SIMTA Intermodal Terminal Facility- Stage 1

Aboriginal Heritage Impact Assessment [DRAFT]

SIMTA

SYDNEY INTERMODAL TERMINAL ALLIANCE

Part 4, Division 4.1, State Significant Development

May 2015

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PROJECT NAME	SIMTA Intermodal Terminal, Moorebank, NSW – Stage 1 - Aboriginal Heritage Impact Assessment
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DATE	18 May 2015

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GLOSSARY

Aboriginal Cultural Heritage Assessment (ACHA)	A document developed to assess the archaeological and cultural values of an area, generally required as part of an Environmental Assessment (EA).
Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010	Guidelines developed by OEH to guide formal Aboriginal community consultation undertaken as part of an Aboriginal Cultural Heritage Assessment (ACHA).
Aboriginal Heritage Impact Assessment	Similar in scope and content to an ACHA, but developed to comply with OEH (then DEC) guidelines for projects assessed under Part 3A, 4.1 and 5.1 of the *Environmental Planning and Assessment Act 1979*.
Aboriginal Heritage Impact Permit (AHIP)	The statutory instrument that the Director General of the Office of Environment and Heritage (OEH) issues under Section 90 of the National Parks and Wildlife Act 1974 to allow the investigation (when not in accordance with certain guidelines), impact and/or destruction of Aboriginal objects. AHIPs are not required for a project seeking approval under Part 3A of the Environmental Planning and Assessment Act 1979.
Aboriginal object	A statutory term defined under the National Parks and Wildlife Act 1974 as, 'any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains'.
Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales	Guidelines developed by OEH to inform the structure, practice and content of any archaeological investigations undertaken as part of an Aboriginal Cultural Heritage Assessment (ACHA).
Department of Environment, Climate Change and Water (DECCW)	Now known as the Office of Environment and Heritage (OEH), Department of Premier and Cabinet.
Department of Planning and Infrastructure (DPE)	The Consent Authority for development applications made in accordance with Part 3A, 4.1 and 5.1 of the *Environmental Planning and Assessment Act 1979*.
Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales	Guidelines developed by OEH, outlining the first stage of a two stage process in determining whether Aboriginal objects and/or areas of archaeological interest are present within a study area. The findings of a due diligence assessment may lead to the development of an Aboriginal Cultural Heritage Assessment.
Environmental Assessment (EA)	A document summarising the assessment of environmental impacts of a development which supports an application for approval under Part 3A of the *Environmental Planning and Assessment Act 1979*.
Environmental Planning and Assessment Act 1979	Statutory instrument that provides planning controls and requirements for environmental assessment in the development approval process. The Act is administered by the DPI.

Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW	Guidelines developed by OEH to inform the structure and content of an Aboriginal Cultural Heritage Assessment (ACHA).
Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation	Guidelines developed by OEH (then DEC) to assess Aboriginal heritage for projects being considered under Part 3A of the *Environmental Planning and Assessment Act 1979.* These guidelines have since been adopted for projects under Part 4.1 and 5.1 of the same Act, since Part 3A has been repealed.
Isolated Find	An isolated find is usually considered a single artefact or stone tool, but can relate to any product of prehistoric Aboriginal societies. The term "object" is used in the ACHA, to reflect the definitions of Aboriginal stone tools or other products in the National Parks and Wildlife Act 1974.
National Parks and Wildlife Act 1974	The primary piece of legislation for the protection of Aboriginal cultural heritage in NSW. Part 6 of this Act outlines the protection afforded to and offences relating to disturbance of Aboriginal objects. The Act is administered by OEH.
Office of Environment and Heritage (OEH)	The OEH is responsible for managing the Aboriginal Heritage (and other) provisions of the National Parks and Wildlife Act 1974.
Potential Archaeological Deposit (PAD)	An area assessed as having the potential to contain Aboriginal objects. PADs are commonly identified on the basis of landform types, surface expressions of Aboriginal objects, surrounding archaeological material, disturbance, and a range of other factors. While not defined in the National Parks and Wildlife Act 1974, PADs are generally considered to retain Aboriginal objects and are therefore protected and managed in accordance with that Act.
Proponent	A corporate entity, Government agency or an individual in the private sector which proposes to undertake a development project.

ABBREVIATIONS

ACHA	Aboriginal Cultural Heritage Assessment
AHIMS	Aboriginal Heritage Information Management System
AHIA	Aboriginal Heritage Impact Assessment
AHIP	Aboriginal Heritage Impact Permit
AHMS	Archaeological and Heritage Management Solutions
BP	Before present (AD 1950)
CHL	Commonwealth Heritage List
DCP	Development Control Plan
DECCW	Department of Environment, Climate Change and Water (now OEH)
DP	Deposited Plan
EP&A Act	Environmental Planning and Assessment Act 1979
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
ERS	Eastern Regional Sequence
ka	Abbreviation for thousands of years ago (e.g. 1 ka equals 1,000 years ago)
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan
LGA	Local Government Area
LTO	Land Titles Office
NHL	National Heritage List
NPW Act	National Parks and Wildlife Act 1974
OEH	Office of Environment and Heritage (formerly DECCW)
OSL	Optically Stimulated Luminescence
PAD	Potential Archaeological Deposit
RAP	Registered Aboriginal Party
REP	Regional Environmental Plan
SIMTA	Sydney Intermodal Terminal Alliance
SEARS	Secretary's Environmental Assessment Requirements

EXECUTIVE SUMMARY

The SIMTA Project involves the development of an intermodal facility, including warehouse and distribution facilities, freight village (ancillary site and operational services), stormwater mitigation works, landscaping, servicing and associated works on the eastern side of Moorebank Avenue, Moorebank. The SIMTA Project also includes a Rail link, within an identified rail corridor, which connects from the southern part of the SIMTA site to the Southern Sydney Freight Line.

AHMS undertook an Aboriginal Heritage Impact Assessment as part of the Concept Approval for the SIMTA Project (AHMS 2012a). While this report was thorough, and sufficient for the approval, it made a number of recommendations for future stages of the project. These recommendations primarily related to the need for further characterisation of a series of potential archaeological deposits (PAD) associated with the banks of Anzac Creek and Georges River. Time, cost and access issues restricted the test excavations of these areas of archaeological interest during the investigations undertaken for the Concept Approval.

As part of the Stage 1 Proposal, the Secretary's Environmental Assessment Requirements (SEARs) identified the need to further characterise the potential impacts of the development to Aboriginal heritage (**Section 1.2.1**). This resulted in the implementation of the AHMS (2012a) recommendations, specifically for sub-surface investigations to be implemented along the Stage 1 rail corridor in the vicinity of previously identified PADs. This report presents the tasks, methods, and findings of these works. In addition, due to the 18 month time-gap between the original assessment, and the proposed Stage 1 development, the report also updates key components of the AHMS (2012a) assessment, most notably consultation with the Aboriginal community.

Aboriginal consultation was undertaken in accordance with *the Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (April 2010). The Registered Aboriginal Parties for the project were: Cubbitch Barta Native Title Claimants, Tharawal Local Aboriginal Land Council, Darug Custodian Aboriginal Corporation, Darug Tribal Aboriginal Corporation, Darug Aboriginal Cultural Heritage Assessments, Darug Aboriginal Landcare Inc., Darug Land Observations, and Tocomwall.

A review of previous studies, most notably AHMS (2012a) and a more recent study of the Moorebank Intermodal Terminal (Navin Officer Heritage Consultants Pty Ltd, 2014) identified a number of existing Aboriginal objects/sites within, or in close proximity to the Stage 1 Proposal. Specifically, AHMS (2012a) identified two Potential Archaeological Deposits (PADs) #2 and #3 within the rail corridor, and an area of cultural value encompassing the western bank of Georges River. Navin Officer Heritage Consultants (2014) assessment extended the identification of the area of cultural value to the west, and which now encompasses ~1.5km of the Georges River riparian corridor.

As part of the current project AHMS carried out a series of test excavations along the Stage 1 rail corridor, focussing on the banks of Georges River and either side of Anzac Creek (PADs 2 and 3). Overall, 13 test pits (1m^2) were excavated at 20m spacing across these areas. The excavations revealed a deep (50-90cm) coarse silt soil unit over-lying coffee rock of clay subsoils, and frequently impacted by introduced fill on the surface. The soil was characteristic of deposition by flooding of Georges River in the past. 28 Aboriginal objects were recovered from the test pits associated with Georges River, and suggested a low-level of past activity on the maximal upper slope and ridge in this area. Importantly, the assemblage was considered to reflect two different periods of activity in the past. The upper assemblage was characteristic of occupation in the last few thousand years, and this was corroborated by an OSL age of 3.4ka. The lower assemblage was found in association with an age of 18ka, and represents some of the earliest evidence of activity on the Georges River. The sand sheet itself began forming at ~60ka.

The works above identified that PAD 3 contained no cultural materials and could be de-listed. PAD 2 was also re-considered and limited to an area encompassing the elevated areas immediately above Georges River. This area was re-labelled as MA14 to reflect its new identification as an artefact scatter and deposits (and to ensure compatibility with other sites labelled similarly nearby).

MA14 was considered to have high research potential, and was assessed as being of local significance. Given the age of this assemblage (18ka or older), this is likely to be upgraded to State significance if future works reveal denser evidence of occupation.

It was determined that ~20% of MA14 would be directly impacted by the Stage 1 Rail link, and given the site's significance, an archaeological salvage program has been outlined in **Section 9.6** to allow ex-situ conservation of a portion of the site prior to development. There are no other direct impacts to other identified Aboriginal objects/sites. However, several sites are in close proximity to the Stage 1 Proposal and recommendations have been made to avoid inadvertent or accidental impacts.

Recommendations

Please note that the recommendations below may be modified following review by the Registered Aboriginal Parties.

The recommendations below are made to ensure that the proposed development mitigates impacts on significant Aboriginal cultural heritage and complies with all state legislative requirements. We highlight that the preferred heritage outcome is, as always, to redesign the project to avoid impacts on Aboriginal cultural heritage altogether wherever possible and where this is not possible to minimise impacts.

- Consultation should be maintained with the Aboriginal stakeholders during the finalisation of the Stage 1 Proposal. This should focus on the long term curation and management of the Aboriginal objects recovered through the archaeological program, and any mitigation measures implemented prior to, and during, the works.
- Following finalisation, a copy of the report should be lodged with the Office of Environment and Heritage (OEH) Aboriginal Heritage Information Management System (AHIMS), and each of the Aboriginal stakeholders.
- If re-location of any element of the Stage 1 Proposal outside the area assessed in this study is proposed, further assessment of the additional area(s) should be undertaken to identify and appropriately manage Aboriginal objects/sites/places that may be in this additional area(s).
- Management of Aboriginal heritage should be included in the Stage 1 Proposal's Construction Environmental Management Plan or equivalent document. Information should include the findings, mitigation measures and recommendations of this report, along with guidance on unexpected archaeological and cultural finds (including human remains).
- SIMTA should advise all relevant personnel and contractors involved in the design, construction and operation of the Stage 1 Proposal of the relevant heritage considerations, legislative requirements and recommendations identified in this report.
- The Stage 1 Proposal is likely to impact one Aboriginal site, MA14 (artefact scatter and deposit) on the eastern bank of Georges River. Due to the significance of this site, additional mitigation measures prior to development is recommended and outlined in

Section 9.6 of this report. These include open area salvage excavation of up to 100m^2 in the vicinity of test pit #3.

- The Stage 1 Proposal is in close proximity (but does not directly impact) a number of Aboriginal sites encompassing the western riparian corridor of Georges River. To avoid inadvertent impact, appropriate temporary fencing should be installed along the Proposal's boundary in this location. Should activities be proposed to extend beyond this boundary, appropriate heritage investigations must first be undertaken.
- An Aboriginal Heritage Site Recording Form for MA14 (included in **Appendix 10**) should be submitted to the Office of Environment & Heritage AHIMS database following finalisation of this report.
- The draft report should be submitted to the Registered Aboriginal Parties for their review and comment prior to finalisation.

1 INTRODUCTION

1.1 Background

The SIMTA Project involves the development of an intermodal facility, including warehouse and distribution facilities, freight village (ancillary site and operational services), stormwater, landscaping, servicing and associated works on the eastern side of Moorebank Avenue, Moorebank (the SIMTA site). The SIMTA Project also includes a Rail link, within an identified rail corridor (the Rail Corridor), which connects from the southern part of the SIMTA site to the Southern Sydney Freight Line (SSFL) (the entire area, SIMTA site and Rail Corridor referred to as the Project site). The SIMTA Project is to be developed in three key stages:

- Stage 1- Construction of the Intermodal Terminal Facility and Rail link
- Stage 2- Construction of warehouse and Distribution Facilities
- Stage 3- Extension of the Intermodal Terminal Facility and completion of Warehouse and Distribution Facilities.

A summary of the approvals undertaken to date for the SIMTA site, relating to the SIMTA Project, include:

- EPBC Approval (No. 2011/6229) granted in March 2014 for the impact of the SIMTA Project on listed threatened species and communities (sections 18 and 18A of the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)) and Commonwealth land (sections 26 and 27A of the EPBC Act).
- Concept Approval (No. 10_0193) granted by the Planning Assessment Commission (PAC) on the 29 September 2014 for the 'Concept Approval' of the SIMTA Project under Part 3A of the EP&A Act.

Both of these approvals involved the preparation of design and environmental assessment documentation.

1.2 Report Purpose

1.2.1 SEARs

This report has been prepared for approval of the initial stage of the SIMTA Project, known as the Stage 1 Proposal. A summary of the works included in the Stage 1 Proposal is provided below. This report has been prepared to support a State Significant Development (SSD) Application for which approval is sought under Part 4, Division 4.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

This report has been prepared in accordance with the Secretary's Environmental Assessment Requirements (SEARs) (ref: SSD 14-6766 and dated December 2014). **Table 1** provides a summary of the SEARs and the section where they have been addressed in this report.

Table 1. SEARs (SSD 14-6766) compliance table

Section/number	SEARs	Where addressed
10	Heritage including but not limited to: An assessment of the heritage impacts of the proposal. The assessment shall: a) consider impacts to Aboriginal heritage (including cultural and archaeological significance), in particular impacts to Aboriginal heritage sites identified within or near the project should be assessed. Where impacts are identified, the assessment shall demonstrate effective consultation with Aboriginal communities in determining and assessing impacts and developing and selecting options and mitigation measures (including the final proposed measures)	Section 4 - Aboriginal Consultation Sections 4 and 5 - Information on Aboriginal Heritage within the Stage 1 study area. Section 6 - Significance of Aboriginal object/sites within the Stage 1 study area. Section 7 - Potential Impacts to Aboriginal objects/sites within the Stage 1 study area. Section 8 - Options and mitigation measures.

1.2.2 Heritage Compliance

AHMS undertook an Aboriginal Heritage Impact Assessment as part of the Concept Approval for the SIMTA Project (AHMS 2012a). While this report was comprehensive, and sufficient for the approval, it made a number of recommendations for future stages of the project. These recommendations primarily related to the need for further characterisation of a series of potential archaeological deposits (PAD) associated with the banks of Anzac Creek and Georges River.

As part of the proposed Stage 1 assessment, the SEARs identified the need to further characterise the potential impacts of the Proposal on Aboriginal heritage (**Section 1.2.1**). This resulted in the implementation of the AHMS (2012a) recommendations, specifically for sub-surface investigations to be implemented along the rail corridor in the vicinity of previously identified PADs. This report presents the tasks, methods, and findings of these works.

In addition, due to the 18 month time-gap between the original assessment, and the Stage 1 Proposal, the report also updates key components of the AHMS (2012a) assessment, most notably consultation with the Aboriginal community.

In summary, the report aims are to:

- Provide additional information and update AHMS' (2012a) previous assessment of the SIMTA Project.
- Undertake Aboriginal community consultation in accordance with the applicable Guidelines and SEARs.
- Present the location, methods and results of the test excavation program.
- Assess the archaeological (scientific), public and Aboriginal (social) significance of any Aboriginal sites or objects that may be impacted by the SIMTA Project.
- Identify any possible Aboriginal cultural heritage constraints for the SIMTA Project.

- Assess the potential for direct and indirect impact to Aboriginal cultural heritage.
- Identify and recommend measures to mitigate any potential adverse impacts to Aboriginal cultural heritage.

1.3 Key Terms

Table 2 provides a summary of the key terms which are included within this report. **Figure 1** also provides an indication of the site areas discussed in this table.

Table 2. Key terms

Term	Description
Concept Plan Approval	Concept Plan Approval (MP 10_0193) granted on 29 September 2014 for the development of the SIMTA Moorebank Intermodal Terminal Facility at Moorebank. This reference includes the associated Conditions of Approval (CoA) and Statement of Commitments (SoC) which form the approval documentation for the Concept Plan Approval.
EPBC Approval	Approval (No. 2011/6229) granted under the EPBC Act on March 2014 by the Commonwealth Department of Environment for the development of the SIMTA Moorebank Intermodal Terminal Facility at Moorebank.
SIMTA Project	The SIMTA Moorebank Intermodal Terminal Facility at Moorebank as approved by the Concept Plan (MP_10_0913).
SIMTA site	Includes the former Defence National Storage and Distribution Centre (DNSDC) site, the land owned by SIMTA which is subject to the Concept Plan Approval (refer to **Figure 1**).
Rail Corridor	Area defined as the 'Rail Corridor' within the Concept Plan Approval. The Rail link is also included within this area (refer to **Figure 1**).
Project site	Includes the SIMTA site and the Rail Corridor, i.e. the entire site area which was approved under the Concept Plan Approval (refer to **Figure 1**).
Stage 1 site	The subject of this EIS, the western part of the SIMTA site which includes all areas to be disturbed by the Stage 1 Proposal (including the Operational area and Indicative Construction area) (refer to **Figure 1**). This area does not include the Rail Corridor.
Construction area	Extent of construction works, namely areas to be disturbed during construction of the Stage 1 Proposal (refer to **Figure 1**).
Operational area	Extent of operational activities for the operation of the Proposal (refer to **Figure 1**).
Proposal site	Includes the Stage 1 site and the Rail Corridor, i.e. the area for which approval (construction and operation) is sought within this EIS.
Rail link	The Rail link including the area on either side to be impacted by the construction works included in the Stage 1 Proposal.
The Proposal	Stage 1 of the SIMTA Moorebank Intermodal Terminal Facility including construction and operation of the intermodal terminal facility and Rail link, i.e. all works and built form for which approval is sought in this EIS/Technical Report.
MIC Proposal	The development of an intermodal facility, associated commercial infrastructure (warehousing) and a Rail link (3 options have been provided) to be located on the MIC site, for which an approval, under Part 4, Division 4.1 of the *Environmental Planning and Assessment Act 1979*. This proposal is currently under assessment by the Department of Planning and Environment.
MIC site	The former School of Military Engineering site to the immediate west of the SIMTA site, across Moorebank Avenue.

1.4 Proposal Overview

The Proposal involves the construction and operation of the necessary infrastructure to support a container freight road volume of 250,000 TEU (twenty-foot equivalent units). Specifically, Stage 1 includes the following key components, which together comprise the intermodal terminal facility (IMT):

- Truck processing, holding and loading areas- entrance and exit from Moorebank Avenue.
- Rail loading and container storage areas – installation of four rail sidings with adjacent container storage area serviced by manual handling equipment initially and overhead gantry cranes progressively. .
- Administration facility and associated car parking- light vehicle access from Moorebank Avenue.
- The Rail link – located within the Rail Corridor, including a connection to the intermodal terminal facility, traversing of Moorebank Avenue, Anzac Creek and Georges River and connection to the SSFL.
- Ancillary works- vegetation clearing, remediation, earth works, utilities installation/connection, signage and landscaping.

1.5 Study Area

The SIMTA site, including the Stage 1 site, is located approximately 27 kilometres south-west of the Sydney Central Business District (CBD) and approximately 26 kilometres west of Port Botany. The SIMTA site is situated within the Liverpool Local Government Area (LGA), in Sydney's South West Sub-Region, approximately 2.5 kilometres from the Liverpool City Centre (**Figure 1**).

The SIMTA site is located approximately 800 metres south of the intersection of Moorebank Avenue and the M5 Motorway. The M5 Motorway provides the main road link between the SIMTA site and the key employment and industrial areas within the West and South Western Sydney Sub-Regions. The M5 Motorway connects with the M7 Motorway to the west, providing access to the Greater Sydney Metropolitan Region and NSW road network. Similarly the M5 Motorway is the principal connection to Sydney's north and north-east via the Hume Highway.

The Southern Sydney Freight Line (SSFL) is located one kilometre to the west of the proposed SIMTA site. The SSFL is a 36 kilometre dedicated freight line between Macarthur and Chullora.

The SIMTA site was recently operating as the Defence National Storage and Distribution Centre (DNSDC) however Defence has recently relocated this operation and vacated the SIMTA site. The majority of land immediately surrounding the SIMTA site is owned and operated by the Commonwealth and comprises:

- School of Military Engineering (SME), on the western side of Moorebank Avenue directly adjacent to the SIMTA site.
- Holsworthy Military Reserve, to the south of the site on the southern side of the East Hills Passenger Railway Line.

- Commonwealth Residual Land, to the east between the SIMTA site and the Wattle Grove residential area.

The site to immediate west of the SIMTA site which currently includes the SME is the subject of a Development Application (DA) (SSD-5066), under Part 4, Division 4.1 of the EP&A Act, for the development of an intermodal facility known as the Moorebank Intermodal Terminal Project (MIC Proposal). The EIS for the MIC Proposal has recently been prepared a Preferred Project Report (PPR) to respond to submissions received during public exhibition. The MIC Proposal has yet to be determined by the Department of Planning and Environment (DP&E).

The 'study area' referred to in this report specifically relating to the archaeological testing program includes two locations along the proposed Rail Corridor. An area located east of Georges River encompassing ~250m of the terrace and a portion of the RAE Golf Course (MIC site); the second area encompassing ~120m stretch of land portion situated on both the north and south sides of Anzac Creek (**Figure 1**).

1.6 Authors and Acknowledgments

This report was written by Alan Williams, B.Sc., M.Sc., MAACAI (Senior Archaeologist) and Alistair Hobbs, B.A Hons (Archaeologist). Michelle Lau undertook the lithic analysis and reporting. Ashley O'Sullivan digitised the section drawings. Susan McIntyre-Tamwoy (Assoc. Director) reviewed and edited a final draft of the report.

The test excavation was directed by Alan Williams and Alistair Hobbs. The archaeological team consisted of Alan Williams, Alistair Hobbs, Ashley O'Sullivan, Jack O'Connor-Veth and Ben Christenson. Registered Aboriginal Party representatives from Cubbitch Barta Native Title Claimants Aboriginal Corporation, Darug Aboriginal Cultural Heritage Assessments, Darug Custodian Aboriginal Corporation, Tharawal LALC, Tocomwall and Darug Land Observations also participated in the excavation.

AHMS would like to thank Westley Owers and Jane Rodd (Hyder Consulting), Steve Ryan (Tactical Group), Paul Wheeler (Milsearch) and James Dudley (Golder Associates) for their support and assistance throughout the project.

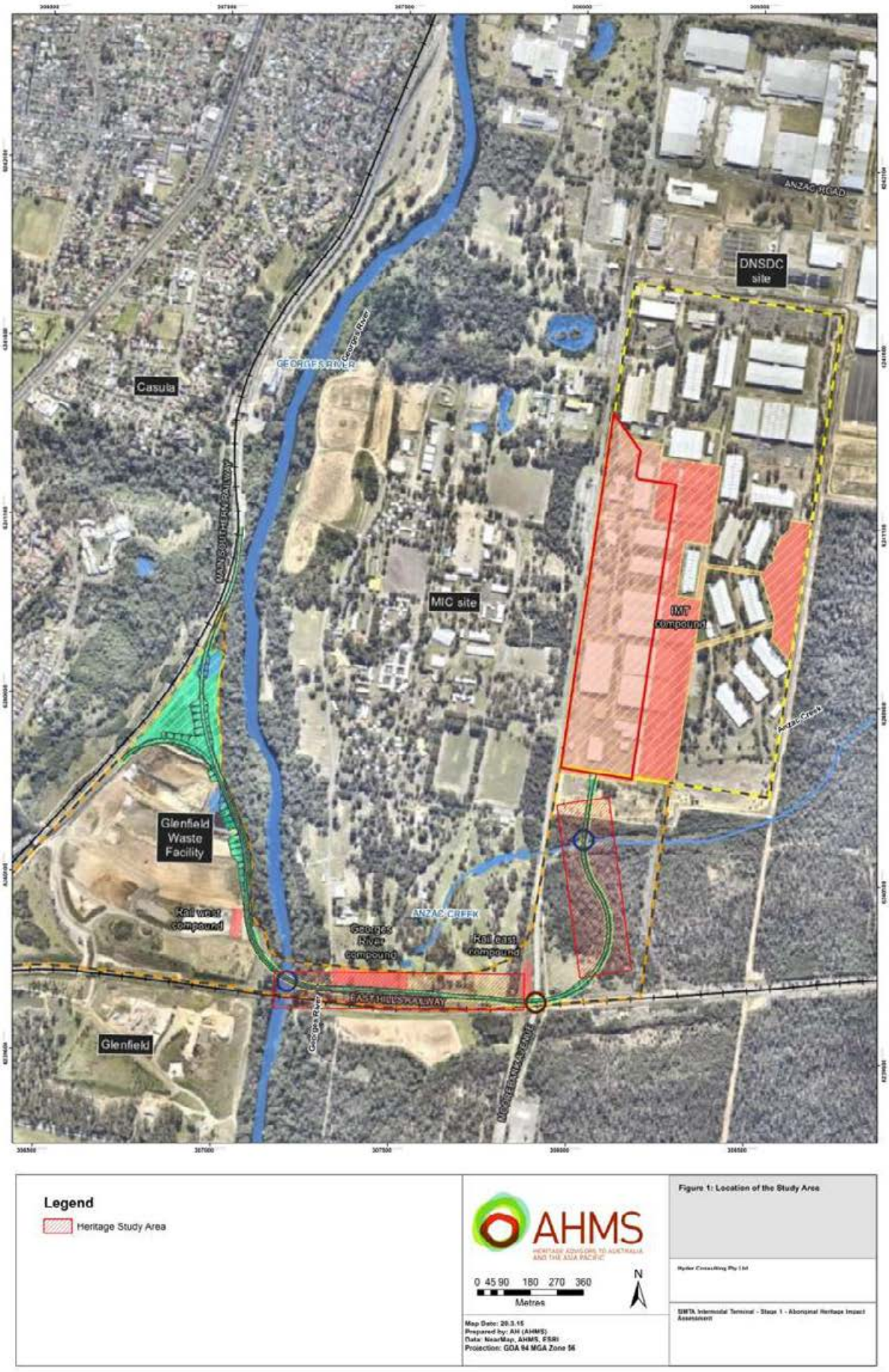

Figure 1. The Project Site and the location of heritage areas that formed the focus of this study .

2 STATUTORY CONTEXT

2.1 Commonwealth Legislation

2.1.1 Aboriginal and Torres Strait Islander Heritage Protection Act 1984

The *Aboriginal and Torres Strait Islander Heritage Protection Act, 1984* was enacted at a Federal level to preserve and protect areas (particularly sacred sites) and objects of particular significance to Aboriginal Australians from damage or desecration. Steps necessary for the protection of a threatened place are outlined in a gazetted Ministerial Declaration (Sections 9 and 10).

As well as providing protection to areas, it can also protect objects by Declaration, in particular Aboriginal skeletal remains (Section 12). Although this is a Federal Act, it can be invoked on a State level if the State is unwilling or unable to provide protection for such sites or objects.

No Aboriginal sites or places within the study area (as defined in **Section 1.5**) are currently subject to a Declaration.

2.1.2 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection & Biodiversity Conservation Act, 1999* provides for the protection of natural and cultural heritage places. The Act establishes (amongst other things) a National Heritage List (NHL) and a Commonwealth Heritage List (CHL). Places on the NHL are of natural or cultural significance at a national level and can be in public or private ownership. The CHL is limited to places owned or occupied by the Commonwealth which are of heritage significance for certain specified reasons.

Places listed on the NHL are considered to be of State and local heritage value, even if State or local heritage lists do not specifically include them.

The heritage values of places on the NHL or the CHL are protected under the terms of the EPBC Act. The Act requires that the Minister administering the EPBC Act assess any action which has, will have, or is likely to have, a significant impact on the heritage values of a listed place. The approval (or rejection) follows the referral of the matter by the relevant agency's Minister.

The SIMTA site includes the Defence National Storage Distribution Centre (DNSDC), Moorebank Avenue, Moorebank, NSW. The DNSDC is included in the CHL primarily for its ongoing Defence use and built heritage values. The DNSDC CHL citation does not include or refer to the site embodying or containing Aboriginal cultural values. An EPBC Approval (#2011/6229) for the proposed re-development of the SIMTA site was granted on 6 March 2014. The Approval identified no specific requirements for Aboriginal heritage.

2.1.3 Native Title Act 1993

The *Native Title Act 1993* provides recognition and protection for native title. The Act established the National Native Title Tribunal to administer native title claims to rights and interests over lands and waters by Aboriginal people. The Tribunal also administers the future act processes that attract the right to negotiate under the *Native Title Act 1993*.

The Act also provides for Indigenous Land Use Agreements (ILUA). An ILUA is an agreement between a native title group and others about the use and management of land and waters. ILUAs

were introduced as a result of amendments to the Native Title Act in 1998. They allow people to negotiate flexible, pragmatic agreements to suit their particular circumstances.

An ILUA can be negotiated over areas where native title has, or has not yet, been determined. They can be part of a native title determination, or settled separately from a native title claim. An ILUA can be negotiated and registered whether there is a native title claim over the area or not.

A search of the National Native Title Tribunal Registers was undertaken 31 January 2011, during the initial stages of the Aboriginal community consultation process (**Section 3**). The search results returned the following:

Register Type	NNTT Reference Numbers
National Native Title Register	Nil
Register of Native Title Claims	Nil
Unregistered Claimant Applications	Nil
Register of Indigenous Land Use Agreements	Nil

A further search of the Native Title Applications, Registration Decisions and Determinations was undertaken on 19 March 2015 to verify the results. No additional Native Title Claimants or ILUAs have been registered within this period.

2.2 NSW State Legislation

2.2.1 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) requires that environmental and heritage impacts are considered by consent authorities prior to granting development approvals. The relevant sections of the EP&A Act are:

> Transitional Part 3A: A now repealed assessment and approval pathway for major development and infrastructure projects.
> Part 4 (Division 4.1): An approval pathway for State Significant Development (SSD) projects.
> Part 4: Development that requires consent under consideration of environmental planning instruments.
> Part 5: An assessment process for activities undertaken by or on behalf of Public Authorities and for developments that do not require development consent.

Where approval is to be determined under Part 4 (Division 4.1) of the Act, as is the case for the Stage 1 Proposal, further approvals under the *National Parks & Wildlife Act, 1974* which protects Aboriginal cultural heritage in NSW are not required. In those instances, management of Aboriginal heritage follows the applicable Aboriginal assessment guidelines (the Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation, July 2005) and any relevant compilation of mitigation measures included in the Development Approval.

2.2.2 National Parks and Wildlife Act 1974

In NSW, Aboriginal objects, whether recorded or as yet undiscovered, are afforded statutory protection under the *National Parks and Wildlife Act 1974*. Under Section 86 of the Act it is an offence to disturb, destroy or deface Aboriginal objects without the approval of the Director General of the Office of Environment & Heritage (OEH). A breach of Section 86 of *the National Parks and Wildlife Act 1974* could result in prosecution and fines in excess of $1 million.

Under Section 90 of the Act, an Aboriginal Heritage Impact Permit (AHIP) is required to harm or desecrate Aboriginal objects or places. AHIP applications and approvals are managed by the Office of Environment & Heritage. AHIP applications must be lodged with an Aboriginal Cultural Heritage

Assessment and Archaeological Report. However the provisions of the NPW Act that require various approvals or permits to disturb or discover Aboriginal deposits, objects and places are not applicable to Part 4 (Division 4.1) projects, which include the Stage 1 project.

The OEH provides a series of guidelines as a framework for identifying and managing Aboriginal heritage and the cultural heritage interests of Aboriginal parties within development planning contexts.

An Aboriginal place is any place declared to be an Aboriginal place by the Minister for Environment & Heritage, under Section 84 of the NPW Act. One declared Aboriginal Place is located near the study area. Collingwood Precinct is located approximately 1.5 kilometres to the north-west of the study area, and is very unlikely to be impacted by the SIMTA Project.

2.2.3 Aboriginal Land Rights Act, 1983

The *Aboriginal Land Rights Act, 1983* allows for the transfer of ownership to an Aboriginal Land Council of vacant Crown land not required for an essential purpose or for residential land. These lands are then managed and maintained by the local Aboriginal Land Council.

A search was requested by AHMS (14.11.2014) for the study area and immediate surrounds using the following Lot and DP numbers:

Lot 1 DP 1048263, Lot 1 DP 825352, Lot 3001 DP 1125930, Lot 91 DP 1155962, Lot 5 DP 833516, Lot DP 515696, Lot 52 DP 517310, lot 103 & 104 DP 1143827, Lot 4 DP 1130937.

None of the Lots listed above are currently subject to Aboriginal Land Claims.

2.2.4 Liverpool Local Environmental Plan 2008 (LEP 2008)

The study area is not included on Schedule 5 – Environmental Heritage – of the Liverpool Local Environmental Plan (LEP) 2008. The Liverpool City 2008 Development Control Plan (DCP) for the DNSDC site does not include provisions or requirements regarding the Aboriginal or non-Aboriginal heritage values of the site. The entirety of the Stage 1 area is included in the 2008 DCP but the rail corridor is not encompassed.

3 ABORIGINAL COMMUNITY CONSULTATION

3.1 General

Consultation with the Aboriginal communities within the region has been undertaken in accordance with procedures set out in the Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (the Guidelines), developed by OEH. A complete log of actions and correspondence regarding Aboriginal community consultation is included in the Aboriginal Cultural Heritage Assessment.

The consultation process for the SIMTA Project and the Stage 1 Proposal has two aims. Firstly, it is designed to comply with the OEH consultation procedures to obtain input on our proposed assessment methodology and comment on our assessment report and management recommendations. Secondly, to identify cultural places and values that may be affected by the proposed future development of the study area through consultation with knowledge holders.

3.2 Previous Assessment

Aboriginal community consultation was undertaken as part of the Concept Approval in 2011-2012 (see AHMS 2012a). Consultation was undertaken in accordance with OEH guidelines, and included liaison with six Aboriginal organisations:

- Tharawal Local Aboriginal Land Council (LALC).
- Darug Aboriginal Cultural Heritage Assessments.
- Darug Tribal Aboriginal Corporation.
- Cubbitch Barta Native Title Claimants.
- Darug Land Observations.
- Tocomwall (then Yarrawalk).

Consultation with these organisations included notification of the SIMTA Project, participation in on-site investigations, and discussions and input into the final report.

3.3 This Assessment

Due to length of time between the Concept Approval and Stage 1 (~2 years), it was decided that Aboriginal consultation should be re-started. Consultation was subsequently renewed in accordance with OEH's guidelines in November 2014.

A consultation log of all actions outlined below is presented in **Appendix 1**.

3.3.1 Pre-Notification Stage

The initial stage of the consultation process consisted of the identification of Aboriginal people who may hold cultural knowledge relevant to determining the significance of Aboriginal objects and places. On 14 November 2014, the following organisations were contacted with a request for information:

- Greater Sydney Local Land Services.
- Liverpool City Council.
- NTSCorp.
- Office of Environment and Heritage.
- Tharawal Local Aboriginal Land Council.
- National Native Title Tribunal.
- Office of the Registrar, Aboriginal Land Rights Act 1983.

The responses received identified the following Aboriginal organisations as relevant to the study area:

- Darug Aboriginal Cultural Heritage Assessments (DACHA).
- Cubbitch Barta Native Title Claimants Aboriginal Corporation (CBNTCAC).
- Tharawal LALC.
- Gandangara LALC.
- Tocomwall.
- Darug Custodian Aboriginal Corporation (DCAC).
- Darug Tribal Aboriginal Corporation (DTAC).
- Darug Aboriginal Landcare Inc (DALI).
- Darug Land Observations (DLO).
- Wurrumay Consultancy.
- Warragil Cultural Services.
- Liverpool City Council Aboriginal Consultative Committee.

3.3.2 Notification and Registration of Interest

On 3 December 2014, notification of the Proposal, an invitation to register an interest and the methodology was sent to Aboriginal parties identified in **Section 3.3.1**. The letter requested registration of interest in mid-December, with comments on the methodology by mid-January 2015 (**Appendix 2**). A newspaper advert was also published in the *Liverpool Champion* on the 26 November 2014 seeking any Aboriginal stakeholders not captured through the process outlined in **Section 3.3.1**.

Registrations of interest were received from DACHA, CBNTCAC, Tharawal LALC, Gandangara LALC, Tocomwall, DCAC, DTAC, DLO, and DALI.

As with other stages of the project, it was determined that the study area was outside of Gandangara LALC's boundaries, and only the Tharawal LALC was involved in subsequent stages of the Proposal.

3.3.3 Presentation of Information/Methodology

As discussed in **Section 3.3.2**, to minimise unnecessary time-delays, the methodology was sent out with the notification letters on 3 December 2014. The letter detailed background on the Proposal, and a proposed assessment methodology, which focussed on the test excavations (**Appendix 2**).

In addition, the letter requested information from the RAPs about how they wished to be consulted, how they wished cultural information to be managed, and other relevant matters. No meetings were undertaken during this process, although all RAPs were advised that meetings could be arranged if required. A period of 28 days was provided for comments. When taking into account the December shutdown by most organisations, this resulted in a comment period that expired in mid-January 2015. All responses received have been included in **Appendix 3**. Generally, responses involved endorsement of the methodology or identified minor points of concern that were integrated into the field investigation where possible.

One response from CBNTC questioned the rationale for excavating near Georges River, since an investigation as part of the intermodal terminal in this area had previously been undertaken (see **Section 4**). However, it was determined that these previous excavations were generally north of the proposed Rail link, and failed to investigate the banks of Georges River. The methodology therefore continued to focus on the Georges River terraces, and this information was relayed to CBTNC during the field program.

3.3.4 Test Excavation

Field investigation was undertaken by AHMS in conjunction with RAP representatives between the 19 -23 January 2015. All RAPs were invited to participate, with the following participating:

- CBNTC: Glenda Chalker and Jaydon Chalker.
- DACHA: Tim Wells and Gordon Morton.
- DCAC: Libby Coplin, Tylah Blunden and Lana Wedgewood.
- DLO: Jamie Eastwood and Mark Newham
- Tharawal LALC: Abbi Willock and Donna Willock.
- Tocomwall: Jenn Norfolk and Michael Lester.

3.3.5 Report Review

The report was provided to each RAP for a period of 28 days between 17 April and 14 May 2015.

Four sets of comments were received from CBNTAC, DCAC, DLO and Tocomwall. They were all very positive of the findings of the study, and the proposed recommendations for future management of the site. CBNTAC sought minor modifications to the mitigation methodology, and was generally disappointed that greater conservation outcomes could not be achieved. These comments are included in **Appendix 4**.

4 EXISTING ENVIRONMENT

4.1 General

This section provides a summary of the archaeological characteristics of the SIMTA site. This information was developed as part of the Concept Approval for the overall SIMTA Project, and presented in full in AHMS (2012a). This section focusses on AHMS (2012a) and a further study associated with the MIC Proposal located within the SME site (MIC Site). Specifically, relevant studies include:

- AHMS (2012a) Aboriginal Cultural Heritage Assessment: SIMTA Moorebank Intermodal Terminal Facility. Unpublished Report for Hyder Consulting Pty Ltd.
- AHMS (2012b) Indigenous Biodiversity Values Assessment: Sydney Intermodal Terminal, Moorebank, NSW. Unpublished Report for Hyder Consulting Pty Ltd.
- Navin Officer Heritage Consultants (2014) Moorebank Intermodal Terminal, Aboriginal Cultural Heritage Assessment. Unpublished Report for Parsons Brinckerhoff.

4.2 AHMS (2012a)

In late 2010 AHMS was commissioned by Hyder Consulting Pty Ltd for SIMTA to undertake an Aboriginal Heritage Impact Assessment of the SIMTA site for a Concept Approval under Transitional Part 3A of the Environmental Planning and Assessment Act 1979. The project included consultation with six Aboriginal stakeholders (see Section 3.2).

The assessment included an archaeological predictive model which was informed by a detailed background analysis of previous archaeological investigations in the region and information from the AHIMS database. A site survey was also undertaken in conjunction with the Aboriginal communities.

The assessment identified that most of the SIMTA site and parts of the proposed rail corridor were heavily disturbed and/or previously developed areas, and the potential for preservation of archaeological materials was low. Ultimately, seven isolated Aboriginal objects and three areas of potential archaeological deposit (PAD) were identified. These areas included: a river terrace on the east side of the Georges River (PAD 1); the golf course south of Anzac Creek (PAD 2); and the southern-most part of the SIMTA site, and the disused rail corridor directly south of and adjacent to the SIMTA site (PAD 3) (**Table 1**, **Figure 2**). A strip of land along the western bank of Georges River (and outside the SIMTA Project boundary) was also identified for cultural values. Specifically, the report stated:

> *Area 1 is considered potentially culturally significant, as it is a wooded area adjacent to the western side of the Georges River, and Aboriginal cultural sites have been identified in a similar landform on the eastern side of the river. It may contain stone artefacts, which are culturally significant to the RAPs as evidence of the material culture of their ancestors.*

Table 3. Summary of sites recorded by AHMS (2012a)

Site Name	Description
PAD 1	A river terrace running along the eastern side of the Georges River; largely undisturbed; vegetation cleared; eroding; grassy with exposures; 10% ground surface visibility with stone artefacts '5' and '6' identified here. PAD 1 was considered culturally significant by the RAPs as it contains recorded sites. Glenda Chalker (Cubbitch Barta Native Title Claimants) provided information that a site in the area had been recorded during another survey. However, this site did not appear on the AHIMS search, so it appears not to have been registered. The site was rediscovered, and was considered by the RAPs to be culturally significant as the remains of the material culture of their ancestors.
PAD 2	Comprises part of RAE Golf Course between Anzac Creek and East Hills Rail Line; grassy but possibly some original soil profile; scattered large eucalypts; 15% ground surface visibility; no artefacts identified on the surface. The RAPs voiced concern that PAD 2 may contain stone artefacts, as it is very near recorded artefact scatters, and close to Georges River. If this is the case, they advised they would consider them culturally significant as the remains of the material culture of their ancestors. PAD 2 was considered to moderate archaeological potential.
PAD 3	Wooded area bounded by SIMTA site to north, disused rail line to east and Moorebank Ave to south; some very old paperbarks identified; much original soil profile remaining; just south of Anzac Creek; ground surface visibility 10%; no artefacts identified here; possible ground oven identified. Glenda Chalker indicated that several very old paperbarks (Melaleuca sp.) in PAD 3 were culturally significant. Although they did not appear to be culturally modified, mature examples of this species are now rare in the area. They were used traditionally by Aboriginal people for food. The bark was also used for wrapping babies and starting fires. Scott Franks (Tocomwall) identified a feature in PAD 3 that he believed to be culturally significant. He indicated that it was potentially a ground oven that may even contain a burial underneath. Mr Franks advised that he had encountered a similar feature elsewhere. He explained that this area was frequented by Aboriginal people in recent history.
Isolated Find #1	Mudstone complete flake; found in sandy clay, flat cleared area
Isolated Find #2	Mudstone possible flake core; found near vehicle track in mud.
Isolated Find #3	Red/ black silcrete possible core with one negative flake scar; found near vehicle track in mud.
Isolated Find #4	Chert core with 8 negative flake scars; found near vehicle track in mud.
Isolated Find #5	Red silcrete possible flaked piece found on sandy exposure west of road
Isolated Find #6	Poor quality grey chert/ silcrete; possible medial flake; found on sandy exposure west of
Isolated Find #7	Red silcrete proximal flake; found in gravel along rail corridor.

The report demonstrated that all of these sites would be impacted through the SIMTA Project, and made a number of recommendations. For the purpose of the Stage 1 assessment, the following are relevant:

- The artefacts identified immediately south of the SIMTA site, should be collected by RAPs in conjunction with a heritage professional before construction commences. A Care and Control Agreement should be completed between SIMTA and the RAPs regarding the future of the artefacts (it is usually preferred that they be reburied nearby).

- Given the extensive historical disturbance within the remainder of the SIMTA site, it is considered that the likelihood of the presence of intact or significant Aboriginal objects and/or sites is low and no further archaeological investigations are warranted in these remaining areas.

- In relation to the proposed rail corridor, with the exception of PADs 1 - 3, it is considered that the likelihood of the presence of intact or significant Aboriginal objects and/or sites is low and no further archaeological investigations are warranted in the remaining areas.

- Any areas outside those investigated as part of this assessment, most notably those areas within 50 m of the eastern and western banks of the Georges River, should not be impacted without further assessment.

- Areas of the study area in close proximity to Georges River and the southwestern most corner of the proposed rail corridor, which could not be adequately investigated due to access issues, should be investigated further. The background and predictive models presented in this report may suffice for a conditional approval, however, access and more detailed assessment of these areas is required to fully identify development impacts.

- In relation to PADs 1 - 3, it is recommended that, either:

    - Impacts within these areas are entirely avoided (i.e. no modifications are made to any ground surface in any way, including but not limited to excavation, grading and the use of heavy or metal tracked vehicles); or

    - Test excavations be undertaken in each of PADs 1 - 3 in accordance with current archaeological practice and any relevant guidelines to determine the nature, extent and significance of any Aboriginal archaeological deposit.

    - If significant Aboriginal site(s) are identified in PADs 1, 2 or 3, then design of the SIMTA proposal to avoid such sites(s) is the preferred option. However, if it is not considered possible to avoid such site(s), then salvage excavations of the PADs in accordance with current archaeological practice, any relevant guidelines and in consultation with the RAPs should be undertaken to gather as much information on the site(s) as possible prior to disturbance.

- Based on the comments received throughout the consultation process, the RAPs support the above recommendations. However, Cubbitch Barta Native Title Claimants has noted the possible presence of a scarred tree at the golf course. Based on this potential for scarred trees in this area, it is recommended that :

    - Any proposed impacts to mature trees (greater than 80 years old) in the golf course should be avoided.

    - If avoidance is not feasible, any mature trees that will be impacted by the proposed development should be inspected to identify potential Aboriginal cultural scarring. The survey, if required, should be undertaken early in the planning process to avoid any project delays.

    - Should the survey identify any trees with potential cultural scarring, further heritage assessment and/or mitigation measures may need to be developed.

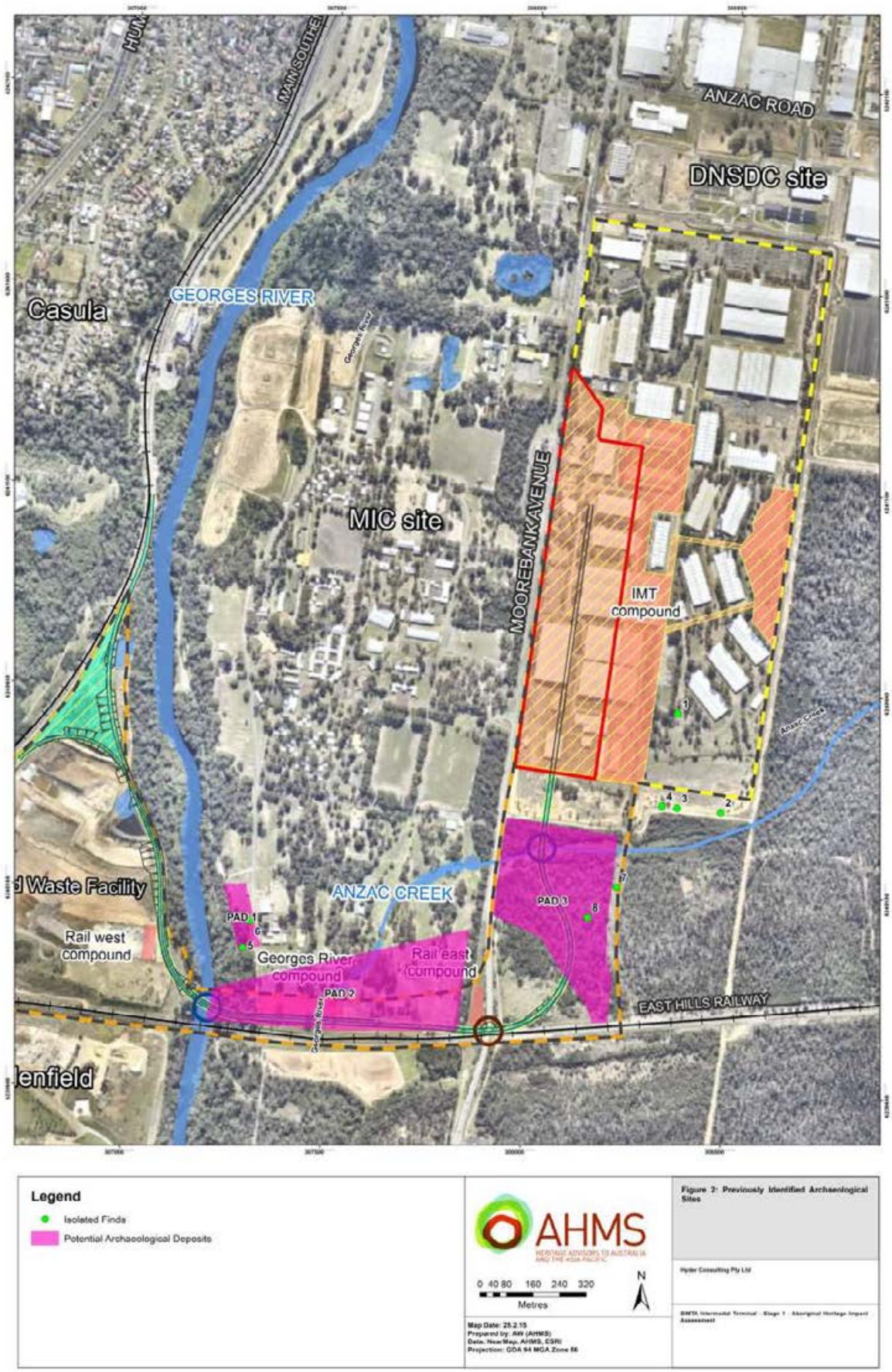

Figure 2. Previously recorded sites identified as part of the Concept Approval assessment (AHMS 2012a).

4.3 AHMS (2012b)

In late 2012, AHMS undertook consultation with the registered Aboriginal parties (RAP) in relation to cultural values associated with biodiversity within the SIMTA site. Consultation included documentation and letters to the RAPs outlining the known threatened flora and fauna within the SIMTA site. The work also included an ethnographic review of the literature to identify whether these species were documented as of value or use in the past.

Ultimately, the process identified two plant and four animal species as having been used in the past, specifically:

- *Persoonia nutans* (Nodding Geebung)
- *Grevillea parviflora* (Small-flowered Grevillea)
- *Miniopterus schreibersii oceanensis* (Eastern Bent-wing Bat)
- *Myotis macropus* (Southern Myotis)
- *Mormopterus norfolkensis* (Eastern Free-tail Bat)
- *Pteropus poliocephalus* (Grey-headed Flying Fox)

No specific information on any of these species was obtained for the SIMTA site, but more general evidence indicated that they were all utilised by Aboriginal people in the past for food and other resources. The report concluded:

> *Aboriginal community viewpoints typically embrace conservation of endemic flora and fauna as a general principle and as related to a common sense of custodianship – being the contemporary interpretation of what was a traditional social obligation in relation to the land. All native species may therefore be considered to have a level of significance attached to them. In this sense, any absences of specific viewpoints on specific vulnerable, threatened or endangered species should be seen to fall back upon this default position.*

4.4 MIC Proposal (Navin Officer Heritage Consultants 2014)

In 2014, an Aboriginal heritage assessment was undertaken of the proposed Moorebank Intermodal Terminal located to the west of Moorebank Avenue. This site encompasses the MIC site, and parts of the Concept Plan Rail Corridor and Stage 1 Rail link.

Their assessment consisted of several field surveys and excavations across the site between 2010 and 2014. Initial field investigations identified five artefact scatters (MA1-MA5 inclusive), three scarred trees (MA6-MA8 inclusive), three PADs (MAPAD1, PAD 1 and PAD 2), and three archaeological sensitive landforms (**Figure 3**). PADs 1 and 2 referred here are the same as those documented in AHMS (2012a) (**Section 5.2**). A further PAD (MAPAD 2) was identified in later field investigations (**Figure 4**).

Subsequent work consisted of test excavations in 2012 and 2013. The 2012 excavations consisted of 50 test pits excavated across the site (**Figure 4**), and recovered 264 Aboriginal objects (from 26 test pits). Subsequent excavations undertook a further 45 manually dug test pits and eight mechanically dug trenches, all focussed within MAPAD 2 - a low-lying floodplain running along the west side of

Georges River (**Figure 4**). These excavations revealed three discrete areas of cultural deposit, and were labelled MA11-13 inclusive. While reference is made to MA 10, there is no description as to what or where this site was found. Archaeological materials were generally found in low densities (<5/m^2) with the highest densities occurring in MA5 at 124/m^2; MAPAD1 also contained some test pits with over 20 artefacts. Artefacts were dominated by silcrete and quartz, and were likely of late Holocene age.

Geomorphological assessment of the works identified the deep nature of many of the deposits. The soil profile was generally composed of a deep sandy soil overlying "coffee rock" or clayey subsoils. The majority of the test pits revealed some evidence of disturbance and/or truncation, and it was considered that little of the surface reflected a pre-European landscape. However, no soil analysis to determine the origin of the soil profile, nor dating, appeared to have been undertaken to further characterise the deposits or associated cultural materials.

Ultimately, the investigations identified 13 discrete archaeological sites, and MAPAD2 (which was divided into two different units) (**Figure 5**). These sites were assessed under Burra Charter and Commonwealth Heritage listings, and identified three sites as of high significance (MA6, MA7 and MA8), two of moderate-high (MA5 and 9), and the remainder as low (MA1-5 inclusive and MA11-13 inclusive). MAPAD2 was considered to have potentially high significance, but was inadequately assessed due to the base of the deposits (>1.2m) not being reached. The assessment also identified the banks of Georges River as of archaeological importance.

It is highlighted that the Navin Officer Heritage Consultant investigations undertook investigations of parts of PAD 2 identified by AHMS (2012a) (**Figure 6**), but failed to recover any Aboriginal objects along Anzac Creek. Their excavations were some distance from the Stage 1 Rail link. PAD 1 is located outside the study area of this report. The following figures provide a summary of the Navin Officer results. The Navin Officer assessment found that all but one of the Aboriginal objects/sites (MA8) would be partially or completely impacted by the proposed development. They made a number of recommendations, including further assessment of the scarred trees, sub-surface investigation of parts of the Georges River corridor, MRSA 2 and MAPAD2, and salvage excavation of MA5 and MA9 (**Figure 7**).

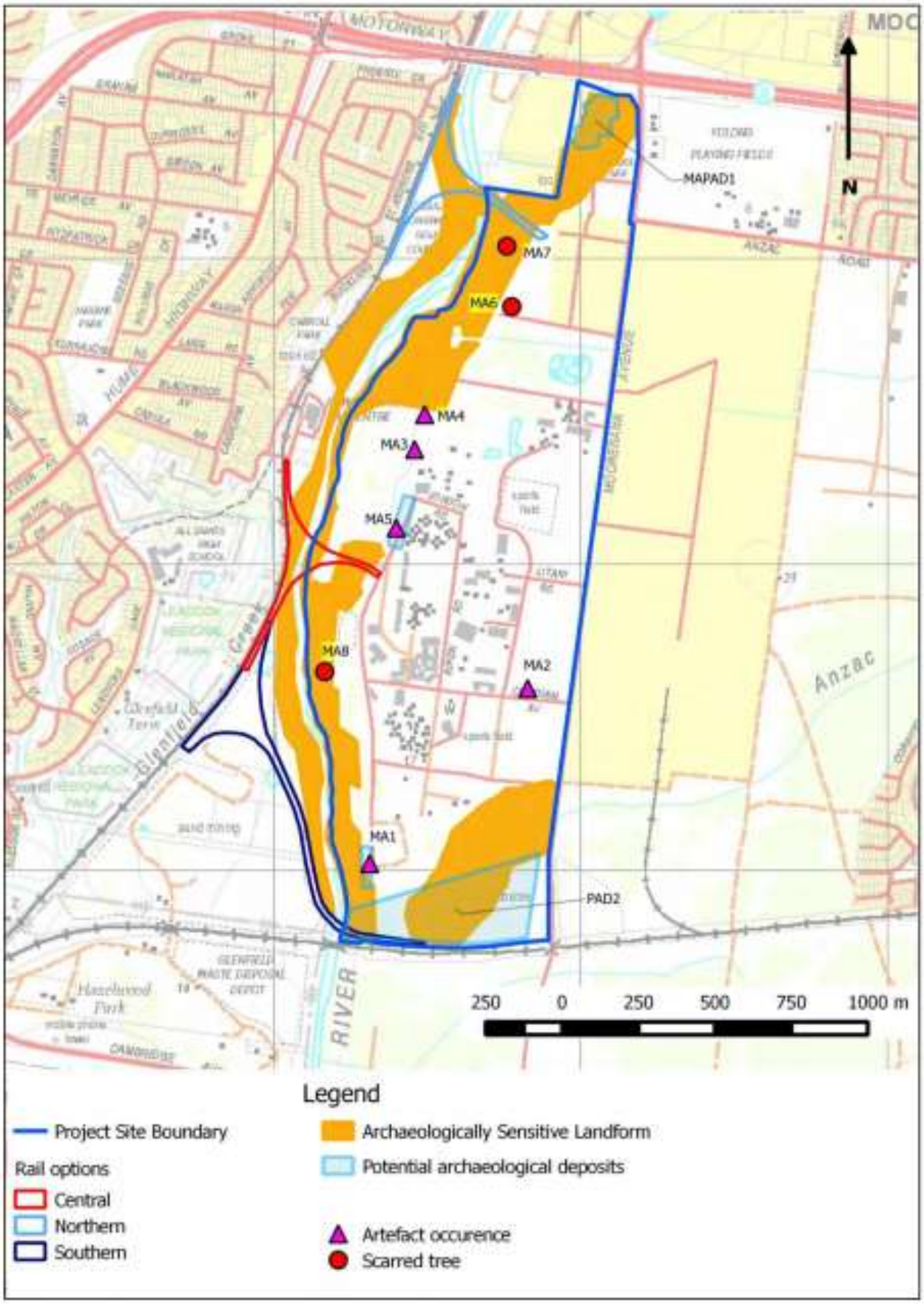

Figure 3. Aboriginal objects/sites and areas of archaeological interested identified through surface investigation of the MIC Proposal (source: Navin Officer Heritage Consultant 2014).

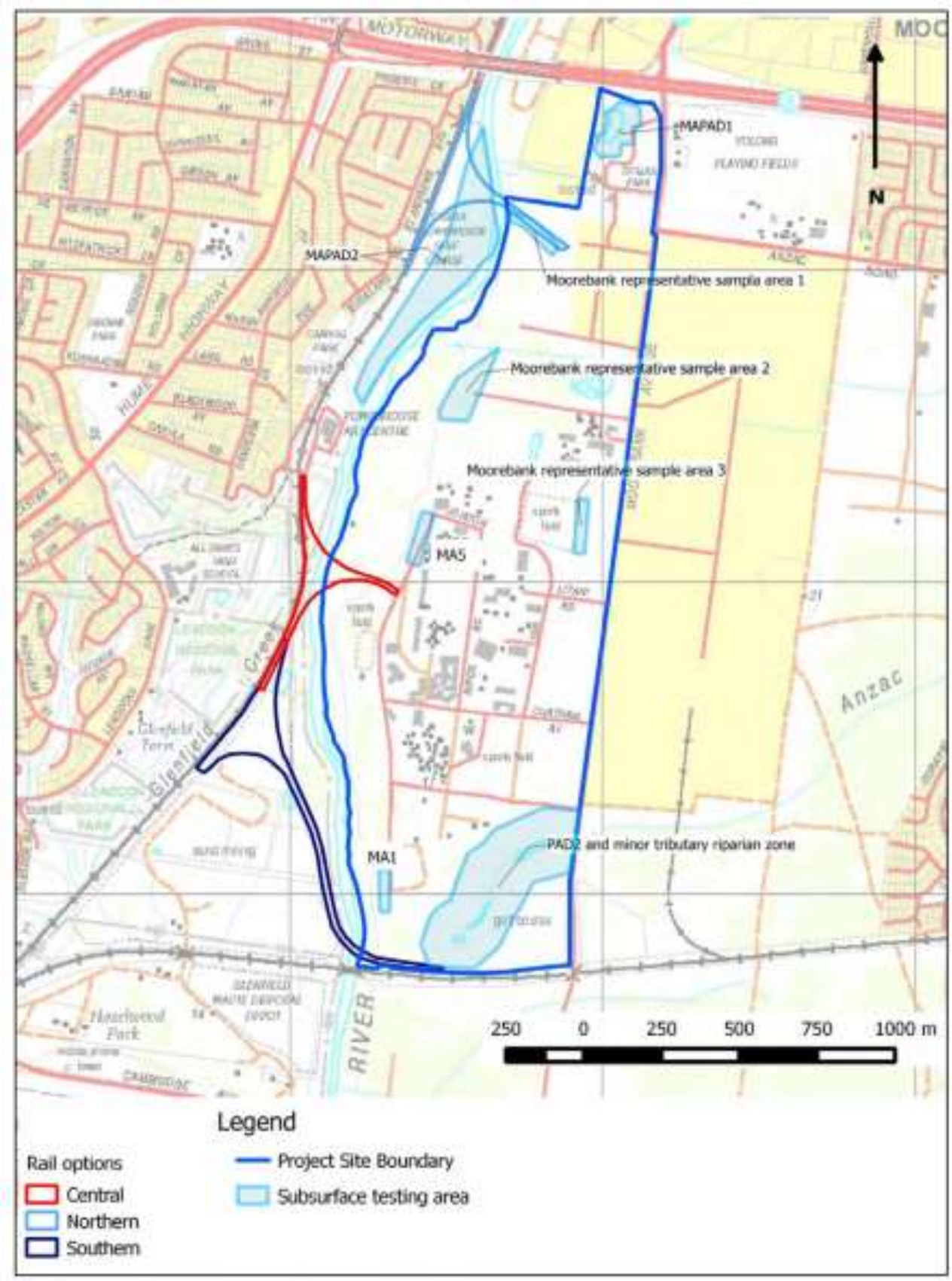

Figure** 4. **Map showing the general sites and locations of sub-surface testing for the MIC Proposal (source: Navin Officer Heritage Consultants 2014).

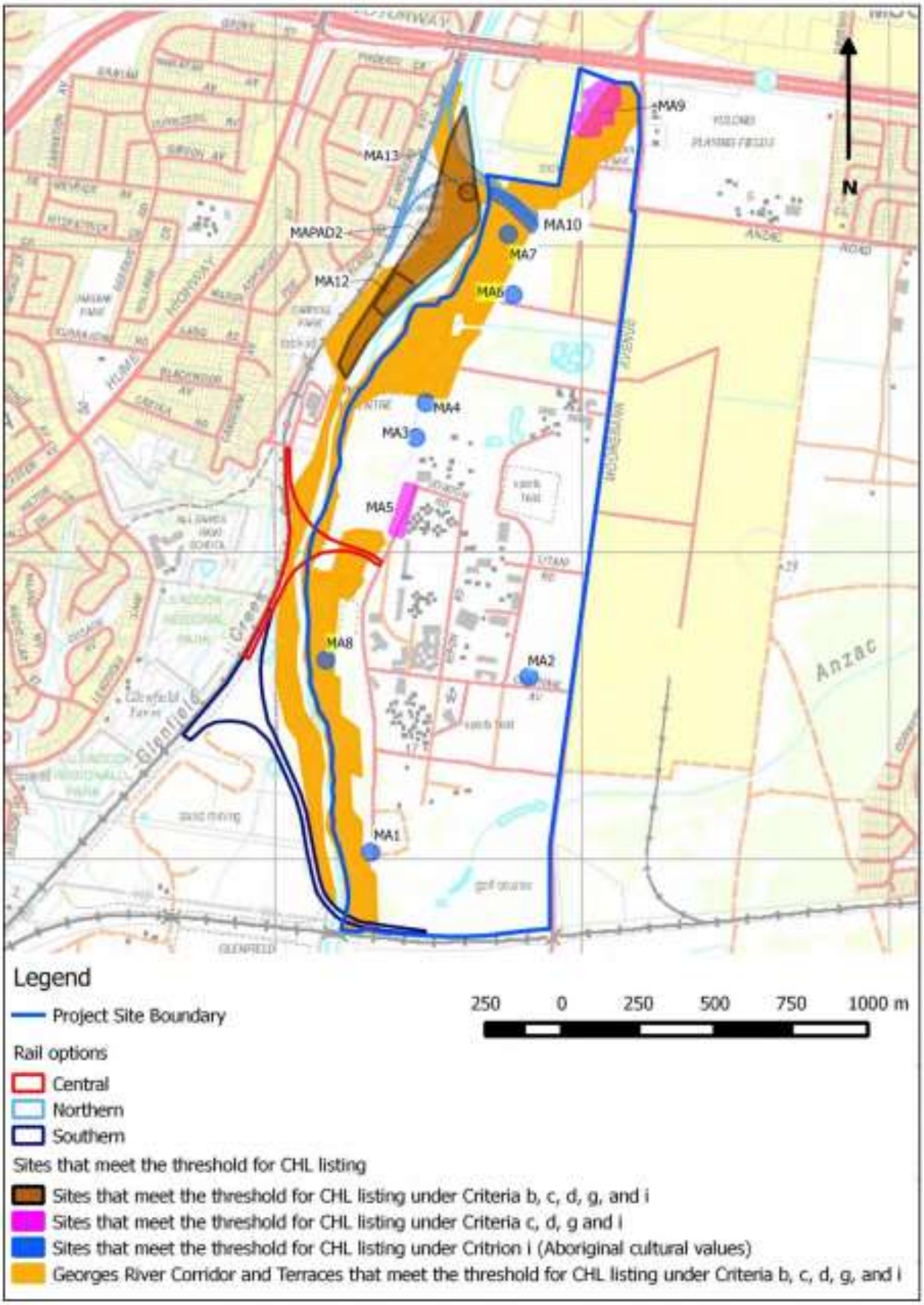

Figure 5. The significance of Aboriginal objects/sites and areas of archaeological interest for the MIC Proposal (source: Navin Officer Heritage Consultants 2014).

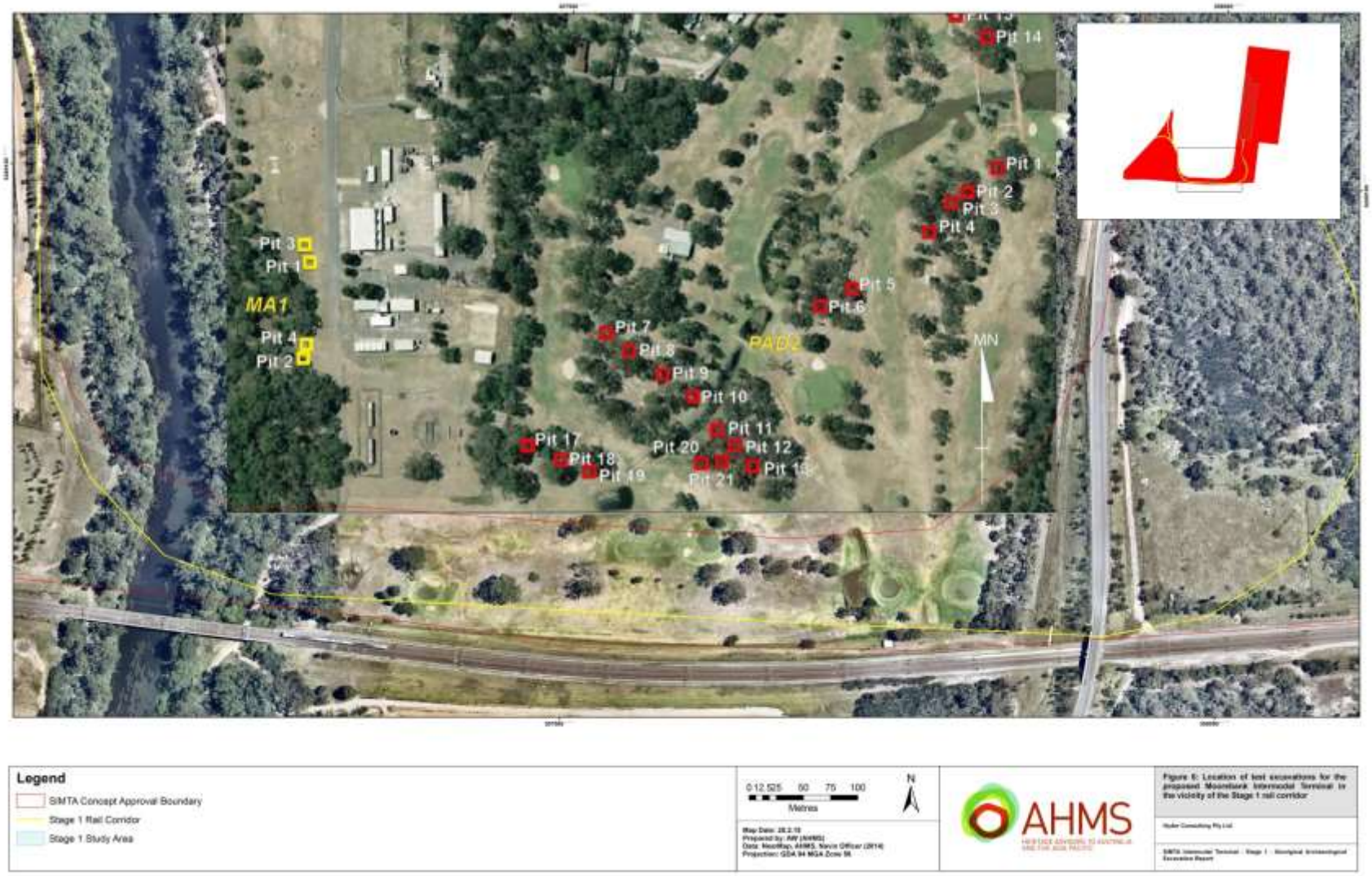

Figure 6. An overlay of test excavations along Anzac Creek (red) as part of the MIC Proposal in the vicinity of the Stage 1 rail corridor.

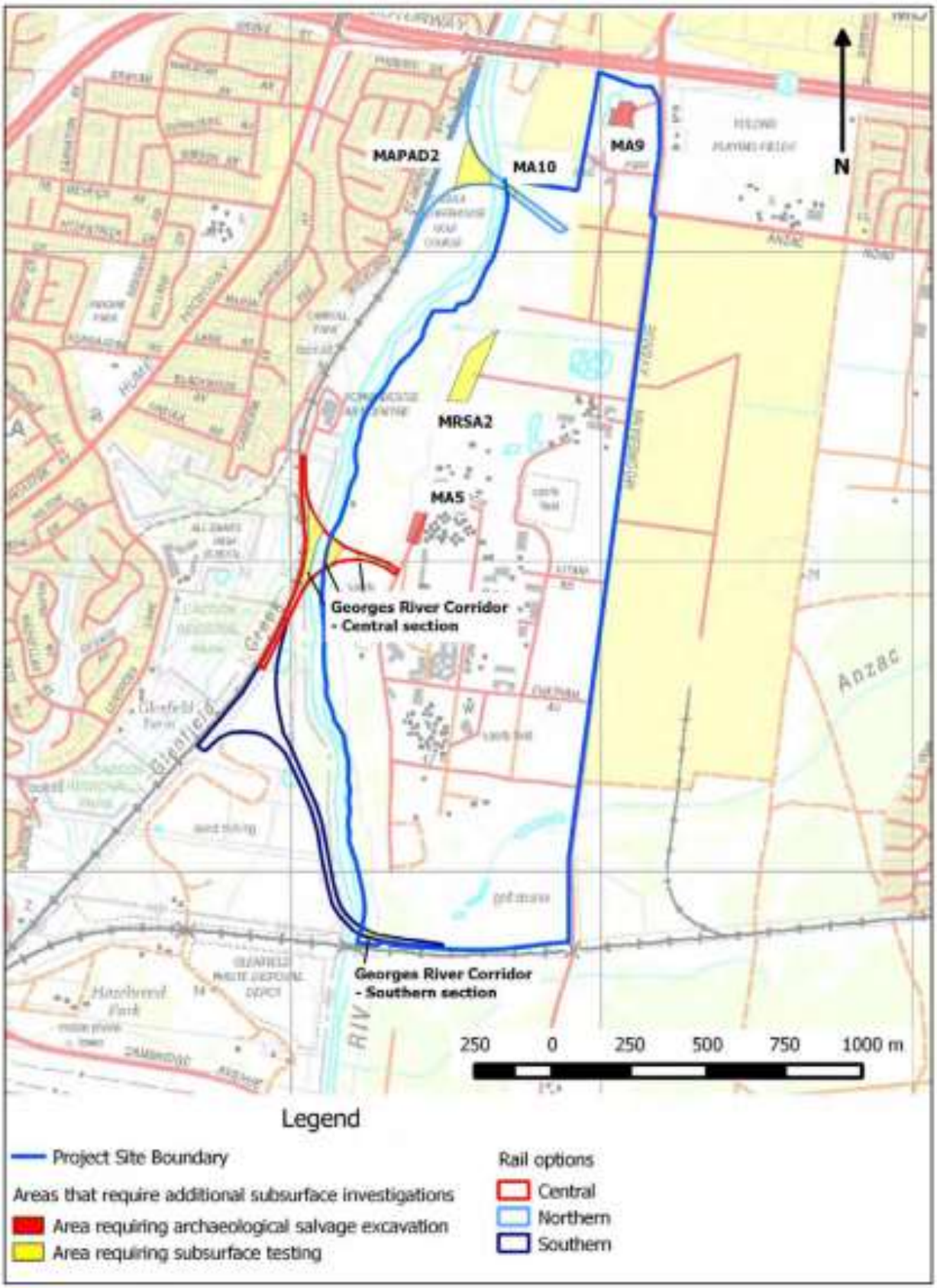

Figure 7. Proposed mitigation measures for the MIC Proposal (source: Navin Officer Heritage Consultants 2014).

5 TEST EXCAVATION

5.1 Rationale and Research Objectives

As outlined in **Section 4.2**, an initial assessment of the SIMTA Project was undertaken as part of the Concept Approval. This assessment identified several recommendations that could not be fulfilled at the time. One of the key requirements was the need to undertake sub-surface investigation of the identified PADs to determine whether they contained cultural materials, and assess their significance if present. The SEARs for Stage 1 identified this limitation, and indicated further characterisation of Aboriginal heritage was required.

An excavation program was therefore developed to investigate the two PADs within the Stage 1 study area. (PAD 1 was situated outside of the proposed impact and was investigated as part of the MIC Proposal (see **Section 4.3**)). The main objectives of the archaeological excavation program were to:

- Further determine the nature and extent of the Aboriginal heritage resource (specifically PAD 2 and PAD 3) within the Stage 1 study area;
- Assess the potential impact of the proposed development to these highlighted areas of archaeological sensitivity; and
- Supplement and integrate the new data into the existing AHIA, in accordance with relevant guidelines.

5.2 Sampling Strategy and Excavation Methodology

An excavation sampling strategy was developed to achieve the research aims outlined in **Section 5.1**. Since the Proposal is being assessed under Part 4 (Division 4.1) of the EP &A Act, excavation procedures did not have to strictly adhere to OEH guidelines. However, the excavation program was developed in broad accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010), since this reflects current best practice, and to allow comparison with surrounding studies in the area, and in the event alternate legislative approval is required.

Therefore, the excavation program consisted of the following:

- Placement of test excavation units along the proposed Rail link, ensuring that individual test pits were situated in a systematic grid (in this case 20m apart). Test pits were located by a surveyor with Trimble® GPS using RTK (real time kinematic).
- Manual excavation by hand.
- Individual test excavation units of 1 x 1 m size.
- Excavation in 10 cm spits.
- Excavation to the base of the identified Aboriginal-object-bearing soil(s) and below, sufficient to confirm that the underlying soil(s) were culturally sterile.
- Wet - sieving of all excavated material through a 5 mm sieve.
- Photographic and scale-drawn records of each single excavation unit.

- Backfilling of excavation units as soon as practicable.

Ultimately, this program resulted in the excavation of thirteen 1m^2 test pits focussed across the eastern bank of Georges River and both banks of Anzac Creek (**Figure 8**). This was divided as seven test pits within the RAE golf course, and encompassing ~250m of the terrace over-looking Georges River, and within the curtilage of PAD 2; and six test pits (three on each side) across Anzac Creek, within the curtilage of PAD 3. (Note the test pits were not situated directly on the proposed Rail link, since this was within the centre of an active golf course; the test pits were however still within the 20m corridor proposed to be impacted through the development).

Test pits closest to the Georges River were not undertaken, since they were situated in the modern floodplain, and where largely inaccessible. This resulted in excavations only on the maximal upper slope and elevated terrace overlooking the river, and some 50m from the river bank. A similar issue arose with Anzac Creek, which in the location of the testing program was poorly defined and swampy, especially along its southern fringe. Test pits in this area were also located to avoid any impact to identified endangered and vulnerable flora species. As such, test pits in this area were situated 30-40m from the creek edge.

During the course of the field program, the initial test pits locations were tested by Paul Wheeler to identify any possible unexploded ordinance (UXO). A few anomalies were identified which resulted in some of the test pits being slightly relocated from their original locations.

The test excavation was carried out over five days between 19-23 January 2015, by a team of 7-8 archaeologists and Aboriginal stakeholders (see **Section 1.4** and **4.3.4** for further details).

Figure 8. The test excavation program undertaken for this assessment.

