Moorebank Intermodal Terminal:
Aboriginal cultural heritage salvage strategy

FINAL REPORT

Prepared for Liberty Industrial on behalf of SIMTA

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Glossary

AHIMS	Aboriginal Heritage Information Management System
AMS	Accelerator Mass Spectrometry
CBD	Central Business District
CHL	Commonwealth Heritage Listing
CoA	Conditions of Approval
DEC	Department of Environment and Conservation
DECCW	Department of Climate Change and Water
DoE	Department of the Environment
EA	Environmental Assessment
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environmental Protection and Biodiversity Conservation Act1999*
NOHC	Navin Officer Heritage Consultants
NPW Act	*National Parks and Wildlife Act 1974*
NSW	New South Wales
OEH	Office of Environment and Heritage
RAPs	Representative Aboriginal Party
Study area	The broader area of the Moorebank IMT site

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1 Introduction

1.1 Project background

Biosis has been commissioned by Liberty Industrial on behalf of SIMTA to prepare an Aboriginal cultural heritage salvage strategy (salvage strategy). The salvage strategy has been prepared to guide the Aboriginal salvage required as part of condition B7 of the Minister's Conditions of Approval (CoA). The Moorebank Intermodal Terminal is located in Moorebank, NSW. The study area is located in the Liverpool Local Government Area, approximately 30 kilometres south-west of the Sydney CBD and 4 kilometres south of the Liverpool CBD (Figure 1 and Figure 2).

The Moorebank Intermodal Terminal Environmental Assessment (EA) (Parsons Brinkerhoff, 2014) assessed the impacts of construction of the project on Aboriginal and non-Aboriginal heritage. As part of EA development, detailed Aboriginal and non-Aboriginal cultural heritage assessment was prepared to address the Director General's Requirements issued by the (then) Department of Planning. The assessments were included in the EA as:

- Volume 7, Technical paper 10: Aboriginal heritage assessment (Navin Officer Heritage Consultants 2014a) (NOHC).

The following heritage documents were also prepared as part of the response to submissions:

- Appendix I: Aboriginal scar tree assessment (NOHC 2014b).
- Appendix J: Cultural heritage report (NOHC 2014c).

The impact assessment in NOCH (2014a: 105 - 116) identified that sites MA1, MA2, MA3, MA4, MA5 and MA9 must be salvaged as these are all located within the construction footprint and will be wholly or partially impacted by the project.

1.2 Planning approvals

The concept and early works (stage 1) associated with the project received approval on 3 June 2016 under Part 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) (SSD 5066). The CoAs incorporate the recommendations made as part of Volume 7 (NOHC 2014a) and NOHC (2014c). The Conditions of Approvals have a number of requirements relating to Aboriginal heritage, this document satisfies condition B7, which states that:

> *Prior to the commencement of Early Works affecting sites MA1, MA2, MA3, MA4, MA5 and MA9, the Applicant shall:*
>
> *(a) develop a detailed salvage strategy, prepared in consultation with the OEH (Aboriginal heritage) and the Aboriginal stakeholders. The investigation program shall be prepared to the satisfaction of the Secretary; and*
>
> *(b) undertake any further archaeological excavation works recommended by the results of the Aboriginal archaeological excavation program.*
>
> *Within twelve months of completing the above work, unless otherwise agreed by the Secretary, the Applicant shall submit a report containing the findings of the excavations, including artefact analysis and Aboriginal Site Impacts Recording Forms (ASIR), and the identification of final storage for all Aboriginal objects recovered (testing and salvage), prepared in consultation with the Aboriginal stakeholders, the OEH (Aboriginal heritage) and to the satisfaction of the Secretary.*

Note: where archaeological testing has occurred as part of the Environmental Assessment and the results are included in the documents listed in condition 4 the sites tested must still form part of the final report prepared under B7(b).

Specifically, this document addressed Condition B7 (a) that requires a detailed salvage strategy to be prepared in consultation with OEH and Aboriginal stakeholders to the satisfaction of the secretary. Consultation that has been undertaken with OEH and Aboriginal stakeholders is detailed in Section 1.3.

In order to further reduce environmental impacts, SIMITA has committed to undertaking a series of Recommended Environmental Mitigation Measures (REMMs). Seven of the REMMs relate to Aboriginal heritage, three of these need to be considered as part of this salvage strategy. These are outlined below:

12D - An archaeological salvage excavation program would be implemented to preserve archaeological deposits of moderate to high archaeological/scientific significance located within the construction footprint (items recorded at MA5 and MA9).

Consideration would be given to conserving both sites in situ, within open space reserves, or as an extension of the proposed conservation zone.

12E - A surface salvage program would be carried out to conserve surface artefacts located within the construction footprint (items recorded at MA1, MA2, MA3 and MA4). Salvage of surface artefacts would be undertaken before any impacts in these areas.

12G - Consultation would be ongoing with the registered Aboriginal parties during construction of the Project and would include:

- *consultation on the future care and management of recovered Aboriginal objects;*
- *methodologies for any future investigations; and*
- *finalisation of management and mitigation strategies subject to detailed design.*

Other relevant legislation and planning instruments that will inform this assessment include:

- *Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act)*
- *Environmental Planning and Assessment Act 1979 (NSW) (EP&A Act)*
- *National Parks and Wildlife Act 1974 (NSW)*
- *National Parks and Wildlife Amendment Act 2010 (NSW)*

1.3 Regulator and Aboriginal consultation

Consultation and collaboration with registered Aboriginal stakeholders has been integral to the assessment and management of Aboriginal cultural heritage for the project. Consultation undertaken to date is outlined in the EA, this was undertaken initially accordance with the Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DEC, 2005) with the consultation being later restarted under the Aboriginal cultural heritage consultation requirements for proponents 2010 (DECCW, 2010a).

The following groups registered under the DEC 2005 guidelines:

- Tharawal Local Aboriginal Land Council.
- Cubbitch Barta Native Title Claimants Aboriginal Corporation.
- Darug Land Observations.

- Darug Custodian Aboriginal Corporation.
- Darug Aboriginal Cultural Heritage Assessments.
- Darug Aboriginal Landcare Incorporated.
- Banyadjaminga.

The following groups registered upon restarting the consultation under the DECCW 2010a requirements:

- Gandangara Local Aboriginal Land Council.
- Tocomwall Pty Ltd.

A copy of this methodology was sent to the groups above and OEH on 19 September 2016 for a period of 28 days for their review and comment. Table 1 details the responses received from these groups.

Table 1 Outcomes of consultation with Aboriginal stakeholders

Group	Correspondence	Outcome
Tharawal Local Aboriginal Land Council	Emailed salvage strategy on 19 September 2016.	No response
	Phone call and voicemail left on 13 January 2017.	No response
	Salvage strategy resent via email.	-
	Response received from Tharawal Local Aboriginal Land Council	Tharawal Local Aboriginal Land Council support the salvage strategy and recommended any recovered artefacts be buried on Country (the study area). **Consultation closed.**
Cubbitch Barta Native Title Claimants Aboriginal Corporation	Emailed salvage strategy on 19 September 2016.	Comments from [redacted] have been addressed in Appendix B. Biosis has updated this document to incorporate all relevant comments. **Consultation closed.**
Darug Land Observations	Emailed salvage strategy on 19 September 2016.	Phone response agreeing with salvage strategy. **Consultation closed.**
Darug Custodian Aboriginal Corporation	Emailed salvage strategy on 19 September 2016.	Phone response agreeing with salvage strategy. **Consultation closed.**

Group	Correspondence	Outcome
Darug Aboriginal Cultural Heritage Assessments	Emailed salvage strategy on 19 September 2016.	Phone response agreeing with salvage strategy. **Consultation closed.**
Darug Aboriginal Landcare Incorporated	Emailed salvage strategy on 19 September 2016.	Email response agreeing with salvage strategy. **Consultation closed.**
Banyadjaminga	Emailed salvage strategy on 19 September 2016.	No response. The EIS does not contain any email, phone or other contact details for this group and they did not participate in the surveys or consultation process beyond registration. Biosis has reviewed the most recent OEH consultation list for the region and this group are not included. As such, Biosis has not been able to consult any further with this group. Biosis has been advised by Tharawal LALC that Banyadjaminga are a charity and do not undertake Aboriginal consultation work. **Consultation closed.**
Gandangara Local Aboriginal Land Council	Emailed salvage strategy on 13 January 2017	Gandangara LALC responded on 24 February 2017 that they accepted the salvage strategy with no comments. **Consultation closed.**
Tocomwall Pty Ltd	Emailed salvage strategy on 13 January 2017	Comments from Tocomwall have been addressed in Appendix B. Biosis has updated this document to incorporate all relevant comments. **Consultation closed.**

OEH responded on 19 September 2016, stating that they will not be commenting on the methodology. Four RAPs (Tharawal Local Aboriginal Land Council, Darug Land Observations, Darug Aboriginal Landcare Incorporated and Cubbitch Barta Native Title Claimants Aboriginal Organisation) have recommended reburial of salvaged artefacts onsite, this is addressed further in Section 2.5.

