Acid Sulfate Soil Management Plan

Moorebank Precinct West Site, 400 Moorebank Avenue, Moorebank NSW

Prepared for: Qube Property Management Services Pty Ltd c/o Tactical Group Pty Ltd

EP1340.001_MPW_ASSMP v5 | 30 January 2020

APPROVED COMPANY ISO 9001 Quality Management Systems QMS Certification Services

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EP RISK

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30 January 2020

Qube Property Management Services Pty Ltd c/o Tactical Group Pty Ltd

Via email: feichen@tacticalgroup.com.au

Our Ref: EP1340.001_MPW_ASSMP v5

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Abbreviations and Terminology

Abbreviations	Term	Definition
ASS	-	Acid Sulfate Soil
AHD	-	Australian Height Datum
BGS	-	Below Ground Surface
CoC	Conditions of Consent	Conditions of Consent SSD 7709
Construction Area	-	Extent of construction works, namely areas to be disturbed during the construction of the Site.
DPI&E	-	NSW Department of Planning, Industry and Environment
EPA	-	Environment Protection Authority
IMEX	-	Import-Export
IMT	-	Intermodal Terminal
Induction	Site Specific Induction	The *Work Health and Safety Act 2011* (WHS Act) main objective is to secure the health and safety of workers and workplaces. A site specific induction is necessary for all workers on the Site to understand the site specific risks.
LGA	-	Local Government Area or Agency
MIC	-	Moorebank Intermodal Company
MPE Project	Moorebank Precinct East Project	The MPE Intermodal Terminal Facility, including a rail link and warehouse and distribution facilities at Moorebank (eastern side of Moorebank Avenue) as approved by the Concept Plan Approval (MP10_0913) and the MPE Stage 1 Approval (14_6766).
MPE Site	Moorebank Precinct East Site	Including the former DSNDC site and the land owned by SIMTA which is subject to the Concept Plan Approval. The MPE Site does not include the rail corridor, which relates to the land on which the rail link is to be constructed.
MPE Stage 1 Site	Moorebank Precinct East Stage 1 Site	Moorebank Precinct East Stage 1 Site, including the MPE Stage 1 Site and the Rail Corridor, i.e. the area for which approval (construction and operation) was sought within the MPE Stage 1 Proposal EIS.
MPE Stage 2 Site	Moorebank Precinct East Stage 2 Site	Stage 2 of the MPE Concept Plan Approval including the construction and operation of 300,000m^2 of warehousing and distribution facilities on the MPE Site and the Moorebank Avenue upgrade within the Moorebank Precinct.
MIT Project	Moorebank Intermodal Terminal Project	The MIT Project as approved under the Concept Plan Approval (SSD_5066) and the MPW EPBC Approval (No. 2011/6086).

Abbreviations and Terminology

Abbreviations	Term	Definition
MPW Stage 2	Moorebank Precinct West Stage 2	The subject of this ASSMP. The site which is the subject of the MPW Concept Plan Approval, MPW EPBC Approval and MPW Stage 2 SSD 7709. The MPW Stage 2 does not include the rail link as referenced in the MPW Concept Plan Approval or MPE Concept Plan Approval.
PASS	-	Potential Acid Sulfate Soil
PSI	-	Preliminary Site Investigation
QUBE	QUBE Holdings Ltd	Joint owners of the Moorebank Precinct
RAE	-	Royal Australian Engineers
Rail Corridor	-	Area defined as the 'Rail Corridor' within the MPE Concept Plan Approval.
Rail Link	-	The rail link from the South Sydney Freight Line to the MPE IMEX Terminal, including the area on either side to be impacted by the construction works included in MPE Stage 1.
SIMTA	-	Sydney Intermodal Terminal Alliance - a consortium comprising Qube and Aurizon Holdings.
Site	Site	MPW Site, excludes the Rail Corridor
SME	-	School of Military Engineering
SMP	-	Site Management Plan
SSD	-	State Significant Development
SSFL	-	South Sydney Freight Line
Tactical	Tactical Group	Project Managers of the Moorebank Precinct for Qube
MAUW	Moorebank Avenue Upgrade Works	The extent of construction works to facilitate the construction of the Moorebank Avenue upgrade. Raising of the vertical alignment of Moorebank Avenue for 1.5 kilometres of its length by approximately two metres, from the northern boundary of the MPE Site to approximately 120 metres south of the MPE Site. The Moorebank Avenue upgrade also includes upgrades to intersections, ancillary works and the construction of an on-site detention basin to the west of Moorebank Avenue within the MPW Site.
The Moorebank Precinct	-	Refers to the whole Moorebank intermodal precinct, i.e. the MPE Site and the MPW Site.

1 Introduction

EP Risk Management Pty Ltd (EP Risk) was engaged by Qube (Qube) Property Management Services Pty Ltd c/o Tactical Group Pty Ltd (Tactical), to prepare the Acid Sulfate Soil Management Plan (ASSMP) for the Moorebank Precinct West (MPW) Stage 2 Site located at 400 Moorebank Avenue, Moorebank NSW (the Site) **Figure 1** (Attached Figures).

The Site is legally described as Lot 1 in Deposited Plan (DP) 1197707 and Lot 100 in DP 1049508, and is approximately 190 hectares (ha) in area.

It is understood the Site has been owned by the Commonwealth Government since 1913 and used as a Defence site since the 1940s.

The preparation of this ASSMP satisfies Condition of Consent (CoC) B39 required by the Development Consent SSD 7709, for the MPW Stage 2

1.1 Proposed Development

The MPW Stage 2 comprises the development of an intermodal terminal (IMT), including a rail link to the Southern Sydney Freight Line (SSFL) within the rail corridor, construction of warehouse and distribution facilities with ancillary offices, a freight village (ancillary site and operational services), stormwater, landscaping, servicing and associated works on the eastern side of Moorebank Avenue, Moorebank, NSW.

Construction and 24/7 operation of an intermodal terminal (IMT) facility to support a container freight throughput volume of 500,000 twenty-foot equivalent units (TEUs) per annum, including:

- A rail terminal with nine rail sidings and associated locomotive shifter.
- A rail link connection from the sidings to the rail link constructed under MPE Stage 1 (SSD 6766) to the Southern Sydney Freight Line (SSFL).
- rail and truck container loading and unloading and container storage areas.
- Truck waiting area and emergency truck storage area.
- Container wash-down facilities and degassing area.
- Mobile locomotive refuelling station.
- Engineer's workshop, administration facility and associated car parking.

Operation of the IMT facility includes operation of the rail link to the SSFL and container freight movements by truck to and from the Moorebank Precinct East (MPE) site.

Construction and 24/7 operation of a warehousing estate on the northern part of the site servicing the IMT facility and including:

- six warehouses with a total gross floor area (GFA) of 215,000 m^2 and, for each warehouse, associated offices, staff amenities, hardstands and truck and light vehicle parking.
- 800 m^2 freight village (operating from 7am to 6pm, 7 days/ week) including staff/ visitor amenities.
- internal roads, noise wall, landscaping, lighting and signage.

- Intersection upgrades on Moorebank Avenue at:
- Anzac Road providing site access.
- Bapaume Road for left turn only out of the site.

Construction and operation of on-site detention basins, bioretention/ biofiltration systems and trunk stormwater drainage for the entire site.

Construction works and temporary ancillary facilities, including:

- Vegetation clearing, topsoil stripping and stockpiling and site earthworks and temporary on-site detention.
- Importation of up to 1,600,000 m^3 of uncompacted fill, temporary stockpiling and placement over the entire site to raise existing ground levels by up to 3 m.
- Materials screening, crushing and washing facilities.
- Importation and placement of engineering fill and rail line ballast.
- Installation and use of a concrete batching plant.
- Utilities installation/ connection.

1.2 Background

The Liverpool Local Environment Plan ('LEP') 2008 indicated that the Site is located within predominantly in a Class 5 Acid Sulfate Soil Area with a thin portion of Class 1 associated with the Georges River corridor, which states:

> *"Acid sulfate soils in a Class 5 area are Works within 500 metres of adjacent Class 1 -4 land which are likely to lower the water table below 1 metre AHD on adjacent Class 1-4 land. Any works[1] will trigger the requirement for assessment and may require management."*

Previous investigations undertaken have identified indicators of actual and or potential acid sulfate soil ('AASS' or 'PASS') in soils within the proposed civil excavation footprint within the Development Area exceeding NSW Acid Sulfate Soil Assessment Guidelines 1998 ('ASSMAC') minimum 'action criteria' threshold. Earthworks in areas where exceedance of ASSMAC action criteria is verified require the preparation of an Acid Sulfate Soil Management Plan ('ASSMP').

1.3 Purpose and Application

The preparation of this ASSMP satisfies Condition of Consent Item B39 required by the Development Consent SSD 7709, for the MPW Stage 2, as outlined below.

> *"B39. An Acid Sulfate Soils Management Plan must be developed consistent with the Acid Sulfate Soils Manual and must:*
>
> *(a) deal with the unexpected discovery of actual or potential acid sulfate soils; and*
>
> *(b) include procedures for the investigation, handling, treatment and management of such soils and water seepage.*

[1] 'Work' is defined as any works that may disturb more than one (1) tonne of soil, or lower the water table.

The Plan is to form part of the CEMP required by Condition C2."

The objective of the ASSMP is to ensure a controlled management approach and strategy associated with acid sulfate soil ('ASS') and provide guidance on the management of stockpiling and on-site reuse (if suitable) of surplus soil material which is likely to be encountered during the MPW Stage 2. The ASSMP has been prepared in accordance with the Acid Sulfate Soil Manual (ASSMAC 1998[2])

This ASSMP aims to satisfy the following objectives:

1. Review of previous investigations undertaken at the Site.
2. Address the requirements of the relevant environmental legislation and statutory requirements as it applies to the MPW Stage 2.
3. Summarise potential impacts on the environment from the proposed works.
4. Document environmental procedures that must be followed to control potential environmental impacts.
5. Control and minimise the disturbance of ASS.
6. Confirmation of the effectiveness of the adopted control measures by validation testing and documentation.
7. Preservation of engineered structures, water quality, soil quality and the wider environment.
8. Preparation of this ASSMP in accordance with the relevant statutory provisions and guidelines.

1.4 Objectives and Targets

The objectives and targets set out for the MPW Stage 2 in relation to the management of ASS during construction are outlined in **Table 1**.

Table 1 – Objectives and Targets

Objective	Target	Frequency	Accountability	Source Reference
Monitor for the presence of potential and / or actual ASS	Excavations of the Onsite Stormwater Detention (OSD) basins.	Ongoing during the OSD excavations.	Principal Contractor.	**Section 7.2**
Sample suspected PASS or AASS	In the event suspected PASS or ASS is identified	Ongoing during the OSD excavations.	Principal Contractor.	**Section 7.3**
Calculate the applicable rate for neutralisation	Identified PASS and AASS	Where required.	Principal Contractor.	**Section 7.4**
Appropriate construction and Management of a Soil Treatment Area	Identified PASS and AASS	Where required.	Principal Contractor.	**Section 7.5**
Appropriate stockpiling of soils	Identified PASS and AASS	Where required.	Principal Contractor.	**Section 7.6**

[2] Acid Sulfate Soils Planning Guidelines and Manual, NSW Acid Sulfate Soils Management Advisory Committee (ASSMAC 1998).

Table 1 – Objectives and Targets

Objective	Target	Frequency	Accountability	Source Reference
Appropriate management of waters	Excavation for the OSD basins	Only where groundwaters are encountered	Principal Contractor.	**Section 7.7**
Appropriate treatment of soil and water and validation	Identified PASS and AASS	Where required.	Principal Contractor.	**Section 7.8, 7.9 and 7.10**
Appropriate use of treated PASS and ASS	Treated soils	Where required.	Principal Contractor.	**Section 7.11**
Appropriate contingency measures implemented	PASS / AASS requiring treatment	Where required.	Principal Contractor.	**Section 7.11**

2 Environmental Management

2.1 Legal and Other Requirements

The following statutory provisions and guidelines are applicable to the proposed construction and earthworks, with regards to ASS:

1. Liverpool Local Environmental Plan ('LEP') 2008 (Current version for 22 March 2019 to date (accessed 1 August 2019)), Part 7.1 Acid Sulfate Soils
2. Acid Sulfate Soils Planning Guidelines and Manual, NSW Acid Sulfate Soils Management Advisory Committee ('ASSMAC', 1998).
3. NSW Environment Protection Authority ('NSW EPA') Contaminated Land Management Act 1997 ('CLM Act').
4. NSW EPA, Protection of the Environment Operations Act 1997 ('POEO Act').
5. The Principal Contractor's Construction Environmental Management Plan ('CEMP').
6. MPW Stage 2 SSD 7709 - Development Consent made under *Section 89E of the Environmental Planning and Assessment Act 1979.*
7. The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) approval for the MPW Concept was granted by Department of the Environment and Energy (DotEE) number (No.) EPBC 2011/6086.

2.2 Compliance Matrix

The Development Consent made under *Section 89E of the Environmental Planning and Assessment Act 1979* has listed the conditions of consent (CoC) in **Table 2** in relation to the ASSMP.

Table 2 – Conditions of Consent (CoC)

CoC	Requirement	Document Reference	How Addressed
C1	The applicant must ensure that the environmental management plans required under this consent are prepared in accordance with any relevant guidelines, and include: a) Baseline data; b) A description of: (i) The relevant statutory requirements (including any relevant approval, licence or lease conditions); (ii) Any relevant limits or performance measures/criteria; and (iii) The specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any measurement measures; c) A description of the management measures to be implemented to comply with the relevant statutory requirements, limits or performance measures/criteria; d) A program to monitor and report on the: (i) Impacts and environmental performance of the development; and (ii) Effectiveness of any management measures (see (c) above); e) A contingency plan to manage any unpredicted impacts and their consequences; f) A program to investigate and implement ways to improve the environmental performance of the development over time; g) A protocol for management and reporting any: (i) Incidents and non-compliances; (ii) Complaints; (iii) Non-compliances with statutory requirements; and h) Roles and responsibilities for implementing the plan; and i) A protocol for periodic review of the plan.	a) **Section 4**; b) (i) **Section 2.1**; (ii) **Section 5, 7.2 and 7.10**; (iii) **Section 5 and 7**; c) **Section 7**; d) (i) **Section 7.12**; and (ii) **Section 7.12**; e) **Section 8**; f) **Section 9.2**; g) (i) **Section 9.2**; (ii) **Section 9.2**; (iii) **Section 9.2**; and h) **Section 7.1**. i) **Section 9.1.**	a) Includes known site conditions, summarised potential for ASS within the Site; b) (i) Covers any relevant approval and/or license; (ii) Specifies adopted criteria and monitoring requirements to be used for assessment and validation; (iii) Specifies the current applicable guidelines and the management requirements for excavation within the OSDs; c) Specifies the details how to manage expected and /or unexpected ASS; d) (i) Describes the sampling analysis and reporting program for identified ASS; and (ii) The sampling and validation programs will report on the effectiveness of the any of the management measures; e) Details the contingency plan in relation to ASS; f) Continual improvement for the ASSMP is discussed; g) (i) Specifies how incidents and non-compliances will be managed; (ii) Specifies how complaints in relation to ASS will be managed; (iii) Specifies how non-compliance to statutory requirements will be managed; and h) Lists the responsibilities for the ASSMP Implementation. i) Specified how the ASSMP will be reviewed/updated.
B39	An Acid Sulfate Soils Management Plan must be developed consistent with the Acid Sulfate Soils Manual and must: (a) deal with the unexpected discovery of actual or potential acid sulfate soils; and	(a) **Section 7;** and (b) **Section 7.2 to 7.12.**	This Plan has been developed in accordance with the Acid Sulfate Soils Manual (ASSMAC 1998). (a) Details how to manage expected or unexpected actual or potential ASS; and

Table 2 – Conditions of Consent (CoC)

CoC	Requirement	Document Reference	How Addressed
	(b) include procedures for the investigation, handling, treatment and management of such soils and water seepage. The Plan is to form part of the CEMP required by Condition C2.		(b) Provides the details on how to screen, sample, handle, treat and mange soils and water found to be actual or potential ASS.

The MPW Stage 2 Environmental Impact Statement ((MPW Stage 2 EIS) Arcadis, 2016a[3]) identified a range of environmental impacts and recommended management and mitigation measures to avoid, remedy or mitigate these impacts. These mitigation measures were revised as part of the MPW Stage 2 Response to Submissions Report (RtS). The Final Compilation of Mitigation Measures (FCMM) presents the mitigation measures previously presented separately in the MPW Stage 2 EIS and Response to Submissions (RtS). A list of the relevant FCMMs relevant to the ASSMP and how they have been complied within this plan are provided in **Table 3.**

Table 3 – Final Compilation of Mitigation Measures (FCMMs)

FCMM	Requirement	Document Reference	How Addressed
OB	The Construction Environmental Management Plan (CEMP), or equivalent, for the Proposal would be based on the Preliminary CEMP (Appendix I of this EIS), and include the following preliminary management plans: • Preliminary Construction Traffic Management Plan (PCTMP) (Appendix M of the EIS) • Air Quality Management Plan (Appendix O of the EIS) • Erosion and Sediment Control Plans (ESCPs) and Bulk Earthworks Plans, within the Stormwater Drainage Design Drawings (Appendix R of the EIS) As a minimum, the CEMP would include the following sub-plans: • Construction Traffic Management Plan (CTMP) • Construction Noise and Vibration Management Plan (CNVMP), prepared in accordance with the Interim Construction Noise Guideline • Cultural Heritage Assessment Report/Management Plan • Construction Air Quality Management Plan • Construction Soil and Water Management Plan (SWMP), prepared in accordance with Managing Urban Stormwater, 4th Edition, Volume 1, (2004). • Erosion and Sediment Control Plan • Flood Emergency Response and Evacuation Plan • UXO, EO, and EOW Management Plan • **Acid Sulfate Soils Management Plan** • Bushfire Management Strategy • Community Information and Awareness Strategy. • Flora and Fauna Management Plan (FFMP) • Groundwater Monitoring Program (GMP)	This plan addresses the requirement for an ASSMP.	The ASSMP is a sub-plan to the CEMP and aims to satisfy the following objectives: 1. Review of previous investigations undertaken at the Site. 2. Address the requirements of the relevant environmental legislation and statutory requirements as it applies to the MPW Stage 2. 3. Summarise potential impacts on the environment from the proposed works. 4. Document environmental procedures that must be followed to control potential environmental impacts. 5. Control and minimise the disturbance of ASS. 6. Confirmation of the effectiveness of the adopted control measures by validation testing and documentation. 7. Preservation of engineered structures, water quality, soil quality and the wider environment. 8. Preparation in accordance with the relevant statutory provisions and guidelines.
6E	An ASSMP (or equivalent) would be prepared as part of the CEMP in accordance with the ASSMAC Assessment Guidelines (1998), for areas identified as being of low or high risk i.e. works within close vicinity of the Georges River (Figure 13-2 of this EIS).	This plan addresses the requirement for an ASSMP.	This ASSMP has been prepared with reference to ASSMAC (1998).

[3] *Moorebank Precinct West Stage 2 Environmental Impact Statement,* Arcadis 2016 (Arcadis 2016).

Table 3 – Final Compilation of Mitigation Measures (FCMMs)

FCMM	Requirement	Document Reference	How Addressed
	In addition, a risk assessment quantifying the risks associated with the volumes of soil to be disturbed, the laboratory results from ASS testing undertaken, the end use of the materials and the proximity to sensitive environments is to be undertaken. All offsite disposal would be in accordance with the NSW Waste Classification Guidelines Part 4: Acid Sulfate Soils (2009).		Areas identified within close vicinity of the Georges River **Section 4.2** Risk Assessment was undertaken as part of the historical assessment works. Summarised in Baseline Data **Section 4 and Appendix A.** Volumes of soil to be disturbed **Section 6.1** related only to the construction of the OSDs. Laboratory Results from testing are discussed in Baseline Data **Section 4 and Appendix A.** Sampling requirements when PASS or AASS identified are discussed in **Section 7.3.** End use of materials is discussed in **Section 7.11** Proximity to sensitive environments is discussed in relation to potential Environmental Impacts in **Section 6.2**. Any materials to be disposed offsite will be classified in accordance with NSW EPA NSW Waste Classification Guidelines Part 4: Acid Sulfate Soils (2014), **Section 7.11**

Condition A3d) of the MPWS2 SSD 7709 recommended conditions state *the development may only be carried out: in accordance with the management and mitigation measures in Appendix 2*. The Revised Environmental Management Measures (REMM) as per Arcadis (2016b[4]) Table 3 was reviewed and the relevant REMM to this plan are identified in **Table 4.**

[4] *Moorebank Precinct West (MPW) – Stage 2 Proposal SEARs, CoAs and REMMS Compliance Tables*, Arcadis. October 2016 (Arcadis 2016b).

Table 4 – Revised Environmental Mitigation Measures (REMMs)

REMM	Requirement	Document Reference	How Addressed
8E	An ASS management plan (or equivalent) would be developed in accordance with the ASSMAC Assessment Guidelines (1998), with active ongoing management through the construction phases. Offsite disposal would need to be in accordance with the NSW Waste Classification Guidelines Part 4: Acid Sulfate Soils (2009).	This plan addresses the requirement for an ASSMP. Management methods described in **Section 7** Waste Classification discussed in **Section 7.11.**	The plan has been developed with reference to the ASSMAC. It describes the required management measures. It describes why, when and how materials would need to be classified in accordance with the now *Part 4: Acid Sulfate Soil* (EPA 2014) guideline.

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) approval for the MPW Concept was granted by Department of the Environment and Energy (DotEE) number (No.) EPBC 2011/6086. This approval was provided for the impact of the MIT Project on listed threatened species and communities (Sections 18 and 18A of the EPBC Act) and Commonwealth action (Section 28 of the EPBC Act).

