon.

Hence it is difficult to demonstrate a direct relationship between land use and bulk density values. However, as clearing for agriculture influences the structure of surface layers of soil, it is speculated that this is the main influence on changes in bulk density in short and long-cleared and uncleared sites. Organic carbon appears to be possibly modifying this influence, but is not the main factor controlling the bulk density changes.

Regarding the confounding effects of compaction and soil loss on bulk density discussed above, it is speculated that there would be a 1-2 cm compaction from the observed 5-10 % increase in bulk density changes in the top 20 cm of soil, were there to be no soil loss. If this were the only change, the compaction would slightly reduce the organic carbon concentration (as wt %) in the surface samples through the inclusion of additional soil with lower concentration. On the other hand, it would result in slightly increased organic carbon density (as e.g. t/ha over a given depth). The amount of increase would be less than the 5-10 % increase in bulk density.

## 5.5 FINE EARTH ORGANIC CARBON (WT %)

The organic carbon in the fine earth fraction was concentrated at the surface, where the greatest variation occurred (0.5 to 1.5%), falling to generally less than 0.5% by 50 cm (Appendices 2, 6). The decline with depth roughly followed a set of negative power curves (Appendices 2, 6). At some locations there were obvious relative concentrations at depth (e.g. Brookton, Condingup and Newdegate (deep)). This mostly occurred at the top of the B horizon for texture contrast or top of the gravel layer for gravelly soils.

There were no consistent trends between sites in the organic carbon related to land use for the top 10 cm. Some locations seemed to have a consistent trend of increasing organic carbon with increasing time of clearing (Wittenoom Hills, Condingup, Merredin and Brookton). However, Brookton should be considered an artefact of low values for uncleared samples. Some sites had consistent trends the other way (Mullewa and Newdegate (shallow)). These seem to be due to the very low pH of Mullewa soils, and wind erosion events for Newdegate (shallow)).

The remainder of the sites appeared to have similar values for all land uses (Badgingarra, Newdegate (deep) and Northampton).

Below 10 cm, the organic carbon in the fine earth fraction in uncleared land was mostly slightly higher than, or at least equivalent to that of sites with other land uses.

## 5.6 CUMULATIVE FINE EARTH ORGANIC CARBON (AS T/HA)

The organic carbon per unit volume was calculated and a cumulative value (t/ha) by depth and is presented in Appendix 7 for each combination of location and land use. A summary of the findings are presented in Table 5. All of the curves in Appendix 7 flatten out with increasing profile depth. However, none become entirely flat, indicating that the total organic carbon in the fine earth of the profiles is probably 5 to more than 20 t/ha greater than the amount in the top 1 m. At this rate, the organic carbon in the top 30 cm appears to represent about half that in the whole profile.

The variation in the estimates of the carbon pool among sites was found to be 20-30 % (Table 5), even in the same site (land use) at the same location.

These cumulative curves (in Appendix 7) show no consistent differences due to land use. A general trend appears to be that the organic carbon in the uncleared sites is less than or equal to that of the cleared sites in the surface, but the situation is gradually reversed (greater than or equal to) as the deeper soil is taken into account. This is attributable to the fact that native vegetation exploits the soil to a greater depth than annual agricultural plants.

There were significant differences in the cumulative organic carbon per unit area between locations, mainly in the top 10 cm (Figure 4). For the uncleared sites, cumulative organic carbon per unit area at Wittenoom Hills was more than twice the lowest (Brookton) and about 50% more than that at most other locations. (Brookton was disturbed by grazing many years ago and appears to be have yielded a

**Table 5. Cumulative organic carbon (t/ha) summarised by location and land use.**

| Location Name | Land Use | by 10 cm | | | by 30 cm | | | by 100 cm | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | min | mean | max | min | mean | max | min | mean | max |
| Northampton | L | 8 | 11 | 13 | 16 | 19 | 21 | 28 | 32 | 33 |
| Northampton | S | 9 | 10 | 10 | 14 | 16 | 17 | 22 | 24 | 25 |
| Northampton | U | 8 | 10 | 11 | 17 | 19 | 22 | 28 | 36 | 56 |
| Badgingarra | L | 11 | 11 | 12 | 18 | 18 | 19 | 26 | 28 | 31 |
| Badgingarra | S | 10 | 10 | 11 | 17 | 19 | 20 | 30 | 32 | 34 |
| Badgingarra | U | 9 | 10 | 12 | 16 | 18 | 21 | 27 | 29 | 32 |
| Brookton | L | 9 | 11 | 12 | 14 | 18 | 19 | 21 | 24 | 26 |
| Brookton | U | 7 | 8 | 8 | 13 | 14 | 14 | 20 | 21 | 22 |
| Mullewa | L | 7 | 8 | 9 | 15 | 16 | 17 | 21 | 22 | 23 |
| Mullewa | S | 7 | 8 | 8 | 16 | 18 | 19 | 26 | 28 | 30 |
| Mullewa | U | 10 | 11 | 13 | 21 | 24 | 27 | 34 | 39 | 43 |
| Merredin | L | 11 | 12 | 13 | 20 | 21 | 22 | 29 | 30 | 31 |
| Merredin | S | 12 | 14 | 16 | 24 | 26 | 29 | 34 | 36 | 38 |
| Merredin | U | 9 | 9 | 9 | 20 | 20 | 20 | 30 | 32 | 35 |
| Newdegate (deep) | L | 12 | 13 | 14 | 17 | 19 | 20 | 29 | 33 | 37 |
| Newdegate (deep) | S | 11 | 12 | 13 | 17 | 19 | 23 | 25 | 28 | 36 |
| Newdegate (deep) | U | 7 | 11 | 17 | 14 | 19 | 25 | 25 | 27 | 32 |
| Newdegate (shallow) | L | 10 | 11 | 12 | 19 | 21 | 25 | 27 | 32 | 38 |
| Newdegate (shallow) | S | 11 | 13 | 15 | 20 | 23 | 27 | 26 | 33 | 37 |
| Newdegate (shallow) | U | 14 | 17 | 22 | 29 | 33 | 35 | 38 | 45 | 52 |
| Wittenoom Hills | L | 16 | 20 | 22 | 26 | 34 | 42 | 31 | 42 | 51 |
| Wittenoom Hills | S | 14 | 18 | 21 | 25 | 31 | 34 | 31 | 41 | 47 |
| Wittenoom Hills | U | 15 | 17 | 18 | 30 | 34 | 38 | 40 | 44 | 50 |
| Condingup | L | 12 | 14 | 14 | 20 | 22 | 23 | 29 | 34 | 36 |
| Condingup | S | 12 | 14 | 16 | 20 | 23 | 25 | 35 | 39 | 45 |
| Condingup | U | 9 | 9 | 11 | 18 | 20 | 21 | 33 | 35 | 37 |

L represents long-cleared site; S, short-cleared site; and U, uncleared site.

lower biomass than might otherwise have been expected for that plant community.) Among long-cleared sites, cumulative organic carbon per unit area at Wittenoom Hills was also more than twice the lowest (Mullewa) and about 50% more than most other locations. The sandy duplexes at the Wittenoom Hills and Newdegate (shallow) locations appear to have more organic carbon than the deep sands at the Northampton and Badgingarra locations.

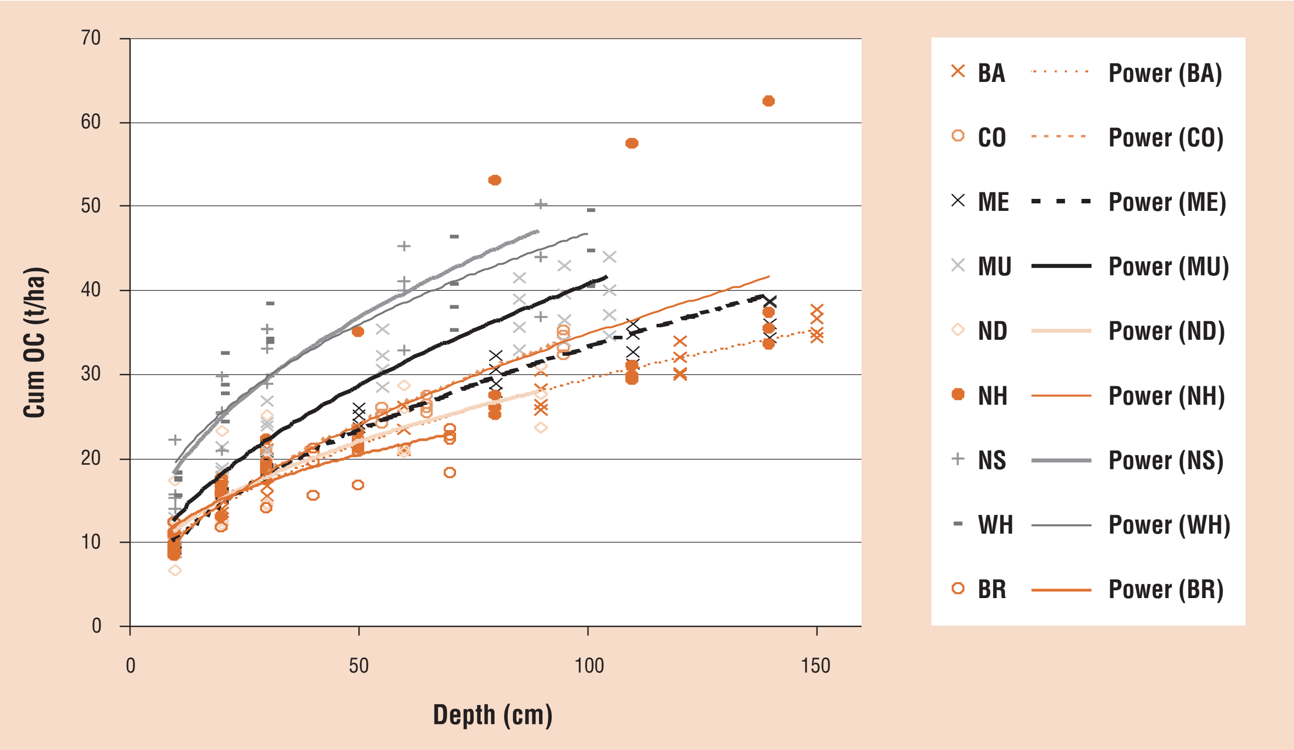



**Figure 4a. Cumulative organic carbon (W&B,%) of fine earth fraction by depth - Uncleared sites.**

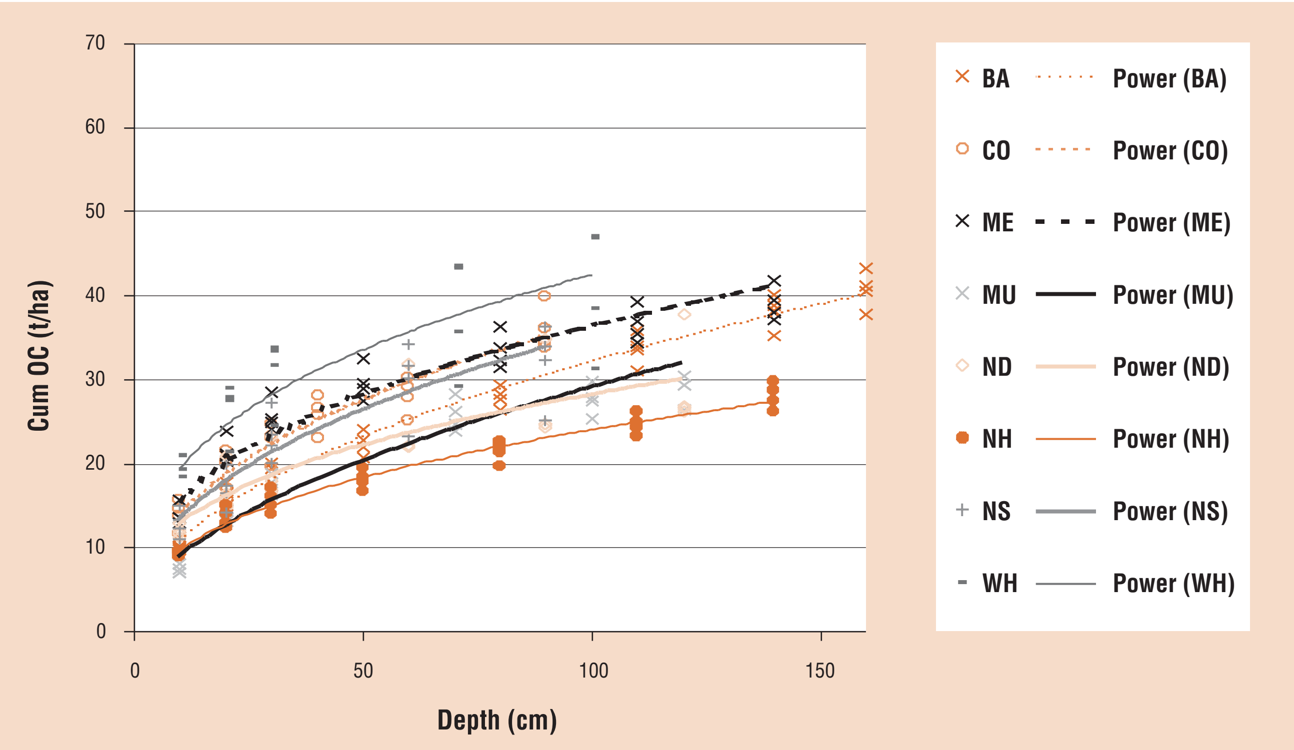



**Figure 4b. Cumulative organic carbon (W&B,%) of fine earth fraction by depth - Short-cleared sites.**

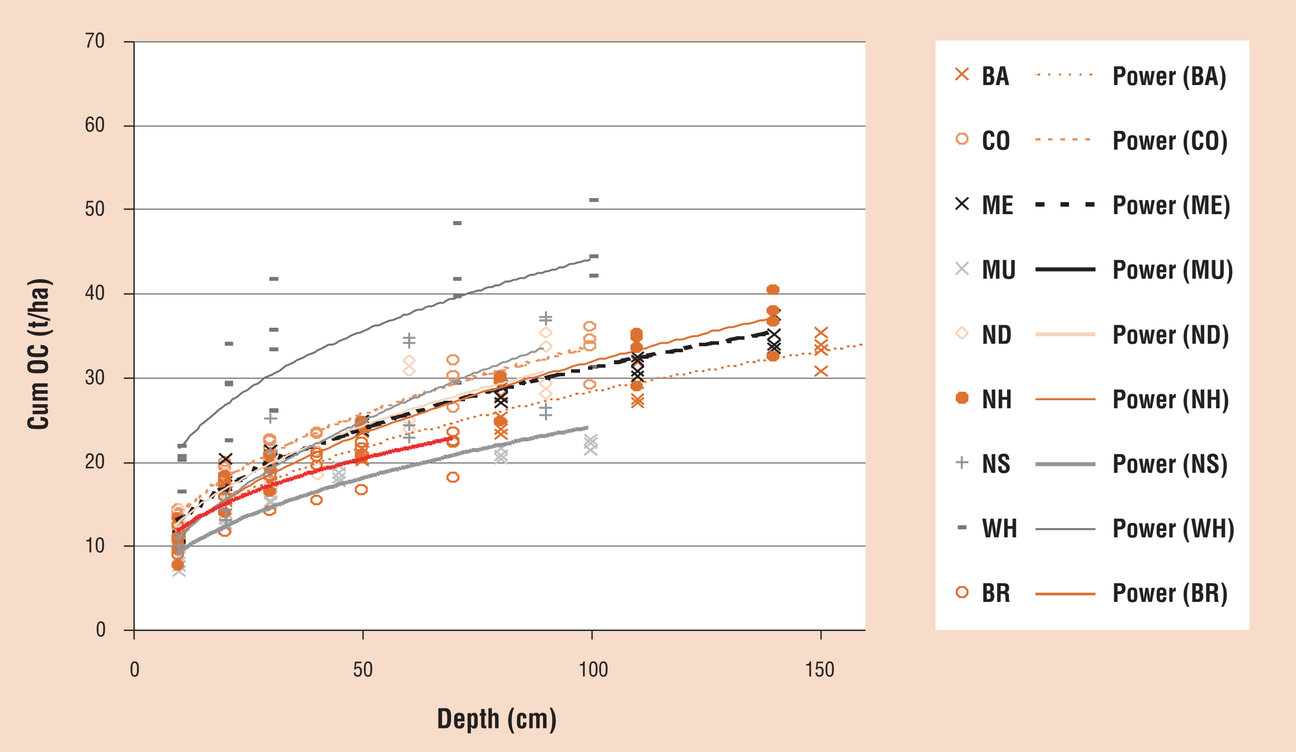



**Figure 4c. Cumulative organic carbon (W&B,%) of fine earth fraction by depth - Long-cleared sites.**

## 5.7 COMPARISON OF FINE EARTH ORGANIC CARBON VALUES WITH THAT FROM PREVIOUS STUDY

The locations in this study were chosen as examples of soils in different ecological regions of south-western Australia. A previous study (Griffin and Schoknecht 2000) presented a compilation of the organic carbon (using Walkley and Black methods) in the fine earth fractions in uncleared vegetation from different soil types in different IBRA regions.

Appendix 8 presents the current data (as individual sample values of organic carbon (wt %) plotted against depth) with that from comparable IBRA regions and soil types from the previous study. The Condingup and Mullewa locations had negligible comparable data from the earlier study. Of the other locations, the scatter of the data points was roughly within that from the earlier study. Only the Badgingarra location appears to have consistently lower values, which suggests the Badgingarra location might be slightly at variance with the data that of the previous study. The significance of this difference is unknown.

Cumulative organic carbon content for the top 30 cm of soil under uncleared vegetation, as derived by Griffin and Schoknecht (2000), are provided in Table 1. The data is broadly similar to that of the uncleared land use sites from the current study. Some locations had lower values in the current study (Badgingarra, Brookton) and some had higher values (Northampton, Newdegate (deep). This suggests that the previous study reported values of an appropriate order of magnitude.

## 5.8 COARSE ORGANIC MATTER

Coarse organic matter was concentrated at the surface, where it is 0.1 to over 8% of the whole soil, usually reducing rapidly to less than 0.1% by 50 cm (Appendix 9). This was characteristic of all sites.

There were, however, distinct differences between land use sites in the amount of coarse organic matter. Most of the uncleared sites had more coarse organic matter, especially below 10 cm. There was consistently more coarse organic matter throughout the profile in uncleared than short-cleared or long cleared sites at Badgingarra, Brookton, Mullewa, Northampton, and Wittenoom Hills locations. For Condingup, Merredin, Newdegate (deep) and Newdegate (shallow) locations, the amount of coarse organic matter was consistently greater in uncleared than short-cleared or long-cleared sites below 10 cm.

Some of the coarse organic matter was clearly live roots. The determination of dead or live roots was extremely difficult and could not be resolved without detailed study. Field observations suggested that there appeared to also be more dead roots in the uncleared than in the other land uses. It was also often noted that there were more dead roots of perennial plants in short-cleared than in long-cleared sites.

There appears to be significant differences between locations in the amount of coarse organic matter (Figure 5), even though there is a lot of overlap in the data. The differences were across land uses and were greatest for the surface layers. For the uncleared sites, the sandy soils (e.g. Northampton and Badgingarra) appeared to have the most coarse organic matter and the duplex soils (e.g. Wittenoom Hills, Newdegate (shallow) and Newdegate (deep)) tend to have the least. This suggests soil type has a strong influencing on root densities independent of vegetation type/land use. This could reflect the differences in the disposition and concentration of available nutrients and moisture. (Brookton was overlooked in this analysis for it appears to be atypically low because of prior grazing.). It must also be considered possible that these results are confounded by the differences in the time of the year at which the sampling was undertaken for the crops in the cleared sites were annual species with roots which begin to decay in summer. Badgingarra and Northampton were among the earliest sampled (winter) and Wittenoom and Condingup were the latest (summer).

The levels of organic carbon in these samples varied greatly and there were no clear differences between land uses (across locations). However, the nitrogen and phosphorus content of the coarse organic matter between land uses were very different, especially between uncleared and long cleared sites (Figure 6a). This shows both differences in the absolute values of these two elements and in the relationship between them. The short-cleared samples analysed were intermediate between uncleared and long-cleared and were closer to that of the uncleared in terms of nitrogen and phosphorus levels. The organic carbon-nitrogen ratios showed clear differences between the land uses (Figure 6b).

The organic carbon, nitrogen and phosphorus composition differences probably reflect the differences in root type. It was noted that the coarse organic matter of the uncleared sites was dominated by roots of perennial plants and the long-cleared sites had mainly roots of annual crops and pasture species.

While these data are interesting in themselves, the differences in type and composition will probably affect the rate of decomposition, something which could conceivably affect the modelling of the organic carbon pool.

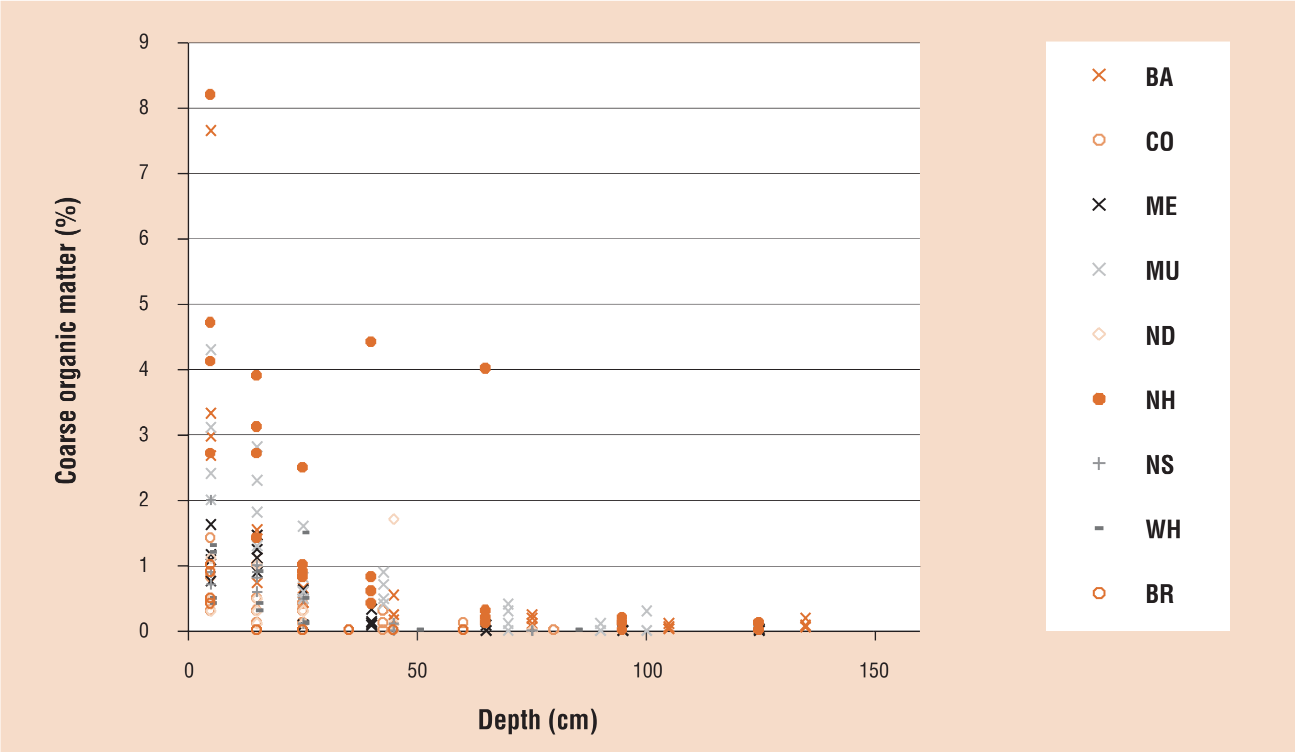



**Figure 5a. Coarse organic matter (% of whole soil) by depth - Uncleared sites.**

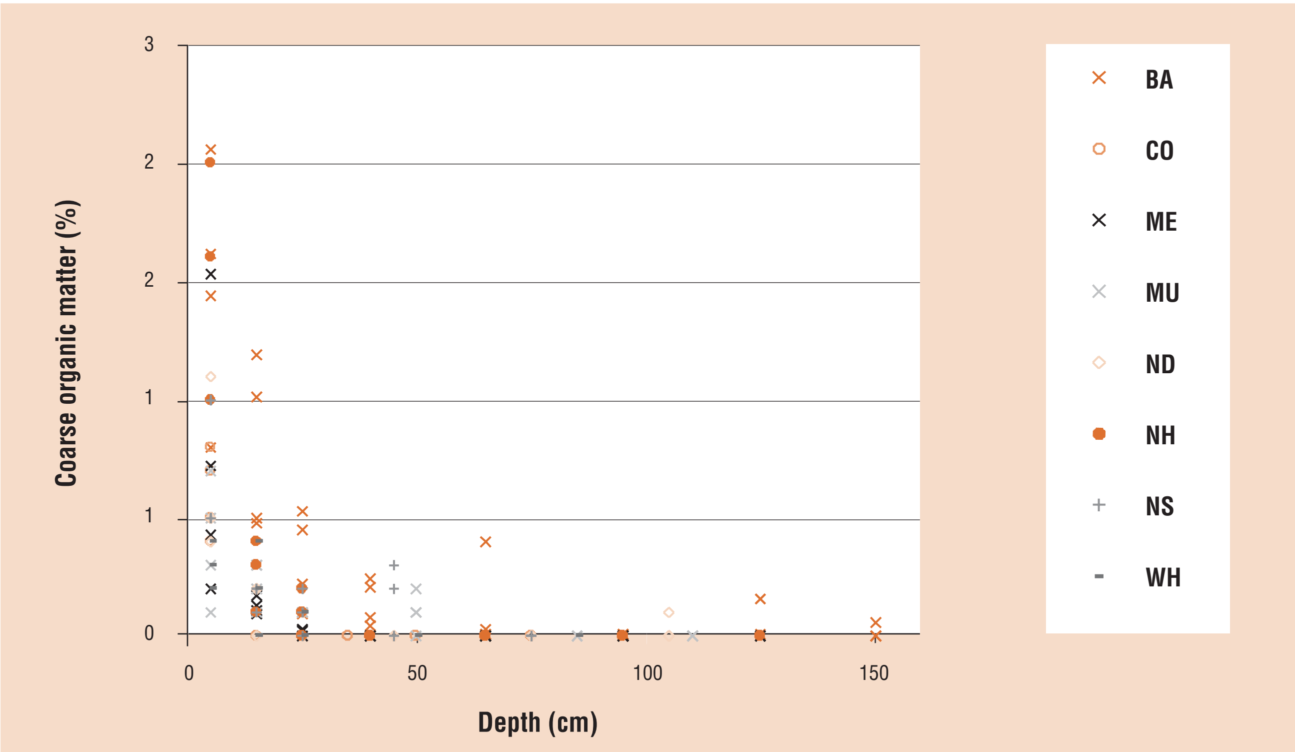



**Figure 5b. Coarse organic matter (% of whole soil) by depth - Short-cleared sites.**

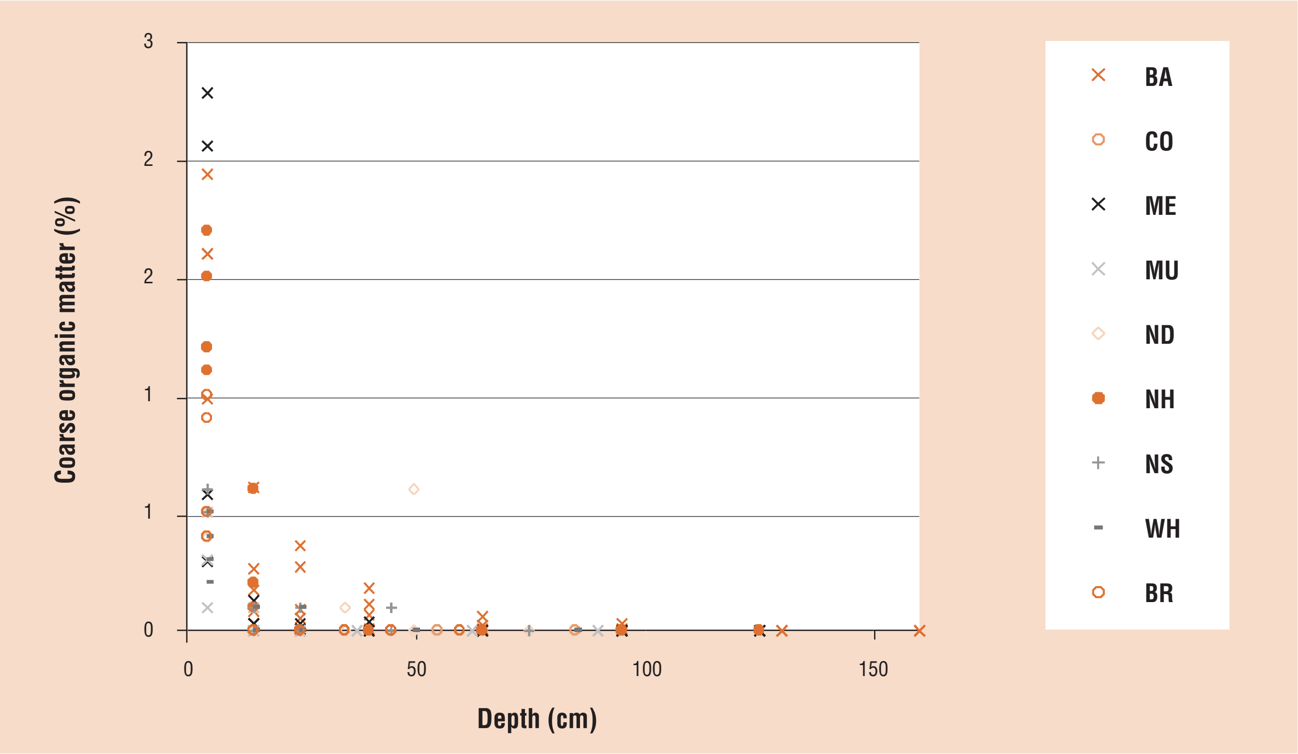



**Figure 5c. Coarse organic matter (% of whole soil) by depth - Long-cleared sites.**

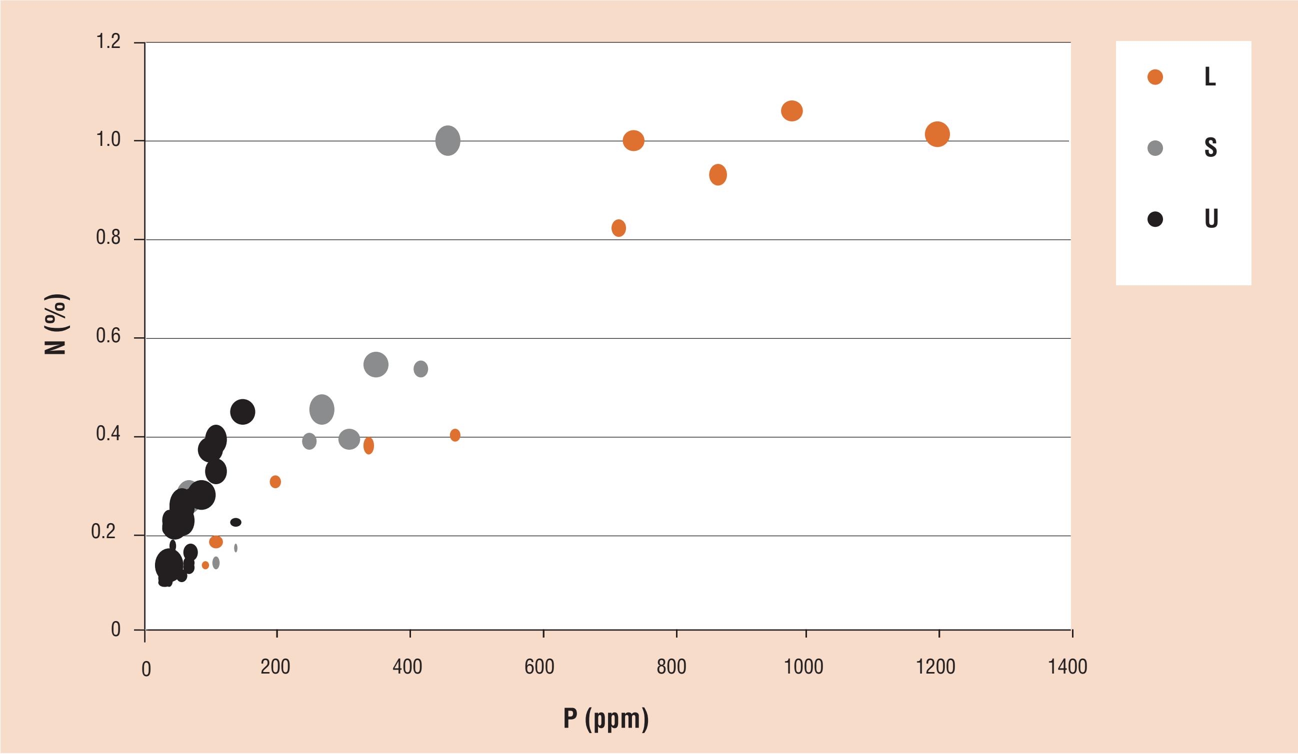



**Figure 6a. Composition of coarse organic matter by land use: total N versus total P, with organic carbon indicated by size of points.**

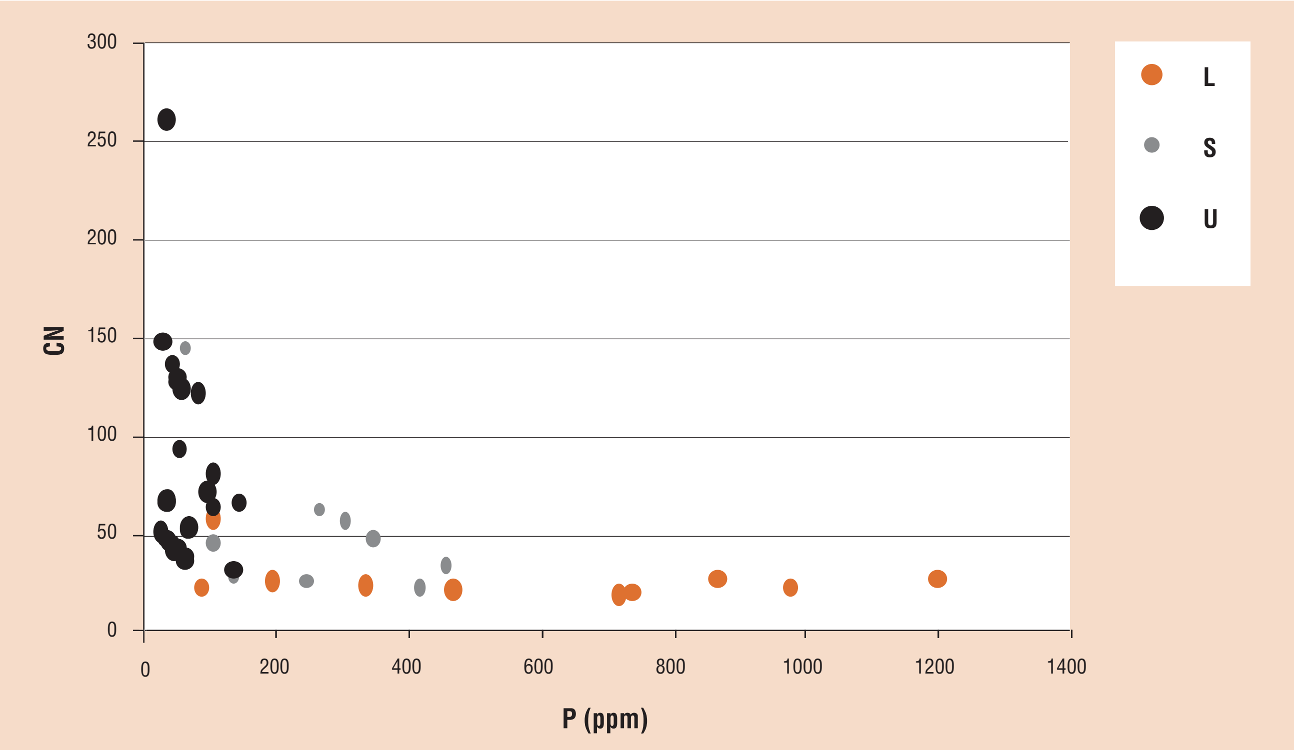



**Figure 6b. Composition of coarse organic matter by land use: Carbon Nitrogen ratio versus P values**

## 5.9 FINE EARTH ORGANIC CARBON AND COARSE ORGANIC MATTER

The fine earth organic carbon and coarse organic matter are potentially in equilibrium, with the organic carbon dependent on the balance between the rate of production and decomposition of the coarse organic matter. With the coarse organic matter of the uncleared and long-cleared being of apparently different composition (Figure 6), the rate of decomposition, and therefore the relationship between fine earth organic carbon and coarse organic matter, might be expected to be related to land use. Appendix 10 shows that for most locations, this relationship is mostly different for uncleared sites than for the cleared sites. The slopes of the regressions of organic carbon in the fine earth on coarse organic matter in the soil for the uncleared sites were about a quarter of that of the cleared sites.

The uncleared sites had more woody roots, both dead and alive. The live roots are not obviously decaying. Dead woody roots decay more slowly than the softer annual roots.

Figure 7 shows that the relationship between fine earth organic carbon and coarse organic matter also differs greatly between locations. These show that land use is apparently not the dominant factor in this relationship.

Curiously (or perhaps more importantly), the variation between locations (as represented by the slope of the regressions) is more or less independent of land use. That is, the steeper sloped regressions for the uncleared sites tended to be from the same locations as the steeper sloped regressions for the cleared sites.

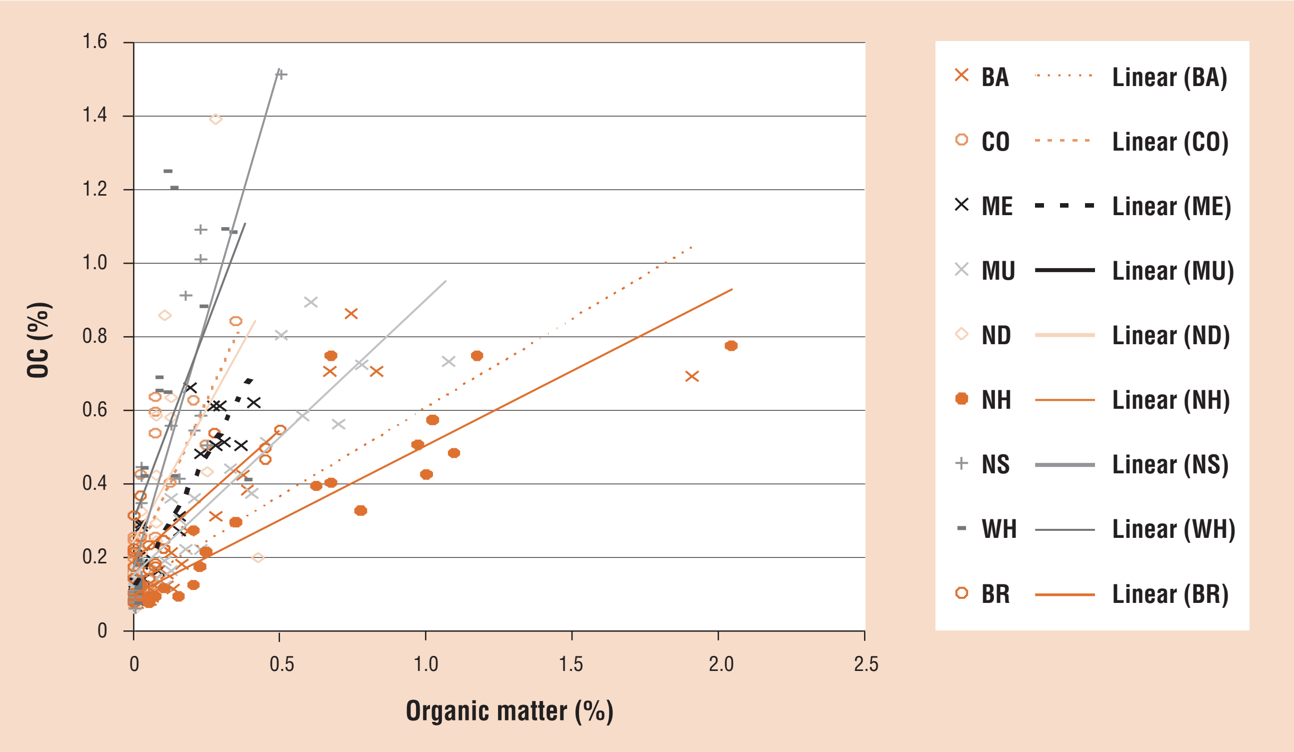



**Figure 7a. Organic carbon (W&B,%) of fine earth fraction by % coarse organic matter - Uncleared sites.**

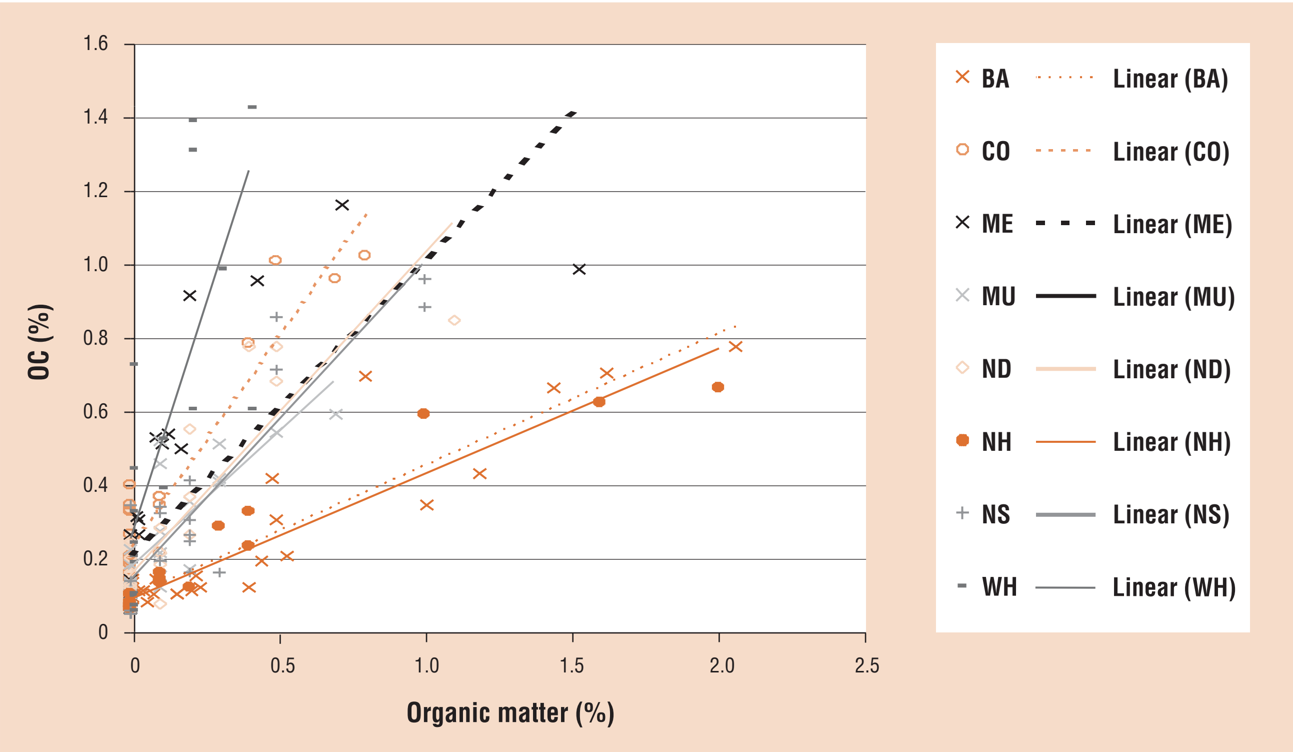



**Figure 7b. Organic carbon (W&B,%) of fine earth fraction by % coarse organic matter - Short-cleared sites.**

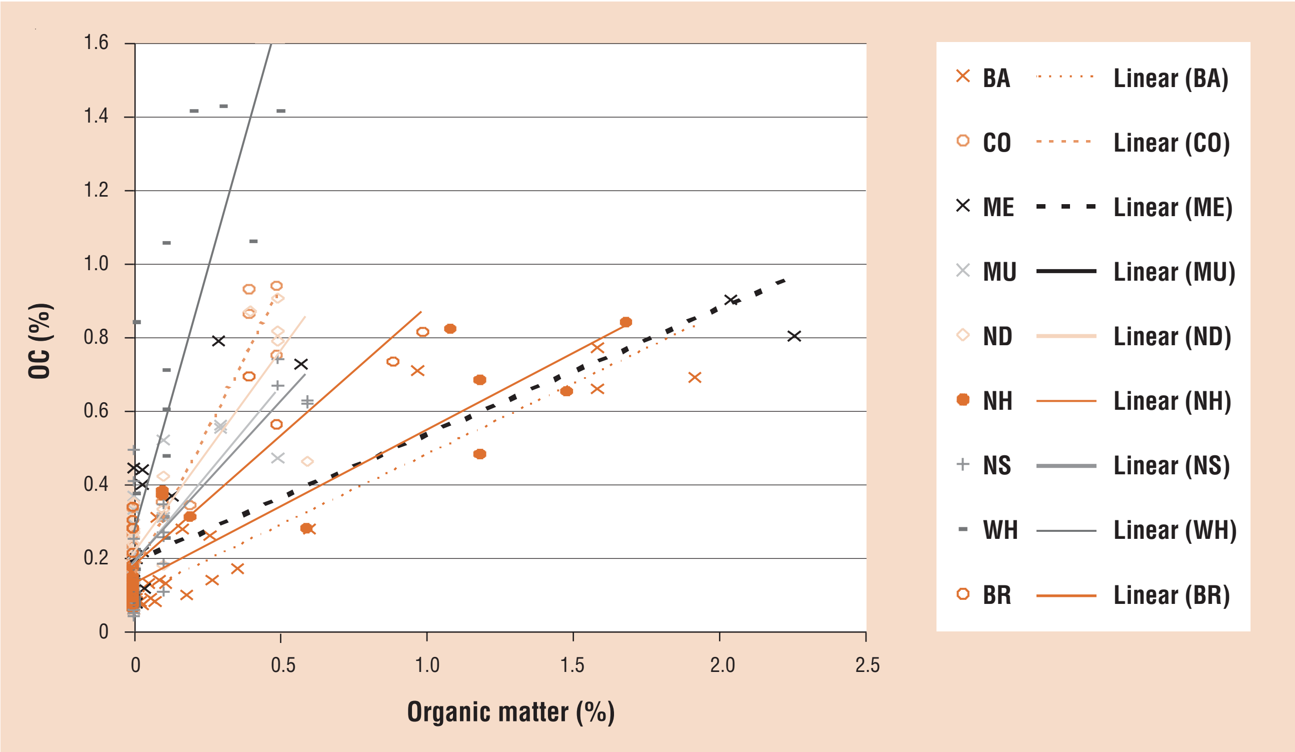



**Figure 7c. Organic carbon (W&B,%) of fine earth fraction by % coarse organic matter - Long-cleared sites.**

The sandy duplex soils (e.g. Wittenoom Hills and Newdegate (shallow) locations) have the steepest regression slopes and the deep sands (e.g. Badgingarra and Northampton) have the flattest regression slopes. This suggests that the organic carbon equilibrium is dependant on the soil type. In contrast, an investigation of the relationship between organic carbon and clay content did not provide an obvious relationship. There could be some confounding of the results due to climate, however, rainfall seems not likely to be the major influence as all locations were relatively dry (< 500 mm annual rainfall).

The difference between locations of this relationship appears to parallel the difference between location in the concentration of organic carbon (Figure 4). Just as with that relationship, the sandy duplexes (Wittenoom Hills and Newdegate (shallow)) appear to have more organic carbon per unit of coarse organic matter than the deep sands (e.g. Northampton and Badgingarra). To a limited degree, these trends are the inverse of the relative abundance of coarse organic matter at the locations.

## 5.10 ORGANIC CARBON IN COARSE MINERAL FRACTION

An analysis by Pate *et al.* (2001) of the coarse mineral fraction (usually lateritic (ferruginous) gravels in south-western Australia) showed there to be significant organic carbon present. Close examination has demonstrated that some of this is from the remnants of tightly adpressed cluster roots. Bacteria have also been shown to exist within the rind of the gravels. The concentration of organic carbon has been generally higher than in the surrounding fine earth. To confirm these findings, a proportion of the coarse mineral fraction was analysed for a number of elements including organic carbon.

There is a general trend of declining organic carbon (wt %) in the coarse mineral fraction with depth (Appendix 11; the raw data for these are in Appendix 2). Also for most locations, the organic carbon (wt %) in this fraction was greater than that in the fine earth fraction, especially for the upper parts of the soil. Those locations for which this was not the case were Newdegate (shallow), Wittenoom Hills and Newdegate (deep). Newdegate (shallow) and Wittenoom Hills were both shallow duplexes with the coarse fraction being mainly carbonate or silcrete. However, the coarse mineral fragments for Newdegate (deep) was lateritic and very abundant.

The organic carbon of the coarse mineral fraction in the uncleared land use sites appeared to be consistently higher than in the cleared land use sites but the variations were too great to be confident of this. If this were a real difference, it might mean that the organic carbon in the coarse fragments is depleted with time since clearing, and/or the root systems of agricultural annual species are not developing as strong an association with the gravels as do some of the native plant species.

## 5.11 CUMULATIVE ORGANIC CARBON (AS T/HA) IN WHOLE SOIL

The coarse fractions, both organic and mineral, can contain significant organic carbon in addition to that of the fine earth fraction. The limited analysis of the coarse fractions allowed tentative estimations of the organic carbon in each of these fractions at each location. From these, the total weight of organic carbon was estimated for each sample. This was converted to t/ha from which cumulative values were generated for increasing depths.

Appendix 13 shows the increase in these estimates of organic carbon in the whole soil by depth for each location and land use combination. As for the cumulative curves for the fine earth organic carbon, this shows that the organic carbon had not reached a plateau by the depths (1–2 m) sampled.

Clearly, most organic carbon is in the fine earth fraction. For some locations almost all organic carbon is in this form (Appendix 13). However, the proportion of the whole soil organic carbon represented by the fine earth organic carbon varies with coarse fragment content, depth, location and land use.

Appendix 14 shows the percentage of organic carbon in the three fractions (fine earth, coarse organic fragments, coarse mineral fragments) in each sample for each combination of location by land use. Both coarse fragment types can contribute significantly to the organic carbon in different parts of the profile. The coarse organic matter is most important at the surface. Its contribution varies greatly from about 10 to 50 % of the organic carbon, but declines to negligible levels by 1 m. Where coarse mineral fragments are present, this fraction can be a significant or even the dominant part of the total organic carbon in a sample. This is related to the amount of coarse mineral fragments present, and commonly occurs in the mid- to lower-portion of the profile. It should be noted that the peak concentrations from this fraction appear to be at or near the upper portion of the coarse mineral fragments layer (Appendix 15).

The cumulative data demonstrate some differences apparently due to land use (Appendix 13). Typically, the uncleared land use site has a lower proportion of the whole soil organic carbon in the fine earth fraction than the cleared land use sites. This is obviously due to the higher contribution from the coarse organic matter and some extra from the higher concentrations in the coarse mineral fragments.

## 5.12 OTHER DIFFERENCES RELATED TO LAND USE

A number of other variables appear to have values influenced by the different land uses. Most of these should be considered tentative as they come from analysis of samples with only one replicate from each location and land use combination.

### Electrical Conductivity

Very little difference in electrical conductivity (EC) values was apparent between land uses, except for some locations at depth (Appendix 16). Condingup, Newdegate (deep) and Wittenoom Hills all had higher EC values (about twice) at depth for the uncleared than the cleared sites. For Newdegate (shallow) the opposite situation was the case. It should be noted that all these locations mentioned were the only ones that had significant salt in the subsoil. It is speculated that these apparent effects might be influenced by the different moisture status observed for the land uses, as pits dug in areas of uncleared native vegetation were mostly drier than those in areas cleared for agriculture.

### pH

There were some differences in pH values between land uses but no consistent depression of pH was obvious in the subsoil for long-cleared or short-cleared sites compared to uncleared sites (Appendix 17). There were, however, differences in pH due to land use which appeared related to the pH characteristics of the locations.

The pH was consistently lower for soils between 10 and 100 cm in long-cleared sites from locations with acid soil reaction trends and only moderate acidity (Badgingarra, Brookton, Condingup & Northampton), compared to the uncleared sites. The short-cleared sites tended to have an intermediate degree of depression in pH values for these locations. For sites with acid soil reaction trends that were strongly acid (Merredin & Mullewa), there was no obvious differences in the pH between land use sites. This suggests that the amount of H+ added by pasture species and fertilizer was insignificant compared to the native soil.

Among the alkaline soil reaction trend locations, the pH trends of long-cleared compared to uncleared sites were inconsistent. For Newdegate (shallow), long-cleared sites were more acidified, for Newdegate (deep), there were no obvious differences, and for Wittenoom Hills, long-cleared sites were more alkaline. The latter could be explained if alkaline subsoil had been incorporated into the topsoil by deep ripping.

### Macronutrients

Analysis of macronutrient levels showed some differences between land use sites (Appendices 18, 19 and 20). This was mainly the case for total P, which in the top 10 to 30 cm was clearly greater in the short-cleared and long-cleared sites than the uncleared samples. Total N showed similar trends but not so clearly. Total K showed no consistent trends that could be associated with land use. Mullewa was one location that appeared inconsistent for both N and P, there being little difference between land use sites. This location was notably amongst the more nutrient-rich of the sites sampled. It is on a farm which has a low fertilizer usage record.

The nutrient values of the cleared land use sites are in part due to the nutrient inputs, and the elevated values of the long cleared sites are probably a reflection of this. The apparent elevation in nutrient values, especially total P, might be an indication of the amount of nutrient input, however, caution should be used in considering this link, for the ability of the soil to retain the nutrients must be considered also.

### Fe and Al

There were no obvious differences in the total Fe and total Al related to land use. Extractable Al was only measured in those samples with low pH values on the assumption that where the pH is higher, there is negligible extractable Al (Appendix 21). From the limited data from four locations, there were apparently divergent influences of land use. From Condingup and Brookton, there is a suggestion that extractable Al is increased by clearing. In contrast, no obvious difference occurred at Mullewa or Merredin. These data parallel the apparent depression in pH for moderately acidic soils (Condingup and Brookton), and no depression for strongly acidic soils (Merredin and Mullewa) following clearing.

### Exchangeable Cations

No significant differences were detected in the level of exchangeable cations due to land use (Appendix 22). There is a suggestion from some locations (e.g. Northampton, Brookton, Mullewa, Merredin and Wittenoom Hills) that there were higher exchangeable cations (mainly calcium) in the surface layers for the cleared land use sites. Organic matter is the dominant exchange material in these layers. However, this elevation in the exchangeable cation levels is not parallelled by either increases in fine earth organic carbon or coarse organic matter levels. Should the higher exchange capacity of the surface be real, the difference in the nature of the organic matter (crops versus perennial shrubs) as reflected in the N and P values of the coarse organic matter might be a contributor to this elevated value.

## 6. DISCUSSION

This study has provided significant new documentation of the organic carbon pool for a selection of soils subject to different land uses in drier parts of south-western Australia. The study demonstrated that most of the soil carbon occurs in the top 10-30 cm of the soil profile, but significant amounts occur at depths to at least 1 m. The fine earth fraction is considered to contain most of the carbon pool, however, significant amounts are also present in the coarse organic matter and coarse mineral fragments. The latter is part of a phenomenon recently documented by Pate *et al.* (2001), who demonstrated an association between the roots of native plants and the ferruginous coarse fragments. With there still being significant organic carbon in these ferruginous coarse fragments in areas cleared decades before, there is either strong persistence of this carbon, or a continuing relationship between pasture and crop plants with the gravel.

The organic carbon values reported here are consistent with those reported in Griffin and Schoknecht (2000), which used a limited study methodology. Both of these studies used the Walkley and Black method for determining soil carbon levels, which appears to provide a few percent lower than that derived from the LECO method.

Differences in soil properties occurred when land use changed from native vegetation to annual pasture or cropping systems. The bulk density of the surface layers commonly were greater in the cleared than in the uncleared soils. There was generally a slight increase in the fine earth organic carbon (as wt %) of these surface layers, which is inconsistent with compaction of the surface layers, or even soil loss. It is argued that for most of the locations sampled, there was an increase in this organic carbon because of the changed land use.

The total organic carbon pool (as t/ha) appears to not have changed greatly even after 30 or more years since clearing. In most locations the organic carbon in the fine earth fraction of the whole profile remained relatively unchanged, however, there appears to be slightly more in the surface layers and less in the deeper layers. This is supported by similar changes in the type and distribution of root systems.

In some soils there was a significant depletion of organic carbon following clearing. This was observed at Mullewa which had strongly acidic soil even under native vegetation. It is suggested that this decline is in part caused by the strongly acidic soil being hostile to good growth of agricultural plants but not to native species. The Mullewa property also appears to have received relatively low levels of fertiliser inputs, which may contribute to the lower soil carbon levels through lower crop and pasture production.

Some other soil properties appear to be changed by clearing. The nature of soil acidification of the top 50 cm, which also involves an increase in the amount of extractable Al, was observed in these data. This acidification is well documented, apparently being related to increased nitrogen fixation and fertilizer inputs from land holders. However, this was not observed for the alkaline or highly acidic soils, only those with moderately acidic soil.

Acidification is influenced by the pH buffering capacity, which in turn is a function of clay and organic matter content. The possible influence of the changes in organic carbon and coarse organic matter on the differential rate of acidification was not investigated here but might be a worthwhile exercise in the future.

The bulk density increases observed in the top 30 cm of soil after clearing were inconsistent with the increased fine earth organic carbon values for the surface soil under agriculture. Typically, organic matter would be expected to decrease the bulk density, however, it appears that increased bulk density was due to reductions in soil structure and increased compaction under agriculture.

## 7. CONCLUSIONS

There are a number of useful findings from this study:

- The type and distribution of soil organic carbon in the top 1–2 m of a range of sandy-surfaced soils in south-western Australia is now documented;
- The fine earth fraction of the top 30 cm typically contains the majority of the carbon but significant amounts are also present in coarse organic matter and ferruginous gravels;
- The variation in most soil parameters measured at the same site (i.e. between sampling points) was commonly 10 - 30%. This was of a similar order of magnitude to the findings of Griffin and Schoknecht (2000). This suggests that the relative value of the detailed sampling methodology should be considered;
- Changes in soil carbon due to the clearing of native vegetation and establishing annual agricultural systems were observed, but were of minor extent;
- The total carbon pool was changed little by the change in land use from native vegetation to agriculture, except that under agriculture there appeared to be more in the top soils and less coarse organic matter at depth;
- The bulk density of the surface layers were mostly increased by the change in land use from native vegetation to agriculture; and
- Changes to soil chemistry were generally minor. Acidification appeared to be limited to those soils that were initially moderately acid, but not alkaline or strongly acid soils. Fertilizer inputs, particularly phosphorus, are reflected in the soil macronutrient analysis.

## 8. RECOMMENDATIONS

### KEY DELIVERABLE: FUTURE MONITORING

A requirement of this study was to make recommendations of future monitoring and especially whether any of the current paired sites should continue to be monitored.

Monitoring programs are expensive to maintain, and a clear examination of purpose and the cost-benefit of the monitoring program needs to be assessed. There is some virtue in continued monitoring of the paired sites as input for *Roth-C* or other soil carbon models, but this would require detailed recording of land use inputs and exports, and significant resources.

The current study includes both short and long-cleared paired sites, which show limited differences in organic carbon as a result of land use. The expense of monitoring of these areas in the long term, therefore, appears unjustified.

#### Recommendation 1

*That no further monitoring of the paired sites for the purpose of understanding soil organic carbon be undertaken.*

There is currently very little land clearing in south-western Australia and it is more than 20 years since significant land clearing occurred. In that light, land clearing is only a minor contributor to greenhouse gas emissions in south-western Australia. Changes in farming systems are likely to be far more significant contributors to soil carbon changes. There is, therefore, merit in investigating the changes in soil carbon due to changing farming systems across a full range of soil types. The current study focused on sandy-surfaced soils.

#### Recommendation 2

*Develop a monitoring program to assess changes in soil carbon (in conjunction with programs looking at other soil factors) with the development of sustainable farming systems across a broad range of soil types.*

The intensity of sampling needs some consideration in future studies. This study provided much documentation about a few sites for a particular purpose. For other purposes, greater cost-benefits would be obtained from more locations sampled less intensively.

#### Recommendation 3

*The intensity of sampling needs to be tailored to the purpose of the study; e.g. more samples for documentation, less for modelling.*

### KEY DELIVERABLE: PROPOSED ARRANGEMENTS FOR ARCHIVING SAMPLES

The future of the samples from this project need to be considered. The Chemistry Centre of Western Australia maintains a significant archive of samples that can be made available for later studies. There has already been an inquiry on the use of the samples from the present study. Normally the Chemistry Centre of Western Australia provides samples at its own discretion, especially years after the initial collection. Issues of ownership and the cost of storage and retrieval need to be negotiated in relation to the current samples.

#### Recommendation 4

*The current samples should continue to be archived by the Chemistry Centre of Western Australia and negotiations on ownership and cost of storage and retrieval be undertaken. No material should be used for any purpose until an agreement between the Australian Greenhouse Office, Department of Agriculture, Western Australia and the Chemistry Centre of Western Australia has been reached.*

## 9. REFERENCES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# APPENDIX 1

## Description of Locations and Sampling Points

### Descriptions Generated from the Department of Agriculture, Profiles Database

# TABLE OF CONTENTS

| | |
|---|---|
| **Observation Type/Category:** | soil pit, full description |
| **Lab Analyses:** | Limited chemical and physical analyses |
| **Location:** | MGA Zone: 50 355855 mE 6641040 mN |
| **Locations Notes:** | Badgingarra, Tom Plant |
| **Site Notes:** | FRAME: 6-10 |
| **Disturbance:** | Complete clearing; past cultivation |

**Landform**

| | | | |
|---|---|---|---|
| **Landform pattern:** | pediment | **Slope:** | 2 % |
| **Relief/modal slope:** | undulating low hills | | |
| **Landform element:** | hillslope | **Slope length (m):** | 150 |
| **Morphological type:** | lower slope | **Slope curvature:** | concave slope |
| **Relief:** | 50 m | **Pattern Relief:** | pediment |

**Surface and Hydrological Properties**

| | |
|---|---|
| **Rock outcrop:** | 0 % |
| **Surface coarse fragments:** | no coarse fragments gravels |
| **Physical properties:** | Water repellent; loose; very deep soil; water table at 80 cm |

**Geology/Parent Material**

| | |
|---|---|
| **Soil parent material:** | unconsolidated material (unidentified) Jurassic sandstone, Colluvium |
| **Geology:** | sandstone |

**Vegetation**

| | |
|---|---|
| **Type:** | |
| **Site:** | |
| **Surrounds:** | |
| **Notes:** | Pasture: Brome, Cape Weed, Blue lupins & assorted grasses & Silver grass |

**Land Use**

| | |
|---|---|
| **Site:** | Cropping (may include grazing in rotation) |
| **Surrounds:** | Cropping (may include grazing in rotation) |

**Visible Erosion, Assessed Flooding and Salinity**

No wind erosion, no scald erosion, slight sheet erosion, no rill erosion, no gully erosion, no flooding, no ponding, no salinity.

**Current Classification**

| | |
|---|---|
| **WA Soil Group:** | Pale deep sand, (1999) |
| **Australian Soil Classification:** | Basic Arenic Bleached-Orthic Tenosol (2002) |
| **Map Unit:** | 224Ye_3a |

## Soil Profile Description

| Horizon | Depth (cm) | Description |
|---|---|---|
| Ap | 0-20 | greyish brown (10YR 5/2) moist, grey (10YR 6/1) dry medium sand; loose dry consistence; apedal, single grain structure; sandy fabric; many, very fine roots; no coarse fragments; rapid permeability; fine to medium sand. Many very fine (< 1 mm) grass roots; clear, smooth boundary. |
| A2 | 20-50 | light brownish grey (10YR 6/2) moist, light grey (10YR 7/2) dry medium sand; loose dry consistence; apedal, single grain structure; sandy fabric; few, very fine roots; no coarse fragments; rapid permeability; fine to medium sand. Few very fine grass roots; diffuse, smooth boundary. |
| A3 | 50-110 | yellow (10YR 8/6) moist, very pale brown (10YR 8/3) dry medium sand; loose dry consistence; apedal, single grain structure; sandy fabric; no, very fine roots; no coarse fragments; rapid permeability; Roots 1 per 100cm2; gradual, smooth boundary. |
| B1 | 110-150 | yellow (10YR 8/6) moist, very pale brown (10YR 8/4) dry medium sand with 4-8% clay; moderately moist soil; apedal, massive structure; earthy fabric; no, very fine roots; 5% subrounded ironstone fine gravels, soft irregular nodules and subrounded ironstone medium gravels; moderately rapid permeability; Friable, nil roots. Old decayed carbonic root channels + 5 mm. |
| B2 | 150-170+ | yellow (10YR 7/8) moist, very pale brown (10YR 8/4) dry clayey medium sand; very few mottles; moist soil; apedal, massive structure; earthy fabric; no, very fine roots; 5% subrounded ironstone fine gravels, variegated red and subrounded ironstone medium gravels; moderately rapid permeability; nil roots. Friable. |

| | |
|---|---|
| **Observation Type/Category:** | soil pit, full description |
| **Lab Analyses:** | Limited chemical and physical analyses |
| **Location:** | MGA Zone: 50 357152 mE 6644285 mN |
| **Locations Notes:** | Badgingarra, Tom Plant |
| **Site Notes:** | Photo frame: 11-15 |
| **Disturbance:** | Complete clearing; past cultivation |

**Landform**

| | | | |
|---|---|---|---|
| **Landform pattern:** | pediment | **Slope:** | 1 % |
| **Relief/modal slope:** | undulating low hills | | |
| **Landform element:** | hillslope | **Slope length (m):** | 250 |
| **Morphological type:** | lower slope | **Slope curvature:** | concave slope |
| **Relief:** | 50 m | **Pattern Relief:** | pediment |

**Surface and Hydrological Properties**

| | |
|---|---|
| **Rock outcrop:** | 0 % |
| **Surface coarse fragments:** | no coarse fragments gravels, no coarse fragments stones |
| **Physical properties:** | loose; very deep soil; water table at 80 cm |

**Geology/Parent Material**

| | |
|---|---|
| **Soil parent material:** | unconsolidated material (unidentified) Jurassic sandstone, Colluvium |
| **Geology:** | sandstone |

**Vegetation**

| | |
|---|---|
| **Type:** | |
| **Site:** | |
| **Surrounds:** | |
| **Notes:** | Sparse pasture: Rye grass & clover with lupins & cape weed |

**Land Use**

| | |
|---|---|
| **Site:** | Cropping (may include grazing in rotation) |
| **Surrounds:** | Cropping (may include grazing in rotation) |

**Visible Erosion, Assessed Flooding and Salinity**

No wind erosion, no scald erosion, slight sheet erosion, no rill erosion, no gully erosion, no flooding, no ponding, no salinity.

**Current Classification**

| | |
|---|---|
| **WA Soil Group:** | Pale deep sand, (1999) |
| **Australian Soil Classification:** | Basic Arenic Bleached-Orthic Tenosol (2002) |
| **Map Unit:** | 224Ye_3a |

## Soil Profile Description

| Horizon | Depth (cm) | Description |
|---|---|---|
| Ap | 0-20 | greyish brown (10YR 5/2) moist, light brownish grey (10YR 6/2) dry sand; loose dry consistence; apedal, single grain structure; sandy fabric; common, very fine roots; no coarse fragments; rapid permeability, water repellent; very fine common grass roots. Occasional medium lateral roots from old native species; abrupt, wavy boundary. |
| A2 | 20-50 | very pale brown (10YR 7/3) moist, white (10YR 8/2) dry sand; very weak dry consistence; apedal, single grain structure; sandy fabric; common, very fine roots; no coarse fragments; rapid permeability;Common fine grass roots plus occasional woody roots as above; diffuse, smooth boundary. |
| A3 | 50-110 | yellow (10YR 7/5) moist, very pale brown (10YR 7/4) dry sand with 4-8% clay; very few mottles; weak moderately moist consistence; apedal, massive structure; sandy fabric; few, fine roots; no coarse fragments; moderately rapid permeability; few fine roots occasional medium roots as above; diffuse, smooth boundary. |
| B1 | 110-140 | yellow (10YR 7/6) moist, yellow (10YR 7/5) dry clayey sand; weak moist consistence; apedal, massive structure; sandy fabric; few, fine roots; very few subrounded ironstone medium gravels; moderately rapid permeability; occasional fine roots. Few woody roots as above; diffuse, smooth boundary. |
| B2 | 140-160+ | yellow (10YR 7/6) moist, yellow (10YR 7/5) dry clayey sand; few mottles; weak moist consistence; apedal, massive structure; sandy fabric; 2 % subrounded ironstone fine gravels and 1 % subrounded ironstone medium gravels; moderately rapid permeability; occasional fine roots. Woody roots as above. |

| | |
|---|---|
| **Observation Type/Category:** | soil pit, full description |
| **Lab Analyses:** | Limited chemical and physical analyses. |
| **Location:** | MGA Zone: 50 357745 mE 6644312 mN |
| **Locations Notes:** | Badgingarra, Tom Plant |
| **Site Notes:** | Photo frame: 17-25. Burnt some time. 5 years since fire |
| **Disturbance:** | Natural |

**Landform**

| | | | |
|---|---|---|---|
| **Landform pattern:** | pediment | **Slope:** | 1 % |
| **Relief/modal slope:** | undulating low hills | | |
| **Landform element:** | hillslope | **Slope length (m):** | 100 |
| **Morphological type:** | lower slope | **Slope curvature:** | concave slope |
| **Relief:** | 50 m | **Pattern Relief:** | pediment |

**Surface and Hydrological Properties**

| | |
|---|---|
| **Rock outcrop:** | 0 % |
| **Surface coarse fragments:** | no coarse fragments gravels, no coarse fragments, stones |
| **Physical properties:** | loose; very deep soil; water table at 80 cm |

**Geology/Parent Material**

| | |
|---|---|
| **Soil parent material:** | unconsolidated material (unidentified) Jurassic sandstone, Colluvium |
| **Geology:** | sandstone |

**Vegetation**

| | |
|---|---|
| **Type:** | |
| **Site:** | |
| **Surrounds:** | heathland |
| **Notes:** | Low heath |

**Land Use**

| | |
|---|---|
| **Site:** | Not used |
| **Surrounds:** | Cropping (may include grazing in rotation) |

**Visible Erosion, Assessed Flooding and Salinity**

No wind erosion, no scald erosion, no sheet erosion, no rill erosion, no gully erosion, no flooding, no ponding, no salinity.

**Current Classification**

| | |
|---|---|
| **WA Soil Group:** | Pale deep sand, (1999) |
| **Australian Soil Classification:** | Basic Arenic Bleached-Orthic Tenosol (2002) |
| **Map Unit:** | 224Ye_3a |

## Soil Profile Description

| Horizon | Depth (cm) | Description |
|---|---|---|
| A1 | 0-10 | dark greyish brown (10YR 4/2) moist, greyish brown (10YR 5/2) dry sand; loose dry consistence; apedal, single grain structure; no coarse fragments; rapid permeability, non water repellent; many very fine roots. Few fine roots. Occasional medium roots; clear, smooth boundary. |
| A2 | 10-30 | very pale brown (10YR 7/3) moist, very pale brown (10YR 7/3) dry sand; loose dry consistence; apedal, single grain structure; no coarse fragments; rapid permeability; few very fine & fine roots. Occasional lateral medium roots; diffuse, smooth boundary. |
| A3 | 30-60 | very pale brown (10YR 7/4) moist, very pale brown (10YR 7/4) dry sand with 2-4% clay; very weak, moderately moist consistence; apedal, single grain structure; no coarse fragments; moderately rapid permeability; few very fine & fine and occasional medium roots; diffuse, smooth boundary. |
| B1 | 60-90 | yellow (10YR 7/6) moist, yellow (10YR 7/5) dry sand with 4-8% clay; common mottles; very weak moist consistence; apedal, massive structure; no coarse fragments; moderately rapid permeability; few very fine & fine and occasional medium roots; diffuse, smooth boundary. |
| B2 | 90-120 | yellow (10YR 7/6) moist, yellow (10YR 7/6) dry clayey sand; many mottles; very weak moist consistence; apedal, massive structure; no coarse fragments; moderately rapid permeability; few very fine & fine and occasional medium roots; diffuse, wavy boundary. |
| B3 | 120-150+ | yellow (10YR 7/6) moist, yellow (10YR 7/6) dry clayey sand; many mottles; very weak moist consistence; apedal, massive structure; no coarse fragments; moderately rapid permeability; few very fine & fine and occasional medium roots. |

| | |
|---|---|
| **Observation Type/Category:** | soil pit, full description |
| **Lab Analyses:** | Detailed chemical and physical analyses |
| **Location:** | MGA Zone: 50 490424 mE 6429025 mN |
| **Locations Notes:** | NW of Brookton |
| **Site Notes:** | MicroRelief: Plough furrows |
| **Disturbance:** | Cultivation, rainfed |

**Landform**

| | | | |
|---|---|---|---|
| **Landform pattern:** | rises | **Slope:** | 3 % |
| **Relief/modal slope:** | undulating rises | | |
| **Landform element:** | hillslope | **Slope length (m):** | 500 |
| **Morphological type:** | mid-slope | **Slope curvature:** | uniform slope |
| **Relief:** | 50 m | **Pattern Relief:** | rises |

**Surface and Hydrological Properties**

| | |
|---|---|
| **Rock outcrop:** | 0 % |
| **Surface coarse fragments:** | no coarse fragments gravels, no coarse fragments stones |
| **Physical properties:** | Water repellent; loose; moderately deep soil |

**Geology/Parent Material**

| | |
|---|---|
| **Soil parent material:** | strongly weathered, unconsolidated material (unidentified) Colluvium |
| **Geology:** | |

**Vegetation**

| | |
|---|---|
| **Type:** | |
| **Site:** | |
| **Surrounds:** | low heath |
| **Notes:** | |

**Land Use**

| | |
|---|---|
| **Site:** | Cropping (may include grazing in rotation) |
| **Surrounds:** | Cropping (may include grazing in rotation) |

**Visible Erosion, Assessed Flooding and Salinity**

Slight wind erosion, no scald erosion, no sheet erosion, no rill erosion, no gully erosion, no flooding, no ponding, no salinity.

**Current Classification**

| | |
|---|---|
| **WA Soil Group:** | Reticulite deep sandy duplex, gravelly (1999) |
| **Australian Soil Classification:** | Acidic Ferric-Petroferric Bleached-Orthic Tenosol (2002) |

## Soil Profile Description

| Horizon | Depth (cm) | Description |
|---|---|---|
| Ap | 0-10 | dark greyish brown (10YR 4/2) moist sand with 2-4 % clay; firm consistence; apedal, single grain structure; common, very fine roots; no coarse fragments; moderately rapid permeability; roots few, fine; clear, smooth boundary. |
| A2 | 10-40 | pale brown (10YR 6/3) moist, white (10YR 8/0) dry sand; very weak consistence; apedal, single grain structure; few, very fine roots; no coarse fragments; moderately rapid permeability; roots few, fine; clear, wavy boundary. |
| B1 | 40-50 | pale brown (10YR 6/3) moist sand with 2-4 % clay; very weak consistence; apedal, single grain structure; few, very fine roots; 20 % subrounded ferruginous fine gravels and 40 % subrounded ferruginous medium gravels; moderately rapid permeability; gradual, tongued boundary. |
| B2 | 50-90+ | brownish yellow (10YR 6/8) moist; rigid consistence; apedal, massive structure; few, very fine roots; 10% subrounded ferruginous medium gravels; moderate permeability; Breaking up reticulite. As per site BRU2. Roots size 1, fine. |

| | |
|---|---|
| **Observation Type/Category:** | soil pit, full description |
| **Lab Analyses:** | Detailed chemical and physical analyses |
| **Location:** | MGA Zone: 50 490379 mE 6429160 mN |
| **Locations Notes:** | NW of Brookton |
| **Site Notes:** | Once grazed. Fenced off 15 years ago |
| **Disturbance:** | No effective disturbance, grazed |

**Landform**

| | | | |
|---|---|---|---|
| **Landform pattern:** | rises | **Slope:** | 3 % |
| **Relief/modal slope:** | undulating rises | | |
| **Landform element:** | hillslope | **Slope length (m):** | 500 |
| **Morphological type:** | mid-slope | **Slope curvature:** | uniform slope |
| **Relief:** | 50 m | **Pattern Relief:** | rises |

**Surface and Hydrological Properties**

| | |
|---|---|
| **Rock outcrop:** | 0 % |
| **Surface coarse fragments:** | no coarse fragments gravels, no coarse fragments stones, no coarse fragments |
| **Physical properties:** | loose; moderately deep soil |

**Geology/Parent Material**

| | |
|---|---|
| **Soil parent material:** | strongly weathered, unconsolidated material (unidentified) Colluvium |
| **Geology:** | granite |

**Vegetation**

| | |
|---|---|
| **Type:** | |
| **Site:** | |
| **Surrounds:** | |
| **Notes:** | |

**Land Use**

| | |
|---|---|
| **Site:** | Not used |
| **Surrounds:** | Not used |

**Visible Erosion, Assessed Flooding and Salinity**

No wind erosion, no scald erosion, no sheet erosion, no rill erosion, no gully erosion, no flooding, no ponding, no salinity.

**Current Classification**

| | |
|---|---|
| **WA Soil Group:** | Reticulite deep sandy duplex, gravelly (1999) |
| **Australian Soil Classification:** | Acidic Ferric-Petroferric Bleached-Orthic Tenosol (2002) |

### Soil Profile Description

| Horizon | Depth (cm) | Description |
|---|---|---|
| Ap | 0-10 | dark grey (10YR 4/1) moist medium sand with 2-4% clay; weak dry consistence; apedal, single grain structure; many, very fine roots; no coarse fragments; moderately rapid permeability; sand M to F. Surface sand was L on top of well developed surface seal. Roots size F - F & size M - F; diffuse, smooth boundary. |
| A2 | 10-30 | pale brown (10YR 6/3) moist, white (10YR 8/0) dry sand; very weak dry consistence; apedal, single grain structure; common, very fine roots; no coarse fragments; moderately rapid permeability; Roots size F - F & size M - F; gradual, smooth boundary. |
| B1 | 30-60 | pale brown (10YR 6/3) moist medium sand with 2-4 % clay; very weak dry consistence; apedal, single grain structure; common, very fine roots; 20% fine gravels and 30 % medium gravels Alluvial and 20 % coarse gravels; moderately rapid permeability; sand M to F. Boundary sometimes tongued. Roots size F - F & size M rare; gradual, wavy boundary. |
| B2 | 60-85+ | rigid dry consistence; apedal, massive structure; few, very fine roots; no coarse fragments; moderate permeability; reticulite breaking up. Ferricrinds with pale smooth goethite cotes. Also roots size F - F & size M rare. Massive reticulite. |

| | |
|---|---|
| **Observation Type/Category:** | soil pit, full description |
| **Lab Analyses:** | Detailed chemical and physical analyses |
| **Location:** | MGA Zone: 51 481020 mE 6276953 mN |
| **Locations Notes:** | Condingup |
| **Site Notes:** | |
| **Disturbance:** | Cultivation, rainfed |

**Landform**

| | | | |
|---|---|---|---|
| **Landform pattern:** | rises | **Slope:** | 1 % |
| **Relief/modal slope:** | gently undulating rises | | |
| **Landform element:** | hillslope | **Slope length (m):** | 100 |
| **Morphological type:** | mid-slope | **Slope curvature:** | concave slope |
| **Relief:** | 30 m | **Pattern Relief:** | rises |

**Surface and Hydrological Properties**

| | |
|---|---|
| **Rock outcrop:** | 0 % |
| **Surface coarse fragments:** | no coarse fragments gravels, no coarse fragments stones |
| **Physical properties:** | loose; very deep soil |

**Geology/Parent Material**

| | |
|---|---|
| **Soil parent material:** | strongly weathered, unconsolidated material (unidentified) Colluvium |
| **Geology:** | sandstone |

**Vegetation**

| | |
|---|---|
| **Type:** | |
| **Site:** | |
| **Surrounds:** | |
| **Notes:** | |

**Land Use**

| | |
|---|---|
| **Site:** | Cropping (may include grazing in rotation) |
| **Surrounds:** | Cropping (may include grazing in rotation) |

**Visible Erosion, Assessed Flooding and Salinity**

Moderate wind erosion, no scald erosion, no sheet erosion, no rill erosion, no gully erosion, no ponding, no salinity.

**Current Classification**

| | |
|---|---|
| **WA Soil Group:** | Yellow/brown deep sandy duplex, gravelly (1999) |
| **Australian Soil Classification:** | Ferric Eutrophic Yellow Chromosol (2002) |
| **Map Unit:** | 245Es_2 |

## Soil Profile Description

| Horizon | Depth (cm) | Description |
|---|---|---|
| Ap | 0-10 | dark grey (10YR 4/1) moist fine sand; weak moderately moist consistence; apedal, single grain structure; sandy fabric; no coarse fragments; moderately rapid permeability; gradual boundary. |
| A2 | 10-20 | very pale brown (10YR 7/4) moist fine sand; weak moist consistence; apedal, single grain structure; sandy fabric; no coarse fragments; moderately rapid permeability; clear boundary. |
| A3 | 20-40 | very pale brown (10YR 7/4) moist fine sand; weak moist consistence; apedal, single grain structure; sandy fabric; 55 % subangular ferruginous medium gravels concentrated towards lower boundary; moderately rapid permeability; clear boundary. |
| B2 | 40-70 | brownish yellow (10YR 6/8) moist light clay; many coarse prominent yellowish red (5YR 5/8) moist mottles; very firm moist consistence; pedal, strong, angular blocky structure; 5 % subrounded ferruginous medium gravels; moderate permeability; diffuse boundary. |
| C | 70-130+ | light grey (10YR 7/2) moist light clay; common coarse prominent yellow (10YR 7/5) moist mottles; very firm moist consistence; pedal, strong, angular blocky structure; 1 % ferruginous; moderate permeability. |

| | |
|---|---|
| **Observation Type/Category:** | soil pit, full description |
| **Lab Analyses:** | Detailed chemical and physical analyses |
| **Location:** | MGA Zone: 51 481233 mE 6276873 mN |
| **Locations Notes:** | Condingup |
| **Site Notes:** | |
| **Disturbance:** | Cultivation, rainfed. |

**Landform**

| | | | |
|---|---|---|---|
| **Landform pattern:** | rises | **Slope:** | 1 % |
| **Relief/modal slope:** | gently undulating rises | | |
| **Landform element:** | hillslope | **Slope length (m):** | 1000 |
| **Morphological type:** | mid-slope | **Slope curvature:** | convex slope |
| **Relief:** | 30 m | **Pattern Relief:** | rises |

**Surface and Hydrological Properties**

| | |
|---|---|
| **Rock outcrop:** | 0 % |
| **Surface coarse fragments:** | no coarse fragments gravels, no coarse fragments stones |
| **Physical properties:** | |

**Geology/Parent Material**

| | |
|---|---|
| **Soil parent material:** | strongly weathered, unconsolidated material (unidentified) Colluvium |
| **Geology:** | sandstone |

**Vegetation**

| | |
|---|---|
| **Type:** | |
| **Site:** | |
| **Surrounds:** | |
| **Notes:** | |

**Land Use**

| | |
|---|---|
| **Site:** | Cropping (may include grazing in rotation) |
| **Surrounds:** | Cropping (may include grazing in rotation) |

**Visible Erosion, Assessed Flooding and Salinity**

**Current Classification**

| | |
|---|---|
| **WA Soil Group:** | Yellow/brown deep sandy duplex, gravelly (1999) |
| **Australian Soil Classification:** | Ferric Eutrophic Yellow Chromosol (2002) |
| **Map Unit:** | 245Es_2 |

## Soil Profile Description

| Horizon | Depth (cm) | Description |
|---|---|---|
| Ap | 0-10 | dark grey (10YR 4/1) moist fine sand; weak moderately moist consistence; apedal, single grain structure; sandy fabric; no coarse fragments; moderately rapid permeability; gradual boundary. |
| A21 | 10-20 | very pale brown (10YR 7/4) moist fine sand; weak moderately moist consistence; apedal, single grain structure; sandy fabric; no coarse fragments; moderately rapid permeability; diffuse boundary. |
| A22 | 20-40 | light yellowish brown (10YR 6/4) moist fine sand; weak moderately moist consistence; apedal, single grain structure; sandy fabric; no coarse fragments; moderately rapid permeability; clear boundary. |
| A3 | 40-60 | light yellowish brown (10YR 6/4) moist fine sand; weak moderately moist consistence; apedal, single grain structure; sandy fabric; 40% subrounded ferruginous medium gravels dense gravels; moderately rapid permeability; clear boundary. |
| B2 | 60-100+ | light grey (10YR 7/2) moist light clay; many coarse distinct strong brown (7.5YR 5/8) moist mottles; very firm moderately moist consistence; pedal, strong, angular blocky structure; no coarse fragments; moderately slow permeability. |

| | |
|---|---|
| **Observation Type/Category:** | soil pit, full description |
| **Lab Analyses:** | Detailed chemical and physical analyses |
| **Location:** | MGA Zone: 51 481208 mE 6276764 mN |
| **Locations Notes:** | Condingup |
| **Site Notes:** | |
| **Disturbance:** | Natural |

**Landform**

| | | | |
|---|---|---|---|
| **Landform pattern:** | rises | **Slope:** | 1 % |
| **Relief/modal slope:** | gently undulating rises | | |
| **Landform element:** | hillslope | **Slope length (m):** | 500 |
| **Morphological type:** | mid-slope | **Slope curvature:** | convex slope |
| **Relief:** | 30 m | **Pattern Relief:** | rises |

**Surface and Hydrological Properties**

| | |
|---|---|
| **Rock outcrop:** | 0 % |
| **Surface coarse fragments:** | no coarse fragments gravels, no coarse fragments stones |
| **Physical properties:** | loose; very deep soil |

**Geology/Parent Material**

| | |
|---|---|
| **Soil parent material:** | strongly weathered, unconsolidated material (unidentified) Colluvium |
| **Geology:** | sandstone |

**Vegetation**

| | |
|---|---|
| **Type:** | |
| **Site:** | shrubland |
| **Surrounds:** | |
| **Notes:** | |

**Land Use**

| | |
|---|---|
| **Site:** | Not used |
| **Surrounds:** | Not used |

**Visible Erosion, Assessed Flooding and Salinity**

No wind erosion, no scald erosion, slight sheet erosion, no rill erosion, no gully erosion, no flooding, no ponding, no salinity.

**Current Classification**

| | |
|---|---|
| **WA Soil Group:** | Yellow/brown deep sandy duplex, gravelly (1999) |
| **Australian Soil Classification:** | Ferric Eutrophic Yellow Chromosol (2002) |
| **Map Unit:** | 245Es_2 |

## Soil Profile Description

| Horizon | Depth (cm) | Description |
|---|---|---|
| A1 | 0-10 | dark greyish brown (10YR 4/2) moist fine sand; weak moderately moist consistence; apedal, single grain structure; sandy fabric; no coarse fragments; moderately rapid permeability; clear, smooth boundary. |
| A21 | 10-20 | pale brown (10YR 6/3) moist fine sand; weak moderately moist consistence; apedal, single grain structure; sandy fabric; no coarse fragments; moderately rapid permeability; diffuse, smooth boundary. |
| A22 | 20-30 | light yellowish brown (10YR 6/4) moist fine sand; weak moderately moist consistence; apedal, single grain structure; sandy fabric; no coarse fragments; moderately rapid permeability; diffuse, smooth boundary. |
| A23 | 30-55 | brownish yellow (10YR 6/6) moist fine sand; weak moderately moist consistence; apedal, single grain structure; sandy fabric; no coarse fragments; moderately rapid permeability; clear, wavy boundary. |
| A3 | 55-65 | brownish yellow (10YR 6/6) moist fine sand; weak moderately moist consistence; apedal, single grain structure; sandy fabric; 50% subrounded ferruginous medium gravels; moderately rapid permeability; abrupt, smooth boundary. |
| B2 | 65-95+ | light grey (10YR 7/2) moist light clay; common coarse distinct strong brown (7.5YR 5/8) moist mottles; very firm moderately moist consistence; pedal, strong, angular blocky structure; no coarse fragments; moderately slow permeability. |

| | |
|---|---|
| **Observation Type/Category:** | soil pit, full description |
| **Lab Analyses:** | Detailed chemical and physical analyses |
| **Location:** | MGA Zone: 50 674149 mE 6506171 mN |
| **Locations Notes:** | Bodallin South, Phil Ivey |
| **Site Notes:** | Photo frame: 27 - 32. MICRORELIEF: Cultivation lines. Sheet of deep yellow colluvial soil at site elsewhere occurs as pockets between gravel ridges. See card-Site Notes |
| **Disturbance:** | Cultivation, rainfed |

**Landform**

| | | | |
|---|---|---|---|
| **Landform pattern:** | rises | **Slope:** | 3 % |
| **Relief/modal slope:** | gently undulating rises | | |
| **Landform element:** | hillslope | **Slope length (m):** | 800 |
| **Morphological type:** | mid-slope | **Slope curvature:** | concave slope |
| **Relief:** | 25 m | **Pattern Relief:** | rises |

**Surface and Hydrological Properties**

| | |
|---|---|
| **Rock outcrop:** | 0 % |
| **Surface coarse fragments:** | no coarse fragments gravels, no coarse fragments stones |
| **Physical properties:** | Hardsetting; very deep soil |

**Geology/Parent Material**

| | |
|---|---|
| **Soil parent material:** | strongly weathered, unconsolidated material (unidentified) Colluvium |
| **Geology:** | granite |

**Vegetation**

| | |
|---|---|
| **Type:** | grassland |
| **Site:** | |
| **Surrounds:** | grassland |
| **Notes:** | Cape weed, Sub-clover, Serradella. Cropped since the 70s or earlier |

**Land Use**

| | |
|---|---|
| **Site:** | Cropping (may include grazing in rotation) |
| **Surrounds:** | Cropping (may include grazing in rotation) |

**Visible Erosion, Assessed Flooding and Salinity**

slight wind erosion, slight sheet erosion, no rill erosion, no gully erosion, no flooding, no ponding, no salinity.

**Current Classification**

| | |
|---|---|
| **WA Soil Group:** | Acid yellow sandy earth (1999) |
| **Australian Soil Classification:** | Acidic Mesotrophic Yellow Kandosol (2002) |
| **Map Unit:** | 258Ta |

## Soil Profile Description

| Horizon | Depth (cm) | Description |
|---|---|---|
| A1 | 0-10 | pale brown (10YR 6/3) moist, light brownish grey (10YR 6/2) dry sand with 4-8% clay; very firm dry consistence; apedal; common, very fine roots; no coarse fragments; moderately rapid permeability, non water repellent; clear boundary. |
| A2 | 10-30 | brownish yellow (10YR 6/6) moist, yellow (10YR 7/6) dry clayey sand; very firm moderately moist consistence; apedal, massive structure; earthy fabric; few, very fine roots; no coarse fragments; moderately rapid permeability; diffuse boundary. |
| B1 | 30-80 | brownish yellow (10YR 6/8) moist, yellow (10YR 7/6) dry sandy loam; few coarse mottles and very few coarse mottles; weak moist consistence; apedal, massive structure; earthy fabric; few, very fine roots; no coarse fragments; moderately rapid permeability; diffuse boundary. |
| B2 | 80-150+ | brownish yellow (10YR 6/8) moist, yellow (10YR 7/6) dry sandy loam; few coarse mottles; weak moist consistence; apedal, massive structure; earthy fabric; very fine roots; no coarse fragments; moderately rapid permeability; rare very fine roots. |

| | |
|---|---|
| **Observation Type/Category:** | soil pit, full description |
| **Lab Analyses:** | Detailed chemical and physical analyses |
| **Location:** | MGA Zone: 50 674056 mE 6506032 mN |
| **Locations Notes:** | Bodallin South, Phil Ivey |
| **Site Notes:** | frame: 7 - 14. MICRORELIEF: Cultivation |
| **Disturbance:** | Cultivation, rainfed |

**Landform**

| | | | |
|---|---|---|---|
| **Landform pattern:** | rises | **Slope:** | 2 % |
| **Relief/modal slope:** | gently undulating rises | | |
| **Landform element:** | hillslope | **Slope length (m):** | 500 |
| **Morphological type:** | mid-slope | **Slope curvature:** | uniform slope |
| **Relief:** | 25 m | **Pattern Relief:** | rises |

**Surface and Hydrological Properties**

| | |
|---|---|
| **Rock outcrop:** | 0 % |
| **Surface coarse fragments:** | no coarse fragments gravels, no coarse fragments stones |
| **Physical properties:** | firm; very deep soil; water table at 80 cm |

**Geology/Parent Material**

| | |
|---|---|
| **Soil parent material:** | strongly weathered, unconsolidated material (unidentified) Colluvium |
| **Geology:** | granite |

**Vegetation**

| | |
|---|---|
| **Type:** | |
| **Site:** | |
| **Surrounds:** | combination (shrub, mallee, woodland) |
| **Notes:** | Cape weed, Sub-clover. Cleared in 1990 |

**Land Use**

| | |
|---|---|
| **Site:** | Grazing (grazing of vegetation planted by man) |
| **Surrounds:** | Cropping (may include grazing in rotation) |

**Visible Erosion, Assessed Flooding and Salinity**

Slight wind erosion, no scald erosion, slight sheet erosion, no rill erosion, no gully erosion, no flooding, no ponding, no salinity.

**Current Classification**

| | |
|---|---|
| **WA Soil Group:** | Acid yellow sandy earth (1999) |
| **Australian Soil Classification:** | Acidic Mesotrophic Yellow Kandosol (2002) |
| **Map Unit:** | 258Ta |

### Soil Profile Description

| Horizon | Depth (cm) | Description |
|---|---|---|
| A1 | 0-10 | yellowish brown (10YR 5/4) moist, light yellowish brown (10YR 6/4) dry clayey sand; weak consistence; apedal, single grain structure; no coarse fragments; moderately rapid permeability;(LS); clear boundary. |
| A2 | 10-30 | brownish yellow (10YR 6/6) moist, yellow (10YR 7/6) dry medium sandy loam; firm consistence; apedal, massive structure; no coarse fragments; moderately rapid permeability; cultivation pan at top of this layer; diffuse boundary. |
| B1 | 30-50 | brownish yellow (10YR 6/5) moist medium sandy loam; few red (2.5YR 4/6) moist mottles; weak consistence, slightly sticky, slightly plastic; apedal, massive structure; very few ferruginous semi-indurated, irregular; no coarse fragments; moderately rapid permeability; diffuse boundary. |
| B2 | 50-140+ | brownish yellow (10YR 6/8) moist medium sandy loam; apedal, massive structure; earthy fabric; no coarse fragments; moderately rapid permeability;moist consistence. |

| | |
|---|---|
| **Observation Type/Category:** | soil pit, full description |
| **Lab Analyses:** | Detailed chemical and physical analyses |
| **Location:** | MGA Zone: 50 674101 mE 6506136 mN |
| **Locations Notes:** | Bodallin South, Phil Ivey |
| **Site Notes:** | MICRORELIEF: Pedestals under vegetation. Sand plain. Strip of vegetation 25 m. wide, some slight access by stock obvious. Surface crust about 10mm. Some layers within crust including surface 1-2 mm often with lichen & moss. |
| **Disturbance:** | Slightly disturbed |

**Landform**

| | | | |
|---|---|---|---|
| **Landform pattern:** | rises | **Slope:** | 2 % |
| **Relief/modal slope:** | gently undulating rises | | |
| **Landform element:** | hillslope | **Slope length (m):** | 500 |
| **Morphological type:** | mid-slope | **Slope curvature:** | uniform slope |
| **Relief:** | 25 m | **Pattern Relief:** | rises |

**Surface and Hydrological Properties**

| | |
|---|---|
| **Rock outcrop:** | 0 % |
| **Surface coarse fragments:** | no coarse fragments gravels, no coarse fragments stones |
| **Physical properties:** | surface crust; very deep soil |

**Geology/Parent Material**

| | |
|---|---|
| **Soil parent material:** | strongly weathered, unconsolidated material (unidentified) Colluvium |
| **Geology:** | granite |

**Vegetation**

| | |
|---|---|
| **Type:** | |
| **Site:** | shrubland |
| **Surrounds:** | mallee |
| **Notes:** | Heath. Appears to have been burnt about 1990 |

**Land Use**

| | |
|---|---|
| **Site:** | Not used |
| **Surrounds:** | Cropping (may include grazing in rotation) |

**Visible Erosion, Assessed Flooding and Salinity**

No wind erosion, no scald erosion, no sheet erosion, no rill erosion, no gully erosion, no flooding, no ponding, no salinity.

**Current Classification**

| | |
|---|---|
| **WA Soil Group:** | Acid yellow sandy earth, (1999) |
| **Australian Soil Classification:** | Acidic Mesotrophic Yellow Kandosol (2002) |
| **Map Unit:** | 258Ta |

## Soil Profile Description

| Horizon | Depth (cm) | Description |
|---|---|---|
| A11 | 0-2 | brown (10YR 5/3) moist fine sand; very firm dry consistence; pedal, moderate, 2-5 mm, platy structure; no coarse fragments; moderately slow permeability, non water repellent;texture FM CS; abrupt boundary. |
| A12 | 2-10 | brownish yellow (10YR 6/6) moist fine sand; loose dry consistence; apedal, single grain structure; no coarse fragments; moderately rapid permeability; texture FK CS; gradual boundary. |
| A2 | 10-30 | yellow (10YR 7/6) moist clayey sand; few mottles; loose dry consistence; apedal, single grain structure; no coarse fragments; moderately rapid permeability; gradual boundary. |
| B1 | 30-80 | brownish yellow (10YR 6/8) moist sandy loam; few mottles; very weak dry consistence; apedal, massive structure; ferruginous; 1 % rounded quartz fine gravels; moderately rapid permeability; semi-indurated FE mottles, irregular, infilled root channels; diffuse boundary. |
| B2 | 80-150+ | brownish yellow (10YR 6/8) moist sandy loam; weak moderately moist consistence; apedal, massive structure; medium ferruginous and fine ferruginous; 2 % subrounded quartz fine gravels; moderately rapid permeability;semi-indurated FE mottles, irregular, infilled root channels. |

| | |
|---|---|
| **Observation Type/Category:** | soil pit, full description |
| **Lab Analyses:** | Detailed chemical and physical analyses |
| **Location:** | MGA Zone: 50 389969 mE 6827030 mN |
| **Locations Notes:** | Tardan, Christian Brother's College |
| **Site Notes:** | MICRORELIEF: Vehicle tracks |
| **Disturbance:** | Cultivation, rainfed |

### Landform

| | | | |
|---|---|---|---|
| **Landform pattern:** | rises | **Slope:** | < 1 % |
| **Relief/modal slope:** | gently undulating rises | | |
| **Landform element:** | hillslope | **Slope length (m):** | 2000 |
| **Morphological type:** | mid-slope | **Slope curvature:** | uniform slope |
| **Relief:** | 20 m | **Pattern Relief:** | rises |

### Surface and Hydrological Properties

| | |
|---|---|
| **Rock outcrop:** | 0 % |
| **Surface coarse fragments:** | no coarse fragments gravels, no coarse fragments stones |
| **Physical properties:** | loose; deep soil |

### Geology/Parent Material

| | |
|---|---|
| **Soil parent material:** | strongly weathered, unconsolidated material (unidentified) Colluvium/lateritic |
| **Geology:** | granite |

### Vegetation

| | |
|---|---|
| **Type:** | |
| **Site:** | |
| **Surrounds:** | |
| **Notes:** | Cape weed, Sub - clover & grasses |

### Land Use

| | |
|---|---|
| **Site:** | Cropping (may include grazing in rotation) |
| **Surrounds:** | Cropping (may include grazing in rotation) |

### Visible Erosion, Assessed Flooding and Salinity

Slight wind erosion, no scald erosion, no sheet erosion, no rill erosion, no gully erosion, no flooding, no ponding, no salinity.

### Current Classification

| | |
|---|---|
| **WA Soil Group:** | Yellow deep sand, acid, gravelly (1999) |
| **Australian Soil Classification:** | Acidic Ferric-Reticulate Yellow-Orthic Tenosol (2002) |
| **Map Unit:** | 271Pi_2 |

### Soil Profile Description

| Horizon | Depth (cm) | Description |
|---|---|---|
| Ap | 0-12 | brown (7.5YR 4/4) moist, light yellowish brown (10YR 6/4) dry sand with 4-8 % clay; very weak consistence; apedal, massive structure; 1 % rounded ironstone fine gravels no goethite coatings; moderately rapid permeability; clear, wavy boundary. |
| A2 | 12-45 | brownish yellow (10YR 6/6) moist, yellow (10YR 7/6) dry clayey sand; weak consistence; apedal, massive structure; 1% rounded ironstone fine gravels no goethite coatings; moderately rapid permeability; gradual boundary. |
| B1 | 45-80 | strong brown (7.5YR 5/6) moist clayey sand; firm consistence; apedal, massive structure; 20 % subrounded ironstone fine gravels goethite, haematite interior and 10 % subrounded ironstone medium gravels goethite, haematite interior and 40 % subrounded ironstone coarse gravels goethite, haematite interior; moderately rapid permeability; gradual boundary. |
| B2 | 80-150+ | brownish yellow (10YR 6/6) moist sandy loam; very firm consistence; apedal, massive structure; 80% subangular ironstone Manganese in reticulite, highly Fe, black interior. |

| | |
|---|---|
| **Observation Type/Category:** | soil pit, full description |
| **Lab Analyses:** | Detailed chemical and physical analyses |
| **Location:** | MGA Zone: 50 391259 mE 6829101 mN |
| **Locations Notes:** | Tardan, Christian Brother's College |
| **Site Notes:** | MICRORELIEF: Vehicle tracks. Frame No.3 From 35 - 37 |
| **Disturbance:** | Cultivation, rainfed |

**Landform**

| | | | |
|---|---|---|---|
| **Landform pattern:** | plain | **Slope:** | < 1 % |
| **Relief/modal slope:** | undulating plains | | |
| **Landform element:** | hillslope | **Slope length (m):** | 300 |
| **Morphological type:** | mid-slope | **Slope curvature:** | uniform slope |
| **Relief:** | 20 m | **Pattern Relief:** | plain |

**Surface and Hydrological Properties**

| | |
|---|---|
| **Rock outcrop:** | 0 % |
| **Surface coarse fragments:** | no coarse fragments gravels, no coarse fragments stones |
| **Physical properties:** | loose; deep soil |

**Geology/Parent Material**

| | |
|---|---|
| **Soil parent material:** | strongly weathered, unconsolidated material (unidentified) Colluvium |
| **Geology:** | granite |

**Vegetation**

| | |
|---|---|
| **Type:** | |
| **Site:** | |
| **Surrounds:** | |
| **Notes:** | Cape weed, raddish, some grass & clover |

**Land Use**

| | |
|---|---|
| **Site:** | Cropping (may include grazing in rotation) |
| **Surrounds:** | Not used |

**Visible Erosion, Assessed Flooding and Salinity**

Slight wind erosion, no scald erosion, no sheet erosion, no rill erosion, no gully erosion, no flooding, no ponding, no salinity.

**Current Classification**

| | |
|---|---|
| **WA Soil Group:** | Yellow deep sand, acid, gravelly (1999) |
| **Australian Soil Classification:** | Acidic Ferric-Reticulate Yellow-Orthic Tenosol (2002) |
| **Map Unit:** | 271Pi_2 |

### Soil Profile Description

| Horizon | Depth (cm) | Description |
|---|---|---|
| Ap | 0-10 | strong brown (7.5YR 5/6) moist, brownish yellow (10YR 6/6) dry sand; very weak dry consistence; apedal, single grain structure; very few rounded ironstone fine gravels; moderately rapid permeability; many very fine roots; clear boundary. |
| A2 | 10-80 | yellowish brown (10YR 5/6) moist sand; weak moderately moist consistence; apedal, massive structure; very few rounded ironstone fine gravels; moderately rapid permeability; few very fine roots; diffuse boundary. |
| B1 | 80-100 | brownish yellow (10YR 6/6) moist clayey sand; firm moist consistence; apedal, massive structure; 30 % rounded fine gravels and 45 % rounded medium gravels; moderately rapid permeability; few very fine roots; clear boundary. |
| B2 | 100-120+ | light grey (10YR 7/2) moist sandy loam; common brownish yellow (10YR 6/6) moist mottles; very firm moist consistence; apedal, massive structure; 40 % subangular ironstone fine gravels reticulite and 40% subangular ironstone medium gravels; moderate permeability; 4 - 5 Consistence. Occasional very fine roots. |

| | |
|---|---|
| **Observation Type/Category:** | soil pit, full description |
| **Lab Analyses:** | Limited chemical and physical analyses |
| **Location:** | MGA Zone: 50 391259 mE 6829051 mN |
| **Locations Notes:** | Tardan, Christian Brother's College |
| **Site Notes:** | MICRORELIEF: Pedestals around plants |
| **Disturbance:** | Natural |

**Landform**

| | | | |
|---|---|---|---|
| **Landform pattern:** | plain | **Slope:** | < 1 % |
| **Relief/modal slope:** | undulating plains | | |
| **Landform element:** | hillslope | **Slope length (m):** | |
| **Morphological type:** | mid-slope | **Slope curvature:** | uniform slope |
| **Relief:** | 20 m | **Pattern Relief:** | plain |

**Surface and Hydrological Properties**

| | |
|---|---|
| **Rock outcrop:** | 0 % |
| **Surface coarse fragments:** | no coarse fragments gravels, no coarse fragments stones |
| **Physical properties:** | surface crust; deep soil |

**Geology/Parent Material**

| | |
|---|---|
| **Soil parent material:** | strongly weathered, unconsolidated material (unidentified) Colluvium |
| **Geology:** | granite |

**Vegetation**

| | |
|---|---|
| **Type:** | |
| **Site:** | heathland |
| **Surrounds:** | |
| **Notes:** | |

**Land Use**

| | |
|---|---|
| **Site:** | Not used |
| **Surrounds:** | Cropping (may include grazing in rotation) |

**Visible Erosion, Assessed Flooding and Salinity**

No wind erosion, no scald erosion, no sheet erosion, no rill erosion, no gully erosion, no flooding, no ponding, no salinity.

**Current Classification**

| | |
|---|---|
| **WA Soil Group:** | Yellow deep sand, acid, gravelly (1999) |
| **Australian Soil Classification:** | Acidic Ferric-Reticulate Yellow-Orthic Tenosol (2002) |
| **Map Unit:** | 271Pi_2 |

## Soil Profile Description

| Horizon | Depth (cm) | Description |
|---|---|---|
| A1 | 0-5 | brown (7.5YR 4/4) moist, light yellowish brown (10YR 6/4) dry sand with 4-8 % clay; weak dry consistence; apedal, single grain structure; no coarse fragments; moderately rapid permeability; texture: fine to medium, top 0.5 cm biological surface crust.; gradual boundary. |
| A21 | 5-30 | yellowish brown (10YR 5/6) moist, very pale brown (10YR 7/4) dry sand with 4-8 % clay; very weak dry consistence; apedal, single grain structure; no coarse fragments; moderately rapid permeability; texture: fine to medium. |
| A22 | 30-85 | yellowish brown (10YR 5/8) moist, brownish yellow (10YR 6/6) dry sand with 4-8 % clay; very weak dry consistence; apedal, massive structure; very few ironstone; moderately rapid permeability; texture: fine to medium. |
| B1 | 85-95 | yellowish brown (10YR 5/8) moist, brownish yellow (10YR 6/6) dry sand with 4-8 % clay; very weak dry consistence; apedal, massive structure; 30 % rounded ironstone fine gravels goethite coated and 20 % rounded ironstone medium gravels goethite coated; moderately rapid permeability; texture: fine to medium. |
| B2 | 95-100+ | brownish yellow (10YR 6/8), very pale brown (10YR 7/4) moist clayey sand; very firm moderately moist consistence; apedal, massive structure; 60 % subrounded ironstone medium gravels multi-coloured, goethite & haematite; moderate permeability; perm. fact.: 3 - 4 variable. |

| | |
|---|---|
| **Observation Type/Category:** | soil pit, full description |
| **Lab Analyses:** | Limited chemical and physical analyses |
| **Location:** | MGA Zone: 50 684796 mE 6302488 mN |
| **Locations Notes:** | South Newdegate, Barry and Anne Rick |
| **Site Notes:** | |
| **Disturbance:** | Complete clearing; past cultivation |

**Landform**

| | | | |
|---|---|---|---|
| **Landform pattern:** | rises | **Slope:** | 2 % |
| **Relief/modal slope:** | gently undulating rises | | |
| **Landform element:** | hillslope | **Slope length (m):** | 500 |
| **Morphological type:** | mid-slope | **Slope curvature:** | uniform slope |
| **Relief:** | 20 m | **Pattern Relief:** | rises |

**Surface and Hydrological Properties**

| | |
|---|---|
| **Rock outcrop:** | 0 % |
| **Surface coarse fragments:** | no coarse fragments gravels, no coarse fragments stones |
| **Physical properties:** | Water repellent; loose; deep soil |

**Geology/Parent Material**

| | |
|---|---|
| **Soil parent material:** | strongly weathered, unconsolidated material (unidentified) Colluvium |
| **Geology:** | granite |

**Vegetation**

| | |
|---|---|
| **Type:** | |
| **Site:** | |
| **Surrounds:** | |
| **Notes:** | dried off pasture, none recognisable, cereal stubble from previous year |

**Land Use**

| | |
|---|---|
| **Site:** | Grazing (grazing of vegetation planted by man) |
| **Surrounds:** | Cropping (may include grazing in rotation) |

**Visible Erosion, Assessed Flooding and Salinity**

Moderate wind erosion, no scald erosion, no sheet erosion, no rill erosion, no gully erosion, no flooding, no ponding, no salinity.