5.3 Excavation Results

5.3.1 General

Overall, 13m^2 were excavated across PADs 2 and 3 (**Table 2**; **Figure 8; Appendices 5-9**). Test pits were on average 70cm deep, and exhibited a deep coarse silt unit over-lying an indurated coffee rock layer and/or heavy clay subsoil. On the MIC site, the upper units were frequently characterised by a unit (0-30cm) of modern disturbance and fill materials, with the exception of those test pits on the immediate banks of Georges River (test pits #2 and #3). Despite localised disturbance, the test pits around Anzac Creek all contained natural topsoils, with no over-lying fill materials.

Deposits in close proximity to Georges River were considered of fluvial origins based on particle size analysis. The particle size data from test pit #3 suggests a poorly sorted stratigraphy of silt and the presence of fine gravels, both more likely to be from fluvial deposition than aeolian (**Appendix 7**). Further it is considered likely the unit represents a single fluvial event, with little evidence of multiple phases or land-surfaces within the sequence. While, no soil analysis was undertaken at Anzac Creek, the sequence is very similar to test pit #3 (albeit slightly shallower), and may have similar fluvial origins. These data suggests that at some points in the past, the Georges River flooded these areas, which are ~14m above its surface level today.

The excavations recovered only 28 Aboriginal objects (~2.1/m^2) (**Figure 9**). These were all recovered from the edge of Georges River, and most notably within test pit #3. No Aboriginal objects were recovered from test pits around Anzac Creek - a finding also made in earlier studies (see **Section 4.3**). Artefacts were found throughout the soil profile, but primarily in spits 3 and 8/9. The lack of size sorting and different raw materials between these levels suggest at least two different periods of occupation in the past. The artefacts in the upper layers were typologically of middle Bondaian age (3-0.2ka), and included backed artefacts and thumbnail scrapers (**Section 5.4.1**). The artefacts in the lower deposits had the characteristics of the core and tool scraper tradition, and suggest that they may be >5ka. The small size of the assemblage makes any further interpretation of the past use of the area unfeasible.

Three OSL ages were recovered from test pit #3, which contained the highest concentration of Aboriginal objects. The ages indicate that the sand sheet began forming at ~60ka. Two further OSL ages indicate that the upper assemblage was probably in the order of 3-4,000 years old, while the lower artefacts were ~18ka. This latter deposit represents some of the oldest cultural material recovered in the Sydney Basin.

Table 4. Summary of test pit information. All co-ordinates presented in MGA 94 Area 56.

Test Pit #	Easting	Northing	Dimensions (m^2)	Depth (m)	Spits	Aboriginal Objects Recovered	Notes
2	307293	6239798	1	0.2	2	3	
3	307313	6239796	1	1.1	11	13	
4	-	-	-	-	-	-	Not excavated - potential UXO detected.
5	307362	6239791	1	0.8	8	0	Modern Fill, no natural soil profile identified
6	307385	6239790	1	1.2	12	6	
7	307410	6239789	1	1.1	11	4	
8	307435	6239788	1	1	10	-	
9	307460	6239788	1	0.9	9	2	
18	308049	6240125	1	0.4	4	0	
19	308049	6240147	1	0.4	4	0	
20	308043	6240160	1	0.34	4	0	
21	-	-	-	-	-	-	Not excavated - potential UXO detected.
22	308041	6240226	1	0.7	7	0	
23	308044	6240240	1	0.6	6	0	
24	308044	6240254	1	0.4	4	0	
Average				*0.7*	*7*	*2.15*	
Total			**13**			**28**	

5.3.2 PAD 2

Soil Description

Test pit depths within PAD 2 varied from 0.2m – 1.2m, with an average depth of 0.9m. The soil profiles of the seven tests pits dug on the east side of Georges River and on the MIC site were generally consistent. Test pits #2 and #3, located in bushland to the side of the golf course, and closest to Georges River, comprised a dark silty loam humic layer, 10-15cm in depth (A Horizon), overlying pale yellow silt, 15 - 100cm in depth (alluvium) with a gradual change ~100cm to yellow orange sand containing few ironstone inclusions and pieces of degrading sandstone.

Test pits #5 – 9 located on the MIC site, exhibited the same silty deposits as test pits #2 and #3, with the addition of imported topsoil and a fill layer/lens, probably introduced as part of development of the golf course fairways (**Plates 1-10**). The fill units appeared to comprise grey brown shaly clayey subsoils with sandstone pieces and gravels. The topsoil comprised dark silty loam averaging a depth of 10-20cm, overlying ~10cm of compacted fill, overlying pale grey sand which gradually changed with depth to yellow sand containing few fine ironstone inclusions and pieces of degrading sandstone. This colour change and presence of ironstone and sandstone inclusions occurred ~80cm.

Test pit #5 contained no natural soils and fill was continuous to depths of 80cm, as a result no further excavation was undertaken in this test pit.

Lithics

A total of 28 artefacts were recovered from the test pits east of Georges River and across the MIC site. The highest number of artefacts was recovered from test pit #3, containing 13 artefacts. All other test pits in this location contained artefacts with the exception of test pit #5, which contained no natural soils. Lithology of the assemblage recovered included milky quartz, red and yellow silcrete, red and yellow chert and brown and yellow tuff. Further discussion of the lithics assemblage is provided in **Section 5.4.1**.

Figure 9. Artefact densities for test pits in close proximity to Georges River.

Plate 1. View south west across test pit 2 showing typical ground coverage on the east side Georges River.

Plate 2. South facing section of test pit 2.

Plate 3. East facing section of test pit 3, showing large tree roots growing through the top of the pit.

Plate 4. North facing section of test pit 3, showing location of OSL samples 1, 2 and 3 (in order of depth).

Plate 5. View north east, showing the location of the test pits dug along the RAE golf course.

Plate 6. South facing section of test pit 5, showing the depth of the fill deposit in this location.

Plate 7. East facing section of test pit 6.

Plate 8. North facing section of test pit 7.

Plate 9. East facing section of test pit 8.

Plate 10. North facing section of test pit 9.

5.3.3 PAD 3

Soil Description

Testing at PAD 3 ran across creek flats of Anzac Creek, located in a heavily vegetated area. Test pit depths within PAD 3 varied from 0.34m – 0.7m, with an average depth of 0.47m. The six pits excavated north and south of Anzac Creek all contained similar soil profiles (**Plates 11-18**). The soil materials found at PAD 3 comprised a dark brown silty loam topsoil, ~10cm in depth (A horizon), overlying pale yellow grey silt and finally yellow silt/sand with sandstone inclusions (B horizon).

The areas located within close proximity to Anzac Creek appeared swampy and prone to flooding. This was confirmed by test pit #22, excavated on the north side of Anzac Creek, which hit the water table at 40cm. The proposed location of test pit #21, located on the south side of Anzac Creek also flooded during excavation.

The area was heavily disturbed in places showing signs of material movement from bulldozing, dumping of waste material including building rubble. Other evidence for contamination of the site included areas covered by bamboo which grew along the southern portion of Anzac Creek. A dirt track ran from Moorebank Avenue to an old disused railway located to the east. Further disturbance was evident along the track most likely relating to the construction of the rail line.

Lithics

No artefacts were recovered from the test excavation work undertaken around Anzac Creek.

Plate 11. View south between test pits 22 and 23, showing dense vegetation coverage.

Plate 12. View south across area south of Anzac Creek, showing test pit 18 in the background.

Plate 13. West facing section of test pit 18.

Plate 14. West facing section of test pit 19.

Plate 15. West facing section of test pit 20.

Plate 16. South facing section of test pit 22

Plate 17. North facing section of test pit 23.

Plate 18. North facing section of test pit 24.

5.4 Post Excavation Analysis

5.4.1 Lithic Assemblage

This section provides an analysis of the stone artefact assemblage collected from the SIMTA Moorebank test excavation. The lithic analysis and cataloguing was undertaken by Michelle Lau (AHMS).

Artefacts were cleaned, individually analysed and entered into the software program Entrer (E4) loaded with a configuration file written for this specific purpose. This program prompts the user to record all relevant attributes through a series of menus based on the artefact type (e.g. core, complete flake, complete tool etc.). Artefacts that were shattered through extreme heat and could not be identified by type were called a heat-fractured artefact. By-products of flaking include debitage, shatter and angular fragments. A typological, technological and metrical analysis of the assemblage was undertaken. Each artefact was bagged individually given a unique identification number in accordance with the Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW, Section 3.7, Requirement 26, and also complies with the Australian Museum, Protocols for the Deposition of Archaeological Materials. Measurements were made in millimetres to two decimal places (**Appendix 9**). Analysis was aided by the use of a 10x hand lens and a standard digital Vernier calliper.

The assemblage was characteristic of the Bondaian period (5000 years ago -1788) when the key artefact attributes were assessed against the Eastern Regional Sequence for the Sydney Region (Attenbrow 2010: 153-158). There were three backed artefacts (Table 5): #0009 a red, fine silcrete thumbnail scraper; #0027 a red, medium silcrete, backed blade, and; #0025 a red, fine silcrete, proximal backed blade. These tools in the assemblage fit the chronology for the Sydney Region when backed artefacts, Bondi points, burins, geometric microliths, thumbnail scrapers and small retouched flakes were increasingly used and produced. A red, fine silcrete, micro-blade core #0028 was also characteristic of the Middle Bondaian period. Additionally, the increasing use of the bipolar percussive technique in the Middle Bondaian may be evidenced by artefacts #0004 a grey, fine grain siliceous, bipolar flake and #0005 a yellow milky quartz bipolar flake. Silcrete, chert, tuff and quartz material were the preferred materials for artefact production at this site. The presence of quartz suggested this assemblage was more characteristic of the Middle-Late Bondaian period (3000 years ago – c.1788).

The types of artefacts and their characteristics were used to establish how stones were worked, used and discarded on-site. There were a high proportion of cores made of silcrete and tuff, indicating Aboriginal people's particular preference for the reduction and discard of these materials at this location in the landscape (White and McDonald 2010). Cores, tools and complete flakes made up

44% of the assemblage (18%, 15% and 11% respectively). The high frequency of these artefacts suggested that this was a site was favoured by Aboriginal people for the primary or initial stages of core reduction. People would have transported away the final reduced stone products (tools) to use for tasks elsewhere and the cores were abandoned at this location after being exhausted or were perhaps left to be used again later when they returned on another visit. This also explains the next highest artefact type frequency of distal flakes often post depositional breakage (i.e. treadage) and angular fragments (21%), which were predominantly the by-products of core reduction.

Bimodal distribution of raw material types was observed when the assemblage was analysed by spit (**Table 6**). The upper spits (1 - 4) were dominated by silcrete and quartz, with no tuff or chert, while the lower spits (5 - 9) were dominated by tuff and chert, with silcrete only present in spits 5 and 6. This was evidence of two different assemblages. The upper assemblage fits McCarthy's (1961: 143) definition of the Bondaian culture of the Sydney region as "having trimmed blocks, a few elouera, burins, flake fabricators, scrapers of many kinds, a wide range of geometrical microliths, and the Bondi point in large numbers; it marks the beginning of gum hafting of knapped implements and the appearance of the ground edge in eastern New South Wales." As well as Attenbrow's (2010: 153-158) definition which notes that implements and associated debitage are much smaller in average size and weight than those from earlier assemblages, an increase in the use of silcrete and coupled with use of the bipolar percussive technique over time (especially from 3000 to 1788AD). The average size of artefacts was 10mm less in the upper spits (1 – 5) if the large #0017 yellow, silcrete, core in spit 3 is excluded.

The assemblage found in the lower horizon (spits 6 - 9) had features typically found in the Australian core tool and scraper tradition (McCarthy, 1964; Williams et al., 2012, 2014). This broad, pan-continental category encompasses all Pleistocene and early Holocene assemblages. In the Sydney region this type of assemblage was originally described as Capertian by McCarthy (1964:141) and is considered older than 5000 years (Attenbrow 2010: 153-158). This 'industry' was first identified in excavations from the Capertee river valley and defined by the dominance of tuff (grey chert) and the presence of large, concave and nosed "scrapers, knives, dentated saws and burins, with a few choppers, unspecialized cores, uniface pebble implements and hammerstones" (McCarthy 1964:141). Unfortunately, this assemblage does not contain any tools for analysis, and may only be attributed to the Capertian based on the preference shown for tuff and chert in these lower spits (**Table 6**).

There was limited evidence of size sorting or downward displacement of artefacts when the average size of the artefacts is considered (see **Table 6**). Many processes affect archaeological remains after their initial discard. A variety of post-depositional processes (e.g. trampling, bioturbation or flood events) can lead to the downwards displacement of artefacts through sediments (Richardson 1992). Size sorting is expected for surface assemblage sites where there was repeated short or long term occupation at the same location over long periods of time. Small artefacts were more likely to be affected by size sorting (i.e. larger numbers of smaller artefacts will occur at the base of the excavation) (Baker 1978). Overall, the average size of artefacts was fairly constant with the only decrease in average artefact size in spit 5 where the standard deviation was also small and in the lowest spits 8 and 9 (**Table 6**). However, given the differences in raw materials in the upper and lower assemblages it is likely that while movement occurred within each horizon the two horizons are clearly differentiated.

Heat damage (e.g. blackening, cracking, pot-lidding, crazing) was recorded on 11% (n= 3) of the artefacts in the whole assemblage. Heat damage was expected in surface assemblages as a result of un-controlled, post-depositional burning possibly the caused by campfires/ovens or wild bushfire. There was no indication that Aboriginal people used deliberate heat treatment to improve the quality of raw materials in this assemblage.

Table 5. Artefact types and raw material types.

Artefact Type	Tool Type	Material Type						
		Chert	Clear Quartz	Fine Silcrete	Medium Silcrete	Milky Quartz	Tuff	Total
Angular				1	1		4	6
Complete Flake					1	1	3	5
Complete Split						1		1
Complete Tool	Backed				1			1
	Thumb			1				1
	Usewear		1					1
Core				1	1		1	3
Core Fragment						1		1
Distal Flake		3			2	1	2	8
Proximal Tool	Backed			1				1
Total		**3**	**1**	**4**	**6**	**4**	**10**	**28**

Table 6. Distribution of raw materials per spit showing average maximum dimensions of artefacts.

Spit No	Milky Quartz	Clear Quartz	Fine Silcrete	Medium Silcrete	Chert	Tuff	Total	Average Length (mm)	Std Dev +/-
2	3	1	1	3			8	15.3	4.8
3			2	1			3	28.2	28.6
4	1				1		2	17.8	9.4
5			1	1		1	3	16.8	2.7
6				1	1	5	7	25.6	8.2
7					1	2	3	27.0	15.1
8						1	1	14.4	-
9						1	1	12.2	-
Total	**4**	**1**	**4**	**6**	**3**	**10**	**28**	**20.7**	**11.6**

5.4.2 OSL analysis

Standard sampling procedures were used to collect three OSL samples from test pit #3, containing the highest number of artefacts (**Plate 4**). The samples were sent to the University of Gloucestershire for processing in January 2015. The summary results are provided in **Table 7** with a full report provided in **Appendix 3**.

The samples demonstrate that the sand body encompassing most of the site probably began forming at ~60ka. This was a period of dry and arid conditions, with occasional flooding, and the likely source of the deposit. The cultural materials were found in two discrete layers. The ages indicate that the upper assemblage was recovered from just below at an age of 3.4ka, while the lower assemblage was found associated (if not slightly below) an age of 18ka. These results suggest that Aboriginal people have been sporadically visiting the area for at least 20,000 years.

Table 7. Summary results of OSL samples

Field Code	Sample No.	Lab Code	Depth (m)	Elevation at ground level (m)*	Age (ka)
SIMTA Moorebank 2015	1	GL14063	0.20	15.287	3.4±0.3 (0.3)
SIMTA Moorebank 2015	2	GL14064	0.60	14.837	18±1 (1)
SIMTA Moorebank 2015	3	GL14065	0.90	14.542	60±5 (5)

*Australian Height Datum

5.5 Summary

This section provides a summary of the excavation work undertaken for the Stage 1 Proposal. This work has identified a number of findings in relation to the archaeological resource of the area, specifically:

- The archaeological testing consisted of excavation of thirteen 1m^2 test pits (a total area of 13m^2) spaced at ~20m intervals across PAD 2 and PAD 3. Ultimately, testing east of Georges River (PAD 2) covered a distance of 300m with seven test pits. Testing of Anzac Creek (PAD 3) covered a distance of 160m with six test pits.

- A total of 28 artefacts were recovered with densities ranging between 0- 13/m^2 ($\bar{x}$= 2/m^2). All artefacts were recovered from test pits dug within PAD 2. The highest number of artefacts was recovered from test pit #3, located on a raised terrace on the east side of Georges River. Generally the area contained low densities of Aboriginal objects throughout. Despite the low numbers of artefacts recovered, the assemblage contained a diverse range of lithologies, dominated by tuff and medium silcrete with formal tool types present. Importantly, the data indicates two different periods of activity at the site, with the lower assemblage being possible of Pleistocene age (>10ka).

- No artefacts were recovered from the test excavations undertaken at PAD 3, which investigated both sides of Anzac Creek. This is a similar finding to other works along Anzac Creek in the MIC site (Navin Officer Heritage Consultant 2014).

- Silty deposits were present throughout both PAD 2 and PAD 3, with some test pits exceeding >1m. These deposits were considered to have been formed from the flooding of the Georges River in the past, and inundating these areas.

- As with other studies in the region, modern disturbance and landscaping has resulted in modifications to the upper soil profile in several areas, and this may have impacted any cultural material situated across the SIMTA site. Further, any surface cultural material must be treated with caution, since it may have been moved from its original location.

- Test excavation was not carried out on the western side of Georges River as it was considered unnecessary based on the results of previous Archaeological assessment undertaken by AHMS (2012c). An assessment undertaken at Glenfield Waste Disposal revealed that much of

the area had been heavily disturbed by sand extraction. As a result it was considered that the area had low-nil potential for Aboriginal objects to exist and therefore no further investigation was carried out as part of the test excavation.

6 THE ARCHAEOLOGICAL RESOURCE

6.1 General

This section summarises the background assessment and field investigations of the SIMTA site (and more specifically Stage 1 site and Rail link) to develop an archaeological model. The model will be used in subsequent sections to determine archaeological and cultural significance, identify potential impacts, and propose strategies to manage and mitigate cultural deposits prior to and during development.

6.2 An Archaeological Model for the SIMTA Site

Based on the information presented in **Sections 4-6**, an archaeological model of the study area can now be developed. The model has been developed based on two previous studies by AHMS (2012a) and Navin Office Heritage Consultants (2014), and works undertaken for this assessment. AHMS has also recently undertaken work in the Glenfield Waste Disposal site on the western side of Georges River (AHMS 2012c), but this area is heavily disturbed and has little to contribute.

The initial assessment for the Concept Approval identified seven isolated finds and three PADs within the SIMTA site boundary. The isolated finds were situated across the site, and are all outside the Stage 1 site boundary. Of the three PADs, two were within the Proposal site boundary. Archaeological testing of these two sites identified that only a small portion of PAD 2 contained Aboriginal objects above the general background scatter that is common in the Cumberland Plain (<5/m^2). This area was situated on the waxing upper slope and ridge over-looking the Georges River, and based on the soil profile was considered a levee. Based on the results of the excavation, and the extent of the modern floodplain of Georges River (where survivability of cultural material is considered low), this deposit can be considered to extend between 75 and 175m from the edge of the river, and across the entire Rail Corridor. It is, however, acknowledged that localised disturbance from past activities has impacted some parts of this area, including a former sewage works (now removed) adjacent the existing rail line.

Levee banks over-looking major river systems are known to have been attractive to Aboriginal people in the past, and a key focus for occupation. Other examples, include the ridgeline over-looking the Hawkesbury River at Pitt Town (Williams et al., 2012, 2014) and the well-documented Pleistocene sand sheet beneath Parramatta CBD (McDonald, 2008). Importantly, all of these sites reveal evidence of early occupation of the Sydney Basin. In the case of Pitt Town, Williams et al. (2014) showed that the area was occupied by 36ka and formed a refuge for people through the Last Glacial Maximum - an extremely cool and arid period between ~23-18ka. Similarly, evidence suggests the Parramatta sand sheet has also been used since at least the LGM (AHMS, 2012d, 2013, 2014; McDonald, 2008). The results of the excavations here also strongly indicate the use of the Georges River, another major river system, for a significant period of time. Specifically, the lower assemblage has all the characteristics of occupation greater than 5,000 years ago, and is similar in raw material types to much older sites referenced above. An OSL age associated with the assemblage also suggests deposition occurred by ~18ka, if not slightly earlier.

The excavations undertaken by Navin Officer Heritage Consultants (2014) in the MIC site show similar findings to those presented here. While, the report does not provide much detail on the stratigraphic location of the artefacts recovered, they similarly identify the elevated areas over-looking the banks of Georges River as a foci of past human activity, and of high significance (**Figure 10**). They also found no evidence of cultural material along the banks of Anzac Creek or surrounds. Along with the results here, this strongly suggests that Georges River formed the focus of past activity, with only transitory movement along minor tributaries at least in this immediate area.

For the purposes of management, and to continue the existing labelling by Navin Officer Heritage Consultants (2014), we have re-labelled PAD 2 to MA14, since the area has now been confirmed as an Aboriginal site.

To the west side of Georges River, two areas have been identified as of archaeological concern, both outside (but in close proximity) of the Stage 1 proposal site boundary. Through the Aboriginal consultation process, AHMS (2012a) identified an area of cultural value, which encompassed the slopes and floodplains along Georges River (**Figure 10**). No specific information was provided on this area, and the description suggests the identification was made based on the potential for material culture to occur (similar to the findings and sites identified on the east side of the river). Navin Officer Heritage Consultants (2014) also identified the western banks of Georges River as of archaeological importance, including a large site, MAPAD2, along the entire stretch of river. This site was ultimately divided into the three smaller sites (MA11-13 inclusive), but considered to retain high research potential, since excavations failed to reach the base of the deposits. Due to the large number of rail options for the MIC Proposal, Navin Officer Heritage Consultants did not undertake specific site investigations for these areas; rather they identified areas requiring future consideration. One of these areas is situated at the northern end of the area identified as having cultural value (**Figure 10**). Effectively, the two sites outlined here encompass the riparian corridor of the Georges River for ~1.5km. While the sites are all outside of the Project site boundary and SSFL fence line, they are in close proximity, and any works on the edges of the Project has potential to affect them if they extend beyond the boundary.

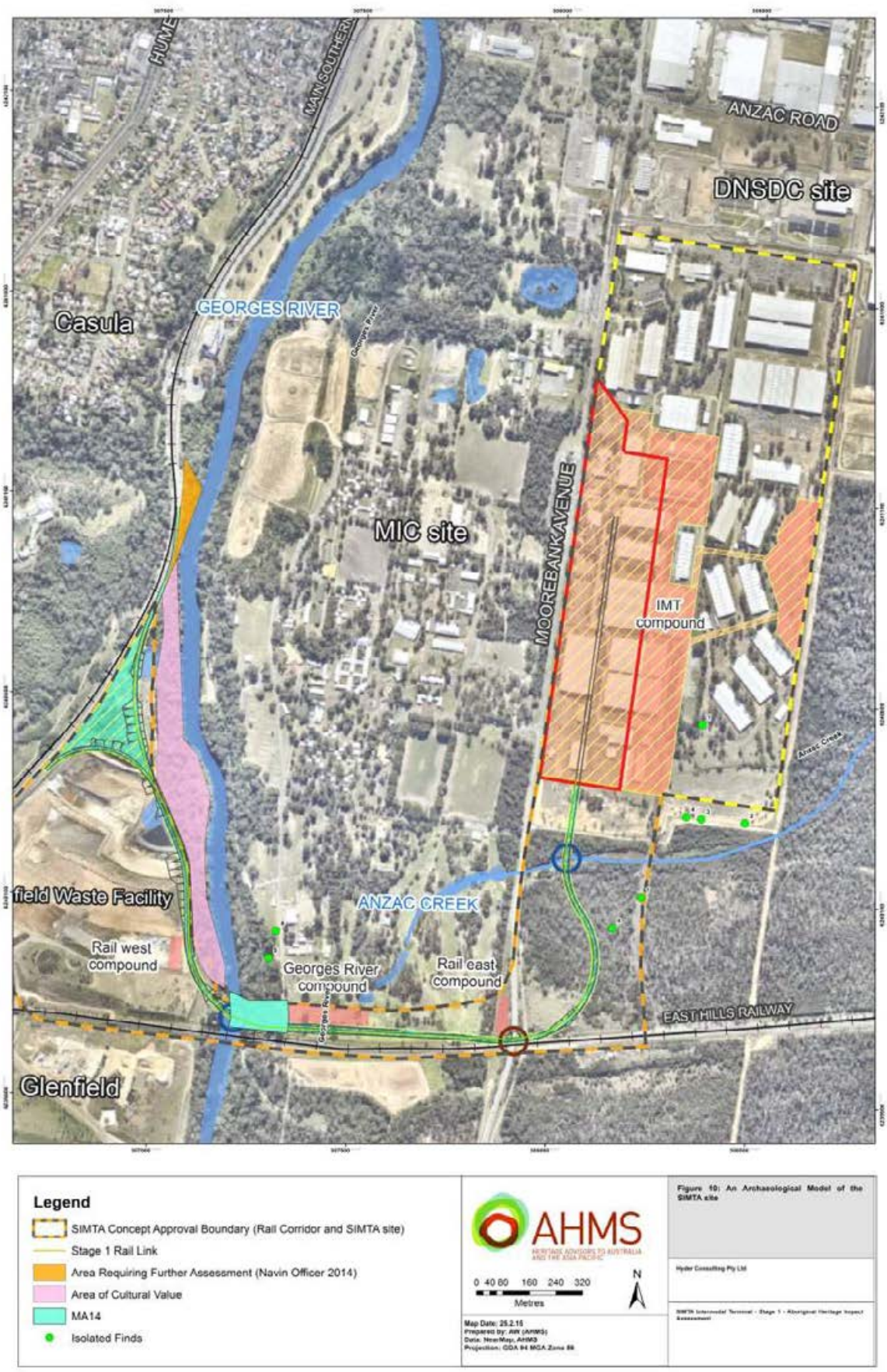

Figure 10. ***Map of Aboriginal objects/sites within the SIMTA site based on recent studies and the works within this assessment. Within the Stage 1 site, the key site identified was MA14, part of the original PAD 2, which has been shown to have the potential to contain significant cultural material. Other sites in close proximity to the Stage 1 rail line are also presented. Areas not highlighted are considered to have low risk of impacting significant Aboriginal objects/sites.***

7 ARCHAEOLOGICAL AND CULTURAL SIGNIFICANCE

While all Aboriginal objects in NSW are protected under NSW legislation, the *NPW Act 1974* recognises that the destruction of sites may be necessary to allow other activities or developments to proceed. In order for the State regulator to make informed decisions on such matters, a consideration of the significance of cultural heritage places and objects is an important element of the cultural heritage assessment process. The heritage significance of Aboriginal archaeological sites can be assessed using the four criteria outlined in the Burra Charter; aesthetic, historic, scientific, and social or spiritual (Australia ICOMOS, 2013).

7.1 Significance Levels and Thresholds

Most cultural places and objects are of cultural value to at least some individuals or community groups. The assessment process requires the analysis and ranking of significance. Australia has a four tiered system of heritage protection that has been implemented across all levels of government i.e. Commonwealth, State and Local governments. While heritage in NSW is managed under NSW legislation it is compliant with this four tiered system. Under this system, cultural heritage places and objects once identified are assessed according to their significance at World, National, State and Local levels and whether they are above or below threshold for listing or protection. For ease of discussion here we can set aside discussion of world heritage places as such places must meet a threshold of 'Outstanding Universal Value' (OUV) and such places are unlikely to occur in the study area. It is a requirement of this process that the higher levels will meet and exceed the thresholds for the level below. In other words a place or object of World Heritage Significance will also be of National significance and so on. This process can be visualised as shown in **Figure 11** where each of the protected categories of Local, State and National are subset of each other and indeed a broader inventory of places that have been assessed and considered. It can be seen that places that meet the threshold for a particular level of significance will have met the thresholds for the levels below: e.g. nationally significant places will as a pre requisite have satisfied the thresholds for State significance and Local significance.

In NSW 'State heritage significance', in relation to a place, building, work, relic, moveable object or precinct, means significance to the State in relation to the historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic value of the item, and 'Local heritage significance', in relation to a place, building, work, relic, moveable object or precinct, means significance to an area in relation to the historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic value of the item (S 4A, NSW *Heritage Act 1977*).

In assessing the significance of sites aspects such as rarity and representativeness and the integrity (sometimes referred to as the intactness of the site) must be considered. Generally speaking a site or object that is rare will have a heightened significance although a site that is suitable of conservation as 'representative' of its type will also be significant. Conversely an extremely rare site may no longer be significant if its integrity has been sufficiently compromised. For example a rare Pleistocene era site that would normally be considered of high scientific significance may be below threshold if the site has suffered substantial subsurface damage.

A summary of these values is presented in **Table 8**.

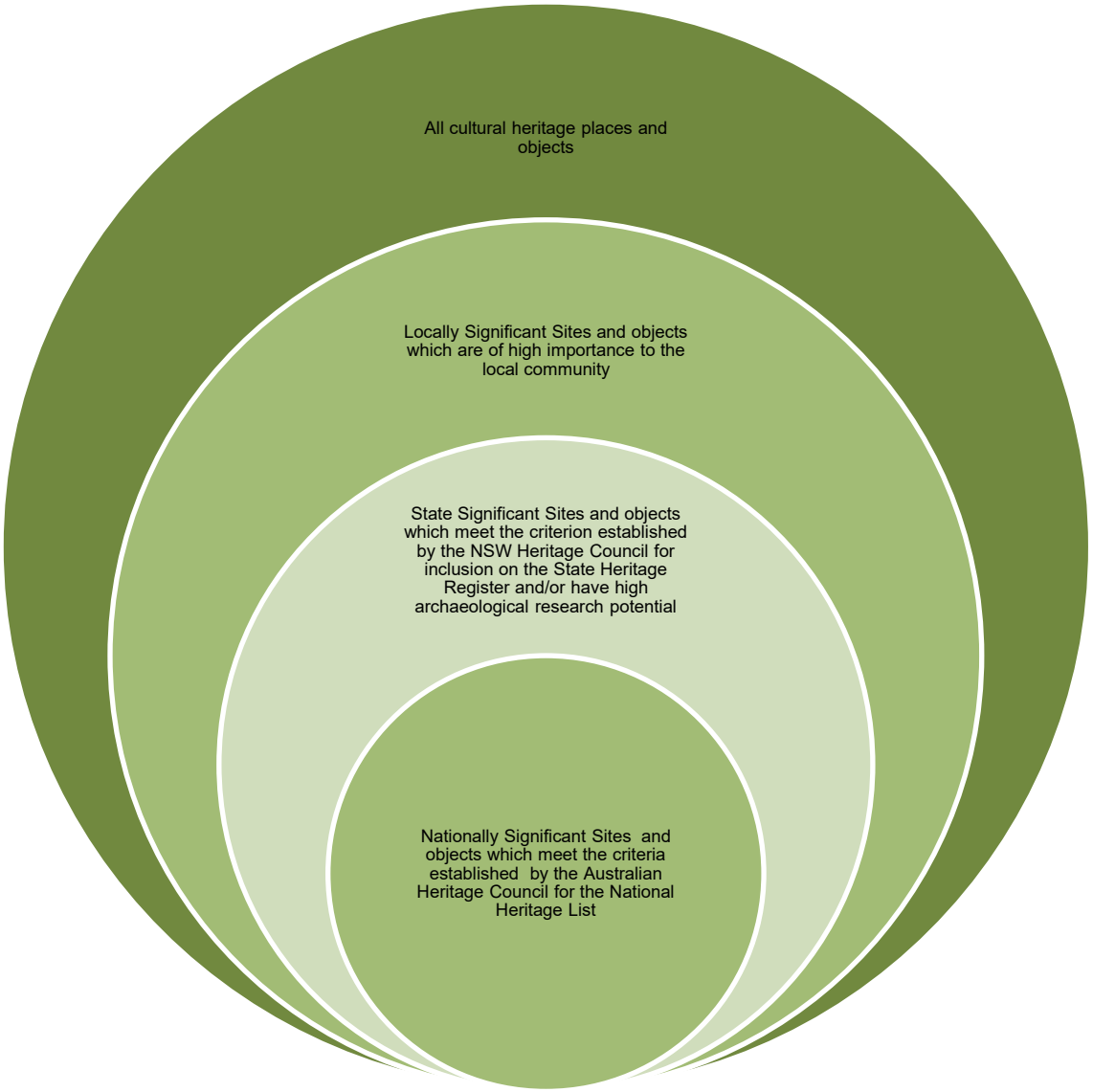

Figure 11. The tiered heritage system operating in Australia.

Aesthetic Significance

This criterion refers to aspects of sensory perception and the ability of the site to elicit emotional responses referred to as sensory or sensori-emotional values. The guidelines to the Burra Charter note that assessment may include consideration of the form, scale, colour, texture and material of the item or place, as well as sounds and smells. With regard to pre-contact Aboriginal cultural heritage sites, the placement within the landscape would be considered under this criterion as would memoryscapes and the ability of the site to transmit such memories. It is important to consider that sensori-emotional values are not always equated with "beauty"; for example massacre sites or sites of incarceration may have value under this criterion. Individual artefacts, sites and site features may also have aesthetic significance.

Historic Significance

The guidelines to the Burra Charter include the following discussion of historic significance:

A place may have historic value because it has influenced, or has been influenced by, an historic figure, event, phase or activity. It may also have historic value as the site of an important event. For any given place the significance will be greater where evidence of the association or event survives in situ, or where the settings are substantially intact, than where it has been changed or evidence does not survive. However, some events or associations may be so important that the place retains significance regardless of subsequent treatment.

In relation to Aboriginal cultural heritage, many post-contact places and sites would have historic value. Pre-contact places and items may also be significant according to this criterion, although the association with historic figures, events, phases or activities may be more difficult to establish. Places of historic significance may include sacred or ceremonial sites, sites of resistance battles and massacres, and archaeological sites with evidence of technological developments.

Social and Spiritual Significance

In Aboriginal heritage this criterion concerns the relationship and importance of sites to the contemporary Aboriginal community. Aspects of social and spiritual significance include people's traditional and contemporary links with a place or object as well as an overall concern by Aboriginal people for sites and their continued protection. Aboriginal cultural values may partially reflect or follow on from archaeological values, historic values, aesthetic values or be tied to values associated with the natural environment. This criterion requires the active participation of Aboriginal people in the assessment process as it is their knowledge and values that must be articulated.

Scientific Significance

Scientific value is associated with the research potential of a site. Rarity and representativeness are also related concepts that are taken into account. Research potential or demonstrated research importance, is considered according to the contribution that a heritage site can make to present understanding of human society and the human past. Heritage sites, objects or places of high scientific significance are those which provide an uncommon opportunity to provide information about the specific antiquity of people in an area, or a rare glimpse of artistic endeavour or a chronological record of cultural change of continuity through deep archaeological stratigraphy.

The comparative rarity of a site is a consideration in assessing scientific significance. A certain site type may be "one of a kind" in one region, but very common in another. Artefacts of a particular type may be common in one region, but outside the known distribution in another.

The integrity of a site is also a consideration in determining scientific significance. While disturbance of a topsoil deposit with artefacts does not entirely diminish research value, it may limit the types of questions that may be addressed. A heavily cultivated paddock may be unsuited to addressing

research questions of small-scale site structure, but it may still be suitable for answering more general questions of implement distribution in a region and raw material logistics.

The capacity of a site to address research questions is predicated on a definition of what the key research issues are for a region. In the region including the study area, the key research issues revolve around the chronology of Aboriginal occupation and variability in stone artefact manufacturing technology. Sites with certain backed implements from the Holocene are very common, but sites with Pleistocene evidence are extremely rare, and hence of extremely high significance if found.

Table 8. A summary of criteria and rankings used to determine a site's significance.

Criterion	Threshold indicators State	Threshold indicator local	Below threshold for significance
Aesthetic	The site or object elicits a strong emotional response and is part of a state or national narrative. Is set within a landscape that inspires awe.	The site is known or suspected of eliciting strong responses from the local community. While similar sites may exist elsewhere they are rare in the local area.	The site or object does not elicit a relevant sensori-emotional response. Or The site has been disturbed to the extent that it can no longer elicit a relevant sensori-emotional response
Historic	The site or object is important in representing an aspect of history important to the State or National as reflected in the Australian (and State) Historical Thematic Framework	The site or object is rare in the local area and, Would provide strong opportunities for interpretation to the public. The site illustrates elements of the history of the local area	The site is common in the local area, does not provide opportunities for interpretation to the public and does not contribute substantially to an understanding the historic themes relevant to the local area and or the state. (Note – individuals may still feel attachment for sites below threshold)
Cultural and or spiritual	The site or object is important to an understanding of pre or post contact Aboriginal cultural life in NSW The site or object is part of a dreaming story or track. The site or object is part of ongoing ceremony or ritual Substantial cultural knowledge about this site exists within the relevant Aboriginal community or custodians for this site or has been previously documented.	The site is important to local Aboriginal community or subset of the community and this importance can be articulated.	There is little or no knowledge in the Aboriginal community about this site or object. The knowledge that does exist falls into the category of family history and is not generally relevant to the broader Aboriginal community and or Aboriginal historical narrative. (Note – individuals may still feel attachment for sites below threshold)
Scientific (archaeological)	The site or object has potential to answer key questions about Aboriginal culture and society in NSW or Australia as a whole pre or post contact; The site or object is unique and /or rare and intact/ or the site is the best representative (and	The site or object is rare in the local area; and It provides potential to learn more about a little understood aspect of Aboriginal cultural or society in the local area. The site has a high artefact density, and is large enough in size to be used to interpret larger scale questions about	The site or object is common in the local area and or the state. The site does not have or has low excavation /research potential OR the site is common but has some potential information to be salvaged.

Criterion	Threshold indicators State	Threshold indicator local	Below threshold for significance
	intact) example of a type of site that may be common but not conserved elsewhere.	technology and occupation in the local area.	

7.2 Statement of Significance

This assessment identified only one Aboriginal site within the Proposal Site, specifically MA14. This site forms a part of the previously documented PAD 2, and has been re-labelled as an Aboriginal site following excavations.

Based on the excavations undertaken here, MA14 contains localised evidence of past Aboriginal activity and occupation on the maximal upper slopes and ridgeline over-looking Georges River. It is acknowledged that large parts of the site are disturbed, but those areas intact contain deep stratified deposits with at least two periods of past activity. The lower assemblage has been dated to ~18ka, and represents some of the earliest evidence of Aboriginal activity on the Georges River and more broadly within the Cumberland Plain. For this reason, the site is considered to have high research potential, and meet the thresholds of local significance (**Table 9**). These early sites with Pleistocene dates are a rare occurrence and should the lower assemblage prove to be more extensive (with future stages of work - see **Section 9.6**), the site has the potential to be of State significance.

MA14 can also be considered to have some aesthetic value. It is located near relatively undisturbed sections of Georges River and this site therefore provides an opportunity to gain a sense of the setting in the pre-colonial landscape.

No site specific cultural significance was provided by the Aboriginal stakeholders in relation MA14. However, sites of potential antiquity, and which contain extensive cultural material are frequently identified as of importance to the Aboriginal people, and as such the site can be considered to have cultural values.

The area identified as of cultural value was assessed in AHMS (2012a), and was considered to meet the threshold of locally significant for social and spiritual values, and this assessment has identified no information to modify this finding.

The area identified for further work by Navin Officer Heritage Consultants (2014) immediately north of the Stage 1 Rail link to the west of Georges River was assessed as meeting several Commonwealth Heritage criteria (b, c, d, g and i) associated with Indigenous and natural values.

The management implications of the site's significance are discussed in **Section 9**.

Table 9. Table of scientific significance of investigated sites.

Site	Site Type	Scientific Significance	Aesthetic Significance	Historic Significance	Social/ Spiritual Significance	Overall Significance
MA14 (formerly PAD 2)	Artefact Scatter and archaeological deposit	Local (potentially State)	Below threshold	Below threshold	Local	Local

8 IMPACT ASSESSMENT AND MANAGEMENT STRATEGIES

8.1 General

The following section details the potential archaeological impact of the Proposal Site, and the relevant legislative requirements to address this impact. Options to avoid, minimise and/or mitigate impact are outlined.

8.2 Summary of the Proposed Development

The SIMTA Project involves the development of an intermodal facility, including warehouse and distribution facilities, freight village (ancillary site and operational services), stormwater, landscaping, servicing and associated works. The SIMTA Project also includes a Rail link, within an identified rail corridor, which connects from the southern part of the SIMTA site to the SSFL. **Section 1.4** outlines the proposal, which includes the southwest portion of the SIMTA site, and the Rail link.

From an archaeological perspective, the development would result in extensive earthworks and landscape modification in these areas, and would impact intact soil profile (and associated cultural material) that may be present. The Rail link, which is the only element of the development likely to harm Aboriginal objects / sites is proposed to be ~20m wide.

8.3 Potential Archaeological Impact

Only one Aboriginal site was identified within the Proposal Site, MA14 (artefact scatter and deposit). This site was situated on the maximal upper slopes and ridge adjacent Georges River within the MIC site and the SIMTA Rail Corridor. The proposed Rail link would directly impact this site. Specifically, the alignment runs through the southern portion of this site, and would impact ~20% (2,000m^2) of the site (~10,000m^2).

Two other sites are situated outside of the Stage 1 Proposal, but in close proximity. These incorporate the riparian corridor along the western bank of Georges River, which has been identified variously as of cultural and archaeological importance. The area is unlikely to be impacted through the development, but should the boundary change, or works extend over this boundary, they would be affected. Recommendations have been made to ensure these areas remain unaffected during the development.

8.4 Summary of Statutory Context

Aboriginal objects in NSW are protected by the National Parks and Wildlife Act 1974. An Aboriginal object is defined as:

... any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains.

Anyone who discovers an Aboriginal object is obliged to report the discovery to OEH.

It is an offence to harm or desecrate an Aboriginal object. However, there are a number of defences and exemptions to this offence, one of which is that harm was carried out under an Aboriginal Heritage Impact Permit (AHIP).

In the case of this project, management of Aboriginal objects is addressed through the Concept and Project Approvals obtained and/or being sought under Part 4 (Division 4.1) of the *Environmental Planning and Assessment Act 1979.* This approval pathway turns off the need for AHIPs for damaging or defacing Aboriginal objects/sites to be obtained. Rather, Aboriginal heritage is managed through the requirements and recommendations of Aboriginal heritage documentation developed through the approval process, and any subsequent Conditions of Consent based developed from them.

8.5 Management Strategy

The development of heritage management recommendations in the context of a proposed development is based on the significance, or heritage values of the site concerned, the relevant legislative protection, and the feasibility of the overall development.

In general, avoidance of impact must be recommended as the first or best option for the management of the heritage values of a particular study area. However, it is understood the Rail link cannot be redesigned and therefore the following management strategy has been developed to mitigate potential impacts to Aboriginal heritage.

Despite the large-scale nature of the development of the SIMTA Project, there are few impacts to Aboriginal heritage. Following the works undertaken in AHMS (2012a), the additional investigations undertaken here indicate that only one Aboriginal site would be affected by the Proposal. This site, MA14 (formerly part of PAD 2), was identified as an artefact scatter and deposit of local archaeological significance situated on the elevated areas over-looking the Georges River. Excavations revealed a stratified site with at least two periods of previous activity and occupation; the lower assemblage has the potential to be of significant antiquity. It must be noted, however, that while the site was considered of local significance, it has potential to be of greater importance, with several similarities to other key archaeological sites across the Cumberland Plain. For this reason, should impacts to this site be necessary, additional mitigation measures have been proposed in **Section 9.6**.

The Rail link to the west of Georges River is also in close proximity to the riparian corridor of Georges River. These areas have been identified as of cultural and archaeological importance by various studies. Based on overlays undertaken here, none of the works would affect these areas, which are outside of the SIMTA site boundary. However, should such impacts be required, these areas would require further assessment (in the form of sub-surface investigations) prior to any development. Indirect impacts to these areas should be avoided through the installation of temporary fencing along the SIMTA site boundary prior to any works being initiated.

Since the Stage 1 Proposal is being assessed under Part 4 (Division 4.1) of the EP &A Act, an Aboriginal Heritage Impact Permit under the *National Parks and Wildlife Act 1974* is not required. Rather, the recommendations outlined in **Section 9.7** below should be integrated into the Conditions of Approval and project's Construction Environmental Management Plan to ensure Aboriginal heritage is appropriately managed through the life of the Proposal.

8.6 Mitigation Measures

8.6.1 Rationale for Salvage Excavations

Following the assessment and its findings, it is considered that additional archaeological mitigations are warranted in the vicinity of MA14. The proposed development would impact ~20% of this site, an artefact scatter and deposit of local (and potentially State) significance (**Figure 10**).

Based on the excavations undertaken here, MA14 contains localised evidence of past Aboriginal activity and occupation on the maximal upper slopes and ridgeline over-looking Georges River. It is acknowledged that large parts of the site are disturbed, but those areas intact contain deep stratified deposits with at least two periods of past activity. The lower assemblage has the potential to be significantly old based on similar types of deposit in other parts of the Cumberland Plain. Based on the excavations, the areas around test pit #3 contained the most undisturbed soil profile, the greatest diversity, moderate levels of artefact density, and were close to Georges River, and a larger assemblage for analysis was considered desirable.

It was determined that the level of test excavation was adequate to characterise and assess the development footprint for the purpose of the Approval, but was insufficient to appropriately document the findings of test pit #3 if it were to be partially impacted or destroyed. Since conservation of these areas within the development footprint is not a viable option, heritage impact mitigation in the form of salvage excavation of the area is the preferred option.[1] Such works would also provide an improved characterisation of the parts of the site remaining unaffected by the development.

Due to the relatively coarse nature of the test excavations (the main aim of which was to identify the presence or absence of Aboriginal objects, as well as their broad spatial patterning), salvage excavations are proposed to undertake a more detailed recovery and recording of cultural deposits within the study area; obtain a large sample of the archaeological assemblage; and to undertake additional environmental and chronological analysis to further understand the site's formation and use in the past. From an archaeological perspective, this is important to:

- Obtain a statistically viable assemblage of cultural material, which based on other nearby studies is in the order of 2,000+ artefacts.
- Focus on obtaining a chronology for occupation of the site, which is likely to be of late Holocene (<5,000 years BP) and possibly Pleistocene (>10,000 years BP) based on artefact typology and two distinct periods of activity in the soil profile.
- Undertake detailed analysis of the lithic assemblage to provide further information on the suite of production activities, from exploitation of the raw material outcrops to the development of complex stone tools.
- Improve our understanding of the length and nature of occupation of Georges River, and compare it with other major river systems were early occupation is well-documented (e.g. Hawkesbury and Parramatta Rivers).

It may also result in greater interpretive and education outcomes for the local and regional community, and further empowerment of the local Aboriginal community. There is also a range of cultural reasons for undertaking the salvage, to ensure the Aboriginal communities have an awareness of and association with the site before its re-development; this form of 'cultural salvage' is becoming more

[1] The earthworks proposed for this area would likely require elevation of the ground-surface, and burial in situ of these deposits may be a viable option. However, OEH and many of the Aboriginal stakeholder groups generally consider such an approach to be an 'impact' to the cultural materials, and hence not conservation.

common in large-scale development projects, and often replaces the less effective and more risky 'cultural monitoring' often practiced.

All mitigation works would be constrained to the area immediately around test pit #3, and would consist of an open area salvage excavation. Salvage excavations are proposed to consist of 100 m^2. Ideally salvage excavations would consist of one large open area, which is usually the most successful for achieving the research objectives below, most notably retrieving a large assemblage and gaining greater understanding of the use and occupation of the site; and is the simplest and most cost-effective approach to large-scale excavations (rather than multiple excavations across a large area). However, should early results of the salvage excavation in this area prove to be inadequate in order to meet the research objectives, additional salvage would be undertaken in other undisturbed areas (most likely around test pit #2 or #6 based on artefact densities and depth of deposit). Where multiple salvage areas are undertaken, they would ultimately total up to 100m^2. While there is no specific direction or requirement on the extent of salvage excavations, we propose recovery of 100m^2, rather than another value, based on a number of recent salvage projects undertaken by AHMS that achieved highly successful outcomes (e.g. AHMS 2011b, 2012e, Williams et al. 2012, 2014). In general, this broad approach and quantum was pioneered by Jo McDonald Cultural Heritage Management Pty Ltd (JMCHM) in western Sydney (e.g. JMCHM, 2005; Staib, 2002), and has been adopted by a number of consultants in NSW (e.g. ERM, 2006; ENSR AECOM 2008; Southeast Archaeology, 2000). In over a decade of consulting archaeology, we find this approach (outlined below) provides sound archaeological outcomes efficiently.

8.6.2 Research Objectives

The proposed salvage excavation has the following research objectives:

- Using fine resolution excavation and environmental analyses to further characterise the archaeological deposits relating to the prehistoric Aboriginal occupation of MA14. This includes a greater understanding of resource exploitation; identification of any change through time in spatial and chronological phases of activity; and site formation processes.
- To use the findings of MA14 to further understand the wider occupation and activity of Aboriginal people in northwest Sydney.
- To obtain the largest possible assemblage of Aboriginal objects, for detailed documentation and long term curation, within the spatial limits of the site and the financial/time constraints of the project.
- To allow greater cultural association between the site and the Aboriginal stakeholders (i.e. a form of cultural salvage) through involvement in the excavation, and options for the interpretation of the results, should the community decide that this is appropriate.
- To ensure that the development can proceed with a minimised risk of unknown or unexpected significant Aboriginal objects/features being harmed during construction.

8.6.3 Excavation Methodology

The proposed methodology is broadly consistent with the recently-completed excavation, in order to ensure that the results are comparable. For example, this methodology was used by AHMS in the recent archaeological salvage excavation at Fernadell Precinct, Pitt Town (AHIP No. 1129099; AHMS 2012; Williams et al., 2014). The use of the results in the post-excavation analysis and reporting showed that the methodology provided meaningful information, which could allow for long term curation with the Australian Museum (based on verbal discussions); data acceptable for international publication; and able to assist in wider education and interpretive outcomes.

The methodology would consist of up to 100 m^2 focussed initially on test pit #3. The excavation would be conducted with a series of hold points where additional excavation would only be undertaken if significant Aboriginal cultural material is being recovered and/or information on the research aims are continuing to be addressed. The decision to continue would be made by the excavation director in consultation with the RAPs and developer, and should include the ongoing presence of undisturbed or deep sand, the presence of Aboriginal objects (ideally in dense numbers), and/or any archaeological features of interest (such as hearths, knapping events, etc). The initial hold point would be 36m^2 (6x6m square), a further hold point would occur at 49m^2 (7x7m), and a final hold point at 81m^2 (9x9m).

All excavation would be undertaken manually, using shovels, mattocks and trowels, etc, by a team of archaeologists and Aboriginal stakeholders. The number of the team is to be determined, but would probably number between 8 and 10, with a field program proposed for approximately 6-8 weeks. Excavations would be undertaken in contiguous 50cm^2 test pits and in 5 cm spits up to the total area permitted. Each test pit would be dug discretely with AHD heights being obtained every four spits to ensure vertical integrity. Each test pit would be given an alpha-numeric label for identification purposes. A standard site recording form will be used for each spit of each excavation unit (50 x 50 cm). Details will include site name, date, site recorder, spit number and depth, square ID, description of finds, description of soil, sketch plan of excavation (if relevant to show feature) and a bucket tally. Excavation would be undertaken to basal clays or culturally sterile deposits, which based on the test excavation program is likely to be between 80-100cm below the surface.

Sediment from each 5 cm spit would be bucketed separately and sieved through 3mm mesh. Any Aboriginal objects recovered from the sediments would be retained in a plastic bag with the relevant test pit alpha-numeric code written upon it.

During, or immediately following, completion of the excavation, a range of soil and chronological samples would be taken. Soil and environmental samples would be taken at regular intervals through the soil profile (probably in the order of 2-5cm) and retained in labelled plastic bags for subsequent analysis. Radiocarbon and/or OSL samples would be taken in areas where Aboriginal objects are found, and generally try to bracket the deposit (to provide a maximum and minimum age). Material for radiocarbon analysis may also be undertaken opportunistically if archaeological features containing charcoal or other dateable material are evident.

All test pits, and the final open area, would be documented using photographic records, written descriptions and scaled drawings.

If discrete high-density artefact concentrations or cultural features, such as hearths, are revealed during the excavation, these will be excavated and recorded (by photography and planning). The locations of in-situ artefacts in such features may also be individually recorded.

A surveyor will be engaged to plan the locations of the salvage excavation areas, and establish a site datum, in order to record the level of deposits and features. A scaled photographic record will be kept, along with scaled drawings and written descriptions of the site and any findings.

8.6.4 Analysis and Reporting

The post-excavation analysis would be designed to address the research objectives, along with other relevant questions that may arise based on the results of the excavation. Results of analysis would be presented in relation to comparative site data where possible and where useful in addressing the research questions. Post-excavation analysis would involve the following components.

Stone Artefact Analysis

A qualified lithics specialist would undertake descriptive and functional recording of recovered artefacts. The analysis would be consistent with that undertaken during the test excavation post-

excavation analysis in order to facilitate data comparison. Specifically, the analysis would aim to determine the following:

- Source information. What raw material resources were used; where did they come from; and what does this tell us about Aboriginal use of the region in the past?
- Stone reduction technology. How was the stone worked and used? Does this change over time? Can the function of the site be inferred from the artefact assemblage? What does this tell us about Aboriginal occupation, use, settlement and activities undertaken through time in this region?
- Post-depositional influences. What post-depositional influences have impacted on the assemblage, and what does this tell us about the integrity and significance of the site?
- Site chronology. When was the site occupied? Was the assemblage the product of repeated occupations or a single event? Is there spatial patterning in the assemblage, and what does this tell us about repeated use, activities and/or occupation of the region through time?
- Landforms. Is it possible to differentiate between occupation of different landforms based on the spatial patterning of the assemblage?

A program of conjoin analysis (re-fitting) on a sample of artefacts may be undertaken if higher density concentrations (greater than 30 artefacts per square metre) are found during the excavation. As described above, scope has been provided for 3D recording of individual artefacts within discrete artefact concentrations or other cultural features.

Analysis of the vertical and horizontal patterning of artefact distribution will be undertaken using the data derived from excavation in 50 x 50 cm units and 5 cm spits. This would attempt to provide information about the stone reduction strategies used at the site, temporal change, and the extent and nature of post-depositional influences.

Geomorphology

Geomorphological analysis and reporting was undertaken as part of the ACHA, and it is probable that the results of this work would apply equally to the salvage excavation. However, should significant variations in geomorphology be discovered, a specialist could be engaged to inspect and report upon these.

Dating

If suitable features and/or deposits are discovered, samples would be taken for dating, by radiocarbon or OSL analysis, depending on the nature of the sample.

Reporting

The results of the salvage excavation would be analysed, and presented in an excavation report. The report would be provided to the RAPs as a draft for review, and as a final version, incorporating any RAP comments received on the draft. The final version would be lodged with OEH. An Aboriginal Site Impact Recording Form would also be completed and lodged with OEH.

8.6.5 Community Consultation

Aboriginal community consultation will continue throughout the project, in broad accordance with the current OEH guidelines. In addition, there are a number of options for conveying the results of the proposed salvage excavation to the RAPs, and developing interpretation strategies with the RAPs. These options will be discussed further with the RAPs and the applicant in the course of the project.

8.6.6 Storage of Aboriginal Objects

All Aboriginal objects recovered will be securely stored at the archaeologists' office for analysis. Arrangements will be discussed with the RAPs regarding the long-term management of the objects following analysis.

Option 1: Deposition with the Australian Museum

Depending on the nature and significance of the assemblage recovered, it may be possible to deposit the objects with the Australian Museum. The assemblage would be assessed for accession according to the *Archaeological Collection Deposition Policy* (Australian Museum, January 2012) and the *Protocols for the Deposition of Archaeological Material* (Australian Museum, January 2012). It is important to note that while the assemblage may be assessed as significant under several criteria, the Museum will further assess the assemblage in line with their capacity to house the collection, and there is no legislative requirement for the Museum to accept the assemblage.

Acceptance of the assemblage by the Museum will depend upon the significance of the material and the Museum's capacity to accept it. The assemblage must have an appropriate level of significance against at least one of the following criteria:

- Social or cultural value to the Aboriginal community.
- Research potential.
- Capacity to enhance the geographic, temporal and/or thematic coverage of the Australian Museum archaeology collections.
- Public program and educational value to the Australian Museum.

The significance thresholds are not specified. It is not possible to assess the significance of an assemblage, or apply to the Museum for deposition, until after the excavation and analysis has been completed.

Option 2: Reburial on site

Reburial of the assemblage is an option where the property owner agrees, and can ensure the care of the Aboriginal objects in perpetuity at the reburial location. This Option requires that a Management Plan be prepared in consultation with the RAPs. This Plan outlines how the reburial site will be protected.

Option 3: Care and Control Agreement

The third option is for one of the RAPs to accept the assemblage, in accordance with section 85A (1) (c) of the NPW Act. This would be done in accordance with a Care and Control Agreement developed in consultation with all of the RAPs and submitted for approval to the Office of Environment and Heritage. If deposition of the assemblage in a Keeping Place is required, a written commitment would be produced by the proponent in conjunction with the RAPs addressing the nature of the Keeping Place, and how it would be funded, maintained and administered. Should there be disagreement regarding the proposed custodian of the assemblage, this would be determined and/or arbitrated by the Office of Environment and Heritage.

8.7 Recommendations

Please note that the recommendations below may be modified following review by the Registered Aboriginal Parties.

The recommendations below are made to ensure that the proposed development mitigates impacts on Aboriginal cultural heritage and complies with all state legislative requirements. We highlight that the preferred heritage outcome is, as always, to redesign the project to avoid impacts on Aboriginal cultural heritage altogether wherever possible and where this is not possible to minimise impacts.

- Consultation should be maintained with the Aboriginal stakeholders during the finalisation of the Stage 1 Proposal. This should focus on the long term curation and management of the Aboriginal objects recovered through the archaeological program, and any mitigation measures implemented prior to, and during, the works.
- Following finalisation, a copy of the report should be lodged with the Office of Environment and Heritage (OEH) Aboriginal Heritage Information Management System (AHIMS), and each of the Aboriginal stakeholders.
- If re-location of any element of the Stage 1 Proposal outside the area assessed in this study is proposed, further assessment of the additional area(s) should be undertaken to identify and appropriately manage Aboriginal objects/sites/places that may be in this additional area(s).
- Management of Aboriginal heritage should be included in the Stage 1 Proposal's Construction Environmental Management Plan or equivalent document. Information should include the findings, mitigation measures and recommendations of this report, along with guidance on unexpected archaeological and cultural finds (including human remains).
- SIMTA should advise all relevant personnel and contractors involved in the design, construction and operation of the Stage 1 Proposal of the relevant heritage considerations, legislative requirements and recommendations identified in this report.
- The Stage 1 Proposal is likely to impact one Aboriginal site, MA14 (artefact scatter and deposit) on the eastern bank of Georges River. Due to the significance of this site, additional mitigation measures prior to development is recommended and outlined in **Section 9.6** of this report. These include open area salvage excavation of up to 100m^2 in the vicinity of test pit #3.
- The Stage 1 Proposal is in close proximity (but does not directly impact) a number of Aboriginal sites encompassing the western riparian corridor of Georges River. To avoid inadvertent impact, appropriate temporary fencing should be installed along the Proposal's boundary in this location. Should activities be proposed to extend beyond this boundary, appropriate heritage investigations must first be undertaken.
- An Aboriginal Heritage Site Recording Form for MA14 (included in **Appendix 10**) should be submitted to the Office of Environment & Heritage AHIMS database following finalisation of this report.
- The draft report should be submitted to the RAPs for their review and comment prior to finalisation.

9 REFERENCES

AHMS (2011) Cleary Precinct, Pitt Town, NSW – Aboriginal Heritage Impact Permit #1110877 Excavation Report. Unpublished Report to Johnson Property Group Pty Ltd.

AHMS (2012a) Aboriginal Cultural Heritage Assessment: SIMTA Moorebank Intermodal Terminal Facility. Unpublished Report for Hyder Consulting Pty Ltd.

AHMS (2012b) Indigenous Biodiversity Values Assessment: Sydney Intermodal Terminal, Moorebank, NSW. Unpublished Report for Hyder Consulting Pty Ltd.

AHMS (2012c) Aboriginal Cultural Heritage Assessment – Glenfield Waste Disposal, Glenfield, NSW. AHMS Unpublished Report to Environmental Property Services Pty Ltd.

AHMS (2012d) 330 Church Street, Parramatta, NSW – Aboriginal Heritage Impact Assessment. Unpublished Report to Meriton Apartments Pty Ltd.

AHMS (2012e) Fernadell Precinct, Pitt Town, NSW - Aboriginal Heritage Impact Permit #1129099 – Report on Salvage Excavations. Unpublished Report to Johnson Property Group Pty Ltd.

AHMS (2013) Aboriginal Cultural Heritage Assessment – 189-191 Macquarie Street, Parramatta, NSW. Unpublished Report to Toplace Pty Ltd.

AHMS (2014) Aboriginal Cultural Heritage Assessment – 2-8 River Road West, Parramatta, NSW. Unpublished Report to Toplace Pty Ltd.

Attenbrow, V.J. (2010) *Sydney's Aboriginal Past. Investigating the Archaeological and Historical Records*. (2nd edition – soft cover). Sydney: UNSW Press.

Baker, C. M. (1978) The size effect: an explanation of variability in surface assemblage content. *American Antiquity* 43:288-293.

ERM (2006) Aboriginal archaeological salvage excavation report of Aboriginal site OAD1 at Claremont Meadows, NSW. Unpublished Report to Landcom.

ENSR AECOM 2008, Stage 1 archaeological test excavations -GCC Precincts Oran Park and Turner Road, South West Growth Centre, NSW. *Unpublished Report to NSW Growth Centres Commission.*

Jo McDonald Cultural Heritage Management P/L (JMcDCHM) (2002) Excavations at Windsor Road, Kellyville, NSW (Site RH/CD 12: NPWS # 45-5-962) Archaeological Salvage Programme prior to residential development. Unpublished Report prepared for Australand Holdings Ltd.

JMCHM (2005) Archaeological salvage excavation of site RTA-G1 - 109-113 George Street, Parramatta, NSW. Unpublished Report to Roads and Traffic Authority.

JMcDCHM (2008) Archaeological mitigation of the sedimentation pond at RH/CD 7, Caddies Creek. Unpublished Report prepared for Lend Lease GPT (Rouse Hill) Pty Ltd.

McCarthy, F. (1964) The archaeology of the Capertee Valley. Records of the Australian Museum 26, 197-246.

McDonald, J. (2008) *Dreamtime Superhighway. Sydney Basin Rock Art and Prehistoric Information Exchange. T*erra Australis 27. The Australian National University, Canberra.

Navin Officer Heritage Consultants (2014) Moorebank Intermodal Terminal, Aboriginal Cultural Heritage Assessment. Unpublished Report for Parsons Brinckerhoff.

Richardson, N. (1992) Conjoin sets and stratigraphic integrity in a sandstone shelter: Kenniff Cave (Queensland, Australia*). Antiquity* 66:408-418.

Southeast Archaeology (2000) Salvage of Aboriginal archaeological sites in relation to the F3 Freeway near Lenaghans Drive, Black Hill, New South Wales. Unpublished Report to Roads and Traffic Authority.

Staib, R. (2002) Archaeological assessment in the Rouse Hill urban release area. *Australian Archaeology*, 54: 22-28.

White, E., McDonald J (2010) Lithic artefact distribution in the Rouse Hill Development Area, Cumberland Plain, New South Wales. *Australian Archaeology*, 70: 29-38.

Williams, A.N., Mitchell, P., Wright, R.V.S., Toms, P. (2012) A Terminal Pleistocene Open Site on the Hawkesbury River, Pitt Town, NSW. *Australian Archaeology*, 74: 85-97.

Williams, A.N., Atkinson, F., Lau, M., Toms, P. (2014) A Glacial cryptic refuge in southeast Australia: Human occupation and mobility from 36,000 years ago in the Sydney Basin, New South Wales. *Journal of Quaternary Science*, 29(8): 735-748.

Appendix 1: Consultation Log

Agency	Contact	Date	Details	AHMS Contact
Greater Sydney Local Land Services	-	14.11.14	Sent search requests for potential Aboriginal stakeholders.	Fenella Atkinson
Liverpool City Council	-			
NTSCorp	-			
Office of Environment and Heritage	Miranda Firman			
Tharawal Local Aboriginal Land Council	-			
National Native Title Tribunal	-			
Office of the Registrar, *Aboriginal Land Rights Act 1983*	-			
Greater Sydney Local Land Services	Margaret Bottrell	17.11.14	Margaret emailed to advise that she is not able to pass on the information requested. She will pass on the letter to the members of the Advisory Committee.	Fenella Atkinson
National Native Title Tribunal	Sylvia Jagtman	18.11.14	Sylvia emailed results of a search of the NNTT Registers over the Liverpool LGA. A registered claim extends into the LGA – Gundungurra Tribal Council Aboriginal Corporation #6 (NSD6060/1998 / NC1997/007).	Fenella Atkinson
Liverpool City Council	Norma Burrows	20.11.14	Norma emailed a list of potential stakeholders for projects within the Liverpool LGA. Also advised that she would table the information at the next meeting of the LCC Aboriginal Consultative Committee, on 3 December.	Fenella Atkinson
OEH	Miranda Firman	25.11.14	Provided a list of Aboriginal stakeholders for the region.	Alan Williams
Liverpool City Champion	-	26.11.14	Project notification and invitation to register an interest	Alan Williams
Office of the Registrar, *Aboriginal Land Rights Act 1983*	Bianca Ceissman	2.12.14	Study area does not appear as being affected by a land claim.	Fenella Atkinson
Cubbitch Barta Native Title Claimant Aboriginal Corporation (CBNTC)	Glenda Chalker	3.12.14	Distributed a letter of information and assessment methodology on the project seeking the organisations interest, and any comments on the methodology. The same letter revised with corrected dates sent early on the 4.12.14.	Alan Williams
Darug Aboriginal Cultural Heritage Assessment (DACHA)	Gordon Morton	3.12.14	Distributed a letter of information and assessment methodology on the project seeking the organisations interest, and any comments on the methodology. The same letter revised with corrected dates	Alan Williams

Agency	Contact	Date	Details	AHMS Contact
			sent early on the 4.12.14.	
Darug Aboriginal Landcare Inc (DALI)	Des Dyer	3.12.14	Distributed a letter of information and assessment methodology on the project seeking the organisations interest, and any comments on the methodology. The same letter revised with corrected dates sent early on the 4.12.14.	Alan Williams
Darug Custodian Aboriginal Corporation (DCAC)	Leanne Watson	3.12.14	Distributed a letter of information and assessment methodology on the project seeking the organisations interest, and any comments on the methodology. The same letter revised with corrected dates sent early on the 4.12.14.	Alan Williams
Darug Land Observations (DLO)	Gordon Workman	3.12.14	Distributed a letter of information and assessment methodology on the project seeking the organisations interest, and any comments on the methodology. The same letter revised with corrected dates sent early on the 4.12.14.	Alan Williams
Darug Tribal Aboriginal Corporation (DTAC)	Denise Newham	3.12.14	Distributed a letter of information and assessment methodology on the project seeking the organisations interest, and any comments on the methodology. The same letter revised with corrected dates sent early on the 4.12.14.	Alan Williams
Gandangara LALC	Mikael Smith, P. Knight	3.12.14	Distributed a letter of information and assessment methodology on the project seeking the organisations interest, and any comments on the methodology. Sought clarification on whether it was in the LACL boundaries. The same letter revised with corrected dates sent early on the 4.12.14.	Alan Williams
Tharawal LALC	Heritage Officer	3.12.14	Distributed a letter of information and assessment methodology on the project seeking the organisations interest, and any comments on the methodology. Sought clarification on whether it was in the LACL boundaries. The same letter revised with corrected dates sent early on the 4.12.14.	Alan Williams
Tocomwall	Scott and Danny Franks	3.12.14	Distributed a letter of information and assessment methodology on the project seeking the organisations interest, and any comments on the methodology. The same letter revised with corrected dates sent early on the 4.12.14.	Alan Williams
Wurrumay Consultancy	Kerrie Slater	3.12.14	Distributed a letter of information and assessment methodology on the project seeking the organisations interest, and any comments on the methodology. The same letter revised with corrected dates	Alan Williams

Agency	Contact	Date	Details	AHMS Contact
			sent early on the 4.12.14.	
Warragil Cultural Services	Aaron Slater	3.12.14	Distributed a letter of information and assessment methodology on the project seeking the organisations interest, and any comments on the methodology. The same letter revised with corrected dates sent early on the 4.12.14.	Alan Williams
Liverpool City Council Aboriginal Consultative Committee	Norma Burrows	3.12.14	Distributed a letter of information and assessment methodology on the project seeking the organisations interest, and any comments on the methodology. The same letter revised with corrected dates sent early on the 4.12.14.	Alan Williams
CBNTC	Glenda Chalker	4.12.14	Registered an interest in the project	Alan Williams
NTSCorp	George Tonna	5.12.14	George advised that NTSCorp cannot provide contact details of traditional owners, but that the information provided will be forwarded to any stakeholders of whom they are aware.	Fenella Atkinson
DACHA	Celestine Everingham	5.12.14	Registered an interest in the project	Alan Williams
Tocomwall	Danny Franks	4.12.14	Registered an interest in the project, and supported the assessment methodology.	Alan Williams
DCAC	Justine Coplin	5.12.14	Registered an interest in the project	Alan Williams
CBNTC	Glenda Chalker	11.12.14	Advised that our proposed excavations were in similar locations to another study by Navin Officer to the west of Moorebank Avenue for another terminal hub.	Alan Williams
DALI	Des Dyer	10.12.14	Registered an interest in the project	Alan Williams
Cubbitch Barta Native Title Claimants Aboriginal Corporation	Glenda Chalker	11.12.14	Glenda sent a response to the methodology. Noted that PAD1 and PAD2 had recently been subject to test excavation by Navin Officer, and that these areas should therefore not be included in the assessment. Otherwise agrees with the recommendations.	Alan Williams
Darug Land Observations (DLO)	Gordon Workman	18.12.14	Registered an interest in the project	Alan Williams
Cubbitch Barta Native Title Claimants Aboriginal Corporation	Glenda Chalker	7.1.15	Emailed a reminder that comments on the proposed methodology are due today. Requested completed access application forms for nominated site officers.	Fenella Atkinson
Darug Aboriginal Cultural Heritage Assessments	Celestine Everingham			

Agency	Contact	Date	Details	AHMS Contact
Darug Aboriginal Landcare	Des Dyer			
Darug Custodian Aboriginal Corporation	Justine Coplin			
Darug Land Observations	Gordon Workman			
Tharawal Local Aboriginal Land Council	CEO and Heritage email addresses			
Tocomwall	Scott Franks Sarah Franks Danny Franks			
Darug Land Observations	Gordon Workman	7.1.15	Gordon rang. He was not sure if he had provided a response to the methodology, and could not check his files at present. Fenella to check with Alan when he returns from leave. In the meantime, Gordon advised that he supported the proposed methodology. Regarding the access forms – Fenella to email reminder to Gordon, listing the information required, Gordon to provide information, Fenella to complete forms and send back to Gordon for signature. Fenella responded by email.	Fenella Atkinson
DCAC DACHA Tocomwall DALI CBNTC DLO		13.1.2015	All RAPs called to confirm availability for fieldwork 19-23 Jan. All confirmed except DALI. Roster was changed to accommodate the remaining groups.	A Hobbs
DCAC DACHA Tocomwall CBNTC DLO		13.12015	Contract sent out to group to sign and return prior to fieldwork. Reminder sent regarding submitting access forms and ID to work on site	A Hobbs
DACHA	Celestine	14.1.2015	Fax received from DACHA – Gordon Morton's access form and ID	A Hobbs

Agency	Contact	Date	Details	AHMS Contact
	Everingham			
DCAC	Justine Coplin	14.1.2015	Email received – signed contract and access forms	A Hobbs
Tharawal LALC	Abbi Whillock	16.1.15	Abbi rang Alistair, advised that the Land Council had been involved in the project from the start, and would like to be involved in the fieldwork. Fenella rang back, advised that the consultation process had been restarted for this phase of the project, and that a registration of interest had not been received from the Land Council. Asked about availability for fieldwork next week. Alistair and Fenella to get approval from client to engage additional RAP in the fieldwork, contact Abbi on Monday with details.	Fenella Atkinson
Tharawal LALC	Abbi Whillock	19.1.15	Called Abbi to confirm fieldwork for Tues-Fri, then emailed contract. Abbi reviewed contract, and questioned the rate as it did not match Tharawal LALC fieldwork rates. Fenella advised that the client had requested a set rate for all RAP site officers, and asked if Tharawal LALC could be engaged at the set rate for this project.	Fenella Atkinson
Darug Land Observations	Gordon Workman	19.1.15	Rang Gordon to remind him to send in signed contract. Gordon noted that the set rate was not in line with DLO's rates, but returned signed contract.	Fenella Atkinson
Darug Aboriginal Cultural Heritage Assessments	Celestine Everingham	19.1.15	Rang Celestine to ask about contract, Celestine advised that it had already been sent in.	Fenella Atkinson
All RAPs	-	19-23.1.15	Participated in test excavations.	Alan Williams/Alistair Hobbs
All RAPs	-	16.4.15	Distributed draft copy of the excavation report for review	Alan Williams
Tocomwall	Danny Franks	16.4.15	Provided support for the project and proposed future mitigation of MA14.	Alan Williams
DCAC	Justine Coplin	20.4.15	Provided support for the report and its recommendations	Alan Williams
DLO	Gordon Workman	27.4.15	Would like to have more photographs of artefacts, but otherwise had no concerns with the report.	Alan Williams
CBNTAC	Glenda Chalker	2.5.15	Provided a thorough review of the report, including some modifications to the proposed mitigation program	Alan Williams

Agency	Contact	Date	Details	AHMS Contact
All RAPs	-	13.5.15	Reminder that the report was soon to be finalised.	Alan Williams

Appendix 2: Aboriginal Consultation – Pre-Notification and Responses

NSW GOVERNMENT | Office of Environment & Heritage

Our reference: EF14/2019

Mr Alan Williams
Manager – Aboriginal Heritage
Archaeological and Heritage Management Solutions
2/729 Elizabeth Street
WATERLOO NSW 2017

Dear Mr Williams,

Thank you for your letter dated 14/11/2014 to the Office of Environment and Heritage (OEH) regarding obtaining a list of the Aboriginal stakeholders that may have an interest in the SIMTA Stage 1 Proposal, Moorebank (Liverpool LGA).

Please find attached the list of Aboriginal stakeholders known to OEH that may have an interest in the project.

As the Department of Planning and Environment is the approval authority for this project, the consultation process should be in accordance with the relevant guidelines as stipulated by the Department of Planning and Environment.

If you wish to discuss any of the above matter further please contact Miranda Firman, Aboriginal Heritage Planning Officer, on (02) 9995 5477. Please note the change in postal address below.

Yours sincerely

S. Harrison 20/11/14

Susan Harrison
Senior Team Leader Planning
Greater Sydney Region
Regional Operations

PO Box 644 Parramatta NSW 2124
Level 6, 10 Valentine Avenue Parramatta NSW 2150
Tel: (02) 9995 5477
ABN 30 841 387 271
www.environment.nsw.gov.au

Aboriginal Stakeholders that may have an interest in the Liverpool LGA

Gandangara Local Aboriginal Land Council		(02) 96025280	PO Box 1038 Liverpool NSW 2170
Darug Custodial Aboriginal Corporation	Leanne Watson	02 4577 5181 / 0415 770 163	PO Box 81, Windsor NSW 2756
Darug Tribal Aboriginal Corporation	Sandra Lee	02 9622 4081	PO Box 441, Blacktown NSW 2148
Darug Aboriginal Cultural Heritage Assessments	Gordon Morton	02 4567 7421 or 0422 865 831	90 Hermitage Rd, Kurrajong Hills NSW 2758
Darug Land Observations	Gordon Workman	0415 663 763/ fax 02 9831 8868	PO Box 571, Plumpton, NSW 2761
	Des Dyer	0408 360 814	18a Perigee Close, Doonside 2767
Cubbitch Barta	Glenda Chalker	0427 218 425	55 Nightingale Rd, Pheasants Nest NSW 2574
	Scott Franks	0404 171 544	PO Box 76, Caringbah NSW 1495
Warragil Cultural Services	Aaron Slater	0481 280 067	22 Tiffany Close, Rooty Hill NSW
Wurrumay Consultancy	Kerrie Slater	0423 935 556	89 Pyramid street, Emu Plains NSW

OFFICE OF THE REGISTRAR
ABORIGINAL LAND RIGHTS ACT 1983 (NSW)

11-13 Mansfield Street
Glebe NSW 2037
PO Box 112, Glebe NSW 2037
P. 02 9562 6327 F. 02 9562 6350

Fenella Atkinson
AHMS
2/729 Elizabeth Street
WATERLOO NSW 2017

Dear Fenella

Request - Search for Aboriginal Land Claim

I refer to your letter dated 14 November 2014 to search the Register of Aboriginal Land Claims database in relation to land described by you as:

Lot 1 DP 1048263, Lot 1 DP 825352, Lot 3001 DP 1125930,
Lot 91 DP 1155962, Lot 5 DP 833516, Lot 51 DP 515696
Lot 52 DP 517310, Lot 103 & 104 DP 1143827, Lot 4 DP 1130937

Parish: Holsworthy
County: Cumberland

I have searched the Register of Aboriginal Land Claims database and the subject land described by you *does not appear* on the Register as being affected by an Aboriginal Land Claim in pursuant to sections 36 or 37 of the *Aboriginal Land Rights Act 1983.*

Regards

Bianca Ceissman
Administrative Officer
Office of the Registrar, *Aboriginal Land Rights Act 1983 (NSW)*
Please Note: Search Requests should not be made over privately owned land. Crown Land is the only land in NSW that is likely to be affected by an Aboriginal Land Claim under the Aboriginal Land Rights Act. It is not necessary to make a search over privately owned – even if an Aboriginal Land Claim has been made over privately owned land it would be refused as soon as this is known.