The construction and operation of the MPW Stage 2 has been designed to be consistent with the EPBC Act Approval conditions, where relevant. EPBC Act Approval conditions for the MIT Project include specific conditions and commitments.

Upon review of the approval EPBC 2011/6086 Condition 8 refers to the CEMP in relation to contamination and soils and the ASSMP must:

- Condition 8 b) – incorporate measure 8E from Table 7.1 of the finalised EIS[5] that are described as *mandatory.*
- Condition 8 c) – incorporate measure 8E from Table 7.1 of the finalised EIS that are described as *subject to review* have been addressed.

It is noted measure 8E is also required as part of the REMMs and its compliance is discussed in **Table 4** above.

2.3 Training

Training will be undertaken in accordance with the Construction Environment Management Plan (CEMP). The Principal Contractor will provide all employees with suitable environmental induction / training (relevant to this ASSMP) to ensure they are aware of their responsibilities and are competent to carry out the work.

Additional training will be provided if required in response to a review of the ASSMP requiring a change in environmental management, following an environmental incident, or due to the results of environmental monitoring.

[5] *Chapter 7 Revised environmental management measures Moorebank Intermodal Terminal Project – Final Environmental Impact Statement*, Parsons Brinckerhoff.

As a minimum the induction will include the following:

- Existence and requirements of this ASSMP;
- Relevant legislation- penalties, fines;
- Roles and responsibilities for acid sulfate management;
- Stockpile management measures;
- Material movement and tracking measures; and
- Unexpected finds.

Toolbox meetings will also be undertaken, as and when required.

Personnel directly involved in implementing ASSMP on the MPW Stage 2 site will be given specific training in the various measures to be implemented.

Personnel conducting sampling, measuring, monitoring and reporting activities are to be suitably trained or experienced in the activity. Records of all training are to be filed in accordance with the project filing system.

It is the Principal Contractors Environmental Managers responsibility to ensure all personnel are appropriately trained as outlined above.

Records of all training are to be filed in accordance with the document control system outlined in the CEMP.

3 Site Identification

Pertinent Site identification details are presented in **Table 5**.

Table 5 – Site Identification

Item	Description
Address	400 Moorebank Avenue, Moorebank, NSW
Legal Description	Lot 1 in DP 1197707 Lot 100 in DP 1049508
Site Location	**Figure 1**
State Significant Development Area	190 hectares (Ha)
Municipality	Liverpool Council
Zoning	IN1 – General Industrial E3 – Environmental Management

4 Baseline Data

4.1 Previous Environmental Investigations

The following environmental investigations have been undertaken at the Development Area:

- Golder Associates Pty Ltd, Post Phase 2 Environmental Site Assessment, Moorebank Intermodal Terminal (ref: 147623070-019-R-Rev0) (Golder 2015).
- Parsons Brinckerhoff Pty Ltd ('PB'), Phase 2 Environmental Site Assessment, Moorebank Intermodal Terminal ('Phase 2 ESA') (ref: 2103829A-CLM-REP-1 RevB), dated 28 May 2014 (PB 2014).

Phase 2 Environmental Site Assessment (PB 2014)

A review of the PB (2014) Phase 2 ESA indicated the following:

- PB was engaged by Moorebank Intermodal Company (MIC) to prepare a Phase 2 environmental site assessment (ESA) for the proposed Moorebank Intermodal Terminal (IMT) located adjacent to Moorebank Avenue in Moorebank, NSW which included a desktop and preliminary fieldwork assessment into the presence/absence of PASS/AASS.
- The Site lies between 4 and 18 m Australian Height Datum (m AHD). The lowest elevations are associated with the terraces of the Georges River.
- Surficial geology comprised localised fill with variable alluvial deposits consisting clays, sands and silts. The geological conditions encountered were consistent with conditions reported by the Earth Tech report (2006) which noted the majority of fill encountered was considered to be locally derived reworked natural material with localised occurrences of anthropogenic fill containing concrete and brick gravels and/or road base gravels and sands.
- Based on the CSIRO Australian Soil Resource Information System most of the Site has an extremely low probability of ASS. High probability of ASS occurrence was shown within the immediate corridor of the Georges River.
- Seven (7) test pits were completed at the Site targeting the lands adjacent to the Georges River within the Development Area
- Nine (9) soil samples were analysed by a National Association of Testing Authorities ('NATA') accredited laboratory for the contaminants of potential concern ('COPC') including suspension peroxide oxidation combined acidity and sulfate ('SPOCAS').

PB (2014) concluded, based on their limited analytical results, subsurface materials encountered at the Moorebank IMT site may pose an acid generation risk if exposed to oxygen during redevelopment. Further, as the water table impedes oxidation of potential iron sulfides in the subsurface, dewatering/lowering of the groundwater table during redevelopment may result in oxidising conditions at depth.

Post Phase 2 Environmental Site Assessment (Golder 2015)

A review of Golder (2015) indicated the following:

- The majority of the MPW Stage 2 site has no known occurrence of ASS. A small western portion of the site located on the Georges River flood plain (Environmental Protection Zone)

has a low probability of ASS and the immediate area surrounding the Georges River has a high probability of ASS. This is in line with PB (2014) findings.

- The investigation was specifically designed to determine "*are acid generating soil present in areas which may be disturbed or dewatered during future construction works onsite? If so, what management will be required*"
- Fifteen (15) soil samples were selected for analysis by a National Association of Testing Authorities ('NATA') accredited laboratory for the contaminants of potential concern ('COPC') including Chromium Reduceable Sulfur which is considered comparable to SPOCAS analysis.

Golder (2015) concluded:

- Acidic soils did not appear to be associated with the oxidation of sulphide minerals.
- The source of the acidity within the soils was considered to be unknown and management of such soils was to be included within the Construction Environmental Management Plan (CEMP).

4.2 Summary of Site History

Based on the review of available information and assessment of the soil data (**Section 4.1**), actual and potential acid sulfate soils were identified in shallow soils between 1.0m BGL and 2.0m BGL in the Environmental Protection Zone on site along the Georges River refer to **Appendix A**.

Golder (2015) concluded the acid generating potential of the soils was not caused by sulfidic material. Both Golder (2015) and PB (2014) recommended an Acid Sulfate Soil Management Plan was a requirement for future earthworks.

Soil results and sampling locations from the previous investigation are summarised in **Appendix A**.

- Golder (2015) calculated a liming Rate of 2.7 to 3.3 kg/t (Aglime) to treat the site soils.

The PB (2014) and Golder (2015) results are considered relevant as the current and proposed Site use has not changed since the assessment or Development Consent.

4.3 Site Conditions and Surrounding Environment

The Site is located approximately 27 km south-west of the Sydney Central Business District (CBD) and approximately 26 km west of Port Botany. The Site is situated within the Liverpool Local Government Area (LGA), in Sydney's South West subregion, approximately 2.5 km from the Liverpool City Centre. The Site is located at the intersection of Moorebank Avenue and the M5 Motorway.

The location of the Site is shown in **Figure 1 (Attached Figures)**. The boundary of the Site is shown in **Figure 2 (Attached Figures).**

4.4 Site Description and Surrounding Land Use

The Site has undergone Stage 1 of redevelopment as part of the Concept Proposal and Early Works construction of the MITD (SSD_5066). Buildings previously used by Defence have been demolished and remedial works in accordance with Golder (2016a[6]) have been completed.

The Site comprised grassed open space, former defence building footprints and former training areas including open grassed/concrete areas used for specialist training.

Access to the Site was generally off Moorebank Avenue on the eastern boundary and to Lot 100 off Bapaume Road to the area of the Site north of Bapaume Road. Following Early Works (Stage 1) the Site comprised vacant land with a number of swales and basins excavated to manage stormwater throughout early works.
The land surrounding the Site comprises:

- **North:** Industrial warehouses, the M5 motorway, small pockets of remnant bushland and further industrial and residential properties beyond. The Georges River bends to the north east.
- **South:** Rail corridor, Holsworthy Defence land, and residential properties to the west of the Georges River.
- **East:** Moorebank Avenue, MPE, general industrial properties and infrastructure (Defence), Liverpool Fire Station (north-east), Anzac Creek, low density and medium density residential properties beyond.
- **West:** The Georges River (which flows north), Glenfield Tip, rail corridor and Casula Station, Leacock Regional Park and low and medium density residential properties beyond.

4.5 Geology

A review of PB (2014) indicated the regional geology and hydrogeology across the site was as follows:

- The Site overlies a Quaternary and Tertiary alluvium consisting of silt, sand and gravels from quaternary fluvial deposition.
- The site overlies localised fill with variable alluvial deposits consisting clays, sands and silts. The majority of fill encountered was considered to be locally derived reworked natural material with occurrences of anthropogenic fill.
- Fill depths across the site generally ranged between 0.5 and 1 m BGL, however fill depths of up to 3.2m BGL were encountered in Dust Bowl and immediately north east (**Figure 2**).

4.6 Acid Sulfate Soils

A review of the Liverpool Local Environmental Plan 2008 indicates the Site is located predominantly within Class 5 and Class 1 acid sulfate soil (ASS) developmental control areas. The Development Area is within a Class 5 ASS area with the exception of the OSD Basin 5, 6 and 8 spillways (**Figure 2**) which

[6] *Moorebank Intermodal Company Property West Land Preparation Works Stage 1 and Stage 2 – Remediation Action Plan*, Golder Associates, 9 August 2016 (Golder 2016a)

cross into the Georges River Class 1 Area. Development consent is required for carrying out any works in Class 1 acid sulfate soil (ASS) developmental control areas.

4.7 Topography

EP Risk (2018[7]) reported the topography of the Site was generally level in the eastern portion and gradually sloped down towards the Georges River in the western portion.

Drainage at the Site is anticipated to follow the general topography of the land as overland flow or via drainage channels, swales and detention basins to the Georges River. A number of surface water bodies were located on and within the vicinity of the Site including:

- The head waters of Anzac Creek, which flows through the golf course in the southern portion of the Site and discharges off-site to the east.
- Lake Sisinyak to the north east of the Dust Bowl.
- A number of excavated swales and sediment basins (excavated as part of the early works).

4.8 Hydrology

EP Risk (2018) reported the closest significant body of water to the Site is the Georges River, immediately west of the Site. The Georges River flows north towards Lake Moore, situated approximately 2.5 km north north-east of the Site, and into Chipping Norton Lake, located approximately 5.6 km north east of the Site. The Site is situated near the upstream portion of the Georges River, which flows in a general north, then east / south easterly direction towards Botany Bay which is located approximately 20 km south south-east of the Site.

The head waters of Anzac Creek are located in the southern portion of the Site within the former Royal Australian Engineers (RAE) Golf Course on the western side of Moorebank Avenue (within the MPW site). The creek appears to have been modified into a series of water features (dams/ponds). Anzac Creek is east-west aligned and flows generally north-east to its confluence with the Georges River, approximately 5 km north of the Site. Anzac Creek is considered to be an ephemeral water body.

4.9 Hydrogeology

EP Risk (2018) reported groundwater flow is towards the west and the nearest surface water body, the Georges River. Groundwater ranged from 1.784 m Australian Height Datum (AHD) to 14.055 m AHD.

Alluvial sediments adjacent to the Georges River in the western portion of the Site reported higher horizontal hydraulic conductivities and groundwater velocities than the predominately clay aquifer in the eastern portion of the Site.

EP Risk (2018) also reported that groundwater was predominantly fresh to brackish water (relatively low electrical conductivity, EC) with the exception of six (6) groundwater monitoring wells (GMWs) which indicated an area of high salinity (> 10,000 µS/cm) in the central portion of the Site. Dissolved oxygen (DO) measurements indicated generally anaerobic conditions. The oxidation-reduction potential (ORP) indicated reducing conditions and the pH measurements were generally slightly acidic.

[7] *Moorebank Precinct West Site-Wide Per- and Poly- Fluoroalkyl Substances (PFAS) Assessment* (ref: EP0748.008 v1, 22.08.18) EP Risk Management Pty Ltd (EP Risk 2018)

5 Acid Sulfate Soil Indicators and Assessment Criteria

The following ASS indicators and assessment criteria are based on the ASSMAC, 1998.

ASS generally consist of clays and sands containing pyritic material and are usually found in estuarine areas. The field indicators of AASS include:

- pH readings measured in the field of <4.
- Presence of shell.
- Iron staining on any drain surfaces.
- Unusually clear or milky green water discharge.
- Iron oxide mottling of soil in the subsurface.
- Corrosion of concrete or steel structures.

Undisturbed soils which contain iron sulfides or sulfidic material, which have not been exposed to air and oxidised, generally waterlogged, pH of 4 or more and may be neutral or slightly alkaline are known as PASS. The following may also be indicators of PASS.

- Presence of any sulfurous odours.
- Presence of shell.
- pH following oxidation with 30% hydrogen peroxide (H_2O_2) is less than 3.
- Strength of the oxidation reaction.
- Lowering of the pH by at least 1 unit.

The above field screening observations are used to guide selection of samples for laboratory analysis. Soil samples submitted for laboratory analysis are tested using the Chromium Reduceable Sulfur or SPOCAS method. The results will be assessed against the guidelines specified in ASSMAC 1998. Based on types of material PB (2014) encountered within the test pits, the adopted criteria of the material are based upon the medium texture (sandy loams to light clays).

The results were assessed against the criteria shown in **Table 6** below.

Table 6 – Soil Assessment Criteria					
Texture range	Approximate clay content (%)	1-1000 t material disturbed		>1000 t material disturbed	
		% S-equiv. (oven-dried basis)	Mol H+/t (oven dried basis)	% S-equiv. (oven-dried basis)	Mol H+/t (oven-dried basis)
Fine Medium to heavy clays and silty clays	>40	0.1	62	0.03	18
Medium Sandy loams to light clays	5-40	0.06	36		
Coarse Sands to loamy sands and peats	<5	0.03	18		
Draft action criteria for poorly buffered sands					
Coarse Sands, poorly buffered	<5	0.01	6	0.01	6

Notes:
- The highest laboratory result(s) should always be used to decide if the relevant action criterion level has been met or exceeded; using the average or mean of a set of results is not appropriate or acceptable.

5.1 Leachate Criteria

The treatment and management of surface water flows from areas containing acid sulfate soils to prevent leaching of acidic waters and metal contaminants into the environment should maintain the present surface water quality. The discharge of surface water should be done so in accordance with the Construction Soil and Water Management Plan (CSWMP) for the project and this plan. Minimum requirements in relation to ASS management are presented in **Table 7** below.

Table 7 – Adopted Leachate Criteria		
Indicator	**Fresh Water**	**Marine Water**
pH	6.5-8.0	8.0-8.4 and <0.2 unit change
Suspended Solids	Not Defined	
Turbidity (NTU)	1-20	0.5-10
Dissolved Oxygen (field measured, %)	110	
Oil and Grease	Nonvisible or detected	
Iron Floc and Scum	Nonvisible or detected in discharge water	

6 Aspects, Impacts and Risks

6.1 Proposed Disturbance Activity

The proposed development for MPW Stage 2 is likely to include construction of the following:

- An open access import-export (IMEX) freight terminal with an ultimate capacity of up to 1.05 million Twenty-foot Equivalent Unit (TEU) per annum, including on-site freight rail sidings.
- An open access interstate freight terminal with an ultimate capacity of up to 500,000 TEU per annum.
- Terminal warehousing and distribution facilities comprising approximately 215,000 m^2 of warehousing with ancillary offices.
- A rail access, connecting the SSFL at the southern end of the interstate and IMEX terminal.
- A freight village of support services on site, including management and security offices, meeting rooms, driver facilities, retail and business services.
- Measures to manage stormwater flow in the Proposed Development include construction of three proposed OSDs as follows (**Figure 2**):
    - OSD Basin 5 and outlet
    - Dust Bowl - OSD Basin 6 and outlet; and
    - FFTA - OSD Basin 8 and outlet.
- It is understood that excavation of OSD Basins will generate approximately 200,000m^3 of soil for off-site disposal and/or potential reuse onsite. The average depth of excavation for the OSD basins is 2.0m

Based on historical data (**Section 4**) the only excavations with the potential to encounter PASS or AASS is associated with construction of the OSD Basins and specifically the spillways into the Georges River. The remaining earthworks across the site is situated in areas considered to have negligible PASS/AASS risk.

This ASSMP relates to bulk earthworks and excavations for the construction of OSD Basins 5, 6 and 8 of the proposed development.

Copies of the proposed construction drawings are provided as **Appendix B.**

6.2 Environmental impacts

The potential impacts of PASS or existing AASS from the proposed earthwork include:

- Exposing existing AASS in the vicinity of OSD Basins 5, 6 or 8 overflow spillways during excavation and or construction causing a release of acid into the surrounding environment and/or Georges River.
- Exposing PASS to air in the vicinity of OSD Basins 5, 6 or 8 overflow spillways causing oxidation and a release of acid into the surrounding environment and/or Georges River .
- Leaching of acid into the surrounding environment and/or Georges River at treatment sites.

6.3 Construction Impacts

Excavation within the areas identified within this plan to contain potential or actual ASS must be managed in accordance with this plan.

7 Management Measures

7.1 Roles and responsibilities

The key stakeholders responsible for the implementation of the control measures outlined in the ASSMP are presented in **Table 8** and are in accordance with Section 2.5 of the CEMP (SIMTA 2019[8]).

Table 8 – Roles and responsibilities

Role	Party	Responsibilities
Regulator	Department of Planning, Industry and Environment (DPIE)	Review and approve formal requests for permission to carry out a 'development'.
SIMTA (Principal)		• To Engage the consultants and contractors. • Undertake Stakeholder management. • Provide advice and leadership on environmental management
Site Auditor	Enviroview Pty Ltd ('Enviroview')	• Review and approve the management measures provided in the ASSMP. • Consideration of the ASS closure report in the preparation of a non-statutory site audit statement and site audit report.
Principal's Representative (Project Management Team and Environmental Specialists)		Manage and assist the contractors to meet their environmental responsibilities and minimise the potential for environmental incidents Review the CEMP and sub-plans for adequacy. Review the Construction Contractor's environmental monitoring reports and compliance documentation to confirm that the CEMP and sub-plans are being implemented and remain adequate. Issue a stop work direction immediately where an unacceptable environmental impact may occur. Liaise with the DPIE and other relevant regulators as required.
Community Engagement Consultant (CEC)		Manage the relevant enquiries and complaints Working with contractors in the organisation and delivery of community notifications and/or information dissemination Reviewing contractor community relations materials, including notifications, letters, advertising, signs and factsheets Monitoring, responding to and triaging Project calls and emails from community stakeholders Working with Contractor's Environmental Manager and Community Liaison Manager on environmental complaints received from the public

[8] *Construction Environmental Management Plan Moorebank Precinct West Stage 2*, Sydney Intermodal Terminal Alliance, 4 October 2019 (SIMTA 2019).

Table 8 – Roles and responsibilities

Role	Party	Responsibilities
Contractor's Project Manager (Contractor's PM)		Oversee the implementation and maintenance of the CEMP Report to senior management and the Principal's Representative on the performance of the system and environmental breaches Take action to resolve environmental non-conformances, non-compliances and incidents Demonstrate that suppliers and sub-contractors are implementing Project environmental requirements Report environmental incidents to the Principal's Representative Authorise expenditure to implement environmental management requirements within limits of authority as defined in the Principal's Representatives Project requirements Coordinate Incident Cause Analysis Method (ICAM) investigations Review audit corrective actions and take action as necessary to ensure timely close out of issues Direct works to be performed in a more environmentally responsible manner that reduces impacts or stop works if there is a risk of environmental harm
Contractor's Construction Manager (Contractor's CM)		Communicating with all personnel and sub-contractors regarding conformance with the CEMP and site specific environmental issues Identifying resources and competencies required for implementation of the CEMP Co-ordinating the implementation and maintenance of site environmental controls and provide support for the Contractor's EM Report all environmental incidents in accordance with incident reporting protocol Participate ICAM investigations Take action to resolve non-conformances, non-compliances and incidents Manage and direct works in an environmentally responsible manner that reduces environmental impacts or stop works if there is a risk of environmental harm

Table 8 – Roles and responsibilities

Role	Party	Responsibilities
Contractor's Environmental Manager (Contractor's EM)		Assist and guide the respective workers to meet their environmental responsibilities and minimise the potential for environmental incidents Undertake regular environmental inspections including against implementation of management measures and environmental controls Report to the Contractor's CM on environmental issues Implement appropriate action to address any environmental incidents Investigate and report on identified non-conformances and non-compliances Ongoing identification and mitigation of environmental risks and notify the Principals Representative of any required change Develop environmental components of site induction and ensure a register of attendance is maintained Present and participate in toolbox meetings Manage environmental document control, reporting, inductions and training Oversee site monitoring, inspections and internal audits Monitor and report on the environmental capability and performance of subcontractors Participate ICAM investigations Report environmental non-conformances, incidents and potential incidents to the Contractor's PM Cooperate and participate in audits and action results of any audit findings.
Environmental Suitability Qualified Person (ESQP) (in accordance with NEPM Schedule B9[9] 2013)		Assessing Materials and determining treatment requirements – soils and waters. Validate all stockpiles and remediated soils. Prepare validation Report.

7.2 Monitoring requirements During Excavation of OSD Basins

During excavation of the OSD Basins an ESQP will be present daily to carry out inspections of excavated materials for the presence of suspected PASS or AASS.

The visual indicators for Potential Acid Sulfate Soils are:

- Soils are wet, usually entirely saturated, and may not be easy to walk on.
- Color ranges from pale to dark shades of grey and or may be greenish in some cases.