**Current Classification**

| | |
|---|---|
| **WA Soil Group:** | Duplex sandy gravel, (1999) |
| **Australian Soil Classification:** | Ferric Mottled-Subnatric Yellow Sodosol (2002) |
| **Map Unit:** | 250Nw_5 |

## Soil Profile Description

| Horizon | Depth (cm) | Description |
|---|---|---|
| A1 | 0-10 | dark grey (10YR 4/1) moist, grey (10YR 6/1) dry sand; very weak dry consistence; apedal, single grain structure; 1 % rounded ironstone fine gravels; rapid permeability; dry due to plough layer; sharp, smooth boundary. |
| A21 | 10-12 | pale brown (10YR 6/3) moist, light grey (10YR 7/2) dry sand; weak dry consistence; apedal, single grain structure; 5 % rounded ironstone fine gravels and 2 % subrounded ironstone medium gravels; rapid permeability; abrupt, smooth boundary. |
| A22 | 12-42 | pale brown (10YR 6/3) moist, very pale brown (10YR 7/3) dry sand; very weak dry consistence; apedal, single grain structure; 25 % subrounded ironstone fine gravels and 30 % subrounded ironstone medium gravels and 5 % subrounded ironstone coarse gravels; rapid permeability; abrupt, wavy boundary. |
| B21 | 42-50 | pale brown (10YR 6/3) moist sandy clay; common medium distinct yellowish red (5YR 5/8) moist mottles; strong dry consistence; apedal, massive structure; 5 % subrounded ironstone medium gravels; moderately slow permeability; gradual, wavy boundary. |
| B22 | 50-70 | pale brown (10YR 6/3) moist medium clay; many medium prominent yellowish red (5YR 5/8) moist mottles; very firm moderately moist consistence; pedal, weak, 10-20 mm, subangular blocky structure; 2% subrounded ironstone medium gravels; moderate permeability;Reticulate pattern; diffuse, wavy boundary. |
| B23 | 70-110+ | light yellowish brown (10YR 6/4) moist medium clay; many medium distinct light grey (10YR 7/2) moist mottles; firm moderately moist consistence; pedal, weak, 5-10 mm, angular blocky structure; 5% subrounded ironstone medium gravels; moderate permeability. |

| | |
|---|---|
| **Observation Type/Category:** | soil pit, full description |
| **Lab Analyses:** | Limited chemical and physical analyses |
| **Location:** | MGA Zone: 50 683571 mE 6301325 mN |
| **Locations Notes:** | South Newdegate, Barry and Anne Rick |
| **Site Notes:** | MICRORELIEF: Plough furrows. Some roots on surface |
| **Disturbance:** | Complete clearing; past cultivation |

**Landform**

| | | | |
|---|---|---|---|
| **Landform pattern:** | rises | **Slope:** | 1 % |
| **Relief/modal slope:** | gently undulating rises | | |
| **Landform element:** | hillslope | **Slope length (m):** | 500 |
| **Morphological type:** | mid-slope | **Slope curvature:** | uniform slope |
| **Relief:** | 20 m | **Pattern Relief:** | rises |

**Surface and Hydrological Properties**

| | |
|---|---|
| **Rock outcrop:** | 0 % |
| **Surface coarse fragments:** | no coarse fragments gravels, no coarse fragments stones |
| **Physical properties:** | soft; moderately deep soil |

**Geology/Parent Material**

| | |
|---|---|
| **Soil parent material:** | strongly weathered, unconsolidated material (unidentified) |
| **Geology:** | granite |

**Vegetation**

| | |
|---|---|
| **Type:** | |
| **Site:** | |
| **Surrounds:** | |
| **Notes:** | Pasture, crop last year. Sub-clover, raddish, Vulpia. Lot of stubble last year |

**Land Use**

| | |
|---|---|
| **Site:** | Grazing (grazing of vegetation planted by man) |
| **Surrounds:** | Not used |

**Visible Erosion, Assessed Flooding and Salinity**

No wind erosion, no scald erosion, no sheet erosion, no rill erosion, no gully erosion, no flooding, no ponding, no salinity.

**Current Classification**

| | |
|---|---|
| **WA Soil Group:** | Grey deep sandy duplex, gravelly (1999) |
| **Australian Soil Classification:** | Ferric Mottled-Subnatric Yellow Sodosol (2002) |
| **Map Unit:** | 250Nw_5 |

## Soil Profile Description

| Horizon | Depth (cm) | Description |
|---|---|---|
| A1 | 0-5 | dark greyish brown (10YR 4/2) moist, light brownish grey (10YR 6/2) dry sand; very weak dry consistence; apedal, single grain structure; 2 % rounded ironstone medium gravels; rapid permeability; roots 1,2; abrupt, smooth boundary. |
| A21 | 5-18 | pale brown (10YR 6/3) moist, very pale brown (10YR 7/3) dry sand; very weak dry consistence; apedal, single grain structure; 2 % subrounded ironstone medium gravels; rapid permeability; roots 1,1; abrupt, wavy boundary. |
| A22 | 18-36 | pale brown (10YR 6/3) moist, very pale brown (10YR 7/3) dry sand with 2-4 % clay; very weak dry consistence; apedal, single grain structure; 20 % subrounded ironstone fine gravels and 40 % subrounded ironstone medium gravels; rapid permeability; roots 1,2 & 2,1. Thin bleach (10yr 8/2D) at bottom of horizon over B; sharp, wavy boundary. |
| B21 | 36-48 | pale brown (10YR 6/3) moist sandy clay loam; few medium distinct strong brown (7.5YR 5/6) moist mottles; strong dry consistence; apedal, massive structure; 5 % subrounded ironstone medium gravels; moderately slow permeability; top of B indurated. Roots 2,1; gradual, wavy boundary. |
| B22 | 48-78 | light yellowish brown (10YR 6/4) moist medium clay; many medium prominent red (2.5YR 5/6) moist mottles; very firm moderately moist consistence; pedal, moderate, 10-20 mm, subangular blocky structure; 2 % subrounded ironstone medium gravels; moderate permeability; roots nil; diffuse, wavy boundary. |
| B23 | 78-105 | pale yellow (2.5Y 7/3) moist medium clay; common medium distinct brownish yellow (10YR 6/6) moist mottles and few medium distinct yellowish red (5YR 5/6) moist mottles; firm moderately moist consistence; pedal, moderate, 10-20 mm, angular blocky structure; clay cutans; Object invalid or no longer set. |

| | |
|---|---|
| **Observation Type/Category:** | soil pit, full description |
| **Lab Analyses:** | Limited chemical and physical analyses |
| **Location:** | MGA Zone: 50 683637 mE 6301339 mN |
| **Locations Notes:** | South Newdegate, Barry and Anne Rick |
| **Site Notes:** | MICRORELIEF: SM |
| **Disturbance:** | Natural |

**Landform**

| | | | |
|---|---|---|---|
| **Landform pattern:** | rises | **Slope:** | < 1 % |
| **Relief/modal slope:** | gently undulating rises | | |
| **Landform element:** | hillslope | **Slope length (m):** | 700 |
| **Morphological type:** | Slope curvature: uniform slope | | |
| **Relief:** | 20 m | **Pattern Relief:** | rises |

**Surface and Hydrological Properties**

| | |
|---|---|
| **Rock outcrop:** | 0 % |
| **Surface coarse fragments:** | no coarse fragments gravels, no coarse fragments stones |
| **Physical properties:** | Water repellent; firm; moderately deep soil |

**Geology/Parent Material**

| | |
|---|---|
| **Soil parent material:** | strongly weathered, unconsolidated material (unidentified) |
| **Geology:** | granite |

**Vegetation**

| | |
|---|---|
| **Type:** | |
| **Site:** | mallee |
| **Surrounds:** | mallee |
| **Notes:** | |

**Land Use**

| | |
|---|---|
| **Site:** | Not used |
| **Surrounds:** | Cropping (may include grazing in rotation) |

**Visible Erosion, Assessed Flooding and Salinity**

No wind erosion, no scald erosion, no sheet erosion, no rill erosion, no gully erosion, no tunnel erosion, no stbank erosion, no wave erosion, no mass movement, no flooding, no ponding, no salinity.

**Current Classification**

| | |
|---|---|
| **WA Soil Group:** | Grey deep sandy duplex, gravelly (1999) |
| **Australian Soil Classification:** | Ferric Mottled-Mesonatric Yellow Sodosol (2002) |
| **Map Unit:** | 250Nw_5 |

## Soil Profile Description

| Horizon | Depth (cm) | Description |
|---|---|---|
| A1 | 0-12 | pale brown (10YR 6/3) moist, very pale brown (10YR 7/3) dry sand; very weak dry consistence; apedal, single grain structure; many, fine roots; 1 % rounded ironstone fine gravels; rapid permeability; plus roots size M, 0-1 %; abrupt, wavy boundary. |
| A2 | 12-30 | light grey (10YR 7/2) moist, white (10YR 8/2) dry sand; very weak dry consistence; apedal, single grain structure; common, fine roots; 50 % rounded; rapid permeability;Strong bleach at bottom of horizon (2.5 yr 8/1), plus roots size M, 0-1 %; sharp, irregular boundary. |
| B1 | 30-40 | pale brown (10YR 6/3) moist sandy clay loam; few medium distinct yellowish red (5YR 5/6) moist mottles; strong dry consistence; pedal, weak, 50-100 mm, columnar structure; few, medium roots; 2 % subrounded ironstone fine gravels; moderately slow permeability; line of horizontal large roots at 35 cm. (15-20 mm diameter); gradual, wavy boundary. |
| B21 | 40-65 | light yellowish brown (10YR 6/4) moist medium clay; common medium distinct yellowish red (5YR 5/6) moist mottles; very firm dry consistence; pedal, weak, 2-5 mm, angular blocky structure; few, coarse roots; moderate permeability; occasional large roots; diffuse, wavy boundary. |
| B22 | 65-90 | light yellowish brown (10YR 6/4) moist light clay; common medium distinct reddish yellow (7.5YR 6/6) moist mottles; firm moderately moist consistence; pedal, weak, 2-5 mm, subangular blocky structure; few, coarse roots; moderate permeability; occasional large roots; diffuse, wavy boundary. |
| BC | 90-105+ | pale yellow (2.5Y 7/3) moist light clay; common fine faint reddish yellow (7.5YR 6/6) moist mottles; firm moderately moist consistence; pedal, weak, 5-10 mm, subangular blocky structure; clay cutans; Object invalid or no longer set. |

| | |
|---|---|
| **Observation Type/Category:** | soil pit, full description |
| **Lab Analyses:** | Limited chemical and physical analyses |
| **Location:** | MGA Zone: 50 239254 mE 6889688 mN |
| **Locations Notes:** | NW of Northampton, Lyal Reynolds |
| **Site Notes:** | |
| **Disturbance:** | Complete clearing; past cultivation |

**Landform**

| | | | |
|---|---|---|---|
| **Landform pattern:** | rises | **Slope:** | 3 % |
| **Relief/modal slope:** | undulating rises | | |
| **Landform element:** | hillslope | **Slope length (m):** | 500 |
| **Morphological type:** | mid-slope | **Slope curvature:** | uniform slope |
| **Relief:** | 30 m | **Pattern Relief:** | rises |

**Surface and Hydrological Properties**

| | |
|---|---|
| **Rock outcrop:** | 0 % |
| **Surface coarse fragments:** | no coarse fragments gravels, no coarse fragments stones |
| **Physical properties:** | loose; very deep soil; water table at 0 cm |

**Geology/Parent Material**

| | |
|---|---|
| **Soil parent material:** | strongly weathered, unconsolidated material (unidentified) colluvium |
| **Geology:** | sandstone |

**Vegetation**

| | |
|---|---|
| **Type:** | |
| **Site:** | |
| **Surrounds:** | grassland |
| **Notes:** | pasture, clover, Stipa, doublegee |

**Land Use**

| | |
|---|---|
| **Site:** | Grazing (grazing of vegetation planted by man) |
| **Surrounds:** | Grazing (grazing of vegetation planted by man) |

**Visible Erosion, Assessed Flooding and Salinity**

Slight wind erosion, no scald erosion, slight sheet erosion, no rill erosion, no gully erosion, no flooding, no ponding, no salinity.

**Current Classification**

| | |
|---|---|
| **WA Soil Group:** | Yellow deep sand, (1999) |
| **Australian Soil Classification:** | Basic Regolithic Yellow-Orthic Tenosol (2002) |
| **Map Unit:** | 232Ur |

### Soil Profile Description

| Horizon | Depth (cm) | Description |
|---|---|---|
| A1 | 0-10 | greyish brown (10YR 5/2) moist, pale brown (10YR 6/3) dry medium sand; very weak dry consistence; apedal, single grain structure; no coarse fragments; rapid permeability; roots many very fine; clear boundary. |
| A2 | 10-40 | brownish yellow (10YR 6/6) moist, yellow (10YR 7/6) dry medium sand; weak dry consistence; apedal, massive structure; no coarse fragments; moderately rapid permeability; few very fine roots; diffuse boundary. |
| B1 | 40-100 | brownish yellow (10YR 6/8) moist, yellow (10YR 7/8) dry clayey medium sand; firm moderately moist consistence; apedal, massive structure; no coarse fragments; moderately rapid permeability;medium to coarse sand, very few to no roots; diffuse boundary. |
| B2 | 100-160+ | brownish yellow (10YR 6/8) moist, yellow (10YR 7/8) dry clayey medium sand; firm moderately moist consistence; apedal, massive structure; no coarse fragments; moderately rapid permeability;medium to coarse sand, no roots. |

| | |
|---|---|
| **Observation Type/Category:** | soil pit, full description |
| **Lab Analyses:** | Limited chemical and physical analyses |
| **Location:** | MGA Zone: 50 239671 mE 6891057 mN |
| **Locations Notes:** | NW of Northampton, Lyal Reynolds |
| **Site Notes:** | wheel ruts, Some wood 0.5 - 2 cm. diameter on ground, wheat stubble |
| **Disturbance:** | Complete clearing; past cultivation |

**Landform**

| | | | |
|---|---|---|---|
| **Landform pattern:** | rises | **Slope:** | 2 % |
| **Relief/modal slope:** | undulating rises | | |
| **Landform element:** | hillslope | **Slope length (m):** | 300 |
| **Morphological type:** | lower slope | **Slope curvature:** | convex slope |
| **Relief:** | 30 m | **Pattern Relief:** | rises |

**Surface and Hydrological Properties**

| | |
|---|---|
| **Rock outcrop:** | 0 % |
| **Surface coarse fragments:** | no coarse fragments gravels, no coarse fragments stones |
| **Physical properties:** | soft; very deep soil |

**Geology/Parent Material**

| | |
|---|---|
| **Soil parent material:** | strongly weathered, unconsolidated material (unidentified) colluvium |
| **Geology:** | sandstone |

**Vegetation**

| | |
|---|---|
| **Type:** | |
| **Site:** | |
| **Surrounds:** | heathland |
| **Notes:** | Light pasture, Hypochoeris, Stipa, a little Clover & Double Gee (Banksia prionotes nearby) |

**Land Use**

| | |
|---|---|
| **Site:** | Grazing (grazing of vegetation planted by man) |
| **Surrounds:** | Not used |

**Visible Erosion, Assessed Flooding and Salinity**

Severe wind erosion, no scald erosion, severe sheet erosion, no rill erosion, no gully erosion, no flooding, no ponding, no salinity.

**Current Classification**

| | |
|---|---|
| **WA Soil Group:** | Yellow deep sand, (1999) |
| **Australian Soil Classification:** | Basic Regolithic Yellow-Orthic Tenosol (2002) |
| **Map Unit:** | 232Wi |

## Soil Profile Description

| Horizon | Depth (cm) | Description |
|---|---|---|
| A1 | 0-15 | greyish brown (10YR 5/2) moist, light grey (10YR 7/2) dry sand; very weak dry consistence; apedal, single grain structure; no coarse fragments; rapid permeability, water repellent; many very fine roots; clear boundary. |
| A2 | 15-40 | light yellowish brown (10YR 6/4) moist, very pale brown (10YR 7/4) dry sand; weak dry consistence; apedal, massive structure; no coarse fragments; moderately rapid permeability; Few very fine roots, some carbonised remnants of larger K roots; gradual boundary. |
| B1 | 40-80 | brownish yellow (10YR 6/8) moist sand; weak dry consistence; apedal, massive structure; no coarse fragments; moderately rapid permeability;Very few, very fine roots. Old carbonised coarse (K) roots; diffuse boundary. |
| B2 | 80-150+ | brownish yellow (10YR 6/8) moist sand; weak moderately moist consistence; apedal, massive structure; no coarse fragments; moderately rapid permeability;Very few, very fine roots. Old carbonised coarse (K) roots. |

| | |
|---|---|
| **Observation Type/Category:** | soil pit, full description |
| **Lab Analyses:** | Limited chemical and physical analyses |
| **Location:** | MGA Zone: 50 239372 mE 6891351 mN |
| **Locations Notes:** | NW of Northampton, Lyal Reynolds |
| **Site Notes:** | MICRORELIEF: Small pedestals. Site photo type: C. From 22 to 26. Burnt 5 - 7 years ago |
| **Disturbance:** | Natural |

**Landform**

| | | | |
|---|---|---|---|
| **Landform pattern:** | rises | **Slope:** | 2 % |
| **Relief/modal slope:** | undulating rises | | |
| **Landform element:** | hillslope | **Slope length (m):** | 300 |
| **Morphological type:** | mid-slope | **Slope curvature:** | concave slope |
| **Relief:** | 30 m | **Pattern Relief:** | rises |

**Surface and Hydrological Properties**

| | |
|---|---|
| **Rock outcrop:** | 0 % |
| **Surface coarse fragments:** | no coarse fragments gravels, no coarse fragments stones |
| **Physical properties:** | loose; very deep soil |

**Geology/Parent Material**

| | |
|---|---|
| **Soil parent material:** | strongly weathered, unconsolidated material (unidentified) Colluvium |
| **Geology:** | sandstone |

**Vegetation**

| | |
|---|---|
| **Type:** | |
| **Site:** | heathland |
| **Surrounds:** | no vegetation |
| **Notes:** | |

**Land Use**

| | |
|---|---|
| **Site:** | Not used |
| **Surrounds:** | Not used |

**Visible Erosion, Assessed Flooding and Salinity**

No wind erosion, no sheet erosion, no rill erosion, no gully erosion, no flooding, no ponding, no salinity.

**Current Classification**

| | |
|---|---|
| **WA Soil Group:** | Yellow deep sand, (1999) |
| **Australian Soil Classification:** | Basic Regolithic Yellow-Orthic Tenosol (2002) |
| **Map Unit:** | 232Ba |

## Soil Profile Description

| Horizon | Depth (cm) | Description |
| --- | --- | --- |
| A1 | 0-10 | dark grey (10YR 4/1) moist, light brownish grey (10YR 6/2) dry medium sand; very weak dry consistence; apedal, single grain structure; no coarse fragments; moderately rapid permeability; clear boundary. |
| A21 | 10-30 | light yellowish brown (10YR 6/4) moist, very pale brown (10YR 7/3) dry medium sand; very weak dry consistence; apedal, single grain structure; no coarse fragments; moderately rapid permeability; diffuse boundary. |
| A22 | 30-100 | brownish yellow (10YR 6/6) moist, very pale brown (10YR 7/4) dry medium sand with 4-8% clay; weak dry consistence; apedal, single grain structure; no coarse fragments; moderately rapid permeability; clear boundary. |
| B2 | 100-160+ | brownish yellow (10YR 6/8) moist clayey sand; very firm moist consistence; apedal, massive structure; no coarse fragments; moderately rapid permeability. |

| | |
|---|---|
| **Observation Type/Category:** | soil pit, full description |
| **Lab Analyses:** | Limited chemical and physical analyses |
| **Location:** | MGA Zone: 50 685583 mE 6304203 mN |
| **Locations Notes:** | South Newdegate, Barry and Anne Rick |
| **Site Notes:** | Fallow, over grazed |
| **Disturbance:** | Complete clearing; past cultivation |

**Landform**

| | | | |
|---|---|---|---|
| **Landform pattern:** | rises | **Slope:** | 2 % |
| **Relief/modal slope:** | gently undulating rises | | |
| **Landform element:** | hillslope | **Slope length (m):** | 500 |
| **Morphological type:** | mid-slope | **Slope curvature:** | uniform slope |
| **Relief:** | | **Pattern Relief:** | rises |

**Surface and Hydrological Properties**

| | |
|---|---|
| **Rock outcrop:** | 0 % |
| **Surface coarse fragments:** | no coarse fragments gravels, no coarse fragments stones |
| **Physical properties:** | Water repellent; loose; shallow soil |

**Geology/Parent Material**

| | |
|---|---|
| **Soil parent material:** | strongly weathered, unconsolidated material (unidentified) Colluvium |
| **Geology:** | granite |

**Vegetation**

| | |
|---|---|
| **Type:** | |
| **Site:** | |
| **Surrounds:** | |
| **Notes:** | |

**Land Use**

| | |
|---|---|
| **Site:** | Grazing (grazing of vegetation planted by man) |
| **Surrounds:** | |

**Visible Erosion, Assessed Flooding and Salinity**

Moderate wind erosion, no scald erosion, slight sheet erosion, no rill erosion, no gully erosion, no flooding, no ponding, no salinity.

**Current Classification**

| | |
|---|---|
| **WA Soil Group:** | Alkaline grey shallow sandy duplex, sodic (1999) |
| **Australian Soil Classification:** | Eutrophic Mottled-Mesonatric Grey Sodosol (2002) |
| **Map Unit:** | 250Nw_5 |

## Soil Profile Description

| Horizon | Depth (cm) | Description |
|---|---|---|
| A1 | 0-9 | greyish brown (10YR 5/2) moist, light grey (10YR 7/2) dry fine sand; very weak dry consistence; apedal, single grain structure; 1 % rounded ironstone fine gravels; rapid permeability; roots 1,2; clear boundary. |
| A2 | 9-18 | light grey (10YR 7/2) moist, white (10YR 8/2) dry fine sand; weak dry consistence; apedal, single grain structure; 20 % subrounded ironstone fine gravels and 13 % subangular ironstone medium gravels; rapid permeability; gravel shape SR. Roots 1,1; sharp boundary. |
| B1 | 18-40 | pinkish grey (7.5YR 7/3) moist, pink (7.5YR 7/4) dry sandy loam; few fine distinct reddish yellow (5YR 6/8) moist mottles and common medium distinct brown (7.5YR 4/2) moist mottles; very strong dry consistence; pedal, weak, 200-500 mm, columnar structure; no coarse fragments; domed (clay) domes morte or less 20 cm wide. Sodic columns. No roots. Dark mottling due to old root channels; diffuse boundary. |
| B21 | 40-75 | pale yellow (2.5Y 7/3) moist, pale yellow (5Y 8/3) dry medium clay; common fine prominent yellow (10YR 7/6) moist mottles; strong moderately moist consistence; pedal, weak, 20-50 mm, angular blocky structure; 1 % subrounded ironstone fine gravels; no roots; gradual boundary. |
| B22 | 75-90+ | light grey (2.5Y 7/2) moist light clay; common fine prominent yellow (10YR 7/6) moist mottles; very firm moderately moist consistence; pedal, weak, 10-20 mm, angular blocky structure; 5 % subrounded silcrete cobbles; lumps of silcrete more or less 100 mm size at about 80 cm. No roots. |

| | |
|---|---|
| **Observation Type/Category:** | soil pit, full description |
| **Lab Analyses:** | Limited chemical and physical analyses |
| **Location:** | MGA Zone: 50 682826 mE 6301421 mN |
| **Locations Notes:** | South Newdegate, Barry and Anne Rick |
| **Site Notes:** | Photo frame: 10 - 15 |
| **Disturbance:** | Complete clearing; past cultivation |

**Landform**

| | | | |
|---|---|---|---|
| **Landform pattern:** | rises | **Slope:** | < 1 % |
| **Relief/modal slope:** | gently undulating rises | | |
| **Landform element:** | hillslope | **Slope length (m):** | 500 |
| **Morphological type:** | lower slope | **Slope curvature:** | uniform slope |
| **Relief:** | 20 m | **Pattern Relief:** | rises |

**Surface and Hydrological Properties**

| | |
|---|---|
| **Rock outcrop:** | 0 % |
| **Surface coarse fragments:** | no coarse fragments gravels, no coarse fragments stones |
| **Physical properties:** | soft; moderately deep soil |

**Geology/Parent Material**

| | |
|---|---|
| **Soil parent material:** | strongly weathered, unconsolidated material (unidentified) Colluvium |
| **Geology:** | granite |

**Vegetation**

| | |
|---|---|
| **Type:** | |
| **Site:** | |
| **Surrounds:** | |
| **Notes:** | Pasture: sub-clover, Vulpia, radish, lots of stubble from last year cereal |

**Land Use**

| | |
|---|---|
| **Site:** | Grazing (grazing of vegetation planted by man) |
| **Surrounds:** | Not used |

**Visible Erosion, Assessed Flooding and Salinity**

No wind erosion, no scald erosion, no sheet erosion, no rill erosion, no gully erosion, no flooding, no ponding, no salinity.

**Current Classification**

| | |
|---|---|
| **WA Soil Group:** | Alkaline grey shallow sandy duplex, sodic (1999) |
| **Australian Soil Classification:** | Eutrophic Mottled-Subnatric Grey Sodosol (2002) |
| **Map Unit:** | 250Nw_5 |

## Soil Profile Description

| Horizon | Depth (cm) | Description |
|---|---|---|
| A11 | 0-6 | very dark grey (10YR 3/1) moist, dark greyish brown (10YR 4/2) dry sand; loose dry consistence; apedal, single grain structure; many, very fine roots; 1 % subrounded ironstone medium gravels; rapid permeability; roots 1,3. |
| A12 | 6-17 | brown (10YR 5/3) moist, pale brown (10YR 6/3) dry sand; very weak dry consistence; apedal, single grain structure; common, very fine roots; 1 % subrounded ironstone medium gravels; rapid permeability; roots 1,2. |
| A2 | 17-26 | light grey (10YR 7/2) moist, white (10YR 8/2) dry sand; weak dry consistence; apedal, single grain structure; few, very fine roots; 5 % subrounded ironstone medium gravels; rapid permeability; roots 1,1 & 3,1. |
| B1 | 26-33 | pale brown (10YR 6/3) moist sandy loam; common medium faint brownish yellow (10YR 6/6) moist mottles; strong moderately moist consistence; pedal, weak, 100-200 mm, columnar structure; few, medium roots; no coarse fragments; moderately rapid permeability; weak column development. Soil structure largely massive. Roots 3,1. If sodic, then only just. |
| B21 | 33-70 | light yellowish brown (10YR 6/4) moist medium clay; common medium distinct reddish yellow (7.5YR 6/8) moist mottles; firm moderately moist consistence; pedal, moderate, 10-20 mm, angular blocky structure; few, very fine roots; no coarse fragments; moderately slow permeability; roots 1,1. |
| B22 | 70-75+ | light grey (2.5Y 7/2) moist light clay; many medium distinct brownish yellow (10YR 6/6) moist mottles and few medium distinct light reddish brown (5YR 6/4) moist mottles; firm moderately moist consistence; pedal, weak, 20-50 mm, angular blocky structure; no coarse fragments; moderately slow permeability; texture becoming lighter with depth. Perhaps SCL at 120 cm. |

| | |
|---|---|
| **Observation Type/Category:** | soil pit, full description |
| **Lab Analyses:** | Limited chemical and physical analyses |
| **Location:** | MGA Zone: 50 685634 mE 6304170 mN |
| **Locations Notes:** | South Newdegate, Barry and Anne Rick |
| **Site Notes:** | MICRORELIEF: Pedestals |
| **Disturbance:** | Natural |

**Landform**

| | | | |
|---|---|---|---|
| **Landform pattern:** | rises | **Slope:** | 1 % |
| **Relief/modal slope:** | gently undulating rises | | |
| **Landform element:** | hillslope | **Slope length (m):** | |
| **Morphological type:** | mid-slope | **Slope curvature:** | uniform slope |
| **Relief:** | 20 m | **Pattern Relief:** | rises |

**Surface and Hydrological Properties**

| | |
|---|---|
| **Rock outcrop:** | 0 % |
| **Surface coarse fragments:** | no coarse fragments gravels, no coarse fragments stones |
| **Physical properties:** | surface crust; moderately deep soil |

**Geology/Parent Material**

| | |
|---|---|
| **Soil parent material:** | strongly weathered, unconsolidated material (unidentified) Colluvium |
| **Geology:** | granite |

**Vegetation**

| | |
|---|---|
| **Type:** | |
| **Site:** | |
| **Surrounds:** | |
| **Notes:** | |

**Land Use**

| | |
|---|---|
| **Site:** | Not used |
| **Surrounds:** | Cropping (may include grazing in rotation) |

**Visible Erosion, Assessed Flooding and Salinity**

No wind erosion, no scald erosion, no sheet erosion, no rill erosion, no gully erosion, no flooding, no ponding, no salinity.

**Current Classification**

| | |
|---|---|
| **WA Soil Group:** | Alkaline grey shallow sandy duplex, sodic (1999) |
| **Australian Soil Classification:** | Eutrophic Mottled-Subnatric Grey Sodosol (2002) |
| **Map Unit:** | 250Nw_5 |

## Soil Profile Description

| Horizon | Depth (cm) | Description |
|---|---|---|
| A1 | 0-10 | brown (10YR 5/3) moist, light grey (10YR 7/2) dry fine sand; weak dry consistence; single grain structure; no coarse fragments; moderately rapid permeability, water repellent; 1 mm surface seal in bare patches, hydrophobic below surface; clear, smooth boundary. |
| A2 | 10-18 | light grey (2.5Y 7/2) moist, white (2.5Y 8/1) dry fine sand; very weak dry consistence; single grain structure; no coarse fragments; moderately rapid permeability, water repellent; no pan evident; sharp, wavy boundary. |
| B1 | 18-30 | light grey (2.5Y 7/2) moist sandy loam; abundant medium yellowish red (5YR 5/8) moist redox mottles; rigid dry consistence; moderate, 100-200 mm, columnar structure; 2 % subrounded ironstone medium gravels occasional clusters of pisolithic gravel, very variable, about 1 cm; slow permeability, non water repellent; sodic columns, bleaches on surface for about 0.5 cm; gradual boundary. |
| B21 | 30-60 | pale yellow (2.5Y 7/3) moist; many medium brownish yellow (10YR 6/8) moist redox mottles; very strong moderately moist consistence; massive structure; no coarse fragments; moderate permeability, non water repellent; gradual boundary. |
| B22 | 60-90+ | yellow (5Y 7/5) moist; many medium olive yellow (2.5Y 6/6) moist redox mottles; very strong moderately moist consistence; massive structure; 20 % subrounded coarse gravels silcrete, some preserving whole Fe pissolites, i.e. evidence of over printing; moderate permeability, non water repellent. |

| | |
|---|---|
| **Observation Type/Category:** | soil pit, full description |
| **Lab Analyses:** | Limited chemical and physical analyses |
| **Location:** | MGA Zone: 51 412041 mE 6300680 mN |
| **Locations Notes:** | Wittenoom Hills, see notes for WHS2 |
| **Site Notes:** | |
| **Disturbance:** | Cultivation, rainfed |

**Landform**

| | | | |
|---|---|---|---|
| **Landform pattern:** | plain | **Slope:** | 1 % |
| **Relief/modal slope:** | level plain | | |
| **Landform element:** | plain | **Slope length (m):** | |
| **Morphological type:** | simple slope | **Slope curvature:** | |
| **Relief:** | | **Pattern Relief:** | plain |

**Surface and Hydrological Properties**

| | |
|---|---|
| **Rock outcrop:** | 0 % |
| **Surface coarse fragments:** | very few subangular calcrete gravels, no coarse fragments stones |
| **Physical properties:** | soft; moderately deep soil |

**Geology/Parent Material**

| | |
|---|---|
| **Soil parent material:** | strongly weathered, unconsolidated material (unidentified) Tertiary marine sediments |
| **Geology:** | |

**Vegetation**

| | |
|---|---|
| **Type:** | |
| **Site:** | |
| **Surrounds:** | |
| **Notes:** | Some active annual weeds and medic pasture from summer rain. Roots in lower B tend to follow old root channels |

**Land Use**

| | |
|---|---|
| **Site:** | Cropping (may include grazing in rotation) |
| **Surrounds:** | Cropping (may include grazing in rotation) |

**Visible Erosion, Assessed Flooding and Salinity**

No wind erosion, no scald erosion, no sheet erosion, no rill erosion, no gully erosion, no flooding, no ponding, no salinity.

**Current Classification**

| | |
|---|---|
| **WA Soil Group:** | Alkaline grey shallow sandy duplex, (1999) |
| **Australian Soil Classification:** | Hypercalcic Mesonatric Grey Sodosol (2002) |
| **Soil Series:** | Scaddan |
| **Map Unit:** | 246Ha_1 |

### Soil Profile Description

| Horizon | Depth (cm) | Description |
|---|---|---|
| Ap | 0-10 | dark grey (10YR 4/1) moist, light brownish grey (10YR 6/2) dry fine sand; weak dry consistence; pedal, weak, 5-10 mm, platy structure; many, fine roots; no coarse fragments; moderate permeability; abrupt, smooth boundary. |
| A2 | 10-20 | light yellowish brown (10YR 6/4) moist fine sandy clay loam; very firm moderately moist consistence; pedal, strong, 100-200 mm, columnar structure; few, fine roots; 5 % calcrete medium gravels hard and soft; slow permeability; clear, smooth boundary. |
| B1 | 20-30 | light brownish grey (2.5Y 6/2) moist fine sandy clay loam; very pale brown (10YR 7/3) moist and olive (5Y 5/6) moist ; strong moist consistence; pedal, strong, 5-10 mm, angular blocky structure; few, fine roots; 30% calcrete medium gravels hard and soft; moderately slow permeability; gradual, smooth boundary. |
| B2 | 30-70 | light brownish grey (2.5Y 6/2) moist light clay; yellowish red (5YR 5/6) moist ; strong moist consistence; pedal, strong, 5-10 mm, angular blocky structure; few, fine roots; 15% calcrete in pockets; moderate permeability; diffuse boundary. |
| BC | 70-130+ | light brownish grey (2.5Y 6/2) moist light clay; yellowish red (5YR 5/6) moist ; strong moist consistence; pedal, strong, 5-10 mm, angular blocky structure; no; no coarse fragments; moderate permeability. |

| | | | |
|---|---|---|---|
| **Observation Type/Category:** | soil pit, full description | | |
| **Lab Analyses:** | Detailed chemical and physical analyses | | |
| **Location:** | MGA Zone: 51 415159 mE 6300713 mN Elevation (m): Map sheet: | | |
| **Locations Notes:** | Wittenoom Hills, site appears to have a large catchment than WHL sites possibly contributing to carbonates being lower in the profile and dome and bleach better developed | | |
| **Site Notes:** | | | |
| **Disturbance:** | Cultivation, rainfed | | |

**Landform**

| | | | |
|---|---|---|---|
| **Landform pattern:** | plain | **Slope:** | < 1 % |
| **Relief/modal slope:** | level plain | | |
| **Landform element:** | plain | **Slope length (m):** | |
| **Morphological type:** | flat | **Slope curvature:** | |
| **Relief:** | | **Pattern Relief:** | plain |

**Surface and Hydrological Properties**

| | |
|---|---|
| **Rock outcrop:** | 0 % |
| **Surface coarse fragments:** | very few subangular silcrete gravels, no coarse fragments stones |
| **Physical properties:** | soft; moderately deep soil |

**Geology/Parent Material**

| | |
|---|---|
| **Soil parent material:** | strongly weathered, unconsolidated material (unidentified) Tertiary marine sediments |
| **Geology:** | |

**Vegetation**

| | |
|---|---|
| **Type:** | |
| **Site:** | |
| **Surrounds:** | |
| **Notes:** | |

**Land Use**

| | |
|---|---|
| **Site:** | Cropping (may include grazing in rotation) |
| **Surrounds:** | Cropping (may include grazing in rotation) |

**Visible Erosion, Assessed Flooding and Salinity**

No wind erosion, no scald erosion, no sheet erosion, no rill erosion, no gully erosion, no tunnel erosion, no flooding, no ponding, no salinity.

**Current Classification**

| | |
|---|---|
| **WA Soil Group:** | Alkaline grey shallow sandy duplex, (1999) |
| **Australian Soil Classification:** | Hypercalcic Subnatric Grey Sodosol (2002) |
| **Soil Series:** | Scaddan |
| **Map Unit:** | 246Sc_7 |

## Soil Profile Description

| Horizon | Depth (cm) | Description |
|---|---|---|
| Ap | 0-10 | dark grey (10YR 4/1) moist, light brownish grey (10YR 6/2) dry fine sand; weak dry consistence; pedal, weak, 5-10 mm, platy structure; no coarse fragments; moderate permeability; clear, smooth boundary. |
| A2 | 10-20 | dark grey (10YR 4/1) moist fine sandy clay loam; very firm moderately moist consistence; pedal, strong, 100-200 mm, columnar structure; 10 % calcrete medium gravels hard and soft; slow permeability; clear, smooth boundary. |
| B1 | 20-30 | light brownish grey (2.5Y 6/2) moist fine sandy clay loam; very pale brown (10YR 7/3) moist ; strong moist consistence; pedal, strong, 5-10 mm, angular blocky structure; 15 % silcrete medium gravels hard and soft; moderately slow permeability; gradual, smooth boundary. |
| B2 | 30-70 | pale red (2.5YR 6/2) moist light clay; reddish yellow (5YR 6/6) moist; strong moist consistence; pedal, strong, 5-10 mm, angular blocky structure; 2 % silcrete medium gravels pockets; moderate permeability; diffuse boundary. |
| BC | 70-130+ | light brownish grey (2.5Y 6/2) moist light clay; reddish yellow (5YR 6/6) moist; strong moist consistence; pedal, strong, 5-10 mm, angular blocky structure; no coarse fragments; moderate permeability. |

| | |
|---|---|
| **Observation Type/Category:** | soil pit, full description |
| **Lab Analyses:** | Detailed chemical and physical analyses |
| **Location:** | MGA Zone: 51 415164 mE 6300814 mN |
| **Locations Notes:** | Wittenoom Hills |
| **Site Notes:** | |
| **Disturbance:** | Natural |

**Landform**

| | | | |
|---|---|---|---|
| **Landform pattern:** | plain | **Slope:** | < 1 % |
| **Relief/modal slope:** | level plain | | |
| **Landform element:** | plain | **Slope length (m):** | |
| **Morphological type:** | flat | **Slope curvature:** | uniform slope |
| **Relief:** | | **Pattern Relief:** | plain |

**Surface and Hydrological Properties**

| | |
|---|---|
| **Rock outcrop:** | 0 % |
| **Surface coarse fragments:** | very few subangular silcrete gravels, no coarse fragments stones |
| **Physical properties:** | firm; ; moderately deep soil |

**Geology/Parent Material**

| | |
|---|---|
| **Soil parent material:** | strongly weathered, unconsolidated material (unidentified) Tertiary marine sediments |
| **Geology:** | |

**Vegetation**

| | |
|---|---|
| **Type:** | |
| **Site:** | |
| **Surrounds:** | mallee |
| **Notes:** | |

**Land Use**

| | |
|---|---|
| **Site:** | Not used |
| **Surrounds:** | Not used |

**Visible Erosion, Assessed Flooding and Salinity**

No wind erosion, no scald erosion, no sheet erosion, no rill erosion, no gully erosion, no flooding, slight ponding, no salinity.

**Current Classification**

| | |
|---|---|
| **WA Soil Group:** | Alkaline grey shallow sandy duplex, (1999) |
| **Australian Soil Classification:** | Hypercalcic Mesonatric Grey Sodosol (2002) |
| **Soil Series:** | Scaddan |
| **Map Unit:** | 246Sc_7 |

## Soil Profile Description

| Horizon | Depth (cm) | Description |
|---|---|---|
| A1 | 0-5 | brown (7.5YR 5/4) moist fine sand; weak dry consistence; apedal, massive structure; no coarse fragments; moderate permeability; abrupt, wavy boundary. |
| B11 | 5-20 | dark grey (10YR 4/1) moist fine sandy clay loam; very firm dry consistence; pedal, strong, 100-200 mm, columnar structure; 5% calcrete medium gravels soft and hard; slow permeability; clear, smooth boundary. |
| B12 | 20-30 | pale red (2.5YR 6/2) moist fine sandy clay loam; strong dry consistence; pedal, strong, 5-10 mm, angular blocky structure; 10% calcrete coarse gravels soft and hard; moderately slow permeability; gradual, smooth boundary. |
| B2 | 30-70 | pale red (2.5YR 6/2) moist fine sandy clay; reddish yellow (7.5YR 6/6) moist ; strong moderately moist consistence; pedal, strong, 5-10 mm, angular blocky structure; 2% calcrete medium gravels soft and hard; moderate permeability; diffuse boundary. |
| BC | 70-130 | pale red (2.5YR 6/2) moist fine sandy clay; reddish yellow (7.5YR 6/6) moist ; strong moderately moist consistence; pedal, strong, 5-10 mm, angular blocky structure; no coarse fragments; moderate permeability. |

# ATTACHMENT A

## PROFILE PHOTOS FOR REPRESENTATIVE PITS FROM EACH LOCATION

(WA Soil Group and Australian Soil Classifications beneath)

### Badgingarra (BAL2)


**Pale deep sand**

Basic Arenic Bleached-Orthic Tenosol

### Brookton (BRL2)


**Reticulite deep sandy duplex**

Acidic Ferric-Petroferric Bleached-Orthic Tenosol

### Condingup (COL3)


**Yellow/brown deep sandy duplex**

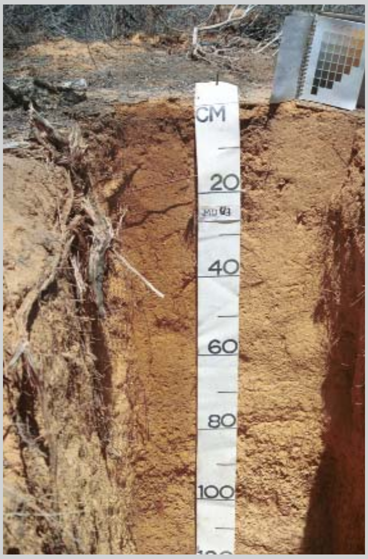
Ferric Eutrophic Yellow Chromosol

### Merredin (MEL3)


**Acid yellow sandy earth**

Acidic Mesotrophic Yellow Kandosol

### Mullewa (MUU3)




**Yellow deep sand**

Acidic Ferric-Reticulate Yellow-Orthic Tenosol

### Newdegate deep (NDS4)


**Grey deep sandy duplex**

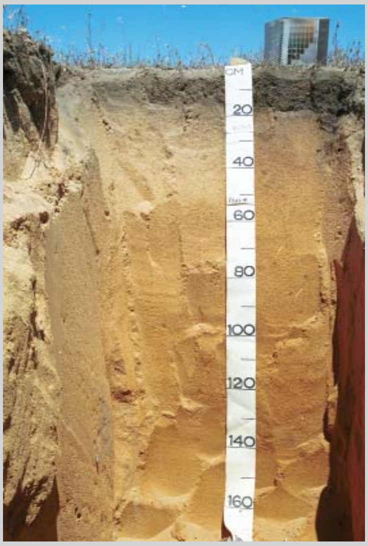
Ferric Mottled-Subnatric Yellow Sodosol

### Newdegate shallow (NSS1)

**Alkaline grey shallow sandy duplex**

Eutrophic Mottled-Subnatric Grey Sodosol

### Northampton (NHS3)



**Yellow deep sand**

Basic Regolithic Yellow-orthic Tenosol

### Wittenoom Hills (WHS2)

**Alkaline grey shallow sandy duplex**

Hypercalcic Subnatric Grey Sodosol

# APPENDIX 2

## Organic Carbon, Bulk Density and Clay Content

**LEGEND**

| | |
|---|---|
| **OC** | Organic Carbon |
| **t/ha** | Tonnes per hectare |
| **wt %** | Percent weight |

# TABLE OF CONTENTS

| | | | | Depth | | Bulk Density | | Fine Earth | | | | | Coarse Organics | | | Coarse Minerals | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Landuse | Sample point | Sample | Upper | Lower | Method | Result | wt% of sample | Clay (wt%) | OC (wt%) | Source | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) |
| Northampton | | | | | | | | | | | | | | | | | | |
| NH | L | 1 | A | 0 | 10 | core | 1.63 | 99 | 4 | 0.48 | | 7.7 | 1 | | | 0 | | |
| NH | L | 1 | B | 10 | 20 | core | 1.70 | 100 | 5 | 0.37 | | 6.3 | 0 | | | 0 | | |
| NH | L | 1 | C | 20 | 30 | core | 1.66 | 100 | 7 | 0.15 | | 2.5 | 0 | | | 0 | | |
| NH | L | 1 | D | 30 | 50 | core | 1.64 | 100 | 9 | 0.12 | | 3.9 | 0 | | | 0 | | |
| NH | L | 1 | E | 50 | 80 | core | 1.66 | 100 | 12 | 0.09 | | 4.5 | 0 | | | 0 | | |
| NH | L | 1 | F | 80 | 110 | core | 1.71 | 100 | 12 | 0.08 | | 4.1 | 0 | | | 0 | | |
| NH | L | 1 | G | 110 | 140 | core | 1.71 | 100 | 12 | 0.07 | | 3.6 | 0 | | | 1 | | |
| NH | L | 2 | A | 0 | 10 | core | 1.59 | 99 | 4 | 0.68 | | 10.7 | 1 | | | 0 | | |
| NH | L | 2 | B | 10 | 20 | core | 1.65 | 100 | 5 | 0.38 | | 6.2 | 0 | | | 0 | | |
| NH | L | 2 | C | 20 | 30 | core | 1.66 | 100 | 6 | 0.17 | | 2.8 | 0 | | | 0 | | |
| NH | L | 2 | D | 30 | 50 | core | 1.66 | 100 | 8 | 0.13 | | 4.3 | 0 | | | 0 | | |
| NH | L | 2 | E | 50 | 80 | core | 1.68 | 100 | 11 | 0.11 | | 5.5 | 0 | | | 0 | | |
| NH | L | 2 | F | 80 | 110 | core | 1.69 | 100 | 13 | 0.11 | | 5.6 | 0 | | | 1 | | |
| NH | L | 2 | G | 110 | 140 | core | 1.77 | 100 | 12 | 0.10 | | 5.3 | 0 | | | 0 | | |
| NH | L | 3 | A | 0 | 10 | core | 1.62 | 98 | 4 | 0.84 | | 13.3 | 2 | | | 0 | | |
| NH | L | 3 | B | 10 | 20 | core | 1.64 | 100 | 5 | 0.31 | | 5.1 | 0 | | | 0 | | |
| NH | L | 3 | C | 20 | 30 | core | 1.69 | 100 | 6 | 0.14 | | 2.4 | 0 | | | 0 | | |
| NH | L | 3 | D | 30 | 50 | core | 1.66 | 100 | 8 | 0.12 | | 4.0 | 0 | | | 0 | | |
| NH | L | 3 | E | 50 | 80 | core | 1.68 | 100 | 10 | 0.11 | | 5.5 | 0 | | | 0 | | |
| NH | L | 3 | F | 80 | 110 | core | 1.67 | 100 | 12 | 0.09 | | 4.5 | 0 | | | 0 | | |
| NH | L | 3 | G | 110 | 140 | core | 1.75 | 100 | 11 | 0.06 | | 3.1 | 0 | | | 0 | | |
| NH | L | 4 | A | 0 | 10 | core | 1.64 | 99 | 4 | 0.82 | | 13.3 | 1 | 13.7 | 2.5 | 0 | | |
| NH | L | 4 | B | 10 | 20 | core | 1.68 | 99 | 5 | 0.28 | | 4.7 | 1 | 2.55 | 0.3 | 0 | | |
| NH | L | 4 | C | 20 | 30 | core | 1.68 | 100 | 8 | 0.17 | | 2.8 | 0 | | | 0 | | |
| NH | L | 4 | D | 30 | 50 | core | 1.66 | 99 | 10 | 0.11 | | 3.6 | 0 | | | 1 | 0.31 | 0.1 |
| NH | L | 4 | E | 50 | 80 | core | 1.70 | 100 | 11 | 0.10 | | 5.1 | 0 | | | 0 | | |

| | | | | Depth | | Bulk Density | | Fine Earth | | | | | Coarse Organics | | | Coarse Minerals | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Landuse | Sample point | Sample | Upper | Lower | Method | Result | wt% of sample | Clay (wt%) | OC (wt%) | Source | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) |
| NH | L | 4 | F | 80 | 110 | core | 1.69 | 100 | 12 | 0.08 | | 4.0 | 0 | | | 0 | | |
| NH | L | 4 | G | 110 | 140 | core | 1.73 | 99 | 11 | 0.06 | | 3.1 | 0 | | | 1 | 0.07 | 0.0 |
| NH | S | 1 | A | 0 | 10 | core | 1.52 | 99 | 2 | 0.65 | | 9.7 | 2 | 10.4 | 2.4 | 0 | | |
| NH | S | 1 | B | 10 | 20 | core | 1.68 | 100 | 3 | 0.32 | | 5.4 | 0 | 4.20 | 0.3 | 0 | | |
| NH | S | 1 | C | 20 | 30 | core | 1.64 | 100 | 3 | 0.14 | | 2.3 | 0 | | | 0 | | |
| NH | S | 1 | D | 30 | 50 | core | 1.64 | 100 | 3 | 0.07 | | 2.3 | 0 | | | 0 | | |
| NH | S | 1 | E | 50 | 80 | core | 1.67 | 100 | 5 | 0.06 | | 3.0 | 0 | | | 0 | | |
| NH | S | 1 | F | 80 | 110 | core | 1.69 | 100 | 11 | 0.07 | | 3.5 | 0 | | | 0 | | |
| NH | S | 1 | G | 110 | 140 | core | 1.72 | 100 | 12 | 0.07 | | 3.6 | 0 | | | 0 | | |
| NH | S | 2 | A | 0 | 10 | core | 1.61 | 98 | 3 | 0.61 | | 9.7 | 2 | | | 0 | | |
| NH | S | 2 | B | 10 | 20 | core | 1.70 | 100 | 3 | 0.16 | | 2.7 | 0 | | | 0 | | |
| NH | S | 2 | C | 20 | 30 | core | 1.69 | 100 | 3 | 0.10 | | 1.7 | 0 | | | 0 | | |
| NH | S | 2 | D | 30 | 50 | core | 1.68 | 100 | 4 | 0.08 | | 2.7 | 0 | | | 0 | | |
| NH | S | 2 | E | 50 | 80 | core | 1.66 | 100 | 5 | 0.06 | | 3.0 | 0 | | | 0 | | |
| NH | S | 2 | F | 80 | 110 | core | 1.70 | 100 | 12 | 0.07 | | 3.6 | 0 | | | 0 | | |
| NH | S | 2 | G | 110 | 140 | core | 1.69 | 100 | 12 | 0.06 | | 3.0 | 0 | | | 0 | | |
| NH | S | 3 | A | 0 | 10 | core | 1.51 | 98 | 2 | 0.65 | | 9.6 | 2 | | | 0 | | |
| NH | S | 3 | B | 10 | 20 | core | 1.63 | 100 | 3 | 0.28 | | 4.6 | 0 | | | 0 | | |
| NH | S | 3 | C | 20 | 30 | core | 1.67 | 100 | 3 | 0.12 | | 2.0 | 0 | | | 0 | | |
| NH | S | 3 | D | 30 | 50 | core | 1.68 | 100 | 3 | 0.07 | | 2.3 | 0 | | | 0 | | |
| NH | S | 3 | E | 50 | 80 | core | 1.71 | 100 | 5 | 0.07 | | 3.6 | 0 | | | 0 | | |
| NH | S | 3 | F | 80 | 110 | core | 1.69 | 100 | 6 | 0.06 | | 3.0 | 0 | | | 0 | | |
| NH | S | 3 | G | 110 | 140 | core | 1.74 | 100 | 12 | 0.07 | | 3.6 | 0 | | | 0 | | |
| NH | S | 4 | A | 0 | 10 | core | 1.58 | 99 | 2 | 0.58 | | 9.1 | 1 | | | 0 | | |
| NH | S | 4 | B | 10 | 20 | core | 1.70 | 100 | 3 | 0.23 | | 3.9 | 0 | | | 0 | | |
| NH | S | 4 | C | 20 | 30 | core | 1.68 | 100 | 3 | 0.13 | | 2.2 | 0 | | | 0 | | |
| NH | S | 4 | D | 30 | 50 | core | 1.70 | 100 | 3 | 0.08 | | 2.7 | 0 | | | 0 | | |

| | | | | Depth | | Bulk Density | | Fine Earth | | | | | Coarse Organics | | | Coarse Minerals | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Landuse | Sample point | Sample | Upper | Lower | Method | Result | wt% of sample | Clay (wt%) | OC (wt%) | Source | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) |
| NH | S | 4 | E | 50 | 80 | core | 1.69 | 100 | 6 | 0.07 | | 3.6 | 0 | | | 0 | | |
| NH | S | 4 | F | 80 | 110 | core | 1.71 | 100 | 11 | 0.06 | | 3.1 | 0 | | | 0 | | |
| NH | S | 4 | G | 110 | 140 | core | 1.74 | 100 | 11 | 0.06 | | 3.1 | 0 | | | 0 | | |
| NH | U | 1 | A | 0 | 10 | core | 1.41 | 95 | 2 | 0.74 | | 9.9 | 5 | | | 0 | | |
| NH | U | 1 | B | 10 | 20 | core | 1.48 | 97 | 2 | 0.40 | | 5.8 | 3 | | | 0 | | |
| NH | U | 1 | C | 20 | 30 | core | 1.63 | 99 | 2 | 0.21 | | 3.4 | 1 | | | 0 | | |
| NH | U | 1 | D | 30 | 50 | core | 1.64 | 99 | 2 | 0.12 | | 3.9 | 1 | | | 0 | | |
| NH | U | 1 | E | 50 | 80 | core | 1.66 | 100 | 2 | 0.09 | | 4.5 | 0 | | | 0 | | |
| NH | U | 1 | F | 80 | 110 | core | 1.68 | 100 | 4 | 0.07 | | 3.5 | 0 | | | 0 | | |
| NH | U | 1 | G | 110 | 140 | core | 1.74 | 100 | 20 | 0.12 | | 6.2 | 0 | | | 0 | | |
| NH | U | 2 | A | 0 | 10 | core | 1.52 | 96 | 2 | 0.57 | | 8.3 | 4 | 7.04 | 4.4 | 0 | | |
| NH | U | 2 | B | 10 | 20 | core | 1.54 | 97 | 2 | 0.32 | | 4.8 | 3 | 4.50 | 2.2 | 0 | | |
| NH | U | 2 | C | 20 | 30 | core | 1.62 | 99 | 2 | 0.27 | | 4.3 | 1 | 9.31 | 1.2 | 0 | | |
| NH | U | 2 | D | 30 | 50 | core | 1.68 | 100 | 2 | 0.11 | | 3.7 | 0 | 14.0 | 1.9 | 0 | | |
| NH | U | 2 | E | 50 | 80 | core | 1.72 | 100 | 3 | 0.08 | | 4.1 | 0 | 5.80 | 0.3 | 0 | | |
| NH | U | 2 | F | 80 | 110 | core | 1.70 | 100 | 5 | 0.09 | | 4.6 | 0 | | | 0 | | |
| NH | U | 2 | G | 110 | 140 | core | 1.68 | 100 | 17 | 0.11 | | 5.5 | 0 | | | 0 | | |
| NH | U | 3 | A | 0 | 10 | core | 1.50 | 97 | 2 | 0.74 | | 10.8 | 3 | | | 0 | | |
| NH | U | 3 | B | 10 | 20 | core | 1.71 | 99 | 2 | 0.29 | | 4.9 | 1 | | | 0 | | |
| NH | U | 3 | C | 20 | 30 | core | 1.63 | 99 | 2 | 0.17 | | 2.7 | 1 | | | 0 | | |
| NH | U | 3 | D | 30 | 50 | core | 1.66 | 99 | 2 | 0.09 | | 3.0 | 1 | | | 0 | | |
| NH | U | 3 | E | 50 | 80 | core | 1.70 | 100 | 3 | 0.09 | | 4.6 | 0 | | | 0 | | |
| NH | U | 3 | F | 80 | 110 | core | 1.65 | 100 | 6 | 0.07 | | 3.5 | 0 | | | 0 | | |
| NH | U | 3 | G | 110 | 140 | core | 1.72 | 100 | 15 | 0.08 | | 4.1 | 0 | | | 0 | | |
| NH | U | 4 | A | 0 | 10 | core | 1.33 | 92 | 3 | 0.77 | | 9.4 | 8 | | | 0 | | |
| NH | U | 4 | B | 10 | 20 | core | 1.53 | 96 | 3 | 0.50 | | 7.3 | 4 | | | 0 | | |
| NH | U | 4 | C | 20 | 30 | core | 1.45 | 98 | 3 | 0.39 | | 5.5 | 3 | | | 0 | | |

| | | | | Depth | | Bulk Density | | Fine Earth | | | | | Coarse Organics | | | Coarse Minerals | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Landuse | Sample point | Sample | Upper | Lower | Method | Result | wt% of sample | Clay (wt%) | OC (wt%) | Source | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) |
| NH | U | 4 | D | 30 | 50 | core | 1.39 | 96 | 3 | 0.48 | | 12.8 | 4 | | | 0 | | |
| NH | U | 4 | E | 50 | 80 | core | 1.49 | 96 | 4 | 0.42 | | 18.0 | 4 | | | 0 | | |
| NH | U | 4 | F | 80 | 110 | core | 1.59 | 100 | 8 | 0.09 | | 4.3 | 0 | | | 0 | | |
| NH | U | 4 | G | 110 | 140 | core | 1.70 | 100 | 12 | 0.10 | | 5.1 | 0 | | | 0 | | |
| Badgingarra | | | | | | | | | | | | | | | | | | |
| BA | L | 1 | A | 0 | 10 | core | 1.63 | 99 | 1 | 0.71 | | 11.4 | 1 | | | 0 | | |
| BA | L | 1 | B | 10 | 20 | core | 1.62 | 100 | 1 | 0.31 | | 5.0 | 0 | | | 0 | | |
| BA | L | 1 | C | 20 | 30 | core | 1.62 | 100 | 1 | 0.13 | | 2.1 | 0 | | | 0 | | |
| BA | L | 1 | D | 30 | 50 | core | 1.57 | 100 | 1 | 0.10 | | 3.1 | 0 | | | 0 | | |
| BA | L | 1 | E | 50 | 80 | core | 1.60 | 100 | 2 | 0.08 | | 3.8 | 0 | | | 0 | | |
| BA | L | 1 | F | 80 | 110 | core | 1.66 | 98 | 3 | 0.08 | | 3.9 | 0 | | | 2 | | |
| BA | L | 1 | G | 110 | 150 | core | 1.61 | 89 | 2 | 0.08 | | 4.6 | 0 | | | 11 | | |
| BA | L | 1 | H | 150 | 170 | core | 1.69 | 84 | 5 | 0.10 | | 2.8 | 0 | | | 16 | | |
| BA | L | 2 | A | 0 | 10 | core | 1.62 | 98 | 1 | 0.77 | | 12.2 | 2 | 7.62 | 2.0 | 0 | | |
| BA | L | 2 | B | 10 | 20 | core | 1.65 | 100 | 1 | 0.26 | | 4.3 | 0 | 11.8 | 0.5 | 0 | | |
| BA | L | 2 | C | 20 | 30 | core | 1.66 | 100 | 1 | 0.17 | | 2.8 | 0 | 9.41 | 0.6 | 0 | | |
| BA | L | 2 | D | 30 | 50 | core | 1.61 | 100 | 1 | 0.13 | | 4.2 | 0 | | | 0 | | |
| BA | L | 2 | E | 50 | 80 | core | 1.65 | 100 | 2 | 0.09 | | 4.4 | 0 | | | 0 | 0.70 | 0.1 |
| BA | L | 2 | F | 80 | 110 | core | 1.66 | 97 | 3 | 0.08 | | 3.9 | 0 | | | 3 | 0.20 | 0.3 |
| BA | L | 2 | G | 110 | 150 | core | 1.66 | 90 | 3 | 0.06 | | 3.6 | 0 | | | 10 | 0.13 | 0.9 |
| BA | L | 2 | H | 150 | 170 | core | 1.72 | 79 | 14 | 0.10 | | 2.7 | 0 | | | 21 | 0.08 | 0.6 |
| BA | L | 3 | A | 0 | 10 | core | 1.61 | 98 | 1 | 0.69 | | 10.9 | 2 | | | 0 | | |
| BA | L | 3 | B | 10 | 20 | core | 1.67 | 100 | 2 | 0.28 | | 4.7 | 0 | | | 0 | | |
| BA | L | 3 | C | 20 | 30 | core | 1.62 | 100 | 1 | 0.14 | | 2.3 | 0 | | | 0 | | |
| BA | L | 3 | D | 30 | 50 | core | 1.54 | 100 | 1 | 0.08 | | 2.5 | 0 | | | 0 | | |
| BA | L | 3 | E | 50 | 80 | core | 1.57 | 100 | 1 | 0.08 | | 3.7 | 0 | | | 0 | | |

| | | | | Depth | | Bulk Density | | Fine Earth | | | | | Coarse Organics | | | Coarse Minerals | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Landuse | Sample point | Sample | Upper | Lower | Method | Result | wt% of sample | Clay (wt%) | OC (wt%) | Source | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) |
| BA | L | 3 | F | 80 | 110 | core | 1.64 | 99 | 2 | 0.07 | | 3.4 | 0 | | | 1 | | |
| BA | L | 3 | G | 110 | 150 | core | 1.63 | 98 | 2 | 0.09 | | 5.8 | 0 | | | 2 | | |
| BA | L | 3 | H | 150 | 170 | core | 1.67 | 92 | 3 | 0.06 | | 1.8 | 0 | | | 8 | | |
| BA | L | 4 | A | 0 | 10 | core | 1.64 | 98 | 1 | 0.66 | | 10.6 | 2 | | | 0 | | |
| BA | L | 4 | B | 10 | 20 | core | 1.70 | 99 | 1 | 0.28 | | 4.7 | 1 | | | 0 | | |
| BA | L | 4 | C | 20 | 30 | core | 1.64 | 100 | 1 | 0.14 | | 2.3 | 0 | | | 0 | | |
| BA | L | 4 | D | 30 | 50 | core | 1.56 | 100 | 1 | 0.09 | | 2.8 | 0 | | | 0 | | |
| BA | L | 4 | E | 50 | 80 | core | 1.61 | 99 | 2 | 0.06 | | 2.9 | 0 | | | 1 | | |
| BA | L | 4 | F | 80 | 110 | core | 1.64 | 98 | 3 | 0.08 | | 3.9 | 0 | | | 2 | | |
| BA | L | 4 | G | 110 | 150 | core | 1.65 | 79 | 3 | 0.07 | | 3.7 | 0 | | | 21 | | |
| BA | L | 4 | H | 150 | 170 | core | 1.63 | 78 | 4 | 0.07 | | 1.8 | 0 | | | 22 | | |
| BA | S | 1 | A | 0 | 10 | core | 1.52 | 98 | 2 | 0.76 | | 11.3 | 2 | | | 0 | | |
| BA | S | 1 | B | 10 | 20 | core | 1.61 | 100 | 2 | 0.41 | | 6.6 | 0 | | | 0 | | |
| BA | S | 1 | C | 20 | 30 | core | 1.65 | 100 | 2 | 0.15 | | 2.5 | 0 | | | 0 | | |
| BA | S | 1 | D | 30 | 50 | core | 1.62 | 100 | 2 | 0.12 | | 3.9 | 0 | | | 0 | | |
| BA | S | 1 | E | 50 | 80 | core | 1.60 | 100 | 3 | 0.11 | | 5.3 | 0 | | | 0 | | |
| BA | S | 1 | F | 80 | 110 | core | 1.66 | 100 | 10 | 0.13 | | 6.5 | 0 | | | 0 | | |
| BA | S | 1 | G | 110 | 140 | core | 1.64 | 99 | 10 | 0.09 | | 4.3 | 0 | | | 1 | | |
| BA | S | 1 | H | 140 | 160 | core | 1.68 | 93 | 12 | 0.10 | | 3.1 | 0 | | | 7 | | |
| BA | S | 2 | A | 0 | 10 | core | 1.51 | 98 | 1 | 0.69 | | 10.2 | 2 | 25.5 | 6.2 | 0 | | |
| BA | S | 2 | B | 10 | 20 | core | 1.64 | 100 | 1 | 0.30 | | 4.9 | 1 | 5.62 | 0.5 | 0 | | |
| BA | S | 2 | C | 20 | 30 | core | 1.65 | 100 | 1 | 0.14 | | 2.3 | 0 | | | 0 | | |
| BA | S | 2 | D | 30 | 50 | core | 1.58 | 100 | 2 | 0.11 | | 3.5 | 0 | | | 0 | | |
| BA | S | 2 | E | 50 | 80 | core | 1.61 | 100 | 5 | 0.14 | | 6.8 | 0 | | | 0 | | |
| BA | S | 2 | F | 80 | 110 | core | 1.63 | 100 | 8 | 0.12 | | 5.9 | 0 | | | 0 | | |
| BA | S | 2 | G | 110 | 140 | core | 1.64 | 96 | 11 | 0.10 | | 4.7 | 0 | | | 4 | | |
| BA | S | 2 | H | 140 | 160 | core | 1.64 | 92 | 11 | 0.08 | | 2.4 | 0 | | | 8 | | |

| Location | Landuse | Sample point | Sample | Depth | | Bulk Density | | Fine Earth | | | | | Coarse Organics | | | Coarse Minerals | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Upper | Lower | Method | Result | wt% of sample | Clay (wt%) | OC (wt%) | Source | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) |
| BA | S | 3 | A | 0 | 10 | core | 1.51 | 99 | 2 | 0.68 | | 10.2 | 1 | | | 0 | | |
| BA | S | 3 | B | 10 | 20 | core | 1.64 | 99 | 2 | 0.34 | | 5.5 | 1 | | | 0 | | |
| BA | S | 3 | C | 20 | 30 | core | 1.62 | 99 | 1 | 0.20 | | 3.2 | 1 | | | 0 | | |
| BA | S | 3 | D | 30 | 50 | core | 1.58 | 100 | 1 | 0.10 | | 3.2 | 0 | | | 0 | | |
| BA | S | 3 | E | 50 | 80 | core | 1.61 | 100 | 3 | 0.09 | | 4.3 | 0 | | | 0 | | |
| BA | S | 3 | F | 80 | 110 | core | 1.62 | 98 | 10 | 0.10 | | 4.7 | 0 | | | 2 | | |
| BA | S | 3 | G | 110 | 140 | core | 1.62 | 98 | 10 | 0.09 | | 4.3 | 0 | | | 2 | | |
| BA | S | 3 | H | 140 | 160 | core | 1.68 | 91 | 10 | 0.08 | | 2.4 | 0 | | | 9 | | |
| BA | S | 4 | A | 0 | 10 | core | 1.54 | 99 | 2 | 0.65 | | 9.9 | 1 | | | 0 | | |
| BA | S | 4 | B | 10 | 20 | core | 1.61 | 99 | 2 | 0.42 | | 6.7 | 1 | | | 0 | | |
| BA | S | 4 | C | 20 | 30 | core | 1.57 | 100 | 2 | 0.19 | | 3.0 | 0 | | | 0 | | |
| BA | S | 4 | D | 30 | 50 | core | 1.57 | 100 | 1 | 0.11 | | 3.4 | 0 | | | 0 | | |
| BA | S | 4 | E | 50 | 80 | core | 1.51 | 100 | 2 | 0.12 | | 5.4 | 0 | | | 0 | | |
| BA | S | 4 | F | 80 | 110 | core | 1.61 | 99 | 8 | 0.12 | | 5.7 | 0 | | | 1 | | |
| BA | S | 4 | G | 110 | 140 | core | 1.63 | 100 | 11 | 0.10 | | 4.9 | 0 | | | 0 | | |
| BA | S | 4 | H | 140 | 160 | core | 1.64 | 90 | 10 | 0.08 | | 2.4 | 0 | | | 10 | | |
| BA | U | 1 | A | 0 | 10 | core | 1.39 | 97 | 2 | 0.86 | | 11.5 | 3 | 8.35 | 3.4 | 0 | | |
| BA | U | 1 | B | 10 | 20 | core | 1.54 | 99 | 2 | 0.42 | | 6.4 | 1 | 8.87 | 2.0 | 0 | | |
| BA | U | 1 | C | 20 | 30 | core | 1.55 | 100 | 2 | 0.21 | | 3.2 | 0 | 13.8 | 1.0 | 0 | | |
| BA | U | 1 | D | 30 | 60 | core | 1.54 | 99 | 3 | 0.11 | | 5.1 | 1 | | | 0 | | |
| BA | U | 1 | E | 60 | 90 | core | 1.57 | 100 | 6 | 0.09 | | 4.2 | 0 | | | 0 | | |
| BA | U | 1 | F | 90 | 120 | core | 1.67 | 100 | 7 | 0.07 | | 3.5 | 0 | | | 0 | | |
| BA | U | 1 | G | 120 | 150 | core | 1.58 | 100 | 6 | 0.08 | | 3.8 | 0 | | | 0 | | |
| BA | U | 2 | A | 0 | 10 | core | 1.48 | 92 | 2 | 0.69 | | 9.4 | 8 | | | 0 | | |
| BA | U | 2 | B | 10 | 20 | core | 1.49 | 99 | 2 | 0.31 | | 4.6 | 1 | | | 0 | | |
| BA | U | 2 | C | 20 | 30 | core | 1.51 | 99 | 2 | 0.18 | | 2.7 | 1 | | | 0 | | |
| BA | U | 2 | D | 30 | 60 | core | 1.57 | 100 | 3 | 0.09 | | 4.2 | 0 | | | 0 | | |

| | | | | Depth | | Bulk Density | | Fine Earth | | | | | Coarse Organics | | | Coarse Minerals | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Landuse | Sample point | Sample | Upper | Lower | Method | Result | wt% of sample | Clay (wt%) | OC (wt%) | Source | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) |
| BA | U | 2 | E | 60 | 90 | core | 1.62 | 100 | 5 | 0.10 | | 4.8 | 0 | | | 0 | | |
| BA | U | 2 | F | 90 | 120 | core | 1.58 | 100 | 8 | 0.09 | | 4.3 | 0 | | | 0 | | |
| BA | U | 2 | G | 120 | 150 | core | 1.67 | 100 | 8 | 0.10 | | 5.0 | 0 | | | 0 | | |
| BA | U | 3 | A | 0 | 10 | core | 1.47 | 97 | 2 | 0.70 | | 10.0 | 3 | | | 0 | | |
| BA | U | 3 | B | 10 | 20 | core | 1.52 | 98 | 2 | 0.38 | | 5.7 | 2 | | | 0 | | |
| BA | U | 3 | C | 20 | 30 | core | 1.52 | 100 | 2 | 0.15 | | 2.3 | 0 | | | 0 | | |
| BA | U | 3 | D | 30 | 60 | core | 1.56 | 100 | 3 | 0.12 | | 5.6 | 0 | | | 0 | | |
| BA | U | 3 | E | 60 | 90 | core | 1.58 | 100 | 5 | 0.10 | | 4.7 | 0 | | | 0 | | |
| BA | U | 3 | F | 90 | 120 | core | 1.62 | 100 | 8 | 0.08 | | 3.9 | 0 | | | 0 | | |
| BA | U | 3 | G | 120 | 150 | core | 1.67 | 100 | 8 | 0.09 | | 4.5 | 0 | | | 0 | | |
| BA | U | 4 | A | 0 | 10 | core | 1.42 | 97 | 2 | 0.70 | | 9.6 | 3 | | | 0 | | |
| BA | U | 4 | B | 10 | 20 | core | 1.52 | 99 | 2 | 0.27 | | 4.1 | 1 | | | 0 | | |
| BA | U | 4 | C | 20 | 30 | core | 1.53 | 100 | 2 | 0.12 | | 1.8 | 0 | | | 0 | | |
| BA | U | 4 | D | 30 | 60 | core | 1.55 | 100 | 3 | 0.12 | | 5.6 | 0 | | | 0 | | |
| BA | U | 4 | E | 60 | 90 | core | 1.61 | 100 | 5 | 0.11 | | 5.3 | 0 | | | 0 | | |
| BA | U | 4 | F | 90 | 120 | core | 1.61 | 100 | 7 | 0.08 | | 3.9 | 0 | | | 0 | | |
| BA | U | 4 | G | 120 | 150 | core | 1.68 | 100 | 6 | 0.08 | | 4.0 | 0 | | | 0 | | |
| Brookton | | | | | | | | | | | | | | | | | | |
| BR | L | 1 | A | 0 | 10 | core | 1.60 | 100 | 1 | 0.56 | | 8.9 | 1 | | | 0 | | |
| BR | L | 1 | B | 10 | 20 | core | 1.67 | 99 | 1 | 0.17 | | 2.8 | 0 | | | 1 | | |
| BR | L | 1 | C | 20 | 30 | core | 1.72 | 99 | 2 | 0.14 | | 2.4 | 0 | | | 1 | | |
| BR | L | 1 | D | 30 | 40 | estim | 1.70 | 98 | 2 | 0.08 | | 1.3 | 0 | | | 3 | | |
| BR | L | 1 | E | 40 | 50 | estim | 1.70 | 62 | 3 | 0.12 | | 1.3 | 0 | | | 38 | | |
| BR | L | 1 | F | 50 | 70 | estim | 1.70 | 16 | 7 | 0.28 | | 1.5 | 0 | | | 84 | | |
| BR | L | 2 | A | 0 | 10 | core | 1.72 | 99 | 2 | 0.73 | | 12.4 | 1 | 7.92 | 1.2 | 0 | | |
| BR | L | 2 | B | 10 | 20 | core | 1.71 | 99 | 2 | 0.28 | | 4.7 | 0 | | | 1 | | |

| | | | | Depth | | Bulk Density | | Fine Earth | | | | | Coarse Organics | | | Coarse Minerals | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Landuse | Sample point | Sample | Upper | Lower | Method | Result | wt% of sample | Clay (wt%) | OC (wt%) | Source | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) |
| BR | L | 2 | C | 20 | 30 | core | 1.71 | 99 | 2 | 0.13 | | 2.2 | 0 | | | 1 | | |
| BR | L | 2 | D | 30 | 40 | estim | 1.70 | 98 | 2 | 0.10 | | 1.7 | 0 | | | 2 | | |
| BR | L | 2 | E | 40 | 50 | core | 1.65 | 35 | 5 | 0.21 | | 1.2 | 0 | | | 65 | 0.33 | 3.6 |
| BR | L | 2 | F | 50 | 70 | estim | 1.70 | 11 | 9 | 0.34 | | 1.3 | 0 | | | 89 | 0.33 | 10.0 |
| BR | L | 3 | A | 0 | 10 | core | 1.55 | 99 | 2 | 0.81 | | 12.4 | 1 | | | 0 | | |
| BR | L | 3 | B | 10 | 20 | core | 1.71 | 99 | 2 | 0.30 | | 5.1 | 0 | | | 1 | | |
| BR | L | 3 | C | 20 | 30 | core | 1.74 | 98 | 2 | 0.11 | | 1.9 | 0 | | | 2 | | |
| BR | L | 3 | D | 30 | 40 | estim | 1.70 | 96 | 2 | 0.07 | | 1.1 | 0 | | | 4 | | |
| BR | L | 3 | E | 40 | 50 | core | 1.79 | 95 | 3 | 0.07 | e | 1.2 | 0 | | | 5 | | |
| BR | L | 3 | F | 50 | 70 | estim | 1.80 | 13 | 7 | 0.18 | | 0.8 | 0 | | | 87 | | |
| BR | L | 4 | A | 0 | 10 | core | 1.62 | 100 | 1 | 0.69 | | 11.1 | 0 | | | 0 | | |
| BR | L | 4 | B | 10 | 20 | core | 1.75 | 98 | 1 | 0.28 | | 4.8 | 0 | | | 2 | | |
| BR | L | 4 | C | 20 | 30 | core | 1.73 | 94 | 2 | 0.15 | | 2.4 | 0 | | | 7 | | |
| BR | L | 4 | D | 30 | 40 | estim | 1.70 | 96 | 1 | 0.07 | | 1.1 | 0 | | | 4 | | |
| BR | L | 4 | E | 40 | 50 | core | 1.89 | 95 | 3 | 0.07 | e | 1.3 | 0 | | | 5 | | |
| BR | L | 4 | F | 50 | 70 | estim | 1.80 | 45 | 3 | 0.09 | | 1.5 | 0 | | | 55 | | |
| BR | U | 1 | A | 0 | 10 | core | 1.58 | 98 | 2 | 0.49 | | 7.6 | 2 | | | 0 | | |
| BR | U | 1 | B | 10 | 20 | core | 1.60 | 99 | 1 | 0.22 | | 3.5 | 0 | | | 1 | | |
| BR | U | 1 | C | 20 | 30 | core | 1.62 | 98 | 1 | 0.17 | | 2.7 | 0 | | | 2 | | |
| BR | U | 1 | D | 30 | 60 | core | 1.83 | 49 | 1 | 0.14 | | 3.7 | 0 | | | 51 | | |
| BR | U | 1 | E | 60 | 85 | estim | 1.70 | 20 | 4 | 0.25 | | 2.1 | 0 | | | 80 | | |
| BR | U | 2 | A | 0 | 10 | core | 1.53 | 98 | 1 | 0.54 | | 8.1 | 2 | 4.52 | 1.4 | 0 | | |
| BR | U | 2 | B | 10 | 20 | core | 1.61 | 98 | 1 | 0.23 | | 3.6 | 0 | 15.4 | 0.5 | 1 | | |
| BR | U | 2 | C | 20 | 30 | core | 1.62 | 97 | 1 | 0.14 | | 2.2 | 0 | 14.0 | 0.5 | 3 | 0.74 | 0.3 |
| BR | U | 2 | D | 30 | 60 | core | 1.90 | 89 | 1 | 0.09 | | 4.5 | 0 | | | 11 | 0.47 | 3.1 |
| BR | U | 2 | E | 60 | 85 | estim | 1.80 | 29 | 2 | 0.17 | | 2.2 | 0 | | | 71 | 0.39 | 12.6 |
| BR | U | 3 | A | 0 | 10 | core | 1.50 | 99 | 2 | 0.53 | | 7.9 | 1 | | | 0 | | |

| | | | | Depth | | Bulk Density | | Fine Earth | | | | | Coarse Organics | | | Coarse Minerals | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Landuse | Sample point | Sample | Upper | Lower | Method | Result | wt% of sample | Clay (wt%) | OC (wt%) | Source | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) |
| BR | U | 3 | B | 10 | 20 | core | 1.58 | 97 | 1 | 0.22 | | 3.4 | 0 | | | 3 | | |
| BR | U | 3 | C | 20 | 30 | core | 1.64 | 79 | 2 | 0.16 | | 2.1 | 0 | | | 21 | | |
| BR | U | 3 | D | 30 | 60 | core | 1.88 | 30 | 2 | 0.36 | | 6.0 | 0 | | | 70 | | |
| BR | U | 3 | E | 60 | 85 | estim | 1.90 | 13 | 3 | 0.31 | | 1.9 | 0 | | | 87 | | |
| BR | U | 4 | A | 0 | 10 | core | 1.63 | 98 | 1 | 0.46 | | 7.4 | 2 | | | 0 | | |
| BR | U | 4 | B | 10 | 20 | core | 1.60 | 99 | 1 | 0.24 | | 3.8 | 0 | | | 1 | | |
| BR | U | 4 | C | 20 | 30 | core | 1.72 | 98 | 1 | 0.18 | | 3.0 | 0 | | | 2 | | |
| BR | U | 4 | D | 30 | 60 | core | 1.80 | 27 | 2 | 0.22 | | 3.3 | 0 | | | 73 | | |
| BR | U | 4 | E | 60 | 85 | estim | 1.80 | 16 | 4 | 0.21 | | 1.5 | 0 | | | 84 | | |
| BR | U | 4 | F | 85 | 90 | estim | 1.80 | 24 | 6 | 0.20 | | 0.4 | 0 | | | 76 | | |
| Mullewa | | | | | | | | | | | | | | | | | | |
| MU | L | 1 | A | 0 | 10 | core | 1.67 | 96 | 8 | 0.55 | | 8.8 | 0 | | | 4 | | |
| MU | L | 1 | B | 10 | 20 | core | 1.67 | 96 | 11 | 0.29 | | 4.6 | 0 | | | 4 | | |
| MU | L | 1 | C | 20 | 30 | core | 1.71 | 94 | 11 | 0.17 | | 2.7 | 0 | | | 6 | | |
| MU | L | 1 | D | 30 | 45 | core | 1.75 | 83 | 11 | 0.12 | | 2.6 | 0 | | | 17 | | |
| MU | L | 1 | E | 45 | 80 | core | 1.86 | 26 | 13 | 0.13 | | 2.2 | 0 | | | 74 | | |
| MU | L | 1 | F | 80 | 100 | core | 1.75 | 67 | 11 | 0.06 | | 1.4 | 0 | | | 33 | | |
| MU | L | 2 | A | 0 | 10 | core | 1.60 | 95 | 10 | 0.47 | | 7.1 | 1 | | | 4 | | |
| MU | L | 2 | B | 10 | 20 | core | 1.64 | 95 | 11 | 0.33 | | 5.1 | 0 | | | 5 | | |
| MU | L | 2 | C | 20 | 30 | core | 1.72 | 94 | 12 | 0.18 | | 2.9 | 0 | | | 6 | | |
| MU | L | 2 | D | 30 | 45 | core | 1.72 | 86 | 12 | 0.12 | | 2.6 | 0 | | | 14 | | |
| MU | L | 2 | E | 45 | 80 | core | 1.82 | 31 | 14 | 0.13 | | 2.5 | 0 | | | 69 | | |
| MU | L | 2 | F | 80 | 100 | core | 1.72 | 42 | 21 | 0.08 | | 1.1 | 0 | | | 58 | | |
| MU | L | 3 | A | 0 | 10 | core | 1.57 | 94 | 10 | 0.56 | | 8.2 | 0 | 4.15 | 0.2 | 6 | 0.58 | 0.5 |
| MU | L | 3 | B | 10 | 20 | core | 1.64 | 94 | 10 | 0.37 | | 5.7 | 0 | | | 6 | 0.30 | 0.3 |
| MU | L | 3 | C | 20 | 30 | core | 1.66 | 92 | 12 | 0.21 | | 3.2 | 0 | | | 8 | 0.13 | 0.2 |

| | | | | Depth | | Bulk Density | | Fine Earth | | | | | Coarse Organics | | | Coarse Minerals | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Landuse | Sample point | Sample | Upper | Lower | Method | Result | wt% of sample | Clay (wt%) | OC (wt%) | Source | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) |
| MU | L | 3 | D | 30 | 45 | core | 1.65 | 85 | 12 | 0.12 | e | 2.5 | 0 | | | 15 | 0.11 | 0.4 |
| MU | L | 3 | E | 45 | 80 | core | 1.77 | 28 | 13 | 0.12 | e | 2.1 | 0 | | | 72 | 0.14 | 6.2 |
| MU | L | 3 | F | 80 | 100 | core | 1.74 | 45 | 13 | 0.07 | e | 1.1 | 0 | | | 55 | 0.06 | 1.1 |
| MU | L | 4 | A | 0 | 10 | core | 1.56 | 95 | 9 | 0.52 | | 7.7 | 0 | | | 5 | | |
| MU | L | 4 | B | 10 | 20 | core | 1.69 | 95 | 11 | 0.31 | | 5.0 | 0 | | | 5 | | |
| MU | L | 4 | C | 20 | 30 | core | 1.68 | 93 | 11 | 0.18 | | 2.8 | 0 | | | 7 | | |
| MU | L | 4 | D | 30 | 45 | core | 1.69 | 79 | 11 | 0.13 | | 2.6 | 0 | | | 21 | | |
| MU | L | 4 | E | 45 | 80 | core | 1.86 | 28 | 13 | 0.15 | | 2.7 | 0 | | | 72 | | |
| MU | L | 4 | F | 80 | 100 | core | 1.84 | 30 | 12 | 0.07 | e | 0.8 | 0 | | | 70 | | |
| MU | S | 1 | A | 0 | 10 | core | 1.47 | 97 | 7 | 0.53 | | 7.6 | 1 | | | 2 | | |
| MU | S | 1 | B | 10 | 20 | core | 1.66 | 97 | 8 | 0.35 | | 5.6 | 0 | | | 3 | | |
| MU | S | 1 | C | 20 | 30 | core | 1.73 | 95 | 9 | 0.20 | | 3.3 | 0 | | | 5 | | |
| MU | S | 1 | D | 30 | 70 | core | 1.81 | 90 | 9 | 0.15 | | 9.8 | 0 | | | 10 | | |
| MU | S | 1 | E | 70 | 100 | core | 1.97 | 24 | 11 | 0.13 | | 1.8 | 0 | | | 76 | | |
| MU | S | 1 | F | 100 | 120 | core | 1.95 | 36 | 10 | 0.10 | | 1.4 | 0 | | | 64 | | |
| MU | S | 2 | A | 0 | 10 | core | 1.45 | 96 | 8 | 0.51 | | 7.1 | 0 | | | 4 | | |
| MU | S | 2 | B | 10 | 20 | core | 1.67 | 98 | 8 | 0.40 | | 6.5 | 0 | | | 1 | | |
| MU | S | 2 | C | 20 | 30 | core | 1.71 | 96 | 9 | 0.21 | | 3.4 | 0 | | | 4 | | |
| MU | S | 2 | D | 30 | 70 | core | 1.77 | 81 | 9 | 0.12 | | 6.8 | 0 | | | 19 | | |
| MU | S | 2 | E | 70 | 100 | core | 1.89 | 24 | 12 | 0.12 | | 1.6 | 0 | | | 76 | | |
| MU | S | 2 | F | 100 | 120 | core | 1.98 | 22 | 11 | 0.12 | | 1.0 | 0 | | | 78 | | |
| MU | S | 3 | A | 0 | 10 | core | 1.50 | 95 | 8 | 0.58 | | 8.2 | 1 | | | 5 | | |
| MU | S | 3 | B | 10 | 20 | core | 1.64 | 96 | 8 | 0.41 | | 6.4 | 0 | | | 4 | | |
| MU | S | 3 | C | 20 | 30 | core | 1.72 | 96 | 9 | 0.20 | | 3.3 | 0 | | | 4 | | |
| MU | S | 3 | D | 30 | 70 | core | 1.78 | 87 | 9 | 0.17 | | 10.4 | 0 | | | 13 | | |
| MU | S | 3 | E | 70 | 100 | core | 1.95 | 21 | 11 | 0.13 | | 1.6 | 0 | | | 79 | | |
| MU | S | 3 | F | 100 | 120 | core | 1.87 | 16 | 10 | 0.11 | | 0.6 | 0 | | | 84 | | |

| | | | | Depth | | Bulk Density | | Fine Earth | | | | | Coarse Organics | | | Coarse Minerals | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Landuse | Sample point | Sample | Upper | Lower | Method | Result | wt% of sample | Clay (wt%) | OC (wt%) | Source | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) |
| MU | S | 4 | A | 0 | 10 | core | 1.48 | 96 | 7 | 0.50 | | 7.1 | 0 | | | 3 | | |
| MU | S | 4 | B | 10 | 20 | core | 1.72 | 97 | 7 | 0.45 | | 7.4 | 0 | | | 3 | | |
| MU | S | 4 | C | 20 | 30 | core | 1.72 | 95 | 8 | 0.27 | | 4.4 | 0 | | | 5 | | |
| MU | S | 4 | D | 30 | 70 | core | 1.86 | 62 | 9 | 0.13 | | 5.9 | 0 | | | 38 | | |
| MU | S | 4 | E | 70 | 100 | core | 1.97 | 21 | 10 | 0.22 | | 2.7 | 0 | | | 79 | | |
| MU | S | 4 | F | 100 | 120 | estim | 1.90 | 26 | 7 | 0.18 | | 1.8 | 0 | | | 74 | | |
| MU | U | 1 | A | 0 | 10 | core | 1.52 | 97 | 9 | 0.89 | | 13.1 | 2 | | | 1 | | |
| MU | U | 1 | B | 10 | 20 | core | 1.49 | 97 | 10 | 0.58 | | 8.4 | 2 | | | 1 | | |
| MU | U | 1 | C | 20 | 30 | core | 1.53 | 97 | 11 | 0.37 | | 5.5 | 2 | | | 1 | | |
| MU | U | 1 | D | 30 | 55 | core | 1.60 | 97 | 13 | 0.22 | | 8.6 | 1 | | | 2 | | |
| MU | U | 1 | E | 55 | 85 | core | 1.80 | 93 | 13 | 0.12 | | 6.0 | 0 | | | 7 | | |
| MU | U | 1 | F | 85 | 95 | core | 1.95 | 40 | 14 | 0.20 | | 1.5 | 0 | | | 60 | | |
| MU | U | 1 | G | 95 | 105 | clod | 1.88 | 32 | 14 | 0.17 | | 1.0 | 0 | | | 68 | | |
| MU | U | 2 | A | 0 | 10 | core | 1.53 | 96 | 10 | 0.73 | | 10.6 | 4 | | | 0 | | |
| MU | U | 2 | B | 10 | 20 | core | 1.53 | 97 | 11 | 0.56 | | 8.3 | 3 | | | 0 | | |
| MU | U | 2 | C | 20 | 30 | core | 1.51 | 98 | 12 | 0.36 | | 5.3 | 1 | | | 2 | | |
| MU | U | 2 | D | 30 | 55 | core | 1.63 | 96 | 13 | 0.16 | | 6.2 | 1 | | | 4 | | |
| MU | U | 2 | E | 55 | 85 | core | 1.71 | 90 | 13 | 0.11 | | 5.1 | 0 | | | 10 | | |
| MU | U | 2 | F | 85 | 95 | core | 1.78 | 35 | 15 | 0.16 | | 1.0 | 0 | | | 65 | | |
| MU | U | 2 | G | 95 | 105 | estim | 1.80 | 23 | 16 | 0.14 | | 0.6 | 0 | | | 77 | | |
| MU | U | 3 | A | 0 | 10 | core | 1.48 | 96 | 9 | 0.72 | | 10.2 | 3 | 6.21 | 2.9 | 1 | | |
| MU | U | 3 | B | 10 | 20 | core | 1.49 | 97 | 10 | 0.44 | | 6.3 | 1 | 7.71 | 1.5 | 2 | 0.60 | 0.1 |
| MU | U | 3 | C | 20 | 30 | core | 1.51 | 97 | 11 | 0.30 | | 4.4 | 1 | 12.9 | 1.2 | 2 | 0.51 | 0.2 |
| MU | U | 3 | D | 30 | 55 | core | 1.62 | 98 | 12 | 0.19 | | 7.5 | 0 | 4.46 | 0.7 | 2 | 0.26 | 0.2 |
| MU | U | 3 | E | 55 | 85 | core | 1.66 | 88 | 13 | 0.10 | | 4.4 | 0 | | | 12 | 0.10 | 0.6 |
| MU | U | 3 | F | 85 | 95 | core | 1.84 | 41 | 14 | 0.14 | | 1.0 | 0 | | | 59 | 0.10 | 1.1 |
| MU | U | 3 | G | 95 | 105 | clod | 1.94 | 29 | 15 | 0.14 | | 0.8 | 0 | | | 71 | 0.08 | 1.1 |

| | | | | Depth | | Bulk Density | | Fine Earth | | | | | Coarse Organics | | | Coarse Minerals | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Landuse | Sample point | Sample | Upper | Lower | Method | Result | wt% of sample | Clay (wt%) | OC (wt%) | Source | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) |
| MU | U | 4 | A | 0 | 10 | core | 1.43 | 98 | 7 | 0.80 | | 11.2 | 2 | | | 0 | | |
| MU | U | 4 | B | 10 | 20 | core | 1.48 | 97 | 8 | 0.51 | | 7.3 | 2 | | | 1 | | |
| MU | U | 4 | C | 20 | 30 | core | 1.55 | 98 | 10 | 0.36 | | 5.4 | 1 | | | 2 | | |
| MU | U | 4 | D | 30 | 55 | core | 1.58 | 97 | 11 | 0.22 | | 8.4 | 1 | | | 2 | | |
| MU | U | 4 | E | 55 | 85 | core | 1.71 | 92 | 12 | 0.14 | | 6.6 | 0 | | | 8 | | |
| MU | U | 4 | F | 85 | 95 | core | 1.74 | 22 | 14 | 0.17 | | 0.6 | 0 | | | 78 | | |
| MU | U | 4 | G | 95 | 105 | estim | 1.90 | 23 | 18 | 0.12 | | 0.5 | 0 | | | 78 | | |
| Merredin | | | | | | | | | | | | | | | | | | |
| ME | L | 1 | A | 0 | 10 | core | 1.53 | 96 | 13 | 0.90 | | 13.2 | 2 | | | 2 | | |
| ME | L | 1 | B | 10 | 20 | core | 1.65 | 98 | 20 | 0.44 | e | 7.2 | 0 | | | 2 | | |
| ME | L | 1 | C | 20 | 30 | core | 1.60 | 96 | 22 | 0.08 | | 1.2 | 0 | | | 4 | | |
| ME | L | 1 | D | 30 | 50 | core | 1.55 | 82 | 19 | 0.10 | | 2.5 | 0 | | | 18 | | |
| ME | L | 1 | E | 50 | 80 | core | 1.55 | 83 | 14 | 0.08 | | 3.0 | 0 | | | 17 | | |
| ME | L | 1 | F | 80 | 110 | core | 1.58 | 84 | 15 | 0.08 | | 3.1 | 0 | | | 16 | | |
| ME | L | 1 | G | 110 | 140 | core | 1.63 | 65 | 20 | 0.12 | | 3.8 | 0 | | | 35 | | |
| ME | L | 2 | A | 0 | 10 | core | 1.45 | 97 | 13 | 0.80 | | 11.3 | 2 | | | 1 | | |
| ME | L | 2 | B | 10 | 20 | core | 1.49 | 98 | 19 | 0.44 | | 6.4 | 0 | | | 2 | | |
| ME | L | 2 | C | 20 | 30 | core | 1.52 | 97 | 22 | 0.22 | | 3.2 | 0 | | | 3 | | |
| ME | L | 2 | D | 30 | 50 | core | 1.53 | 96 | 25 | 0.14 | | 4.1 | 0 | | | 4 | | |
| ME | L | 2 | E | 50 | 80 | core | 1.58 | 95 | 26 | 0.09 | | 4.0 | 0 | | | 5 | | |
| ME | L | 2 | F | 80 | 110 | core | 1.58 | 94 | 26 | 0.07 | | 3.1 | 0 | | | 6 | | |
| ME | L | 2 | G | 110 | 140 | core | 1.55 | 85 | 25 | 0.14 | | 5.4 | 0 | | | 15 | | |
| ME | L | 3 | A | 0 | 10 | core | 1.56 | 98 | 12 | 0.73 | | 11.1 | 1 | 6.91 | 0.6 | 2 | | |
| ME | L | 3 | B | 10 | 20 | core | 1.59 | 99 | 20 | 0.40 | | 6.2 | 0 | | | 1 | | |
| ME | L | 3 | C | 20 | 30 | core | 1.56 | 98 | 21 | 0.20 | | 3.0 | 0 | | | 2 | | |
| ME | L | 3 | D | 30 | 50 | core | 1.54 | 97 | 23 | 0.12 | | 3.5 | 0 | | | 3 | 0.22 | 0.2 |

| | | | | Depth | | Bulk Density | | Fine Earth | | | | | Coarse Organics | | | Coarse Minerals | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Landuse | Sample point | Sample | Upper | Lower | Method | Result | wt% of sample | Clay (wt%) | OC (wt%) | Source | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) |
| ME | L | 3 | E | 50 | 80 | core | 1.57 | 91 | 24 | 0.09 | | 3.8 | 0 | | | 9 | 0.09 | 0.4 |
| ME | L | 3 | F | 80 | 110 | core | 1.58 | 96 | 24 | 0.07 | | 3.1 | 0 | | | 4 | 0.08 | 0.2 |
| ME | L | 3 | G | 110 | 140 | core | 1.59 | 85 | 22 | 0.07 | | 2.8 | 0 | | | 15 | 0.05 | 0.3 |
| ME | L | 4 | A | 0 | 10 | core | 1.62 | 97 | 14 | 0.79 | | 12.3 | 0 | | | 3 | | |
| ME | L | 4 | B | 10 | 20 | core | 1.61 | 94 | 20 | 0.37 | | 5.5 | 0 | | | 6 | | |
| ME | L | 4 | C | 20 | 30 | core | 1.53 | 97 | 24 | 0.19 | | 2.8 | 0 | | | 3 | | |
| ME | L | 4 | D | 30 | 50 | core | 1.53 | 95 | 23 | 0.14 | | 4.0 | 0 | | | 5 | | |
| ME | L | 4 | E | 50 | 80 | core | 1.55 | 91 | 24 | 0.11 | | 4.6 | 0 | | | 9 | | |
| ME | L | 4 | F | 80 | 110 | core | 1.53 | 91 | 24 | 0.08 | | 3.3 | 0 | | | 9 | | |
| ME | L | 4 | G | 110 | 140 | core | 1.58 | 81 | 20 | 0.07 | | 2.7 | 0 | | | 19 | | |
| ME | S | 1 | A | 0 | 10 | core | 1.42 | 99 | 12 | 1.14 | | 15.9 | 1 | 9.00 | 0.9 | 1 | | |
| ME | S | 1 | B | 10 | 20 | core | 1.56 | 98 | 18 | 0.53 | | 8.1 | 0 | | | 2 | | |
| ME | S | 1 | C | 20 | 30 | core | 1.54 | 98 | 21 | 0.31 | | 4.7 | 0 | | | 2 | | |
| ME | S | 1 | D | 30 | 50 | core | 1.55 | 96 | 22 | 0.13 | | 3.9 | 0 | | | 4 | | |
| ME | S | 1 | E | 50 | 80 | core | 1.58 | 91 | 23 | 0.09 | | 3.9 | 0 | | | 9 | | |
| ME | S | 1 | F | 80 | 110 | core | 1.61 | 87 | 20 | 0.07 | | 2.9 | 0 | | | 13 | | |
| ME | S | 1 | G | 110 | 140 | core | 1.58 | 91 | 20 | 0.06 | | 2.6 | 0 | | | 9 | | |
| ME | S | 2 | A | 0 | 10 | core | 1.47 | 98 | 12 | 0.90 | | 13.0 | 0 | | | 1 | | |
| ME | S | 2 | B | 10 | 20 | core | 1.51 | 98 | 18 | 0.50 | | 7.4 | 0 | | | 2 | | |
| ME | S | 2 | C | 20 | 30 | core | 1.51 | 95 | 22 | 0.26 | | 3.7 | 0 | | | 5 | | |
| ME | S | 2 | D | 30 | 50 | core | 1.56 | 94 | 22 | 0.12 | | 3.5 | 0 | | | 6 | | |
| ME | S | 2 | E | 50 | 80 | core | 1.59 | 92 | 23 | 0.09 | | 3.9 | 0 | | | 8 | | |
| ME | S | 2 | F | 80 | 110 | core | 1.62 | 88 | 21 | 0.07 | | 3.0 | 0 | | | 12 | | |
| ME | S | 2 | G | 110 | 140 | core | 1.59 | 91 | 19 | 0.06 | | 2.6 | 0 | | | 9 | | |
| ME | S | 3 | A | 0 | 10 | core | 1.49 | 97 | 12 | 0.94 | | 13.6 | 0 | | | 2 | | |
| ME | S | 3 | B | 10 | 20 | core | 1.57 | 97 | 19 | 0.49 | | 7.4 | 0 | | | 3 | | |
| ME | S | 3 | C | 20 | 30 | core | 1.58 | 96 | 22 | 0.26 | | 3.9 | 0 | | | 4 | | |

| | | | | Depth | | Bulk Density | | Fine Earth | | | | | Coarse Organics | | | Coarse Minerals | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Landuse | Sample point | Sample | Upper | Lower | Method | Result | wt% of sample | Clay (wt%) | OC (wt%) | Source | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) |
| ME | S | 3 | D | 30 | 50 | core | 1.55 | 95 | 22 | 0.14 | | 4.1 | 0 | | | 5 | | |
| ME | S | 3 | E | 50 | 80 | core | 1.57 | 90 | 23 | 0.08 | | 3.4 | 0 | | | 10 | | |
| ME | S | 3 | F | 80 | 110 | core | 1.57 | 84 | 21 | 0.08 | | 3.2 | 0 | | | 16 | | |
| ME | S | 3 | G | 110 | 140 | core | 1.59 | 86 | 19 | 0.06 | | 2.4 | 0 | | | 14 | | |
| ME | S | 4 | A | 0 | 10 | core | 1.46 | 96 | 12 | 0.97 | | 13.6 | 2 | | | 2 | | |
| ME | S | 4 | B | 10 | 20 | core | 1.52 | 96 | 17 | 0.52 | | 7.6 | 0 | | | 4 | | |
| ME | S | 4 | C | 20 | 30 | core | 1.51 | 96 | 21 | 0.30 | | 4.3 | 0 | | | 4 | | |
| ME | S | 4 | D | 30 | 50 | core | 1.55 | 95 | 21 | 0.14 | | 4.1 | 0 | | | 5 | | |
| ME | S | 4 | E | 50 | 80 | core | 1.57 | 91 | 24 | 0.10 | | 4.3 | 0 | | | 9 | | |
| ME | S | 4 | F | 80 | 110 | core | 1.62 | 81 | 23 | 0.08 | | 3.1 | 0 | | | 19 | | |
| ME | S | 4 | G | 110 | 140 | core | 1.60 | 86 | 22 | 0.06 | | 2.5 | 0 | | | 14 | | |
| ME | U | 1 | A | 0 | 10 | core | 1.50 | 97 | 15 | 0.62 | | 9.1 | 2 | 4.33 | 1.1 | 1 | | |
| ME | U | 1 | B | 10 | 20 | core | 1.38 | 95 | 19 | 0.48 | | 6.3 | 1 | 6.11 | 0.8 | 4 | | |
| ME | U | 1 | C | 20 | 30 | core | 1.48 | 97 | 21 | 0.29 | | 4.1 | 0 | | | 3 | | |
| ME | U | 1 | D | 30 | 50 | core | 1.55 | 95 | 22 | 0.14 | | 4.1 | 0 | | | 5 | 0.34 | 0.5 |
| ME | U | 1 | E | 50 | 80 | core | 1.60 | 89 | 23 | 0.10 | | 4.2 | 0 | | | 11 | 0.13 | 0.7 |
| ME | U | 1 | F | 80 | 110 | core | 1.59 | 91 | 23 | 0.08 | | 3.5 | 0 | | | 9 | 0.12 | 0.5 |
| ME | U | 1 | G | 110 | 140 | core | 1.63 | 88 | 20 | 0.07 | | 3.0 | 0 | | | 12 | 0.07 | 0.4 |
| ME | U | 2 | A | 0 | 10 | core | 1.45 | 96 | 14 | 0.66 | | 9.2 | 1 | | | 3 | | |
| ME | U | 2 | B | 10 | 20 | core | 1.36 | 93 | 20 | 0.50 | | 6.3 | 1 | | | 6 | | |
| ME | U | 2 | C | 20 | 30 | core | 1.49 | 97 | 22 | 0.31 | | 4.4 | 1 | | | 3 | | |
| ME | U | 2 | D | 30 | 50 | core | 1.52 | 95 | 23 | 0.21 | | 6.0 | 0 | | | 5 | | |
| ME | U | 2 | E | 50 | 80 | core | 1.59 | 88 | 27 | 0.15 | | 6.3 | 0 | | | 12 | | |
| ME | U | 2 | F | 80 | 110 | core | 1.62 | 87 | 26 | 0.09 | | 3.8 | 0 | | | 13 | | |
| ME | U | 2 | G | 110 | 140 | core | 1.62 | 81 | 25 | 0.07 | | 2.7 | 0 | | | 19 | | |
| ME | U | 3 | A | 0 | 10 | core | 1.49 | 98 | 14 | 0.61 | | 8.8 | 1 | | | 1 | | |
| ME | U | 3 | B | 10 | 20 | core | 1.43 | 96 | 19 | 0.50 | | 6.9 | 1 | | | 2 | | |

| | | | | Depth | | Bulk Density | | Fine Earth | | | | | Coarse Organics | | | Coarse Minerals | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Landuse | Sample point | Sample | Upper | Lower | Method | Result | wt% of sample | Clay (wt%) | OC (wt%) | Source | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) |
| ME | U | 3 | C | 20 | 30 | core | 1.50 | 97 | 21 | 0.27 | | 3.9 | 1 | | | 2 | | |
| ME | U | 3 | D | 30 | 50 | core | 1.45 | 96 | 22 | 0.16 | | 4.4 | 0 | | | 4 | | |
| ME | U | 3 | E | 50 | 80 | core | 1.55 | 94 | 24 | 0.11 | | 4.8 | 0 | | | 6 | | |
| ME | U | 3 | F | 80 | 110 | core | 1.58 | 92 | 25 | 0.09 | | 3.9 | 0 | | | 8 | | |
| ME | U | 3 | G | 110 | 140 | core | 1.64 | 86 | 23 | 0.08 | | 3.4 | 0 | | | 14 | | |
| ME | U | 4 | A | 0 | 10 | core | 1.51 | 97 | 14 | 0.61 | | 8.9 | 1 | | | 2 | | |
| ME | U | 4 | B | 10 | 20 | core | 1.41 | 97 | 19 | 0.51 | | 7.0 | 1 | | | 2 | | |
| ME | U | 4 | C | 20 | 30 | core | 1.49 | 97 | 22 | 0.28 | | 4.0 | 0 | | | 3 | | |
| ME | U | 4 | D | 30 | 50 | core | 1.50 | 96 | 23 | 0.18 | | 5.2 | 0 | | | 4 | | |
| ME | U | 4 | E | 50 | 80 | core | 1.53 | 94 | 23 | 0.13 | | 5.6 | 0 | | | 6 | | |
| ME | U | 4 | F | 80 | 110 | core | 1.64 | 82 | 23 | 0.10 | | 4.0 | 0 | | | 18 | | |
| ME | U | 4 | G | 110 | 140 | core | 1.64 | 81 | 21 | 0.10 | | 4.0 | 0 | | | 19 | | |
| Newdegate (deep) | | | | | | | | | | | | | | | | | | |
| ND | L | 1 | A | 0 | 10 | core | 1.64 | 96 | 3 | 0.91 | | 14.3 | 1 | | | 3 | | |
| ND | L | 1 | B | 10 | 20 | core | 1.78 | 60 | 3 | 0.42 | | 4.5 | 0 | | | 40 | | |
| ND | L | 1 | C | 20 | 30 | core | 1.90 | 30 | 4 | 0.27 | | 1.5 | 0 | | | 71 | | |
| ND | L | 1 | C1 | 30 | 40 | core | 1.90 | 30 | 4 | 0.19 | | 1.1 | 0 | | | 71 | | |
| ND | L | 1 | D | 40 | 60 | core | 1.92 | 98 | 43 | 0.26 | | 9.6 | 0 | | | 2 | | |
| ND | L | 1 | E | 60 | 90 | core | 1.77 | 96 | 38 | 0.06 | | 2.9 | 0 | | | 4 | | |
| ND | L | 2 | A | 0 | 10 | core | 1.63 | 97 | 2 | 0.79 | | 12.5 | 1 | 21.8 | 1.8 | 3 | | |
| ND | L | 2 | B | 10 | 20 | core | 1.79 | 69 | 2 | 0.28 | | 3.5 | 0 | | | 31 | 0.12 | 0.7 |
| ND | L | 2 | C | 20 | 30 | core | 1.88 | 33 | 2 | 0.24 | | 1.5 | 0 | | | 67 | 0.09 | 1.1 |
| ND | L | 2 | C1 | 30 | 40 | core | 1.88 | 34 | 4 | 0.18 | | 1.2 | 0 | 26.6 | 0.5 | 66 | 0.09 | 1.1 |
| ND | L | 2 | D | 40 | 60 | core | 1.85 | 97 | 43 | 0.18 | | 6.4 | 0 | 16.8 | 0.0 | 3 | 0.14 | 0.1 |
| ND | L | 2 | E | 60 | 90 | core | 1.73 | 98 | 36 | 0.09 | | 4.4 | 0 | 30.6 | 0.0 | 2 | 0.09 | 0.1 |
| ND | L | 3 | A | 0 | 10 | core | 1.58 | 95 | 3 | 0.87 | | 13.0 | 0 | | | 5 | | |

| | | | | Depth | | Bulk Density | | Fine Earth | | | | | Coarse Organics | | | Coarse Minerals | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Landuse | Sample point | Sample | Upper | Lower | Method | Result | wt% of sample | Clay (wt%) | OC (wt%) | Source | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) |
| ND | L | 3 | B | 10 | 20 | core | 1.71 | 54 | 3 | 0.35 | | 3.2 | 0 | | | 46 | | |
| ND | L | 3 | C | 20 | 30 | core | 1.85 | 32 | 4 | 0.27 | | 1.6 | 0 | | | 68 | | |
| ND | L | 3 | C1 | 30 | 40 | core | 1.85 | 33 | 4 | 0.27 | | 1.6 | 0 | | | 67 | | |
| ND | L | 3 | D | 40 | 60 | core | 1.93 | 71 | 34 | 0.46 | | 12.7 | 1 | | | 28 | | |
| ND | L | 3 | E | 60 | 90 | core | 1.78 | 92 | 32 | 0.07 | | 3.3 | 0 | | | 8 | | |
| ND | L | 4 | A | 0 | 10 | core | 1.56 | 97 | 3 | 0.82 | | 12.4 | 1 | | | 2 | | |
| ND | L | 4 | B | 10 | 20 | core | 1.75 | 84 | 3 | 0.33 | | 4.9 | 0 | | | 16 | | |
| ND | L | 4 | C | 20 | 30 | core | 1.82 | 36 | 3 | 0.21 | | 1.4 | 0 | | | 64 | | |
| ND | L | 4 | C1 | 30 | 40 | core | 1.82 | 39 | 4 | 0.14 | | 1.0 | 0 | | | 61 | | |
| ND | L | 4 | D | 40 | 60 | core | 1.95 | 68 | 38 | 0.17 | | 4.4 | 0 | | | 32 | | |
| ND | L | 4 | E | 60 | 90 | core | 2.06 | 96 | 30 | 0.07 | | 4.0 | 0 | | | 4 | | |
| ND | S | 1 | A | 0 | 10 | core | 1.68 | 96 | 3 | 0.76 | | 12.3 | 0 | | | 3 | | |
| ND | S | 1 | B | 10 | 20 | core | 1.73 | 69 | 3 | 0.36 | | 4.3 | 0 | | | 31 | | |
| ND | S | 1 | C | 20 | 30 | core | 1.87 | 38 | 4 | 0.21 | | 1.5 | 0 | | | 62 | | |
| ND | S | 1 | D | 30 | 60 | core | 1.95 | 57 | 32 | 0.13 | | 4.3 | 0 | | | 43 | | |
| ND | S | 1 | E | 60 | 90 | core | 1.76 | 61 | 28 | 0.08 | | 2.5 | 0 | | | 40 | | |
| ND | S | 1 | F | 90 | 120 | core | 1.80 | 54 | 29 | 0.07 | | 2.0 | 0 | | | 46 | | |
| ND | S | 2 | A | 0 | 10 | core | 1.61 | 97 | 3 | 0.76 | | 11.8 | 1 | | | 3 | | |
| ND | S | 2 | B | 10 | 20 | core | 1.76 | 85 | 3 | 0.24 | | 3.6 | 0 | | | 15 | | |
| ND | S | 2 | C | 20 | 30 | core | 1.84 | 52 | 3 | 0.18 | | 1.7 | 0 | | | 48 | | |
| ND | S | 2 | D | 30 | 60 | core | 1.71 | 83 | 35 | 0.12 | | 5.0 | 0 | | | 17 | | |
| ND | S | 2 | E | 60 | 90 | core | 1.75 | 76 | 32 | 0.07 | | 2.7 | 0 | | | 24 | | |
| ND | S | 2 | F | 90 | 120 | core | 1.84 | 65 | 22 | 0.06 | | 2.1 | 0 | | | 35 | | |
| ND | S | 3 | A | 0 | 10 | core | 1.75 | 97 | 3 | 0.67 | | 11.4 | 1 | | | 2 | | |
| ND | S | 3 | B | 10 | 20 | core | 1.75 | 80 | 2 | 0.26 | | 3.6 | 0 | | | 20 | | |
| ND | S | 3 | C | 20 | 30 | core | 1.91 | 52 | 2 | 0.16 | | 1.6 | 0 | | | 48 | | |
| ND | S | 3 | D | 30 | 60 | core | 1.68 | 94 | 37 | 0.12 | | 5.6 | 0 | | | 6 | | |