Representatives of the registered Aboriginal stakeholders will be invited to participate in the Aboriginal heritage salvage as outlined below. Negotiation about the rates of pay and number of days for each group will be undertaken prior to fieldwork commencing. All Aboriginal participants will be required to sign a Biosis services agreement prior to participation in the Aboriginal heritage excavations.

1.4 Contributors

This report was prepared by [redacted], Principal Archaeologist at Biosis Pty Ltd. This report has been reviewed by [redacted], Senior Archaeologist and [redacted] Wollongong Resource Group Manager.

Figure 1 Location of the study area

Figure 2 Detailed aerial imagery of the study area

2 Salvage strategy

2.1 Background

The Aboriginal cultural heritage values were subject to assessment through the following processes:

- Literature and database review
- Archaeological survey
- Archaeological testing
- Aboriginal consultation
- Assessment of significance and proposed impacts.

Upon completion, fourteen Aboriginal heritage sites were identified as relevant to the study area. These are detailed in Table 2 and their locations are identified in Figure 3.

2.1.1 Document review

The following documents were reviewed in preparation of this document:

- Archaeological & Heritage Management Solutions Pty Ltd (AHMS) 2012 Aboriginal Cultural Heritage Assessment [Final]. Appendix U In, *SIMTA Sydney Intermodal Terminal Alliance Part 3A Concept Application*, Hyder Consulting Pty Ltd.
- Navin Officer Heritage Consultants. 2014a. *Volume 7, Technical paper 10: Aboriginal heritage assessment*. Report prepared for Parsons Brinkerhoff.
- Navin Officer Heritage Consultants. 2014b. *Appendix I: Aboriginal scar tree assessment*. Report prepared for Parsons Brinkerhoff.
- Navin Officer Heritage Consultants. 2014c. *Appendix J: Cultural heritage report*. Report prepared for Parsons Brinkerhoff.

Table 2 Aboriginal heritage sites associated with the project.

Site	Description	Significance		Early works schedule
		Burra Charter	CHL	
MA1	This recording consists of three surface artefacts on or adjacent to an approximate 90 m interval of roadway near the entrance to the Initial Employment Training Squadron Building. The area was noted to be extensively disturbed by earthworks, importation of fill and gravel, and the installation of underground services. A total of four mechanical test pits were excavated which retrieved eight artefacts.	Low	Yes	Yes
MA2	This recording consists of a single artefact (banded grey fine grained metamorphic sedimentary rock)	Low	Yes	Yes

Site	Description	Significance		Early works schedule
		Burra Charter	CHL	
	situated in a shallow scald within mown grass north of the entry gates to the SME. The area has undergone vegetation clearance, agricultural development, grading, soil removal and construction of surface drainage.			
MA3	This recording consists of a single artefact located at the base of the cut and graded Tertiary terrace edge and is approximately 300 m south of MA4 (Figure 20.3). The area has been extensively disturbed by Defence-related earthworks and excavations. The artefact was a banded grey-grey green rhyolite multi-platform core.	Low	Yes	Yes
MA4	This recording is a low density artefact scatter of three artefacts exposed on the edge of a Tertiary terrace and situated on a gravelled dirt track. The track slopes down onto river flats, which were highly disturbed by excavation and landscaping.	Low	Yes	Yes
MA5	This recording consists of three artefacts situated on the high side of an artificially benched slope atop the Tertiary terrace, and adjacent to the lower lying dirt pan. Eleven pits were excavated within MA5 (nine mechanical and two hand excavated). A total of 110 artefacts were retrieved. The excavations indicated that the site may have the potential to contain an intact deposit that reflects sporadic activity through time.	Moderate to high	Yes	Yes
MA6	The scarred tree is an old growth Eucalyptus in fair to good health, with a number of hollows and missing limbs. The scar was of an irregular and asymmetrical shape and was assessed to be of possible Aboriginal origin. The scar on MA6 has been estimated to be between 265 and 219 years old.	High	Yes	No
MA7	The scarred tree was recorded as a smooth barked Eucalyptus (Red gum). The tree is located close to a playing field and the Tertiary terrace edge, and is approximately 80–100 m from the river. The scar regrowth is irregular and the age of the tree and the scar may be post-European settlement. It was assessed to be of possible Aboriginal origin. MA7 has been estimated to been made 86 years ago	High	Yes	No

Site	Description	Significance		Early works schedule
		Burra Charter	CHL	
MA8	The scarred tree was recorded as a rough barked Eucalyptus, becoming smooth barked two thirds of the way up the trunk. The tree is located approximately 60 m from the river. The scar may have been caused by machinery during the cutting and benching of the area. A possible Aboriginal origin is supported by the possible age and symmetrical shape of the scar, the amount of scar regrowth and the tree type, as well as its proximity to the Georges River.	High	Yes	No
MA9 (MA PAD 1)	This recording consists of the banks and a fringing 50 m radius around a natural lake basin situated in the far northern portion of the project site. This lake basin is situated close to the riparian corridor of the Georges River. It provides a strong basis for predicting evidence of past Aboriginal occupation along its original banks and surrounds. A total of 10 hand excavated pits were excavated within MA9 which identified 130 artefacts.	Moderate to high	Yes	Yes
MA10 (MRSA 1)	This potential archaeological deposit was described by AHMS (2012) as a river terrace running along the eastern side of the Georges River, based on the landform, the presence of intact soil profile and the presence of artefacts. A total of six hand excavated pits were excavated within MA10 with 16 artefacts retrieved.	Moderate to low	Yes	No
MRSA2 (MA14)	MRSA2 is located on the tertiary terrace edge of the Georges River. A total of 7 test pits were completed at MRSA2 with a total of 34 artefacts were recovered.	Moderate to high	Yes	No
MA PAD 2 (Unit 1) **MA PAD 2 (Unit 2)**	MAPAD2 is located on an archaeologically sensitive landform. Disturbance within this PAD is moderate, and is mostly related to previous use as a golf course. The most common impacts on the original ground surface of this landform are earthworks, resulting in both cuttings into and capping of the PAD. As the deposit depth is considered to be more than 1 m, archaeological subsurface potential exists in both disturbed (cut into and capped) and undisturbed areas of this PAD. As part of the subsurface testing program 45 test pits were excavated across MAPAD2 comprising 37 by-hand test pits and eight mechanical pits. A total of 14	High	Potentially	No

Site	Description	Significance		Early works schedule
		Burra Charter	CHL	
	artefacts were recovered from 9 pits (Pits 1, 5, 9, 10, 12, 13, 14, 34 and 42. This testing program led to the identification of MA11, MA12 and MA13.			
MA 11	MA 11 consists of artefacts associated with the Unit 3 fill that has been reworked and deposited as the result of mechanical earth works at the southern end of MAPAD2 (Pits 1 and 5).	Low	No	No
MA 12	MA12 consists of artefacts associated with Unit 2 fluvial sands across the central southern portion of MAPAD2 (Pits 9, 10, 12, 13, 14 and 42).	Low	Yes	No
MA 13	MA13 is a single artefact associated with the Unit 1 silts at the northern end of the test area (Pit 34, Spit 9).	Low	Yes	No
PAD2	PAD2 is located 40m outside of the impact area. [1]	Unknown	Unknown	No

[1] AHMS 2012 indicate that at this stage the significance of PAD2 (formerly referred to as MA14) cannot be determined based upon the current information. It may contain high research potential based upon the landforms ability to contain undisturbed archaeological deposits.

Figure 3 Location of Aboriginal heritage sites associated with the project

2.2 Surface salvage methodology

In accordance with condition B7 the surface salvage of MA1, MA2, MA3 and MA4 is required to be undertaken based upon the findings of the EIS technical papers.

The surface salvage will consist of the following tasks:

- A surface inspection and recording of MA1, MA2, MA3 and MA4 to assess current site conditions and the presence or absence of Aboriginal objects detailed in the site recordings.
- Prior to subsurface salvage, a surface salvage of MA5 will take place.
- Collection of Aboriginal objects identified at MA1, MA2, MA3 and MA4 in partnership with the Registered Aboriginal Stakeholders.
- The artefacts collected as part of the surface salvage will be analysed and managed as part of the assemblage salvaged as part of the subsurface excavations.
- The results will be incorporated into the salvage report (detailed in Section 2.5) and Aboriginal Heritage Information Management System (AHIMS) Site Impact Recording Form will be completed and submitted to the AHIMS Registrar for MA1, MA2, MA3 and MA4, within three months of the completion of the surface salvage.
- The artefacts collected from sites MA1, MA2, MA3, MA4 and MA5 will be kept with all artefacts collected from the subsurface salvage. All artefact and cultural material will be kept in a locked cupboard at the Biosis Wollongong office located at 8 Tate Street, Wollongong.