[9] *National Environment Protection (Assessment of Site Contamination) Measure 1999 as amended 2013* – Schedule B9 Guideline on Competencies & Acceptance of Environmental Auditors and Related Professionals (NEPM B9 2013).

- Sediments will often contain seashells and similar carbonate materials.
- Organic materials may be present, particularly the remnants of plants and grasses.
- A strong hydrogen sulfide (H_2S) gas smell (rotten eggs odor)

The visual indicators for Actual Acid Sulfate Soils are:

- Soils can be quite dry, with a block like structure.
- Colour ranges from pale to dark brown often with yellow or orange mottling. The yellow mottle is the mineral jarosite and the orange colours are other iron oxide minerals.

Where visual indicators suggest PASS or AASS an in-field pH and peroxide test will be conducted to confirm observations:

- AASS - pH readings measured in the field of <4.
- PASS - pH following oxidation with 30% hydrogen peroxide (H_2O_2) is less than 3.
    - Strength of the oxidation reaction.
    - Lowering of the pH by at least 1 unit.

Where in-field tests suggest PASS or AASS is not suspected, one (1) sample will be scheduled for laboratory analysis to confirm field results.

Where PASS or AASS is confirmed by field tests refer to **Section 7.3**.

7.3 Soil Sampling Protocol for Suspected PASS/AASS

In the event suspected PASS or AASS is identified, the soils acid generating potential will need to be determined. The following sampling regime will be followed:

- Collection of soil samples 1 per $25m^3$ for laboratory analysis.
- Testing of each sample for chromium reduceable sulfur or SPOCAS suite including retained acidity by a NATA accredited laboratory.

The adopted sampling approach will be consistent with NEPM (2013) and AS4482.1 (2005). Soil sampling must be undertaken by the ESQP.

7.4 Calculation of Application Rate for Neutralisation Materials

Golder (2015) calculated a general liming rate of 2.7-3.3kg Aglime per tonne of site soils requiring treatment.

If PASS/AASS is identified, the actual liming rate for each volume of soil requiring treatment from OSD Basin spillways will be verified in accordance with formula below:

Lime required (kg $CaCO_3$/t) = kg H_2SO_4/t of material x Safety Factor = (Oxidisable S% x 30.59) x 1.5

Derivation of application rates for neutralisation materials must carried out by ESQP in accordance with ASSMAC (1998).

7.5 Construction of the Soil Treatment Area

Soils excavated during the construction of the OSD Basin spillways (5, 6 and 8) may require soil treatment for PASS/AASS if visual, field and laboratory indicators are observed by the ESQP. Therefore

prior to commencing the works, a suitable soil treatment area located adjacent to each OSD Basin, but within the construction site, will be identified in the event treatment of PASS/AASS is required. Treatment pad(s) will be constructed only in the event PASS/AASS soils area identified onsite as per the following in accordance with ASSMAC (1998):

- Constructed as far as practicable from any drainage channels and within the designated construction areas. The pads/bunds will be constructed to the East of the OSD Basin.
- Designed and sized to accommodate the anticipated volumes of spoil produced from the excavation works.
- Barricaded and appropriate signage erected.
- Bunded to a height of approximately 0.3 m and appropriate sediment controls installed to prevent runoff and sediment migration.
- Designed such that overland flow is diverted.
- Constructed on an impermeable or lined surface to minimise infiltration.
- Constructed with a guard layer comprising of a neutralizing agent.

The minimum guard layer rate should comprise of 5 kg aglime/m^2 per vertical metre of fill material. If the highest detected sum of existing and potential acidity is greater than 1% S-equivalent, the guard layer rate will be a minimum of 10 kg aglime/m^2 per vertical meter of fill.

7.6 Stockpiling Soils

In the event PASS/AASS is identified and requires treatment onsite the following stockpile management protocol will be followed for soils within the soil treatment area:

- Different soil types will be segregated based on treatment requirements.
- Spreading Aglime over the surface of the stockpile to limit the generation of acidity from the surface of the stockpile where it is considered likely that the stockpile will contain existing or potential ASS. The results of previous testing can be used as a guide to the likely presence of existing or potential ASS within the stockpile.
- Soils within the soil treatment area will be kept moist, but not saturated to minimise oxidation prior to treatment.
- All soils will be covered with tarpaulins or geomembrane to mitigate generation of leachate within the soil treatment area.
- Delaying soil treatment will be avoided to minimise potential acid generation.
- The residence time for short term stockpiling of soils without treatment within the soil treatment area will not exceed recommended periods as presented in **Table 9**.
- If ASS is required to be stockpiled for longer time frames then those presented in **Table 9**, then it must be fully treated.

Table 9 – Indicative residence time for soils in soil treatment area before treatment		
Texture	**Approximate clay content (%)**	**Duration of stockpiling (hours)**
Sands to loamy sands	<5	18
Sandy loams to light clays	5-40	42
Medium to heavy clays and silty clays	>40	66

Additional measures to minimise short term effects of oxidation of stockpiles during the proposed works include:

- Spreading aglime over the surface of the stockpile to limit the generation of acidity from the surface of the stockpile where it is considered likely that the stockpile will contain existing or potential ASS. The results of previous validation testing can be used as a guide to the likely presence of existing or potential ASS within the stockpile.
- Soils within the soil treatment area will be kept moist, but not saturated to minimise oxidation prior to treatment.
- All soils will be covered with tarpaulins or geomembrane to mitigate generation of leachate within the soil treatment area.

During treatment an environmental SQP will be present daily to conduct inspections of the stockpile and treatment area.

7.7 Dewatering

The proposed construction drawing for the OSD Basins 5, 6 and 8 (**Figure 2**) are provided in **Appendix B**.

The basins have been designed to avoid any excavation in the Georges River terraces and hence there is no requirement for dewatering of groundwater. However, excavation and displacement of soil may result in temporary minor lowering of water levels in the immediate vicinity of these works. Monitoring of groundwater levels must be undertaken during construction to confirm the proposed methodology is not resulting in dewatering of the aquifer. This will be undertaken by the ESQP. Groundwater monitoring wells adjacent the OSD Basin 5, 6 and 8 will have the water level gauged once per week during excavation.

Should dewatering be required or inadvertent dewatering observed during construction, then the impacted area will be contained or isolated, using containment structures such as sheet piling or shoring boxes where practicable and ongoing monitoring of PASS and AASS conducted by ESQP.

Dewatering or drainage poses a high risk to adjacent in-situ potential ASS, which will then need remediation if oxidation occurs. The approach to diligently manage the potential ASS impacts of groundwater is firstly to minimise the volume extracted, contain the water in a suitable manner and manage water quality appropriately.

Management strategies of dewatering, should it be required will be follows:

- Minimise the volumes of soil excavated and therefore the soils dewatered at any given time.

- Minimise the duration and volume of dewatering, allowing recharge to occur as soon as possible. Reinjection of extracted groundwater will be appropriate if water quality is managed correctly, treatment may be required before release or reuse.
- Full physical confinement of the excavation area as far as possible by using sheeting piling or caisson construction to minimise groundwater drawdown and to prevent seepage into the dewatered void.
- Ongoing monitoring of potential AASS/PASS impacts within the excavation area by an environmental SQP.

7.8 Treatment

The following sections outline treatment options for soil and water considered suitable for the MPW Stage 2 the event ASS or PASS is encountered and requires treatment onsite. Further information on alternative treatment options can be found in ASSMAC (1998).

Soil Treatment

- Stockpile the excavated spoil on the central portion of the treatment pad guard layer.
- Mechanically break up any clods, add Aglime and mix. The Aglime will be thoroughly mixed with the soil using an appropriate mechanical device such as an excavator (or other alternatives as appropriate).
- General dosing rate of Aglime based on Golder (2015):

Table 10 – Dosing rates of Aglime

Soils	Approximate depth range (m)	Aglime dosing rate (kg $CaCO_3$/t)
Clay, sandy clay and sandy gravels (sand loams to light clays)	0.0 – 2.0	2.7 – 3.3[10]

- Actual liming rates for each volume of soil requiring treatment will be verified to avoid over or under treatment of soils
- It's considered too difficult during the earthworks to segregate PASS from acidic soils and therefore common management actions will be applied to both types of soil.
- Progressive neutralisation of stockpiled soil will be undertaken to minimise the size of the soil treatment area.
- Additional liming may be required should validation results indicate that the neutralisation has not been achieved.

[10]This calculation assumes that an aglime with a neutralising value ('NV') of 98% will be used and a safety factor of 1.5 has been applied. Should an aglime with an alternative NV be adopted then the dosing rate will need to be recalculated.

Water treatment

Surface water with the potential to become acidic as a result of interaction with the treatment area or excavations will be treated and monitored as follows:

- Surface water accumulated in excavations or treatment area will be tested for pH. If the pH is outside the range of 6.5 – 8.5 then the water will be neutralised with the addition of agricultural lime or hydrated lime.
- Water should only be discharged to stormwater if it has been appropriately tested and is subject to meeting all other applicable discharge criteria specified in the Construction Soil and Water Management Plan (CSWMP) as well as meeting the criteria for the relevant parameters listed **Table 7**.
    - Records of water discharged or disposed from site shall be maintained in accordance with the requirements in the CSWMP.
- Backfilling excavations, completion of footings and foundations as soon as possible to minimise the oxidation of in-situ soils exposed within the excavations.
- Minimise the drainage of soils by limiting any groundwater drawdown within excavations to the absolute minimum required to complete the excavation safely. Seepage entering the excavation should be minimised through the use of physical barriers.
- Where material is to be transported to the treatment facility via public roads, wheel cleaning facilities will be established at site exits to prevent offsite contamination during transport.
- Material will be transported within trucks with secure tailgates.
- Records of transport including individual truck details and quantity transport will be retained at the Project Office.
- At the end of each transport shift an inspection of the transport route will be undertaken by the Supervisor to determine if material has been spilt. Where material has been spilt on public roads it will be removed immediately.

7.9 Monitoring Program

Overall, the following monitoring will be conducted during the excavation of the OSDs and the management of any soils requiring treatment:

- One week prior to the excavation of the OSDs the groundwater monitoring wells proximal to each basin will be tested in the field for pH and electrical conductivity (EC). The immediately downgradient surface water within the Georges River will also be tested in the field for pH and EC. These will be recorded as baseline measurements.
- Daily visual and in-field soil observations and testing as per **Section 7.2 and 7.3.**
- Where PASS or AASS are identified soil samples will be tested as per **Section 7.3.**
- Where soils require treatment and a treatment area needs to be established, during treatment an environmental SQP will be present daily to conduct inspections of the stockpile and treatment area. As per **Section 7.6**.

- Surface water with the potential to become acidic as a result of interaction with the treatment area or excavations will be monitored as **Section 7.8.**
    - Under dry conditions stormwater/leachates will not be allowed to accumulate within the treatment pads/bunds.
    - Within an excavation deemed to contain AASS or a treatment area, water quality will be monitored following substantial rainfall events or where water has been retained. Water will be sampled and tested for pH.
    - If the pH is outside the range of 6.5 – 8.5 then the water will be neutralised with the addition of agricultural lime or hydrated lime.
- As noted in **Section 7.7,** the basins have been designed to avoid any excavation in the Georges River terraces and hence there is no requirement for dewatering of groundwater. However, excavation and displacement of soil may result in temporary minor lowering of water levels in the immediate vicinity of these works.
    - Monitoring of groundwater levels must be undertaken during construction to confirm the proposed methodology is not resulting in dewatering of the aquifer. This will be undertaken by the ESQP.
    - Groundwater monitoring wells adjacent the OSD Basin 5, 6 and 8 will have the water level gauged, pH and EC measured once per week during excavation (**Section 7.7**).
    - Where variance of water levels is greater than 30% investigate cause.
- During and immediately after the disturbance of AASS, water levels, pH and EC may need to be monitored daily within the excavations, the Georges River (proximal to the disturbance only) and any adjacent groundwater monitoring well.
    - Where pH falls outside of the range 6.5 – 8.5 and the baseline (for groundwater and the Georges River):
        - Excavation water - will be treated with the addition of agricultural lime or hydrated lime.
        - Groundwater and Georges River – an additional 10 readings from the non-complying well for pH will be collected over the course of 24 hours to examine if the non-compliance is from excavation works. The 95% upper confidence limit (UCL) will be calculated.
            - Where the UCL is within range no action is required, continue monitoring pH daily.
            - If the UCL is out of range and beyond the baseline readings works need to cease and investigation conducted into the breach. See **Section 8**.

7.10 Validation Sampling and Analysis

Following general inspection and testing protocol should be followed to validate successful soil treatment if treatment is required.

- Inspections and testing of stockpiled spoil placed within the treatment area shall be undertaken every 1-2 days to determine whether the additional Aglime is required.
- Inspections of stockpiles for visual signs of seepage impacted by ASS including milky waters, iron staining and sulfur odour should be undertaken daily.
- Collection of one composite soil sample (comprised of 6 sub-samples) for every 1000 m^3 of treated soil, based on the results of previous testing reporting <0.5% S-equivalent (<312 mol H+/tonne).
- Verification testing for the success of the soil neutralisation is to be carried out including testing of each sample for chromium reduceable sulfur or SPOCAS suite including retained acidity by a NATA accredited laboratory.
- Validation action criteria is presented in **Section 7.10**

7.11 Validation criteria

The adopted action criteria for the assessment of the effectiveness of soil treatment is detailed Table 4.4 from ASSMP (1998) as below.

Table 4.4. Action criteria based on ASS soil analysis for three broad texture categories

Type of Material		*Action Criteria 1-1000 tonnes disturbed*		*Action Criteria if more than 1000 tonnes disturbed*	
Texture range.McDonald et al. (1990)	*Approx. clay content (% < 0.002 mm)*	*Sulfur trail % S oxidisable (oven-dry basis) eg S_{TOS} or S_{POS}*	*Acid trail mol H^+/tonne (oven-dry basis) eg, TPA or TSA*	*Sulfur trail % S oxidisable (oven-dry basis) eg S_{TOS} or S_{POS}*	*Acid trail mol H^+/tonne (oven-dry basis) eg, TPA or TSA*
Coarse Texture Sands to loamy sands	≤5	0.03	18	0.03	18
Medium Texture Sandy loams to light clays	5 - 40	0.06	36	0.03	18
Fine Texture Medium to heavy clays and silty clays	≥40	0.1	62	0.03	18

Where action criteria are exceeded this indicates the requirement for additional treatment with Aglime is required which can be confirmed by additional testing.

7.12 Uses for treated ASS

Following successful neutralisation and verification testing of PASS and AASS, the following uses of the material can be undertaken:

- Successfully neutralised ASS may be used as fill, backfill or preload depending on the condition the material is suitable for reuse in accordance with NEPM 2013[11] and the CMP (EP Risk 2019[12]) the Site.
- The reuse of neutralised ASS is also subject to geotechnical suitability of the material.

[11] National Environmental Protection Council (NEPC), National Environment Protection (Assessment of Site Contamination) Measure 1999 (2013) (NEPM 2013).
[12] *Contamination Management Plan Moorebank Precinct West Site, 400 Moorebank Avenue, Moorebank NSW*, EP Risk Management Pty Ltd, October 2019 (EP Risk 2019).

- Treated ASS can be disposed of to a suitability licensed landfill lawfully able to accept the waste, provided the material has a waste classification certificate in accordance with the NSW EPA (2014) Waste Classifications Guidelines Part 1: Classifying Waste and Part 4: Acid Sulfate Soils.
- Treated ASS can be used in landscaping and similar works at the Site but may require considerable further amendment due to liming causing a potential for low organic matter and high salts with variable water holding capacity and poor structure.

7.13 Reporting

The following details should be recorded during the soil treatment process and reported in a final 'Validation Report':

- Total final volumes and dimensions of disturbed AASS/PASS if encountered.
- Where dewatering was involved, final location, extent and duration of dewatering and details of groundwater management strategies applied.
- Details of soil management strategies undertaken at the site (including evidence of specific management measures such as waste tracking, photographic evidence of neutralisation and of bunded treatment pads).
- Details of water management strategies undertaken at the site.
- Location and maps of areas used for burial of fines from sluicing.
- Location and maps of areas used for reuse and backfill of fully treated and verified ASS.
- Location and maps of areas used for strategic burial of potential ASS, depth below finished surface and details of safety margin below the permanent water table.
- In appendices, full results of monitoring and verification testing regimes.
- A discussion of the effectiveness of management strategies employed at the site.
- Details of any incidence of nonconformity with the ASSMP plan and corrective actions taken.
- A discussion of any potential risks to the environment or human health.
- Proposed future monitoring and/or reporting programs.
- Proposed remediation measures if needed.

A record of these observations, calculations and soil monitoring results will be provided to the client for each day an inspection is undertaken. At the completion of works a final closure report will be prepared detailing the above information.

8 Contingency plan

A number of contingency measures for the soil treatment works have been provided in **Table 11**.

Table 11 – Contingency plan

Scenario	Consequence	Contingency Measures
Under liming of ASS.	Potential for acid generation and impact to sensitive receptors.	Addition of more Aglime with additional chromium reduceable sulfur or SPOCAS testing to determine additional liming rate (if required).
Over liming of ASS	High pH may cause environmental impact.	Mix over limed soil with ASS to reduce pH levels to within adopted criteria.
Volume of ASS exceeds treatment area	Delays to earthwork. Environmental Impact.	Increase size of soil treatment area.
Observations of ASS leachate production in soil treatment area.	Loss of containment of leachate.	Conduct Aglime treatment and apply leachate back to stockpile.
Heavy rain causing ponding of water within treatment area.	Damage to bunding and sediment controls. Environmental Impact.	Testing of water for adopted action criteria and treatment if exceedance of relevant criteria. Repair bunding as required. Water collection and treatment as required. If a release offsite has occurred notification to the relevant authorities (NSW EPA and DPIE)

If the measured 95% UCL for pH after monitoring in accordance with **Section 7.9**, is out of range and beyond the baseline readings within the proximal groundwater wells and/or the Georges River, works need to cease and the following should be conducted:

- Report the breach to:
    - NSW EPA as soon as aware; and
    - Department of Planning, Industry and Environment (DPIE).
- Investigation into the breach and auditing of the management plan where required.
- Where an immediate response is required sheet pilling or another method to isolate the excavation area from the George River and groundwater, may need to be implemented.
- Develop a remediation and/or restoration plan, a suitably qualified consultant should be engaged to do this:
    - Rehabilitation actions should be undertaken and regular monitoring at agreed intervals should continue until the rehabilitation action has been completed and the situation poses no significant risk to the environment.

9 Environmental Monitoring

9.1 Periodic Review

A periodic review of the ASSMP should be undertaken by a suitably qualified expert[13] for the following:

- In accordance with the conditions of consent Clause C8
- The ASSMP should be reviewed and potentially revised if there are any regulatory changes relevant to the implementation of the ASSMP.
- The ASSMP should be reviewed if there is any significant change in land use or development of the Site.
- Where the ASSMP is revised, copies will be provided to all current stakeholders, training provided, and induction procedures updated where necessary.

9.2 Managing and Reporting

Incidents and Non-compliances

Incidents and non-compliances will be managed in accordance with the CEMP (SIMTA 2019) Section 2.8.1.

Complaints

All complaints will be managed in accordance with the CEMP (SIMTA 2019) Section 2.6.3.

Non-Compliances with statutory requirements

Non-compliances with statutory requirements will be managed in accordance with the CEMP (SIMTA 2019) Section 4.4.

Continual Improvement

Review and improvement of this ASSMP will be undertaken a suitably qualified expert in accordance with the CEMP. Continuous improvement will be achieved by the ongoing evaluation of environmental management performance and effectiveness of this plan against the environmental policies, objectives, and targets.

A copy of the updated plan and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure.

[13] Academic qualifications and registration with the relevant professional body.

9.3 Environmental Monitoring

Environmental monitoring will generally be conducted as per the CEMP. However, environmental monitoring specific to this ASSMP, discussed throughout the document is summarised in **Table 12** below.