| | | | | Depth | | Bulk Density | | Fine Earth | | | | | Coarse Organics | | | Coarse Minerals | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Landuse | Sample point | Sample | Upper | Lower | Method | Result | wt% of sample | Clay (wt%) | OC (wt%) | Source | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) |
| ND | S | 3 | E | 60 | 90 | core | 1.81 | 64 | 26 | 0.07 | | 2.3 | 0 | | | 36 | | |
| ND | S | 3 | F | 90 | 120 | core | 1.74 | 52 | 28 | 0.07 | | 1.8 | 0 | | | 48 | | |
| ND | S | 4 | A | 0 | 10 | core | 1.62 | 97 | 3 | 0.83 | | 12.9 | 1 | 19.3 | 3.4 | 2 | | |
| ND | S | 4 | B | 10 | 20 | core | 1.67 | 89 | 3 | 0.54 | | 8.0 | 0 | | | 11 | 0.28 | 0.5 |
| ND | S | 4 | C | 20 | 30 | core | 1.91 | 45 | 3 | 0.28 | | 2.4 | 0 | | | 55 | 0.11 | 1.1 |
| ND | S | 4 | D | 30 | 60 | core | 1.81 | 81 | 38 | 0.20 | | 8.7 | 0 | | | 19 | 0.14 | 1.4 |
| ND | S | 4 | E | 60 | 90 | core | 1.51 | 81 | 45 | 0.08 | | 2.9 | 0 | | | 19 | 0.05 | 0.4 |
| ND | S | 4 | F | 90 | 120 | core | 1.75 | 71 | 37 | 0.08 | | 2.9 | 0 | | | 29 | 0.07 | 1.0 |
| ND | U | 1 | A | 0 | 10 | core | 1.50 | 93 | 3 | 0.85 | | 11.9 | 0 | 23.9 | 1.4 | 7 | | |
| ND | U | 1 | B | 10 | 20 | core | 1.57 | 66 | 3 | 0.58 | | 6.0 | 1 | 24.9 | 2.0 | 33 | 0.14 | 0.7 |
| ND | U | 1 | C | 20 | 30 | core | 1.78 | 40 | 2 | 0.29 | | 2.0 | 0 | 26.2 | 1.4 | 60 | 0.13 | 1.4 |
| ND | U | 1 | D | 30 | 60 | core | 1.62 | 65 | 32 | 0.19 | | 6.1 | 2 | 30.2 | 25.0 | 34 | 0.15 | 2.4 |
| ND | U | 1 | E | 60 | 90 | core | 1.50 | 60 | 26 | 0.06 | | 1.6 | 0 | | | 40 | 0.04 | 0.7 |
| ND | U | 2 | A | 0 | 10 | core | 1.48 | 98 | 3 | 0.58 | | 8.3 | 0 | | | 2 | | |
| ND | U | 2 | B | 10 | 20 | core | 1.59 | 85 | 5 | 0.32 | | 4.3 | 0 | | | 15 | | |
| ND | U | 2 | C | 20 | 30 | core | 1.71 | 58 | 2 | 0.21 | | 2.1 | 0 | | | 42 | | |
| ND | U | 2 | D | 30 | 60 | core | 1.76 | 72 | 35 | 0.16 | | 6.0 | 0 | | | 28 | | |
| ND | U | 2 | E | 60 | 90 | core | 1.58 | 81 | 40 | 0.08 | | 3.0 | 0 | | | 19 | | |
| ND | U | 3 | A | 0 | 10 | core | 1.11 | 96 | 3 | 0.63 | | 6.7 | 1 | | | 4 | | |
| ND | U | 3 | B | 10 | 20 | core | 1.47 | 88 | 3 | 0.42 | | 5.4 | 0 | | | 12 | | |
| ND | U | 3 | C | 20 | 30 | estim | 1.75 | 51 | 2 | 0.26 | | 2.3 | 0 | | | 49 | | |
| ND | U | 3 | D | 30 | 60 | core | 1.63 | 82 | 34 | 0.17 | | 6.7 | 0 | | | 18 | | |
| ND | U | 3 | E | 60 | 90 | core | 1.67 | 67 | 28 | 0.08 | | 2.6 | 0 | | | 33 | | |
| ND | U | 4 | A | 0 | 10 | core | 1.30 | 96 | 3 | 1.39 | | 17.4 | 1 | | | 3 | | |
| ND | U | 4 | B | 10 | 20 | core | 1.54 | 88 | 2 | 0.43 | | 5.8 | 1 | | | 11 | | |
| ND | U | 4 | C | 20 | 30 | estim | 1.75 | 47 | 2 | 0.24 | | 2.0 | 0 | | | 53 | | |
| ND | U | 4 | D | 30 | 60 | core | 1.62 | 69 | 33 | 0.11 | | 3.6 | 0 | | | 31 | | |

| | | | | Depth | | Bulk Density | | Fine Earth | | | | | Coarse Organics | | | Coarse Minerals | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Landuse | Sample point | Sample | Upper | Lower | Method | Result | wt% of sample | Clay (wt%) | OC (wt%) | Source | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) |
| ND | U | 4 | E | 60 | 90 | core | 1.69 | 69 | 27 | 0.07 | | 2.4 | 0 | | | 31 | | |
| Newdegate (shallow) | | | | | | | | | | | | | | | | | | |
| NS | L | 1 | A | 0 | 10 | core | 1.66 | 99 | 3 | 0.67 | | 10.9 | 1 | | | 1 | | |
| NS | L | 1 | B | 10 | 20 | core | 1.75 | 72 | 2 | 0.27 | | 3.4 | 0 | | | 28 | | |
| NS | L | 1 | C | 20 | 30 | estim | 1.80 | 94 | 27 | 0.41 | | 6.8 | 0 | | | 7 | | |
| NS | L | 1 | D | 30 | 60 | estim | 1.80 | 95 | 37 | 0.25 | | 12.9 | 0 | | | 5 | | |
| NS | L | 1 | E | 60 | 90 | estim | 1.85 | 85 | 27 | 0.06 | | 2.7 | 0 | | | 15 | | |
| NS | L | 2 | A | 0 | 10 | core | 1.58 | 99 | 3 | 0.74 | | 11.5 | 1 | | | 1 | | |
| NS | L | 2 | B | 10 | 20 | core | 1.81 | 86 | 3 | 0.31 | | 4.8 | 0 | | | 14 | | |
| NS | L | 2 | C | 20 | 30 | estim | 1.80 | 100 | 35 | 0.49 | | 8.8 | 0 | | | 1 | | |
| NS | L | 2 | D | 30 | 60 | estim | 1.80 | 97 | 52 | 0.19 | | 9.7 | 0 | | | 3 | | |
| NS | L | 2 | E | 60 | 90 | estim | 1.85 | 88 | 31 | 0.05 | | 2.4 | 0 | | | 12 | | |
| NS | L | 3 | A | 0 | 10 | core | 1.64 | 98 | 2 | 0.63 | | 10.1 | 1 | | | 1 | | |
| NS | L | 3 | B | 10 | 20 | core | 1.69 | 95 | 2 | 0.19 | | 3.1 | 0 | | | 5 | | |
| NS | L | 3 | C | 20 | 30 | estim | 1.80 | 97 | 32 | 0.31 | | 5.5 | 0 | | | 3 | | |
| NS | L | 3 | D | 30 | 60 | estim | 1.80 | 99 | 36 | 0.08 | | 4.2 | 0 | | | 1 | | |
| NS | L | 3 | E | 60 | 90 | estim | 1.85 | 87 | 34 | 0.06 | | 2.8 | 0 | | | 14 | | |
| NS | L | 4 | A | 0 | 10 | core | 1.59 | 97 | 3 | 0.62 | | 9.6 | 1 | 23.1 | 2.2 | 2 | | |
| NS | L | 4 | B | 10 | 20 | core | 1.76 | 81 | 2 | 0.25 | | 3.6 | 0 | | | 19 | 0.12 | 0.4 |
| NS | L | 4 | C | 20 | 30 | estim | 1.80 | 97 | 28 | 0.34 | | 6.0 | 0 | | | 3 | 0.20 | 0.1 |
| NS | L | 4 | D | 30 | 60 | estim | 1.80 | 91 | 35 | 0.11 | | 5.3 | 0 | | | 9 | 0.10 | 0.5 |
| NS | L | 4 | E | 60 | 90 | estim | 1.85 | 96 | 26 | 0.04 | | 2.0 | 0 | | | 4 | 0.09 | 0.2 |
| NS | S | 1 | A | 0 | 10 | core | 1.46 | 97 | 3 | 0.87 | | 12.3 | 1 | 22.1 | 3.2 | 2 | | |
| NS | S | 1 | B | 10 | 20 | core | 1.72 | 97 | 2 | 0.26 | | 4.3 | 0 | 28.0 | 1.0 | 3 | | |
| NS | S | 1 | C | 20 | 30 | estim | 1.80 | 99 | 33 | 0.31 | | 5.6 | 0 | 33.9 | 0.6 | 1 | | |
| NS | S | 1 | D | 30 | 60 | core | 1.71 | 99 | 40 | 0.16 | | 7.9 | 0 | | | 1 | | |

| | | | | Depth | | Bulk Density | | Fine Earth | | | | | Coarse Organics | | | Coarse Minerals | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Landuse | Sample point | Sample | Upper | Lower | Method | Result | wt% of sample | Clay (wt%) | OC (wt%) | Source | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) |
| NS | S | 1 | E | 60 | 90 | core | 1.76 | 90 | 31 | 0.05 | | 2.3 | 0 | | | 10 | | |
| NS | S | 2 | A | 0 | 10 | core | 1.63 | 99 | 3 | 0.70 | | 11.2 | 1 | | | 1 | | |
| NS | S | 2 | B | 10 | 20 | core | 1.67 | 96 | 2 | 0.19 | | 3.0 | 0 | | | 4 | | |
| NS | S | 2 | C | 20 | 30 | core | 1.81 | 99 | 30 | 0.34 | | 6.0 | 0 | | | 1 | | |
| NS | S | 2 | D | 30 | 60 | core | 1.74 | 97 | 39 | 0.06 | | 3.0 | 0 | | | 3 | | |
| NS | S | 2 | E | 60 | 90 | core | 1.73 | 78 | 36 | 0.05 | | 2.0 | 0 | | | 23 | | |
| NS | S | 3 | A | 0 | 10 | core | 1.64 | 99 | 3 | 0.84 | | 13.5 | 1 | | | 1 | | |
| NS | S | 3 | B | 10 | 20 | core | 1.68 | 97 | 2 | 0.24 | | 3.9 | 0 | | | 3 | | |
| NS | S | 3 | C | 20 | 30 | estim | 1.80 | 99 | 27 | 0.34 | | 6.0 | 0 | | | 1 | | |
| NS | S | 3 | D | 30 | 60 | core | 1.76 | 100 | 46 | 0.16 | | 8.2 | 0 | | | 0 | | |
| NS | S | 3 | E | 60 | 90 | core | 1.73 | 95 | 39 | 0.05 | | 2.4 | 0 | | | 5 | | |
| NS | S | 4 | A | 0 | 10 | core | 1.64 | 98 | 3 | 0.94 | | 15.1 | 1 | | | 1 | | |
| NS | S | 4 | B | 10 | 20 | core | 1.67 | 98 | 3 | 0.30 | | 4.9 | 0 | | | 2 | | |
| NS | S | 4 | C | 20 | 30 | estim | 1.80 | 100 | 35 | 0.40 | | 7.2 | 0 | | | 0 | | |
| NS | S | 4 | D | 30 | 60 | core | 1.83 | 93 | 40 | 0.14 | | 7.0 | 0 | | | 7 | | |
| NS | S | 4 | E | 60 | 90 | core | 1.77 | 80 | 43 | 0.05 | | 2.0 | 0 | | | 20 | | |
| NS | U | 1 | A | 0 | 10 | core | 1.57 | 99 | 3 | 0.91 | | 14.1 | 1 | | | 0 | | |
| NS | U | 1 | B | 10 | 20 | core | 1.68 | 98 | 3 | 0.41 | | 6.7 | 1 | | | 1 | | |
| NS | U | 1 | C | 20 | 30 | estim | 1.80 | 100 | 30 | 0.44 | | 8.0 | 0 | | | 0 | | |
| NS | U | 1 | D | 30 | 60 | estim | 1.80 | 99 | 42 | 0.08 | | 4.2 | 0 | | | 1 | | |
| NS | U | 1 | E | 60 | 90 | estim | 1.85 | 92 | 37 | 0.08 | | 3.9 | 0 | | | 8 | | |
| NS | U | 2 | A | 0 | 10 | core | 1.55 | 99 | 3 | 1.01 | | 15.4 | 1 | | | 0 | | |
| NS | U | 2 | B | 10 | 20 | core | 1.90 | 99 | 2 | 0.54 | | 10.1 | 1 | | | 1 | | |
| NS | U | 2 | C | 20 | 30 | estim | 1.80 | 100 | 24 | 0.55 | | 9.9 | 1 | | | 0 | | |
| NS | U | 2 | D | 30 | 60 | estim | 1.80 | 100 | 40 | 0.18 | | 9.9 | 0 | | | 0 | | |
| NS | U | 2 | E | 60 | 90 | estim | 1.85 | 94 | 41 | 0.10 | | 5.0 | 0 | | | 6 | | |
| NS | U | 3 | A | 0 | 10 | core | 1.52 | 97 | 4 | 1.50 | | 22.3 | 2 | | | 1 | | |

| | | | | Depth | | Bulk Density | | Fine Earth | | | | | Coarse Organics | | | Coarse Minerals | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Landuse | Sample point | Sample | Upper | Lower | Method | Result | wt% of sample | Clay (wt%) | OC (wt%) | Source | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) |
| NS | U | 3 | B | 10 | 20 | core | 1.56 | 95 | 3 | 0.50 | | 7.4 | 1 | | | 4 | | |
| NS | U | 3 | C | 20 | 30 | core | 1.65 | 99 | 25 | 0.35 | | 5.7 | 0 | | | 1 | | |
| NS | U | 3 | D | 30 | 60 | estim | 1.80 | 97 | 40 | 0.09 | | 4.6 | 0 | | | 3 | | |
| NS | U | 3 | E | 60 | 90 | estim | 1.85 | 68 | 37 | 0.11 | | 4.0 | 0 | | | 32 | | |
| NS | U | 4 | A | 0 | 10 | core | 1.47 | 99 | 3 | 1.09 | | 15.8 | 1 | 26.9 | 3.6 | 0 | | |
| NS | U | 4 | B | 10 | 20 | core | 1.72 | 97 | 3 | 0.58 | | 9.6 | 1 | 27.8 | 4.3 | 2 | 0.52 | 0.2 |
| NS | U | 4 | C | 20 | 30 | core | 1.85 | 100 | 26 | 0.41 | | 7.7 | 0 | | | 0 | | |
| NS | U | 4 | D | 30 | 60 | estim | 1.80 | 100 | 39 | 0.15 | | 7.9 | 0 | | | 0 | | |
| NS | U | 4 | E | 60 | 90 | estim | 1.85 | 94 | 32 | 0.06 | | 3.0 | 0 | | | 6 | 0.09 | 0.3 |
| Wittenoom Hills | | | | | | | | | | | | | | | | | | |
| WH | L | 1 | A | 0 | 10 | core | 1.45 | 99 | 17 | 1.41 | | 20.2 | 0 | | | 1 | | |
| WH | L | 1 | B | 10 | 20 | core | 1.35 | 79 | 38 | 0.84 | | 8.9 | 0 | | | 21 | | |
| WH | L | 1 | C | 20 | 30 | core | 1.36 | 79 | 38 | 0.60 | | 6.5 | 0 | | | 21 | | |
| WH | L | 1 | D | 30 | 70 | core | 1.63 | 71 | 41 | 0.09 | | 4.0 | 0 | | | 29 | | |
| WH | L | 1 | E | 70 | 100 | core | 1.59 | 68 | 49 | 0.08 | | 2.4 | 0 | | | 32 | | |
| WH | L | 2 | A | 0 | 10 | core | 1.57 | 100 | 5 | 1.06 | | 16.6 | 0 | | | 0 | | |
| WH | L | 2 | B | 10 | 20 | core | 1.60 | 100 | 28 | 0.37 | | 5.9 | 0 | | | 0 | | |
| WH | L | 2 | C | 20 | 30 | core | 1.60 | 100 | 45 | 0.22 | | 3.5 | 0 | | | 0 | | |
| WH | L | 2 | D | 30 | 70 | core | 1.52 | 53 | 41 | 0.10 | | 3.3 | 0 | | | 47 | | |
| WH | L | 2 | E | 70 | 100 | core | 1.56 | 43 | 45 | 0.09 | | 1.8 | 0 | | | 57 | | |
| WH | L | 3 | A | 0 | 10 | core | 1.55 | 100 | 7 | 1.41 | | 21.8 | 1 | | | 0 | | |
| WH | L | 3 | B | 10 | 20 | core | 1.59 | 100 | 29 | 0.48 | | 7.6 | 0 | | | 0 | | |
| WH | L | 3 | C | 20 | 30 | core | 1.57 | 97 | 46 | 0.25 | | 3.8 | 0 | | | 3 | | |
| WH | L | 3 | D | 30 | 70 | core | 1.49 | 84 | 42 | 0.17 | | 8.4 | 0 | | | 16 | | |
| WH | L | 3 | E | 70 | 100 | core | 1.54 | 91 | 62 | 0.07 | | 2.8 | 0 | | | 9 | | |
| WH | L | 4 | A | 0 | 10 | core | 1.46 | 99 | 9 | 1.43 | | 20.6 | 0 | 20.3 | 0.9 | 0 | | |

| | | | | Depth | | Bulk Density | | Fine Earth | | | | | Coarse Organics | | | Coarse Minerals | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Landuse | Sample point | Sample | Upper | Lower | Method | Result | wt% of sample | Clay (wt%) | OC (wt%) | Source | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) |
| WH | L | 4 | B | 10 | 20 | core | 1.36 | 93 | 31 | 1.05 | | 13.3 | 0 | | | 7 | 0.33 | 0.3 |
| WH | L | 4 | C | 20 | 30 | core | 1.37 | 81 | 37 | 0.71 | | 7.9 | 0 | | | 19 | 0.22 | 0.6 |
| WH | L | 4 | D | 30 | 70 | core | 1.50 | 80 | 43 | 0.14 | | 6.6 | 0 | | | 20 | 0.15 | 1.8 |
| WH | L | 4 | E | 70 | 100 | core | 1.50 | 90 | 57 | 0.07 | | 2.7 | 0 | | | 10 | 0.09 | 0.4 |
| WH | S | 1 | A | 0 | 10 | core | 1.33 | 99 | 17 | 1.40 | | 18.5 | 0 | | | 0 | | |
| WH | S | 1 | B | 10 | 20 | core | 1.31 | 98 | 49 | 0.71 | | 9.1 | 0 | | | 2 | | |
| WH | S | 1 | C | 20 | 30 | core | 1.43 | 78 | 50 | 0.52 | | 5.8 | 0 | | | 22 | | |
| WH | S | 1 | D | 30 | 70 | core | 1.52 | 70 | 40 | 0.24 | | 10.1 | 0 | | | 30 | | |
| WH | S | 1 | E | 70 | 100 | core | 1.65 | 73 | 44 | 0.10 | | 3.6 | 0 | | | 27 | | |
| WH | S | 2 | A | 0 | 10 | core | 1.43 | 100 | 5 | 0.96 | | 13.8 | 0 | 21.7 | 0.9 | 0 | | |
| WH | S | 2 | B | 10 | 20 | core | 1.77 | 100 | 22 | 0.44 | | 7.7 | 0 | | | 0 | | |
| WH | S | 2 | C | 20 | 30 | core | 1.71 | 100 | 38 | 0.18 | | 3.1 | 0 | | | 0 | | |
| WH | S | 2 | D | 30 | 70 | core | 1.65 | 70 | 31 | 0.10 | | 4.7 | 0 | | | 30 | | |
| WH | S | 2 | E | 70 | 100 | core | 1.67 | 75 | 45 | 0.06 | | 2.1 | 0 | | | 25 | | |
| WH | S | 3 | A | 0 | 10 | core | 1.51 | 100 | 7 | 1.28 | | 19.2 | 0 | | | 0 | | |
| WH | S | 3 | B | 10 | 20 | core | 1.51 | 98 | 44 | 0.59 | | 8.7 | 0 | | | 2 | | |
| WH | S | 3 | C | 20 | 30 | core | 1.51 | 80 | 49 | 0.32 | | 3.9 | 0 | | | 20 | | |
| WH | S | 3 | D | 30 | 70 | core | 1.55 | 87 | 57 | 0.07 | | 3.8 | 0 | | | 13 | | |
| WH | S | 3 | E | 70 | 100 | core | 1.52 | 86 | 62 | 0.07 | | 2.9 | 0 | | | 14 | | |
| WH | S | 4 | A | 0 | 10 | core | 1.55 | 100 | 10 | 1.36 | | 21.0 | 0 | | | 0 | | |
| WH | S | 4 | B | 10 | 20 | core | 1.39 | 98 | 43 | 0.59 | | 8.1 | 0 | | | 2 | | |
| WH | S | 4 | C | 20 | 30 | core | 1.47 | 84 | 52 | 0.38 | | 4.7 | 0 | | | 16 | | |
| WH | S | 4 | D | 30 | 70 | core | 1.49 | 79 | 49 | 0.20 | | 9.5 | 0 | | | 22 | | |
| WH | S | 4 | E | 70 | 100 | core | 1.49 | 85 | 67 | 0.10 | | 3.7 | 0 | | | 15 | | |
| WH | U | 1 | A | 0 | 10 | core | 1.42 | 100 | 8 | 1.24 | | 17.5 | 0 | | | 0 | | |
| WH | U | 1 | B | 10 | 20 | core | 1.68 | 98 | 38 | 0.68 | | 11.2 | 0 | | | 2 | | |
| WH | U | 1 | C | 20 | 30 | core | 1.56 | 79 | 54 | 0.44 | | 5.4 | 0 | | | 21 | | |

| | | | | Depth | | Bulk Density | | Fine Earth | | | | | Coarse Organics | | | Coarse Minerals | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Landuse | Sample point | Sample | Upper | Lower | Method | Result | wt% of sample | Clay (wt%) | OC (wt%) | Source | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) |
| WH | U | 1 | D | 30 | 70 | core | 1.47 | 63 | 46 | 0.18 | | 6.6 | 0 | | | 37 | | |
| WH | U | 1 | E | 70 | 100 | core | 1.54 | 76 | 55 | 0.11 | | 3.9 | 0 | | | 24 | | |
| WH | U | 2 | A | 0 | 10 | core | 1.63 | 99 | 8 | 1.08 | | 17.5 | 1 | 21.8 | 4.3 | 0 | | |
| WH | U | 2 | B | 10 | 20 | core | 1.59 | 99 | 40 | 0.64 | | 10.1 | 0 | 29.0 | 1.8 | 0 | 0.24 | 0.0 |
| WH | U | 2 | C | 20 | 30 | core | 1.54 | 94 | 49 | 0.41 | | 6.0 | 0 | | | 6 | 0.23 | 0.2 |
| WH | U | 2 | D | 30 | 70 | core | 1.66 | 50 | 47 | 0.13 | | 4.2 | 0 | | | 50 | 0.16 | 5.4 |
| WH | U | 2 | E | 70 | 100 | core | 1.54 | 85 | 51 | 0.07 | | 2.8 | 0 | | | 15 | 0.11 | 0.8 |
| WH | U | 3 | A | 0 | 10 | core | 1.53 | 100 | 6 | 1.20 | | 18.2 | 1 | | | 0 | | |
| WH | U | 3 | B | 10 | 20 | core | 1.63 | 99 | 23 | 0.88 | | 14.1 | 1 | | | 0 | | |
| WH | U | 3 | C | 20 | 30 | core | 1.52 | 96 | 49 | 0.41 | | 6.0 | 2 | | | 2 | | |
| WH | U | 3 | D | 30 | 70 | core | 1.67 | 59 | 49 | 0.20 | | 7.9 | 0 | | | 41 | | |
| WH | U | 3 | E | 70 | 100 | core | 1.56 | 70 | 54 | 0.10 | | 3.2 | 0 | | | 30 | | |
| WH | U | 4 | A | 0 | 10 | core | 1.46 | 99 | 5 | 1.08 | | 15.5 | 1 | | | 0 | | |
| WH | U | 4 | B | 10 | 20 | core | 1.36 | 100 | 27 | 0.65 | | 8.8 | 0 | | | 0 | | |
| WH | U | 4 | C | 20 | 30 | core | 1.37 | 96 | 51 | 0.41 | | 5.4 | 1 | | | 4 | | |
| WH | U | 4 | D | 30 | 70 | core | 1.44 | 52 | 47 | 0.19 | | 5.6 | 0 | | | 49 | | |
| WH | U | 4 | E | 70 | 100 | core | 1.57 | 89 | 56 | 0.12 | | 5.1 | 0 | | | 11 | | |
| Condingup | | | | | | | | | | | | | | | | | | |
| CO | L | 1 | A | 0 | 10 | core | 1.50 | 100 | 2 | 0.94 | | 14.0 | 1 | 17.6 | 1.3 | 0 | | |
| CO | L | 1 | B | 10 | 20 | core | 1.63 | 100 | 3 | 0.35 | | 5.7 | 0 | | | 0 | | |
| CO | L | 1 | C | 20 | 30 | core | 1.69 | 99 | 2 | 0.17 | | 2.8 | 0 | | | 1 | 0.26 | 0.0 |
| CO | L | 1 | D | 30 | 40 | core | 1.62 | 22 | 3 | 0.23 | | 0.8 | 0 | | | 78 | 0.06 | 0.7 |
| CO | L | 1 | E | 40 | 70 | core | 1.71 | 83 | 47 | 0.16 | | 6.9 | 0 | | | 17 | 0.18 | 1.6 |
| CO | L | 1 | F | 70 | 100 | estim | 1.80 | 80 | 40 | 0.08 | | 3.5 | 0 | | | 20 | 0.07 | 0.8 |
| CO | L | 2 | A | 0 | 10 | core | 1.62 | 100 | 1 | 0.75 | | 12.1 | 1 | | | 0 | | |
| CO | L | 2 | B | 10 | 20 | core | 1.68 | 100 | 2 | 0.31 | | 5.2 | 0 | | | 0 | | |

| | | | | Depth | | Bulk Density | | Fine Earth | | | | | Coarse Organics | | | Coarse Minerals | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Landuse | Sample point | Sample | Upper | Lower | Method | Result | wt% of sample | Clay (wt%) | OC (wt%) | Source | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) |
| CO | L | 2 | C | 20 | 30 | core | 1.71 | 96 | 2 | 0.18 | | 3.0 | 0 | | | 4 | | |
| CO | L | 2 | D | 30 | 40 | core | 1.72 | 28 | 3 | 0.20 | | 1.0 | 0 | | | 72 | | |
| CO | L | 2 | E | 40 | 70 | core | 1.65 | 70 | 40 | 0.26 | | 9.0 | 0 | | | 30 | | |
| CO | L | 2 | F | 70 | 100 | estim | 1.70 | 86 | 45 | 0.10 | | 4.4 | 0 | | | 14 | | |
| CO | L | 3 | A | 0 | 10 | core | 1.56 | 100 | 2 | 0.93 | | 14.5 | 0 | | | 0 | | |
| CO | L | 3 | B | 10 | 20 | core | 1.67 | 100 | 2 | 0.33 | | 5.5 | 0 | | | 0 | | |
| CO | L | 3 | C | 20 | 30 | core | 1.69 | 100 | 2 | 0.16 | | 2.7 | 0 | | | 1 | | |
| CO | L | 3 | D | 30 | 40 | core | 1.68 | 27 | 3 | 0.18 | | 0.8 | 0 | | | 73 | | |
| CO | L | 3 | E | 40 | 70 | core | 1.71 | 85 | 50 | 0.20 | | 8.6 | 0 | | | 15 | | |
| CO | L | 3 | F | 70 | 100 | estim | 1.80 | 78 | 40 | 0.10 | | 4.1 | 0 | | | 23 | | |
| CO | L | 4 | A | 0 | 10 | core | 1.61 | 100 | 2 | 0.86 | | 13.8 | 0 | | | 0 | | |
| CO | L | 4 | B | 10 | 20 | core | 1.64 | 100 | 2 | 0.34 | | 5.6 | 0 | | | 0 | | |
| CO | L | 4 | C | 20 | 30 | core | 1.64 | 100 | 2 | 0.14 | | 2.3 | 0 | | | 0 | | |
| CO | L | 4 | D | 30 | 40 | core | 1.60 | 91 | 3 | 0.12 | | 1.7 | 0 | | | 9 | | |
| CO | L | 4 | E | 40 | 70 | core | 1.75 | 68 | 45 | 0.09 | | 3.1 | 0 | | | 32 | | |
| CO | L | 4 | F | 70 | 100 | estim | 1.80 | 83 | 49 | 0.06 | | 2.6 | 0 | | | 17 | | |
| CO | S | 1 | A | 0 | 10 | core | 1.49 | 99 | 2 | 0.94 | | 13.9 | 1 | 29.6 | 3.1 | 0 | | |
| CO | S | 1 | B | 10 | 20 | core | 1.64 | 100 | 2 | 0.39 | | 6.4 | 0 | | | 0 | | |
| CO | S | 1 | C | 20 | 30 | core | 1.68 | 98 | 2 | 0.19 | | 3.1 | 0 | | | 2 | | |
| CO | S | 1 | D | 30 | 40 | core | 1.77 | 95 | 2 | 0.20 | e | 3.4 | 0 | | | 5 | | |
| CO | S | 1 | E | 40 | 60 | estim | 1.80 | 20 | 4 | 0.34 | E | 2.4 | 0 | | | 80 | | |
| CO | S | 1 | F | 60 | 90 | estim | 1.80 | 72 | 45 | 0.14 | E | 5.4 | 0 | | | 28 | | |
| CO | S | 2 | A | 0 | 10 | core | 1.59 | 99 | 2 | 1.00 | | 15.8 | 1 | | | 0 | | |
| CO | S | 2 | B | 10 | 20 | core | 1.62 | 100 | 3 | 0.36 | | 5.8 | 0 | | | 0 | | |
| CO | S | 2 | C | 20 | 30 | core | 1.70 | 93 | 3 | 0.21 | | 3.3 | 0 | | | 7 | | |
| CO | S | 2 | D | 30 | 40 | core | 1.80 | 90 | 3 | 0.20 | e | 3.2 | 0 | | | 10 | | |
| CO | S | 2 | E | 40 | 60 | estim | 1.80 | 33 | 3 | 0.18 | | 2.1 | 0 | | | 67 | | |

| | | | | Depth | | Bulk Density | | Fine Earth | | | | | Coarse Organics | | | Coarse Minerals | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Landuse | Sample point | Sample | Upper | Lower | Method | Result | wt% of sample | Clay (wt%) | OC (wt%) | Source | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) |
| CO | S | 2 | F | 60 | 90 | estim | 1.80 | 77 | 39 | 0.09 | | 3.7 | 0 | | | 23 | | |
| CO | S | 3 | A | 0 | 10 | core | 1.53 | 100 | 2 | 0.77 | | 11.7 | 0 | | | 0 | | |
| CO | S | 3 | B | 10 | 20 | core | 1.62 | 100 | 2 | 0.34 | | 5.5 | 0 | | | 0 | | |
| CO | S | 3 | C | 20 | 30 | core | 1.62 | 99 | 2 | 0.16 | | 2.6 | 0 | | | 1 | | |
| CO | S | 3 | D | 30 | 40 | core | 1.73 | 95 | 2 | 0.20 | e | 3.3 | 0 | | | 5 | | |
| CO | S | 3 | E | 40 | 60 | estim | 1.80 | 24 | 6 | 0.26 | | 2.2 | 0 | | | 77 | | |
| CO | S | 3 | F | 60 | 90 | estim | 1.80 | 83 | 44 | 0.33 | | 14.6 | 0 | | | 17 | | |
| CO | S | 4 | A | 0 | 10 | core | 1.49 | 100 | 1 | 0.99 | | 14.6 | 1 | | | 0 | | |
| CO | S | 4 | B | 10 | 20 | core | 1.59 | 100 | 1 | 0.36 | | 5.7 | 0 | | | 0 | | |
| CO | S | 4 | C | 20 | 30 | core | 1.68 | 84 | 1 | 0.20 | | 2.8 | 0 | | | 17 | | |
| CO | S | 4 | D | 30 | 40 | core | 1.80 | 75 | 2 | 0.20 | e | 2.7 | 0 | | | 25 | | |
| CO | S | 4 | E | 40 | 60 | core | 1.57 | 20 | 5 | 0.32 | | 2.0 | 0 | | | 80 | | |
| CO | S | 4 | F | 60 | 90 | estim | 1.70 | 82 | 51 | 0.20 | | 8.3 | 0 | | | 18 | | |
| CO | U | 1 | A | 0 | 10 | core | 1.31 | 98 | 2 | 0.84 | | 10.8 | 1 | 18.7 | 3.4 | 0 | | |
| CO | U | 1 | B | 10 | 20 | core | 1.37 | 99 | 2 | 0.50 | | 6.7 | 1 | 30.0 | 4.1 | 0 | | |
| CO | U | 1 | C | 20 | 30 | core | 1.52 | 99 | 2 | 0.24 | | 3.6 | 0 | 28.1 | 1.7 | 0 | | |
| CO | U | 1 | D | 30 | 55 | core | 1.54 | 98 | 4 | 0.10 | E | 3.8 | 0 | 14.0 | 0.5 | 2 | 0.94 | 0.8 |
| CO | U | 1 | E | 55 | 65 | core | 1.74 | 32 | 5 | 0.19 | E | 1.0 | 0 | | | 68 | 0.13 | 1.5 |
| CO | U | 1 | F | 65 | 95 | core | 1.72 | 87 | 41 | 0.21 | E | 9.3 | 0 | | | 13 | 0.27 | 1.8 |
| CO | U | 2 | A | 0 | 10 | core | 1.46 | 99 | 2 | 0.62 | | 9.0 | 1 | | | 0 | | |
| CO | U | 2 | B | 10 | 20 | core | 1.57 | 100 | 2 | 0.40 | | 6.2 | 1 | | | 0 | | |
| CO | U | 2 | C | 20 | 30 | core | 1.51 | 100 | 2 | 0.21 | | 3.2 | 0 | | | 0 | | |
| CO | U | 2 | D | 30 | 55 | core | 1.66 | 98 | 4 | 0.14 | | 5.7 | 0 | | | 2 | | |
| CO | U | 2 | E | 55 | 65 | core | 1.61 | 31 | 6 | 0.24 | | 1.2 | 0 | | | 69 | | |
| CO | U | 2 | F | 65 | 95 | core | 1.77 | 84 | 41 | 0.16 | | 6.9 | 0 | | | 16 | | |
| CO | U | 3 | A | 0 | 10 | core | 1.47 | 100 | 2 | 0.59 | | 8.6 | 0 | | | 0 | | |
| CO | U | 3 | B | 10 | 20 | core | 1.51 | 100 | 2 | 0.53 | | 8.0 | 0 | | | 0 | | |

| | | | | Depth | | Bulk Density | | Fine Earth | | | | | Coarse Organics | | | Coarse Minerals | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Landuse | Sample point | Sample | Upper | Lower | Method | Result | wt% of sample | Clay (wt%) | OC (wt%) | Source | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) | wt% of sample | OC (wt%) | OC mass (t/ha) |
| CO | U | 3 | C | 20 | 30 | core | 1.58 | 100 | 2 | 0.25 | | 3.9 | 0 | | | 0 | | |
| CO | U | 3 | D | 30 | 55 | core | 1.62 | 97 | 4 | 0.12 | | 4.7 | 0 | | | 3 | | |
| CO | U | 3 | E | 55 | 65 | core | 1.80 | 40 | 4 | 0.18 | | 1.3 | 0 | | | 60 | | |
| CO | U | 3 | F | 65 | 95 | core | 1.83 | 81 | 39 | 0.15 | | 6.6 | 0 | | | 19 | | |
| CO | U | 4 | A | 0 | 10 | core | 1.51 | 100 | 2 | 0.63 | | 9.4 | 0 | | | 0 | | |
| CO | U | 4 | B | 10 | 20 | core | 1.53 | 100 | 2 | 0.42 | | 6.4 | 0 | | | 0 | | |
| CO | U | 4 | C | 20 | 30 | core | 1.57 | 100 | 2 | 0.28 | | 4.4 | 0 | | | 0 | | |
| CO | U | 4 | D | 30 | 55 | core | 1.58 | 99 | 3 | 0.15 | | 5.8 | 0 | | | 1 | | |
| CO | U | 4 | E | 55 | 65 | core | 1.85 | 30 | 5 | 0.25 | | 1.4 | 0 | | | 71 | | |
| CO | U | 4 | F | 65 | 95 | core | 1.69 | 88 | 44 | 0.16 | | 7.0 | 0 | | | 12 | | |

# APPENDIX 3

## Basic Chemistry of Fractions

### LEGEND

| | |
|---|---|
| **Al** | Aluminum |
| **$Al_2O_3$** | Aluminum Oxide |
| **$CaCl_2$** | Calcium Chloride |
| **$CaCO_3$** | Calcium Carbonate |
| **ECe** | Electrical Conductivity of Saturation Extract |
| **Fe** | Iron |
| **$Fe_2O_3$** | Iron Oxide |
| **K** | Potassium |
| **LD** | Lower Depth |
| **Locat** | Location |
| **N** | Nitrogen |
| **P** | Phosphorus |
| **ppm** | Parts per million |
| **Rep** | Replicate |
| **Samp** | Sample |
| **UD** | Upper Depth |

# TABLE OF CONTENTS

| | | | | | | Coarse Organics | | | Coarse Minerals | | | | | | Fine Earth | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Locat | Landuse | Rep | Samp | UD | LD | wt% of sample | N total (%) | P total (ppm) | wt% of sample | N total (%) | P total (ppm) | K total (ppm) | Fe total (%) | Al total (%) | wt% of sample | N total (%) | P total (ppm) | K total (ppm) | Fe total (%) | $Fe_2O_3$ (%) | Al total (%) | $Al_2O_3$ (%) | Al (1:5) ($CaCl_2$) (ppm) | ECe (mS/m) | $CaCO_3$ (wt%) | pH (1:5) ($H_2O$) | pH (1:5) ($CaCl_2$) | Moisture (%) |
| **Northampton** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NH | L | 4 | A | 0 | 10 | 1 | 0.818 | 720 | 0 | | | | | | 99 | 0.055 | 59 | 260 | 0.7 | 0.29 | 0.74 | 0.05 | 1 | 5 | | 5.9 | 5 | 0.14 |
| NH | L | 4 | B | 10 | 20 | 1 | 0.126 | 93 | 0 | | | | | | 99 | 0.022 | 31 | 250 | 1.01 | 0.48 | 0.92 | 0.08 | <1 | 2 | | 5.7 | 4.6 | 0.12 |
| NH | L | 4 | C | 20 | 30 | 0 | | | 0 | | | | | | 100 | 0.013 | 18 | 270 | 1.03 | 0.55 | 1.24 | 0.09 | <1 | 1 | | 5.5 | 4.4 | 0.06 |
| NH | L | 4 | D | 30 | 50 | 0 | | | 1 | 0.023 | 42 | 1300 | 2.14 | 3.4 | 99 | 0.011 | 20 | 370 | 1.31 | 0.71 | 1.62 | 0.11 | <1 | 1 | | 5.6 | 4.5 | 0.11 |
| NH | L | 4 | E | 50 | 80 | 0 | | | 0 | | | | | | 100 | 0.01 | 22 | 440 | 1.54 | 1.06 | 1.99 | 0.18 | 1 | 1 | | 5.9 | 4.8 | 0.16 |
| NH | L | 4 | F | 80 | 110 | 0 | | | 0 | | | | | | 100 | 0.007 | 22 | 460 | 1.54 | 1.2 | 2.1 | 0.2 | <1 | 2 | | 5.8 | 5 | 0.14 |
| NH | L | 4 | G | 110 | 140 | 0 | | | 1 | <0.005 | 17 | 500 | 1.38 | 1.93 | 99 | <0.005 | 19 | 520 | 1.57 | 1.26 | 2.16 | 0.21 | | 2 | | 5.9 | 5.3 | 0.12 |
| NH | S | 1 | A | 0 | 10 | 2 | 0.529 | 420 | 0 | | | | | | 99 | 0.047 | 35 | 76 | 0.47 | 0.21 | 0.39 | 0.04 | | 3 | | 6.3 | 5.3 | 0.17 |
| NH | S | 1 | B | 10 | 20 | 0 | 0.164 | 140 | 0 | | | | | | 100 | 0.016 | 20 | 61 | 0.48 | 0.27 | 0.44 | 0.05 | | 2 | | 6.2 | 6.2 | 0.12 |
| NH | S | 1 | C | 20 | 30 | 0 | | | 0 | | | | | | 100 | 0.007 | 18 | 75 | 0.42 | 0.28 | 0.38 | 0.05 | | 1 | | 6.3 | 5.2 | 0.04 |
| NH | S | 1 | D | 30 | 50 | 0 | | | 0 | | | | | | 100 | <0.005 | 17 | 180 | 0.71 | 0.42 | 0.66 | 0.08 | | 1 | | 6.2 | 5.2 | 0.04 |
| NH | S | 1 | E | 50 | 80 | 0 | | | 0 | | | | | | 100 | <0.005 | 18 | 260 | 0.83 | 0.52 | 0.73 | 0.1 | | 1 | | 6.6 | 5.6 | 0.04 |
| NH | S | 1 | F | 80 | 110 | 0 | | | 0 | | | | | | 100 | 0.005 | 24 | 270 | 1.29 | 1.04 | 1.52 | 0.2 | | 1 | | 6.5 | 5.5 | 0.09 |
| NH | S | 1 | G | 110 | 140 | 0 | | | 0 | | | | | | 100 | 0.005 | 18 | 250 | 1.1 | 1.21 | 1.61 | 0.23 | | 1 | | 6.6 | 5.5 | 0.11 |
| NH | U | 2 | A | 0 | 10 | 4 | 0.166 | 44 | 0 | | | | | | 96 | 0.023 | 14 | 220 | 0.4 | 0.2 | 0.33 | 0.04 | <1 | 3 | | 6.1 | 4.7 | 0.09 |
| NH | U | 2 | B | 10 | 20 | 3 | 0.093 | 31 | 0 | | | | | | 97 | 0.014 | 12 | 280 | 0.47 | 0.28 | 0.44 | 0.05 | <1 | 3 | | 5.8 | 4.9 | 0.05 |
| NH | U | 2 | C | 20 | 30 | 1 | 0.147 | 41 | 0 | | | | | | 99 | 0.009 | 15 | 160 | 0.45 | 0.24 | 0.38 | 0.04 | 1 | 3 | | 5.6 | 4.8 | 0.06 |
| NH | U | 2 | D | 30 | 50 | 0 | 0.099 | 34 | 0 | | | | | | 100 | 0.005 | 14 | 220 | 0.46 | 0.22 | 0.41 | 0.04 | <1 | 2 | | 5.4 | 4.9 | 0.04 |
| NH | U | 2 | E | 50 | 80 | 0 | | | 0 | | | | | | 100 | 0.005 | 13 | 250 | 0.44 | 0.3 | 0.52 | 0.06 | | 2 | | 5.9 | 5.3 | 0.02 |
| NH | U | 2 | F | 80 | 110 | 0 | | | 0 | | | | | | 100 | 0.005 | 18 | 250 | 0.59 | 0.45 | 0.77 | 0.08 | | 1 | | 6.9 | 5.9 | 0 |
| NH | U | 2 | G | 110 | 140 | 0 | | | 0 | | | | | | 100 | 0.008 | 24 | 440 | 1.49 | 1.48 | 2.49 | 0.27 | | 2 | | 6.6 | 5.6 | 0.22 |

| | | | | | | Coarse Organics | | | Coarse Minerals | | | | | | Fine Earth | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Locat | Landuse | Rep | Samp | UD | LD | wt% of sample | N total (%) | P total (ppm) | wt% of sample | N total (%) | P total (ppm) | K total (ppm) | Fe total (%) | Al total (%) | wt% of sample | N total (%) | P total (ppm) | K total (ppm) | Fe total (%) | $Fe_2O_3$ (%) | Al total (%) | $Al_2O_3$ (%) | Al (1:5) ($CaCl_2$) (ppm) | ECe (mS/m) | $CaCO_3$ (wt%) | pH (1:5) ($H_2O$) | pH (1:5) ($CaCl_2$) | Moisture (%) |
| **Badgingarra** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BA | L | 2 | A | 0 | 10 | 2 | 0.393 | 470 | 0 | | | | | | 98 | 0.034 | 40 | 170 | 0.27 | 0.05 | 0.2 | 0.02 | | 4 | | 6.1 | 5.2 | 0.1 |
| BA | L | 2 | B | 10 | 20 | 0 | | | 0 | | | | | | 100 | 0.011 | 22 | 160 | 0.37 | 0.06 | 0.21 | 0.02 | | 1 | | 5.7 | 4.7 | 0 |
| BA | L | 2 | C | 20 | 30 | 0 | 0.174 | 110 | 0 | | | | | | 100 | 0.006 | 24 | 230 | 0.33 | 0.04 | 0.19 | 0.01 | | 1 | | 5.6 | 4.7 | 0 |
| BA | L | 2 | D | 30 | 50 | 0 | | | 0 | | | | | | 100 | <0.005 | 25 | 200 | 0.32 | 0.05 | 0.2 | 0.01 | | 1 | | 5.3 | 4.6 | 0.1 |
| BA | L | 2 | E | 50 | 80 | 0 | | | 0 | 0.02 | 50 | 400 | 2.68 | 2.28 | 100 | <0.005 | 28 | 240 | 0.42 | 0.16 | 0.31 | 0.03 | | 1 | | 5.4 | 4.6 | 0.1 |
| BA | L | 2 | F | 80 | 110 | 0 | | | 3 | 0.011 | 31 | 600 | 2.72 | 2.44 | 97 | <0.005 | 22 | 280 | 0.53 | 0.22 | 0.55 | 0.06 | | 1 | | 6 | 5 | 0.1 |
| BA | L | 2 | G | 110 | 150 | 0 | | | 10 | 0.007 | 25 | 1000 | 2.38 | 4.83 | 90 | <0.005 | 21 | 340 | 0.48 | 0.18 | 0.59 | 0.04 | | 1 | | 6.2 | 5.4 | 0.1 |
| BA | L | 2 | H | 150 | 170 | 0 | | | 21 | <0.005 | 22 | 800 | 1.85 | 4.76 | 79 | <0.005 | 13 | 420 | 0.79 | 0.52 | 2.8 | 0.1 | | 1 | | 6.2 | 5.6 | 0.3 |
| BA | S | 2 | A | 0 | 10 | 2 | 0.445 | 270 | 0 | | | | | | 98 | 0.028 | 37 | 180 | 0.26 | 0.05 | 0.35 | 0.02 | | 2 | | 6 | 5 | 0.2 |
| BA | S | 2 | B | 10 | 20 | 1 | 0.133 | 110 | 0 | | | | | | 100 | 0.011 | 18 | 180 | 0.33 | 0.05 | 0.29 | 0.01 | | 1 | | 5.6 | 4.6 | 0.1 |
| BA | S | 2 | C | 20 | 30 | 0 | | | 0 | | | | | | 100 | <0.005 | 18 | 240 | 0.31 | 0.17 | 0.32 | 0.05 | | 1 | | 5.6 | 4.7 | 0.1 |
| BA | S | 2 | D | 30 | 50 | 0 | | | 0 | | | | | | 100 | <0.005 | 21 | 200 | 0.32 | 0.08 | 0.36 | 0.02 | | 1 | | 6 | 5 | 0.1 |
| BA | S | 2 | E | 50 | 80 | 0 | | | 0 | | | | | | 100 | <0.005 | 18 | 300 | 0.42 | 0.19 | 0.85 | 0.04 | | 1 | | 6.1 | 5.1 | 0.2 |
| BA | S | 2 | F | 80 | 110 | 0 | | | 0 | | | | | | 100 | <0.005 | 16 | 380 | 0.55 | 0.33 | 1.6 | 0.07 | | 1 | | 6.3 | 5.3 | 0.1 |
| BA | S | 2 | G | 110 | 140 | 0 | | | 4 | | | | | | 96 | 0.007 | 20 | 350 | 0.54 | 0.47 | 1.92 | 0.09 | | 1 | | 6.4 | 5.6 | 0.2 |
| BA | S | 2 | H | 140 | 160 | 0 | | | 8 | | | | | | 92 | 0.005 | 16 | 320 | 0.53 | 0.42 | 1.95 | 0.09 | | 1 | | 6.5 | 5.8 | 0.3 |
| BA | U | 1 | A | 0 | 10 | 3 | 0.215 | 50 | 0 | | | | | | 97 | 0.03 | 16 | 250 | 0.27 | 0.12 | 0.48 | 0.03 | | 2 | | 5.8 | 4.6 | 0.1 |
| BA | U | 1 | B | 10 | 20 | 1 | 0.201 | 39 | 0 | | | | | | 99 | 0.017 | <10 | 180 | 0.26 | 0.1 | 0.38 | 0.02 | | 1 | | 6.2 | 5 | 0.1 |
| BA | U | 1 | C | 20 | 30 | 0 | 0.221 | 38 | 0 | | | | | | 100 | 0.009 | 10 | 180 | 0.25 | 0.12 | 0.39 | 0.02 | | 1 | | 6.3 | 5.2 | 0 |
| BA | U | 1 | D | 30 | 60 | 1 | | | 0 | | | | | | 99 | 0.006 | 12 | 250 | 0.3 | 0.17 | 0.54 | 0.03 | | 1 | | 6.5 | 5.6 | 0 |
| BA | U | 1 | E | 60 | 90 | 0 | | | 0 | | | | | | 100 | 0.005 | 12 | 270 | 0.41 | 0.34 | 0.94 | 0.06 | | 1 | | 6.6 | 5.6 | 0 |
| BA | U | 1 | F | 90 | 120 | 0 | | | 0 | | | | | | 100 | 0.006 | 13 | 320 | 0.51 | 0.44 | 1.18 | 0.07 | | 1 | | 6.8 | 5.9 | 0.1 |
| BA | U | 1 | G | 120 | 150 | 0 | | | 0 | | | | | | 100 | <0.005 | <10 | 230 | 0.43 | 0.4 | 1.01 | 0.06 | | 1 | | 6.7 | 6 | 0.1 |

| | | | | | | Coarse Organics | | | Coarse Minerals | | | | | | Fine Earth | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Locat | Landuse | Rep | Samp | UD | LD | wt% of sample | N total (%) | P total (ppm) | wt% of sample | N total (%) | P total (ppm) | K total (ppm) | Fe total (%) | Al total (%) | wt% of sample | N total (%) | P total (ppm) | K total (ppm) | Fe total (%) | $Fe_2O_3$ (%) | Al total (%) | $Al_2O_3$ (%) | Al (1:5) ($CaCl_2$) (ppm) | ECe (mS/m) | $CaCO_3$ (wt%) | pH (1:5) ($H_2O$) | pH (1:5) ($CaCl_2$) | Moisture (%) |
| **Brookton** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BR | L | 2 | A | 0 | 10 | 1 | 0.373 | 340 | 0 | | | | | | 99 | 0.065 | 61 | 300 | 0.22 | 0.07 | 0.22 | 0.03 | 2 | 4 | | 5.4 | 4.5 | 0 |
| BR | L | 2 | B | 10 | 20 | 0 | | | 1 | | | | | | 99 | 0.018 | 29 | 360 | 0.24 | 0.13 | 0.26 | 0.04 | 2 | 2 | | 5.3 | 4.3 | 0 |
| BR | L | 2 | C | 20 | 30 | 0 | | | 1 | | | | | | 99 | 0.011 | 19 | 380 | 0.24 | 0.08 | 0.25 | 0.03 | 3 | 1 | | 5.3 | 4.4 | 0 |
| BR | L | 2 | D | 30 | 40 | 0 | | | 2 | | | | | | 98 | 0.059 | 52 | 340 | 0.25 | 0.08 | 0.29 | 0.03 | 1 | 5 | | 5.2 | 4.4 | 0 |
| BR | L | 2 | E | 40 | 50 | 0 | | | 65 | 0.015 | 77 | 1300 | 5.86 | 8.19 | 35 | 0.019 | 24 | 360 | 0.27 | 0.08 | 0.28 | 0.04 | 2 | 2 | | 5.1 | 4.2 | 0.3 |
| BR | L | 2 | F | 50 | 70 | 0 | | | 89 | 0.016 | 67 | 1500 | 4.43 | 10 | 11 | 0.006 | 24 | 370 | 0.29 | 0.1 | 0.24 | 0.03 | 2 | 1 | | 5.4 | 4.4 | 0.6 |
| BR | U | 2 | A | 0 | 10 | 2 | 0.133 | 68 | 0 | | | | | | 98 | 0.009 | 10 | 260 | 0.25 | 0.1 | 0.24 | 0.03 | <1 | 1 | | 6 | 4.8 | 0 |
| BR | U | 2 | B | 10 | 20 | 0 | | | 1 | | | | | | 98 | 0.023 | 14 | 230 | 0.28 | 0.08 | 0.25 | 0.03 | <1 | 2 | | 5.8 | 4.6 | 0 |
| BR | U | 2 | C | 20 | 30 | 0 | | | 3 | 0.034 | 110 | 2500 | 10.7 | 7.29 | 97 | 0.015 | <10 | 230 | 0.22 | 0.08 | 0.23 | 0.03 | <1 | 1 | | 6 | 4.6 | 0 |
| BR | U | 2 | D | 30 | 60 | 0 | | | 11 | 0.019 | 100 | 2800 | 10.3 | 8.6 | 89 | 0.007 | 10 | 220 | 0.2 | 0.07 | 0.16 | 0.02 | <1 | 1 | | 6.1 | 4.9 | 0 |
| BR | U | 2 | E | 60 | 85 | 0 | | | 71 | 0.008 | 100 | 2000 | 7.16 | 11.2 | 29 | 0.022 | 13 | 300 | 0.25 | 0.1 | 0.25 | 0.04 | 1 | 1 | | 5.7 | 4.4 | 0 |
| **Mullewa** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MU | L | 3 | A | 0 | 10 | 0 | | | 6 | 0.033 | 90 | 3100 | 6.99 | 3.18 | 94 | 0.038 | 71 | 5600 | 2.08 | 1.35 | 2.95 | 0.2 | 1 | 15 | | 5.6 | 4.6 | 0.3 |
| MU | L | 3 | B | 10 | 20 | 0 | | | 6 | 0.018 | 66 | 3300 | 7.38 | 3.44 | 94 | 0.024 | 41 | 4900 | 1.89 | 1.4 | 2.83 | 0.2 | 4 | 7 | | 5 | 4 | 0.3 |
| MU | L | 3 | C | 20 | 30 | 0 | | | 8 | 0.008 | 62 | 2700 | 9.84 | 3.71 | 92 | 0.021 | 31 | 5400 | 2.08 | 1.45 | 3.1 | 0.2 | 8 | 6 | | 4.8 | 4 | 0.3 |
| MU | L | 3 | D | 30 | 45 | 0 | | | 15 | 0.007 | 92 | 3100 | 13.5 | 4.97 | 85 | 0.02 | 29 | 5400 | 2.13 | 1.48 | 3.25 | 0.21 | 4 | 8 | | 4.7 | 4 | 0.7 |
| MU | L | 3 | E | 45 | 80 | 0 | | | 72 | 0.011 | 110 | 6100 | 13.7 | 8.87 | 28 | 0.027 | 40 | 5100 | 2.22 | 1.57 | 4.07 | 0.24 | | 10 | | 5.7 | 4.7 | 1.5 |
| MU | L | 3 | F | 80 | 100 | 0 | | | 55 | <0.005 | 50 | 7600 | 6.28 | 7.45 | 45 | 0.015 | 41 | 6700 | 1.94 | 1.45 | 4.21 | 0.21 | | 8 | | 7.5 | 6.2 | 2.5 |
| MU | S | 1 | A | 0 | 10 | 1 | | | 2 | | | | | | 97 | 0.03 | 48 | 5300 | 1.5 | 1.16 | 2.59 | 0.19 | 1 | 17 | | 5 | 4.3 | 0.2 |
| MU | S | 1 | B | 10 | 20 | 0 | | | 3 | | | | | | 97 | 0.021 | 35 | 3300 | 1.25 | 1.16 | 2.65 | 0.18 | 4 | 8 | | 4.8 | 4.1 | 0.3 |
| MU | S | 1 | C | 20 | 30 | 0 | | | 5 | | | | | | 95 | 0.019 | 32 | 6200 | 2.22 | 1.28 | 2.88 | 0.18 | 4 | 10 | | 4.7 | 4.1 | 0.3 |
| MU | S | 1 | D | 30 | 70 | 0 | | | 10 | | | | | | 90 | 0.015 | 19 | 5900 | 2 | 1.35 | 2.93 | 0.2 | 6 | 14 | | 4.4 | 4 | 0.4 |
| MU | S | 1 | E | 70 | 100 | 0 | | | 76 | | | | | | 24 | 0.015 | 25 | 3000 | 1.85 | 1.29 | 4 | 0.22 | 2 | 10 | | 5 | 4.2 | 0.1 |
| MU | S | 1 | E | 70 | 100 | 0 | | | 76 | | | | | | 24 | 0.015 | 25 | 3000 | 1.85 | 1.29 | 4 | 0.22 | 2 | 10 | | 5 | 4.2 | 0.1 |
| MU | S | 1 | F | 100 | 120 | 0 | | | 64 | | | | | | 36 | 0.011 | 20 | 6300 | 1.63 | 1 | 3.5 | 0.16 | 1 | 8 | | 5.2 | 4.3 | 0.8 |

| | | | | | | Coarse Organics | | | Coarse Minerals | | | | | | Fine Earth | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Locat | Landuse | Rep | Samp | UD | LD | wt% of sample | N total (%) | P total (ppm) | wt% of sample | N total (%) | P total (ppm) | K total (ppm) | Fe total (%) | Al total (%) | wt% of sample | N total (%) | P total (ppm) | K total (ppm) | Fe total (%) | $Fe_2O_3$ (%) | Al total (%) | $Al_2O_3$ (%) | Al (1:5) ($CaCl_2$) (ppm) | ECe (mS/m) | $CaCO_3$ (wt%) | pH (1:5) ($H_2O$) | pH (1:5) ($CaCl_2$) | Moisture (%) |
| MU | U | 3 | A | 0 | 10 | 3 | 0.216 | 140 | 1 | | | | | | 96 | 0.046 | 52 | 4600 | 1.83 | 1.46 | 2.77 | 0.26 | 2 | 4 | | 5.4 | 4.4 | 0.2 |
| MU | U | 3 | B | 10 | 20 | 1 | 0.154 | 72 | 2 | 0.023 | 82 | 2400 | 13.4 | 3.83 | 97 | 0.024 | 29 | 4200 | 1.67 | 1.34 | 2.32 | 0.21 | 9 | 4 | | 5 | 4.1 | 0.3 |
| MU | U | 3 | C | 20 | 30 | 1 | 0.268 | 71 | 2 | 0.018 | 97 | 2600 | 16.3 | 4.66 | 97 | 0.021 | 22 | 4700 | 1.88 | 1.47 | 2.57 | 0.22 | 15 | 6 | | 4.6 | 4 | 0.3 |
| MU | U | 3 | D | 30 | 55 | 0 | 0.123 | 68 | 2 | 0.013 | 83 | 2800 | 16.4 | 4.78 | 98 | 0.019 | 26 | 5000 | 2.14 | 1.63 | 3.43 | 0.24 | 22 | 6 | | 4.5 | 3.9 | 0.4 |
| MU | U | 3 | E | 55 | 85 | 0 | | | 12 | 0.006 | 88 | 3800 | 17.6 | 5.72 | 88 | 0.017 | 29 | 5900 | 2.18 | 1.64 | 3.3 | 0.25 | 3 | 12 | | 4.4 | 4.1 | 0.2 |
| MU | U | 3 | F | 85 | 95 | 0 | | | 59 | <0.005 | 130 | 5500 | 17.5 | 8.57 | 41 | 0.018 | 31 | 6700 | 2.2 | 1.46 | 3.58 | 0.23 | 1 | 11 | | 5.2 | 4.5 | 0.8 |
| MU | U | 3 | G | 95 | 105 | 0 | | | 71 | <0.005 | 100 | 7100 | 12.7 | 8.04 | 29 | 0.018 | 30 | 6300 | 2.95 | 1.77 | 3.91 | 0.25 | <1 | 12 | | 5.6 | 4.8 | 1 |
| **Merredin** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ME | L | 3 | A | 0 | 10 | 1 | 0.298 | 200 | 2 | | | | | | 98 | 0.044 | 72 | 540 | 1.37 | 1 | 3.44 | 0.18 | 1 | 2 | | 5.8 | 4.6 | 0.4 |
| ME | L | 3 | B | 10 | 20 | 0 | | | 1 | | | | | | 99 | 0.023 | 32 | 460 | 1.39 | 1.2 | 4.04 | 0.18 | 8 | 2 | | 5 | 4.1 | 0.4 |
| ME | L | 3 | C | 20 | 30 | 0 | | | 2 | | | | | | 98 | 0.019 | 18 | 570 | 1.63 | 1.32 | 4.08 | 0.19 | 15 | 2 | | 4.8 | 4.1 | 0.6 |
| ME | L | 3 | D | 30 | 50 | 0 | | | 3 | 0.013 | 22 | 1600 | 3.37 | 7.2 | 97 | 0.013 | 17 | 650 | 1.92 | 1.31 | 5.08 | 0.19 | 12 | 3 | | 4.8 | 4.2 | 2.2 |
| ME | L | 3 | E | 50 | 80 | 0 | | | 9 | 0.007 | 23 | 1300 | 2.95 | 6.87 | 91 | 0.01 | 13 | 560 | 1.91 | 1.46 | 4.97 | 0.22 | 26 | 2 | | 4.8 | 4.1 | 2.4 |
| ME | L | 3 | F | 80 | 110 | 0 | | | 4 | <0.005 | 17 | 1100 | 3.46 | 7.65 | 96 | 0.037 | 16 | 520 | 2.2 | 1.78 | 4.6 | 0.28 | 10 | 3 | | 5 | 4.2 | 1.5 |
| ME | L | 3 | G | 110 | 140 | 0 | | | 15 | <0.005 | 22 | 1100 | 3.3 | 8.22 | 85 | 0.007 | 16 | 620 | 1.53 | 1.73 | 4.24 | 0.28 | 1 | 3 | | 5.2 | 4.6 | 1 |
| ME | S | 1 | A | 0 | 10 | 1 | 0.38 | 250 | 1 | | | | | | 99 | 0.06 | 79 | 600 | 1.47 | 1.08 | 4.29 | 0.22 | 1 | 3 | | 5.8 | 4.7 | 0.4 |
| ME | S | 1 | B | 10 | 20 | 0 | | | 2 | | | | | | 98 | 0.032 | 22 | 550 | 1.55 | 1.23 | 4.69 | 0.21 | 12 | 2 | | 5 | 4.1 | 0.4 |
| ME | S | 1 | C | 20 | 30 | 0 | | | 2 | | | | | | 98 | 0.02 | 16 | 610 | 1.54 | 1.34 | 5.12 | 0.2 | 18 | 3 | | 4.7 | 4.1 | 0.4 |
| ME | S | 1 | D | 30 | 50 | 0 | | | 4 | | | | | | 96 | 0.015 | 16 | 920 | 1.91 | 1.49 | 5.7 | 0.23 | 23 | 3 | | 4.6 | 4 | 0.3 |
| ME | S | 1 | E | 50 | 80 | 0 | | | 9 | | | | | | 91 | 0.011 | 18 | 470 | 2.09 | 1.49 | 5.92 | 0.25 | 19 | 2 | | 4.7 | 4.1 | 0.4 |
| ME | S | 1 | F | 80 | 110 | 0 | | | 13 | | | | | | 87 | 0.007 | 16 | 420 | 2.17 | 1.54 | 5.71 | 0.26 | 6 | 2 | | 4.9 | 4.2 | 0.8 |
| ME | S | 1 | G | 110 | 140 | 0 | | | 9 | | | | | | 91 | 0.005 | 16 | 380 | 2.34 | 1.49 | 6.17 | 0.27 | 2 | 3 | | 5 | 4.4 | 0.4 |
| ME | U | 1 | A | 0 | 10 | 2 | 0.107 | 56 | 1 | | | | | | 97 | 0.029 | 21 | 570 | 1.4 | 0.99 | 3.65 | 0.17 | 2 | 2 | | 5.6 | 4.6 | 0.3 |
| ME | U | 1 | B | 10 | 20 | 1 | 0.095 | 38 | 4 | | | | | | 95 | 0.024 | 16 | 470 | 1.41 | 1.09 | 3.83 | 0.17 | 7 | 2 | | 5.1 | 4.2 | 0.2 |
| ME | U | 1 | C | 20 | 30 | 0 | | | 3 | | | | | | 97 | 0.022 | 18 | 610 | 1.74 | 1.36 | 4.95 | 0.19 | 17 | 2 | | 4.7 | 4 | 0.3 |
| ME | U | 1 | D | 30 | 50 | 0 | | | 5 | 0.011 | 20 | 1300 | 2.91 | 6.16 | 95 | 0.014 | 14 | 620 | 1.85 | 1.62 | 5.22 | 0.24 | 33 | 2 | | 4.6 | 4 | 0.3 |

| | | | | | | Coarse Organics | | | Coarse Minerals | | | | | | Fine Earth | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Locat | Landuse | Rep | Samp | UD | LD | wt% of sample | N total (%) | P total (ppm) | wt% of sample | N total (%) | P total (ppm) | K total (ppm) | Fe total (%) | Al total (%) | wt% of sample | N total (%) | P total (ppm) | K total (ppm) | Fe total (%) | $Fe_2O_3$ (%) | Al total (%) | $Al_2O_3$ (%) | Al (1:5) ($CaCl_2$) (ppm) | ECe (mS/m) | $CaCO_3$ (wt%) | pH (1:5) ($H_2O$) | pH (1:5) ($CaCl_2$) | Moisture (%) |
| ME | U | 1 | E | 50 | 80 | 0 | | | 11 | 0.006 | 22 | 1100 | 2.42 | 6.12 | 89 | 0.01 | 16 | 600 | 2 | 1.43 | 5.17 | 0.22 | 36 | 2 | | 4.6 | 4 | 0.5 |
| ME | U | 1 | F | 80 | 110 | 0 | | | 9 | <0.005 | 18 | 800 | 2.71 | 6.49 | 91 | 0.01 | 18 | 580 | 2.33 | 1.55 | 5.91 | 0.25 | 12 | 2 | | 4.8 | 4.1 | 0.4 |
| ME | U | 1 | G | 110 | 140 | 0 | | | 12 | <0.005 | 18 | 800 | 2.81 | 6.71 | 88 | 0.01 | <10 | 500 | 2.26 | 1.49 | 5.71 | 0.24 | 1 | 9 | | 4.4 | 4.4 | 0.3 |
| **Newdegate (deep)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ND | L | 2 | A | 0 | 10 | 1 | 0.929 | 870 | 3 | | | | | | 97 | 0.047 | 67 | 630 | 0.36 | 0.12 | 0.88 | 0.05 | <2 | 5 | | 5.8 | 4.8 | 0.1 |
| ND | L | 2 | B | 10 | 20 | 0 | | | 31 | <0.005 | 59 | 3600 | 12.8 | 9.87 | 69 | 0.013 | 29 | 600 | 0.33 | 0.11 | 0.57 | 0.03 | <2 | 2 | | 6.3 | 5.2 | 0.1 |
| ND | L | 2 | C | 20 | 30 | 0 | | | 67 | <0.005 | 43 | 3400 | 12.2 | 10 | 33 | 0.015 | 26 | 620 | 0.65 | 0.22 | 0.83 | 0.05 | <2 | 2 | | 6.8 | 5.6 | 0.2 |
| ND | L | 2 | C1 | 30 | 40 | 0 | | | 66 | <0.005 | 38 | 3200 | 12.4 | 9.92 | 34 | 0.011 | 21 | 720 | 0.65 | 0.21 | 1.01 | 0.04 | <2 | 2 | | 7.6 | 6.2 | 0.2 |
| ND | L | 2 | D | 40 | 60 | 0 | | | 3 | 0.005 | 26 | 2700 | 9.77 | 10.4 | 97 | 0.014 | 27 | 2500 | 2.99 | 1.29 | 9.12 | 0.28 | <2 | 10 | | 8.8 | 7.2 | 2 |
| ND | L | 2 | E | 60 | 90 | 0 | | | 2 | <0.005 | 16 | 2600 | 6.7 | 14.1 | 98 | 0.005 | 24 | 2800 | 2.88 | 0.99 | 10.9 | 0.23 | <2 | 15 | | 9 | 7.5 | 3.2 |
| ND | S | 4 | A | 0 | 10 | 1 | 0.385 | 310 | 2 | | | | | | 97 | 0.032 | 60 | 2600 | 0.27 | 0.09 | 0.44 | 0.04 | <2 | 3 | | 6.3 | 5.4 | 0.2 |
| ND | S | 4 | B | 10 | 20 | 0 | | | 11 | 0.006 | 51 | 1400 | 8.89 | 9.75 | 89 | 0.018 | 23 | 530 | 0.33 | 0.1 | 0.64 | 0.02 | <2 | 2 | | 6.3 | 5.3 | 0.2 |
| ND | S | 4 | C | 20 | 30 | 0 | | | 55 | <0.005 | 45 | 1700 | 11 | 10 | 45 | 0.014 | 17 | 660 | 0.62 | 0.26 | 0.93 | 0.06 | <2 | 2 | | 6.5 | 5.5 | 8.3 |
| ND | S | 4 | D | 30 | 60 | 0 | | | 19 | <0.005 | 38 | 2300 | 10.2 | 9.72 | 81 | 0.013 | 26 | 2600 | 1.97 | 0.98 | 5.79 | 0.2 | <2 | 10 | | 8.4 | 6.8 | 1.7 |
| ND | S | 4 | E | 60 | 90 | 0 | | | 19 | <0.005 | 25 | 2600 | 9.05 | 11.4 | 81 | 0.008 | 24 | 3300 | 2.88 | 0.7 | 9.48 | 0.18 | <2 | 21 | | 9 | 7.6 | 2.8 |
| ND | S | 4 | F | 90 | 120 | 0 | | | 29 | <0.005 | 24 | 2300 | 9.73 | 10.9 | 71 | 0.007 | 26 | 4100 | 3.13 | 0.7 | 10.7 | 0.19 | <2 | 30 | | 9 | 7.6 | 4.2 |
| ND | U | 1 | A | 0 | 10 | 0 | 0.363 | 100 | 7 | | | | | | 93 | 0.028 | 16 | 870 | 0.4 | 0.15 | 1.1 | 0.05 | <2 | 4 | | 6 | 5.1 | 1 |
| ND | U | 1 | B | 10 | 20 | 1 | 0.217 | 61 | 33 | <0.005 | 38 | 2900 | 8.8 | 9.51 | 66 | 0.018 | 12 | 600 | 0.31 | 0.09 | 0.64 | 0.03 | <2 | 3 | | 6.2 | 5.2 | 0.3 |
| ND | U | 1 | C | 20 | 30 | 0 | 0.207 | 47 | 60 | <0.005 | 38 | 3200 | 9.2 | 9.19 | 40 | 0.013 | 12 | 640 | 0.5 | 0.23 | 0.7 | 0.05 | <2 | 2 | | 6.4 | 5.3 | 0.1 |
| ND | U | 1 | D | 30 | 60 | 2 | 0.129 | 39 | 34 | <0.005 | 29 | 2900 | 7.9 | 11 | 65 | 0.01 | 26 | 4400 | 3.1 | 1 | 8.35 | 0.28 | 2 | 75 | | 8.8 | 7.9 | 2.7 |
| ND | U | 1 | E | 60 | 90 | 0 | | | 40 | <0.005 | 26 | 3200 | 7.19 | 11 | 60 | 0.005 | 27 | 4700 | 3.19 | 0.75 | 9.71 | 0.25 | <2 | 98 | | 9.1 | 8.2 | 4.3 |

| | | | | | | Coarse Organics | | | Coarse Minerals | | | | | | Fine Earth | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Locat | Landuse | Rep | Samp | UD | LD | wt% of sample | N total (%) | P total (ppm) | wt% of sample | N total (%) | P total (ppm) | K total (ppm) | Fe total (%) | Al total (%) | wt% of sample | N total (%) | P total (ppm) | K total (ppm) | Fe total (%) | $Fe_2O_3$ (%) | Al total (%) | $Al_2O_3$ (%) | Al (1:5) ($CaCl_2$) (ppm) | ECe (mS/m) | $CaCO_3$ (wt%) | pH (1:5) ($H_2O$) | pH (1:5) ($CaCl_2$) | Moisture (%) |
| **Newdegate (shallow)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NS | L | 4 | A | 0 | 10 | 1 | 1.01 | 1200 | 2 | | | | | | 97 | 0.031 | 49 | 650 | 0.22 | 0.08 | 0.51 | 0.02 | | 5 | | 6.4 | 5.1 | 0.2 |
| NS | L | 4 | B | 10 | 20 | 0 | | | 19 | <0.005 | 54 | 2900 | 9.22 | 4.64 | 81 | 0.013 | 20 | 800 | 0.25 | 0.11 | 0.45 | 0.03 | | 3 | | 6.5 | 5.1 | 0.2 |
| NS | L | 4 | C | 20 | 30 | 0 | | | 3 | 0.006 | 32 | 2800 | 5.7 | 4.02 | 97 | 0.016 | 20 | 2600 | 1.37 | 0.55 | 3.85 | 0.1 | | 15 | | 7.1 | 5.7 | 1.5 |
| NS | L | 4 | D | 30 | 60 | 0 | | | 9 | <0.005 | 28 | 3000 | 6.22 | 5.48 | 91 | 0.008 | 23 | 4800 | 2.15 | 0.62 | 5.95 | 0.16 | | 24 | <2 | 8.8 | 7.5 | 2.8 |
| NS | L | 4 | E | 60 | 90 | 0 | | | 4 | <0.005 | 29 | 4200 | 6.9 | 6.44 | 96 | <0.005 | 20 | 6400 | 3.26 | 0.52 | 10.7 | 0.19 | | 40 | 2 | 9.2 | 7.9 | 4.2 |
| NS | S | 1 | A | 0 | 10 | 1 | 0.54 | 350 | 2 | | | | | | 97 | 0.037 | 66 | 600 | 0.21 | 0.08 | 0.49 | 0.03 | | 4 | | 6.9 | 6 | 0.4 |
| NS | S | 1 | B | 10 | 20 | 0 | | | 3 | | | | | | 97 | 0.013 | 17 | 600 | 0.19 | 0.06 | 0.42 | 0.02 | | 2 | | 7 | 6.1 | 0.2 |
| NS | S | 1 | C | 20 | 30 | 0 | 0.268 | 67 | 1 | | | | | | 99 | 0.015 | 23 | 3000 | 1.54 | 0.69 | 5.23 | 0.14 | | 12 | | 8.1 | 6.7 | 1.7 |
| NS | S | 1 | D | 30 | 60 | 0 | | | 1 | | | | | | 99 | 0.012 | 25 | 4800 | 2.19 | 0.94 | 7.85 | 0.24 | | 28 | | 9.2 | 7.9 | 2.4 |
| NS | S | 1 | E | 60 | 90 | 0 | | | 10 | | | | | | 90 | <0.005 | 24 | 5600 | 2.94 | 0.95 | 8.56 | 0.26 | | 55 | 2 | 9.5 | 8.4 | 3.1 |
| NS | U | 4 | A | 0 | 10 | 1 | 0.444 | 150 | 0 | | | | | | 99 | 0.036 | 22 | 800 | 0.24 | 0.07 | 0.53 | 0.03 | | 6 | | 6 | 5.1 | 0.2 |
| NS | U | 4 | B | 10 | 20 | 1 | 0.385 | 110 | 2 | 0.023 | 29 | 3200 | 3.19 | 3.22 | 97 | 0.018 | 14 | 800 | 0.2 | 0.04 | 0.44 | 0.02 | | 5 | | 6.4 | 5.3 | 0.2 |
| NS | U | 4 | C | 20 | 30 | 0 | | | 0 | | | | | | 100 | 0.016 | 18 | 2700 | 1.24 | 0.54 | 3.3 | 0.09 | | 30 | | 7.1 | 6 | 1.2 |
| NS | U | 4 | D | 30 | 60 | 0 | | | 0 | | | | | | 100 | 0.01 | 22 | 4500 | 1.97 | 0.44 | 5.46 | 0.13 | | 69 | <2 | 8.9 | 8 | 2.5 |
| NS | U | 4 | E | 60 | 90 | 0 | | | 6 | <0.005 | 12 | 5100 | 1.13 | 3.93 | 94 | 0.005 | 22 | 6900 | 2.82 | 0.4 | 8.2 | 0.18 | | 120 | 2 | 9.1 | 8.3 | 3.5 |
| **Wittenoom Hills** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| WH | L | 4 | A | 0 | 10 | 0 | 1.06 | 980 | 0 | | | | | | 99 | 0.089 | 95 | 3400 | 0.76 | 0.14 | 1.54 | 0.05 | | 21 | <2 | 7.8 | 7.2 | 1 |
| WH | L | 4 | B | 10 | 20 | 0 | | | 7 | 0.024 | 24 | 10800 | 1.32 | 3.71 | 93 | 0.076 | 53 | 7800 | 1.6 | 0.15 | 3.69 | 0.07 | | 18 | 14 | 8.9 | 8.1 | 4.4 |
| WH | L | 4 | C | 20 | 30 | 0 | | | 19 | 0.013 | 18 | 10500 | 1.3 | 3.51 | 81 | 0.054 | 37 | 10700 | 2.04 | 0.14 | 4.94 | 0.07 | | 22 | 23 | 9.3 | 8.4 | 2.8 |
| WH | L | 4 | D | 30 | 70 | 0 | | | 20 | 0.011 | 19 | 13800 | 1.9 | 5.41 | 80 | 0.016 | 26 | 13100 | 2.47 | 0.18 | 5.92 | 0.1 | | 58 | 17 | 9.9 | 8.8 | 7.7 |
| WH | L | 4 | E | 70 | 100 | 0 | | | 10 | 0.009 | 21 | 17200 | 3.07 | 8.73 | 90 | 0.009 | 21 | 15700 | 3.65 | 0.35 | 8.1 | 0.16 | | 86 | 3 | 9.8 | 8.9 | 6.6 |
| WH | S | 2 | A | 0 | 10 | 0 | | | 0 | | | | | | 100 | 0.056 | 88 | 2000 | 0.43 | 0.08 | 0.92 | 0.04 | | 12 | <2 | 6 | 5 | 0.6 |
| WH | S | 2 | B | 10 | 20 | 0 | | | 0 | | | | | | 100 | 0.023 | 24 | 4400 | 1.17 | 0.24 | 3.03 | 0.08 | | 19 | <2 | 8.1 | 6.8 | 1.1 |
| WH | S | 2 | C | 20 | 30 | 0 | | | 0 | | | | | | 100 | 0.018 | 20 | 8000 | 2.08 | 0.29 | 4.98 | 0.12 | | 34 | <2 | 9 | 7.8 | 3.9 |
| WH | S | 2 | D | 30 | 70 | 0 | | | 30 | | | | | | 70 | 0.011 | 19 | 8500 | 1.98 | 0.19 | 5.09 | 0.08 | | 56 | 11 | 9.9 | 8.6 | 7.4 |

| | | | | | | Coarse Organics | | | Coarse Minerals | | | | | | Fine Earth | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Locat | Landuse | Rep | Samp | UD | LD | wt% of sample | N total (%) | P total (ppm) | wt% of sample | N total (%) | P total (ppm) | K total (ppm) | Fe total (%) | Al total (%) | wt% of sample | N total (%) | P total (ppm) | K total (ppm) | Fe total (%) | $Fe_2O_3$ (%) | Al total (%) | $Al_2O_3$ (%) | Al (1:5) ($CaCl_2$) (ppm) | ECe (mS/m) | $CaCO_3$ (wt%) | pH (1:5) ($H_2O$) | pH (1:5) ($CaCl_2$) | Moisture (%) |
| WH | S | 2 | E | 70 | 100 | 0 | | | 25 | | | | | | 75 | 0.007 | 17 | 10200 | 2.55 | 0.38 | 6.16 | 0.13 | | 75 | 5 | 9.7 | 8.7 | 7.5 |
| WH | U | 2 | A | 0 | 10 | 1 | 0.251 | 60 | 0 | | | | | | 99 | 0.034 | 15 | 2700 | 0.58 | 0.11 | 1.23 | 0.04 | | 4 | <2 | 7 | 5.9 | 0.5 |
| WH | U | 2 | B | 10 | 20 | 0 | 0.249 | 56 | 0 | | | | | | 99 | 0.029 | 17 | 7900 | 2.04 | 0.28 | 4.53 | 0.1 | | 30 | <2 | 8.3 | 7.2 | 2.6 |
| WH | U | 2 | C | 20 | 30 | 0 | | | 6 | 0.018 | 19 | 10600 | 1.46 | 3.82 | 94 | 0.027 | 22 | 12400 | 3.05 | 0.28 | 6.79 | 0.13 | | 61 | 5 | 9.2 | 8.4 | 5.7 |
| WH | U | 2 | D | 30 | 70 | 0 | | | 50 | 0.013 | 17 | 11900 | 1.72 | 4.58 | 50 | 0.014 | 22 | 12700 | 2.7 | 0.3 | 5.74 | 0.13 | | 150 | 9 | 9.4 | 8.6 | 9 |
| WH | U | 2 | E | 70 | 100 | 0 | | | 15 | 0.006 | 13 | 13400 | 2.28 | 5.95 | 85 | 0.01 | 20 | 14200 | 2.99 | 0.44 | 6.75 | 0.16 | | 170 | 3 | 9.1 | 8.4 | 9 |
| **Condingup** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CO | L | 1 | A | 0 | 10 | 1 | 1 | 740 | 0 | | | | | | 100 | 0.056 | 56 | 400 | 0.25 | 0.13 | 0.31 | 0.04 | 1 | 4 | | 5.4 | 4.4 | 0.3 |
| CO | L | 1 | B | 10 | 20 | 0 | | | 0 | | | | | | 100 | 0.016 | 24 | 500 | 0.24 | 0.11 | 0.31 | 0.03 | 2 | 2 | | 5.2 | 4.2 | 0.1 |
| CO | L | 1 | C | 20 | 30 | 0 | | | 1 | 0.014 | 110 | 3200 | 27.2 | 5.77 | 99 | 0.008 | 21 | 500 | 0.27 | 0.14 | 0.27 | 0.04 | 2 | 2 | | 5.2 | 4.3 | 0.2 |
| CO | L | 1 | D | 30 | 40 | 0 | | | 78 | <0.005 | 46 | 4100 | 24.7 | 5.42 | 22 | 0.013 | 22 | 500 | 0.39 | 0.14 | 0.43 | 0.05 | 13 | 1 | | 5.8 | 4.5 | 0.5 |
| CO | L | 1 | E | 40 | 70 | 0 | | | 17 | 0.016 | 35 | 8400 | 10.3 | 11.2 | 83 | 0.013 | 29 | 5200 | 4.97 | 2.36 | 9.3 | 0.52 | | 5 | | 6.8 | 5.9 | 9.5 |
| CO | L | 1 | F | 70 | 100 | 0 | | | 20 | 0.005 | 38 | 6900 | 13.9 | 8.6 | 80 | 0.007 | 27 | 5200 | 5.95 | 2.5 | 10.3 | 0.48 | | 4 | | 7.1 | 6.1 | 10 |
| CO | S | 1 | A | 0 | 10 | 1 | 1 | 460 | 0 | | | | | | 99 | 0.049 | 42 | 300 | 0.17 | 0.07 | 0.23 | 0.03 | 1 | 6 | | 5.4 | 4.6 | 0.2 |
| CO | S | 1 | B | 10 | 20 | 0 | | | 0 | | | | | | 100 | 0.017 | 23 | 400 | 0.16 | 0.08 | 0.28 | 0.03 | 1 | 2 | | 5.8 | 5 | 0.1 |
| CO | S | 1 | C | 20 | 30 | 0 | | | 2 | | | | | | 98 | 0.009 | 17 | 400 | 0.18 | 0.07 | 0.28 | 0.02 | <1 | 1 | | 5.9 | 4.9 | 0.1 |
| CO | S | 1 | D | 30 | 40 | 0 | | | 5 | | | | | | 95 | | | | | | | | | | | | | 0.1 |
| CO | S | 1 | E | 40 | 60 | 0 | | | 80 | | | | | | 20 | 0.015 | 17 | 600 | 0.54 | 0.25 | 0.92 | 0.07 | | 2 | | 6.4 | 5.3 | 0 |
| CO | S | 1 | F | 60 | 90 | 0 | | | 28 | | | | | | 72 | 0.008 | 26 | 3400 | 4.66 | 2.58 | 10.6 | 0.45 | | 10 | | 7 | 5.9 | 1.2 |
| CO | U | 1 | A | 0 | 10 | 1 | 0.321 | 110 | 0 | | | | | | 98 | 0.028 | 16 | 300 | 0.17 | 0.08 | 0.19 | 0.03 | | 2 | | 6.2 | 5 | 0.3 |
| CO | U | 1 | B | 10 | 20 | 1 | 0.272 | 86 | 0 | | | | | | 99 | 0.011 | <10 | 300 | 0.17 | 0.09 | 0.16 | 0.02 | | 2 | | 6.3 | 5 | 0.2 |
| CO | U | 1 | C | 20 | 30 | 0 | 0.247 | 57 | 0 | | | | | | 99 | <0.005 | 12 | 300 | 0.15 | 0.07 | 0.16 | 0.02 | | 2 | | 6.4 | 5.2 | 0.1 |
| CO | U | 1 | D | 30 | 55 | 0 | | | 2 | 0.019 | 33 | 1700 | 13.1 | 4.67 | 98 | <0.005 | 24 | 300 | 0.21 | 0.14 | 0.23 | 0.03 | | 2 | | 6.8 | 5.6 | 0 |
| CO | U | 1 | E | 55 | 65 | 0 | | | 68 | <0.005 | 36 | 1900 | 15.7 | 6.37 | 32 | 0.007 | 13 | 400 | 0.35 | 0.24 | 0.43 | 0.06 | | 2 | | 6.8 | 5.6 | 0 |
| CO | U | 1 | F | 65 | 95 | 0 | | | 13 | 0.013 | 19 | 6200 | 5.08 | 9.56 | 87 | 0.008 | <10 | 3700 | 3.26 | 2.86 | 7.16 | 0.38 | | 50 | | 6 | 5.2 | 1.3 |

# APPENDIX 4

## Exchangeable Cations and Saturation Extract Data for Fine Earth Fraction

### LEGEND

| | |
|---|---|
| **Al** | Aluminum |
| **Ca** | Calcium |
| **CEC** | Cation Exchange Capacity |
| **EC** | Electrical Conductivity |
| **$H_20$** | Hydrogen Dioxide |
| **K** | Potassium |
| **LD** | Lower Depth |
| **Locat** | Location |
| **Na** | Sodium |
| **Mg** | Magnesium |
| **Mn** | Manganese |
| **ppm** | Parts per million |
| **Rep** | Replicate |
| **Samp** | Sample |
| **SAR** | Sodium Absorption Ration |
| **UD** | Upper Depth |

# TABLE OF CONTENTS

| | | | | | | | | Exchangeable Cations | | | | | | | Saturation extract | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Locat | Landuse | Rep | Samp | UD | LD | Moisture (%) | Clay (%) | CEC (cmol(+) /kg) | Ca (cmol(+) /kg) | Mg (cmol(+) /kg) | Na (cmol(+) /kg) | K (cmol(+) /kg) | Al (cmol(+) /kg) | Mn (cmol(+) /kg) | $H_2O$ % | pH | ECe (mS/m) | Ca (me/L) | Mg (me/L) | Na (me/L) | K (me/L) | S (me/L) | SAR |
| **Northampton** | | | | | | | | | | | | | | | | | | | | | | | |
| NH | L | 4 | A | 0 | 10 | 0 | 4.1 | | 1.76 | 0.3 | 0.05 | 0.08 | 0.04 | 0.02 | | | | | | | | | |
| NH | L | 4 | B | 10 | 20 | 0 | 5.3 | | 0.92 | 0.19 | <0.02 | 0.03 | 0.1 | <0.02 | | | | | | | | | |
| NH | L | 4 | C | 20 | 30 | 0 | 7.8 | | 0.49 | 0.13 | <0.02 | 0.04 | 0.08 | <0.02 | | | | | | | | | |
| NH | L | 4 | D | 30 | 50 | 0 | 9.8 | | 0.41 | 0.15 | <0.02 | 0.04 | 0.04 | <0.02 | | | | | | | | | |
| NH | L | 4 | E | 50 | 80 | 0 | 10.9 | | 0.4 | 0.23 | <0.02 | 0.04 | 0.02 | <0.02 | | | | | | | | | |
| NH | L | 4 | F | 80 | 110 | 0 | 12.4 | | 0.4 | 0.32 | <0.02 | 0.04 | <0.02 | <0.02 | | | | | | | | | |
| NH | L | 4 | G | 110 | 140 | 0 | 11.3 | | 0.33 | 0.28 | <0.02 | 0.03 | <0.02 | <0.02 | | | | | | | | | |
| NH | S | 1 | A | 0 | 10 | 0 | 2.4 | | 1.54 | 0.39 | 0.04 | 0.03 | <0.02 | <0.02 | | | | | | | | | |
| NH | S | 1 | B | 10 | 20 | 0 | 2.7 | | 0.96 | 0.22 | 0.02 | <0.02 | 0.02 | <0.02 | | | | | | | | | |
| NH | S | 1 | C | 20 | 30 | 0 | 3.0 | | 0.46 | 0.13 | <0.02 | <0.02 | 0.02 | <0.02 | | | | | | | | | |
| NH | S | 1 | D | 30 | 50 | 0 | 3.4 | | 0.35 | 0.11 | <0.02 | 0.02 | <0.02 | <0.02 | | | | | | | | | |
| NH | S | 1 | E | 50 | 80 | 0 | 5.1 | <1 | 0.31 | 0.16 | 0.03 | 0.03 | | | | | | | | | | | |
| NH | S | 1 | F | 80 | 110 | 0 | 10.6 | 2 | 0.59 | 0.27 | <0.02 | 0.04 | | | | | | | | | | | |
| NH | S | 1 | G | 110 | 140 | 0 | 12.1 | 2 | 0.58 | 0.23 | 0.02 | 0.04 | | | | | | | | | | | |
| NH | U | 2 | A | 0 | 10 | 0 | 1.8 | | 1.07 | 0.29 | 0.05 | 0.07 | 0.06 | <0.02 | | | | | | | | | |
| NH | U | 2 | B | 10 | 20 | 0 | 2.4 | | 0.7 | 0.22 | 0.03 | 0.04 | 0.03 | <0.02 | | | | | | | | | |
| NH | U | 2 | C | 20 | 30 | 0 | 2.0 | | 0.52 | 0.2 | 0.02 | 0.03 | 0.03 | <0.02 | | | | | | | | | |
| NH | U | 2 | D | 30 | 50 | 0 | 1.9 | | 0.21 | 0.12 | 0.02 | 0.02 | <0.02 | <0.02 | | | | | | | | | |
| NH | U | 2 | E | 50 | 80 | 0 | 2.6 | | 0.2 | 0.12 | 0.02 | 0.02 | <0.02 | <0.02 | | | | | | | | | |
| NH | U | 2 | F | 80 | 110 | 0 | 5.0 | | 0.36 | 0.24 | 0.02 | 0.03 | <0.02 | <0.02 | | | | | | | | | |
| NH | U | 2 | G | 110 | 140 | 0 | 16.7 | 2 | 0.6 | 0.6 | 0.05 | 0.08 | | | | | | | | | | | |

| | | | | | | | | Exchangeable Cations | | | | | | | Saturation extract | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Locat | Landuse | Rep | Samp | UD | LD | Moisture (%) | Clay (%) | CEC (cmol(+) /kg) | Ca (cmol(+) /kg) | Mg (cmol(+) /kg) | Na (cmol(+) /kg) | K (cmol(+) /kg) | Al (cmol(+) /kg) | Mn (cmol(+) /kg) | $H_2O$ % | pH | ECe (mS/m) | Ca (me/L) | Mg (me/L) | Na (me/L) | K (me/L) | S (me/L) | SAR |
| **Badgingarra** | | | | | | | | | | | | | | | | | | | | | | | |
| BA | L | 2 | A | 0 | 10 | 0 | 1.3 | | 1.59 | 0.21 | 0.04 | 0.03 | 0.03 | <0.02 | | | | | | | | | |
| BA | L | 2 | B | 10 | 20 | 0 | 0.9 | | 0.42 | 0.06 | <0.02 | <0.02 | 0.06 | <0.02 | | | | | | | | | |
| BA | L | 2 | C | 20 | 30 | 0 | 0.9 | | 0.18 | 0.04 | <0.02 | <0.02 | 0.05 | <0.02 | | | | | | | | | |
| BA | L | 2 | D | 30 | 50 | 0 | 1.0 | | 0.13 | 0.03 | <0.02 | <0.02 | 0.07 | <0.02 | | | | | | | | | |
| BA | L | 2 | E | 50 | 80 | 0 | 1.5 | | 0.06 | 0.02 | <0.02 | <0.02 | 0.09 | <0.02 | | | | | | | | | |
| BA | L | 2 | F | 80 | 110 | 0 | 2.6 | | 0.12 | 0.03 | <0.02 | <0.02 | 0.04 | <0.02 | | | | | | | | | |
| BA | L | 2 | G | 110 | 150 | 0 | 2.5 | | 0.12 | 0.03 | <0.02 | <0.02 | <0.02 | <0.02 | | | | | | | | | |
| BA | L | 2 | H | 150 | 170 | 0 | 13.7 | | 0.39 | 0.22 | 0.02 | 0.02 | <0.02 | <0.02 | | | | | | | | | |
| BA | S | 2 | A | 0 | 10 | 0 | 1.4 | | 1.47 | 0.16 | 0.02 | <0.02 | 0.04 | <0.02 | | | | | | | | | |
| BA | S | 2 | B | 10 | 20 | 0 | 1.4 | | 0.48 | 0.07 | <0.02 | <0.02 | 0.06 | <0.02 | | | | | | | | | |
| BA | S | 2 | C | 20 | 30 | 0 | 1.3 | | 0.19 | 0.03 | <0.02 | <0.02 | 0.03 | <0.02 | | | | | | | | | |
| BA | S | 2 | D | 30 | 50 | 0 | 1.7 | | 0.19 | 0.04 | <0.02 | <0.02 | 0.02 | <0.02 | | | | | | | | | |
| BA | S | 2 | E | 50 | 80 | 0 | 4.5 | | 0.29 | 0.07 | <0.02 | <0.02 | 0.02 | <0.02 | | | | | | | | | |
| BA | S | 2 | F | 80 | 110 | 0 | 8.2 | | 0.34 | 0.17 | <0.02 | 0.02 | 0.02 | <0.02 | | | | | | | | | |
| BA | S | 2 | G | 110 | 140 | 0 | 10.5 | | 0.37 | 0.24 | <0.02 | 0.03 | <0.02 | <0.02 | | | | | | | | | |
| BA | S | 2 | H | 140 | 160 | 0 | 11.3 | | 0.35 | 0.25 | <0.02 | 0.05 | <0.02 | <0.02 | | | | | | | | | |
| BA | U | 1 | A | 0 | 10 | 0 | 2.2 | | 1.58 | 0.21 | 0.06 | 0.02 | 0.08 | <0.02 | | | | | | | | | |
| BA | U | 1 | B | 10 | 20 | 0 | 2.1 | | 0.84 | 0.13 | 0.02 | 0.02 | 0.03 | <0.02 | | | | | | | | | |
| BA | U | 1 | C | 20 | 30 | 0 | 1.7 | | 0.46 | 0.09 | <0.02 | <0.02 | 0.02 | <0.02 | | | | | | | | | |
| BA | U | 1 | D | 30 | 60 | 0 | 2.9 | | 0.3 | 0.08 | <0.02 | 0.02 | 0.02 | <0.02 | | | | | | | | | |
| BA | U | 1 | E | 60 | 90 | 0 | 5.6 | 1 | 0.3 | 0.09 | 0.02 | 0.02 | | | | | | | | | | | |
| BA | U | 1 | F | 90 | 120 | 0 | 6.5 | <1 | 0.27 | 0.09 | <0.02 | 0.04 | | | | | | | | | | | |
| BA | U | 1 | G | 120 | 150 | 0 | 6.4 | 1 | 0.25 | 0.11 | 0.03 | 0.03 | | | | | | | | | | | |

| | | | | | | | | Exchangeable Cations | | | | | | | Saturation extract | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Locat | Landuse | Rep | Samp | UD | LD | Moisture (%) | Clay (%) | CEC (cmol(+)/kg) | Ca (cmol(+)/kg) | Mg (cmol(+)/kg) | Na (cmol(+)/kg) | K (cmol(+)/kg) | Al (cmol(+)/kg) | Mn (cmol(+)/kg) | $H_2O$ % | pH | ECe (mS/m) | Ca (me/L) | Mg (me/L) | Na (me/L) | K (me/L) | S (me/L) | SAR |
| **Brookton** | | | | | | | | | | | | | | | | | | | | | | | |
| BR | L | 2 | A | 0 | 10 | 0 | 1.5 | | 1.46 | 0.27 | 0.02 | 0.04 | 0.12 | 0.02 | | | | | | | | | |
| BR | L | 2 | B | 10 | 20 | 0 | 1.6 | | 0.43 | 0.06 | <0.02 | 0.03 | 0.18 | <0.02 | | | | | | | | | |
| BR | L | 2 | C | 20 | 30 | 0 | 1.9 | | 0.19 | 0.02 | <0.02 | 0.02 | 0.14 | <0.02 | | | | | | | | | |
| BR | L | 2 | D | 30 | 40 | 0 | 1.6 | | 1.24 | 0.25 | 0.03 | 0.04 | 0.14 | 0.02 | | | | | | | | | |
| BR | L | 2 | E | 40 | 50 | 0 | 5.4 | | 0.38 | 0.05 | <0.02 | 0.02 | 0.2 | <0.02 | | | | | | | | | |
| BR | L | 2 | F | 50 | 70 | 1 | 9.0 | | 0.18 | <0.02 | <0.02 | 0.02 | 0.13 | <0.02 | | | | | | | | | |
| BR | U | 2 | A | 0 | 10 | 0 | 0.9 | | 0.25 | 0.15 | 0.02 | 0.02 | 0.06 | <0.02 | | | | | | | | | |
| BR | U | 2 | B | 10 | 20 | 0 | 1.1 | | 0.75 | 0.25 | 0.03 | 0.04 | 0.12 | <0.02 | | | | | | | | | |
| BR | U | 2 | C | 20 | 30 | 0 | 1.1 | | 0.5 | 0.2 | <0.02 | 0.03 | 0.09 | <0.02 | | | | | | | | | |
| BR | U | 2 | D | 30 | 60 | 0 | 1.1 | | 0.26 | 0.12 | <0.02 | 0.02 | 0.04 | <0.02 | | | | | | | | | |
| BR | U | 2 | E | 60 | 85 | 0 | 1.9 | | 0.56 | 0.2 | 0.03 | 0.04 | 0.15 | <0.02 | | | | | | | | | |
| **Mullewa** | | | | | | | | | | | | | | | | | | | | | | | |
| MU | L | 3 | A | 0 | 10 | 0 | 9.7 | | 0.7 | 0.36 | 0.52 | 0.31 | 0.09 | <0.02 | | | | | | | | | |
| MU | L | 3 | B | 10 | 20 | 0 | 10.4 | | 0.33 | 0.17 | 0.24 | 0.13 | 0.34 | <0.02 | | | | | | | | | |
| MU | L | 3 | C | 20 | 30 | 0 | 11.6 | | 0.27 | 0.14 | 0.2 | 0.09 | 0.42 | <0.02 | | | | | | | | | |
| MU | L | 3 | D | 30 | 45 | 1 | 12.2 | | 0.37 | 0.17 | 0.27 | 0.08 | 0.32 | <0.02 | | | | | | | | | |
| MU | L | 3 | E | 45 | 80 | 2 | 13.1 | | 0.41 | 0.54 | 0.55 | 0.14 | 0.07 | <0.02 | | | | | | | | | |
| MU | L | 3 | F | 80 | 100 | 3 | 13.1 | 3 | 0.4 | 1.2 | 0.83 | 0.18 | 0 | 0 | | | | | | | | | |
| MU | S | 1 | A | 0 | 10 | 0 | 6.6 | | 0.52 | 0.22 | 0.58 | 0.13 | 0.22 | <0.02 | | | | | | | | | |
| MU | S | 1 | B | 10 | 20 | 0 | 7.6 | | 0.27 | 0.13 | 0.28 | 0.08 | 0.34 | <0.02 | | | | | | | | | |
| MU | S | 1 | C | 20 | 30 | 0 | 8.8 | | 0.3 | 0.16 | 0.32 | 0.07 | 0.3 | <0.02 | | | | | | | | | |
| MU | S | 1 | D | 30 | 70 | 0 | 9.3 | | 0.25 | 0.18 | 0.45 | 0.05 | 0.36 | <0.02 | | | | | | | | | |
| MU | S | 1 | E | 70 | 100 | 0 | 10.9 | | 0.21 | 0.46 | 0.43 | 0.06 | 0.24 | <0.02 | | | | | | | | | |
| MU | S | 1 | E | 70 | 100 | 0 | 10.8 | | 0.21 | 0.46 | 0.43 | 0.06 | 0.24 | <0.02 | | | | | | | | | |

| | | | | | | | | Exchangeable Cations | | | | | | | Saturation extract | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Locat | Landuse | Rep | Samp | UD | LD | Moisture (%) | Clay (%) | CEC (cmol(+) /kg) | Ca (cmol(+) /kg) | Mg (cmol(+) /kg) | Na (cmol(+) /kg) | K (cmol(+) /kg) | Al (cmol(+) /kg) | Mn (cmol(+) /kg) | $H_2O$ % | pH | ECe (mS/m) | Ca (me/L) | Mg (me/L) | Na (me/L) | K (me/L) | S (me/L) | SAR |
| MU | S | 1 | F | 100 | 120 | 1 | 9.5 | | 0.2 | 0.7 | 0.45 | 0.08 | 0.11 | <0.02 | | | | | | | | | |
| MU | U | 3 | A | 0 | 10 | 0 | 9.3 | | 0.59 | 0.21 | 0.1 | 0.14 | 0.29 | 0.02 | | | | | | | | | |
| MU | U | 3 | B | 10 | 20 | 0 | 10.4 | | 0.2 | 0.12 | 0.09 | 0.09 | 0.43 | <0.02 | | | | | | | | | |
| MU | U | 3 | C | 20 | 30 | 0 | 11.1 | | 0.13 | 0.1 | 0.13 | 0.08 | 0.47 | <0.02 | | | | | | | | | |
| MU | U | 3 | D | 30 | 55 | 0 | 12.4 | | 0.08 | 0.07 | 0.15 | 0.06 | 0.6 | <0.02 | | | | | | | | | |
| MU | U | 3 | E | 55 | 85 | 0 | 12.7 | | 0.29 | 0.29 | 0.39 | 0.08 | 0.25 | <0.02 | | | | | | | | | |
| MU | U | 3 | F | 85 | 95 | 1 | 13.8 | | 0.36 | 0.56 | 0.55 | 0.1 | 0.05 | <0.02 | | | | | | | | | |
| MU | U | 3 | G | 95 | 105 | 1 | 15.0 | | 0.42 | 0.89 | 0.76 | 0.17 | 0.02 | <0.02 | | | | | | | | | |
| **Merredin** | | | | | | | | | | | | | | | | | | | | | | | |
| ME | L | 3 | A | 0 | 10 | 0 | 12.4 | | 1.56 | 0.56 | 0.14 | 0.1 | 0.14 | <0.02 | | | | | | | | | |
| ME | L | 3 | B | 10 | 20 | 0 | 20.0 | | 0.75 | 0.34 | 0.1 | 0.03 | 0.41 | <0.02 | | | | | | | | | |
| ME | L | 3 | C | 20 | 30 | 1 | 21.4 | | 0.56 | 0.22 | 0.13 | 0.02 | 0.56 | <0.02 | | | | | | | | | |
| ME | L | 3 | D | 30 | 50 | 2 | 22.6 | | 0.63 | 0.25 | 0.08 | <0.02 | 0.54 | <0.02 | | | | | | | | | |
| ME | L | 3 | E | 50 | 80 | 2 | 23.7 | | 0.33 | 0.26 | 0.09 | <0.02 | 0.87 | <0.02 | | | | | | | | | |
| ME | L | 3 | F | 80 | 110 | 2 | 24.3 | | 0.48 | 0.64 | 0.15 | <0.02 | 0.5 | <0.02 | | | | | | | | | |
| ME | L | 3 | G | 110 | 140 | 1 | 21.6 | | 0.67 | 1.23 | 0.14 | <0.02 | 0.07 | <0.02 | | | | | | | | | |
| ME | S | 1 | A | 0 | 10 | 0 | 12.0 | | 1.36 | 0.55 | 0.15 | 0.17 | 0.21 | <0.02 | | | | | | | | | |
| ME | S | 1 | B | 10 | 20 | 0 | 18.0 | | 0.6 | 0.26 | 0.09 | 0.04 | 0.55 | <0.02 | | | | | | | | | |
| ME | S | 1 | C | 20 | 30 | 0 | 20.9 | | 0.47 | 0.19 | 0.08 | 0.02 | 0.6 | <0.02 | | | | | | | | | |
| ME | S | 1 | D | 30 | 50 | 0 | 21.7 | | 0.36 | 0.22 | 0.06 | <0.02 | 0.77 | <0.02 | | | | | | | | | |
| ME | S | 1 | E | 50 | 80 | 0 | 23.1 | | 0.29 | 0.34 | 0.09 | <0.02 | 0.64 | <0.02 | | | | | | | | | |
| ME | S | 1 | F | 80 | 110 | 1 | 20.1 | | 0.44 | 0.66 | 0.11 | <0.02 | 0.3 | <0.02 | | | | | | | | | |
| ME | S | 1 | G | 110 | 140 | 0 | 20.0 | | 0.47 | 0.85 | 0.11 | <0.02 | 0.14 | <0.02 | | | | | | | | | |
| ME | U | 1 | A | 0 | 10 | 0 | 14.6 | | 1.01 | 0.4 | 0.09 | 0.1 | 0.12 | <0.02 | | | | | | | | | |
| ME | U | 1 | B | 10 | 20 | 0 | 18.8 | | 0.6 | 0.31 | 0.11 | 0.06 | 0.34 | <0.02 | | | | | | | | | |

| | | | | | | | | Exchangeable Cations | | | | | | | Saturation extract | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Locat | Landuse | Rep | Samp | UD | LD | Moisture (%) | Clay (%) | CEC (cmol(+) /kg) | Ca (cmol(+) /kg) | Mg (cmol(+) /kg) | Na (cmol(+) /kg) | K (cmol(+) /kg) | Al (cmol(+) /kg) | Mn (cmol(+) /kg) | $H_2O$ % | pH | ECe (mS/m) | Ca (me/L) | Mg (me/L) | Na (me/L) | K (me/L) | S (me/L) | SAR |
| ME | U | 1 | C | 20 | 30 | 0 | 21.4 | | 0.45 | 0.25 | 0.08 | 0.03 | 0.58 | <0.02 | | | | | | | | | |
| ME | U | 1 | D | 30 | 50 | 0 | 22.2 | | 0.19 | 0.09 | 0.08 | <0.02 | 0.95 | <0.02 | | | | | | | | | |
| ME | U | 1 | E | 50 | 80 | 1 | 23.2 | | 0.12 | 0.17 | 0.08 | <0.02 | 0.99 | <0.02 | | | | | | | | | |
| ME | U | 1 | F | 80 | 110 | 0 | 22.7 | | 0.34 | 0.57 | 0.08 | <0.02 | 0.48 | <0.02 | | | | | | | | | |
| ME | U | 1 | G | 110 | 140 | 0 | 19.6 | | 0.68 | 0.87 | 0.18 | <0.02 | 0.09 | <0.02 | | | | | | | | | |
| **Newdegate (deep)** | | | | | | | | | | | | | | | | | | | | | | | |
| ND | L | 2 | A | 0 | 10 | 0 | 2.0 | | 1.68 | 0.25 | 0.11 | 0.05 | 0.11 | 0.02 | | | | | | | | | |
| ND | L | 2 | B | 10 | 20 | 0 | 2.0 | | 0.71 | 0.12 | 0.04 | 0.03 | 0.02 | <0.02 | | | | | | | | | |
| ND | L | 2 | C | 20 | 30 | 0 | 2.1 | 2 | 0.71 | 0.22 | 0.06 | 0.05 | | | | | | | | | | | |
| ND | L | 2 | C1 | 30 | 40 | 0 | 4.0 | 2 | 0.63 | 0.48 | 0.14 | 0.07 | | | | | | | | | | | |
| ND | L | 2 | D | 40 | 60 | 2 | 43.2 | 14 | 1.1 | 4.69 | 3.09 | 0.62 | | | | | | | | | | | |
| ND | L | 2 | E | 60 | 90 | 3 | 36.1 | 19 | 0.43 | 7 | 6.5 | 0.7 | | | | | | | | | | | |
| ND | S | 4 | A | 0 | 10 | 0 | 2.6 | | 2.35 | 0.39 | 0.03 | 0.07 | 0.03 | 0.02 | | | | | | | | | |
| ND | S | 4 | B | 10 | 20 | 0 | 2.8 | | 1.53 | 0.32 | 0.03 | 0.05 | 0.04 | <0.02 | | | | | | | | | |
| ND | S | 4 | C | 20 | 30 | 8 | 3.1 | 2 | 0.95 | 0.3 | 0.04 | 0.04 | | | | | | | | | | | |
| ND | S | 4 | D | 30 | 60 | 2 | 38.0 | 12 | 0.46 | 4.34 | 2.86 | 0.46 | | | | | | | | | | | |
| ND | S | 4 | E | 60 | 90 | 3 | 44.6 | 21 | 0.41 | 7.53 | 6.21 | 0.8 | | | 41 | 7.8 | 210 | 0.06 | 0.68 | 19 | 0.17 | 7.53 | 30 |
| ND | S | 4 | F | 90 | 120 | 4 | 36.6 | 22 | 0.4 | 7.34 | 8.03 | 1.03 | | | 44 | 7.8 | 300 | 0.05 | 0.96 | 27 | 0.21 | 10 | 38 |
| ND | U | 1 | A | 0 | 10 | 1 | 3.3 | | 1.61 | 0.43 | 0.1 | 0.08 | 0.1 | <0.02 | | | | | | | | | |
| ND | U | 1 | B | 10 | 20 | 0 | 2.6 | | 1.23 | 0.39 | 0.07 | 0.05 | 0.06 | <0.02 | | | | | | | | | |
| ND | U | 1 | C | 20 | 30 | 0 | 2.1 | | 0.67 | 0.32 | 0.05 | 0.04 | 0.03 | <0.02 | | | | | | | | | |
| ND | U | 1 | D | 30 | 60 | 3 | 31.8 | 20 | 1.19 | 7.59 | 6.98 | 0.88 | | | 40 | 7.8 | 310 | 0.05 | 0.98 | 28 | 0.21 | 10 | 39 |
| ND | U | 1 | E | 60 | 90 | 4 | 25.6 | 22 | 1.22 | 7.74 | 9.77 | 1.14 | | | 44 | 8.1 | 900 | 1.3 | 10 | 79 | 0.36 | 13 | 33 |

| | | | | | | | | Exchangeable Cations | | | | | | | Saturation extract | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Locat | Landuse | Rep | Samp | UD | LD | Moisture (%) | Clay (%) | CEC (cmol(+) /kg) | Ca (cmol(+) /kg) | Mg (cmol(+) /kg) | Na (cmol(+) /kg) | K (cmol(+) /kg) | Al (cmol(+) /kg) | Mn (cmol(+) /kg) | $H_2O$ % | pH | ECe (mS/m) | Ca (me/L) | Mg (me/L) | Na (me/L) | K (me/L) | S (me/L) | SAR |
| **Newdegate (shallow)** | | | | | | | | | | | | | | | | | | | | | | | |
| NS | L | 4 | A | 0 | 10 | 0 | 2.5 | | 1.19 | 0.26 | 0.21 | 0.08 | 0.06 | <0.02 | | | | | | | | | |
| NS | L | 4 | B | 10 | 20 | 0 | 2.4 | 1 | 0.46 | 0.18 | 0.12 | 0.03 | 0.04 | 0.02 | | | | | | | | | |
| NS | L | 4 | C | 20 | 30 | 2 | 28.2 | 8 | 0.94 | 3.57 | 2.66 | 0.17 | | | | | | | | | | | |
| NS | L | 4 | D | 30 | 60 | 3 | 34.5 | 20 | 1 | 8 | 6.89 | 0.57 | | | 37 | 7.9 | 290 | 0.18 | 1.12 | 27 | 0.21 | 5.28 | 33 |
| NS | L | 4 | E | 60 | 90 | 4 | 25.6 | 27 | 1.11 | 8.42 | 10.51 | 0.92 | | | 45 | 8.1 | 420 | 0.14 | 1.46 | 40 | 0.21 | 9.04 | 45 |
| NS | S | 1 | A | 0 | 10 | 0 | 2.7 | 4 | 2.58 | 0.48 | 0.09 | 0.11 | | | | | | | | | | | |
| NS | S | 1 | B | 10 | 20 | 0 | 2.4 | 2 | 1.07 | 0.31 | 0.07 | 0.1 | | | | | | | | | | | |
| NS | S | 1 | C | 20 | 30 | 2 | 33.1 | 11 | 1.69 | 3.32 | 1.93 | 0.51 | | | | | | | | | | | |
| NS | S | 1 | D | 30 | 60 | 2 | 39.9 | 17 | 2.03 | 5.65 | 5.19 | 1.04 | | | 34 | 8.1 | 310 | 0.39 | 1.28 | 29 | 0.29 | 7.24 | 32 |
| NS | S | 1 | E | 60 | 90 | 3 | 31.4 | 19 | 1.4 | 5.88 | 7.45 | 1.08 | | | 41 | 8.5 | 490 | 0.42 | 1.82 | 49 | 0.3 | 11 | 46 |
| NS | U | 4 | A | 0 | 10 | 0 | 2.9 | | 2.21 | 0.49 | 0.17 | 0.12 | 0.08 | <0.02 | | | | | | | | | |
| NS | U | 4 | B | 10 | 20 | 0 | 2.5 | | 1.24 | 0.42 | 0.16 | 0.07 | 0.04 | <0.02 | | | | | | | | | |
| NS | U | 4 | C | 20 | 30 | 1 | 26.1 | 8 | 1.36 | 4 | 2.44 | 0.34 | | | | | | | | | | | |
| NS | U | 4 | D | 30 | 60 | 3 | 39.1 | 18 | 1.07 | 6.54 | 5.86 | 0.7 | | | | | | | | | | | |
| NS | U | 4 | E | 60 | 90 | 4 | 32.1 | 27 | 1.16 | 8.64 | 11.38 | 1.22 | | | | | | | | | | | |