2.3 Sub surface salvage strategy

2.3.1 Justification for excavation

It is proposed that subsurface salvage investigation be conducted for Aboriginal site MA5 and MA9. The salvage excavation would be able to provide further information relating to the artefacts typology and material type, as well as the nature of the activities taking place at MA5 and MA9. Both MA5 and MA9 are present within relatively deep sandy soils associated with river terraces associated with the Georges River corridor (NOHC 2014a: 71-72). The soils show pedogenic properties and horizon development in patterns consistent with elevation and the geomorphological surfaces and landforms on which they occur. Bleached horizons are common in the soils across the area equivalent to an A2 horizon or E horizon definition. The bleached horizons overlie less permeable clayey subsoils or incipient pans. Shale sap rock is suspected below levels excavated in test pits at some locations. Disturbances have been shown to be present across both MA5 and MA9 which have truncated natural soil profiles. In MA5 the northern portion of the site was shown to be heavily disturbed with the southern section appearing to contain a higher level of preservation (NOHC 2014a: 82).

MA5 is located within a river terrace associated with the Georges River. The archaeological test excavations conducted by NOHC as part of the EA at MA5 recovered 110 artefacts from eight of the 11 pits excavated. Artefacts were recovered from Pits 1 (N = 7) with the majority coming out of Pit 3 (N = 50) and Pit 2 (N = 18). Where artefacts were present, artefact numbers per pit varied from two at Pits 2, 4 and 11 through to 62 Pit 7. Artefacts types recovered from MA5 consisted of backed artefacts (N = 5), flakes (N = 74), flaked pieces (N = 17), fragments (N = 2), hammer stone (N = 1), retouched flakes (N = 8) and utilised flakes (N = 3). The predominant raw material type was silcrete (N = 75) followed by quartzite (N = 16) (NOHC 2014a: 71-72). NOHC (2014a: 83) concluded that MA5 may be an example of an intact deposit that reflects sporadic activity

through time, inclusive of acts such as stone knapping that produce localised spikes in artefact distribution. The distribution of test pits within MA5 can be seen in Figure 4.

Figure 4 Distribution of test pits within MA5 (Source: NOHC 2014a: Figure 10.3)

Site MA9 is located within a tertiary terrace located near an unnamed lake. Within MA9 artefacts were recovered from Pits 1 through 11, with the majority found in Pit 2 (N = 46) or Pit 3 (N = 34); only six artefacts were recovered from a depth of 90 cm or more. Test excavations at MA9 recovered 130 artefacts from all ten test pits. The highest density was recovered from pit 4 (N-27) with artefacts occurring to Pit 9 (n=1). The site is associated with an up-slope terrace edge appear to have been the primary focus of past Aboriginal occupation within the Moorebank IMT site. Artefact types from MA9 consisted of cores (N = 11), flakes (N = 72), flaked pieces (N = 35), hammer stones (N = 4), retouched flakes (N = 4), utilised core (N = 1) and utilised flake (N = 3). The predominant raw material type was silcrete (N = 47), quartz (N = 35), quartzite (N = 23) and basalt (N = 10) (NOHC 2014a: 71-72). NOHC (2014a: 83) concluded that MA9 is a genuine activity node that reflects activity adjacent the lake/pond (i.e. repeated focus of activity through time). Subsequent disturbance has not impacted this site to the extent of the impact to the tertiary terrace. The distribution of test pits within MA9 can be seen in Figure 5.

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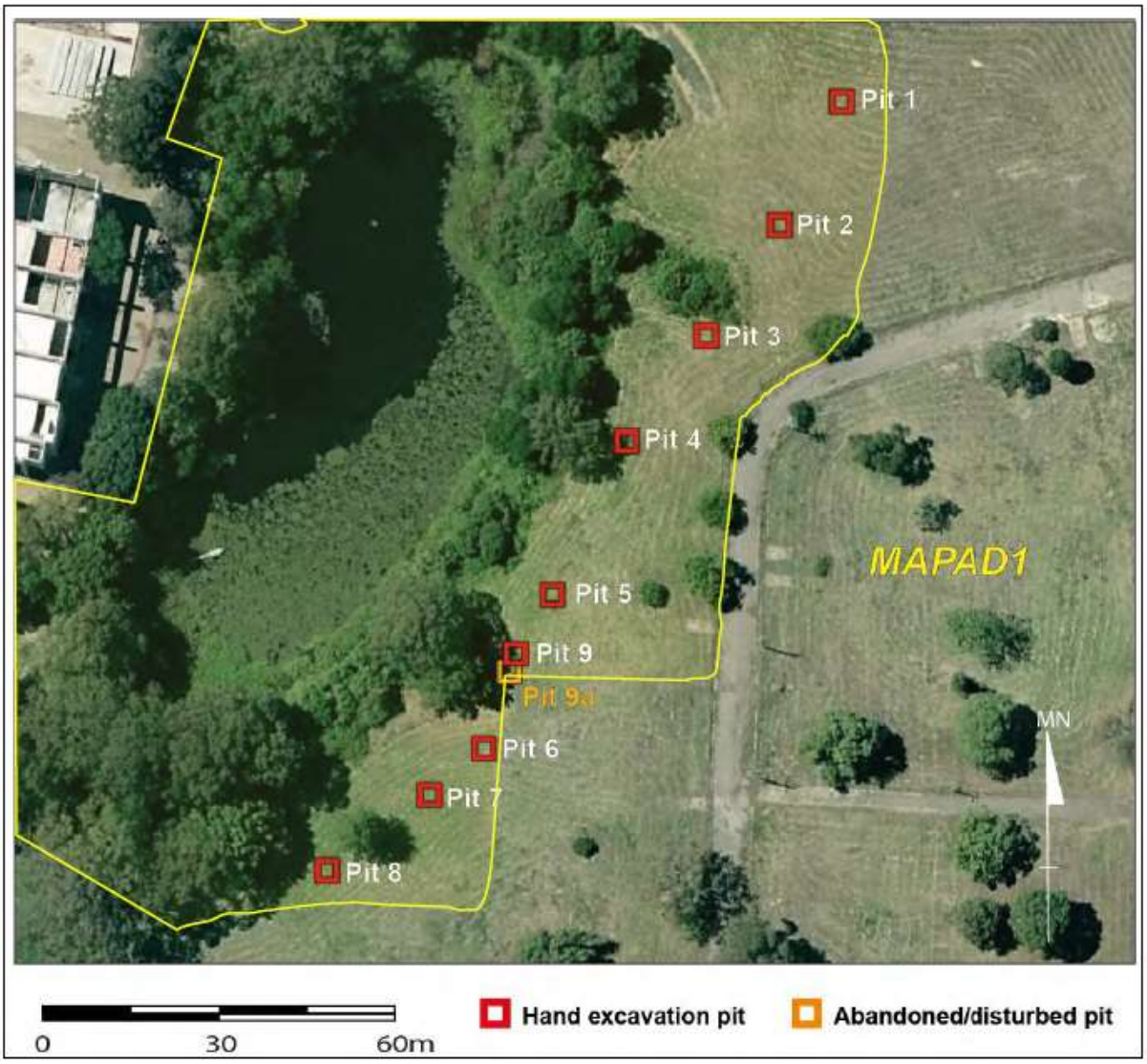

Figure 5 Distribution of test pits within MA9 (formerly MAPAD 1) (Source: NOHC 2014a: Figure 10.4)

The NOHC testing results identified that Aboriginal occupation within the study area was focussed on the tertiary terrace edge. MA9 is situated within an area that would have represented a confluence of resources with a freshwater lake within a tertiary terrace bordering Georges River. The testing appears to indicate that this area was a target of Aboriginal activity that experienced relatively continuous, moderate to high density distribution of artefacts with a diverse range of artefact and material types present (NOHC 2014a: 84). Given the subtle difference in topographic conditions between MA5 and MA9 there is the potential for comparative analysis between the two sites. This would assist in providing a detailed analysis of site variation within the tertiary terraces bordering the Georges River in order to clarify whether the variation in the size and richness of assemblages noted during the testing program relates Aboriginal activity or post depositional site disturbance. Such an analysis would have the potential to advance discussions relating to local predictive modelling associated with the Georges River Corridor.

2.3.2 Aims of the subsurface salvage excavations

The principal objective of the subsurface salvage excavation program is to obtain further information on occupational patterns, raw material procurement and use of local material for artefact production within the study area.

The aims of the subsurface salvage program are to:

- Obtain a larger sample of artefacts in order to successfully compare the assemblage to others within the local and regional area.
- Conduct dispersed salvage for those areas within MA5 and MA9 (in impact area only) that recovers artefacts at sufficiently high numbers in order to adequately record and interpret these sites.
- Analyse and interpret any archaeological finds (such as stone artefacts, hearths, knapping floors etc.) recovered during the salvage program.
- Inform current knowledge of Aboriginal occupation, land use models and raw material procurement within the local area.

2.3.3 Research questions

Research questions provide a framework for undertaking subsurface investigations and ensure that the information collected during the subsurface salvage program contributes to the knowledge of the sites and the broader archaeological record. Research questions include:

- Do sites MA5 and MA9 have stratified deposits that could be used for dating? Specifically, are the deep deposits identified at MA5 the result of Aboriginal activity or post depositional processes?
- Does the variation in size and richness associated with the cultural deposits at MA5 and MA9 indicate spatial variations in Aboriginal activity within the landscape in comparison to other sites investigated along the Georges River Corridor? Can the results from MA5 and MA9 be compared?
- Do sites MA5 and MA9 represent a place where specific activities took place, such as production, resource exploitation, or trade?
- What technological strategies and raw material procurement can be inferred from the assemblages recovered from MA5 and MA9?
- What evidence of taphonomic processes are evident in the soil profile?
- What is the geomorphic composition of the site? Does the geomorphic composition of the site provide evidence of post depositional impacts or is the site considered un-disturbed?
- Can the lithics assemblage provide evidence of the type of occupation at this site? Is the site considered a camp sites or was the occupation transitory?
- Do the results from sites MA5 and MA9 offer an opportunity to advance local and regional models for Aboriginal occupation?