National Native Title Tribunal

Operations East, Sydney Office
Level 16, Law Courts Building,
Queens Square
Sydney NSW 2000
GPO Box 9973
Sydney NSW 2000
Telephone (02) 9227 4000
Facsimile (02) 9227 4030

18 November 2014

Fenella Atkinson
Senior Consultant
AHMS
2/729 Elizabeth Street
WATERLOO NSW 2017

Our Ref: 0274-14/SJ
Your Ref: 140505-1

Dear Ms Atkinson

Native Title Search Results for Liverpool City Council Local Government Areas

Thank you for your search request received on 14 November 2014 in relation to the above area.

Search Results
The results provided are based on the information you supplied and are derived from a search of the following Tribunal databases:

Register Type	NNTT Reference Numbers
Schedule of Applications (unregistered claimant applications)	Nil.
Register of Native Title Claims	NC1997/007
National Native Title Register	Nil.
Register of Indigenous Land Use Agreements	Nil.

I have included a register extract, map and a NNTT Registers fact sheet to help guide your understanding of the search result.

Please note that there may be a delay between a native title determination application being lodged in the Federal Court and its transfer to the Tribunal. As a result, some native title determination applications recently filed in the Federal Court may not appear on the Tribunal's databases.

The search results are based on analysis against external boundaries of applications only. Native title applications commonly contain exclusions clauses which remove areas from within the external boundary. To determine whether the areas described are in fact subject to claim, you

need to refer to "Area covered by claim" section of the relevant Register Extract or Application Summary and any maps attached.

Search results and the existence of native title
Please note that the enclosed information from the Register of Native Title Claims and/or the Schedule of Applications is **not** confirmation of the existence of native title in this area. This cannot be confirmed until the Federal Court makes a determination that native title does or does not exist in relation to the area. Such determinations are registered on the National Native Title Register.

Tribunal accepts no liability for reliance placed on enclosed information
The enclosed information has been provided in good faith. Use of this information is at your sole risk. The National Native Title Tribunal makes no representative, either express or implied, as to the accuracy or suitability of the information enclosed for any particular purpose and accepts no liability for use of the information or reliance placed on it.

If you have any further queries, please contact me on 1800 640 501.

Yours sincerely

Sylvia Jagtman | SENIOR CASE MANAGEMENT ASSISTANT
National Native Title Tribunal | Sydney Office, Operations East
Telephone (02) 9227 4013 | Facsimile (02) 9227 4030 | | Email sylvia.jagtman@nntt.gov.au
Freecall 1800 640 501 | www.nntt.gov.au

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National Native Title Tribunal

Extract from the Register of Native Title Claims

Application Information

Application Reference: **Federal Court number:** NSD6060/1998

NNTT number: NC1997/007

Application name: Gundungurra Tribal Council Aboriginal Corporation #6

Registration History: Registered from 29/04/1997

Register Extract (pursuant to s. 186 of the *Native Title Act 1993*)

Application filed with: National Native Title Tribunal

Date application filed: 29/04/1997

Date claim entered on Register: 29/04/1997

Applicants: Ms Elsie Stockwell, Ms Pamela Stockwell

Address for service:
Eddy Neumann
Eddy Neumann Lawyers
Level 1
255 Castlereagh Street
SYDNEY NSW 2000
Phone: (02) 9264 9933
Fax: (02) 9264 9966

Additional Information:

Not Applicable

DESCRIPTION OF THE AREA COVERED BY THE CLAIM:

(a) Commencing at 150.52997 east longitude and 34.591636 south latitude, approximately 15.5 kilometres east south east of Moss Vale, the application traverses clockwise starting in a south-westerly direction, passing through points 2 to 36,765 of the following geographic coordinates. They are in decimal degrees and referenced to Australian Geodetic Datum 1984 (AGD84). These coordinates are based on the position of spatial reference data sourced by Land Information Centre, Department of Information Management and Technology, New South Wales as of 18 May 1999.

(b) Subject to clauses (d) and (e) the area covered by the application excludes any land or waters covered by:

(i) a scheduled interest;

(ii) freehold estate;

(iii) a commercial lease that is neither an agricultural lease nor a pastoral lease;

(iv) an exclusive agricultural lease or an exclusive pastoral lease;

(v) a residential lease;

(vi) a community purposes lease;

(vii) a lease dissected from a mining lease as referred to in s23B(2)(vii);

(viii) any lease (other than a mining lease) that confers a right of exclusive use over particular land or waters;

which was validly vested or granted on or before 23 December 1996.

(c) Subject to clauses (d) and (e) the area covered by the application excludes any area covered by the valid construction or establishment of any public work, where the construction or establishment of the public work commenced on or before 23 December 1996.

(d) Where the act specified in (b) and (c) falls within the provisions of

(i) s23B(9) - Exclusion of acts benefiting Aboriginal peoples or Torres Strait Islanders;

(ii) s23B (9A) - Establishment of a national or state park;

(iii) s23B (9B) - Acts where legislation provides for non-extinguishment;

(iv) s23B (9C) - Exclusion of Crown to Crown grants; and

(v) s23B (10) - Exclusion by regulation,

the area covered by the act is not excluded from this application.

(e) Where an act referred to in clauses (b) and (c) covers land or waters referred to in:

s47 - Pastoral leases held by native title claimants;

s47A - Reserves etc covered by claimant applications; and

s47B - Vacant crown land covered by claimant applications,

the area covered by the act is not excluded from the application.

(f) Where an area is covered by a previous non-exclusive possession act (s 23F) the native title claim group does not claim possession, occupation, use and enjoyment to the exclusion of all others.

(g) The area covered by the application excludes land where native title has been extinguished at common law.

(h) The area covered by the application excludes areas covered by prior Gundungurra claims filed with the National Native Title Tribunal being NC96/7, NC96/27, NC96/30, NC96/36 and NC97/4.

PERSONS CLAIMING TO HOLD NATIVE TITLE:

The native title claim group comprises all members of the Gundungurra Tribal Council Aboriginal Corporation

REGISTERED NATIVE TITLE RIGHTS AND INTERESTS:

The following Native Title Rights & Interests were entered on the Register on 23/06/2000

1. Subject to (2) - (5) below, the full and free enjoyment of the following native title rights and interests area are claimed in relation to the land and waters the subject of the application:

a. A right to possess, occupy, use and enjoy the claim area;

b. A right to make decisions about the use and enjoyment of the claim area;

c. A right of access to the claimed area;

d. A right to control the access of others to the claimed area;

e. The right to control the use and enjoyment of others of resources of the claimed area.

f. (Right not registered)

g. (Right not registered)

h. (Right not registered)

2. With respect of those parts of the area the subject of the application which are, or have been, the subject of a previous non-exclusive possession act within the meaning of s 23F of the Native Title Act 1993, the native title rights and interests area set out in (1) are claimed subject to the rights and interests created in the 'non-exclusive possession act' which are not inconsistent with the rights and interests claimed and, in the case of rights granted which are inconsistent with the rights and interests claimed, subject to any suspension of the native title rights and interests which those inconsistent rights and interests cause.

3. With respect to those parts of the area the subject of the application which are, or have been, the subject of:

a. a category B intermediate period act within the meaning of s232C of the Native Title Act 1993;

b. a category C intermediate period act within the meaning of s232D of the Native Title Act 1993;

c. a category D intermediate period act within the meaning of s232E of the Native Title Act 1993;

the native title rights and interests claimed are those set out in (1) above subject to the rights and interests created in the non-exclusive possession act which are not inconsistent with the rights and interests claimed and, in the case of any rights granted which are inconsistent with the rights and interests claimed, subject to any suspension of the native title rights and interests which those inconsistent rights and interests cause.

4. With respect to those parts of the area of the application which are, or have been, the subject of:

a. a category B past act within the meaning of s230 of the Native Title Act 1993;

b. a category C past act within the meaning of s231 of the Native Title Act 1993;

c. a category D past act within the meaning of s232 of the Native Title Act 1993;

the native title rights and interests claimed area those set out in (1) above subject to the rights and interests created in the non-exclusive possession act which are not inconsistent with the rights and interests claimed and, in the case of any rights granted which are inconsistent with the rights and interests claimed, subject to any extinguishment or suspension of the native title rights and interests which those inconsistent rights and interests cause.

5. The native title rights and interests identified above do not extend to ownership of any minerals, petroleum or gas which are wholly owned by the Crown.

6. The native title rights and interests identified above do not include a claim for exclusive occupation and use of offshore areas as defined by s253 of the Native Title Act 1993.

REGISTER ATTACHMENTS:

1. 1. Plan of Application Area, Attachment C of the Application, 1 page - A4, 29/04/1997

Note: The Register of Native Title Claims may, in accordance with s. 188 of the Native Title Act 1993, contain confidential information that will not appear on the Extract.

Searching the NNTT Registers in New South Wales

Search service
On request the National Native Title Tribunal may search its public registers for you. A search may assist you in finding out whether any native title applications (claims), determinations or agreements exist over a particular area of land or water.

In New South Wales native title cannot exist on privately owned land including family homes or farms.

What information can a search provide?
A search can confirm whether any applications, agreements or determinations are registered in a local government area. Relevant information, including register extracts and application summaries, will be provided.

In NSW because we cannot search the registers in relation to individual parcels of land we search by local government area.

Most native title applications do not identify each parcel of land claimed. They have an external boundary and then identify the areas not claimed within the boundary by reference to types of land tenure e.g., freehold, agricultural leasehold, public works.

What if the search shows no current applications?
If there is no application covering the local government area this only indicates that at the time of the search either the Federal Court had not received any claims in relation to the local government area or the Tribunal had not yet been notified of any new native title claims.

It does not mean that native title does not exist in the area.

Native title may exist over an area of land or waters whether or not a claim for native title has been made.

Where the information is found
The information you are seeking is held in three registers and on an applications database.

National Native Title Register
The National Native Title Register contains determinations of native title by the High Court, Federal Court and other courts.

Register of Native Title Claims
The Register of Native Title Claims contains applications for native title that have passed a registration test.

Registered claims attract rights, including the right to negotiate about some types of proposed developments.

Register of Indigenous Land Use Agreements
The Register of Indigenous Land Use Agreements contains agreements made with people who hold or assert native title in an area.

The register identifies development activities that have been agreed by the parties.

Schedule of Native Title Applications
The Schedule of Native Title Applications contains a description of the location, content and status of a native title claim.

This information may be different to the information on the Register of Native Title Claims, e.g., because an amendment has not yet been tested.

How do I request a native title search?
Download the Search Request Form from the Tribunal's website at - http://www.nntt.gov.au/assistance/Pages/Searches-and-providing-Register-information.aspx
Email to: NSWEnquiries@nntt.gov.au
Post to: GPO Box 9973 Sydney NSW 2001
For additional enquiries: 02 9227 4000

Alan Williams

From: Norma Burrows <N.Burrows@liverpool.nsw.gov.au>
Sent: Thursday, 20 November 2014 4:19 PM
To: Fenella Atkinson
Subject: HP TRIM ADMINISTRATIVE DOCUMENT : 275110.2014 : Request for information on Aboriginal stakeholders for an Aboriginal Cultural Heritage Assessment of SIMTA Site - Request for stakeholder details - Liverpool LGA
Attachments: Aboriginal Stakeholders List for developments within Liverpool City Council for the proposed project -.docx

Good Afternoon Fenella,

This requested was asked for previously.

For the same matter only different assessors, anyway please find attached a list of proposed Aboriginal Stakeholders that should be consulted in reference to the proposed work. If no response is received in the set time, please record and ensure you keep for your final report.

I will table this information to Council's next Aboriginal Consultative Committee meeting, which is due to be held on Wednesday 3 December 2014 after which time a response from the Committee will be forwarded for your attention.

ATT: Aboriginal Stakeholders List.

In Unity

Norma Burrows | Community Development Worker (Aboriginal and Torres Strait Islander)
33 Moore Street, Liverpool NSW 2170
Phone: 9821 7758 | Fax: 9821 9333
Email: n.burrows@liverpool.nsw.gov.au
www.liverpool.nsw.gov.au

I acknowledge the Cabrogal clan of the Darug nation as the traditional custodians of this land known today as Liverpool City, pay my respect to the Aboriginal Elders both past and present, and to all Aboriginal and Torres Strait Islander people who live here as well.

------< HP TRIM Record Information >------

Record Number: 275110.2014
Title : Request for information on Aboriginal stakeholders for an Aboriginal Cultural Heritage Assessment of SIMTA Site - Request for stakeholder details - Liverpool LGA

Aboriginal Stakeholders List for developments within Liverpool City Council for the proposed project

The following Aboriginal Stakeholders that should consult in regards to any development within Liverpool City Council;

Liverpool City Council
Aboriginal Consultative Committee
Att: Norma Burrows
Phone: 02 9821 7758
Address: Local Bag 7064 Liverpool BC NSW 1871
(will be tabled at Council Aboriginal Consultative Committee on 2 December 2014)

Gandangara Local Aboriginal Land Council
Interim CEO [PKnight@sasl.org.au]
Phone: 02 9602 5280
Address: PO Box 1038 LIVERPOOL BC NSW 1871

Tharawal Local Aboriginal Land Council,
CEO Megan Ely [ceo@tharawal.com.au]
Phone: 02 46810059
Address: PO Box 168 PICTON, 2571 NSW

Cubbitch Barta
Glenda Chalker
Phone: 0427218425
Address: 55 Nightingale Rd Pheasants Nest NSW 2574

Alan Williams

From: Margaret Bottrell <margaret.bottrell@lls.nsw.gov.au>
Sent: Monday, 17 November 2014 9:55 AM
To: Fenella Atkinson
Subject: Aboriginal Cultural Heritage Assessment, SIMTA Stage 1 Proposal

Follow Up Flag: Follow up
Flag Status: Flagged

To Fenella Atkinson,

Under the act that we work, I am not allowed to pass on the information that you requested in your letter dated 14 November 2014 Re: Request for information on Aboriginal Stakeholders for an **Application for an** Aboriginal Cultural Heritage Assessment, SIMTA Stage 1 Proposal, Moorebank, Liverpool LGA

The Greater Sydney Local Land Services (former Catchment Management Authority) has no interest in this project, and will pass your letters on to the members of our Advisory Committee for their information. If they comment on this, it is an individual person and not a representative of the Greater Sydney Local Land Services.

Regards

--

Margaret Bottrell Senior Strategic Land Services Officer
(Aboriginal Communities)
Greater Sydney Local Land Services
NSW Government Office Block Level 4, 2-6 Station Street Penrith
PO Box 4515 Penrith Westfields NSW 2750
T: 02 4725 3049 F: 02 4725 3088
E:margaret.bottrell@lls.nsw.gov.au
W: http://www.lls.nsw.gov.au

18 November 2014 ref: OE&H : 18-11-2014/1

AHMS
2/729 Elizabeth Street
Waterloo NSW 2017

Dear Sir or Madam

Aboriginal Cultural Heritage Assessment

Simta Stage 1 Proposal, Moorebank, Liverpool LGA

I refer to your letter of 14 November 2012 regarding the above matter.

We acknowledge that section 4.1.2 of the Office of Environment & Heritage's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* require you to contact us in order to compile a list of Aboriginal people who may have an interest in the proposed project area and hold knowledge relevant to determining the cultural significance of Aboriginal objects and/or places.

However, we advise that NTSCORP's privacy guidelines restrict us from providing proponents with contact details of traditional owners who may have such an interest or hold such knowledge.

Please be advised that, in response to your notification, we will forward your correspondence to any individuals, groups and organisations whom NTSCORP is aware assert traditional interests within or hold cultural knowledge about the relevant area. Recipients of our correspondence will be invited to register their interest in the project directly with you ASAP.

Please be aware that NTSCORP cannot make a guarantee or undertaking that the recipients of our correspondence represent the entirety of traditional owners for the relevant area.

Yours faithfully,

George Tonna
Land & Notifications Officer
NTSCORP Limited

Level 1, 44-46 Botany St Redfern NSW 2016 Australia
T +61 2 9310 3188
PO Box 2105 Strawberry Hills NSW 2012 Australia
T +61 2 9310 4177
abn 71 098 971 209
W www.ntscorp.com.au

Appendix 3: Aboriginal Consultation – Notification/Methodology and Responses

CLASSIFIEDS

To place an ad go to
www.advertisers.com.au
E: fcnclass@fairfaxmedia.com.au
P: 13 24 25

Religious Notices

Tenders

Austral Public School Canteen Licence

Tenders are called for the licence of the school canteen for the school year commencing 28th January 2015 and for a term of approximately 2 years with the possibility of an extension. Annual school enrolments will be approximately 325. General enquiries and requests for a Tender Information Package should be referred to :

Ms Jan Rogers (Principal)
Phone: 9606 0312

Tenders must be submitted in a sealed envelope marked 'Confidential- School Canteen Tender' and sent to :

The Principal
Austral Public School
219 Edmondson Avenue
Austral NSW 2179

Tenders close at 3pm on 5th December 2014.

A tender visit and briefing session will be organised for interested parties if requested.

All applicants must make themselves familiar with clause 2 of the tender offer. G7292057AA-261114

Public Notices

Notification of Aboriginal Cultural Heritage Assessment and Invitation for Registrations of Interest – SIMTA Stage 1 Proposal, Moorebank (Liverpool LGA).

SIMTA is proposing to undertake an Aboriginal Cultural Heritage Assessment (ACHA) in advance of the proposed Stage 1 of the Sydney Moorebank Intermodal Terminal Facility (Concept Plan Approval (MP10_0193)) on Moorebank Avenue, Moorebank. Contact details for the applicant's representative are: Westley Owers (Hyder), phone: 02 8907 9096, email: Westley.owers@hyderconsulting.com.

Registrations are invited from Aboriginal individuals and organisations who may hold cultural knowledge for the area relevant to determining the significance of Aboriginal objects and/or places and who wish to be involved in the consultation process.

The purpose of the Aboriginal consultation is to assist the applicant in preparing the ACHA for the project area, and if necessary to assist OEH in considering the assessment and any AHIP application.

Registrations of interest should be provided by no later than **10 December** to Alan Williams at Archaeological and Heritage Management Solutions P/L, by:
Phone: (02) 9555 4000
Fax: (02) 9555 7005
Email: awilliams@ahms.com.au
Post: 2/729 Elizabeth Street, Waterloo, NSW 2017.

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All Areas 1300 34 62 62
Main Office 9723 3011
Australian Credit Licence 411597 *Conditions apply

NEED CASH?
$500 to $2000
*Fast easy process
*Loans in office or by email
*Affordable Repayments
*All Welcome Including Centrelink
CityFinance Loans and Cash Solutions
All Areas 1300 34 62 62
Main Office 9723 3011
Australian Credit Licence 411597 *Conditions apply

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admin.wenden@ymca.org.au

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We buy
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FREE Removal
PAYING
$500 to $10,000
Pickup Within 0-2 hours
24/7 Call Jim
0449-525-535
*Conditions Apply

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Call: 13 24 25
Email:
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25/108 St Georges Tce
Perth WA 6000
P 08 9381 5206

3 December 2014

Scott Franks
Tocomwall
PO Box 76
Caringbah NSW 1495

RE: Aboriginal Cultural Heritage Assessment - SIMTA Stage 1, Presentation of Information and Assessment Methodology.

Dear Scott,

Introduction

In accordance with the NSW Office of Environment and Heritage's (OEH) *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010), I am writing to notify you that we have been engaged by Hyder Consulting to undertake an Aboriginal Cultural Heritage Assessment (ACHA) in advance of the proposed development of the Sydney Intermodal Moorebank Terminal Facility, Moorebank Avenue, NSW (**Figure 1**).

The land in question is within the Liverpool Local Government Area and the project involves the re-development of a site, previously used as a Defence storage facility, into an intermodal terminal facility, including a rail link connecting from the site to the Southern Sydney Freight Line. The project has recently been granted Concept Approval (MP10_0193) under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act), and is now seeking approval of Stage 1 (**Figure 2**) (hereafter referred to as the 'proposal') under Part 4, Division 4.1 of the EP&A Act. This approval, specifically the Conditions of Consent (CoC) and Statement of Commitments (SoC), requires more detailed assessment of Aboriginal heritage, most notably test excavations of a number of previously identified sites (the study area).

AHMS will be undertaking the assessment in accordance with the relevant OEH guidelines. An important part of the assessment will be Aboriginal community consultation that aims to identify cultural values and places of importance to the Aboriginal community within the study area. The purpose of the consultation is to assist the applicant in preparing the ACHA for the study area, and if necessary to assist the Department of Planning and Environment (DP&E) in considering the assessment and suitable management recommendations, as necessary.

Due to the tight timeframes of the proposal, this letter is intended to achieve two aims:

1. We are seeking registrations from Aboriginal individuals and/or organisations, who may hold cultural knowledge of the area relevant to determining the significance of Aboriginal objects and/or places, and who wish to be involved in the consultation process; and
2. We provide a background on the study area and project, and a proposed assessment methodology, which includes test excavations.

In relation to timing, we request that you provide a response to (1) by 17 December 2014, and a response to (2) by 7 January 2015.

Contact Details

This letter has been prepared by Archaeological & Heritage Management Solutions Pty Ltd (AHMS) for the proponent, Hyder Consulting:

Table 1 - Contact Details

Managing Consultant	Archaeological Advisor
Hyder Consulting	Archaeological & Heritage Management Solutions Pty Ltd
Locked Bag 6503,	2/729 Elizabeth Street
North Sydney, NSW 2060	Waterloo NSW 2017
Contact Person: Westley Owers	Contact Person: Alan Williams
T. 02 8907 9096	T. 02 9555 4000
	F. 02 9555 7005
E: Westley.Owers@hyderconsulting.com	E: awilliams@ahms.com.au

Background

An Aboriginal Cultural Heritage Assessment of the SIMTA site was prepared by AHMS in February 2012 (updated in November 2012), to accompany the Concept Plan application (**Appendix 1**). This report was undertaken in consultation with a number of Aboriginal stakeholders, and included surface investigations. The report identified several areas of potential archaeological deposit, and sparse Aboriginal objects present on the ground surface in previously disturbed areas (**Figure 3**). The proposed Stage 1 works extend across some of these sensitive areas, and therefore has the potential to impact Aboriginal objects.

The original assessment was thorough, however as required by the CoC's and SoC's, further assessment is needed to support the works proposed in the Stage 1 Development Application. In order to properly assess the potential impact, additional archaeological investigation and assessment was considered to be required. The main component required is test excavation of the areas of sensitivity that would be potentially impacted by the development. There were some attempts to undertake these works as part of the Concept Application, but access issues, and ultimately time constraints did not allow the investigations to proceed. The works proposed in this letter is to undertake such investigations and incorporate them into an updated version of the 2012 ACHA, along with additional survey, consultation and background data.

Due to the relatively long gaps in the consultation process, since the development of the 2012 ACHA, we have re-started the Aboriginal consultation process, in accordance with OEH guidelines. This is to ensure the process is transparent and engages with the current Aboriginal stakeholders in the region. *Please note that even if you have been involved in previous stages of this proposal, you must register again as part of this new consultation process.*

Proposed Assessment Methodology

Test Excavation Activities

AHMS proposes to supplement and integrate new data with the existing ACHA, and in accordance with the latest guidelines for the proposal. Specifically, OEH prepared draft guidelines for the assessment of State Significant Projects to be assessed under Part 3A (now repealed) of the EP&A Act. Use of these guidelines has continued for projects assessed under Part 4, Division 4.1 of the EP&A Act, in combination with updated guidelines issued by OEH. The assessment would be prepared in accordance with the following relevant guidelines:

- *Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (draft, DEC 2005).
- *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW 2010).
- *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010).
- *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011).

Development of the ACHA will include the following tasks:

- Aboriginal community consultation;
- Undertaking of test excavation of parts of the identified zones of known or potential cultural materials that are located within the proposed study area, to further determine the nature and extent of the Aboriginal heritage resource, and the potential impact to it (further detail is provided below). This component would be undertaken in conjunction with representatives of the Registered Aboriginal Parties (RAPs) based on selective commercial engagements determined by the client;
- Integration of additional work and results into the existing ACHA, including Aboriginal consultation and any cultural information provided, outlines the findings of the archaeological survey, assesses potential impacts to Aboriginal heritage, and make recommendations on any Aboriginal heritage sites and/or objects that may be present within the study area;
- If sites are identified, submit Site Cards and Site Impact Recording Forms to OEH; and
- If required, develop a Care and Control agreement for recovered artefacts and/or submit a site update card to OEH upon reburial of artefacts.

Any archaeological test excavations implemented as part of the proposal would be undertaken according to Requirements 16 and 17 of OEH's *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (the Code). In summary, the Code of Practice requires the following general methodology:

- Placement of test excavation units along the proposed rail line, ensuring that individual units are separated by at least 5 m.
- Manual excavation.
- Individual test excavation units of 1 x 1 m size.
- Maximum area of excavation to comprise no more than 0.5% of the area being investigated.
- Excavation in 10 cm spits or according to stratigraphy (whichever is smallest) depending on the results of the first unit.
- Excavation to continue to the base of the identified Aboriginal-object-bearing soil(s) and below, sufficient to confirm that the underlying soil(s) is/are culturally sterile.
- Sieving of all excavated material through a 5 mm sieve.
- Photographic and scale-drawn records of each single excavation unit.
- Backfilling of excavation units as soon as practicable.

The Stage 1 study area is ~7,348 m^2 in size. Assuming a maximum of 0.5% of the study area can be excavated, this allows up to 36 m^2 of excavation. We propose to undertake excavations of 25 x 1m^2 test pits along the proposed rail line (**Figure 4**). The overall size of these 25 test pits will equate to ~ 25 m^2 overall. Should significant cultural materials be identified and time permits, a selection of test pits may be expanded up to 3m^2 - the maximum permitted under OEH guidelines - to further characterise the deposits. It is envisaged that the field program may last 5 days.

All material would be sieved through a 5 mm mesh. All excavations would be recorded in accordance with the Code, including scaled drawings, photographs, written descriptions, etc.

Upon completion of the excavation program, all test pits would be mechanically backfilled and the area re-established before any new areas are opened.

Post Excavation Analysis

Should Aboriginal objects be recovered, post excavation analysis would be required under the Code.

Post-excavation analysis may include any or all of the following tasks:

- Stone tool/lithic analysis: AHMS may engage a stone tool specialist (most likely Michelle Lau) to undertake analysis of the Aboriginal objects recovered. Analysis would be in accordance with the various guidelines, and would include raw material types, measurements of each object (including weight, size, etc), descriptions of any tools recovered, analysis and interpretation of the assemblage in a local and regional context;

- Geomorphology/Soil Analysis: To understand the formation of the soil profile and the archaeology within it, analysis may include visual observation of the test pits by a specialist (most likely Peter Johnston); particle size and/or loss-on-ignition (by University Technology Sydney) and/or soil micromorphology (by Ken McQueen, University of Canberra) to determine microscopic changes in the soil profile; and

- Chronology: AHMS may take samples to date the age of the soil profile and any archaeology within it. Two main types of dating may be attempted, radiocarbon dating and/or Optically Stimulated Luminescence dating. The former would require the presence of charcoal and/or shell within the profile and would be sent to the University of Waikato for analysis; the latter involves extraction of quartz grains from the profile and would be sent to University of Gloucestershire (UK) for analysis.

The findings of these analyses would be integrated into the report prior to its finalisation..

Artefact Storage and Long Term Management

All Aboriginal objects recovered would be securely stored at the AHMS Sydney office (2/729 Elizabeth Road, Waterloo, NSW 2017) for analysis. During this process, AHMS would develop a Care and Control Agreement, if necessary, to determine the long-term location and management of any Aboriginal objects recovered. An Aboriginal Site Impact Recording form would also be completed and lodged with OEH.

Aboriginal Consultation

AHMS has recently begun the formal consultation process in accordance with OEH's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010). Currently, the following individuals/organisations have been identified as potential stakeholders:

- Gandangarra LALC;
- Tharawal LALC;
- Darug Aboriginal Cultural Heritage Assessments;
- Darug Custodian Aboriginal Corporation;
- Darug Tribal Aboriginal Corporation;
- Darug Land Observations;
- Darug Aboriginal Landcare Inc;
- Cubbitch Barta;
- Tocomwall;
- Warragil Cultural Services; and
- Wurrumay Consultancy.

Please note that unless otherwise advised, we are required to send details of all RAPs to OEH and Local Aboriginal Land Council as part of the consultation procedure.

Timeframes

AHMS proposes the following indicative timeframes for the project:

- Distribution of this document to the RAPs: 1 December 2014.
- End of review period for the proposed methodology: 5 January 2015.
- Test Excavations: mid January 2015.
- Review period of draft report: early March 2015.

Information Sought

Notification

If you or your organisation are interested in being part of the consultation process, please provide a registration of interest to:

Alan Williams

AHMS

Address: 2/729 Elizabeth Street, Waterloo NSW 2017;

Phone: 02 9555 4000;

Fax: 02 9555 7005;

Email: awilliams@ahms.com.au.

Registrations are requested on or by **14 December 2014**, with comments on the methodology by 5 January 2015.

To assist us with communicating project information effectively could you please include the following information in your registration of interest:

1. A clear identification of the organisation registering an interest in the project;
2. Your preferred method of communication with AHMS and the proponent during consultation for this proposal, including a nominated contact person and contact details;
3. Comment on the level of consultation / proproposal involvement you request (Do you wish to attend any meetings? Do you wish to be involved in any fieldwork? Do you simply want a copy of the final report?);
4. If you wish to be involved in any meetings or fieldwork, please ensure we have current copies of your public liability, workers compensation and professional indemnity (if available) insurances as soon as possible.

As part of the consultation process we are obliged to provide the contact details of organisations and individuals who register an interest to the OEH and the Local Aboriginal Land Council, unless instructed otherwise. Please advise us if you do not wish this to occur.

Please note that registration of interest will not necessarily lead to participation in fieldwork. Participants will be engaged by the client on the basis of experience, cultural knowledge, appropriate insurances and our personnel requirements.

Presentation of Information and Assessment Methodology

AHMS would appreciate your review of the above methodology proposed for the investigation and assessment of the proposal.

In returning your comments, please include the following where appropriate:

- Any protocols that you would like request be adopted during the proposal;
- Identification of any Aboriginal objects of cultural significance and/or importance that you are aware of within the study area, and how you wish them to be dealt with during the proposal;
- Identification of any places of cultural significance and/or importance that you are aware of within the study area, and how you wish them to be dealt with during the proposal;
- Guidance on the protocols, sensitivity, use and/or distribution of any cultural information that you provide AHMS;
- Whether you require any further information prior to AHMS proceeding with the proposal; and
- Any initial thoughts on the potential long term storage and/or management of the Aboriginal objects that may be recovered from the test excavations if they ensue.

Please ensure AHMS is also provided with your nominated individual's contact information including phone number, fax number, postal address and e-mail address (if available).

If you wish to be considered for participation in any fieldwork, please also provide information on the following:

- Current certificates of currency for relevant insurances;
- Information on hourly or daily rates;

- Information that may demonstrate experience in archaeological excavation;
- An assurance that any proposed staff are ‘fit for work’ to undertake the physical labour of archaeological excavation.
- An assurance that any proposed site staff are endorsed by a relevant section of the Aboriginal community and are able to confer and/or report back to them on project outcomes.

We also direct you to AHMS’ policy and procedures on Aboriginal engagement, which will be provided with this document.

It is important that you understand that AHMS will compile and forward information for review by the applicant, but we do not decide who will be involved in any paid capacity.

If you like to arrange for any elders or other community members to be able to visit the site during the work, please let us know.

Please don’t hesitate to contact me on (02) 9555 4000 if you have any queries or concerns.

Yours sincerely,

Alan Williams MAACAI

Manager NSW - Aboriginal Heritage

Figure 1. The subject area of the SIMTA proposal, highlighting Stage 1.

Figure 2. Map of archaeological sensitivity based on the background review and site inspection. Areas in green are considered highly disturbed and retain little potential for Aboriginal objects to occur. Areas in orange were assessed as having Aboriginal archaeological potential based on background data.

Figure 3. Map showing archaeological findings 2012. Isolated artefacts (shown by numbers) and PADs are presented. Area 1 (shaded blue) along the western edge of Georges River was identified by Aboriginal participants as an area of cultural interest. It is, however, outside of the study area.

Figure 4. Proposed test excavation will occur along the proposed rail link (black line) generally within the two areas shown here (white boxes).

Appendix 1: AHMS 2012 Assessment

This document was provided in the original, but has not been duplicated here.

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25/108 St Georges Tce
Perth WA 6000
P 08 9381 5206

3 December 2014

Gordon Workman
Darug Land Observations
PO Box 571
Plumpton NSW 2761

RE: Aboriginal Cultural Heritage Assessment - SIMTA Stage 1, Presentation of Information and Assessment Methodology.

Dear Gordon,

Introduction

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North Sydney, NSW 2060	Waterloo NSW 2017
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The findings of these analyses would be integrated into the report prior to its finalisation..

Artefact Storage and Long Term Management

All Aboriginal objects recovered would be securely stored at the AHMS Sydney office (2/729 Elizabeth Road, Waterloo, NSW 2017) for analysis. During this process, AHMS would develop a Care and Control Agreement, if necessary, to determine the long-term location and management of any Aboriginal objects recovered. An Aboriginal Site Impact Recording form would also be completed and lodged with OEH.

Aboriginal Consultation

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- Gandangarra LALC;
- Tharawal LALC;
- Darug Aboriginal Cultural Heritage Assessments;
- Darug Custodian Aboriginal Corporation;
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- Darug Land Observations;
- Darug Aboriginal Landcare Inc;
- Cubbitch Barta;
- Tocomwall;
- Warragil Cultural Services; and
- Wurrumay Consultancy.

Please note that unless otherwise advised, we are required to send details of all RAPs to OEH and Local Aboriginal Land Council as part of the consultation procedure.

Timeframes

AHMS proposes the following indicative timeframes for the project:

- Distribution of this document to the RAPs: 1 December 2014.
- End of review period for the proposed methodology: 5 January 2015.
- Test Excavations: mid January 2015.
- Review period of draft report: early March 2015.

Information Sought

Notification

If you or your organisation are interested in being part of the consultation process, please provide a registration of interest to:

Alan Williams

AHMS

Address: 2/729 Elizabeth Street, Waterloo NSW 2017;

Phone: 02 9555 4000;

Fax: 02 9555 7005;

Email: awilliams@ahms.com.au.

Registrations are requested on or by **14 December 2014**, with comments on the methodology by 5 January 2015.

To assist us with communicating project information effectively could you please include the following information in your registration of interest:

3. A clear identification of the organisation registering an interest in the project;
4. Your preferred method of communication with AHMS and the proponent during consultation for this proposal, including a nominated contact person and contact details;
5. Comment on the level of consultation / proproposal involvement you request (Do you wish to attend any meetings? Do you wish to be involved in any fieldwork? Do you simply want a copy of the final report?);
6. If you wish to be involved in any meetings or fieldwork, please ensure we have current copies of your public liability, workers compensation and professional indemnity (if available) insurances as soon as possible.

As part of the consultation process we are obliged to provide the contact details of organisations and individuals who register an interest to the OEH and the Local Aboriginal Land Council, unless instructed otherwise. Please advise us if you do not wish this to occur.

Please note that registration of interest will not necessarily lead to participation in fieldwork. Participants will be engaged by the client on the basis of experience, cultural knowledge, appropriate insurances and our personnel requirements.

Presentation of Information and Assessment Methodology

AHMS would appreciate your review of the above methodology proposed for the investigation and assessment of the proposal.

In returning your comments, please include the following where appropriate:

- Any protocols that you would like request be adopted during the proposal;
- Identification of any Aboriginal objects of cultural significance and/or importance that you are aware of within the study area, and how you wish them to be dealt with during the proposal;
- Identification of any places of cultural significance and/or importance that you are aware of within the study area, and how you wish them to be dealt with during the proposal;
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- Whether you require any further information prior to AHMS proceeding with the proposal; and
- Any initial thoughts on the potential long term storage and/or management of the Aboriginal objects that may be recovered from the test excavations if they ensue.

Please ensure AHMS is also provided with your nominated individual's contact information including phone number, fax number, postal address and e-mail address (if available).

If you wish to be considered for participation in any fieldwork, please also provide information on the following:

- Current certificates of currency for relevant insurances;
- Information on hourly or daily rates;

- Information that may demonstrate experience in archaeological excavation;
- An assurance that any proposed staff are ‘fit for work’ to undertake the physical labour of archaeological excavation.
- An assurance that any proposed site staff are endorsed by a relevant section of the Aboriginal community and are able to confer and/or report back to them on project outcomes.

We also direct you to AHMS’ policy and procedures on Aboriginal engagement, which will be provided with this document.

It is important that you understand that AHMS will compile and forward information for review by the applicant, but we do not decide who will be involved in any paid capacity.

If you like to arrange for any elders or other community members to be able to visit the site during the work, please let us know.

Please don’t hesitate to contact me on (02) 9555 4000 if you have any queries or concerns.

Yours sincerely,

Alan Williams MAACAI

Manager NSW - Aboriginal Heritage

Figure 1. The subject area of the SIMTA proposal, highlighting Stage 1.

Figure 2. Map of archaeological sensitivity based on the background review and site inspection. Areas in green are considered highly disturbed and retain little potential for Aboriginal objects to occur. Areas in orange were assessed as having Aboriginal archaeological potential based on background data.

Figure 3. Map showing archaeological findings 2012. Isolated artefacts (shown by numbers) and PADs are presented. Area 1 (shaded blue) along the western edge of Georges River was identified by Aboriginal participants as an area of cultural interest. It is, however, outside of the study area.

Figure 4. Proposed test excavation will occur along the proposed rail link (black line) generally within the two areas shown here (white boxes).

Appendix 1: AHMS 2012 Assessment

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AHMS ARCHAEOLOGICAL & HERITAGE MANAGEMENT SOLUTIONS

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ACN 088 058 388

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F 02 9555 7005

MELBOURNE
2/35 Hope St
Brunswick VIC 3056
P 03 9388 0622

PERTH
25/108 St Georges Tce
Perth WA 6000
P 08 9381 5206

3 December 2014

Denise Newham
Darug Tribal Aboriginal Corporation
PO Box 441
Blacktown NSW 2148

RE: Aboriginal Cultural Heritage Assessment - SIMTA Stage 1, Presentation of Information and Assessment Methodology.

Dear Denise,

Introduction

In accordance with the NSW Office of Environment and Heritage's (OEH) *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010), I am writing to notify you that we have been engaged by Hyder Consulting to undertake an Aboriginal Cultural Heritage Assessment (ACHA) in advance of the proposed development of the Sydney Intermodal Moorebank Terminal Facility, Moorebank Avenue, NSW (**Figure 1**).

The land in question is within the Liverpool Local Government Area and the project involves the re-development of a site, previously used as a Defence storage facility, into an intermodal terminal facility, including a rail link connecting from the site to the Southern Sydney Freight Line. The project has recently been granted Concept Approval (MP10_0193) under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act), and is now seeking approval of Stage 1 (**Figure 2**) (hereafter referred to as the 'proposal') under Part 4, Division 4.1 of the EP&A Act. This approval, specifically the Conditions of Consent (CoC) and Statement of Commitments (SoC), requires more detailed assessment of Aboriginal heritage, most notably test excavations of a number of previously identified sites (the study area).

AHMS will be undertaking the assessment in accordance with the relevant OEH guidelines. An important part of the assessment will be Aboriginal community consultation that aims to identify cultural values and places of importance to the Aboriginal community within the study area. The purpose of the consultation is to assist the applicant in preparing the ACHA for the study area, and if necessary to assist the Department of Planning and Environment (DP&E) in considering the assessment and suitable management recommendations, as necessary.

Due to the tight timeframes of the proposal, this letter is intended to achieve two aims:

1. We are seeking registrations from Aboriginal individuals and/or organisations, who may hold cultural knowledge of the area relevant to determining the significance of Aboriginal objects and/or places, and who wish to be involved in the consultation process; and
2. We provide a background on the study area and project, and a proposed assessment methodology, which includes test excavations.

In relation to timing, we request that you provide a response to (1) by 17 December 2014, and a response to (2) by 7 January 2015.

Contact Details

This letter has been prepared by Archaeological & Heritage Management Solutions Pty Ltd (AHMS) for the proponent, Hyder Consulting:

Table 1 - Contact Details

Managing Consultant	Archaeological Advisor
Hyder Consulting	Archaeological & Heritage Management Solutions Pty Ltd
Locked Bag 6503,	2/729 Elizabeth Street
North Sydney, NSW 2060	Waterloo NSW 2017
Contact Person: Westley Owers	Contact Person: Alan Williams
T. 02 8907 9096	T. 02 9555 4000
	F. 02 9555 7005
E: Westley.Owers@hyderconsulting.com	E: awilliams@ahms.com.au

Background

An Aboriginal Cultural Heritage Assessment of the SIMTA site was prepared by AHMS in February 2012 (updated in November 2012), to accompany the Concept Plan application (**Appendix 1**). This report was undertaken in consultation with a number of Aboriginal stakeholders, and included surface investigations. The report identified several areas of potential archaeological deposit, and sparse Aboriginal objects present on the ground surface in previously disturbed areas (**Figure 3**). The proposed Stage 1 works extend across some of these sensitive areas, and therefore has the potential to impact Aboriginal objects.

The original assessment was thorough, however as required by the CoC's and SoC's, further assessment is needed to support the works proposed in the Stage 1 Development Application. In order to properly assess the potential impact, additional archaeological investigation and assessment was considered to be required. The main component required is test excavation of the areas of sensitivity that would be potentially impacted by the development. There were some attempts to undertake these works as part of the Concept Application, but access issues, and ultimately time constraints did not allow the investigations to proceed. The works proposed in this letter is to undertake such investigations and incorporate them into an updated version of the 2012 ACHA, along with additional survey, consultation and background data.

Due to the relatively long gaps in the consultation process, since the development of the 2012 ACHA, we have re-started the Aboriginal consultation process, in accordance with OEH guidelines. This is to ensure the process is transparent and engages with the current Aboriginal stakeholders in the region. *Please note that even if you have been involved in previous stages of this proposal, you must register again as part of this new consultation process.*

Proposed Assessment Methodology

Test Excavation Activities

AHMS proposes to supplement and integrate new data with the existing ACHA, and in accordance with the latest guidelines for the proposal. Specifically, OEH prepared draft guidelines for the assessment of State Significant Projects to be assessed under Part 3A (now repealed) of the EP&A Act. Use of these guidelines has continued for projects assessed under Part 4, Division 4.1 of the EP&A Act, in combination with updated guidelines issued by OEH. The assessment would be prepared in accordance with the following relevant guidelines:

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Development of the ACHA will include the following tasks:

- Aboriginal community consultation;
- Undertaking of test excavation of parts of the identified zones of known or potential cultural materials that are located within the proposed study area, to further determine the nature and extent of the Aboriginal heritage resource, and the potential impact to it (further detail is provided below). This component would be undertaken in conjunction with representatives of the Registered Aboriginal Parties (RAPs) based on selective commercial engagements determined by the client;
- Integration of additional work and results into the existing ACHA, including Aboriginal consultation and any cultural information provided, outlines the findings of the archaeological survey, assesses potential impacts to Aboriginal heritage, and make recommendations on any Aboriginal heritage sites and/or objects that may be present within the study area;
- If sites are identified, submit Site Cards and Site Impact Recording Forms to OEH; and
- If required, develop a Care and Control agreement for recovered artefacts and/or submit a site update card to OEH upon reburial of artefacts.

Any archaeological test excavations implemented as part of the proposal would be undertaken according to Requirements 16 and 17 of OEH's *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (the Code). In summary, the Code of Practice requires the following general methodology:

- Placement of test excavation units along the proposed rail line, ensuring that individual units are separated by at least 5 m.
- Manual excavation.
- Individual test excavation units of 1 x 1 m size.
- Maximum area of excavation to comprise no more than 0.5% of the area being investigated.
- Excavation in 10 cm spits or according to stratigraphy (whichever is smallest) depending on the results of the first unit.
- Excavation to continue to the base of the identified Aboriginal-object-bearing soil(s) and below, sufficient to confirm that the underlying soil(s) is/are culturally sterile.
- Sieving of all excavated material through a 5 mm sieve.
- Photographic and scale-drawn records of each single excavation unit.
- Backfilling of excavation units as soon as practicable.

The Stage 1 study area is ~7,348 m^2 in size. Assuming a maximum of 0.5% of the study area can be excavated, this allows up to 36 m^2 of excavation. We propose to undertake excavations of 25 x 1m^2 test pits along the proposed rail line (**Figure 4**). The overall size of these 25 test pits will equate to ~ 25 m^2 overall. Should significant cultural materials be identified and time permits, a selection of test pits may be expanded up to 3m^2 - the maximum permitted under OEH guidelines - to further characterise the deposits. It is envisaged that the field program may last 5 days.

All material would be sieved through a 5 mm mesh. All excavations would be recorded in accordance with the Code, including scaled drawings, photographs, written descriptions, etc.

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Yours sincerely,

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Manager NSW - Aboriginal Heritage

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P 03 9388 0622

PERTH
25/108 St Georges Tce
Perth WA 6000
P 08 9381 5206

3 December 2014

Gordon Morton
Darug Aboriginal Cultural Heritage Assessments
90 Hermitage Road
Kurrajong Hills NSW 2758

RE: Aboriginal Cultural Heritage Assessment - SIMTA Stage 1, Presentation of Information and Assessment Methodology.

Dear Gordon,

Introduction

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- Darug Aboriginal Landcare Inc;
- Cubbitch Barta;
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- Warragil Cultural Services; and
- Wurrumay Consultancy.

Please note that unless otherwise advised, we are required to send details of all RAPs to OEH and Local Aboriginal Land Council as part of the consultation procedure.

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AHMS proposes the following indicative timeframes for the project:

- Distribution of this document to the RAPs: 1 December 2014.
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- Test Excavations: mid January 2015.
- Review period of draft report: early March 2015.

Information Sought

Notification

If you or your organisation are interested in being part of the consultation process, please provide a registration of interest to:

Alan Williams

AHMS

Address: 2/729 Elizabeth Street, Waterloo NSW 2017;

Phone: 02 9555 4000;

Fax: 02 9555 7005;

Email: awilliams@ahms.com.au.

Registrations are requested on or by **14 December 2014**, with comments on the methodology by 5 January 2015.

To assist us with communicating project information effectively could you please include the following information in your registration of interest:

3. A clear identification of the organisation registering an interest in the project;
4. Your preferred method of communication with AHMS and the proponent during consultation for this proposal, including a nominated contact person and contact details;
5. Comment on the level of consultation / proproposal involvement you request (Do you wish to attend any meetings? Do you wish to be involved in any fieldwork? Do you simply want a copy of the final report?);
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As part of the consultation process we are obliged to provide the contact details of organisations and individuals who register an interest to the OEH and the Local Aboriginal Land Council, unless instructed otherwise. Please advise us if you do not wish this to occur.

Please note that registration of interest will not necessarily lead to participation in fieldwork. Participants will be engaged by the client on the basis of experience, cultural knowledge, appropriate insurances and our personnel requirements.

Presentation of Information and Assessment Methodology

AHMS would appreciate your review of the above methodology proposed for the investigation and assessment of the proposal.

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- Identification of any Aboriginal objects of cultural significance and/or importance that you are aware of within the study area, and how you wish them to be dealt with during the proposal;
- Identification of any places of cultural significance and/or importance that you are aware of within the study area, and how you wish them to be dealt with during the proposal;
- Guidance on the protocols, sensitivity, use and/or distribution of any cultural information that you provide AHMS;
- Whether you require any further information prior to AHMS proceeding with the proposal; and
- Any initial thoughts on the potential long term storage and/or management of the Aboriginal objects that may be recovered from the test excavations if they ensue.

Please ensure AHMS is also provided with your nominated individual's contact information including phone number, fax number, postal address and e-mail address (if available).

If you wish to be considered for participation in any fieldwork, please also provide information on the following:

- Current certificates of currency for relevant insurances;
- Information on hourly or daily rates;

- Information that may demonstrate experience in archaeological excavation;
- An assurance that any proposed staff are ‘fit for work’ to undertake the physical labour of archaeological excavation.
- An assurance that any proposed site staff are endorsed by a relevant section of the Aboriginal community and are able to confer and/or report back to them on project outcomes.

We also direct you to AHMS’ policy and procedures on Aboriginal engagement, which will be provided with this document.

It is important that you understand that AHMS will compile and forward information for review by the applicant, but we do not decide who will be involved in any paid capacity.

If you like to arrange for any elders or other community members to be able to visit the site during the work, please let us know.

Please don’t hesitate to contact me on (02) 9555 4000 if you have any queries or concerns.

Yours sincerely,

Alan Williams MAACAI

Manager NSW - Aboriginal Heritage

Figure 1. The subject area of the SIMTA proposal, highlighting Stage 1.

Figure 2. Map of archaeological sensitivity based on the background review and site inspection. Areas in green are considered highly disturbed and retain little potential for Aboriginal objects to occur. Areas in orange were assessed as having Aboriginal archaeological potential based on background data.

Figure 3. Map showing archaeological findings 2012. Isolated artefacts (shown by numbers) and PADs are presented. Area 1 (shaded blue) along the western edge of Georges River was identified by Aboriginal participants as an area of cultural interest. It is, however, outside of the study area.

Figure 4. Proposed test excavation will occur along the proposed rail link (black line) generally within the two areas shown here (white boxes).

Appendix 1: AHMS 2012 Assessment

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AHMS ARCHAEOLOGICAL & HERITAGE MANAGEMENT SOLUTIONS

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ACN 088 058 388

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MELBOURNE
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Brunswick VIC 3056
P 03 9388 0622

PERTH
25/108 St Georges Tce
Perth WA 6000
P 08 9381 5206

3 December 2014

Leanne Watson
Darug Custodian Aboriginal Corporation
PO Box 81
Windsor NSW 2756

RE: Aboriginal Cultural Heritage Assessment - SIMTA Stage 1, Presentation of Information and Assessment Methodology.

Dear Leanne,

Introduction

In accordance with the NSW Office of Environment and Heritage's (OEH) *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010), I am writing to notify you that we have been engaged by Hyder Consulting to undertake an Aboriginal Cultural Heritage Assessment (ACHA) in advance of the proposed development of the Sydney Intermodal Moorebank Terminal Facility, Moorebank Avenue, NSW (**Figure 1**).

The land in question is within the Liverpool Local Government Area and the project involves the re-development of a site, previously used as a Defence storage facility, into an intermodal terminal facility, including a rail link connecting from the site to the Southern Sydney Freight Line. The project has recently been granted Concept Approval (MP10_0193) under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act), and is now seeking approval of Stage 1 (**Figure 2**) (hereafter referred to as the 'proposal') under Part 4, Division 4.1 of the EP&A Act. This approval, specifically the Conditions of Consent (CoC) and Statement of Commitments (SoC), requires more detailed assessment of Aboriginal heritage, most notably test excavations of a number of previously identified sites (the study area).

AHMS will be undertaking the assessment in accordance with the relevant OEH guidelines. An important part of the assessment will be Aboriginal community consultation that aims to identify cultural values and places of importance to the Aboriginal community within the study area. The purpose of the consultation is to assist the applicant in preparing the ACHA for the study area, and if necessary to assist the Department of Planning and Environment (DP&E) in considering the assessment and suitable management recommendations, as necessary.

Due to the tight timeframes of the proposal, this letter is intended to achieve two aims:

1. We are seeking registrations from Aboriginal individuals and/or organisations, who may hold cultural knowledge of the area relevant to determining the significance of Aboriginal objects and/or places, and who wish to be involved in the consultation process; and
2. We provide a background on the study area and project, and a proposed assessment methodology, which includes test excavations.

In relation to timing, we request that you provide a response to (1) by 17 December 2014, and a response to (2) by 7 January 2015.

Contact Details

This letter has been prepared by Archaeological & Heritage Management Solutions Pty Ltd (AHMS) for the proponent, Hyder Consulting:

Table 1 - Contact Details

Managing Consultant	Archaeological Advisor
Hyder Consulting	Archaeological & Heritage Management Solutions Pty Ltd
Locked Bag 6503,	2/729 Elizabeth Street
North Sydney, NSW 2060	Waterloo NSW 2017
Contact Person: Westley Owers	Contact Person: Alan Williams
T. 02 8907 9096	T. 02 9555 4000
	F. 02 9555 7005
E: Westley.Owers@hyderconsulting.com	E: awilliams@ahms.com.au

Background

An Aboriginal Cultural Heritage Assessment of the SIMTA site was prepared by AHMS in February 2012 (updated in November 2012), to accompany the Concept Plan application (**Appendix 1**). This report was undertaken in consultation with a number of Aboriginal stakeholders, and included surface investigations. The report identified several areas of potential archaeological deposit, and sparse Aboriginal objects present on the ground surface in previously disturbed areas (**Figure 3**). The proposed Stage 1 works extend across some of these sensitive areas, and therefore has the potential to impact Aboriginal objects.

The original assessment was thorough, however as required by the CoC's and SoC's, further assessment is needed to support the works proposed in the Stage 1 Development Application. In order to properly assess the potential impact, additional archaeological investigation and assessment was considered to be required. The main component required is test excavation of the areas of sensitivity that would be potentially impacted by the development. There were some attempts to undertake these works as part of the Concept Application, but access issues, and ultimately time constraints did not allow the investigations to proceed. The works proposed in this letter is to undertake such investigations and incorporate them into an updated version of the 2012 ACHA, along with additional survey, consultation and background data.

Due to the relatively long gaps in the consultation process, since the development of the 2012 ACHA, we have re-started the Aboriginal consultation process, in accordance with OEH guidelines. This is to ensure the process is transparent and engages with the current Aboriginal stakeholders in the region. *Please note that even if you have been involved in previous stages of this proposal, you must register again as part of this new consultation process.*

Proposed Assessment Methodology

Test Excavation Activities

AHMS proposes to supplement and integrate new data with the existing ACHA, and in accordance with the latest guidelines for the proposal. Specifically, OEH prepared draft guidelines for the assessment of State Significant Projects to be assessed under Part 3A (now repealed) of the EP&A Act. Use of these guidelines has continued for projects assessed under Part 4, Division 4.1 of the EP&A Act, in combination with updated guidelines issued by OEH. The assessment would be prepared in accordance with the following relevant guidelines:

- *Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (draft, DEC 2005).
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- *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011).

Development of the ACHA will include the following tasks:

- Aboriginal community consultation;
- Undertaking of test excavation of parts of the identified zones of known or potential cultural materials that are located within the proposed study area, to further determine the nature and extent of the Aboriginal heritage resource, and the potential impact to it (further detail is provided below). This component would be undertaken in conjunction with representatives of the Registered Aboriginal Parties (RAPs) based on selective commercial engagements determined by the client;
- Integration of additional work and results into the existing ACHA, including Aboriginal consultation and any cultural information provided, outlines the findings of the archaeological survey, assesses potential impacts to Aboriginal heritage, and make recommendations on any Aboriginal heritage sites and/or objects that may be present within the study area;
- If sites are identified, submit Site Cards and Site Impact Recording Forms to OEH; and
- If required, develop a Care and Control agreement for recovered artefacts and/or submit a site update card to OEH upon reburial of artefacts.

Any archaeological test excavations implemented as part of the proposal would be undertaken according to Requirements 16 and 17 of OEH's *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (the Code). In summary, the Code of Practice requires the following general methodology:

- Placement of test excavation units along the proposed rail line, ensuring that individual units are separated by at least 5 m.
- Manual excavation.
- Individual test excavation units of 1 x 1 m size.
- Maximum area of excavation to comprise no more than 0.5% of the area being investigated.
- Excavation in 10 cm spits or according to stratigraphy (whichever is smallest) depending on the results of the first unit.
- Excavation to continue to the base of the identified Aboriginal-object-bearing soil(s) and below, sufficient to confirm that the underlying soil(s) is/are culturally sterile.
- Sieving of all excavated material through a 5 mm sieve.
- Photographic and scale-drawn records of each single excavation unit.
- Backfilling of excavation units as soon as practicable.

The Stage 1 study area is ~7,348 m^2 in size. Assuming a maximum of 0.5% of the study area can be excavated, this allows up to 36 m^2 of excavation. We propose to undertake excavations of 25 x 1m^2 test pits along the proposed rail line (**Figure 4**). The overall size of these 25 test pits will equate to ~ 25 m^2 overall. Should significant cultural materials be identified and time permits, a selection of test pits may be expanded up to 3m^2 - the maximum permitted under OEH guidelines - to further characterise the deposits. It is envisaged that the field program may last 5 days.

All material would be sieved through a 5 mm mesh. All excavations would be recorded in accordance with the Code, including scaled drawings, photographs, written descriptions, etc.

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Post-excavation analysis may include any or all of the following tasks:

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Manager NSW - Aboriginal Heritage

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P 03 9388 0622

PERTH
25/108 St Georges Tce
Perth WA 6000
P 08 9381 5206

3 December 2014

Elwyn Brown
Tharawal Local Aboriginal Land Council
PO Box 168
Picton NSW 2571

RE: Aboriginal Cultural Heritage Assessment - SIMTA Stage 1, Presentation of Information and Assessment Methodology.

Dear Elwyn,

Introduction

In accordance with the NSW Office of Environment and Heritage's (OEH) *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010), I am writing to notify you that we have been engaged by Hyder Consulting to undertake an Aboriginal Cultural Heritage Assessment (ACHA) in advance of the proposed development of the Sydney Intermodal Moorebank Terminal Facility, Moorebank Avenue, NSW (**Figure 1**).

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Please note that unless otherwise advised, we are required to send details of all RAPs to OEH and Local Aboriginal Land Council as part of the consultation procedure.

Timeframes

AHMS proposes the following indicative timeframes for the project:

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Information Sought

Notification

If you or your organisation are interested in being part of the consultation process, please provide a registration of interest to:

Alan Williams

AHMS

Address: 2/729 Elizabeth Street, Waterloo NSW 2017;

Phone: 02 9555 4000;

Fax: 02 9555 7005;

Email: awilliams@ahms.com.au.

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Presentation of Information and Assessment Methodology

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Please ensure AHMS is also provided with your nominated individual's contact information including phone number, fax number, postal address and e-mail address (if available).

If you wish to be considered for participation in any fieldwork, please also provide information on the following:

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- Information on hourly or daily rates;

- Information that may demonstrate experience in archaeological excavation;
- An assurance that any proposed staff are ‘fit for work’ to undertake the physical labour of archaeological excavation.
- An assurance that any proposed site staff are endorsed by a relevant section of the Aboriginal community and are able to confer and/or report back to them on project outcomes.

We also direct you to AHMS’ policy and procedures on Aboriginal engagement, which will be provided with this document.

It is important that you understand that AHMS will compile and forward information for review by the applicant, but we do not decide who will be involved in any paid capacity.

If you like to arrange for any elders or other community members to be able to visit the site during the work, please let us know.

Please don’t hesitate to contact me on (02) 9555 4000 if you have any queries or concerns.

Yours sincerely,

Alan Williams MAACAI

Manager NSW - Aboriginal Heritage

Figure 1. The subject area of the SIMTA proposal, highlighting Stage 1.

Figure 2. Map of archaeological sensitivity based on the background review and site inspection. Areas in green are considered highly disturbed and retain little potential for Aboriginal objects to occur. Areas in orange were assessed as having Aboriginal archaeological potential based on background data.

Figure 3. Map showing archaeological findings 2012. Isolated artefacts (shown by numbers) and PADs are presented. Area 1 (shaded blue) along the western edge of Georges River was identified by Aboriginal participants as an area of cultural interest. It is, however, outside of the study area.

Figure 4. Proposed test excavation will occur along the proposed rail link (black line) generally within the two areas shown here (white boxes).

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ACN 088 058 388

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MELBOURNE
2/35 Hope St
Brunswick VIC 3056
P 03 9388 0622

PERTH
25/108 St Georges Tce
Perth WA 6000
P 08 9381 5206

3 December 2014

Glenda Chalker
Cubbitch Barta Native Title Claimants
55 Nightingale Road
Pheasants Nest NSW 2574

RE: Aboriginal Cultural Heritage Assessment - SIMTA Stage 1, Presentation of Information and Assessment Methodology.

Dear Glenda,

Introduction

In accordance with the NSW Office of Environment and Heritage's (OEH) *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010), I am writing to notify you that we have been engaged by Hyder Consulting to undertake an Aboriginal Cultural Heritage Assessment (ACHA) in advance of the proposed development of the Sydney Intermodal Moorebank Terminal Facility, Moorebank Avenue, NSW (**Figure 1**).

The land in question is within the Liverpool Local Government Area and the project involves the re-development of a site, previously used as a Defence storage facility, into an intermodal terminal facility, including a rail link connecting from the site to the Southern Sydney Freight Line. The project has recently been granted Concept Approval (MP10_0193) under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act), and is now seeking approval of Stage 1 (**Figure 2**) (hereafter referred to as the 'proposal') under Part 4, Division 4.1 of the EP&A Act. This approval, specifically the Conditions of Consent (CoC) and Statement of Commitments (SoC), requires more detailed assessment of Aboriginal heritage, most notably test excavations of a number of previously identified sites (the study area).

AHMS will be undertaking the assessment in accordance with the relevant OEH guidelines. An important part of the assessment will be Aboriginal community consultation that aims to identify cultural values and places of importance to the Aboriginal community within the study area. The purpose of the consultation is to assist the applicant in preparing the ACHA for the study area, and if necessary to assist the Department of Planning and Environment (DP&E) in considering the assessment and suitable management recommendations, as necessary.

Due to the tight timeframes of the proposal, this letter is intended to achieve two aims:

1. We are seeking registrations from Aboriginal individuals and/or organisations, who may hold cultural knowledge of the area relevant to determining the significance of Aboriginal objects and/or places, and who wish to be involved in the consultation process; and
2. We provide a background on the study area and project, and a proposed assessment methodology, which includes test excavations.

In relation to timing, we request that you provide a response to (1) by 17 December 2014, and a response to (2) by 7 January 2015.

Contact Details

This letter has been prepared by Archaeological & Heritage Management Solutions Pty Ltd (AHMS) for the proponent, Hyder Consulting:

Table 1 - Contact Details

Managing Consultant	Archaeological Advisor
Hyder Consulting	Archaeological & Heritage Management Solutions Pty Ltd
Locked Bag 6503,	2/729 Elizabeth Street
North Sydney, NSW 2060	Waterloo NSW 2017
Contact Person: Westley Owers	Contact Person: Alan Williams
T. 02 8907 9096	T. 02 9555 4000
	F. 02 9555 7005
E: Westley.Owers@hyderconsulting.com	E: awilliams@ahms.com.au

Background

An Aboriginal Cultural Heritage Assessment of the SIMTA site was prepared by AHMS in February 2012 (updated in November 2012), to accompany the Concept Plan application (**Appendix 1**). This report was undertaken in consultation with a number of Aboriginal stakeholders, and included surface investigations. The report identified several areas of potential archaeological deposit, and sparse Aboriginal objects present on the ground surface in previously disturbed areas (**Figure 3**). The proposed Stage 1 works extend across some of these sensitive areas, and therefore has the potential to impact Aboriginal objects.

The original assessment was thorough, however as required by the CoC's and SoC's, further assessment is needed to support the works proposed in the Stage 1 Development Application. In order to properly assess the potential impact, additional archaeological investigation and assessment was considered to be required. The main component required is test excavation of the areas of sensitivity that would be potentially impacted by the development. There were some attempts to undertake these works as part of the Concept Application, but access issues, and ultimately time constraints did not allow the investigations to proceed. The works proposed in this letter is to undertake such investigations and incorporate them into an updated version of the 2012 ACHA, along with additional survey, consultation and background data.

Due to the relatively long gaps in the consultation process, since the development of the 2012 ACHA, we have re-started the Aboriginal consultation process, in accordance with OEH guidelines. This is to ensure the process is transparent and engages with the current Aboriginal stakeholders in the region. *Please note that even if you have been involved in previous stages of this proposal, you must register again as part of this new consultation process.*

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AHMS proposes to supplement and integrate new data with the existing ACHA, and in accordance with the latest guidelines for the proposal. Specifically, OEH prepared draft guidelines for the assessment of State Significant Projects to be assessed under Part 3A (now repealed) of the EP&A Act. Use of these guidelines has continued for projects assessed under Part 4, Division 4.1 of the EP&A Act, in combination with updated guidelines issued by OEH. The assessment would be prepared in accordance with the following relevant guidelines:

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Development of the ACHA will include the following tasks:

- Aboriginal community consultation;
- Undertaking of test excavation of parts of the identified zones of known or potential cultural materials that are located within the proposed study area, to further determine the nature and extent of the Aboriginal heritage resource, and the potential impact to it (further detail is provided below). This component would be undertaken in conjunction with representatives of the Registered Aboriginal Parties (RAPs) based on selective commercial engagements determined by the client;
- Integration of additional work and results into the existing ACHA, including Aboriginal consultation and any cultural information provided, outlines the findings of the archaeological survey, assesses potential impacts to Aboriginal heritage, and make recommendations on any Aboriginal heritage sites and/or objects that may be present within the study area;
- If sites are identified, submit Site Cards and Site Impact Recording Forms to OEH; and
- If required, develop a Care and Control agreement for recovered artefacts and/or submit a site update card to OEH upon reburial of artefacts.

Any archaeological test excavations implemented as part of the proposal would be undertaken according to Requirements 16 and 17 of OEH's *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (the Code). In summary, the Code of Practice requires the following general methodology:

- Placement of test excavation units along the proposed rail line, ensuring that individual units are separated by at least 5 m.
- Manual excavation.
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- Maximum area of excavation to comprise no more than 0.5% of the area being investigated.
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- Excavation to continue to the base of the identified Aboriginal-object-bearing soil(s) and below, sufficient to confirm that the underlying soil(s) is/are culturally sterile.
- Sieving of all excavated material through a 5 mm sieve.
- Photographic and scale-drawn records of each single excavation unit.
- Backfilling of excavation units as soon as practicable.

The Stage 1 study area is ~7,348 m^2 in size. Assuming a maximum of 0.5% of the study area can be excavated, this allows up to 36 m^2 of excavation. We propose to undertake excavations of 25 x 1m^2 test pits along the proposed rail line (**Figure 4**). The overall size of these 25 test pits will equate to ~ 25 m^2 overall. Should significant cultural materials be identified and time permits, a selection of test pits may be expanded up to 3m^2 - the maximum permitted under OEH guidelines - to further characterise the deposits. It is envisaged that the field program may last 5 days.

All material would be sieved through a 5 mm mesh. All excavations would be recorded in accordance with the Code, including scaled drawings, photographs, written descriptions, etc.

Upon completion of the excavation program, all test pits would be mechanically backfilled and the area re-established before any new areas are opened.

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Should Aboriginal objects be recovered, post excavation analysis would be required under the Code.

Post-excavation analysis may include any or all of the following tasks:

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25/108 St Georges Tce
Perth WA 6000
P 08 9381 5206

3 December 2014

Mikael Smith
Gandangara Local Aboriginal Land Council
PO Box 1038
Liverpool BC NSW 1871

RE: Aboriginal Cultural Heritage Assessment - SIMTA Stage 1, Presentation of Information and Assessment Methodology.

Dear Mikael,

Introduction

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6. If you wish to be involved in any meetings or fieldwork, please ensure we have current copies of your public liability, workers compensation and professional indemnity (if available) insurances as soon as possible.

As part of the consultation process we are obliged to provide the contact details of organisations and individuals who register an interest to the OEH and the Local Aboriginal Land Council, unless instructed otherwise. Please advise us if you do not wish this to occur.

Please note that registration of interest will not necessarily lead to participation in fieldwork. Participants will be engaged by the client on the basis of experience, cultural knowledge, appropriate insurances and our personnel requirements.

Presentation of Information and Assessment Methodology

AHMS would appreciate your review of the above methodology proposed for the investigation and assessment of the proposal.

In returning your comments, please include the following where appropriate:

- Any protocols that you would like request be adopted during the proposal;
- Identification of any Aboriginal objects of cultural significance and/or importance that you are aware of within the study area, and how you wish them to be dealt with during the proposal;
- Identification of any places of cultural significance and/or importance that you are aware of within the study area, and how you wish them to be dealt with during the proposal;
- Guidance on the protocols, sensitivity, use and/or distribution of any cultural information that you provide AHMS;
- Whether you require any further information prior to AHMS proceeding with the proposal; and
- Any initial thoughts on the potential long term storage and/or management of the Aboriginal objects that may be recovered from the test excavations if they ensue.

Please ensure AHMS is also provided with your nominated individual's contact information including phone number, fax number, postal address and e-mail address (if available).

If you wish to be considered for participation in any fieldwork, please also provide information on the following:

- Current certificates of currency for relevant insurances;
- Information on hourly or daily rates;

- Information that may demonstrate experience in archaeological excavation;
- An assurance that any proposed staff are ‘fit for work’ to undertake the physical labour of archaeological excavation.
- An assurance that any proposed site staff are endorsed by a relevant section of the Aboriginal community and are able to confer and/or report back to them on project outcomes.

We also direct you to AHMS’ policy and procedures on Aboriginal engagement, which will be provided with this document.

It is important that you understand that AHMS will compile and forward information for review by the applicant, but we do not decide who will be involved in any paid capacity.

If you like to arrange for any elders or other community members to be able to visit the site during the work, please let us know.

Please don’t hesitate to contact me on (02) 9555 4000 if you have any queries or concerns.

Yours sincerely,

Alan Williams MAACAI

Manager NSW - Aboriginal Heritage

Figure 1. The subject area of the SIMTA proposal, highlighting Stage 1.

Figure 2. Map of archaeological sensitivity based on the background review and site inspection. Areas in green are considered highly disturbed and retain little potential for Aboriginal objects to occur. Areas in orange were assessed as having Aboriginal archaeological potential based on background data.

Figure 3. Map showing archaeological findings 2012. Isolated artefacts (shown by numbers) and PADs are presented. Area 1 (shaded blue) along the western edge of Georges River was identified by Aboriginal participants as an area of cultural interest. It is, however, outside of the study area.

Figure 4. Proposed test excavation will occur along the proposed rail link (black line) generally within the two areas shown here (white boxes).

Appendix 1: AHMS 2012 Assessment

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AHMS ARCHAEOLOGICAL & HERITAGE MANAGEMENT SOLUTIONS

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ACN 088 058 388

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Brunswick VIC 3056
P 03 9388 0622

PERTH
25/108 St Georges Tce
Perth WA 6000
P 08 9381 5206

3 December 2014

Aaron Slater
Warragil Cultural Services
22 Tiffany Close
Rooty Hill NSW 2766

RE: Aboriginal Cultural Heritage Assessment - SIMTA Stage 1, Presentation of Information and Assessment Methodology.

Dear Aaron,

Introduction

In accordance with the NSW Office of Environment and Heritage's (OEH) *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010), I am writing to notify you that we have been engaged by Hyder Consulting to undertake an Aboriginal Cultural Heritage Assessment (ACHA) in advance of the proposed development of the Sydney Intermodal Moorebank Terminal Facility, Moorebank Avenue, NSW (**Figure 1**).

The land in question is within the Liverpool Local Government Area and the project involves the re-development of a site, previously used as a Defence storage facility, into an intermodal terminal facility, including a rail link connecting from the site to the Southern Sydney Freight Line. The project has recently been granted Concept Approval (MP10_0193) under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act), and is now seeking approval of Stage 1 (**Figure 2**) (hereafter referred to as the 'proposal') under Part 4, Division 4.1 of the EP&A Act. This approval, specifically the Conditions of Consent (CoC) and Statement of Commitments (SoC), requires more detailed assessment of Aboriginal heritage, most notably test excavations of a number of previously identified sites (the study area).

AHMS will be undertaking the assessment in accordance with the relevant OEH guidelines. An important part of the assessment will be Aboriginal community consultation that aims to identify cultural values and places of importance to the Aboriginal community within the study area. The purpose of the consultation is to assist the applicant in preparing the ACHA for the study area, and if necessary to assist the Department of Planning and Environment (DP&E) in considering the assessment and suitable management recommendations, as necessary.

Due to the tight timeframes of the proposal, this letter is intended to achieve two aims:

1. We are seeking registrations from Aboriginal individuals and/or organisations, who may hold cultural knowledge of the area relevant to determining the significance of Aboriginal objects and/or places, and who wish to be involved in the consultation process; and
2. We provide a background on the study area and project, and a proposed assessment methodology, which includes test excavations.

In relation to timing, we request that you provide a response to (1) by 17 December 2014, and a response to (2) by 7 January 2015.

Contact Details

This letter has been prepared by Archaeological & Heritage Management Solutions Pty Ltd (AHMS) for the proponent, Hyder Consulting:

Table 1 - Contact Details

Managing Consultant	Archaeological Advisor
Hyder Consulting	Archaeological & Heritage Management Solutions Pty Ltd
Locked Bag 6503,	2/729 Elizabeth Street
North Sydney, NSW 2060	Waterloo NSW 2017
Contact Person: Westley Owers	Contact Person: Alan Williams
T. 02 8907 9096	T. 02 9555 4000
	F. 02 9555 7005
E: Westley.Owers@hyderconsulting.com	E: awilliams@ahms.com.au

Background

An Aboriginal Cultural Heritage Assessment of the SIMTA site was prepared by AHMS in February 2012 (updated in November 2012), to accompany the Concept Plan application (**Appendix 1**). This report was undertaken in consultation with a number of Aboriginal stakeholders, and included surface investigations. The report identified several areas of potential archaeological deposit, and sparse Aboriginal objects present on the ground surface in previously disturbed areas (**Figure 3**). The proposed Stage 1 works extend across some of these sensitive areas, and therefore has the potential to impact Aboriginal objects.

The original assessment was thorough, however as required by the CoC's and SoC's, further assessment is needed to support the works proposed in the Stage 1 Development Application. In order to properly assess the potential impact, additional archaeological investigation and assessment was considered to be required. The main component required is test excavation of the areas of sensitivity that would be potentially impacted by the development. There were some attempts to undertake these works as part of the Concept Application, but access issues, and ultimately time constraints did not allow the investigations to proceed. The works proposed in this letter is to undertake such investigations and incorporate them into an updated version of the 2012 ACHA, along with additional survey, consultation and background data.

Due to the relatively long gaps in the consultation process, since the development of the 2012 ACHA, we have re-started the Aboriginal consultation process, in accordance with OEH guidelines. This is to ensure the process is transparent and engages with the current Aboriginal stakeholders in the region. *Please note that even if you have been involved in previous stages of this proposal, you must register again as part of this new consultation process.*

Proposed Assessment Methodology

Test Excavation Activities

AHMS proposes to supplement and integrate new data with the existing ACHA, and in accordance with the latest guidelines for the proposal. Specifically, OEH prepared draft guidelines for the assessment of State Significant Projects to be assessed under Part 3A (now repealed) of the EP&A Act. Use of these guidelines has continued for projects assessed under Part 4, Division 4.1 of the EP&A Act, in combination with updated guidelines issued by OEH. The assessment would be prepared in accordance with the following relevant guidelines:

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- *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011).

Development of the ACHA will include the following tasks:

- Aboriginal community consultation;
- Undertaking of test excavation of parts of the identified zones of known or potential cultural materials that are located within the proposed study area, to further determine the nature and extent of the Aboriginal heritage resource, and the potential impact to it (further detail is provided below). This component would be undertaken in conjunction with representatives of the Registered Aboriginal Parties (RAPs) based on selective commercial engagements determined by the client;
- Integration of additional work and results into the existing ACHA, including Aboriginal consultation and any cultural information provided, outlines the findings of the archaeological survey, assesses potential impacts to Aboriginal heritage, and make recommendations on any Aboriginal heritage sites and/or objects that may be present within the study area;
- If sites are identified, submit Site Cards and Site Impact Recording Forms to OEH; and
- If required, develop a Care and Control agreement for recovered artefacts and/or submit a site update card to OEH upon reburial of artefacts.

Any archaeological test excavations implemented as part of the proposal would be undertaken according to Requirements 16 and 17 of OEH's *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (the Code). In summary, the Code of Practice requires the following general methodology:

- Placement of test excavation units along the proposed rail line, ensuring that individual units are separated by at least 5 m.
- Manual excavation.
- Individual test excavation units of 1 x 1 m size.
- Maximum area of excavation to comprise no more than 0.5% of the area being investigated.
- Excavation in 10 cm spits or according to stratigraphy (whichever is smallest) depending on the results of the first unit.
- Excavation to continue to the base of the identified Aboriginal-object-bearing soil(s) and below, sufficient to confirm that the underlying soil(s) is/are culturally sterile.
- Sieving of all excavated material through a 5 mm sieve.
- Photographic and scale-drawn records of each single excavation unit.
- Backfilling of excavation units as soon as practicable.

The Stage 1 study area is ~7,348 m^2 in size. Assuming a maximum of 0.5% of the study area can be excavated, this allows up to 36 m^2 of excavation. We propose to undertake excavations of 25 x 1m^2 test pits along the proposed rail line (**Figure 4**). The overall size of these 25 test pits will equate to ~ 25 m^2 overall. Should significant cultural materials be identified and time permits, a selection of test pits may be expanded up to 3m^2 - the maximum permitted under OEH guidelines - to further characterise the deposits. It is envisaged that the field program may last 5 days.

All material would be sieved through a 5 mm mesh. All excavations would be recorded in accordance with the Code, including scaled drawings, photographs, written descriptions, etc.

Upon completion of the excavation program, all test pits would be mechanically backfilled and the area re-established before any new areas are opened.

Post Excavation Analysis

Should Aboriginal objects be recovered, post excavation analysis would be required under the Code.