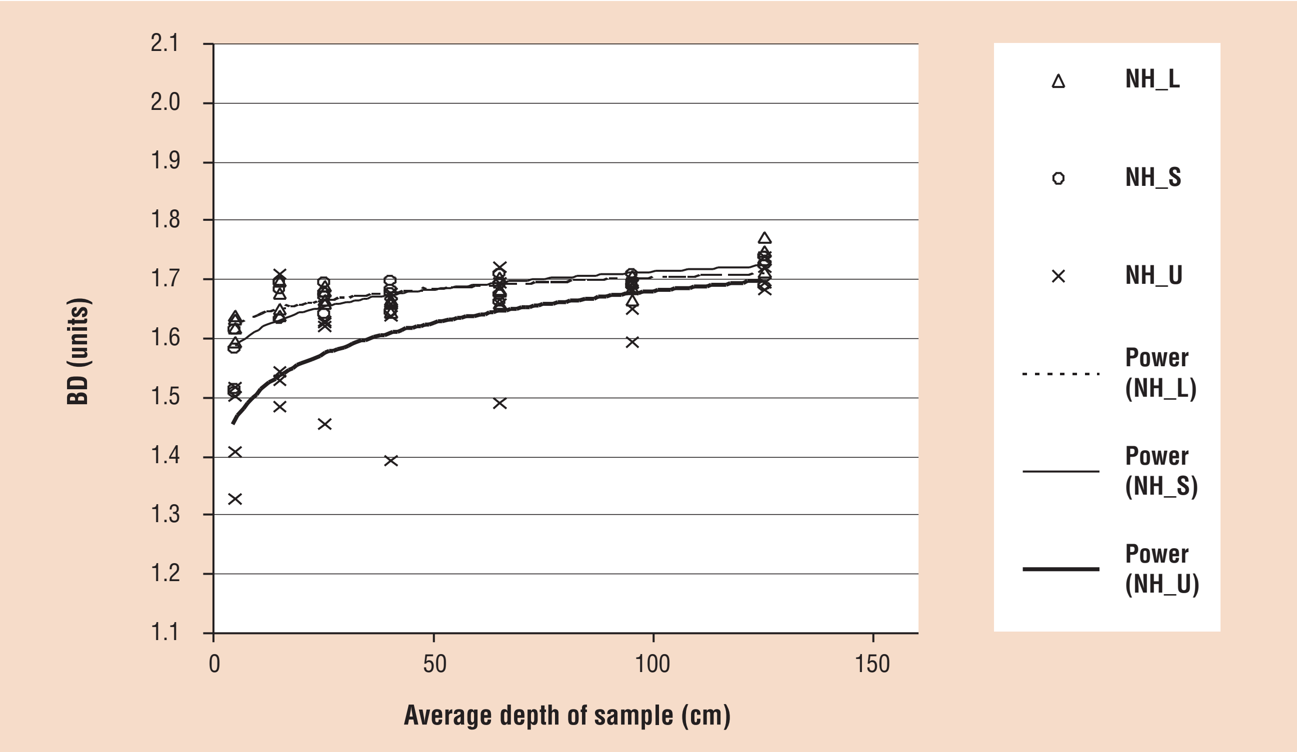
| | | | | | | | | Exchangeable Cations | | | | | | | Saturation extract | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Locat | Landuse | Rep | Samp | UD | LD | Moisture (%) | Clay (%) | CEC (cmol(+) /kg) | Ca (cmol(+) /kg) | Mg (cmol(+) /kg) | Na (cmol(+) /kg) | K (cmol(+) /kg) | Al (cmol(+) /kg) | Mn (cmol(+) /kg) | $H_2O$ % | pH | ECe (mS/m) | Ca (me/L) | Mg (me/L) | Na (me/L) | K (me/L) | S (me/L) | SAR |
| **Wittenoom Hills** | | | | | | | | | | | | | | | | | | | | | | | |
| WH | L | 4 | A | 0 | 10 | 1 | 9.2 | 8 | 10.18 | 1.49 | 0.07 | 0.79 | | | 28.5 | 7.9 | 160 | 0.09 | 3.37 | 2.93 | 1.68 | 1.29 | 2 |
| WH | L | 4 | B | 10 | 20 | 4 | 31.3 | 19 | 9.85 | 4.28 | 0.62 | 1.76 | | | | | | | | | | | |
| WH | L | 4 | C | 20 | 30 | 3 | 36.6 | 20 | 6.97 | 6.9 | 1.23 | 1.89 | | | 45.9 | 8.2 | 94 | 1.46 | 1.61 | 7.36 | 0.4 | 1.22 | 6 |
| WH | L | 4 | D | 30 | 70 | 8 | 42.7 | 20 | 2.19 | 6.63 | 6.32 | 3.43 | | | 45.3 | 9 | 220 | 0.29 | 0.75 | 21 | 0.57 | 3.45 | 29 |
| WH | L | 4 | E | 70 | 100 | 7 | 57.4 | 23 | 1.31 | 6.54 | 9.63 | 3.22 | | | 68.6 | 8.9 | 400 | 0.19 | 0.92 | 38 | 0.61 | 6.34 | 51 |
| WH | S | 2 | A | 0 | 10 | 1 | 4.7 | | 2.14 | 0.66 | 0.51 | 0.28 | 0.1 | 0.02 | | | | | | | | | |
| WH | S | 2 | B | 10 | 20 | 1 | 21.5 | 11 | 2.22 | 3.03 | 2.58 | 0.6 | | | | | | | | | | | |
| WH | S | 2 | C | 20 | 30 | 4 | 38.3 | 19 | 2.31 | 5.25 | 5.2 | 1.73 | | | 42.8 | 8.3 | 350 | 0.69 | 1.67 | 31 | 0.49 | 3.74 | 29 |
| WH | S | 2 | D | 30 | 70 | 7 | 31.4 | 16 | 2.34 | 5.14 | 5.14 | 1.73 | | | 41.7 | 8.8 | 300 | 0.32 | 0.75 | 27 | 0.37 | 2.72 | 36 |
| WH | S | 2 | E | 70 | 100 | 8 | 44.5 | 20 | 1.76 | 5.55 | 7.33 | 2.23 | | | 53.1 | 8.7 | 430 | 0.32 | 1.08 | 40 | 0.49 | 4.24 | 48 |
| WH | U | 2 | A | 0 | 10 | 1 | 7.6 | 5 | 2.37 | 1.16 | 0.22 | 0.28 | | | | | | | | | | | |
| WH | U | 2 | B | 10 | 20 | 3 | 39.6 | 17 | 4.85 | 5.59 | 2.45 | 1.36 | | | 39.6 | 7.6 | 330 | 2.7 | 3.73 | 26 | 0.47 | 2.21 | 14 |
| WH | U | 2 | C | 20 | 30 | 6 | 49.3 | 24 | 5.87 | 7.68 | 4.18 | 2.17 | | | 51.4 | 8.2 | 470 | 2.86 | 4.47 | 38 | 0.68 | 3.37 | 20 |
| WH | U | 2 | D | 30 | 70 | 9 | 47.3 | 24 | 2.75 | 7.02 | 7.29 | 2.56 | | | 59.1 | 8.3 | 1100 | 2.85 | 8.94 | 100 | 1.21 | 12 | 42 |
| WH | U | 2 | E | 70 | 100 | 9 | 50.6 | 24 | 2.02 | 6.79 | 7.62 | 2.61 | | | 57.3 | 8.2 | 1400 | 3.34 | 3 | 130 | 1.43 | 15 | 45 |

| | | | | | | | | Exchangeable Cations | | | | | | | Saturation extract | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Locat | Landuse | Rep | Samp | UD | LD | Moisture (%) | Clay (%) | CEC (cmol(+) /kg) | Ca (cmol(+) /kg) | Mg (cmol(+) /kg) | Na (cmol(+) /kg) | K (cmol(+) /kg) | Al (cmol(+) /kg) | Mn (cmol(+) /kg) | $H_2O$ % | pH | ECe (mS/m) | Ca (me/L) | Mg (me/L) | Na (me/L) | K (me/L) | S (me/L) | SAR |
| **Condingup** | | | | | | | | | | | | | | | | | | | | | | | |
| CO | L | 1 | A | 0 | 10 | 0 | 1.2 | | 1.45 | 0.29 | 0.03 | 0.07 | 0.11 | 0.02 | | | | | | | | | |
| CO | L | 1 | B | 10 | 20 | 0 | 2.0 | | 0.4 | 0.1 | 0.02 | 0.05 | 0.17 | <0.02 | | | | | | | | | |
| CO | L | 1 | C | 20 | 30 | 0 | 1.6 | | 0.22 | 0.06 | <0.02 | 0.04 | 0.14 | <0.02 | | | | | | | | | |
| CO | L | 1 | D | 30 | 40 | 1 | 2.4 | | 0.36 | 0.1 | 0.02 | 0.06 | 0.16 | <0.02 | | | | | | | | | |
| CO | L | 1 | E | 40 | 70 | 10 | 46.5 | 12 | 3.67 | 4.15 | 0.4 | 0.84 | | | | | | | | | | | |
| CO | L | 1 | F | 70 | 100 | 10 | 39.9 | 11 | 3.43 | 4.08 | 0.5 | 0.87 | | | | | | | | | | | |
| CO | S | 1 | A | 0 | 10 | 0 | 1.3 | | 1.87 | 0.45 | 0.04 | 0.06 | 0.1 | 0.04 | | | | | | | | | |
| CO | S | 1 | B | 10 | 20 | 0 | 1.6 | | 0.63 | 0.15 | 0.02 | 0.03 | 0.14 | <0.02 | | | | | | | | | |
| CO | S | 1 | C | 20 | 30 | 0 | 1.6 | | 0.4 | 0.09 | 0.02 | 0.02 | 0.05 | <0.02 | | | | | | | | | |
| CO | S | 1 | D | 30 | 40 | 0 | | | | | | | | | | | | | | | | | |
| CO | S | 1 | E | 40 | 60 | 0 | 5.5 | | 0.97 | 0.49 | 0.07 | 0.07 | 0.04 | <0.02 | | | | | | | | | |
| CO | S | 1 | F | 60 | 90 | 1 | 43.5 | 11 | 2.18 | 5.02 | 1.3 | 0.49 | 0 | 0 | | | | | | | | | |
| CO | U | 1 | A | 0 | 10 | 0 | 1.2 | | 1.46 | 0.35 | 0.05 | 0.06 | 0.05 | <0.02 | | | | | | | | | |
| CO | U | 1 | B | 10 | 20 | 0 | 1.0 | | 0.91 | 0.33 | 0.06 | 0.06 | 0.06 | <0.02 | | | | | | | | | |
| CO | U | 1 | C | 20 | 30 | 0 | 1.0 | | 0.45 | 0.2 | 0.06 | 0.04 | 0.03 | <0.02 | | | | | | | | | |
| CO | U | 1 | D | 30 | 55 | 0 | 1.7 | 1 | 0.28 | 0.23 | 0.07 | 0.04 | | | | | | | | | | | |
| CO | U | 1 | E | 55 | 65 | 0 | 2.4 | 1 | 0.43 | 0.32 | 0.07 | 0.07 | | | | | | | | | | | |
| CO | U | 1 | F | 65 | 95 | 1 | 49.1 | | 1.53 | 6.37 | 1.97 | 0.4 | <0.02 | <0.02 | | | | | | | | | |
| CO | U | 1 | F | 65 | 95 | 0 | | | 13 | 0.013 | 19 | 6200 | 5.08 | 9.56 | 87 | 0.008 | <10 | 3700 | 3.26 | 2.86 | 0.38 | | 7.16 |

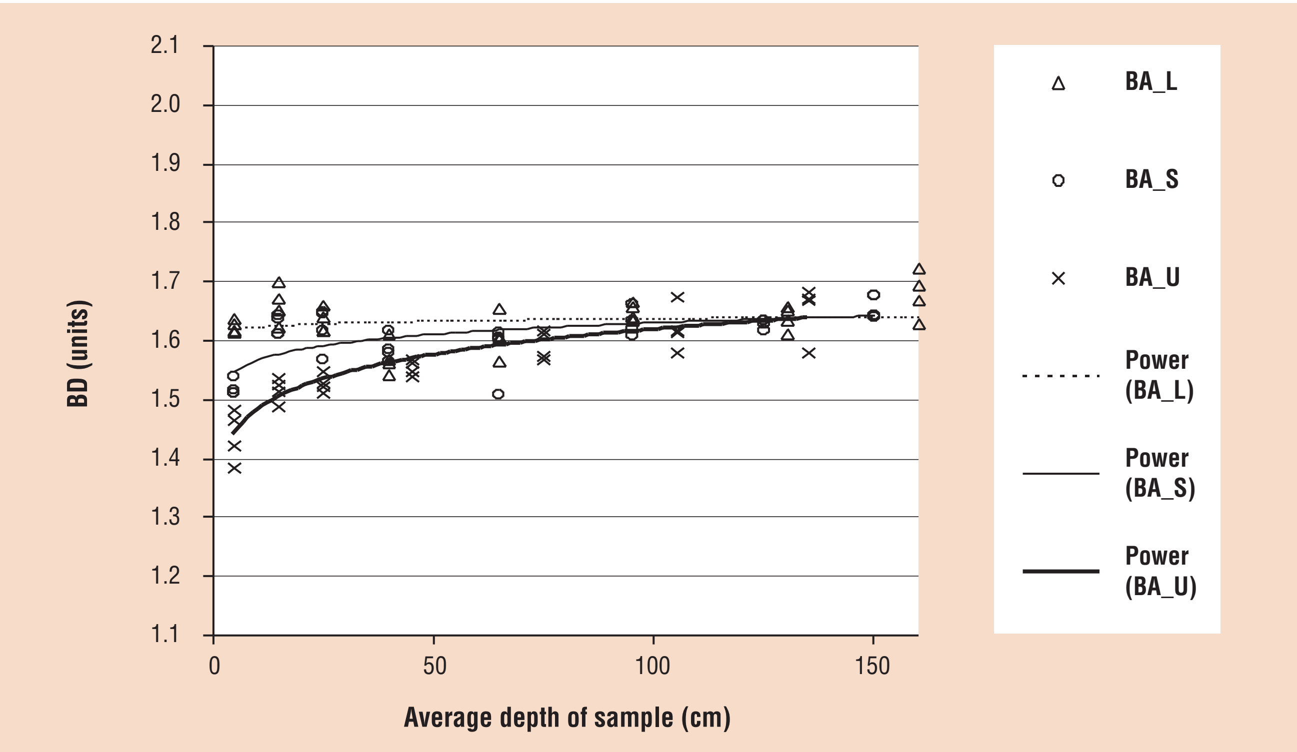
# APPENDIX 5

## Bulk Density by Average Depth of Sample

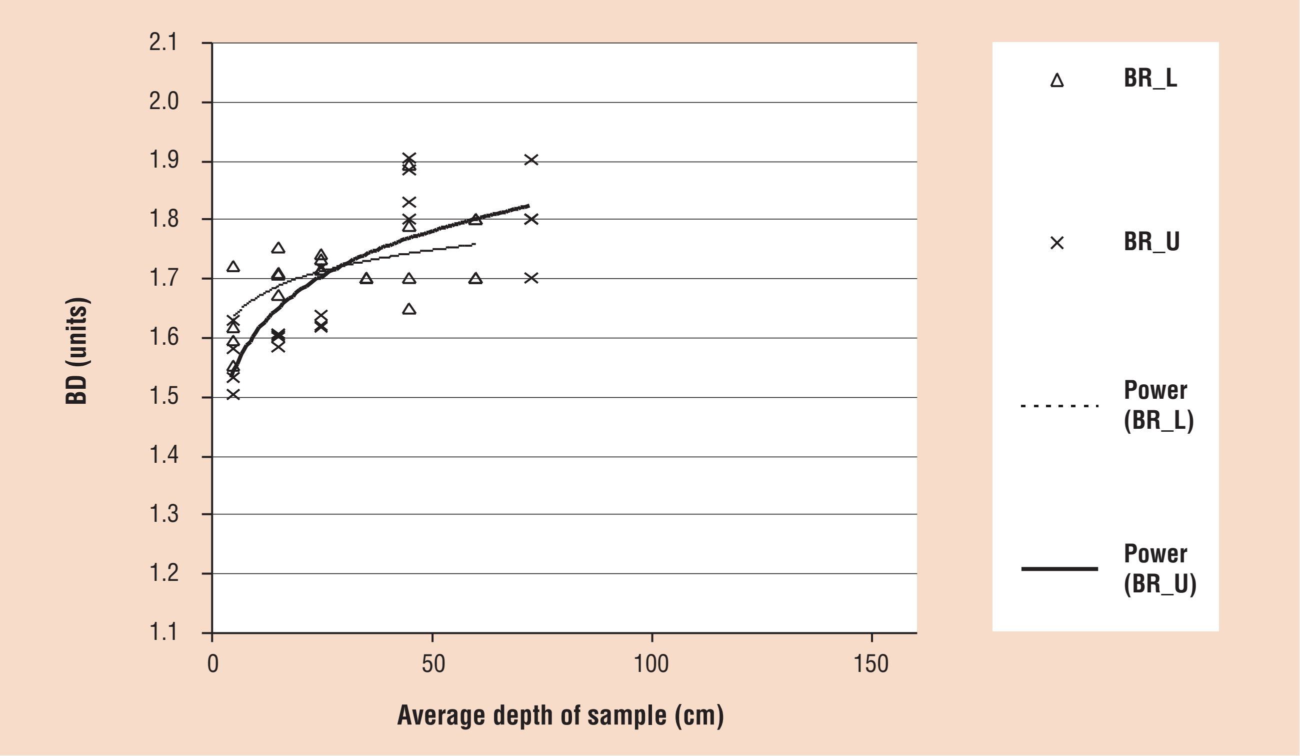
# TABLE OF CONTENTS



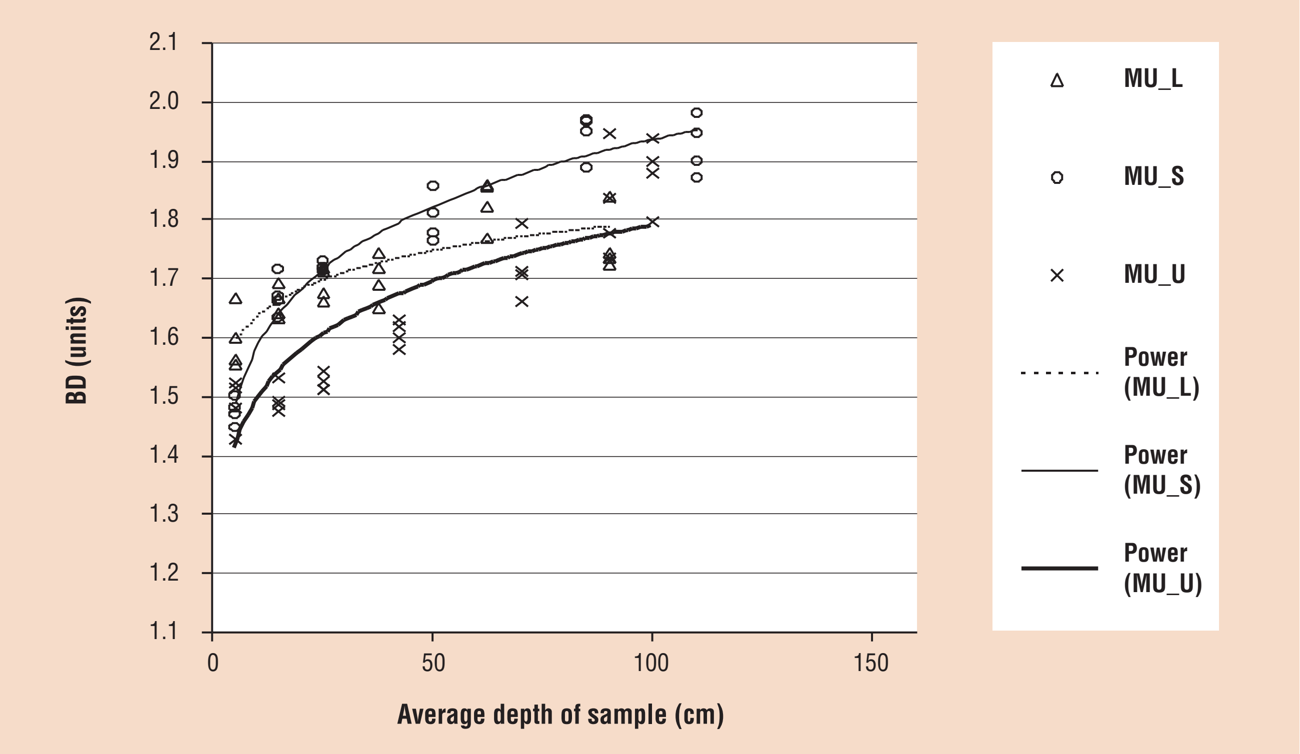

**Northampton**



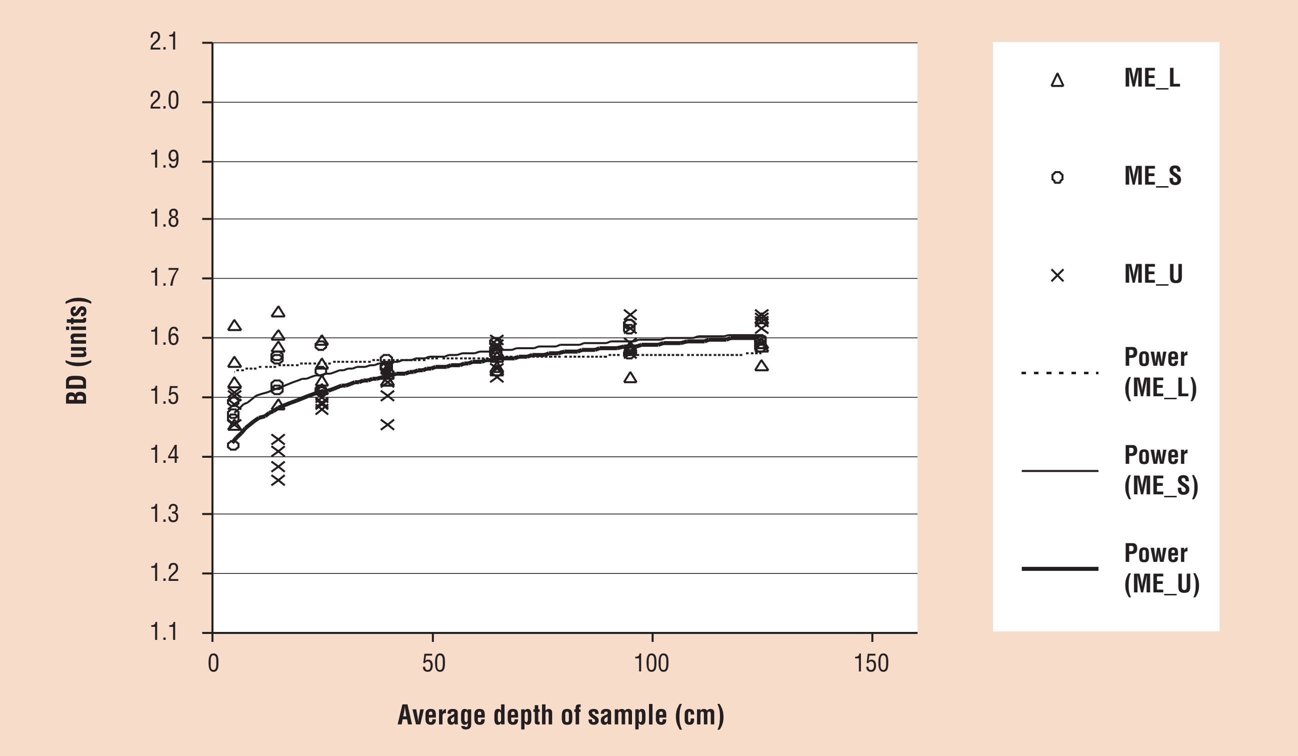

**Badgingarra**



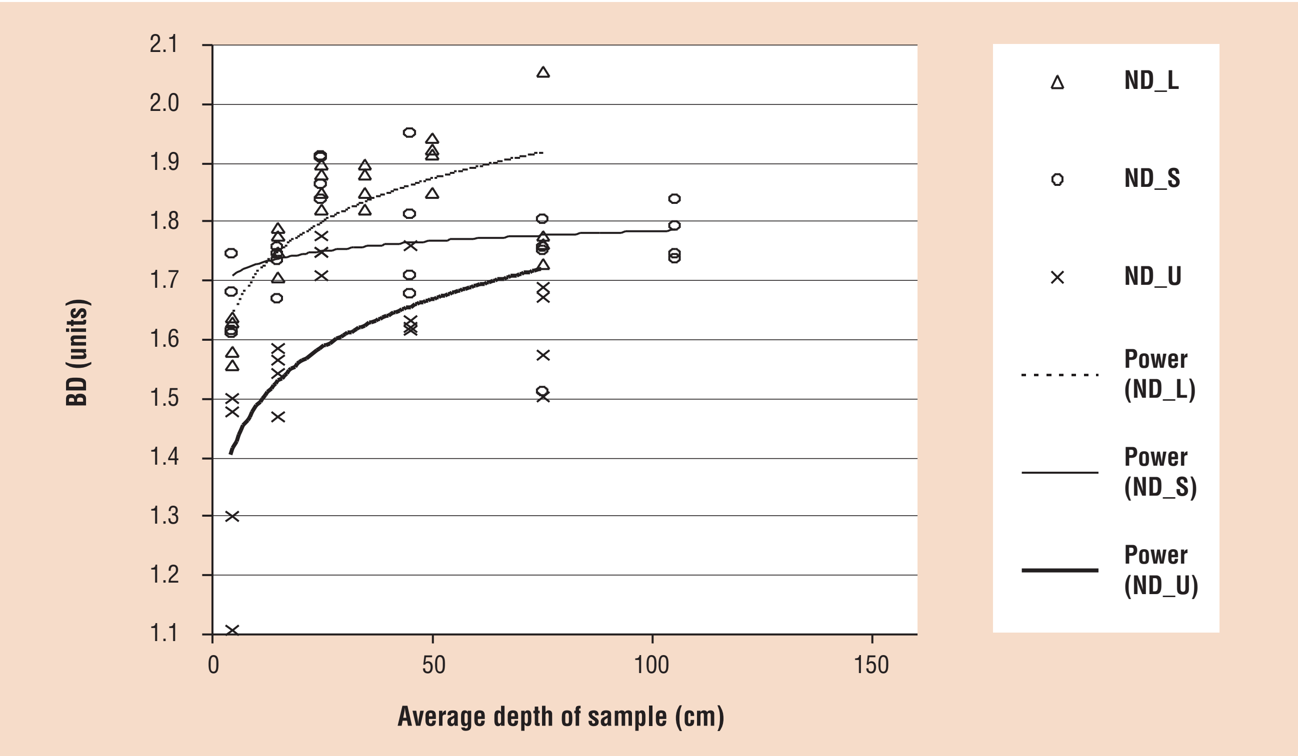

**Brookton**



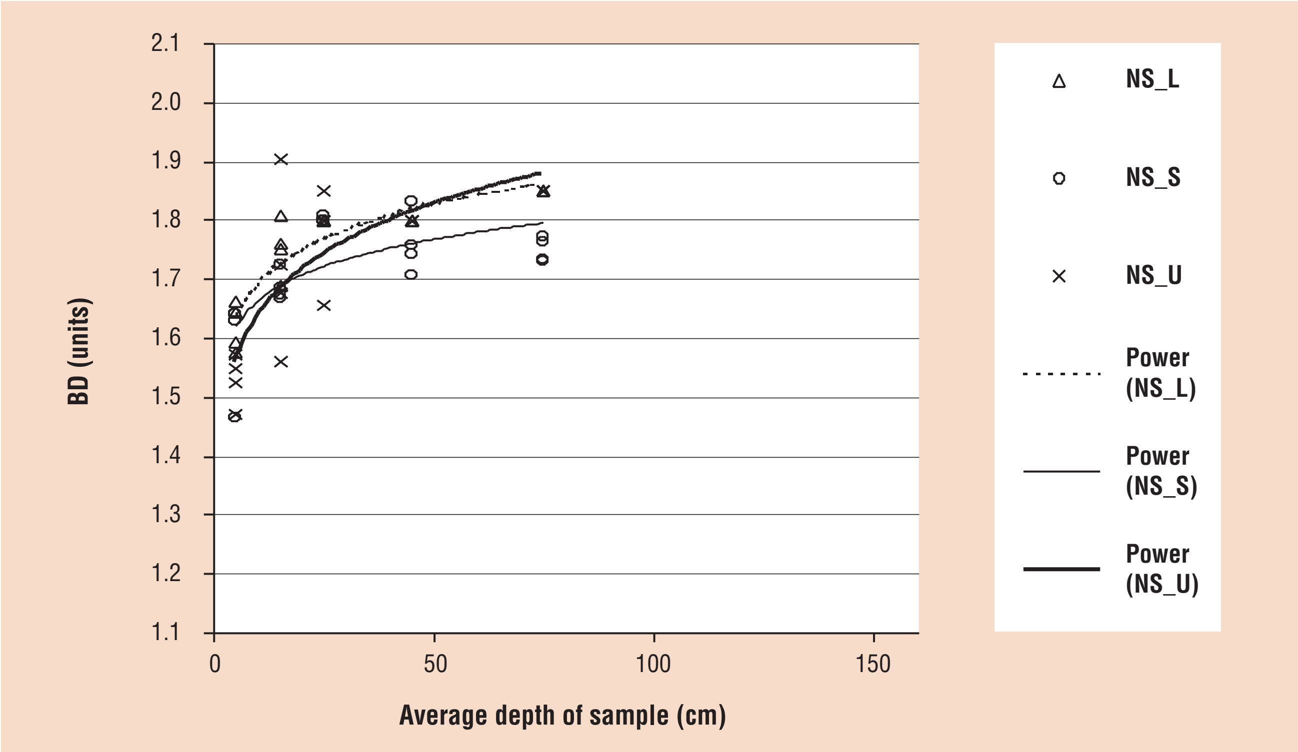

**Mullewa**



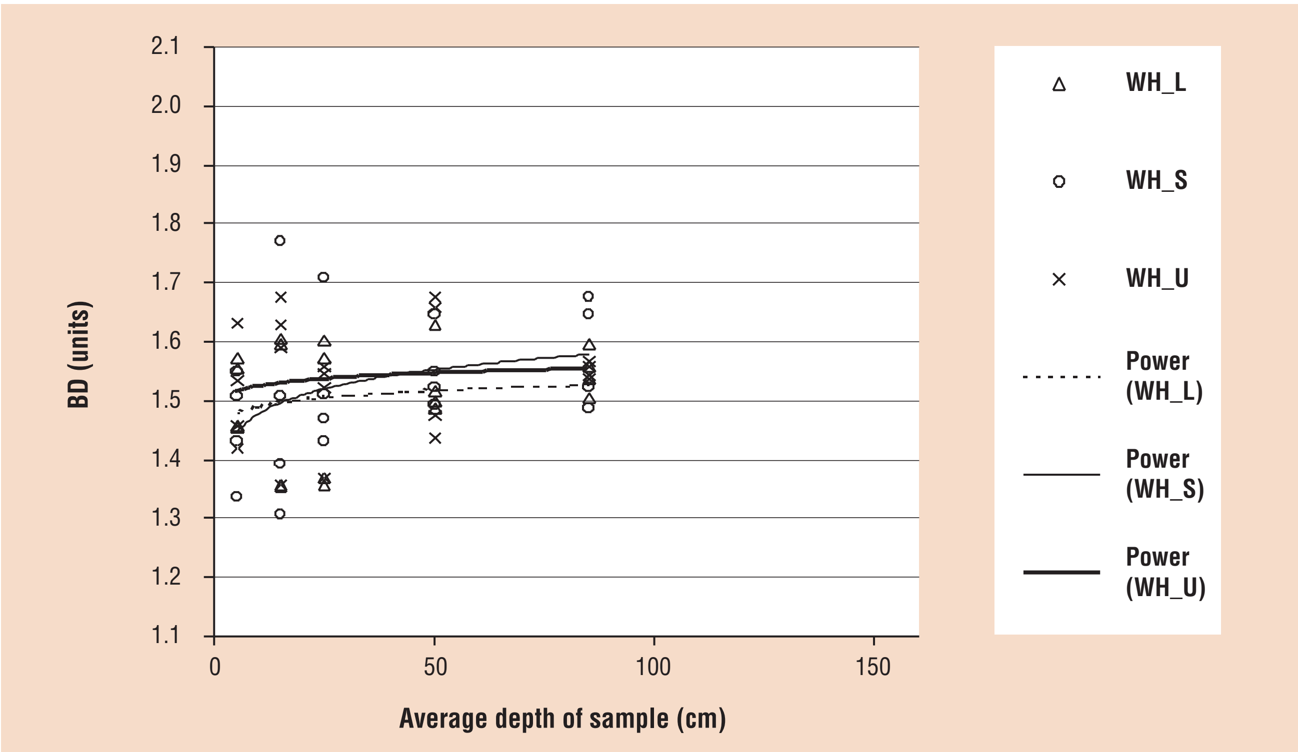

Merredin



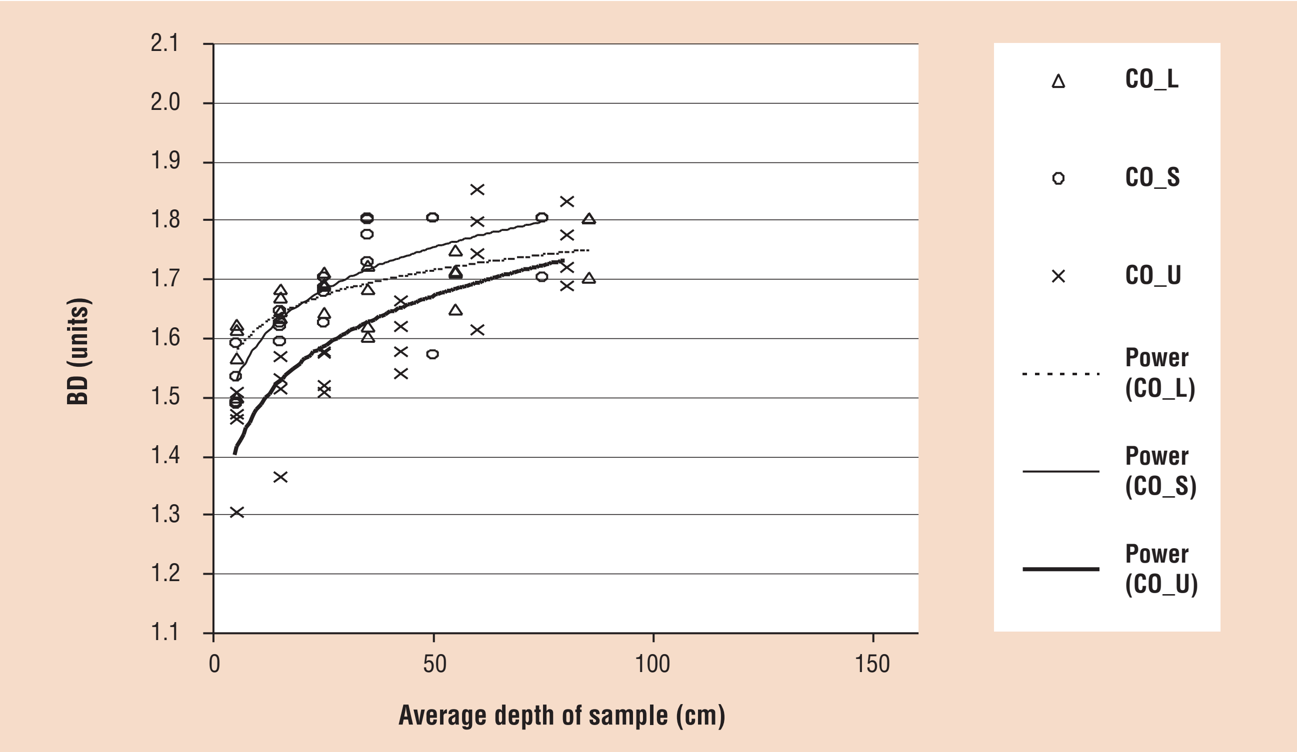

Newdegate (deep)




Newdegate (shallow)




Wittenoom Hills



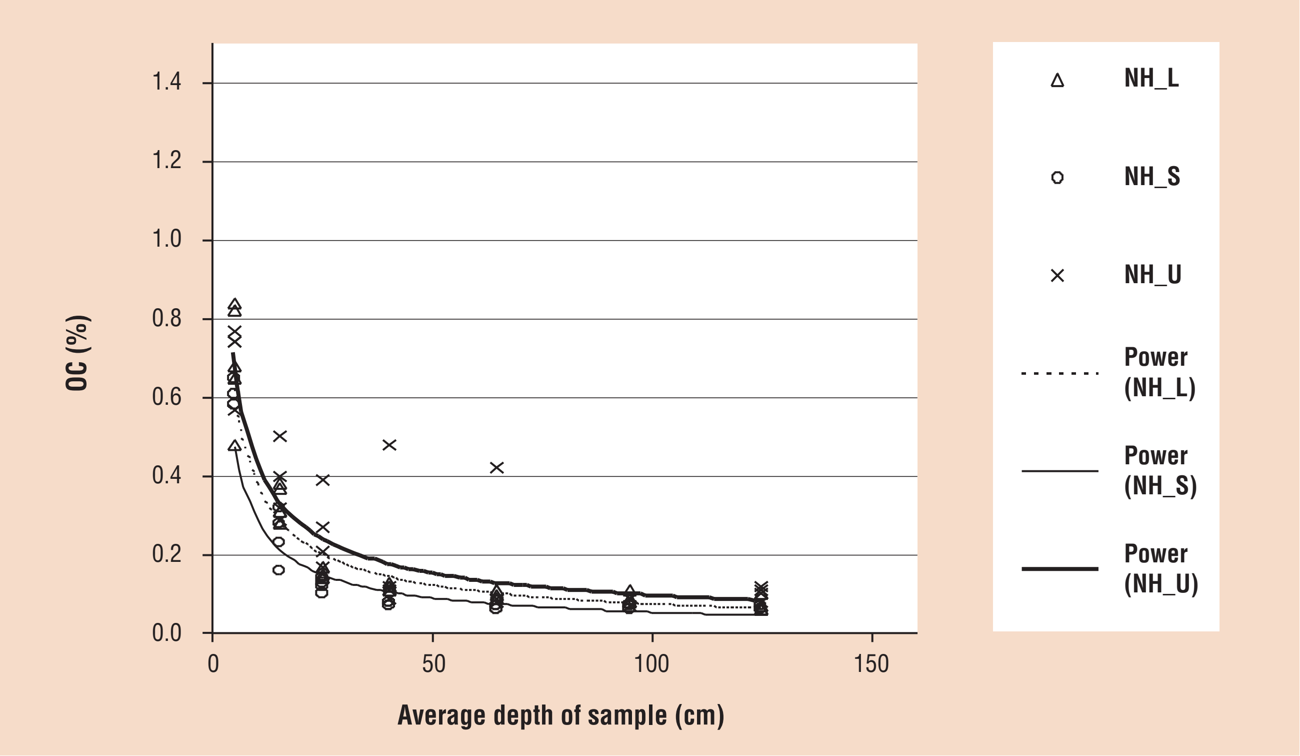
BD (units)
2.1
2.0
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
0
50
100
150
Average depth of sample (cm)
CO_L
CO_S
CO_U
Power (CO_L)
Power (CO_S)
Power (CO_U)


**Condingup**

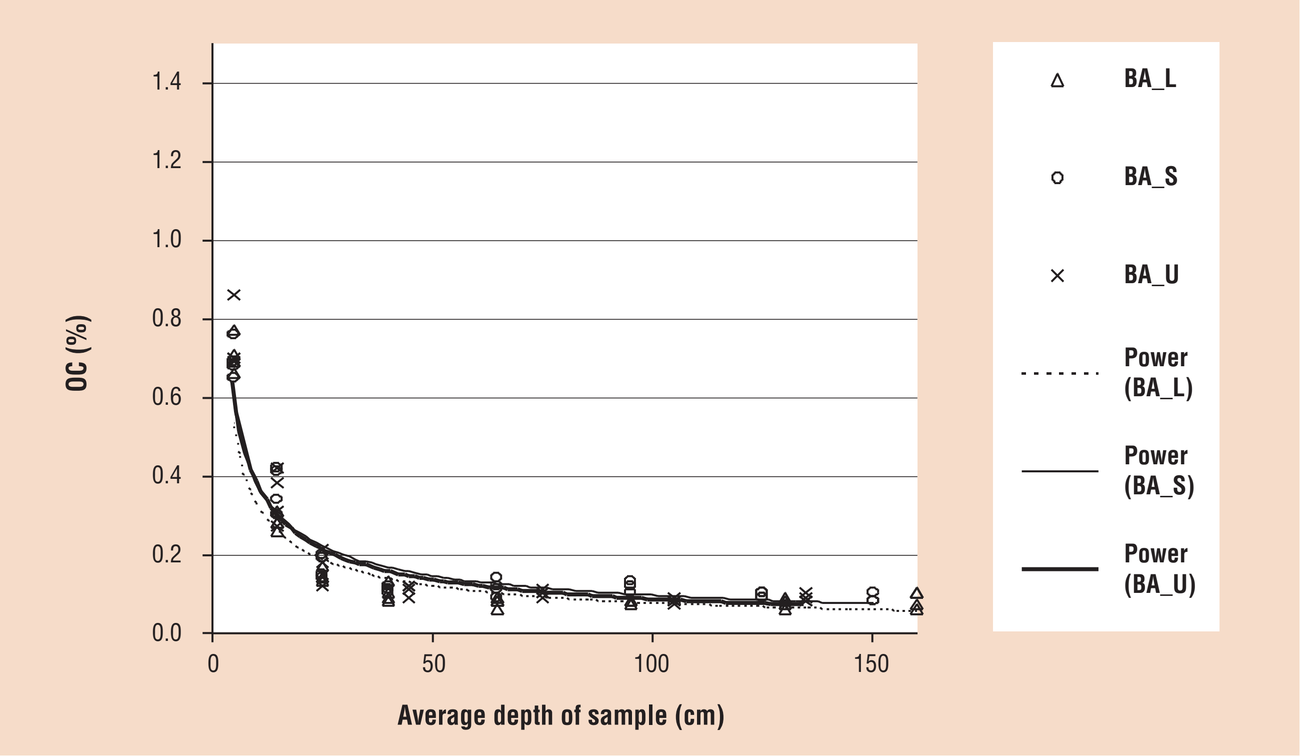
# APPENDIX 6

## Organic Carbon (following Walkley and Black, %) in Fine Earth Fraction by Average Sample Depth

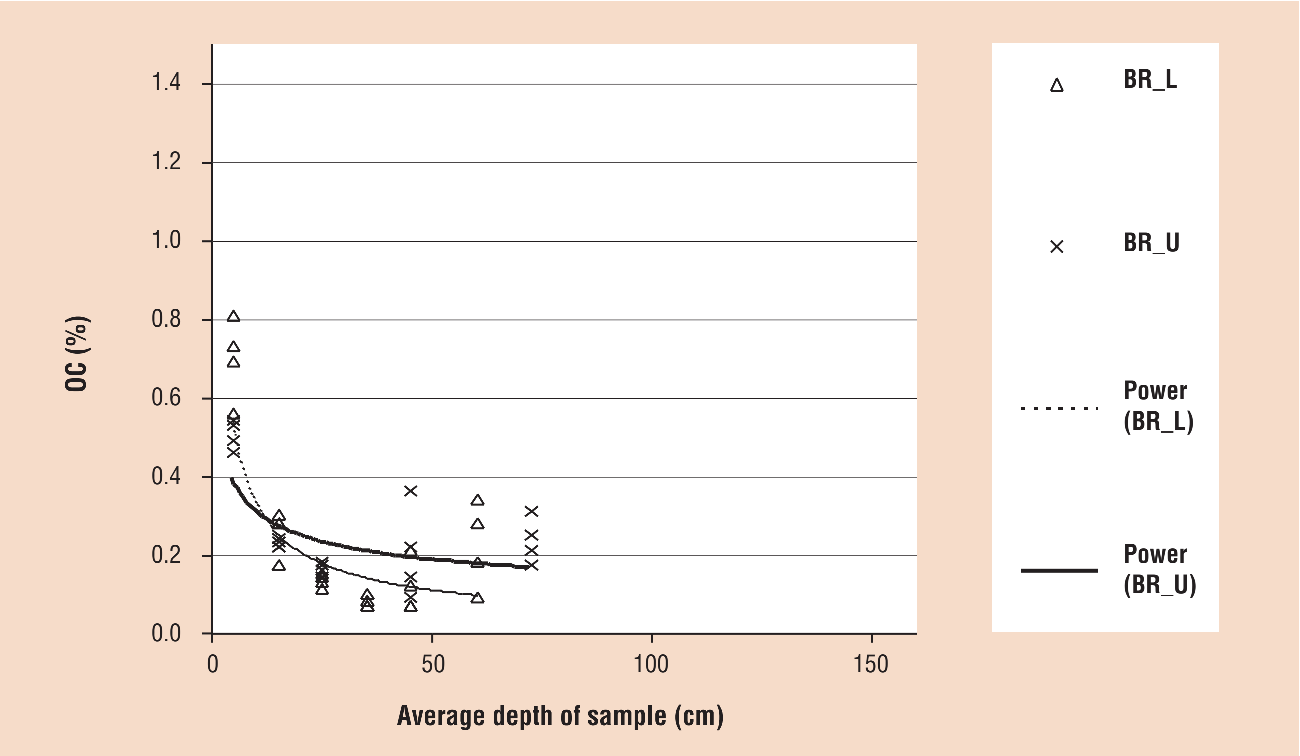
# TABLE OF CONTENTS



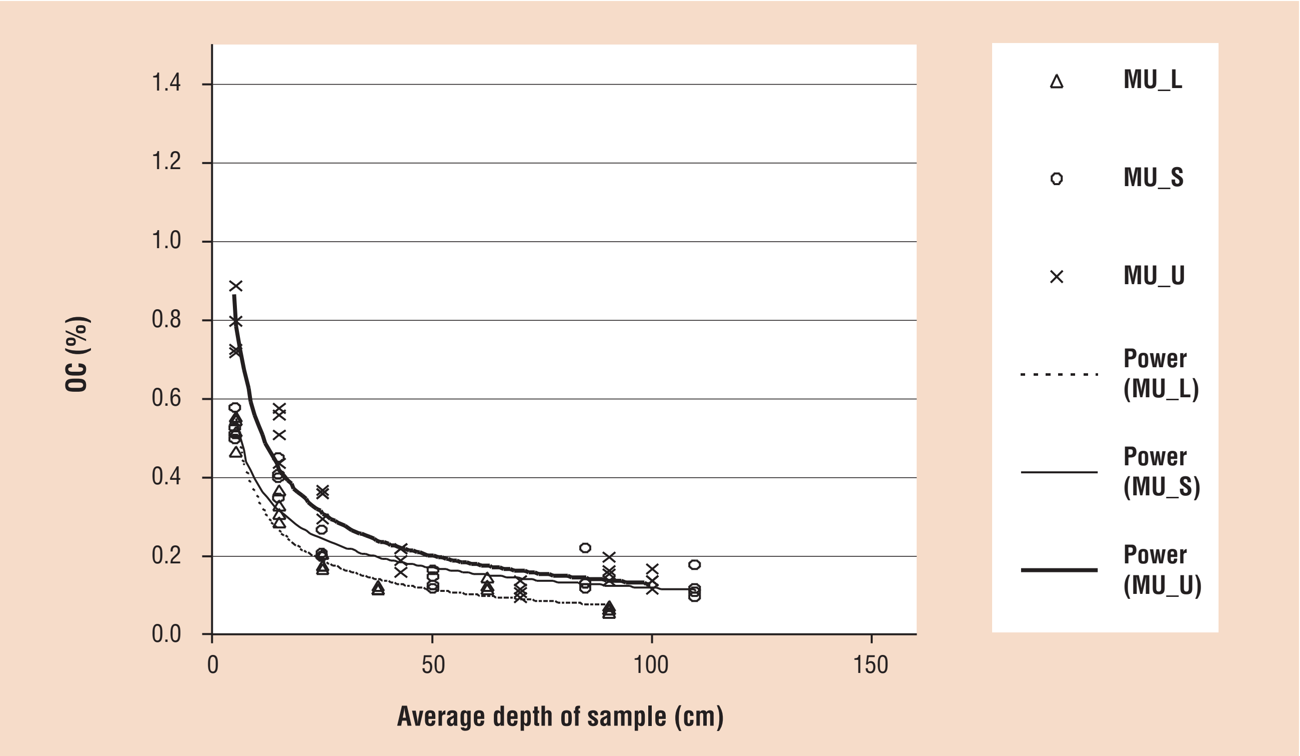

**Northampton**



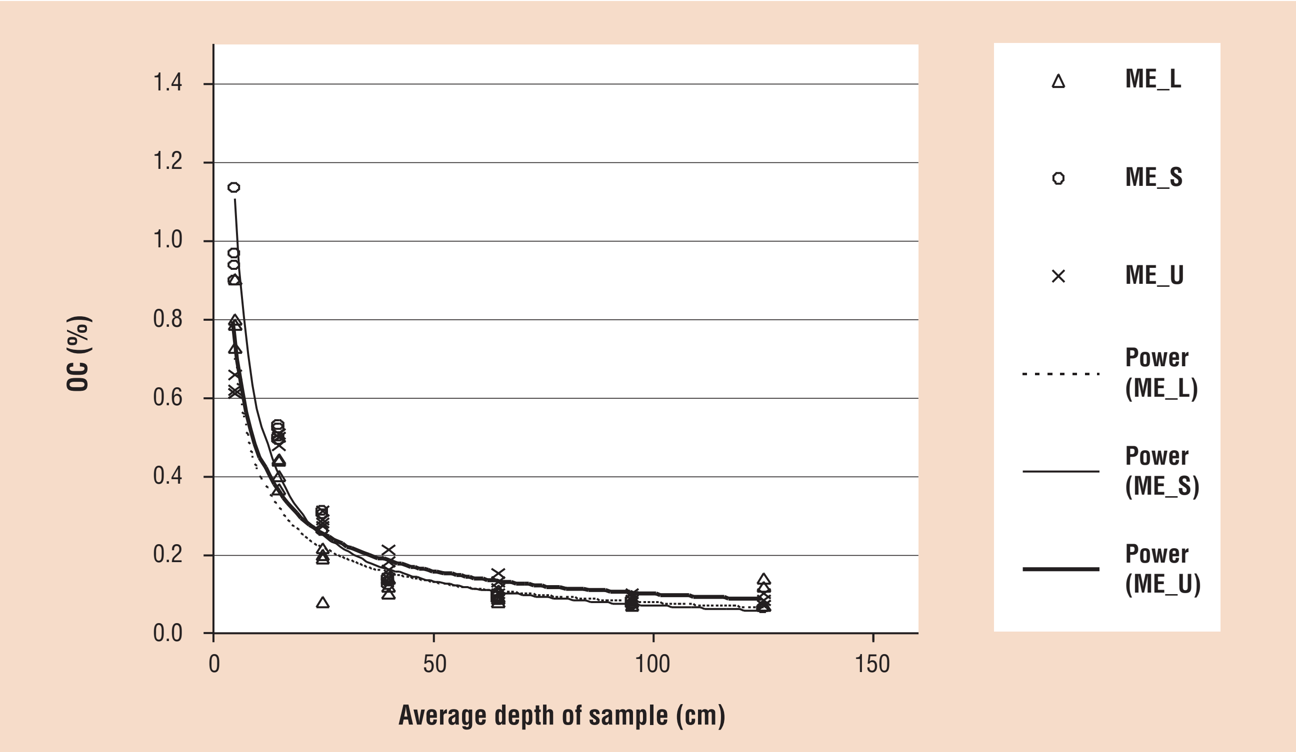

**Badgingarra**



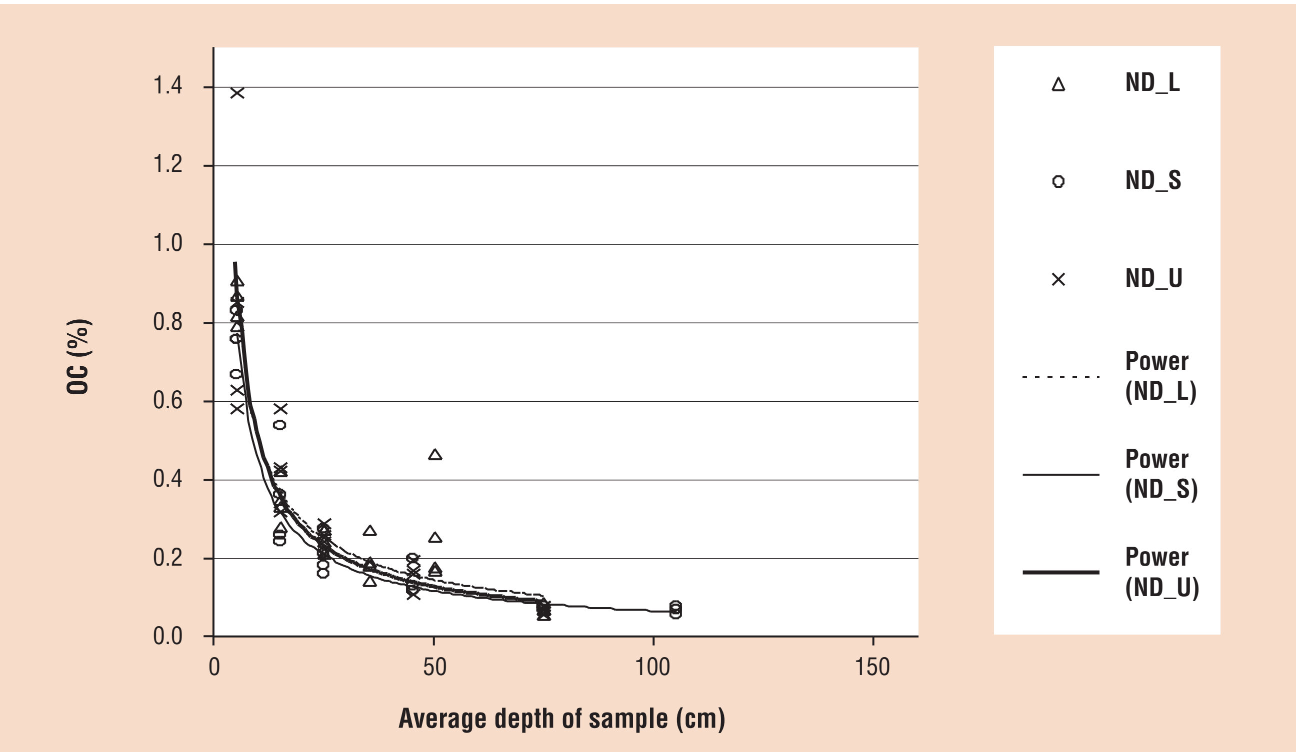

**Brookton**



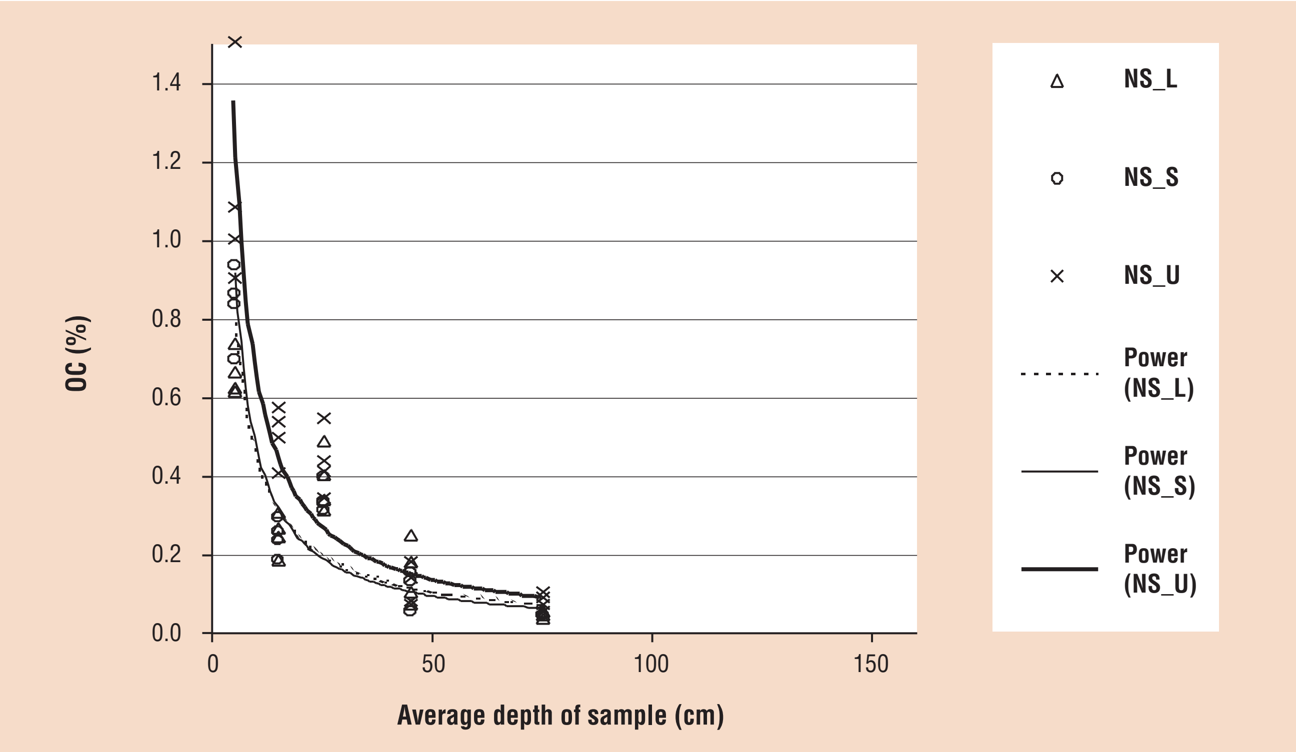

**Mullewa**



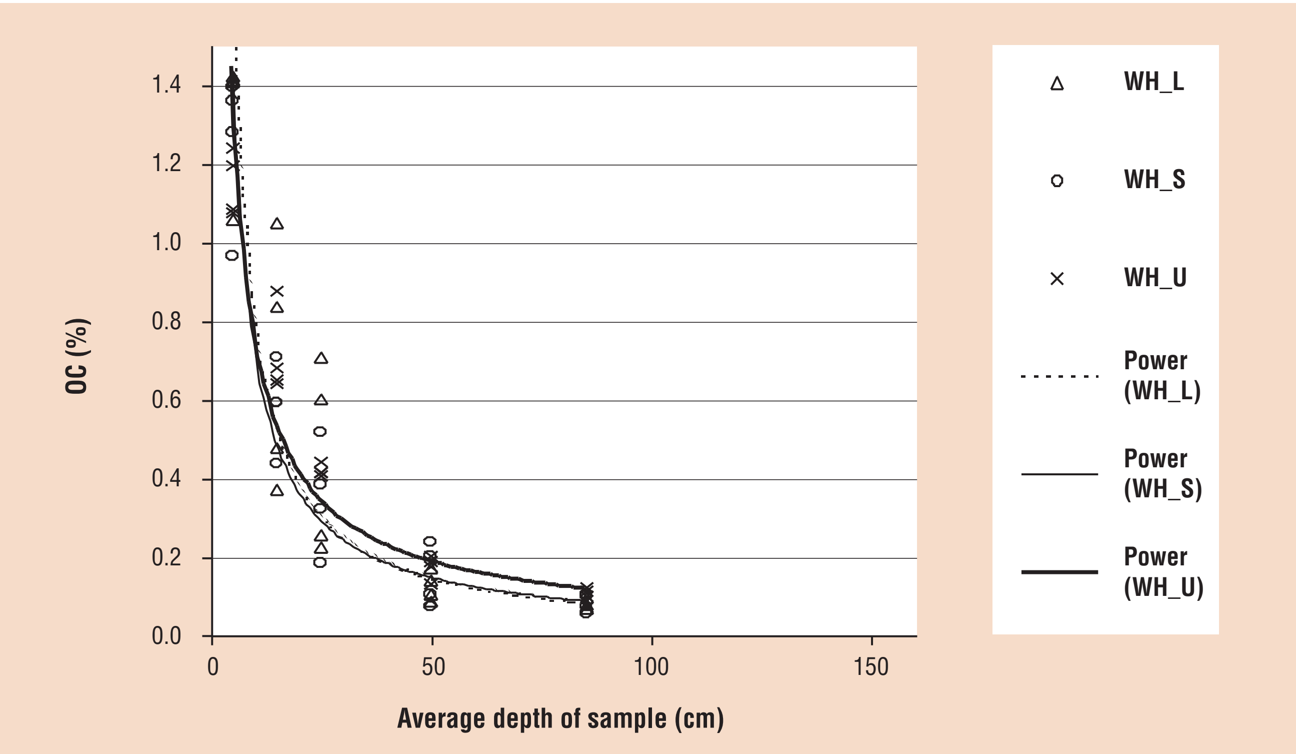

**Merredin**



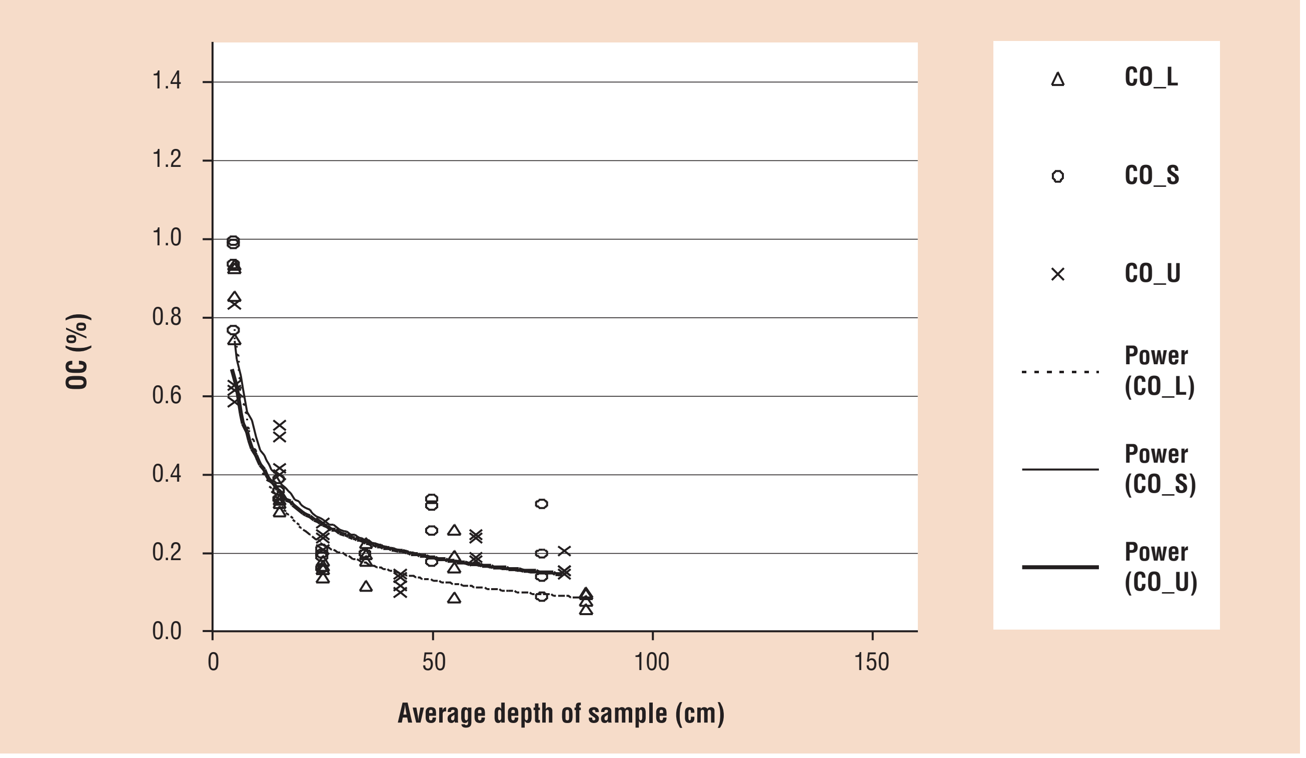

**Newdegate (deep)**




Newdegate (shallow)




Wittenoom Hills



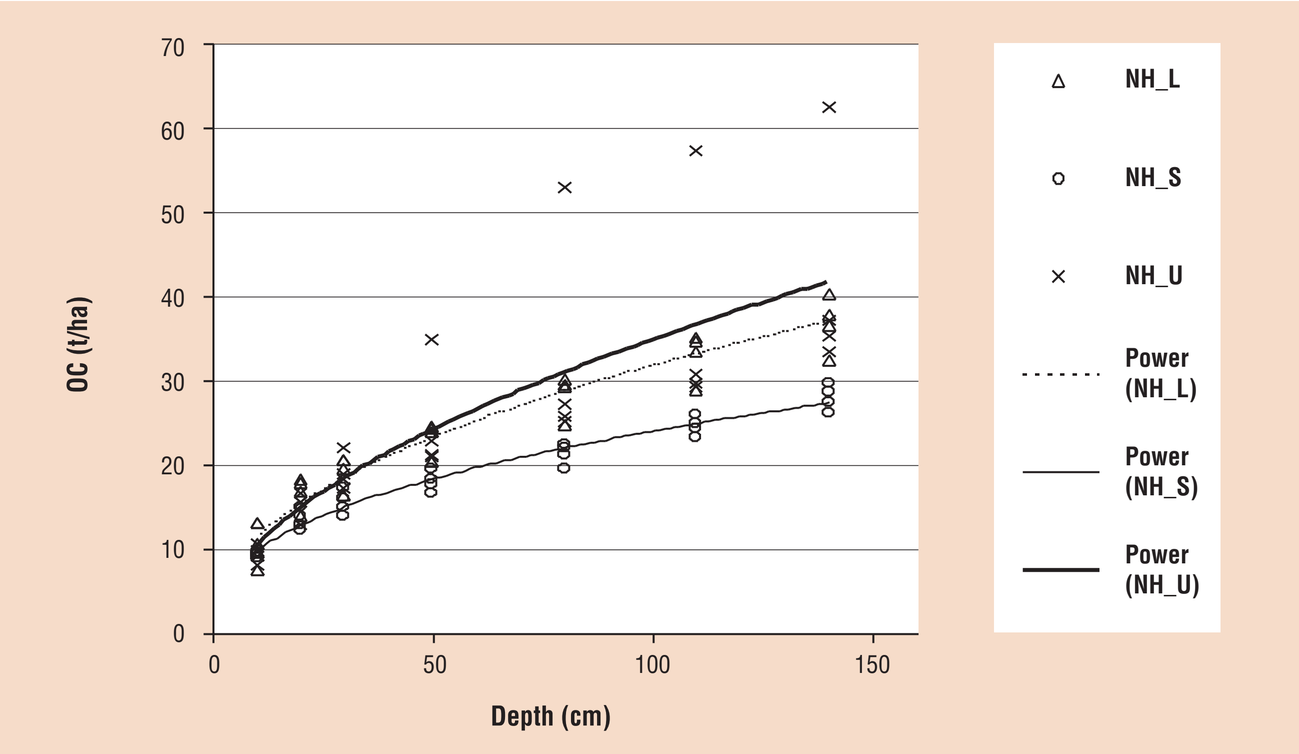
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
OC (%)
0
50
100
150
Average depth of sample (cm)
CO_L
CO_S
CO_U
Power (CO_L)
Power (CO_S)
Power (CO_U)


## Condingup

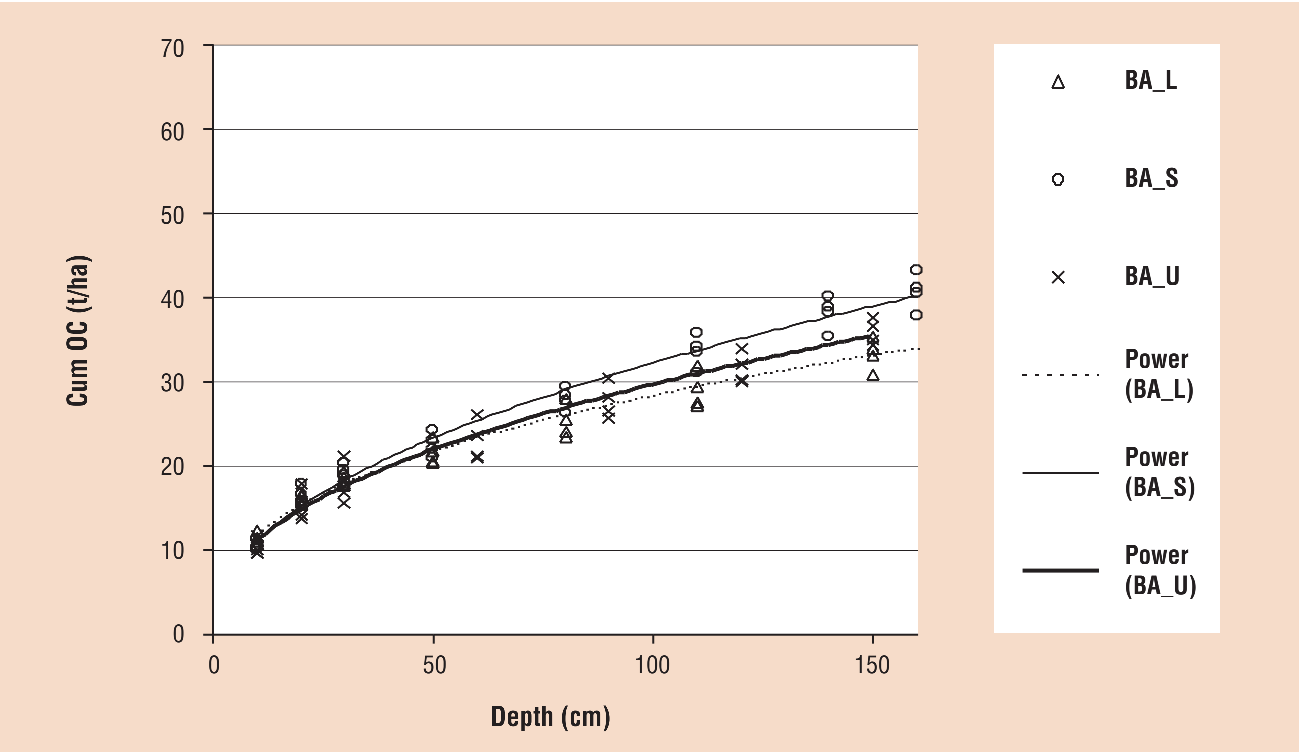
# APPENDIX 7

## Cumulative Organic Carbon (W & B, as t/ha) in Fine Earth Fraction by Mid Sample Depth

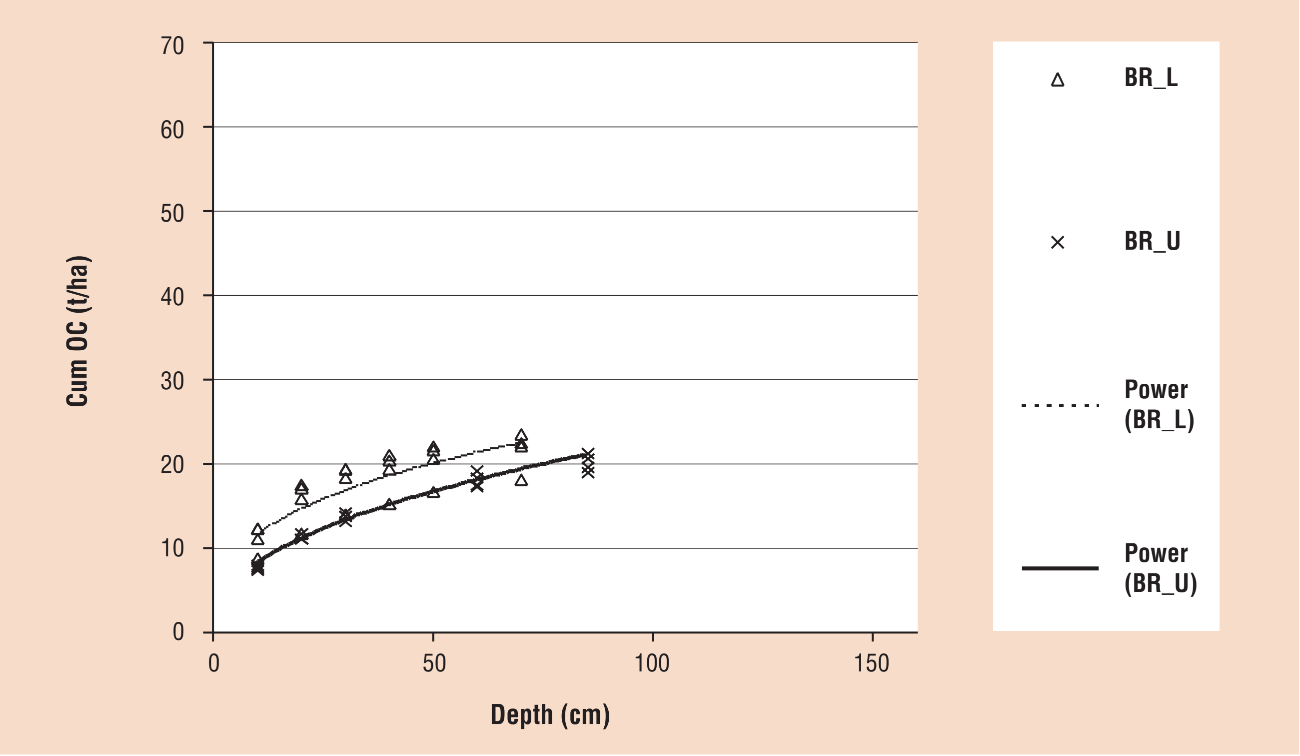
# TABLE OF CONTENTS



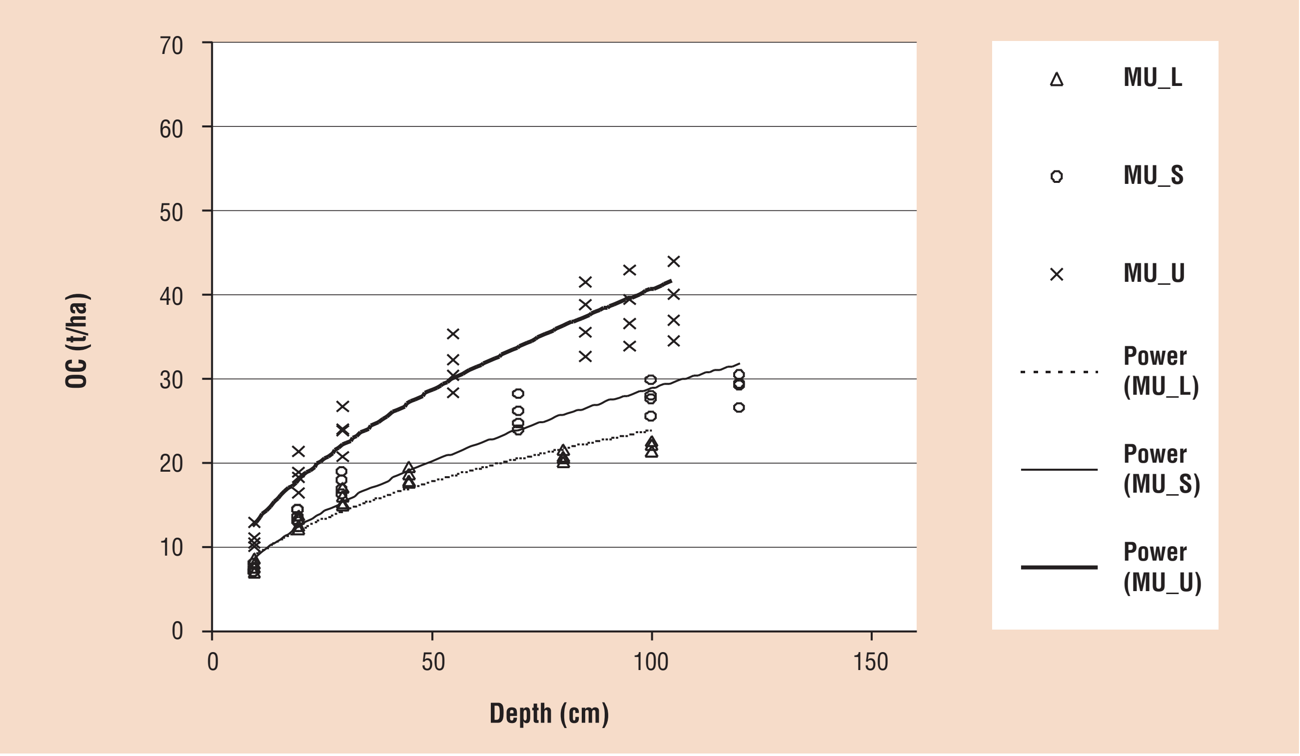

Northampton



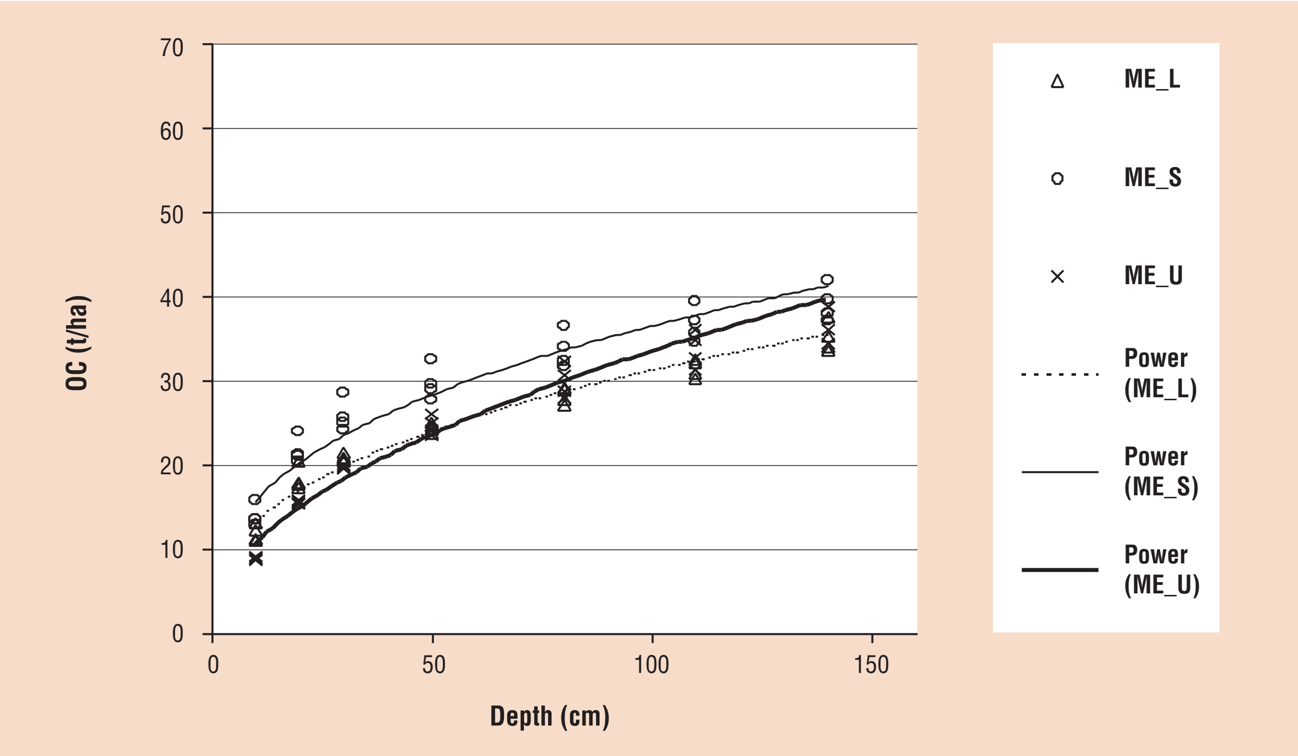

Badgingarra



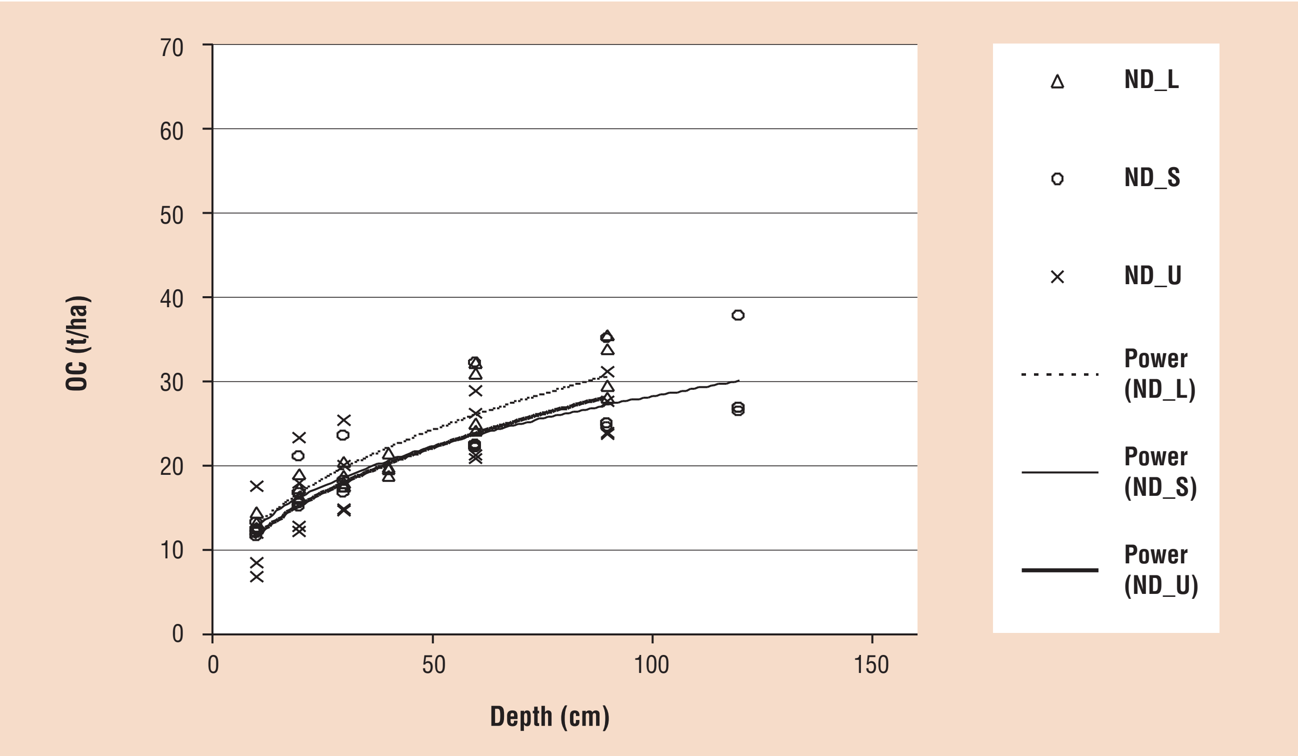

Brookton



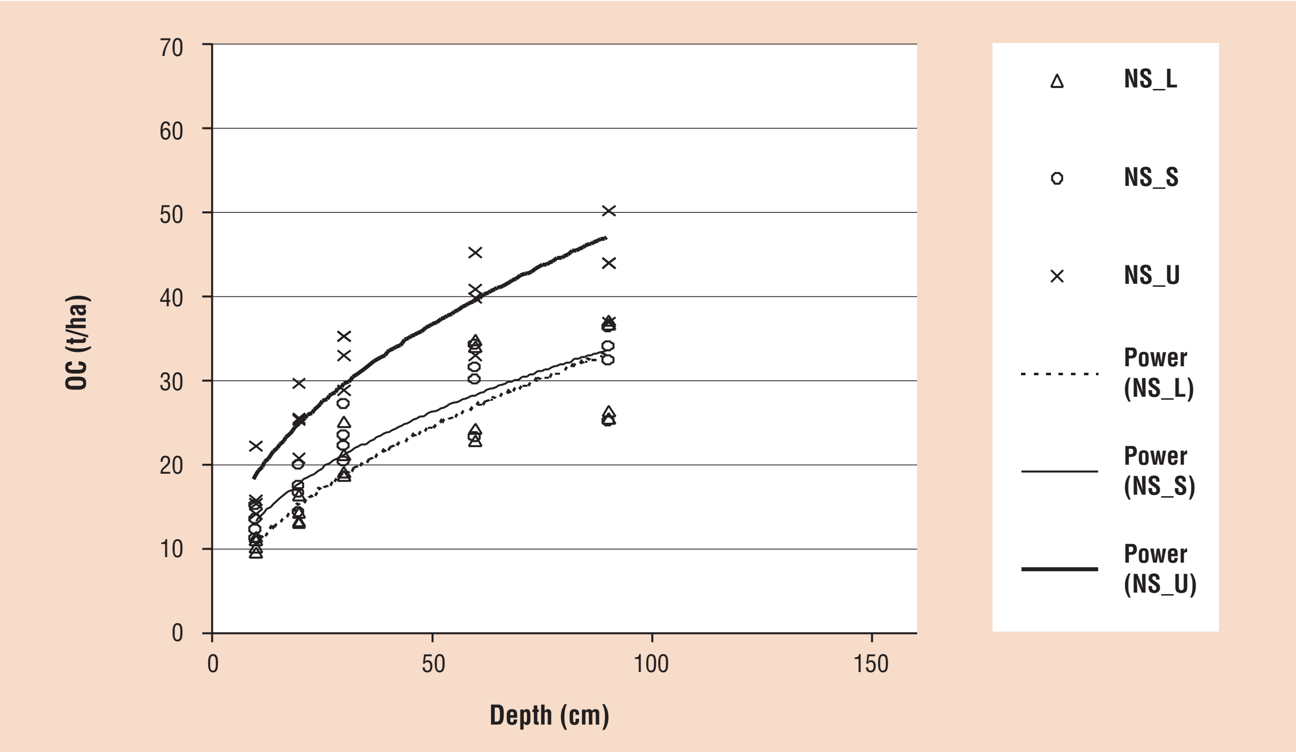

Mullewa



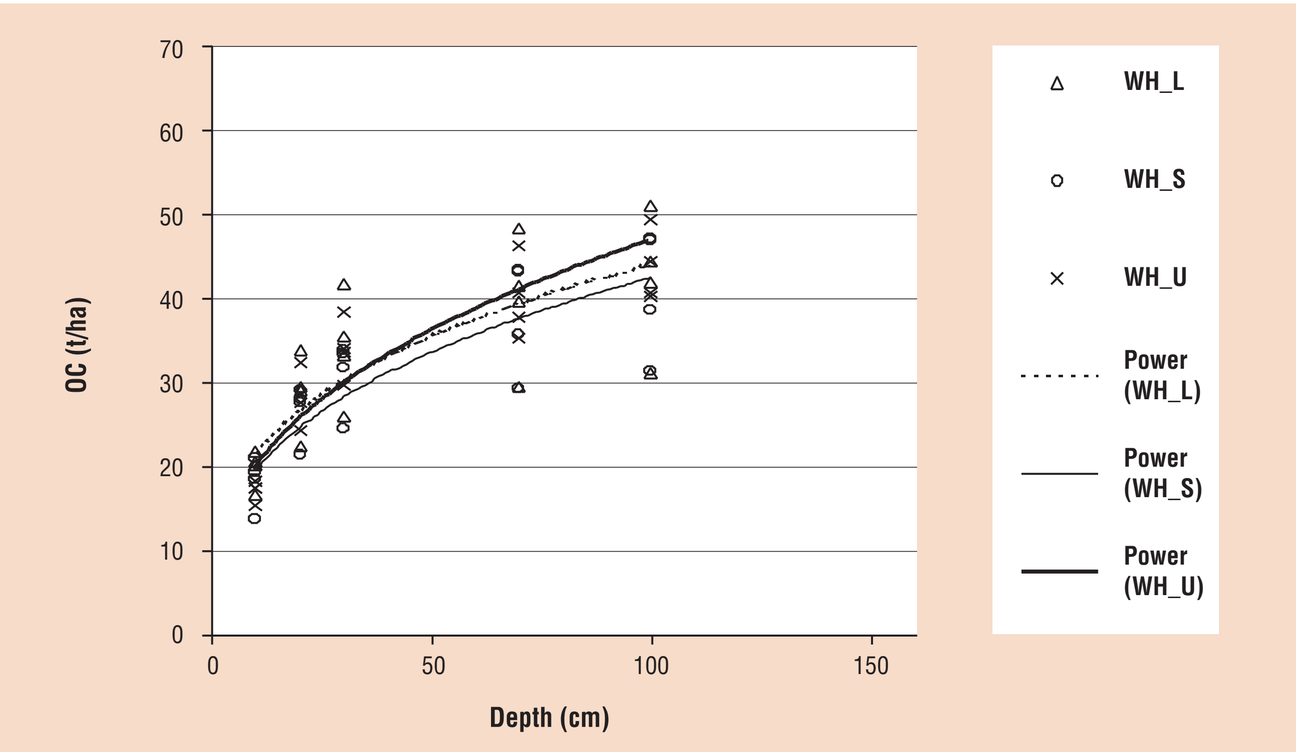

**Merredin**



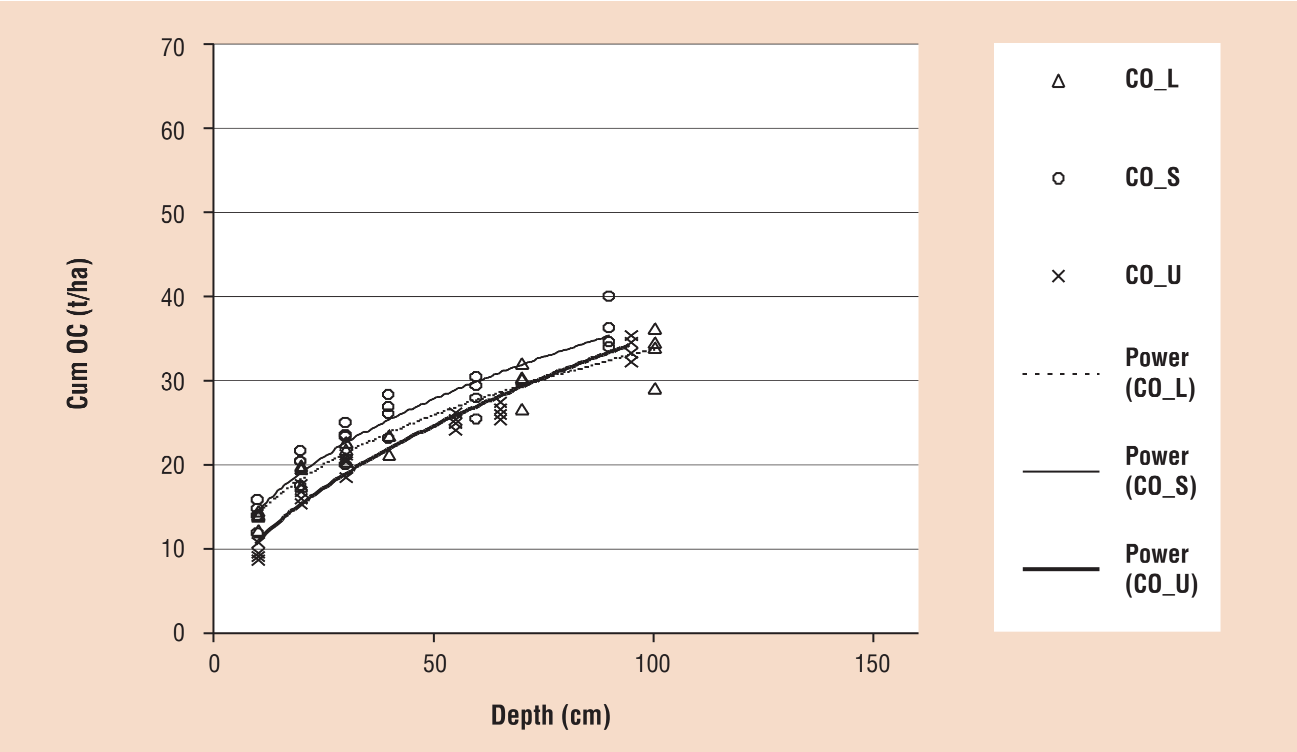

**Newdegate (deep)**




Newdegate (shallow)




Wittenoom Hills



Cum OC (t/ha)
70
60
50
40
30
20
10
0
0
50
100
150
Depth (cm)
CO_L
CO_S
CO_U
Power (CO_L)
Power (CO_S)
Power (CO_U)


**Condingup**

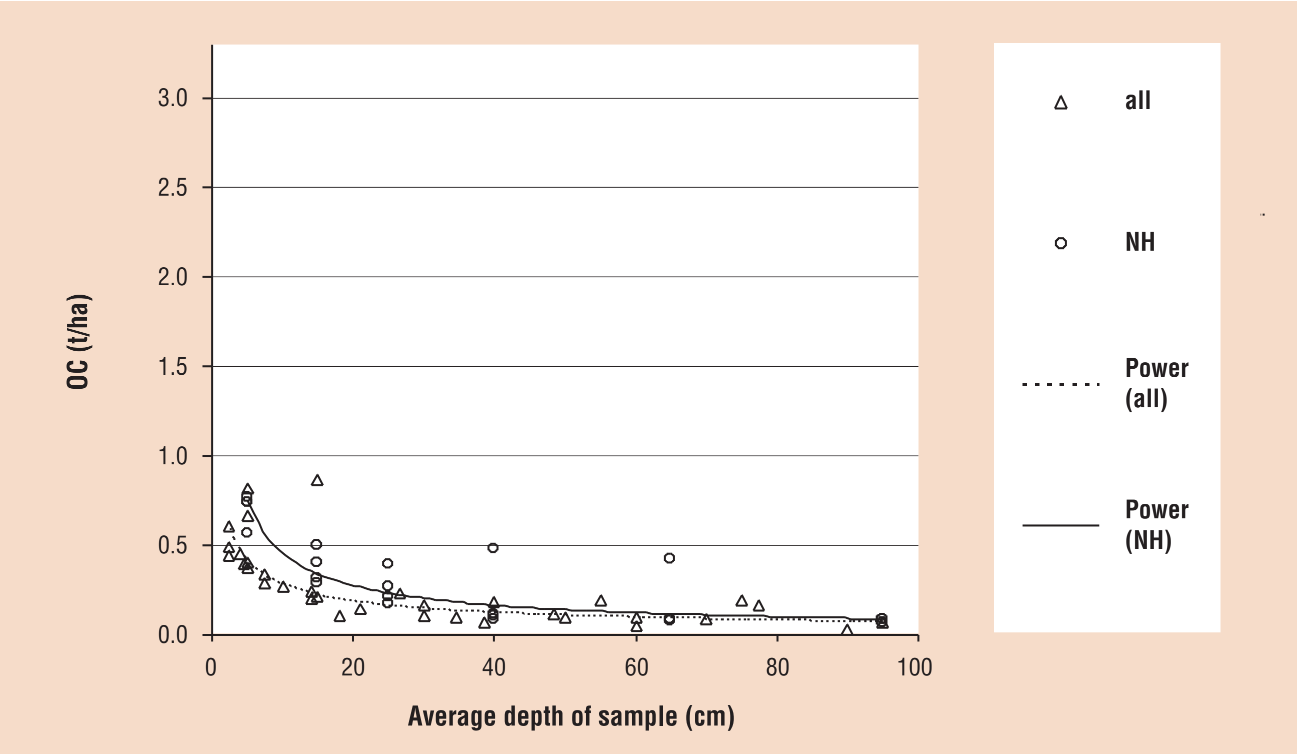
# APPENDIX 8

# Organic Carbon (W & B) in Fine Earth Fraction by Average Sample Depth

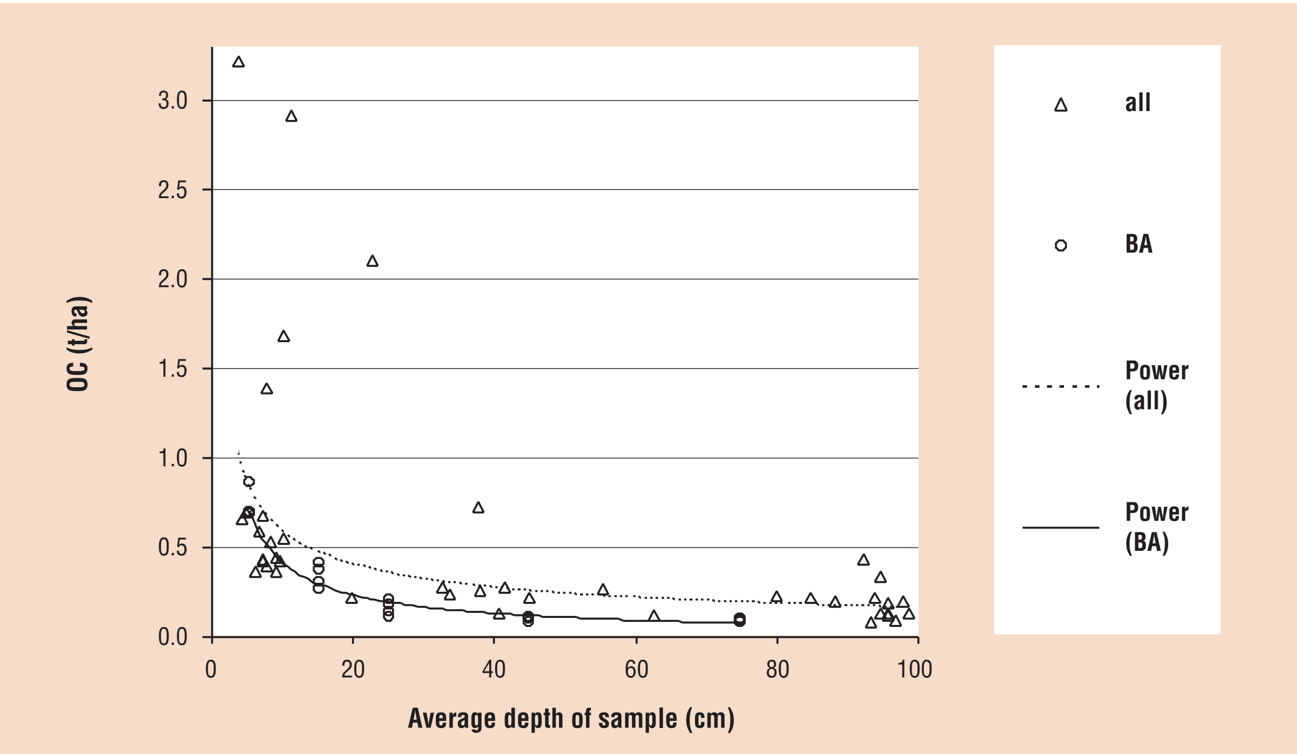
## Paired Sites Uncleared vs Report P7 Soil Data