2.4 Sub surface salvage excavation sampling strategy

To answer these research questions salvage excavation will be conducted within Aboriginal sites MA5 and MA9. The salvage excavation will be conducted by hand and will be laid out on a grid around or adjacent to high density/sensitivity test pits within sites MA 5 (Figure 6) and MA9 (Figure 7). Within these grids a series of dispersed 1 metre by 1 metre salvage pits will be excavated within this area to identify a trend for site patterning, relatively high artefact densities and any features of archaeological interest.

Figure 6 shows the proposed location of salvage pits for site MA5. It is proposed to begin excavation at these locations to determine the highest density of sites or features. The pit locations indicated in orange are expected to yield this highest density of artefacts, based on the results of the test excavations.

Figure 7 shows the proposed location of salvage pits for site MA9. A similar methodology to the one undertaken for MA5 will be executed at MA9.

At both MA5 and MA9, Biosis will expand salvage pits to a maximum size of 10 by 10 metres to ensure the maximum amount of cultural material is recovered during the subsurface salvage.

Figure 6 Location of proposed salvage pits for site MA5

Figure 7 Location of proposed salvage pits for site MA9

The methodology would then be followed by the implementation of open area salvage:

- The salvage program would be undertaken in the following manner:
  - 1 m by 1 m extent pits excavated at selected locations across a grid (see Figures 6 and 7).
  - Based on the results of the excavation of the pit indicated in Figures 6 and 7 additional pits may be excavated or pits expanded to ensure the maximum amount of cultural material is salvaged.
  - Based upon the result of these extent pits, the grid will be expanded into the areas with the highest artefact densities or areas where archaeological features may be present.
  - Salvage pits may be expanded into larger open area excavations should low densities be identified.
  - The total area of excavation within each grid is estimated to be a maximum of 10 m by 10 m.
- The expansion of the pits will be undertaken on case by case basis in order to identify and salvage as larger volume of cultural material as possible. Vertical excavation of deposits will be undertaken in 5 to 10 cm spits dependent on the archaeological deposits encountered and their spatial integrity.
- Pits will be excavated to a depth where archaeologically sterile soils are encountered. If pit depth exceeds 1.2 metres WHS protocols will be implemented. Pits must be excavated to at least the depth of the Aboriginal object-bearing units identified during test excavations. Given that artefacts have been recorded at approximately 1 m in depth it is possible that deep salvage pits will be required. If necessary, salvage pits will be benched to ensure personnel can work safely at depth. If the deposits are too friable for benching safely, shoring may be required. Shoring will be undertaken by an appropriately skilled and qualified professional. All excavated deposits will be sieved and recorded as test pits.
- Where cultural features are encountered, Biosis will undertake stratigraphic excavation to ensure the feature is captured effectively.
- Pits must be excavated using hand tools only including spades, handle shovels, and trowels.
- All material excavated from the excavation units will be dry sieved using 3 mm aperture wire-mesh sieves. All identified cultural material will be bagged individually and allocated a unique label to ensure its provenience for data analysis.
- Should wet sieving be required a water truck will be brought in to provide the water used for wet sieving. Biosis will ensure silt fencing is used to control erosion and sediment. Wet sieving will not be undertaken in areas where sediment may run into natural water courses.
- All consolidated in-situ features, including knapping floors and hearths, must be excavated to the extent of the feature. This may require extending pits.
- All cultural material recovered from the pits will be collected and brought to the Biosis office at Unit 14, 17-27 Power Ave, Alexandria NSW for lithic analysis.
- For each pit that is excavated, the following documentation will be taken:
  - Unique pit identification number

  - GPS coordinate of each pit
  - Munsell soil colour, texture and pH
  - Amount and location of cultural material within the deposit
  - Nature of disturbance where present
  - Stratigraphy
  - Archaeological features (if present)
  - Photographic records
  - Spit records.
- Pits must be backfilled as soon as practicable due to safety issues, although where this is not possible for open area salvage locations, pits will be temporarily fenced with Para webbing and backfilled on the final day of excavation.
- A geomorphologist will inspect the excavated pits at MA5 and MA9 and prepare a report on the geomorphological characteristics of the site. This report will be incorporated into the discussion of the salvage excavation results.
- Any datable material will be collected for the purposes of radiometric or Accelerator Mass Spectrometry dating. Datable materials will be collected, bagged and clearly labelled. They will be temporarily stored in the Biosis office at Unit 14, 17-27 Power Ave, Alexandria before being sent to the University of Waikato Radiocarbon Dating Laboratory.
- Standard protocol for the discovery of any human remains is to be followed in the event that human remains are discovered.

2.5 Objects recovered during excavation

All cultural material recovered from the pits will be labelled and bagged appropriately, including pit number, in accordance with *The Code of Practice for the Archaeological Investigation of Aboriginal Objects in New South Wales*. It is proposed to undertake the lithics analysis in the Biosis Wollongong office, following completion of excavation. However, where possible, analysis may be completed on site to reduce costs and timeframes. Aboriginal objects will be recorded in accordance with Requirements 19 and 20 (where applicable) of *the Code of Practice for the Archaeological Investigation of Aboriginal objects in New South Wales* (DECCW 2010b). For the purposes of recording and analysis the artefacts will be temporarily stored in a locked room at the Biosis Wollongong office located at 8 Tate Street Wollongong.

The analysis of artefacts will consist of recording all relevant artefact attributes; this way a comprehensive typological, technological and metrical analysis of the assemblage can be undertaken. The attributes recorded include:

- Type (flake, core, formal tool type etc.)
- Raw material
- Platform: type, width, length
- Termination: type

- Measurements: length, width, thickness
- Percentage of cortex
- Position and type of retouch (if any)
- Number of negative scares
- Primary, secondary or tertiary flake
- If a core, type of core, number of negative flake scars and longest flake scar will be recorded. If grinding implements are located Biosis will record the type of implement as well as number of grinding surfaces and other notable aspects of the piece.

Biosis will undertake the analysis using a standard digital Vernier calliper and a 10x hand lens. All measurements will be recorded in millimetres to one decimal place. A statistical analysis will then be run to determine the composition of the assemblage. Once the composition is known, the assemblage will be compared to other assemblages from the region to determine if it is a comparable assemblage or whether aspects of the assemblage are rare. The permanent care of the artefacts will be determined by the proponent and the Registered Aboriginal Parties (RAPs). Based upon discussions taking place between SIMTA and RAPs the preference is to rebury the artefacts onsite at a safe location. The ultimate intention is to rebury all artefacts salvaged as part of all stages of the Moorebank IMT works.

2.6 Reporting

At the conclusion of the dispersed salvage excavation program a detailed report will be prepared and will include:

- An executive summary of the report, including a summary table.
- A brief discussion of the results of the background review.
- A list and description of each archaeological site/place identified.
- Detail of all Aboriginal objects recovered from archaeological testing undertaken as part of the Environmental Assessment (EA) and their location for final storage.
- An analysis of all artefact material as a result of the salvage excavations.
- Discussion and interpretation of the findings of the excavations and analysis.
- Each site/place will have a revised scientific significance assessment and also cultural significance, which will be provided through consultation with the relevant Aboriginal stakeholder groups.
- Mapping of all known sites and areas of sensitivity would be included in the report.
- The reburial location of salvaged artefacts will be identified within the report. This will include a map identifying the location and coordinates.

The report will be submitted within 12 months of the completion of salvage works. Following the completion of the report AHIMS Aboriginal Site Recording forms will be completed and submitted to the AHIMS Registrar as soon as practicable, for site MA5 and MA9.

This report will be prepared in consultation with RAPs and OEH as per the CoAs and lodged with AHIMS.

2.7 Aboriginal consultation

The RAPs will be provided 28 days to comment on this salvage strategy. At the completion of the 28 day period, the comments provided will be incorporated into this document, where appropriate and all comments will be included as an appendix.

2.8 Additional investigation

CoA B7 states that additional investigation may be required based on the results of the Aboriginal archaeological investigation (salvage) programs. If further investigation is required Biosis will develop a strategy with the proponents, OEH and the RAPs which will include parameters for surface and subsurface investigation based on the:

- *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010).

2.9 Commencement of construction

Once all investigations relating to this salvage strategy have been completed, Biosis will notify Liberty Industrial and SIMTA of the completion of works and construction will be able to commence.

3 References

Department of Environment and Conservation. 2005. *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation.* NSW Department of Environment and Conservation, Sydney NSW.

Department of Environment, Climate Change and Water. 2010a. *Aboriginal cultural heritage consultation requirements for proponents 2010.* NSW Department of Environment, Climate Change and Water, Sydney NSW.