Post-excavation analysis may include any or all of the following tasks:

- Stone tool/lithic analysis: AHMS may engage a stone tool specialist (most likely Michelle Lau) to undertake analysis of the Aboriginal objects recovered. Analysis would be in accordance with the various guidelines, and would include raw material types, measurements of each object (including weight, size, etc), descriptions of any tools recovered, analysis and interpretation of the assemblage in a local and regional context;

- Geomorphology/Soil Analysis: To understand the formation of the soil profile and the archaeology within it, analysis may include visual observation of the test pits by a specialist (most likely Peter Johnston); particle size and/or loss-on-ignition (by University Technology Sydney) and/or soil micromorphology (by Ken McQueen, University of Canberra) to determine microscopic changes in the soil profile; and

- Chronology: AHMS may take samples to date the age of the soil profile and any archaeology within it. Two main types of dating may be attempted, radiocarbon dating and/or Optically Stimulated Luminescence dating. The former would require the presence of charcoal and/or shell within the profile and would be sent to the University of Waikato for analysis; the latter involves extraction of quartz grains from the profile and would be sent to University of Gloucestershire (UK) for analysis.

The findings of these analyses would be integrated into the report prior to its finalisation..

Artefact Storage and Long Term Management

All Aboriginal objects recovered would be securely stored at the AHMS Sydney office (2/729 Elizabeth Road, Waterloo, NSW 2017) for analysis. During this process, AHMS would develop a Care and Control Agreement, if necessary, to determine the long-term location and management of any Aboriginal objects recovered. An Aboriginal Site Impact Recording form would also be completed and lodged with OEH.

Aboriginal Consultation

AHMS has recently begun the formal consultation process in accordance with OEH's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010). Currently, the following individuals/organisations have been identified as potential stakeholders:

- Gandangarra LALC;
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- Darug Aboriginal Cultural Heritage Assessments;
- Darug Custodian Aboriginal Corporation;
- Darug Tribal Aboriginal Corporation;
- Darug Land Observations;
- Darug Aboriginal Landcare Inc;
- Cubbitch Barta;
- Tocomwall;
- Warragil Cultural Services; and
- Wurrumay Consultancy.

Please note that unless otherwise advised, we are required to send details of all RAPs to OEH and Local Aboriginal Land Council as part of the consultation procedure.

Timeframes

AHMS proposes the following indicative timeframes for the project:

- Distribution of this document to the RAPs: 1 December 2014.
- End of review period for the proposed methodology: 5 January 2015.
- Test Excavations: mid January 2015.
- Review period of draft report: early March 2015.

Information Sought

Notification

If you or your organisation are interested in being part of the consultation process, please provide a registration of interest to:

Alan Williams

AHMS

Address: 2/729 Elizabeth Street, Waterloo NSW 2017;

Phone: 02 9555 4000;

Fax: 02 9555 7005;

Email: awilliams@ahms.com.au.

Registrations are requested on or by **14 December 2014**, with comments on the methodology by 5 January 2015.

To assist us with communicating project information effectively could you please include the following information in your registration of interest:

3. A clear identification of the organisation registering an interest in the project;
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Please don’t hesitate to contact me on (02) 9555 4000 if you have any queries or concerns.

Yours sincerely,

Alan Williams MAACAI

Manager NSW - Aboriginal Heritage

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Figure 2. Map of archaeological sensitivity based on the background review and site inspection. Areas in green are considered highly disturbed and retain little potential for Aboriginal objects to occur. Areas in orange were assessed as having Aboriginal archaeological potential based on background data.

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Figure 4. Proposed test excavation will occur along the proposed rail link (black line) generally within the two areas shown here (white boxes).

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PERTH
25/108 St Georges Tce
Perth WA 6000
P 08 9381 5206

3 December 2014

Kerrie Slater
Wurrumay Consultancy
89 Pyramid Street
Emu Plains NSW 2750

RE: Aboriginal Cultural Heritage Assessment - SIMTA Stage 1, Presentation of Information and Assessment Methodology.

Dear Kerrie,

Introduction

In accordance with the NSW Office of Environment and Heritage's (OEH) *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010), I am writing to notify you that we have been engaged by Hyder Consulting to undertake an Aboriginal Cultural Heritage Assessment (ACHA) in advance of the proposed development of the Sydney Intermodal Moorebank Terminal Facility, Moorebank Avenue, NSW (**Figure 1**).

The land in question is within the Liverpool Local Government Area and the project involves the re-development of a site, previously used as a Defence storage facility, into an intermodal terminal facility, including a rail link connecting from the site to the Southern Sydney Freight Line. The project has recently been granted Concept Approval (MP10_0193) under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act), and is now seeking approval of Stage 1 (**Figure 2**) (hereafter referred to as the 'proposal') under Part 4, Division 4.1 of the EP&A Act. This approval, specifically the Conditions of Consent (CoC) and Statement of Commitments (SoC), requires more detailed assessment of Aboriginal heritage, most notably test excavations of a number of previously identified sites (the study area).

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In relation to timing, we request that you provide a response to (1) by 17 December 2014, and a response to (2) by 7 January 2015.

Contact Details

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Hyder Consulting	Archaeological & Heritage Management Solutions Pty Ltd
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- Identification of any Aboriginal objects of cultural significance and/or importance that you are aware of within the study area, and how you wish them to be dealt with during the proposal;
- Identification of any places of cultural significance and/or importance that you are aware of within the study area, and how you wish them to be dealt with during the proposal;
- Guidance on the protocols, sensitivity, use and/or distribution of any cultural information that you provide AHMS;
- Whether you require any further information prior to AHMS proceeding with the proposal; and
- Any initial thoughts on the potential long term storage and/or management of the Aboriginal objects that may be recovered from the test excavations if they ensue.

Please ensure AHMS is also provided with your nominated individual's contact information including phone number, fax number, postal address and e-mail address (if available).

If you wish to be considered for participation in any fieldwork, please also provide information on the following:

- Current certificates of currency for relevant insurances;
- Information on hourly or daily rates;

- Information that may demonstrate experience in archaeological excavation;
- An assurance that any proposed staff are ‘fit for work’ to undertake the physical labour of archaeological excavation.
- An assurance that any proposed site staff are endorsed by a relevant section of the Aboriginal community and are able to confer and/or report back to them on project outcomes.

We also direct you to AHMS’ policy and procedures on Aboriginal engagement, which will be provided with this document.

It is important that you understand that AHMS will compile and forward information for review by the applicant, but we do not decide who will be involved in any paid capacity.

If you like to arrange for any elders or other community members to be able to visit the site during the work, please let us know.

Please don’t hesitate to contact me on (02) 9555 4000 if you have any queries or concerns.

Yours sincerely,

Alan Williams MAACAI

Manager NSW - Aboriginal Heritage

Figure 1. The subject area of the SIMTA proposal, highlighting Stage 1.

Figure 2. Map of archaeological sensitivity based on the background review and site inspection. Areas in green are considered highly disturbed and retain little potential for Aboriginal objects to occur. Areas in orange were assessed as having Aboriginal archaeological potential based on background data.

Figure 3. Map showing archaeological findings 2012. Isolated artefacts (shown by numbers) and PADs are presented. Area 1 (shaded blue) along the western edge of Georges River was identified by Aboriginal participants as an area of cultural interest. It is, however, outside of the study area.

Figure 4. Proposed test excavation will occur along the proposed rail link (black line) generally within the two areas shown here (white boxes).

Appendix 1: AHMS 2012 Assessment

This document was provided in the original, but has not been duplicated here.

AHMS ARCHAEOLOGICAL & HERITAGE MANAGEMENT SOLUTIONS
ABN 45 088 058 388
ACN 088 058 388
www.ahms.com.au
info@ahms.com.au
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P 02 9555 4000
F 02 9555 7005
MELBOURNE
2/35 Hope St
Brunswick VIC 3056
P 03 9388 0622
PERTH
25/108 St Georges Tce
Perth WA 6000
P 08 9381 5206

3 December 2014

Norma Burrows
Liverpool City Council Aboriginal Consultative Committee
Level 2, 33 Moore Street
Liverpool NSW 2170

RE: Aboriginal Cultural Heritage Assessment - SIMTA Stage 1, Presentation of Information and Assessment Methodology.

Dear Norma,

Introduction

In accordance with the NSW Office of Environment and Heritage's (OEH) *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010), I am writing to notify you that we have been engaged by Hyder Consulting to undertake an Aboriginal Cultural Heritage Assessment (ACHA) in advance of the proposed development of the Sydney Intermodal Moorebank Terminal Facility, Moorebank Avenue, NSW (**Figure 1**).

The land in question is within the Liverpool Local Government Area and the project involves the re-development of a site, previously used as a Defence storage facility, into an intermodal terminal facility, including a rail link connecting from the site to the Southern Sydney Freight Line. The project has recently been granted Concept Approval (MP10_0193) under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act), and is now seeking approval of Stage 1 (**Figure 2**) (hereafter referred to as the 'proposal') under Part 4, Division 4.1 of the EP&A Act. This approval, specifically the Conditions of Consent (CoC) and Statement of Commitments (SoC), requires more detailed assessment of Aboriginal heritage, most notably test excavations of a number of previously identified sites (the study area).

AHMS will be undertaking the assessment in accordance with the relevant OEH guidelines. An important part of the assessment will be Aboriginal community consultation that aims to identify cultural values and places of importance to the Aboriginal community within the study area. The purpose of the consultation is to assist the applicant in preparing the ACHA for the study area, and if necessary to assist the Department of Planning and Environment (DP&E) in considering the assessment and suitable management recommendations, as necessary.

Due to the tight timeframes of the proposal, this letter is intended to achieve two aims:

1. We are seeking registrations from Aboriginal individuals and/or organisations, who may hold cultural knowledge of the area relevant to determining the significance of Aboriginal objects and/or places, and who wish to be involved in the consultation process; and
2. We provide a background on the study area and project, and a proposed assessment methodology, which includes test excavations.

In relation to timing, we request that you provide a response to (1) by 17 December 2014, and a response to (2) by 7 January 2015.

Contact Details

This letter has been prepared by Archaeological & Heritage Management Solutions Pty Ltd (AHMS) for the proponent, Hyder Consulting:

Table 1 - Contact Details

Managing Consultant	Archaeological Advisor
Hyder Consulting	Archaeological & Heritage Management Solutions Pty Ltd
Locked Bag 6503,	2/729 Elizabeth Street
North Sydney, NSW 2060	Waterloo NSW 2017
Contact Person: Westley Owers	Contact Person: Alan Williams
T. 02 8907 9096	T. 02 9555 4000
	F. 02 9555 7005
E: Westley.Owers@hyderconsulting.com	E: awilliams@ahms.com.au

Background

An Aboriginal Cultural Heritage Assessment of the SIMTA site was prepared by AHMS in February 2012 (updated in November 2012), to accompany the Concept Plan application (**Appendix 1**). This report was undertaken in consultation with a number of Aboriginal stakeholders, and included surface investigations. The report identified several areas of potential archaeological deposit, and sparse Aboriginal objects present on the ground surface in previously disturbed areas (**Figure 3**). The proposed Stage 1 works extend across some of these sensitive areas, and therefore has the potential to impact Aboriginal objects.

The original assessment was thorough, however as required by the CoC's and SoC's, further assessment is needed to support the works proposed in the Stage 1 Development Application. In order to properly assess the potential impact, additional archaeological investigation and assessment was considered to be required. The main component required is test excavation of the areas of sensitivity that would be potentially impacted by the development. There were some attempts to undertake these works as part of the Concept Application, but access issues, and ultimately time constraints did not allow the investigations to proceed. The works proposed in this letter is to undertake such investigations and incorporate them into an updated version of the 2012 ACHA, along with additional survey, consultation and background data.

Due to the relatively long gaps in the consultation process, since the development of the 2012 ACHA, we have re-started the Aboriginal consultation process, in accordance with OEH guidelines. This is to ensure the process is transparent and engages with the current Aboriginal stakeholders in the region. *Please note that even if you have been involved in previous stages of this proposal, you must register again as part of this new consultation process.*

Proposed Assessment Methodology

Test Excavation Activities

AHMS proposes to supplement and integrate new data with the existing ACHA, and in accordance with the latest guidelines for the proposal. Specifically, OEH prepared draft guidelines for the assessment of State Significant Projects to be assessed under Part 3A (now repealed) of the EP&A Act. Use of these guidelines has continued for projects assessed under Part 4, Division 4.1 of the EP&A Act, in combination with updated guidelines issued by OEH. The assessment would be prepared in accordance with the following relevant guidelines:

- *Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (draft, DEC 2005).
- *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW 2010).
- *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010).
- *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011).

Development of the ACHA will include the following tasks:

- Aboriginal community consultation;
- Undertaking of test excavation of parts of the identified zones of known or potential cultural materials that are located within the proposed study area, to further determine the nature and extent of the Aboriginal heritage resource, and the potential impact to it (further detail is provided below). This component would be undertaken in conjunction with representatives of the Registered Aboriginal Parties (RAPs) based on selective commercial engagements determined by the client;
- Integration of additional work and results into the existing ACHA, including Aboriginal consultation and any cultural information provided, outlines the findings of the archaeological survey, assesses potential impacts to Aboriginal heritage, and make recommendations on any Aboriginal heritage sites and/or objects that may be present within the study area;
- If sites are identified, submit Site Cards and Site Impact Recording Forms to OEH; and
- If required, develop a Care and Control agreement for recovered artefacts and/or submit a site update card to OEH upon reburial of artefacts.

Any archaeological test excavations implemented as part of the proposal would be undertaken according to Requirements 16 and 17 of OEH's *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (the Code). In summary, the Code of Practice requires the following general methodology:

- Placement of test excavation units along the proposed rail line, ensuring that individual units are separated by at least 5 m.
- Manual excavation.
- Individual test excavation units of 1 x 1 m size.
- Maximum area of excavation to comprise no more than 0.5% of the area being investigated.
- Excavation in 10 cm spits or according to stratigraphy (whichever is smallest) depending on the results of the first unit.
- Excavation to continue to the base of the identified Aboriginal-object-bearing soil(s) and below, sufficient to confirm that the underlying soil(s) is/are culturally sterile.
- Sieving of all excavated material through a 5 mm sieve.
- Photographic and scale-drawn records of each single excavation unit.
- Backfilling of excavation units as soon as practicable.

The Stage 1 study area is ~7,348 m^2 in size. Assuming a maximum of 0.5% of the study area can be excavated, this allows up to 36 m^2 of excavation. We propose to undertake excavations of 25 x 1m^2 test pits along the proposed rail line (**Figure 4**). The overall size of these 25 test pits will equate to ~ 25 m^2 overall. Should significant cultural materials be identified and time permits, a selection of test pits may be expanded up to 3m^2 - the maximum permitted under OEH guidelines - to further characterise the deposits. It is envisaged that the field program may last 5 days.

All material would be sieved through a 5 mm mesh. All excavations would be recorded in accordance with the Code, including scaled drawings, photographs, written descriptions, etc.

Upon completion of the excavation program, all test pits would be mechanically backfilled and the area re-established before any new areas are opened.

Post Excavation Analysis

Should Aboriginal objects be recovered, post excavation analysis would be required under the Code.

Post-excavation analysis may include any or all of the following tasks:

- Stone tool/lithic analysis: AHMS may engage a stone tool specialist (most likely Michelle Lau) to undertake analysis of the Aboriginal objects recovered. Analysis would be in accordance with the various guidelines, and would include raw material types, measurements of each object (including weight, size, etc), descriptions of any tools recovered, analysis and interpretation of the assemblage in a local and regional context;

- Geomorphology/Soil Analysis: To understand the formation of the soil profile and the archaeology within it, analysis may include visual observation of the test pits by a specialist (most likely Peter Johnston); particle size and/or loss-on-ignition (by University Technology Sydney) and/or soil micromorphology (by Ken McQueen, University of Canberra) to determine microscopic changes in the soil profile; and

- Chronology: AHMS may take samples to date the age of the soil profile and any archaeology within it. Two main types of dating may be attempted, radiocarbon dating and/or Optically Stimulated Luminescence dating. The former would require the presence of charcoal and/or shell within the profile and would be sent to the University of Waikato for analysis; the latter involves extraction of quartz grains from the profile and would be sent to University of Gloucestershire (UK) for analysis.

The findings of these analyses would be integrated into the report prior to its finalisation..

Artefact Storage and Long Term Management

All Aboriginal objects recovered would be securely stored at the AHMS Sydney office (2/729 Elizabeth Road, Waterloo, NSW 2017) for analysis. During this process, AHMS would develop a Care and Control Agreement, if necessary, to determine the long-term location and management of any Aboriginal objects recovered. An Aboriginal Site Impact Recording form would also be completed and lodged with OEH.

Aboriginal Consultation

AHMS has recently begun the formal consultation process in accordance with OEH's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010). Currently, the following individuals/organisations have been identified as potential stakeholders:

- Gandangarra LALC;
- Tharawal LALC;
- Darug Aboriginal Cultural Heritage Assessments;
- Darug Custodian Aboriginal Corporation;
- Darug Tribal Aboriginal Corporation;
- Darug Land Observations;
- Darug Aboriginal Landcare Inc;
- Cubbitch Barta;
- Tocomwall;
- Warragil Cultural Services; and
- Wurrumay Consultancy.

Please note that unless otherwise advised, we are required to send details of all RAPs to OEH and Local Aboriginal Land Council as part of the consultation procedure.

Timeframes

AHMS proposes the following indicative timeframes for the project:

- Distribution of this document to the RAPs: 1 December 2014.
- End of review period for the proposed methodology: 5 January 2015.
- Test Excavations: mid January 2015.
- Review period of draft report: early March 2015.

Information Sought

Notification

If you or your organisation are interested in being part of the consultation process, please provide a registration of interest to:

Alan Williams

AHMS

Address: 2/729 Elizabeth Street, Waterloo NSW 2017;

Phone: 02 9555 4000;

Fax: 02 9555 7005;

Email: awilliams@ahms.com.au.

Registrations are requested on or by **14 December 2014**, with comments on the methodology by 5 January 2015.

To assist us with communicating project information effectively could you please include the following information in your registration of interest:

3. A clear identification of the organisation registering an interest in the project;
4. Your preferred method of communication with AHMS and the proponent during consultation for this proposal, including a nominated contact person and contact details;
5. Comment on the level of consultation / proproposal involvement you request (Do you wish to attend any meetings? Do you wish to be involved in any fieldwork? Do you simply want a copy of the final report?);
6. If you wish to be involved in any meetings or fieldwork, please ensure we have current copies of your public liability, workers compensation and professional indemnity (if available) insurances as soon as possible.

As part of the consultation process we are obliged to provide the contact details of organisations and individuals who register an interest to the OEH and the Local Aboriginal Land Council, unless instructed otherwise. Please advise us if you do not wish this to occur.

Please note that registration of interest will not necessarily lead to participation in fieldwork. Participants will be engaged by the client on the basis of experience, cultural knowledge, appropriate insurances and our personnel requirements.

Presentation of Information and Assessment Methodology

AHMS would appreciate your review of the above methodology proposed for the investigation and assessment of the proposal.

In returning your comments, please include the following where appropriate:

- Any protocols that you would like request be adopted during the proposal;
- Identification of any Aboriginal objects of cultural significance and/or importance that you are aware of within the study area, and how you wish them to be dealt with during the proposal;
- Identification of any places of cultural significance and/or importance that you are aware of within the study area, and how you wish them to be dealt with during the proposal;
- Guidance on the protocols, sensitivity, use and/or distribution of any cultural information that you provide AHMS;
- Whether you require any further information prior to AHMS proceeding with the proposal; and
- Any initial thoughts on the potential long term storage and/or management of the Aboriginal objects that may be recovered from the test excavations if they ensue.

Please ensure AHMS is also provided with your nominated individual's contact information including phone number, fax number, postal address and e-mail address (if available).

If you wish to be considered for participation in any fieldwork, please also provide information on the following:

- Current certificates of currency for relevant insurances;
- Information on hourly or daily rates;

- Information that may demonstrate experience in archaeological excavation;
- An assurance that any proposed staff are ‘fit for work’ to undertake the physical labour of archaeological excavation.
- An assurance that any proposed site staff are endorsed by a relevant section of the Aboriginal community and are able to confer and/or report back to them on project outcomes.

We also direct you to AHMS’ policy and procedures on Aboriginal engagement, which will be provided with this document.

It is important that you understand that AHMS will compile and forward information for review by the applicant, but we do not decide who will be involved in any paid capacity.

If you like to arrange for any elders or other community members to be able to visit the site during the work, please let us know.

Please don’t hesitate to contact me on (02) 9555 4000 if you have any queries or concerns.

Yours sincerely,

Alan Williams MAACAI

Manager NSW - Aboriginal Heritage

Figure 1. The subject area of the SIMTA proposal, highlighting Stage 1.

Figure 2. Map of archaeological sensitivity based on the background review and site inspection. Areas in green are considered highly disturbed and retain little potential for Aboriginal objects to occur. Areas in orange were assessed as having Aboriginal archaeological potential based on background data.

Figure 3. Map showing archaeological findings 2012. Isolated artefacts (shown by numbers) and PADs are presented. Area 1 (shaded blue) along the western edge of Georges River was identified by Aboriginal participants as an area of cultural interest. It is, however, outside of the study area.

Figure 4. Proposed test excavation will occur along the proposed rail link (black line) generally within the two areas shown here (white boxes).

Appendix 1: AHMS 2012 Assessment

This document was provided in the original, but has not been duplicated here.

Alan Williams

From: kgchalker <kgchalker@bigpond.com.au>
Sent: Thursday, 4 December 2014 7:39 AM
To: Alan Williams
Subject: Re: SIMTA, Moorebank - Aboriginal Cultural Heritage Assessment - Registration of Interest and Methodology

Alan
Cubbitch Barta wishes to re register. Also could you please send me hard copies ASAP
Thanks Glenda

Alan Williams <AWilliams@ahms.com.au> wrote:

Dear Glenda,

After over a year of no movement, the SIMTA interchange is now progressing. As you may be aware, AHMS undertook a fairly detailed preliminary assessment of the site as part of a Part 3A concept approval (attached). The project is now looking to get staged approved under Part 4 (i.e. by Liverpool City Council), and requires further assessment, and potentially Aboriginal Heritage Impact Permits.

Due to the significant delay in stages, AHMS is beginning the consultation process on the project again, and is seeking your interest in being involved. In addition, to minimise time delays, we also include a proposed assessment methodology for comment if you wish. Please note that since this is a new process, you will need to register again even if you have been previously involved in the project.

Happy to discuss

Thanks

Al

Alan Williams | Manager NSW – Aboriginal Heritage

M: 0408 203 180 | awilliams@ahms.com.au

2/729 Elizabeth Street, Waterloo, NSW 2017

Cubbitch Barta Native Title Claimants
Aboriginal Corporation
55 Nightingale Road,
PHEASANTS NEST. N.S.W. 2574.
11th December, 2014.

AHMS,
2/729 Elizabeth Street,
WATERLOO. N.S.W. 2017.

Dear Alan,

RE; SIMTA STAGE1 METHODOLOGY.

Thank you for the opportunity of commenting on the methodology for the above project. Some of the areas that are included in this assessment have had test excavations carried out more recently by Navin Officer for the Moorebank Intermodal project.

The areas that have been tested are within PAD 1, and PAD 2. PAD 3 was outside of the scope of works for Navin Officer at the time. The works carried out by Navin Officer did not extend to the Eastern side of Moorebank Avenue. Therefore the two PAD areas should no longer be included in this assessment or proposed methodology.

It seems silly to me that two consultants are overlapping for this proposed project. There may be more work required still, as the excavations have only been testing at this stage of the project.

It is never possible on these type of projects to avoid PAD areas, as per the recommendation, therefore I would agree with the proposed recommendations as they are.

Yours faithfully,

G. Chalker

Glenda Chalker
Hon. Chairperson
Phone/Fax 0246841129 0427218425
kgchalker@bigpond.com

P: 02 9555 4000 |F: 02 9555 7005 | www.ahms.com.au

See my latest research article on the population history of Australia at:
http://rspb.royalsocietypublishing.org/content/280/1761/20130486.short?rss=1

DARUG - LAND - OBSERVATIONS

Pty Ltd

ABN: 27 602 765 453
E-MAIL: darudlandobservations@gmail.com
PO BOX: 571 Plumpton. NSW 2761
Phone: 029831 8868 or 0415 663 763

16-12-2014

Alan Williams

Manager NSW – Aboriginal Heritage AHMS

Notification and Registration of ALL Aboriginal Interests
Re: SIMTA, Moorebank - Aboriginal Cultural Heritage Assessment

Please be advice that D.L.O is seeking to be involved in any and all consultation meetings and field work.
This office specializes in Aboriginal and community consultation. An has a membership that comprises of Traditional owners from the area in question those retain strong story and song lines and oral history and continued contact. We would also like to state that we do not except or support any person or organization that are NOT from the DARUG Nation that comments regarding the said area.
Please also be advised that this aboriginal Organization does not do volunteer work or attend unpaid meetings. I hope that you advise your client of this so that, This Group will not be discriminated against and refused paid field work.

All Correspondence should be emailed to the following darudlandobservations@gmail.com

Yours faithfully

Uncle
Gordon Workman
Darug Elder

Sites Officer

Alan Williams

From: desmond dyer <desmond4552@hotmail.com>
Sent: Wednesday, 10 December 2014 8:50 AM
To: Alan Williams
Subject: RE: SIMTA, Moorebank - Aboriginal Cultural Heritage Assessment - Registration of Interest and Methodology

Hi Al
yes the Darug Aboriginal Land care would like to register
Des

From: AWilliams@ahms.com.au
To: desmond4552@hotmail.com
Subject: SIMTA, Moorebank - Aboriginal Cultural Heritage Assessment - Registration of Interest and Methodology
Date: Wed, 3 Dec 2014 03:55:19 +0000

Dear Des

After over a year of no movement, the SIMTA interchange is now progressing. As you may be aware, AHMS undertook a fairly detailed preliminary assessment of the site as part of a Part 3A concept approval (attached). The project is now looking to get staged approved under Part 4 (i.e. by Liverpool City Council), and requires further assessment, and potentially Aboriginal Heritage Impact Permits.

Due to the significant delay in stages, AHMS is beginning the consultation process on the project again, and is seeking your interest in being involved. In addition, to minimise time delays, we also include a proposed assessment methodology for comment if you wish. Please note that since this is a new process, you will need to register again even if you have been previously involved in the project.

Happy to discuss

Thanks
Al

Alan Williams | Manager NSW – Aboriginal Heritage
M: 0408 203 180 | awilliams@ahms.com.au

2/729 Elizabeth Street, Waterloo, NSW 2017
P: 02 9555 4000 |F: 02 9555 7005 | www.ahms.com.au

See my latest research article on the population history of Australia at:
http://rspb.royalsocietypublishing.org/content/280/1761/20130486.short?rss=1

Alan Williams

From: Danny Franks <danny@tocomwall.com.au>
Sent: Thursday, 4 December 2014 11:21 AM
To: Alan Williams
Cc: Scott Franks; Sarah Franks
Subject: EOI FOR ACHA STAGE 1 SIMTA, MOOREBANK
Attachments: AHMS SIMTA EOI 04 DECEMBER 14.pdf; Tocomwall WC insurance EXP30SEP15.pdf

Good morning Alan,

Please see attached Tocomwall's expression of interest for the above mentioned project.
Certificate of currency has been attached.
Our daily rates will be emailed to you tomorrow (by sarah)
I have read over the methodology and agree to the methods prescribed as well as the management of artefacts after salvage is completed. Could we get a chance to have some members of my team come in and be apart of the cataloguing and recording once the project has finished?

Regards

Danny Franks
Aboriginal Heritage & Senior Field Manager

Tocomwall Pty Ltd
PO Box 76
Caringbah NSW 1495
m: 0415226725
p: 02 9542 7714
f: 02 9524 4146
e: danny@tocomwall.com.au
www.tocomwall.com.au

Tocomwall Pty Ltd
PO Box 76 Caringbah NSW 1495
Tel: 02 9542 7714 Fax: 02 9524 4146
Email: info@tocomwall.com.au www.tocomwall.com.au
ABN: 13 137 694 618

04 December 2014

Alan Williams
AHMS
2/729 Elizabeth St
Waterloo NSW 2020
Via email: awilliams@ahms.com.au

Dear Alan,

RE: Aboriginal Cultural Heritage Assessment - SIMTA Stage 1
Registration of Interest

Tocomwall is seeking *primary involvement* in all consultation meetings and fieldwork for the above mentioned project.

Tocomwall represents traditional owners from this area and retains local and oral history on behalf of its membership. We do not accept or support any person or organisation that comments regarding the said area unless confirmed in writing by myself. We have no objection to our information being provided to the Office of Environment and Heritage and the Local Aboriginal Land Council.

Tocomwall is able to assist with input that can be incorporated into a written assessment of cultural values of the area. We are also able to provide fit staff to assist with work that may involve physical labour. We can provide copies of relevant certificates of currency for business insurances on request.

Please also be advised that this Aboriginal organisation does not do volunteer work or attend unpaid meetings.

All correspondence should be emailed to danny@tocomwall.com.au and sarah@tocomwall.com.au or to the above postal address.

Kindly contact our office if you require any further information.

Yours faithfully

Danny Franks
Aboriginal Heritage & Senior Field Manager


DARUG CUSTODIAN
ABORIGINAL
CORPORATION

PO BOX 81 WINDSOR 2756
PHONE: 0245775181 FAX: 0245775098
MOBILE: 0415770163 Leanne Watson
0414962766 Justine Coplin
EMAIL: mulgokiwi@bigpond.com / justinecoplin@optusnet.com.au

Attention: AHMS

Subject: SIMTA, Moorebank - Aboriginal Cultural Heritage Assessment - Registration of Interest

Dear Allan

Our group is a non- profit organisation that has been active for over forty years in Western Sydney, we are a Darug community group with over three hundred members. The main aim in our constitution is the care of Darug sites, places, wildlife and to promote our culture and provide education on the Darug history.

The Moorebank is a area that our group has a vast knowledge of, we have worked and lived in for many years, this area is significant to the Darug people due to the connection of sites and the continued occupation. Our group has been involved in all previous assessments and works in this area as a traditional owner Darug group for the past 40 plus years.

Therefore we would like to register our interest for full consultation and involvement in

SIMTA, Moorebank

Please contact us with all further enquiries on the above contacts.

Regards

Justine Coplin

Appendix 4: Aboriginal Consultation – RAP Responses to AHIA

Aboriginal Corporation
55 Nightingale Road,
PHEASANTS NEST. N.S.W. 2574.
2ND May 2015.

AHMS,
2/729 Elizabeth Street,
WATERLOO. N.S.W. 2017.

Dear Alan,

RE; SIMTA INTERMODAL TERMINAL

Thank you for the opportunity of participating in the recent test excavations, and the opportunity of commenting on the DRAFT report.

There are a couple of things I would like to comment on and they are as follows;

1. Cubbitch Barta are not on the list of stakeholders on page 7.
2. The proposed methodology for salvage excavations is okay, only that 3mm mesh sieves should be used in all cases, along with wet sieving.

I am not surprised, but when the dates that are obtained on such an excavation, come back to be so old, it just adds to what has already been stated on the cultural significance of the area. These places are far older than for instance the pyramids and many other European and middle eastern ruins, which all are held with such high significance.

Why are not Aboriginal sites that are so old held with the same reverence and respect as other cultures around the world. It would seem that the only respect for the culture and its age comes from Aboriginal people themselves. Even 200 years old buildings in Australia are far more protected from destruction then 18,000 year old stone artefacts, in the landscape. The only shame that I feel is that it will all be eventually destroyed by what is called progress today.

There does not appear to be any conservation outcomes possible under the present plan.

Yours faithfully,

G. Chalker

Glenda Chalker
Hon. Chaiperson
Phone/Fax 0246841129 042721825
kgchalker@bigpond.com

THARAWAL LOCAL ABORIGINAL LAND COUNCIL

220 West Parade, Couridjah NSW 2571

Wednesday 20th May 2015

Alan Williams
Aboriginal & Heritage Management Solutions
2/729 Elizabeth Street
Waterloo NSW 2017
Ph: (02) 9555 4000 Fax: (02) 9555 7005
Email: awilliams@ahms.com.au

RE: SIMTA Intermodal Terminal, Moorebank Stage 1 Aboriginal Heritage Impact Assessment,

Dear Alan,

Thank you for your invitation on this project. Tharawal Local Aboriginal Land Council experienced a couple of problems within this project and I have noted them below.

1. Tharawal was not notified of the dates until Tharawal phoned AHMS on the 16th of January and were offered to only work the dates 20th, 21st, 22nd & 23rd of January 2015. As the Local Aboriginal Land Council this was upsetting as the last email we had received was to say that we will hear from AHMS regarding the fieldwork dates.

2. There was a number of Registered Stakeholders that are not recognised by Tharawal Local Aboriginal Land Council and therefore cannot identify them as an Aboriginal Registered Stakeholder they include the below groups.
    - Wurrumay Consultancy
    - Warragil Cultural Services
    - Liverpool City Council Aboriginal Consultative Committee

3. Tharawal Local Aboriginal Land Council Respects that AHMS only involved Tharawal LALC as the Local Aboriginal Land Council within this project as Gandangarra was a Registered Party as well but this project was within Tharawal Boundaries.

4. Tharawal LALC would like to agree with the comments within the DRAFT noted by Cubbitch Barta Native Title Claimants that are listed below. Based on potential scarred trees in this area.
    - Any proposed impacts to mature trees (greater than 80 years old) in the golf course should be avoided.
    - If avoidance is not feasible, any mature trees that will be impacted by the proposed development should be inspected to identify potential Aboriginal

THARAWAL LOCAL ABORIGINAL LAND COUNCIL

220 West Parade, Couridjah NSW 2571

- Cultural scarring. The survey, if required, should be undertaken early in the planning process to avoid any project delays.
- Should the survey identify any trees with potential cultural scarring, further heritage assessment and/or mitigation measures may need to be developed.

Yours Sincerely,

Abbi Whillock
Aboriginal Cultural & Heritage Officer
Tharawal Local Aboriginal Land Council
P: (02) 4681 0059 F: (02) 4681 0866
E: heritage@tharawal.com.au


DARUG CUSTODIAN
ABORIGINAL
CORPORATION

PO BOX 81 WINDSOR 2756
PHONE: 0245775181 FAX: 0245775098
MOBILE: 0415770163 Leanne Watson
0414962766 Justine Coplin
EMAIL: mulgokiwi@bigpond.com / justinecoplin@optusnet.com.au

Attention: AHMS

Subject: SIMTA, Moorebank - Draft Aboriginal Heritage Impact Assessment

Dear Alan

Our group is a non- profit organisation that has been active for over forty years in Western Sydney, we are a Darug community group with over three hundred members. The main aim in our constitution is the care of Darug sites, places, wildlife and to promote our culture and provide education on the Darug history.

We have received and reviewed the Aboriginal Cultural Heritage Assessment for SIMTA, Moorebank report is inclusive and the assessment is thorough with a good documentation of findings.

We support the findings and recommendation within this report.

Please contact us with all further enquiries on the above contacts.

Regards

Justine Coplin

Tocomwall Pty Ltd
PO Box 76 Caringbah NSW 1495
Tel: 02 9542 7714 Fax: 02 9524 4146
Email: info@tocomwall.com.au www.tocomwall.com.au
ABN: 13 137 694 618

20 04 2015

Dear Alan,

RE: ABORIGINAL CULTURAL HERITAGE ASSESSMENT REPORT GEORGES RIVER .

The Georges River is well know amongst the Dharug communites as an invaluable resource and interaction sphere. Communities Can be distinguished in todays setting by observing the material remains that represented and still represent The clans sociocultural systems. For instance, the culture is a set of distinct behaviors that are mirrored or shared with other members of that society. The prevalence of stone tool production throughout the Sydney Basin is high, especially with a proximity close to a watercourse. This River being of first order could mean that some of the earliest reduction techniques have taken place and have been preserved in soils that have been susceptible to different climatic conditions. The ages pulled from the OSL analysis demonstrate a rather unknown period of technical expertise in the Sydney basin. Most clans around Australia that could demonstrate successful reduction techniques showed a higher order of thinking. The ability to recognise a high point in a geometric shape and fashion it into the shape of a blade or tool is seen as class specialization or an artisan level of abilities within a Mob.

The specific area in question is MA 14 it not only contained the highest material remains but it also showed ages that are culturally sensitive to extrapolate information. The intact soil horizons have demonstrated lithic remains that have provided evidence of continued occupation over a period of time and could provide proof for the oldest occupational evidence discovered along this watercourse. This information could provide an invaluable insight into the cultural mechanisms that made this society unique and gave them the ability to adapt in the ecological setting, I highly suggest that a more rigorous approach need to be taken to preserve this area or mitigate the loss of information.

Alan Williams

From: Gordow <gordow51@bigpond.net.au>
Sent: Monday, 27 April 2015 12:52 PM
To: Alan Williams
Subject: Re: SIMTA, Moorebank - Draft Aboriginal Heritage Impact Assessment - Request for Comment

Hi Alan

D.L.O Pty Ltd is concerned that there are no pics of Artefacts in this Draft Report other then that D.L.O Pty Ltd has no concerns with it

With Thank's

Uncle
Gordon Workman
Darug Elder

----- Original Message -----
From: Jamie Workman
To: gordow51@bigpond.net.au
Sent: Thursday, April 16, 2015 10:26 AM
Subject: Fwd: SIMTA, Moorebank - Draft Aboriginal Heritage Impact Assessment - Request for Comment

---------- Forwarded message ----------
From: **Alan Williams** <AWilliams@ahms.com.au>
Date: Thursday, April 16, 2015
Subject: SIMTA, Moorebank - Draft Aboriginal Heritage Impact Assessment - Request for Comment
To: Abbi Whillock <heritage@tharawal.com.au>, "Glenda Chalker (kgchalker@bigpond.com)" <kgchalker@bigpond.com>, "Scott Franks (scott@tocomwall.com.au)" <scott@tocomwall.com.au>, "Danny Franks (danny@tocomwall.com.au)" <danny@tocomwall.com.au>, "mulgokiwi@bigpond.com" <mulgokiwi@bigpond.com>, "Justine Coplin (justinecoplin@optusnet.com.au)" <justinecoplin@optusnet.com.au>, "darug_tribal@live.com.au" <darug_tribal@live.com.au>, "jmreilly228@gmail.com" <jmreilly228@gmail.com>, "Des Dyer (desmond4552@hotmail.com)" <desmond4552@hotmail.com>, "Gordon Workman (daruglandobservations@gmail.com)" <daruglandobservations@gmail.com>
Cc: "Westley Owers (Westley.Owers@hyderconsulting.com)" <Westley.Owers@hyderconsulting.com>, "Steve Ryan (sryan@tacticalgroup.com.au)" <sryan@tacticalgroup.com.au>, Shannon Blackmore <Shannon.Blackmore@hyderconsulting.com>, Alistair Hobbs <AHobbs@ahms.com.au>

Dear All,

As many of you will be aware, AHMS has recently undertaken an Aboriginal Heritage Impact Assessment for Stage 1 of the Sydney Intermodal Moorebank Terminal Alliance, Moorebank Avenue, NSW. This consisted of the southwest corner of the existing Defence Storage facility and a proposed rail corridor running along the edge of the Royal Artillery and Engineering golf course. [This is not to be confused with the other intermodal facility closer to Georges River and undertaken by Navin Officer in recent years].

At the core of this assessment was the excavations of ~13 test pits focussed on Anzac Creek and Georges River. These were undertaken in late January 2015 by AHMS personnel and representatives of the RAPs. The excavations revealed that there was little cultural material along the proposed rail corridor, with only 28 or so Aboriginal objects recovered. However, these objects were primarily found within a deep sand body on the ridgeline overlooking Georges River. Soil and chronological analysis shows that sand body formed through fluvial actions (flooding) at about 60,000 years ago, and that the objects were deposited at two discrete periods, at around 18,000 and 3,500 years ago. The lower assemblage is probably some of the earliest Aboriginal use of Georges River currently documented. This area (~150 x 150m) along the ridgeline has subsequently been identified as an artefact scatter – MA 14 – of local significance, with potential for higher scientific significance with further research.

The proposed development has the potential to impact about 20% of the site, and as such the report includes archaeological mitigations in the form of salvage excavations. The aim of these would be to obtain a greater level of information about this site, which is currently only based on a handful of artefacts.

Please find attached the draft report outlining above in more detail. If you wish, can you please review and provide comment on the report by **14 May 2015**. We are particularly interested in any cultural values associated with the study area and/or MA14. To allow e-mail, I have included the report without appendices here, but will shortly send through a Dropbox link for the complete report. If anyone wants a hard copy, please let me know and I'll post one out.

Happy to discuss

Thanks

Al

Alan Williams | Manager NSW – Aboriginal Heritage

M: 0408 203 180 | awilliams@ahms.com.au

2/729 Elizabeth Street, Waterloo, NSW 2017

P: 02 9555 4000 |F: 02 9555 7005 | www.ahms.com.au

Appendix 5: Excavation Photographs

SIMTA Test Excavation – Moorebank, NSW

DIGITAL IMAGE CATALOGUE SHEET
No.1

PROJECT NAME	SIMTA Test Excavation – Moorebank, NSW		
SITE NAME	SIMTA Moorebank 2015		
PROOF #	SIMTA-D01	**CAMERA**	Olympus TG-830

IMAGE FILE NO.	DATE	DESCRIPTION	ORIENTATION
SIMTA-001	20/01/15	SIMTA: TP2, Location Shot	Facing N
SIMTA-002	20/01/15	SIMTA: TP2, Location Shot	Facing E
SIMTA-003	20/01/15	SIMTA: TP2, Location Shot	Facing S
SIMTA-004	20/01/15	SIMTA: TP2, Location Shot	Facing W
SIMTA-005	20/01/15	SIMTA: TP2, South Facing Section	Facing N
SIMTA-006	20/01/15	SIMTA: TP2, West Facing Section	Facing E
SIMTA-007	20/01/15	SIMTA: TP2, North Facing Section	Facing S
SIMTA-008	20/01/15	SIMTA: TP2, East Facing Section	Facing W
SIMTA-009	20/01/15	SIMTA: TP3, Location Shot	Facing N
SIMTA-010	20/01/15	SIMTA: TP3, Location Shot	Facing E
SIMTA-011	20/01/15	SIMTA: TP3, Location Shot	Facing S
SIMTA-012	20/01/15	SIMTA: TP3, Location Shot	Facing W
SIMTA-013	21/01/15	SIMTA: TP3, South Facing Section (1m depth)	Facing N
SIMTA-014	21/01/15	SIMTA: TP3, South Facing Section (1m depth)	Facing N
SIMTA-015	21/01/15	SIMTA: TP3, West Facing Section (1m depth)	Facing E
SIMTA-016	21/01/15	SIMTA: TP3, North Facing Section (1m depth)	Facing S
SIMTA-017	21/01/15	SIMTA: TP3, North Facing Section (1m depth)	Facing S
SIMTA-018	21/01/15	SIMTA: TP3, East Facing Section (1m depth)	Facing W
SIMTA-019	21/01/15	SIMTA: TP3, East Facing Section (1m depth)	Facing W
SIMTA-020	21/01/15	SIMTA: TP3, OSL Sample (20cm, 60cm, 90cm)	Facing S
SIMTA-021	21/01/15	SIMTA: TP3, OSL Sample (20cm, 60cm, 90cm)	Facing S
SIMTA-022	21/01/15	SIMTA: TP5, Location Shot	Facing N
SIMTA-023	21/01/15	SIMTA: TP5, Location Shot	Facing E
SIMTA-024	21/01/15	SIMTA: TP5, Location Shot	Facing S
SIMTA-025	21/01/15	SIMTA: TP5, Location Shot	Facing W
SIMTA-026	21/01/15	SIMTA: TP5, South Facing Section	Facing N
SIMTA-027	21/01/15	SIMTA: TP5, West Facing Section	Facing E
SIMTA-028	21/01/15	SIMTA: TP5, North Facing Section	Facing S
SIMTA-029	21/01/15	SIMTA: TP5, East Facing Section	Facing W
SIMTA-030	21/01/15	SIMTA: TP6, Location Shot	Facing N
SIMTA-031	21/01/15	SIMTA: TP6, Location Shot	Facing E
SIMTA-032	21/01/15	SIMTA: TP6, Location Shot	Facing S
SIMTA-033	21/01/15	SIMTA: TP6, Location Shot	Facing W
SIMTA-034	21/01/15	SIMTA: TP6, South Facing Section (1m depth)	Facing N
SIMTA-035	21/01/15	SIMTA: TP6, West Facing Section (1m depth)	Facing E
SIMTA-036	21/01/15	SIMTA: TP6, North Facing Section (1m depth)	Facing S
SIMTA-037	21/01/15	SIMTA: TP6, East Facing Section (1m depth)	Facing W

SIMTA Test Excavation – Moorebank, NSW

DIGITAL IMAGE CATALOGUE SHEET
No.2

PROJECT NAME	SIMTA Test Excavation – Moorebank, NSW		
SITE NAME	SIMTA Moorebank 2015		
PROOF #	SIMTA-D02	**CAMERA**	Olympus TG-830

IMAGE FILE NO.	DATE	DESCRIPTION	ORIENTATION
SIMTA-038	21/01/15	SIMTA: TP7, Location Shot	Facing N
SIMTA-039	21/01/15	SIMTA: TP7, Location Shot	Facing E
SIMTA-040	21/01/15	SIMTA: TP7, Location Shot	Facing S
SIMTA-041	21/01/15	SIMTA: TP7, Location Shot	Facing W
SIMTA-042	21/01/15	SIMTA: TP7, South Facing Section (1m depth)	Facing N
SIMTA-043	21/01/15	SIMTA: TP7, West Facing Section (1m depth)	Facing E
SIMTA-044	21/01/15	SIMTA: TP7, North Facing Section (1m depth)	Facing S
SIMTA-045	21/01/15	SIMTA: TP7, East Facing Section (1m depth)	Facing W
SIMTA-046	21/01/15	SIMTA: TP8, Location Shot	Facing N
SIMTA-047	21/01/15	SIMTA: TP8, Location Shot	Facing E
SIMTA-048	21/01/15	SIMTA: TP8, Location Shot	Facing S
SIMTA-049	21/01/15	SIMTA: TP8, Location Shot	Facing W
SIMTA-050	21/01/15	SIMTA: TP8, South Facing Section (90cm depth)	Facing N
SIMTA-051	21/01/15	SIMTA: TP8, West Facing Section (90cm depth)	Facing E
SIMTA-052	21/01/15	SIMTA: TP8, North Facing Section (90cm depth)	Facing S
SIMTA-053	21/01/15	SIMTA: TP8, East Facing Section (90cm depth)	Facing W
SIMTA-054	21/01/15	SIMTA: TP6, OSL Sample (30cm, 50cm, 70cm)	Facing S
SIMTA-055	21/01/15	SIMTA: TP6, OSL Sample (30cm, 50cm, 70cm)	Facing S
SIMTA-056	21/01/15	SIMTA: TP9, Location Shot	Facing N
SIMTA-057	21/01/15	SIMTA: TP9, Location Shot	Facing E
SIMTA-058	21/01/15	SIMTA: TP9, Location Shot	Facing S
SIMTA-059	21/01/15	SIMTA: TP9, Location Shot	Facing W
SIMTA-060	21/01/15	SIMTA: TP9, South Facing Section (90cm depth)	Facing N
SIMTA-061	21/01/15	SIMTA: TP9, West Facing Section (90cm depth)	Facing E
SIMTA-062	21/01/15	SIMTA: TP9, North Facing Section (90cm depth)	Facing S
SIMTA-063	21/01/15	SIMTA: TP9, East Facing Section (90cm depth)	Facing W
SIMTA-064	22/01/15	SIMTA: TP22, Location Shot	Facing N
SIMTA-065	22/01/15	SIMTA: TP22, Location Shot	Facing E
SIMTA-066	22/01/15	SIMTA: TP22, Location Shot	Facing S
SIMTA-067	22/01/15	SIMTA: TP22, Location Shot	Facing W
SIMTA-068	22/01/15	SIMTA: TP22, South Facing Section	Facing N
SIMTA-069	22/01/15	SIMTA: TP22, West Facing Section	Facing E
SIMTA-070	22/01/15	SIMTA: TP22, North Facing Section	Facing S
SIMTA-071	22/01/15	SIMTA: TP22, East Facing Section	Facing W
SIMTA-072	22/01/15	SIMTA: TP23, Location Shot	Facing N
SIMTA-073	22/01/15	SIMTA: TP23, Location Shot	Facing E
SIMTA-074	22/01/15	SIMTA: TP23, Location Shot	Facing S
SIMTA-075	22/01/15	SIMTA: TP23, Location Shot	Facing W

SIMTA Test Excavation – Moorebank, NSW

DIGITAL IMAGE CATALOGUE SHEET
No.3

PROJECT NAME	SIMTA Test Excavation – Moorebank, NSW		
SITE NAME	SIMTA Moorebank 2015		
PROOF #	SIMTA-D03	**CAMERA**	Olympus TG-830

IMAGE FILE NO.	DATE	DESCRIPTION	ORIENTATION
SIMTA-076	22/01/15	SIMTA: TP23, South Facing Section	Facing N
SIMTA-077	22/01/15	SIMTA: TP23, West Facing Section	Facing E
SIMTA-078	22/01/15	SIMTA: TP23, North Facing Section	Facing S
SIMTA-079	22/01/15	SIMTA: TP23, East Facing Section	Facing W
SIMTA-080	22/01/15	SIMTA: TP24, Location Shot	Facing N
SIMTA-081	22/01/15	SIMTA: TP24, Location Shot	Facing E
SIMTA-082	22/01/15	SIMTA: TP24, Location Shot	Facing S
SIMTA-083	22/01/15	SIMTA: TP24, Location Shot	Facing W
SIMTA-084	22/01/15	SIMTA: TP24, South Facing Section	Facing N
SIMTA-085	22/01/15	SIMTA: TP24, West Facing Section	Facing E
SIMTA-086	22/01/15	SIMTA: TP24, North Facing Section	Facing S
SIMTA-087	22/01/15	SIMTA: TP24, East Facing Section	Facing W
SIMTA-088	23/01/15	SIMTA: TP18, Location Shot	Facing N
SIMTA-089	23/01/15	SIMTA: TP18, Location Shot	Facing E
SIMTA-090	23/01/15	SIMTA: TP18, Location Shot	Facing S
SIMTA-091	23/01/15	SIMTA: TP18, Location Shot	Facing W
SIMTA-092	23/01/15	SIMTA: TP18, South Facing Section	Facing N
SIMTA-093	23/01/15	SIMTA: TP18, West Facing Section	Facing E
SIMTA-094	23/01/15	SIMTA: TP18, North Facing Section	Facing S
SIMTA-095	23/01/15	SIMTA: TP18, East Facing Section	Facing W
SIMTA-096	23/01/15	SIMTA: TP3, South Facing Section (1.1m depth)	Facing N
SIMTA-097	23/01/15	SIMTA: TP3, West Facing Section (1.1m depth)	Facing N
SIMTA-098	23/01/15	SIMTA: TP3, West Facing Section (1.1m depth)	Facing E
SIMTA-099	23/01/15	SIMTA: TP3, North Facing Section (1.1m depth)	Facing S
SIMTA-100	23/01/15	SIMTA: TP3, North Facing Section (1.1m depth)	Facing S
SIMTA-101	23/01/15	SIMTA: TP3, East Facing Section (1.1m depth)	Facing W
SIMTA-102	23/01/15	SIMTA: TP3, East Facing Section (1.1m depth)	Facing W
SIMTA-103	23/01/15	SIMTA: TP6, South Facing Section (1.2m depth)	Facing N
SIMTA-104	23/01/15	SIMTA: TP6, West Facing Section (1.2m depth)	Facing E
SIMTA-105	23/01/15	SIMTA: TP6, North Facing Section (1.2m depth)	Facing S
SIMTA-106	23/01/15	SIMTA: TP6, East Facing Section (1.2m depth)	Facing W
SIMTA-107	23/01/15	SIMTA: TP7, South Facing Section (1.2m depth)	Facing N
SIMTA-108	23/01/15	SIMTA: TP7, West Facing Section (1.2m depth)	Facing E
SIMTA-109	23/01/15	SIMTA: TP7, North Facing Section (1.2m depth)	Facing S
SIMTA-110	23/01/15	SIMTA: TP7, East Facing Section (1.2m depth)	Facing W
SIMTA-111	23/01/15	SIMTA: TP8, South Facing Section (1.2m depth)	Facing N
SIMTA-112	23/01/15	SIMTA: TP8, West Facing Section (1.2m depth)	Facing E
SIMTA-113	23/01/15	SIMTA: TP8, North Facing Section (1.2m depth)	Facing S
SIMTA-114	23/01/15	SIMTA: TP8, East Facing Section (1.2m depth)	Facing W

SIMTA Test Excavation – Moorebank, NSW

DIGITAL IMAGE CATALOGUE SHEET
No.

PROJECT NAME	SIMTA Test Excavation – Moorebank, NSW		
SITE NAME	SIMTA Moorebank 2015		
PROOF #	SIMTA-D0	**CAMERA**	Olympus TG-830

IMAGE FILE NO.	DATE	DESCRIPTION	ORIENTATION
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SIMTA-117	29/01/15	SIMTA: TP19, Location Shot	Facing S
SIMTA-118	29/01/15	SIMTA: TP19, Location Shot	Facing W
SIMTA-119	29/01/15	SIMTA: TP19, South Facing Section	Facing N
SIMTA-120	29/01/15	SIMTA: TP19, West Facing Section	Facing E
SIMTA-121	29/01/15	SIMTA: TP19, North Facing Section	Facing S
SIMTA-122	29/01/15	SIMTA: TP19, East Facing Section	Facing W
SIMTA-123	29/01/15	SIMTA: TP20, Location Shot	Facing N
SIMTA-124	29/01/15	SIMTA: TP20, Location Shot	Facing E
SIMTA-125	29/01/15	SIMTA: TP20, Location Shot	Facing S
SIMTA-126	29/01/15	SIMTA: TP20, Location Shot	Facing W
SIMTA-127	29/01/15	SIMTA: TP20, South Facing Section	Facing N
SIMTA-128	29/01/15	SIMTA: TP20, West Facing Section	Facing E
SIMTA-129	29/01/15	SIMTA: TP20, North Facing Section	Facing S
SIMTA-130	29/01/15	SIMTA: TP20, East Facing Section	Facing W
SIMTA-131	29/01/15	SIMTA: TP10 Unexcavated	Facing N
SIMTA-132	29/01/15	SIMTA: TP11 Unexcavated	Facing N
SIMTA-133	29/01/15	SIMTA: TP12 Unexcavated	Facing N
SIMTA-134	29/01/15	SIMTA: TP13 Unexcavated	Facing N
SIMTA-135	29/01/15	SIMTA: TP14 Unexcavated	Facing N
SIMTA-136	29/01/15	SIMTA: TP15 Unexcavated	Facing N
SIMTA-137	29/01/15	SIMTA: TP21 Unexcavated	Facing N

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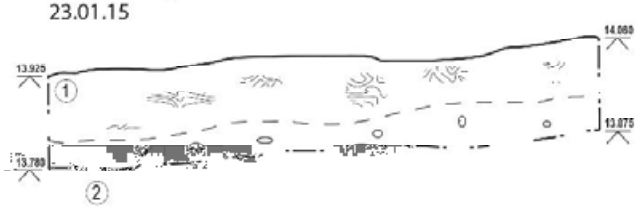
SIMTA-080.JPG

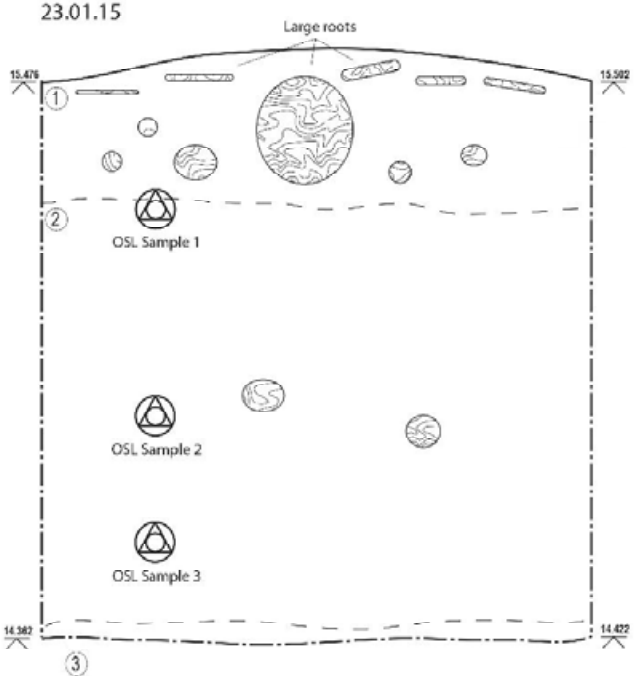
Appendix 6: Section Drawings

SIMTA Moorebank 2015
Test Pit 2
South Facing Section
23.01.15



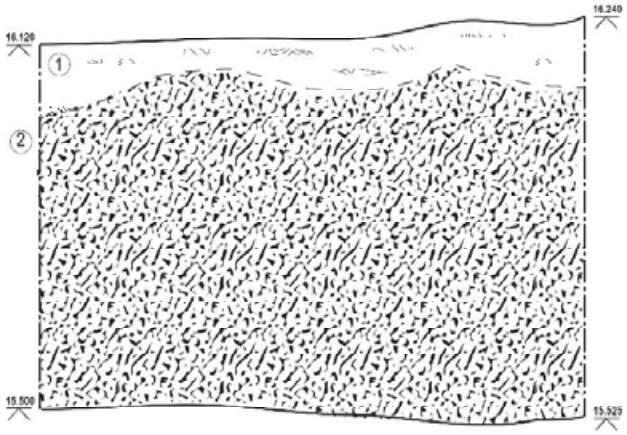
① Humic layer - dark brown/grey sandy loam with roots abundant. Loose compaction. Clear boundary (2-5cm) onto:
② Pale yellow/brown sand. Firm compaction. Degrading sandstone inclusions throughout.

SIMTA Moorebank 2015
Test Pit 3
South Facing Section
23.01.15



① Humic layer - dark brown/grey sandy loam with roots abundant. Loose compaction. One large root across pit. Clear boundary (2-5cm) onto:
② Pale yellow/brown sand. Firm compaction. Little to no inclusions present. Clear boundary (2-5cm) onto:
③ Yellow/brown sandstone layer. Very firm compaction. Degrading sandstone sporadically present.

SIMTA Moorebank 2015
Test Pit 5
South Facing Section
23.01.15



① Humic layer - dark brown/ sandy loam with sporadic roots. Loose compaction. Clear boundary (2-5cm) onto:
② Dark brown/red roadbase fill. Some degrading sandstone inclusions. Firm compaction.

0 50
Centimetres

AHMS
SYDNEY I MELBOURNE I PERTH
www.ahms.com.au
info@ahms.com.au
ABN 16 088 006 368 ACN 088 006 368

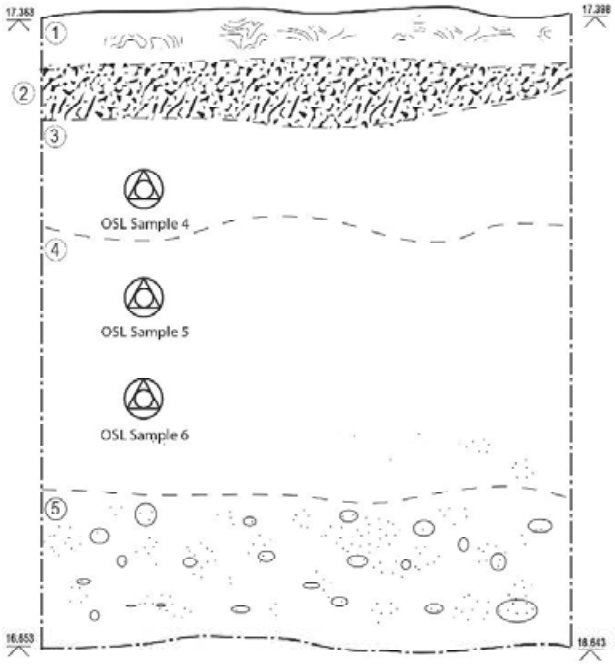
Sydney Intermodal Terminal Stage 1
Test Excavations
for
Hyder Consulting/SIMTA

FIELD DRAWINGS AUTHOR, DATE AND PLAN NUMBER:
J. O'Connor-Veth, Jan 2015
Final Drawing / Date: A. O'Sullivan, Feb 2015

SIMTA Moorebank 2015
Section Plans

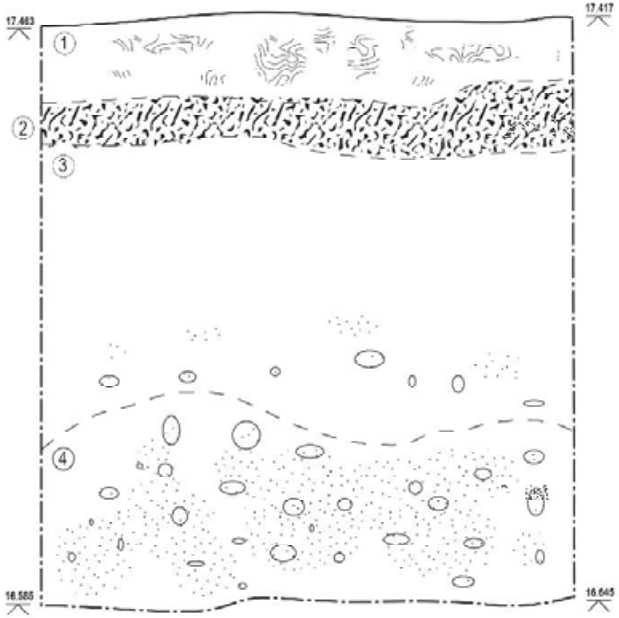
KEY:
Roots
Sandstone
Roadbase and Sandstone

SIMTA Moorebank 2015
Test Pit 6
South Facing Section
29.01.15



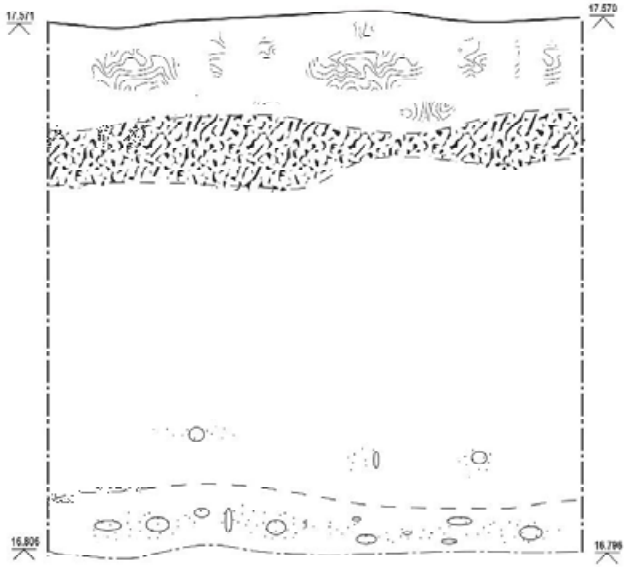
1. Humic layer - dark brown/grey sandy loam with roots abundant. Loose compaction.
   Clear boundary (2-5cm) onto:
2. Dark brown/red roadbase fill. Some degrading sandstone inclusions. Firm compaction.
3. Pale yellow/brown sandy loam. Firm compaction.
   Clear boundary (2-5cm) onto:
4. Pale yellow/brown sand. Firm compaction. Degrading sandstone inclusions as deeper. Clear boundary (2-5cm) onto:
5. Dark yellow/grey sand. Firm compaction with degrading sandstone incluiosns throughout.

SIMTA Moorebank 2015
Test Pit 7
South Facing Section
29.01.15



1. Humic layer - dark brown/grey sandy loam with roots abundant. Loose compaction.
   Clear boundary (2-5cm) onto:
2. Dark brown/red roadbase fill. Some degrading sandstone inclusions. Firm compaction.
3. Pale yellow/brown sand. Firm compaction. Degrading sandstone inclusions as deeper. Clear boundary (2-5cm) onto:
4. Dark yellow/grey sand. Firm compaction with degrading sandstone incluiosns throughout.

SIMTA Moorebank 2015
Test Pit 8
South Facing Section
29.01.15



1. Humic layer - dark brown/grey sandy loam with roots abundant. Loose compaction.
   Clear boundary (2-5cm) onto:
2. Dark brown/red roadbase fill. Some degrading sandstone inclusions. Firm compaction.
3. Pale yellow/brown sand. Firm compaction. Degrading sandstone inclusions as deeper. Clear boundary (2-5cm) onto:
4. Dark yellow/grey sand. Firm compaction with degrading sandstone incluiosns throughout.

0 50
Centimetres

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www.ahms.com.au
info@ahms.com.au

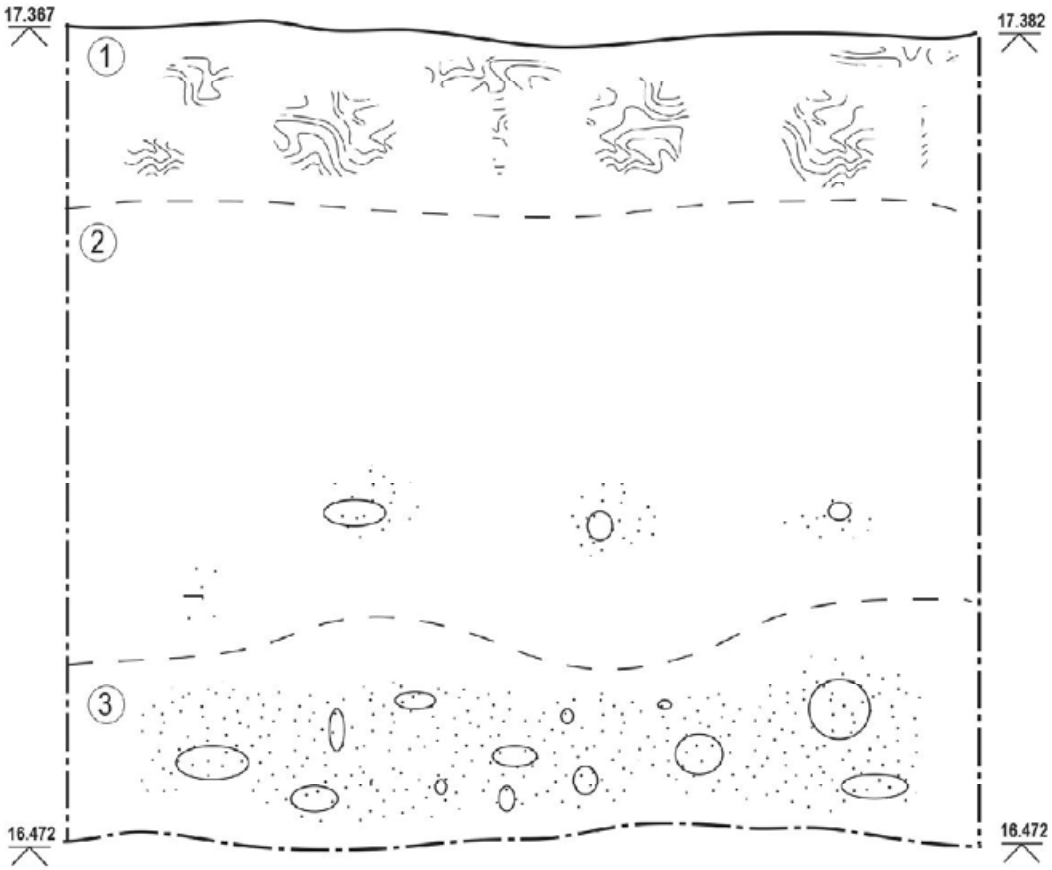
Sydney Intermodal Terminal Stage 1
Test Excavations
for
Hyder Consulting/SIMTA

FIELD DRAWINGS AUTHOR, DATE AND PLAN NUMBER:
A. O'Sullivan, Jan 2015
Final Drawing / Date: A. O'Sullivan, Feb 2015

SIMTA Moorebank 2015
Section Plans

KEY:
Roots
Sandstone
Roadbase and Sandstone

SIMTA Moorebank 2015
Test Pit 9
South Facing Section
29.01.15



1. Humic layer - dark brown/grey sandy loam with roots abundant. Loose compaction.
   Clear boundary (2-5cm) onto:
2. Pale yellow/brown sand. Firm compaction. Degrading sandstone inclusions as deeper. Clear boundary (2-5cm) onto:
3. Dark yellow/grey sand. Firm compaction with degrading sandstone incluiosns throughout.

KEY:	
	Roots
	Sandstone

0 50
Centimetres

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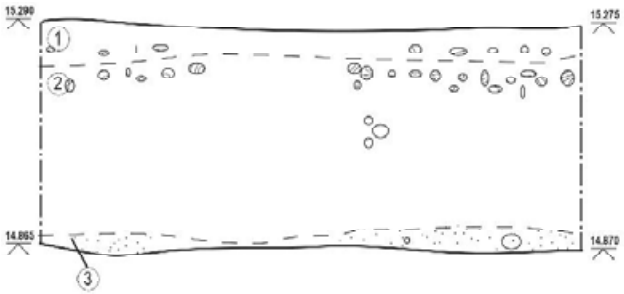
info@ahms.com.au
ACN 093 053 386 ACN 088 058 388

Sydney Intermodal Terminal Stage 1
Test Excavations
for
Hyder Consulting/SIMTA

FIELD DRAWINGS AUTHOR, DATE AND PLAN NUMBER:
A. O'Sullivan, Jan 2015
Final Drawing / Date: A. O'Sullivan, Feb 2015

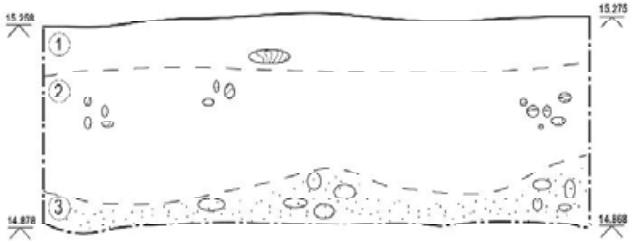
SIMTA Moorebank 2015
Section Plans

SIMTA Moorebank 2015
Test Pit 18
South Facing Section
29.01.15



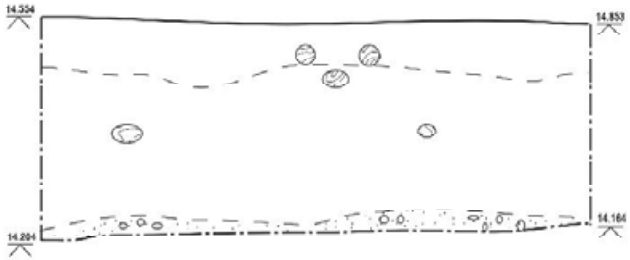
① Humic layer - dark brown/grey sandy loam with roots abundant. Loose compaction.
Clear boundary (2-5cm) onto:
② Pale yellow/brown sand. Firm compaction. Some roots present.
Clear boundary (2-5cm) onto:
③ Dark yellow/grey sand. Firm compaction with degrading sandstone incluiosns throughout.

SIMTA Moorebank 2015
Test Pit 19
South Facing Section
29.01.15



① Humic layer - dark brown/grey sandy loam with roots abundant. Loose compaction.
Clear boundary (2-5cm) onto:
② Pale yellow/brown sand. Firm compaction. Some roots present.
Clear boundary (2-5cm) onto:
③ Dark yellow/grey sand. Firm compaction with degrading sandstone incluiosns throughout.

SIMTA Moorebank 2015
Test Pit 20
South Facing Section
29.01.15

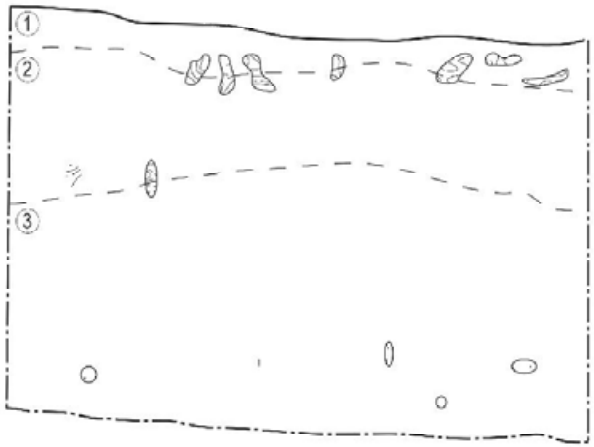


① Humic layer - dark brown/grey sandy loam with roots abundant. Loose compaction.
Clear boundary (2-5cm) onto:
② Pale yellow/brown sand. Firm compaction. Some roots present.
Clear boundary (2-5cm) onto:
③ Dark yellow/grey sand. Firm compaction with degrading sandstone incluiosns throughout.

0 — 50 Centimetres	AHMS	Sydney Intermodal Terminal Stage 1 Test Excavations for Hyder Consulting/SIMTA
FIELD DRAWINGS AUTHOR, DATE AND PLAN NUMBER: A. Hobbs, Jan 2015 Final Drawing / Date: A. O'Sullivan, Feb 2015	SYDNEY I MELBOURNE I PERTH www.ahms.com.au info@ahms.com.au	SIMTA Moorebank 2015 Section Plans

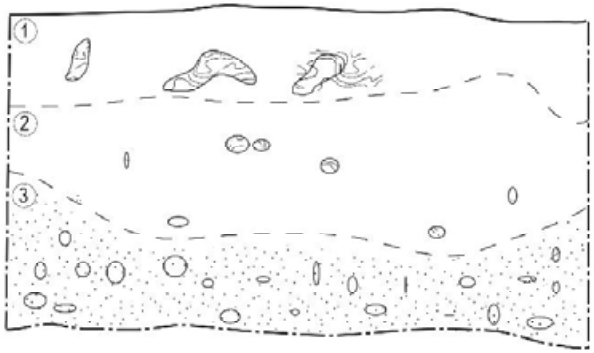
KEY:
Roots
Sandstone

SIMTA Moorebank 2015
Test Pit 22
South Facing Section
23.01.15



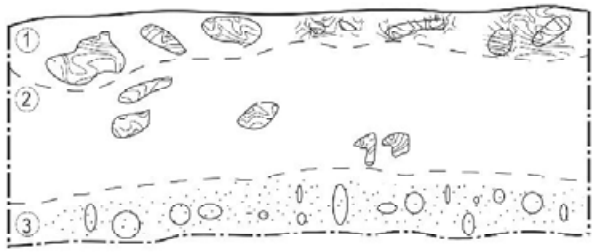
① Humic layer - dark brown/grey sandy loam with roots abundant. Loose compaction.
Clear boundary (2-5cm) onto:
② Darker brown sandy loam. Tree roots sporadic.
Water level hit at 50cm, very moist.
Clear boundary (2-5cm) onto:
③ Dark brown/orange sand. Sporadic degrading sandstone inclusions.

SIMTA Moorebank 2015
Test Pit 23
South Facing Section
23.01.15



① Humic layer - dark brown/grey sandy loam with roots abundant. Loose compaction.
Clear boundary (2-5cm) onto:
② Pale yellow/brown sand. Firm compaction. Some roots present.
Clear boundary (2-5cm) onto:
③ Dark yellow/grey sand. Firm compaction with degrading sandstone incluiosns throughout.

SIMTA Moorebank 2015
Test Pit 24
South Facing Section
23.01.15



① Humic layer - dark brown/grey sandy loam with roots abundant. Loose compaction.
Clear boundary (2-5cm) onto:
② Pale yellow/brown sand. Firm compaction. Some roots present.
Clear boundary (2-5cm) onto:
③ Dark yellow/grey sand. Firm compaction with degrading sandstone incluiosns throughout.

0 50
Centimetres

FIELD DRAWINGS AUTHOR, DATE AND PLAN NUMBER:
J. O'Connor-Veth, Jan 2015
Final Drawing / Date: A. O'Sullivan, Feb 2015

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Sydney Intermodal Terminal Stage 1
Test Excavations
for
Hyder Consulting/SIMTA

SIMTA Moorebank 2015
Section Plans

KEY:
Roots
Sandstone

Appendix 7: Soil Analysis

Please find two folders 'psa' and 'loi' coresponding to particle-size analysis and loss-on ignition analysis of 22 samples sourced from Moorebank, at the Georges River.

psa folder:

- includes standard graphs for each individual sample including histograms ('hist'), cumulative frequency distibutions ('cumfreq'), and cumulative probability distributions ('cumprob').

- sample numbers correspond to the mid-range depth labelled on the sample bags (e.g. hist-32.5cm corresponds to sample 30-35cm).

- a compilation of the graphs that might be included in a report appendix are included in the 'report' figures, which also present the raw data.

- depth function graphs are submitted for graphic mean particle size (stats-M_z), graphic standard deviation (stats-Rho_1), graphic skewness (stats-Sk_1), and graphic kurtosis (K_G).

- raw data is submitted as two csv files, one with sample data and summary statistics (psa) and one with data from the Mastersizer 2000 (mastersizer_2000). Data is presented in micrometers.

- please note that particle-size samples were prepared by digestion in hydrogen peroxide, end-over-end shaking for 24 hours prior to measurement in a Mastersizer 2000.

loi folder:

- a single depth function graph of mean plant organic content is submitted with a fitted smoothing spline to generalise the data.