## (Griffin and Schoknecht, 2000)

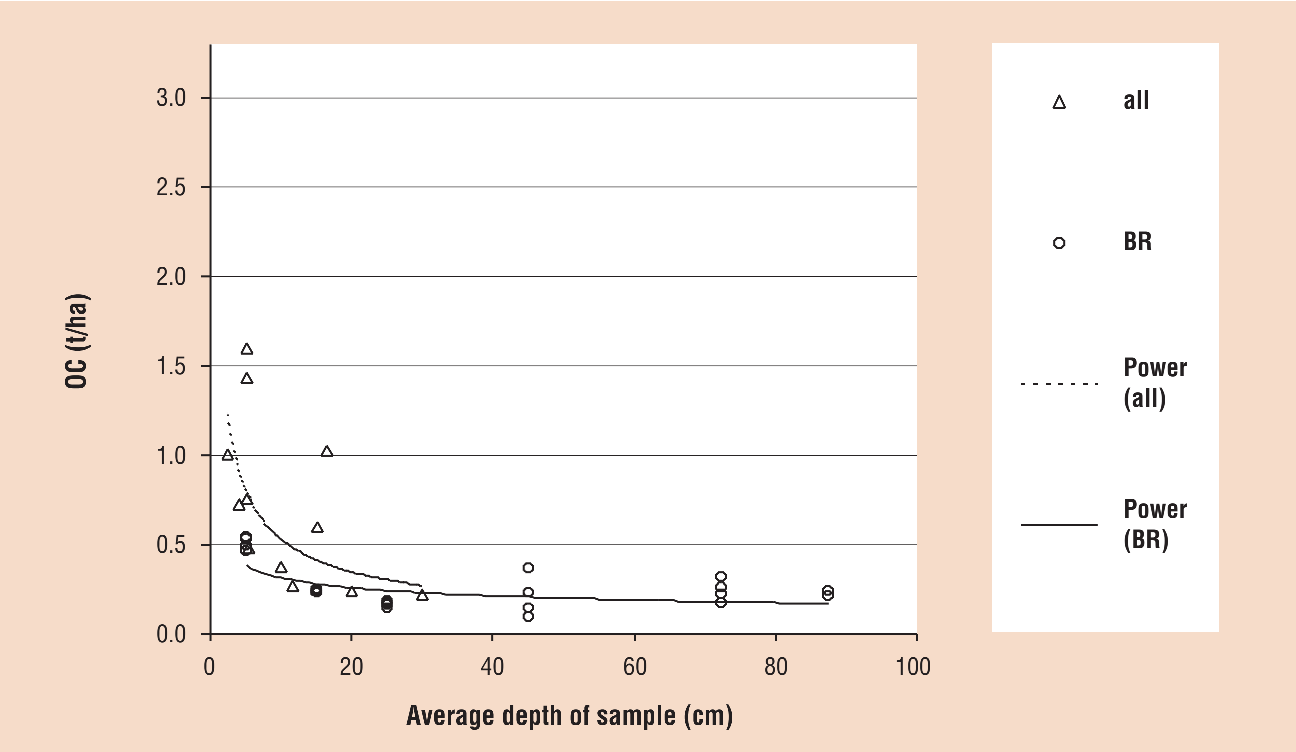
# TABLE OF CONTENTS



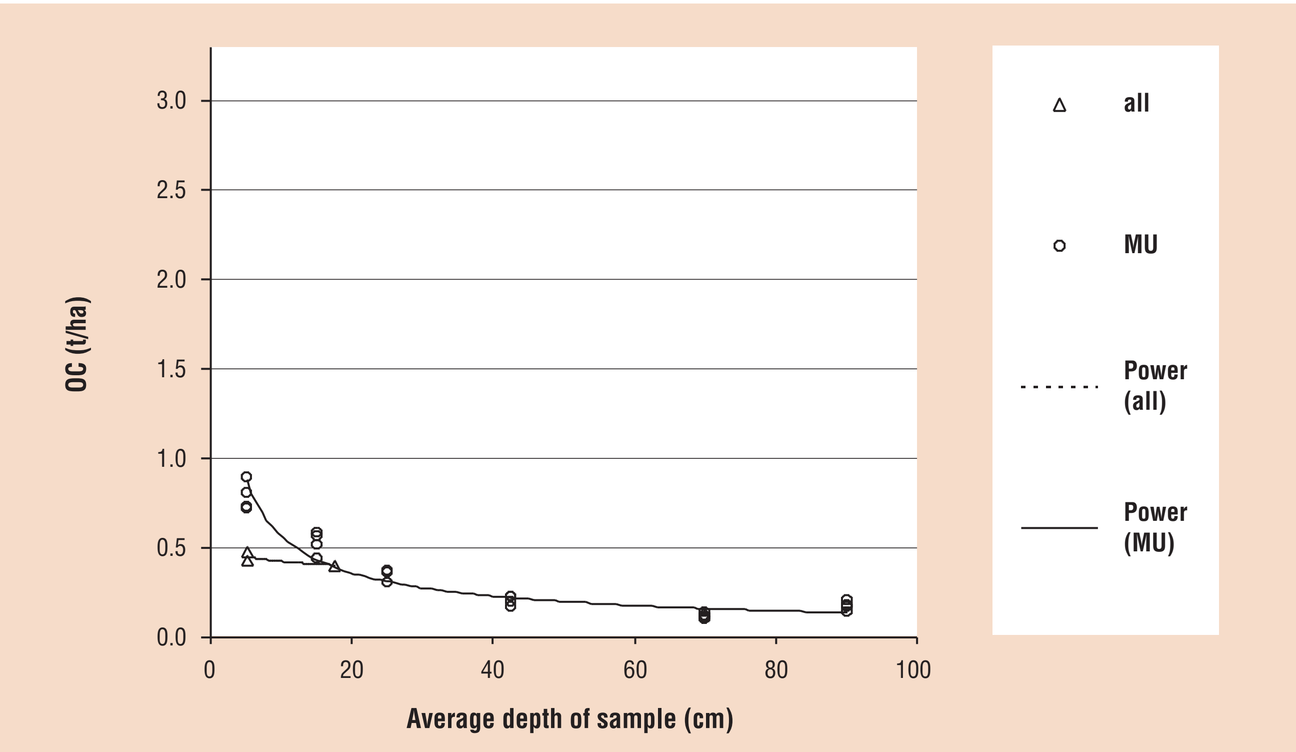

**Northampton**



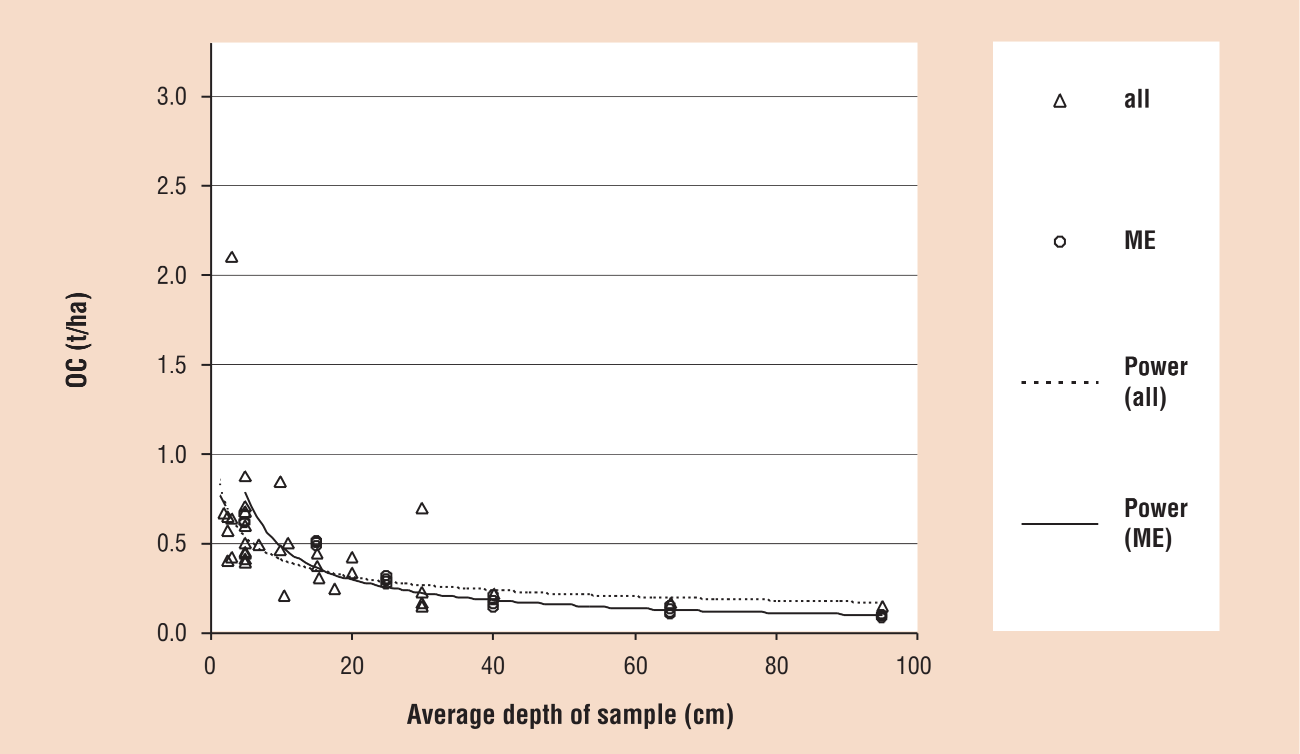

**Badgingarra**



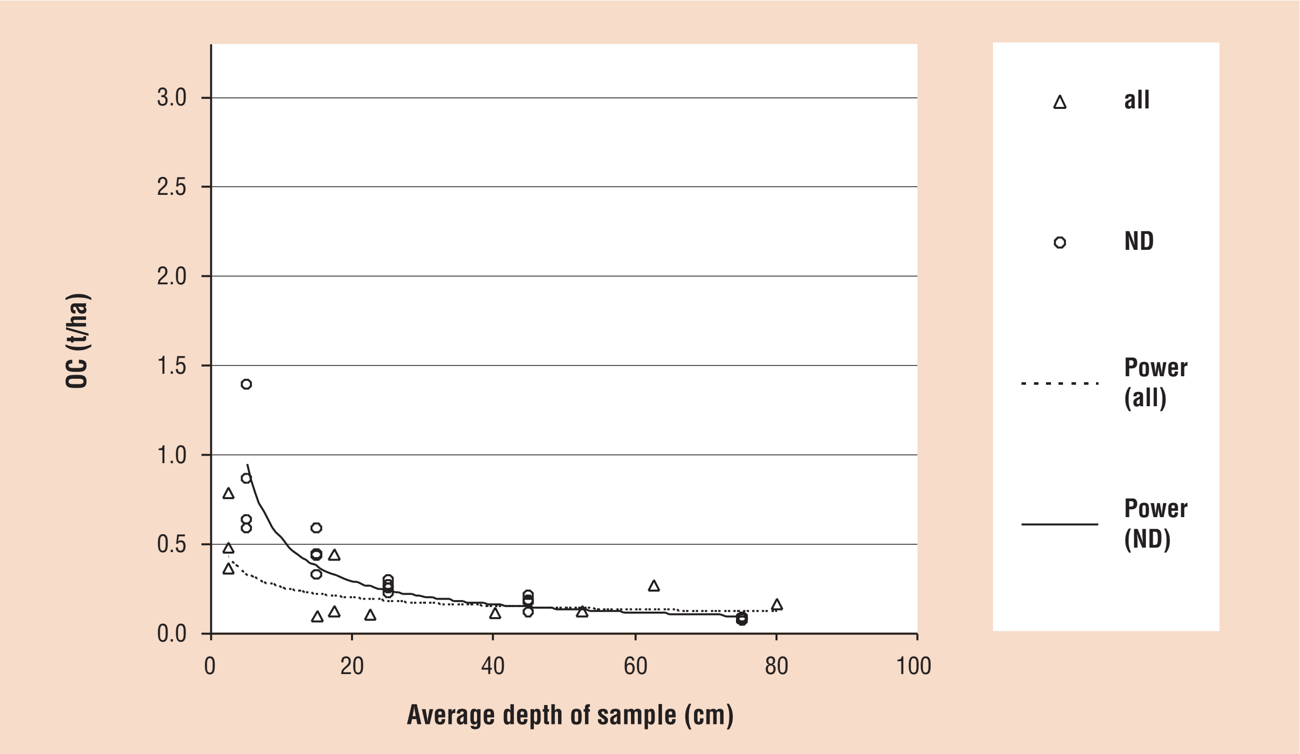

Brookton



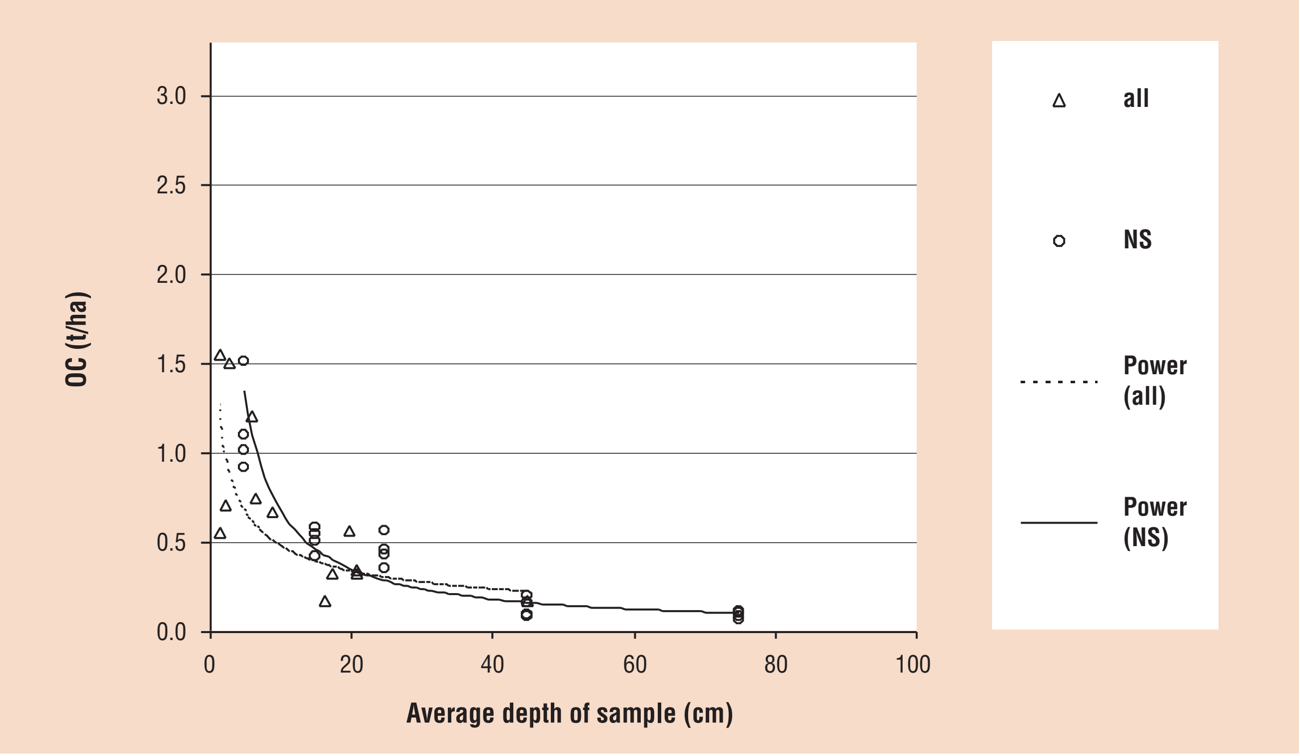

Mullewa



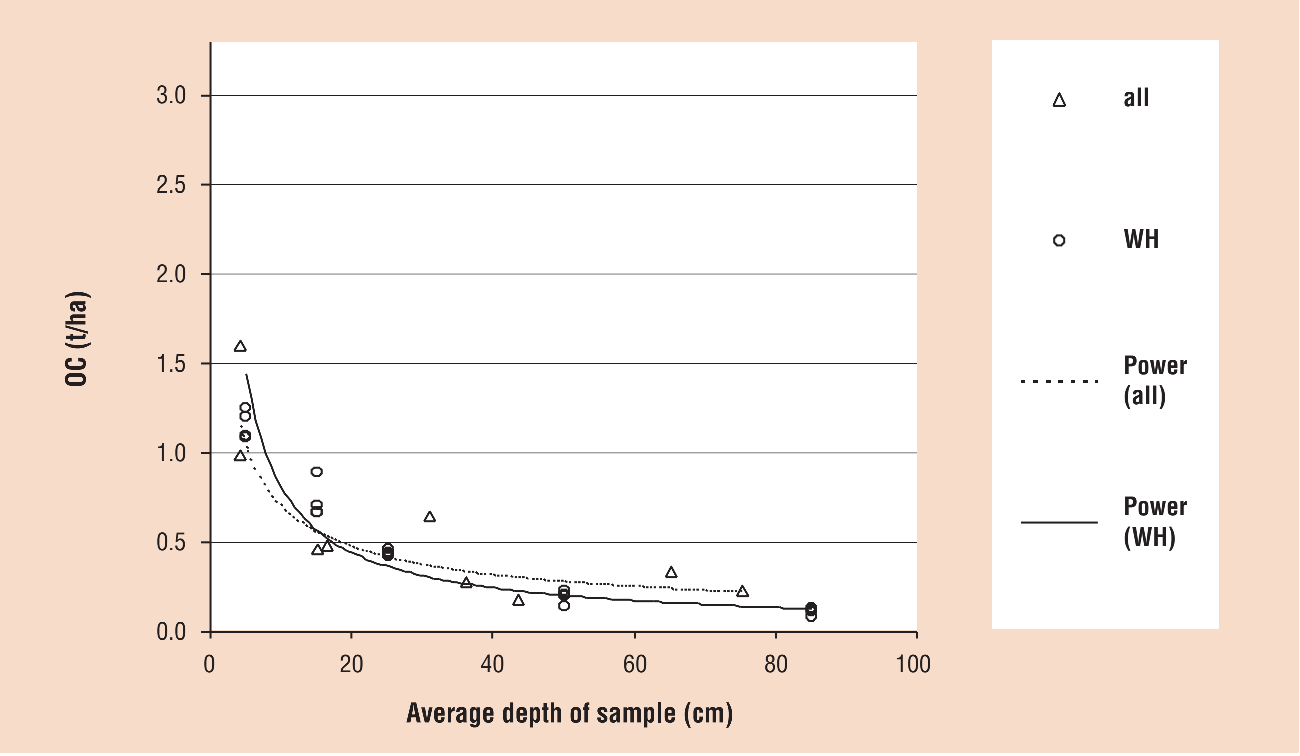

Merredin



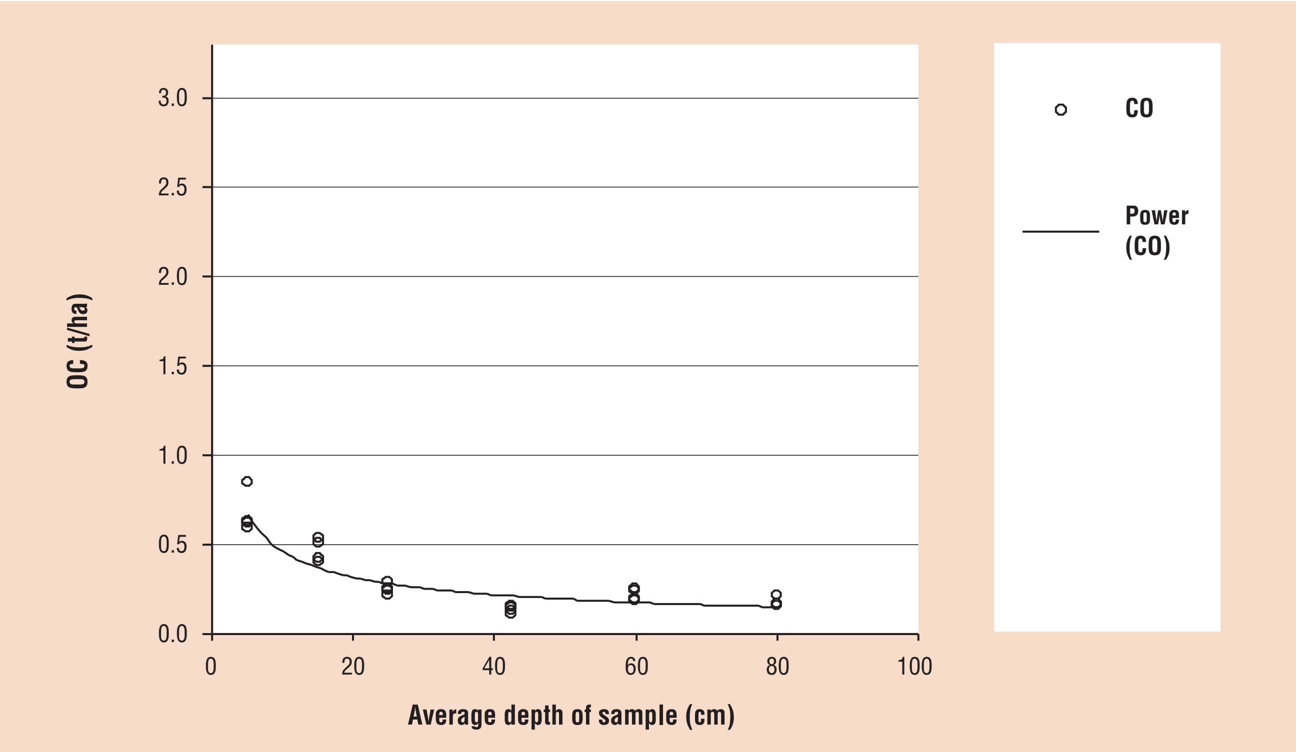

Newdegate (deep)




Newdegate (shallow)




Wittenoom Hills



OC (t/ha)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
20
40
60
80
100
Average depth of sample (cm)
CO
Power (CO)

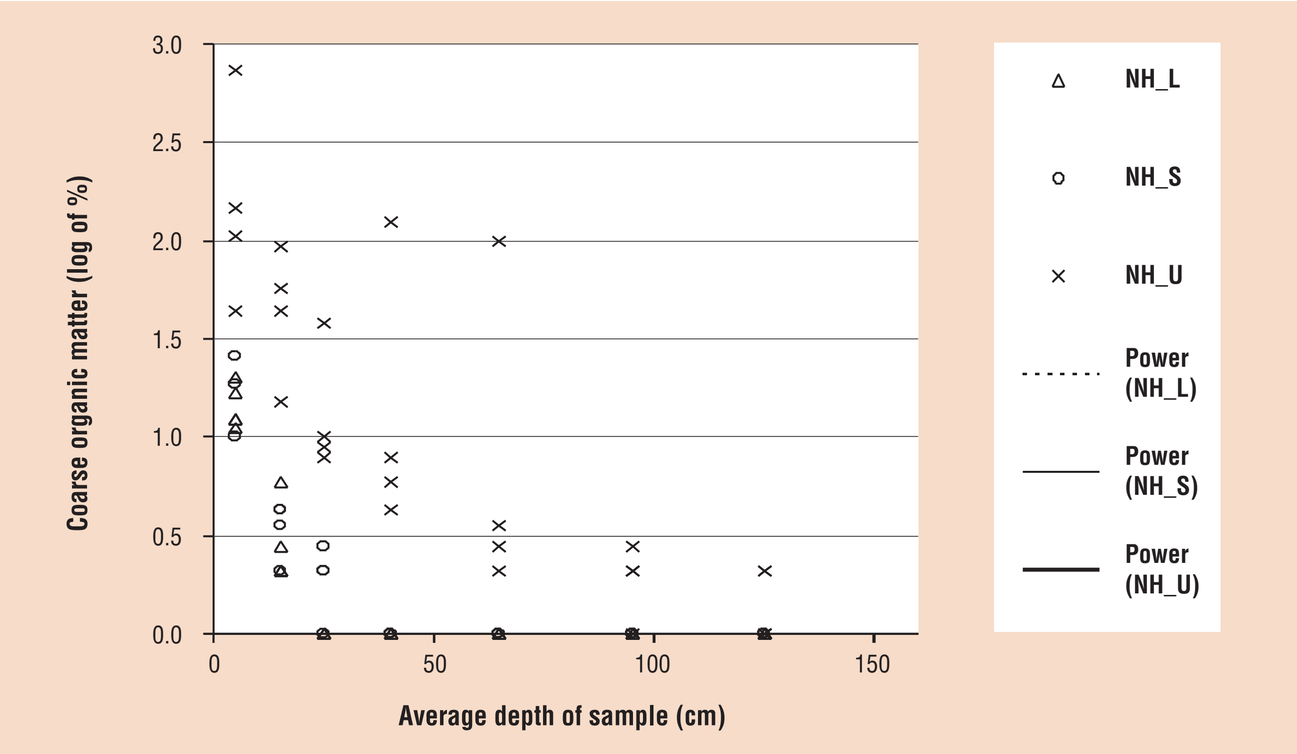

**Condingup**

# APPENDIX 9

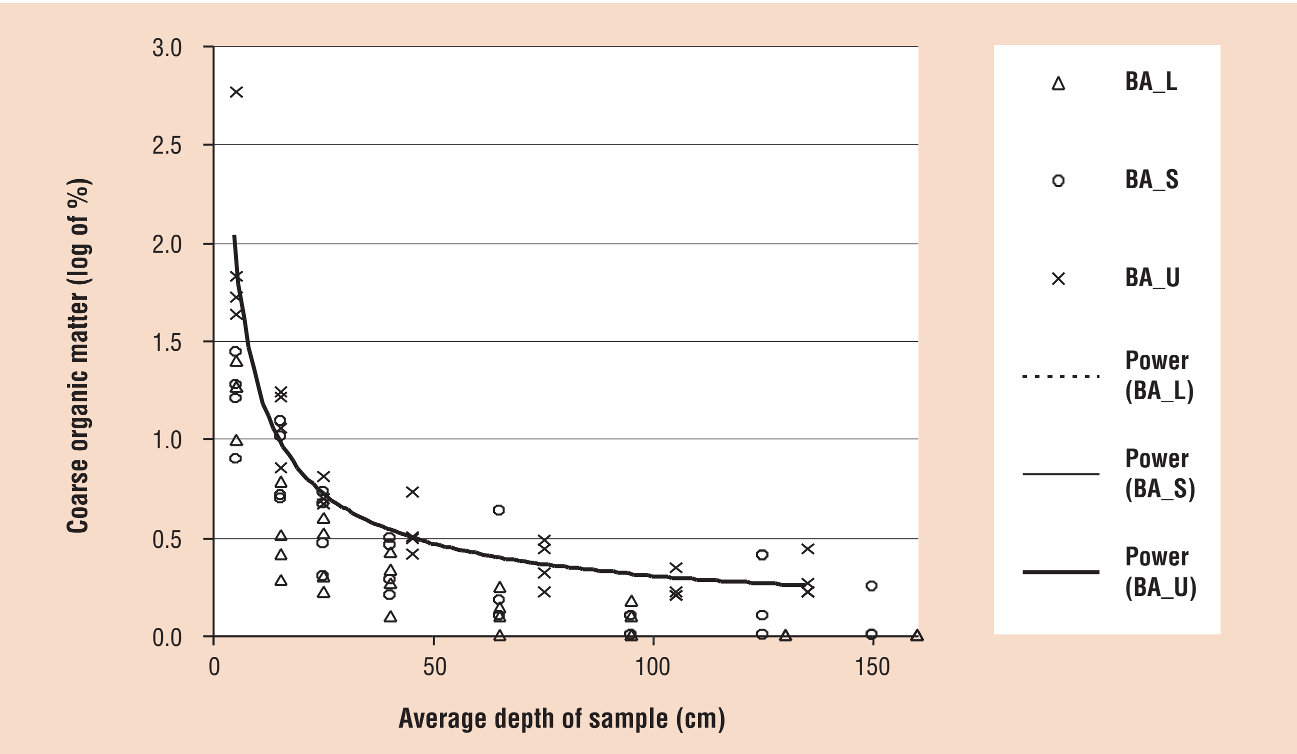
## Coarse Organic Matter (wt %) of Whole Soil by Mid Sample Depth

Plots expressed as ln (wt %), e.g. ln (1.0%) = 1.0, ln (2.0 %) = 1.4, ln (3.0 %) = 1.7, ln (8.0 %) = 2.8

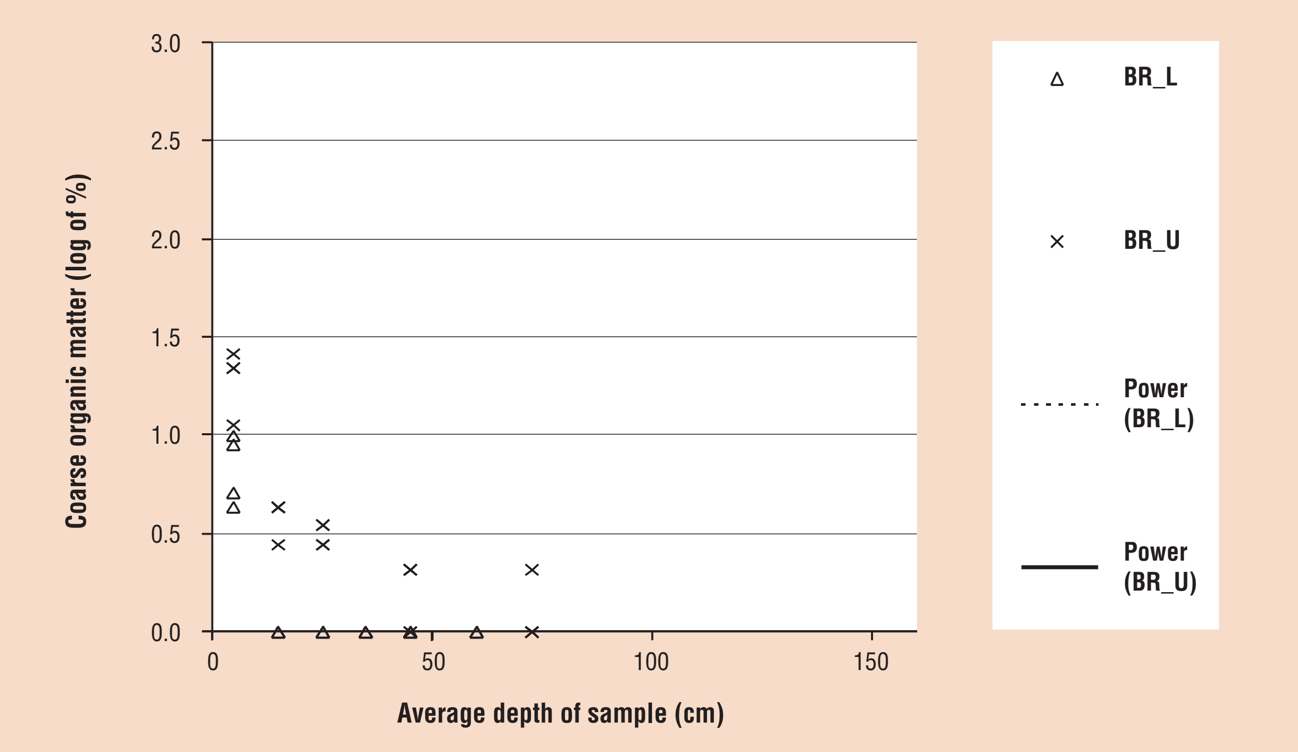
# TABLE OF CONTENTS



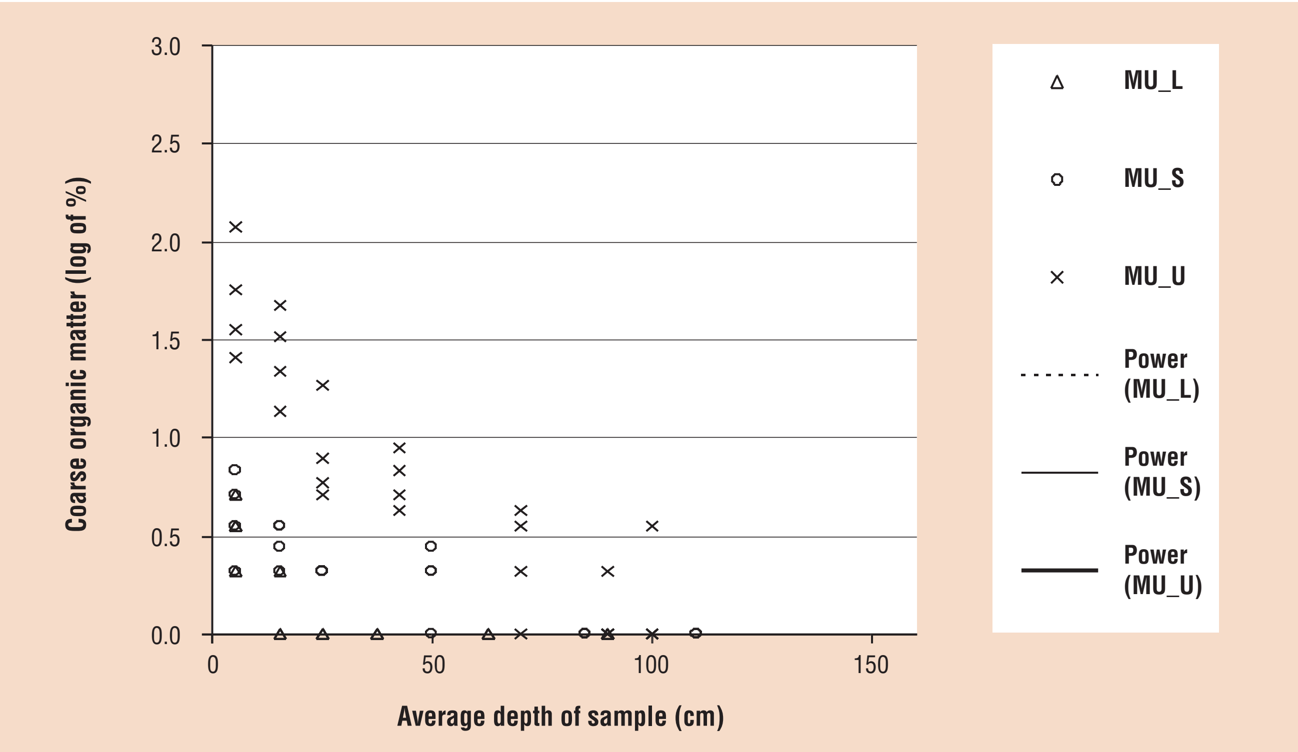

**Northampton**



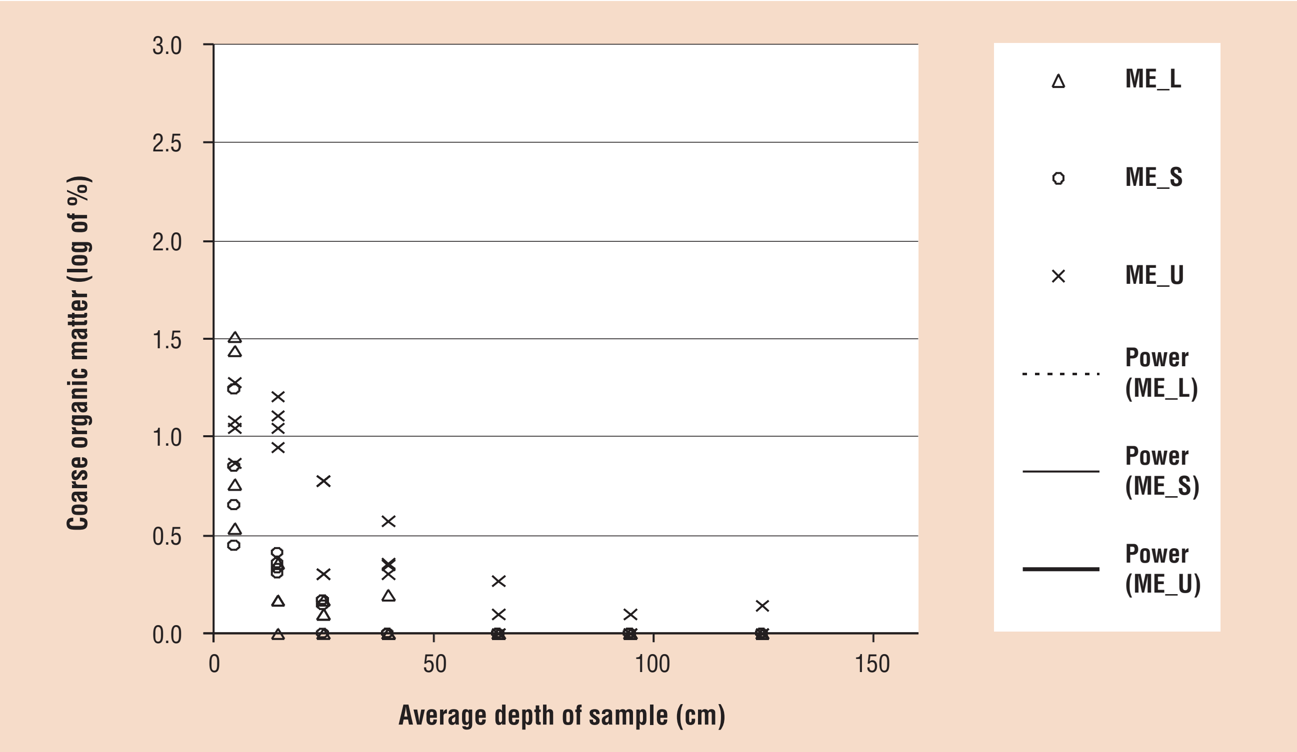

**Badgingarra**



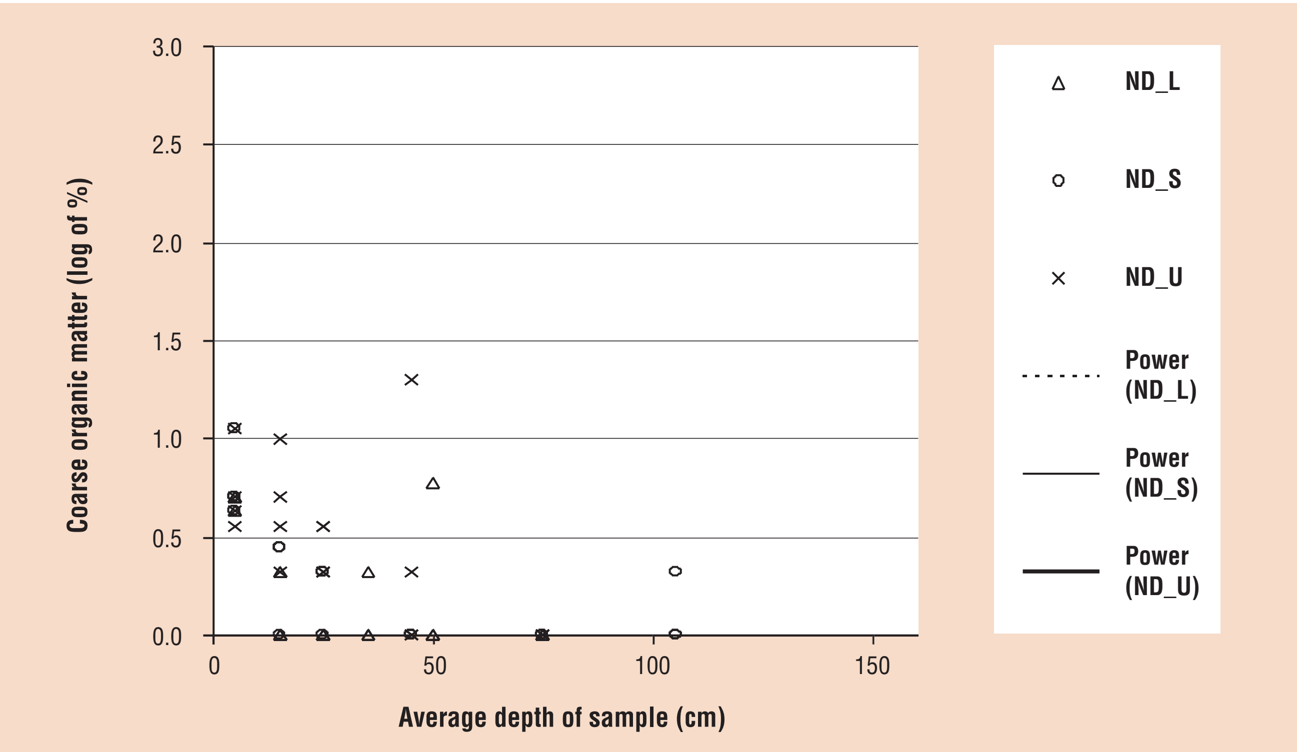

**Brookton**



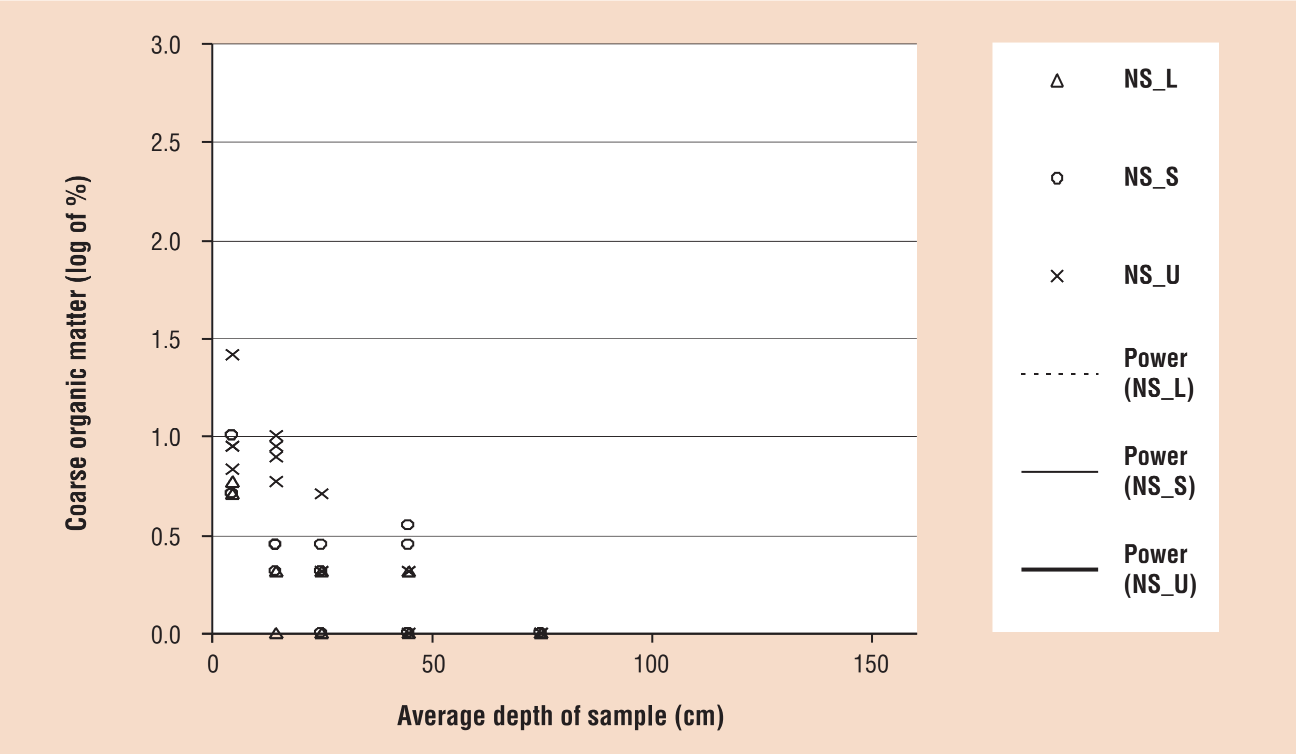

**Mullewa**



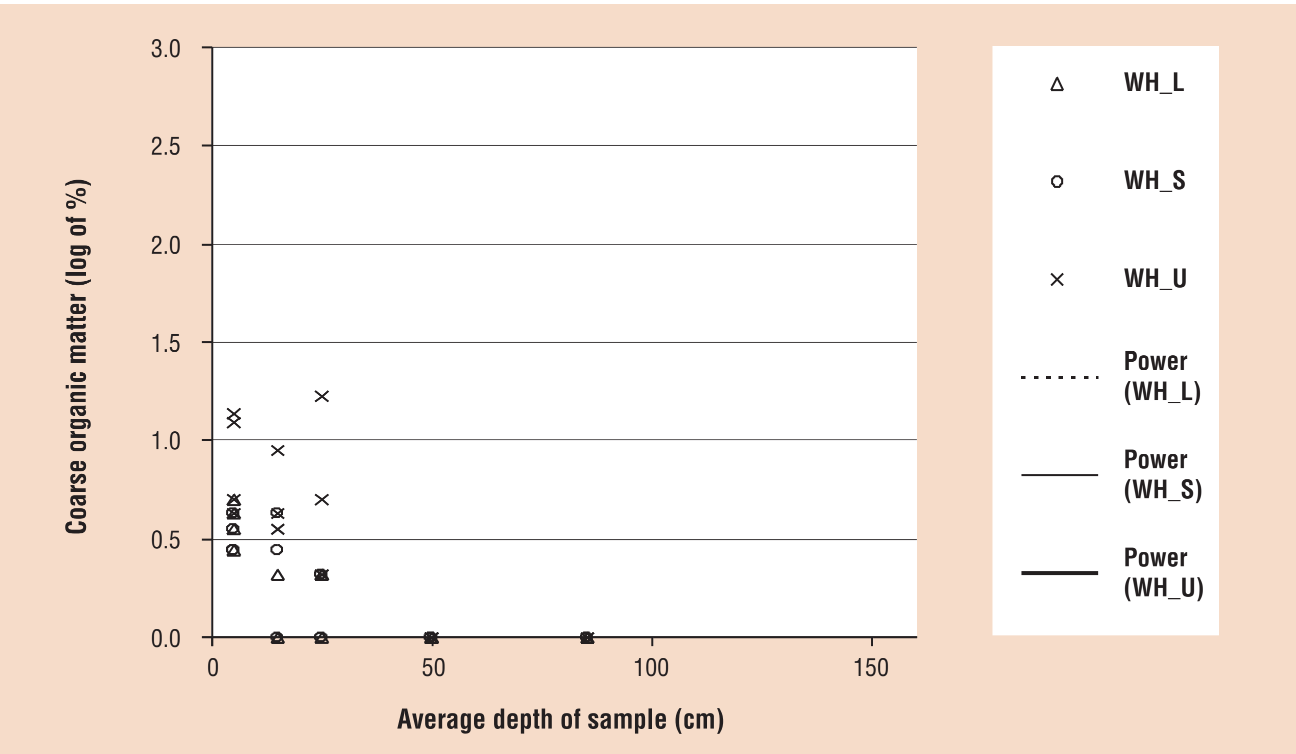

Merredin



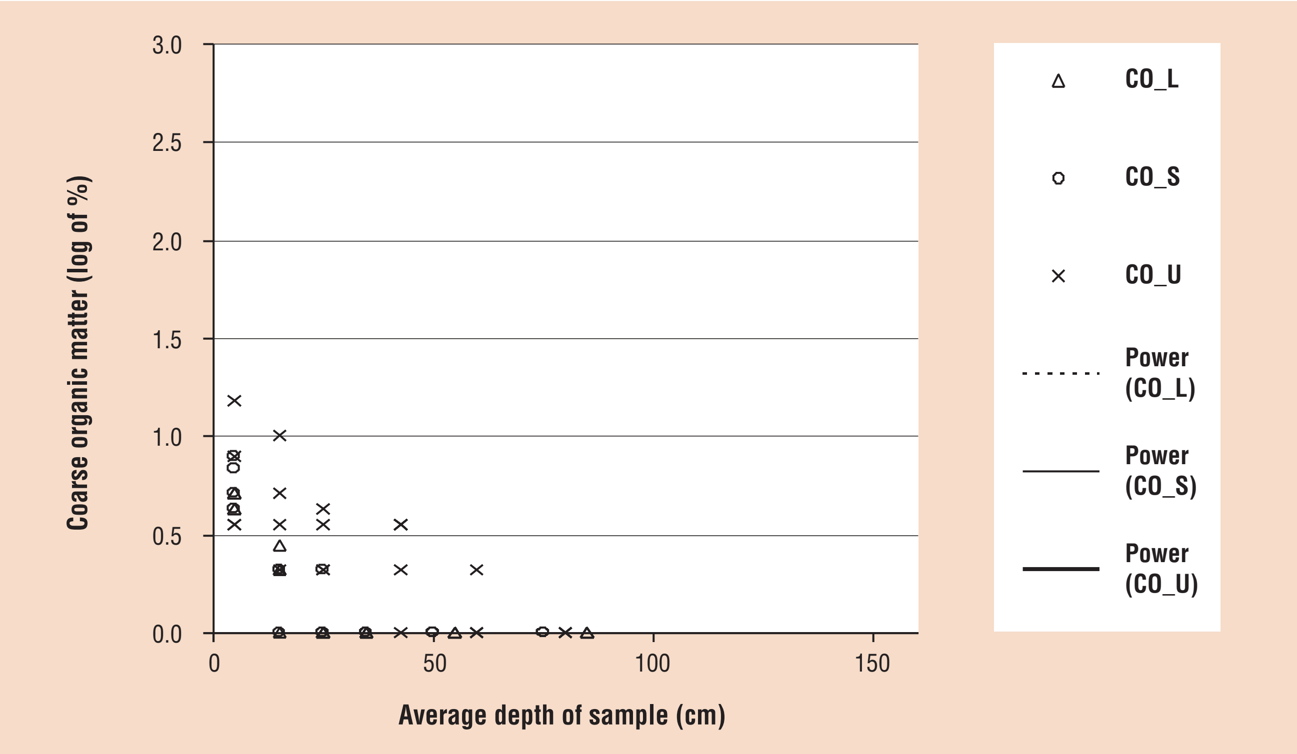

Newdegate (deep)




Newdegate (shallow)




Wittenoom Hills



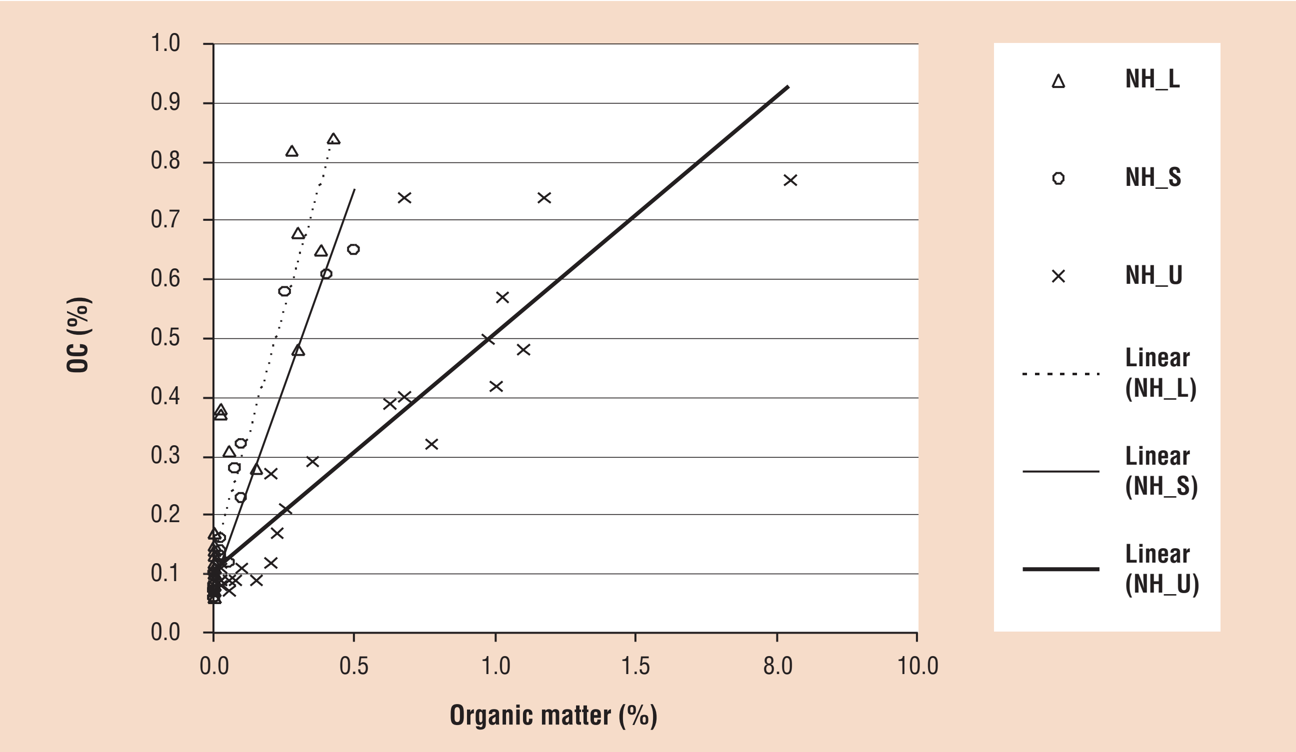
Coarse organic matter (log of %)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
50
100
150
Average depth of sample (cm)
CO_L
CO_S
CO_U
Power (CO_L)
Power (CO_S)
Power (CO_U)


Condingup

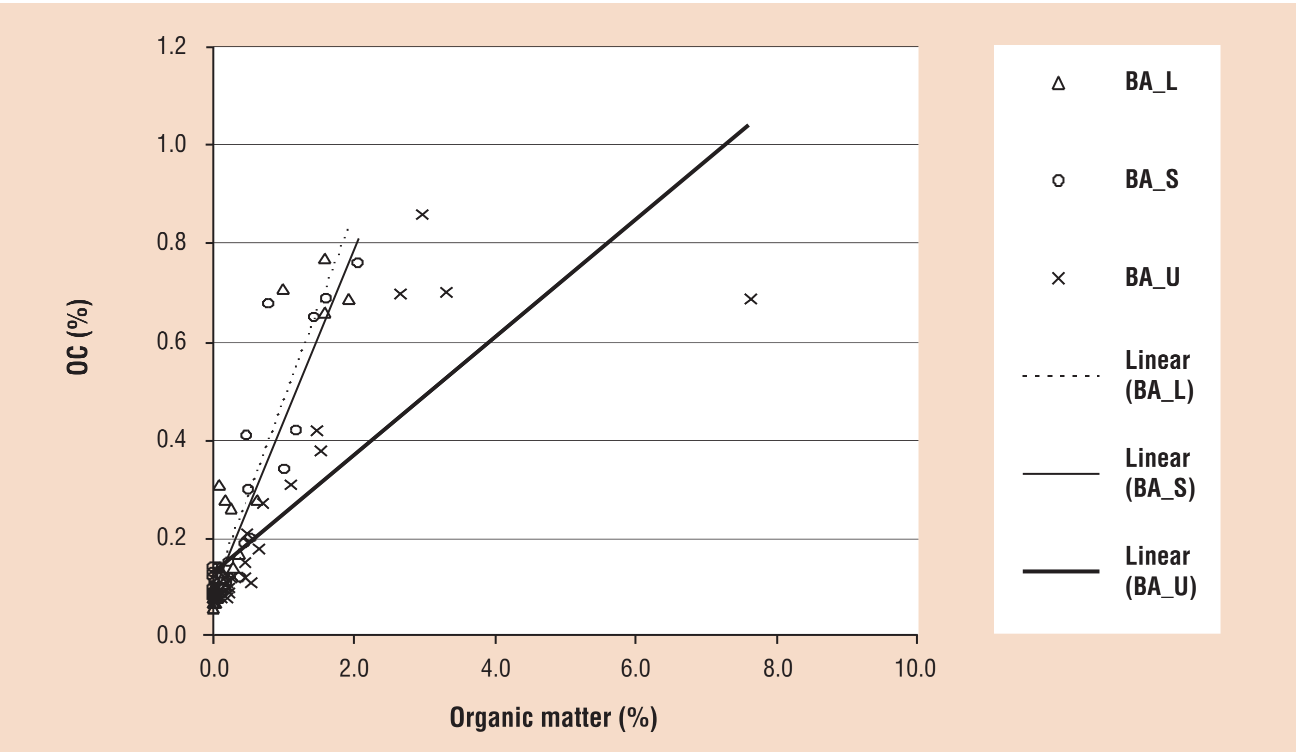
# APPENDIX 10

## Organic Carbon (W&B%) of Fine Earth Fraction by % Coarse Organic Matter of Whole Soil

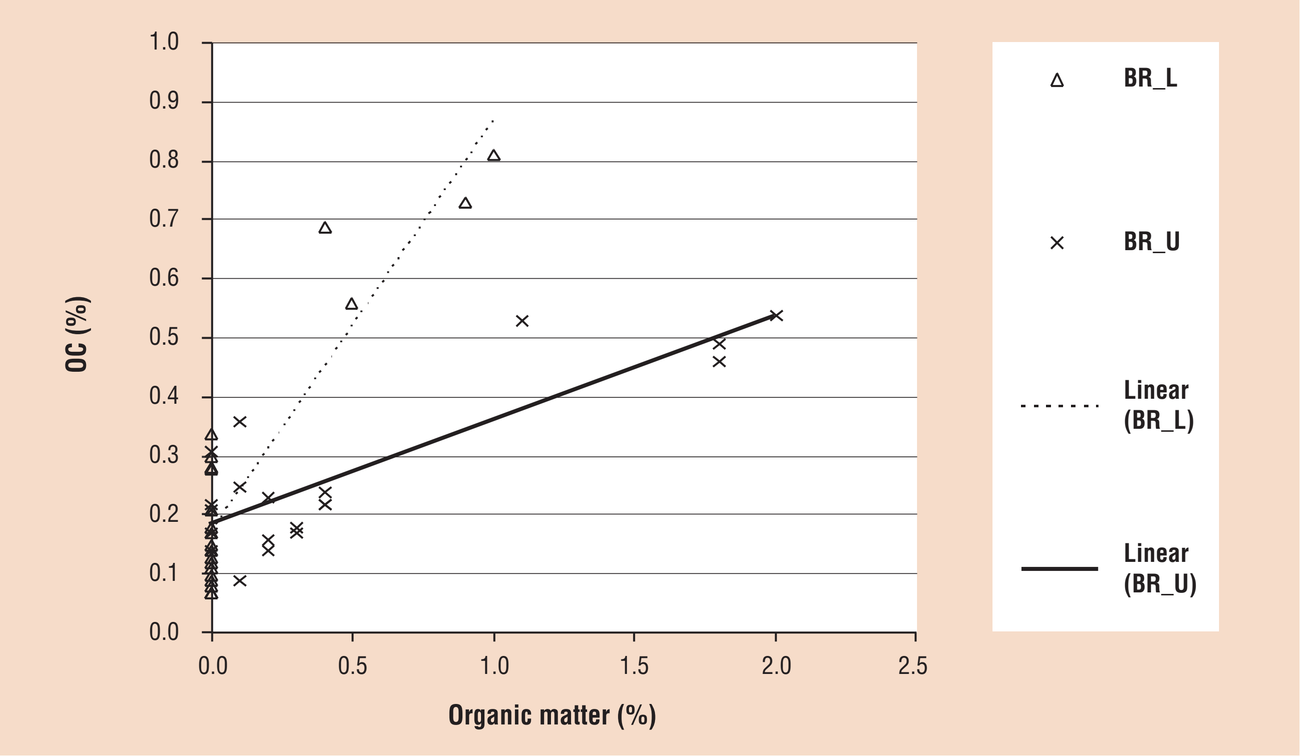
# TABLE OF CONTENTS



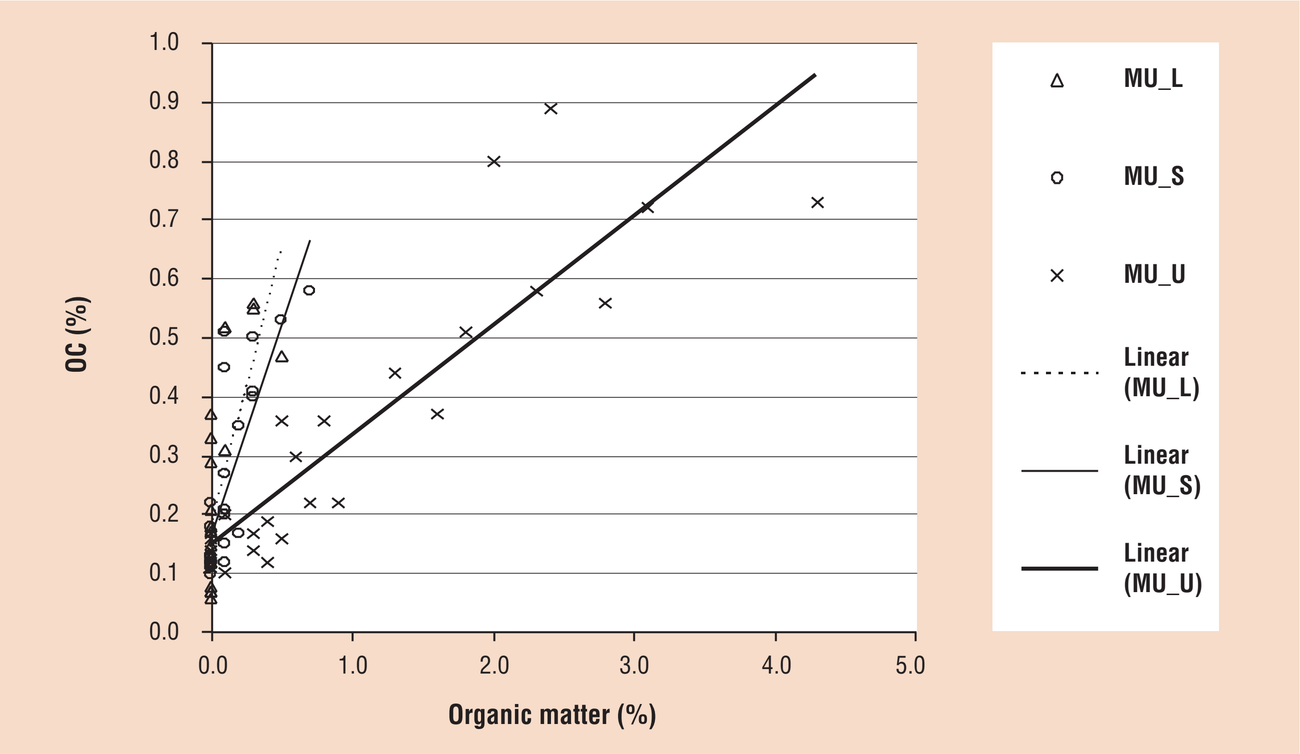

Northampton



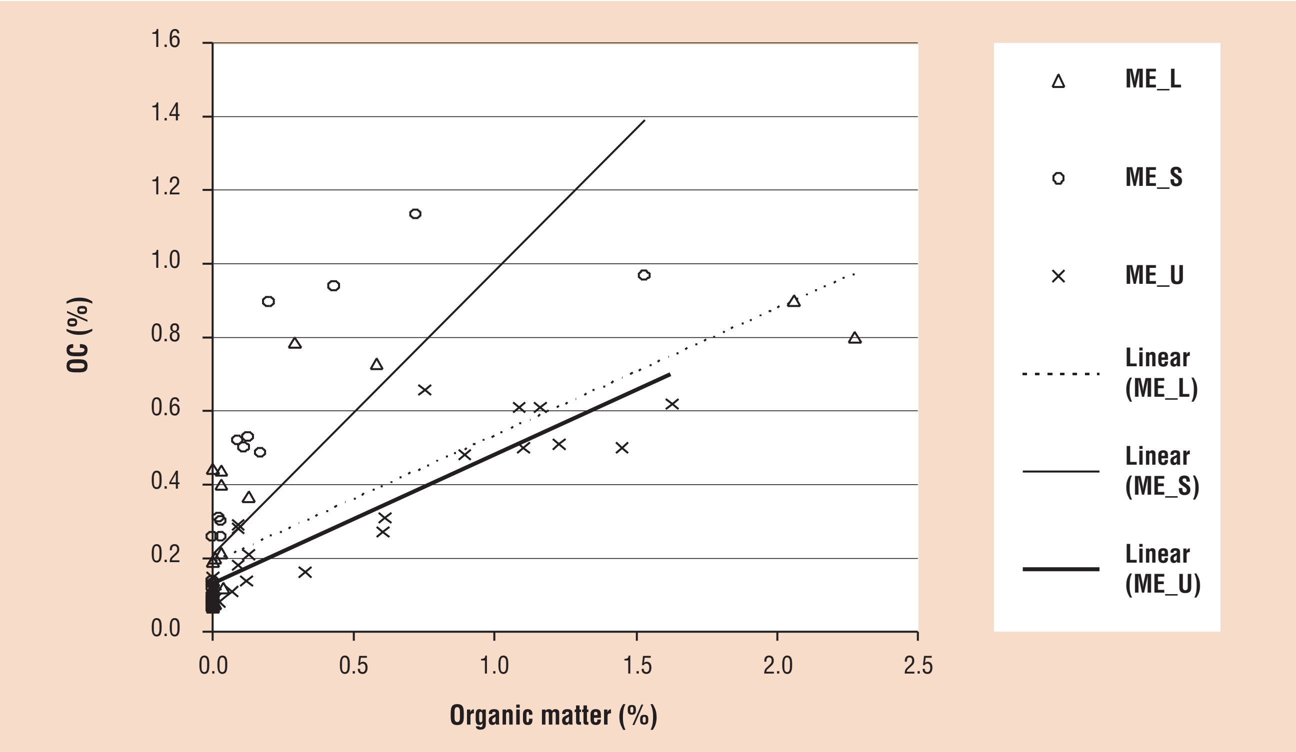

Badgingarra



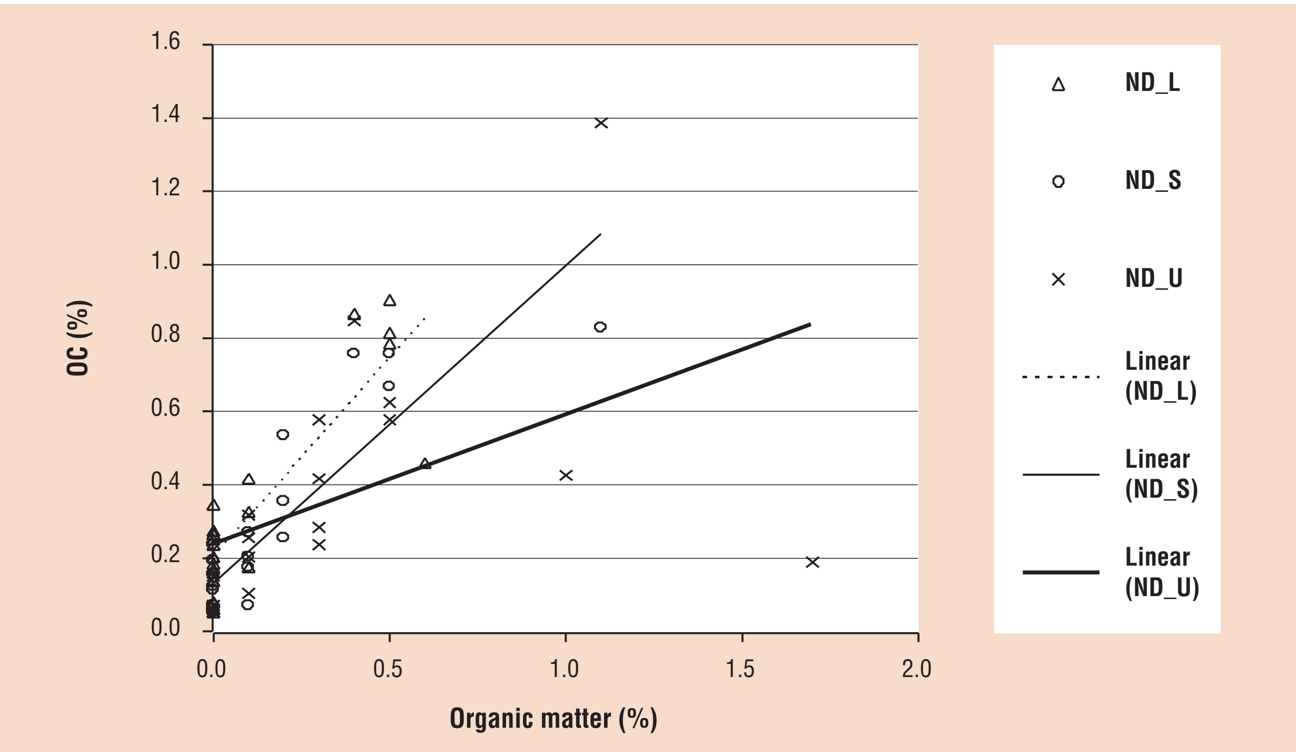

Brookton



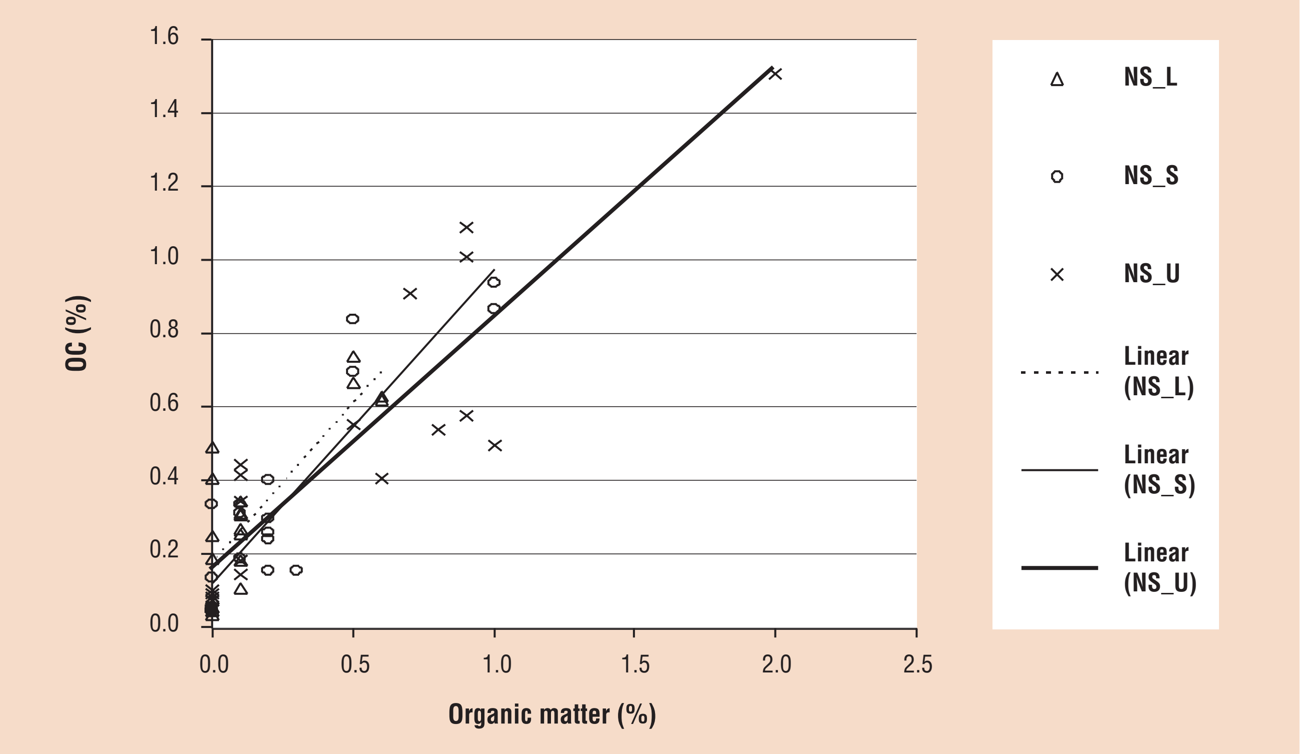

Mullewa



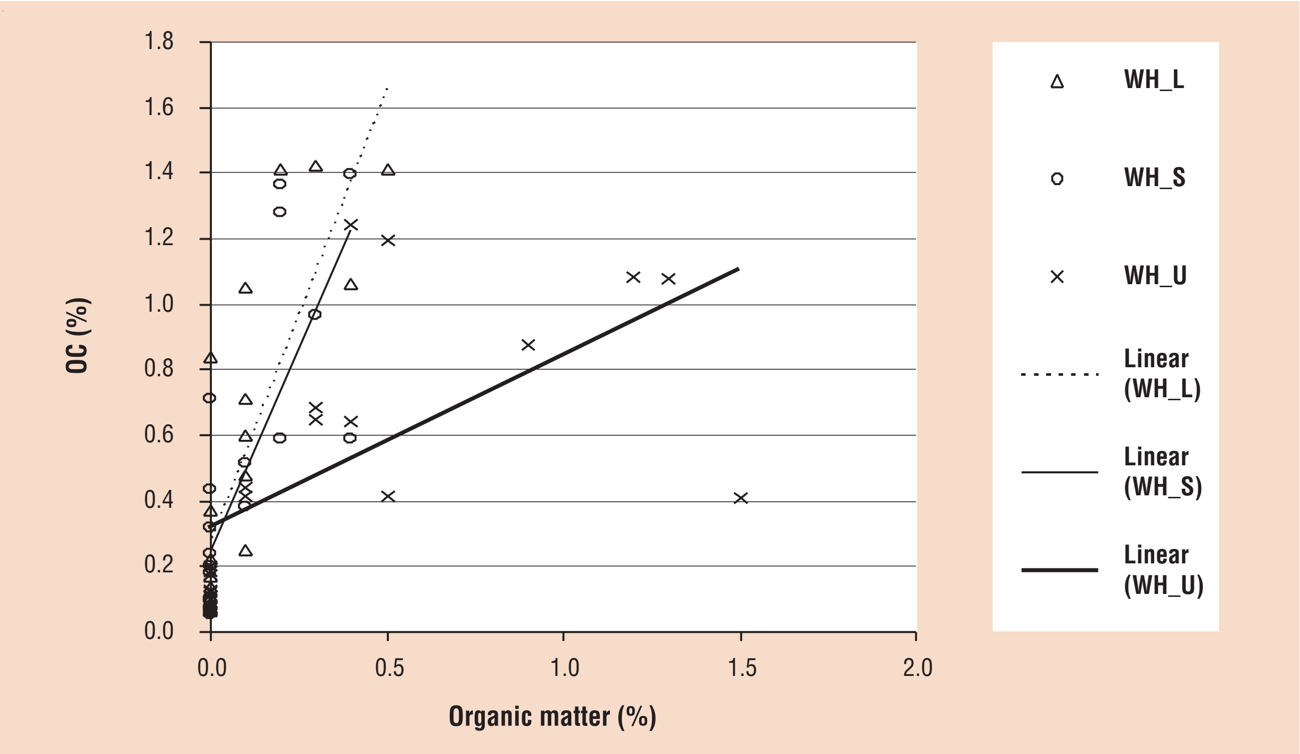

Merredin



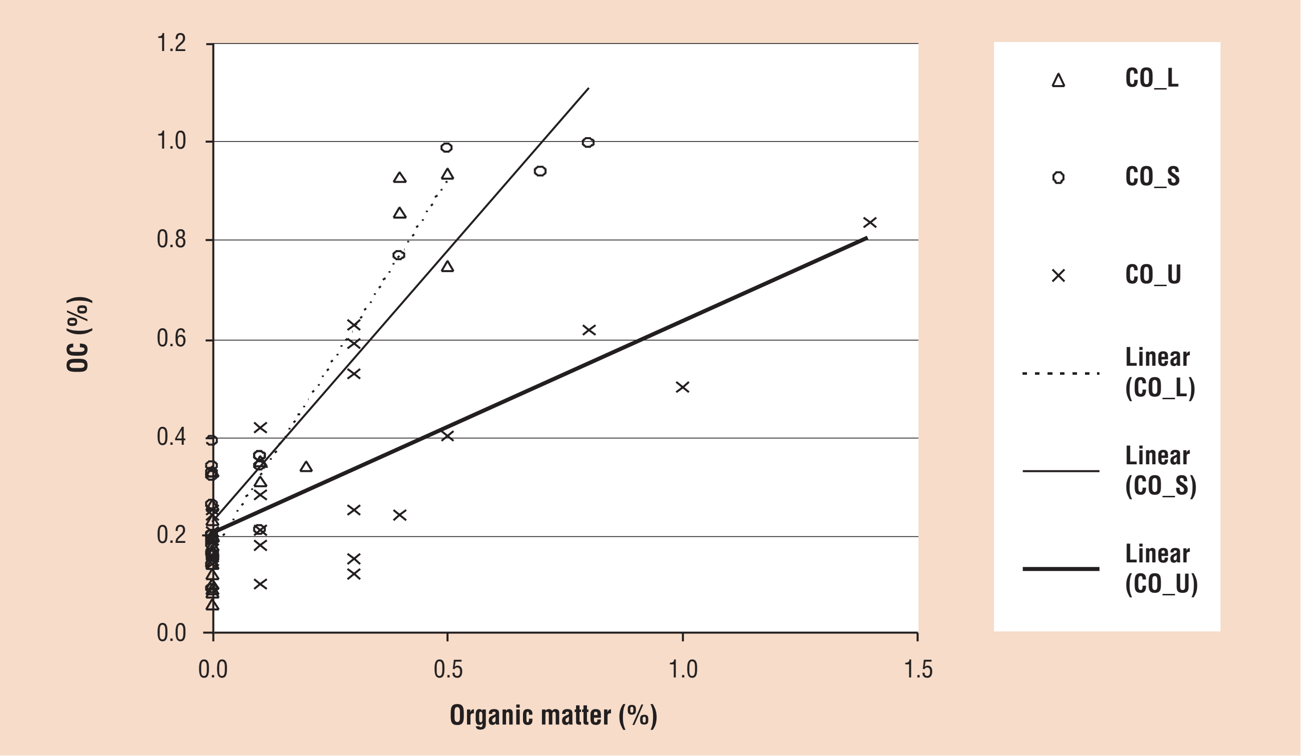

Newdegate (deep)




Newdegate (shallow)




Wittenoom Hills



1.2
1.0
0.8
0.6
0.4
0.2
0.0
OC (%)
0.0
0.5
1.0
1.5
Organic matter (%)
CO_L
CO_S
CO_U
Linear (CO_L)
Linear (CO_S)
Linear (CO_U)

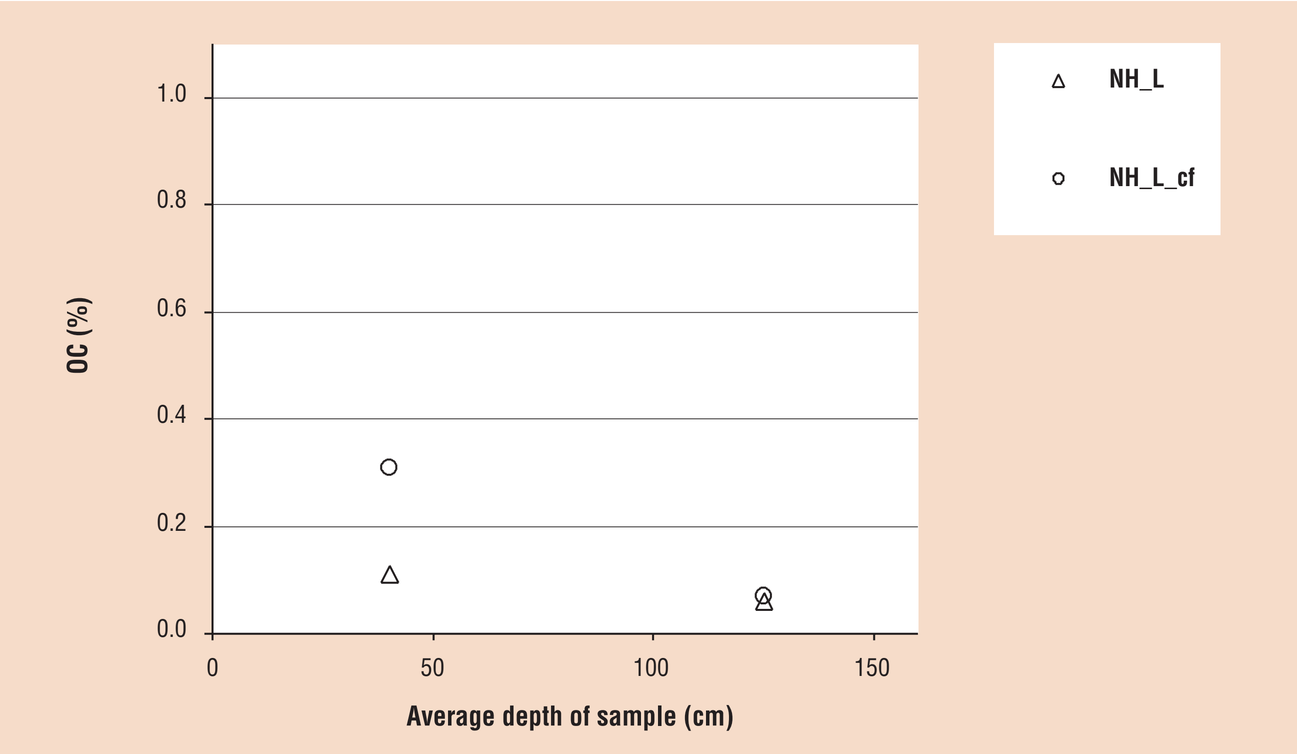

**Condingup**

# APPENDIX 11

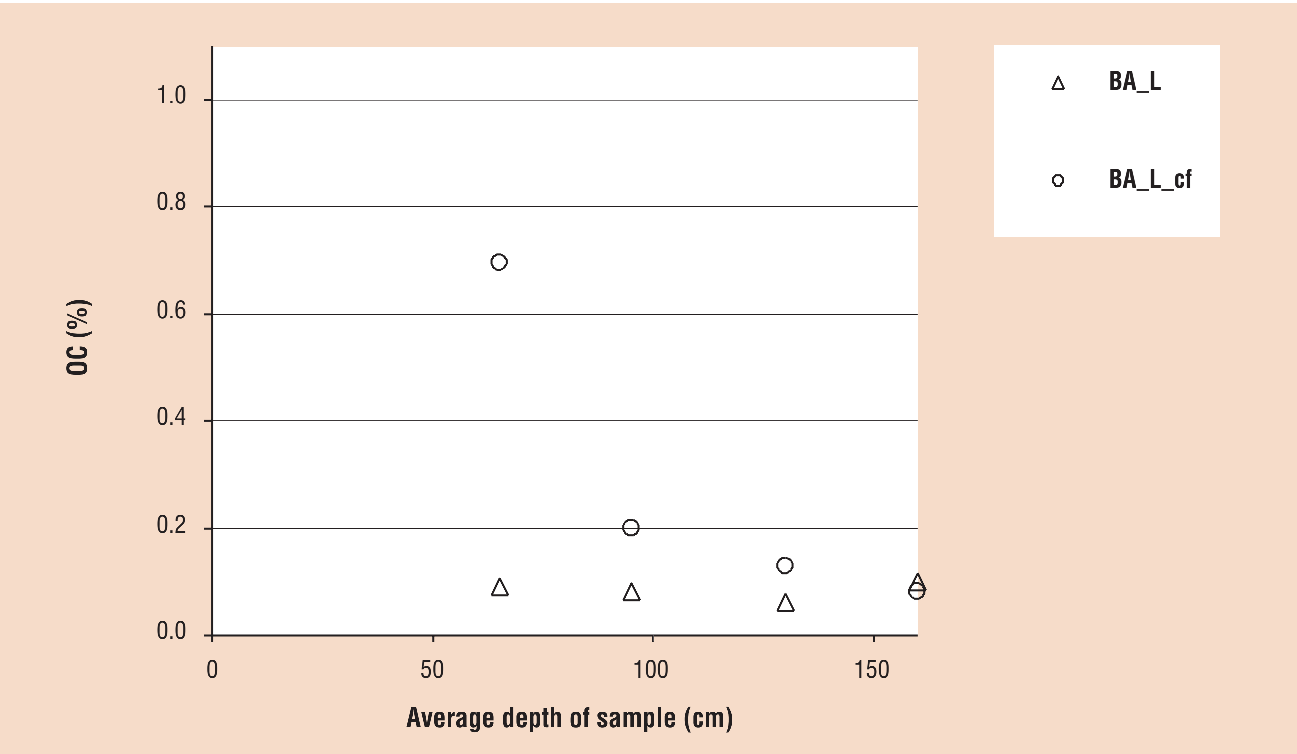
## Organic Carbon (W & B, %) of Coarse Fragments by Mid Sample Depth, Compared to Organic Carbon (W & B, %) of Fine Earth Fraction

**Series with "cf" suffix are organic carbon data from coarse mineral fragments. Other series are organic carbon from fine earth fraction.**

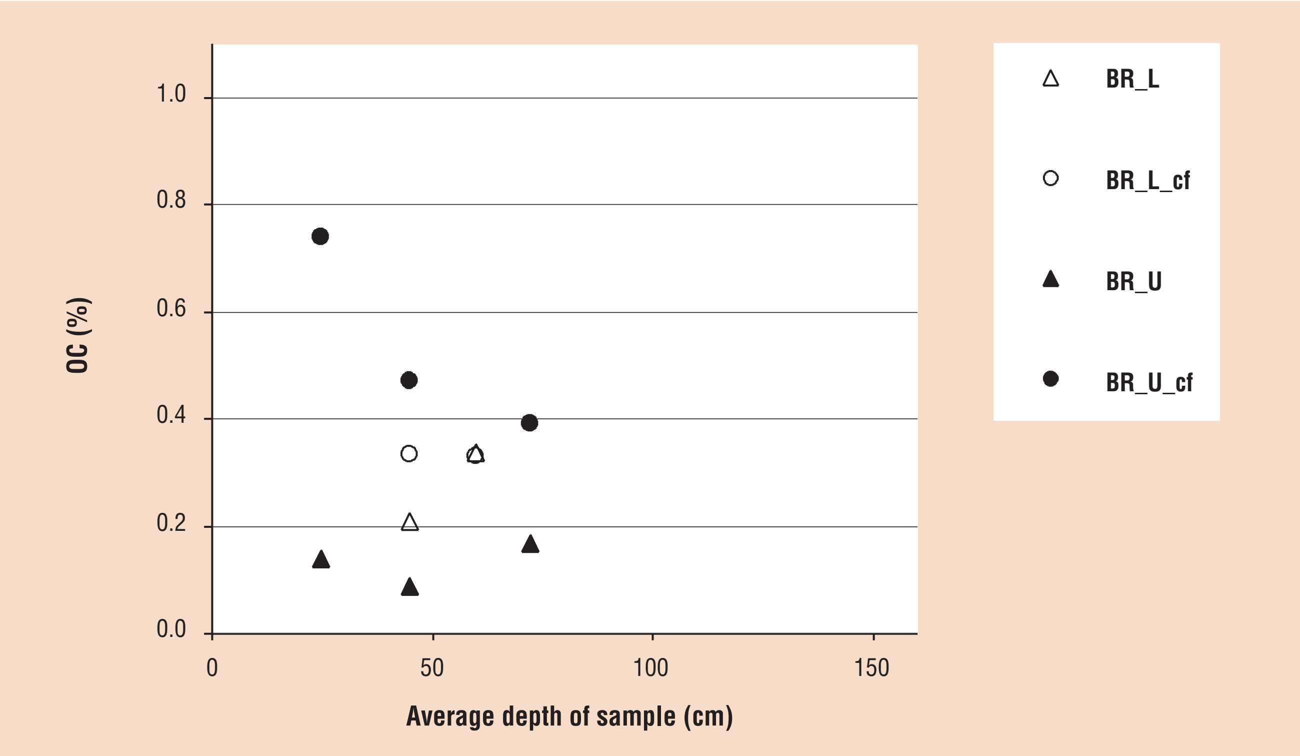
# TABLE OF CONTENTS



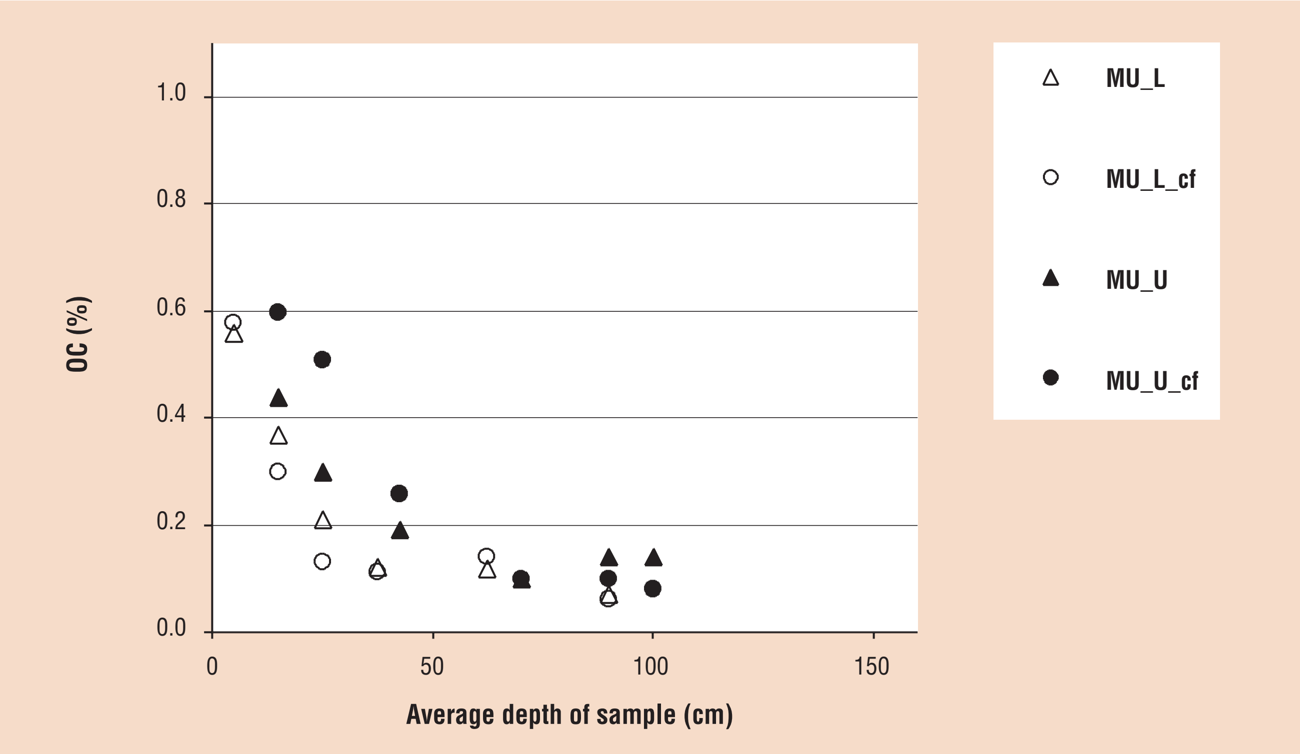

Northampton



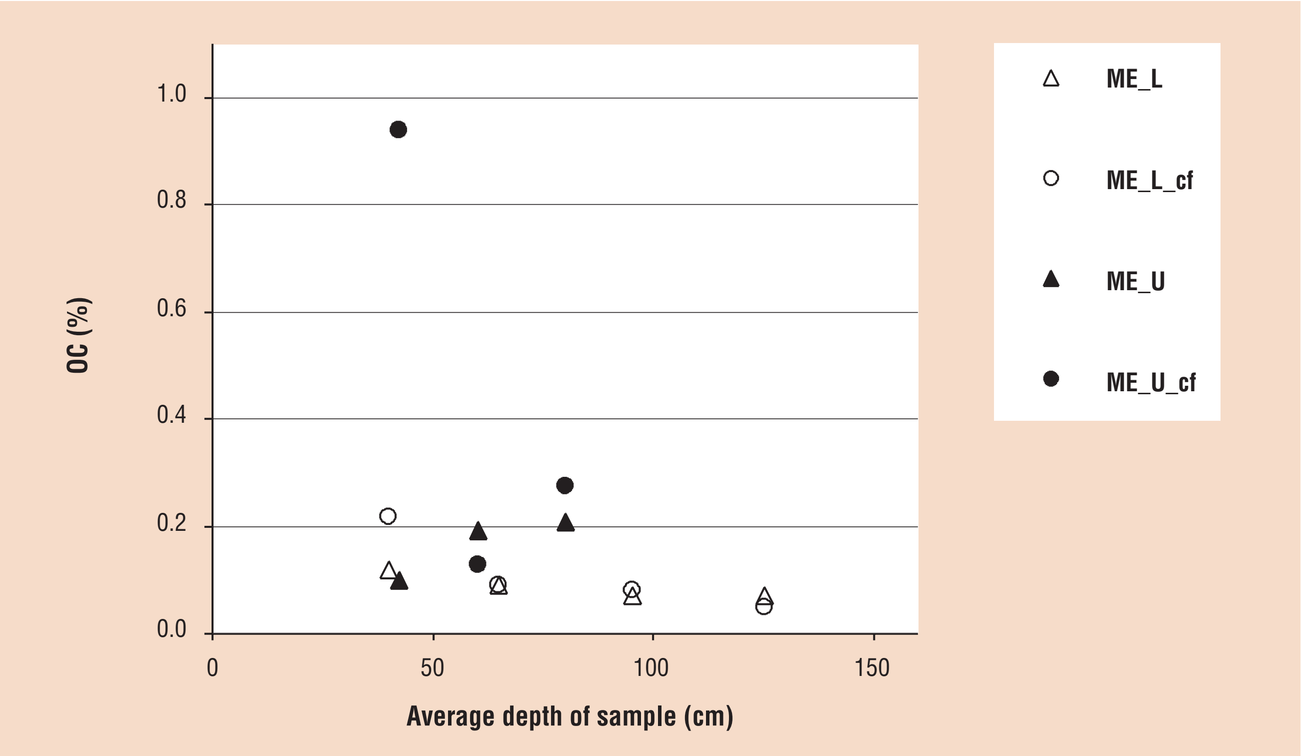

Badgingarra



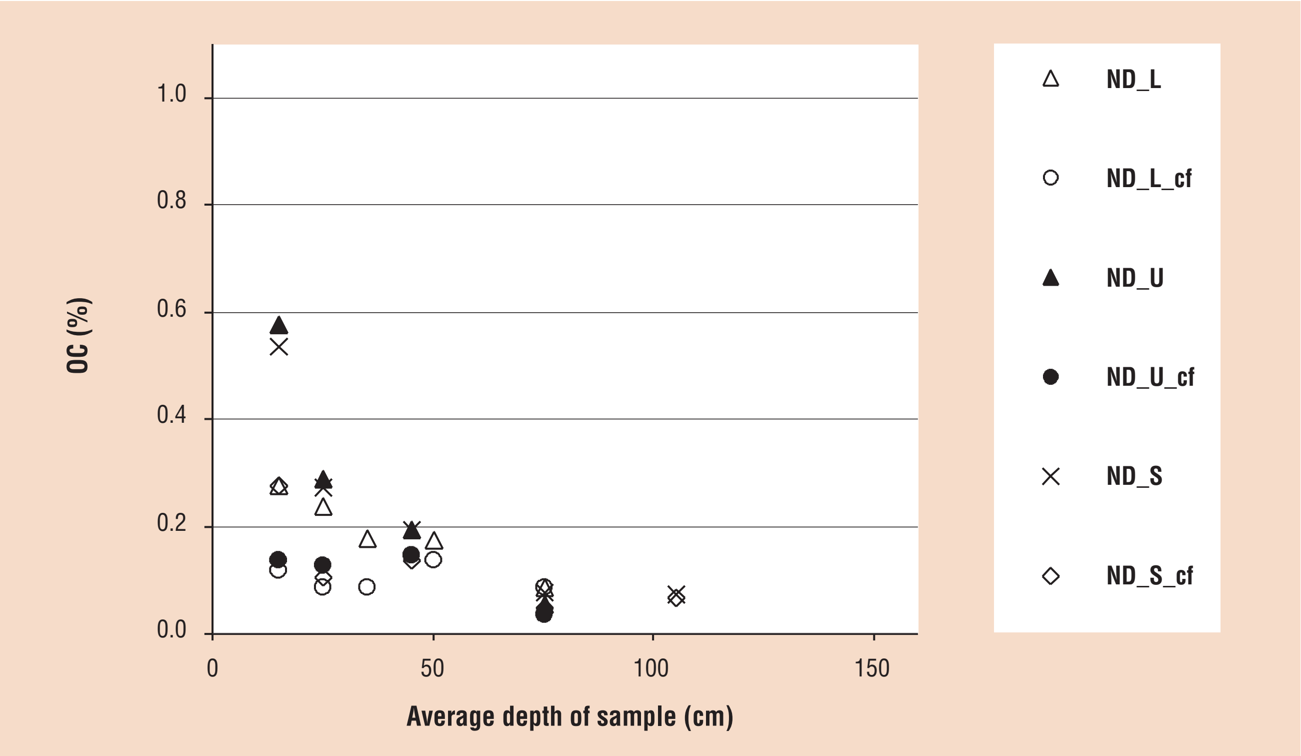

Brookton



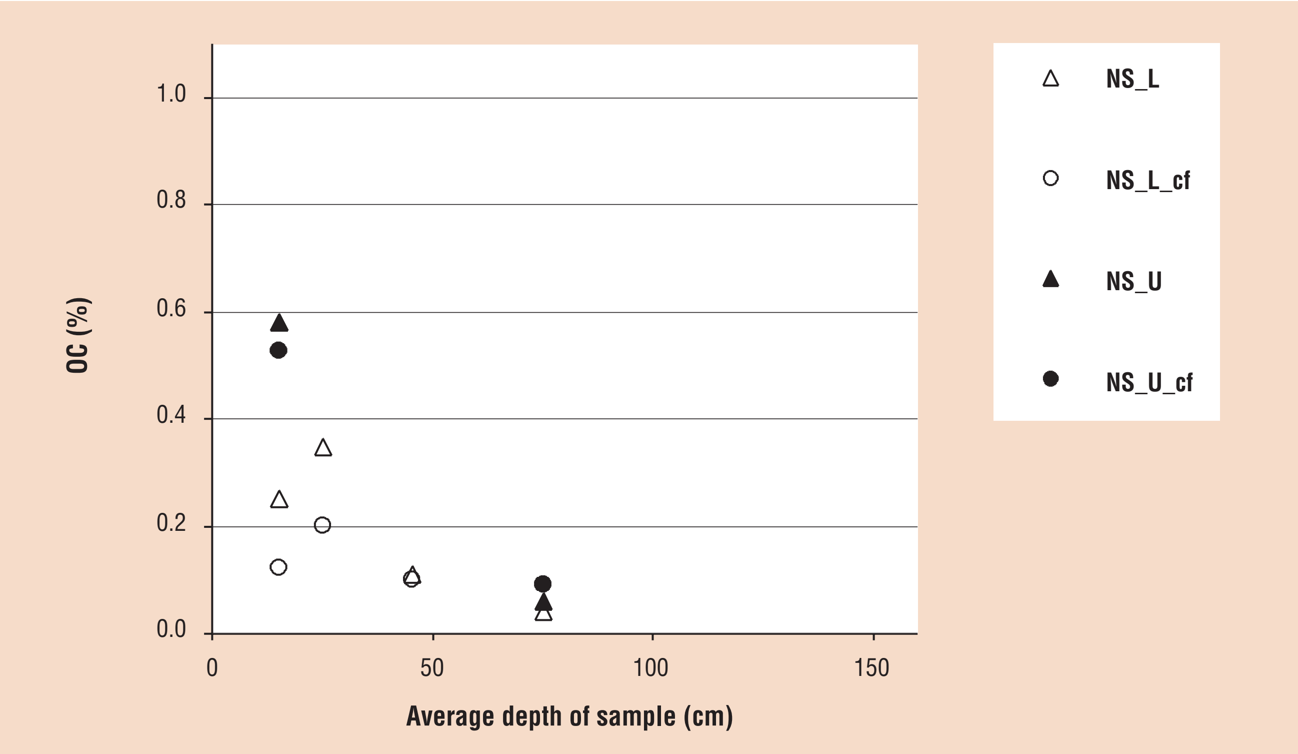

Mullewa



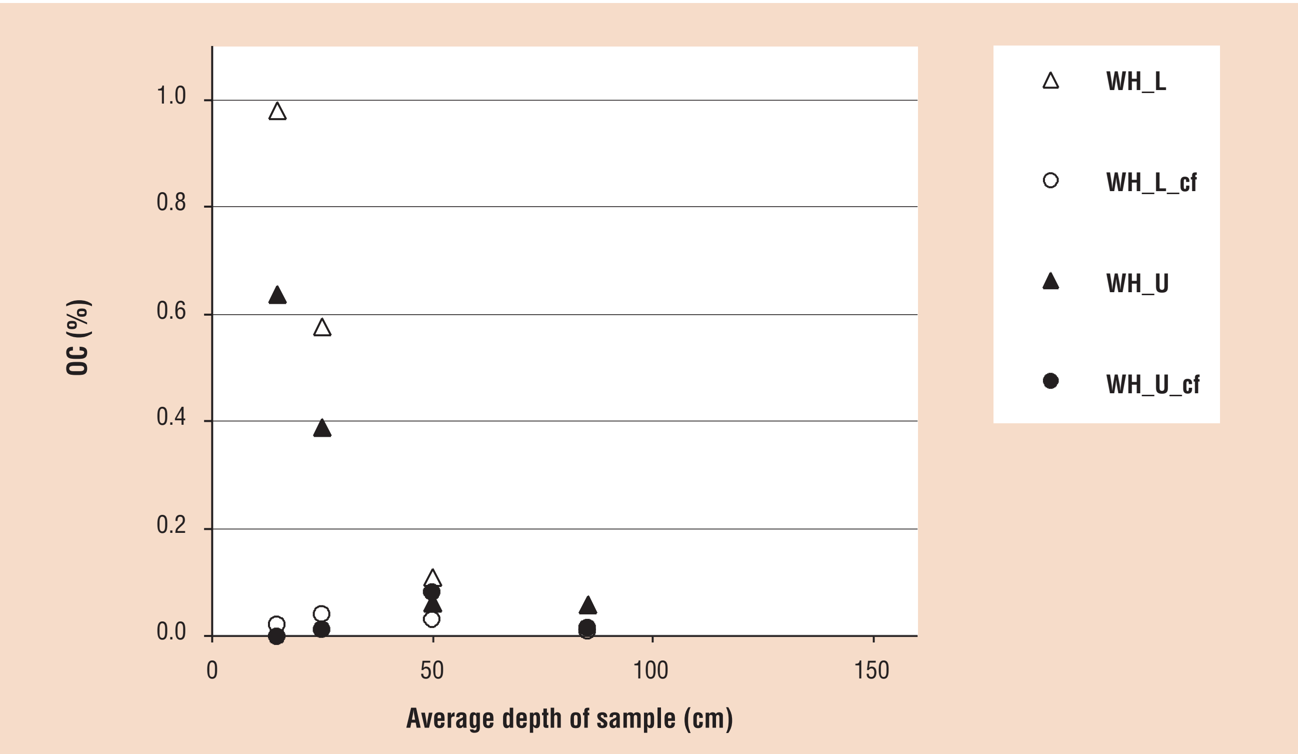

Merredin



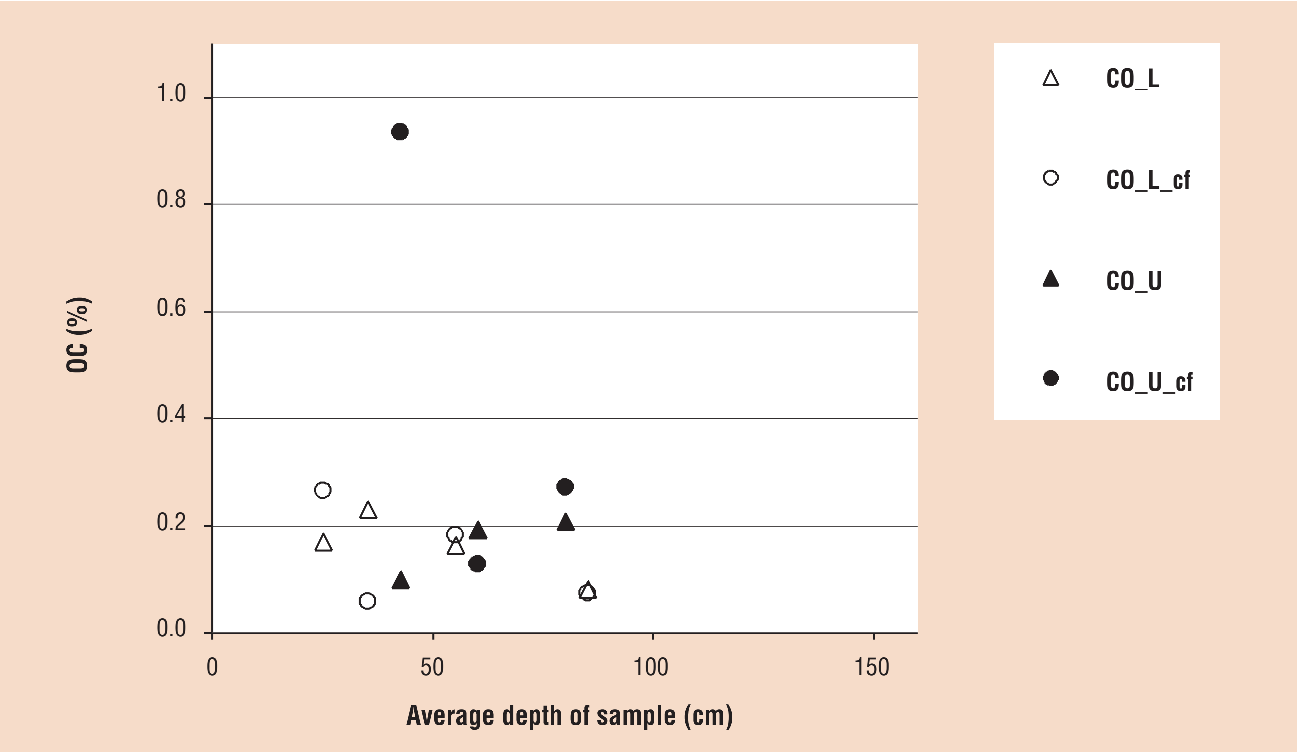

Newdegate (deep)




**Newdegate (shallow)**




**Wittenoom Hills**



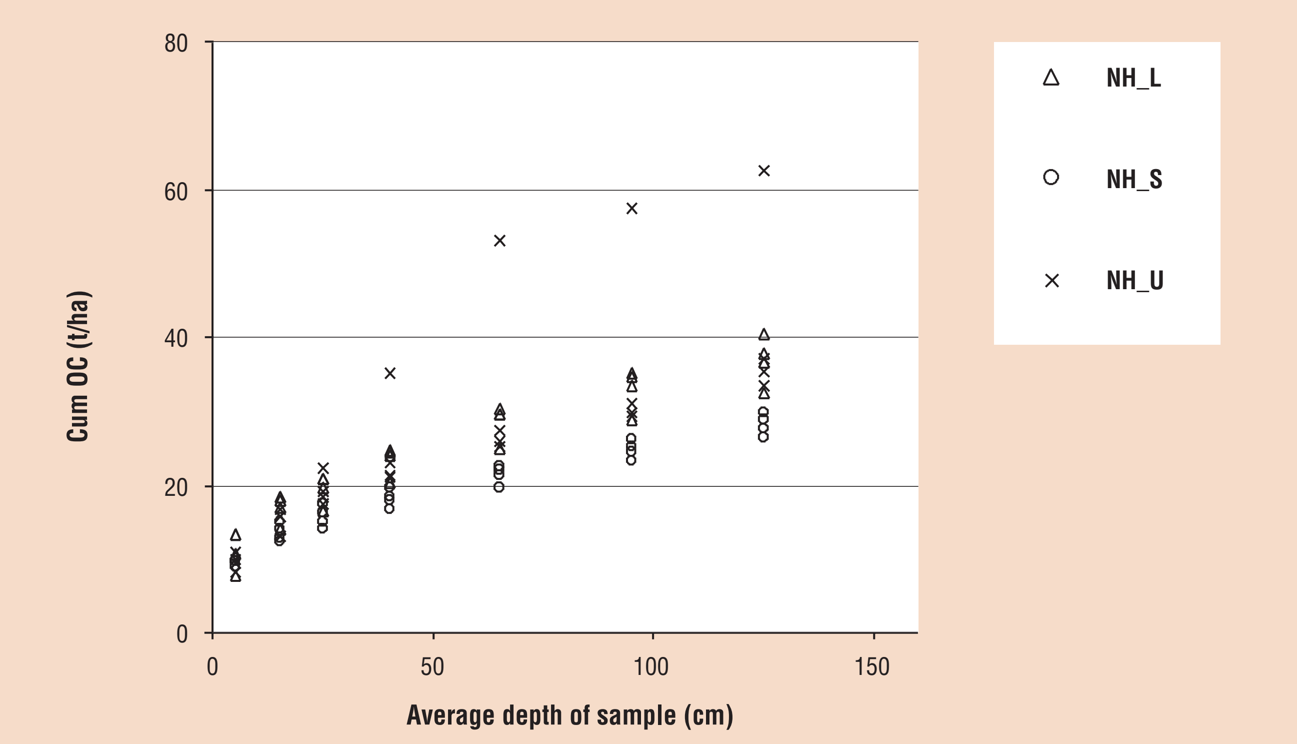
OC (%)
1.0
0.8
0.6
0.4
0.2
0.0
0
50
100
150
Average depth of sample (cm)
CO_L
CO_L_cf
CO_U
CO_U_cf


**Condingup**

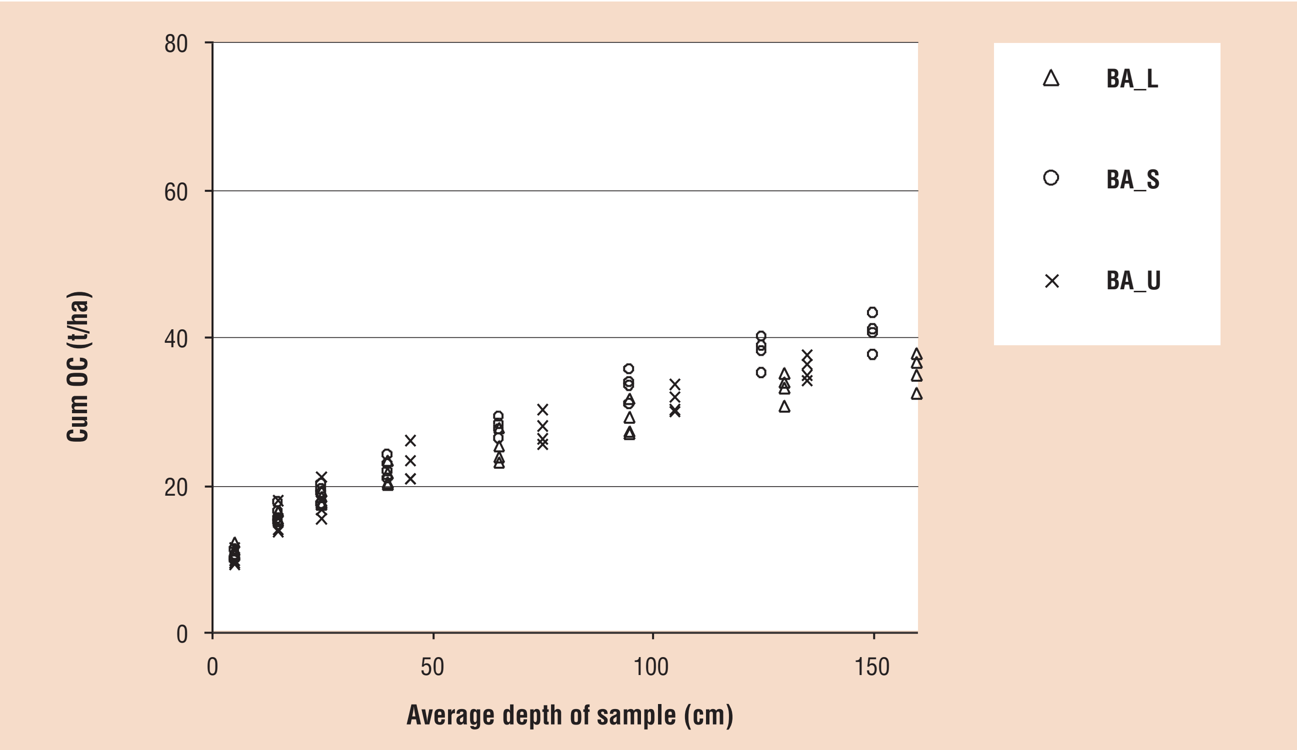
# APPENDIX 12

## Estimations of Cumulative Whole Soil Organic Carbon (t/ha) by Depth

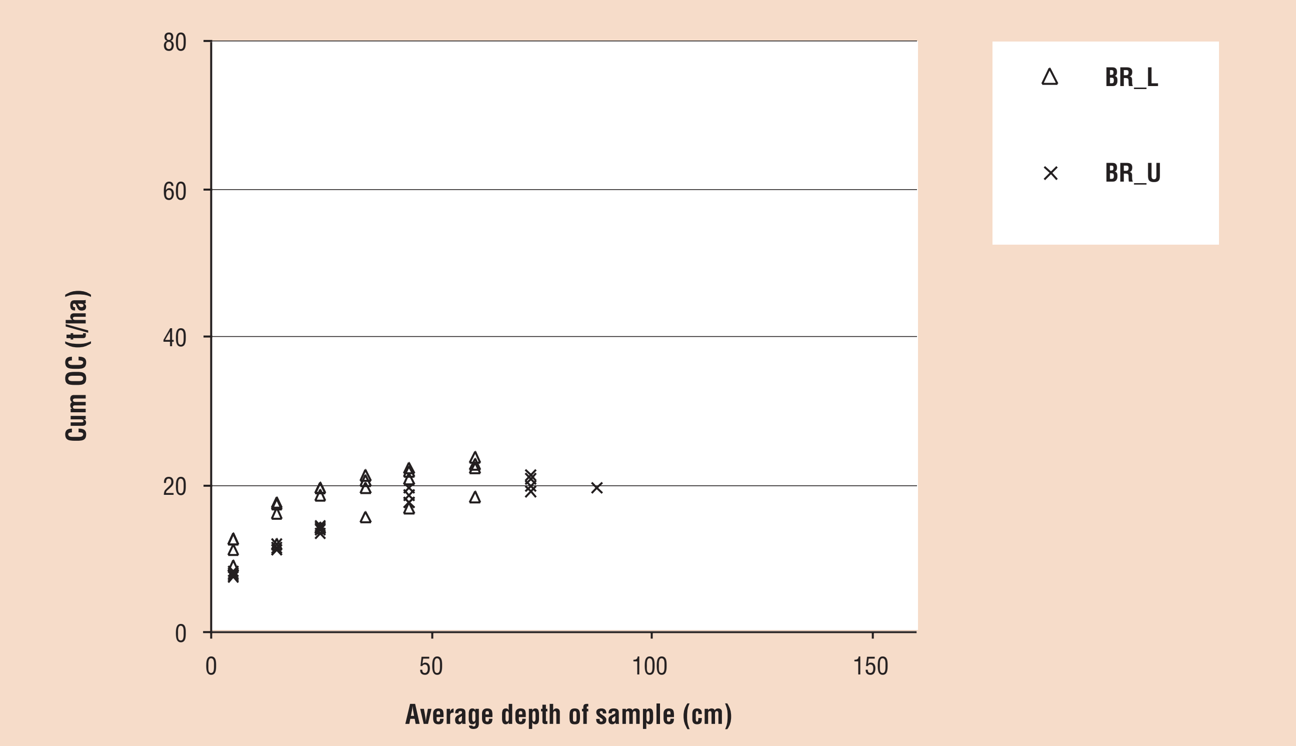
# TABLE OF CONTENTS



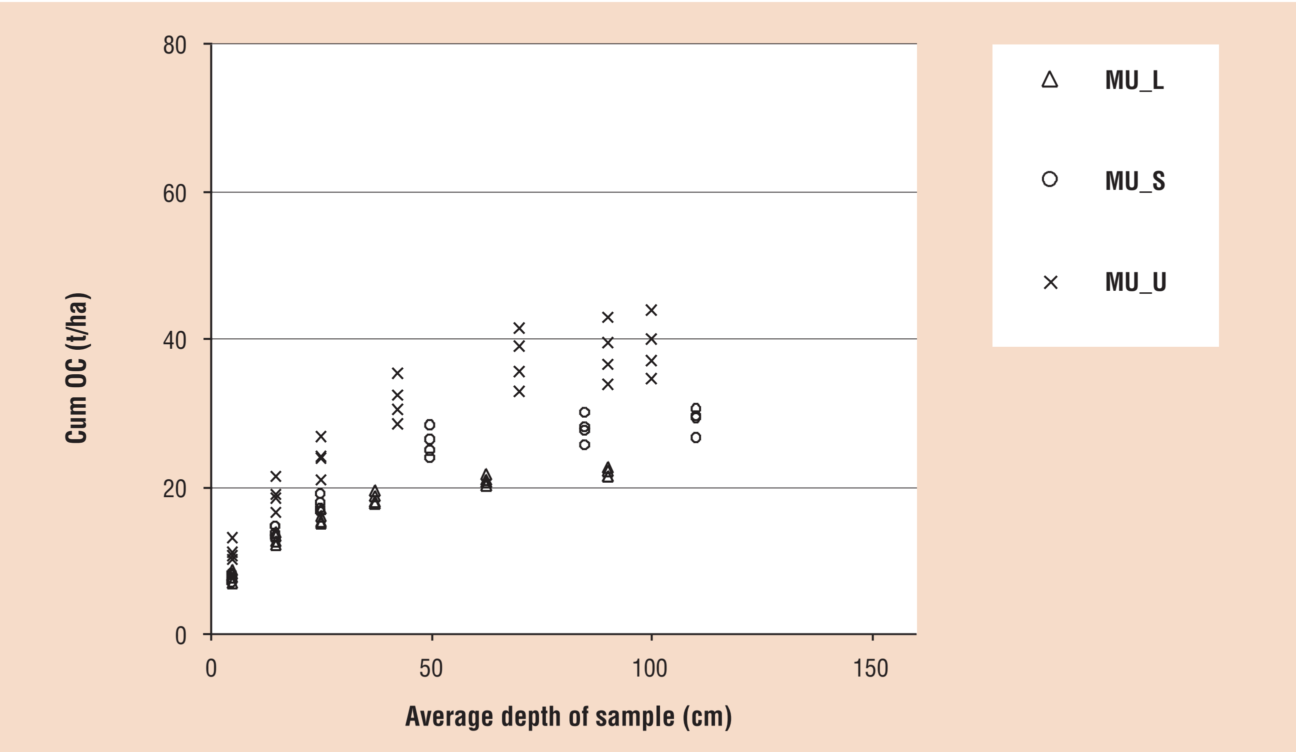

Northampton



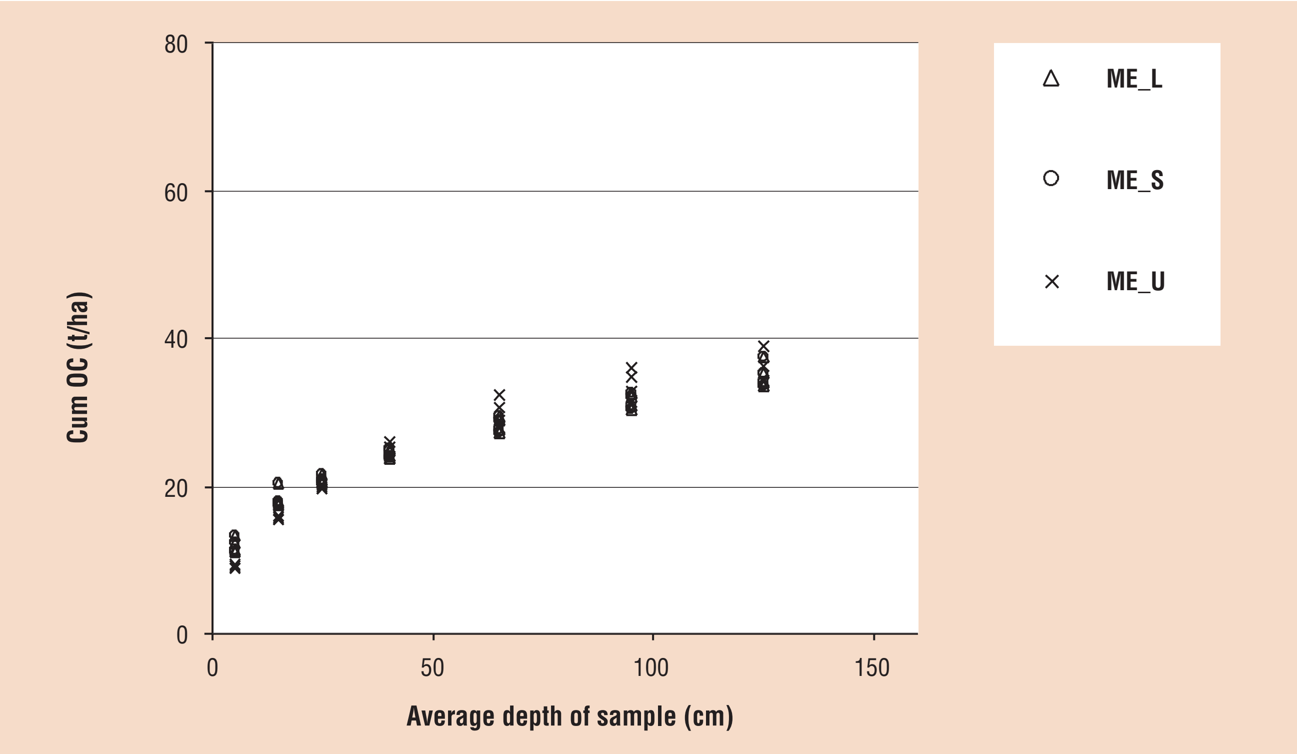

Badgingarra



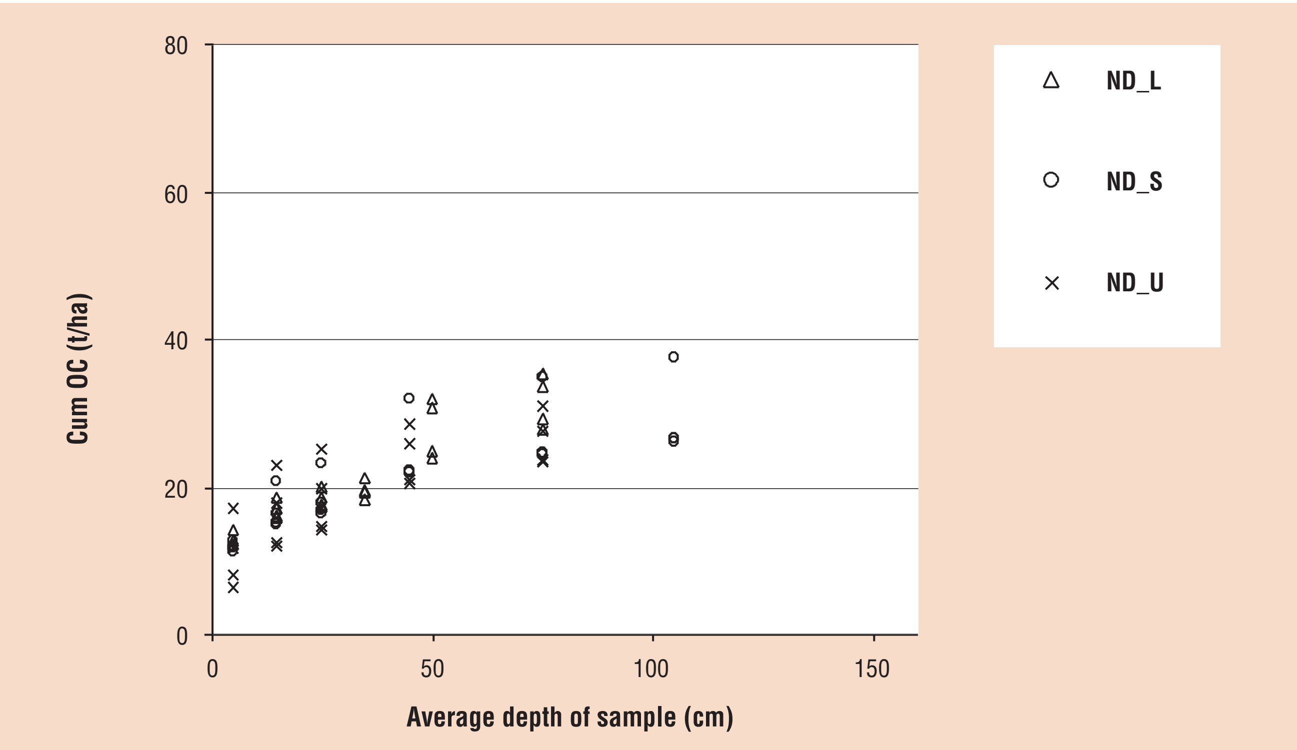

Brookton



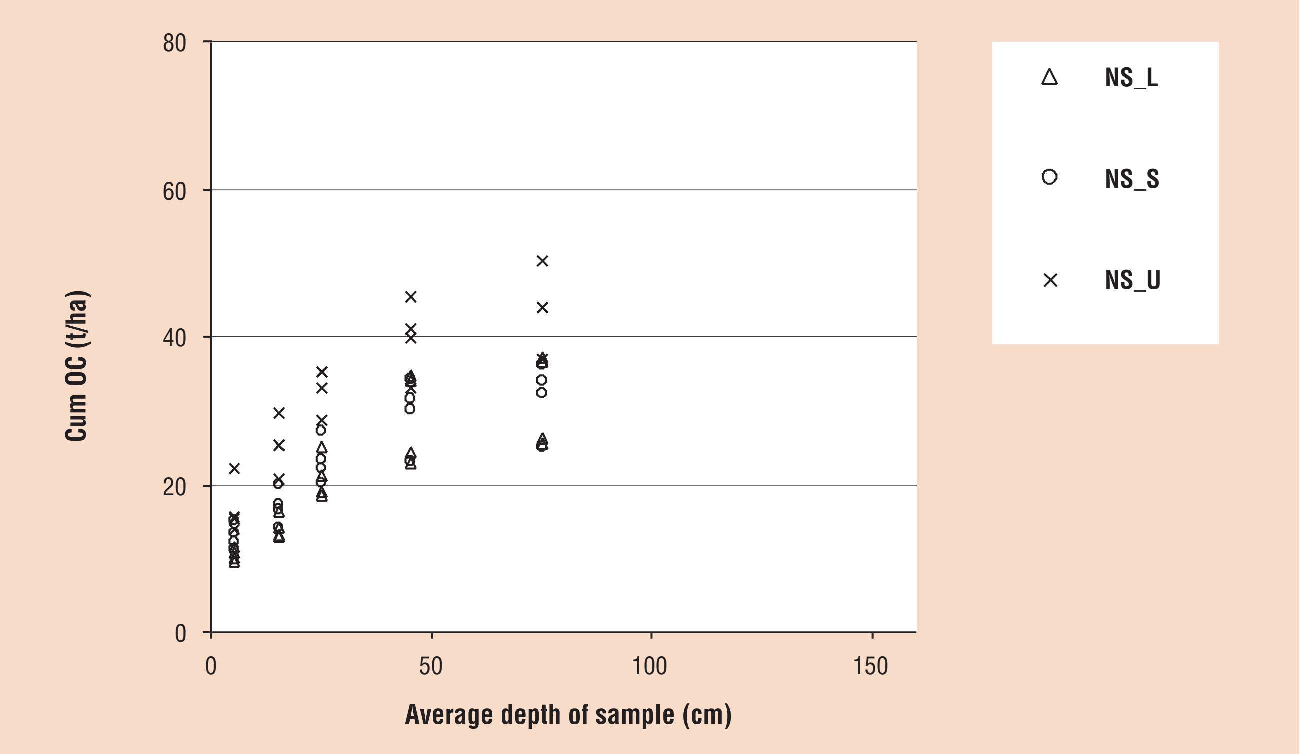

Mullewa



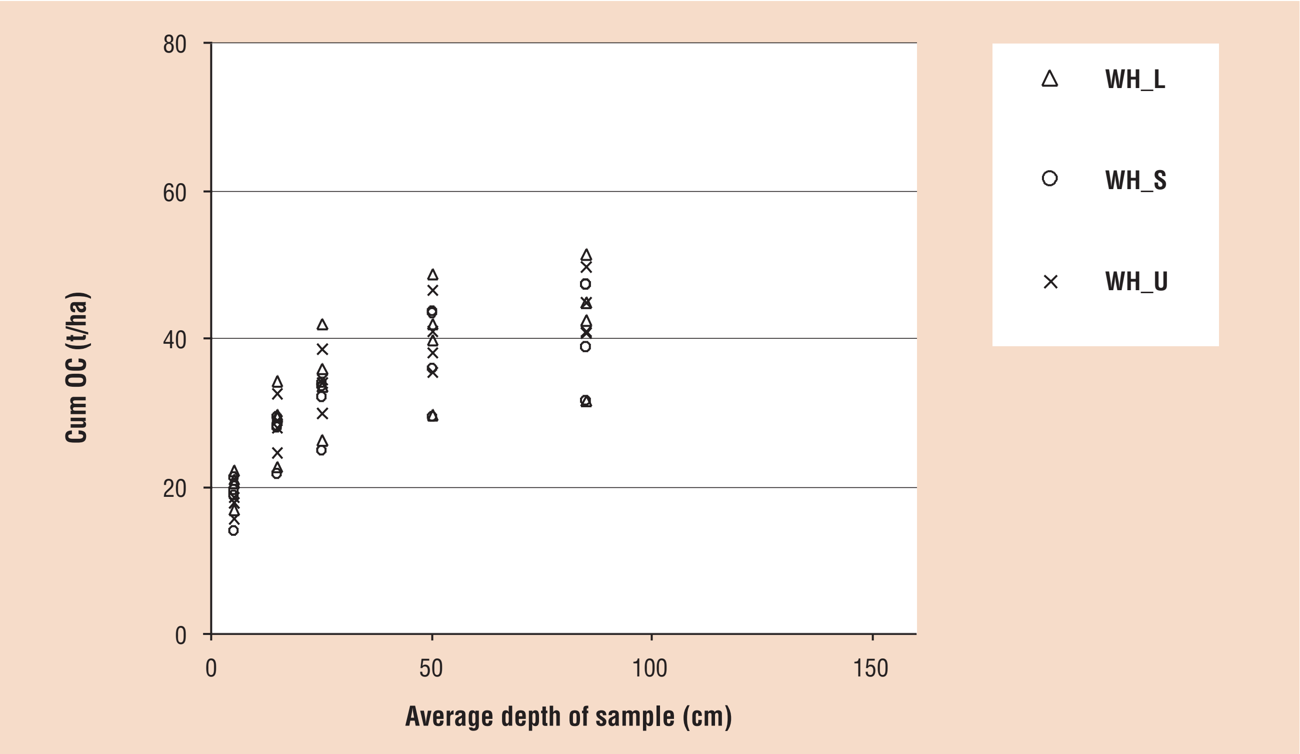

Merredin



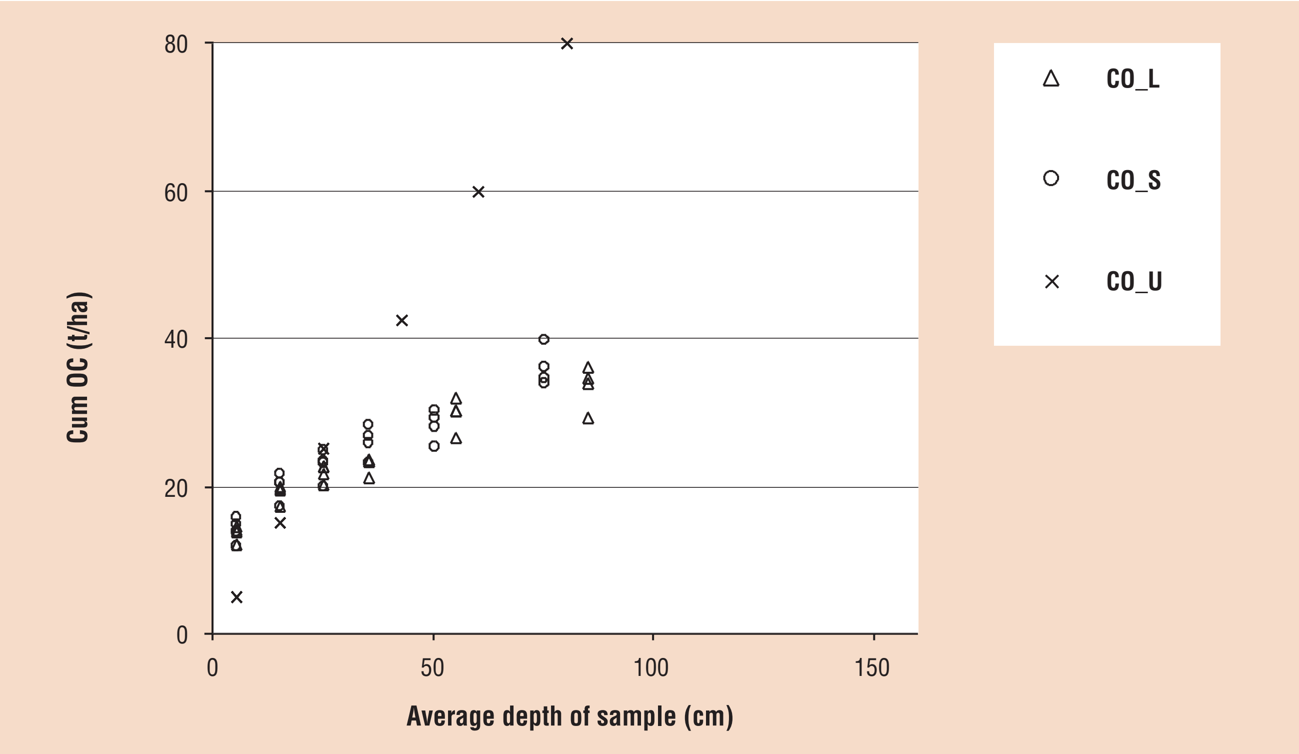

Newdegate (deep)