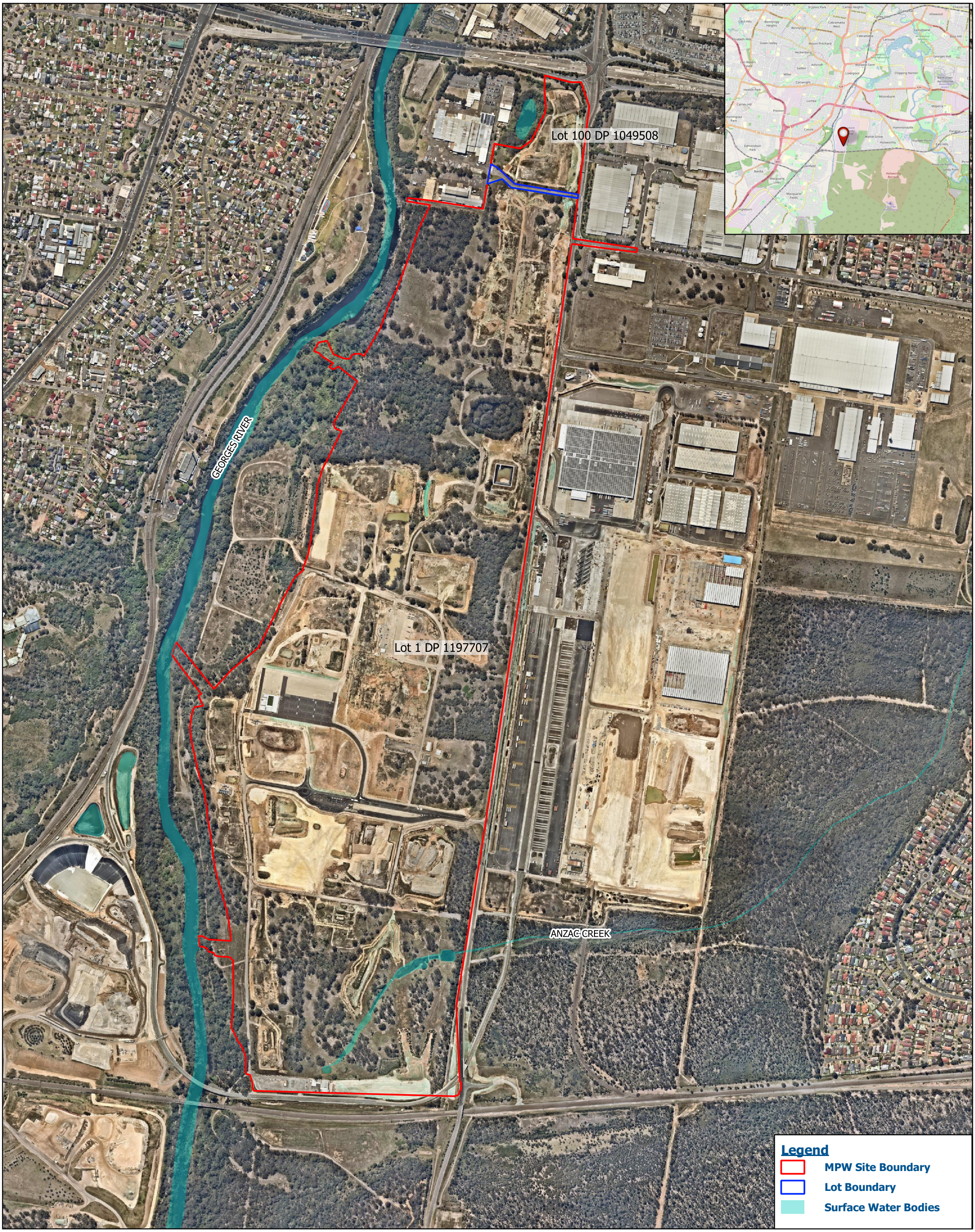
Table 12 – Summary of Environmental Monitoring under the ASSMP

Monitoring Type	Frequency	Responsibility	Relevant Standards	Technique, Location and Installation Requirements	Sample Collection Requirements	Calibration and Maintenance Requirements	Record
Baseline – Groundwater and Georges River	1-week prior to excavation of the OSD spillway	ESAP	**Section 7.9** for all details.				Daily Diary
Groundwater	Weekly during excavation of OSDs – closest operational monitoring well	ESQP	**Section 7.7 and 7.9** Gauge standing water levels weekly when excavating in OSD 5, 6 and 8. Where variance between rounds is greater than 30% investigate cause. pH and EC weekly - where pH falls outside of the limits see **Section 7.9** for requirements. During and immediately after the disturbance of AASS, water levels, pH and EC may need to be monitored daily within the excavations, the Georges River (proximal to the disturbance only) and any adjacent groundwater monitoring well.				Daily Diary
Surface water – treatment or excavation	As required	ESQP	With the potential to become acidic as a result of interaction with the treatment area or excavations will be monitored as **Section 7.8 and 7.9**.				Daily Diary
Surface water – Georges River	Daily - During and immediately after the disturbance of AASS		Water levels, pH and EC may need to be monitored daily within the excavations, the Georges River (proximal to the disturbance only) and any adjacent groundwater monitoring well. See **Section 7.9** for requirements				Daily Diary
Excavation Inspection	Daily during excavation of OSD Basin Spillways	ESQP	Detailed **Section 1.4** and **Section 7.3**				Daily Diary / Letter Report
AASS/PASS verification sampling	As required	ESQP	Detailed in **Section 7.4** • Collection of soil sample per 25m^3 for laboratory analysis. • chromium reduceable sulfur or SPOCAS by a NATA accredited laboratory • Liming rate in accordance ASSMP (1998)				Letter Report

Table 12 – Summary of Environmental Monitoring under the ASSMP

Monitoring Type	Frequency	Responsibility	Relevant Standards	Technique, Location and Installation Requirements	Sample Collection Requirements	Calibration and Maintenance Requirements	Record
Validation Sampling	Where remediation works are required for the treatment of PASS/AASS	ESQP	Detailed in **Section 7.11.** • Collection of one composite soil sample (comprised of 6 sub-samples) for every 1000 m^3 of treated soil • chromium reduceable sulfur or SPOCAS by a NATA accredited laboratory. The adopted sampling approach should be consistent with ASSMP (1998), NEPM (2013) and AS4482.1 (2005).				Validation Report as per OEH 2011 and/or EPA 2014.
Waste Classification	Where materials require disposal to an appropriately licensed waste facility.	ESQP	Must be completed in accordance with *Waste Classification Guidelines Part 1: Classifying Waste* and *Part 4: Acid Sulfate Soils* EPA 2014 Detailed in **Section 7.12 and 7.13**				Classification Report as per EPA 2014
Materials Tracking	During the movement of bulk excavated materials within and off the Site.	ESQP	Detailed in **Section 7.14**				Daily Tracking Sheets.

Figures



EP RISK

www.eprisk.com.au

Acid Sulfate Soil Management Plan
Moorebank Precinct West

Figure 1 - Site Location

Job No: EP1340.001
Date: 12/12/2019
Drawing Ref: Fig 1
Version No: v3

N

0 130 260 390 m

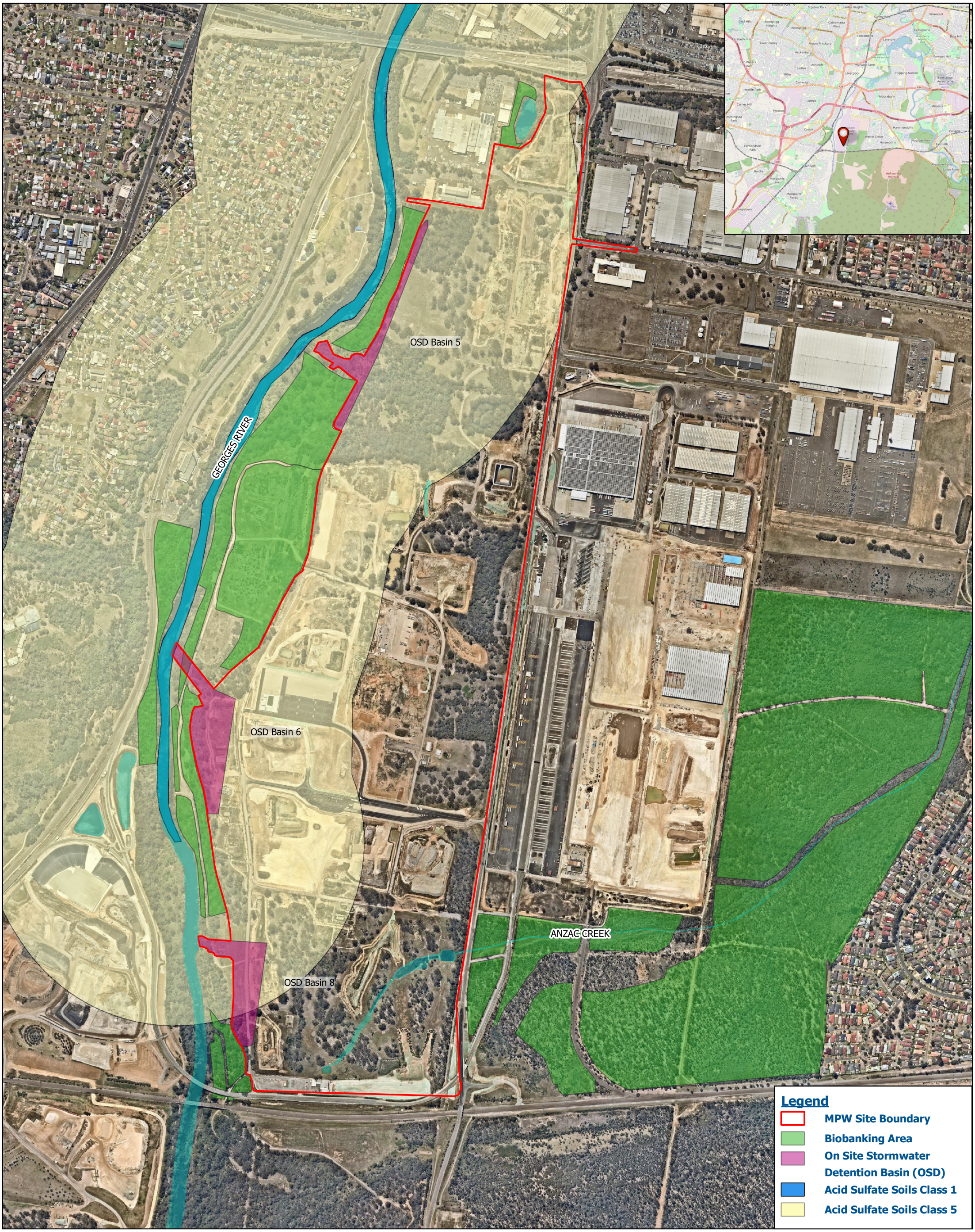
Approximate Scale Only

Coordinate System: WGS 84
Drawn by: OG **Checked by:** KG
Scale of regional map not shown
Source: Near Maps

APPROVED COMPANY ISO 9001 Quality Management Systems QMS Certification Services

APPROVED COMPANY AS/NZS 4801 OH&S Management Systems QMS Certification Services

APPROVED COMPANY ISO 14001 Environmental Management Systems QMS Certification Services



EP RISK

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Acid Sulfate Soil Management Plan
Moorebank Precinct West

Figure 2 - Site Layout and Features

Job No: EP1340.001
Date: 12/12/2019
Drawing Ref: Fig 2
Version No: v3

N

0 130 260 390 m

Approximate Scale Only

Coordinate System: WGS 84
Drawn by: OG Checked by: KG
Scale of regional map not shown
Source: Near Maps

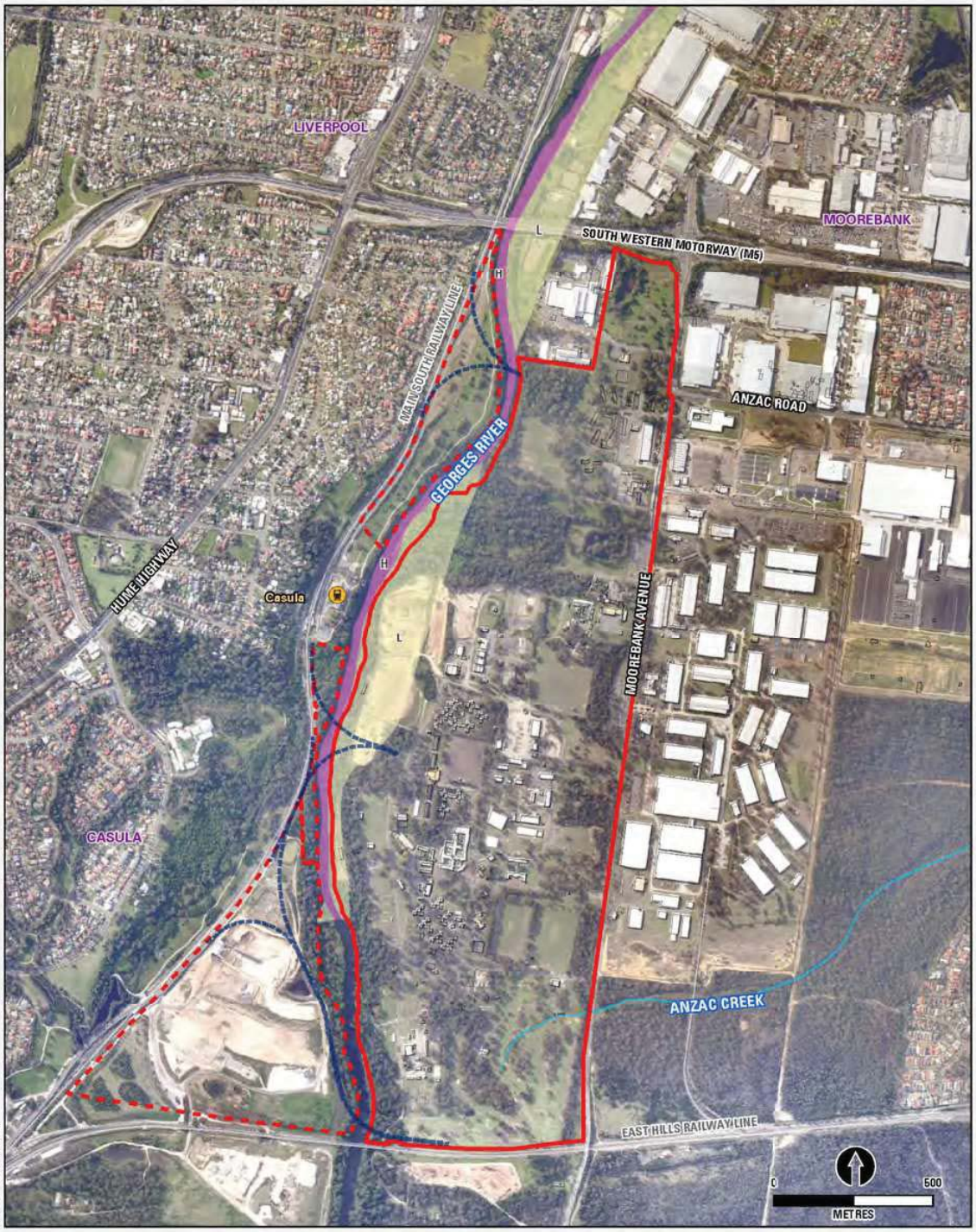
APPROVED COMPANY ISO 9001 Quality Management Systems QMS Certification Services

APPROVED COMPANY AS/NZS 4801 OH&S Management Systems QMS Certification Services

APPROVED COMPANY ISO 14001 Environmental Management Systems QMS Certification Services

Appendix A

PREVIOUS INVESTIGATION RESULTS AND SAMPLING LOCATIONS



Moorebank IMT main site

Land associated with Moorebank IMT rail access options

Footprint of rail corridor associated with the proposed rail access options

Rail line

H - High probability - Below water level

L - Low probability - greater than 3 metres below the ground surface

Extremely low probability of acid sulfate soils where no shading is present

Figure 7: Acid sulfate soils (ASS) risk map

Acid sulfate soil results - Parsons Brinckerhoff 2014

Location	Depth	Description	SPOS	TAA	TAA	TSA	a-Net acidity without ANCE
			%S	mole H+/t	mole H+/t	mole H+/t	mole H+/e
PB_TP11	1.2	Clayey sand	0.02	<2	<2	<2	<10
PB_TP12	3	Clayey sand	0.02	<2	<2	<2	<10
PB_TP20	0.05	Sandy clay	0.02	6	6	27	10
PB_TP20	0.4	Gravelly sand	0.03	17	17	50	21
PB_TP20	1	Sandy clay	0.05	23	23	10	31
PB_TP27	2	Clayey sand	0.03	18	18	<2	21
PB_TP29	2	Clayey sand	0.16	91	91	9	100
PB_TP37	3	Sand	0.02	<2	<2	<2	10
PB_MW14	13	Clayey sand	0.06	33	33	231	36

Notes:
ANCE: Acid Neutralizing Capacity
SPOS: Peroxide Oxidisable Sulfur (Net acidity (sulfur units)
TAA: Total Actual Acidity
TSA: Total Sulfidic Acidity
TPA: Total Potential Acidity

Source: Parsons Brinckerhoff Pty Ltd, Phase 2 Environmental Site Assessment, Moorebank Intermodal Terminal (ref: 2103829A-CLM-REP-1 RevB), dated 28 May 2014

PARSONS BRINCKERHOFF

MOOREBANK INTERMODAL TERMINAL

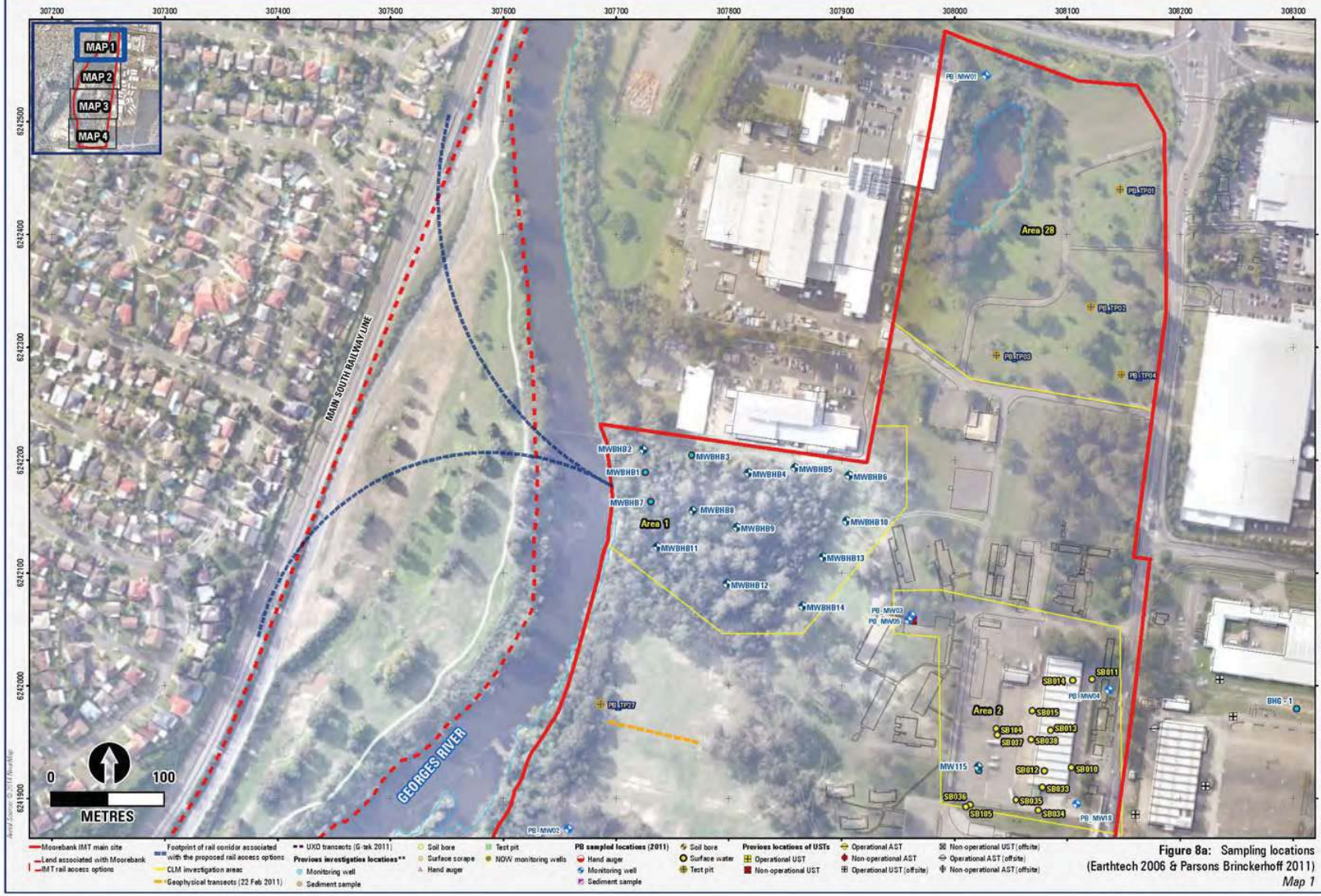
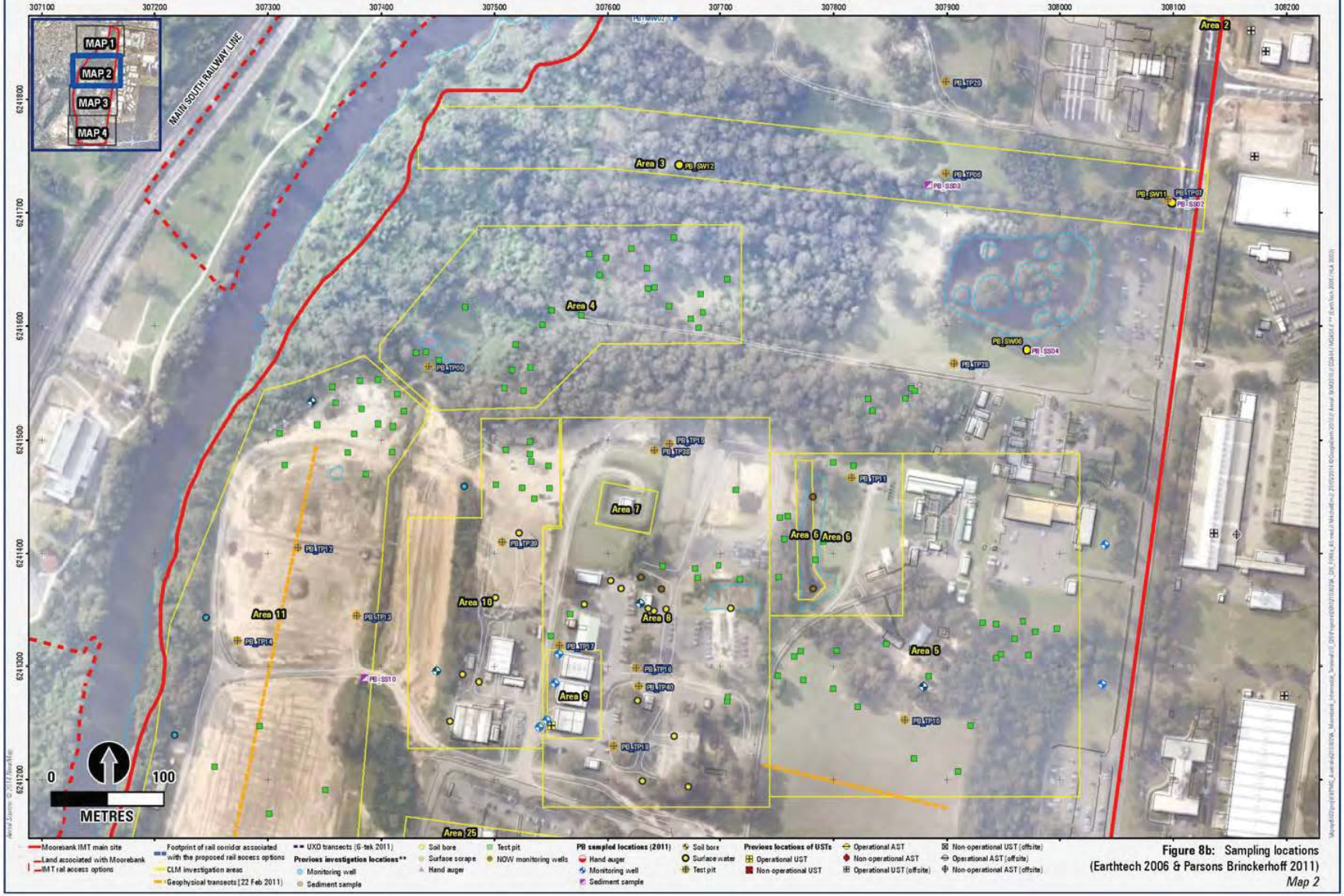