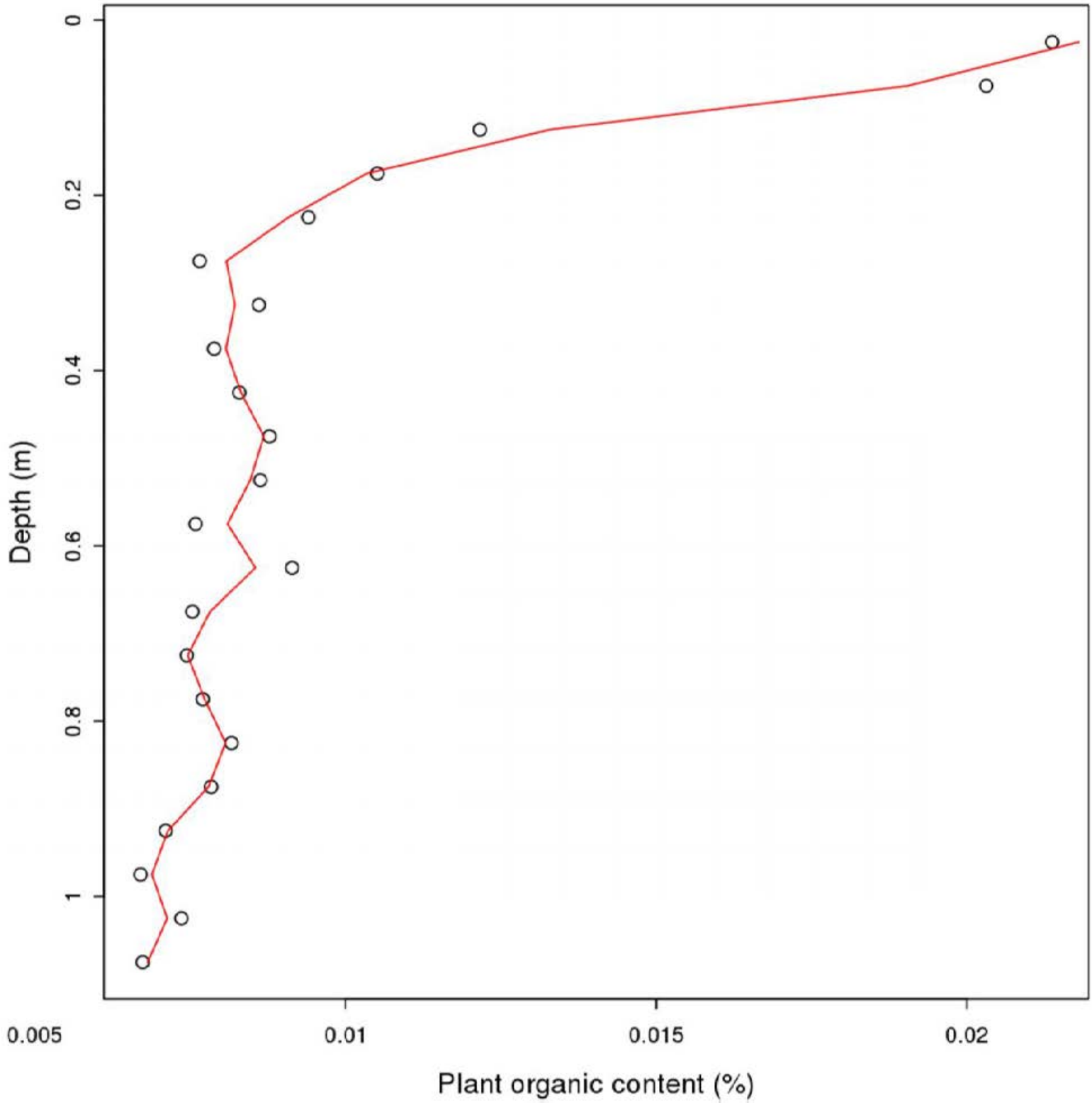
- raw data is submitted as a csv file

References:

- sample preparation for particle-size analysis (mastersizer procedure is developed in-house) and the full procedure of loss-on-ignition can be referenced as:

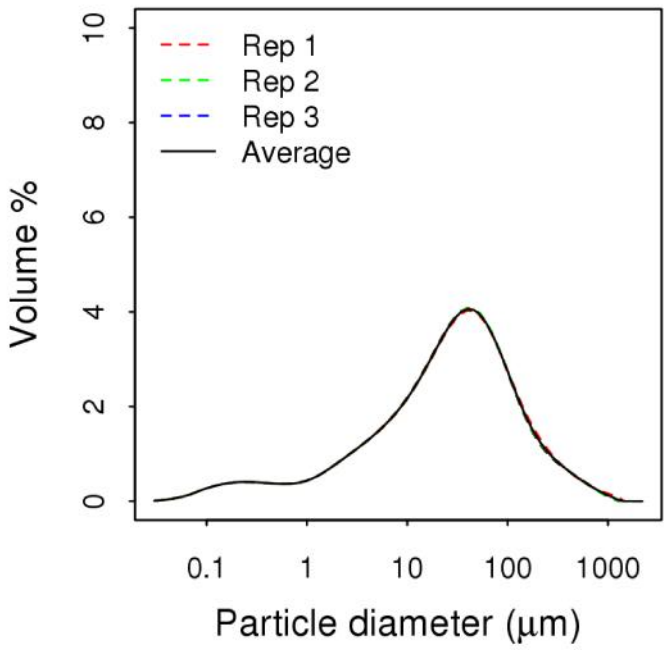
Gale, S.J. & Hoare, P.G. 1991. Quaternary Sediments: Petrographic Methods for the Study of Unlithified Rocks. Belhaven Press, New York.

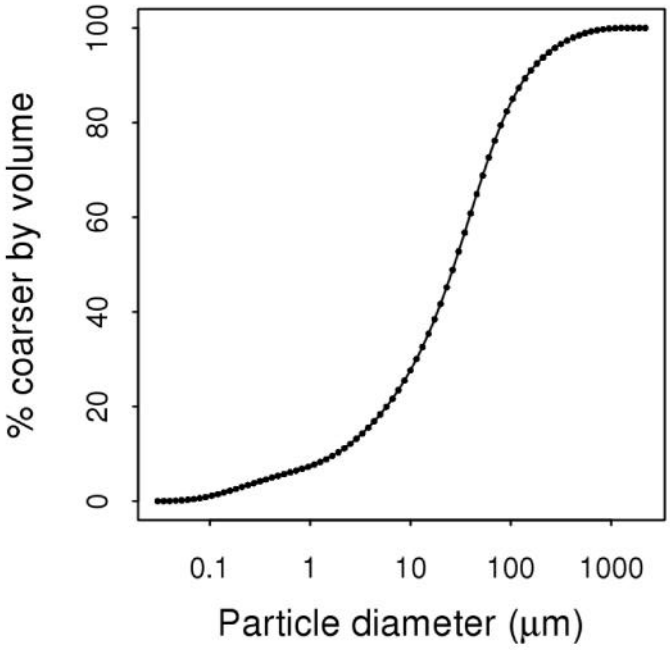
Please contact me at samplayer@geoprospection.com.au if you have any questions.

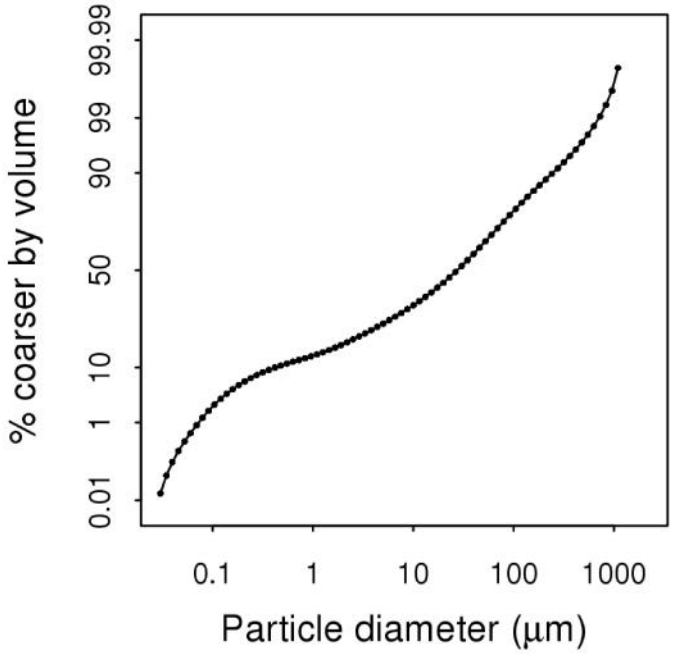

Depth (m)
0
0.2
0.4
0.6
0.8
1
0.005
0.01
0.015
0.02
Plant organic content (%)

Area: Moorebank
Square: TP3

Sample ID: 2.5
Depth: 2.5 cm





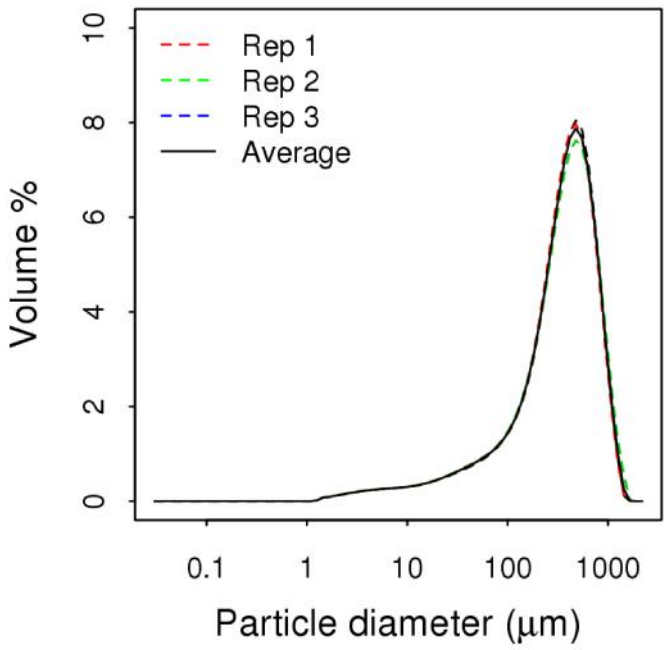


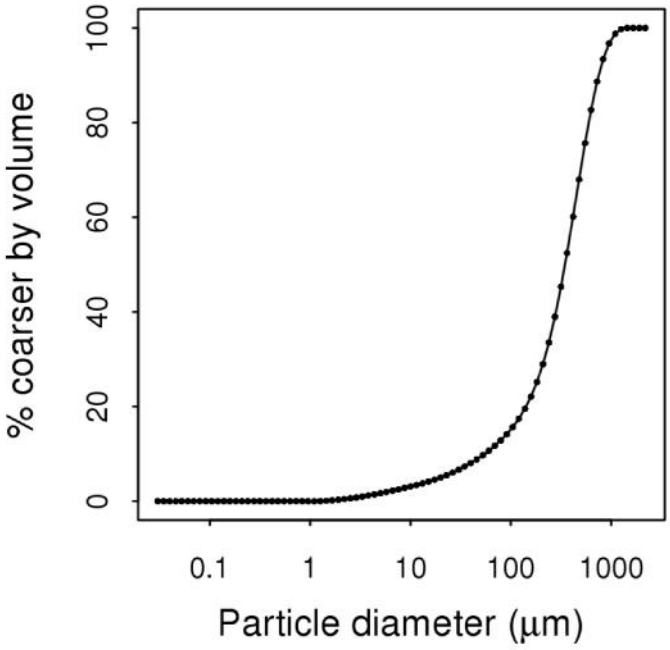
Graphic Mean (µm):	2.64
Standard Deviation (µm):	0.52
Skewness (µm):	-4.77
Kurtosis (µm):	0.14

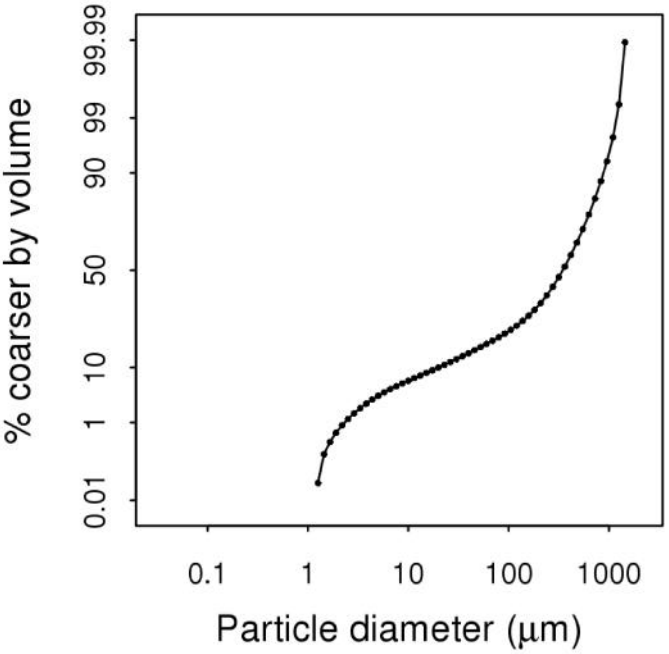
Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %
0.0115	0	0.182	0.39	2.884	1.05	45.7088	4.05	724.436	0.27
0.0132	0	0.2089	0.4	3.3113	1.14	52.4807	3.95	831.7638	0.21
0.0151	0	0.2399	0.41	3.8019	1.24	60.256	3.79	954.9926	0.14
0.0174	0	0.2754	0.4	4.3652	1.35	69.1831	3.56	1096.4782	0.09
0.02	0	0.3162	0.4	5.0119	1.46	79.4328	3.28	1258.9254	0.03
0.0229	0	0.3631	0.39	5.7544	1.57	91.2011	2.96	1445.4398	0
0.0263	0	0.4169	0.38	6.6069	1.7	104.7129	2.63	1659.5869	0
0.0302	0.01	0.4786	0.37	7.5858	1.84	120.2264	2.3	1905.4607	0
0.0347	0.02	0.5495	0.37	8.7096	2	138.0384	1.99	2187.7616	0
0.0398	0.03	0.631	0.36	10	2.17	158.4893	1.71	2511.8864	0
0.0457	0.05	0.7244	0.37	11.4815	2.37	181.9701	1.46	2884.0315	0
0.0525	0.08	0.8318	0.39	13.1826	2.57	208.9296	1.26	3311.3112	0
0.0603	0.11	0.955	0.42	15.1356	2.8	239.8833	1.09	3801.894	0
0.0692	0.14	1.0965	0.47	17.378	3.03	275.4229	0.95	4365.1583	0
0.0794	0.19	1.2589	0.53	19.9526	3.27	316.2278	0.83	5011.8723	0
0.0912	0.24	1.4454	0.6	22.9087	3.49	363.0781	0.72	5754.3994	0
0.1047	0.29	1.6596	0.68	26.3027	3.71	416.8694	0.62	6606.9345	0
0.1202	0.32	1.9055	0.77	30.1995	3.88	478.6301	0.52	7585.7758	0
0.138	0.35	2.1878	0.86	34.6737	4	549.5409	0.44	8709.6359	0
0.1585	0.38	2.5119	0.95	39.8107	4.06	630.9573	0.35	10000	0

Area: Moorebank
Square: TP3

Sample ID: 7.5
Depth: 7.5 cm





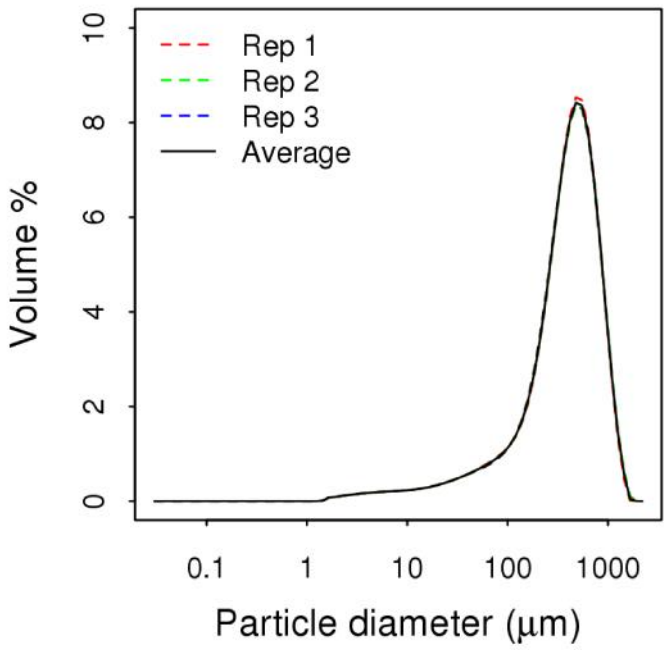


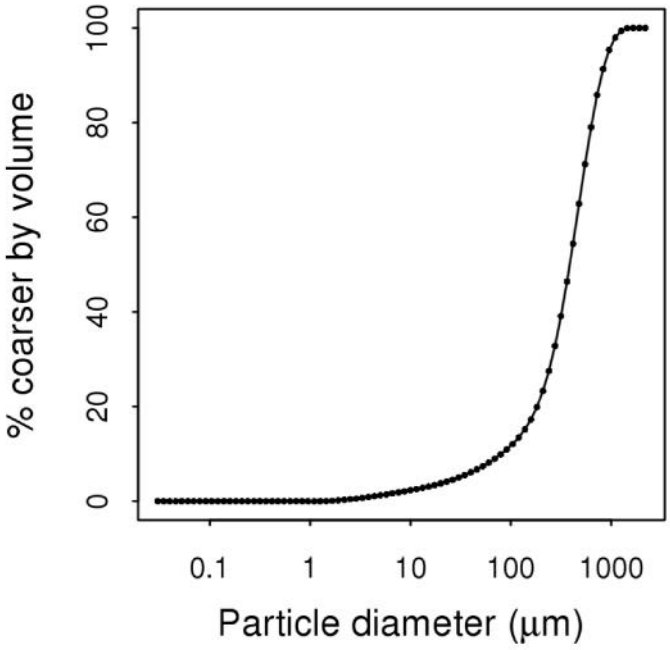
Graphic Mean (µm):	2.62
Standard Deviation (µm):	0.55
Skewness (µm):	-4.98
Kurtosis (µm):	0.16

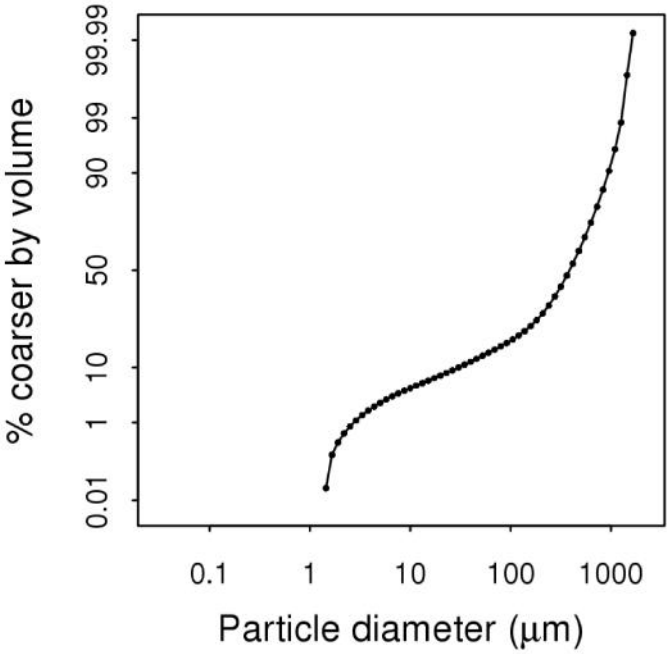
Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %
0.0115	0	0.182	0	2.884	0.18	45.7088	0.79	724.436	6
0.0132	0	0.2089	0	3.3113	0.2	52.4807	0.87	831.7638	4.71
0.0151	0	0.2399	0	3.8019	0.22	60.256	0.95	954.9926	3.33
0.0174	0	0.2754	0	4.3652	0.24	69.1831	1.04	1096.4782	2.04
0.02	0	0.3162	0	5.0119	0.25	79.4328	1.16	1258.9254	0.98
0.0229	0	0.3631	0	5.7544	0.26	91.2011	1.31	1445.4398	0.25
0.0263	0	0.4169	0	6.6069	0.27	104.7129	1.51	1659.5869	0.01
0.0302	0	0.4786	0	7.5858	0.28	120.2264	1.76	1905.4607	0
0.0347	0	0.5495	0	8.7096	0.29	138.0384	2.1	2187.7616	0
0.0398	0	0.631	0	10	0.3	158.4893	2.54	2511.8864	0
0.0457	0	0.7244	0	11.4815	0.32	181.9701	3.09	2884.0315	0
0.0525	0	0.8318	0	13.1826	0.34	208.9296	3.79	3311.3112	0
0.0603	0	0.955	0	15.1356	0.37	239.8833	4.58	3801.894	0
0.0692	0	1.0965	0	17.378	0.41	275.4229	5.46	4365.1583	0
0.0794	0	1.2589	0.02	19.9526	0.45	316.2278	6.33	5011.8723	0
0.0912	0	1.4454	0.08	22.9087	0.5	363.0781	7.11	5754.3994	0
0.1047	0	1.6596	0.09	26.3027	0.55	416.8694	7.66	6606.9345	0
0.1202	0	1.9055	0.11	30.1995	0.61	478.6301	7.88	7585.7758	0
0.138	0	2.1878	0.14	34.6737	0.67	549.5409	7.67	8709.6359	0
0.1585	0	2.5119	0.16	39.8107	0.73	630.9573	7.03	10000	0

Area: Moorebank
Square: TP3

Sample ID: 12.5
Depth: 12.5 cm





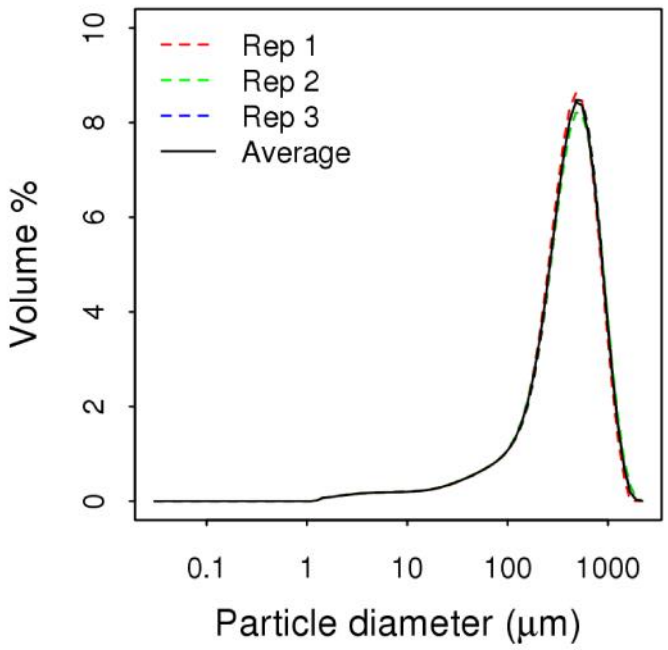


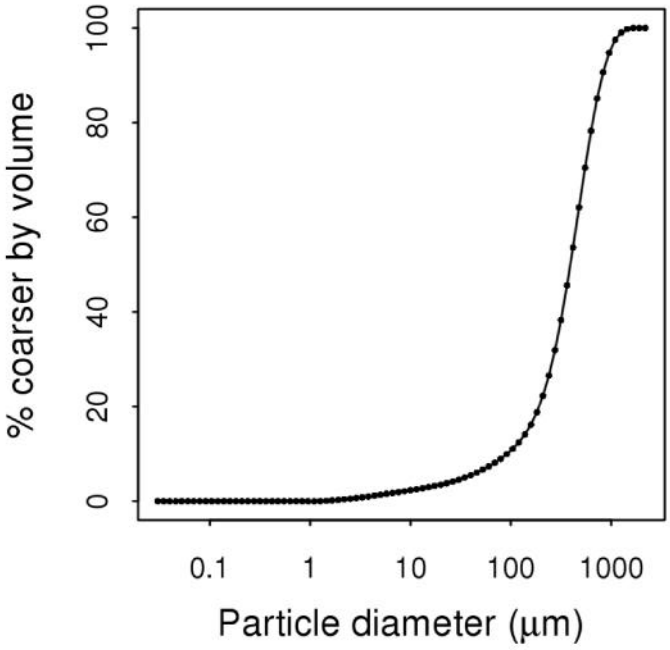
Graphic Mean (µm):	2.64
Standard Deviation (µm):	0.53
Skewness (µm):	-4.8
Kurtosis (µm):	0.14

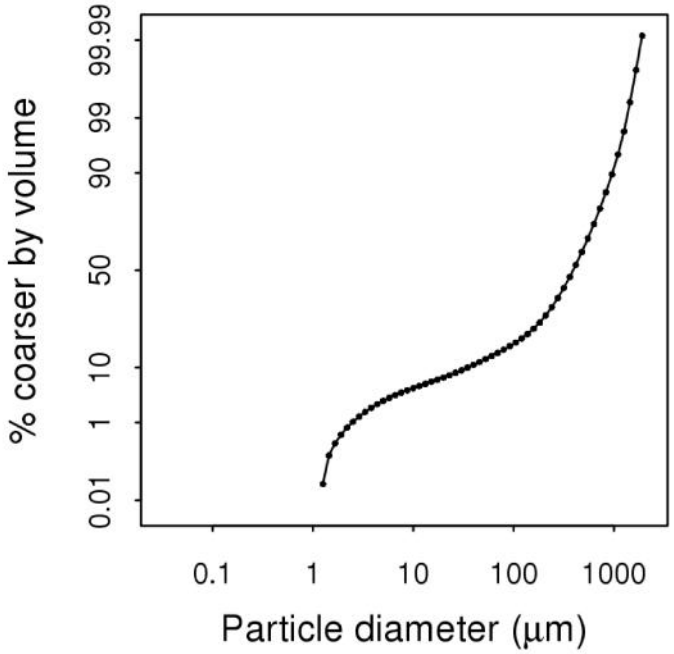
Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %
0.0115	0	0.182	0	2.884	0.14	45.7088	0.63	724.436	6.81
0.0132	0	0.2089	0	3.3113	0.16	52.4807	0.69	831.7638	5.49
0.0151	0	0.2399	0	3.8019	0.17	60.256	0.76	954.9926	4.02
0.0174	0	0.2754	0	4.3652	0.18	69.1831	0.83	1096.4782	2.61
0.02	0	0.3162	0	5.0119	0.19	79.4328	0.92	1258.9254	1.42
0.0229	0	0.3631	0	5.7544	0.2	91.2011	1.03	1445.4398	0.58
0.0263	0	0.4169	0	6.6069	0.2	104.7129	1.17	1659.5869	0.05
0.0302	0	0.4786	0	7.5858	0.21	120.2264	1.38	1905.4607	0
0.0347	0	0.5495	0	8.7096	0.22	138.0384	1.67	2187.7616	0
0.0398	0	0.631	0	10	0.23	158.4893	2.09	2511.8864	0
0.0457	0	0.7244	0	11.4815	0.24	181.9701	2.65	2884.0315	0
0.0525	0	0.8318	0	13.1826	0.26	208.9296	3.38	3311.3112	0
0.0603	0	0.955	0	15.1356	0.28	239.8833	4.26	3801.894	0
0.0692	0	1.0965	0	17.378	0.31	275.4229	5.27	4365.1583	0
0.0794	0	1.2589	0	19.9526	0.34	316.2278	6.31	5011.8723	0
0.0912	0	1.4454	0.01	22.9087	0.38	363.0781	7.28	5754.3994	0
0.1047	0	1.6596	0.08	26.3027	0.42	416.8694	8.02	6606.9345	0
0.1202	0	1.9055	0.09	30.1995	0.46	478.6301	8.42	7585.7758	0
0.138	0	2.1878	0.11	34.6737	0.51	549.5409	8.36	8709.6359	0
0.1585	0	2.5119	0.13	39.8107	0.57	630.9573	7.81	10000	0

Area: Moorebank
Square: TP3

Sample ID: 17.5
Depth: 17.5 cm





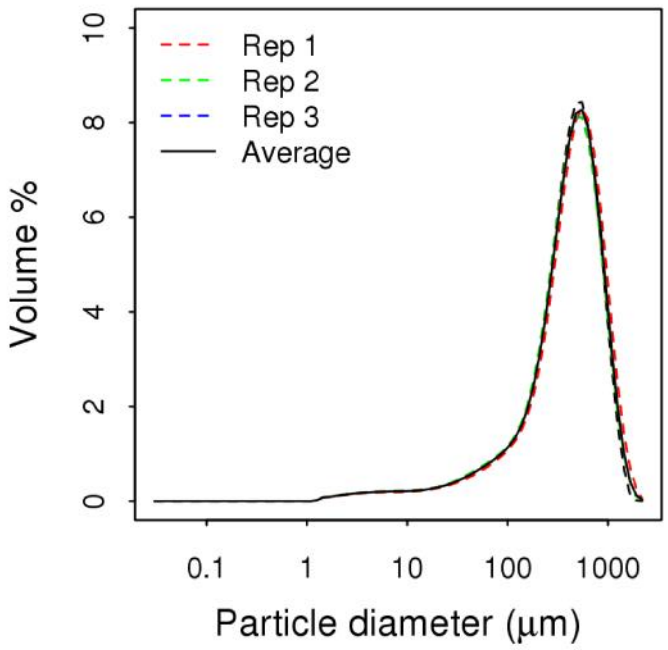


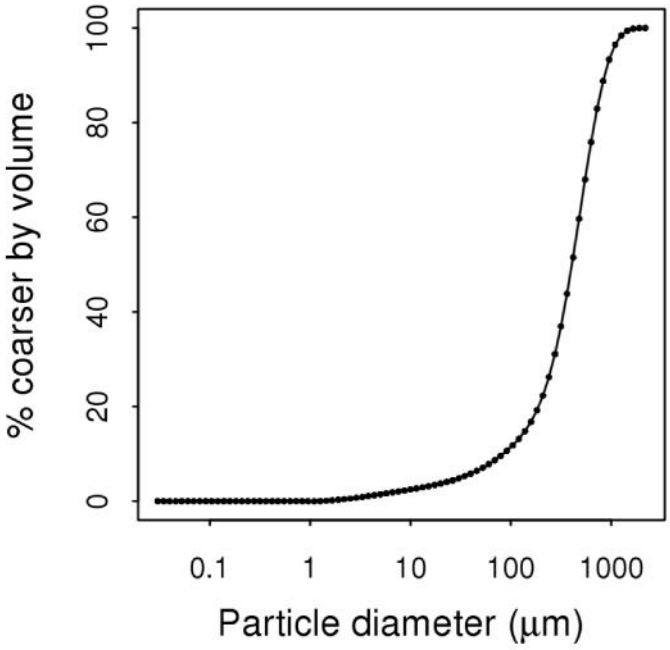
Graphic Mean (µm):	5.01
Standard Deviation (µm):	2.08
Skewness (µm):	-27.71
Kurtosis (µm):	0.35

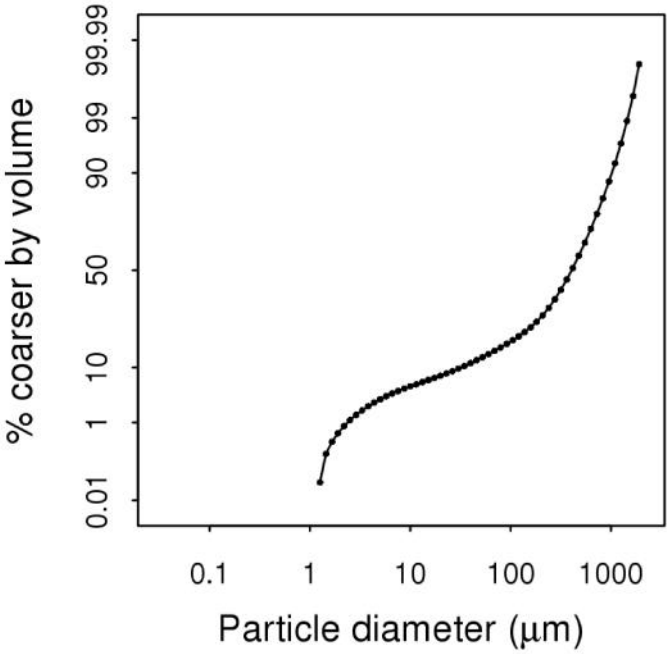
Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %
0.0115	0	0.182	0	2.884	0.15	45.7088	0.56	724.436	6.83
0.0132	0	0.2089	0	3.3113	0.16	52.4807	0.62	831.7638	5.54
0.0151	0	0.2399	0	3.8019	0.17	60.256	0.69	954.9926	4.11
0.0174	0	0.2754	0	4.3652	0.18	69.1831	0.77	1096.4782	2.74
0.02	0	0.3162	0	5.0119	0.18	79.4328	0.86	1258.9254	1.57
0.0229	0	0.3631	0	5.7544	0.19	91.2011	0.97	1445.4398	0.73
0.0263	0	0.4169	0	6.6069	0.19	104.7129	1.13	1659.5869	0.19
0.0302	0	0.4786	0	7.5858	0.19	120.2264	1.35	1905.4607	0.03
0.0347	0	0.5495	0	8.7096	0.19	138.0384	1.65	2187.7616	0
0.0398	0	0.631	0	10	0.2	158.4893	2.09	2511.8864	0
0.0457	0	0.7244	0	11.4815	0.2	181.9701	2.67	2884.0315	0
0.0525	0	0.8318	0	13.1826	0.21	208.9296	3.42	3311.3112	0
0.0603	0	0.955	0	15.1356	0.23	239.8833	4.31	3801.894	0
0.0692	0	1.0965	0	17.378	0.25	275.4229	5.33	4365.1583	0
0.0794	0	1.2589	0.02	19.9526	0.28	316.2278	6.36	5011.8723	0
0.0912	0	1.4454	0.07	22.9087	0.31	363.0781	7.33	5754.3994	0
0.1047	0	1.6596	0.08	26.3027	0.35	416.8694	8.06	6606.9345	0
0.1202	0	1.9055	0.1	30.1995	0.39	478.6301	8.44	7585.7758	0
0.138	0	2.1878	0.12	34.6737	0.44	549.5409	8.37	8709.6359	0
0.1585	0	2.5119	0.13	39.8107	0.5	630.9573	7.81	10000	0

Area: Moorebank
Square: TP3

Sample ID: 22.5
Depth: 22.5 cm





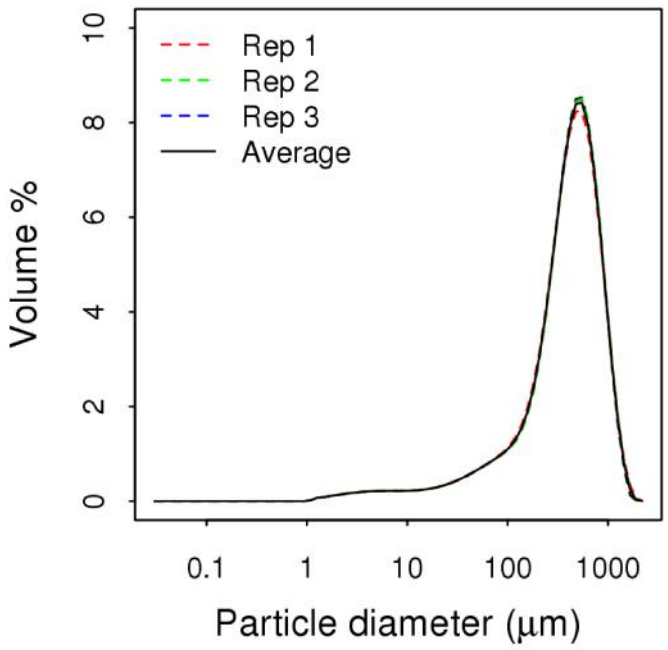


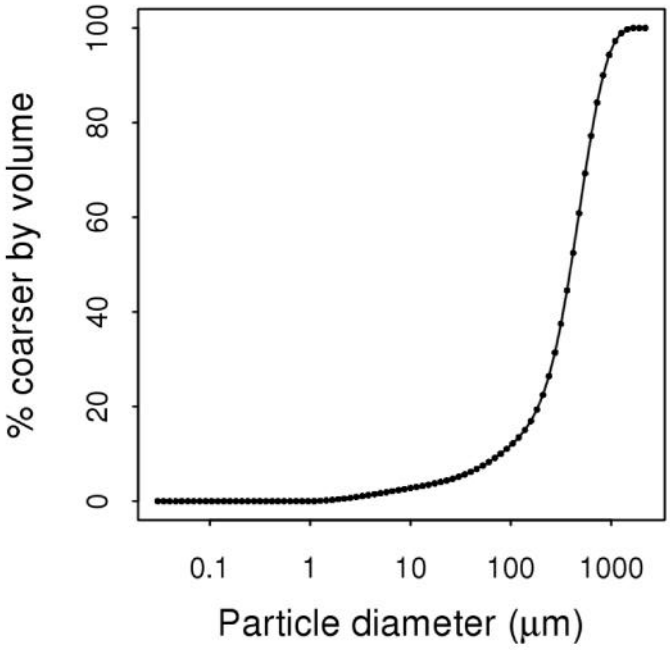
Graphic Mean (µm):	4.99
Standard Deviation (µm):	1.99
Skewness (µm):	-29.24
Kurtosis (µm):	0.31

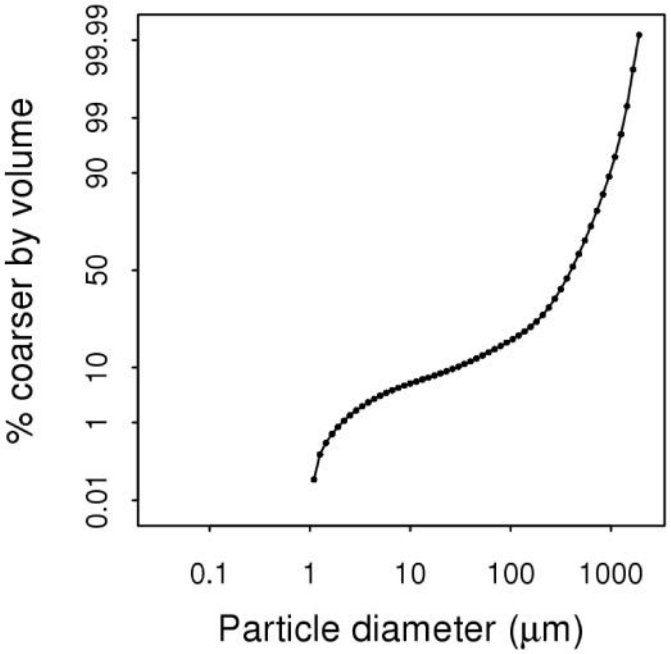
Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %
0.0115	0	0.182	0	2.884	0.16	45.7088	0.6	724.436	7.06
0.0132	0	0.2089	0	3.3113	0.17	52.4807	0.67	831.7638	5.88
0.0151	0	0.2399	0	3.8019	0.18	60.256	0.75	954.9926	4.51
0.0174	0	0.2754	0	4.3652	0.19	69.1831	0.84	1096.4782	3.14
0.02	0	0.3162	0	5.0119	0.2	79.4328	0.93	1258.9254	1.94
0.0229	0	0.3631	0	5.7544	0.2	91.2011	1.04	1445.4398	1.02
0.0263	0	0.4169	0	6.6069	0.2	104.7129	1.18	1659.5869	0.42
0.0302	0	0.4786	0	7.5858	0.2	120.2264	1.36	1905.4607	0.14
0.0347	0	0.5495	0	8.7096	0.21	138.0384	1.61	2187.7616	0.02
0.0398	0	0.631	0	10	0.21	158.4893	1.96	2511.8864	0
0.0457	0	0.7244	0	11.4815	0.22	181.9701	2.45	2884.0315	0
0.0525	0	0.8318	0	13.1826	0.23	208.9296	3.1	3311.3112	0
0.0603	0	0.955	0	15.1356	0.24	239.8833	3.91	3801.894	0
0.0692	0	1.0965	0	17.378	0.26	275.4229	4.87	4365.1583	0
0.0794	0	1.2589	0.02	19.9526	0.29	316.2278	5.88	5011.8723	0
0.0912	0	1.4454	0.08	22.9087	0.32	363.0781	6.87	5754.3994	0
0.1047	0	1.6596	0.09	26.3027	0.36	416.8694	7.68	6606.9345	0
0.1202	0	1.9055	0.11	30.1995	0.41	478.6301	8.19	7585.7758	0
0.138	0	2.1878	0.13	34.6737	0.47	549.5409	8.28	8709.6359	0
0.1585	0	2.5119	0.14	39.8107	0.53	630.9573	7.89	10000	0

Area: Moorebank
Square: TP3

Sample ID: 27.5
Depth: 27.5 cm





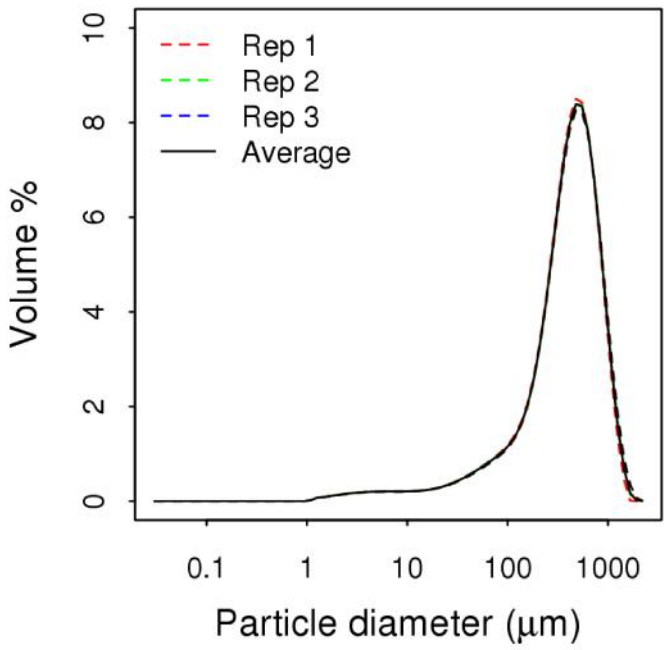


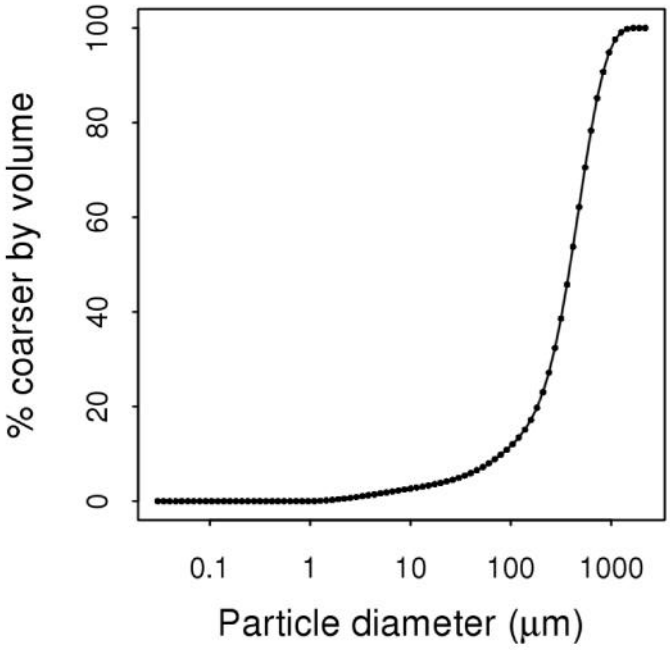
Graphic Mean (µm):	4.87
Standard Deviation (µm):	2.02
Skewness (µm):	-25.64
Kurtosis (µm):	0.37

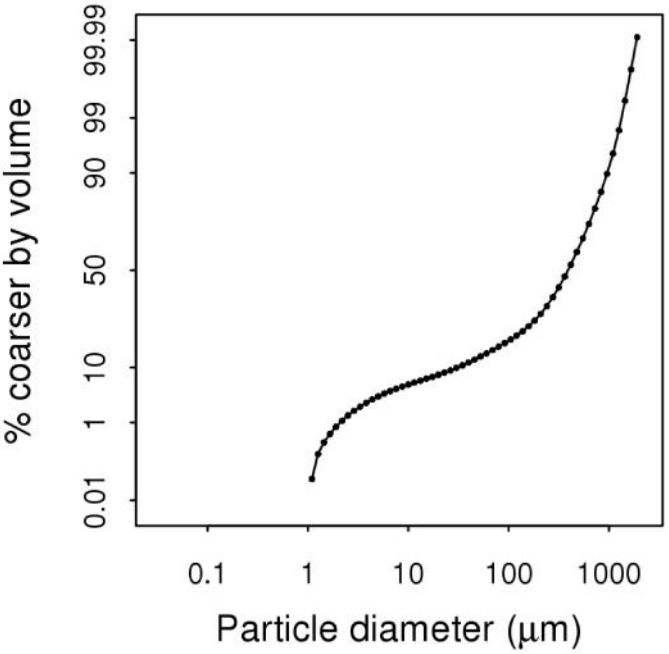
Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %
0.0115	0	0.182	0	2.884	0.18	45.7088	0.61	724.436	7.03
0.0132	0	0.2089	0	3.3113	0.19	52.4807	0.69	831.7638	5.76
0.0151	0	0.2399	0	3.8019	0.2	60.256	0.77	954.9926	4.32
0.0174	0	0.2754	0	4.3652	0.21	69.1831	0.84	1096.4782	2.91
0.02	0	0.3162	0	5.0119	0.21	79.4328	0.93	1258.9254	1.69
0.0229	0	0.3631	0	5.7544	0.21	91.2011	1.02	1445.4398	0.8
0.0263	0	0.4169	0	6.6069	0.22	104.7129	1.14	1659.5869	0.24
0.0302	0	0.4786	0	7.5858	0.22	120.2264	1.3	1905.4607	0.03
0.0347	0	0.5495	0	8.7096	0.22	138.0384	1.54	2187.7616	0
0.0398	0	0.631	0	10	0.22	158.4893	1.9	2511.8864	0
0.0457	0	0.7244	0	11.4815	0.22	181.9701	2.41	2884.0315	0
0.0525	0	0.8318	0	13.1826	0.23	208.9296	3.1	3311.3112	0
0.0603	0	0.955	0	15.1356	0.25	239.8833	3.96	3801.894	0
0.0692	0	1.0965	0.02	17.378	0.27	275.4229	4.98	4365.1583	0
0.0794	0	1.2589	0.07	19.9526	0.3	316.2278	6.05	5011.8723	0
0.0912	0	1.4454	0.08	22.9087	0.33	363.0781	7.08	5754.3994	0
0.1047	0	1.6596	0.1	26.3027	0.37	416.8694	7.91	6606.9345	0
0.1202	0	1.9055	0.12	30.1995	0.42	478.6301	8.39	7585.7758	0
0.138	0	2.1878	0.14	34.6737	0.48	549.5409	8.42	8709.6359	0
0.1585	0	2.5119	0.16	39.8107	0.54	630.9573	7.96	10000	0

Area: Moorebank
Square: TP3

Sample ID: 32.5
Depth: 32.5 cm





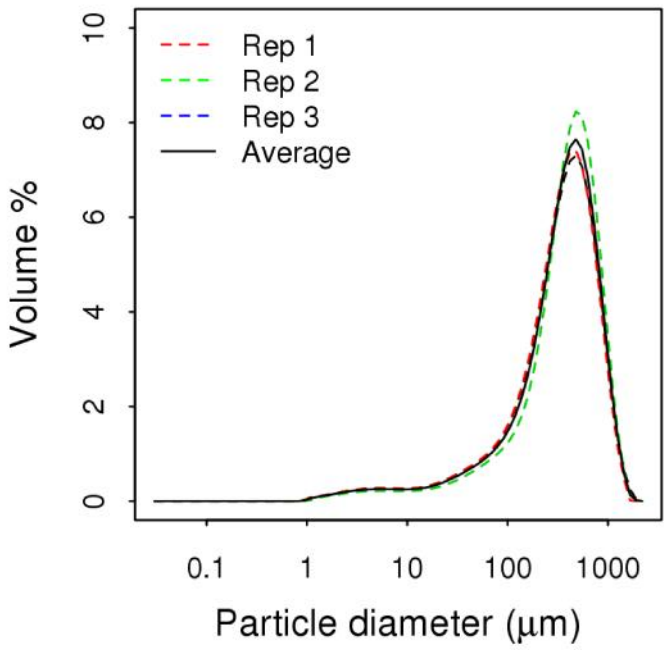


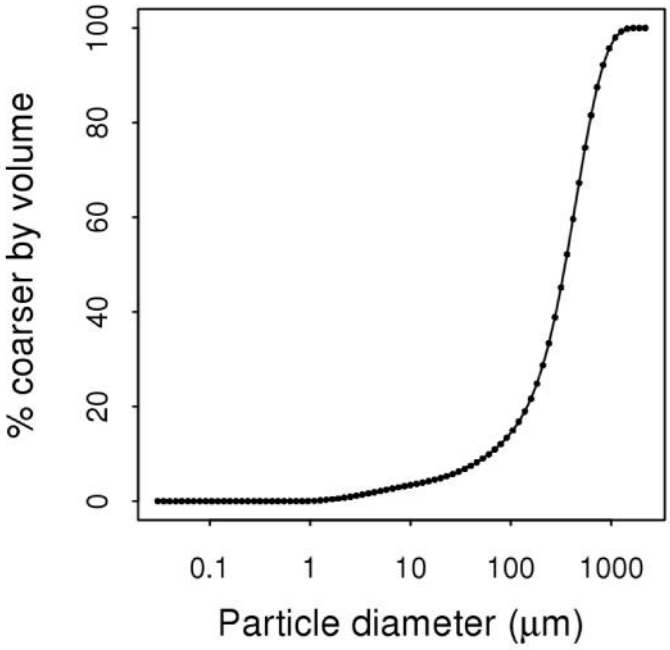
Graphic Mean (µm):	5.57
Standard Deviation (µm):	2.27
Skewness (µm):	-37.19
Kurtosis (µm):	0.43

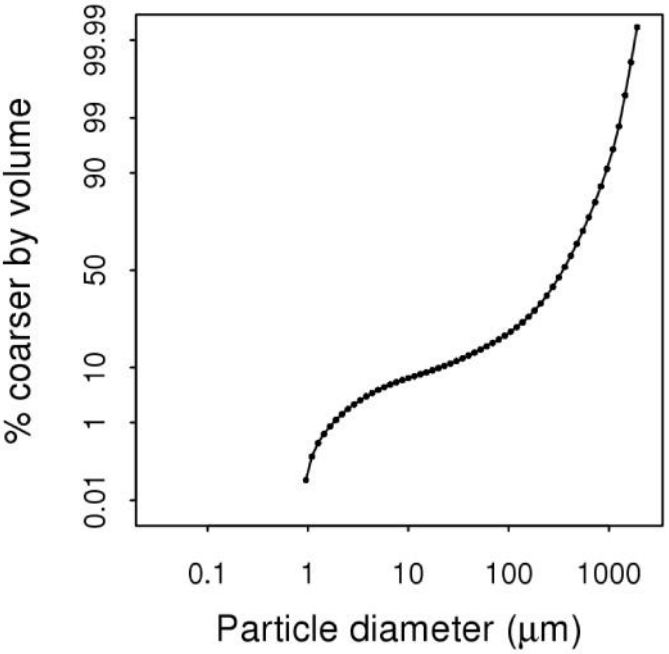
Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %
0.0115	0	0.182	0	2.884	0.17	45.7088	0.61	724.436	6.84
0.0132	0	0.2089	0	3.3113	0.18	52.4807	0.69	831.7638	5.55
0.0151	0	0.2399	0	3.8019	0.19	60.256	0.77	954.9926	4.12
0.0174	0	0.2754	0	4.3652	0.2	69.1831	0.86	1096.4782	2.73
0.02	0	0.3162	0	5.0119	0.2	79.4328	0.96	1258.9254	1.54
0.0229	0	0.3631	0	5.7544	0.2	91.2011	1.07	1445.4398	0.69
0.0263	0	0.4169	0	6.6069	0.2	104.7129	1.2	1659.5869	0.17
0.0302	0	0.4786	0	7.5858	0.2	120.2264	1.39	1905.4607	0.03
0.0347	0	0.5495	0	8.7096	0.2	138.0384	1.65	2187.7616	0
0.0398	0	0.631	0	10	0.21	158.4893	2.04	2511.8864	0
0.0457	0	0.7244	0	11.4815	0.21	181.9701	2.57	2884.0315	0
0.0525	0	0.8318	0	13.1826	0.22	208.9296	3.29	3311.3112	0
0.0603	0	0.955	0	15.1356	0.23	239.8833	4.16	3801.894	0
0.0692	0	1.0965	0.02	17.378	0.25	275.4229	5.17	4365.1583	0
0.0794	0	1.2589	0.07	19.9526	0.28	316.2278	6.23	5011.8723	0
0.0912	0	1.4454	0.09	22.9087	0.31	363.0781	7.21	5754.3994	0
0.1047	0	1.6596	0.1	26.3027	0.35	416.8694	7.98	6606.9345	0
0.1202	0	1.9055	0.12	30.1995	0.41	478.6301	8.39	7585.7758	0
0.138	0	2.1878	0.14	34.6737	0.47	549.5409	8.35	8709.6359	0
0.1585	0	2.5119	0.16	39.8107	0.53	630.9573	7.81	10000	0

Area: Moorebank
Square: TP3

Sample ID: 37.5
Depth: 37.5 cm





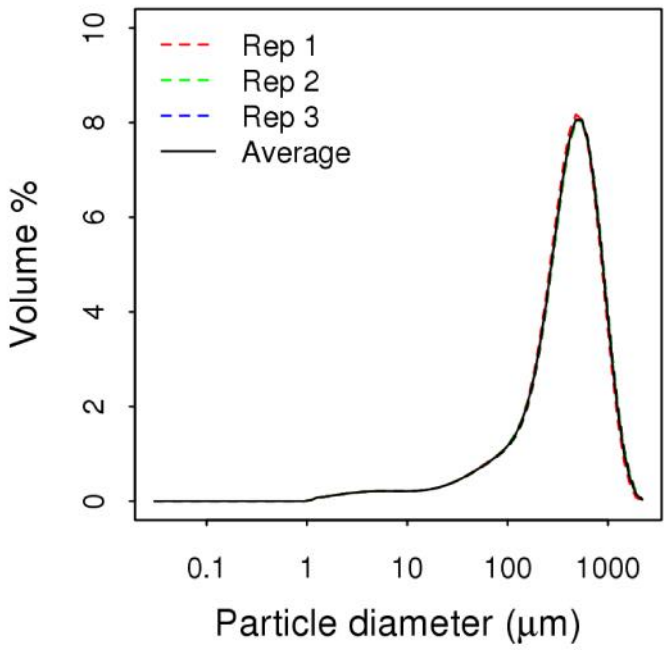


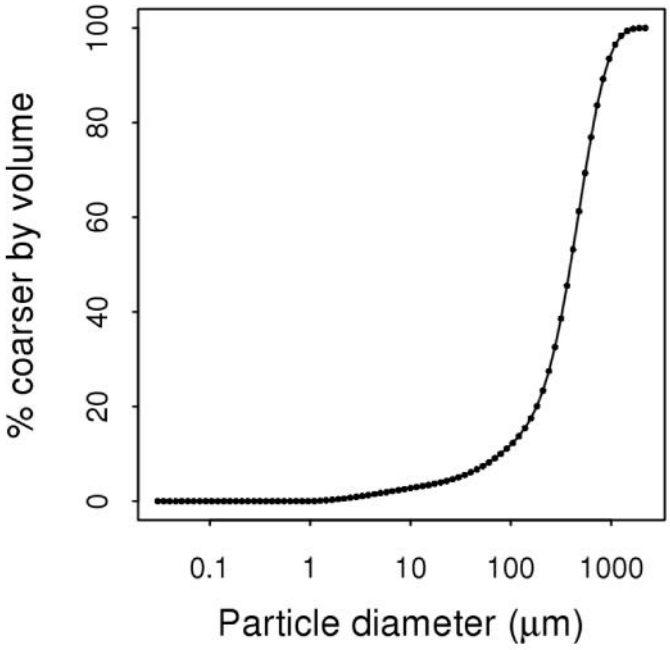
Graphic Mean (µm):	5.63
Standard Deviation (µm):	2.33
Skewness (µm):	-38.03
Kurtosis (µm):	0.4

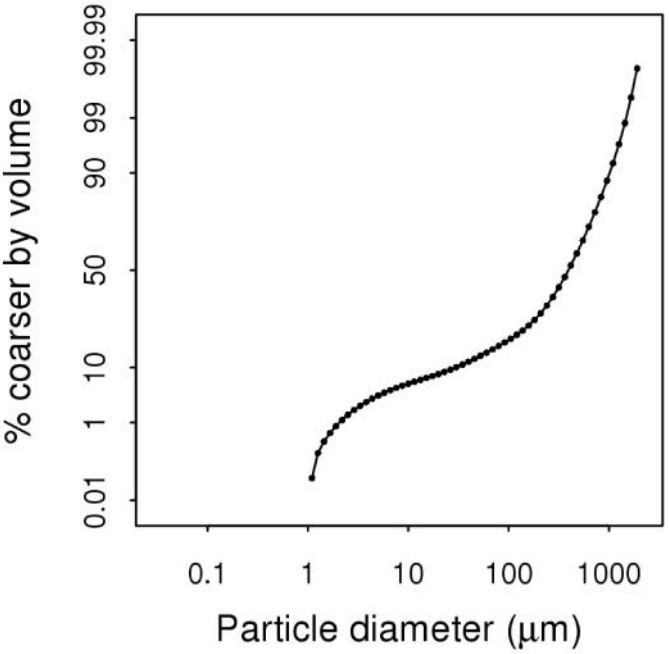
Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %
0.0115	0	0.182	0	2.884	0.22	45.7088	0.73	724.436	5.9
0.0132	0	0.2089	0	3.3113	0.23	52.4807	0.81	831.7638	4.73
0.0151	0	0.2399	0	3.8019	0.24	60.256	0.91	954.9926	3.48
0.0174	0	0.2754	0	4.3652	0.25	69.1831	1.02	1096.4782	2.29
0.02	0	0.3162	0	5.0119	0.26	79.4328	1.16	1258.9254	1.3
0.0229	0	0.3631	0	5.7544	0.26	91.2011	1.33	1445.4398	0.59
0.0263	0	0.4169	0	6.6069	0.25	104.7129	1.55	1659.5869	0.13
0.0302	0	0.4786	0	7.5858	0.25	120.2264	1.83	1905.4607	0.02
0.0347	0	0.5495	0	8.7096	0.25	138.0384	2.19	2187.7616	0
0.0398	0	0.631	0	10	0.25	158.4893	2.65	2511.8864	0
0.0457	0	0.7244	0	11.4815	0.25	181.9701	3.21	2884.0315	0
0.0525	0	0.8318	0	13.1826	0.27	208.9296	3.89	3311.3112	0
0.0603	0	0.955	0.02	15.1356	0.29	239.8833	4.66	3801.894	0
0.0692	0	1.0965	0.06	17.378	0.31	275.4229	5.49	4365.1583	0
0.0794	0	1.2589	0.09	19.9526	0.35	316.2278	6.29	5011.8723	0
0.0912	0	1.4454	0.11	22.9087	0.4	363.0781	6.99	5754.3994	0
0.1047	0	1.6596	0.13	26.3027	0.45	416.8694	7.48	6606.9345	0
0.1202	0	1.9055	0.16	30.1995	0.51	478.6301	7.65	7585.7758	0
0.138	0	2.1878	0.18	34.6737	0.58	549.5409	7.44	8709.6359	0
0.1585	0	2.5119	0.2	39.8107	0.65	630.9573	6.84	10000	0

Area: Moorebank
Square: TP3

Sample ID: 42.5
Depth: 42.5 cm





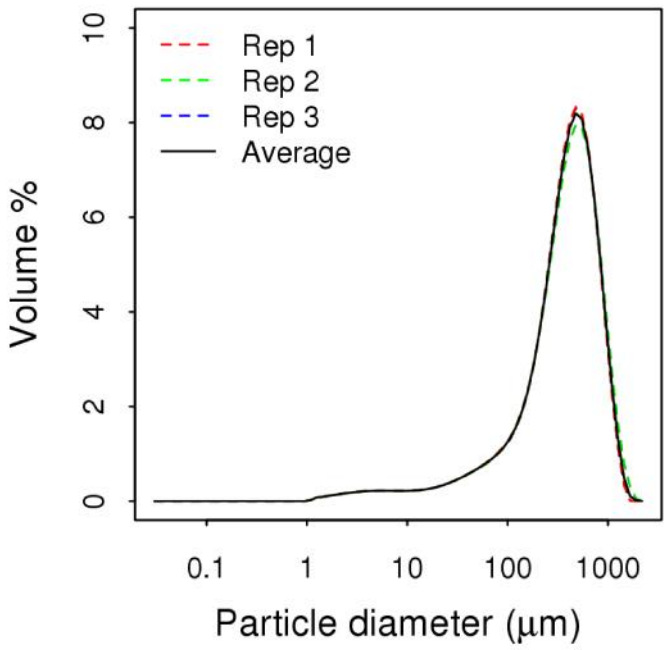


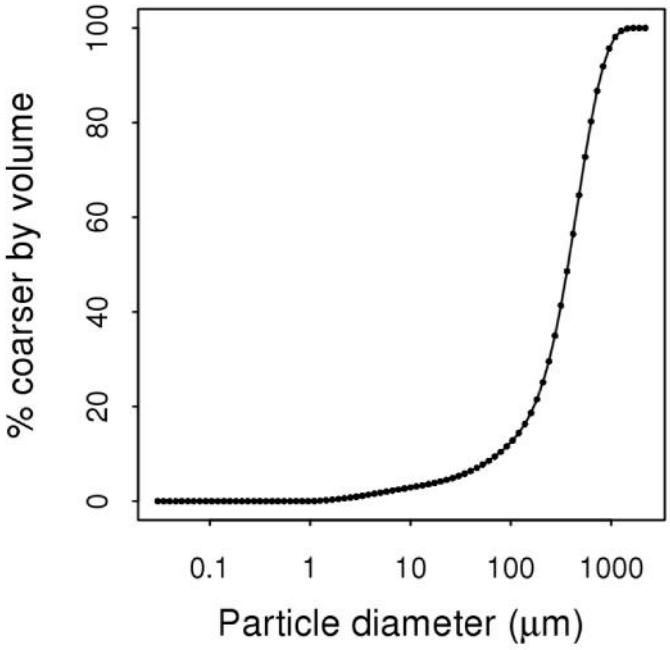
Graphic Mean (µm):	5.56
Standard Deviation (µm):	2.3
Skewness (µm):	-36.67
Kurtosis (µm):	0.42

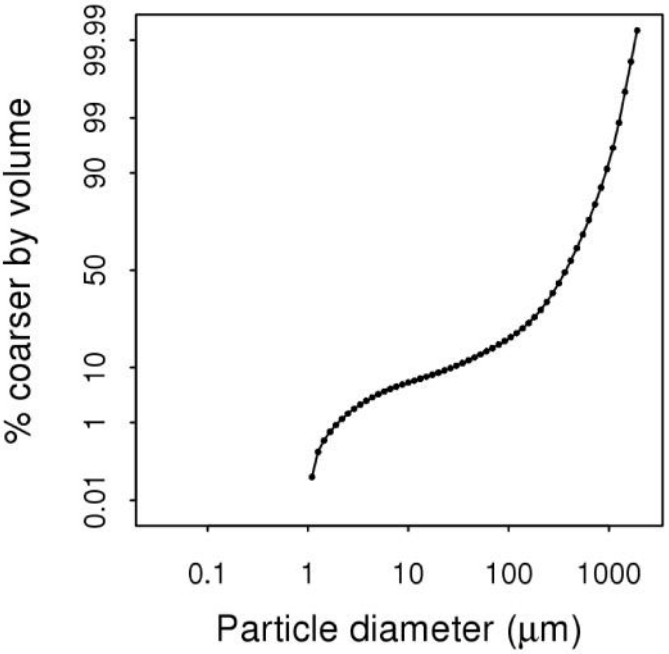
Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %
0.0115	0	0.182	0	2.884	0.18	45.7088	0.62	724.436	6.73
0.0132	0	0.2089	0	3.3113	0.19	52.4807	0.7	831.7638	5.57
0.0151	0	0.2399	0	3.8019	0.2	60.256	0.78	954.9926	4.27
0.0174	0	0.2754	0	4.3652	0.21	69.1831	0.87	1096.4782	2.99
0.02	0	0.3162	0	5.0119	0.21	79.4328	0.96	1258.9254	1.87
0.0229	0	0.3631	0	5.7544	0.21	91.2011	1.08	1445.4398	1.01
0.0263	0	0.4169	0	6.6069	0.21	104.7129	1.22	1659.5869	0.46
0.0302	0	0.4786	0	7.5858	0.21	120.2264	1.41	1905.4607	0.14
0.0347	0	0.5495	0	8.7096	0.21	138.0384	1.69	2187.7616	0.03
0.0398	0	0.631	0	10	0.21	158.4893	2.07	2511.8864	0
0.0457	0	0.7244	0	11.4815	0.21	181.9701	2.6	2884.0315	0
0.0525	0	0.8318	0	13.1826	0.22	208.9296	3.28	3311.3112	0
0.0603	0	0.955	0	15.1356	0.23	239.8833	4.11	3801.894	0
0.0692	0	1.0965	0.02	17.378	0.25	275.4229	5.06	4365.1583	0
0.0794	0	1.2589	0.08	19.9526	0.28	316.2278	6.04	5011.8723	0
0.0912	0	1.4454	0.09	22.9087	0.32	363.0781	6.96	5754.3994	0
0.1047	0	1.6596	0.11	26.3027	0.36	416.8694	7.67	6606.9345	0
0.1202	0	1.9055	0.13	30.1995	0.42	478.6301	8.07	7585.7758	0
0.138	0	2.1878	0.14	34.6737	0.48	549.5409	8.05	8709.6359	0
0.1585	0	2.5119	0.16	39.8107	0.55	630.9573	7.6	10000	0

Area: Moorebank
Square: TP3

Sample ID: 47.5
Depth: 47.5 cm





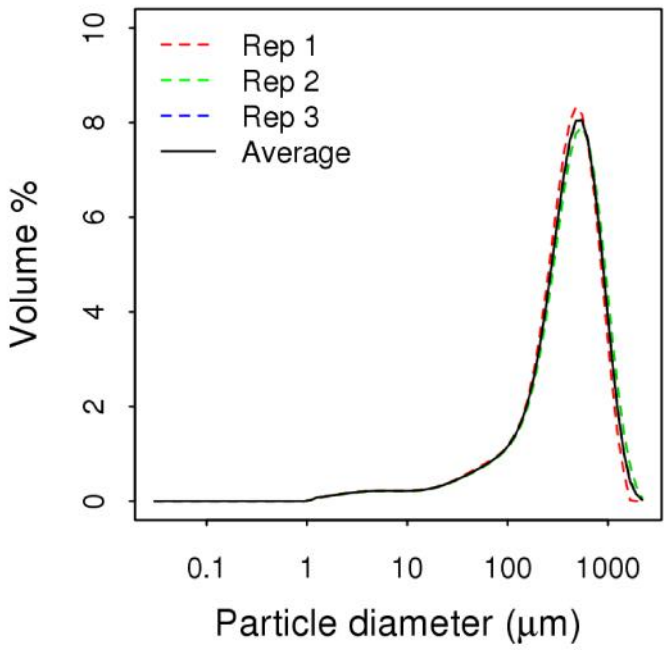


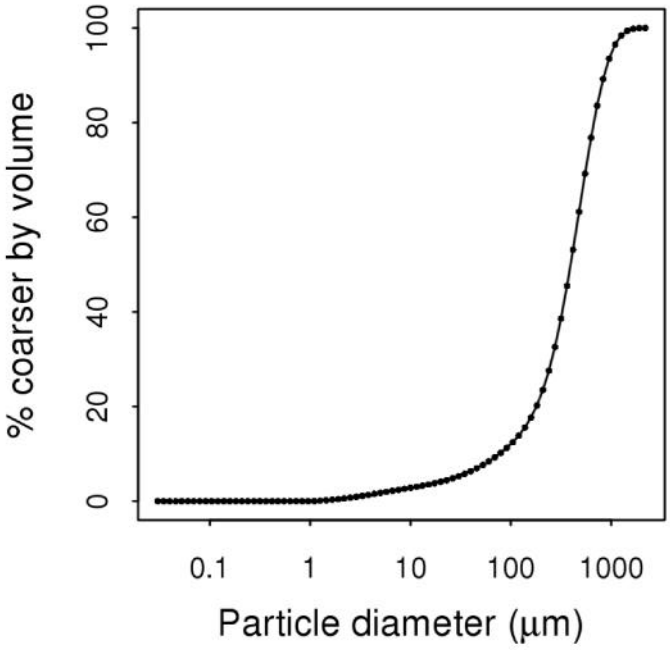
Graphic Mean (µm):	5.6
Standard Deviation (µm):	2.17
Skewness (µm):	-34.6
Kurtosis (µm):	0.3

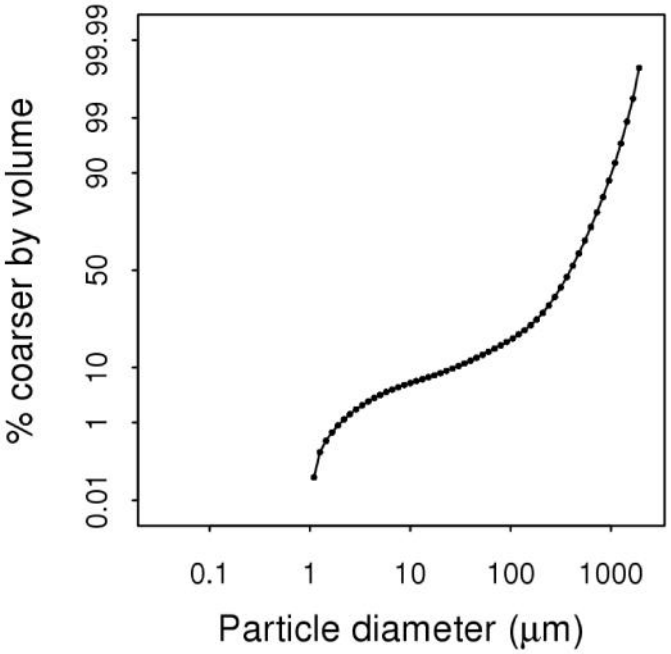
Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %
0.0115	0	0.182	0	2.884	0.19	45.7088	0.64	724.436	6.47
0.0132	0	0.2089	0	3.3113	0.2	52.4807	0.71	831.7638	5.18
0.0151	0	0.2399	0	3.8019	0.21	60.256	0.79	954.9926	3.77
0.0174	0	0.2754	0	4.3652	0.22	69.1831	0.89	1096.4782	2.42
0.02	0	0.3162	0	5.0119	0.22	79.4328	1	1258.9254	1.3
0.0229	0	0.3631	0	5.7544	0.22	91.2011	1.14	1445.4398	0.5
0.0263	0	0.4169	0	6.6069	0.22	104.7129	1.31	1659.5869	0.11
0.0302	0	0.4786	0	7.5858	0.22	120.2264	1.55	1905.4607	0.02
0.0347	0	0.5495	0	8.7096	0.22	138.0384	1.88	2187.7616	0
0.0398	0	0.631	0	10	0.22	158.4893	2.32	2511.8864	0
0.0457	0	0.7244	0	11.4815	0.22	181.9701	2.89	2884.0315	0
0.0525	0	0.8318	0	13.1826	0.23	208.9296	3.61	3311.3112	0
0.0603	0	0.955	0	15.1356	0.25	239.8833	4.46	3801.894	0
0.0692	0	1.0965	0.02	17.378	0.27	275.4229	5.41	4365.1583	0
0.0794	0	1.2589	0.08	19.9526	0.3	316.2278	6.37	5011.8723	0
0.0912	0	1.4454	0.09	22.9087	0.34	363.0781	7.24	5754.3994	0
0.1047	0	1.6596	0.11	26.3027	0.39	416.8694	7.89	6606.9345	0
0.1202	0	1.9055	0.13	30.1995	0.44	478.6301	8.2	7585.7758	0
0.138	0	2.1878	0.15	34.6737	0.5	549.5409	8.07	8709.6359	0
0.1585	0	2.5119	0.17	39.8107	0.56	630.9573	7.48	10000	0

Area: Moorebank
Square: TP3

Sample ID: 52.5
Depth: 52.5 cm





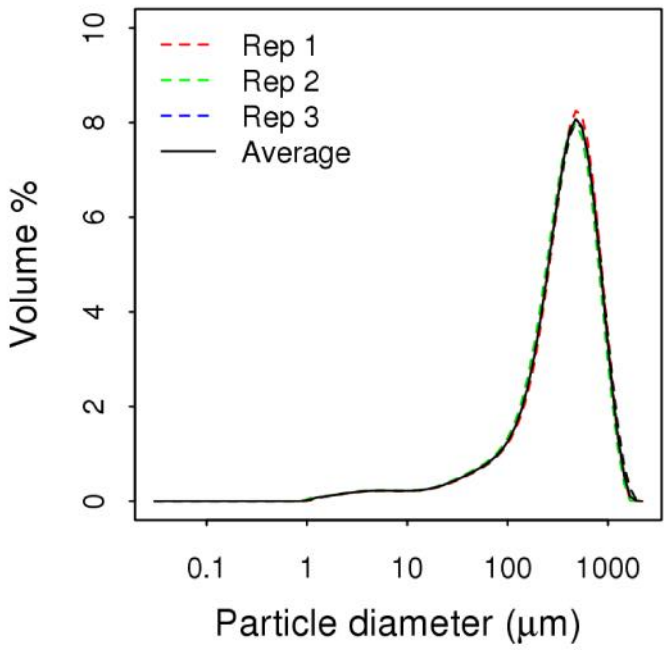


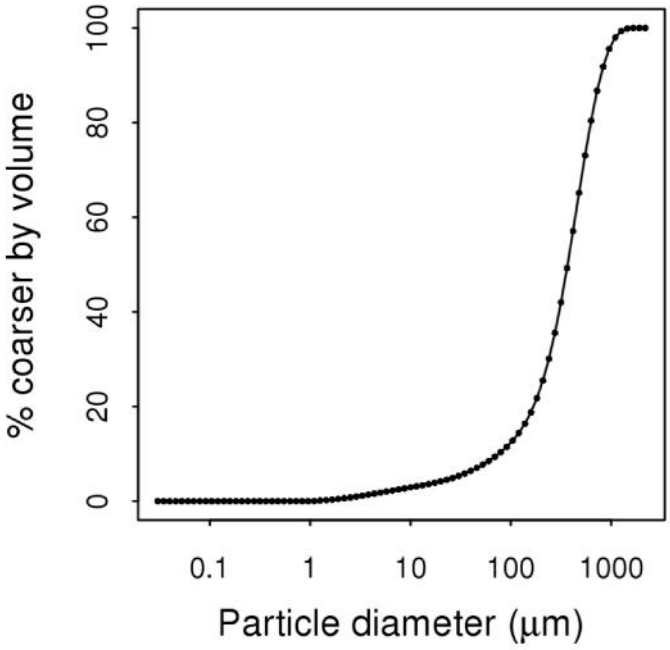
Graphic Mean (µm):	5.68
Standard Deviation (µm):	2.26
Skewness (µm):	-40.9
Kurtosis (µm):	0.41

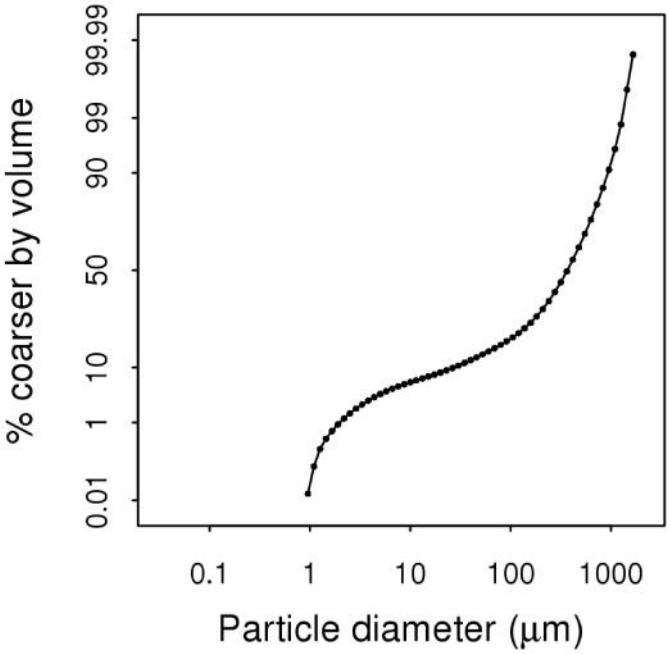
Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %
0.0115	0	0.182	0	2.884	0.18	45.7088	0.63	724.436	6.77
0.0132	0	0.2089	0	3.3113	0.19	52.4807	0.7	831.7638	5.62
0.0151	0	0.2399	0	3.8019	0.2	60.256	0.77	954.9926	4.31
0.0174	0	0.2754	0	4.3652	0.21	69.1831	0.85	1096.4782	3.01
0.02	0	0.3162	0	5.0119	0.22	79.4328	0.94	1258.9254	1.87
0.0229	0	0.3631	0	5.7544	0.22	91.2011	1.06	1445.4398	1.01
0.0263	0	0.4169	0	6.6069	0.22	104.7129	1.21	1659.5869	0.41
0.0302	0	0.4786	0	7.5858	0.22	120.2264	1.41	1905.4607	0.15
0.0347	0	0.5495	0	8.7096	0.21	138.0384	1.69	2187.7616	0.03
0.0398	0	0.631	0	10	0.22	158.4893	2.08	2511.8864	0
0.0457	0	0.7244	0	11.4815	0.22	181.9701	2.6	2884.0315	0
0.0525	0	0.8318	0	13.1826	0.23	208.9296	3.27	3311.3112	0
0.0603	0	0.955	0	15.1356	0.25	239.8833	4.08	3801.894	0
0.0692	0	1.0965	0.02	17.378	0.27	275.4229	5.02	4365.1583	0
0.0794	0	1.2589	0.08	19.9526	0.3	316.2278	5.98	5011.8723	0
0.0912	0	1.4454	0.09	22.9087	0.34	363.0781	6.9	5754.3994	0
0.1047	0	1.6596	0.11	26.3027	0.39	416.8694	7.62	6606.9345	0
0.1202	0	1.9055	0.13	30.1995	0.44	478.6301	8.04	7585.7758	0
0.138	0	2.1878	0.15	34.6737	0.5	549.5409	8.05	8709.6359	0
0.1585	0	2.5119	0.17	39.8107	0.56	630.9573	7.62	10000	0