**Newdegate (shallow)**




**Wittenoom Hills**

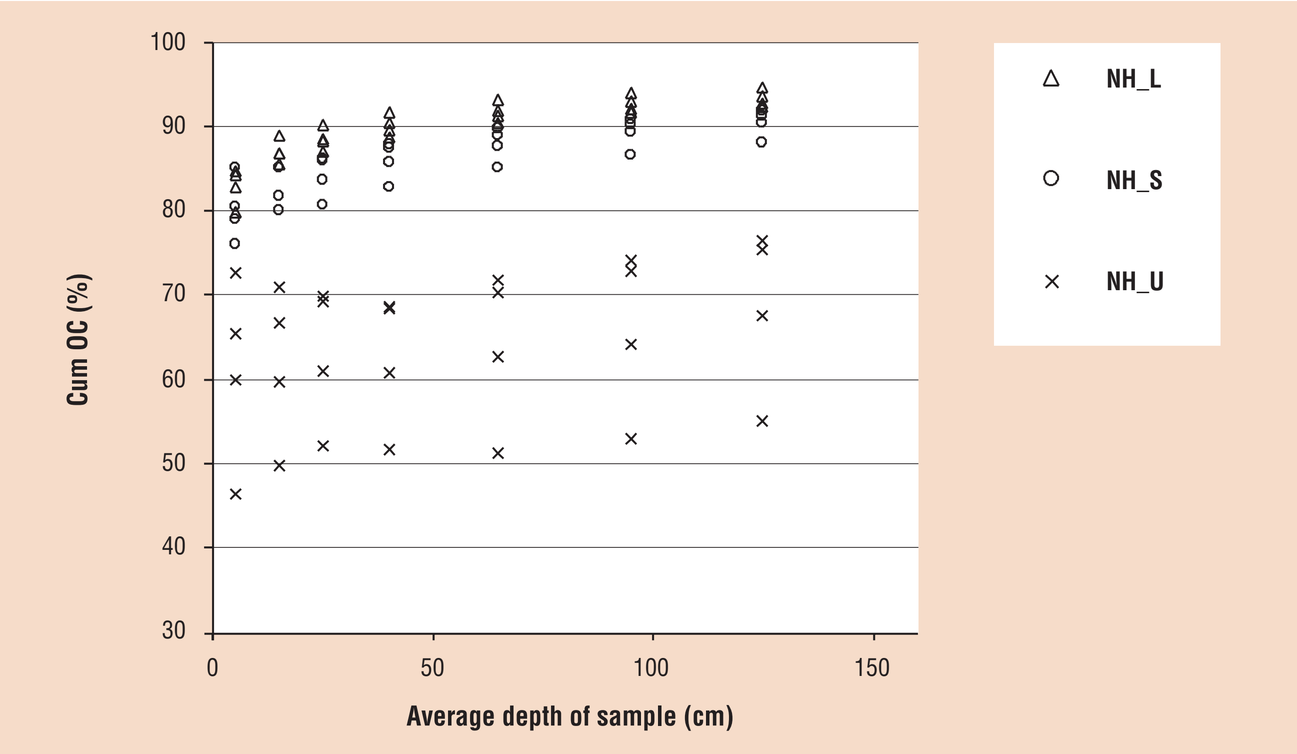

Cum OC (t/ha)
80
60
40
20
0
0
50
100
150
Average depth of sample (cm)
CO_L
CO_S
CO_U

## Condingup

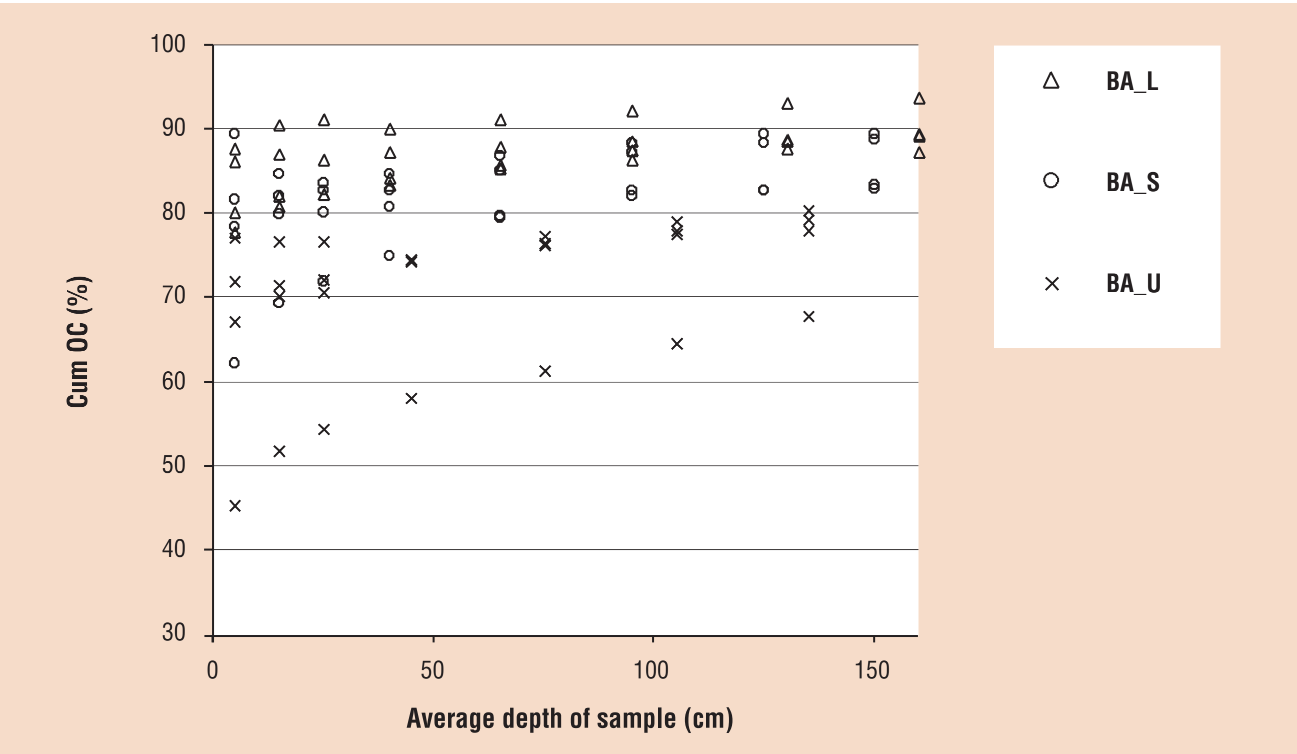
# APPENDIX 13

## Cumulative Organic Carbon in Fine Earth Fraction as a Percentage of the Estimates of Cumulative Whole Soil Organic Carbon (t/ha) by Mid Sample Depth

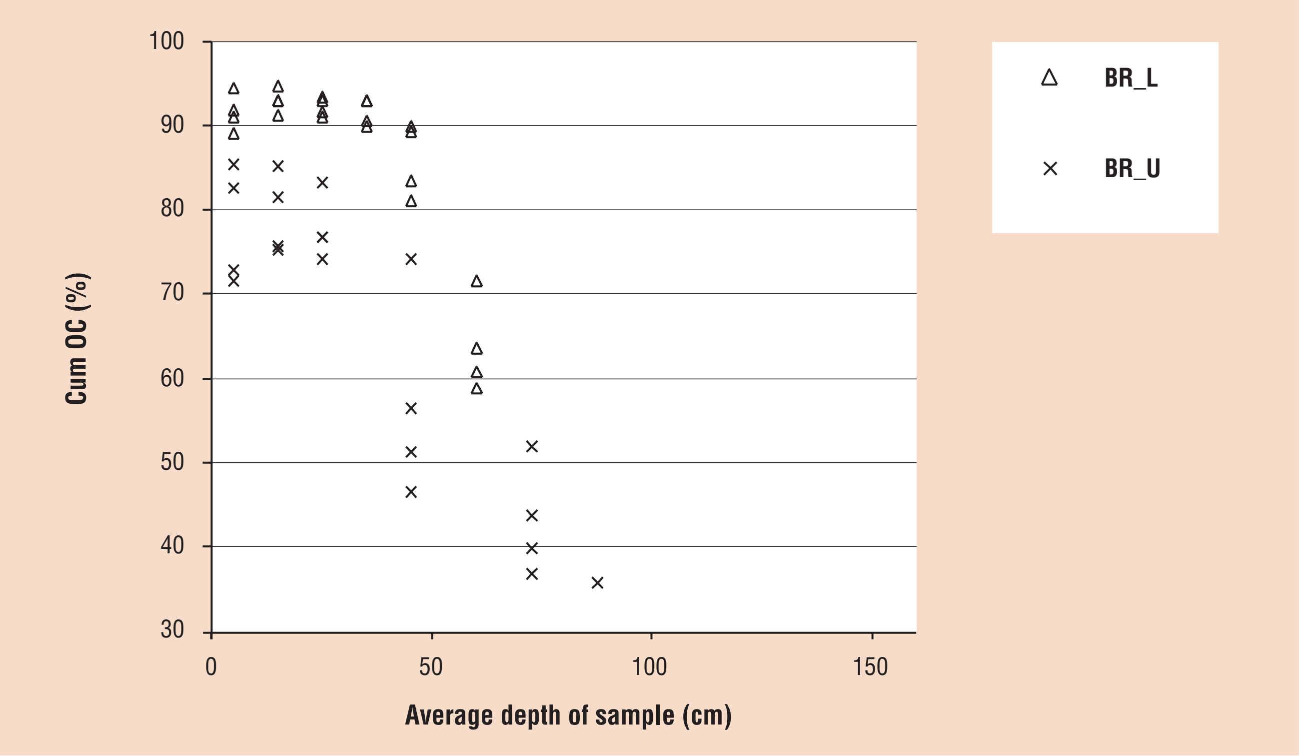
# TABLE OF CONTENTS



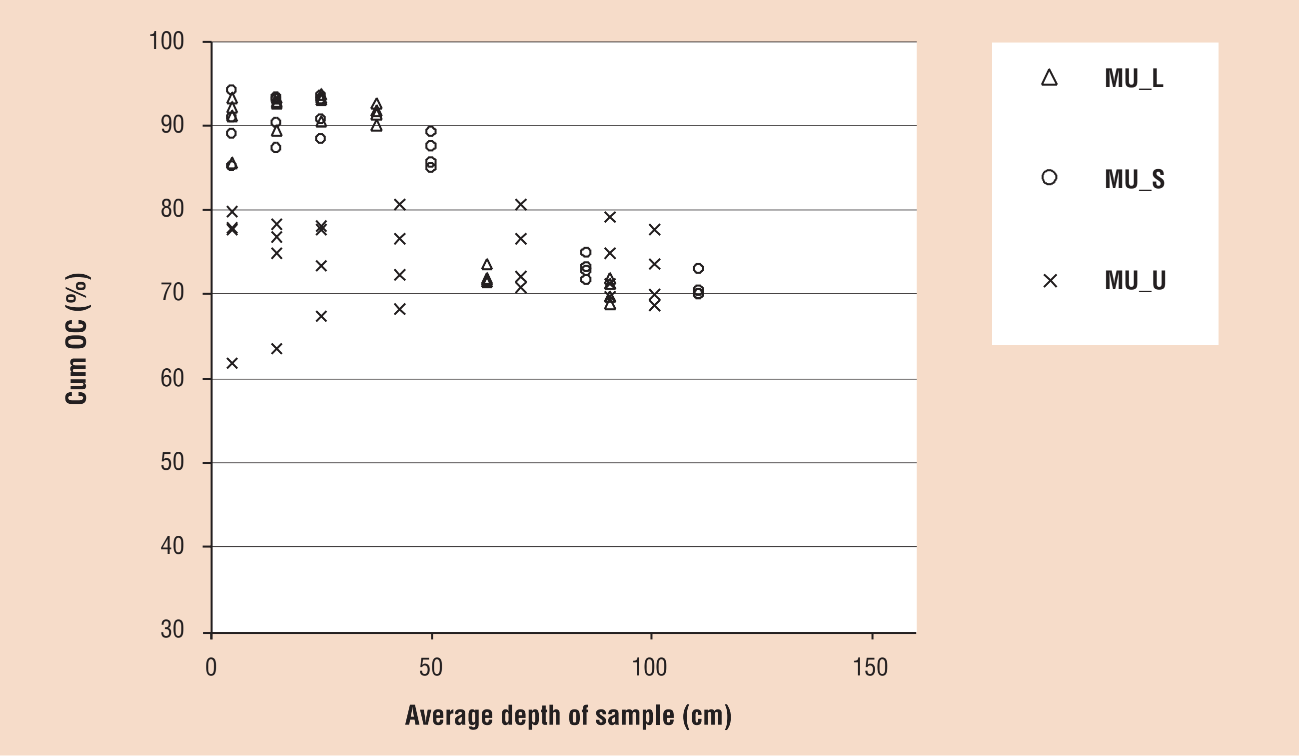

Northampton



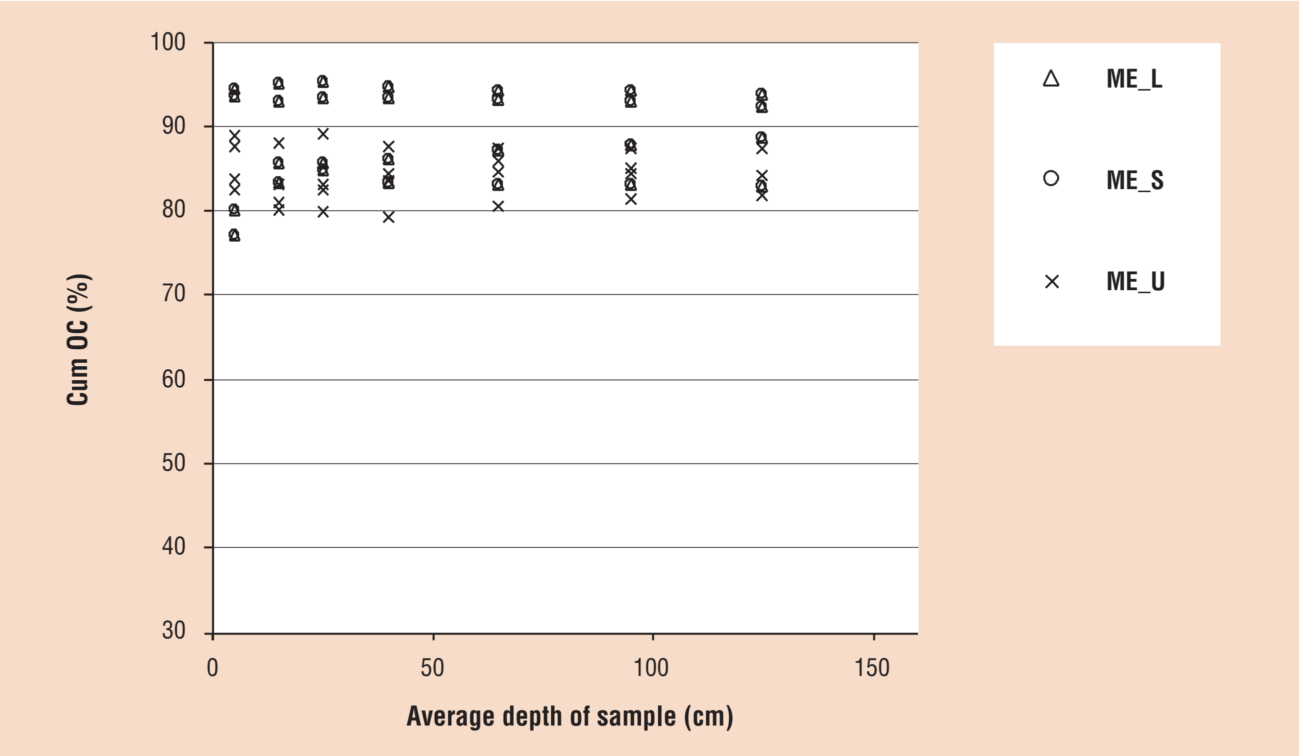

Badgingarra



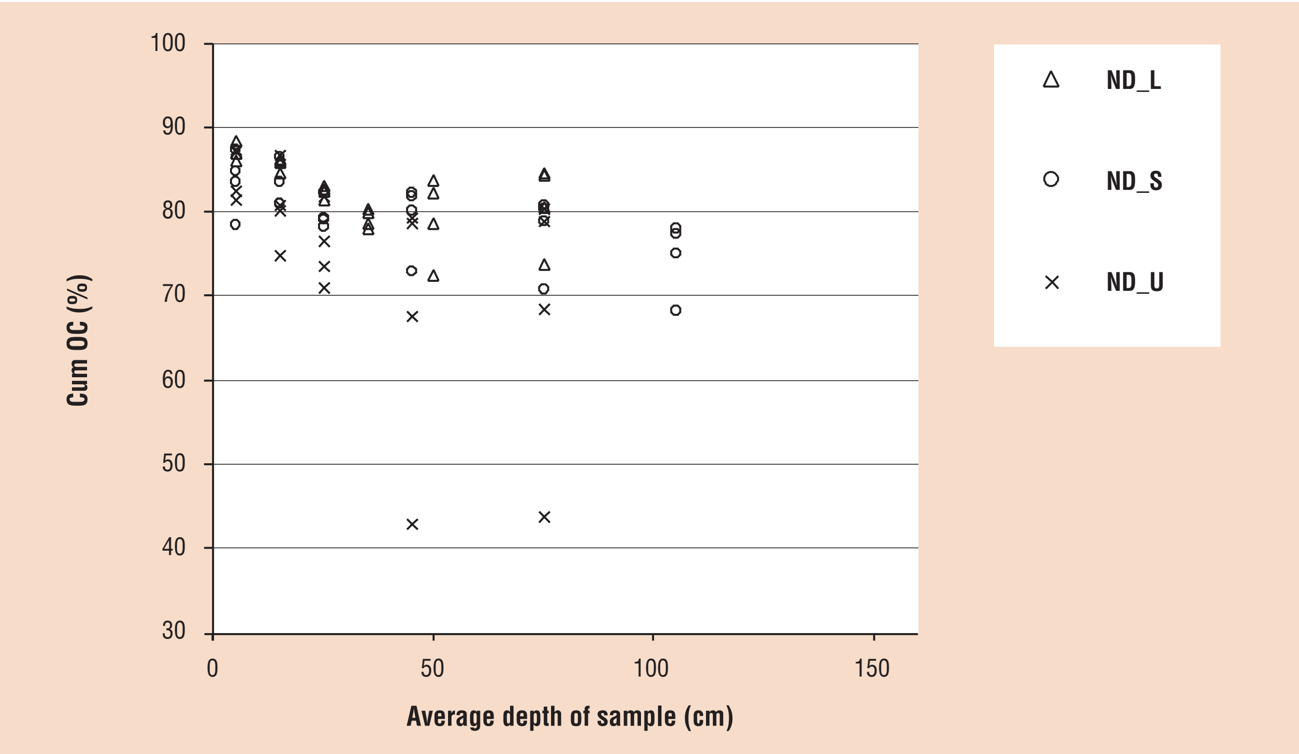

**Brookton**



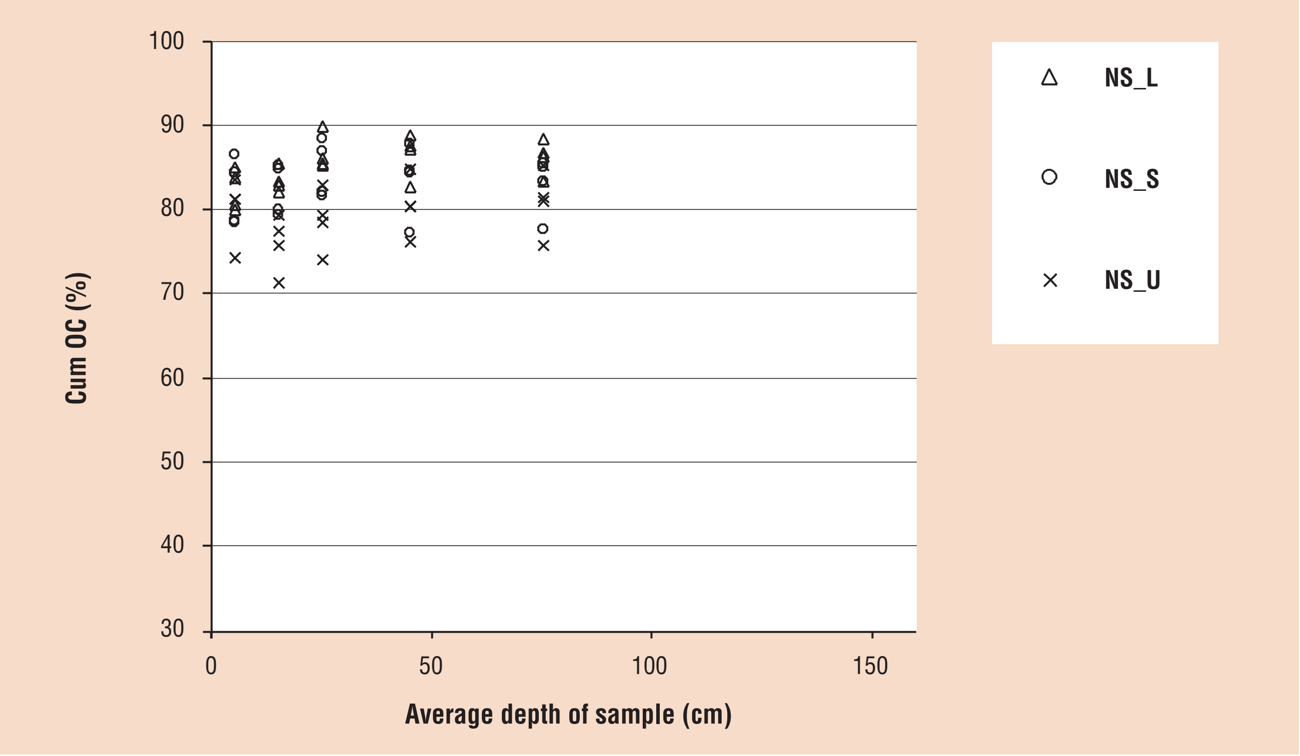

**Mullewa**



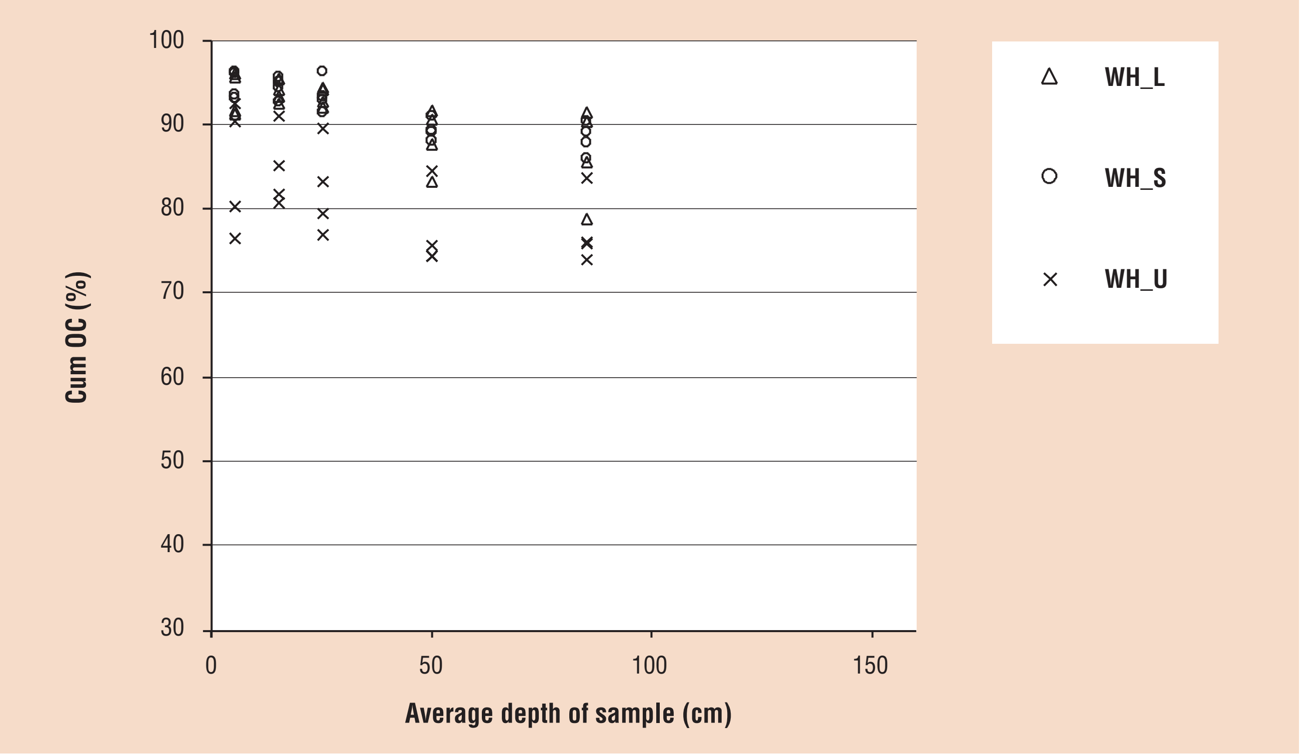

Merredin



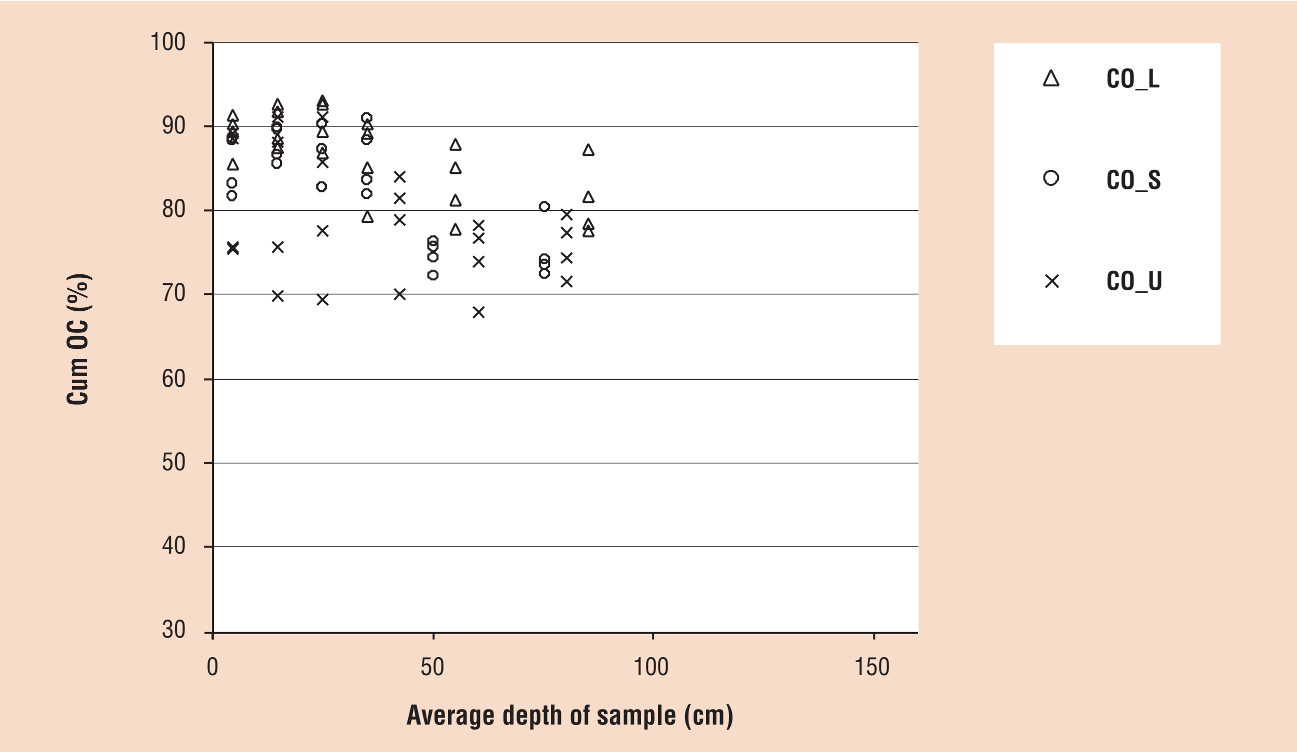

Newdegate (deep)




**Newdegate (shallow)**




**Wittenoom Hills**


100
90
80
70
60
50
40
30
Cum OC (%)
0
50
100
150
Average depth of sample (cm)
CO_L
CO_S
CO_U

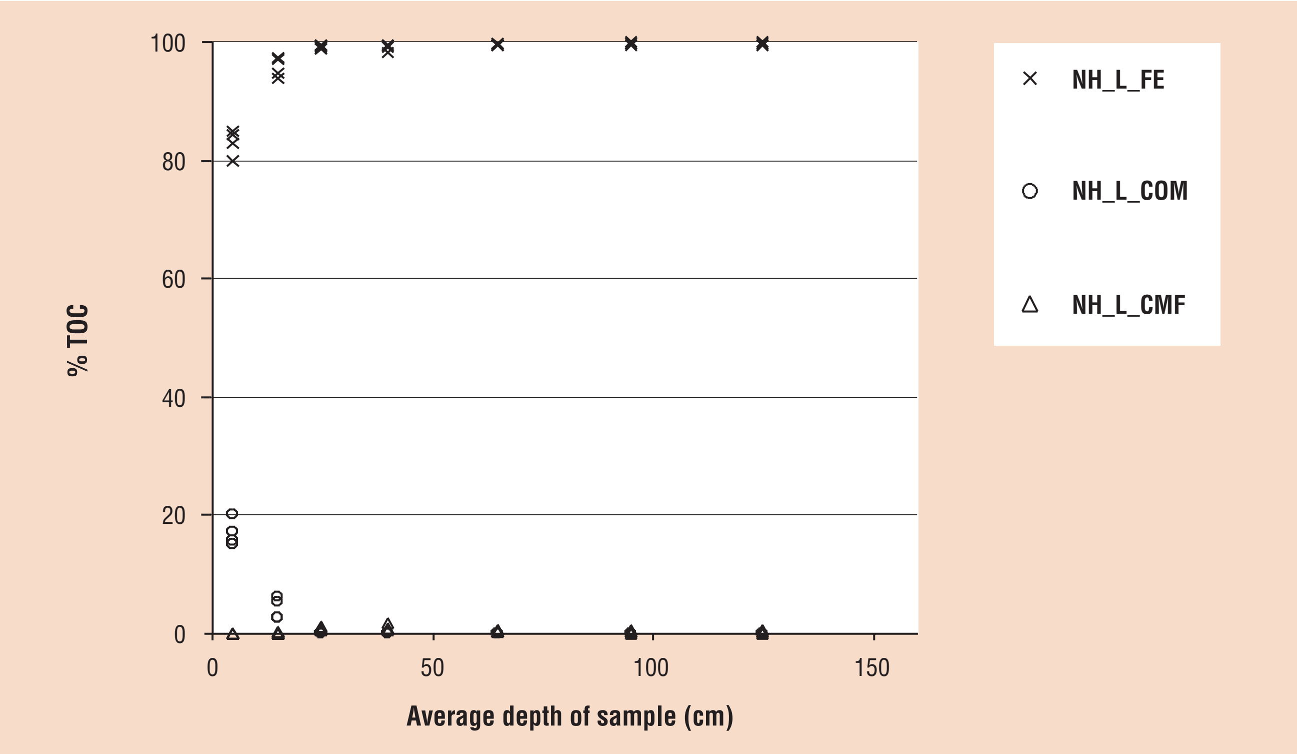
**Condingup**

# APPENDIX 14

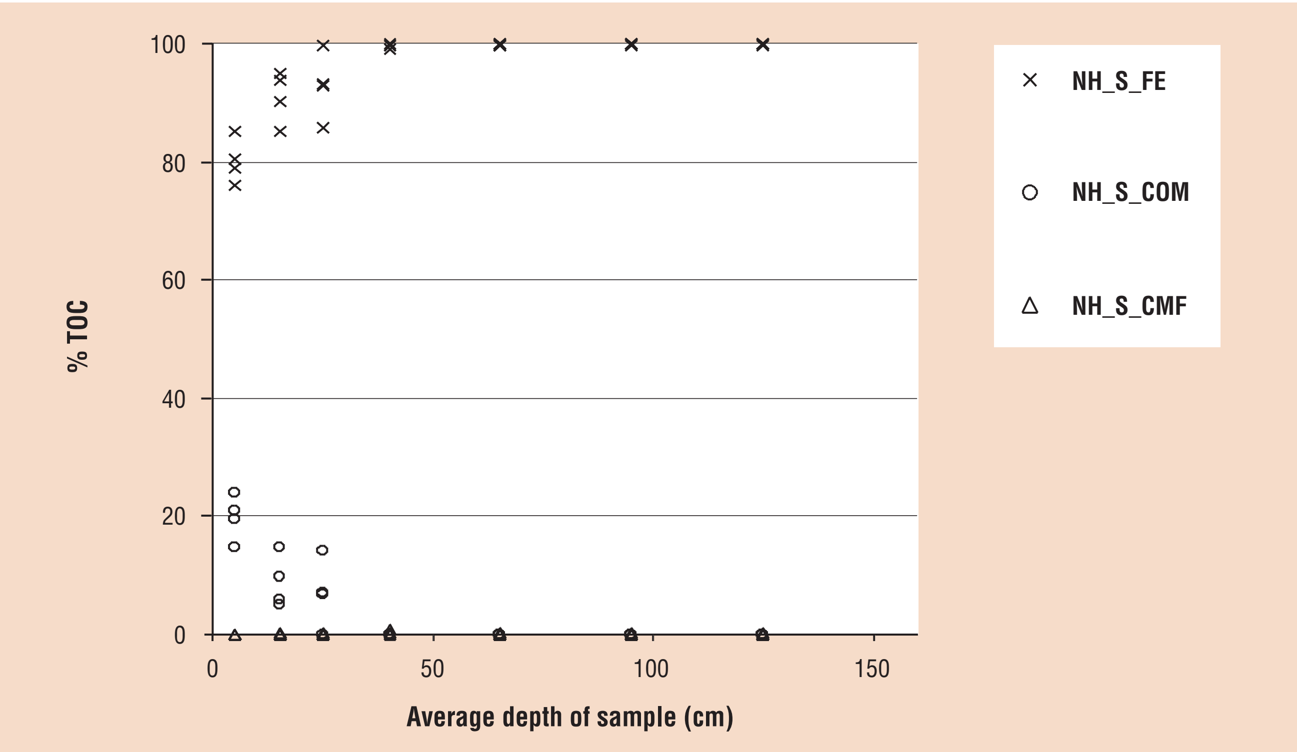
## Percentage of Total Organic Carbon in Each Fraction of Each Sample Plotted by Average Sample Depth

The suffixes – FE, -COM, -CMF denote fine earth, coarse organic matter and coarse mineral fraction respectively.

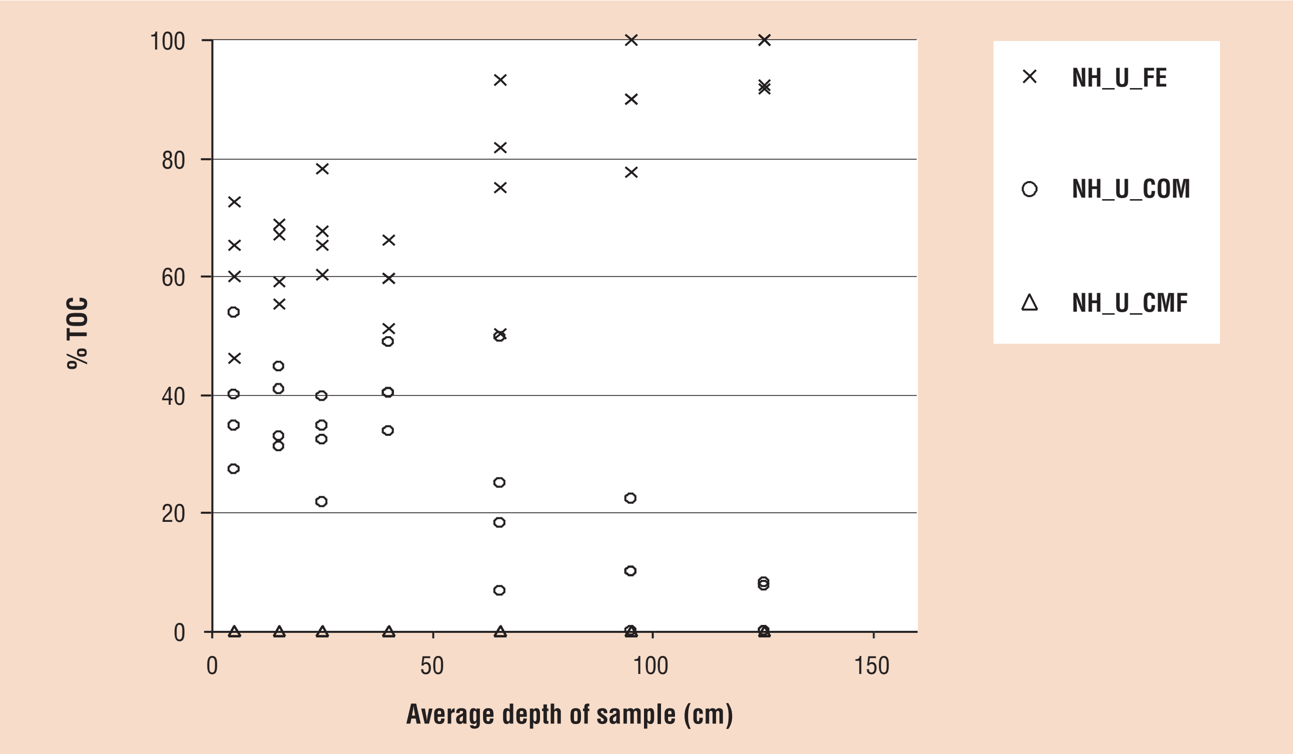
# TABLE OF CONTENTS



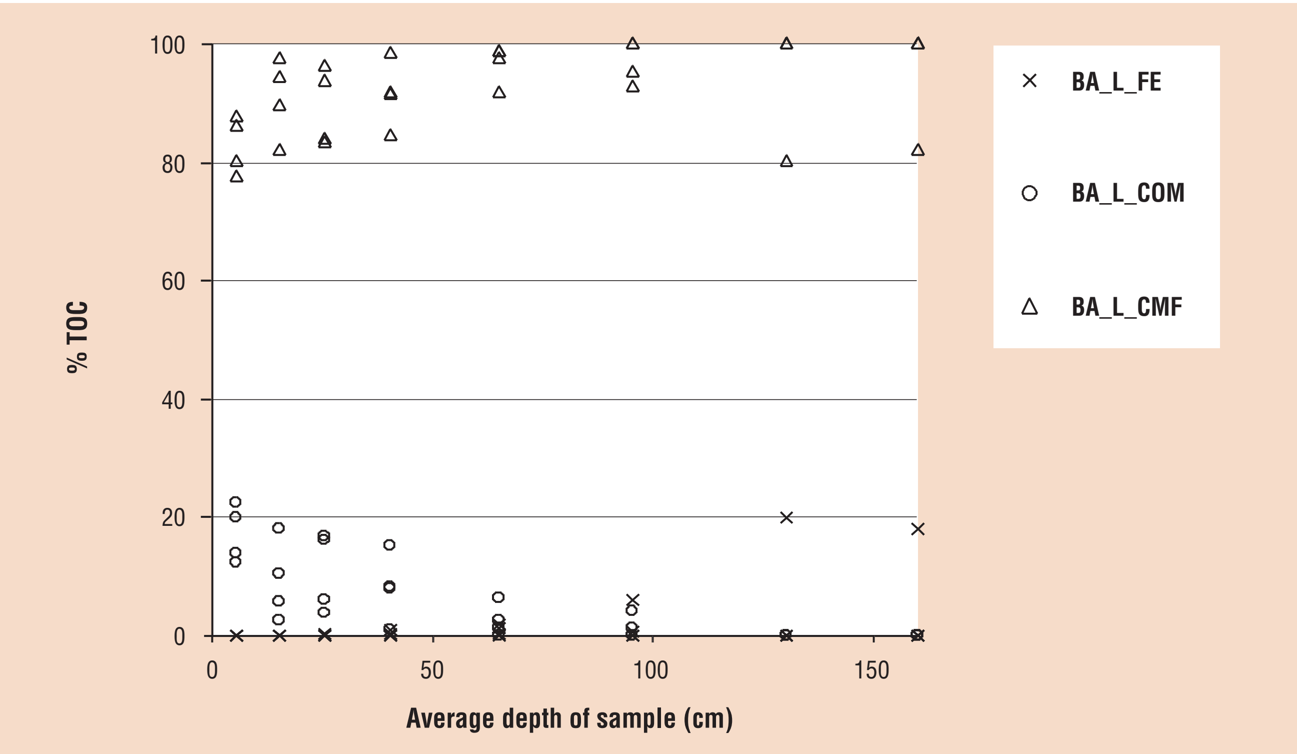

Northampton, long cleared



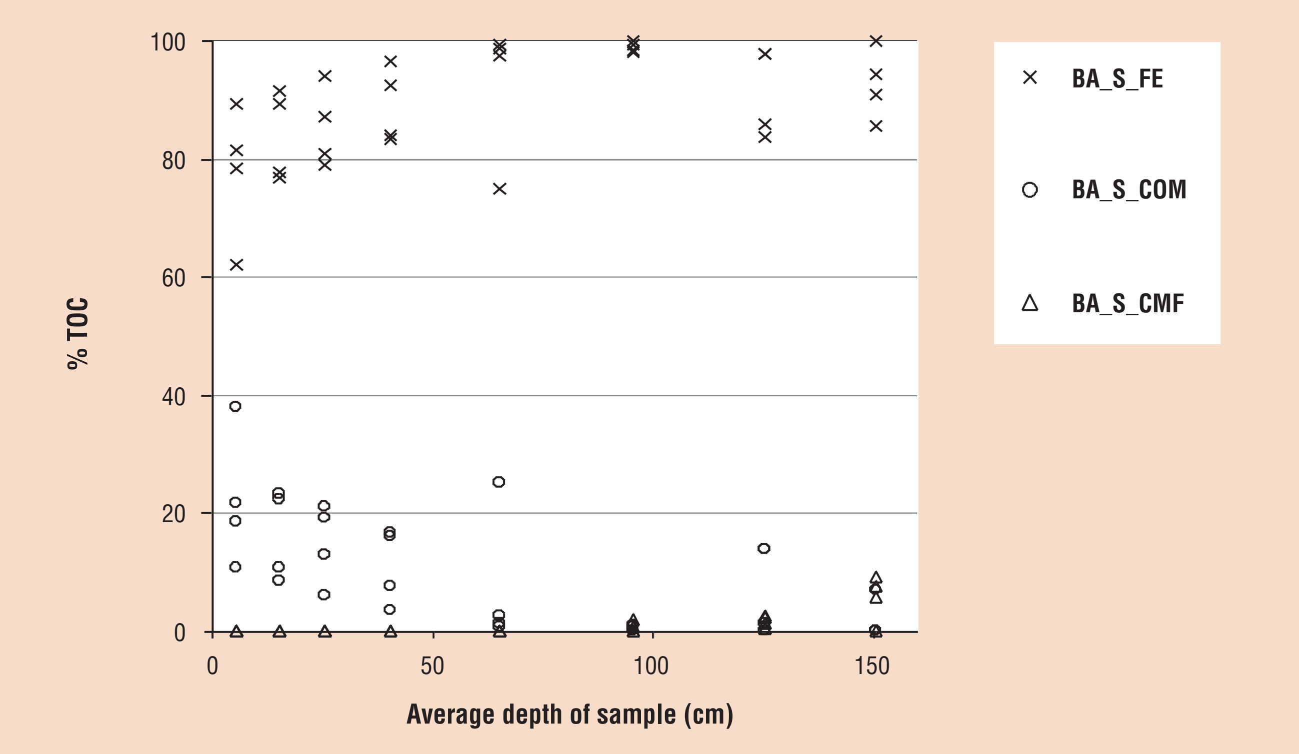

Northampton, short cleared



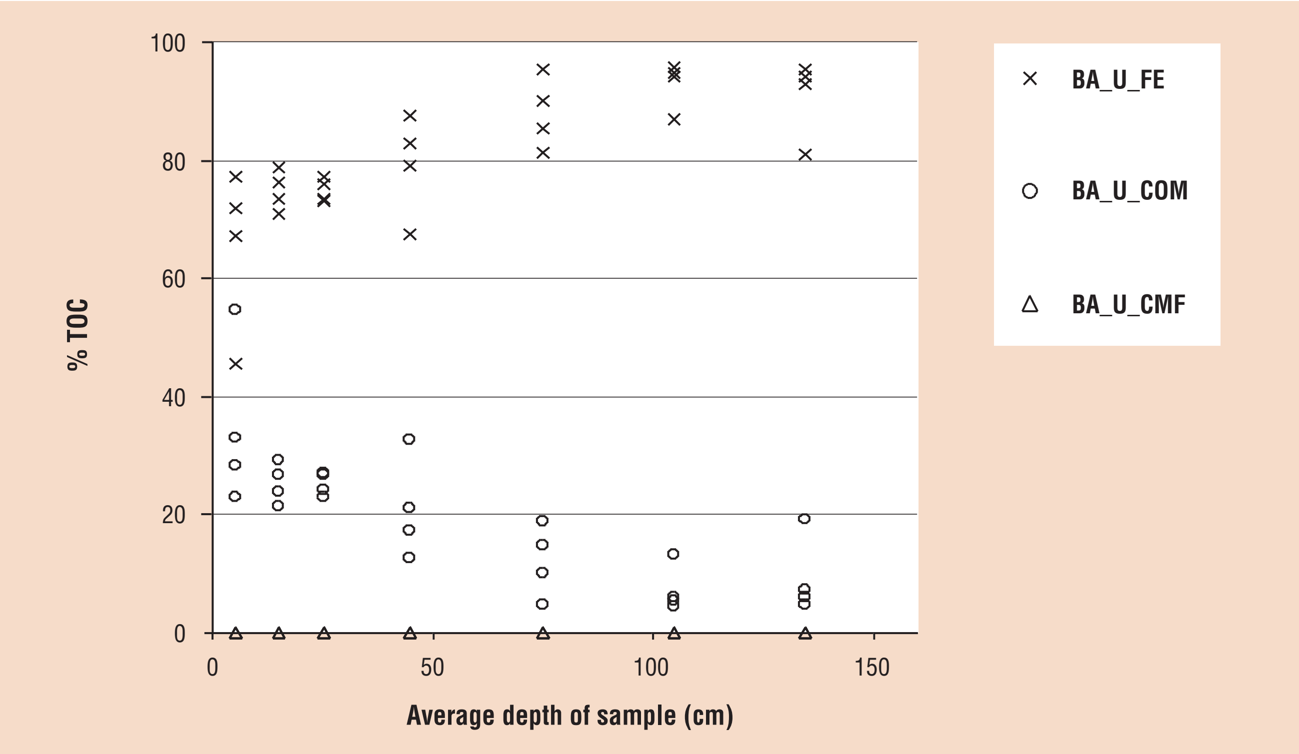

**Northampton, uncleared**



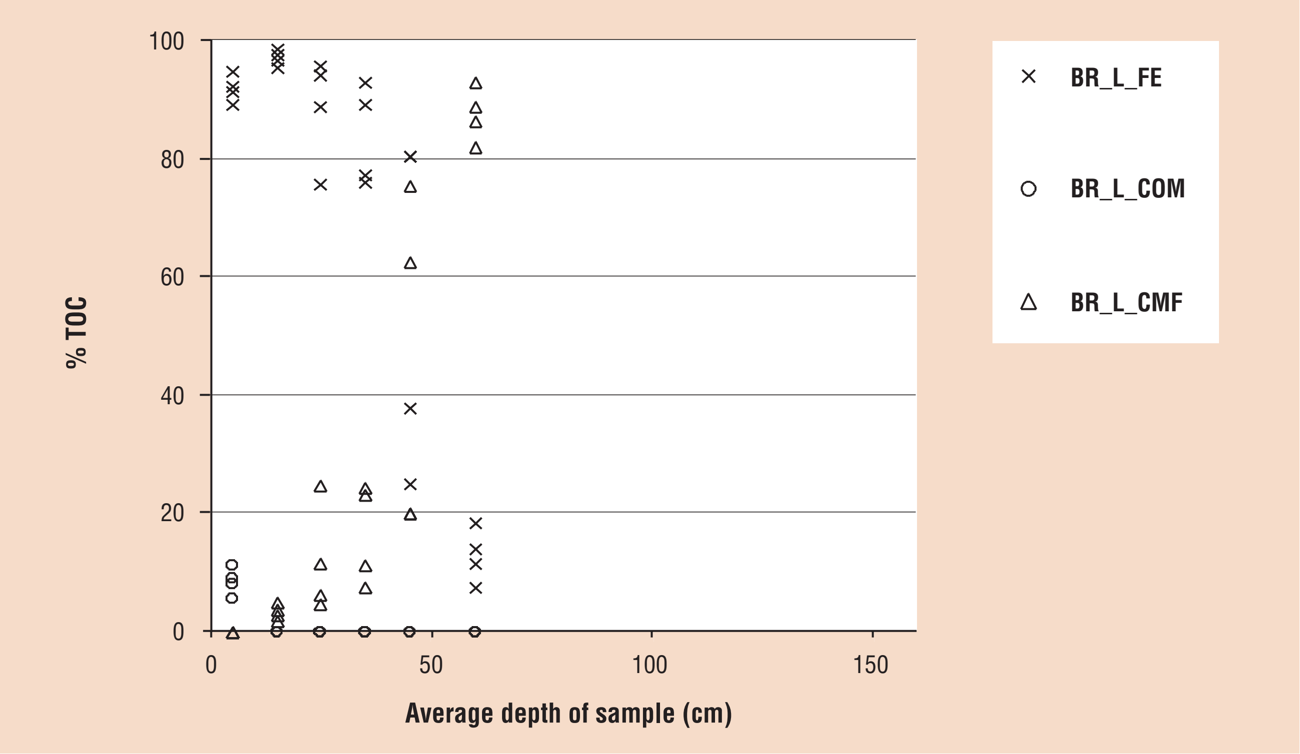

**Badgingarra, long cleared**



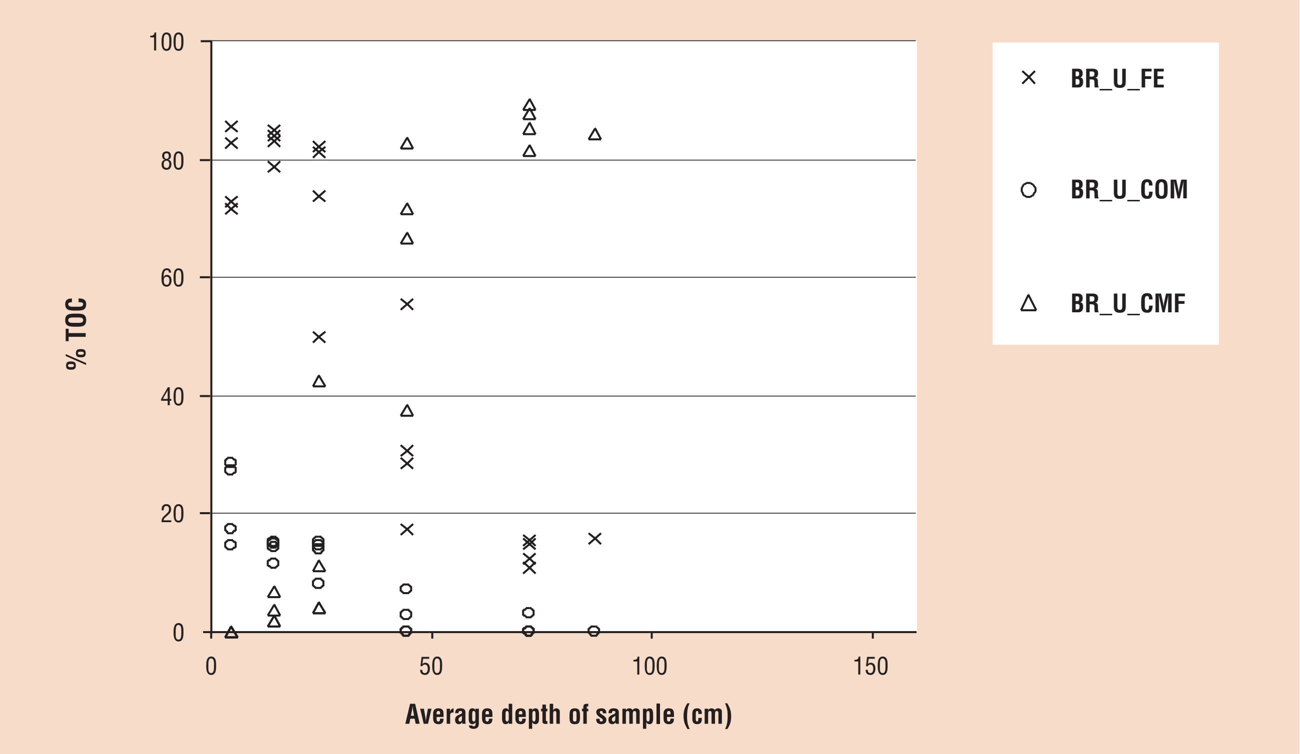

**Badgingarra, short cleared**



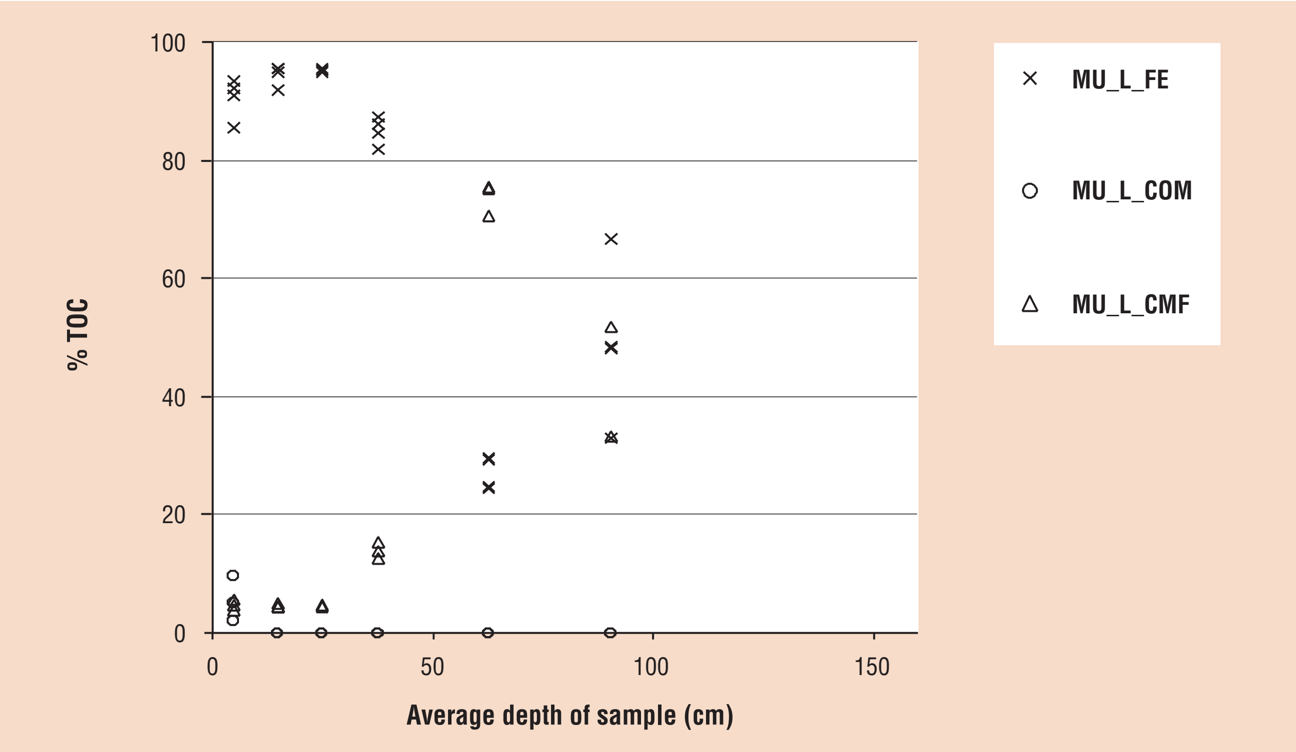

**Badgingarra, uncleared**



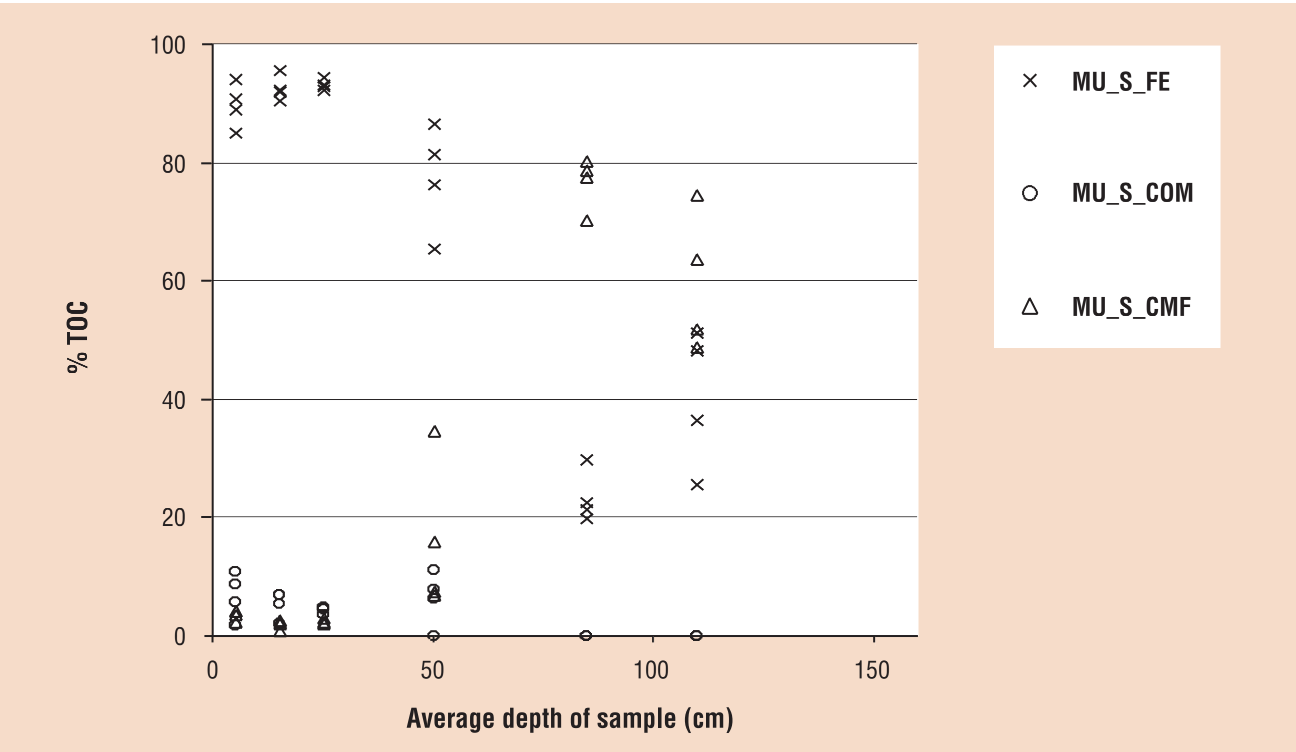

**Brookton, long cleared**



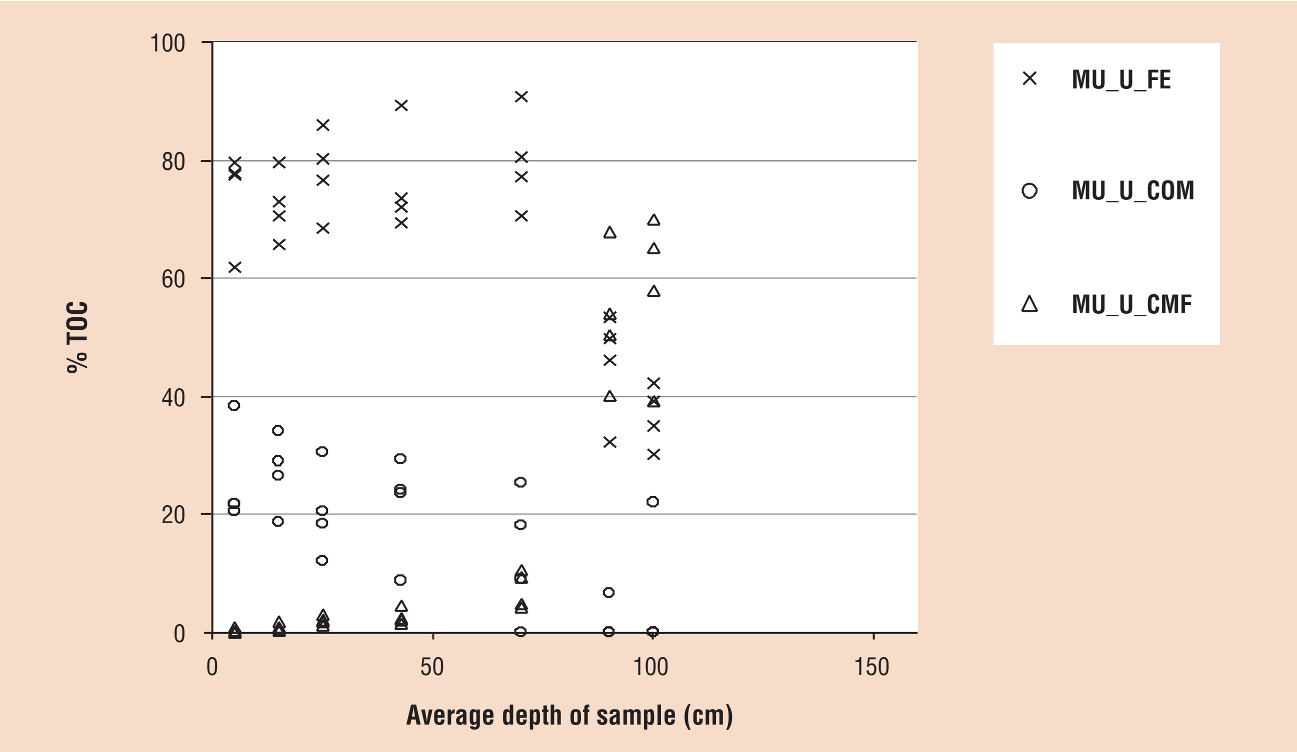

**Brookton, uncleared**



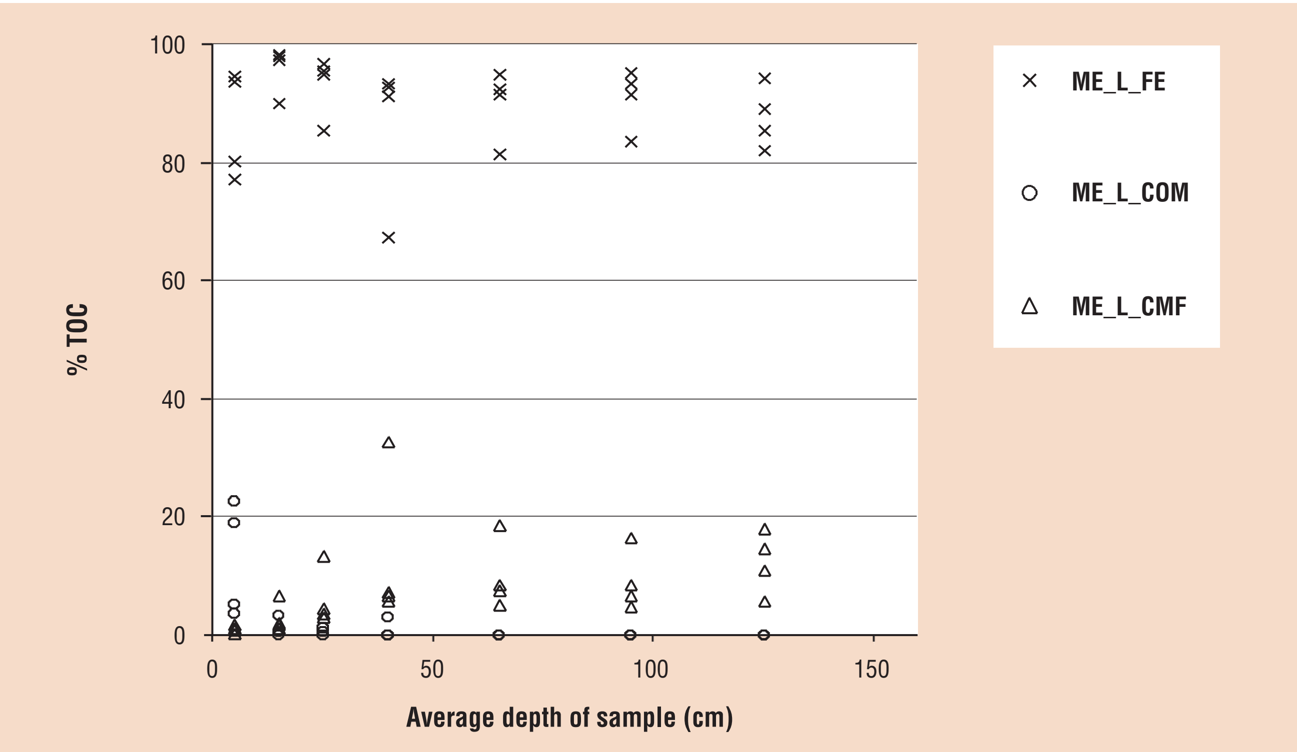

**Mullewa, long cleared**



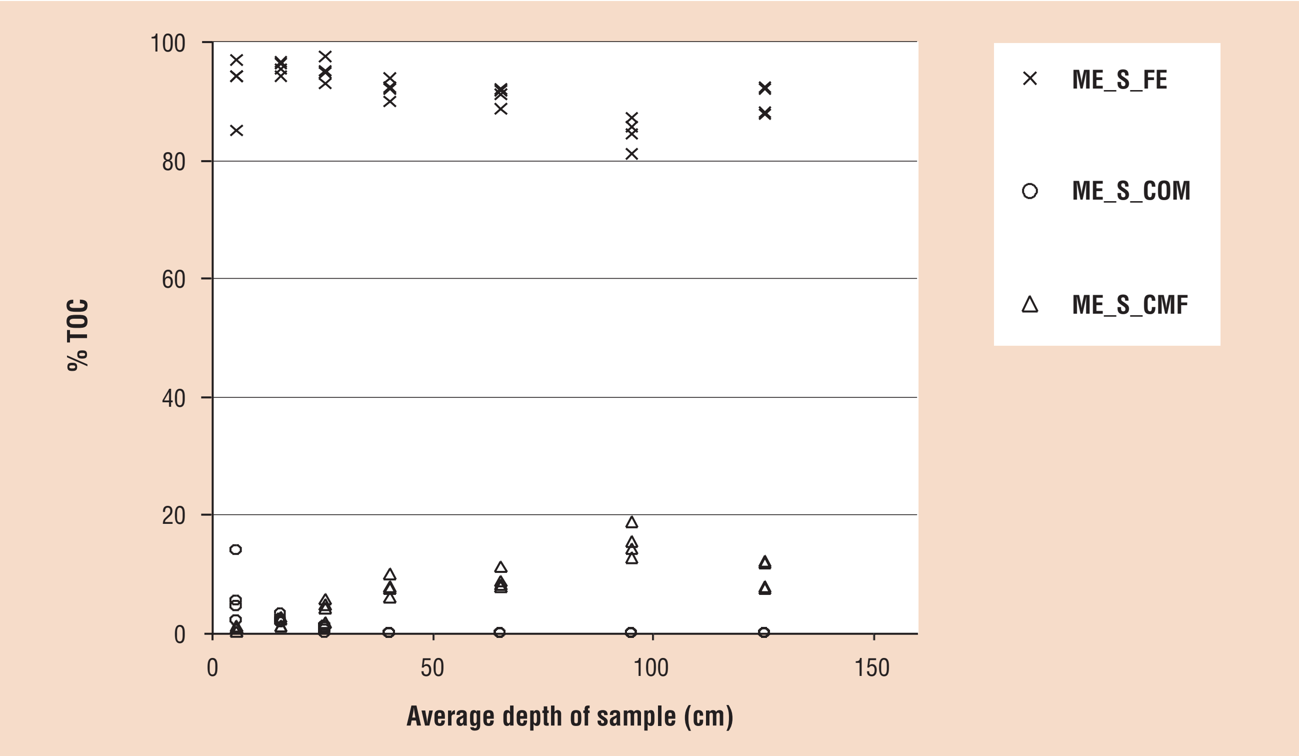

**Mullewa, short cleared**



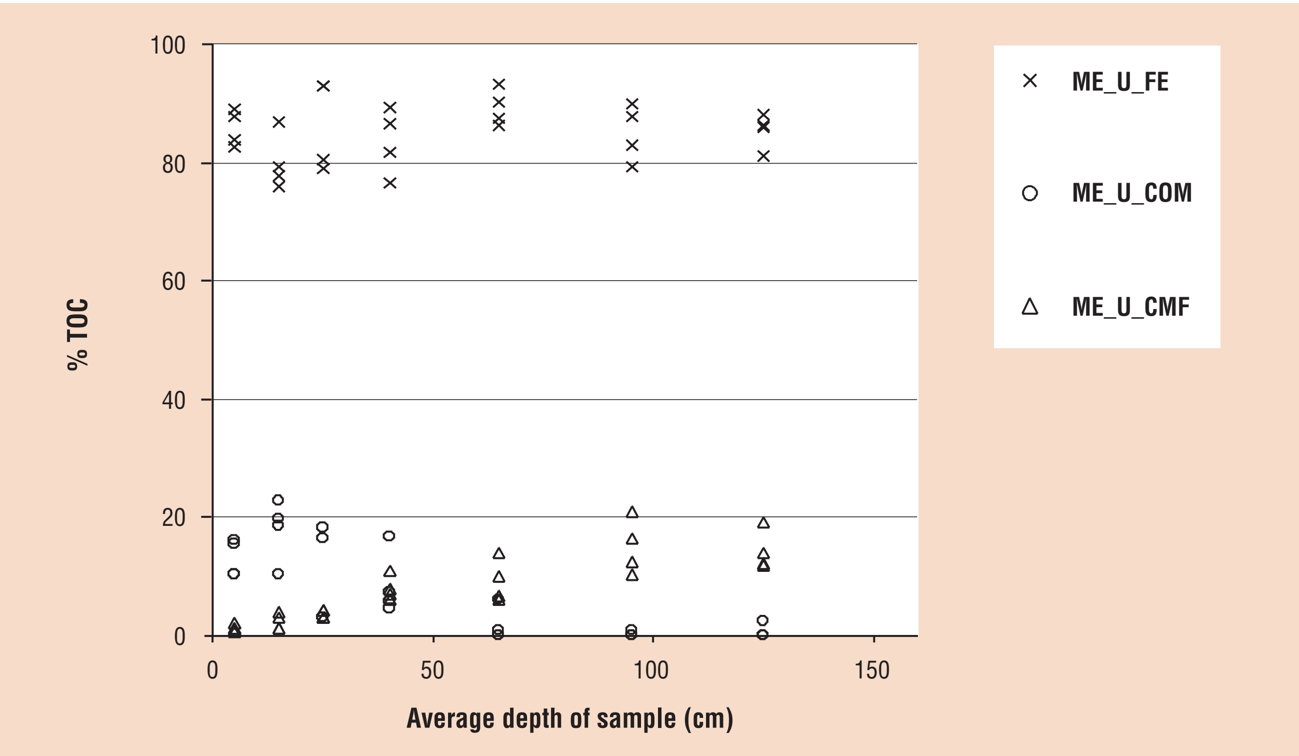

Mullewa, uncleared



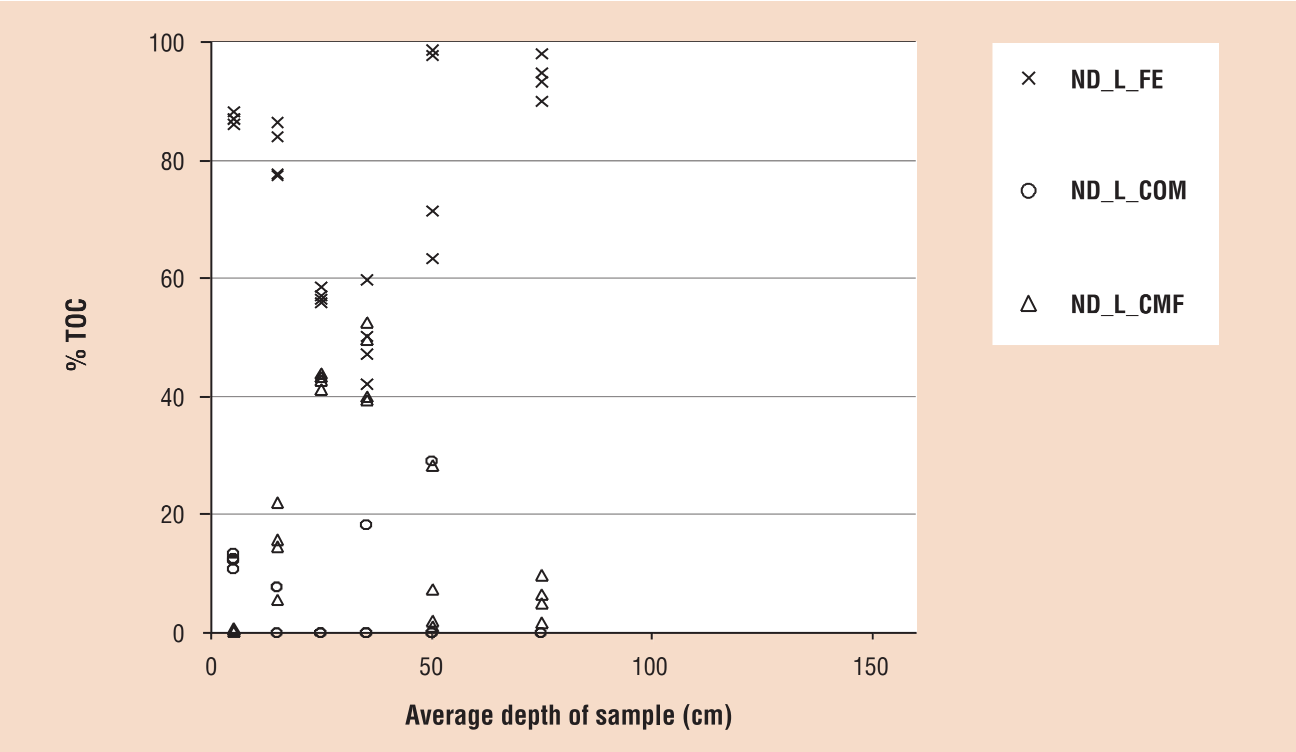

Merredin, long cleared



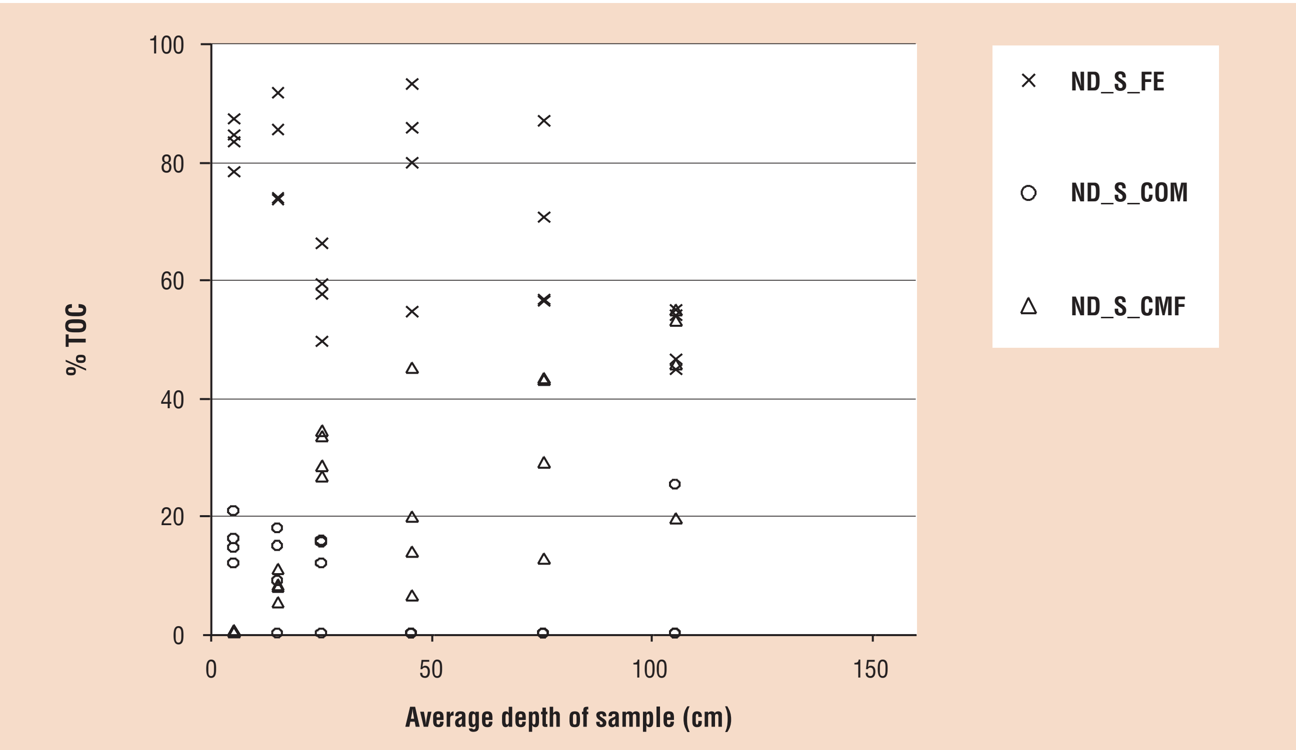

**Merredin, short cleared**



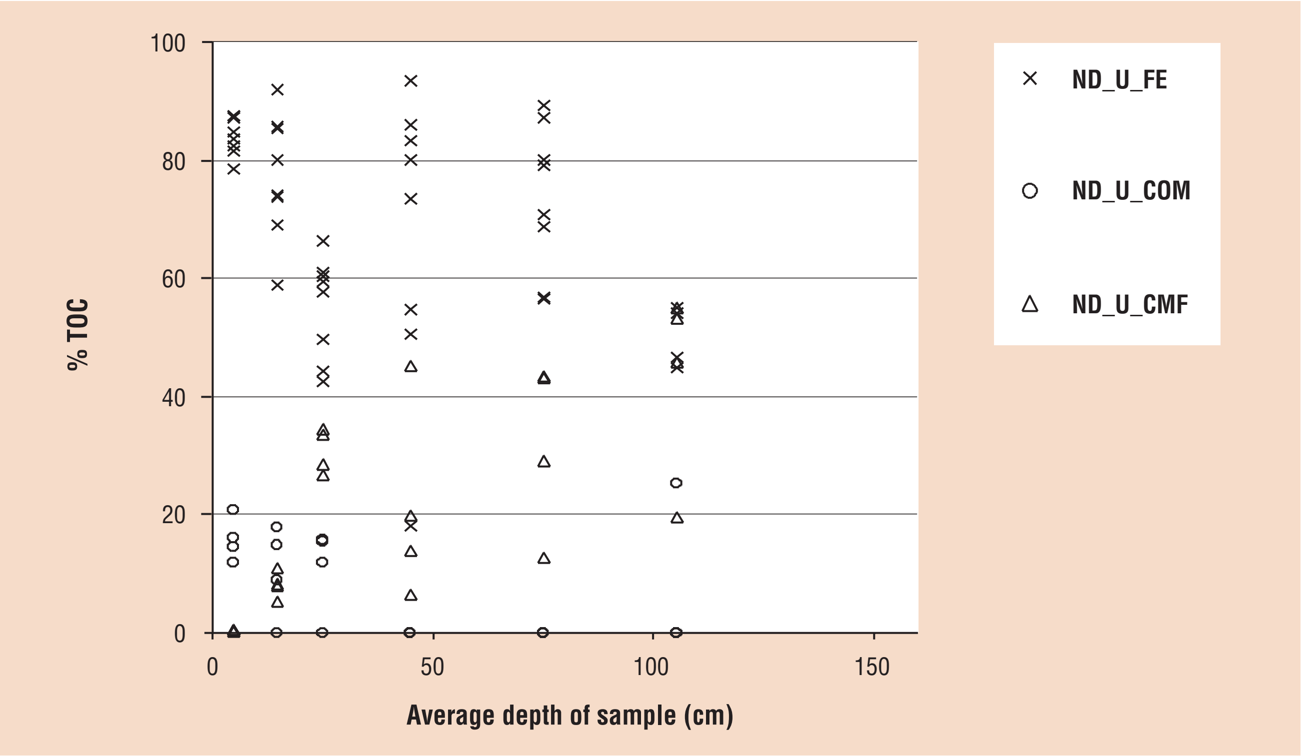

**Merredin, uncleared**



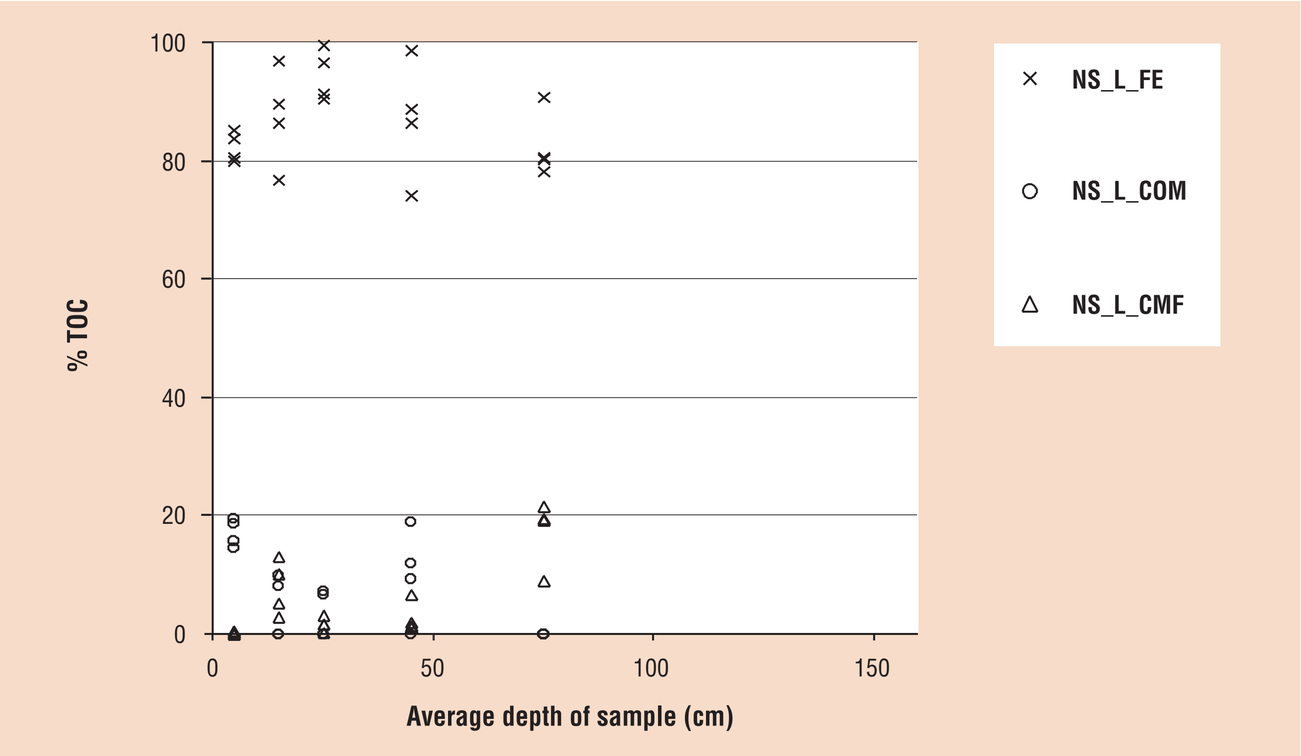

**Newdegate (deep), long cleared**



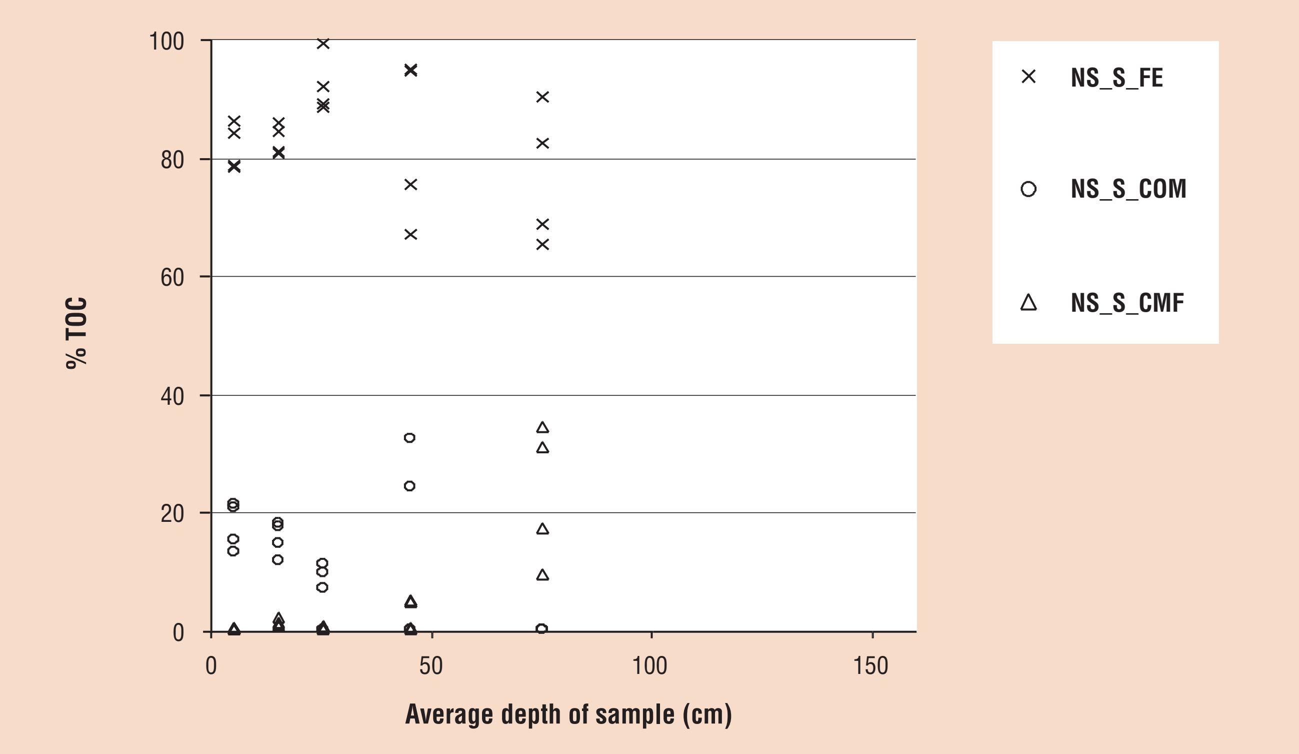

**Newdegate (deep), short cleared**



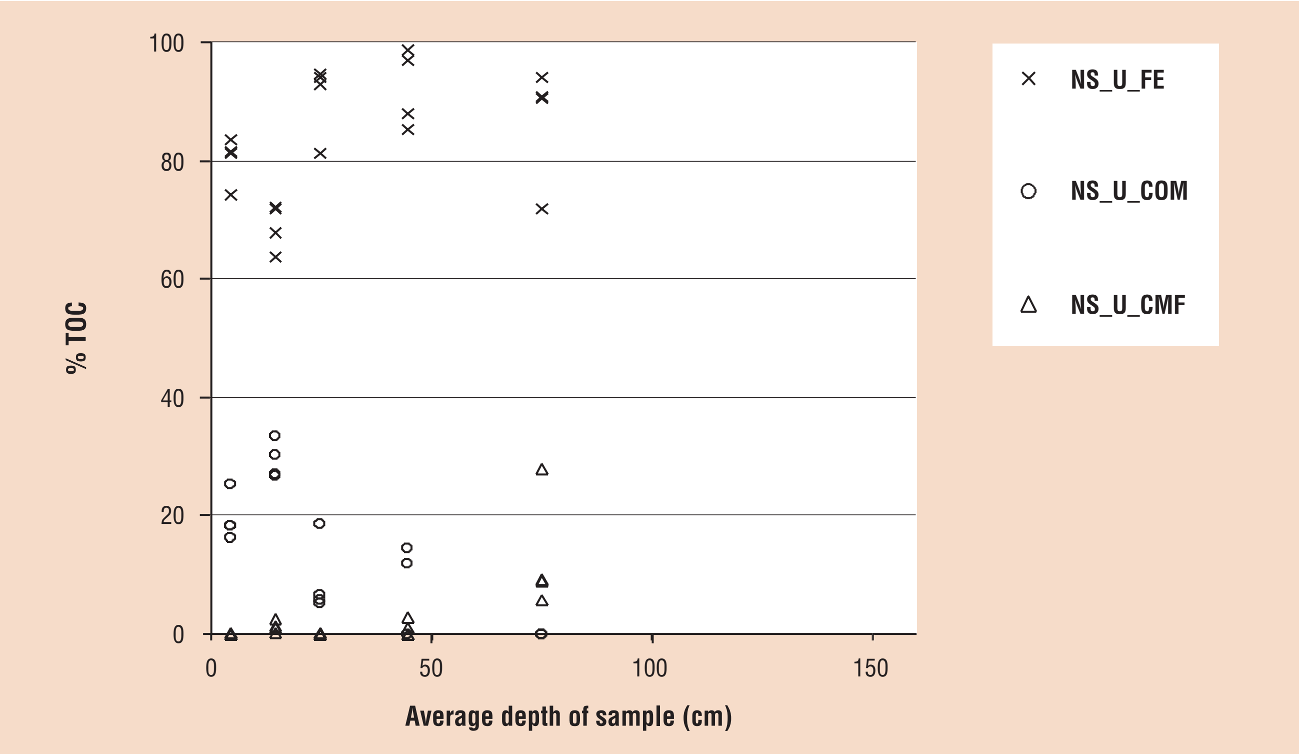

Newdegate (deep), uncleared



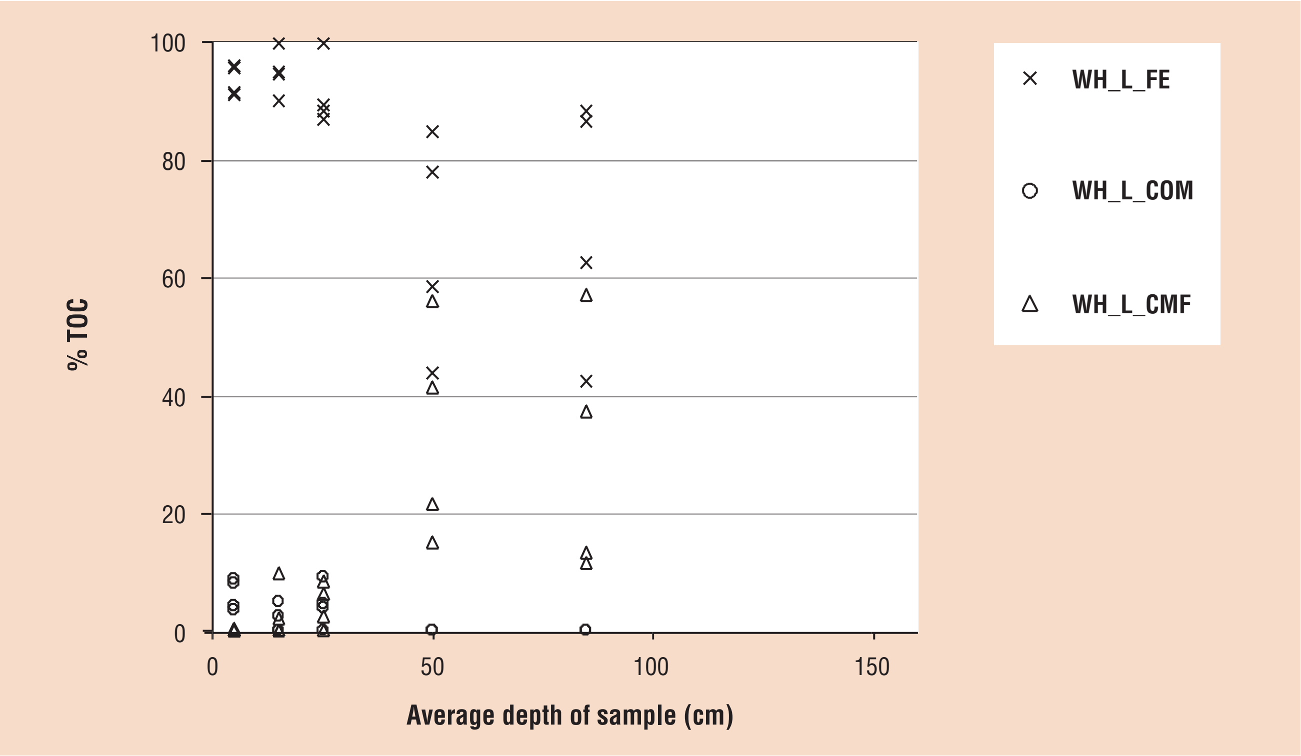

Newdegate (shallow), long cleared



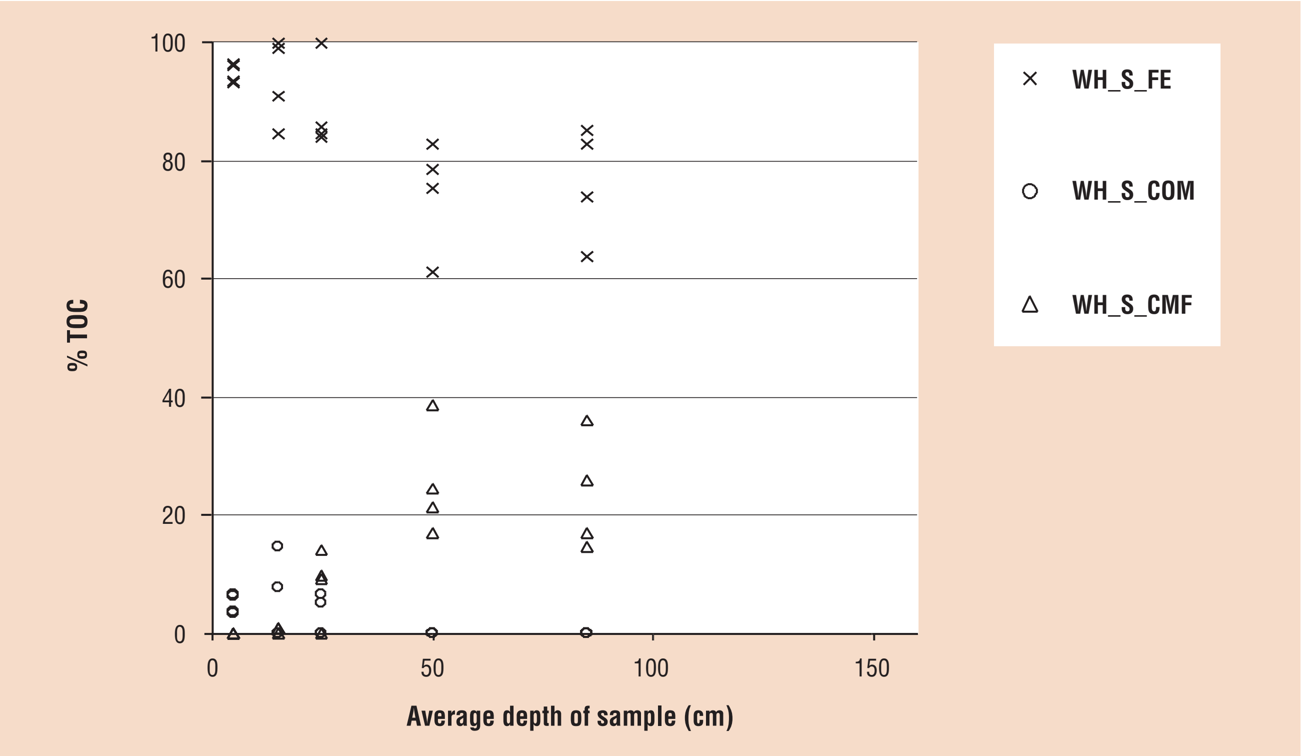

Newdegate (shallow), short cleared



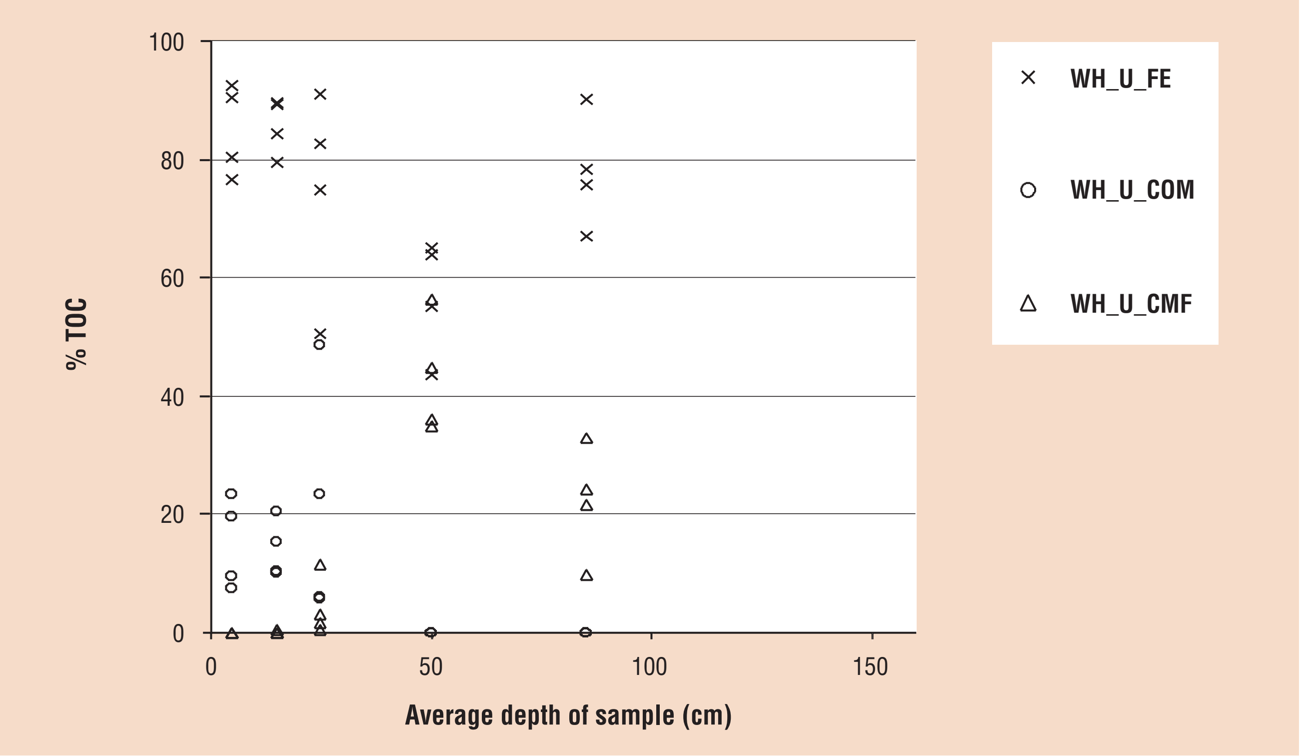

Newdegate (shallow), uncleared



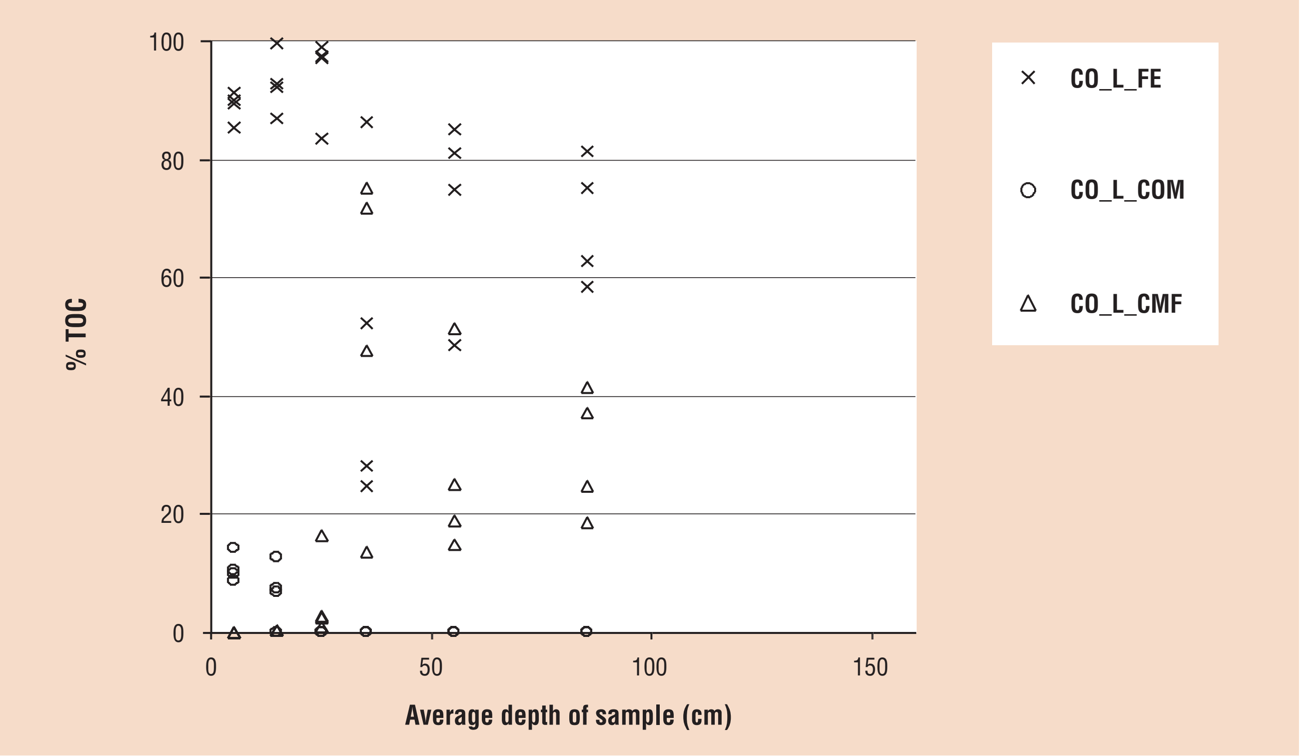

Wittenoom Hills, long cleared



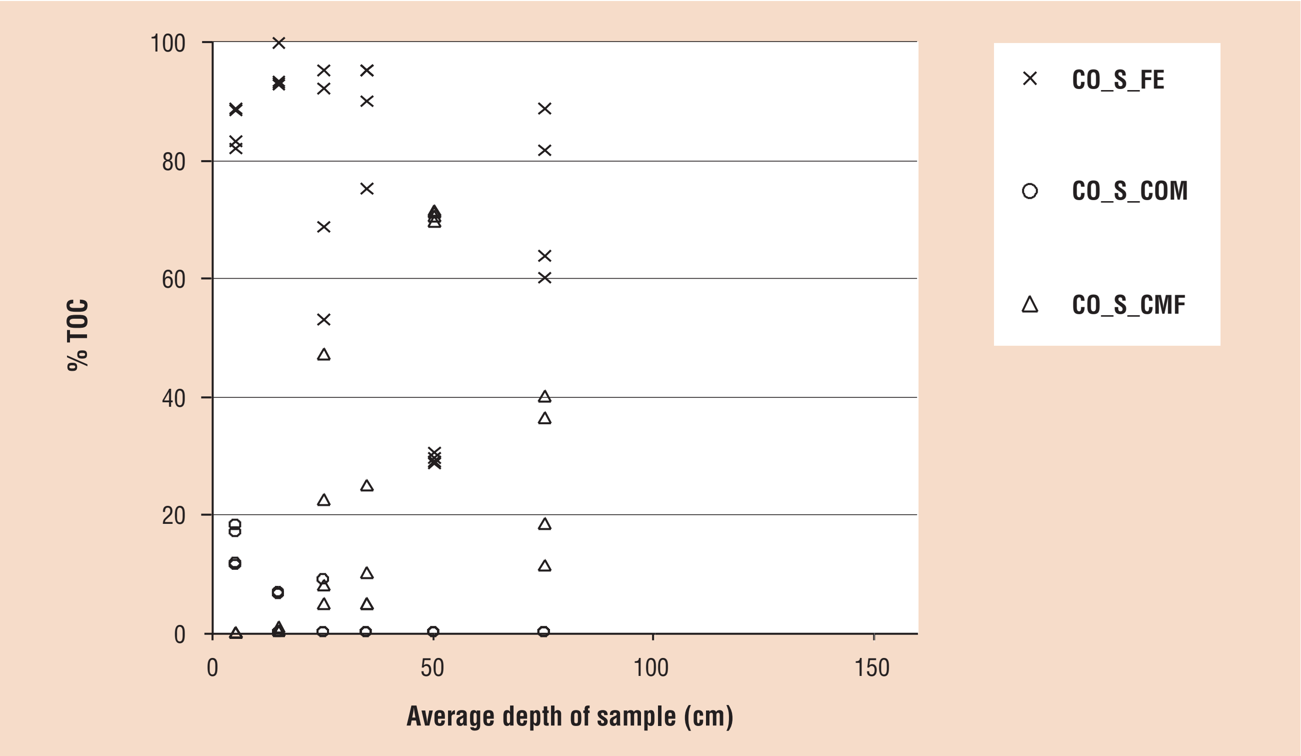

Wittenoom Hills, short cleared



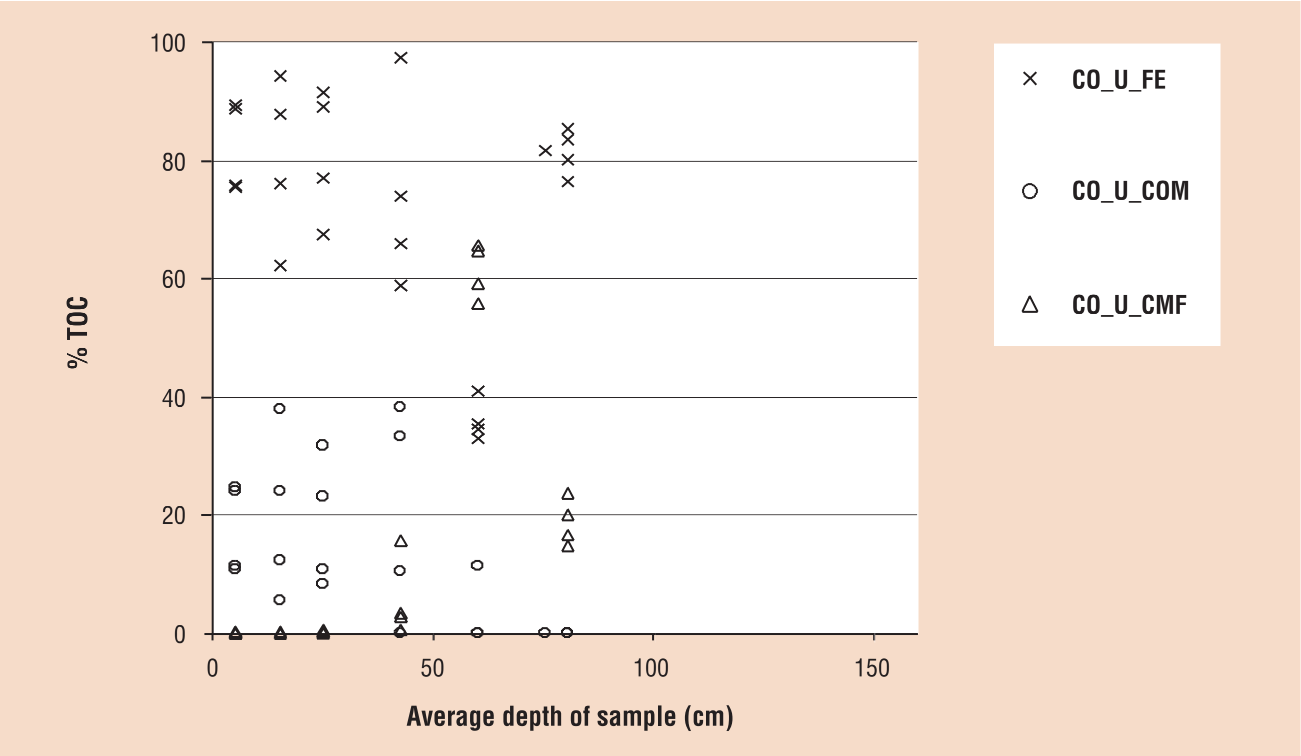

Witteneoom Hills, uncleared




Condingup, long cleared




**Condingup, short cleared**



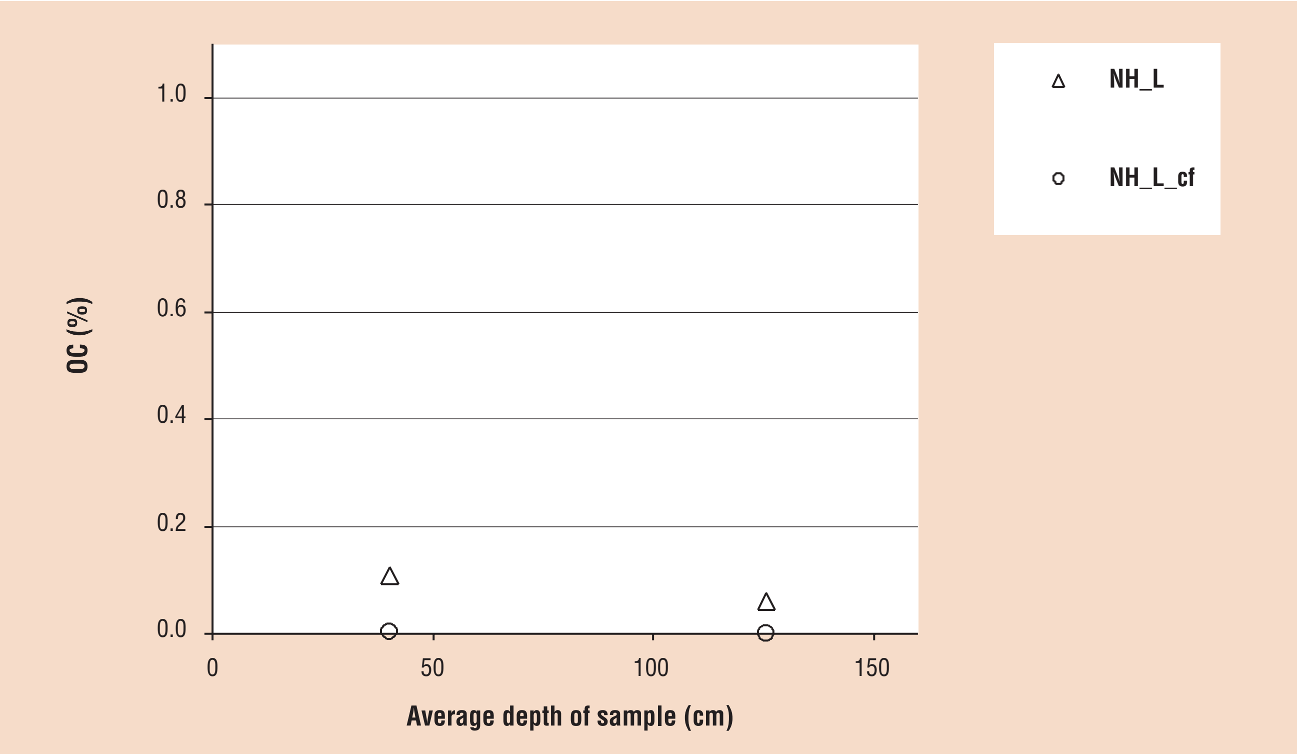

**Condingup, uncleared**

# APPENDIX 15

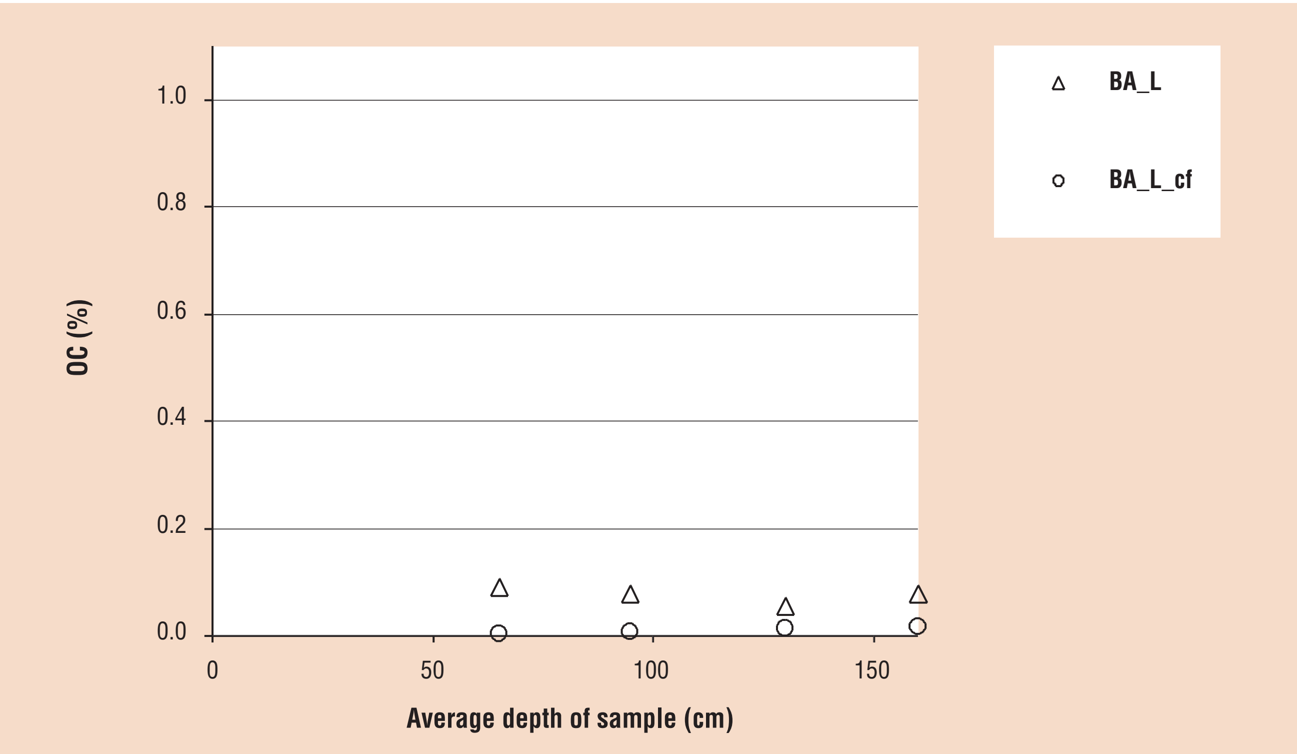
## Organic Carbon (W & B, %) of Coarse Fragments by Depth, Compared to Organic Carbon (W & B, %) of Fine Earth Fraction