Figure 8a: Sampling locations (Earthtech 2006 & Parsons Brinckerhoff 2011)
Map 1

PARSONS BRINCKERHOFF

MOOREBANK INTERMODAL TERMINAL



Moorebank IMT main site
Land associated with Moorebank IMT rail access options
Footprint of rail corridor associated with the proposed rail access options
CLM investigation areas
Geophysical transects (22 Feb 2011)
UXO transects (G-tek 2011)
Previous investigation locations**
Monitoring well
Sediment sample
Soil bore
Surface scrape
Hand auger
Test pit
NOW monitoring wells
PB sampled locations (2011)
Hand auger
Monitoring well
Sediment sample
Soil bore
Surface water
Test pit
Previous locations of USTs
Operational UST
Non-operational UST
Operational AST
Non-operational AST
Operational UST (offsite)
Non-operational UST (offsite)
Operational AST (offsite)
Non-operational AST (offsite)

Figure 8b: Sampling locations (Earthtech 2006 & Parsons Brinckerhoff 2011)
Map 2

PARSONS BRINCKERHOFF

MOOREBANK INTERMODAL TERMINAL

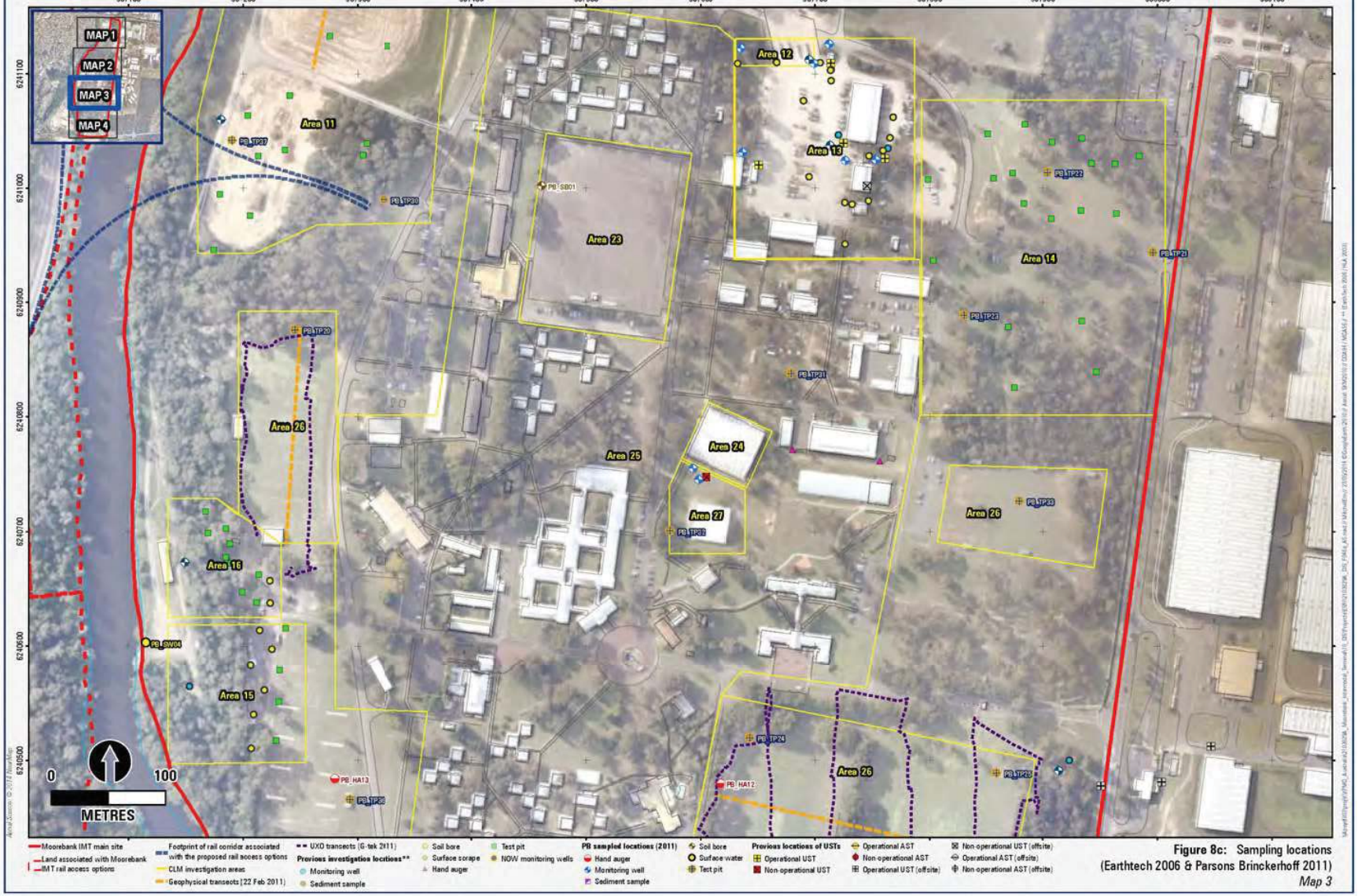


Figure 8c: Sampling locations (Earthtech 2006 & Parsons Brinckerhoff 2011)

Map 3

PARSONS BRINCKERHOFF

MOOREBANK INTERMODAL TERMINAL

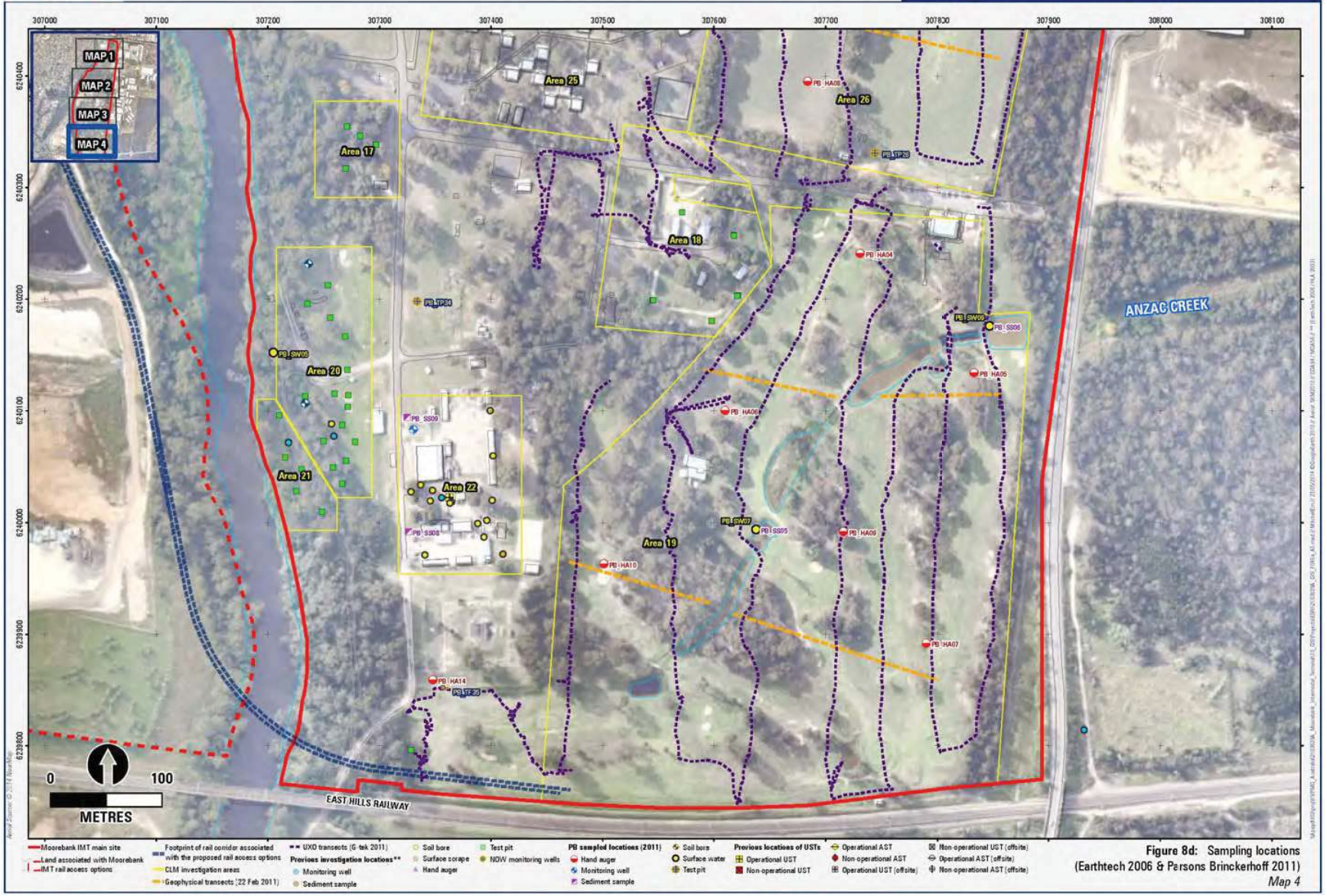


Figure 8d: Sampling locations (Earthtech 2006 & Parsons Brinckerhoff 2011)
Map 4

Analytical Results: Soil
Table A6: Acid Sulfate Soils

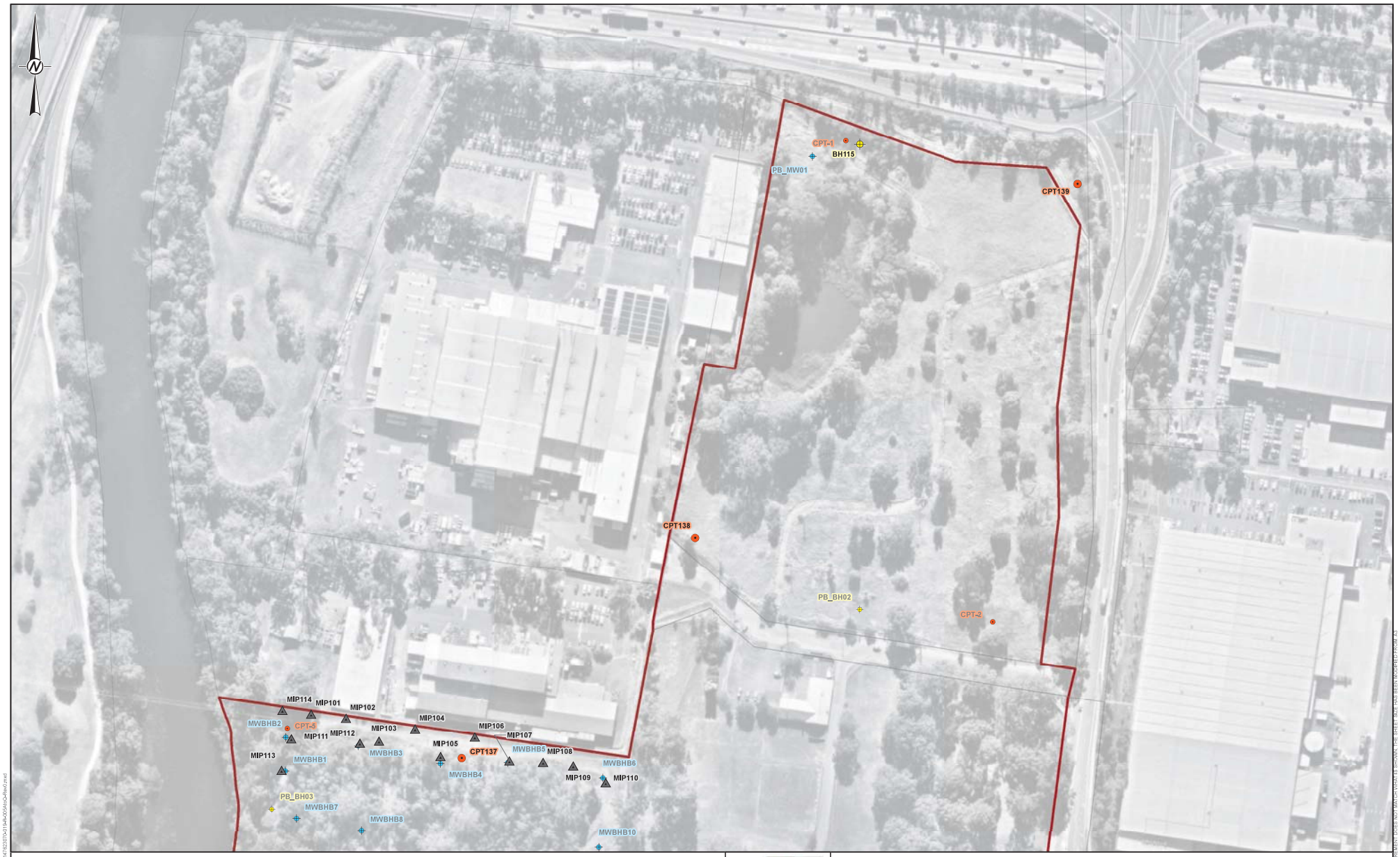
Sample Number	Test Location	Depth Range (m - BGL)		$pH_{(F)}$	$pH_{(Fox)}$	pH_{KCl}	TAA (moles H+/t)	sTAA Converted to %S*	S_{NAS} (if pH_{KCl} <4.5)	Existing Acidity %S (sTAA + 0.75 x S_{NAS})	Chromium Reducible Sulfur (S_{CR}) %S	Acid Neutralising Capacity %CaCO3 (if pH more than 6.5)	Net Acidity %S (S_{CR}+Existing Acidity - ANC/FF)	Is This ASS?	Is This PASS?	Liming Rate for Net Acidity (Neutralises both AASS & PASS) (kg/m3)
BH102-013	BH102	9.20	9.30	5.2	3.3	4.6	2	0.003		0.003	< 0.005		0.003	No	No	NA
BH103_011	BH103	11.50	11.70	6.1	4.3	5.2	6	0.010		0.010	< 0.005		0.010	No	No	NA
BH104-010	BH104	7.10	7.30	5.4	3.7	4.5	27	0.043		0.043	< 0.005		0.043	Acidity Source Unclear	No	3.3
BH105_015	BH105	11.80	12.00	5.7	4	5.2	4	0.006		0.006	< 0.005		0.006	No	No	NA
BH106_ASS	BH106		8.80	5.1	4	4.3	22	0.035	< 0.02	0.035	< 0.005		0.035	Acidity Source Unclear	No	2.7
BH107_014	BH107	11.70	11.80	5	3.8	5	6	0.010		0.010	< 0.005		0.010	No	No	NA
BH108_012ASS	BH108	9.00	9.45	5	3.9	4.6	16	0.026		0.026	< 0.005		0.026	No	No	NA
BH109_014	BH109	10.10	10.40	5.4	4.1	5.7	4	0.006		0.006	< 0.005		0.006	No	No	NA
BH110-014	BH110	10.10	10.20	5.2	4	4.5	18	0.029		0.029	< 0.005		0.029	No	No	NA
BH111_ASS	BH111	10.00	10.45	5.7	4.4	4.5	15	0.024		0.024	< 0.005		0.024	No	No	NA
BH112-013	BH112	8.60	8.70	6.8	4.8	4.6	16	0.026		0.026	< 0.005		0.026	No	No	NA
BH114-014	BH114	9.00	9.45	5.3	4	5	9	0.014		0.014	< 0.005		0.014	No	No	NA
BH115-013	BH115	5.10	5.20	5.5	5	-	-	-		-	-		-	No	No	NA
BHB1-014	BHBI	7.00	7.10	5.8	5.1	-	-	-		-	-		-	No	No	NA
CPT118_002	CPT118	0.00	0.10	6.3	4.8	6.5	< 2	< 0.003		0.000	< 0.005	0.940	< LOR	No	No	NA

Note: * Equivalent oxidisable sulfur calculated as TAA/623.7

Liming rates assume a bulk density of 1.60 t/m3

Fineness Factor = 1.5

Created By: JD 23/01/2015
Checked By: MB 28/01/2015



LEGEND

Golder Investigation Locations
- Borehole
- CPT
- MIP

Non Golder Investigation Locations
- Borehole
- CPT
- Grounwater Well

Approximate Site Boundary

NOTES

1. THE APPROXIMATE SITE BOUNDARY REPRESENTS THE SPATIAL EXTENT OF THE GOLDER POST PHASE 2 ESA PROJECT.

REFERENCE

1. AERIAL PHOTOGRAPHY COPYRIGHT NEARMAP PTY LTD.

KEY MAP

	5A	
	5B	
5C	5D	5E
5A	5G	5H
5I	5J	5K
5L	5M	5N
5O	5P	5Q

CLIENT
MOOREBANK INTERMODAL COMPANY

PROJECT
MOOREBANK INTERMODAL TERMINAL

0 20 40 60 80 100 METRES

REFERENCE SCALE: 1:2,000 (at A3)
PROJECTION: GDA 1994 MGA Zone 56

TITLE
POST PHASE 2 ESA: GEOTECHNICAL AND GEOCHEMICAL INVESTIGATION LOCATIONS

CONSULTANT
Golder Associates

YYYY-MM-DD	2015-07-21
PREPARED	AOB / TCH
DESIGN	-
REVIEW	RB
APPROVED	GVS

PROJECT No. 147623070 | CONTROL 019-R | Rev. 0 | FIGURE **005A**

LEGEND

Golder Investigation Locations

- Borehole
- CPT

Non Golder Investigation Locations

- Borehole
- CPT
- Grounwater Well
- Test Pit

Approximate Site Boundary

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MOOREBANK INTERMODAL COMPANY

PROJECT
MOOREBANK INTERMODAL TERMINAL

0 20 40 60 80 100
METRES

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POST PHASE 2 ESA: GEOTECHNICAL AND GEOCHEMICAL INVESTIGATION LOCATIONS

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Golder Associates

YYYY-MM-DD	2015-07-21
PREPARED	AOB / TCH
DESIGN	-
REVIEW	RB
APPROVED	GVS

PROJECT No.	CONTROL	Rev.	FIGURE
147623070	019-R	0	005B

LEGEND

Golder Investigation Locations
- Borehole
- CPT
- Test Pit

Non Golder Investigation Locations
- Borehole
- CPT
- Grounwater Well
- Sediment
- Test Pit

Approximate Site Boundary

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CLIENT
MOOREBANK INTERMODAL COMPANY

PROJECT
MOOREBANK INTERMODAL TERMINAL

0 20 40 60 80 100
METRES

REFERENCE SCALE: 1:2,000 (at A3)
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TITLE
POST PHASE 2 ESA: GEOTECHNICAL AND GEOCHEMICAL INVESTIGATION LOCATIONS

CONSULTANT
Golder Associates

YYYY-MM-DD	2015-07-21
PREPARED	AOB / TCH
DESIGN	-
REVIEW	RB
APPROVED	GVS

PROJECT No.	CONTROL	Rev.	FIGURE
147623070	019-R	0	005C

LEGEND

Golder Investigation Locations
- Borehole
- CPT

Non Golder Investigation Locations
- Borehole
- CPT
- Grounwater Well
- Sediment
- Test Pit

Approximate Site Boundary

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5A	5G	5H
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5O	5P	5Q

CLIENT
MOOREBANK INTERMODAL COMPANY

PROJECT
MOOREBANK INTERMODAL TERMINAL

0 20 40 60 80 100 METRES

REFERENCE SCALE: 1:2,000 (at A3)
PROJECTION: GDA 1994 MGA Zone 56

TITLE
POST PHASE 2 ESA: GEOTECHNICAL AND GEOCHEMICAL INVESTIGATION LOCATIONS

CONSULTANT
Golder Associates

YYYY-MM-DD	2015-07-21
PREPARED	AOB / TCH
DESIGN	-
REVIEW	RB
APPROVED	GVS

PROJECT No.	CONTROL	Rev.	FIGURE
147623070	019-R	0	005D

LEGEND

Golder Investigation Locations

Test Pit

Approximate Site Boundary

NOTES

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CLIENT
MOOREBANK INTERMODAL COMPANY