Department of Environment, Climate Change and Water 2010b. *Code of Practice for the Archaeological Investigation of Aboriginal objects in New South Wales.* NSW Department of Environment, Climate Change and Water, Sydney NSW.

Navin Officer Heritage Consultants. 2014a*. Volume 7, Technical paper 10: Aboriginal heritage assessment*. Report prepared for Parsons Brinkerhoff.

Navin Officer Heritage Consultants. 2014b. *Appendix I: Aboriginal scar tree assessment*. Report prepared for Parsons Brinkerhoff.

Navin Officer Heritage Consultants. 2014c. *Appendix J: Cultural heritage report*. Report prepared for Parsons Brinkerhoff.

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4 Appendix A: Consultation

4.1 Consultation Log

Organisation	Person	Organisation	Person	Date of Contact	Method	Notes
Tharawal Local Aboriginal Land Council	[redacted]	Biosis Pty Ltd	[redacted]	19/09/2016	Email	Aboriginal salvage strategy sent
		Liberty Industrial		13/01/2017	Phone	[redacted] was not sure if they received the salvage strategy but advised to email it to [redacted] for review.
		Liberty Industrial		13/01/2017	Email	Aboriginal salvage strategy resent
		Biosis Pty Ltd		13/01/2017	Phone	Tharawal Local Aboriginal Land Council support the salvage strategy and recommended any recovered artefacts be burial on Country (the study area).
Cubbitch Barta Native Title Claimants Aboriginal Corporation	[redacted]	Biosis Pty Ltd	[redacted]	19/09/2016	Email	Aboriginal salvage strategy sent
		Liberty Industrial		13/01/2017	Phone	Call to discuss salvage strategy. No answer.
		Liberty Industrial		13/01/2017	Emailed	Aboriginal salvage strategy sent for review
		Liberty Industrial		14/01/2017	Email	Requested hard copy of salvage strategy
		Liberty Industrial		16/01/2017	In person	Hardcopy of salvage strategy delivered.
		Liberty Industrial		16/01/2017	Email	Letter detailing recommendations to salvage strategy. See Appendix B.
Darug Land Observations	[redacted]	Biosis Pty Ltd	[redacted]	19/09/2016	Email	Aboriginal salvage strategy sent
		Biosis Pty Ltd		25/09/2016	Phone	[redacted] agreed with salvage strategy.
		Biosis Pty Ltd		10/10/2016	Email	Letter received supporting the strategy and stating their

Organisation	Person	Organisation	Person	Date of Contact	Method	Notes
						preference for reburial of artefacts.
Darug Custodian Aboriginal Corporation	[redacted]	Biosis Pty Ltd	[redacted]	19/09/2016	Email	Aboriginal salvage strategy sent
		Liberty Industrial		13/01/2017	Phone	Call to discuss salvage strategy. No answer.
		Liberty Industrial		13/01/2017	Email	Aboriginal salvage strategy sent
		Biosis Pty Ltd		13/01/2017	Phone	Called [redacted]. She suggested calling [redacted]. Phone call to [redacted], no response.
		Biosis Pty Ltd		13/01/2017	Phone	Agreed with salvage strategy. Notified that excavations were postponed.
Darug Aboriginal Cultural Heritage Assessments	[redacted]	Biosis Pty Ltd	[redacted]	19/09/2016	Post	Aboriginal salvage strategy sent
		Biosis Pty Ltd		23/09/2016	Phone	Agreed with salvage strategy.
Darug Aboriginal Landcare Incorporated	[redacted]	Biosis Pty Ltd	[redacted]	19/09/2016	Email	Aboriginal salvage strategy sent
		Biosis Pty Ltd		27/09/2016	Email	Agreed with salvage strategy and recommended a plan of management for reburied artefacts, which can be displayed with signage or buried close to where they were found and not to be impacted by development. Any scared trees, rock engraving or grinding grooves must be protected.
		Liberty Industrial		13/01/2017	Email	Aboriginal salvage strategy sent
		Biosis Pty Ltd		13/01/2017	Phone	Agreed with salvage strategy.
Banyadjaminga Swagg Inc.	Unknown	Biosis Pty Ltd	[redacted]	19/09/2016	Post	Aboriginal salvage strategy sent
	Unknown	Liberty Industrial		13/01/2017	Phone	Contacted Tharawal LALC for contact

Organisation	Person	Organisation	Person	Date of Contact	Method	Notes
						details. She advised that she does not have details and that they would not review the plan as they do not have an interest in Aboriginal heritage salvage, as they are a charity.
Tocomwall	[redacted]	Biosis Pty ltd	[redacted]	13/01/2017	Email	Aboriginal salvage strategy sent.
		Biosis Pty ltd		13/01/2017	Email	Called to discuss salvage strategy. Left voice mail.
		Tocomwall		19/01/2017	Email	Letter detailing recommendations to salvage strategy. See Appendix B.
		Biosis Pty Ltd		10/04/2017	Email	Revised Aboriginal salvage strategy sent to Tocomwall for their records.
Gandangara Local Aboriginal Land Council	[redacted]	Biosis Pty ltd	[redacted]	13/01/2017	Email	Aboriginal salvage strategy sent.
		Biosis Pty ltd		13/01/2017	Email	[redacted] responded stating that that they had no comments on the methodology.

5 Appendix B: Communications received

The following appendix contains details of communications received which have been addressed as part of this document.

Comment	Biosis response
Cubbitch Barta Native Title Claimants Aboriginal Corporation	
The site recorded as MA10 is not included in the salvage. Why is that?	MA10 is not included in the Conditions of Approval for the Early Works. As such it does not form part of the scope of this project.
There is a Pad area identified in Figure 3 that is also not included in this salvage strategy.	This PAD is not included in the scope of this project and has not been included.
There was test excavations carried out by AHMS in PAD 2 in the southern end, will that recommendation for further salvage be carried out in this proposed work?	The salvage works associated with PAD 2 will be undertaken as part of a separate approval and phase of works. As such, these are not addressed in this document.
I cannot compare Figure 5 and Figure 7. Figure 7 was not included in the report. Perhaps they are the same as my comment on 4. I am not sure.	Biosis has checked and Figure 7 was included in the report. Unsure how this can be addressed. The information in this figure is unlikely to affect the comments on the report made by Cubbitch Barta.
No excavated material should be dry sieved. It all should be wet sieved. It is a health issue to dry sieve the material. The fine dust and silica and even asbestos can be breathed in, creating breathing and other health issues.	Biosis has allowed for dry sieving as the sediments are likely to be sandy and therefore pass through a sieve without the aid of water. Whilst this may cause issues with dust this should not cause any adverse health effects. In the event that excessive dust is encountered, wet sieving can be implemented and has been allowed for in this salvage strategy. Biosis will make all reasonable and practicable methods to ensure the safety of all participants in the excavation and will ensure that relevant PPE is worn. This may include dust masks, glasses and gloves. There is no record of asbestos or other contaminants being present within either of the salvage areas.
All excavated material should be sieved using the 3 or 2.5mm mesh, so as to retrieve as many artefacts as possible. Too many small artefacts are lost through 5mm sieve. Without the smaller artefacts the whole picture of Aboriginal life on the banks of the Georges River cannot be recorded.	Noted, 3mm mesh will be utilised in the excavation.

Comment	Biosis response
I do agree with reburying the artefacts somewhere on the site. Somewhere that will never be disturbed ever again within the project area after completion. They will be recorded and the place where they will be buried again be recorded as an Aboriginal site on AHIMS.	Noted. No change required.
Tocomwall	
Tocomwall have reviewed the proposed methodology and have the following comments, suggestions and recommendations to make. Importantly, Tocomwall consider the proposed research design and methodology to be scientifically and culturally inappropriate because of the reasons discussed below and will not sign off on it until considerable changes have been made.	The proposed salvage strategy is consistent with those used to support Aboriginal Heritage Impact Permits under the *NSW Parks and Wildlife Act 1974*. The salvage strategy is a research design insofar as it presents a summary of prior investigations, description of the sites identified, their characteristics and proposes a series of research questions and a methodology to achieving these answers. Biosis has considered Tocomwall's comments and made the necessary changes to this document where the comments are considered to add value to the document.
The salvage strategy is not – in itself – a research design and methodology: it simply lists a series of tasks rather than presenting a document that complies with scientific and cultural expectations and standards. In order to comply with both statutory and professional conditions, as well as 'best practice' (e.g. the Burra Charter), some form of scientific and cultural justification needs to be formulated and disseminated amongst the RAP. The idea of 'it needs to be salvaged' – which is what is presented in the BIOSIS document, is simply not good enough and goes against the requirements set out in documents such as: • **Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW 2010 (DECCW, 2010); and** • **The Burra Charter: the Australia ICOMOS Charter for Places of Cultural Significance, 2013.** **The research design and methodology should begin with a summary of the information presented in previous reports (e.g. the Navin Officer reports), as well as explain and justify the conclusions that the previous works had formulated. This then needs to be followed by a research design for the recovery of artefacts listing an explicit series of questions and a practical methodology for recovering, for example, the surface artefacts. For example, will the sites be**	As above. The salvage strategy is consistent with those used to support Aboriginal Heritage Impact Permits. The document is consistent with the Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW 2010 (DECCW, 2010); and The Burra Charter: the Australia ICOMOS Charter for Places of Cultural Significance, 2013. Information from the prior reports is presented in this document in Section 2; this includes a description of the tasks undertaken as part of the EIS and the sites identified. Furthermore, a justification for the salvage excavation including the artefact densities and location of artefacts in the soil profiles from the testing phase is presented in 2.3.1 Biosis have carefully considered the comments provided by Tocomwall; however, their proposed methodology questions do not relate to the tasks outlined in the methodology and are not considered to be appropriate for the sites identified. Biosis's approach is believed to be appropriate for this area and is based on a sound understanding of archaeological and Aboriginal salvage processes, as well as an understanding of the requirements for state significant approvals and their associated Aboriginal consultation processes. In response:

Comment	Biosis response
gridded and the artefacts collected within the grid system? Or alternatively, will a total station be used to accurately plot the artefact locations in three dimensions? What form of analysis will be undertaken on the artefacts and how will it 'fit' with the subsurface salvage program? How will geomorphic processes be covered, considering the fact that as surface artefacts they are essentially lag gravels and the context is likely to reflect geomorphic processes rather than human behaviour? What form (paradigm) will the framework take: will it entail a 'processual' approach to the research design? How will site formation and post-depositional processes be considered? How will considerations of cultural landscape, traditional knowledge and cultural significance be collated and incorporated into the overall assessment?	• The surface salvage consists of isolated or low density artefact scatters, therefore gridding and recording of artefacts with a total station or sub-metre accurate GPS will not answer any meaningful research questions. Biosis proposes to analyse the surface artefacts with the sub-surface assemblage. This is stated in section 2.2.2. • The analysis of surface characteristics and geomorphological processes during the surface salvage is deemed to be irrelevant in this case. These surface artefacts are present within a modern, heavily modified environment which has noticeably been subject to human behaviour rather than soil processes. • Processual archaeology means to "understand how the people who used the artefacts recovered during excavation lived in the past". This approach has already been proposed, as demonstrated in the salvage strategy, as this forms part of the research questions. • Section 2.4 states that the soil profiles will be recorded. The final report will contain a discussion of the artefacts salvaged and the associated soil conditions, including formation processes and how this has effected the placement of artefacts. • As stated in Section 1.3 Biosis intends to include RAPs in the salvage works. In accordance with the conditions of approval, Biosis will prepare the final report in consultation with the RAPs. This provides ample opportunity to incorporate information received concerning the cultural landscape and any other information pertinent to the analysis of salvaged artefacts.
The landforms associated with sites earmarked for salvage lie within the floodplain of the Georges River. It is well known that alluvial environments are both complex and rewarding for the recovery of in situ archaeological deposits (cf. Brown 1997). Your research design and research questions do not consider any environmental factors, or explicitly describe how site formation processes and post-depositional changes will be described, sampled and accounted for? There is no consideration of geoarchaeology or environmental sampling, despite the fact that both of these sub-disciplines are crucial in establishing the nature of archaeological verses natural or disturbed contexts, as well as elucidating palaeoenvironmental factors.	Biosis has formulated a salvage methodology based upon the testing results within the EIS. This provides ample information on the soil characteristics, specifically disturbances to these horizons. Section 2.4 describes the minimum requirements for the recording of salvage pits, which includes describing the stratigraphic relationships observed and disturbances present. This is consistent with the Code of Practice and other industry guidelines. Biosis had included the option of collecting soil samples where environmental analysis may be required. Furthermore, Biosis has allowed for the collection of dateable material, including OSL samples where the soil horizons appear to be undisturbed and Aboriginal occupation can be dated through the analysis of these samples.

Comment	Biosis response
In terms of the archaeology, some form of discussion reflecting a framework of enquiry (or paradigm) is required in order to both guide and inform the salvage program. For example, the ideas championed in the processual school of archaeology relating to aspects of 'residential' verses 'logistical' mobility and conforming to 'foraging' or 'collecting' definitions of hunter-gatherers respectively, first described by Binford (1980) are a potential point of reference. Additionally, one needs to identify geomorphic parameters – primary verses secondary contexts – in order to assess the veracity of the archaeological interpretations (see for example Foley 1981 - a contemporary corresponding colleague of Binford's at the time of his classic paper). Accordingly, it is suggested that the research questions should provide a description of parameters that define how the integrity of soil deposition and/or archaeological deposits will be established. For example, how will soils be distinguished from sediments? What will distinguish primary or secondary contexts in soils and sediments? Will refitting be used in order to establish phasing or specific (contemporary) activities? These parameters need to be explicitly listed in order to provide a rigorous scientific framework. The current form of the document does not provide a sound platform for each of the stakeholders to evaluate whether salvage excavations are justified and where. This can create confusion, misunderstanding and delays in the salvage process. Some consideration of whether artefact localities reflect base camps/residential areas or activity specific/transit camps could also be useful. Distinguishing these features requires certain prerequisites such as the identification of *in situ* deposits and specific artefact densities that reflect different relative frequencies of raw materials, tool types and debitage, as well as the presence (potentially) of associated features such as middens, post-holes (for shelters) and hearths etc. A basic assumption would be that base camps have a greater artefact density and complexity in relation to transit camps that would reveal a low density and complexity of stone artefacts. How will BIOSIS distinguish a base camp from a transit camp? In other words, will there be a bias in targeting high-density artefact locations rather than lower-density transit camps or 'one-off' events?	The methodology outlined in section 2.4 clearly states that stratigraphic relationships will be established and recorded – i.e. primary and secondary relationships will be established along with phasing and influences on these relationships – i.e. disturbances or natural processes. Biosis has proposed a series of research questions to frame the salvage; however, the methodology proposed is flexible to allow for its adaption to meet the site conditions and nature of archaeology encountered. This does not preclude the application of supplementary research questions once the nature of the archaeology has been identified. At present, the current research questions are considered to be satisfactory. Establishing the nature of the archaeological remains is core to the salvage methodology. All of the questions proposed by Tocomwall would be answered through the analysis of the artefactual assemblage and soil conditions encountered. Both tasks are included in the salvage strategy. The points raised by Tocomwall will be considered should the archaeological finds from the salvage justify the exploration of these conceptual pathways.
The summary on sandy soils and in particular podzols is provided in order to contextualise the potential of the study area. The preparation of a research design and methodology needs to address	As stated previously, the salvage strategy is consistent with methodologies used for salvage AHIPs. The methodology does consider the complexity of the study area and does

Comment	Biosis response
the potential complexity of the study area rather than sending a 'formulaic cut-and-paste' research design as is currently the case. BIOSIS needs to demonstrate to Tocomwall that they are familiar with the wider issues of site formation processes and postdepositional changes and how they can potentially affect Aboriginal settlement patterns, issues of visibility and absence/presence, in addition to being explicit in how they will differentiate archaeological deposits reflecting human behaviour verses geomorphic or human disturbance processes (*in situ* verses secondary contexts). The short discussion on processual archaeology is offered for similar reasons and is provided so that BIOSIS can put some additional thought into not only how the archaeology will be recovered, but also into how it will be interpreted. Presenting a 'shopping-list' of artefacts and a simple discussion on them fails to do the cultural heritage justification from a cultural and scientific perspective. The purpose of this review is to generate some deeper consideration of the archaeological record, considering that much if not all of the Aboriginal heritage on the study area will be destroyed or irrevocably damaged. **Tocomwall also has an expectation that when questions are raised on site in regards to issues such as how buried soils or palaeosols will be identified, whether environmental sampling methods such as the use of monoliths and laboratory methods such as loss of ignition or particle size analysis are raised, the archaeologists will be able to answer these questions in a knowledgeable way. The same expectation holds for consideration of the framework of enquiry or paradigm in relation to the archaeological interpretation.**	consider the site conditions particularly site formation processes and post depositional changes (see section 2.3). The interpretation of the archaeology encountered will be done through the analysis of the results of the excavation – see section 2.6.
Tocomwall, at this time, do not support the research design and methodology presented by BIOSIS. The document fails to properly consider questions of scientific and cultural significance. There are several ways in which this can be rectified. The dot points below are not exhaustive and are provided as a guide only: **1 Refine the research questions to adequately define and capture the archaeological expressions of foraging verses collector subsistence-settlement systems;** **2 Modify the methodology to provide clear parameters on what constitutes base and transit camps and provide explicit criteria for distinguishing them, identifying the**	Biosis is able to supply the following responses to these questions: 1 There is no evidence to suggest that this research question is valid. Furthermore, the information supplied by Tocomwall does not supply any valid reasons (either cultural or scientific) for why this research question is required. Biosis is willing to consider this research question should the excavation yield a statistically viable sample of artefacts which possess the required attributes to postulate this question. 2 An analysis of the salvage findings will explore the nature of subsistence, if possible. Further consideration of the type of camp (i.e. base and transit) is not warranted at this stage.