**Series with "cf" suffix are organic carbon data from coarse mineral fragments. Other series are organic carbon from fine earth fraction.**

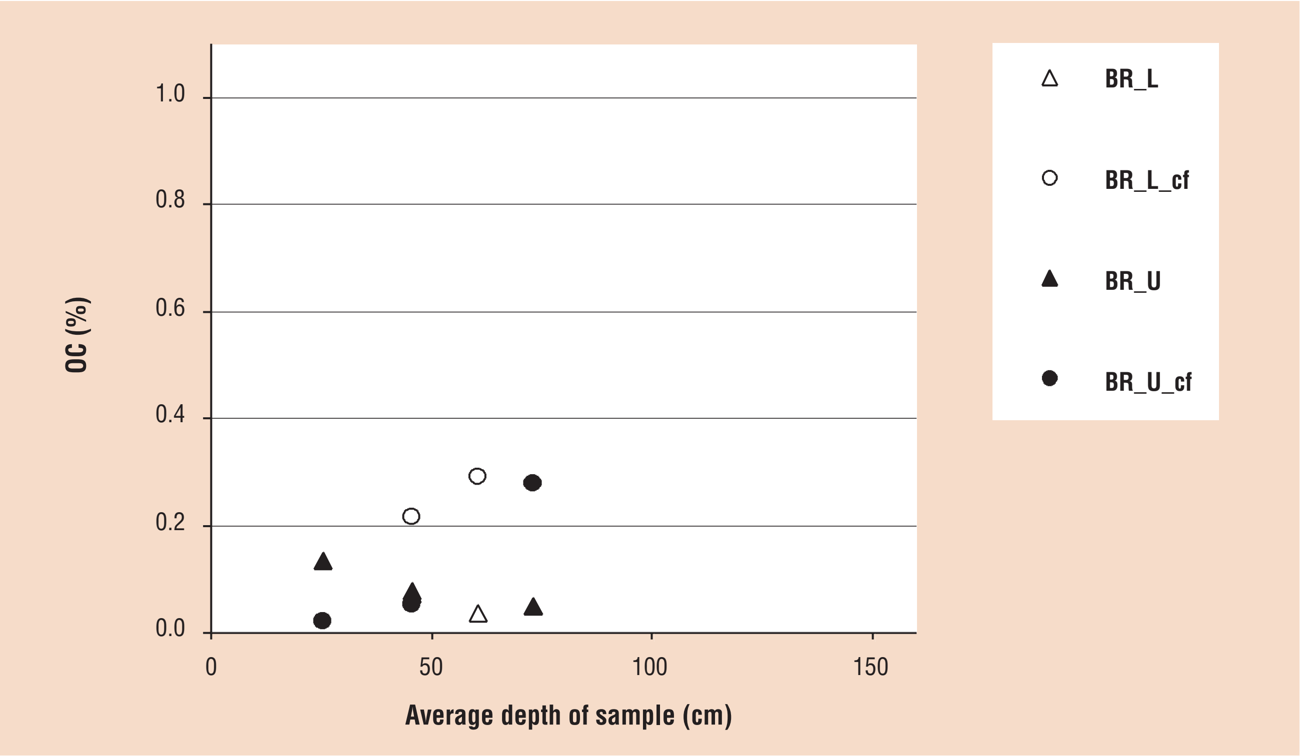
# TABLE OF CONTENTS



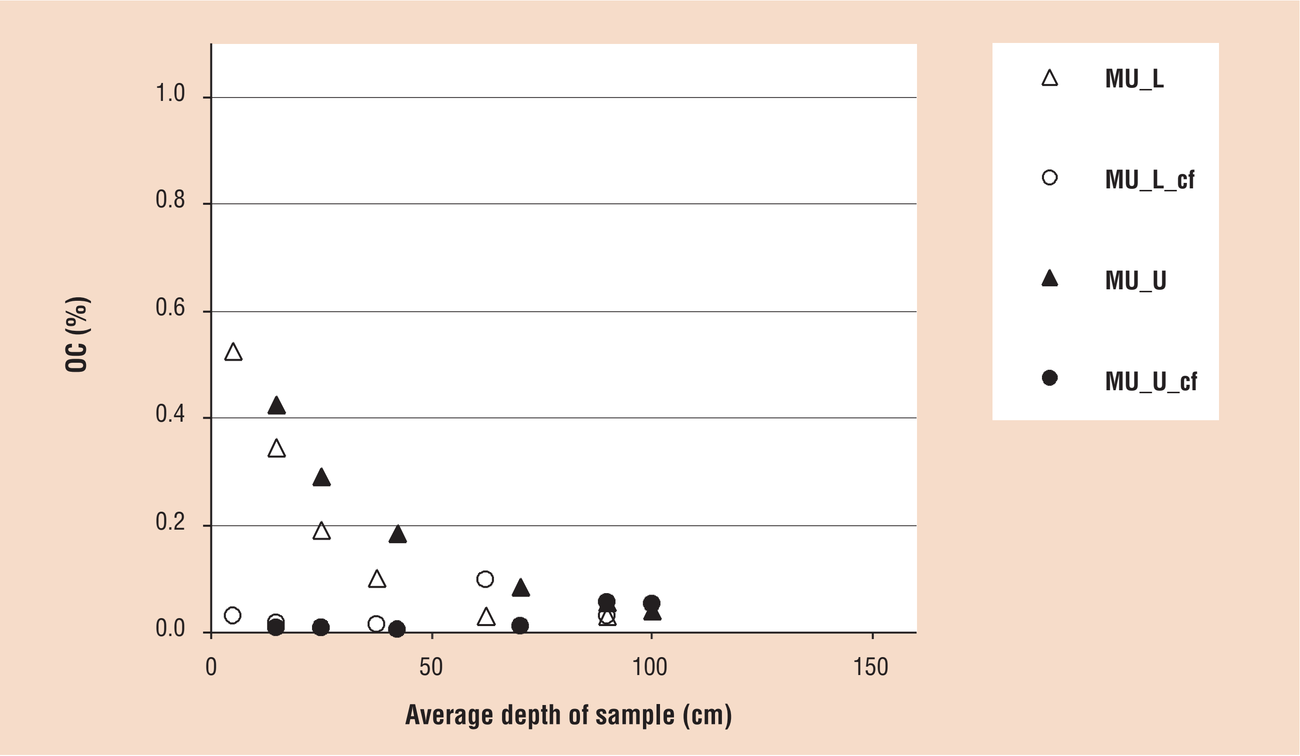

**Northampton**



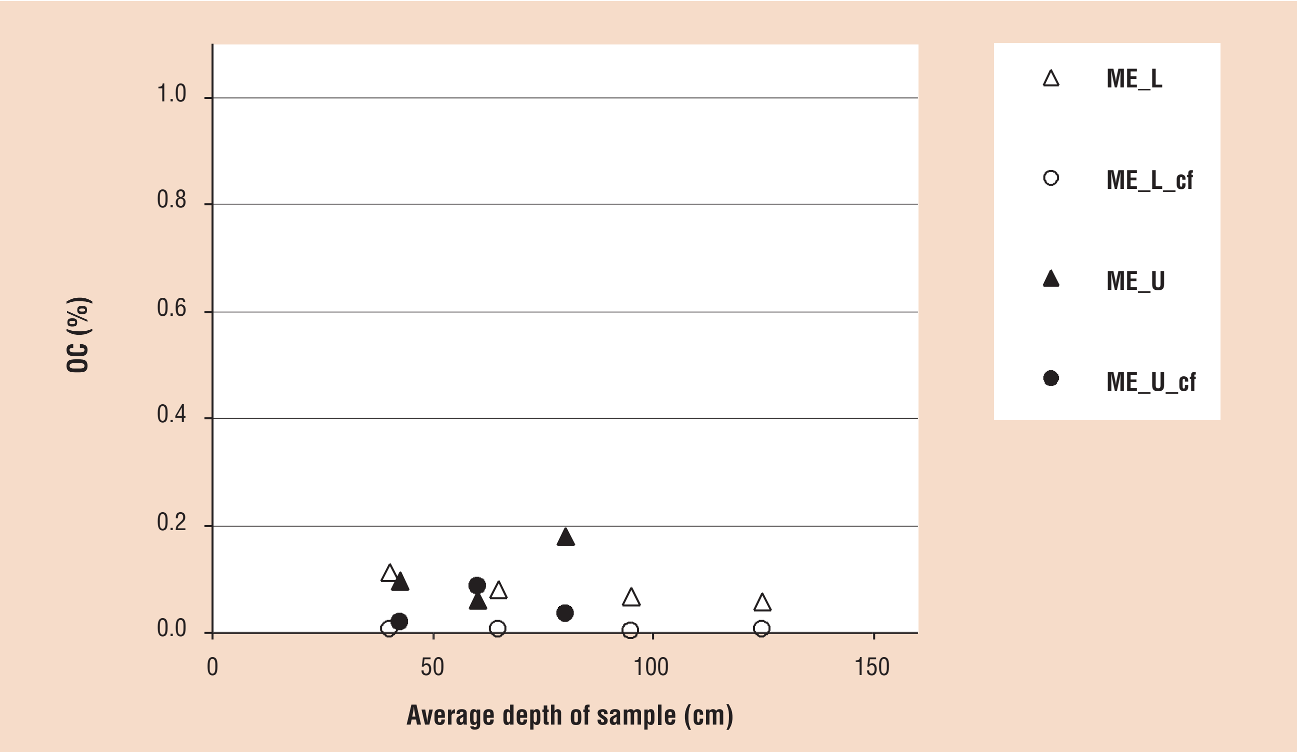

**Badgingarra**



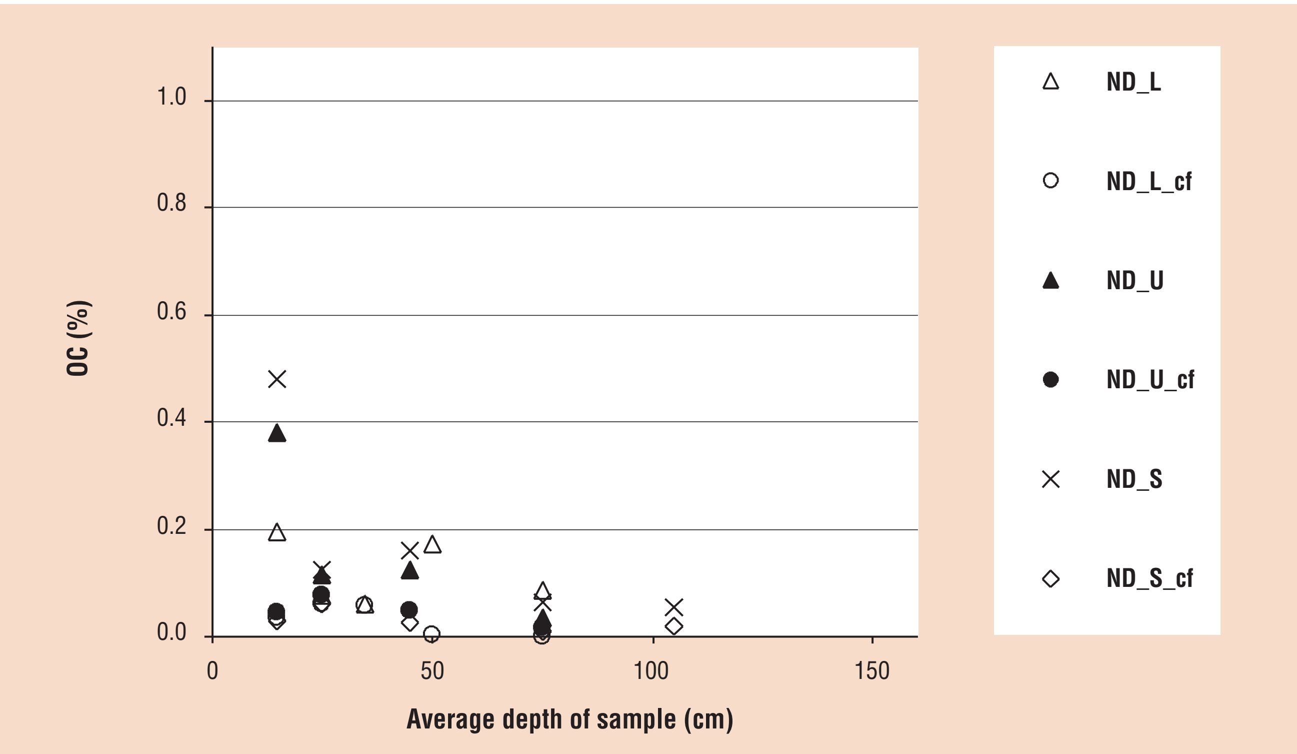

**Brookton**



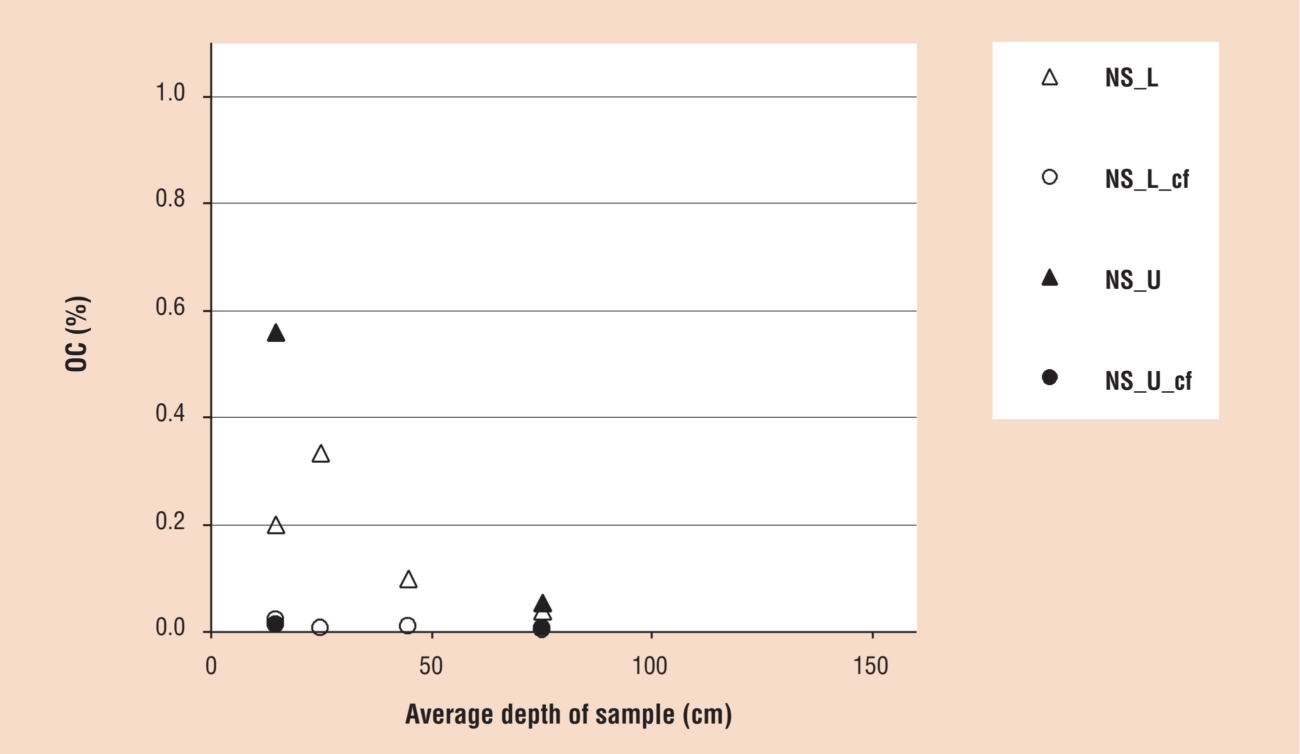

**Mullewa**



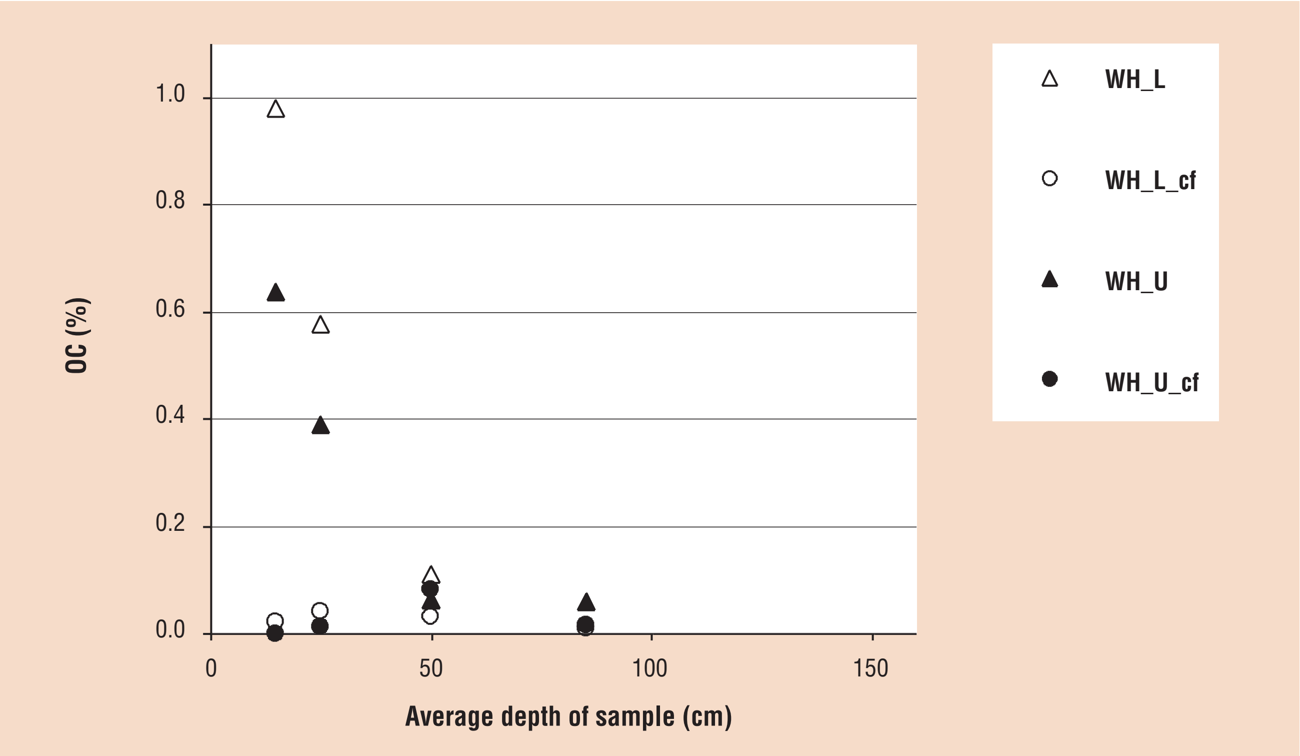

**Merredin**



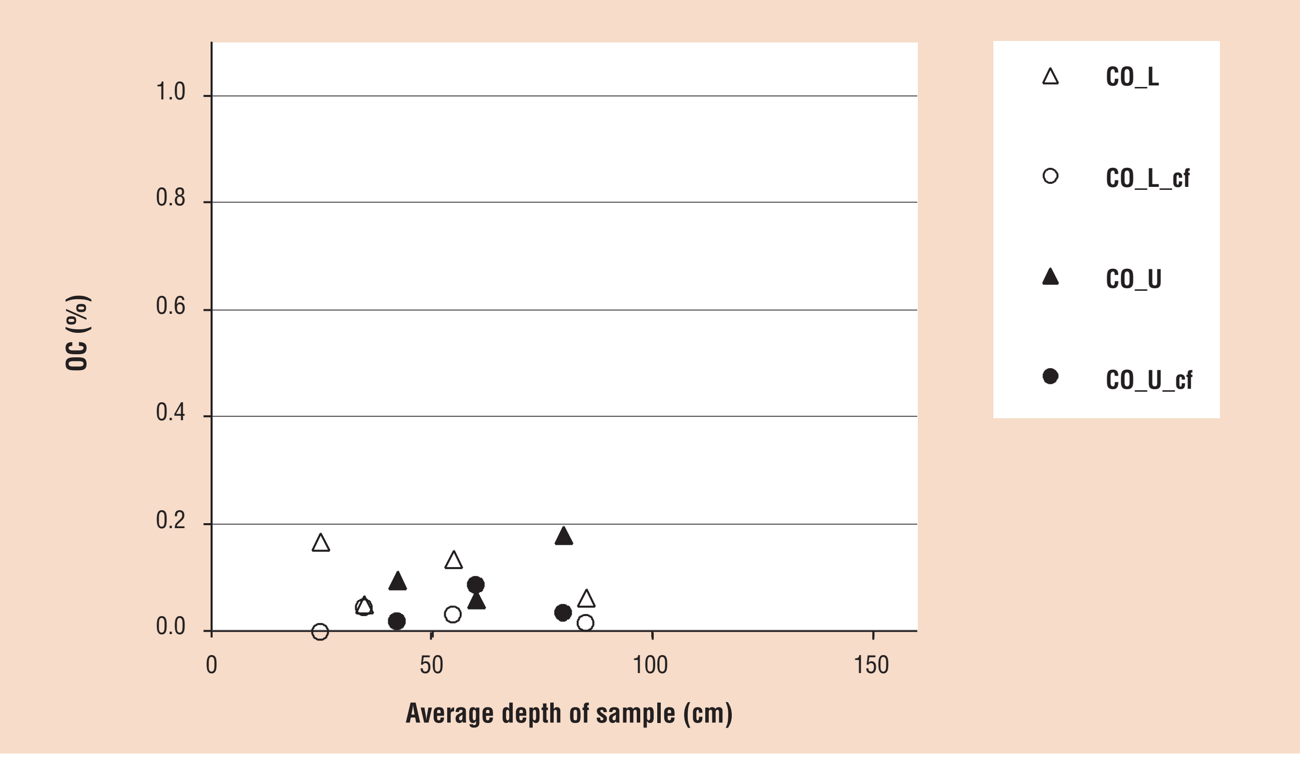

**Newdegate (deep)**




**Newdegate (shallow)**




**Wittenoom Hills**



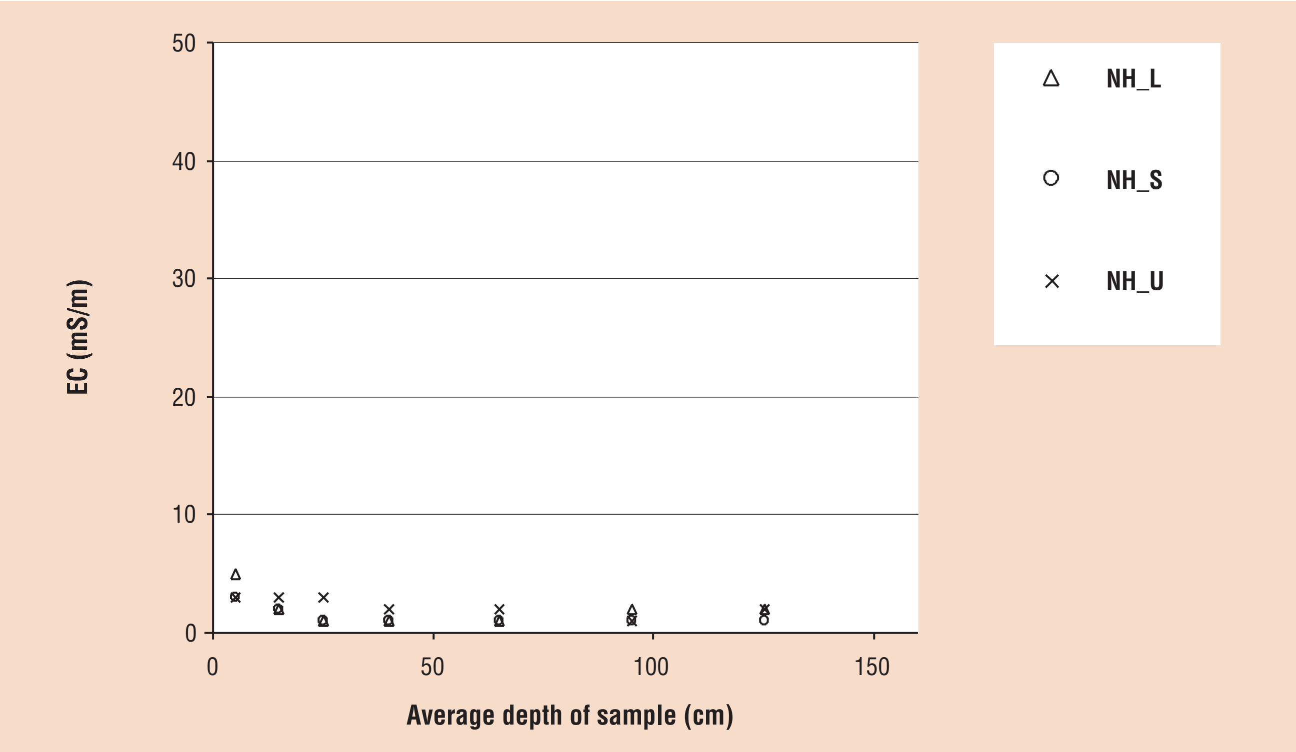
1.0
0.8
0.6
0.4
0.2
0.0
OC (%)
0
50
100
150
Average depth of sample (cm)
CO_L
CO_L_cf
CO_U
CO_U_cf


**Condingup**

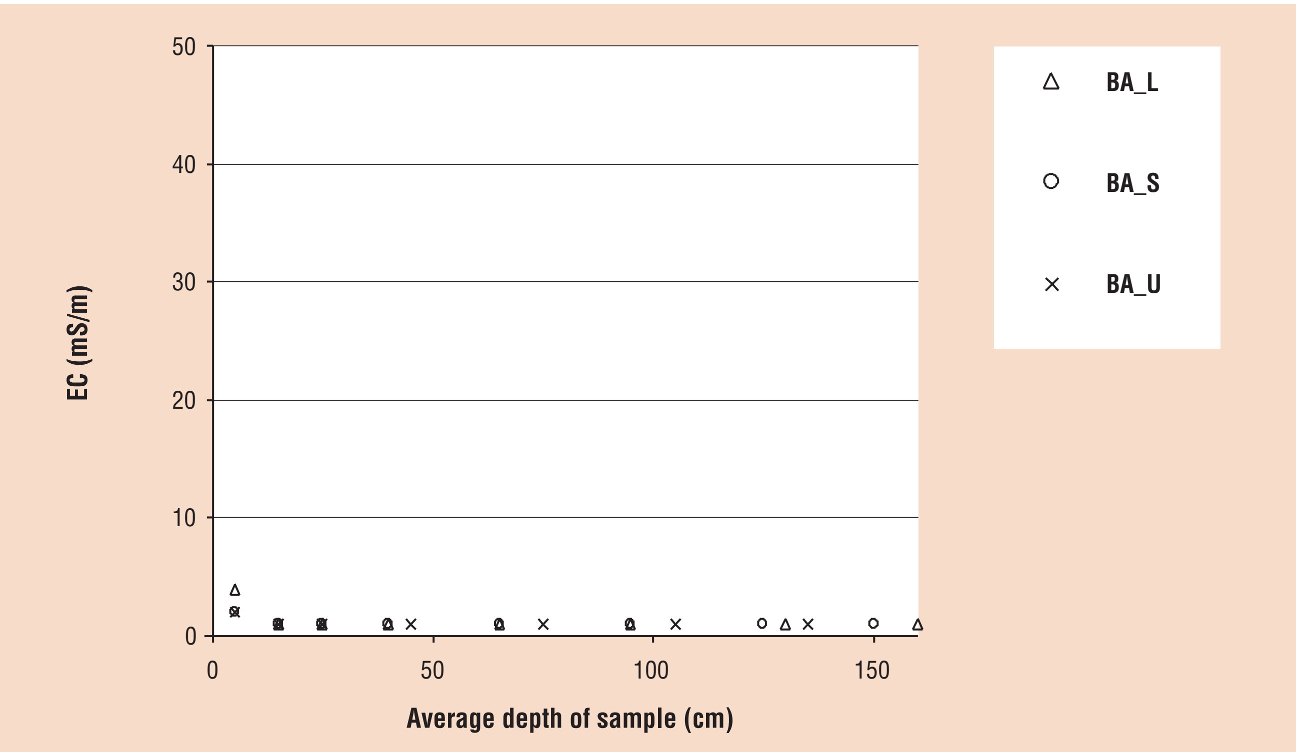
# APPENDIX 16

## EC (1:5, mS/m) of Fine Earth Fraction by Average Sample Depth

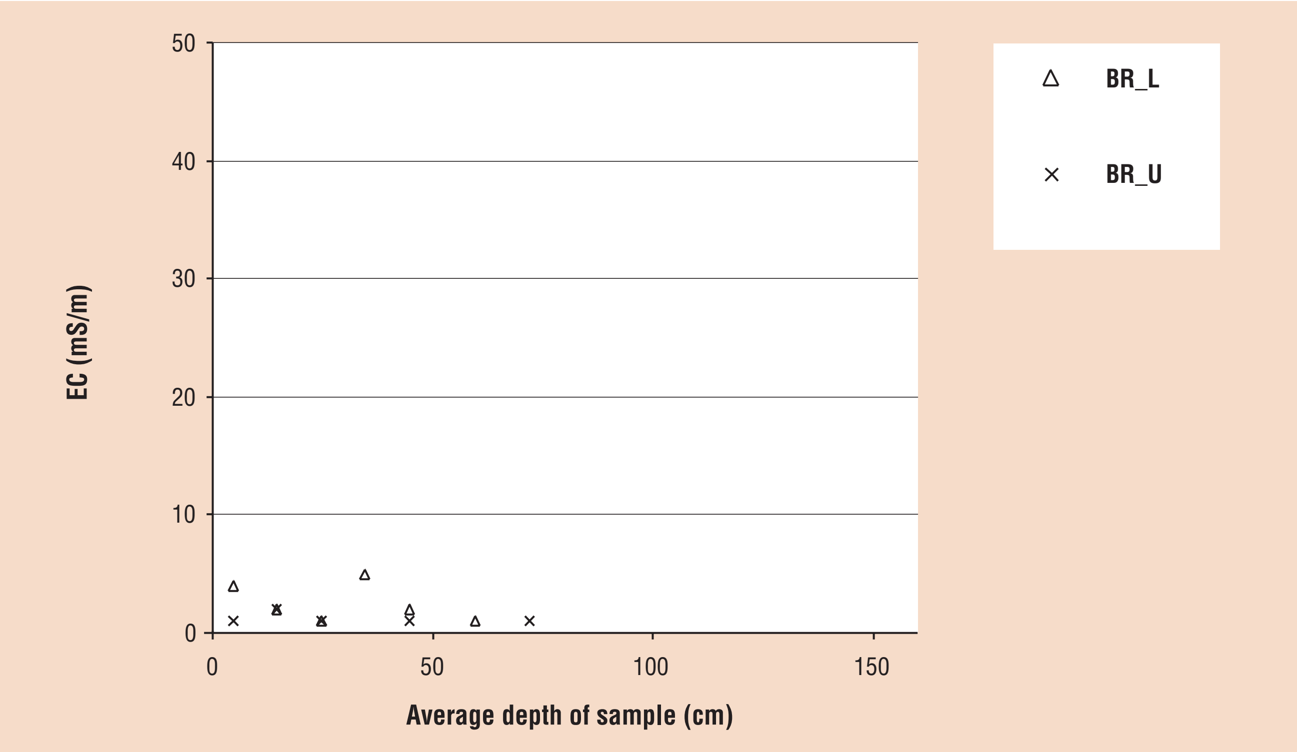
# TABLE OF CONTENTS



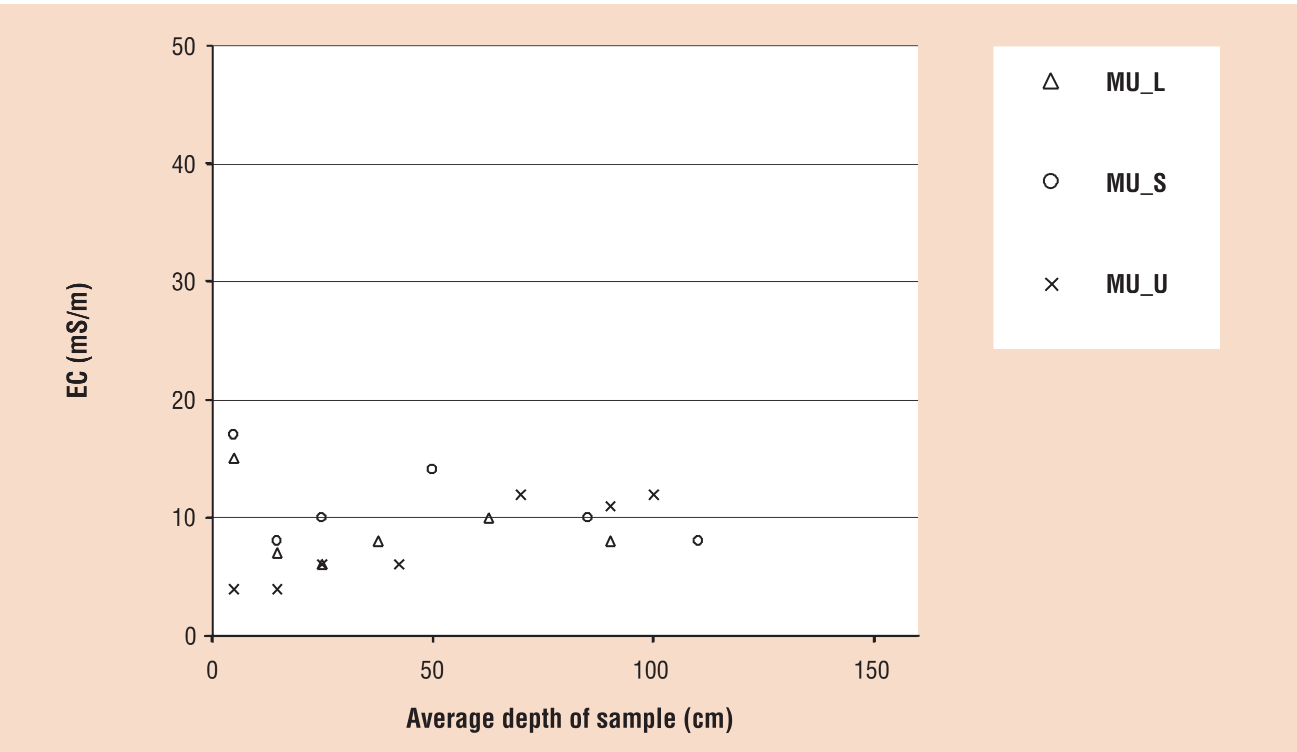

Northampton



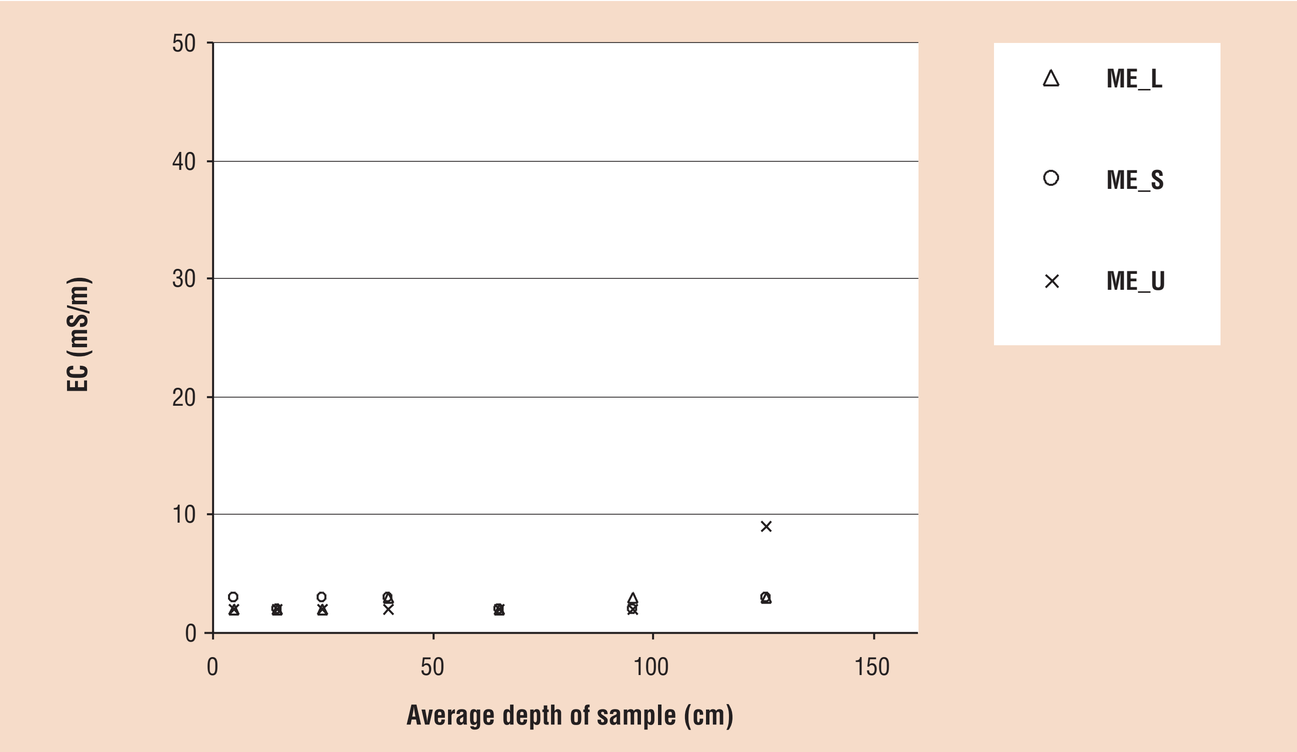

Badgingarra



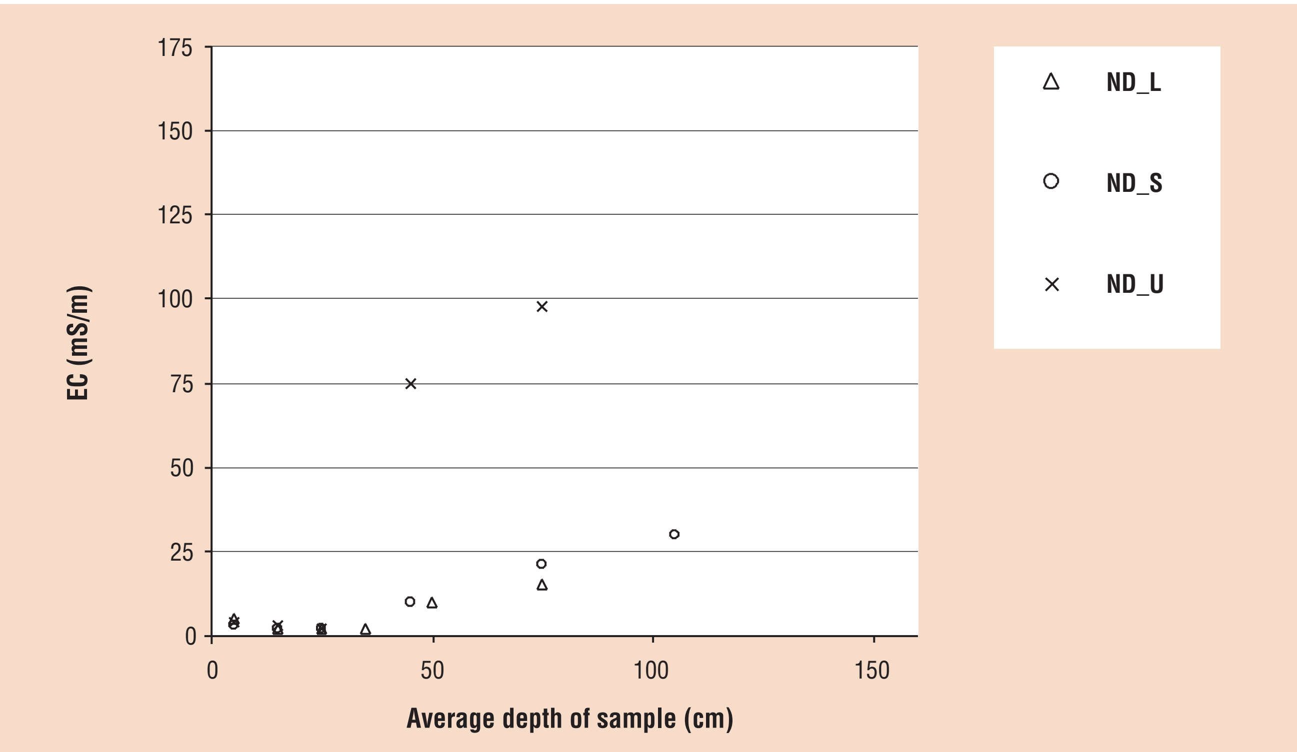

**Brookton**



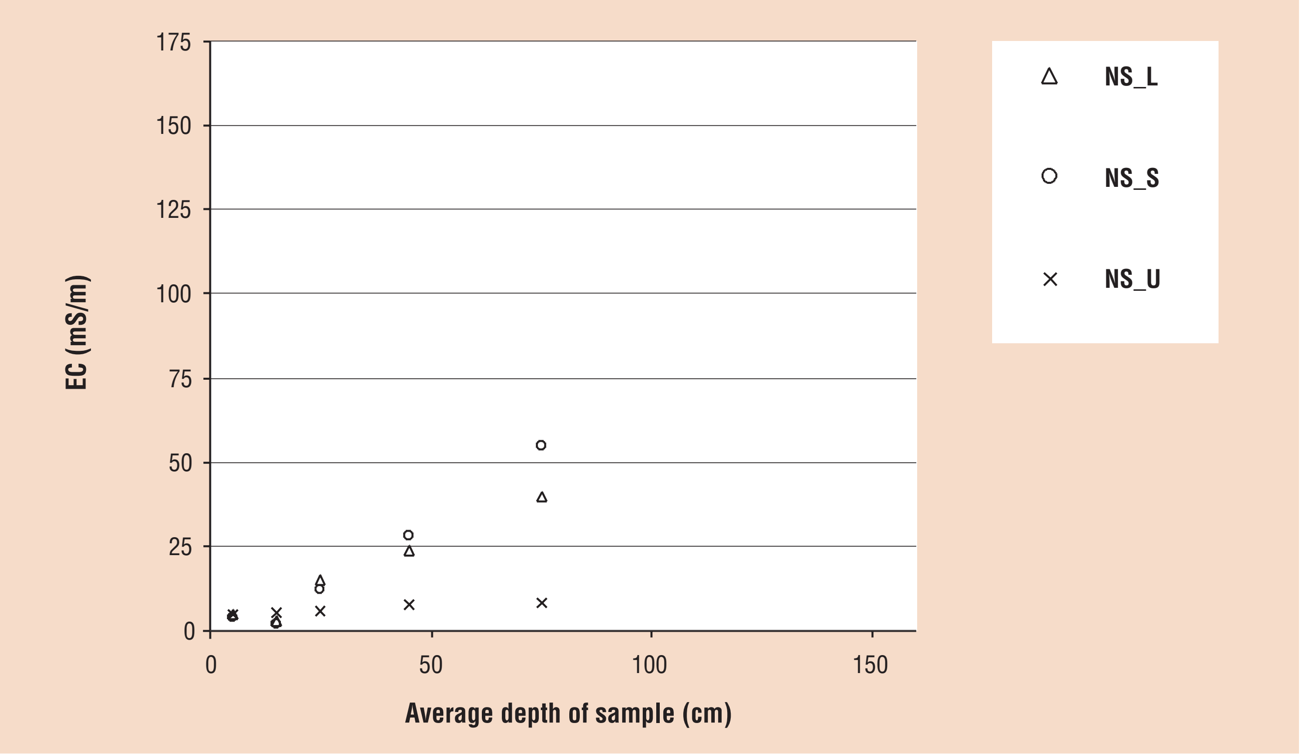

**Mullewa**



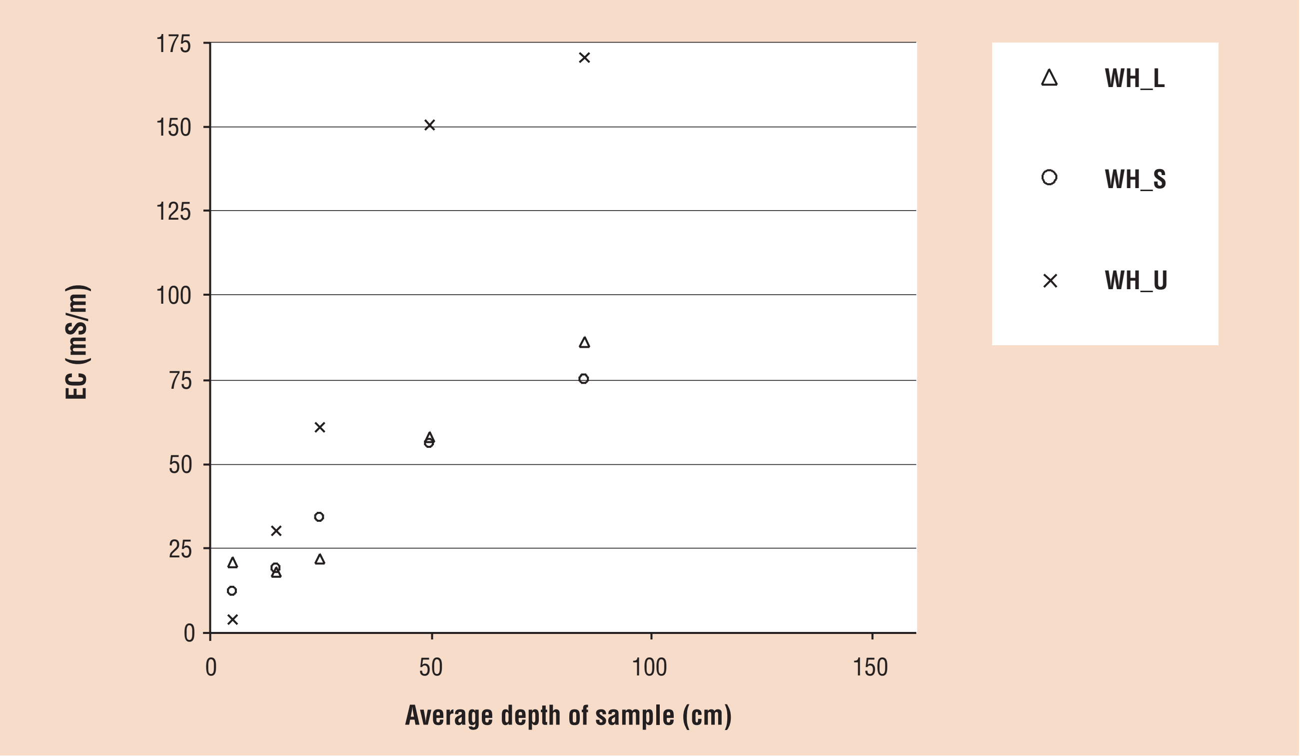

**Merredin**



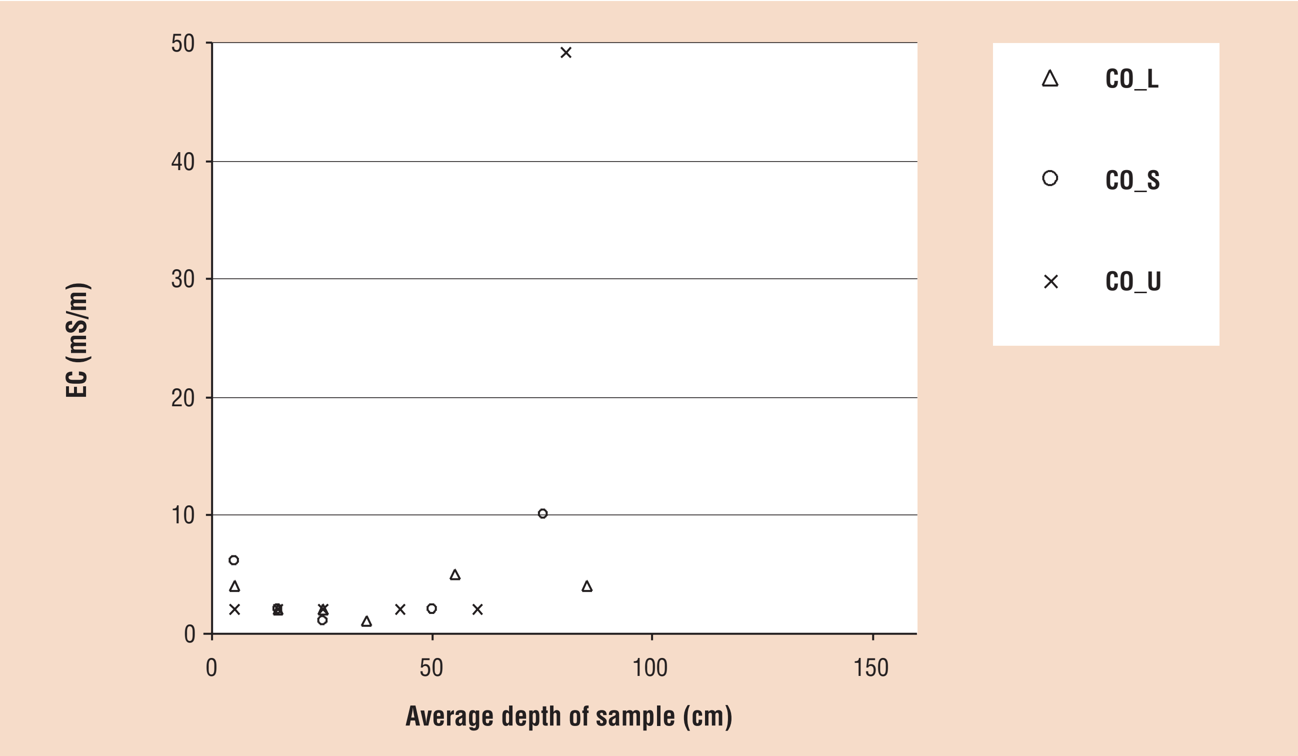

**Newdegate (deep)**




**Newdegate (shallow)**




**Wittenoom Hills**

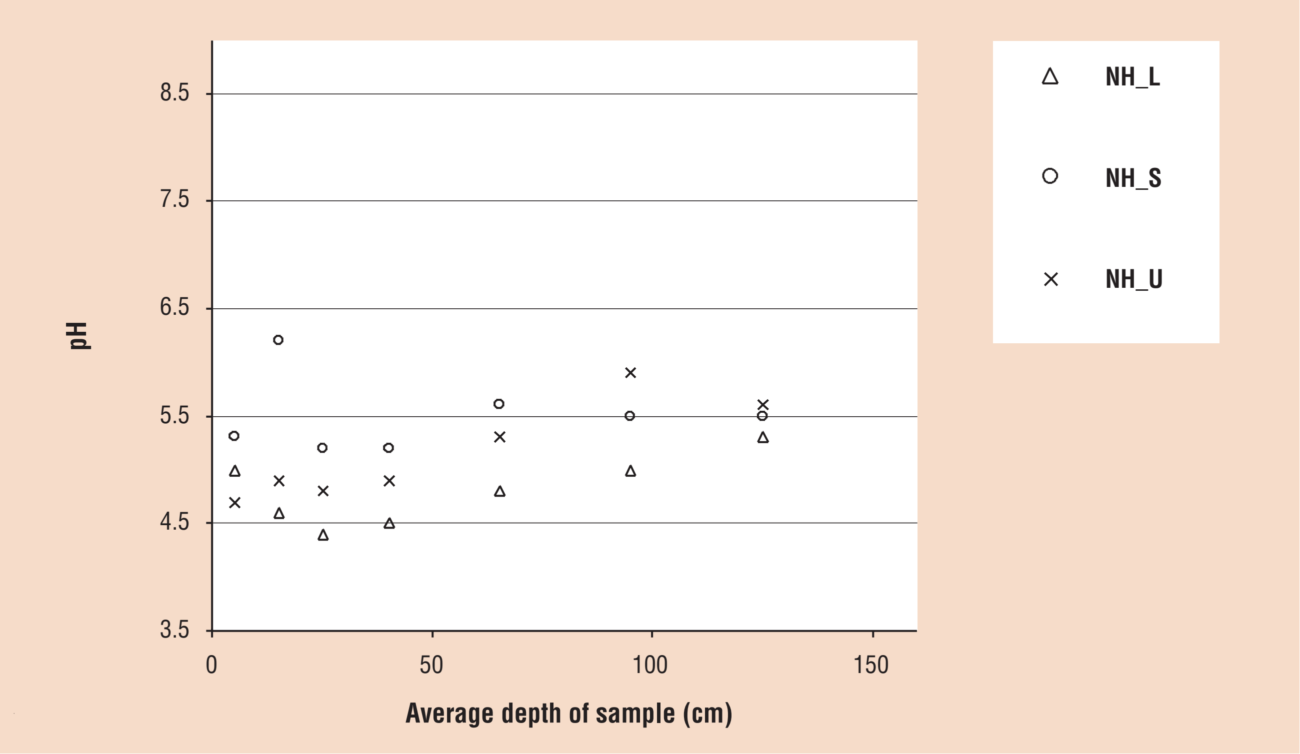

EC (mS/m)
50
40
30
20
10
0
0
50
100
150
Average depth of sample (cm)
CO_L
CO_S
CO_U

### Condingup

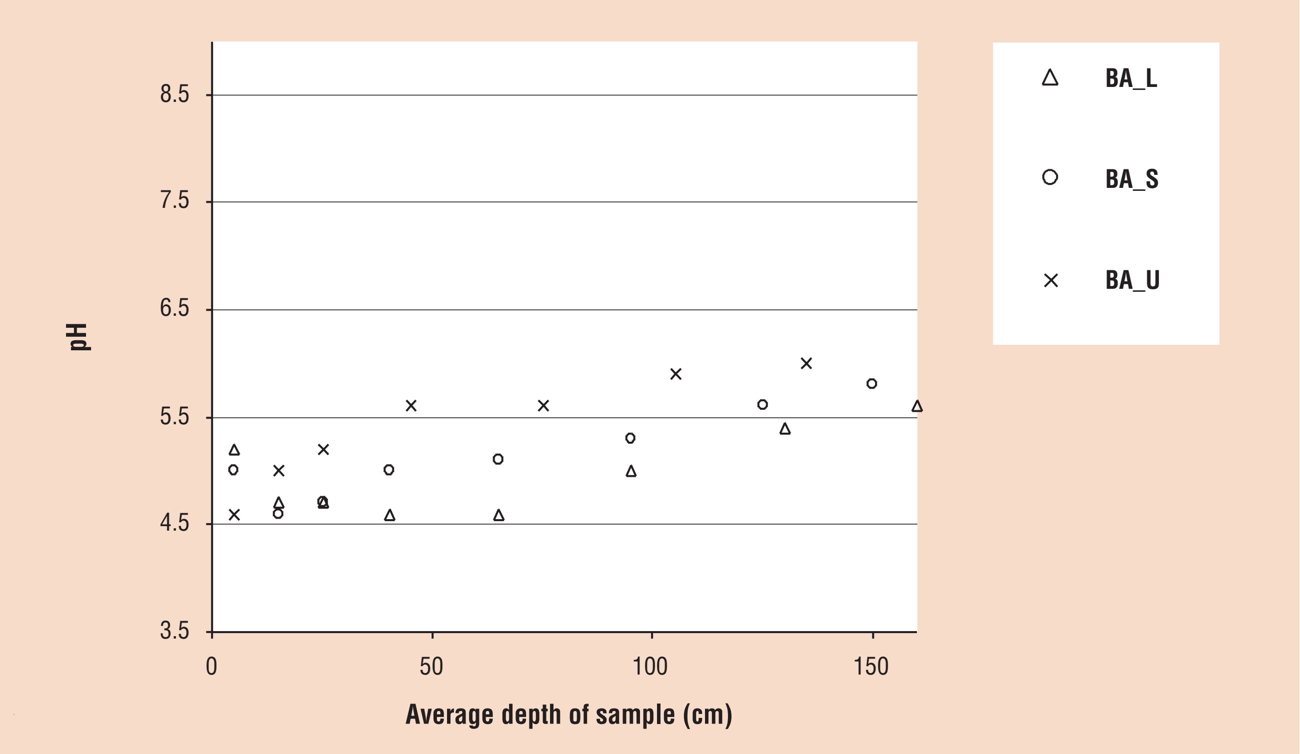
# APPENDIX 17

## pH (1:5 CaCl2) of Fine Earth Fraction by Average Sample Depth

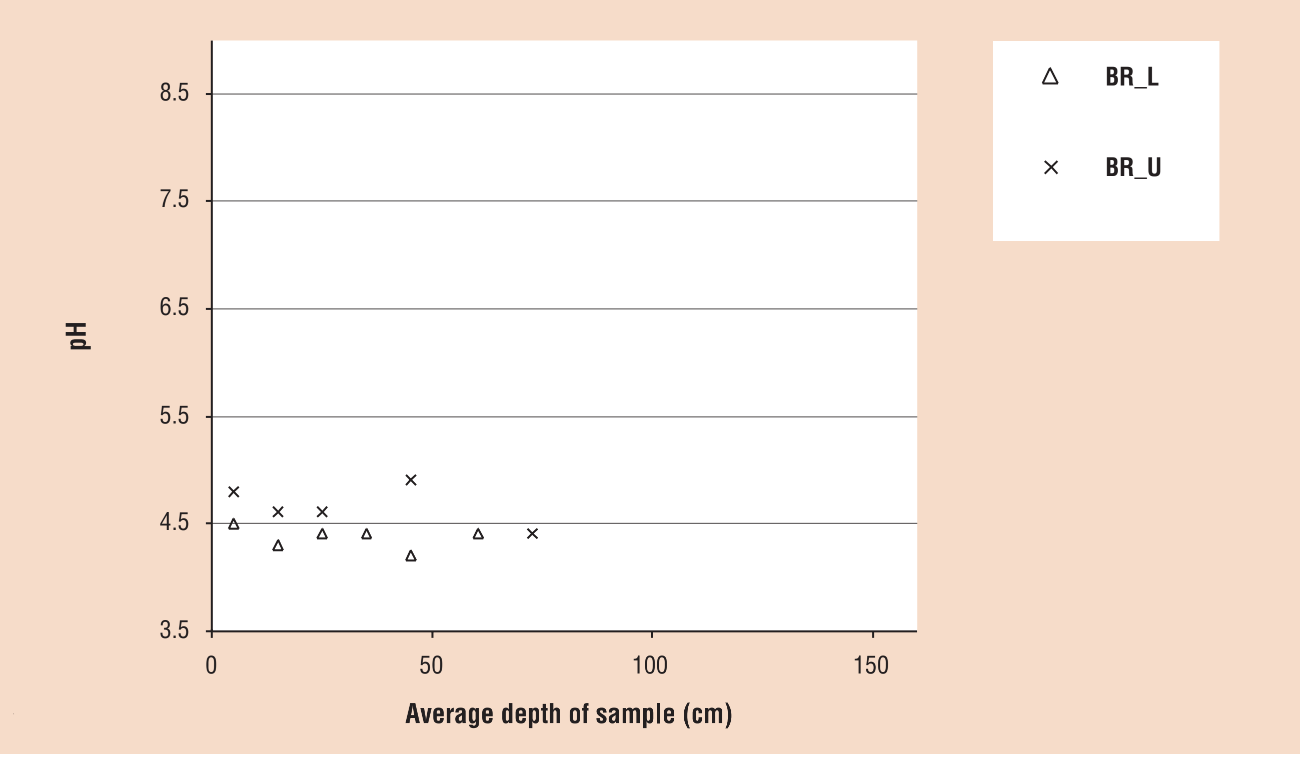
# TABLE OF CONTENTS



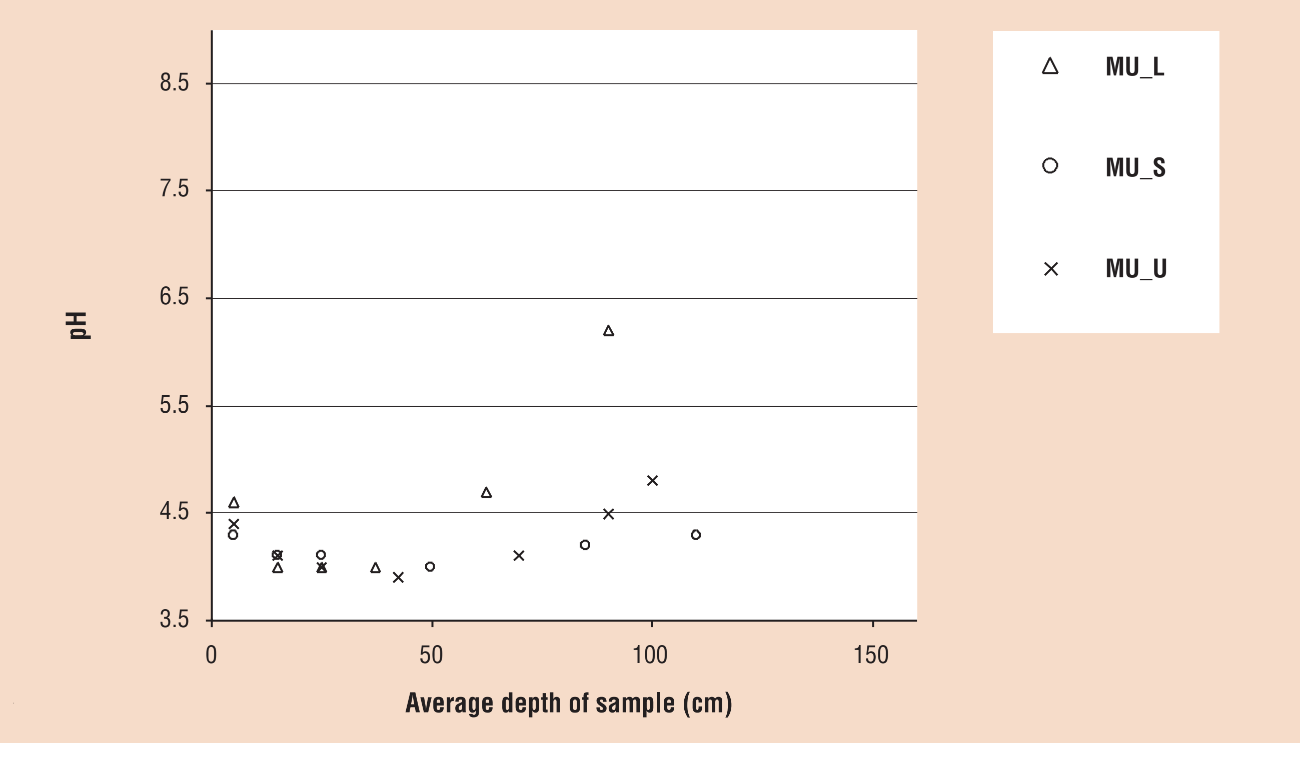

Northampton



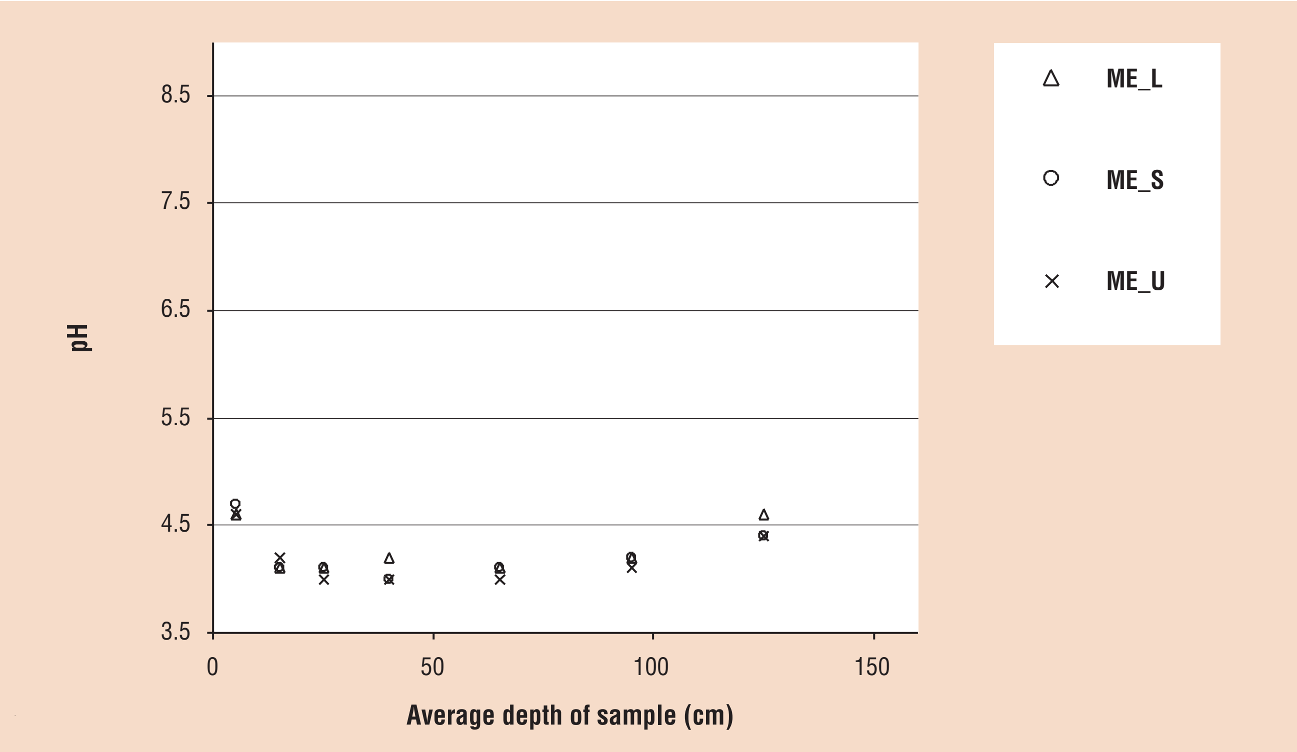

Badgingarra



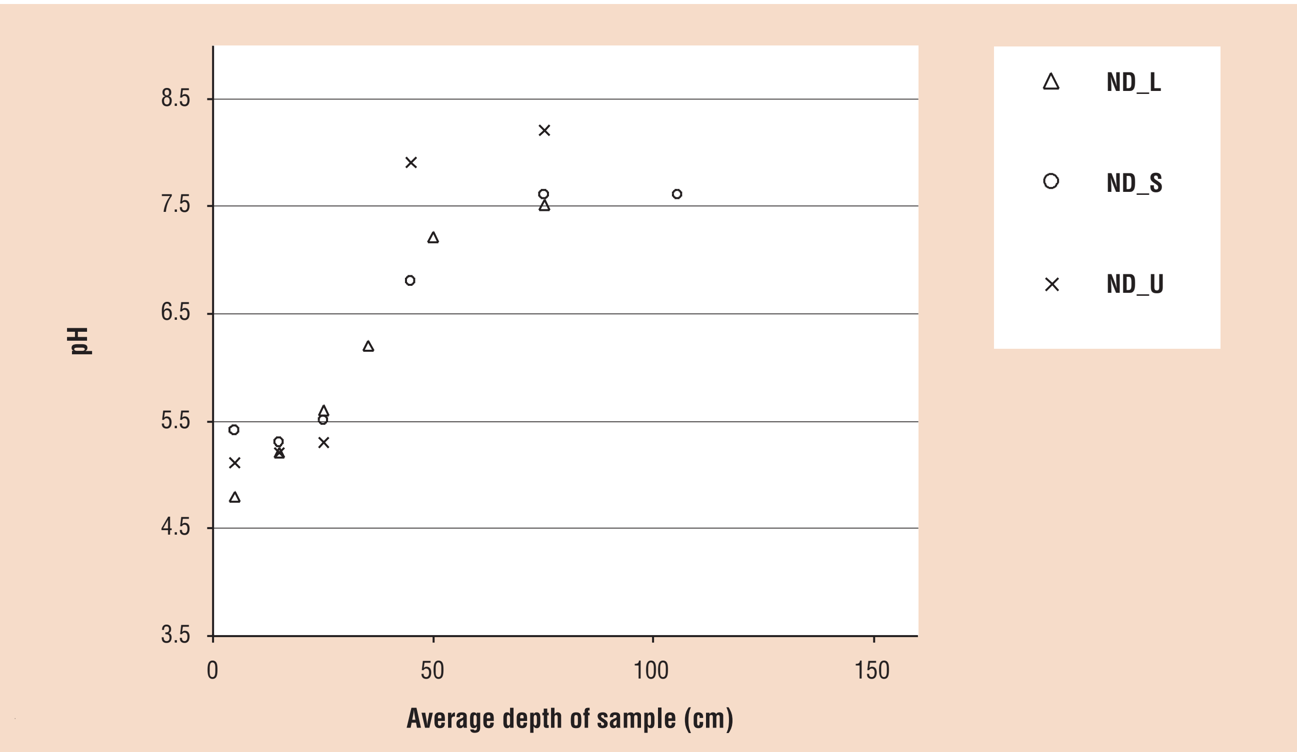

Brookton



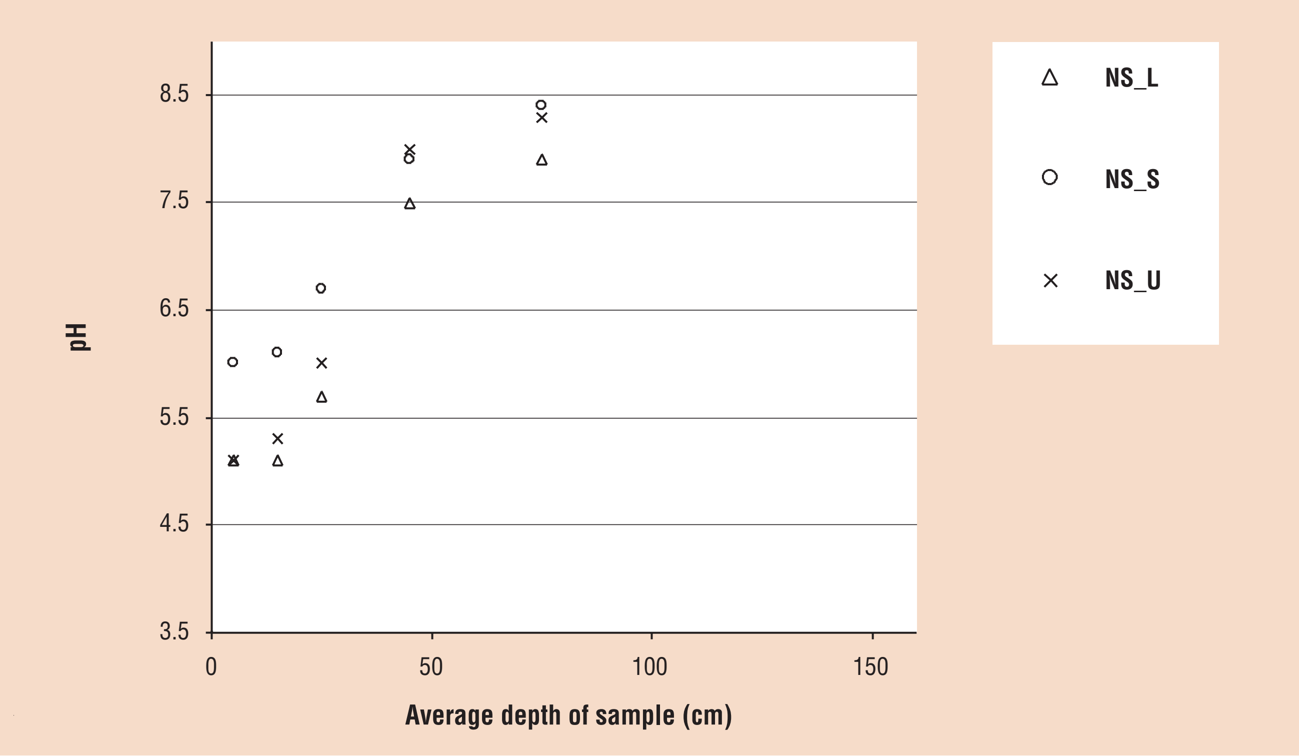

Mullewa



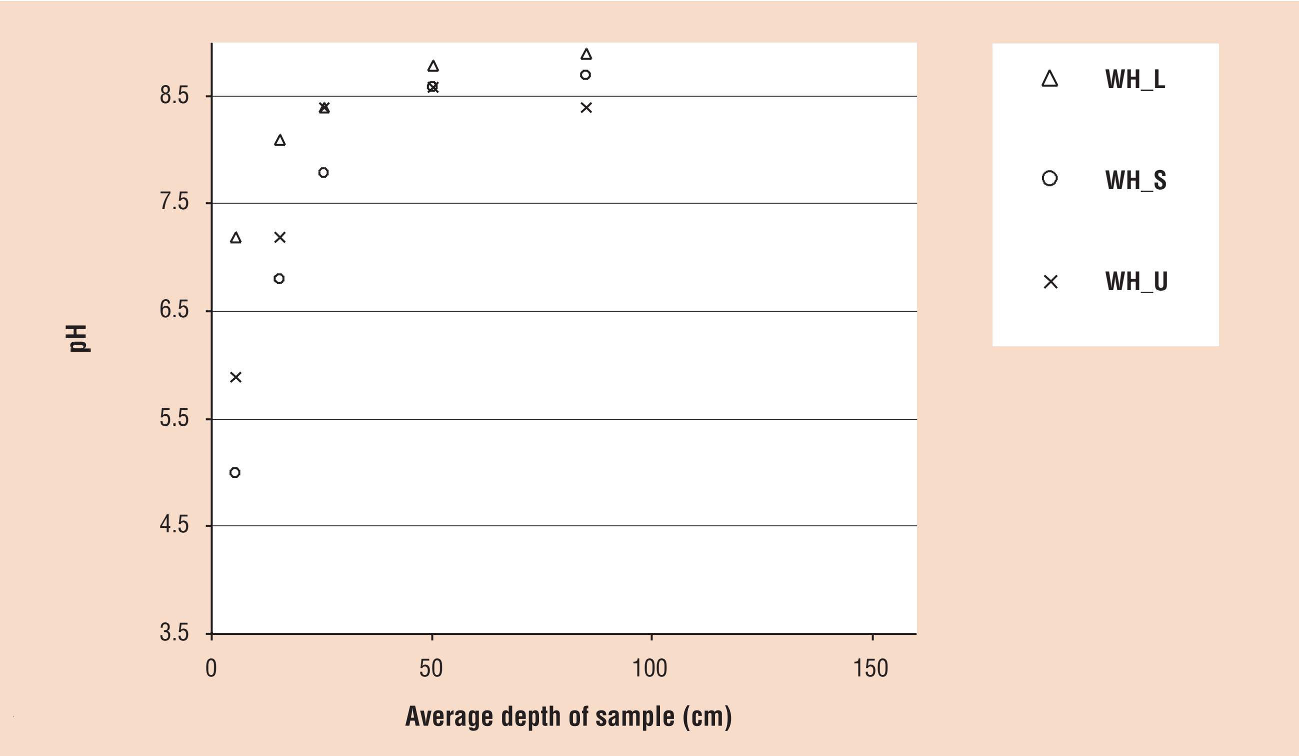

Merredin



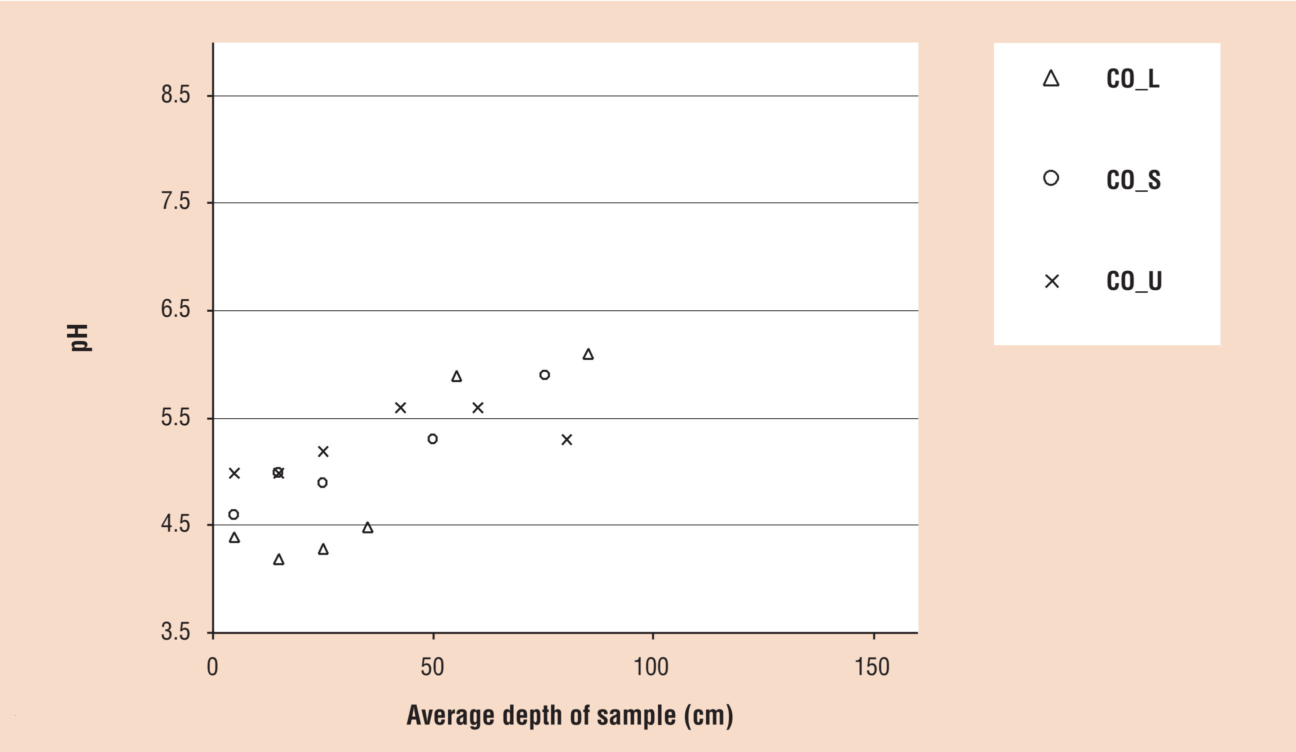

Newdegate (deep)




Newdegate (shallow)




Wittenoom Hills

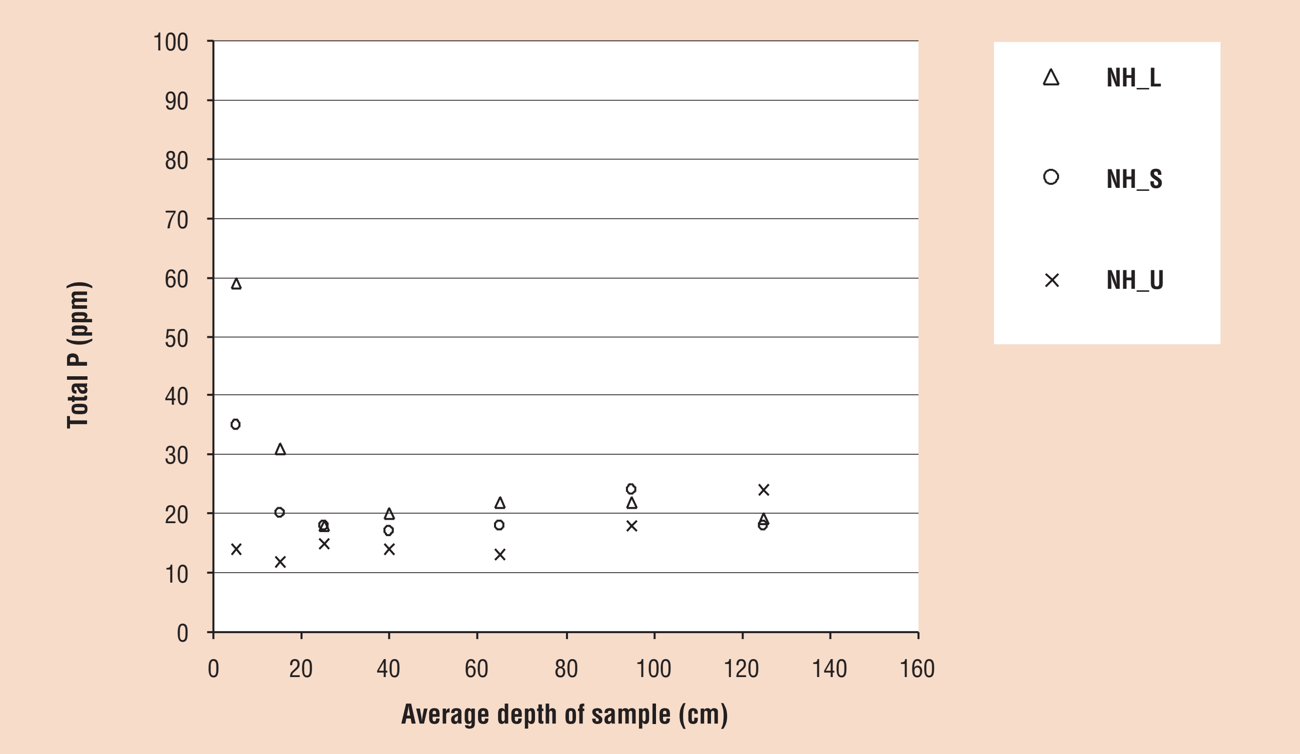

pH
8.5
7.5
6.5
5.5
4.5
3.5
0
50
100
150
Average depth of sample (cm)
CO_L
CO_S
CO_U

## Condingup

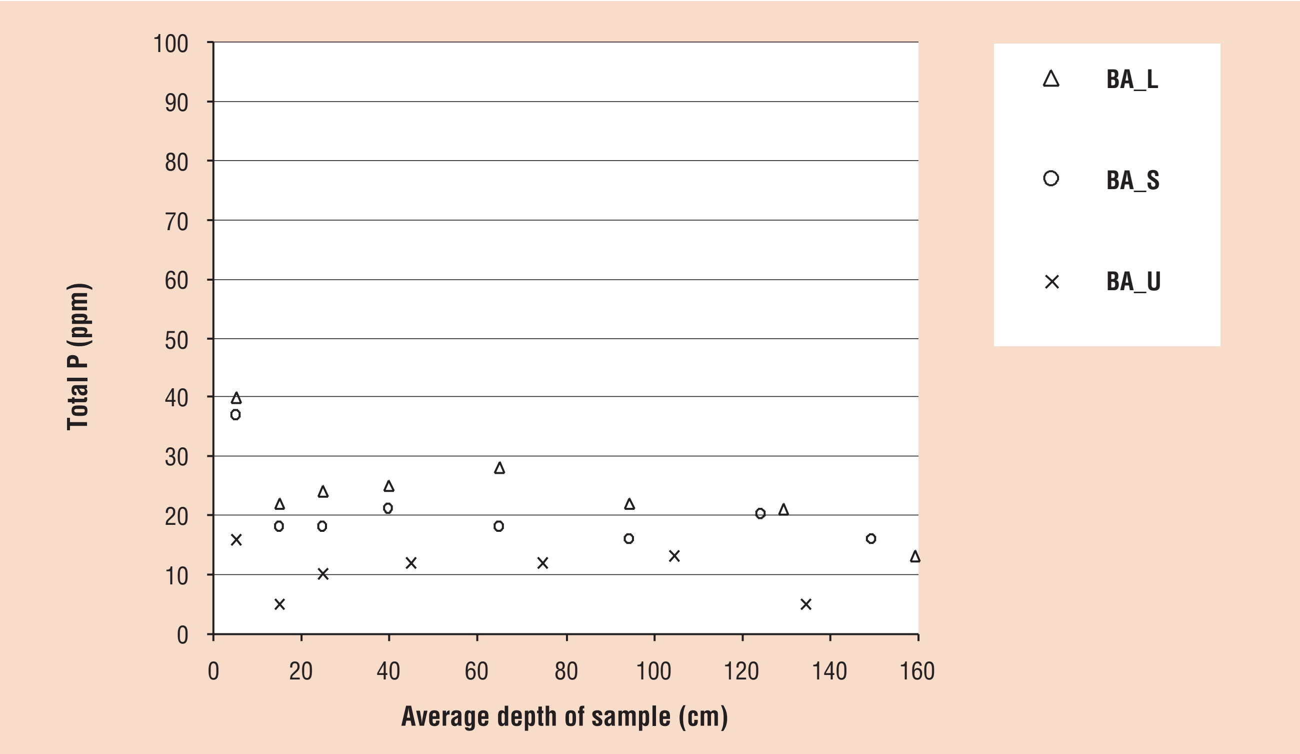
# APPENDIX 18

## Total P (ppm) of Fine Earth Fraction by Average Sample Depth

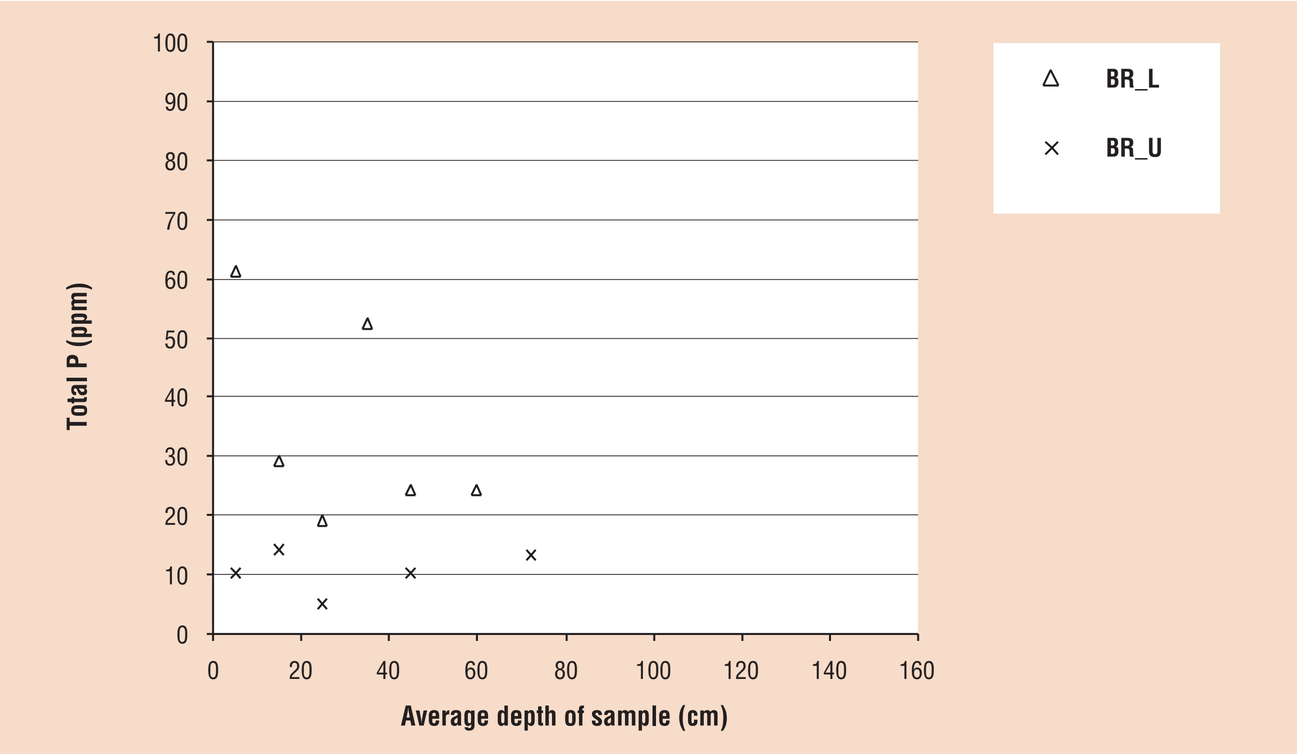
# TABLE OF CONTENTS



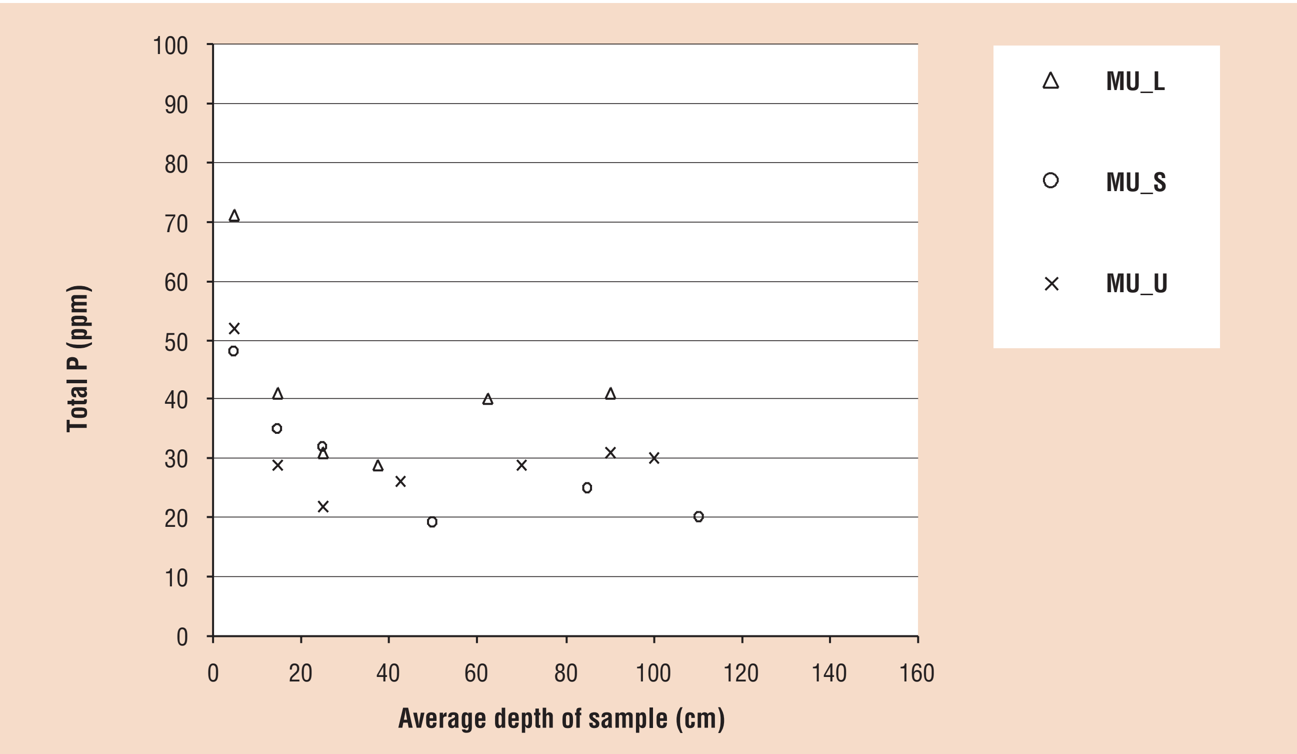

Northampton



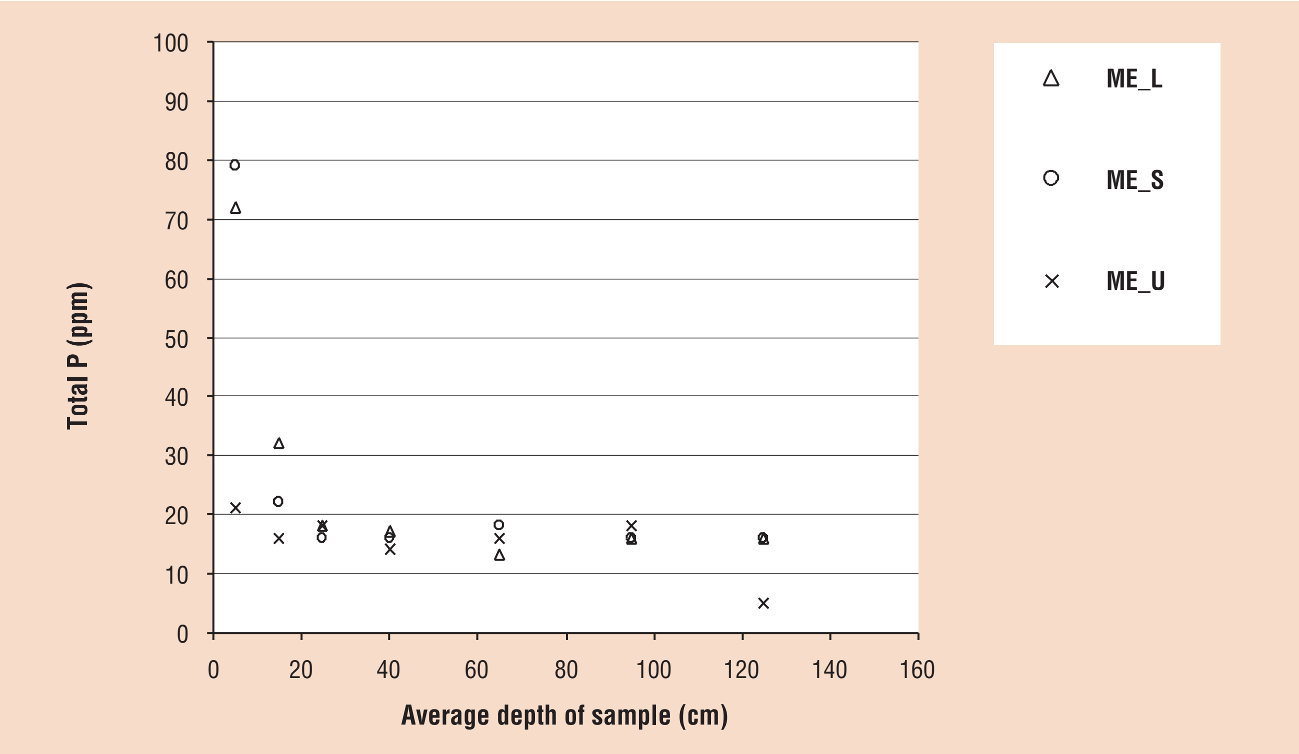

Badgingarra



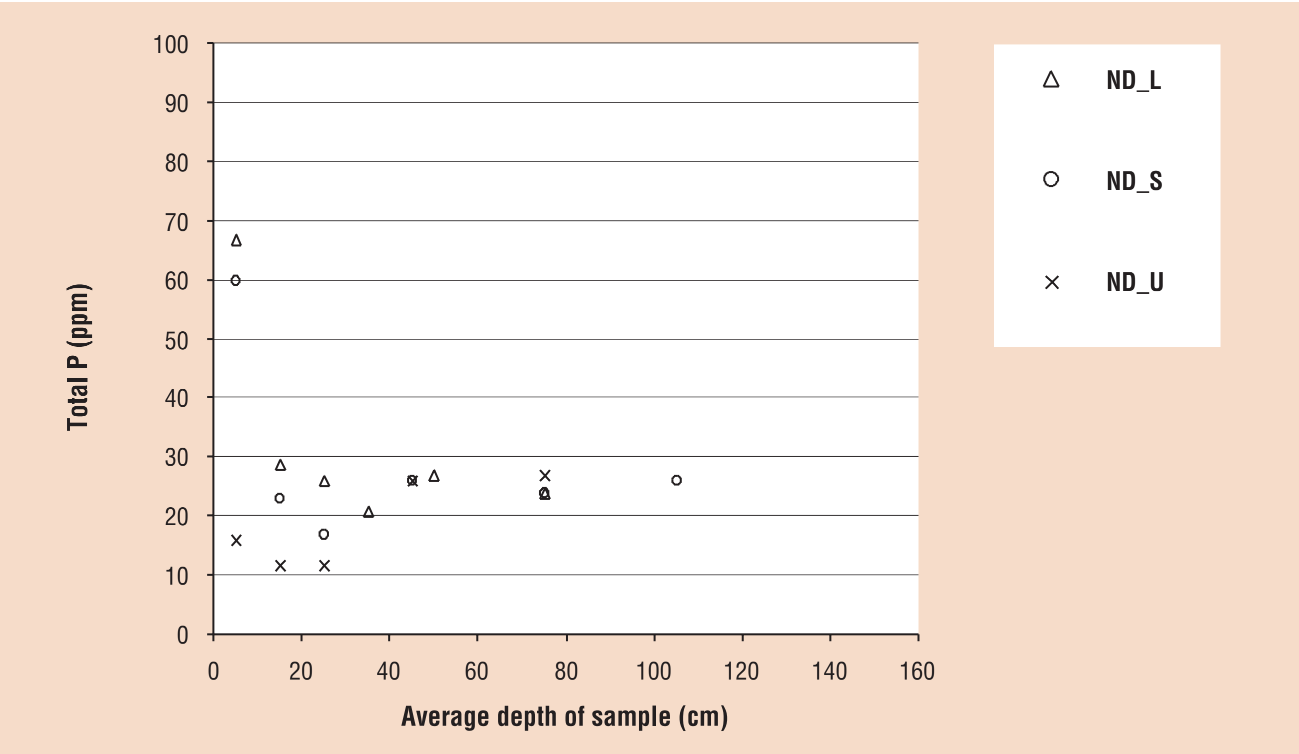

Brookton



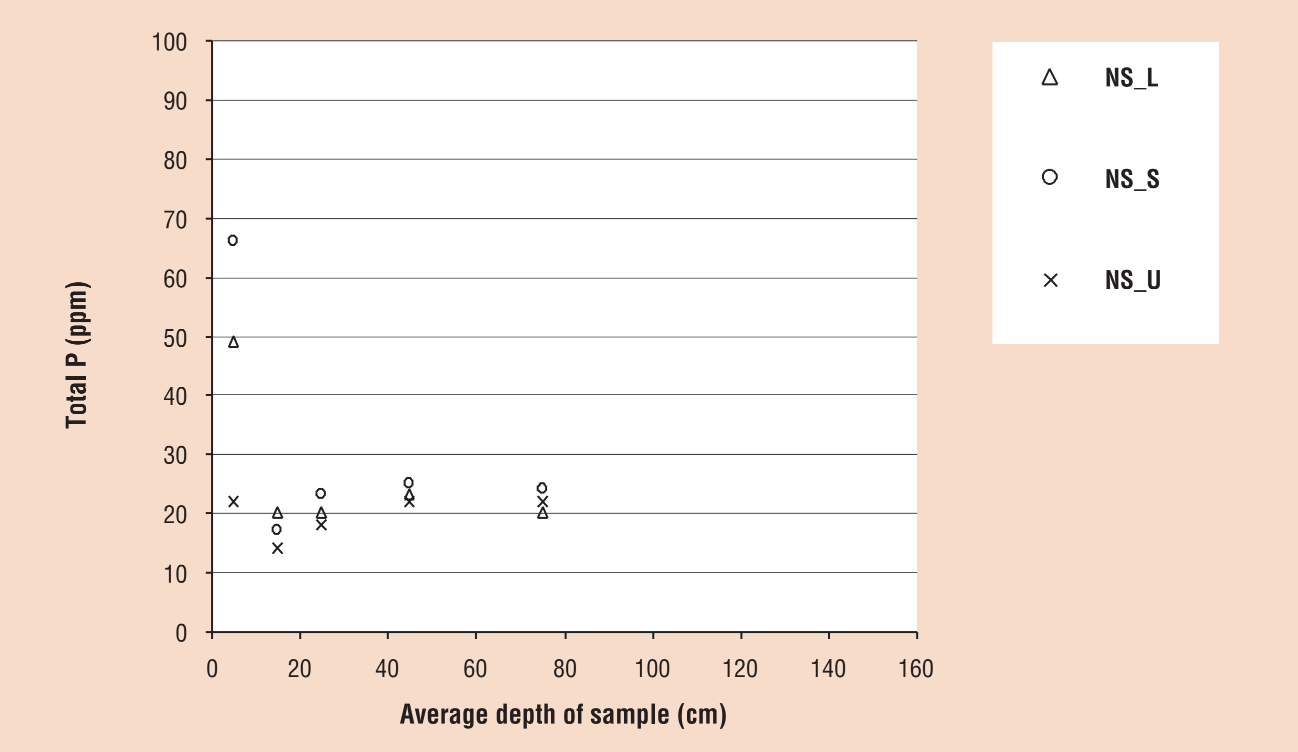

Mullewa



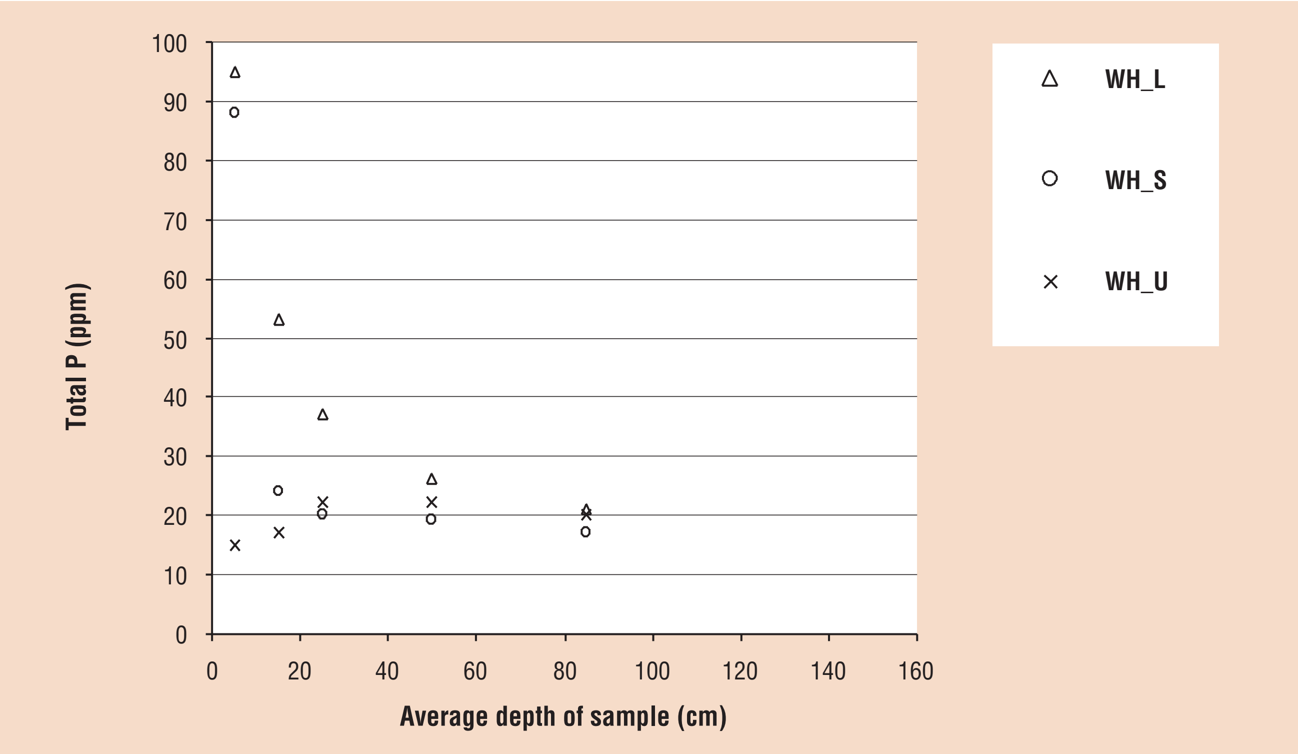

**Merredin**



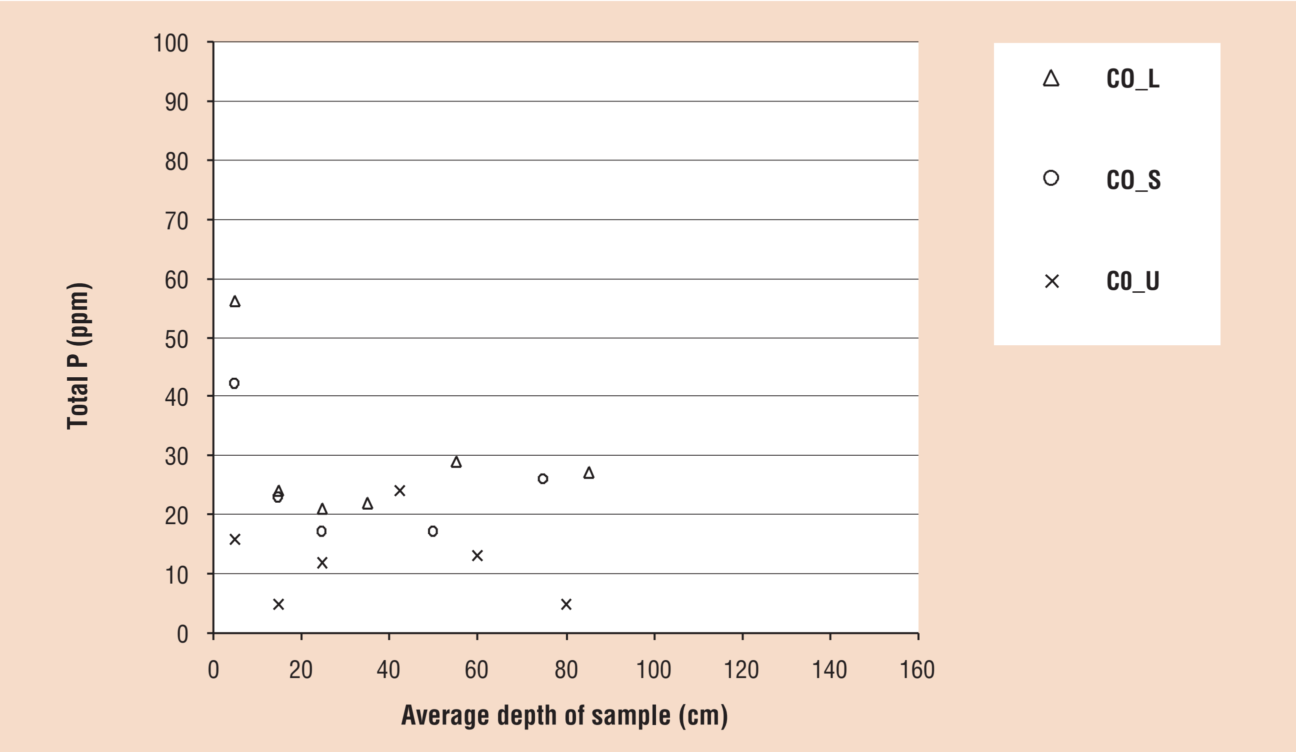

**Newdegate (deep)**




Newdegate (shallow)