Area: Moorebank
Square: TP3

Sample ID: 57.5
Depth: 57.5 cm





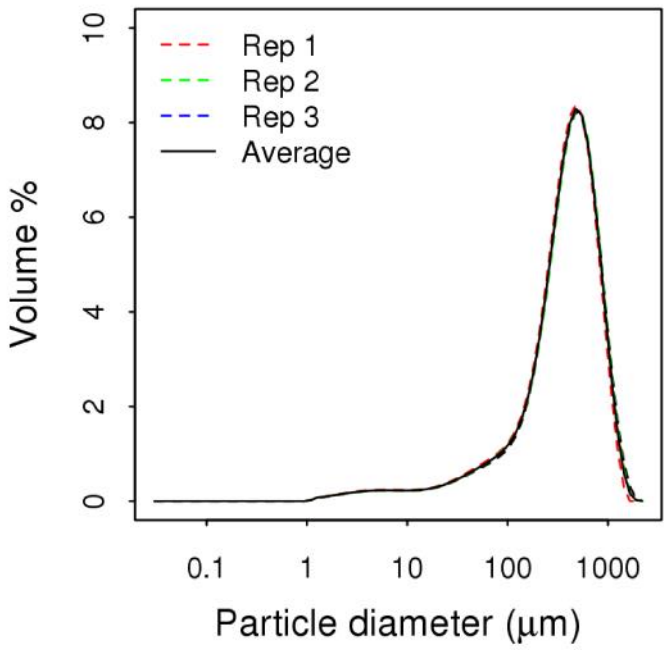


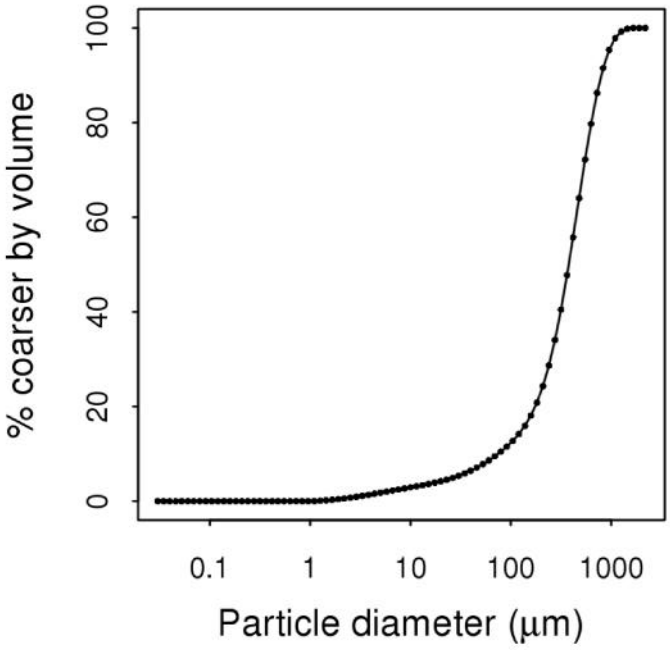
Graphic Mean (µm):	5.51
Standard Deviation (µm):	2.1
Skewness (µm):	-32.89
Kurtosis (µm):	0.33

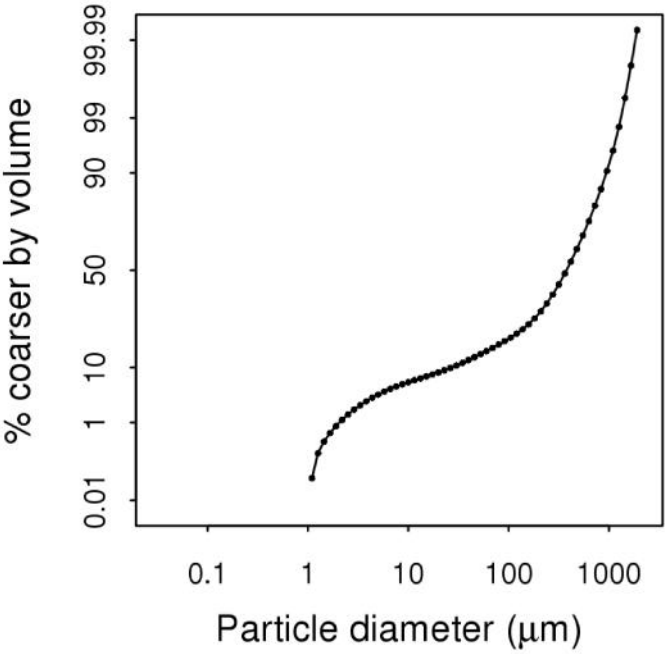
Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %
0.0115	0	0.182	0	2.884	0.19	45.7088	0.62	724.436	6.33
0.0132	0	0.2089	0	3.3113	0.2	52.4807	0.7	831.7638	5.09
0.0151	0	0.2399	0	3.8019	0.21	60.256	0.78	954.9926	3.73
0.0174	0	0.2754	0	4.3652	0.22	69.1831	0.87	1096.4782	2.43
0.02	0	0.3162	0	5.0119	0.22	79.4328	0.98	1258.9254	1.34
0.0229	0	0.3631	0	5.7544	0.22	91.2011	1.13	1445.4398	0.57
0.0263	0	0.4169	0	6.6069	0.22	104.7129	1.33	1659.5869	0.1
0.0302	0	0.4786	0	7.5858	0.22	120.2264	1.59	1905.4607	0.01
0.0347	0	0.5495	0	8.7096	0.22	138.0384	1.94	2187.7616	0
0.0398	0	0.631	0	10	0.22	158.4893	2.41	2511.8864	0
0.0457	0	0.7244	0	11.4815	0.22	181.9701	3	2884.0315	0
0.0525	0	0.8318	0	13.1826	0.23	208.9296	3.74	3311.3112	0
0.0603	0	0.955	0.01	15.1356	0.25	239.8833	4.58	3801.894	0
0.0692	0	1.0965	0.04	17.378	0.27	275.4229	5.51	4365.1583	0
0.0794	0	1.2589	0.08	19.9526	0.3	316.2278	6.42	5011.8723	0
0.0912	0	1.4454	0.09	22.9087	0.34	363.0781	7.24	5754.3994	0
0.1047	0	1.6596	0.11	26.3027	0.39	416.8694	7.83	6606.9345	0
0.1202	0	1.9055	0.13	30.1995	0.44	478.6301	8.08	7585.7758	0
0.138	0	2.1878	0.15	34.6737	0.5	549.5409	7.91	8709.6359	0
0.1585	0	2.5119	0.17	39.8107	0.56	630.9573	7.31	10000	0

Area: Moorebank
Square: TP3

Sample ID: 62.5
Depth: 62.5 cm





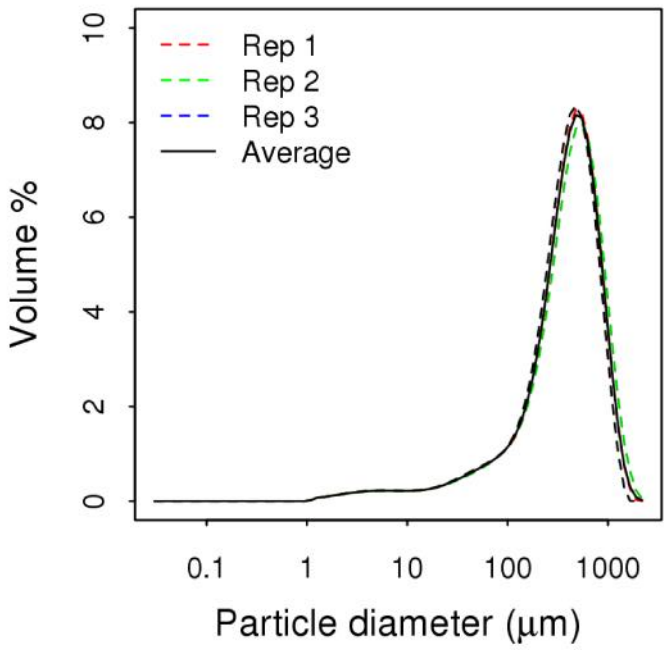


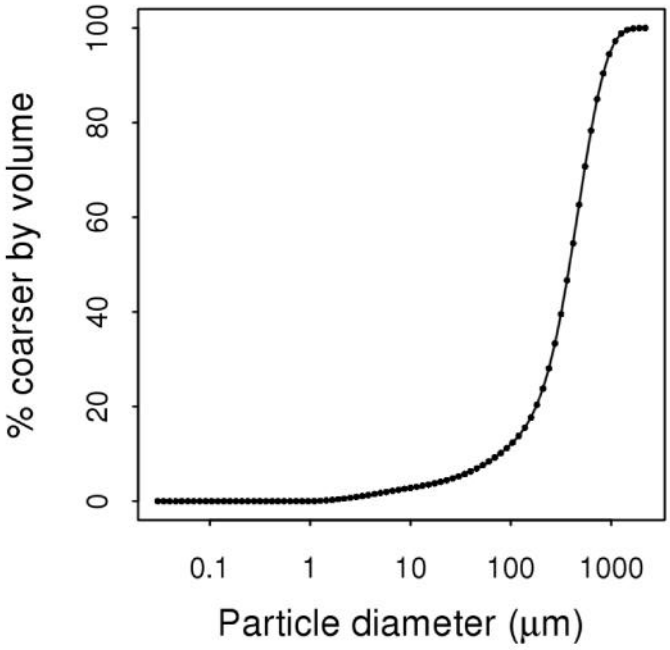
Graphic Mean (µm):	5.57
Standard Deviation (µm):	2.16
Skewness (µm):	-33.11
Kurtosis (µm):	0.3

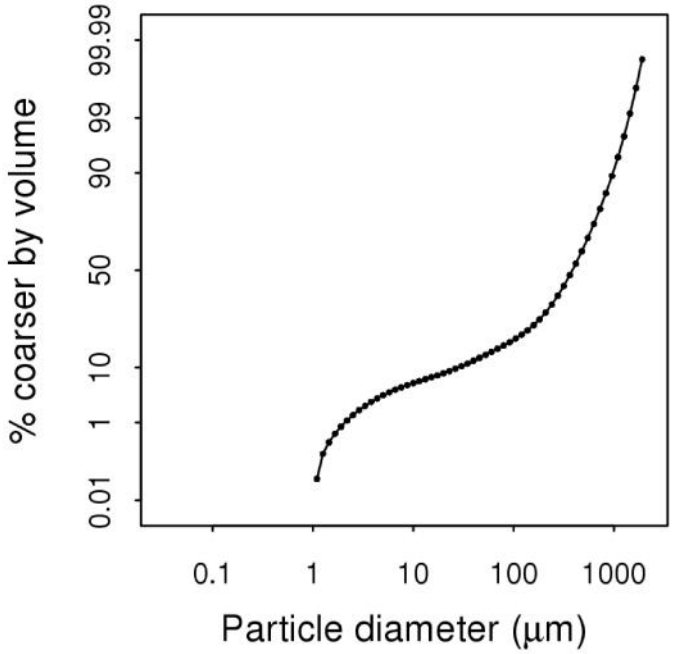
Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %
0.0115	0	0.182	0	2.884	0.19	45.7088	0.64	724.436	6.53
0.0132	0	0.2089	0	3.3113	0.2	52.4807	0.72	831.7638	5.24
0.0151	0	0.2399	0	3.8019	0.21	60.256	0.79	954.9926	3.83
0.0174	0	0.2754	0	4.3652	0.22	69.1831	0.87	1096.4782	2.5
0.02	0	0.3162	0	5.0119	0.23	79.4328	0.97	1258.9254	1.39
0.0229	0	0.3631	0	5.7544	0.23	91.2011	1.08	1445.4398	0.59
0.0263	0	0.4169	0	6.6069	0.23	104.7129	1.23	1659.5869	0.15
0.0302	0	0.4786	0	7.5858	0.23	120.2264	1.44	1905.4607	0.02
0.0347	0	0.5495	0	8.7096	0.23	138.0384	1.74	2187.7616	0
0.0398	0	0.631	0	10	0.23	158.4893	2.17	2511.8864	0
0.0457	0	0.7244	0	11.4815	0.23	181.9701	2.74	2884.0315	0
0.0525	0	0.8318	0	13.1826	0.24	208.9296	3.49	3311.3112	0
0.0603	0	0.955	0	15.1356	0.25	239.8833	4.37	3801.894	0
0.0692	0	1.0965	0.02	17.378	0.27	275.4229	5.38	4365.1583	0
0.0794	0	1.2589	0.08	19.9526	0.3	316.2278	6.39	5011.8723	0
0.0912	0	1.4454	0.09	22.9087	0.34	363.0781	7.31	5754.3994	0
0.1047	0	1.6596	0.11	26.3027	0.39	416.8694	7.98	6606.9345	0
0.1202	0	1.9055	0.13	30.1995	0.44	478.6301	8.29	7585.7758	0
0.138	0	2.1878	0.15	34.6737	0.51	549.5409	8.15	8709.6359	0
0.1585	0	2.5119	0.17	39.8107	0.57	630.9573	7.55	10000	0

Area: Moorebank
Square: TP3

Sample ID: 67.5
Depth: 67.5 cm





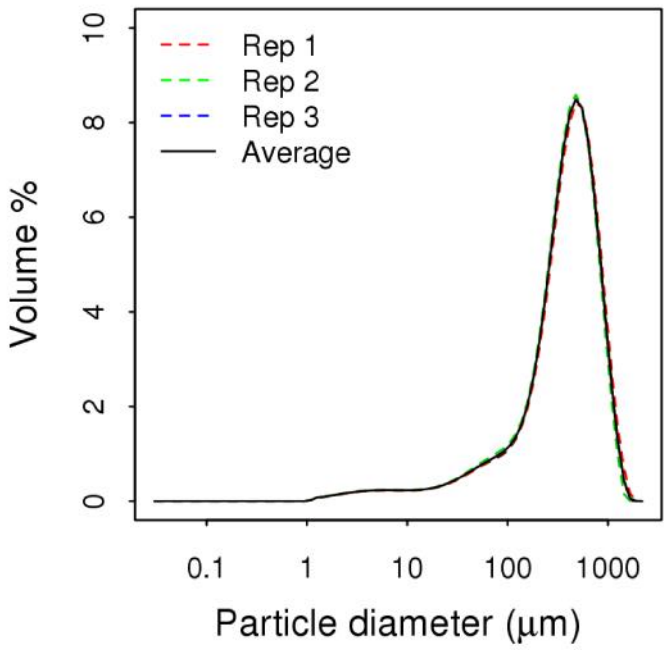


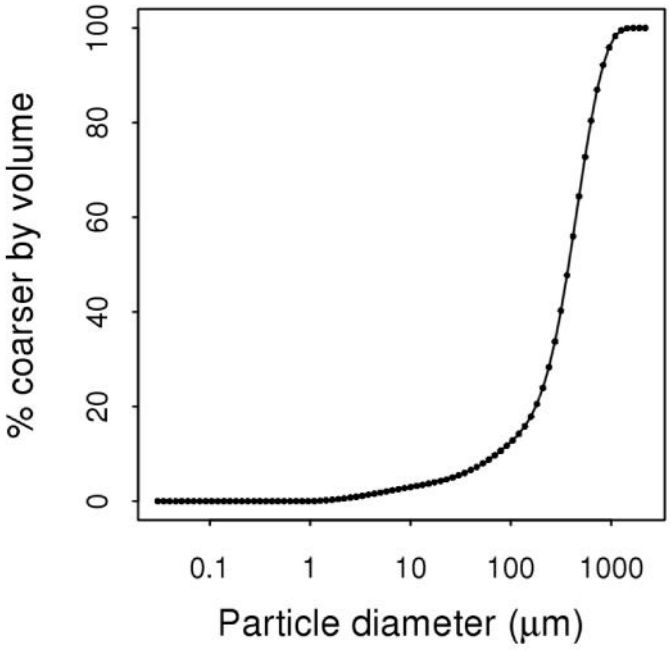
Graphic Mean (µm):	5.54
Standard Deviation (µm):	2.1
Skewness (µm):	-37.07
Kurtosis (µm):	0.42

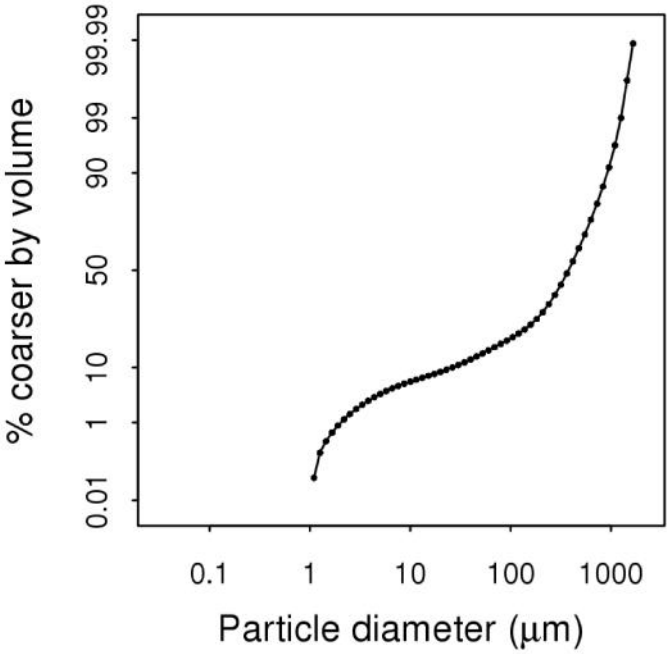
Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %
0.0115	0	0.182	0	2.884	0.18	45.7088	0.63	724.436	6.65
0.0132	0	0.2089	0	3.3113	0.2	52.4807	0.7	831.7638	5.43
0.0151	0	0.2399	0	3.8019	0.21	60.256	0.77	954.9926	4.07
0.0174	0	0.2754	0	4.3652	0.21	69.1831	0.84	1096.4782	2.75
0.02	0	0.3162	0	5.0119	0.22	79.4328	0.93	1258.9254	1.61
0.0229	0	0.3631	0	5.7544	0.22	91.2011	1.04	1445.4398	0.78
0.0263	0	0.4169	0	6.6069	0.22	104.7129	1.2	1659.5869	0.3
0.0302	0	0.4786	0	7.5858	0.22	120.2264	1.41	1905.4607	0.09
0.0347	0	0.5495	0	8.7096	0.22	138.0384	1.71	2187.7616	0.02
0.0398	0	0.631	0	10	0.22	158.4893	2.14	2511.8864	0
0.0457	0	0.7244	0	11.4815	0.22	181.9701	2.7	2884.0315	0
0.0525	0	0.8318	0	13.1826	0.23	208.9296	3.42	3311.3112	0
0.0603	0	0.955	0	15.1356	0.24	239.8833	4.28	3801.894	0
0.0692	0	1.0965	0.02	17.378	0.27	275.4229	5.25	4365.1583	0
0.0794	0	1.2589	0.07	19.9526	0.3	316.2278	6.23	5011.8723	0
0.0912	0	1.4454	0.09	22.9087	0.34	363.0781	7.13	5754.3994	0
0.1047	0	1.6596	0.1	26.3027	0.38	416.8694	7.81	6606.9345	0
0.1202	0	1.9055	0.12	30.1995	0.44	478.6301	8.17	7585.7758	0
0.138	0	2.1878	0.14	34.6737	0.5	549.5409	8.1	8709.6359	0
0.1585	0	2.5119	0.16	39.8107	0.56	630.9573	7.58	10000	0

Area: Moorebank
Square: TP3

Sample ID: 72.5
Depth: 72.5 cm





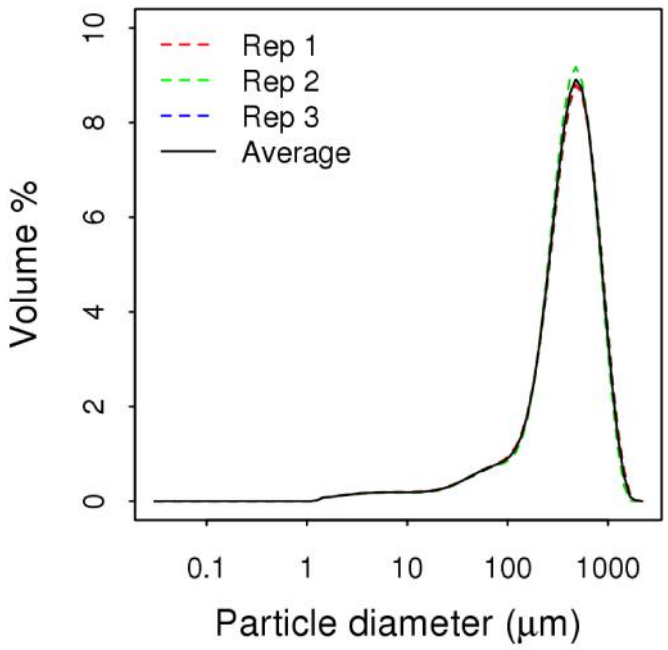


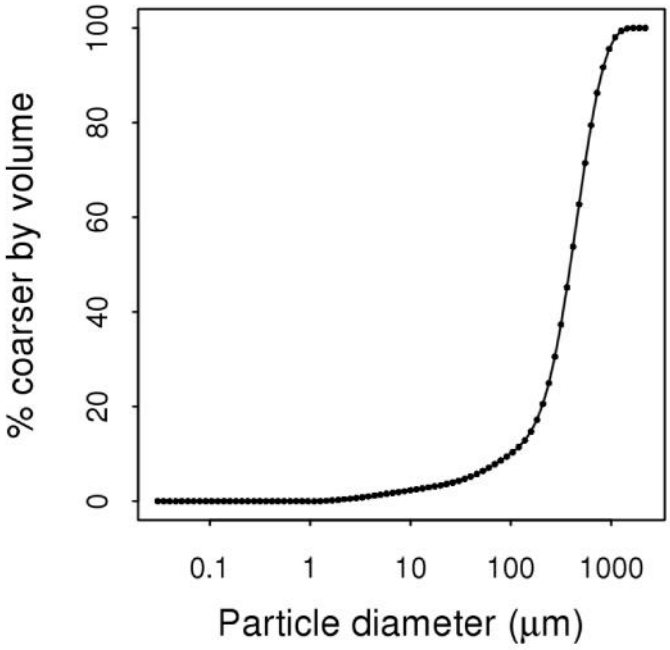
Graphic Mean (µm):	5.15
Standard Deviation (µm):	1.87
Skewness (µm):	-31.91
Kurtosis (µm):	0.33

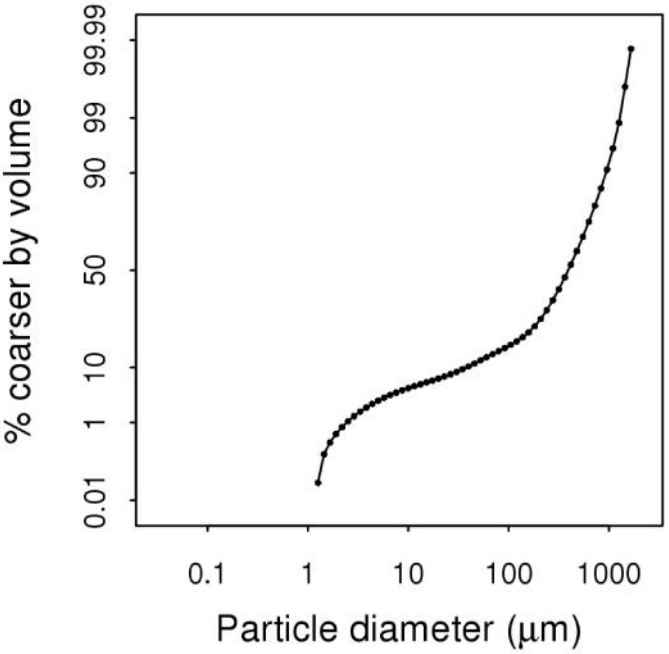
Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %
0.0115	0	0.182	0	2.884	0.19	45.7088	0.67	724.436	6.56
0.0132	0	0.2089	0	3.3113	0.2	52.4807	0.74	831.7638	5.2
0.0151	0	0.2399	0	3.8019	0.22	60.256	0.82	954.9926	3.74
0.0174	0	0.2754	0	4.3652	0.23	69.1831	0.89	1096.4782	2.37
0.02	0	0.3162	0	5.0119	0.23	79.4328	0.96	1258.9254	1.23
0.0229	0	0.3631	0	5.7544	0.23	91.2011	1.05	1445.4398	0.43
0.0263	0	0.4169	0	6.6069	0.23	104.7129	1.17	1659.5869	0.06
0.0302	0	0.4786	0	7.5858	0.23	120.2264	1.35	1905.4607	0.01
0.0347	0	0.5495	0	8.7096	0.23	138.0384	1.62	2187.7616	0
0.0398	0	0.631	0	10	0.23	158.4893	2.05	2511.8864	0
0.0457	0	0.7244	0	11.4815	0.23	181.9701	2.63	2884.0315	0
0.0525	0	0.8318	0	13.1826	0.24	208.9296	3.42	3311.3112	0
0.0603	0	0.955	0	15.1356	0.25	239.8833	4.36	3801.894	0
0.0692	0	1.0965	0.02	17.378	0.27	275.4229	5.44	4365.1583	0
0.0794	0	1.2589	0.08	19.9526	0.3	316.2278	6.52	5011.8723	0
0.0912	0	1.4454	0.09	22.9087	0.34	363.0781	7.49	5754.3994	0
0.1047	0	1.6596	0.11	26.3027	0.39	416.8694	8.19	6606.9345	0
0.1202	0	1.9055	0.13	30.1995	0.45	478.6301	8.49	7585.7758	0
0.138	0	2.1878	0.15	34.6737	0.52	549.5409	8.32	8709.6359	0
0.1585	0	2.5119	0.17	39.8107	0.59	630.9573	7.65	10000	0

Area: Moorebank
Square: TP3

Sample ID: 77.5
Depth: 77.5 cm





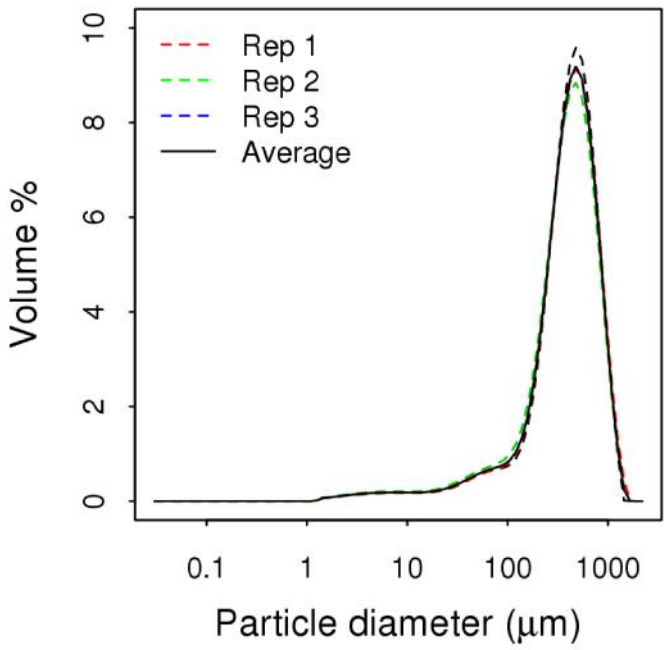


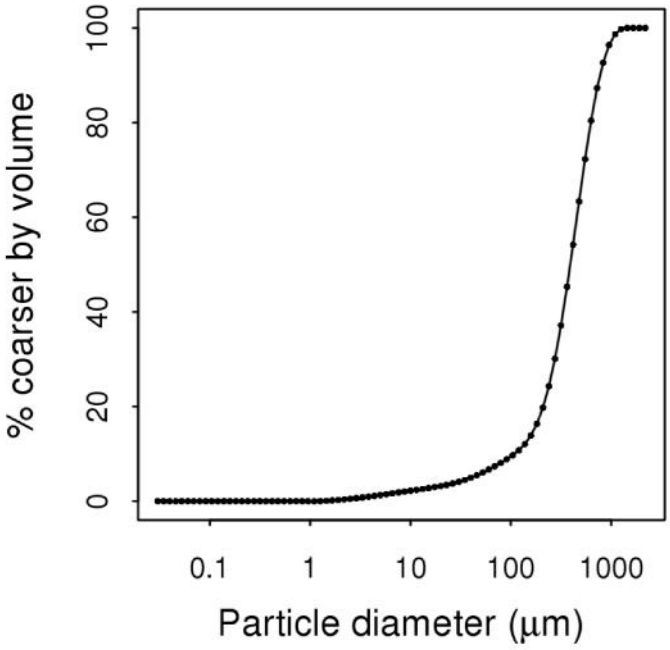
Graphic Mean (µm):	5.58
Standard Deviation (µm):	2.23
Skewness (µm):	-34.43
Kurtosis (µm):	0.3

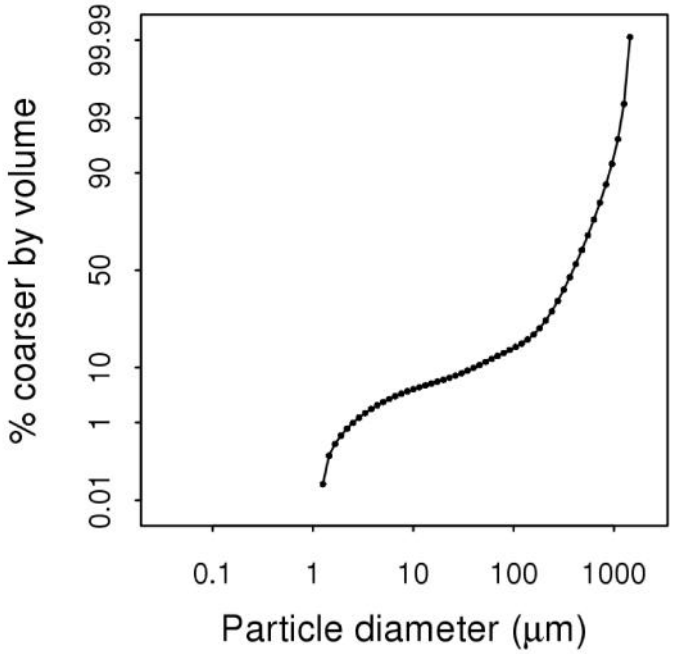
Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %
0.0115	0	0.182	0	2.884	0.15	45.7088	0.56	724.436	6.83
0.0132	0	0.2089	0	3.3113	0.16	52.4807	0.62	831.7638	5.4
0.0151	0	0.2399	0	3.8019	0.17	60.256	0.68	954.9926	3.89
0.0174	0	0.2754	0	4.3652	0.18	69.1831	0.73	1096.4782	2.48
0.02	0	0.3162	0	5.0119	0.18	79.4328	0.78	1258.9254	1.33
0.0229	0	0.3631	0	5.7544	0.19	91.2011	0.84	1445.4398	0.54
0.0263	0	0.4169	0	6.6069	0.19	104.7129	0.94	1659.5869	0.09
0.0302	0	0.4786	0	7.5858	0.19	120.2264	1.11	1905.4607	0.01
0.0347	0	0.5495	0	8.7096	0.19	138.0384	1.39	2187.7616	0
0.0398	0	0.631	0	10	0.19	158.4893	1.84	2511.8864	0
0.0457	0	0.7244	0	11.4815	0.19	181.9701	2.48	2884.0315	0
0.0525	0	0.8318	0	13.1826	0.19	208.9296	3.36	3311.3112	0
0.0603	0	0.955	0	15.1356	0.2	239.8833	4.41	3801.894	0
0.0692	0	1.0965	0	17.378	0.22	275.4229	5.6	4365.1583	0
0.0794	0	1.2589	0.02	19.9526	0.24	316.2278	6.79	5011.8723	0
0.0912	0	1.4454	0.08	22.9087	0.27	363.0781	7.85	5754.3994	0
0.1047	0	1.6596	0.09	26.3027	0.31	416.8694	8.6	6606.9345	0
0.1202	0	1.9055	0.1	30.1995	0.36	478.6301	8.92	7585.7758	0
0.138	0	2.1878	0.12	34.6737	0.42	549.5409	8.71	8709.6359	0
0.1585	0	2.5119	0.13	39.8107	0.49	630.9573	7.99	10000	0

Area: Moorebank
Square: TP3

Sample ID: 82.5
Depth: 82.5 cm





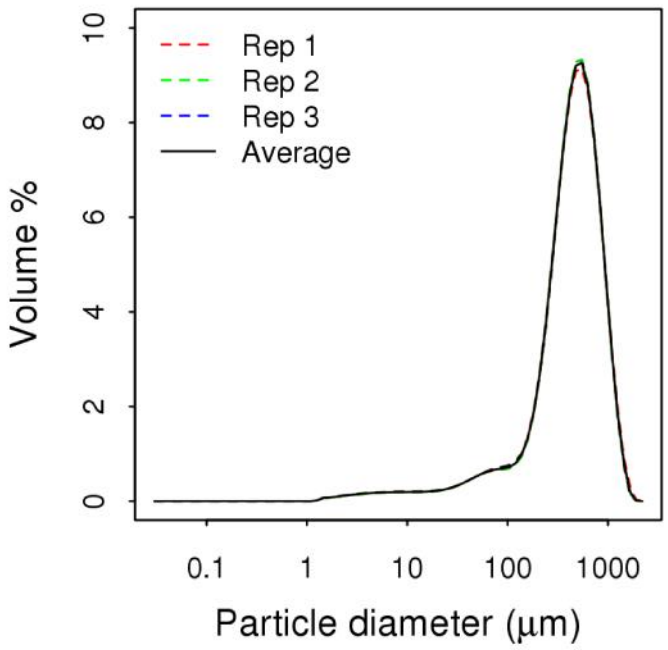


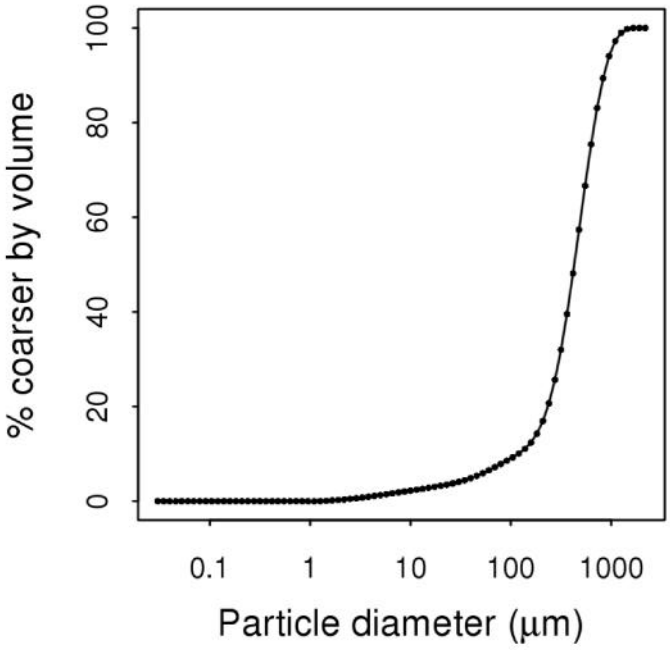
Graphic Mean (µm):	5.47
Standard Deviation (µm):	2.13
Skewness (µm):	-32.62
Kurtosis (µm):	0.32

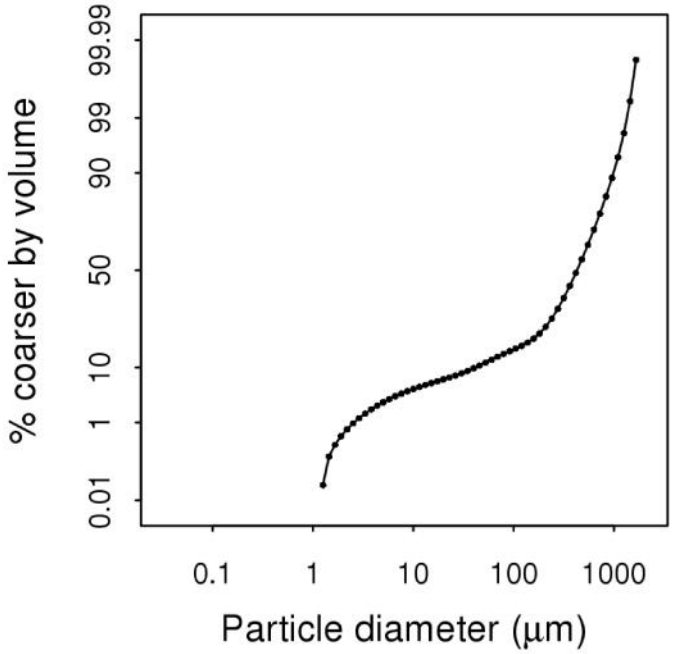
Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %
0.0115	0	0.182	0	2.884	0.14	45.7088	0.53	724.436	6.88
0.0132	0	0.2089	0	3.3113	0.15	52.4807	0.59	831.7638	5.35
0.0151	0	0.2399	0	3.8019	0.16	60.256	0.64	954.9926	3.75
0.0174	0	0.2754	0	4.3652	0.17	69.1831	0.68	1096.4782	2.28
0.02	0	0.3162	0	5.0119	0.18	79.4328	0.72	1258.9254	1.08
0.0229	0	0.3631	0	5.7544	0.18	91.2011	0.77	1445.4398	0.24
0.0263	0	0.4169	0	6.6069	0.18	104.7129	0.86	1659.5869	0
0.0302	0	0.4786	0	7.5858	0.19	120.2264	1.03	1905.4607	0
0.0347	0	0.5495	0	8.7096	0.18	138.0384	1.32	2187.7616	0
0.0398	0	0.631	0	10	0.18	158.4893	1.8	2511.8864	0
0.0457	0	0.7244	0	11.4815	0.18	181.9701	2.49	2884.0315	0
0.0525	0	0.8318	0	13.1826	0.19	208.9296	3.42	3311.3112	0
0.0603	0	0.955	0	15.1356	0.19	239.8833	4.53	3801.894	0
0.0692	0	1.0965	0	17.378	0.2	275.4229	5.79	4365.1583	0
0.0794	0	1.2589	0.01	19.9526	0.22	316.2278	7.04	5011.8723	0
0.0912	0	1.4454	0.07	22.9087	0.25	363.0781	8.14	5754.3994	0
0.1047	0	1.6596	0.08	26.3027	0.29	416.8694	8.9	6606.9345	0
0.1202	0	1.9055	0.1	30.1995	0.34	478.6301	9.19	7585.7758	0
0.138	0	2.1878	0.11	34.6737	0.4	549.5409	8.93	8709.6359	0
0.1585	0	2.5119	0.13	39.8107	0.46	630.9573	8.13	10000	0

Area: Moorebank
Square: TP3

Sample ID: 87.5
Depth: 87.5 cm





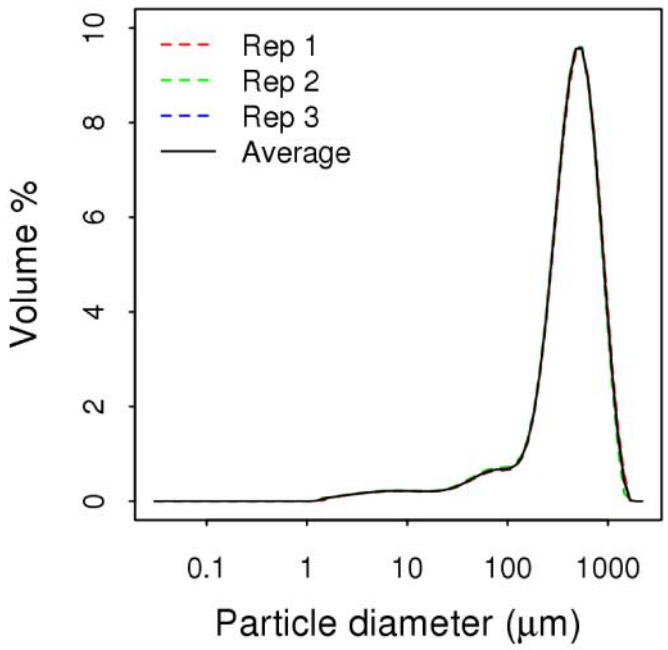


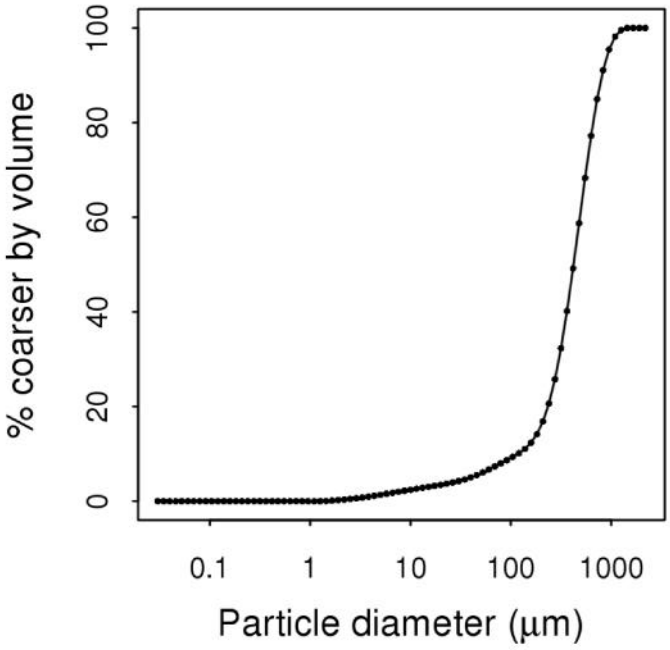
Graphic Mean (µm):	5.23
Standard Deviation (µm):	2.02
Skewness (µm):	-34.4
Kurtosis (µm):	0.3

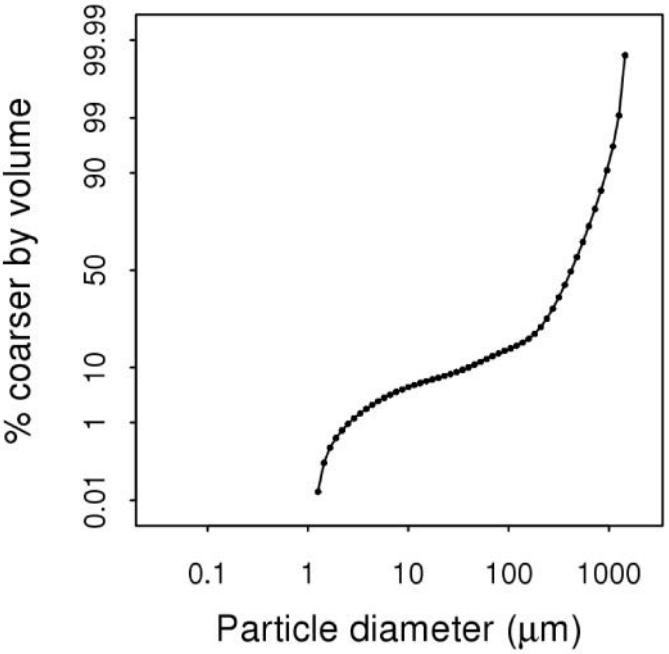
Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %
0.0115	0	0.182	0	2.884	0.14	45.7088	0.49	724.436	7.71
0.0132	0	0.2089	0	3.3113	0.15	52.4807	0.56	831.7638	6.29
0.0151	0	0.2399	0	3.8019	0.16	60.256	0.61	954.9926	4.69
0.0174	0	0.2754	0	4.3652	0.17	69.1831	0.65	1096.4782	3.13
0.02	0	0.3162	0	5.0119	0.18	79.4328	0.68	1258.9254	1.78
0.0229	0	0.3631	0	5.7544	0.19	91.2011	0.69	1445.4398	0.81
0.0263	0	0.4169	0	6.6069	0.19	104.7129	0.72	1659.5869	0.19
0.0302	0	0.4786	0	7.5858	0.19	120.2264	0.8	1905.4607	0.02
0.0347	0	0.5495	0	8.7096	0.19	138.0384	0.98	2187.7616	0
0.0398	0	0.631	0	10	0.19	158.4893	1.33	2511.8864	0
0.0457	0	0.7244	0	11.4815	0.19	181.9701	1.88	2884.0315	0
0.0525	0	0.8318	0	13.1826	0.2	208.9296	2.69	3311.3112	0
0.0603	0	0.955	0	15.1356	0.2	239.8833	3.73	3801.894	0
0.0692	0	1.0965	0	17.378	0.21	275.4229	4.99	4365.1583	0
0.0794	0	1.2589	0.01	19.9526	0.22	316.2278	6.31	5011.8723	0
0.0912	0	1.4454	0.07	22.9087	0.24	363.0781	7.59	5754.3994	0
0.1047	0	1.6596	0.08	26.3027	0.27	416.8694	8.6	6606.9345	0
0.1202	0	1.9055	0.09	30.1995	0.31	478.6301	9.2	7585.7758	0
0.138	0	2.1878	0.11	34.6737	0.37	549.5409	9.26	8709.6359	0
0.1585	0	2.5119	0.12	39.8107	0.43	630.9573	8.75	10000	0

Area: Moorebank
Square: TP3

Sample ID: 92.5
Depth: 92.5 cm





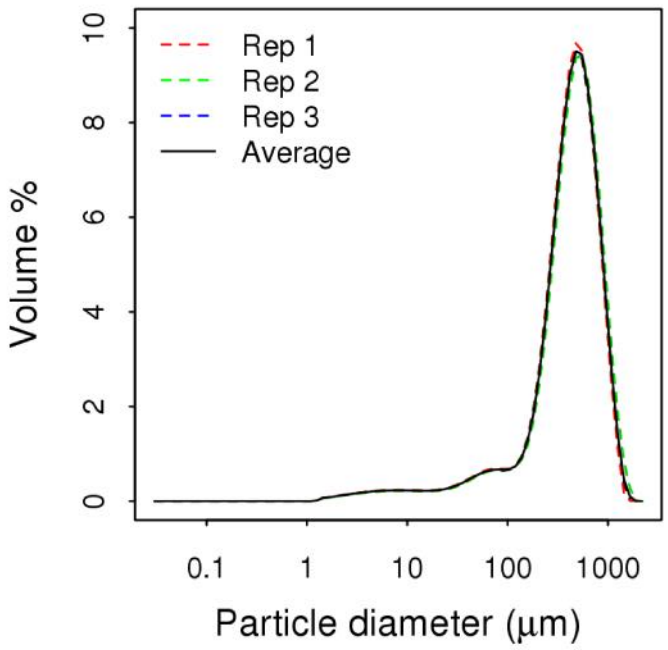


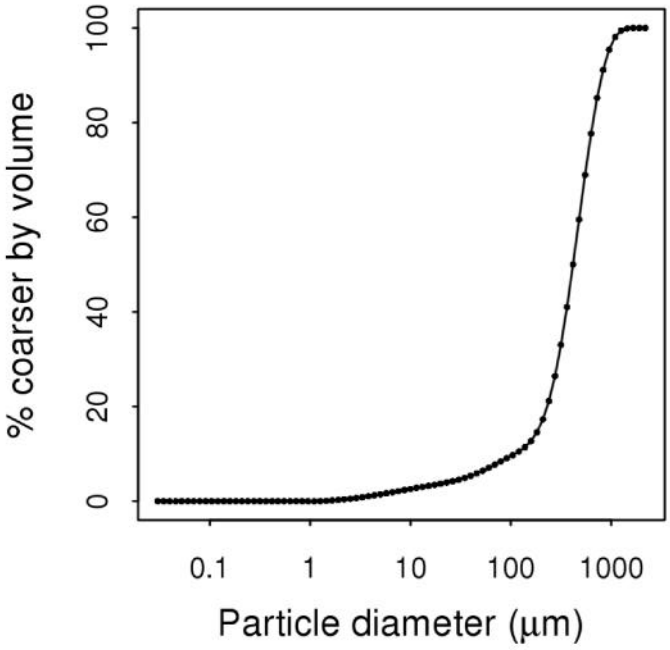
Graphic Mean (µm):	5.2
Standard Deviation (µm):	1.9
Skewness (µm):	-33.51
Kurtosis (µm):	0.32

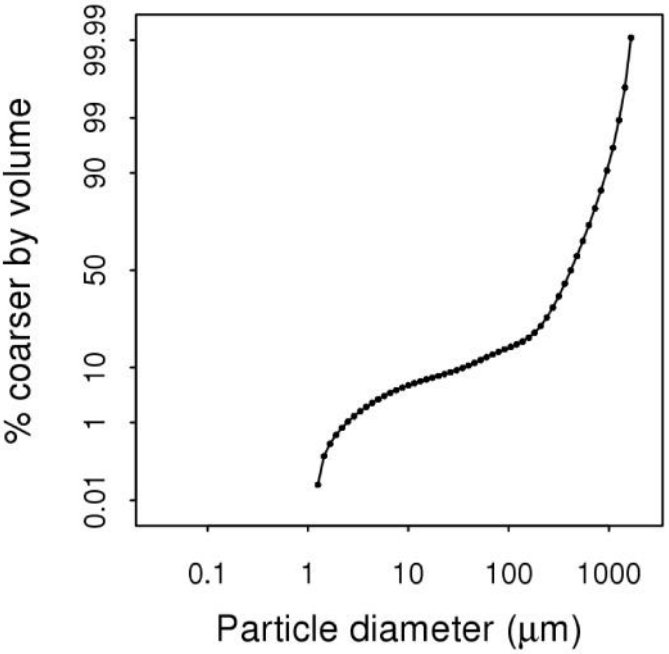
Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %
0.0115	0	0.182	0	2.884	0.15	45.7088	0.49	724.436	7.72
0.0132	0	0.2089	0	3.3113	0.16	52.4807	0.56	831.7638	6.13
0.0151	0	0.2399	0	3.8019	0.18	60.256	0.61	954.9926	4.38
0.0174	0	0.2754	0	4.3652	0.19	69.1831	0.65	1096.4782	2.73
0.02	0	0.3162	0	5.0119	0.2	79.4328	0.67	1258.9254	1.37
0.0229	0	0.3631	0	5.7544	0.21	91.2011	0.68	1445.4398	0.43
0.0263	0	0.4169	0	6.6069	0.21	104.7129	0.69	1659.5869	0.01
0.0302	0	0.4786	0	7.5858	0.22	120.2264	0.76	1905.4607	0
0.0347	0	0.5495	0	8.7096	0.22	138.0384	0.93	2187.7616	0
0.0398	0	0.631	0	10	0.21	158.4893	1.27	2511.8864	0
0.0457	0	0.7244	0	11.4815	0.21	181.9701	1.84	2884.0315	0
0.0525	0	0.8318	0	13.1826	0.21	208.9296	2.69	3311.3112	0
0.0603	0	0.955	0	15.1356	0.21	239.8833	3.79	3801.894	0
0.0692	0	1.0965	0	17.378	0.21	275.4229	5.13	4365.1583	0
0.0794	0	1.2589	0.01	19.9526	0.21	316.2278	6.54	5011.8723	0
0.0912	0	1.4454	0.05	22.9087	0.23	363.0781	7.9	5754.3994	0
0.1047	0	1.6596	0.08	26.3027	0.26	416.8694	8.96	6606.9345	0
0.1202	0	1.9055	0.09	30.1995	0.3	478.6301	9.56	7585.7758	0
0.138	0	2.1878	0.11	34.6737	0.35	549.5409	9.56	8709.6359	0
0.1585	0	2.5119	0.13	39.8107	0.42	630.9573	8.92	10000	0

Area: Moorebank
Square: TP3

Sample ID: 97.5
Depth: 97.5 cm





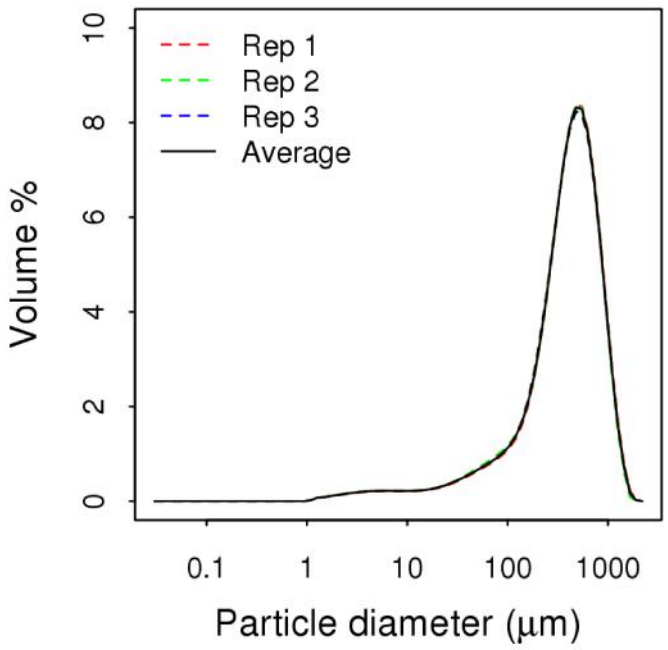


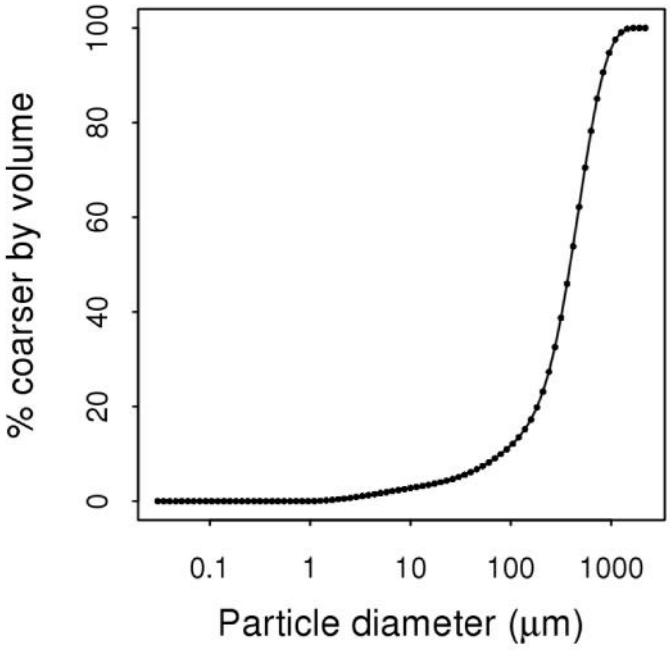
Graphic Mean (µm):	5.62
Standard Deviation (µm):	2.31
Skewness (µm):	-38.27
Kurtosis (µm):	0.41

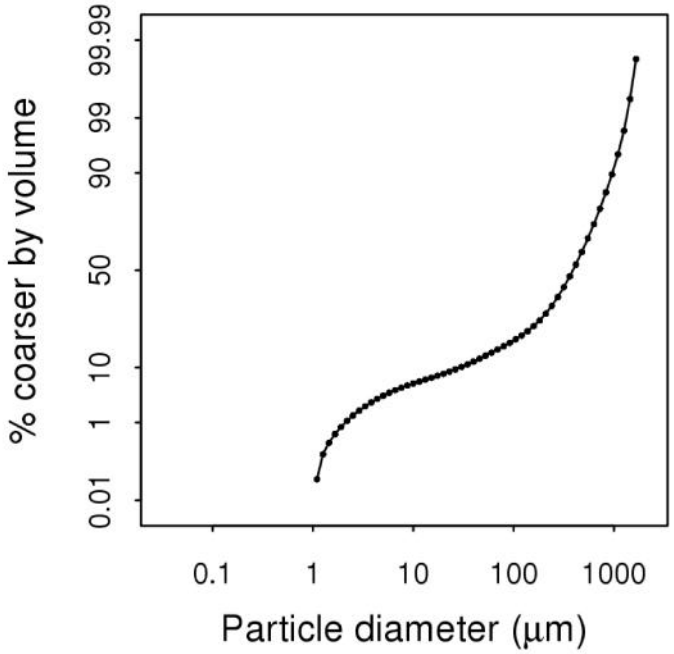
Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %
0.0115	0	0.182	0	2.884	0.16	45.7088	0.51	724.436	7.52
0.0132	0	0.2089	0	3.3113	0.17	52.4807	0.58	831.7638	5.95
0.0151	0	0.2399	0	3.8019	0.19	60.256	0.63	954.9926	4.25
0.0174	0	0.2754	0	4.3652	0.2	69.1831	0.66	1096.4782	2.66
0.02	0	0.3162	0	5.0119	0.21	79.4328	0.67	1258.9254	1.37
0.0229	0	0.3631	0	5.7544	0.22	91.2011	0.67	1445.4398	0.46
0.0263	0	0.4169	0	6.6069	0.23	104.7129	0.68	1659.5869	0.1
0.0302	0	0.4786	0	7.5858	0.23	120.2264	0.74	1905.4607	0
0.0347	0	0.5495	0	8.7096	0.23	138.0384	0.92	2187.7616	0
0.0398	0	0.631	0	10	0.23	158.4893	1.28	2511.8864	0
0.0457	0	0.7244	0	11.4815	0.22	181.9701	1.87	2884.0315	0
0.0525	0	0.8318	0	13.1826	0.22	208.9296	2.75	3311.3112	0
0.0603	0	0.955	0	15.1356	0.22	239.8833	3.88	3801.894	0
0.0692	0	1.0965	0	17.378	0.22	275.4229	5.23	4365.1583	0
0.0794	0	1.2589	0.01	19.9526	0.23	316.2278	6.65	5011.8723	0
0.0912	0	1.4454	0.07	22.9087	0.25	363.0781	7.97	5754.3994	0
0.1047	0	1.6596	0.08	26.3027	0.28	416.8694	8.98	6606.9345	0
0.1202	0	1.9055	0.1	30.1995	0.32	478.6301	9.51	7585.7758	0
0.138	0	2.1878	0.12	34.6737	0.38	549.5409	9.44	8709.6359	0
0.1585	0	2.5119	0.14	39.8107	0.44	630.9573	8.74	10000	0

Area: Moorebank
Square: TP3

Sample ID: 102.5
Depth: 102.5 cm





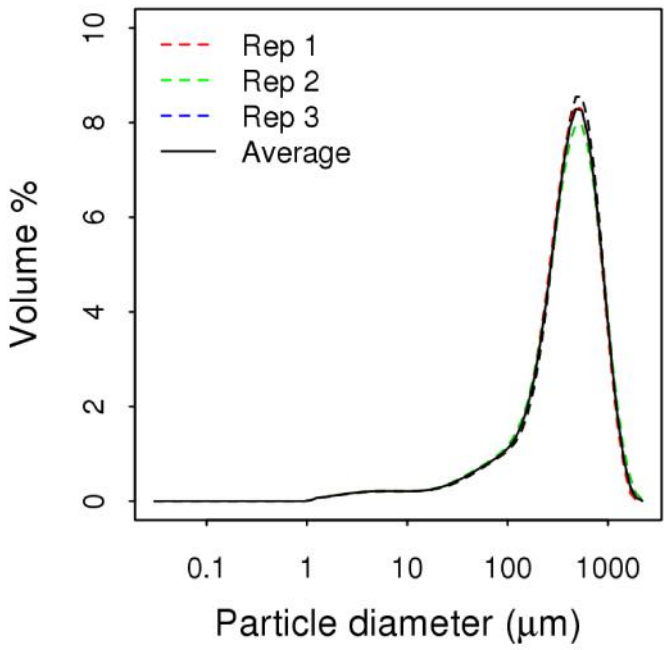


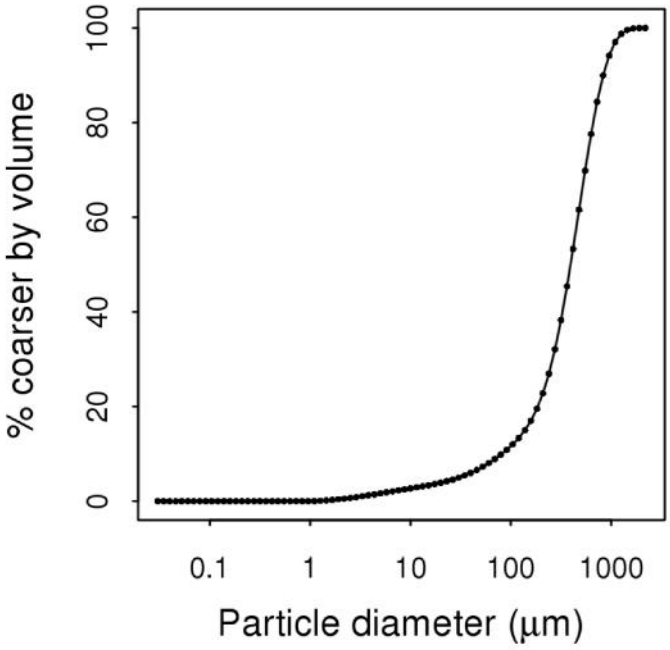
Graphic Mean (µm):	5.56
Standard Deviation (µm):	2.12
Skewness (µm):	-33.63
Kurtosis (µm):	0.3

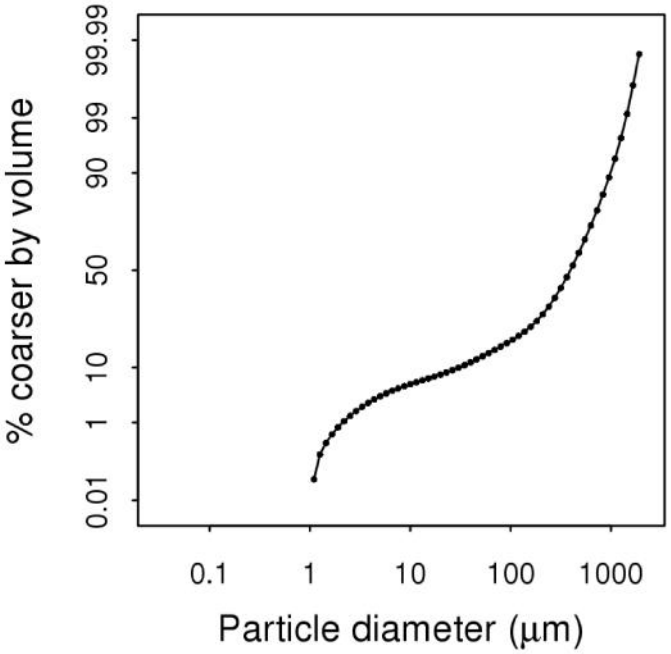
Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %
0.0115	0	0.182	0	2.884	0.18	45.7088	0.61	724.436	6.82
0.0132	0	0.2089	0	3.3113	0.19	52.4807	0.68	831.7638	5.56
0.0151	0	0.2399	0	3.8019	0.2	60.256	0.76	954.9926	4.14
0.0174	0	0.2754	0	4.3652	0.21	69.1831	0.84	1096.4782	2.76
0.02	0	0.3162	0	5.0119	0.22	79.4328	0.93	1258.9254	1.58
0.0229	0	0.3631	0	5.7544	0.22	91.2011	1.03	1445.4398	0.73
0.0263	0	0.4169	0	6.6069	0.22	104.7129	1.17	1659.5869	0.17
0.0302	0	0.4786	0	7.5858	0.22	120.2264	1.37	1905.4607	0.02
0.0347	0	0.5495	0	8.7096	0.21	138.0384	1.65	2187.7616	0
0.0398	0	0.631	0	10	0.21	158.4893	2.05	2511.8864	0
0.0457	0	0.7244	0	11.4815	0.22	181.9701	2.6	2884.0315	0
0.0525	0	0.8318	0	13.1826	0.22	208.9296	3.32	3311.3112	0
0.0603	0	0.955	0	15.1356	0.24	239.8833	4.19	3801.894	0
0.0692	0	1.0965	0.02	17.378	0.26	275.4229	5.19	4365.1583	0
0.0794	0	1.2589	0.07	19.9526	0.28	316.2278	6.22	5011.8723	0
0.0912	0	1.4454	0.08	22.9087	0.32	363.0781	7.18	5754.3994	0
0.1047	0	1.6596	0.1	26.3027	0.37	416.8694	7.92	6606.9345	0
0.1202	0	1.9055	0.12	30.1995	0.42	478.6301	8.32	7585.7758	0
0.138	0	2.1878	0.14	34.6737	0.48	549.5409	8.28	8709.6359	0
0.1585	0	2.5119	0.16	39.8107	0.54	630.9573	7.77	10000	0

Area: Moorebank
Square: TP3

Sample ID: 107.5
Depth: 107.5 cm

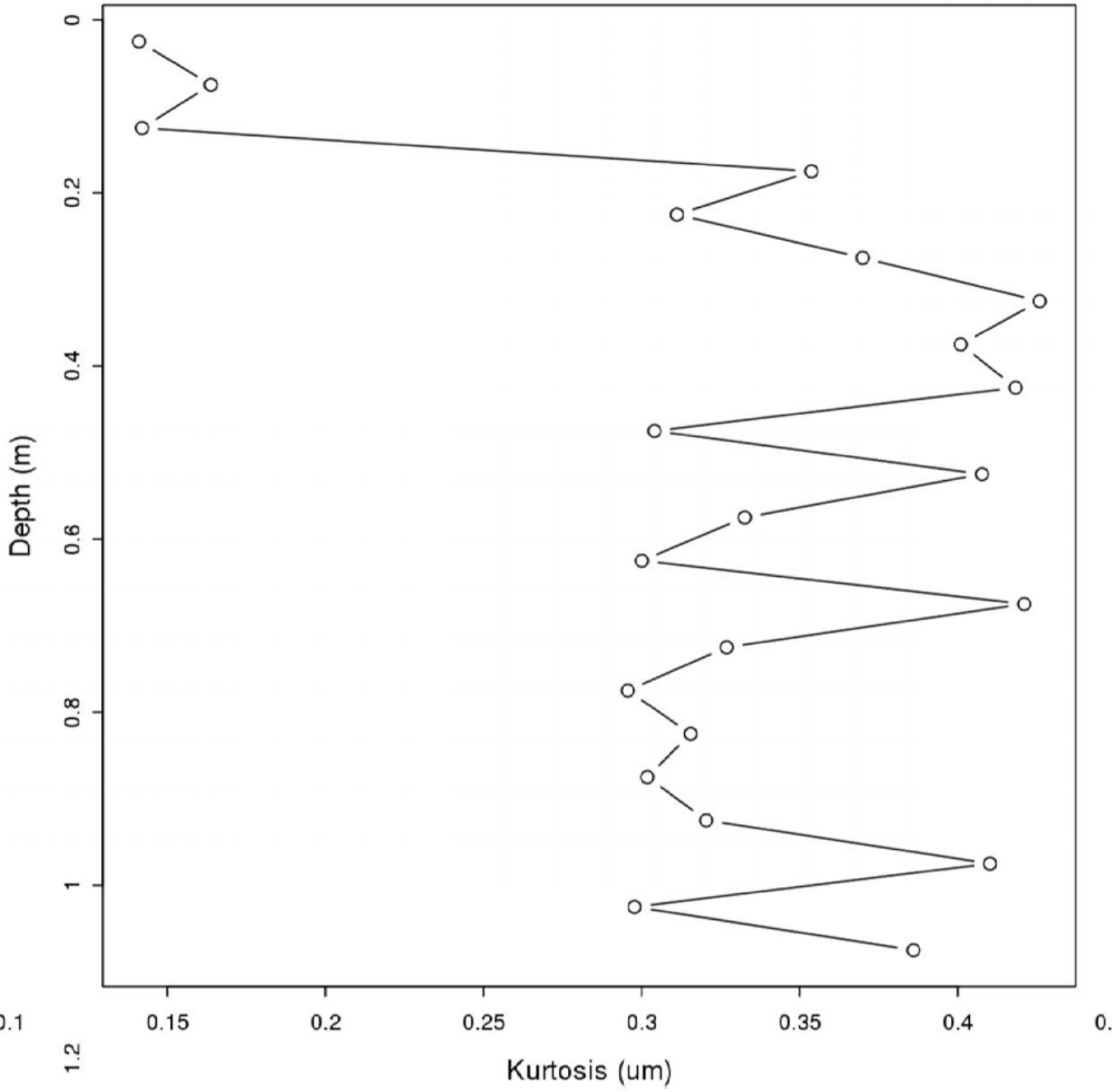






Graphic Mean (µm):	4.79
Standard Deviation (µm):	1.85
Skewness (µm):	-25.93
Kurtosis (µm):	0.39

Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %	Size (mm)	Volume %
0.0115	0	0.182	0	2.884	0.17	45.7088	0.62	724.436	6.81
0.0132	0	0.2089	0	3.3113	0.19	52.4807	0.69	831.7638	5.57
0.0151	0	0.2399	0	3.8019	0.2	60.256	0.77	954.9926	4.2
0.0174	0	0.2754	0	4.3652	0.2	69.1831	0.85	1096.4782	2.86
0.02	0	0.3162	0	5.0119	0.21	79.4328	0.93	1258.9254	1.71
0.0229	0	0.3631	0	5.7544	0.21	91.2011	1.03	1445.4398	0.86
0.0263	0	0.4169	0	6.6069	0.21	104.7129	1.16	1659.5869	0.32
0.0302	0	0.4786	0	7.5858	0.21	120.2264	1.34	1905.4607	0.08
0.0347	0	0.5495	0	8.7096	0.21	138.0384	1.61	2187.7616	0.01
0.0398	0	0.631	0	10	0.21	158.4893	2	2511.8864	0
0.0457	0	0.7244	0	11.4815	0.21	181.9701	2.54	2884.0315	0
0.0525	0	0.8318	0	13.1826	0.22	208.9296	3.27	3311.3112	0
0.0603	0	0.955	0	15.1356	0.23	239.8833	4.14	3801.894	0
0.0692	0	1.0965	0.02	17.378	0.25	275.4229	5.15	4365.1583	0
0.0794	0	1.2589	0.07	19.9526	0.28	316.2278	6.18	5011.8723	0
0.0912	0	1.4454	0.08	22.9087	0.31	363.0781	7.15	5754.3994	0
0.1047	0	1.6596	0.1	26.3027	0.36	416.8694	7.89	6606.9345	0
0.1202	0	1.9055	0.12	30.1995	0.41	478.6301	8.29	7585.7758	0
0.138	0	2.1878	0.14	34.6737	0.48	549.5409	8.25	8709.6359	0
0.1585	0	2.5119	0.16	39.8107	0.54	630.9573	7.74	10000	0