PROJECT
MOOREBANK INTERMODAL TERMINAL

0 20 40 60 80 100
METRES

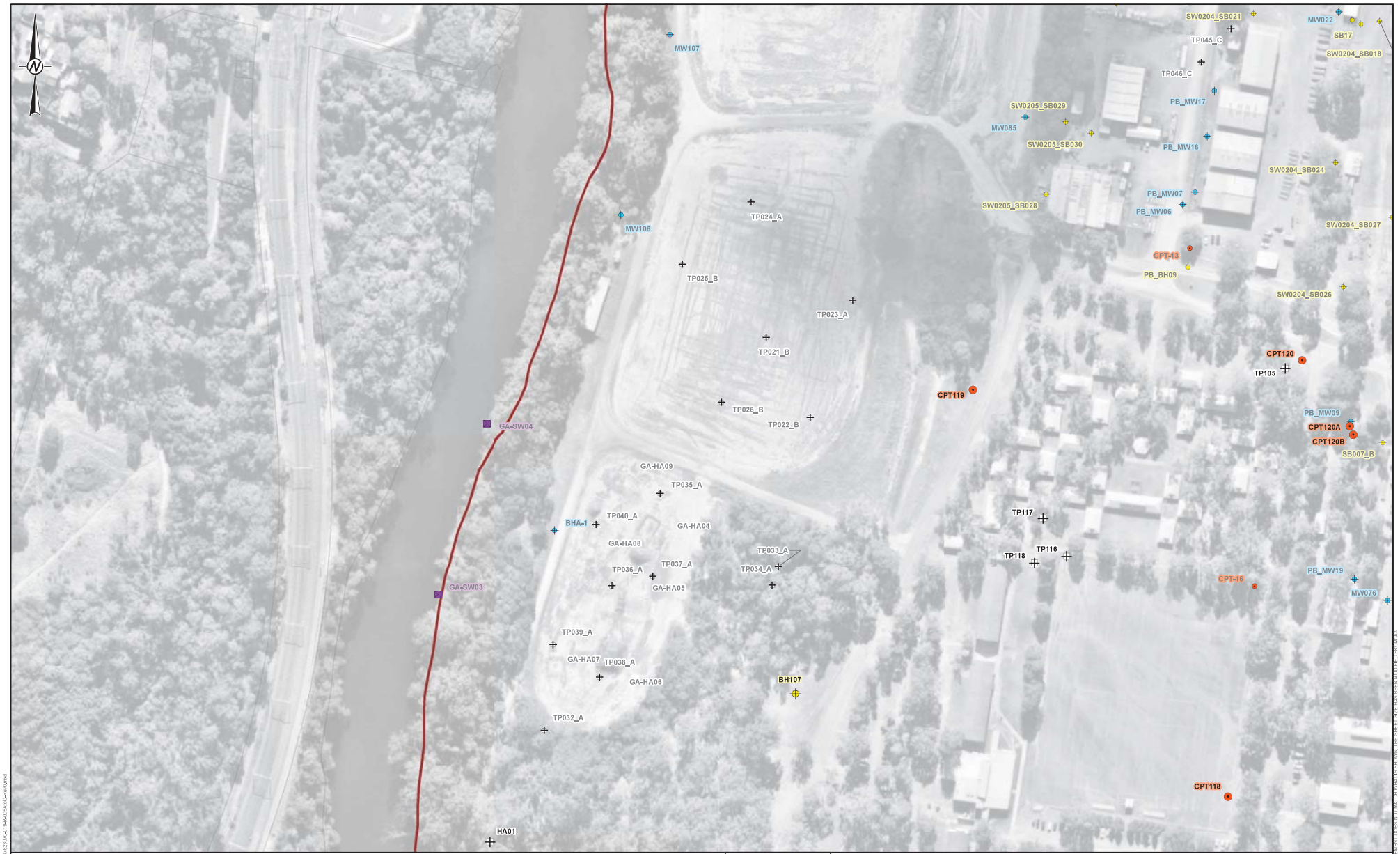
REFERENCE SCALE: 1:2,000 (at A3)
PROJECTION: GDA 1994 MGA Zone 56

TITLE
POST PHASE 2 ESA: GEOTECHNICAL AND GEOCHEMICAL INVESTIGATION LOCATIONS

CONSULTANT
Golder Associates

YYYY-MM-DD	2015-07-21
PREPARED	AOB / TCH
DESIGN	-
REVIEW	RB
APPROVED	GVS

PROJECT No.	CONTROL	Rev.	FIGURE
147623070	019-R	0	**005E**



LEGEND

Golder Investigation Locations

- Borehole
- CPT
- Test Pit

Non Golder Investigation Locations

- Borehole
- CPT
- Grounwater Well
- Surface Scrape
- Test Pit

Approximate Site Boundary

NOTES

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REFERENCE

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MOOREBANK INTERMODAL COMPANY

PROJECT
MOOREBANK INTERMODAL TERMINAL

0 20 40 60 80 100 METRES

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POST PHASE 2 ESA: GEOTECHNICAL AND GEOCHEMICAL INVESTIGATION LOCATIONS

CONSULTANT
Golder Associates

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PREPARED	AOB / TCH
DESIGN	-
REVIEW	RB
APPROVED	GVS

PROJECT No.	CONTROL	Rev.	FIGURE
147623070	019-R	0	005F

LEGEND

Golder Investigation Locations

- Borehole
- CPT
- Test Pit

Non Golder Investigation Locations

- Borehole
- CPT
- Grounwater Well
- Test Pit

Approximate Site Boundary

NOTES

1. THE APPROXIMATE SITE BOUNDARY REPRESENTS THE SPATIAL EXTENT OF THE GOLDER POST PHASE 2 ESA PROJECT.

REFERENCE

1. AERIAL PHOTOGRAPHY COPYRIGHT NEARMAP PTY LTD.

KEY MAP

	5A	
	5B	
5C	5D	5E
5A	5G	5H
5I	5J	5K
5L	5M	5N
5O	5P	5Q

CLIENT
MOOREBANK INTERMODAL COMPANY

PROJECT
MOOREBANK INTERMODAL TERMINAL

0 20 40 60 80 100
METRES

REFERENCE SCALE: 1:2,000 (at A3)
PROJECTION: GDA 1994 MGA Zone 56

TITLE
POST PHASE 2 ESA: GEOTECHNICAL AND GEOCHEMICAL INVESTIGATION LOCATIONS

CONSULTANT
Golder Associates

YYYY-MM-DD	2015-07-21
PREPARED	AOB / TCH
DESIGN	-
REVIEW	RB
APPROVED	GVS

PROJECT No.	CONTROL	Rev.	FIGURE
147623070	019-R	0	005G

LEGEND

Golder Investigation Locations

Test Pit

Approximate Site Boundary

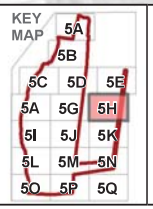
NOTES

1. THE APPROXIMATE SITE BOUNDARY REPRESENTS THE SPATIAL EXTENT OF THE GOLDER POST PHASE 2 ESA PROJECT.

REFERENCE

1. AERIAL PHOTOGRAPHY COPYRIGHT NEARMAP PTY LTD.

KEY MAP



CLIENT
MOOREBANK INTERMODAL COMPANY

PROJECT
MOOREBANK INTERMODAL TERMINAL

0 20 40 60 80 100
METRES

REFERENCE SCALE: 1:2,000 (at A3)
PROJECTION: GDA 1994 MGA Zone 56

TITLE
POST PHASE 2 ESA: GEOTECHNICAL AND GEOCHEMICAL INVESTIGATION LOCATIONS

CONSULTANT
Golder Associates

YYYY-MM-DD	2015-07-21
PREPARED	AOB / TCH
DESIGN	-
REVIEW	RB
APPROVED	GVS

PROJECT No. 147623070 | CONTROL 019-R | Rev. 0 | FIGURE **005H**

LEGEND

Golder Investigation Locations

- Borehole
- CPT
- Test Pit

Non Golder Investigation Locations

- Borehole
- CPT
- Grounwater Well
- Test Pit

Approximate Site Boundary

NOTES

1. THE APPROXIMATE SITE BOUNDARY REPRESENTS THE SPATIAL EXTENT OF THE GOLDER POST PHASE 2 ESA PROJECT.

REFERENCE

1. AERIAL PHOTOGRAPHY COPYRIGHT NEARMAP PTY LTD.

KEY MAP

	5A	
	5B	
5C	5D	5E
5A	5G	5H
5I	5J	5K
5L	5M	5N
5O	5P	5Q

CLIENT
MOOREBANK INTERMODAL COMPANY

PROJECT
MOOREBANK INTERMODAL TERMINAL

0 20 40 60 80 100 METRES

REFERENCE SCALE: 1:2,000 (at A3)
PROJECTION: GDA 1994 MGA Zone 56

TITLE
POST PHASE 2 ESA: GEOTECHNICAL AND GEOCHEMICAL INVESTIGATION LOCATIONS

CONSULTANT
Golder Associates

YYYY-MM-DD	2015-07-21
PREPARED	AOB / TCH
DESIGN	-
REVIEW	RB
APPROVED	GVS

PROJECT No.	CONTROL	Rev.	FIGURE
147623070	019-R	0	005I

LEGEND

Golder Investigation Locations

- Borehole
- CPT
- Test Pit

Non Golder Investigation Locations

- Borehole
- CPT
- Grounwater Well
- Test Pit

Approximate Site Boundary

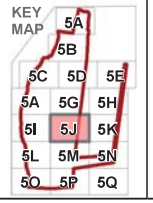
NOTES

1. THE APPROXIMATE SITE BOUNDARY REPRESENTS THE SPATIAL EXTENT OF THE GOLDER POST PHASE 2 ESA PROJECT.

REFERENCE

1. AERIAL PHOTOGRAPHY COPYRIGHT NEARMAP PTY LTD.

KEY MAP



CLIENT
MOOREBANK INTERMODAL COMPANY

PROJECT
MOOREBANK INTERMODAL TERMINAL

0 20 40 60 80 100 METRES

REFERENCE SCALE: 1:2,000 (at A3)
PROJECTION: GDA 1994 MGA Zone 56

TITLE
POST PHASE 2 ESA: GEOTECHNICAL AND GEOCHEMICAL INVESTIGATION LOCATIONS

CONSULTANT
Golder Associates

YYYY-MM-DD	2015-07-21
PREPARED	AOB / TCH
DESIGN	-
REVIEW	RB
APPROVED	GVS

PROJECT No.	CONTROL	Rev.	FIGURE
147623070	019-R	0	005J

LEGEND

Golder Investigation Locations

Test Pit

Approximate Site Boundary

NOTES

1. THE APPROXIMATE SITE BOUNDARY REPRESENTS THE SPATIAL EXTENT OF THE GOLDER POST PHASE 2 ESA PROJECT.

REFERENCE

1. AERIAL PHOTOGRAPHY COPYRIGHT NEARMAP PTY LTD.

KEY MAP

	5A	
	5B	
5C	5D	5E
5A	5G	5H
5I	5J	5K
5L	5M	5N
5O	5P	5Q

CLIENT
MOOREBANK INTERMODAL COMPANY

PROJECT
MOOREBANK INTERMODAL TERMINAL

0 20 40 60 80 100
METRES

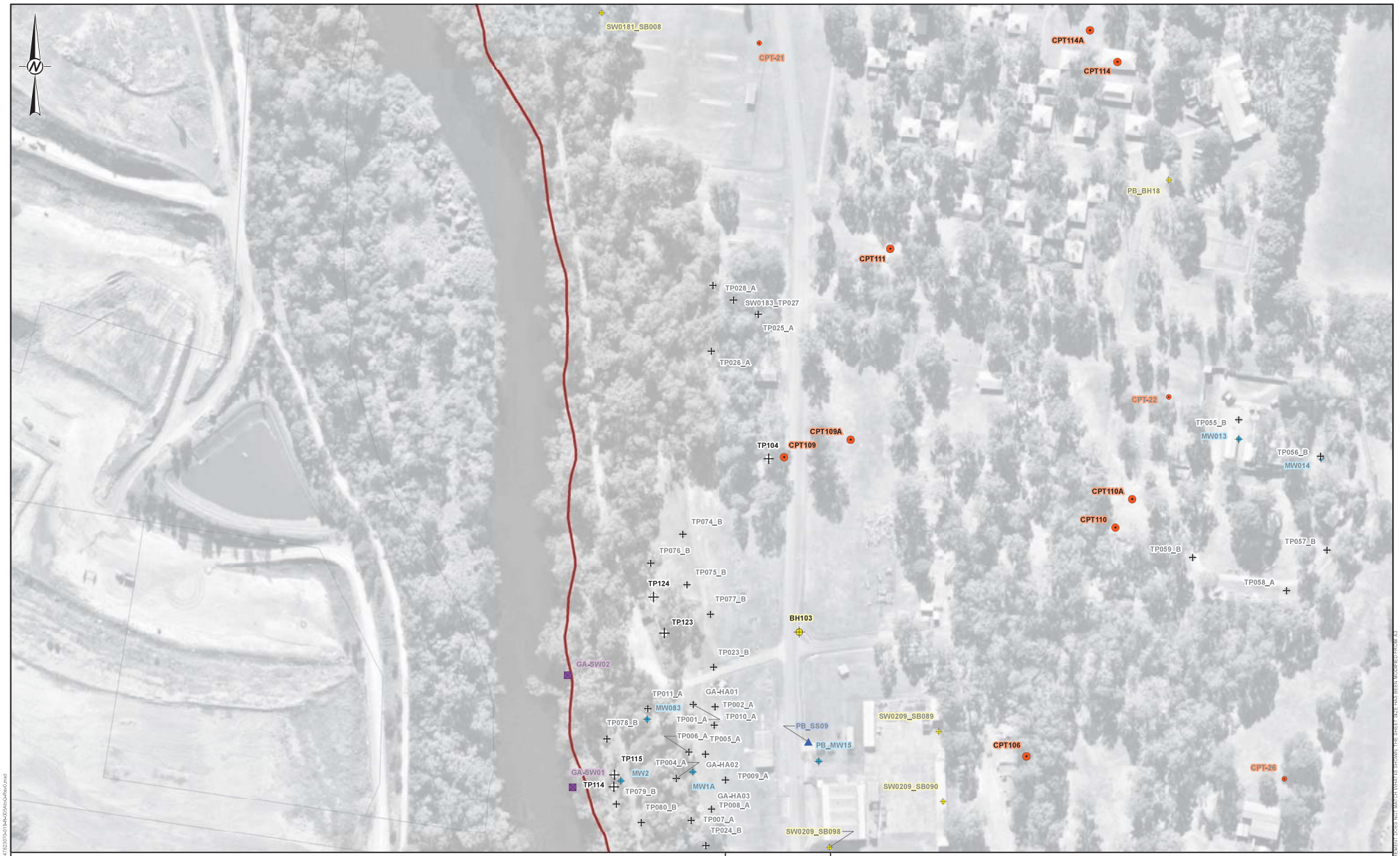
REFERENCE SCALE: 1:2,000 (at A3)
PROJECTION: GDA 1994 MGA Zone 56

TITLE
POST PHASE 2 ESA: GEOTECHNICAL AND GEOCHEMICAL INVESTIGATION LOCATIONS

CONSULTANT
Golder Associates

YYYY-MM-DD	2015-07-21
PREPARED	AOB / TCH
DESIGN	-
REVIEW	RB
APPROVED	GVS

PROJECT No.	CONTROL	Rev.	FIGURE
147623070	019-R	0	**005K**



LEGEND

Golder Investigation Locations
- Borehole
- CPT
- Test Pit

Non Golder Investigation Locations
- Borehole
- CPT
- Grounwater Well
- Sediment
- Surface Scrape
- Test Pit

Approximate Site Boundary

NOTES

1. THE APPROXIMATE SITE BOUNDARY REPRESENTS THE SPATIAL EXTENT OF THE GOLDER POST PHASE 2 ESA PROJECT.

REFERENCE

1. AERIAL PHOTOGRAPHY COPYRIGHT NEARMAP PTY LTD.

KEY MAP

	5A	
	5B	
5C	5D	5E
5A	5G	5H
5I	5J	5K
5L	5M	5N
5O	5P	5Q

CLIENT
MOOREBANK INTERMODAL COMPANY

PROJECT
MOOREBANK INTERMODAL TERMINAL

0 20 40 60 80 100
METRES

REFERENCE SCALE: 1:2,000 (at A3)
PROJECTION: GDA 1994 MGA Zone 56

TITLE
POST PHASE 2 ESA: GEOTECHNICAL AND GEOCHEMICAL INVESTIGATION LOCATIONS

CONSULTANT
Golder Associates

YYYY-MM-DD	2015-07-21
PREPARED	AOB / TCH
DESIGN	-
REVIEW	RB
APPROVED	GVS

PROJECT No.	CONTROL	Rev.	FIGURE
147623070	019-R	0	005L

LEGEND

Golder Investigation Locations
- Borehole
- CPT
- Test Pit

Non Golder Investigation Locations
- Borehole
- CPT
- Grounwater Well
- Sediment
- Test Pit

Approximate Site Boundary

NOTES

1. THE APPROXIMATE SITE BOUNDARY REPRESENTS THE SPATIAL EXTENT OF THE GOLDER POST PHASE 2 ESA PROJECT.

REFERENCE

1. AERIAL PHOTOGRAPHY COPYRIGHT NEARMAP PTY LTD.

KEY MAP

	5A	
	5B	
5C	5D	5E
5A	5G	5H
5I	5J	5K
5L	5M	5N
5O	5P	5Q

CLIENT
MOOREBANK INTERMODAL COMPANY

PROJECT
MOOREBANK INTERMODAL TERMINAL

0 20 40 60 80 100
METRES

REFERENCE SCALE: 1:2,000 (at A3)
PROJECTION: GDA 1994 MGA Zone 56

TITLE
POST PHASE 2 ESA: GEOTECHNICAL AND GEOCHEMICAL INVESTIGATION LOCATIONS

CONSULTANT
Golder Associates

YYYY-MM-DD	2015-07-21
PREPARED	AOB / TCH
DESIGN	-
REVIEW	RB
APPROVED	GVS

PROJECT No. 147623070 | CONTROL 019-R | Rev. 0 | FIGURE **005M**

LEGEND

Golder Investigation Locations

- Borehole
- Test Pit

Approximate Site Boundary

NOTES

1. THE APPROXIMATE SITE BOUNDARY REPRESENTS THE SPATIAL EXTENT OF THE GOLDER POST PHASE 2 ESA PROJECT.

REFERENCE

1. AERIAL PHOTOGRAPHY COPYRIGHT NEARMAP PTY LTD.

KEY MAP

	5A	
	5B	
5C	5D	5E
5A	5G	5H
5I	5J	5K
5L	5M	5N
5O	5P	5Q

CLIENT
MOOREBANK INTERMODAL COMPANY

PROJECT
MOOREBANK INTERMODAL TERMINAL

0 20 40 60 80 100
METRES

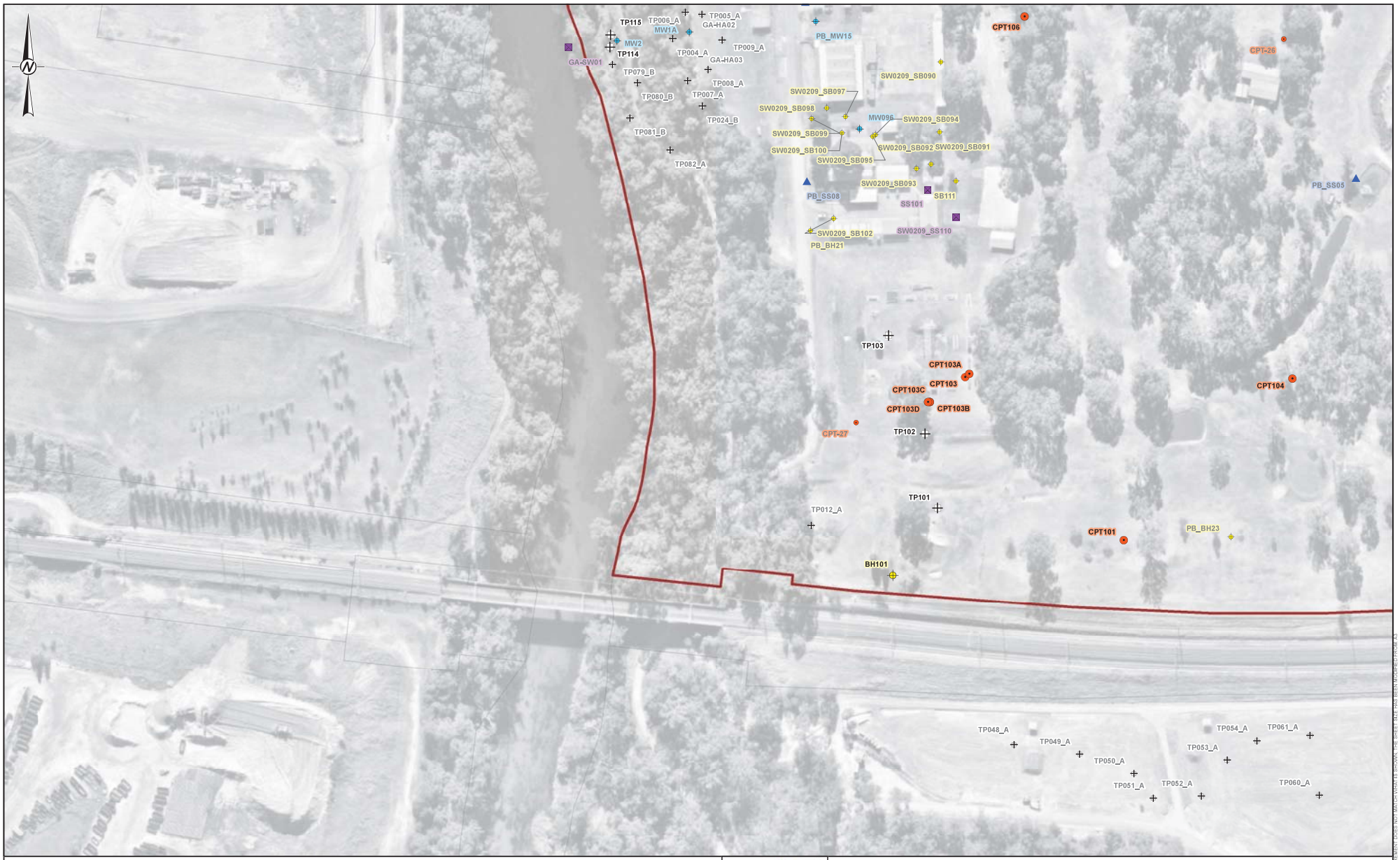
REFERENCE SCALE: 1:2,000 (at A3)
PROJECTION: GDA 1994 MGA Zone 56