Wittenoom Hills



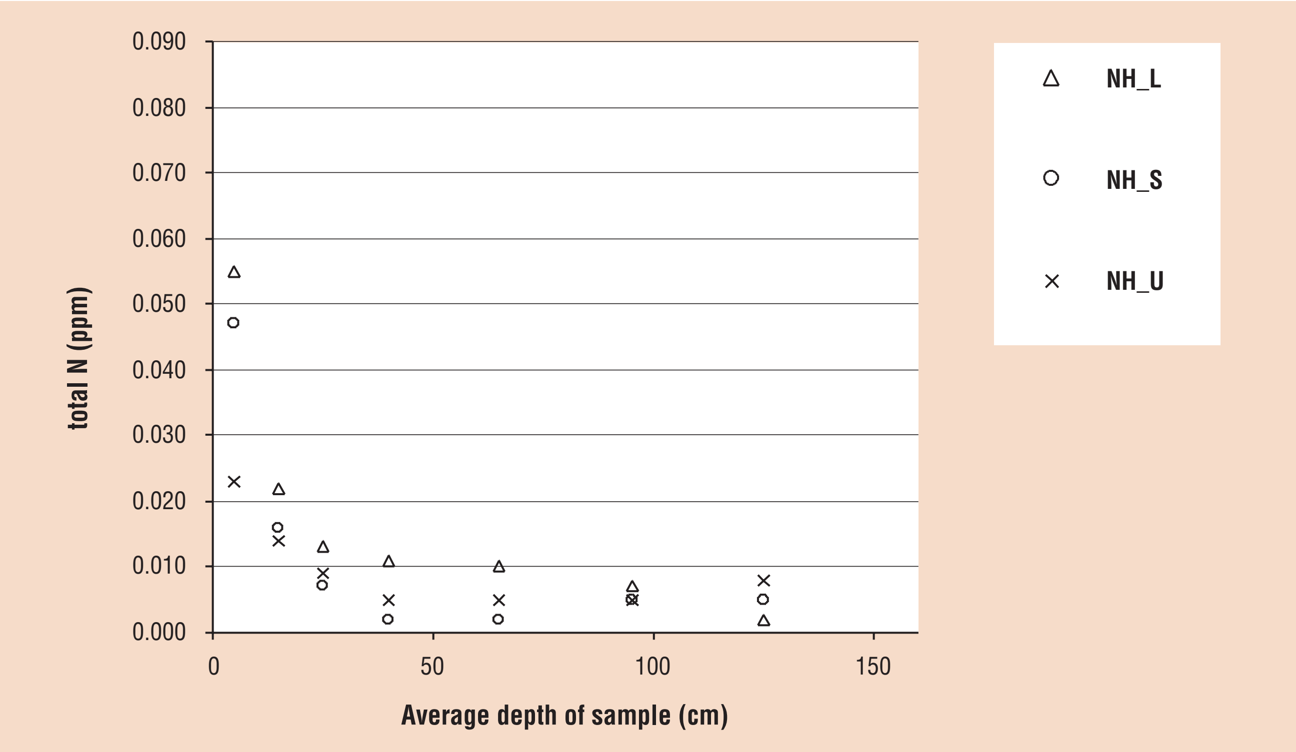
Total P (ppm)
100
90
80
70
60
50
40
30
20
10
0
0
20
40
60
80
100
120
140
160
Average depth of sample (cm)
CO_L
CO_S
CO_U


## Condingup

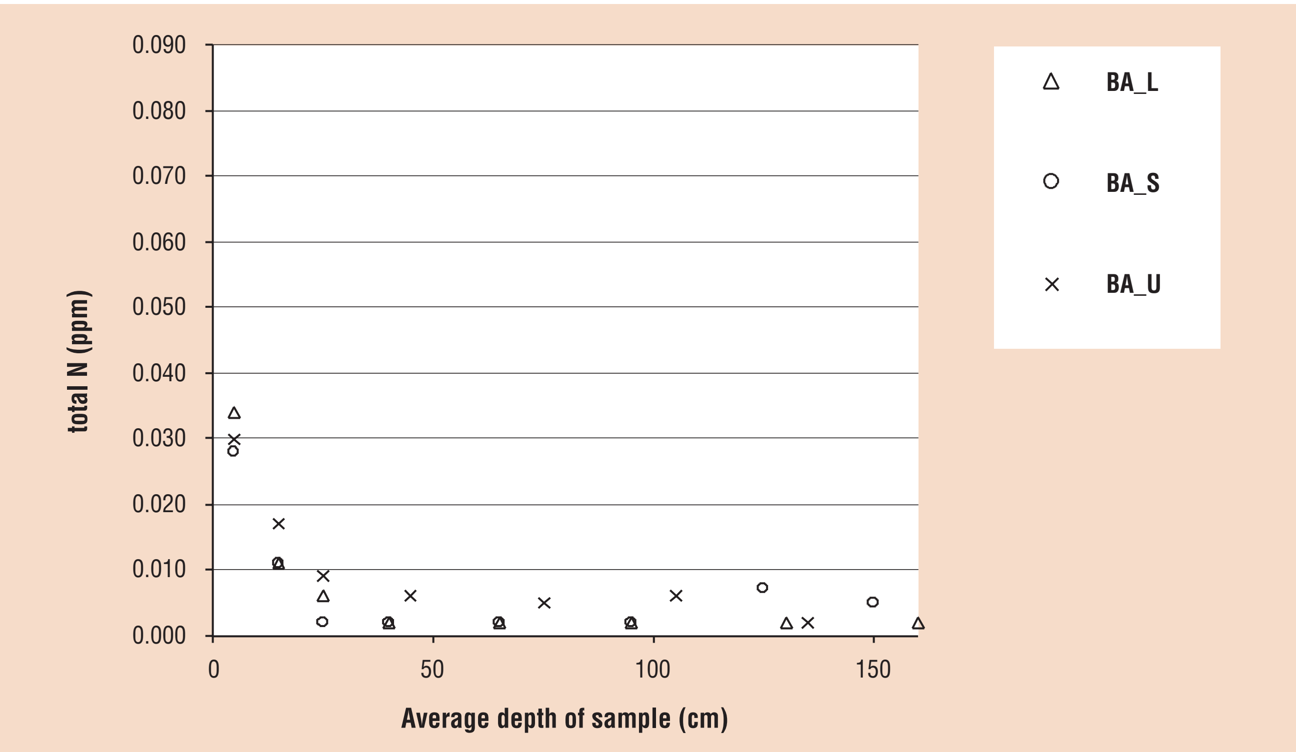
# APPENDIX 19

## Total N (ppm) of Fine Earth Fraction by Average Sample Depth

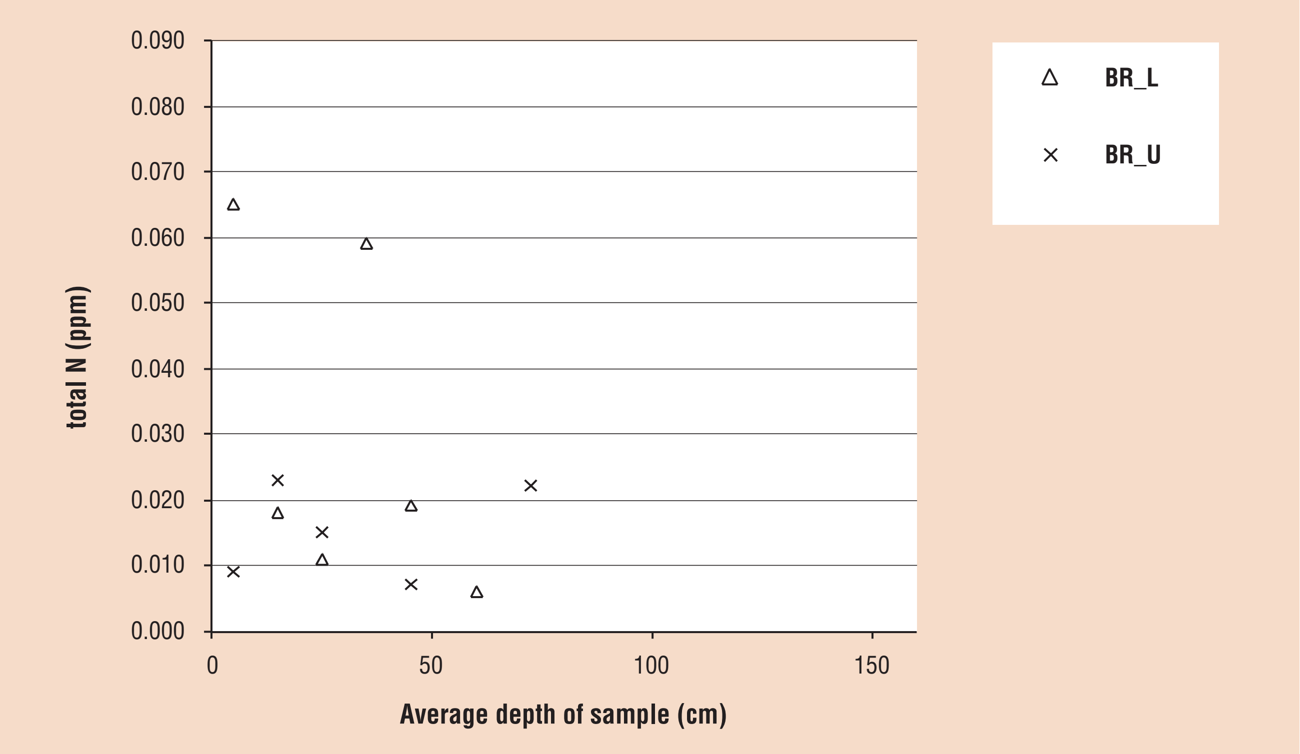
# TABLE OF CONTENTS



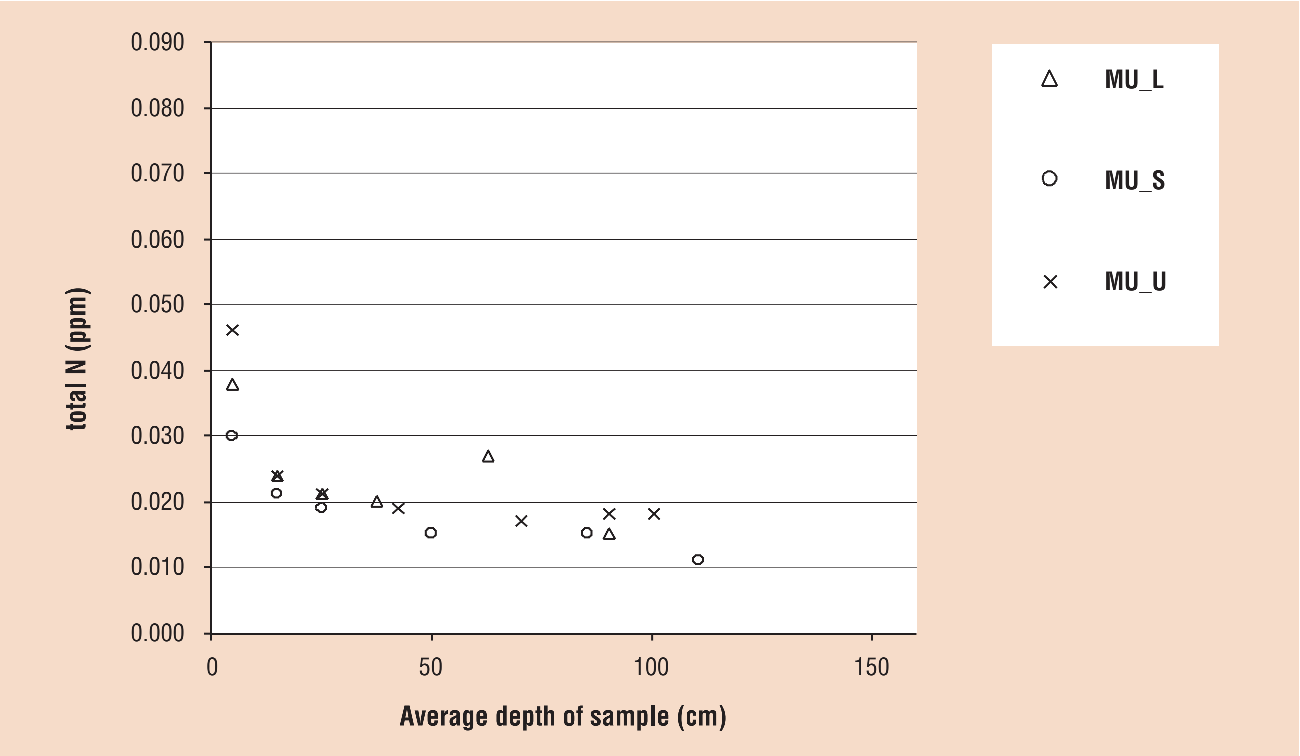

Northampton




Badgingarra




Brookton

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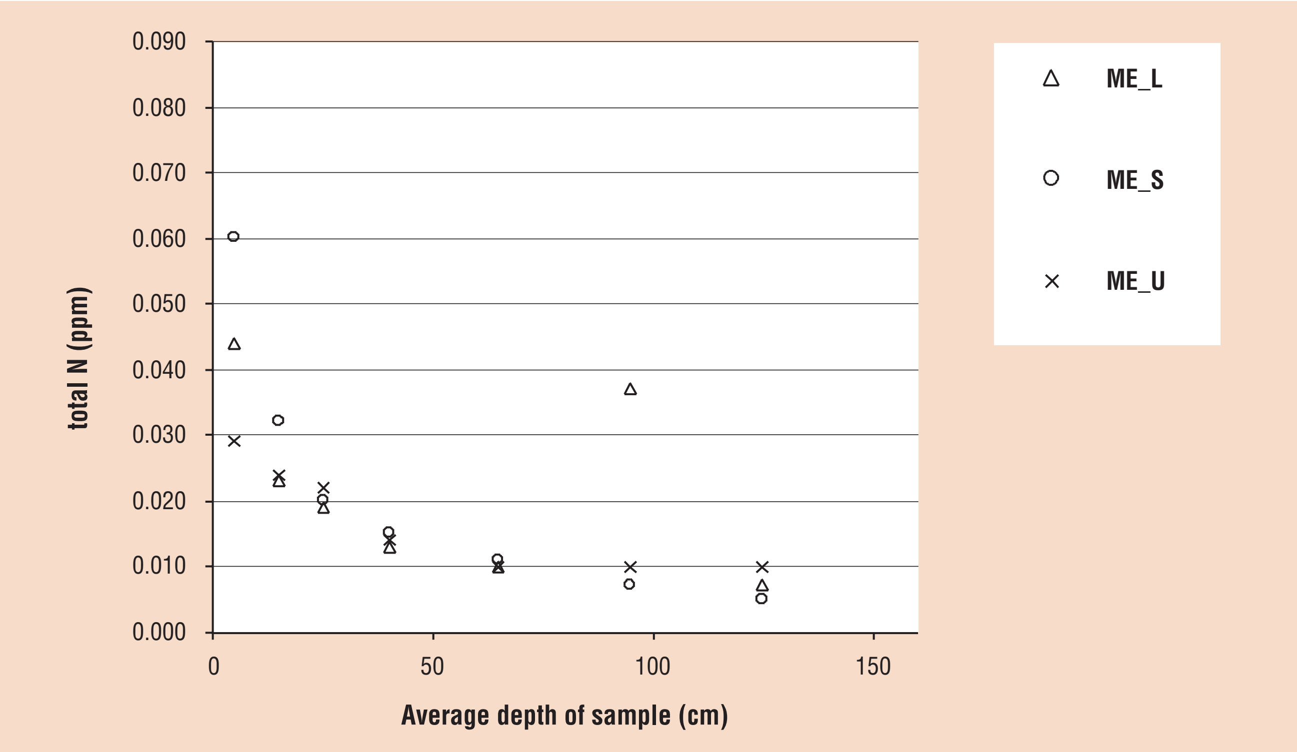
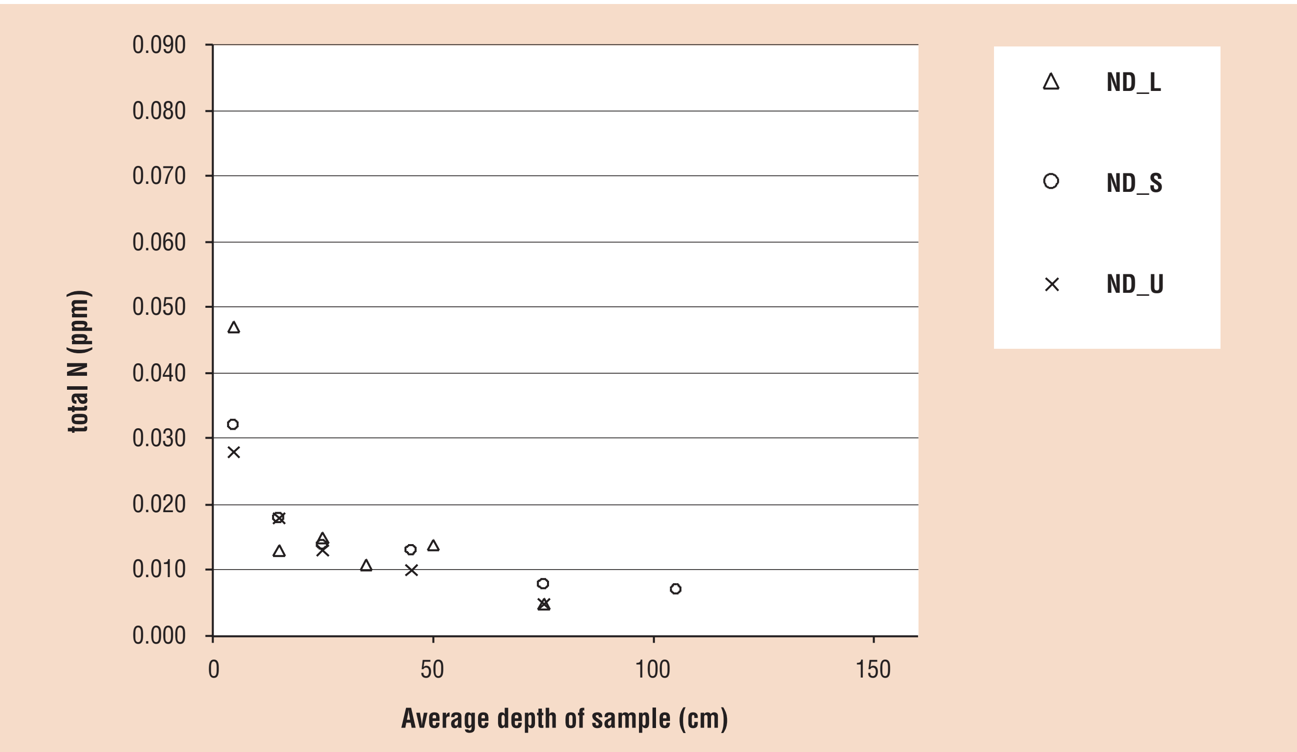
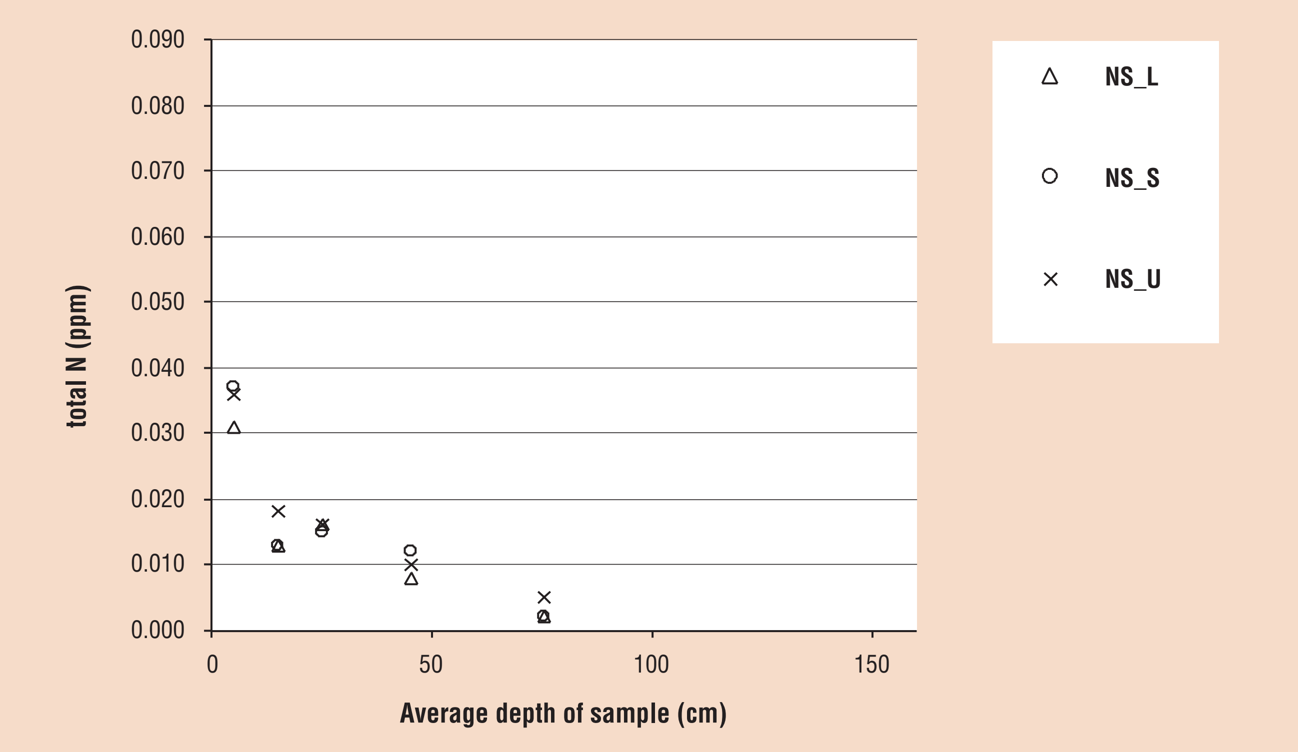


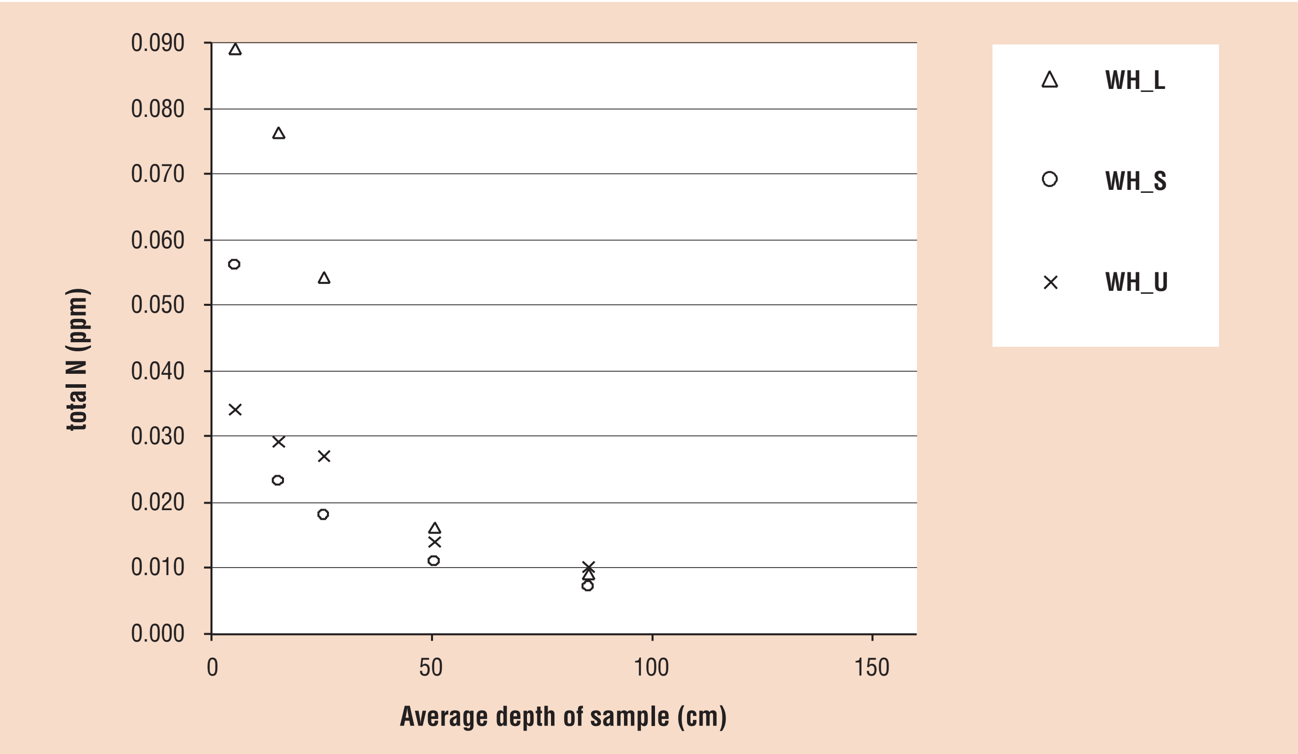

Merredin



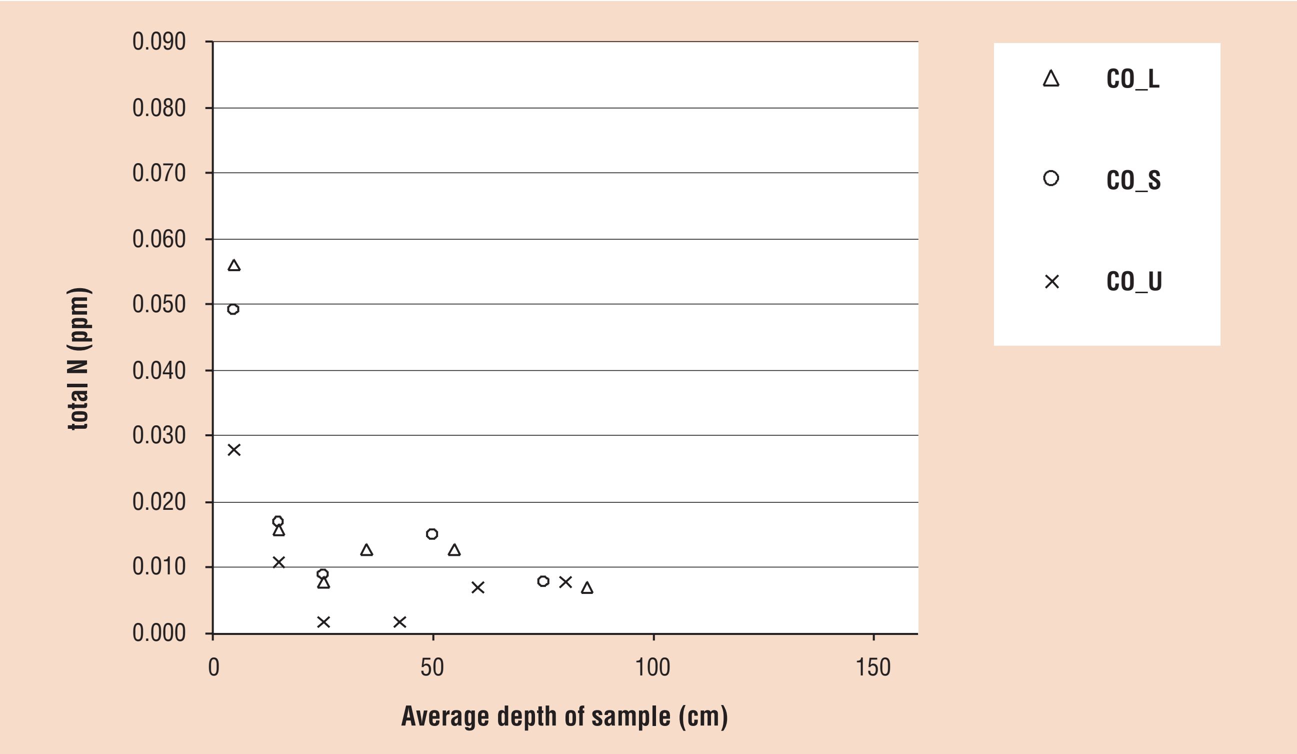

Newdegate (deep)




Newdegate (shallow)




Wittenoom Hills

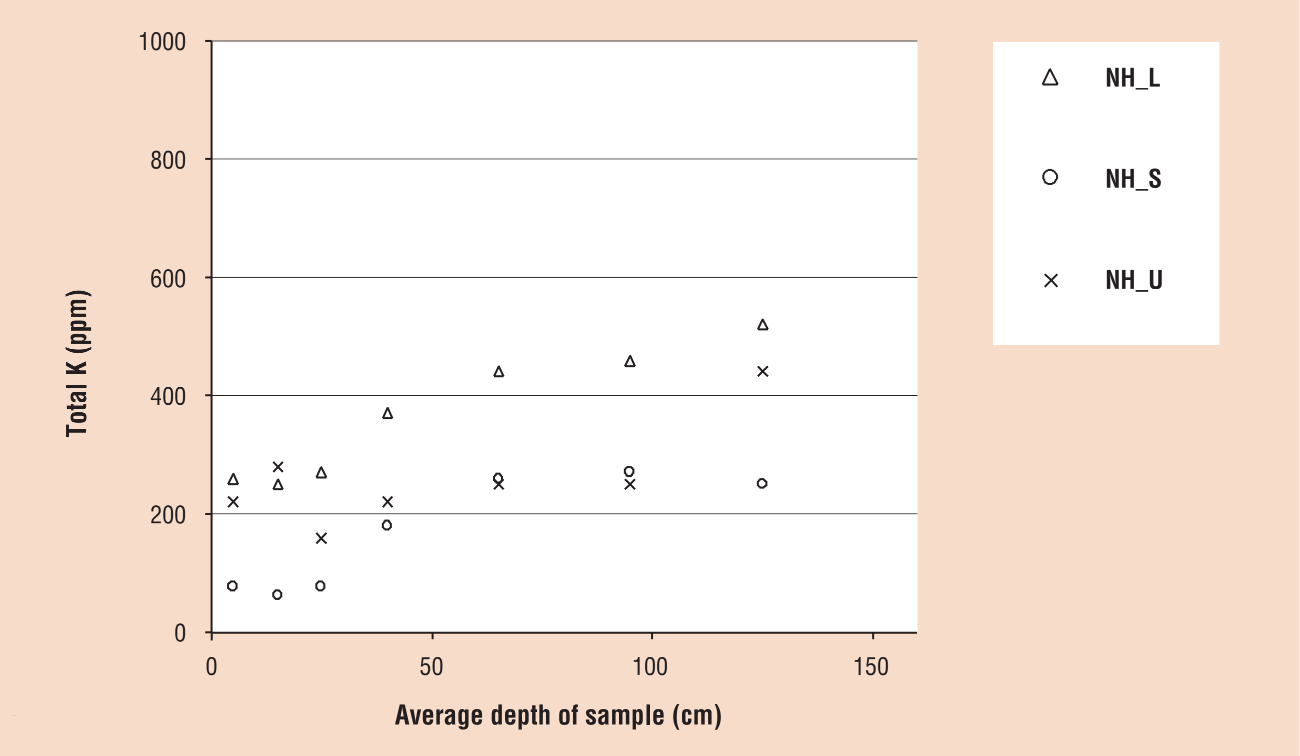

0.090
0.080
0.070
0.060
0.050
0.040
0.030
0.020
0.010
0.000
total N (ppm)
0
50
100
150
Average depth of sample (cm)
CO_L
CO_S
CO_U

**Condingup**

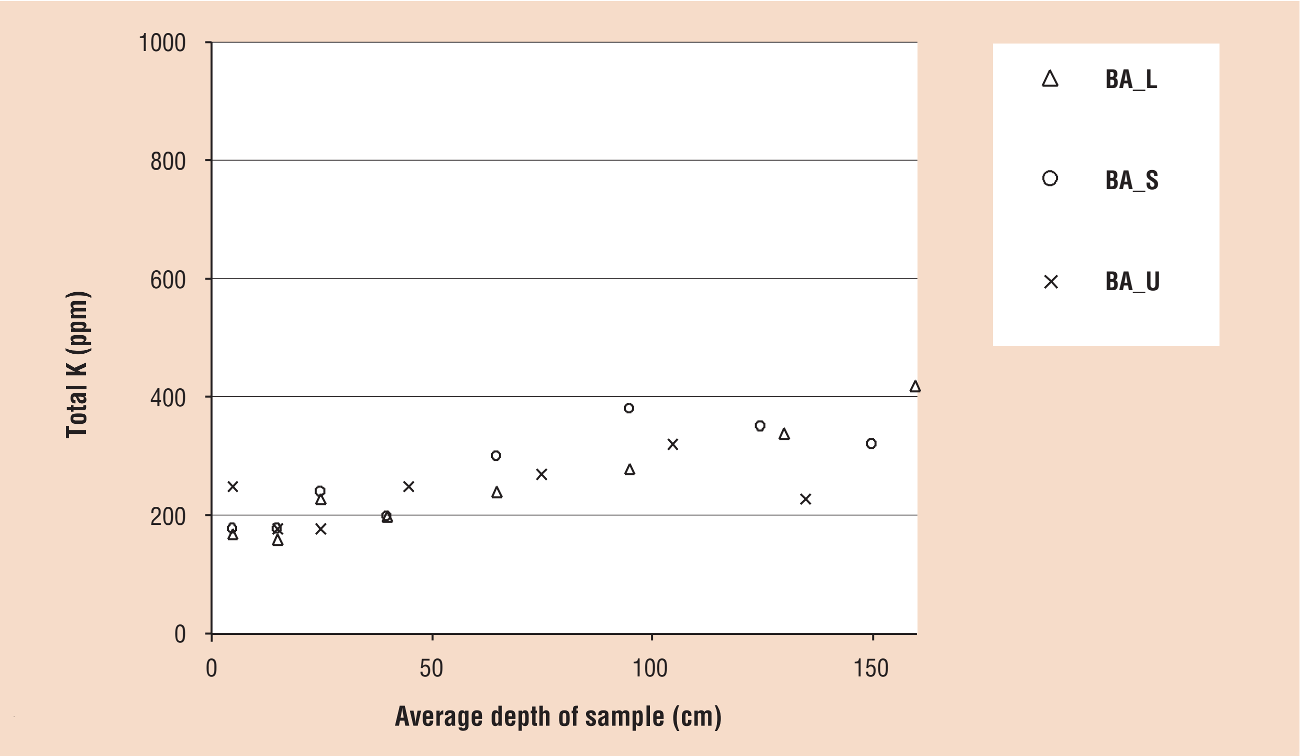
# APPENDIX 20

## Total K (ppm) of Fine Earth Fraction by Average Sample Depth

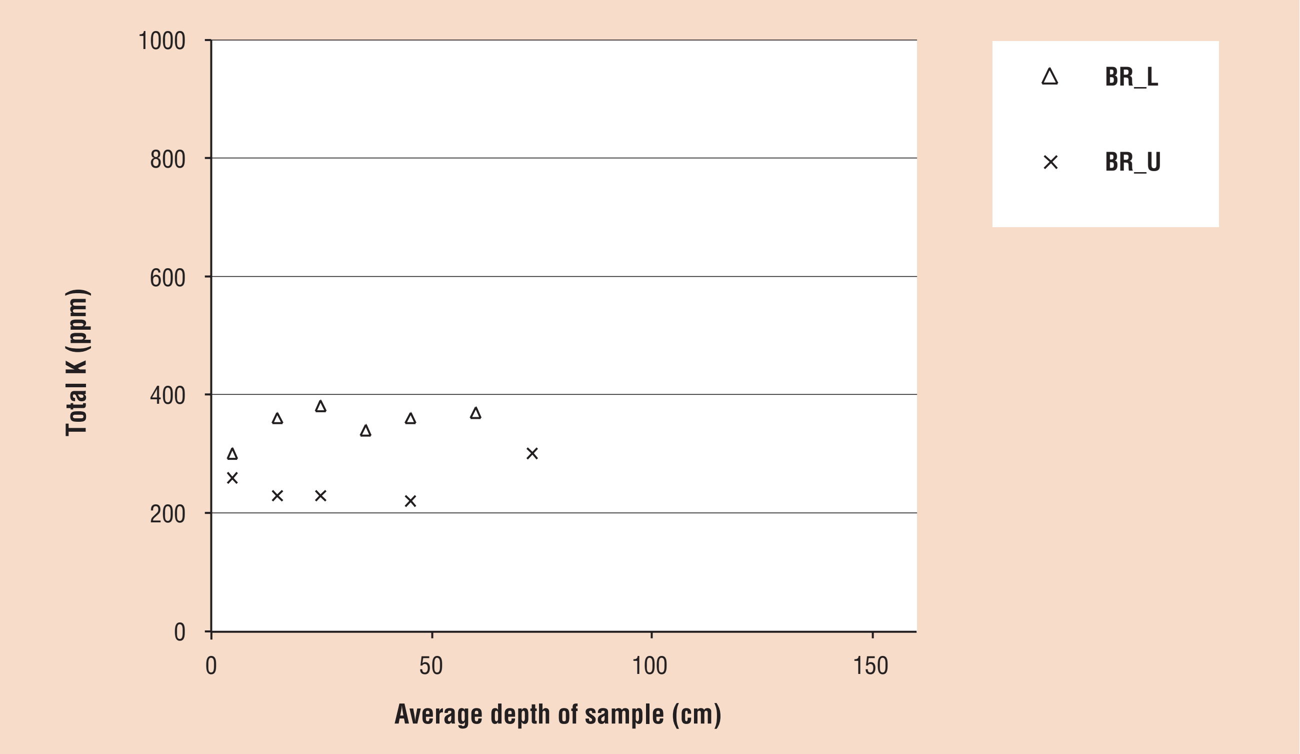
# TABLE OF CONTENTS



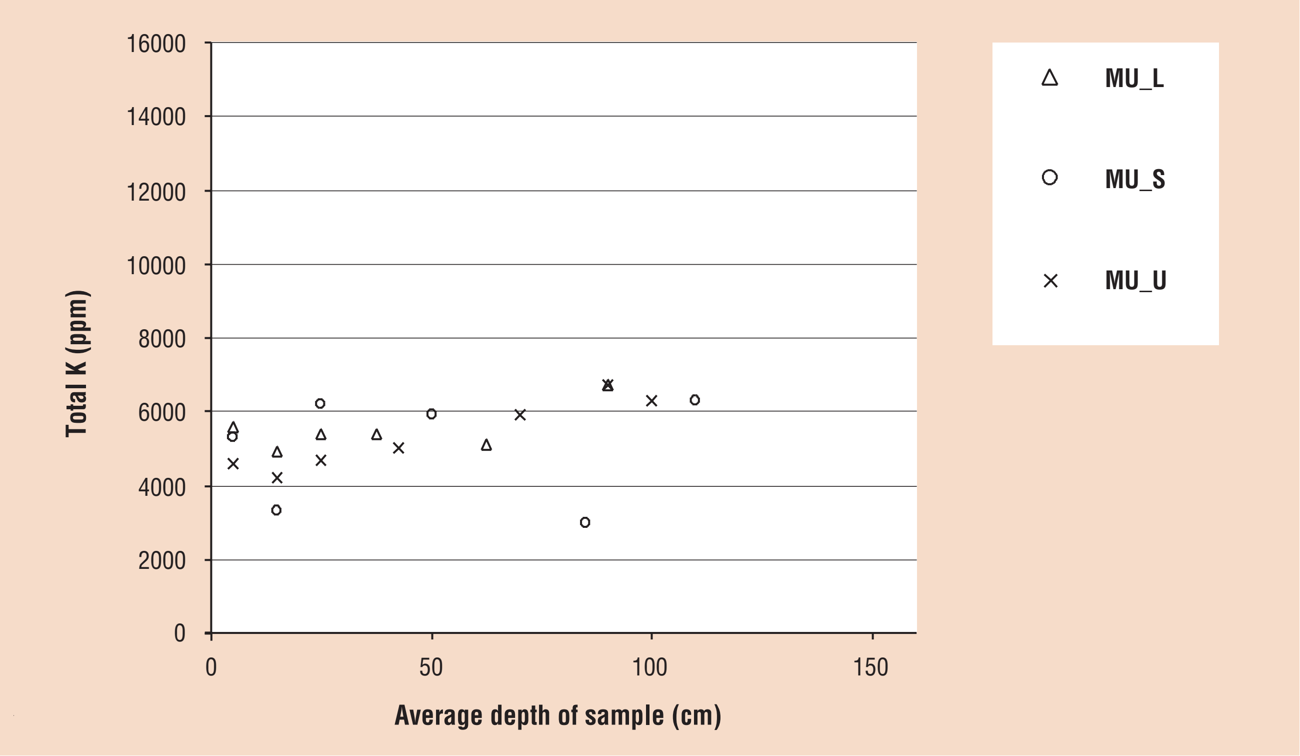

Northampton



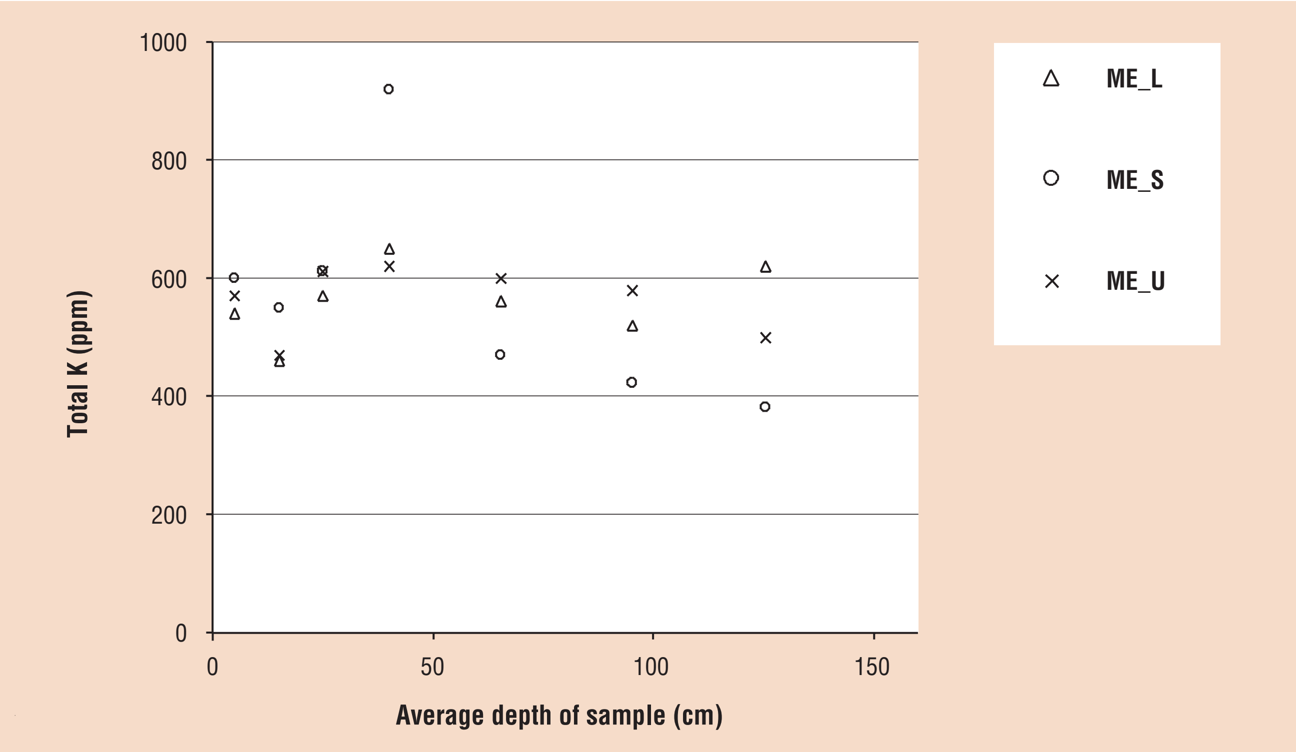

Badgingarra



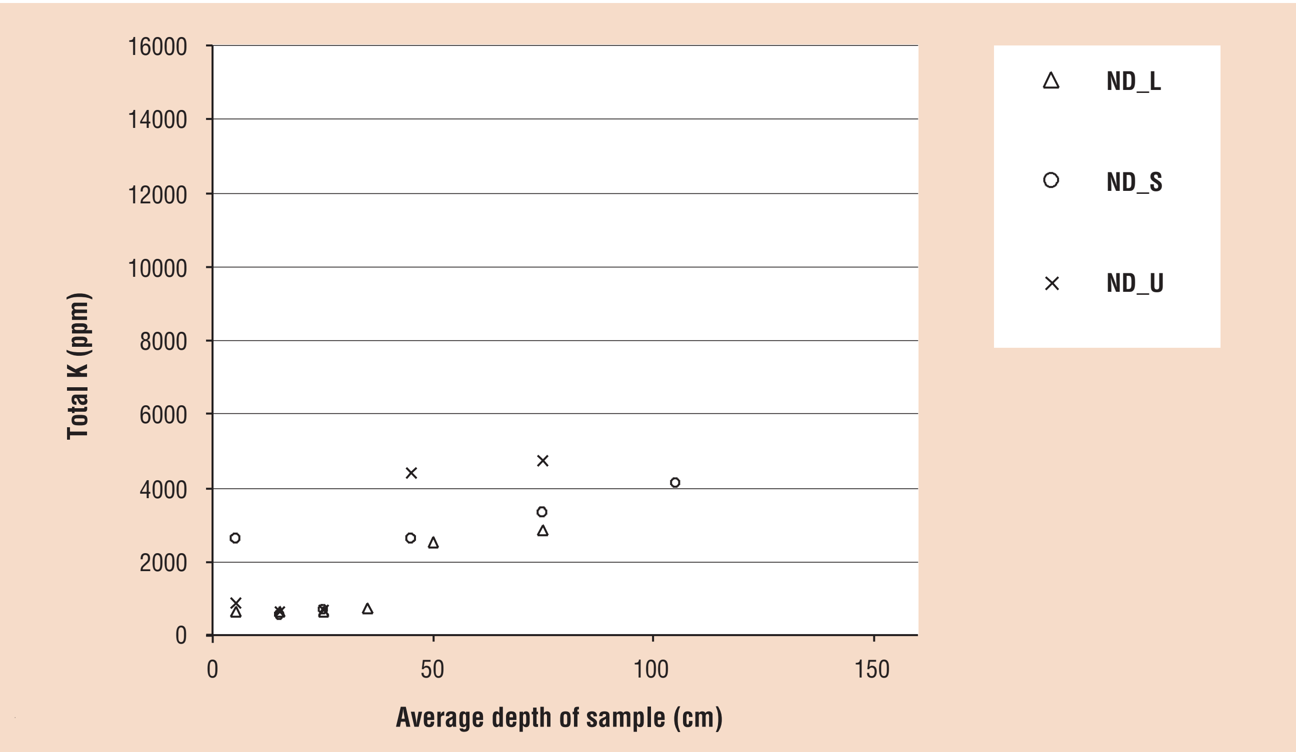

Brookton



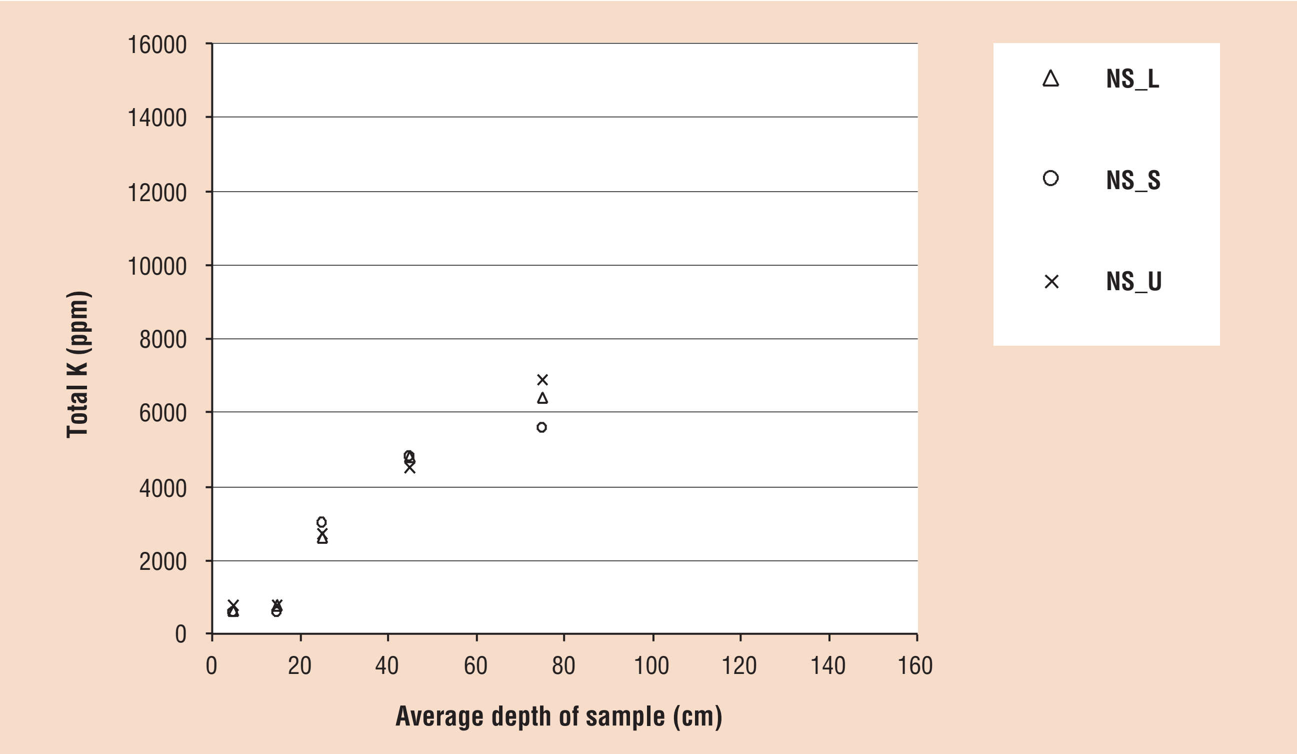

Mullewa



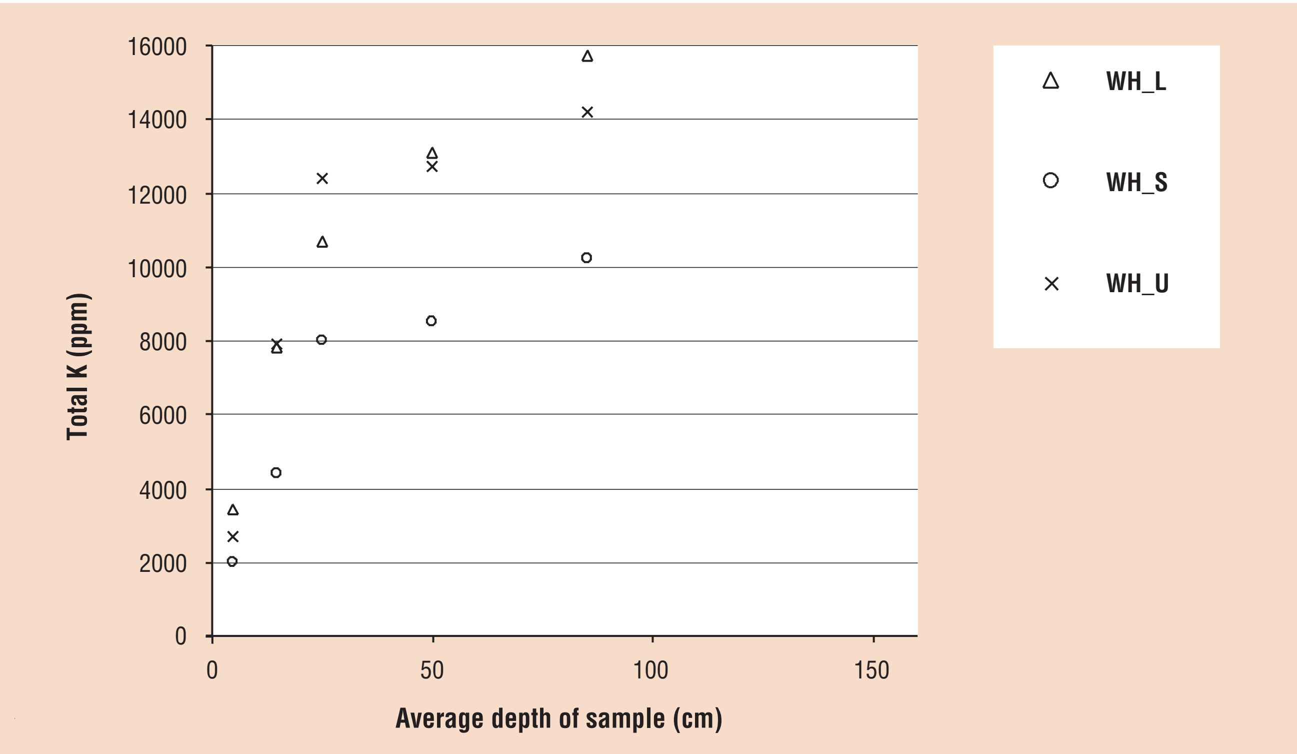

Merredin



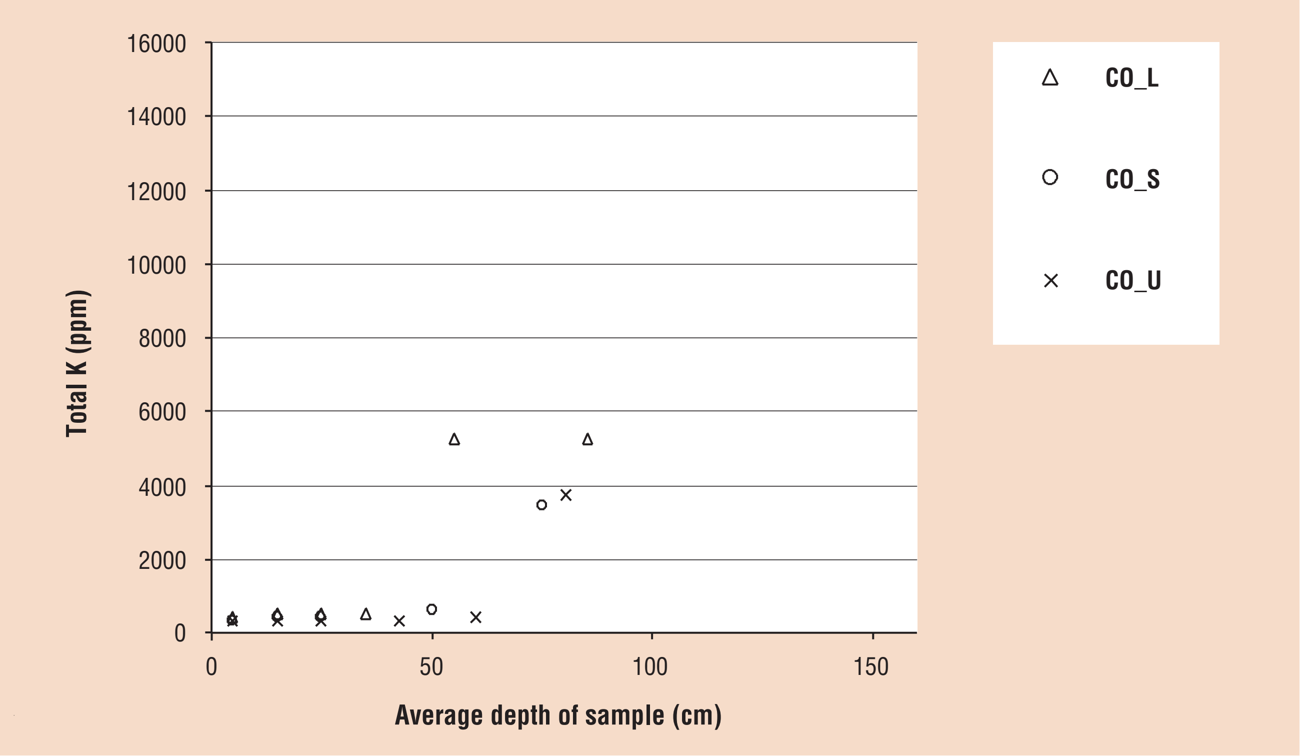

Newdegate (deep)




**Newdegate (shallow)**




**Wittenoom Hills**



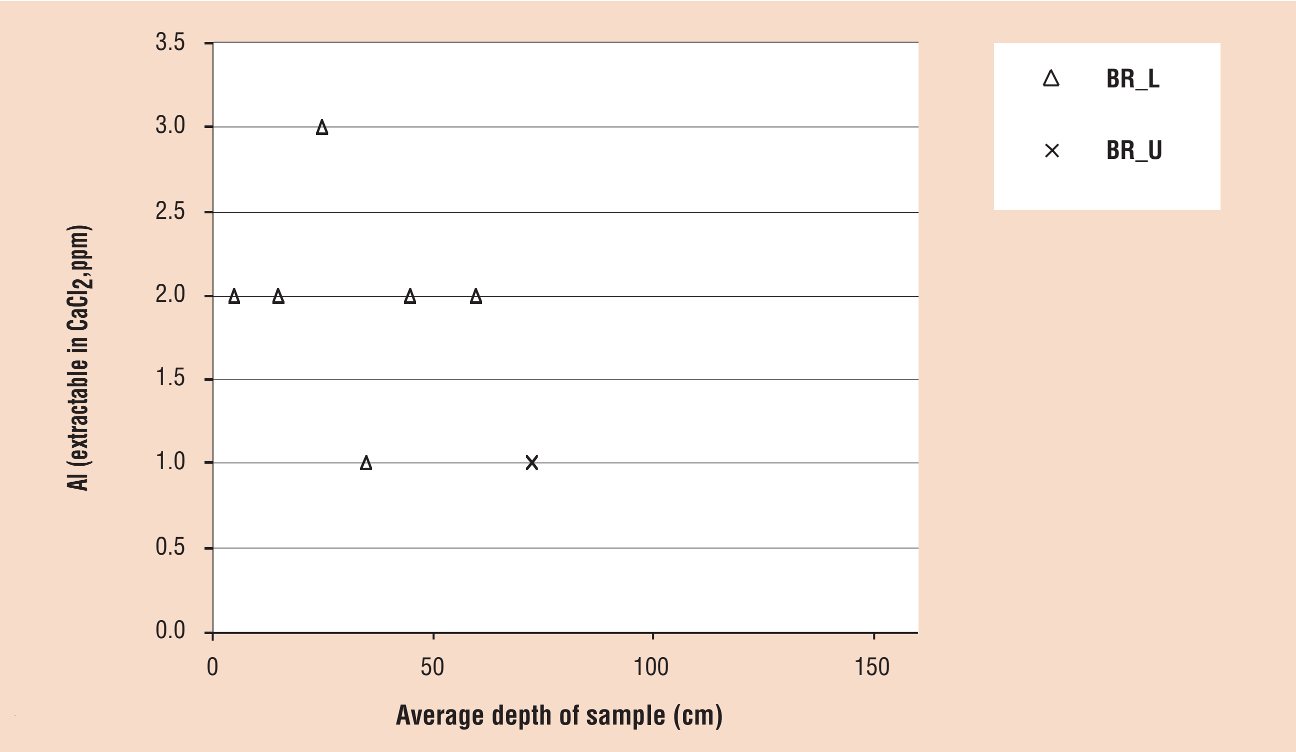
Total K (ppm)
16000
14000
12000
10000
8000
6000
4000
2000
0
0
50
100
150
Average depth of sample (cm)
CO_L
CO_S
CO_U


## Condingup

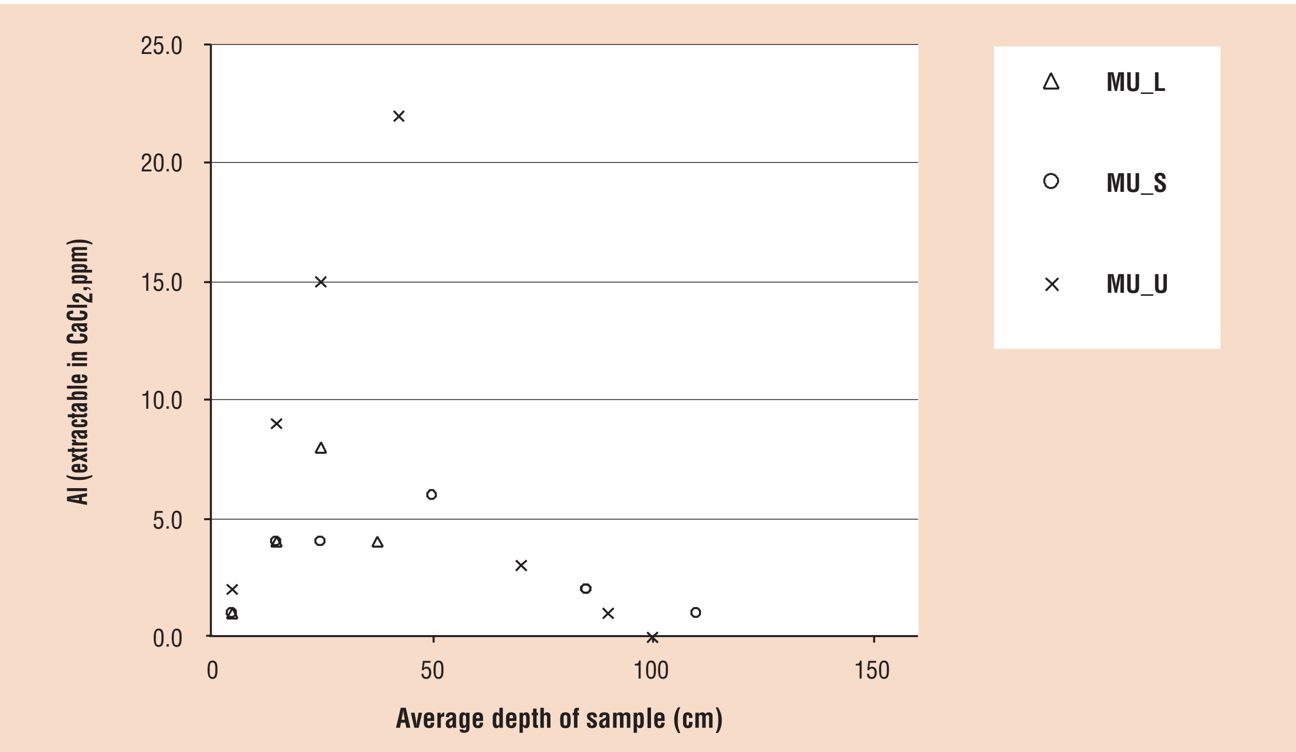
# APPENDIX 21

## Extractable Al (ppm, in 1:5 $CaCl_2$) of Fine Earth Fraction by Average Sample Depth

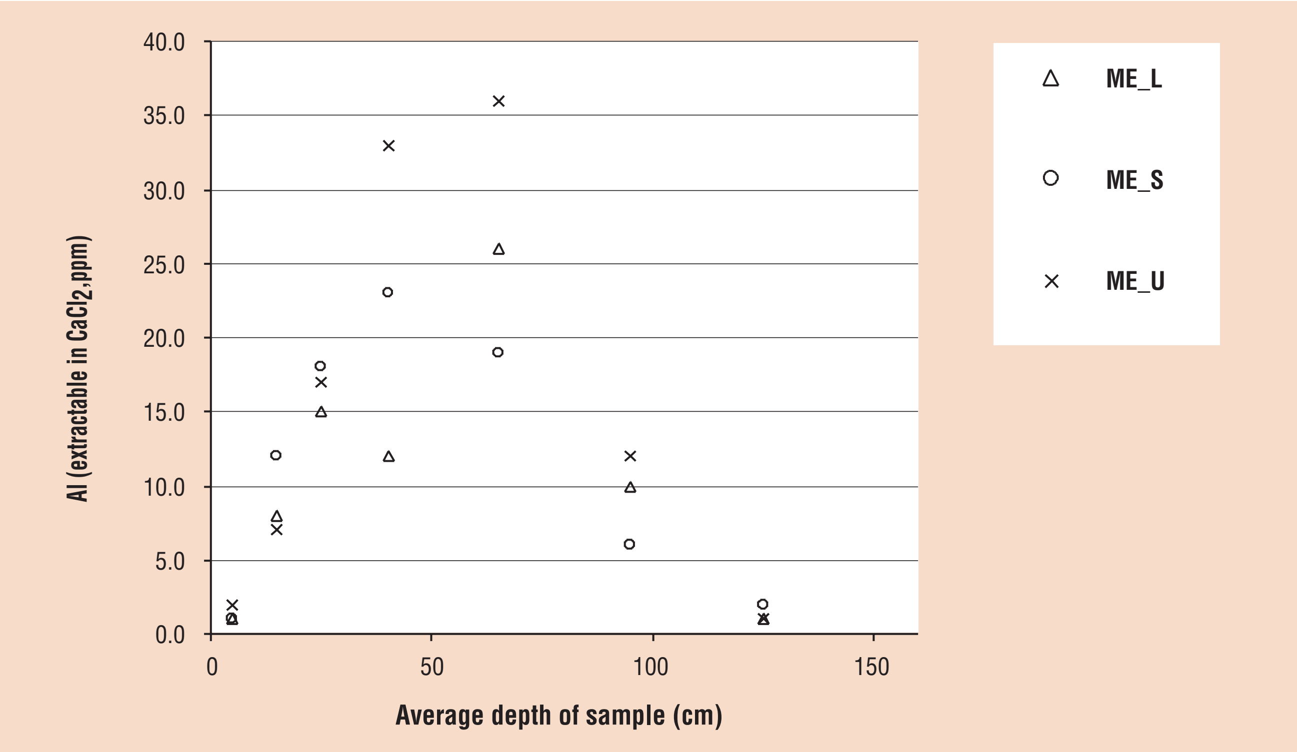
# TABLE OF CONTENTS



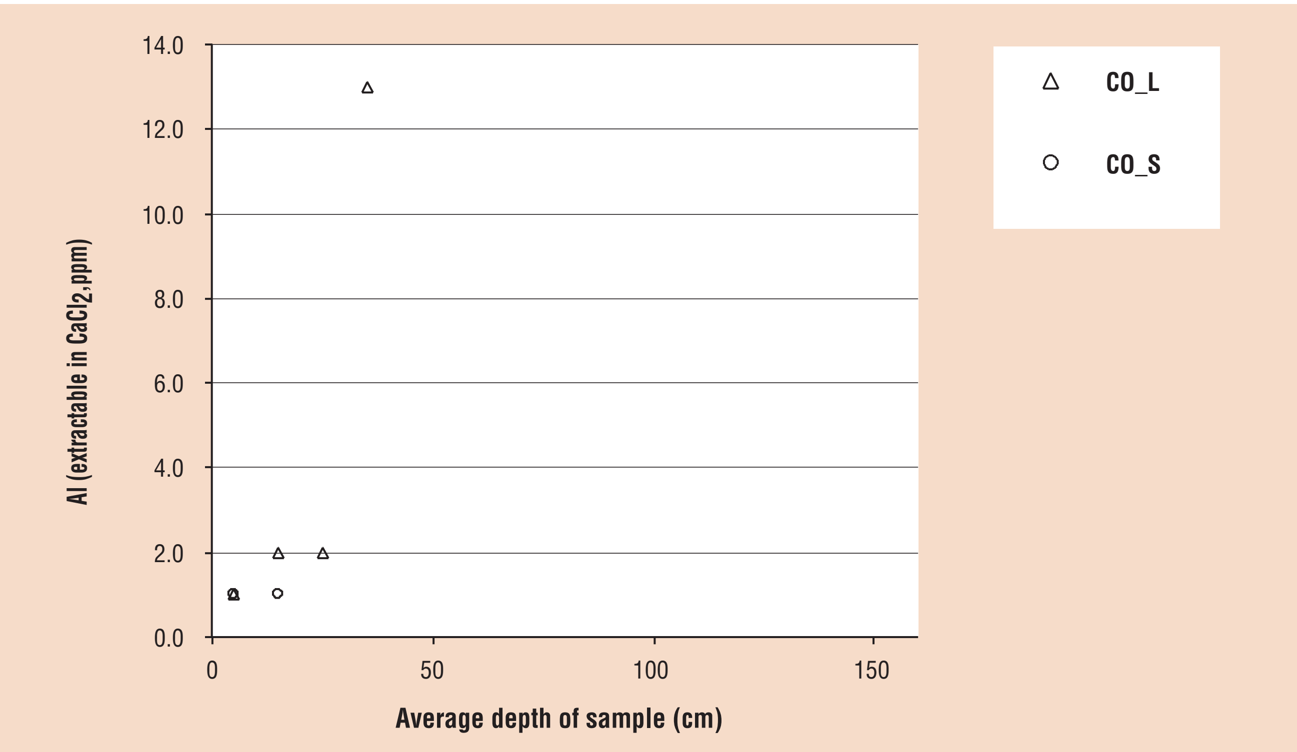

**Brookton**




**Mullewa**




**Merredin**

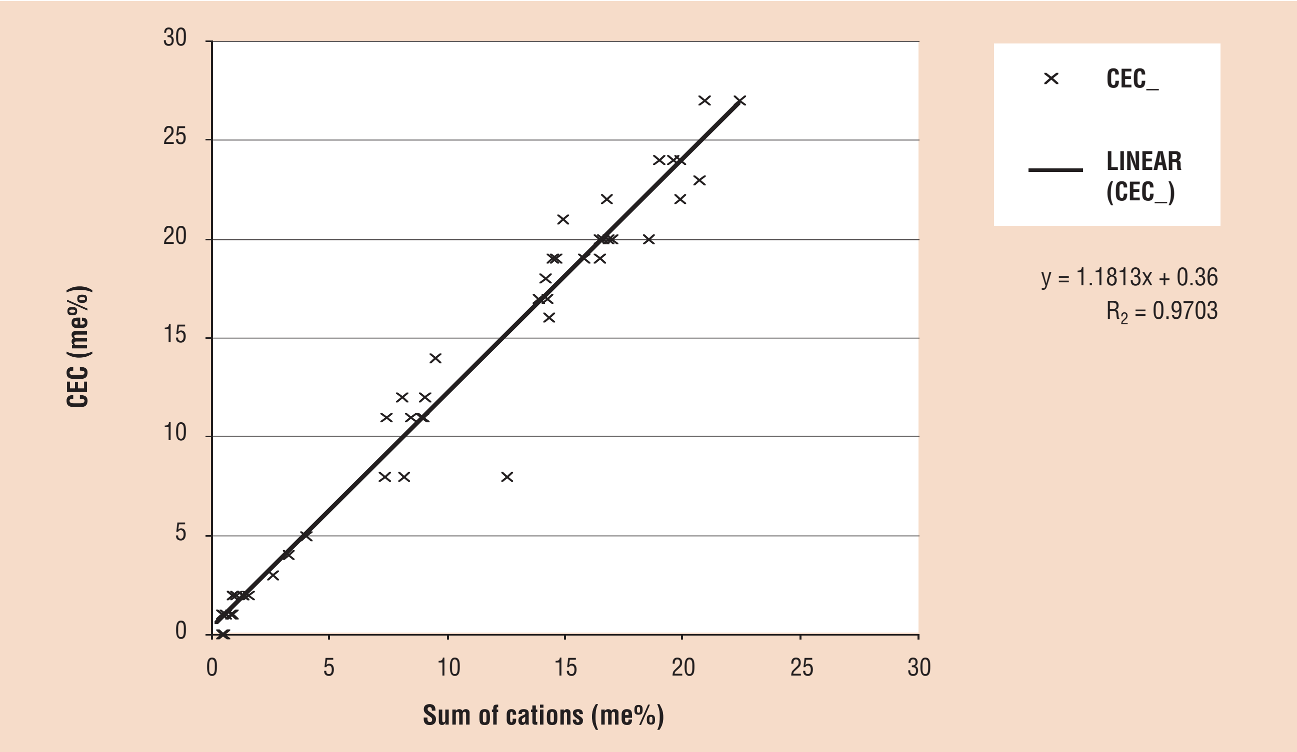



**Condingup**

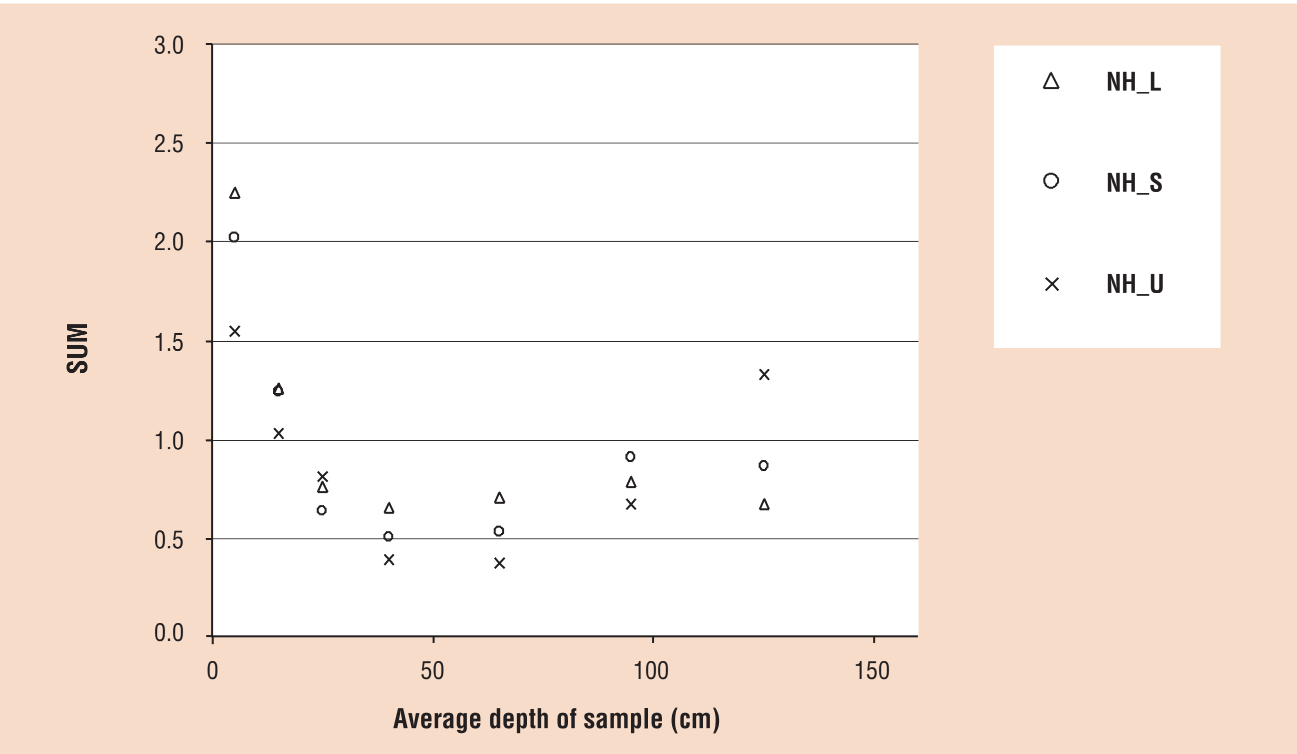
# APPENDIX 22

## Sum of Cations (me%) of Fine Earth Fraction by Average Sample Depth

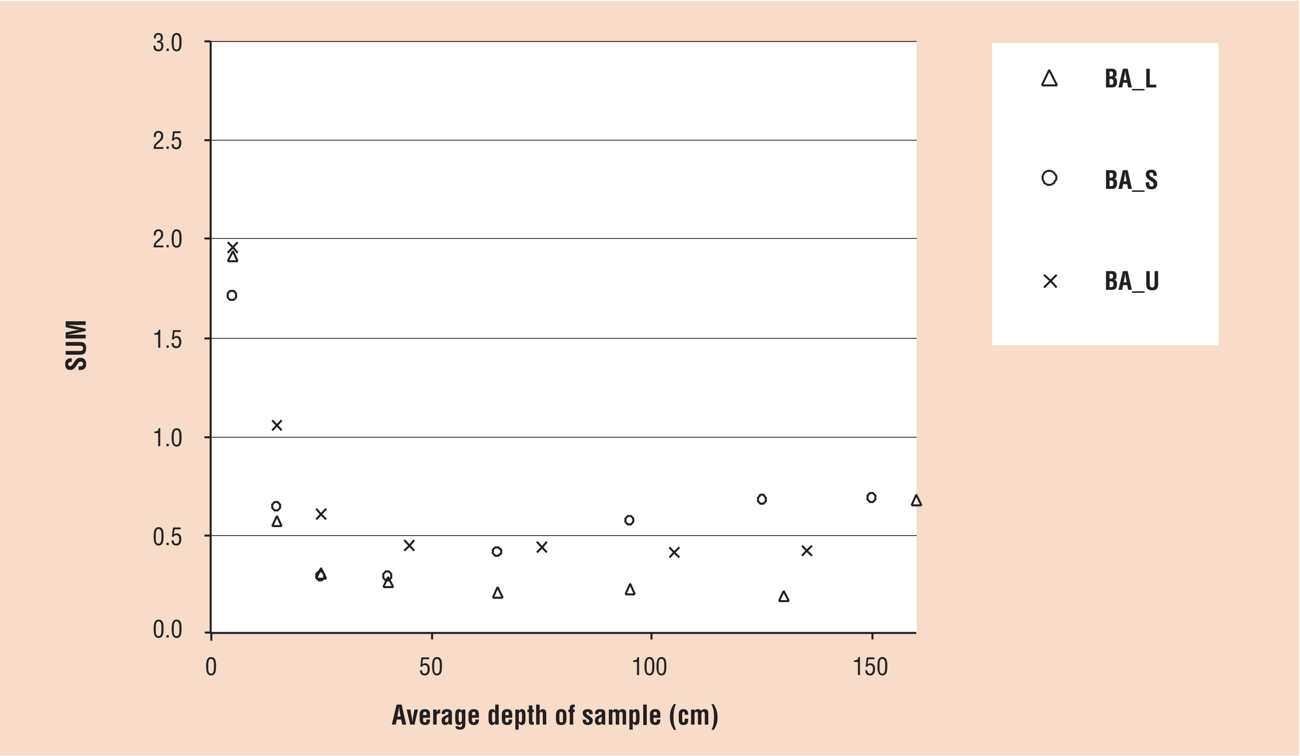
# TABLE OF CONTENTS



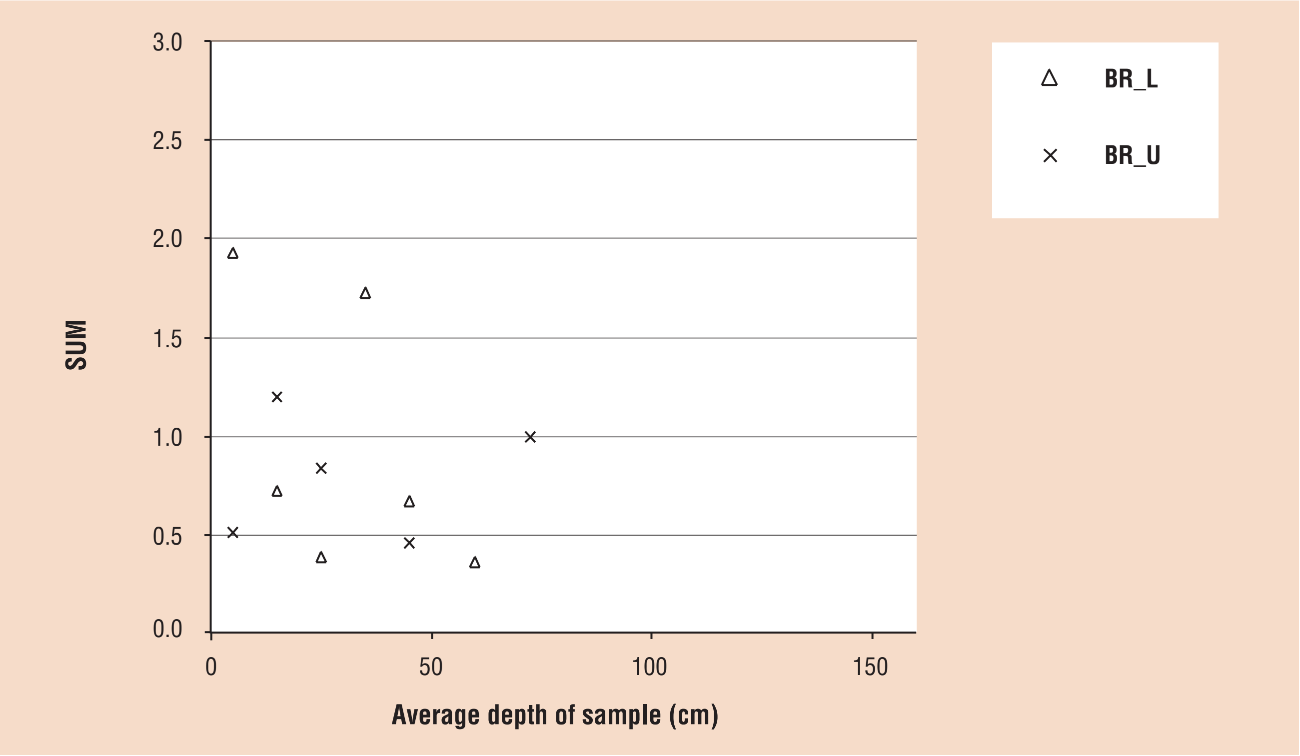

Cation Exchange Capacity (CEC)  vs sum of cations



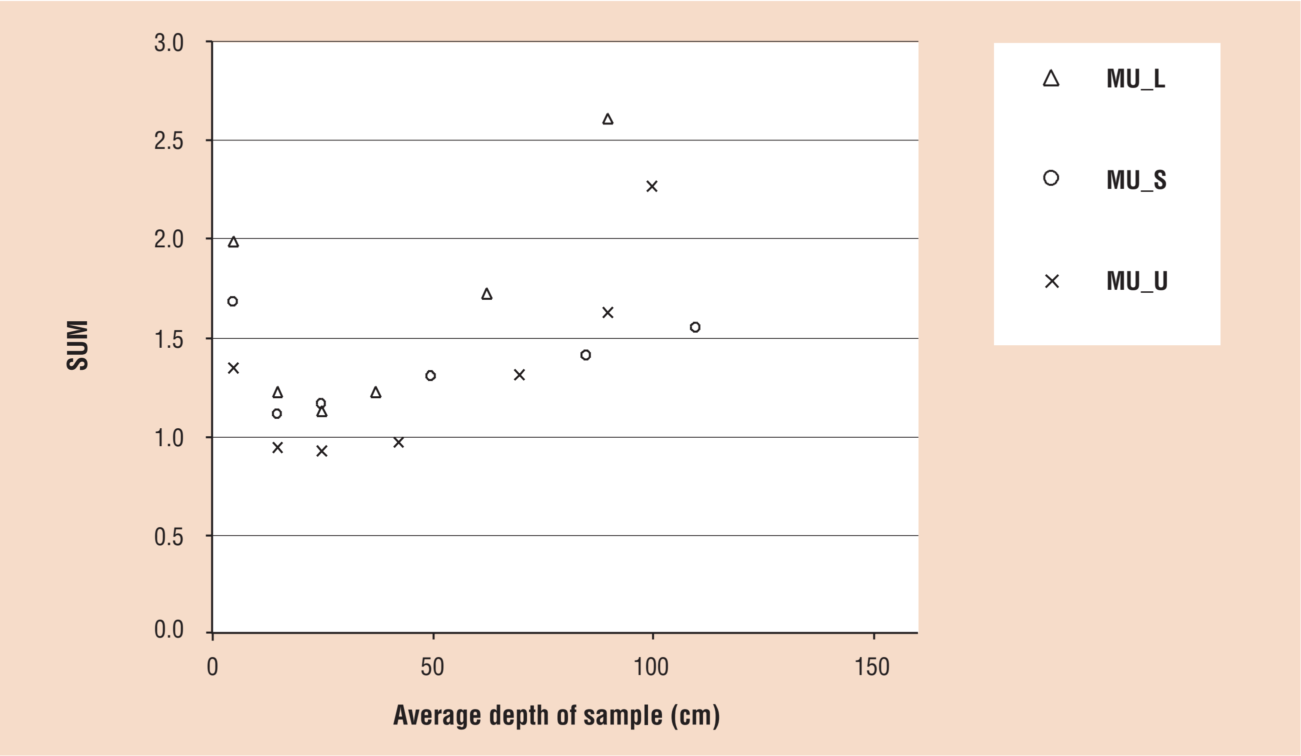

Northampton



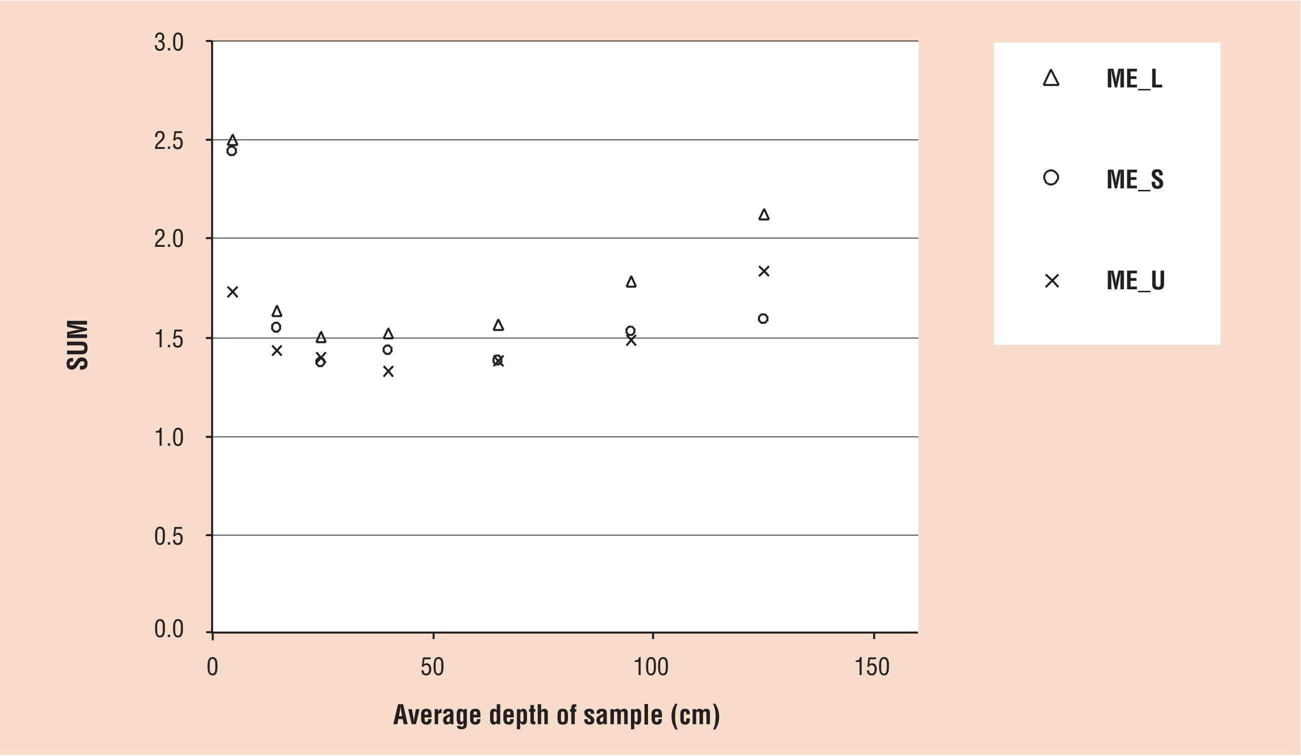

Badgingarra



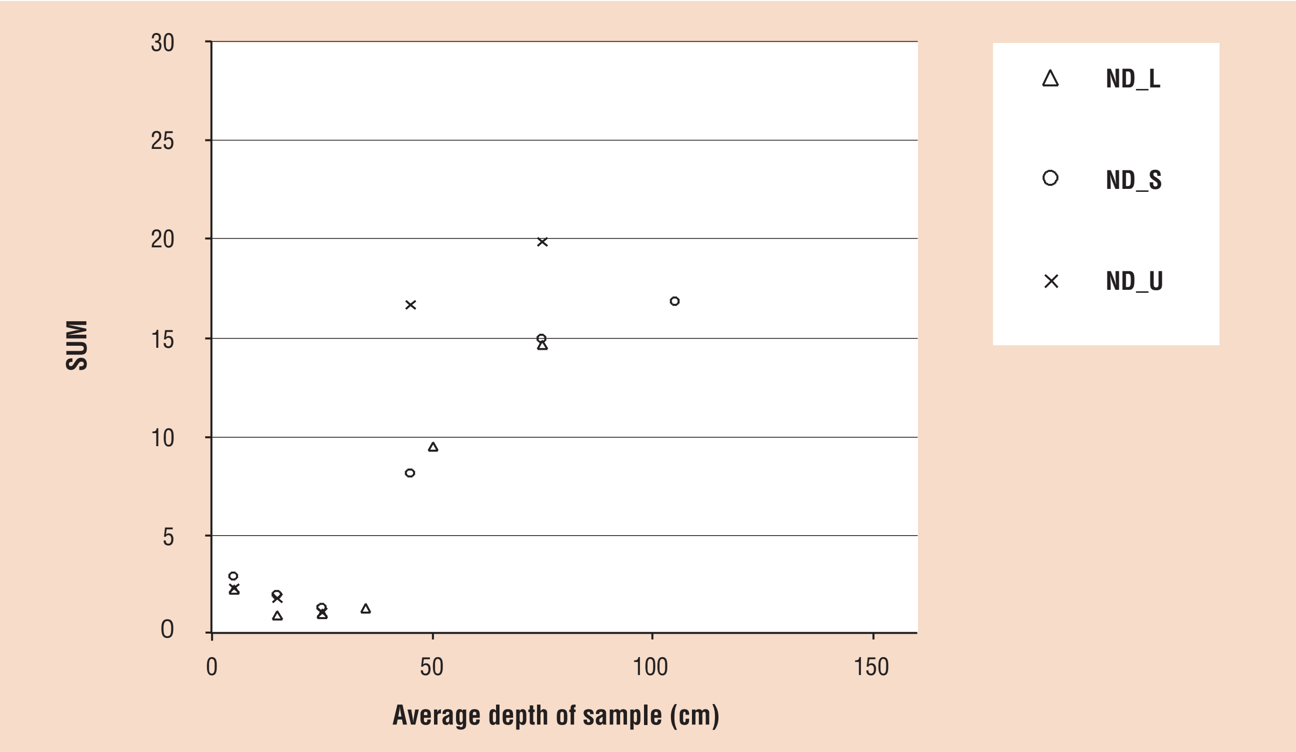

Brookton



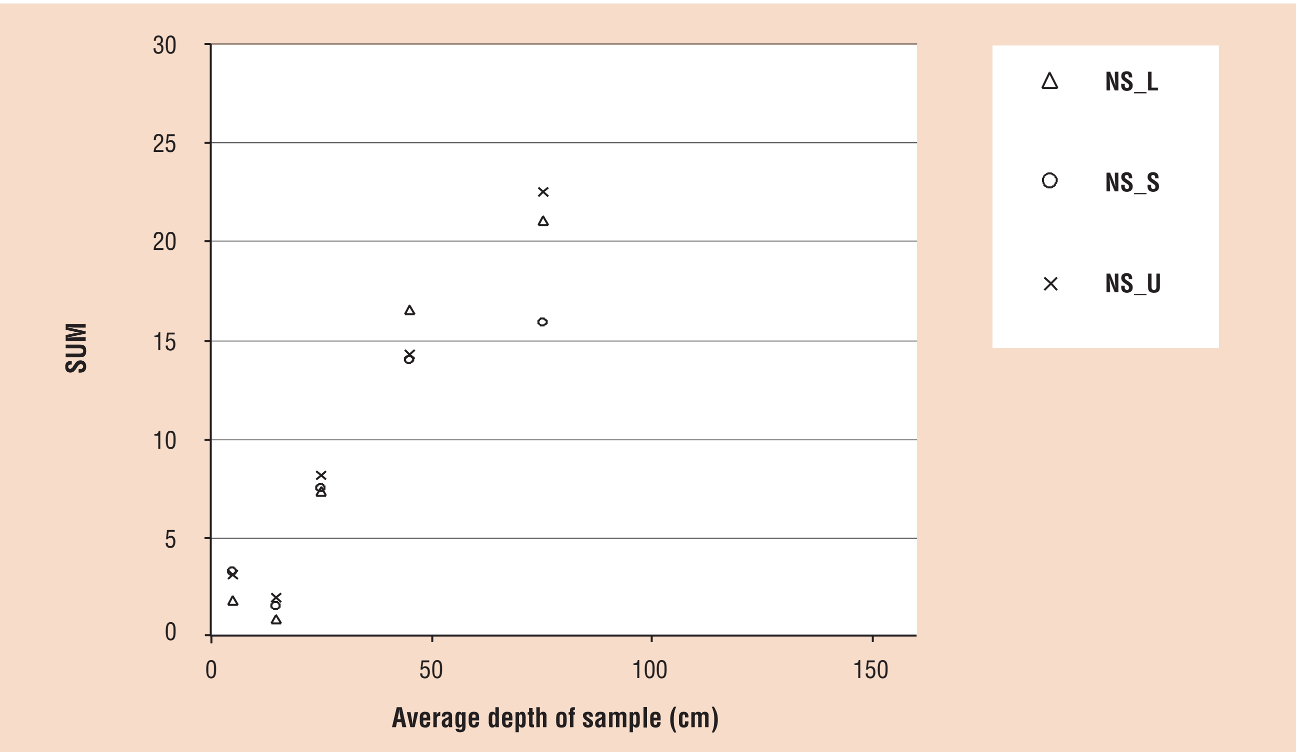

Mullewa



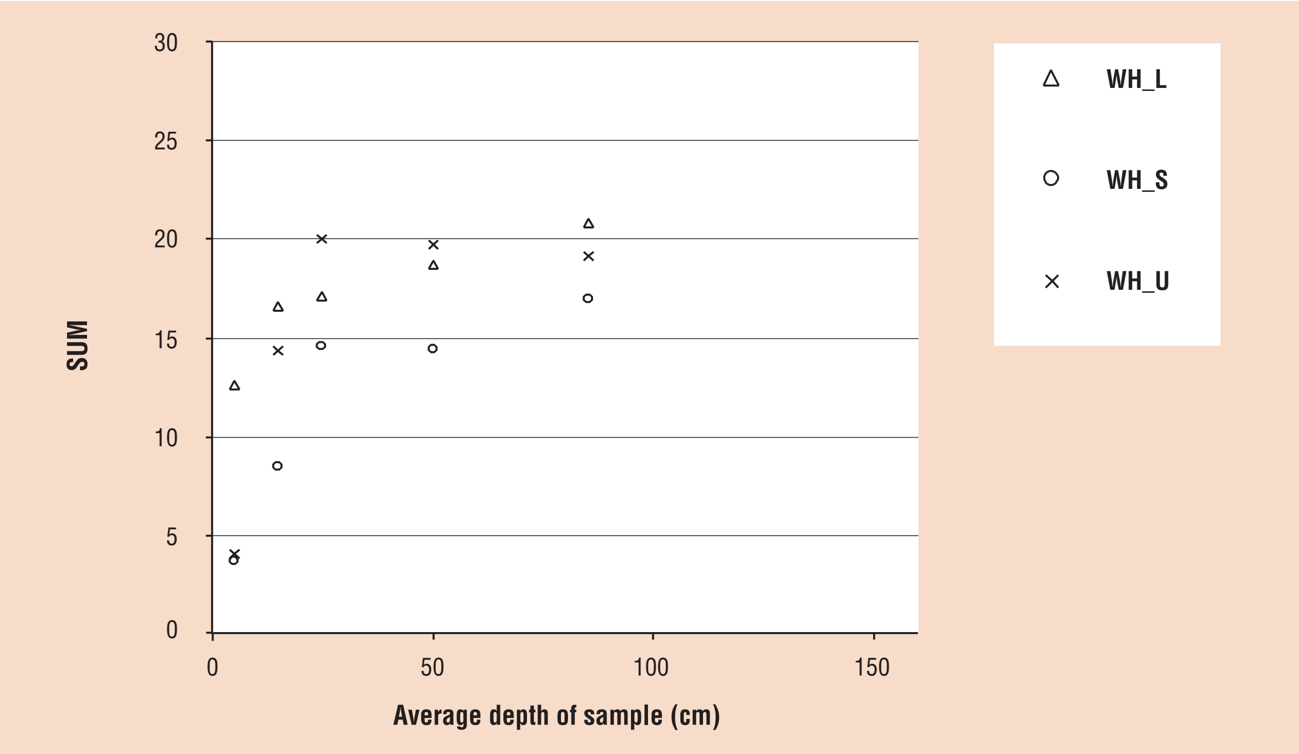

Merredin



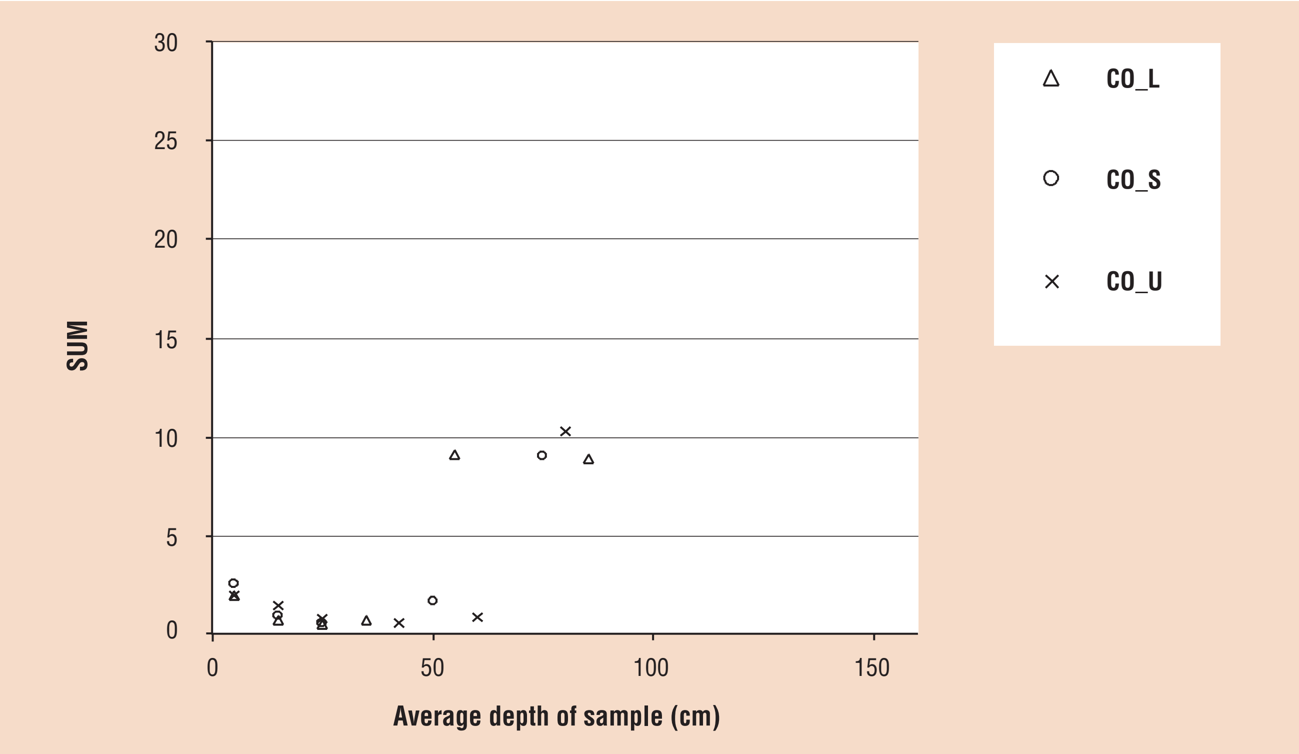

**Newdegate (deep)**




**Newdegate (shallow)**




Wittenoom Hills




Condingup

# Series 1 Publications

Set the framework for development of the National Carbon Accounting System (NCAS) and document initial NCAS-related technical activities
(see http://www.greenhouse.gov.au/ncas/ publications).

# Series 2 Publications

Provide targeted technical information aimed at improving carbon accounting for Australian land based systems (see http://www.greenhouse.gov.au/ncas/publications).

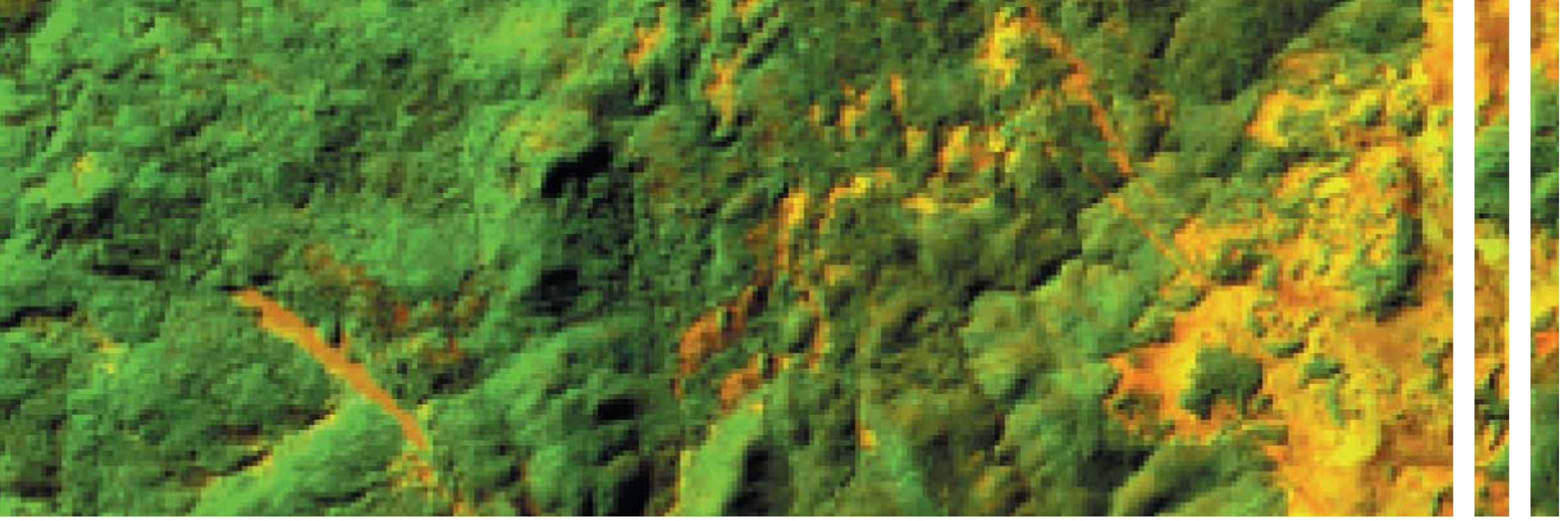
# Series 3 Publications

Detail protocols for biomass estimation and the development of integrated carbon accounting models for Australia (see http://www.greenhouse.gov.au/ncas /publications).
Of particular note is Technical Report No.

28. The FullCAM Carbon Accounting Model: Development, Calibration and Implementation for the National Carbon Accounting System.

# Series 4 Publications include:

34. Paired Site Sampling for Soil Carbon Estimation - New South Wales.
35. Emission Sources of Nitrous Oxide from Australian Agriculture and Mitigation Options.
36. Integrated Soils Modelling for the National Carbon Accounting System.
37. Paired Site Sampling for Soil Carbon Estimation - Queensland.
38. Paired Site Sampling for Soil Carbon Estimation - Western Australia.



The National Carbon Accounting System provides a complete accounting and forecasting capability for human-induced sources and sinks of greenhouse gas emissions from Australian land based systems. It will provide a basis for assessing Australia's progress towards meeting its international emissions commitments.



http://www.greenhouse.gov.au