Depth (m)
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0.2
0.4
0.6
0.8
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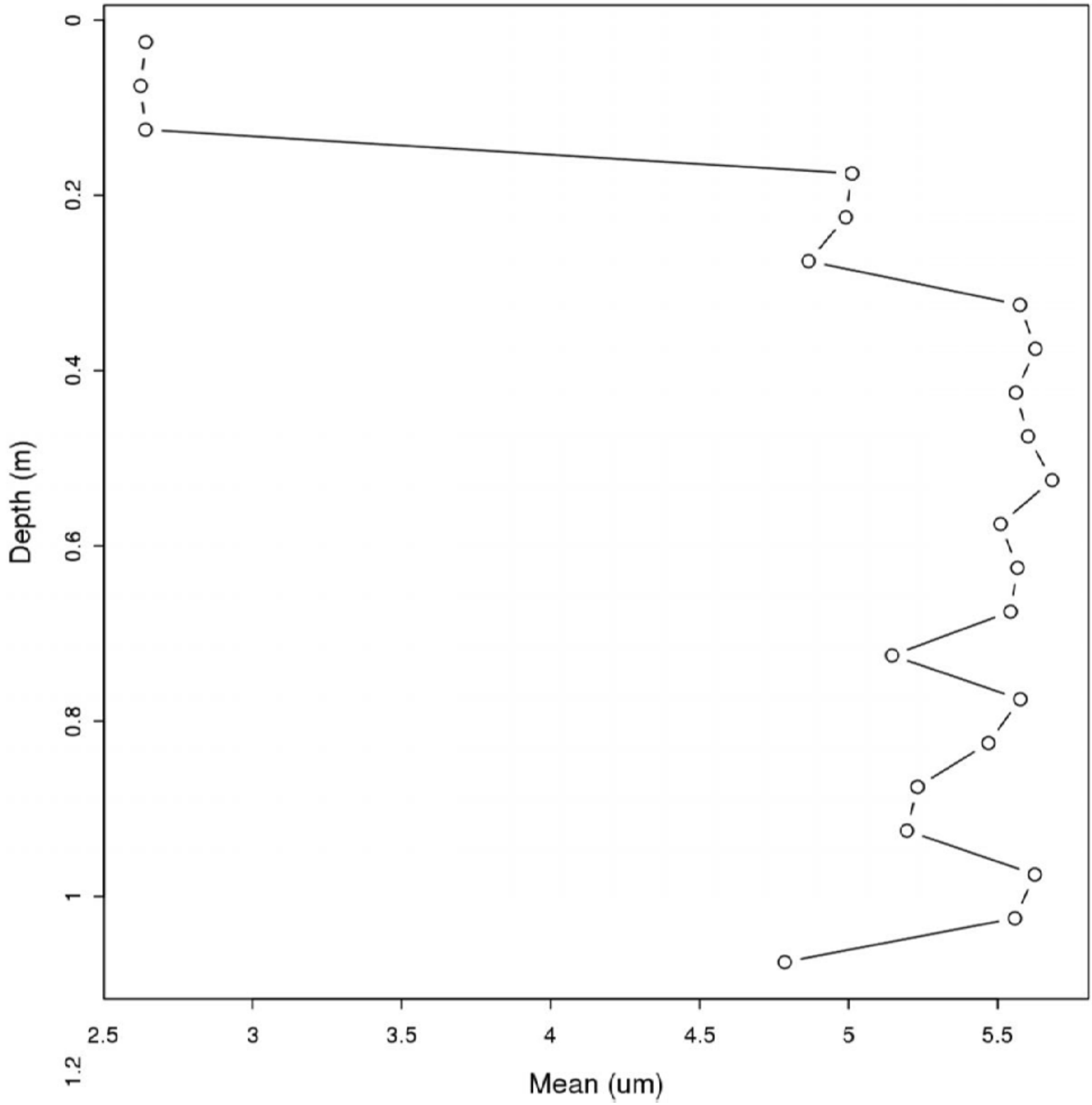
1.2
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Kurtosis (um)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0.8
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1.2
2.5
3
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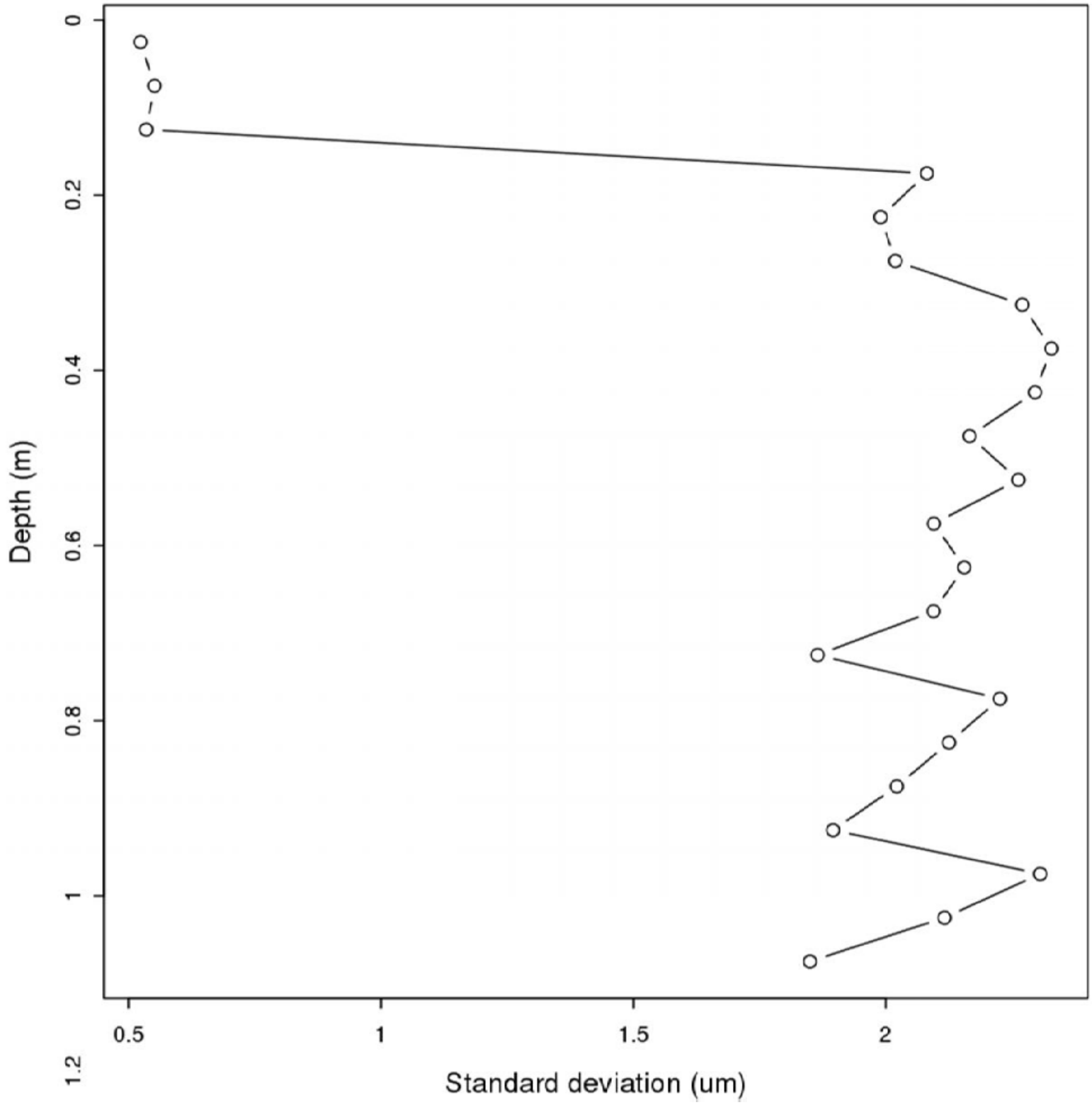
4
4.5
5
5.5
Mean (um)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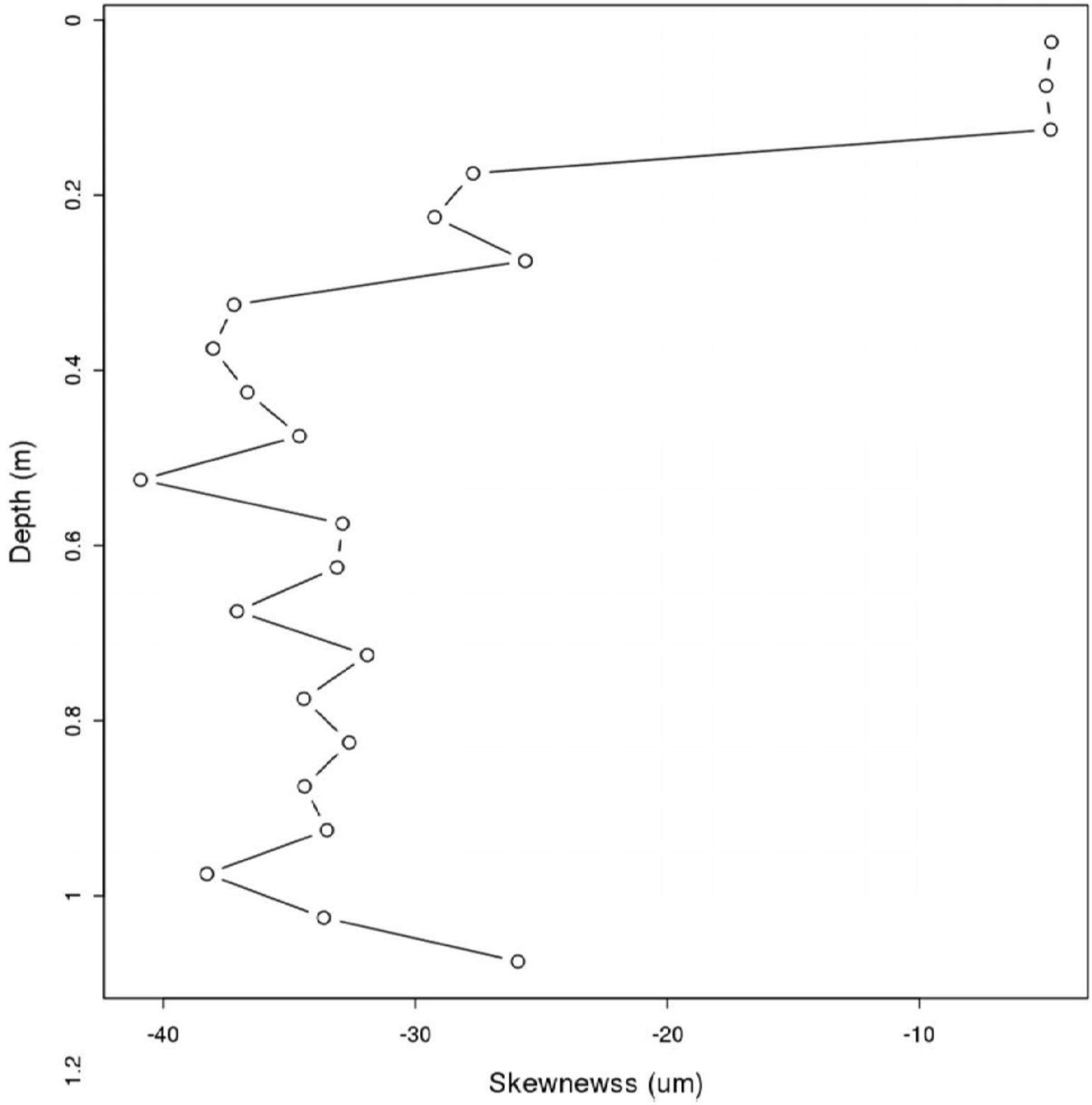
Standard deviation (um)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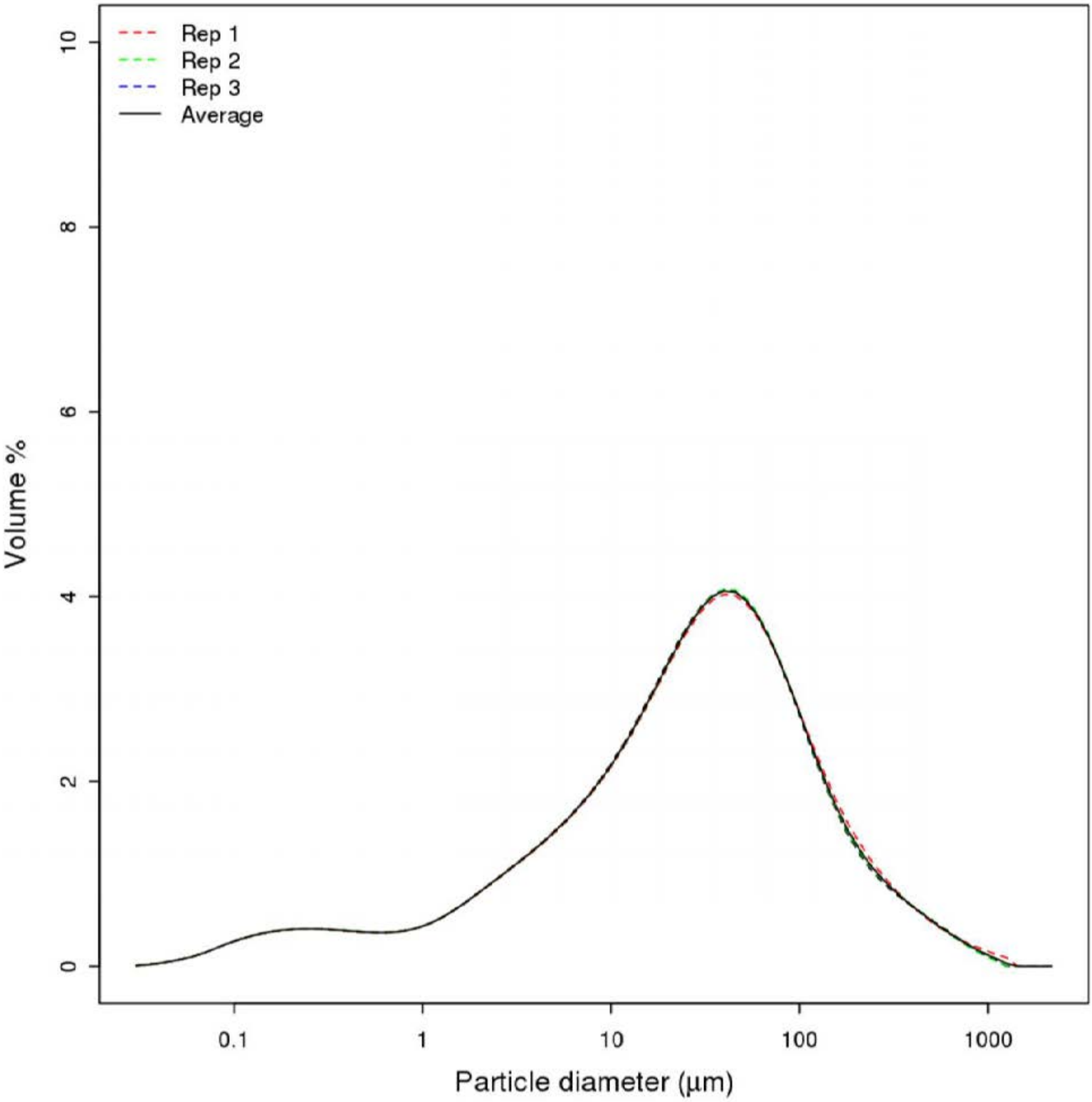
-10
Skewnewss (um)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Rep 2
Rep 3
Average
Volume %
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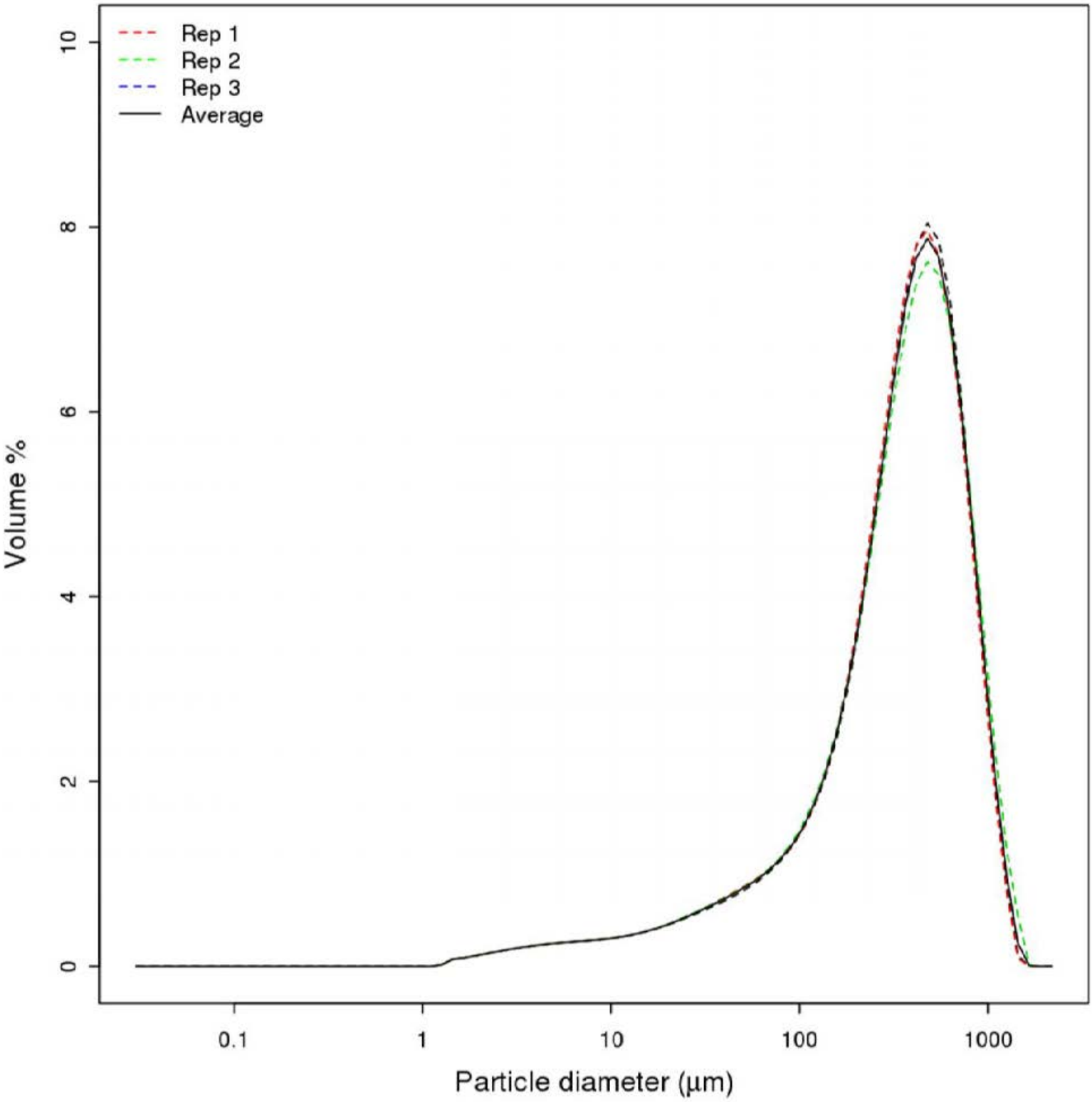
2
4
6
8
10
0.1
1
10
100
1000
Particle diameter (µm)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Rep 2
Rep 3
Average
Volume %
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0.1
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100
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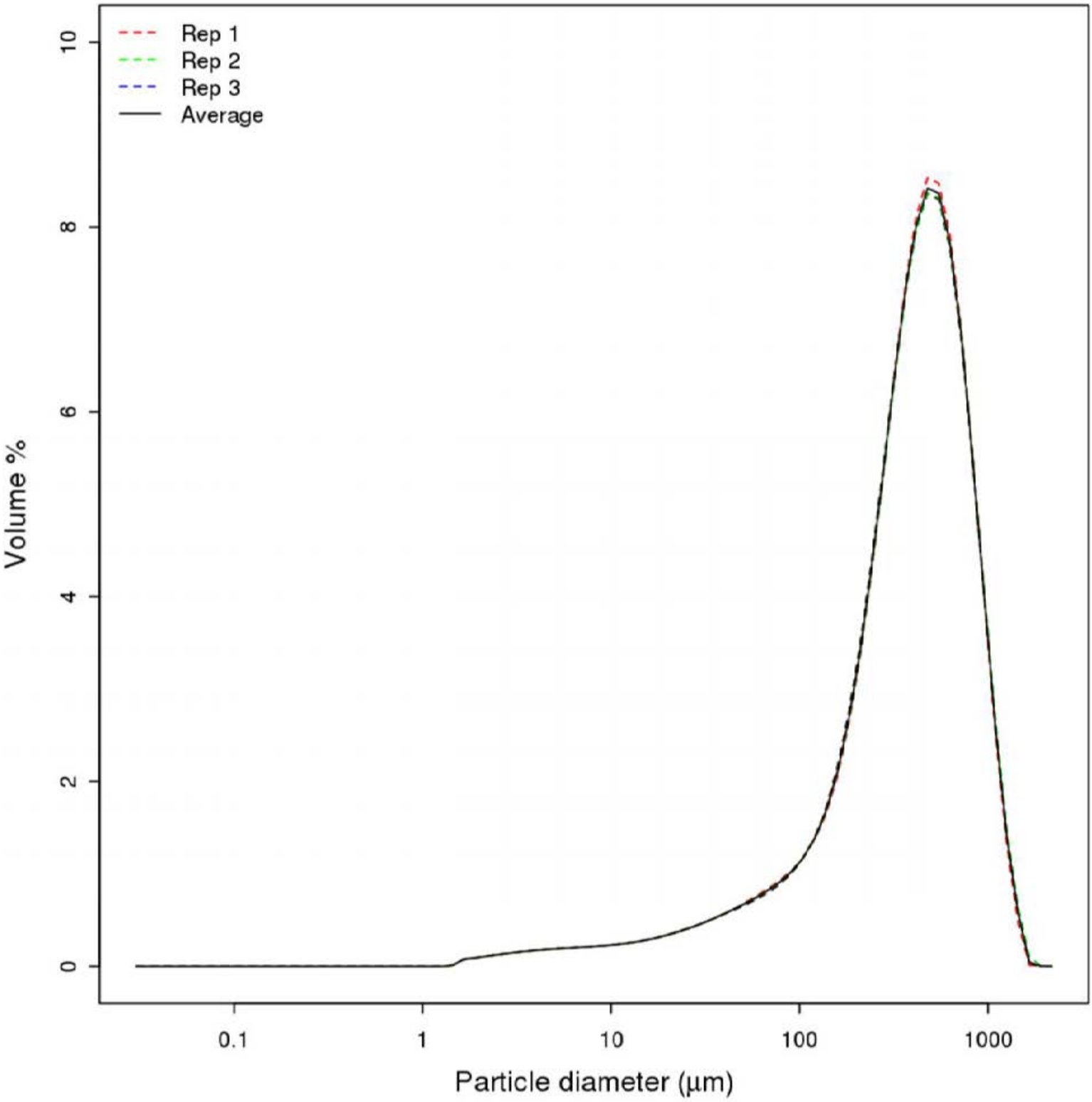
Particle diameter (µm)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Average
Volume %
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8
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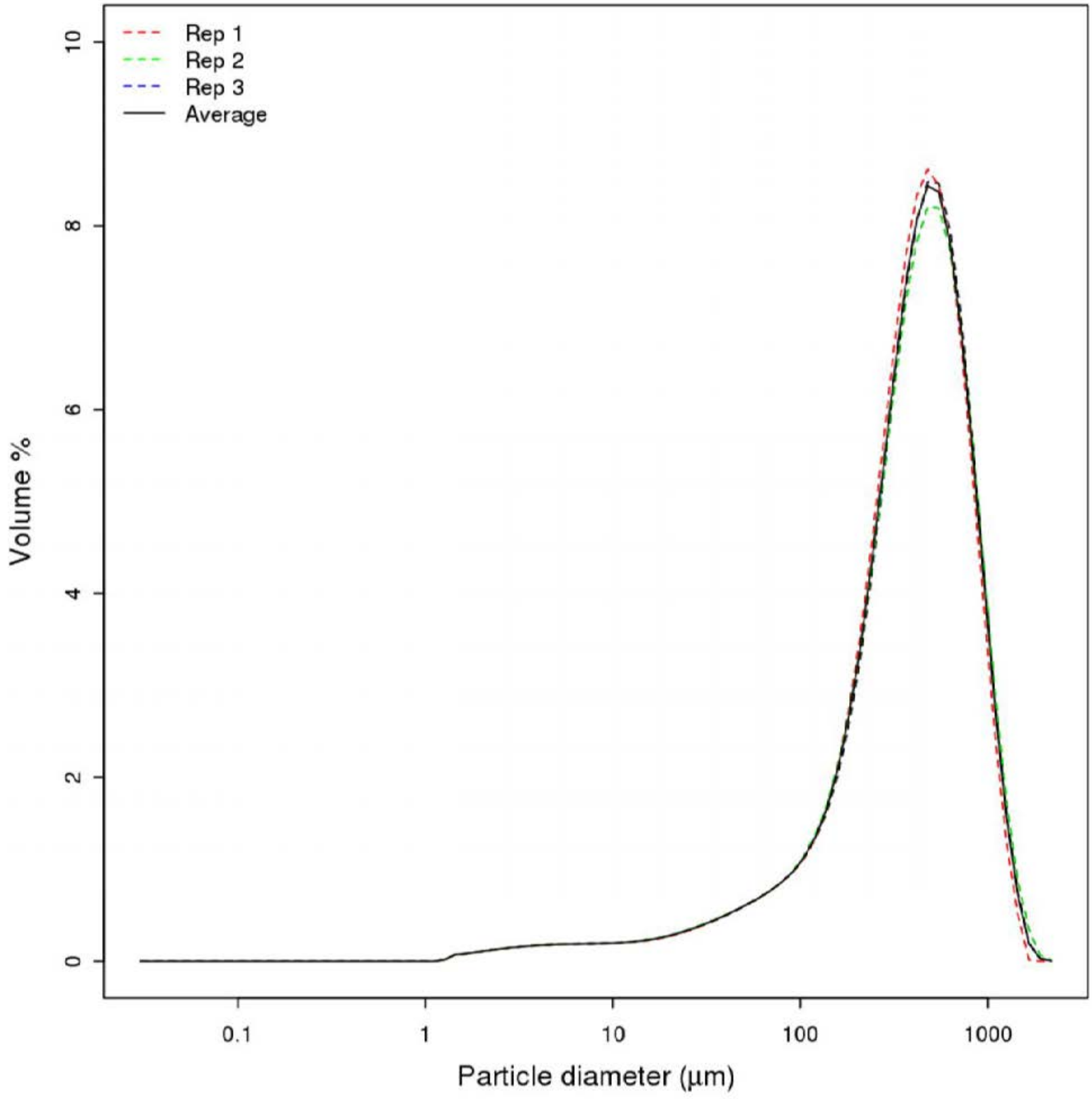
0.1
1
10
100
1000
Particle diameter (µm)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Volume %
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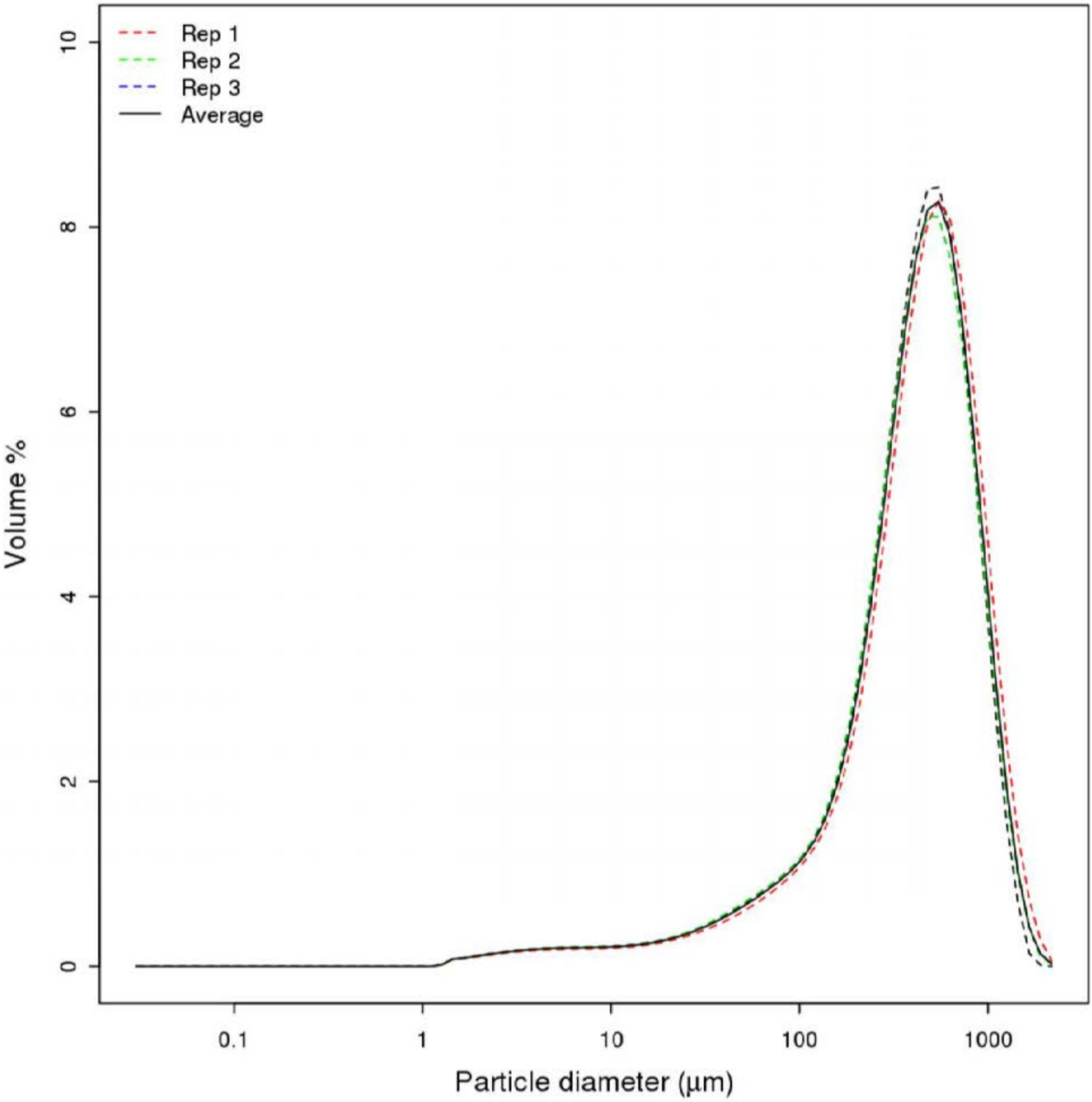
Particle diameter (µm)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Average
Volume %
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8
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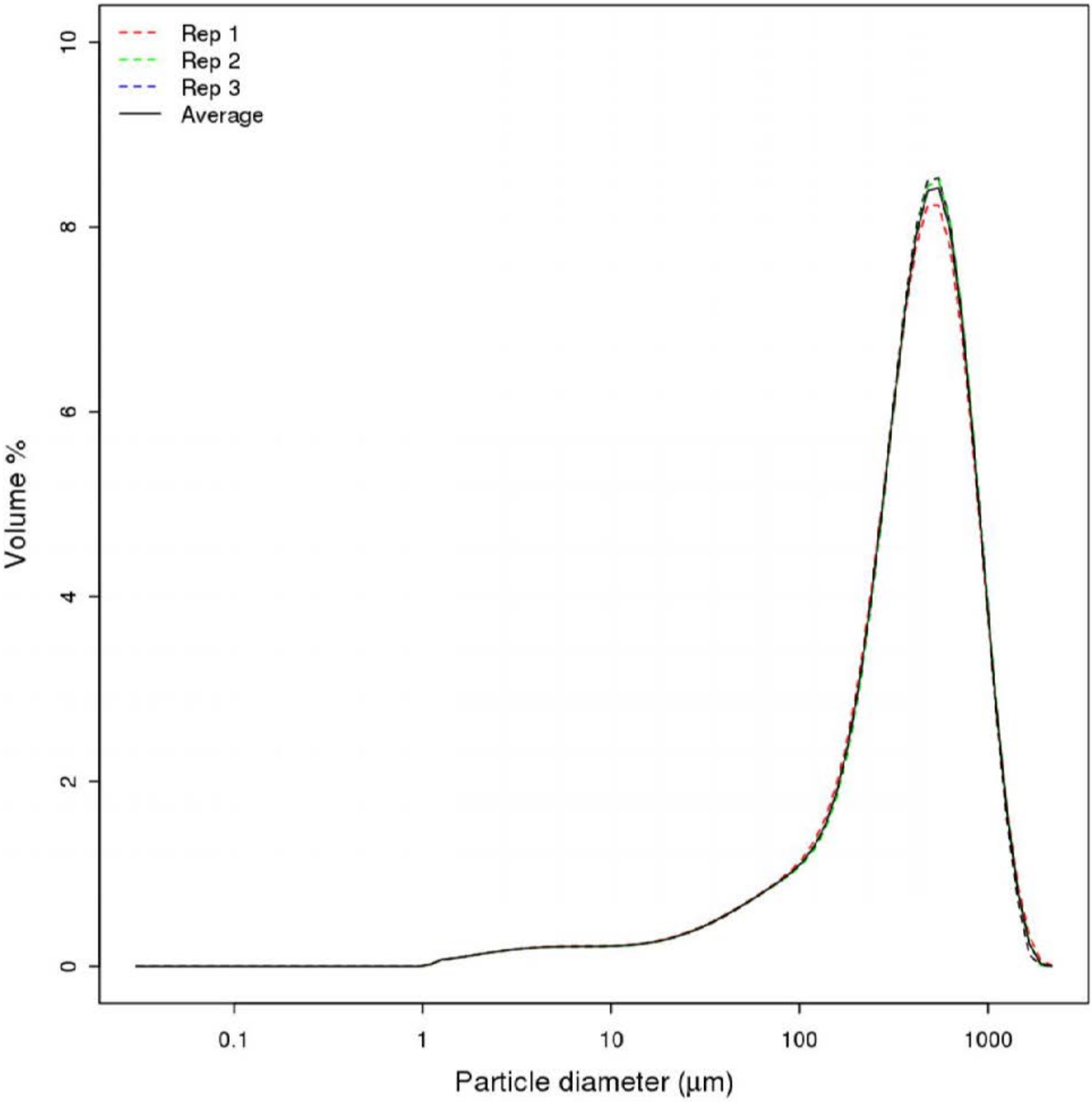
100
1000
Particle diameter (µm)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Average
Volume %
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100
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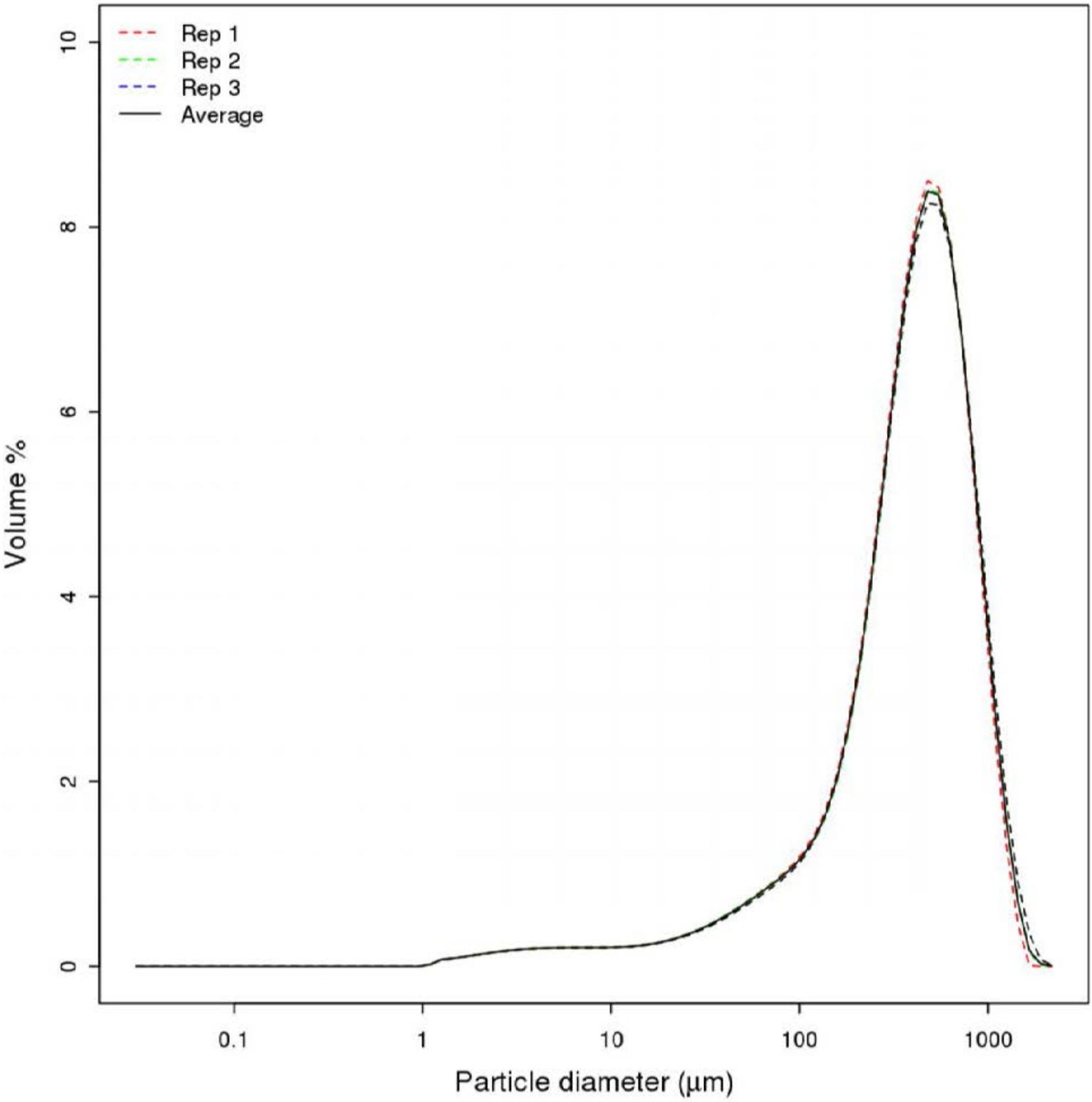
Particle diameter (µm)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Rep 3
Average
Volume %
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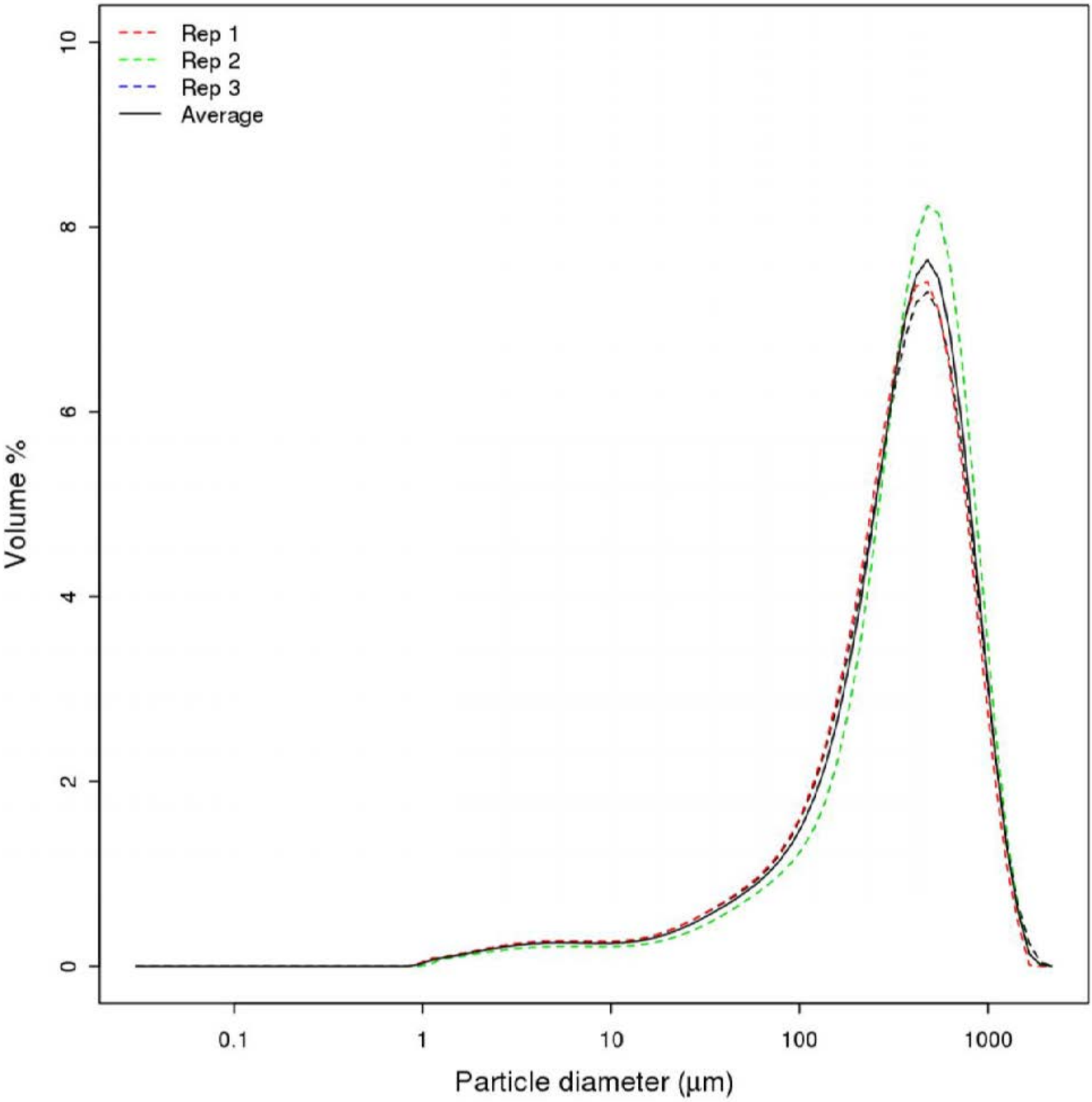
100
1000
Particle diameter (µm)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Average
Volume %
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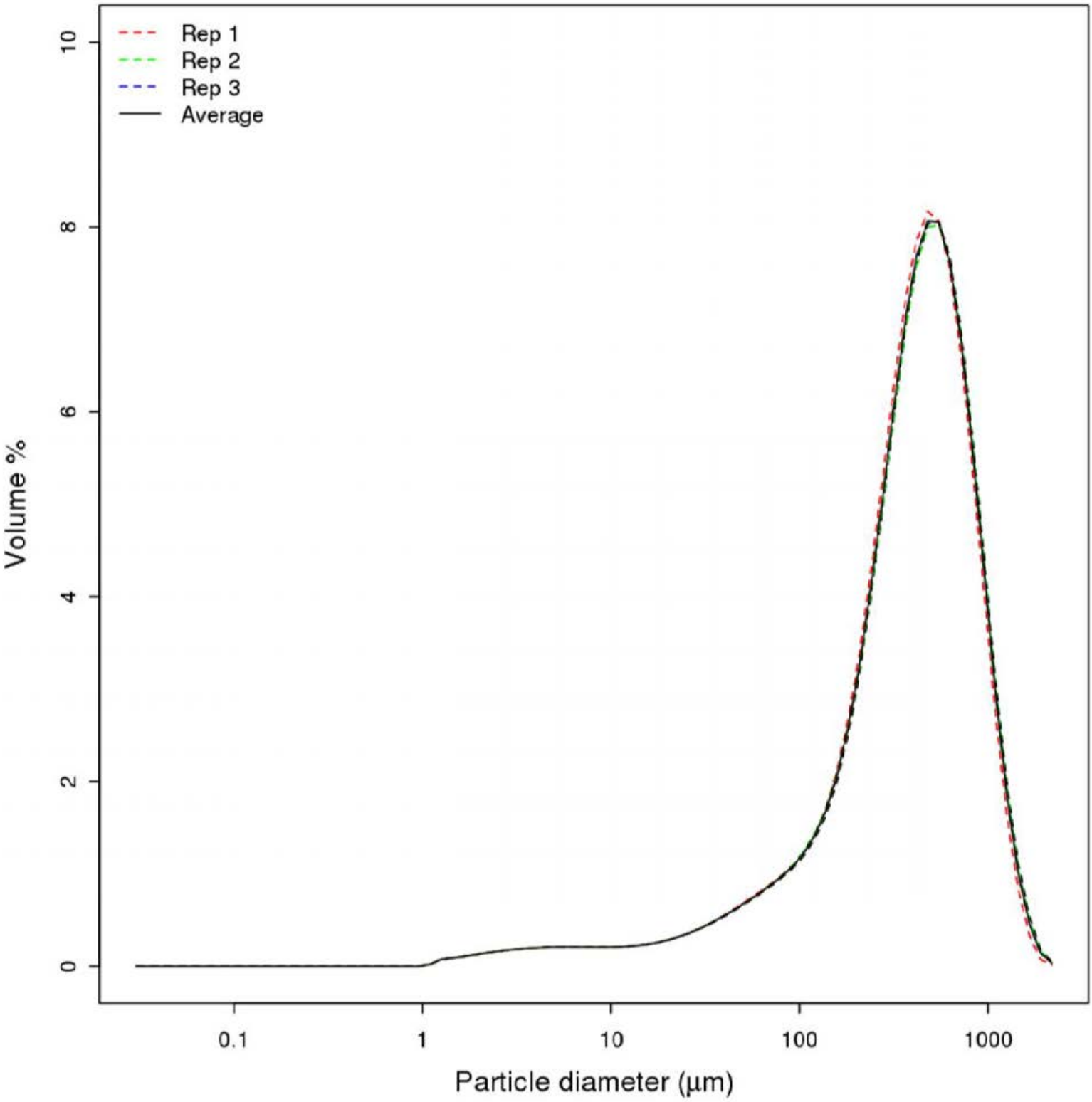
1000
Particle diameter (µm)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Rep 2
Rep 3
Average
Volume %
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2
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6
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0.1
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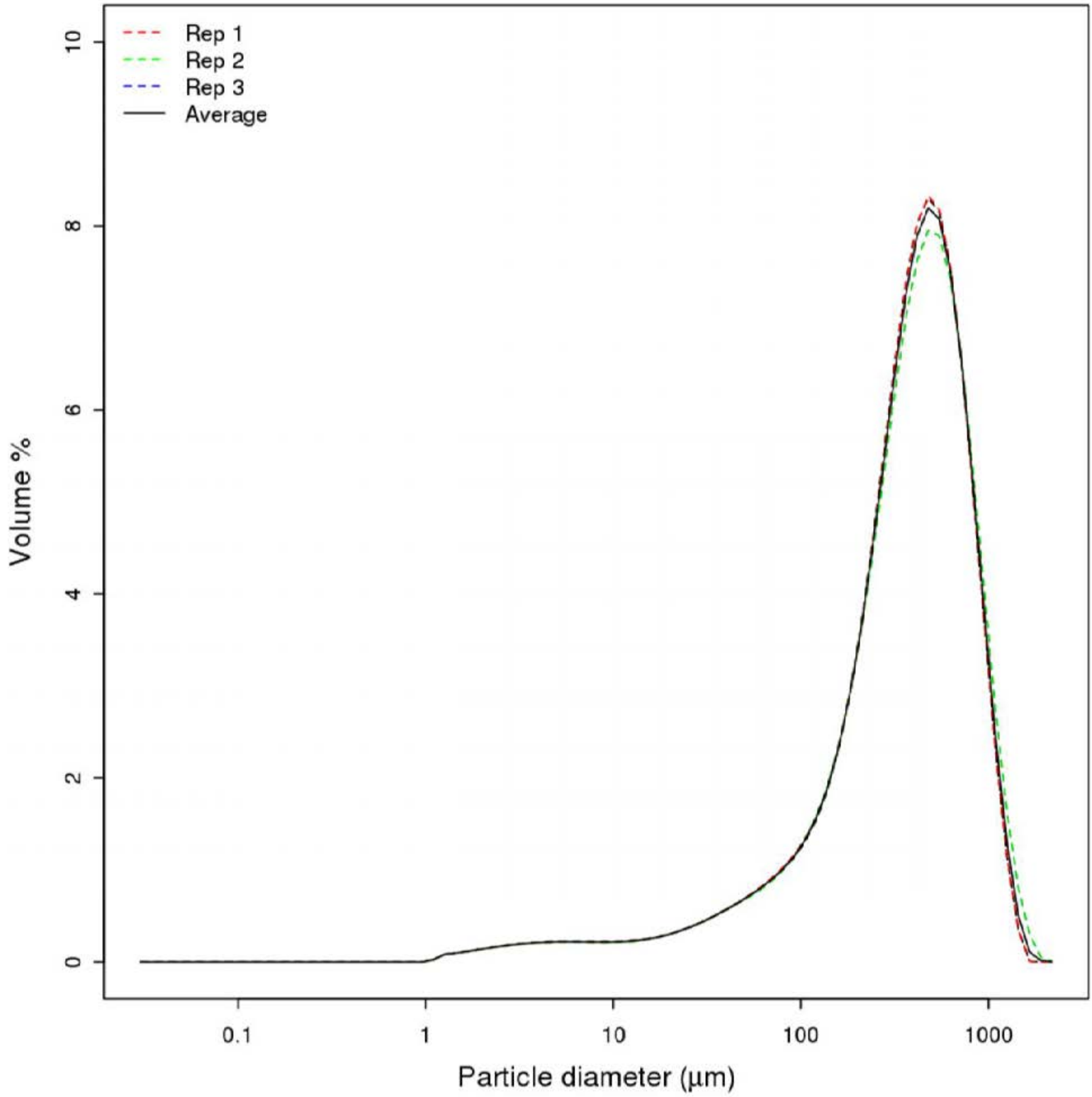
100
1000
Particle diameter (µm)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Average
Volume %
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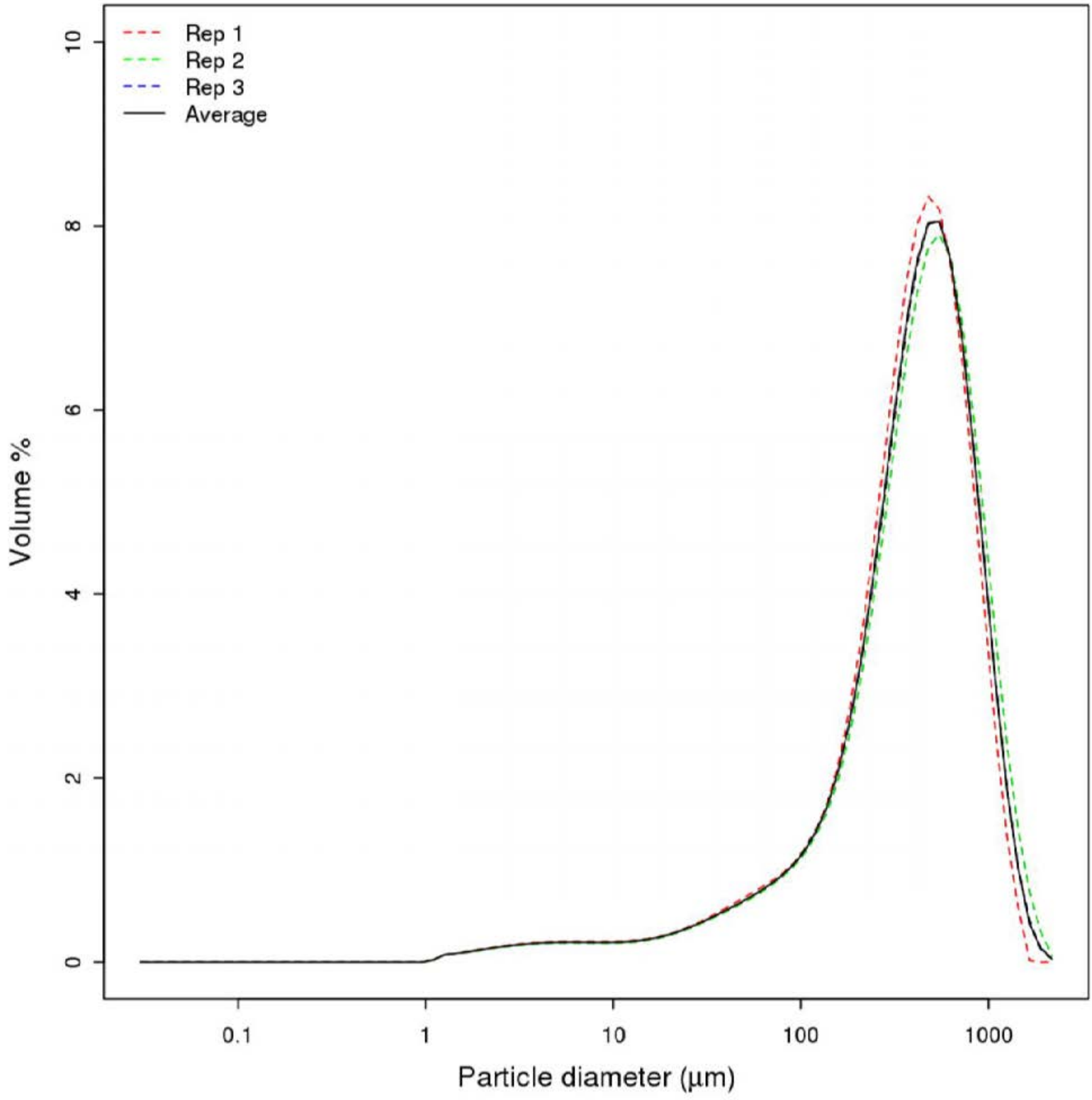
0.1
1
10
100
1000
Particle diameter (µm)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Rep 3
Average
Volume %
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8
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0.1
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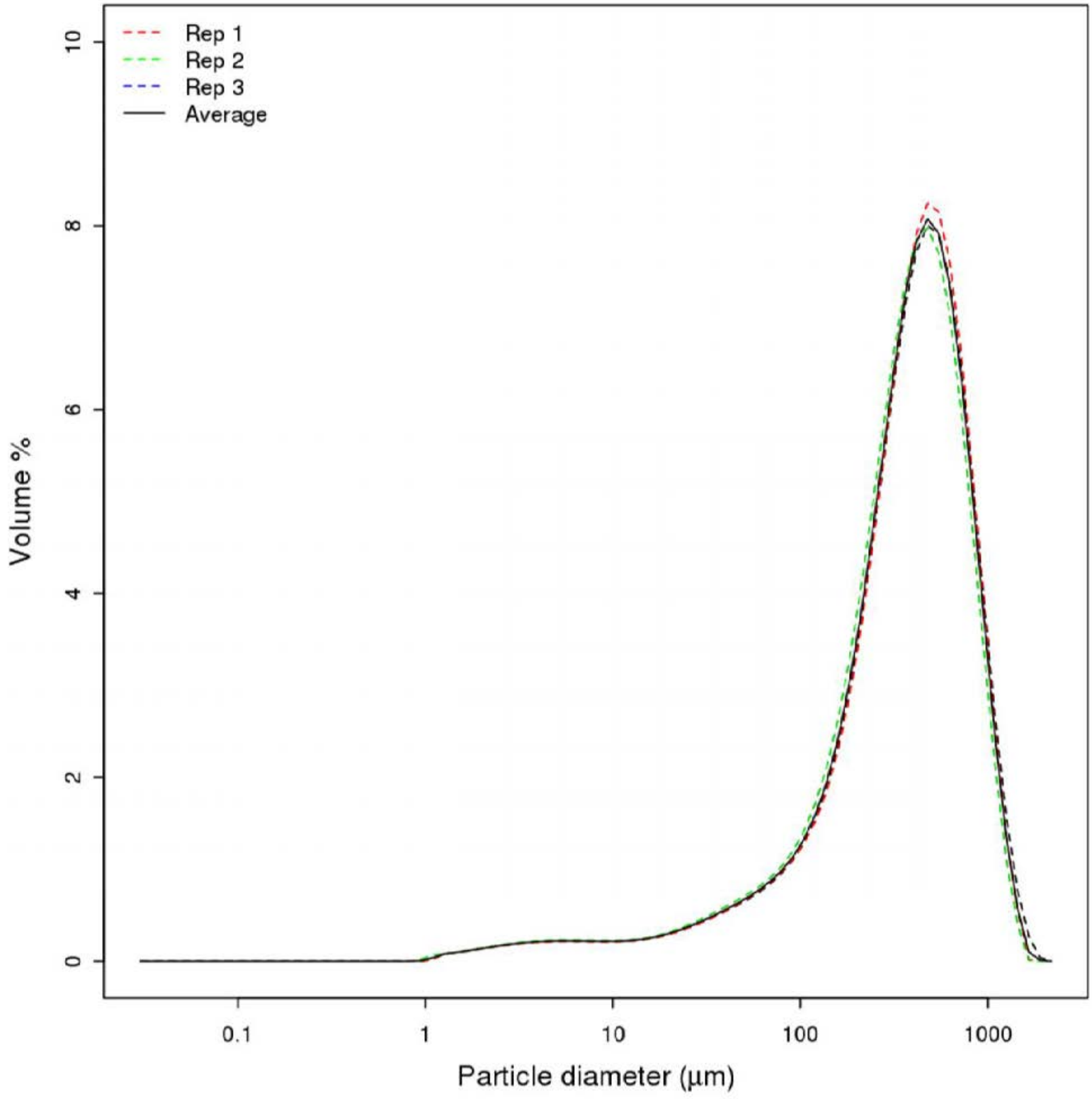
100
1000
Particle diameter (µm)


Rep 1
Rep 2
Rep 3
Average
Volume %
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8
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0.1
1
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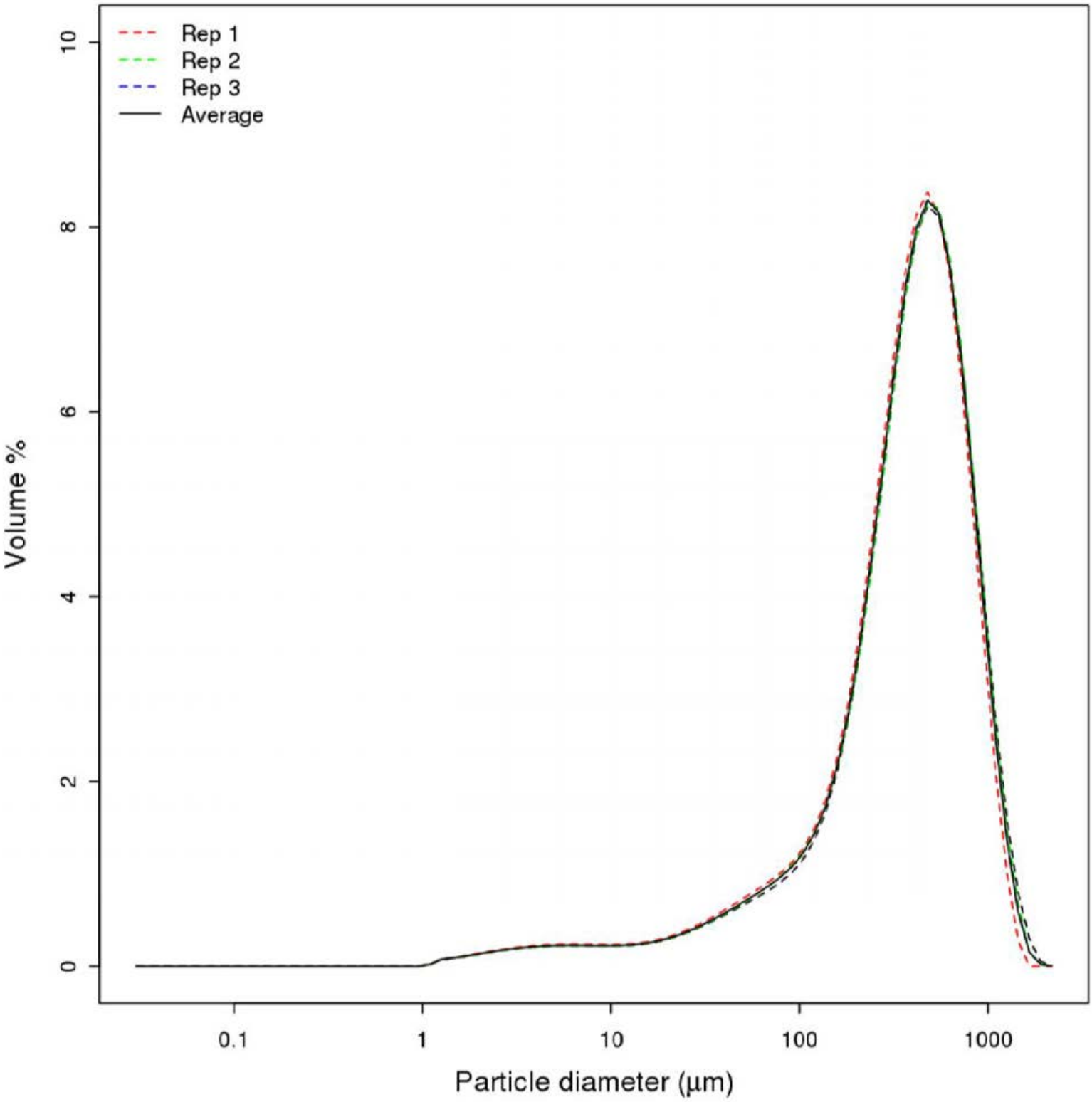
100
1000
Particle diameter (µm)


Rep 1
Rep 2
Rep 3
Average
Volume %
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8
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0.1
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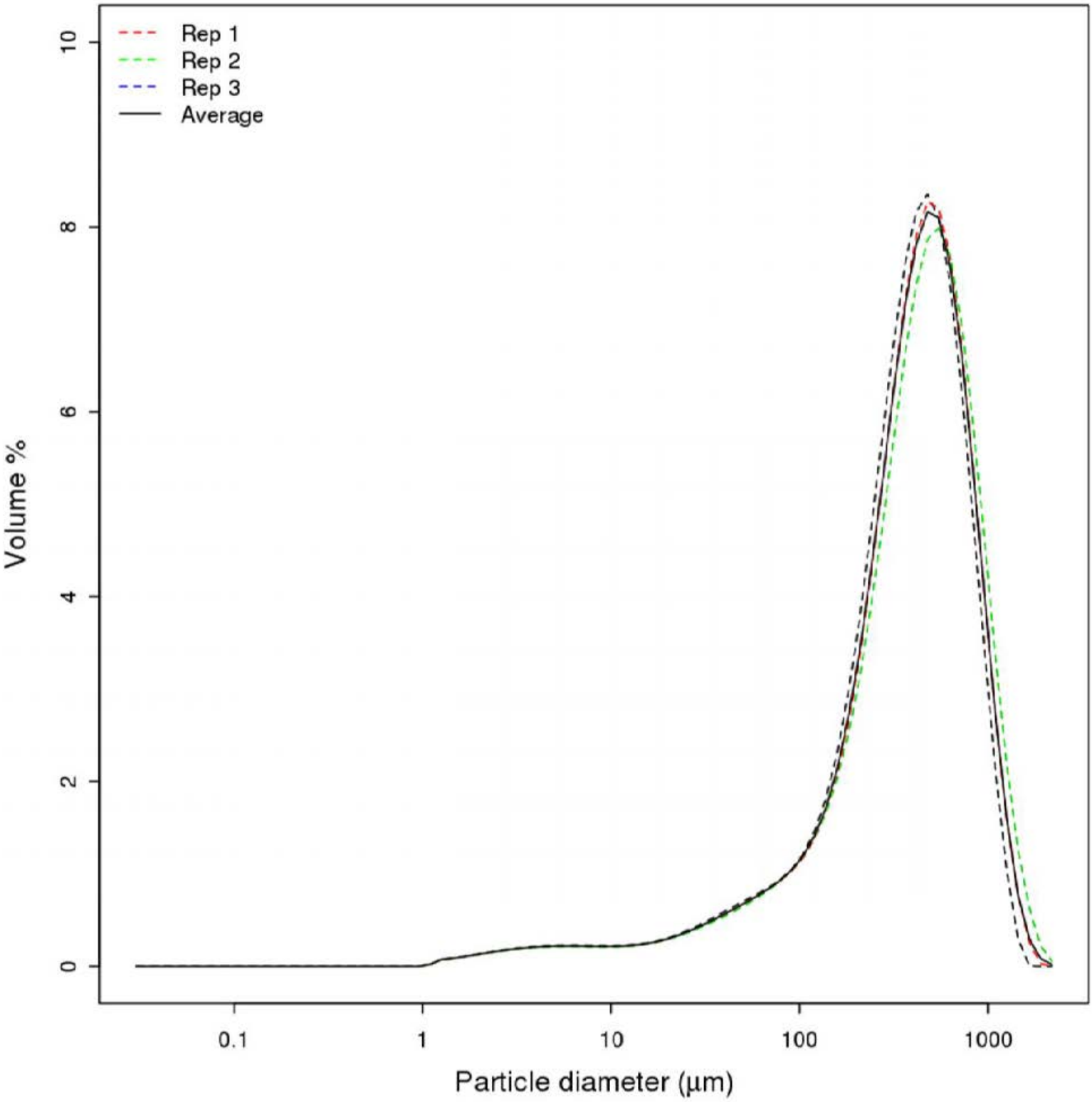
100
1000
Particle diameter (µm)


Rep 1
Rep 2
Rep 3
Average
Volume %
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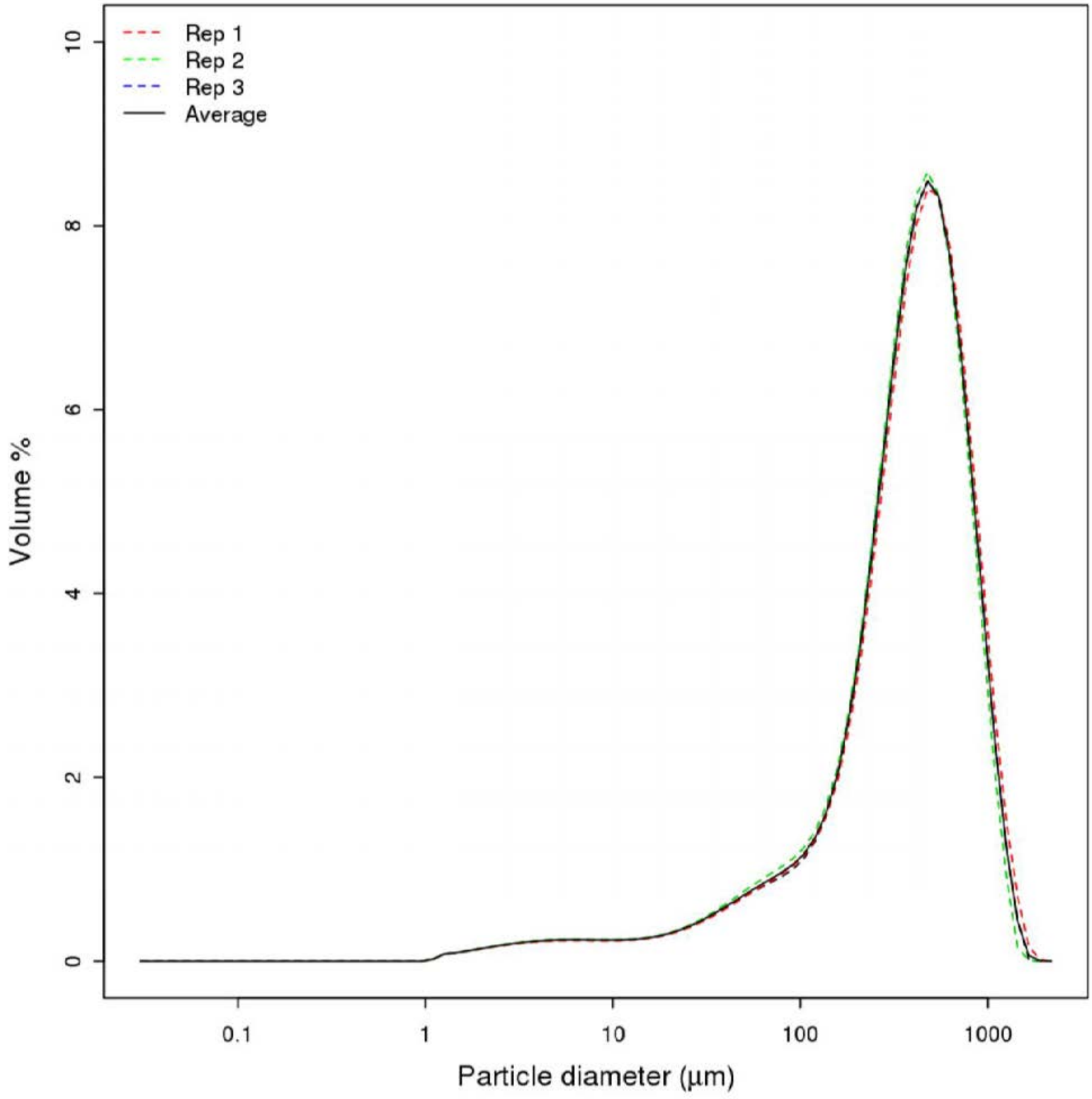
2
4
6
8
10
0.1
1
10
100
1000
Particle diameter (µm)


Rep 1
Rep 2
Rep 3
Average
Volume %
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4
6
8
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0.1
1
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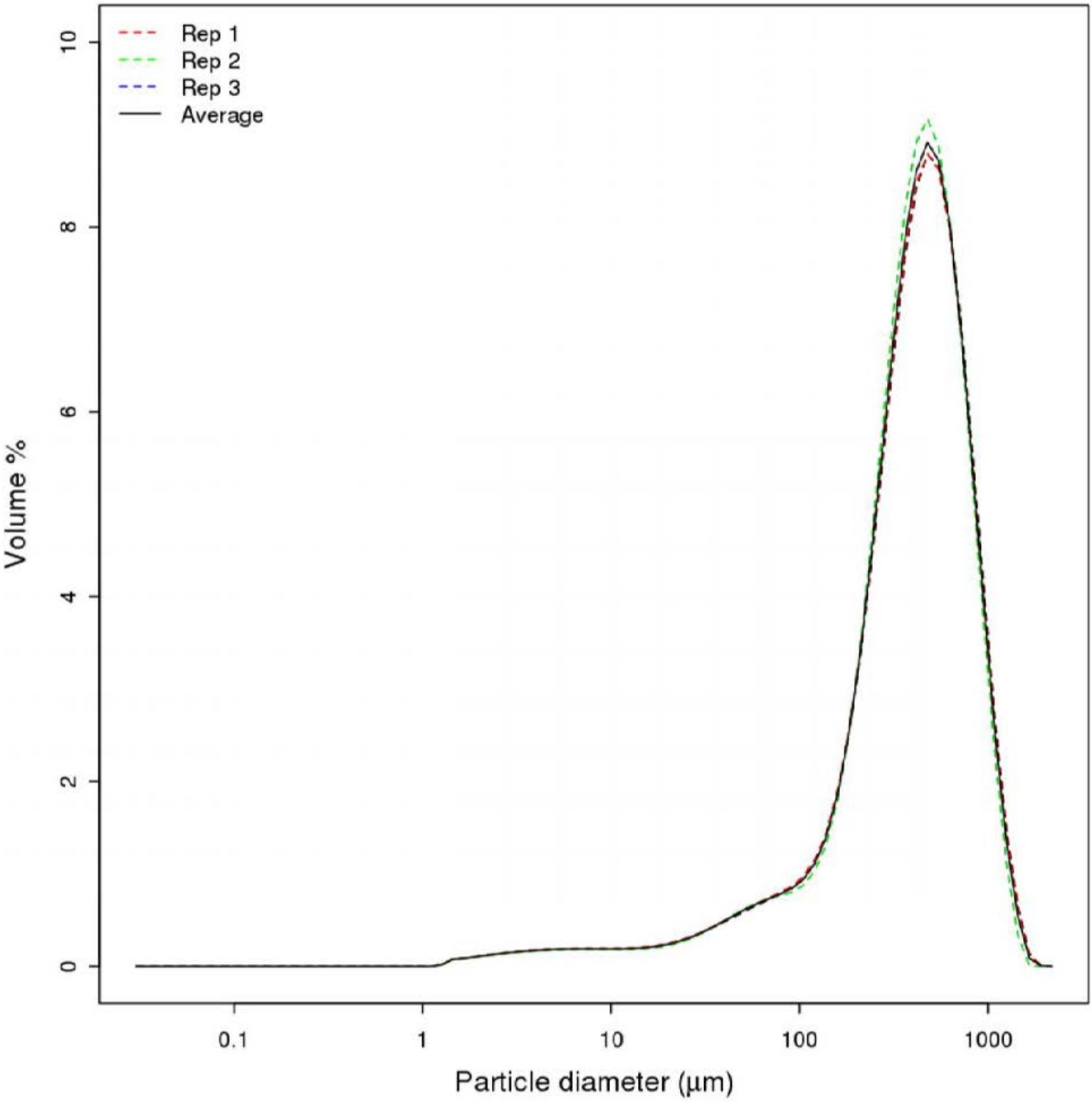
100
1000
Particle diameter (µm)


Rep 1
Rep 2
Rep 3
Average
Volume %
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4
6
8
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0.1
1
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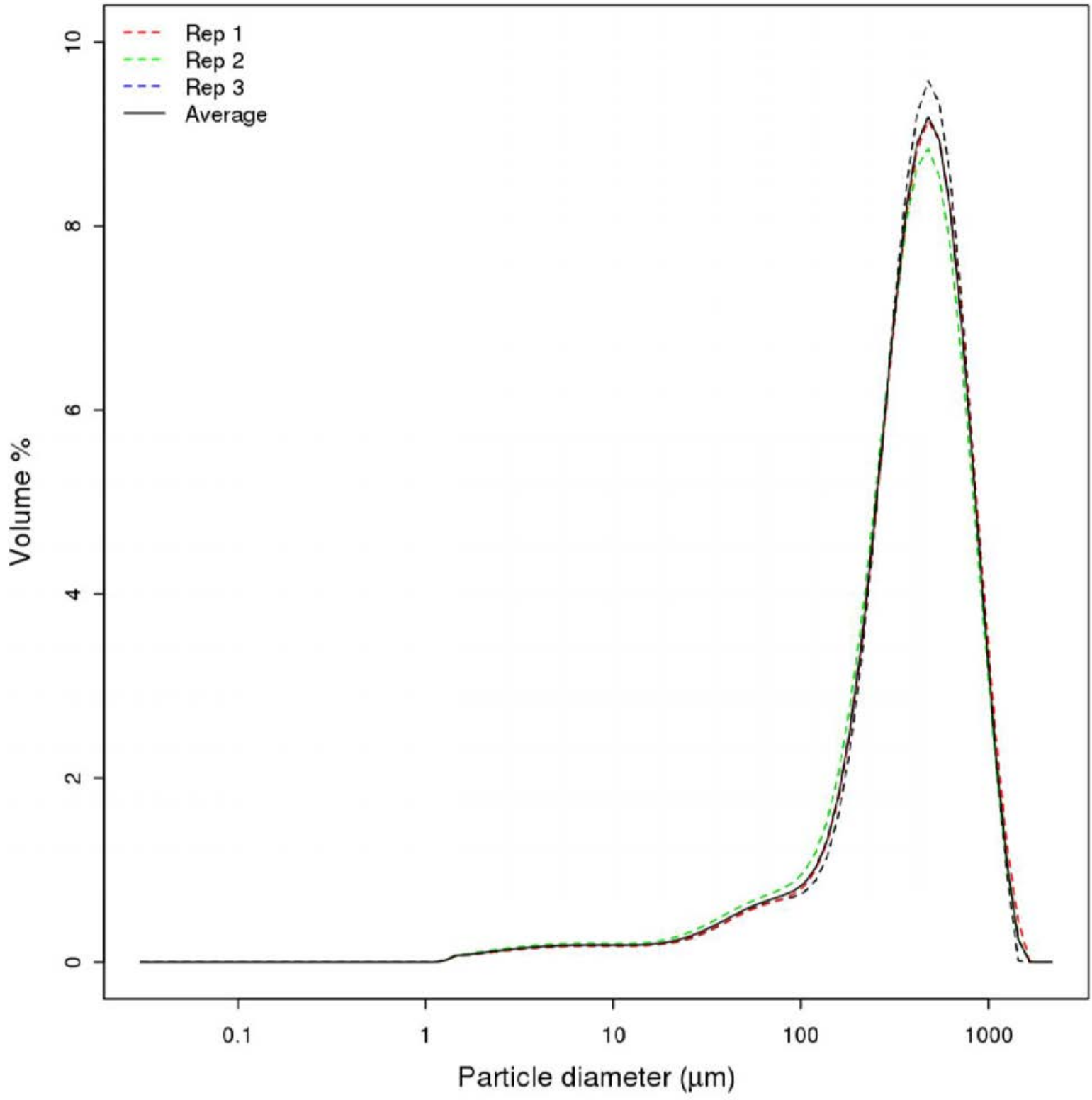
100
1000
Particle diameter (µm)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Rep 2
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Average
Volume %
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0.1
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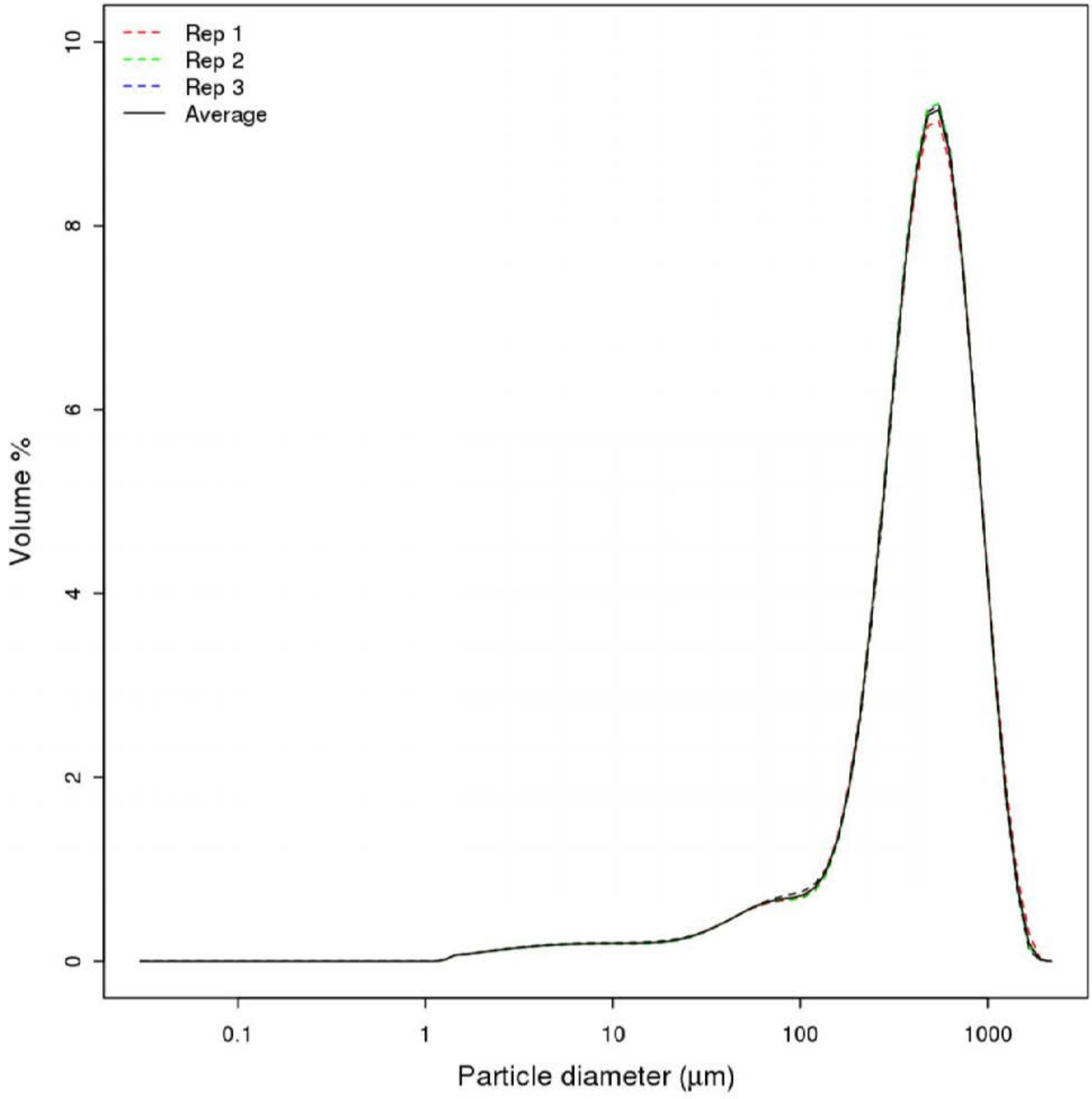
100
1000
Particle diameter (µm)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Average
Volume %
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4
6
8
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0.1
1
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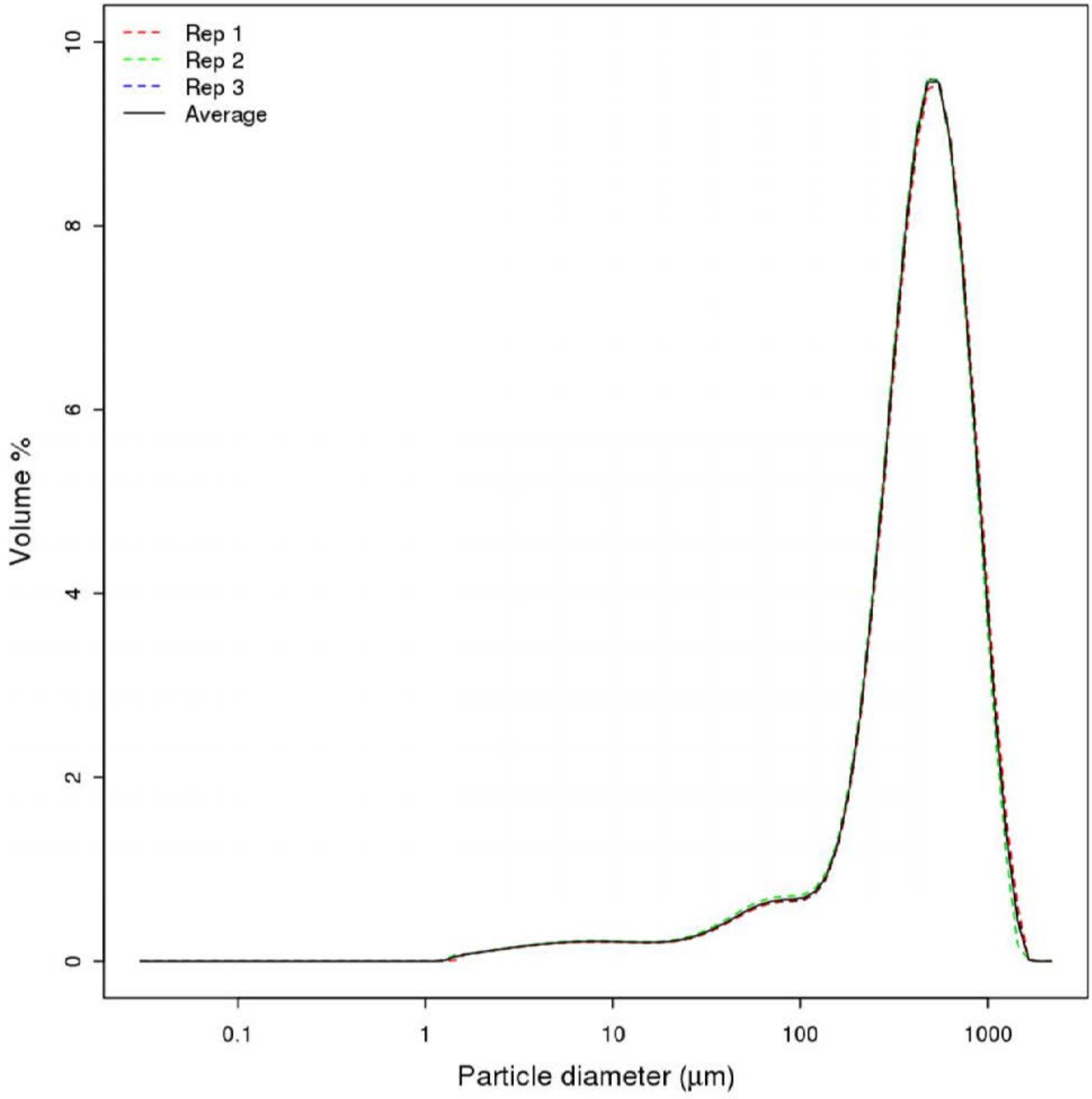
100
1000
Particle diameter (µm)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Average
Volume %
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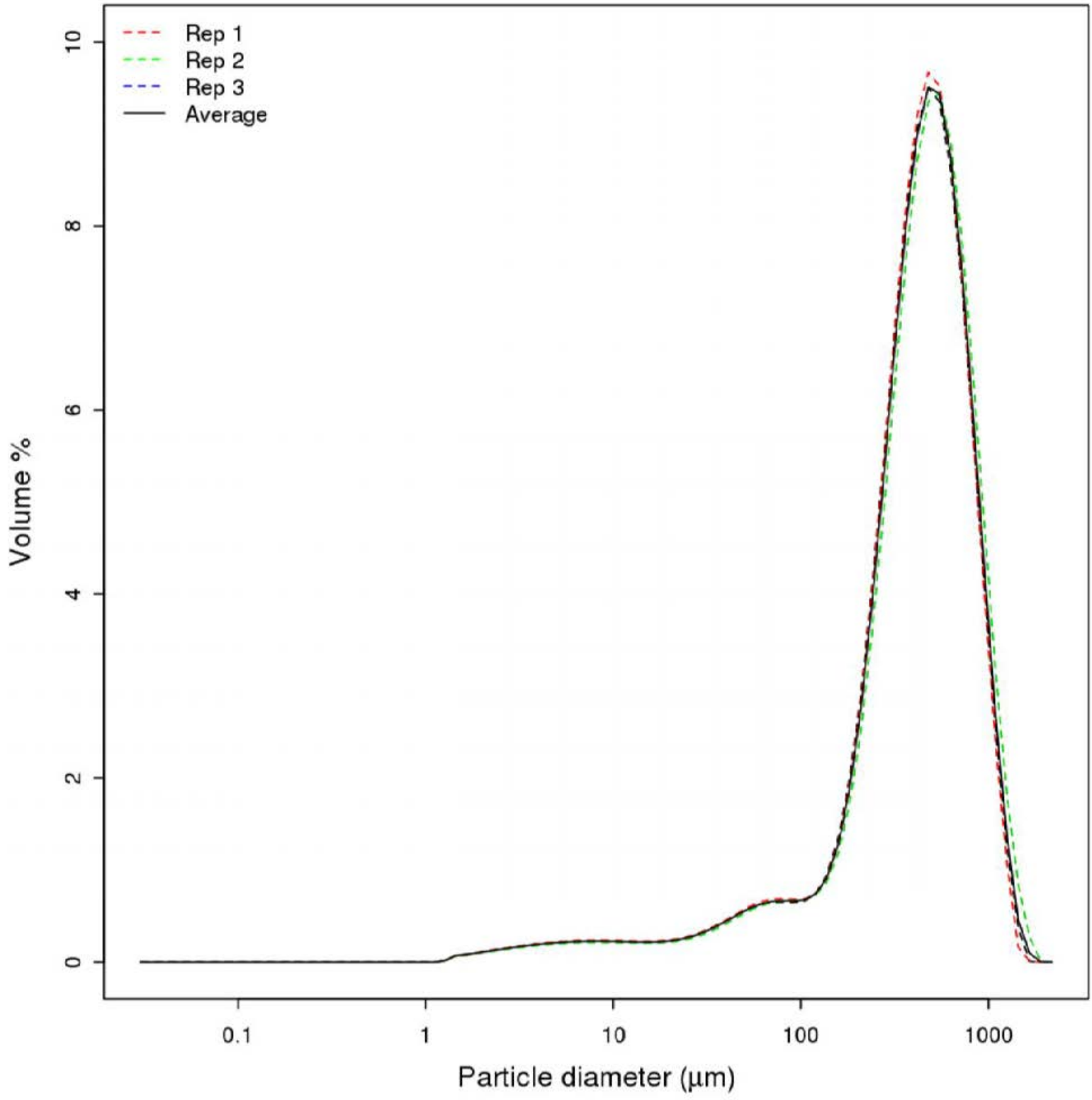
100
1000
Particle diameter (µm)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Volume %
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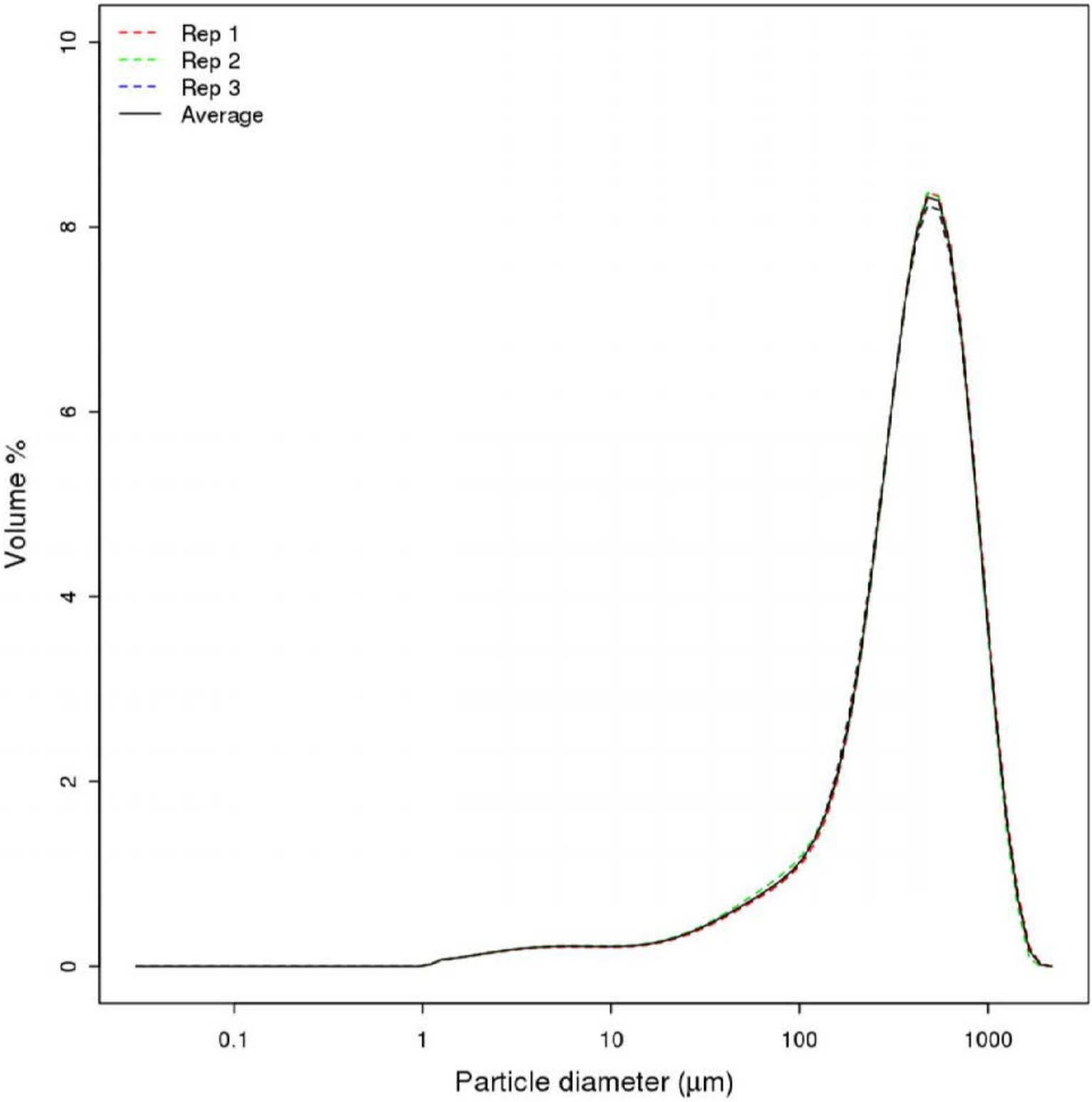
Particle diameter (µm)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Average
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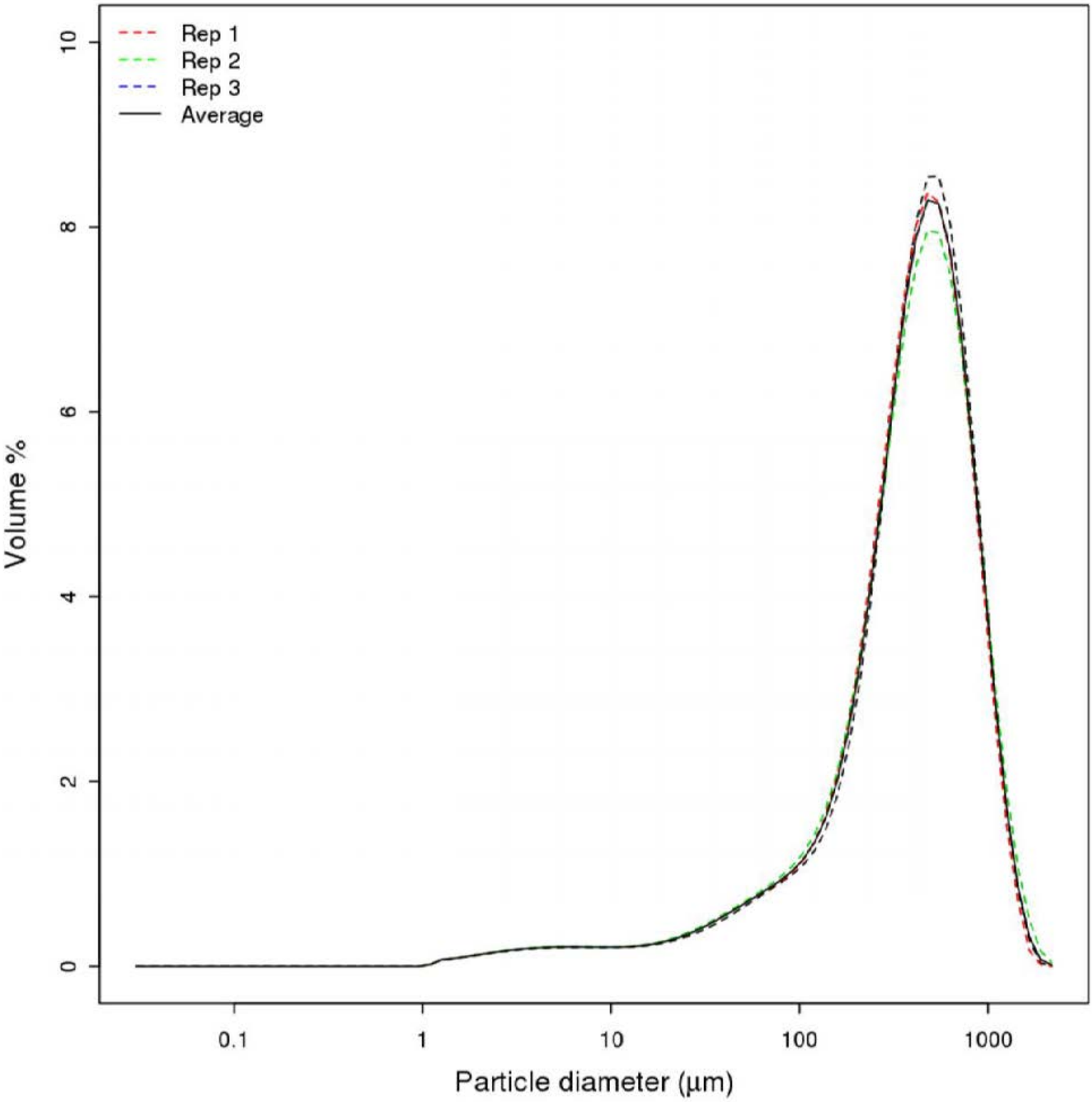
100
1000
Particle diameter (µm)


Rep 1
Rep 2
Rep 3
Average
Volume %
0
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0.1
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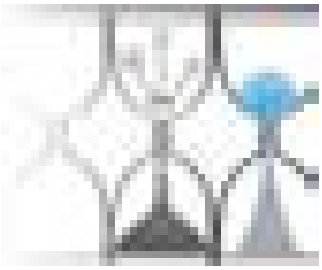
10
100
1000
Particle diameter (µm)

Appendix 8: OSL Report

University of Gloucestershire

Luminescence dating laboratory



Optical dating of sediments:

Moorebank excavation, Holsworthy Military Steele Barracks, Australia

to

A. Williams

Archaeological & Heritage Management Solutions

Prepared by Dr P.S. Toms, 13 March 2015

Contents

Scope of Report

This is a standard report of the Luminescence dating laboratory, University of Gloucestershire. In large part, the document summarises the processes, diagnostics and data drawn upon to deliver Table 1. A conclusion on the analytical validity of each sample's optical age estimate is expressed in Table 2; where there are caveats, the reader is directed to the relevant section of the report that explains the issue further in general terms.