Comment	Biosis response
archaeological significance and why such distinctions are important; 3 **Provide a thorough review and discussion on geoarchaeological, environmental and chronological techniques and the relevance of their application in different contexts.**	3 This is contained within the EIS. Further consideration in the salvage strategy has negligible benefit considering that the nature, extent and significance of MA5 and MA9 has been established.
Artefact peer review	
Inclusion of additional information on justification for harm, and salvage as a broad approach	Sites MA1, MA2, MA3, MA4, MA5 and MA9 are all located within the construction footprint and will be wholly or partially impacted by the project; therefore, they must be salvaged.
Involvement of a geomorphologist, and reporting on geomorphological characteristics of the site by the geomorphologist	Biosis has added three additional research questions relating to the geomorphological characteristics of the site. A geomorphologist will inspect pits MA4 and MA9 and prepare a report, which will be incorporated into the discussion of the salvage excavation results.
Include addition research questions relating to site formation process and occupation type	See above.
Addition of detail around methodology for lithic analysis (analytic technique and attributes)	Biosis has added more detail relating to the lithics analysis including type, raw material, platform attributes, termination type, measurements, cortex percentage, retouch, negative flake scar attributes, core attributes, and grinding implement attributes.

6 Appendix C: Letter response from RAPs

DARUG LAND
OBSERVATIONS PTY LTD
ABN 27 602 765 453

EMAIL: [redacted]
PO BOX 571 PLUMPTON NSW 2761
MOBILE: 0420 591 138 / 0413 687 279

10th October 2016

[redacted]
Biosis Pty Limited
8 Tate Street
WOLLONGONG NSW 2515

Dear [redacted]

RE: MOOREBANK INTERMODAL TERMINAL, MOOREBANK

Aboriginal Cultural Heritage Salvage Strategy

Darug Land Observations Pty Ltd has reviewed the Aboriginal Cultural Heritage Salvage Strategy Report, and supports the salvage strategy for the proposed Moorebank Intermodal Terminal located in Moorebank, approximately 30kms southwest of the Sydney CBD and 4kms south of Liverpool CBD.

In relation to the long-term storage of recovered artefacts, if any, Darug Land Observations Pty Ltd strongly believes that the recovered artefacts should be re-buried on Country (the study area).

Furthermore, Darug Land Observations Pty Ltd would be involved in the monitoring of the topsoil removal and all other form of works to be carried out on the site.

Yours sincerely,

[redacted]
Darug Land Observations Pty Ltd

[redacted]
Darug Elder

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

[redacted]

19 January 2017

Biosis Pty Ltd
8 Tate Street
Wollongong NSW 2500
Via email: [redacted]

Dear [redacted],

RE: Moorebank Intermodal Terminal: Aboriginal Cultural Heritage Salvage Strategy

Tocomwall have reviewed the proposed methodology and have the following comments, suggestions and recommendations to make. Importantly, Tocomwall consider the proposed research design and methodology to be scientifically and culturally inappropriate because of the reasons discussed below and will not sign off on it until considerable changes have been made.

Introduction

The salvage strategy is not – in itself – a research design and methodology: it simply lists a series of tasks rather than presenting a document that complies with scientific and cultural expectations and standards. In order to comply with both statutory and professional conditions, as well as 'best practice' (e.g. the Burra Charter), some form of scientific and cultural justification needs to be formulated and disseminated amongst the RAP. The idea of 'it needs to be salvaged' – which is what is presented in the BIOSIS document, is simply not good enough and goes against the requirements set out in documents such as:

- *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW 2010 (DECCW, 2010); and*
- *The Burra Charter: the Australia ICOMOS Charter for Places of Cultural Significance, 2013.*

The research design and methodology should begin with a summary of the information presented in previous reports (e.g. the Navin Officer reports), as well as explain and justify the conclusions that the previous works had formulated. This then needs to be followed by a research design for the recovery of artefacts listing an explicit series of questions and a practical methodology for recovering, for example, the surface artefacts. For example, will the sites be gridded and the artefacts collected within the grid system? Or alternatively, will a total station be used to accurately plot the artefact locations in three dimensions? What form of analysis will be undertaken on the artefacts and how will it 'fit' with the subsurface salvage program? How will geomorphic processes be covered, considering the fact that as surface artefacts they are essentially lag gravels and the context is likely to reflect geomorphic processes rather than human behaviour? What form (paradigm) will the framework take: will it entail a 'processual' approach to the research design? How will site formation and post-depositional processes be considered? How will considerations of cultural landscape, traditional knowledge and cultural significance be collated and incorporated

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into the overall assessment?

Geoarchaeology

The landforms associated with sites earmarked for salvage lie within the floodplain of the Georges River. It is well known that alluvial environments are both complex and rewarding for the recovery of *in situ* archaeological deposits (cf. Brown 1997). Your research design and research questions do not consider any environmental factors, or explicitly describe how site formation processes and post-depositional changes will be described, sampled and accounted for? There is no consideration of geoarchaeology or environmental sampling, despite the fact that both of these sub-disciplines are crucial in establishing the nature of archaeological verses natural or disturbed contexts, as well as elucidating palaeoenvironmental factors.

In relation to soil and terrace formation, there are a considerable amount of variables in relation to their development that need to be considered. As noted in an influential paper by Wood and Johnson (1979) on disturbance processes in the archaeological record, '*the relationship of cultural materials to one another - and to the natural features of a site, are the foundations of our discipline. If we fail to record the context, or if we misread or misinterpret that context, proper archaeological interpretation is impossible* (Wood and Johnson 1979: 315)'. With that in mind, a brief discussion on sandy deposits is provided below.

A consideration of post-European land management practices is essential in stratigraphic deliberations of sandy deposits. These reflect settlement, agriculture and increased urbanisation and have left indelible marks across the landscape that serve to disturb and/or truncate natural soil profiles. However, a consideration when looking at sandy soil landscapes is that ploughing, if present, is unlikely to reflect a long-term process undertaken for the purposes of planting crops. This is because sandy soils have extremely low fertility, poor water retention and tend to exhibit seasonal waterlogging of some form or another. Evidence of 'ploughing' is likely therefore to be undertaken for other reasons such as pasture improvement. 'Ripping' for example is undertaken for two reasons: to aerate soils prior to planting trees in order to enhance their growth; additionally, areas are ripped by farmers for the purposes of destroying rabbit burrows, a common problem in these soft, easily erodible sandy soils.

The formation of sandy deposits is usually attributed to generally drier and windier climates (for example the LGM), but sandy deposits have also been subject to episodic reworking during the Pleistocene and Holocene, as evidenced by features such as buried soils. This process has been identified in both Australian contexts (e.g. Nott et al 1994; Thom et al 1994) and other continents (e.g. Fairbridge and Finkl Jr 1984). The sand dune complexes created and reworked during the LGM, whilst obviously reflecting a major period of dune building as evidenced by studies across Australia (Bowler et al, 1976; Hesse et al, 2003; Thom et al, 1994), are not limited to the Pleistocene. Studies of sand deposits in Australia have clearly identified more recent episodic Holocene reworking of sand dunes (Nott et al 1994; Thom et al 1994); indeed, any visit today to these environments would clearly show areas which are stable and areas that are currently being reworked (Thom et al 1994: 171; personal observations of the barrier systems between Newcastle and the Myall Lakes area, NSW). Any conclusion to the contrary is simply not supported by current and past geomorphic processes of hydraulic, gravitational or aeolian winnowing (Fairbridge and Finkl Jr 1984: 45-46), particularly after vegetation is removed by natural processes such as bushfires or directly as a result of anthropogenic land management practices, resulting in the formation of lag deposits. Coincidentally, these

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processes of winnowing that create lag deposits (or 'stone lines' as identified by Fairbridge and Finkl Jr 1984) can also create false 'archaeological horizons', a process that needs to be considered in the research design for the current activity area. This is further complicated by the fact that the podzolising process in Australia has been observed to occur within reworked sands in *less than ten years* (Paton et al 1976): it means that podzol profiles may have been eroded leaving behind lag gravels (artefact concentrations), subsequently reburied and 're-podzolised' during the post-Contact period. In other words, unless chronological and soil geomorphic studies are routinely undertaken on archaeological sites, the very real possibility that seemingly '*in situ*' archaeological sites may actually be the result of both ancient *and* recent reworking of sand dune complexes.

Podzols (also known as Spodosols or Podosols) have distinctive features that identify them as being *in situ*: these are horizonation, the process whereby soil materials are differentiated into profiles having distinct horizons (Wood and Johnson 1979: 317); and where the boundaries between them take on particular morphological forms. There are other methods for the identification of whether soil profiles are *in situ*: for example looking at the soil chemistry of the distinct horizons because of the particular chemical signatures of each of them. Additionally, the presence of certain archaeological features (in particular hearths) and/or refitting of artefacts can be used to gauge whether a soil profile has been disturbed and to what degree.