TITLE
POST PHASE 2 ESA: GEOTECHNICAL AND GEOCHEMICAL INVESTIGATION LOCATIONS

CONSULTANT
Golder Associates

YYYY-MM-DD	2015-07-21
PREPARED	AOB / TCH
DESIGN	-
REVIEW	RB
APPROVED	GVS

PROJECT No.	CONTROL	Rev.	FIGURE
147623070	019-R	0	**005N**



LEGEND

Golder Investigation Locations
- Borehole
- CPT
- Test Pit

Non Golder Investigation Locations
- Borehole
- CPT
- Grounwater Well
- Sediment
- Surface Scrape
- Test Pit

Approximate Site Boundary

NOTES

1. THE APPROXIMATE SITE BOUNDARY REPRESENTS THE SPATIAL EXTENT OF THE GOLDER POST PHASE 2 ESA PROJECT.

REFERENCE

1. AERIAL PHOTOGRAPHY COPYRIGHT NEARMAP PTY LTD.

KEY MAP

	5A	
	5B	
5C	5D	5E
5A	5G	5H
5I	5J	5K
5L	5M	5N
5O	5P	5Q

CLIENT
MOOREBANK INTERMODAL COMPANY

PROJECT
MOOREBANK INTERMODAL TERMINAL

0 20 40 60 80 100 METRES

REFERENCE SCALE: 1:2,000 (at A3)
PROJECTION: GDA 1994 MGA Zone 56

TITLE
POST PHASE 2 ESA: GEOTECHNICAL AND GEOCHEMICAL INVESTIGATION LOCATIONS

CONSULTANT
Golder Associates

YYYY-MM-DD	2015-07-21
PREPARED	AOB / TCH
DESIGN	-
REVIEW	RB
APPROVED	GVS

PROJECT No. 147623070 | CONTROL 019-R | Rev. 0 | FIGURE **005O**

LEGEND

Golder Investigation Locations
- Borehole
- CPT

Non Golder Investigation Locations
- Borehole
- CPT
- Sediment
- Test Pit

Approximate Site Boundary

NOTES

1. THE APPROXIMATE SITE BOUNDARY REPRESENTS THE SPATIAL EXTENT OF THE GOLDER POST PHASE 2 ESA PROJECT.

REFERENCE

1. AERIAL PHOTOGRAPHY COPYRIGHT NEARMAP PTY LTD.

KEY MAP

	5A	
	5B	
5C	5D	5E
5A	5G	5H
5I	5J	5K
5L	5M	5N
5O	5P	5Q

CLIENT
MOOREBANK INTERMODAL COMPANY

PROJECT
MOOREBANK INTERMODAL TERMINAL

0 20 40 60 80 100 METRES

REFERENCE SCALE: 1:2,000 (at A3)
PROJECTION: GDA 1994 MGA Zone 56

TITLE
POST PHASE 2 ESA: GEOTECHNICAL AND GEOCHEMICAL INVESTIGATION LOCATIONS

CONSULTANT
Golder Associates

YYYY-MM-DD	2015-07-21
PREPARED	AOB / TCH
DESIGN	-
REVIEW	RB
APPROVED	GVS

PROJECT No. 147623070 | CONTROL 019-R | Rev. 0 | FIGURE **005P**

LEGEND

Golder Investigation Locations

Test Pit

Approximate Site Boundary

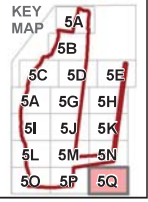
NOTES

1. THE APPROXIMATE SITE BOUNDARY REPRESENTS THE SPATIAL EXTENT OF THE GOLDER POST PHASE 2 ESA PROJECT.

REFERENCE

1. AERIAL PHOTOGRAPHY COPYRIGHT NEARMAP PTY LTD.

KEY MAP



CLIENT
MOOREBANK INTERMODAL COMPANY

PROJECT
MOOREBANK INTERMODAL TERMINAL

0 20 40 60 80 100
METRES

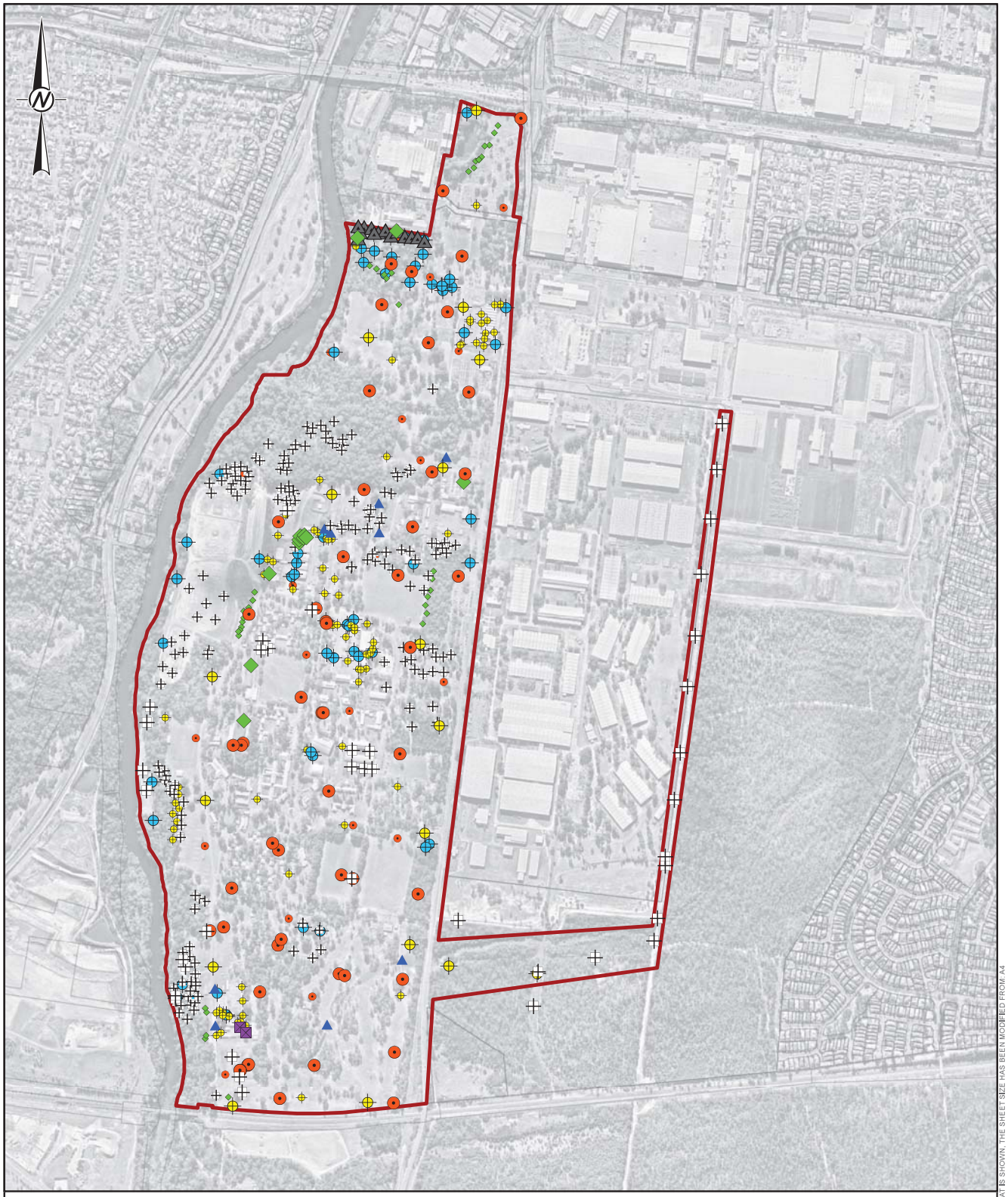
REFERENCE SCALE: 1:2,000 (at A3)
PROJECTION: GDA 1994 MGA Zone 56

TITLE
POST PHASE 2 ESA: GEOTECHNICAL AND GEOCHEMICAL INVESTIGATION LOCATIONS

CONSULTANT
Golder Associates

YYYY-MM-DD	2015-07-21
PREPARED	AOB / TCH
DESIGN	-
REVIEW	RB
APPROVED	GVS

PROJECT No.	CONTROL	Rev.	FIGURE
147623070	019-R	0	**005Q**



LEGEND

Approximate Site Boundary

Golder Investigation Locations

- Borehole
- CPT
- MIP
- Test Pit
- Other

Non Golder Investigation Locations

- Borehole
- CPT
- Grounwater Well
- Sediment
- Surface Scrape
- Test Pit
- Other

NOTES

1. The Approximate Site Boundary represents the spatial extent of the Golder Post Phase 2 ESA project.

REFERENCE

1. Aerial Photography Copyright NearMap Pty Ltd.

0 100 200 400 600 800 1,000 Metres

REFERENCE SCALE: 1:15,000 (at A4)
PROJECTION: GDA 1994 MGA Zone 56

CLIENT
MOOREBANK INTERMODAL COMPANY

PROJECT
MOOREBANK INTERMODAL TERMINAL

TITLE
POST PHASE 2 ESA: GEOTECHNICAL AND GEOCHEMICAL INVESTIGATION LOCATIONS

CONSULTANT
Golder Associates

YYYY-MM-DD	2015-07-16
PREPARED	AOB
DESIGN	-
REVIEW	RB
APPROVED	GVS

PROJECT	DOCUMENT	Rev.	FIGURE
147623070	019-R	0	**005**

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM A4

25mm

0

Path: S:\Commonwealth\MICLI\Project\Deliverable\019-R\rev0\147623070-019-R-005-Rev0.mxd

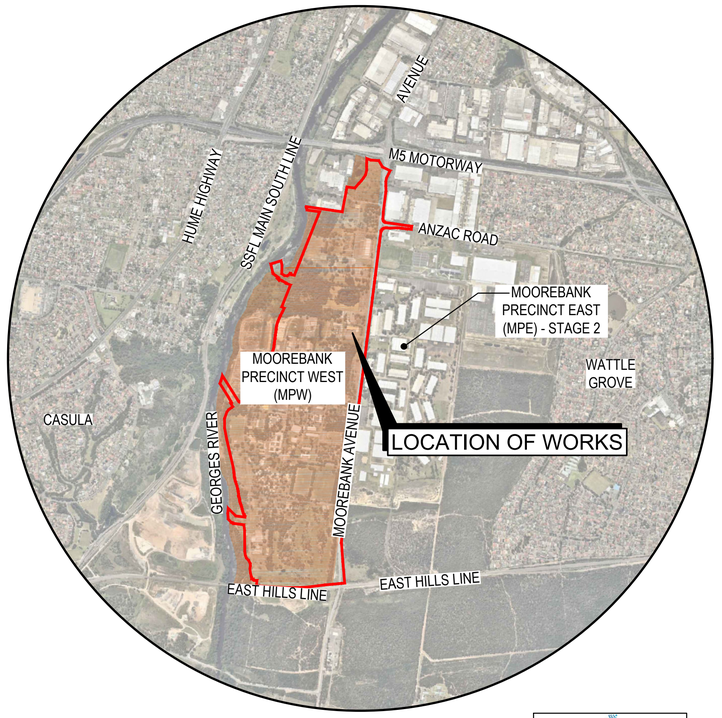
Appendix B
OSD BASIN CONSTRUCTION DRAWINGS

MOOREBANK PRECINCT WEST (MPW) - STAGE 2

LAND PREPARATION MAIN WORKS (LPMW)

APPLICATION NUMBER : SSD 16_7709

VOLUME	CONTENTS
01	RESERVED
02	CIVIL WORKS
03	STRUCTURAL WORKS
04	HYDRAULIC AND FIRE SERVICES
05	ELECTRICAL SERVICES
06	TELECOMMUNICATIONS SERVICES



LOCALITY PLAN

1 : 20,000

nearmap.com IMAGERY EXTRACTED FROM nearmap.com

Issue	Description	Date
A	ISSUE FOR CONSTRUCTION	23/05/2018

0 500 1000 1500 2000m

1 : 20000

Client: SIMTA SYDNEY INTERMODAL TERMINAL ALLIANCE; TACTICAL GROUP

Status: FOR CONSTRUCTION

Scales	1 : 20000	Current Issue Signatures	
Original Size	A1	Drawn D.WALL	
Height Datum	AHD	Designed M.O'CALLAGHAN	
Grid	MGA	Checked R.LENFERNA	
		Approved M.KEFFORD	

Filename: LPMW-ARC-CV-DWG-0000-ProjectCoverSheet.dwg

Project: MOOREBANK PRECINCT WEST (MPW) - STAGE 2 LAND PREPARATION MAIN WORKS (LPMW)

Title: PROJECT COVER SHEET

ARCADIS

Arcadis Australia Pacific Pty Limited
Level 5, 141 Walker St
NORTH SYDNEY NSW 2060
ABN 76 104 485 289

Tel No: +61 2 8907 9000
Fax No: +61 2 8907 9001
arcadis.com

Volume No. -

Project No. AA009335

Drawing No. LPMW-ARC-CV-DWG-0000-

Issue A

100mm on Original

MOOREBANK PRECINCT WEST (MPW) - STAGE 2

LAND PREPARATION MAIN WORKS (LPMW)

VOLUME 2: INTERNAL CIVIL WORKS

APPLICATION NUMBER : SSD 16_7709

DRAWING LIST

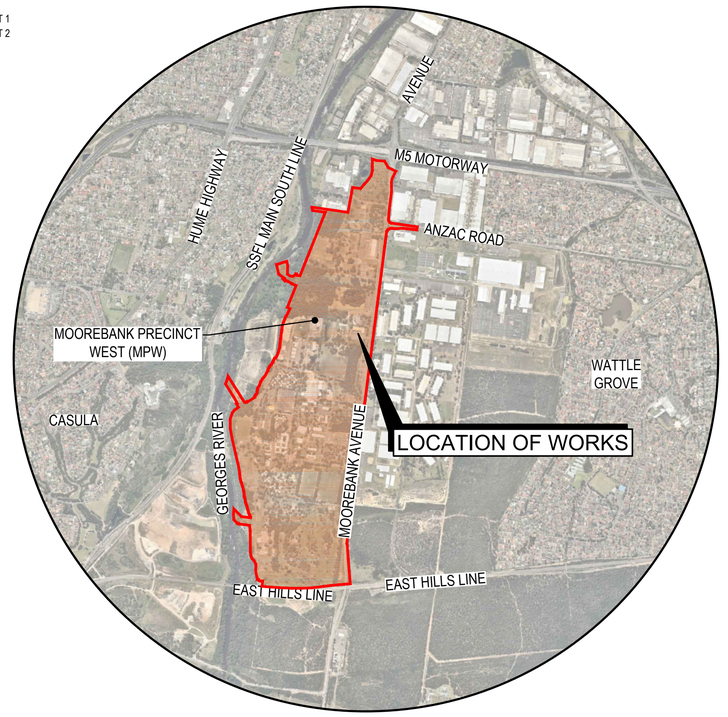
GENERAL

SITE PREPARATION

CIVIL WORKS

STORMWATER DRAINAGE

SERVICES



LOCALITY PLAN
1 : 20,000

nearmap IMAGERY EXTRACTED FROM nearmap.com

Issue	Description	Date
A	ISSUE FOR CONSTRUCTION	23/05/2018

0 500 1000 1500 2000m
1 : 20000

Client: SIMTA SYDNEY INTERMODAL TERMINAL ALLIANCE; TACTICAL GROUP

Status: FOR CONSTRUCTION

Scales	AS SHOWN	Current Issue Signatures	
		Drawn	D.WALL
Original Size	A1	Designed	M.O'CALLAGHAN
Height Datum	AHD	Checked	R.LENFERNA
Grid	MGA	Approved	M.KEFFORD

Filename: LPMW-ARC-CV-DWG-2000-CoverSheetAndDrawingList.dwg

Project: MOOREBANK PRECINCT WEST (MPW) - STAGE 2
LAND PREPARATION MAIN WORKS (LPMW)

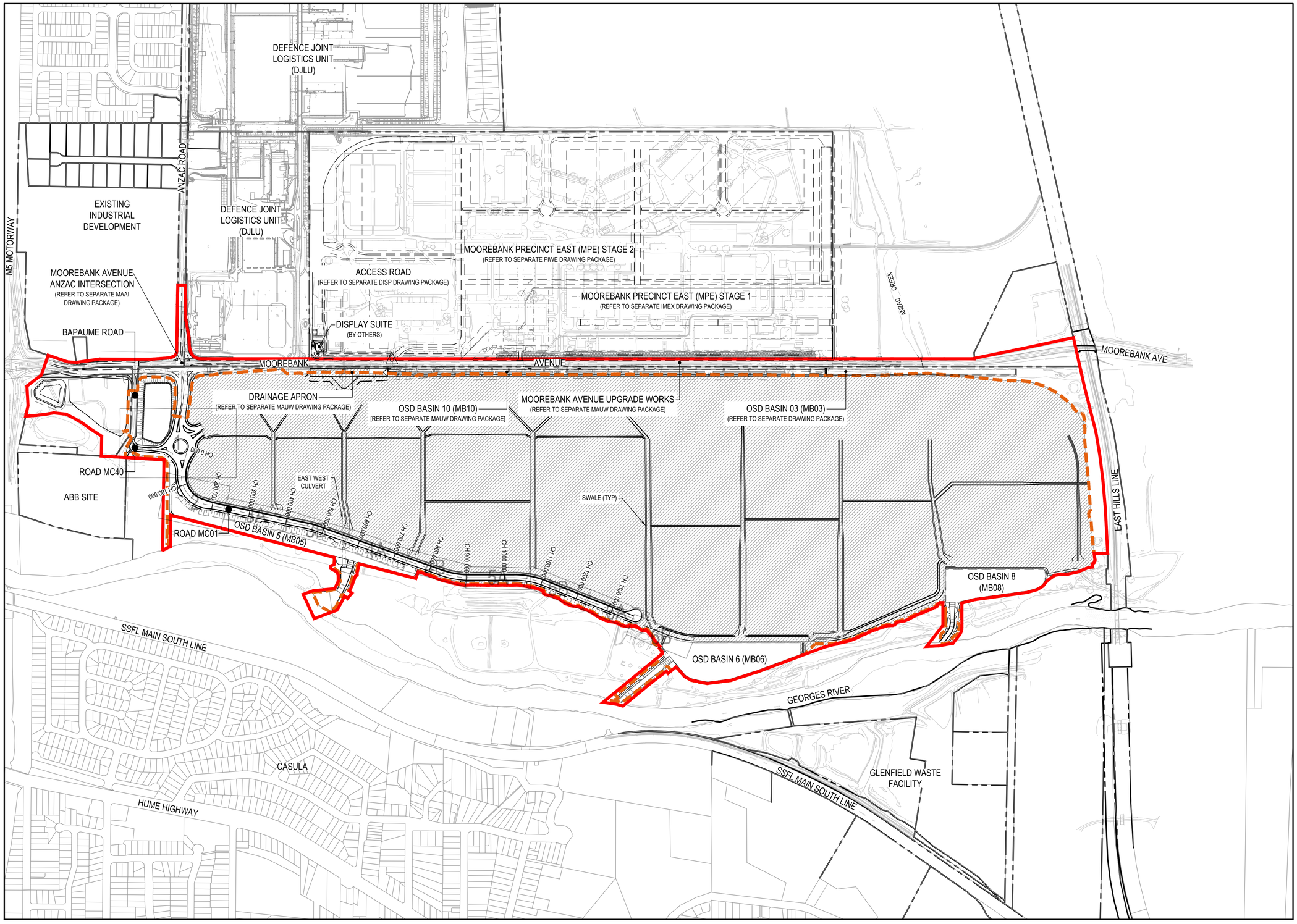
Title: COVER SHEET AND DRAWING LIST

ARCADIS
Arcadis Australia Pacific Pty Limited
Level 16, 580 George St
SYDNEY NSW 2000
ABN 76 104 485 289
Tel No: +61 2 8907 9000
Fax No: +61 2 8907 9001
arcadis.com

Volume No. 02
Project No. AA009335
Drawing No. LPMW-ARC-CV-DWG-2000- Issue A

100mm on Original

Date Plotted: 23 May 2018 - 01:05PM File Name: F:\AA009335\1_LPMW\CV\DWG\LPMW-ARC-CV-DWG-2000-CoverSheetAndDrawingList.dwg V1



LEGEND

- MPW APPROVAL BOUNDARY
- PROPOSED LAND PREPARATION MAIN WORKS (LPMW) VOLUME 2 LIMIT OF WORKS BOUNDARY
- PROPOSED ULTIMATE WORKS (REFER TO SEPARATE DRAWING PACKAGES)
- SURVEY TITLE BOUNDARIES
- BULK EARTHWORKS AREA (REFER TO NOTE BELOW)
- STATE SURVEY MARK

NOTES

1. BULK EARTHWORKS AREA IS TO BE EITHER GRASS SEEDED OR SEALED WITH BITUMEN-BASED EMULSION UPON COMPLETION OF WORKS. PREFERRED SURFACE TREATMENT TO BE CONFIRMED BY GEOTECHNICAL ENGINEER.