Field Code	Lab Code	Overburden (m)	Grain size (μm)	Moisture content (%)	NaI γ-spectrometry (*in situ*)			γ D_r ($Gy.ka^{-1}$)	Ge γ-spectrometry (*ex situ*)			β D_r ($Gy.ka^{-1}$)	Cosmic D_r ($Gy.ka^{-1}$)	Preheat (°C for 10s)	Repeat Ratio	Low Regenerative-dose D_e	Repeat Ratio	High Regenerative-dose D_e	Post-IR OSL Ratio
					K (%)	Th (ppm)	U (ppm)		K (%)	Th (ppm)	U (ppm)								
TP3 #1	GL14063	0.2	125-180	3 ± 1	-	-	-	0.37 ± 0.04	0.13 ± 0.03	5.38 ± 0.37	0.82 ± 0.08	0.31 ± 0.04	0.16 ± 0.02	260	1.00 ± 0.01	1.00 ± 0.01	1.00 ± 0.01	1.00 ± 0.00	0.99 ± 0.01
TP3 #2	GL14064	0.6	125-180	1 ± 0	-	-	-	0.39 ± 0.04	0.00 ± 0.00	6.17 ± 0.43	0.92 ± 0.09	0.25 ± 0.04	0.15 ± 0.02	260	0.98 ± 0.01	0.99 ± 0.01	1.00 ± 0.00	1.01 ± 0.01	0.99 ± 0.00
TP3 #3	GL14065	0.9	125-180	1 ± 0	-	-	-	0.36 ± 0.04	0.00 ± 0.00	5.59 ± 0.42	0.84 ± 0.08	0.23 ± 0.04	0.15 ± 0.01	280	0.99 ± 0.00	1.00 ± 0.01	1.00 ± 0.00	1.01 ± 0.01	0.97 ± 0.00

Field Code	Lab Code	Total D_r ($Gy.ka^{-1}$)	D_e (Gy)	Age (ka)
TP3 #1	GL14063	0.84 ± 0.05	2.90 ± 0.22	3.4 ± 0.3 (0.3)
TP3 #2	GL14064	0.80 ± 0.04	14.1 ± 0.7	18 ± 1 (1)
TP3 #3	GL14065	0.73 ± 0.04	43.8 ± 2.9	60 ± 5 (5)

Table 1 D_r, D_e and Age data of submitted samples located at c. 34°S, 151°E, 15m. Age estimates expressed relative to year of sampling. Uncertainties in age are quoted at 1σ confidence, are based on analytical errors and reflect combined systematic and experimental variability and (in parenthesis) experimental variability alone (see 6.0). Blue indicates samples with accepted age estimates, red, age estimates with caveats (see Table 2).

Generic considerations	Field Code	Lab Code	Sample specific considerations
Absence of *in situ* γ spectrometry data (see section 4.0)	TP3 #1	GL14063	None
	TP3 #2	GL14064	None
	TP3 #3	GL14065	None

Table 2 Analytical validity of sample suite age estimates and caveats for consideration

1.0 Mechanisms and principles

Upon exposure to ionising radiation, electrons within the crystal lattice of insulating minerals are displaced from their atomic orbits. Whilst this dislocation is momentary for most electrons, a portion of charge is redistributed to meta-stable sites (traps) within the crystal lattice. In the absence of significant optical and thermal stimuli, this charge can be stored for extensive periods. The quantity of charge relocation and storage relates to the magnitude and period of irradiation. When the lattice is optically or thermally stimulated, charge is evicted from traps and may return to a vacant orbit position (hole). Upon recombination with a hole, an electron's energy can be dissipated in the form of light generating crystal luminescence providing a measure of dose absorption.

Herein, quartz is segregated for dating. The utility of this minerogenic dosimeter lies in the stability of its datable signal over the mid to late Quaternary period, predicted through isothermal decay studies (e.g. Smith *et al*., 1990; retention lifetime 630 Ma at 20°C) and evidenced by optical age estimates concordant with independent chronological controls (e.g. Murray and Olley, 2002). This stability is in contrast to the anomalous fading of comparable signals commonly observed for other ubiquitous sedimentary minerals such as feldspar and zircon (Wintle, 1973; Templer, 1985; Spooner, 1993)

Optical age estimates of sedimentation (Huntley *et al*., 1985) are premised upon reduction of the minerogenic time dependent signal (Optically Stimulated Luminescence, OSL) to zero through exposure to sunlight and, once buried, signal reformulation by absorption of litho- and cosmogenic radiation. The signal accumulated post burial acts as a dosimeter recording total dose absorption, converting to a chronometer by estimating the rate of dose absorption quantified through the assay of radioactivity in the surrounding lithology and streaming from the cosmos.

$$\text{Age} = \frac{\text{Mean Equivalent Dose } (D_e, \text{Gy})}{\text{Mean Dose Rate } (D_r, \text{Gy.ka}^{-1})}$$

Aitken (1998) and Bøtter-Jensen et al. (2003) offer a detailed review of optical dating.

2.0 Sample Preparation

Three sediment samples were submitted within opaque tubing for Optical dating. To preclude optical erosion of the datable signal prior to measurement, all samples were opened and prepared under controlled laboratory illumination provided by Encapsulite RB-10 (red) filters. To isolate that material potentially exposed to daylight during sampling, sediment located within 20 mm of each tube-end was removed.

The remaining sample was dried and then sieved. The fine sand (125-180 μm) fraction was segregated and then subjected to acid and alkaline digestion (10% HCl, 15% H_2O_2) to attain removal of carbonate and organic components respectively. A further acid digestion in HF (40%, 60 mins) was used to etch the outer 10-15 μm layer affected by α radiation and degrade each samples' feldspar content. During HF treatment, continuous magnetic stirring was used to effect isotropic etching of grains. 10% HCl was then added to remove acid soluble fluorides. Each sample was dried, resieved and quartz isolated from the remaining heavy mineral fraction using a sodium polytungstate density separation at 2.68g.cm^{-3}. Twelve 8 mm multi-grain aliquots (*c*. 3-6 mg) of quartz from each sample were then mounted on aluminium discs for determination of D_e values.

All drying was conducted at 40°C to prevent thermal erosion of the signal. All acids and alkalis were Analar grade. All dilutions (removing toxic-corrosive and non-minerogenic luminescence-bearing substances) were conducted with distilled water to prevent signal contamination by extraneous particles.

3.0 Acquisition and accuracy of D_e value

All minerals naturally exhibit marked inter-sample variability in luminescence per unit dose (sensitivity). Therefore, the estimation of D_e acquired since burial requires calibration of the natural signal using known amounts of laboratory dose. D_e values were quantified using a single-aliquot regenerative-dose (SAR) protocol (Murray and Wintle 2000; 2003) facilitated by a Risø TL-DA-15 irradiation-stimulation-detection system (Markey *et al*., 1997; Bøtter-Jensen *et al*., 1999). Within this apparatus, optical signal stimulation is provided by an assembly of blue diodes (5 packs of 6 Nichia NSPB500S), filtered to 470±80 nm conveying 15 $mW.cm^{-2}$ using a 3 mm Schott GG420 positioned in front of each diode pack. Infrared (IR) stimulation, provided by 6 IR diodes (Telefunken TSHA 6203) stimulating at 875±80nm delivering ~5 $mW.cm^{-2}$, was used to indicate the presence of contaminant feldspars (Hütt *et al*., 1988). Stimulated photon emissions from quartz aliquots are in the ultraviolet (UV) range and were filtered from stimulating photons by 7.5 mm HOYA U-340 glass and detected by an EMI 9235QA photomultiplier fitted with a blue-green sensitive bialkali photocathode. Aliquot irradiation was conducted using a 1.48 GBq $^{90}Sr/^{90}Y$ β source calibrated for multi-grain aliquots of 125-180 µm quartz fraction against the 'Hotspot 800' ^{60}Co γ source located at the National Physical Laboratory (NPL), UK.

SAR by definition evaluates D_e through measuring the natural signal (Fig. 1) of a single aliquot and then regenerating that aliquot's signal by using known laboratory doses to enable calibration. For each aliquot, 5 different regenerative-doses were administered so as to image dose response. D_e values for each aliquot were then interpolated, and associated counting and fitting errors calculated, by way of exponential plus linear regression (Fig. 1). Weighted (geometric) mean D_e values were calculated from 12 aliquots using the central age model outlined by Galbraith *et al*. (1999) and are quoted at 1σ confidence (Table 1). The accuracy with which D_e equates to total absorbed dose and that dose absorbed since burial was assessed. The former can be considered a function of laboratory factors, the latter, one of environmental issues. Diagnostics were deployed to estimate the influence of these factors and criteria instituted to optimise the accuracy of D_e values.

3.1 Laboratory Factors

3.1.1 Feldspar contamination

The propensity of feldspar signals to fade and underestimate age, coupled with their higher sensitivity relative to quartz makes it imperative to quantify feldspar contamination. At room temperature, feldspars generate a signal (IRSL; Fig. 1) upon exposure to IR whereas quartz does not. The signal from feldspars contributing to OSL can be depleted by prior exposure to IR. For all aliquots the contribution of any remaining feldspars was estimated from the OSL IR depletion ratio (Duller, 2003). The influence of IR depletion on the OSL signal can be illustrated by comparing the regenerated post-IR OSL D_e with the applied regenerative-dose (Fig. 5). If the addition to OSL by feldspars is insignificant, then the repeat dose ratio of OSL to post-IR OSL should be statistically consistent with unity (Table 1). If any aliquots do not fulfil this criterion, then the sample age estimate should be accepted tentatively. The source of feldspar contamination is rarely rooted in sample preparation; it predominantly results from the occurrence of feldspars as inclusions within quartz.

3.1.2 Preheating

Preheating aliquots between irradiation and optical stimulation is necessary to ensure comparability between natural and laboratory-induced signals. However, the multiple irradiation and preheating steps that are required to define single-aliquot regenerative-dose response leads to signal sensitisation, rendering calibration of the natural signal inaccurate. The SAR protocol (Murray and Wintle, 2000; 2003) enables this sensitisation to be monitored and corrected using a test dose, here set at 5 Gy preheated to 220°C for 10s, to track signal sensitivity between irradiation-preheat steps. However, the accuracy of sensitisation correction for both natural and laboratory signals can be preheat dependent.

The Dose Recovery test was used to assess the optimal preheat temperature for accurate correction and calibration of the time dependent signal. Dose Recovery (Fig. 2) attempts to quantify the combined effects of thermal transfer and

sensitisation on the natural signal, using a precise lab dose to simulate natural dose. The ratio between the applied dose and recovered D_e value should be statistically concordant with unity. For this diagnostic, 6 aliquots were each assigned a 10 s preheat between 180°C and 280°C.

That preheat treatment fulfilling the criterion of accuracy within the Dose Recovery test was selected to generate the final D_e value from a further 12 aliquots. Further thermal treatments, prescribed by Murray and Wintle (2000; 2003), were applied to optimise accuracy and precision. Optical stimulation occurred at 125ºC in order to minimise effects associated with photo-transferred thermoluminescence and maximise signal to noise ratios. Inter-cycle optical stimulation was conducted at 280ºC to minimise recuperation.

3.1.3 Irradiation

For all samples having D_e values in excess of 100 Gy, matters of signal saturation and laboratory irradiation effects are of concern. With regards the former, the rate of signal accumulation generally adheres to a saturating exponential form and it is this that limits the precision and accuracy of D_e values for samples having absorbed large doses. For such samples, the functional range of D_e interpolation by SAR has been verified up to 600 Gy by Pawley *et al*. (2010). Age estimates based on D_e values exceeding this value should be accepted tentatively.

3.1.4 Internal consistency

Quasi-radial plots (*cf* Galbraith, 1990) are used to illustrate inter-aliquot D_e variability for natural, repeat regenerative-dose and post-IR OSL signals (Figs 3 to 5, respectively). D_e values are standardised relative to the central D_e value for natural signals and applied dose for regenerated signals. D_e values are described as overdispersed when >5% lie beyond $\pm 2\sigma$ of the standardising value; resulting from a heterogeneous absorption of burial dose and/or response to the SAR protocol. For multi-grain aliquots, overdispersion of natural signals does not necessarily imply inaccuracy. However where overdispersion is observed for regenerated signals, the efficacy of sensitivity correction may be problematic. Murray and Wintle (2000; 2003) suggest repeat dose ratios (Table 1) offer a measure of SAR protocol success, whereby ratios ranging across 0.9-1.1 are acceptable. However, this variation of repeat dose ratios in the high-dose region can have a significant impact on D_e interpolation. The influence of this effect can be outlined by quantifying the ratio of interpolated to applied regenerative-dose ratio (Table 1, Fig. 4). In this study, where both the repeat dose ratios and interpolated to applied regenerative-dose ratios range across 0.9-1.1, sensitivity-correction is considered effective.

3.2 Environmental factors

3.2.1 Incomplete zeroing

Post-burial OSL signals residual of pre-burial dose absorption can result where pre-burial sunlight exposure is limited in spectrum, intensity and/or period, leading to age overestimation. This effect is particularly acute for material eroded and redeposited sub-aqueously (Olley *et al*., 1998, 1999; Wallinga, 2002) and exposed to a burial dose of <20 Gy (e.g. Olley *et al*., 2004), has some influence in sub-aerial contexts but is rarely of consequence where aerial transport has occurred. Within single-aliquot regenerative-dose optical dating there are two diagnostics of partial resetting (or bleaching); signal analysis (Agersnap-Larsen *et al*., 2000; Bailey *et al*., 2003) and inter-aliquot D_e distribution studies (Murray *et al*., 1995).

Within this study, signal analysis was used to quantify the change in D_e value with respect to optical stimulation time for multi-grain aliquots. This exploits the existence of traps within minerogenic dosimeters that bleach with different efficiency for a given wavelength of light to verify partial bleaching. D_e (t) plots (Fig. 6; Bailey *et al*., 2003) are constructed from separate integrals of signal decay as laboratory optical stimulation progresses. A statistically significant increase in natural D_e (t) is indicative of partial bleaching assuming three conditions are fulfilled. Firstly, that a statistically significant increase in D_e (t) is observed when partial bleaching is simulated within the laboratory. Secondly, that there is no significant rise in D_e (t) when full bleaching is simulated. Finally, there should be no significant augmentation in D_e (t) when zero dose is simulated. Where partial bleaching is detected, the age derived from the sample should be considered

a maximum estimate only. However, the utility of signal analysis is strongly dependent upon a samples pre-burial experience of sunlight's spectrum and its residual to post-burial signal ratio. Given in the majority of cases, the spectral exposure history of a deposit is uncertain, the absence of an increase in natural D_e (t) does not necessarily testify to the absence of partial bleaching.

Where requested and feasible, the insensitivities of multi-grain single-aliquot signal analysis may be circumvented by inter-aliquot D_e distribution studies. This analysis uses aliquots of single sand grains to quantify inter-grain D_e distribution. At present, it is contended that asymmetric inter-grain D_e distributions are symptomatic of partial bleaching and/or pedoturbation (Murray *et al*., 1995; Olley *et al*., 1999; Olley *et al*., 2004; Bateman *et al*., 2003). For partial bleaching at least, it is further contended that the D_e acquired during burial is located in the minimum region of such ranges. The mean and breadth of this minimum region is the subject of current debate, as it is additionally influenced by heterogeneity in microdosimetry, variable inter-grain response to SAR and residual to post-burial signal ratios. Presently, the apposite measure of age is that defined by the D_e interval delimited by the minimum and central age models of Galbraith *et al*. (1999).

3.2.2 Pedoturbation

The accuracy of sedimentation ages can further be controlled by post-burial trans-strata grain movements forced by pedo- or cryoturbation. Berger (2003) contends pedogenesis prompts a reduction in the apparent sedimentation age of parent material through bioturbation and illuviation of younger material from above and/or by biological recycling and resetting of the datable signal of surface material. Berger (2003) proposes that the chronological products of this remobilisation are A-horizon age estimates reflecting the cessation of pedogenic activity, Bc/C-horizon ages delimiting the maximum age for the initiation of pedogenesis with estimates obtained from Bt-horizons providing an intermediate age 'close to the age of cessation of soil development'. Singhvi et al. (2001), in contrast, suggest that B and C-horizons closely approximate the age of the parent material, the A-horizon, that of the 'soil forming episode'. At present there is no post-sampling mechanism for the direct detection of and correction for post-burial sediment remobilisation. However, intervals of palaeosol evolution can be delimited by a maximum age derived from parent material and a minimum age obtained from a unit overlying the palaeosol. Inaccuracy forced by cryoturbation may be bidirectional, heaving older material upwards or drawing younger material downwards into the level to be dated. Cryogenic deformation of matrix-supported material is, typically, visible; sampling of such cryogenically-disturbed sediments can be avoided.

4.0 Acquisition and accuracy of D_r value

Lithogenic D_r values were defined through measurement of U, Th and K radionuclide concentration and conversion of these quantities into β and γ D_r values (Table 1). β contributions were estimated from sub-samples by laboratory-based γ spectrometry using an Ortec GEM-S high purity Ge coaxial detector system, calibrated using certified reference materials supplied by CANMET. γ dose rates can be estimated from *in situ* NaI gamma spectrometry or, where direct measurements are unavailable as in the present case, from laboratory-based Ge γ spectrometry. *In situ* measurements reduce uncertainty relating to potential heterogeneity in the γ dose field surrounding each sample. The level of U disequilibrium was estimated by laboratory-based Ge γ spectrometry. Estimates of radionuclide concentration were converted into D_r values (Adamiec and Aitken, 1998), accounting for D_r modulation forced by grain size (Mejdahl, 1979) and present moisture content (Zimmerman, 1971). Cosmogenic D_r values were calculated on the basis of sample depth, geographical position and matrix density (Prescott and Hutton, 1994).

The spatiotemporal validity of D_r values can be considered a function of five variables. Firstly, age estimates devoid of *in situ* γ spectrometry data should be accepted tentatively if the sampled unit is heterogeneous in texture or if the sample is located within 300 mm of strata consisting of differing texture and/or mineralogy. However, where samples are obtained

throughout a vertical profile, consistent values of γ D_r based solely on laboratory measurements may evidence the homogeneity of the γ field and hence accuracy of γ D_r values. Secondly, disequilibrium can force temporal instability in U and Th emissions. The impact of this infrequent phenomenon (Olley et al., 1996) upon age estimates is usually insignificant given their associated margins of error. However, for samples where this effect is pronounced (>50% disequilibrium between ^{238}U and ^{226}Ra; Fig. 7), the resulting age estimates should be accepted tentatively. Thirdly, pedogenically-induced variations in matrix composition of B and C-horizons, such as radionuclide and/or mineral remobilisation, may alter the rate of energy emission and/or absorption. If D_r is invariant through a dated profile and samples encompass primary parent material, then element mobility is likely limited in effect. Fourthly, spatiotemporal detractions from present moisture content are difficult to assess directly, requiring knowledge of the magnitude and timing of differing contents. However, the maximum influence of moisture content variations can be delimited by recalculating D_r for minimum (zero) and maximum (saturation) content. Finally, temporal alteration in the thickness of overburden alters cosmic D_r values. Cosmic D_r often forms a negligible portion of total D_r. It is possible to quantify the maximum influence of overburden flux by recalculating D_r for minimum (zero) and maximum (surface sample) cosmic D_r.

5.0 Estimation of Age

Ages reported in Table 1 provide an estimate of sediment burial period based on mean D_e and D_r values and their associated analytical uncertainties. Uncertainty in age estimates is reported as a product of systematic and experimental errors, with the magnitude of experimental errors alone shown in parenthesis (Table 1). Probability distributions indicate the inter-aliquot variability in age (Fig. 8). The maximum influence of temporal variations in D_r forced by minima-maxima in moisture content and overburden thickness is illustrated in Fig. 8. Where uncertainty in these parameters exists this age range may prove instructive, however the combined extremes represented should not be construed as preferred age estimates. The analytical validity of each sample is presented in Table 2.

6.0 Analytical uncertainty

All errors are based upon analytical uncertainty and quoted at 1σ confidence. Error calculations account for the propagation of systematic and/or experimental (random) errors associated with D_e and D_r values.

For D_e values, systematic errors are confined to laboratory β source calibration. Uncertainty in this respect is that combined from the delivery of the calibrating γ dose (1.2%; NPL, pers. comm.), the conversion of this dose for SiO_2 using the respective mass energy-absorption coefficient (2%; Hubbell, 1982) and experimental error, totalling 3.5%. Mass attenuation and bremsstrahlung losses during γ dose delivery are considered negligible. Experimental errors relate to D_e interpolation using sensitisation corrected dose responses. Natural and regenerated sensitisation corrected dose points (S_i) were quantified by,

$$S_i = (D_i - x.L_i) / (d_i - x.L_i) \qquad \textbf{Eq.1}$$

where D_i = Natural or regenerated OSL, initial 0.2 s
L_i = Background natural or regenerated OSL, final 5 s
d_i = Test dose OSL, initial 0.2 s
x = Scaling factor, 0.08

The error on each signal parameter is based on counting statistics, reflected by the square-root of measured values. The propagation of these errors within Eq. 1 generating σS_i follows the general formula given in Eq. 2. σS_i were then used to define fitting and interpolation errors within exponential plus linear regressions.

For D_r values, systematic errors accommodate uncertainty in radionuclide conversion factors (5%), β attenuation coefficients (5%), a-value (4%; derived from a systematic α source uncertainty of 3.5% and experimental error), matrix density (0.20 $g.cm^{-3}$), vertical thickness of sampled section (specific to sample collection device), saturation moisture content (3%), moisture content attenuation (2%), burial moisture content (25% relative, unless direct evidence exists of the magnitude and period of differing content) and NaI gamma spectrometer calibration (3%). Experimental errors are associated with radionuclide quantification for each sample by NaI and Ge gamma spectrometry.

The propagation of these errors through to age calculation was quantified using the expression,

$$\sigma y\,(\delta y/\delta x) = (\Sigma\,((\delta y/\delta x_n).\sigma x_n)^2)^{1/2} \qquad \textbf{Eq. 2}$$

where y is a value equivalent to that function comprising terms x_n and where σy and σx_n are associated uncertainties.

Errors on age estimates are presented as combined systematic and experimental errors and experimental errors alone. The former (combined) error should be considered when comparing luminescence ages herein with independent chronometric controls. The latter assumes systematic errors are common to luminescence age estimates generated by means identical to those detailed herein and enable direct comparison with those estimates.

Fig. 1 Signal Calibration

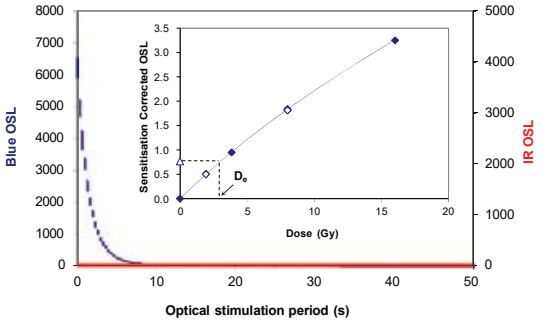


Fig. 1 Signal Calibration Natural blue and laboratory-induced infrared (IR) OSL signals. Detectable IR signal decays are diagnostic of feldspar contamination. Inset, the natural blue OSL signal (open triangle) of each aliquot is calibrated against known laboratory doses to yield equivalent dose (D_e) values. Repeats of low and high doses (open diamonds) illustrate the success of sensitivity correction.

Fig. 2 Dose Recovery The acquisition of D_e values is necessarily predicated upon thermal treatment of aliquots succeeding environmental and laboratory irradiation. The Dose Recovery test quantifies the combined effects of thermal transfer and sensitisation on the natural signal using a precise lab dose to simulate natural dose. Based on this an appropriate thermal treatment is selected to generate the final D_e value.

Fig. 3 Inter-aliquot D_e distribution Provides a measure of inter-aliquot statistical concordance in D_e values derived from **natural** irradiation. Discordant data (those points lying beyond ±2 **standardised ln D_e**) reflects heterogeneous dose absorption and/or inaccuracies in calibration.

Fig. 4 Low and High Repeat Regenerative-doses Measures the statistical concordance of D_e from **low** and **high** repeat regenerative-doses with the applied regenerative-dose. Discordant data (those points lying beyond ±2 ln D_e standardised against the applied regenerative-dose) indicate a significant impact of uncorrected sensitisation upon dose response and D_e interpolation.

Fig. 5 OSL to Post-IR OSL Measures the statistical concordance of post-IR OSL D_e with the applied regenerative-dose. Discordant, underestimating data (those points lying below -2 ln D_e standardised against the applied regenerative-dose) coupled with an IRSL signal (Fig. 1) highlight the presence of significant feldspar contamination.

Fig. 6 Signal Analysis Statistically significant increase in **natural** D_e value with signal stimulation period is indicative of a partially-bleached signal, provided a significant increase in D_e results from **simulated partial bleaching** followed by insignificant adjustment in D_e for simulated **zero** and **full bleach** conditions. Ages from such samples are considered maximum estimates. In the absence of a significant rise in D_e with stimulation time, simulated partial bleaching and zero/full bleach tests are not assessed.

Fig. 7 U Activity Statistical concordance (equilibrium) in the activities of the daughter radioisotope ^{226}Ra with its parent ^{238}U may signify the temporal stability of D_r emissions from these chains. Significant differences (disequilibrium; >50%) in activity indicate addition or removal of isotopes creating a time-dependent shift in D_r values and increased uncertainty in the accuracy of age estimates. A 20% disequilibrium marker is also shown.

Fig. 8 Age Range The **mean age range** provides an estimate of sediment burial period based on mean D_e and D_r values with associated analytical uncertainties. The probability distribution indicates the inter-aliquot variability in age. The **maximum influence** of temporal variations in D_r forced by minima-maxima variation in moisture content and overburden thickness may prove instructive where there is uncertainty in these parameters, however the combined extremes represented should not be construed as preferred age estimates.

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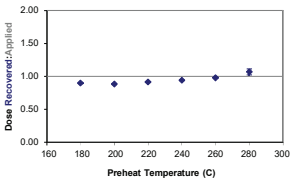


Fig. 3 Inter-aliquot D_e distribution

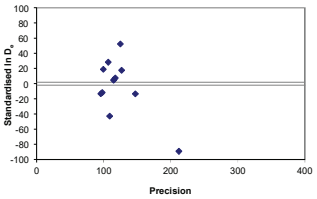


Fig. 4 Low and High Repeat Regenerative-doses

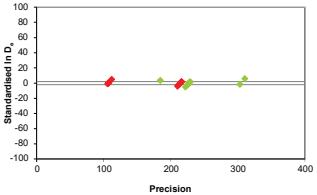
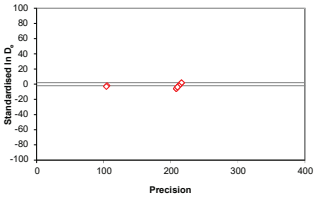


Fig. 5 Post-IR OSL



Sample: GL14063

Fig. 6 Signal Analysis

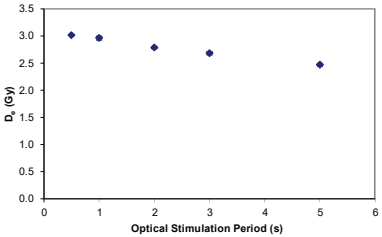


Fig. 7 U Decay Activity

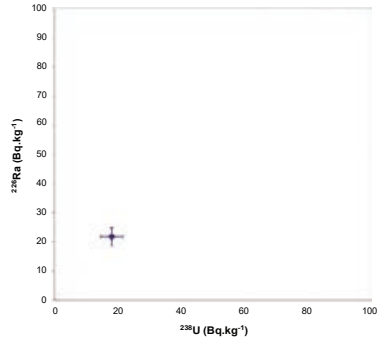
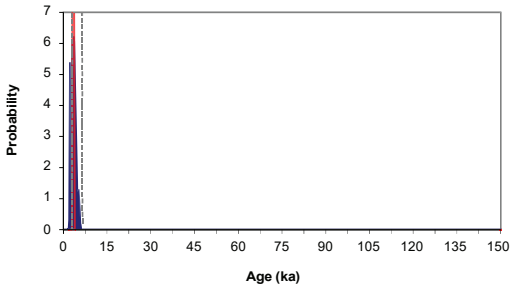


Fig. 8 Age Range



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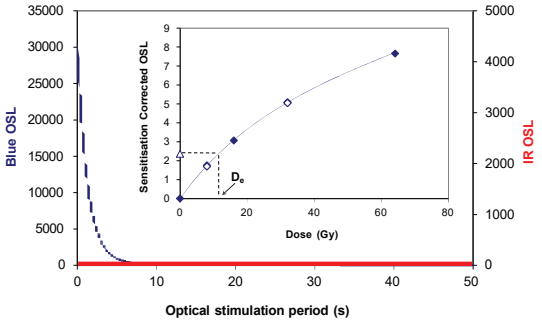

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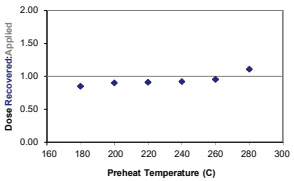

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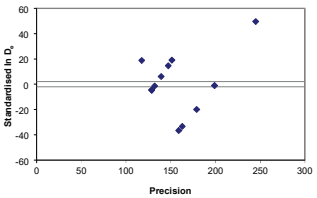

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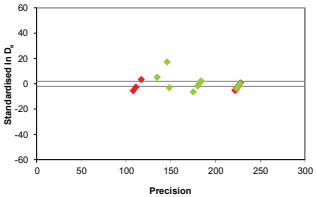
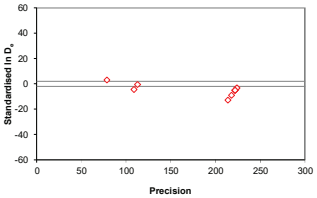
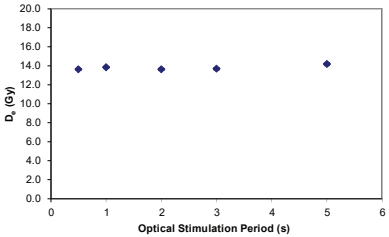


Fig. 5 Post-IR OSL



Sample: GL14064

Fig. 6 Signal Analysis



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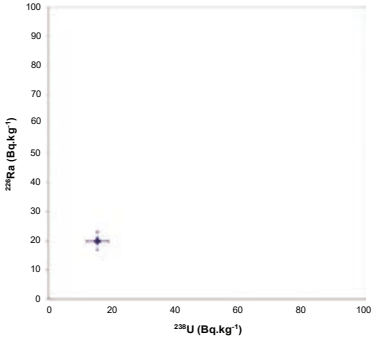
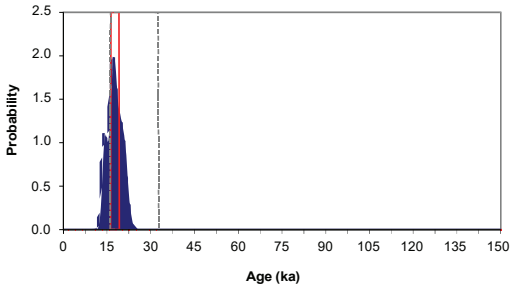


Fig. 8 Age Range



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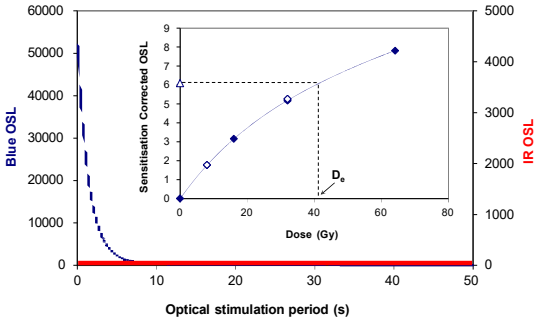


Fig. 1 Signal Calibration Natural blue and laboratory-induced infrared (IR) OSL signals. Detectable IR signal decays are diagnostic of feldspar contamination. Inset, the natural blue OSL signal (open triangle) of each aliquot is calibrated against known laboratory doses to yield equivalent dose (D_e) values. Repeats of low and high doses (open diamonds) illustrate the success of sensitivity correction.

Fig. 2 Dose Recovery The acquisition of D_e values is necessarily predicated upon thermal treatment of aliquots succeeding environmental and laboratory irradiation. The Dose Recovery test quantifies the combined effects of thermal transfer and sensitisation on the natural signal using a precise lab dose to simulate natural dose. Based on this an appropriate thermal treatment is selected to generate the final D_e value.

Fig. 3 Inter-aliquot D_e distribution Provides a measure of inter-aliquot statistical concordance in D_e values derived from **natural** irradiation. Discordant data (those points lying beyond ±2 **standardised ln D_e**) reflects heterogeneous dose absorption and/or inaccuracies in calibration.

Fig. 4 Low and High Repeat Regenerative-doses Measures the statistical concordance of D_e from **low** and **high** repeat regenerative-doses with the applied regenerative-dose. Discordant data (those points lying beyond ±2 ln D_e standardised against the applied regenerative-dose) indicate a significant impact of uncorrected sensitisation upon dose response and D_e interpolation.

Fig. 5 OSL to Post-IR OSL Measures the statistical concordance of post-IR OSL D_e with the applied regenerative-dose. Discordant, underestimating data (those points lying below -2 ln D_e standardised against the applied regenerative-dose) coupled with an IRSL signal (Fig. 1) highlight the presence of significant feldspar contamination.

Fig. 6 Signal Analysis Statistically significant increase in **natural** D_e value with signal stimulation period is indicative of a partially-bleached signal, provided a significant increase in D_e results from **simulated partial bleaching** followed by insignificant adjustment in D_e for simulated **zero** and **full bleach** conditions. Ages from such samples are considered maximum estimates. In the absence of a significant rise in D_e with stimulation time, simulated partial bleaching and zero/full bleach tests are not assessed.

Fig. 7 U Activity Statistical concordance (equilibrium) in the activities of the daughter radioisotope ^{226}Ra with its parent ^{238}U may signify the temporal stability of D_r emissions from these chains. Significant differences (disequilibrium; >50%) in activity indicate addition or removal of isotopes creating a time-dependent shift in D_r values and increased uncertainty in the accuracy of age estimates. A 20% disequilibrium marker is also shown.

Fig. 8 Age Range The **mean age range** provides an estimate of sediment burial period based on mean D_e and D_r values with associated analytical uncertainties. The probability distribution indicates the inter-aliquot variability in age. The **maximum influence** of temporal variations in D_r forced by minima-maxima variation in moisture content and overburden thickness may prove instructive where there is uncertainty in these parameters, however the combined extremes represented should not be construed as preferred age estimates.

Fig. 2 Dose Recovery

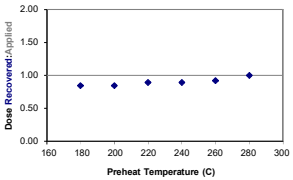


Fig. 3 Inter-aliquot D_e distribution

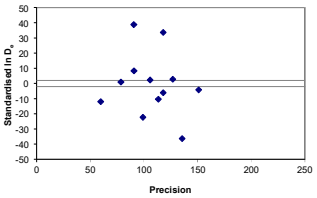


Fig. 4 Low and High Repeat Regenerative-doses

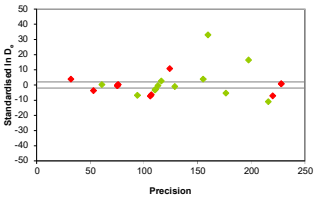
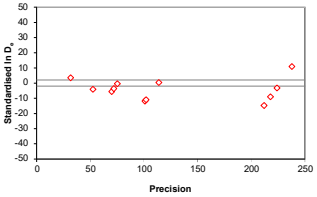


Fig. 5 Post-IR OSL



Sample: GL14065

Fig. 6 Signal Analysis

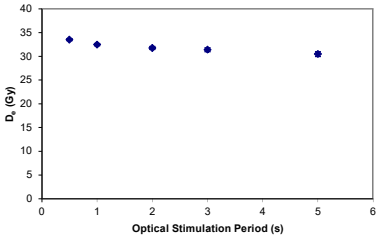
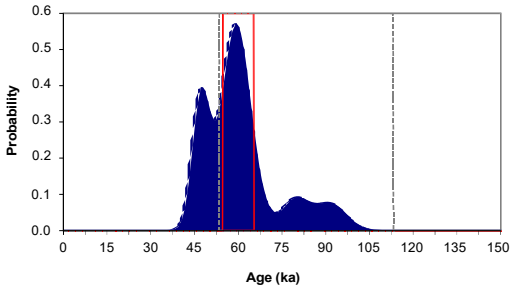


Fig. 7 U Decay Activity

Beneath detection limits

Fig. 8 Age Range



References

Adamiec, G. and Aitken, M.J. (1998) Dose-rate conversion factors: new data. *Ancient TL*, 16, 37-50.

Agersnap-Larsen, N., Bulur, E., Bøtter-Jensen, L. and McKeever, S.W.S. (2000) Use of the LM-OSL technique for the detection of partial bleaching in quartz. *Radiation Measurements*, 32, 419-425.

Aitken, M. J. (1998) An introduction to optical dating: the dating of Quaternary sediments by the use of photon-stimulated luminescence. Oxford University Press.

Bailey, R.M., Singarayer, J.S. , Ward, S. and Stokes, S. (2003) Identification of partial resetting using D_e as a function of illumination time. *Radiation Measurements*, 37, 511-518.

Bateman, M.D., Frederick, C.D., Jaiswal, M.K., Singhvi, A.K. (2003) Investigations into the potential effects of pedoturbation on luminescence dating. *Quaternary Science Reviews*, 22, 1169-1176.

Berger, G.W. (2003). Luminescence chronology of late Pleistocene loess-paleosol and tephra sequences near Fairbanks, Alaska. *Quaternary Research*, 60, 70-83.

Bøtter-Jensen, L., Mejdahl, V. and Murray, A.S. (1999) New light on OSL. *Quaternary Science Reviews*, 18, 303-310.

Bøtter-Jensen, L., McKeever, S.W.S. and Wintle, A.G. (2003) Optically Stimulated Luminescence Dosimetry. Elsevier, Amsterdam.

Duller, G.A.T (2003) Distinguishing quartz and feldspar in single grain luminescence measurements. *Radiation Measurements*, 37, 161-165.

Galbraith, R, F. (1990) The radial plot: graphical assessment of spread in ages. *Nuclear Tracks and Radiation Measurements*, 17, 207-214.

Galbraith, R. F., Roberts, R. G., Laslett, G. M., Yoshida, H. and Olley, J. M. (1999) Optical dating of single and multiple grains of quartz from Jinmium rock shelter (northern Australia): Part I, Experimental design and statistical models. *Archaeometry*, 41, 339-364.

Huntley, D.J., Godfrey-Smith, D.I. and Thewalt, M.L.W. (1985) Optical dating of sediments. *Nature*, 313, 105-107.

Hubbell, J.H. (1982) Photon mass attenuation and energy-absorption coefficients from 1keV to 20MeV. *International Journal of Applied Radioisotopes*, 33, 1269-1290.

Hütt, G., Jaek, I. and Tchonka, J. (1988) Optical dating: K-feldspars optical response stimulation spectra. *Quaternary Science Reviews*, 7, 381-386.

Markey, B.G., Bøtter-Jensen, L., and Duller, G.A.T. (1997) A new flexible system for measuring thermally and optically stimulated luminescence. *Radiation Measurements*, 27, 83-89.

Mejdahl, V. (1979) Thermoluminescence dating: beta-dose attenuation in quartz grains. *Archaeometry*, 21, 61-72.

Murray, A.S. and Olley, J.M. (2002) Precision and accuracy in the Optically Stimulated Luminescence dating of sedimentary quartz: a status review. *Geochronometria*, 21, 1-16.

Murray, A.S. and Wintle, A.G. (2000) Luminescence dating of quartz using an improved single-aliquot regenerative-dose protocol. *Radiation Measurements*, 32, 57-73.

Murray, A.S. and Wintle, A.G. (2003) The single aliquot regenerative dose protocol: potential for improvements in reliability. *Radiation Measurements*, 37, 377-381.

Murray, A.S., Olley, J.M. and Caitcheon, G.G. (1995) Measurement of equivalent doses in quartz from contemporary water-lain sediments using optically stimulated luminescence. *Quaternary Science Reviews*, 14, 365-371.

Olley, J.M., Murray, A.S. and Roberts, R.G. (1996) The effects of disequilibria in the Uranium and Thorium decay chains on burial dose rates in fluvial sediments. *Quaternary Science Reviews*, 15, 751-760.

Olley, J.M., Caitcheon, G.G. and Murray, A.S. (1998) The distribution of apparent dose as determined by optically stimulated luminescence in small aliquots of fluvial quartz: implications for dating young sediments. *Quaternary Science Reviews*, 17, 1033-1040.

Olley, J.M., Caitcheon, G.G. and Roberts R.G. (1999) The origin of dose distributions in fluvial sediments, and the prospect of dating single grains from fluvial deposits using -optically stimulated luminescence. *Radiation Measurements,* 30**,** 207-217.

Olley, J.M., Pietsch, T. and Roberts, R.G. (2004) Optical dating of Holocene sediments from a variety of geomorphic settings using single grains of quartz. *Geomorphology*, 60, 337-358.

Pawley, S.M., Toms, P.S., Armitage, S.J., Rose, J. (2010) Quartz luminescence dating of Anglian Stage fluvial sediments: Comparison of SAR age estimates to the terrace chronology of the Middle Thames valley, UK. *Quaternary Geochronology*, 5, 569-582.

Prescott, J.R. and Hutton, J.T. (1994) Cosmic ray contributions to dose rates for luminescence and ESR dating: large depths and long-term time variations. *Radiation Measurements*, 23, 497-500.

Singhvi, A.K., Bluszcz, A.., Bateman, M.D., Someshwar Rao, M. (2001). Luminescence dating of loess-palaeosol sequences and coversands: methodological aspects and palaeoclimatic implications. *Earth Science Reviews*, 54, 193-211.

Smith, B.W., Rhodes, E.J., Stokes, S., Spooner, N.A. (1990) The optical dating of sediments using quartz. *Radiation Protection Dosimetry*, 34, 75-78.

Spooner, N.A. (1993) The validity of optical dating based on feldspar. Unpublished D.Phil. thesis, Oxford University.

Templer, R.H. (1985) The removal of anomalous fading in zircons. *Nuclear Tracks and Radiation Measurements*, 10, 531-537.

Wallinga, J. (2002) Optically stimulated luminescence dating of fluvial deposits: a review. *Boreas* 31, 303-322.

Wintle, A.G. (1973) Anomalous fading of thermoluminescence in mineral samples. *Nature*, 245, 143-144.

Zimmerman, D. W. (1971) Thermoluminescent dating using fine grains from pottery. *Archaeometry*, 13, 29-52.

Appendix 9: Lithic Data

TestPit	Spit	ID	DATACLASS	MATERIAL	COLOUR	HEAT DAMAGE	DISTEND	MANUPORT	CORTEX
3	2	0001	CompleteSplit	MilkyQuartz	White	N	Feather		0%
3	2	0002	DistalFlake	MilkyQuartz	White	N	Feather		51-99%
3	2	0003	CompleteTool	ClearQuartz	Grey	N	Feather		1-25%
3	2	0004	CompleteFlake	MediumSilcrete	Red	N	Crush		0%
3	2	0005	CompleteFlake	MilkyQuartz	Yellow	N	Crush		51-99%
3	6	0007	DistalFlake	Chert	Red	N	Hinge		0%
3	6	0006	DistalFlake	MediumSilcrete	Yellow	N	Axial		1-25%
2	2	0008	Angular	MediumSilcrete	Red	Y			0%
2	2	0009	CompleteTool	FineSilcrete	Red	N	Feather		0%
2	2	0010	DistalFlake	MediumSilcrete	Red	Y	Feather		1-25%
3	8	0011	Angular	Tuff	Yellow	N			0%
3	7	0012	Angular	Tuff	Yellow	Y			0%
3	7	0013	DistalFlake	Tuff	Yellow	N	Feather		0%
3	9	0014	Angular	Tuff	Yellow	N			0%
3	4	0015	DistalFlake	Chert	Yellow	N	Hinge		0%
3	5	0016	Angular	Tuff	Yellow	N			0%
9	3	0017	Core	MediumSilcrete	Yellow	N			0%
9	6	0018	Core	Tuff	Yellow	N			0%
6	4	0023	CoreFragment	MilkyQuartz	Pink	N			0%
6	3	0024	Angular	FineSilcrete	Red	N			26-50%
6	3	0025	ProximalTool	FineSilcrete	Red	N			0%
6	7	0026	DistalFlake	Chert	Yellow	N	Feather		0%
6	5	0027	CompleteTool	MediumSilcrete	Red	N	Axial		0%

TestPit	Spit	ID	DATACLASS	MATERIAL	COLOUR	HEAT DAMAGE	DISTEND	MANUPORT	CORTEX
6	5	0028	Core	FineSilcrete	Red	N			26-50%
7	6	0019	CompleteFlake	Tuff	Yellow	N	Hinge		0%
7	6	0020	CompleteFlake	Tuff	Brown	N	Axial		0%
7	6	0021	DistalFlake	Tuff	Yellow	N	Feather		0%
7	6	0022	CompleteFlake	Tuff	Yellow	N	Feather		0%

TestPit	Spit	ID	CORTEXT	FORM	PLATTYPE	PLATPREP	FLAKESCARS	SCAR1	TOOLTYPE
3	2	0001		N/A		Y			
3	2	0002	Water-Rolled	Indeterminate					
3	2	0003	Rough	Expanding	Cortical	N	<3	1	Usewear
3	2	0004		Bipolar	Uni	N	<3	90	
3	2	0005	Water-Rolled	Bipolar	Cortical	N	0	1	
3	6	0007		N/A					
3	6	0006	Water-Rolled	N/A					
2	2	0008		N/A					
2	2	0009		N/A	NA	N	0	90	Thumb
2	2	0010	Rind	Elongated					
3	8	0011		N/A					
3	7	0012		N/A					
3	7	0013		N/A					
3	9	0014		N/A					
3	4	0015		Elongated					
3	5	0016		N/A					
9	3	0017							
9	6	0018							
6	4	0023							
6	3	0024	Water-Rolled	N/A					
6	3	0025		Elongated	Uni	N			Backed
6	7	0026		Indeterminate					
6	5	0027		Blade	Uni	N	<3	1	Backed

TestPit	Spit	ID	CORTEXT	FORM	PLATTYPE	PLATPREP	FLAKESCARS	SCAR1	TOOLTYPE
6	5	0028	Water-Rolled						
7	6	0019		Elongated	Uni	N	<3	1	
7	6	0020		Elongated	Uni	N	<3	1	
7	6	0021		N/A					
7	6	0022		Indeterminate	GullWing	Y	>3	1	

TestPit	Spit	ID	RETEDGE	RETTYPE1	RETTYPE2	RETTYPE3	RETTYPE4	CORETYPE	COREBODY
3	2	0001	0						
3	2	0002	0						
3	2	0003	1	N/A	N/A	Usewear	N/A		
3	2	0004	0						
3	2	0005	0						
3	6	0007	0						
3	6	0006	0						
2	2	0008	0						
2	2	0009	3	Backed	Backed	Backed	N/A		
2	2	0010	0						
3	8	0011	0						
3	7	0012	0						
3	7	0013	0						
3	9	0014	0						
3	4	0015	0						
3	5	0016	0						
9	3	0017	0					Unidirectional	Block
9	6	0018	0					Multi	Block
6	4	0023	0						
6	3	0024	0						
6	3	0025	0						
6	7	0026	0						
6	5	0027	2	Backed	Backed	N/A	N/A		

TestPit	Spit	ID	RETEDGE	RETTYPE1	RETTYPE2	RETTYPE3	RETTYPE4	CORETYPE	COREBODY
6	5	0028	0					Microblade	Block
7	6	0019	0						
7	6	0020	0						
7	6	0021	0						
7	6	0022	0						

TestPit	Spit	ID	CORESEC	SCARFORM	CPLATNO	STEPT	HINGET	LENGTH	LENGTHCF
3	2	0001			0			9.32	8.02
3	2	0002			0			12.28	0
3	2	0003			0			18.69	18.74
3	2	0004			0			19.08	19.08
3	2	0005			0			19.25	19.64
3	6	0007			0			20.97	0
3	6	0006			0			14.95	0
2	2	0008			0			11.98	0
2	2	0009			0			9.99	0
2	2	0010			0			21.49	0
3	8	0011			0			14.37	0
3	7	0012			0			19.55	0
3	7	0013			0			16.97	0
3	9	0014			0			12.19	0
3	4	0015			0			11.2	0
3	5	0016			0			13.76	0
9	3	0017	Lenticular	Mixed	1	<5	<5	61.26	0
9	6	0018	Square	Elongated	4	<5	<5	34.63	0
6	4	0023			0			24.43	0
6	3	0024			0			11.48	0
6	3	0025			0			11.84	0
6	7	0026			0			44.36	0
6	5	0027			0			17.61	17.01

TestPit	Spit	ID	CORESEC	SCARFORM	CPLATNO	STEPT	HINGET	LENGTH	LENGTHCF
6	5	0028	Lenticular	Blade	1	<5	0	18.88	0
7	6	0019			0			26.61	22.46
7	6	0020			0			16.57	12.7
7	6	0021			0			33.81	0
7	6	0022			0			31.62	25.91

TestPit	Spit	ID	WIDTH	THICK	CLENGTH	PLWID	PLTH	CORESCAR	CORSCARW
3	2	0001	0	0	0	0	0.82	0	0
3	2	0002	0	0	0	0	0	0	0
3	2	0003	14.52	3.27	0	6.46	1.95	0	0
3	2	0004	12.03	2.61	0	7.34	1.22	0	0
3	2	0005	11.77	6.23	0	5.52	1.71	0	0
3	6	0007	0	0	0	0	0	0	0
3	6	0006	0	0	0	0	0	0	0
2	2	0008	0	0	0	0	0	0	0
2	2	0009	8.84	4.64	0	0	0	0	0
2	2	0010	0	0	0	0	0	0	0
3	8	0011	0	0	0	0	0	0	0
3	7	0012	0	0	0	0	0	0	0
3	7	0013	0	0	0	0	0	0	0
3	9	0014	0	0	0	0	0	0	0
3	4	0015	0	0	0	0	0	0	0
3	5	0016	0	0	0	0	0	0	0
9	3	0017	54.24	29.03	35.88	0	0	15.74	14.37
9	6	0018	25.94	11.15	21.24	0	0	21.24	10.75
6	4	0023	12.4	8.63	0	0	0	0	0
6	3	0024	0	0	0	0	0	0	0
6	3	0025	0	0	0	6.33	2.47	0	0
6	7	0026	0	0	0	0	0	0	0
6	5	0027	7.42	5.42	0	5.52	3.63	0	0

TestPit	Spit	ID	WIDTH	THICK	CLENGTH	PLWID	PLTH	CORESCAR	CORSCARW
6	5	0028	16.56	10.2	15.9	0	0	12.22	7.26
7	6	0019	13.81	4.32	0	9.79	2.01	0	0
7	6	0020	8.24	3.15	0	7.4	5.85	0	0
7	6	0021	0	0	0	0	0	0	0
7	6	0022	26.16	5.22	0	18.21	3.18	0	0

TestPit	Spit	ID	CORSCAR	WEIGHT
3	2	0001		0.1
3	2	0002		0.3
3	2	0003		1.2
3	2	0004		0.8
3	2	0005		1.6
3	6	0007		0.7
3	6	0006		0.5
2	2	0008		0.3
2	2	0009		0.3
2	2	0010		1.1
3	8	0011		0.3
3	7	0012		0.8
3	7	0013		0.5
3	9	0014		0.3
3	4	0015		0.2
3	5	0016		0.3
9	3	0017	>10	112.9
9	6	0018	3-5	10.1
6	4	0023		2.5
6	3	0024		0.2
6	3	0025		0.3
6	7	0026		10.9
6	5	0027		0.6

TestPit	Spit	ID	CORSCAR	WEIGHT
6	5	0028	1-2	3.3
7	6	0019		2
7	6	0020		0.4
7	6	0021		3.5
7	6	0022		4.4

Appendix 10: AHIMS Site Card – MA14

Aboriginal Site Recording Form

AHIMS Aboriginal Heritage Information Management System

Department of Environment & Climate Change NSW

AHIMS Registrar
PO Box 1967, Hurstville NSW 2220

Office Use Only

Site Number _____

Date received __/__/__ Date entered into system __/__/__ Date catalogued __/__/__

Entered by (I.D.) _____

Information Access

☐ Gender/male ☐ Gender/female ☐ Location restriction ☐ General restriction ☐ No access

Office Use Only

For Further Information Contact:

☐ **Nominated Trustee**

Title	Surname	First Name	Initials

Organisation _____

Address _____

Phone number _____ Fax _____

Client on system ☐

☐ **Knowledge Holder**

Title	Surname	First Name	Initials

Organisation _____

Address _____

Phone number _____ Fax _____

Client on system ☐

Aboriginal Heritage Unit or Cultural Heritage Division Contacts

_____

Geographic Location

Site Name: MA14

Easting: 307312 Northing: 6239795 AGD/GDA: GDA

Mapsheet _____

Zone 56 Location Method: Non-Differential GPS

Other Registration _____

Primary Recorder

Title	Surname	First Name	Initials
Mr	Williams	Alan	N

Organisation: AHMS Pty Ltd

Address: 2/729 Elzibeth St, Waterloo

Phone number: 02 9555 4000 Fax: 02 9555 7005

Date recorded: 02/03/2015

Client on system ☐

NPWS Aboriginal Site Recording Form - Site Information

OPEN/CLOSE SITE Open Site

Site Context

Landform

- ☐ Mountainous
- ☐ Plain
- ☐ Rolling hills
- ☐ Steep hills
- ☐ Undulating plain

Landform Unit

- ☐ Beach
- ☐ Coastal rock platform
- ☐ Dune
- ☐ Intertidal flat
- ☐ Lagoon
- ☐ Tidal Creek
- ☐ Tidal Flat
- ☐ Cliff
- ☐ Crest
- ☐ Flat
- ☐ Lower slope
- ☐ Mid slope
- ☐ Upper slope
- ☐ Plain
- ☐ Ridge
- ☐ Tor
- ☐ Valley flat
- ☐ Levy
- ☐ Stream bank
- ☐ Stream channel
- ☐ Swamp
- ☐ Terrace
- ☐ Terrace flat

Slope

☐ degrees

Vegetation

- ☐ Closed forest
- ☐ Grasslands
- ☐ Isolated clumps of trees
- ☐ Open forest
- ☐ Open woodland
- ☐ Scrub
- ☐ Woodland
- ☐ Cleared
- ☐ Revegetated
- ☐ N/A

Land use

- ☐ Conservation
- ☐ Established urban
- ☐ Farming-intensive
- ☐ Farming-low intensity
- ☐ Forestry
- ☐ Industrial
- ☐ Mining
- ☐ Pastoral/grazing
- ☐ Recreation
- ☐ Semi-rural
- ☐ Service corridor
- ☐ Transport corridor
- ☐ Urban expansion
- ☐ N/A

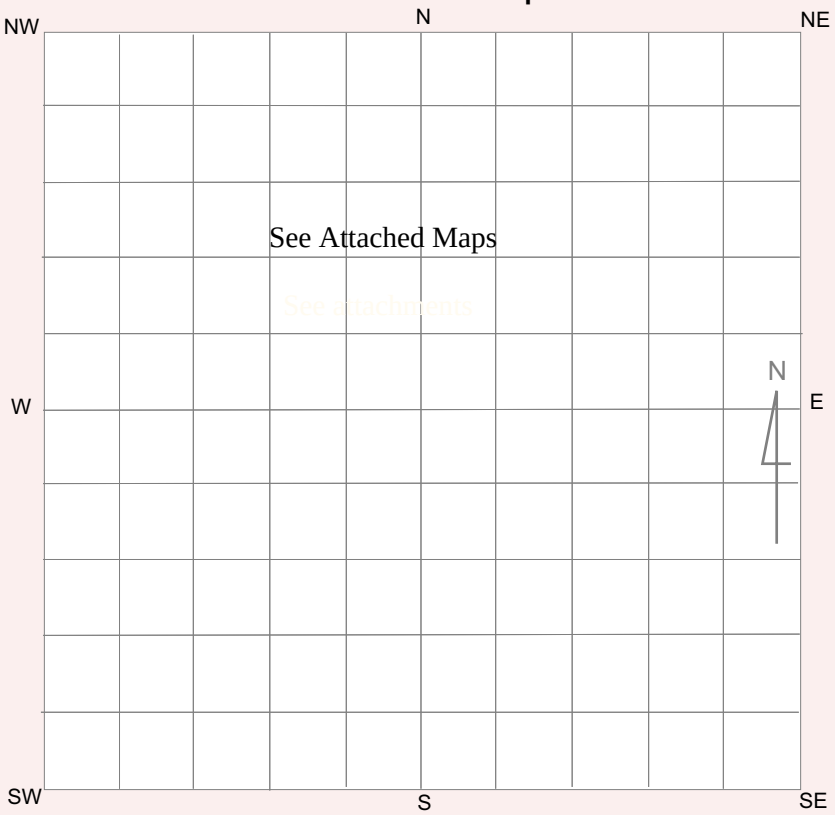
Water

Distance to permanent water source	75 metres
Distance to temporary water source	150 metres
Name of nearest permanent water source	Georges R
Name of nearest temporary water	Anzac Ck

Directions for Relocation

This site is located on the banks of the Georges River in the Defence School of Military Engineering, Moorebank. To get to the site enter the base at Chatham Avenue, head south along Tarakan Road. The site consists of the ridge between the end of the road and the Eastern Hills railway line to the south. It is currently used as a golf course.

Site Location Map



Current Land Tenure

- ☐ Public — National Park / other Government Dept.
- ☐ Private — Defence

Primary report **I.D.** ☐ (I.D. Office Use only)

AHMS (2015) SIMTA Intermodal Terminal - Stage 1 - Aboriginal Heritage Impact Assessment. Unpublished Report for Hyder Consuting Pty Ltd

NPWS Aboriginal Site Recording Form - Site Information

General Site Information

Closed Site

Shelter/Cave Formation

- ☐ Boulder
- ☐ Wind erosion
- ☐ Water erosion
- ☐ Rock collapse

Rock Surface Condition

- ☐ Boulder
- ☐ Sandstone platform
- ☐ Silica gloss
- ☐ Tessellated
- ☐ Weathered
- ☐ Other platform

Condition of Ceiling

- ☐ Boulder
- ☐ Sandstone platform
- ☐ Silica gloss
- ☐ Tessellated
- ☐ Weathered
- ☐ Other platform

Shelter Aspect

- ☐ North
- ☐ North East
- ☐ East
- ☐ South East
- ☐ South
- ☐ South West
- ☐ West
- ☐ North West

Open Site

Site Orientation

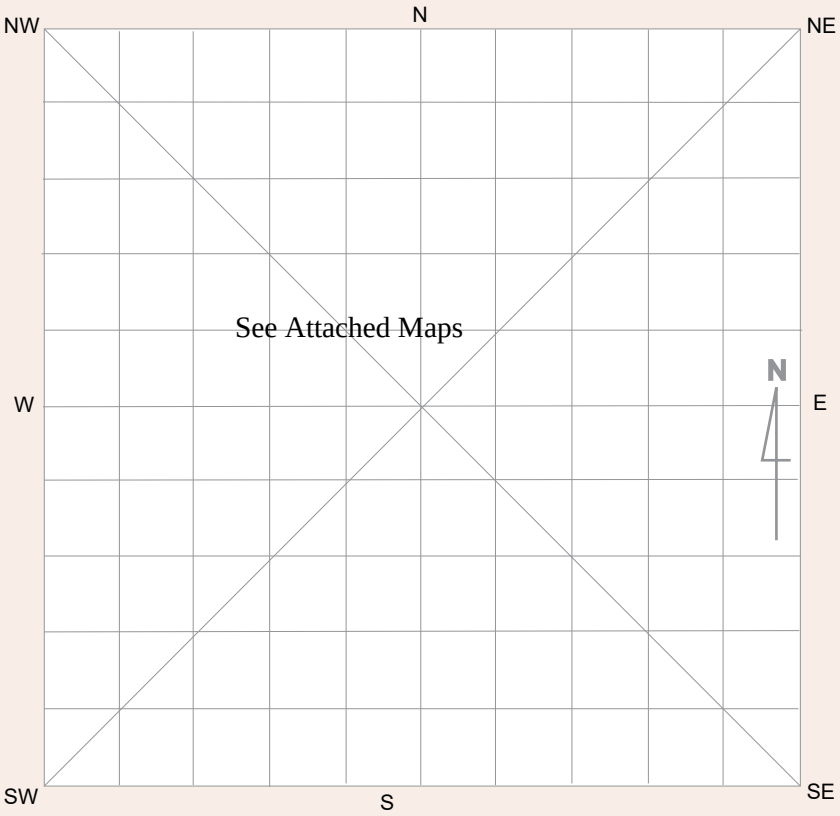
- ☐ N-S
- ☐ NE-SW
- ☐ E-W
- ☐ SE-NW
- ☐ N/A

Features

- ☐ 1. Aboriginal Ceremony & Dreaming
- ☐ 2. Aboriginal Resource & Gathering
- ☐ 3. Art
- ☐ 4. Artefact
- ☐ 5. Burial
- ☐ 6. Ceremonial Ring
- ☐ 7. Conflict
- ☐ 8. Earth Mound
- ☐ 9. Fish Trap
- ☐ 10. Grinding Groove
- ☐ 11. Habitation Structure
- ☐ 12. Hearth
- ☐ 13. Non Human Bone & Organic Material
- ☐ 14. Ochre quarry
- ☐ 15. Potential Archaeological Deposit
- ☐ 16. Stone Quarry
- ☐ 17. Shell
- ☐ 18. Stone Arrangement
- ☐ 19. Modified Tree
- ☐ 20. Water Hole

Site Plan

Indicate scale, boundaries of site, features



Site Dimensions

Closed Site Dimensions (m)

- ☐ Internal length
- ☐ Internal width
- ☐ Shelter height
- ☐ Shelter floor area

Open Site Dimensions (m)

- 100 Total length of visible site
- 100 Average width of visible site
- 100 Estimated area of visible site
- 100 Length of assessed site area

Aboriginal Community Interpretation and Management Recommendations

No specific information was provided on the site, although the importance of Georges River as a resource by Aboriginal people was identified. Given the site's proxmity to the creek, it is considered likely to have cultural values.

Preliminary Site Assessment

Site Cultural & Scientific Analysis and Preliminary Management Recommendations

The site consisted of two periods of activity within a deep (90cm) coarse silt flood deposit on the ridgeline over-looking Georges River. The upper assemblage was of late Bondaian age (3-0.2ka), while the lower assemblage had Capertian characteristics. The sample size was, however, very low (28 objects), and future recommendations include additional work at the site. OSL samples for the deposit are also being processed. The site is considered of local significance due to its high research potential. This may be revised following receipt of dates and/or further investigation on the site.

This section should only be filled in by the Endorsees

Endorsed by: ☐ Knowledge Holder ☐ Nominated Trustee ☐ Native Title Holder ☐ Community Consensus

Title | Surname | First Name | Initials

Organisation

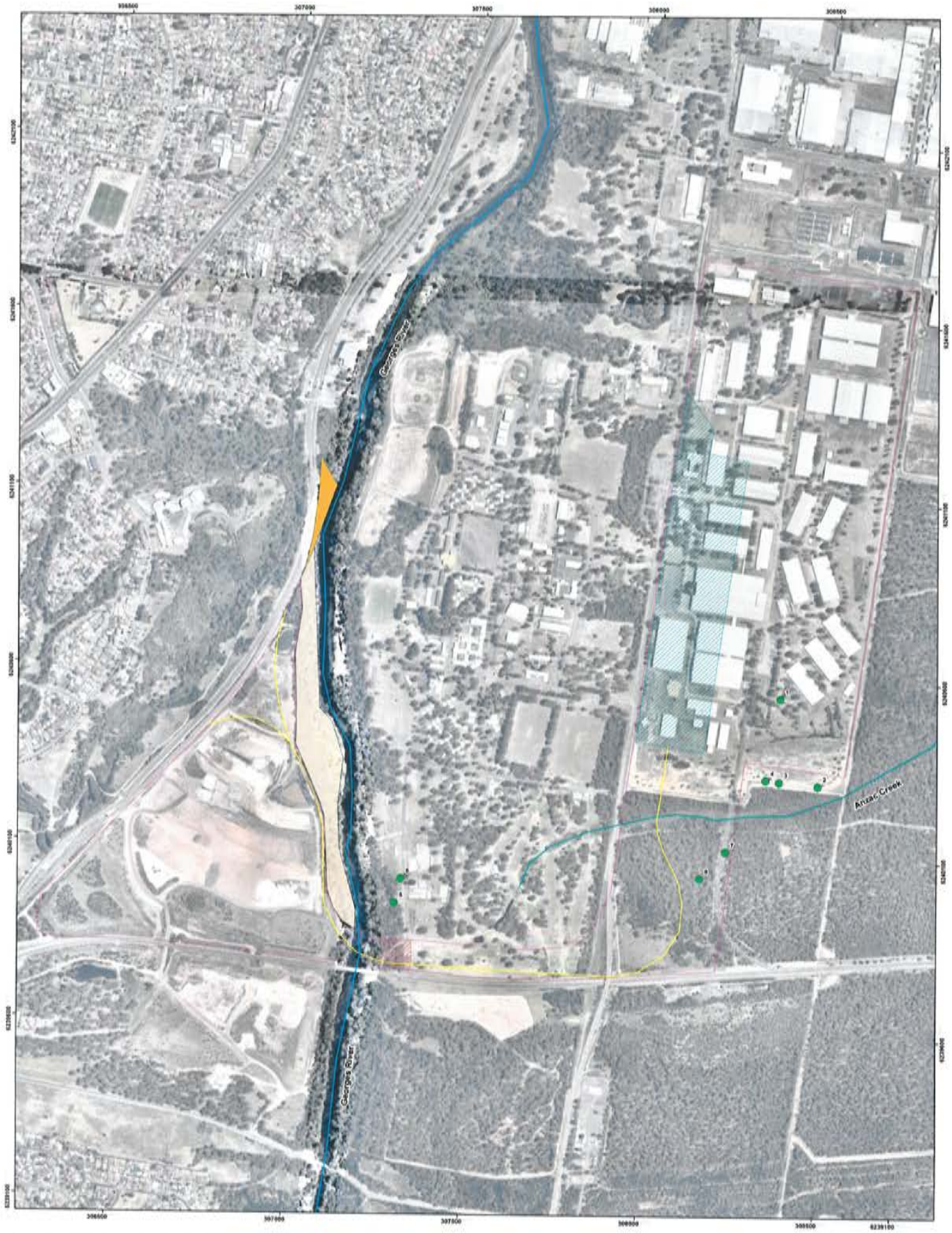
Address

Phone number | Fax

Attachments (No.)

- ☐ A4 location map
- ☐ B/W photographs
- ☐ Colour photographs
- ☐ Slides
- ☐ Aerial photographs
- ☐ Site plans, drawings
- ☐ Recording tables
- ☐ Other
- ☐ Feature inserts-No. ☐

Comments



Legend

- SIMTA Concept Approval Boundary
- Stage 1 Rail Corridor
- Stage 1 Study Area
- Navin Officer Heritage Consultants 2014
- Area of Cultural Value
- Isolated Finds
- MA14

AHMS
HERITAGE ADVISORS TO AUSTRALIA AND THE ASIA PACIFIC

0 50100 200 300 400
Metres

N

Map Date: 25.2.15
Prepared by: AW (AHMS)
Data: NearMap, AHMS
Projection: GDA 94 MGA Zone 56

Figure 10: An Archaeological Model of the SIMTA site

Hyder Consulting Pty Ltd

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