The process of horizonation, in this case that of podzolisation, creates three very distinct soil units across a profile. The A_1 horizon is the main zone of biological activity and includes the various processes of bioturbation: these are the humic horizons from which organic matter, aluminium and iron are translocated. The boundaries between these A_1 soil horizons and the underlying A_2 can be both relatively sharp if the bioturbation occurs to a limited depth and the leaching (water movement) in the A_2 is pronounced, or diffuse where bioturbation is marked. The presence of a B horizon will usually reflect an *in situ* profile, but not necessarily a conformable one. Studies in Australian sandy deposits (e.g. Nott et al 1994) have clearly demonstrated the fact that A_1 and A_2 are often not stratigraphically related to underlying B horizons, the age of the two sometimes separated by thousands if not tens of thousands of years.

Framework of Enquiry

In terms of the archaeology, some form of discussion reflecting a framework of enquiry (or paradigm) is required in order to both guide and inform the salvage program. For example, the ideas championed in the processual school of archaeology relating to aspects of 'residential' verses 'logistical' mobility and conforming to 'foraging' or 'collecting' definitions of hunter-gatherers respectively, first described by Binford (1980) are a potential point of reference. Additionally, one needs to identify geomorphic parameters – primary verses secondary contexts – in order to assess the veracity of the archaeological interpretations (see for example Foley 1981 - a contemporary corresponding colleague of Binford's at the time of his classic paper). Accordingly, it is suggested that the research questions should provide a description of parameters that define how the integrity of soil deposition and/or archaeological deposits will be established. For example, how will soils be distinguished from sediments? What will distinguish primary or secondary contexts in soils and sediments? Will refitting be used in order to establish phasing or specific (contemporary) activities? These parameters need to be explicitly listed in order to provide a rigorous scientific framework. The current form of the document does not provide a sound platform for each of the stakeholders to

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evaluate whether salvage excavations are justified and where. This can create confusion, misunderstanding and delays in the salvage process.

Some consideration of whether artefact localities reflect base camps/residential areas or activity specific/transit camps could also be useful. Distinguishing these features requires certain prerequisites such as the identification of *in situ* deposits and specific artefact densities that reflect different relative frequencies of raw materials, tool types and debitage, as well as the presence (potentially) of associated features such as middens, post-holes (for shelters) and hearths etc. A basic assumption would be that base camps have a greater artefact density and complexity in relation to transit camps that would reveal a low density and complexity of stone artefacts. How will BIOSIS distinguish a base camp from a transit camp? In other words, will there be a bias in targeting high-density artefact locations rather than lower-density transit camps or 'one-off' events?

Summary

The summary on sandy soils and in particular podzols is provided in order to contextualise the potential of the study area. The preparation of a research design and methodology needs to address the potential complexity of the study area rather than sending a 'formulaic cut-and-paste' research design as is currently the case. BIOSIS needs to demonstrate to Tocomwall that they are familiar with the wider issues of site formation processes and post-depositional changes and how they can potentially affect Aboriginal settlement patterns, issues of visibility and absence/presence, in addition to being explicit in how they will differentiate archaeological deposits reflecting human behaviour verses geomorphic or human disturbance processes (*in situ* verses secondary contexts). The short discussion on processual archaeology is offered for similar reasons and is provided so that BIOSIS can put some additional thought into not only how the archaeology will be recovered, but also into how it will be interpreted. Presenting a 'shopping-list' of artefacts and a simple discussion on them fails to do the cultural heritage justification from a cultural and scientific perspective. The purpose of this review is to generate some deeper consideration of the archaeological record, considering that much if not all of the Aboriginal heritage on the study area will be destroyed or irrevocably damaged.

Tocomwall also has an expectation that when questions are raised on site in regards to issues such as how buried soils or palaeosols will be identified, whether environmental sampling methods such as the use of monoliths and laboratory methods such as loss of ignition or particle size analysis are raised, the archaeologists will be able to answer these questions in a knowledgeable way. The same expectation holds for consideration of the framework of enquiry or paradigm in relation to the archaeological interpretation.

Recommendations

Tocomwall, at this time, do not support the research design and methodology presented by BIOSIS. The document fails to properly consider questions of scientific and cultural significance. There are several ways in which this can be rectified. The dot points below are not exhaustive and are provided as a guide only:

- Refine the research questions to adequately define and capture the archaeological expressions of foraging verses collector subsistence-settlement systems;

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- Modify the methodology to provide clear parameters on what constitutes base and transit camps and provide explicit criteria for distinguishing them, identifying the archaeological significance and why such distinctions are important;
- Provide a thorough review and discussion on geoarchaeological, environmental and chronological techniques and the relevance of their application in different contexts.

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Please feel free to contact me if you have any questions.

Regards,

[redacted]

Senior Archaeologist
Tocomwall Pty Ltd

[redacted]

THARAWAL
LOCAL ABORIGINAL
LAND COUNCIL

13 January 2017

[redacted]
Biosis Pty Limited
8 Tate Street
WOLLONGONG NSW 2515

Dear [redacted],
RE: MOOREBANK INTERMODAL TERMINAL, MOOREBANK
Aboriginal Cultural Heritage Salvage Strategy

Tharawal Local Aboriginal Land Council has reviewed the Aboriginal Cultural Heritage Salvage Strategy Report, and supports the salvage strategy for the proposed Moorebank Intermodal Terminal located in Moorebank, approximately 30kms southwest of the Sydney CBD and 4kms south of Liverpool CBD.
In relation to the long-term storage of recovered artefacts, if any, Tharawal Local Aboriginal Land Council recommends that the recovered artefacts should be reburied on Country. (the study area).
Furthermore, Tharawal Local Aboriginal Land Council would be involved in the monitoring of the topsoil removal and all other form of works to be carried out on the site.

Yours sincerely,
[redacted]

Personal Assistant to Chief Executive Officer.

Tharawal local Aboriginal Land Council.

Site: 220 West Parade, COURIDJAH NSW 2572
Mailing address: PO BOX 245, THIRLMERE NSW
Website: www.tharawal.com.au
Facebook page: www.facebook.com/Tharawal-Local-Aboriginal-Land-Council
Phone Enquiries: 02 4681 0059
Facsimile: 02 4681 0866

Cubbitch Barta Native Title Claimants
Aboriginal Corporation
55 Nightingale Road,
PHEASANTS NEST. N.S.W. 2574
22ND January, 2017.

[redacted]
Liberty Industrial
95-99 Bridge Road,
GLEBE. N.S.W. 2037

Dear [redacted]

RE; MOOREBANK INTERMODAL
TERMINAL

Thank you for the opportunity to comment on the Moorebank Intermodal project in regards to the Salvage strategy. There are a couple of points I would like to comment on, they are as follows;

1. The site recorded as MA 10, is not included in the salvage. Why is that?
2. There is a Pad area identified in Figure 3 that is also not included in this salvage strategy.
3. There was test excavations carried out by AHMS in PAD 2 in the southern end, will that recommendation for further salvage be carried out in this proposed works?
4. The map on figure 4 showing the original test pits, and the map on Figure 6, in comparison, why aren't the original test pits being opened up rather than creating other new test pits?
5. I cannot compare Figure 5 and Figure 7. Figure 7 was not included in the report. Perhaps they are the same as my comment on 4. I am not sure.
6. No excavated material should be dry sieved. It all should be wet sieved. It is a health issue to dry sieve the material. The fine dust and silica, and even possibly asbestos can be breathed in, creating breathing and other health issues.
7. All excavated material should be sieved using the 3 or 2.5mm mesh, so as to retrieve as many artefacts as possible. Too many small artefacts are lost through a 5mm sieve. Without the smaller artefacts the whole picture of Aboriginal life on the banks of the Georges River cannot be recorded.
8. I do agree with reburying the artefacts somewhere on the site. Somewhere that will never be disturbed ever again within the project area, after completion. They will all be recorded and the place where they will be buried will again be recorded as an Aboriginal site on AHIMS.

[redacted]

From: [redacted]
To:
Cc:
Subject: RE: Moorebank Intermodal Terminal Construction Heritage Management Plan
Date: Monday, 23 January 2017 1:34:37 PM
Attachments: image001.png
image002.png

Hi [redacted],

Gandangara accepts and agrees to the methodology set out in the Moorebank Intermodel Terminal Construction Heritage Management Plan.

Regards

[redacted]

Cultural and Heritage Officer

Gandangara Local Aboriginal Land Council

103 Moore Street, LIVERPOOL NSW 2170 I PO Box 1038 Liverpool BC 1871

Ph: [redacted] Fax: [redacted] Mobile: [redacted] E: [redacted] W: www.glalc.org.au

Gandangara LALC acknowledges the Cabrogal Clan and the Darug Nation as the traditional custodians of the land and as such pays deep respect to the Elders past and present. We also acknowledge that the Dhurawal and Dharuk Nations continue to have a long standing relationship with this country and its people.

From: [redacted]
Sent: Monday, 16 January 2017 3:05 PM
To: [redacted]
Cc: [redacted]
Subject: Moorebank Intermodal Terminal Construction Heritage Management Plan

Hi [redacted],

Please find attached the CHMP for the Moorebank Intermodal Terminal. Please provide feedback by close of business today and feel free to call myself on the numbers below or my colleague [redacted] If you have any questions.

Kind regards,

[redacted]

Research Assistant - Heritage

[redacted]

Leaders in Ecology and Heritage Consulting

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