Issue	Description	Date
A	ISSUE FOR CONSTRUCTION	23/05/2018

100mm on Original

0 50 100 200 300 400 500m

1 : 5000

Client: SIMTA SYDNEY INTERMODAL TERMINAL ALLIANCE; TACTICAL GROUP

Status: FOR CONSTRUCTION

Scales	1 : 5000	Current Issue Signatures	
Original Size	A1	Drawn D.WALL	
Height Datum	AHD	Designed M.O'CALLAGHAN	
Grid	MGA	Checked R.LENFERNA	
Filename:	LPMW-ARC-CV-DWG-2002-GeneralArrangementPlan.dwg	Approved M.KEFFORD	

Project: MOOREBANK PRECINCT WEST (MPW) - STAGE 2
LAND PREPARATION MAIN WORKS (LPMW)

Title: GENERAL ARRANGEMENT PLAN

ARCADIS
Arcadis Australia Pacific Pty Limited
Level 16, 580 George St
SYDNEY NSW 2000
ABN 76 104 485 289
Tel No: +61 2 8907 9000
Fax No: +61 2 8907 9001
arcadis.com

Volume No. 02
Project No. AA009335
Drawing No. LPMW-ARC-CV-DWG-2002-
Issue A

Date Plotted: 23 May 2018 - 04:58PM File Name: F:\AA009335\1_LPMW\CV\DWG\LPMW-ARC-CV-DWG-2002-GeneralArrangementPlan.dwg

ACCESS ROAD
(REFER TO SEPARATE DISP DRAWING PACKAGE)

MOOREBANK PRECINCT EAST (MPE) STAGE 2
(REFER TO SEPARATE PIWE DRAWING PACKAGE)

MOOREBANK PRECINCT EAST (MPE) STAGE 1
(REFER TO SEPARATE IMEX DRAWING PACKAGE)

DISPLAY SUITE
(BY OTHERS)

MOOREBANK AVENUE ANZAC INTERSECTION
(REFER TO SEPARATE MAAI DRAWING PACKAGE)

DRAINAGE APRON
(REFER TO SEPARATE MAUW DRAWING PACKAGE)

MOOREBANK AVENUE UPGRADE WORKS
(REFER TO SEPARATE MAUW DRAWING PACKAGE)

OSD BASIN 10 (MB10)
(REFER TO SEPARATE MAUW DRAWING PACKAGE)

OSD BASIN 5 (MB05)

4 2131 | 5 2132 | 6 2132 | 1 2131 | 2 2131 | 3 2131

REFER TO SHEET CH_LPMW-ARC-CV-DWG-2127 FOR CONTINUATION

LEGEND

- PROPOSED LAND PREPARATION MAIN WORKS (LPMW) VOLUME 2 LIMIT OF WORKS BOUNDARY
- PROPOSED ULTIMATE WORKS (REFER TO SEPARATE DRAWING PACKAGE)
- SURVEY TITLE BOUNDARIES
- 20 PROPOSED DESIGN CONTOURS

NOTES

1. STRIPPED EXISTING SURFACE CREATED BY STRIPPING OFF THE TOPSOIL FROM THE EXISTING SURFACE IN ACCORDANCE WITH GOLDERS TOPSOIL DEPTH CONTOURS.
2. CONTOURS SHOWN REFLECT BULK EARTHWORKS LEVELS (IE. EXCLUDING PAVEMENT) FOR ALL AREAS OUTSIDE ROADS. CONTOURS SHOWN WITHIN ROADS REFLECT ROAD SURFACE LEVELS

CUT / FILL VOLUMES

STRIPPED TOPSOIL	294,200m³
TOTAL CUT TO ONSITE FILL	676,900m³
TOTAL FILL (INCLUDING ONSITE CUT)	2,489,900m³
TOTAL FILL TO BE IMPORTED	1,813,000m³

EARTHWORKS NOTES/ASSUMPTIONS

TERMINAL

1. THE CUT/FILL VOLUMES PROVIDED ARE TO BULK EARTHWORKS LEVELS AND EXCLUDE PAVEMENTS. THE FOLLOWING PAVEMENT MATERIAL THICKNESS HAVE BEEN ASSUMED: PAVEMENT THICKNESS 675mm.
2. FILL VOLUMES ARE TAKEN BETWEEN THE UNDERSIDE OF ASSUMED PAVEMENT AND THE STRIPPED EXISTING SURFACE.
3. IN AREAS OF CUT IT IS ASSUMED TO EXCAVATE AN ADDITIONAL 1000mm.

RAIL

1. THE CUT/FILL VOLUMES PROVIDED ARE TO BULK EARTHWORKS LEVELS AND EXCLUDE PAVEMENTS. THE FOLLOWING PAVEMENT MATERIAL THICKNESS HAVE BEEN ASSUMED: PAVEMENT THICKNESS 525mm.
2. FILL VOLUMES ARE TAKEN BETWEEN THE UNDERSIDE OF ASSUMED PAVEMENT AND THE STRIPPED EXISTING SURFACE.
3. IN AREAS OF CUT IT IS ASSUMED TO EXCAVATE AN ADDITIONAL 1000mm.

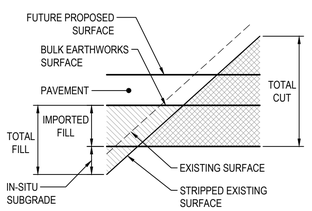
REST OF SITE

1. THE CUT/FILL VOLUMES PROVIDED ARE TO BULK EARTHWORKS LEVELS AND EXCLUDE PAVEMENTS. THE FOLLOWING PAVEMENT MATERIAL THICKNESS HAVE BEEN ASSUMED: PAVEMENT THICKNESS 525mm.
2. FILL VOLUMES ARE TAKEN BETWEEN THE UNDERSIDE OF ASSUMED PAVEMENT AND THE STRIPPED EXISTING SURFACE.
3. IN AREAS OF CUT IT IS ASSUMED TO EXCAVATE AN ADDITIONAL 1000mm.

DEPTH RANGE LEGEND

DEPTH OF FILL: 999, 3.50, 3.00, 2.50, 2.00, 1.50, 1.00, 0.50, 0.01, 0.00

DEPTH OF CUT: 0.00, 0.01, 0.50, 1.00, 1.50, 2.00, 2.50, 3.00, 3.50, 999



TYPICAL EARTHWORKS SECTION

Issue	Description	Date
A	ISSUE FOR CONSTRUCTION	23/05/2018

0 50 100 150 200m

1 : 2000

100mm on Original

Client: SIMTA SYDNEY INTERMODAL TERMINAL ALLIANCE; TACTICAL GROUP

Status: FOR CONSTRUCTION

		Current Issue Signatures	
Scales	1 : 2000	Drawn D.WALL	
Original Size	A1	Designed M.O'CALLAGHAN	
Height Datum	AHD	Checked R.LENFERNA	
Grid	MGA	Approved M.KEFFORD	

Filename: LPMW-ARC-CV-DWG-2126-BulkEarthworksPlanSheet1.dwg

Project: MOOREBANK PRECINCT WEST (MPW) - STAGE 2 LAND PREPARATION MAIN WORKS (LPMW)

Title: BULK EARTHWORKS PLAN SHEET 1

ARCADIS
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Volume No. 02

Project No. AA009335

Drawing No. LPMW-ARC-CV-DWG-2126-

Issue A

Date Plotted: 23 May 2018 - 05:07PM File Name: F:\AA009335\1_LPMW\CV\DWG\LPMW-ARC-CV-DWG-2126-BulkEarthworksPlanSheet1.dwg

MOOREBANK PRECINCT EAST (MPE) STAGE 1
(REFER TO SEPARATE IMEX DRAWING PACKAGE)

MOOREBANK AVENUE UPGRADE WORKS
(REFER TO SEPARATE MAUW DRAWING PACKAGE)

OSD BASIN 10 (MB10)
(REFER TO SEPARATE MAUW DRAWING PACKAGE)

OSD BASIN 03 (MB03)
(REFER TO SEPARATE DRAWING PACKAGE)

OSD BASIN 8 (MB08)

OSD BASIN 6 (MB06)

8 / 2132

7 / 2132

2 / 2131

3 / 2131

REFER TO SKETCH LPMW-ARC-CV-DWG-2126 FOR CONTINUATION

NOTES

1. REFER TO DRAWING LPMW-ARC-CV-DWG-2126 FOR LEGEND & NOTES.

Issue	Description	Date
A	ISSUE FOR CONSTRUCTION	23/05/2018

100mm on Original

0 50 100 150 200m

1 : 2000

Client: SIMTA SYDNEY INTERMODAL TERMINAL ALLIANCE; TACTICAL GROUP

Status: FOR CONSTRUCTION

		Current Issue Signatures	
Scales	1 : 2000	Drawn D.WALL	
Original Size	A1	Designed M.O'CALLAGHAN	
Height Datum	AHD	Checked R.LENFERNA	
Grid	MGA	Approved M.KEFFORD	

Filename: LPMW-ARC-CV-DWG-2127-BulkEarthworksPlanSheet2.dwg

Project: MOOREBANK PRECINCT WEST (MPW) - STAGE 2
LAND PREPARATION MAIN WORKS (LPMW)

Title: BULK EARTHWORKS PLAN SHEET 2

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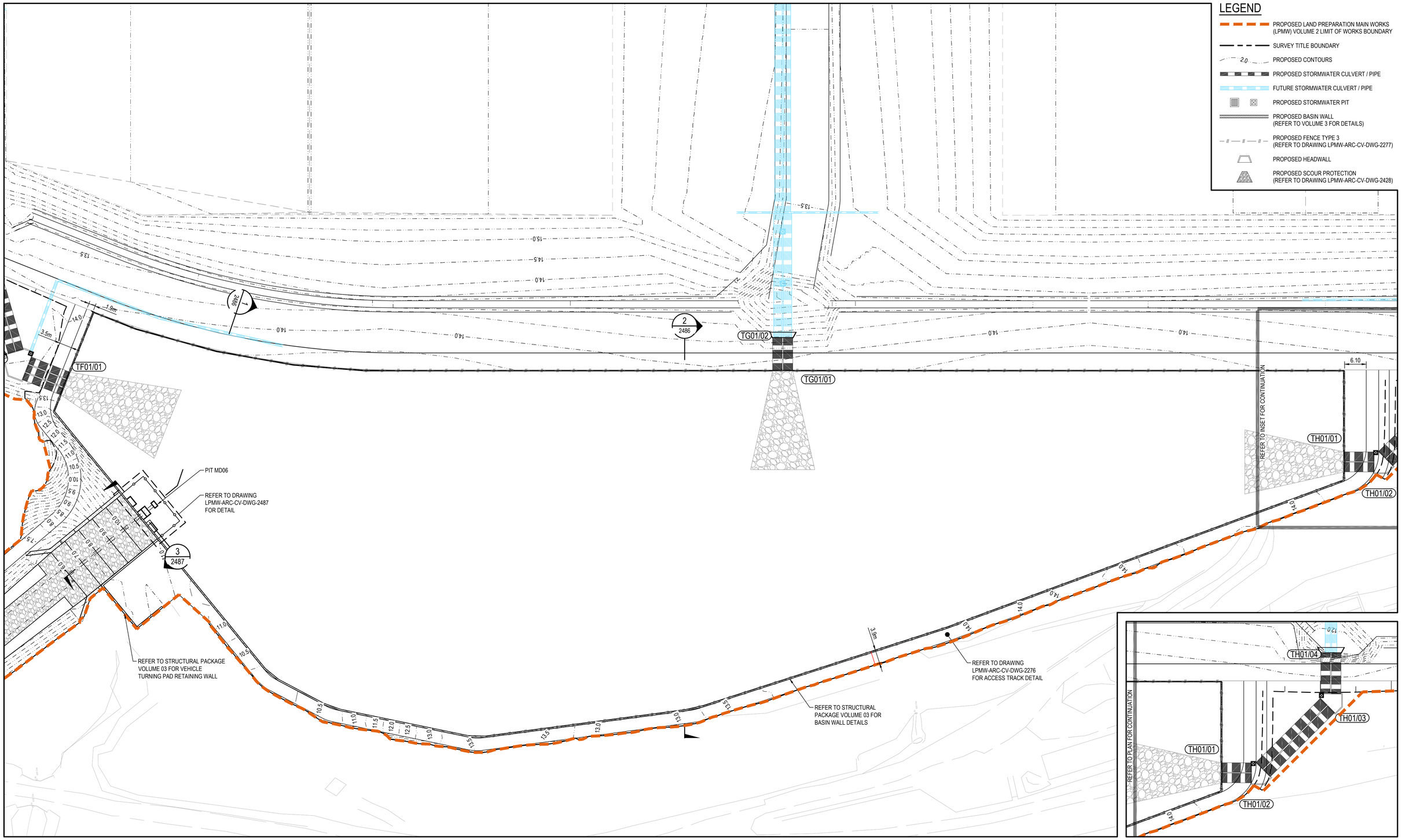
Volume No. 02
Project No. AA009335
Drawing No. LPMW-ARC-CV-DWG-2127-
Issue A

Date Plotted: 23 May 2018 - 01:30PM File Name: F:\AA009335\1_LPMW\CV\DWG\LPMW-ARC-CV-DWG-2127-BulkEarthworksPlanSheet2.dwg

LEGEND

- PROPOSED LAND PREPARATION MAIN WORKS (LPMW) VOLUME 2 LIMIT OF WORKS BOUNDARY
- SURVEY TITLE BOUNDARY
- PROPOSED CONTOURS
- PROPOSED STORMWATER CULVERT / PIPE
- FUTURE STORMWATER CULVERT / PIPE
- PROPOSED STORMWATER PIT
- PROPOSED BASIN WALL (REFER TO VOLUME 3 FOR DETAILS)
- PROPOSED FENCE TYPE 3 (REFER TO DRAWING LPMW-ARC-CV-DWG-2277)
- PROPOSED HEADWALL
- PROPOSED SCOUR PROTECTION (REFER TO DRAWING LPMW-ARC-CV-DWG-2428)



PLAN

INSET A

Issue	Description	Date
A	ISSUE FOR CONSTRUCTION	23/05/2018

100mm on Original

0 10 20 30 40 50m

1 : 500

Client: SIMTA SYDNEY INTERMODAL TERMINAL ALLIANCE; TACTICAL GROUP

Status: FOR CONSTRUCTION

		Current Issue Signatures	
Scales	1 : 500	Drawn D.WALL	
Original Size	A1	Designed J.KO	
Height Datum	AHD	Checked G.DUNSTAN	
Grid	MGA	Approved M.KEFFORD	

Filename: LPMW-ARC-CV-DWG-2481-OSDBasinMB06Plan.dwg

Project: MOOREBANK PRECINCT WEST (MPW) - STAGE 2
LAND PREPARATION MAIN WORKS (LPMW)

Title: OSD BASIN 6 (MB06) PLAN

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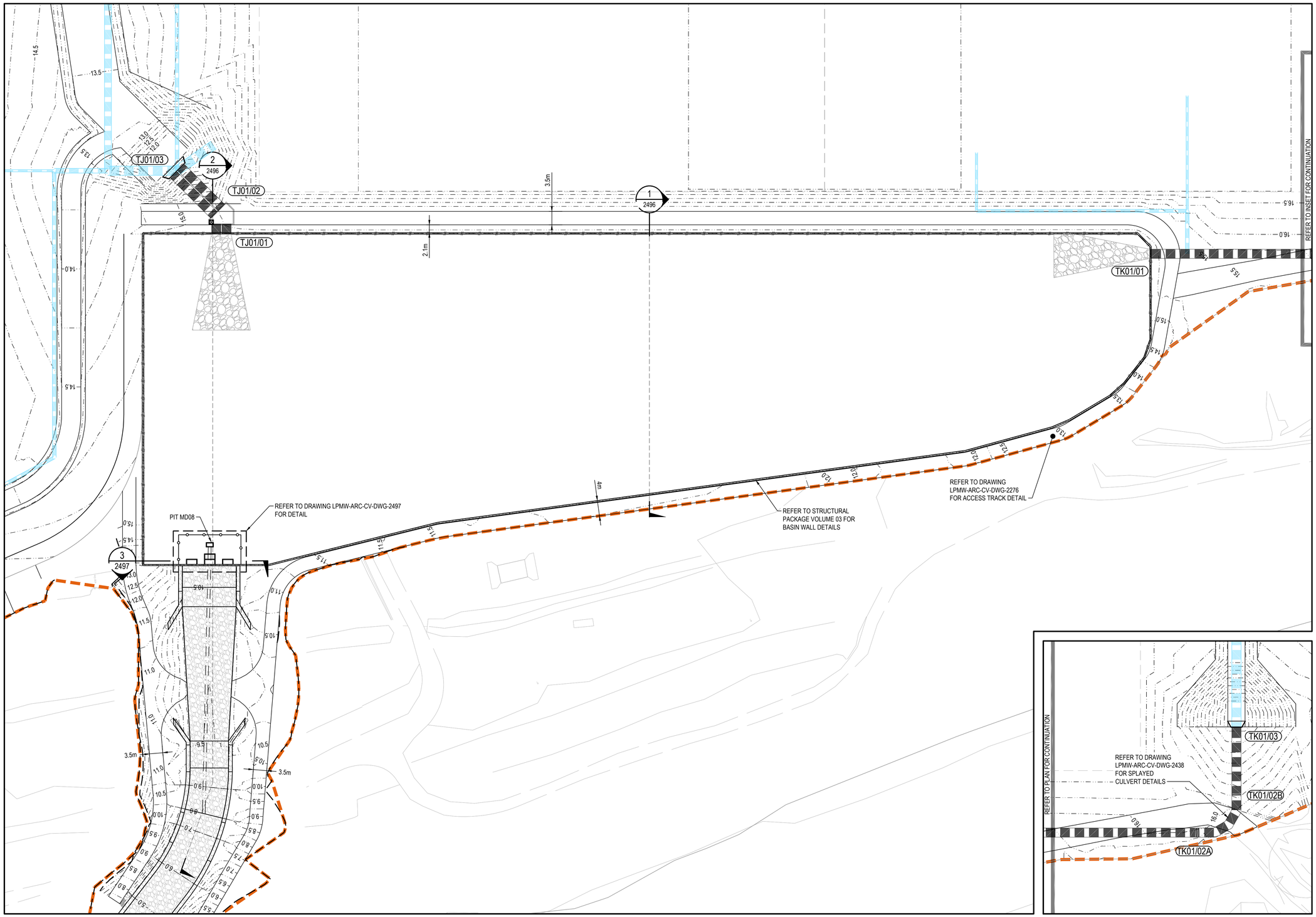
Volume No. 02

Project No. AA009335

Drawing No. LPMW-ARC-CV-DWG-2481 - | Issue A



PLAN

INSET

LEGEND

- PROPOSED LAND PREPARATION MAIN WORKS (LPMW) VOLUME 2 LIMIT OF WORKS BOUNDARY
- SURVEY TITLE BOUNDARY
- PROPOSED CONTOURS
- PROPOSED STORMWATER CULVERT / PIPE
- FUTURE STORMWATER CULVERT / PIPE
- PROPOSED STORMWATER PIT
- PROPOSED BASIN WALL (REFER TO VOLUME 3 FOR DETAILS)
- PROPOSED FENCE TYPE 3 (REFER TO DRAWING LPMW-ARC-CV-DWG-2277)
- PROPOSED HEADWALL
- PROPOSED SCOUR PROTECTION (REFER TO DRAWING LPMW-ARC-CV-DWG-2428)

Issue	Description	Date
A	ISSUE FOR CONSTRUCTION	23/05/2018

0 10 20 30 40 50m

1 : 500

100mm on Original

Client: SIMTA SYDNEY INTERMODAL TERMINAL ALLIANCE; TACTICAL GROUP

Status: FOR CONSTRUCTION

		Current Issue Signatures	
Scales	1 : 500	Drawn D.WALL	
Original Size	A1	Designed J.KO	
Height Datum	AHD	Checked G.DUNSTAN	
Grid	MGA	Approved M.KEFFORD	

Filename: LPMW-ARC-CV-DWG-2491-OSDBasinMB08Plan.dwg

Project: MOOREBANK PRECINCT WEST (MPW) - STAGE 2
LAND PREPARATION MAIN WORKS (LPMW)

Title: OSD BASIN 8 (MB08) PLAN

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Volume No. 02
Project No. AA009335
Drawing No. LPMW-ARC-CV-DWG-2491 - Issue A

Date Plotted: 23 May 2018 - 01:26PM File Name: F:\AA009335\1_LPMW\CV\DWG\LPMW-ARC-CV-DWG-2491-OSDBasinMB08Plan.dwg V1

DETAILS TO BE DETERMINED ON SITE

GEORGES RIVER

CH 156.816
CH 150.000
CREST 140.000
SAG 130.000
CH 120.000
TP 119.742
CH 110.000
CH 100.000
CH 90.000
CH 80.000
SAG 78.001
CH 70.000
SAG 68.001
CH 60.000
CH 47.000
CH 45.000
CH 51.506
CH 50.000
CH 40.000
CH 30.000
CH 15.000
SAG 34.001
SAG 34.000
CH 30.000
SAG 22.001
SAG 20.001
CH 20.000
SAG 15.001
SAG 10.001
CH 10.000
SAG 5.001
CH 0.000
MD5A
CREST 5.326
CH 0.000
MD05
2xØ450 RCP's

BASIN MB05

REFER TO DRAWING
LPMW-ARC-CV-DWG-2276
FOR ACCESS TRACK DETAILS

REFER TO DRAWING
LPMW-ARC-CV-DWG-2276
FOR ACCESS TRACK DETAILS

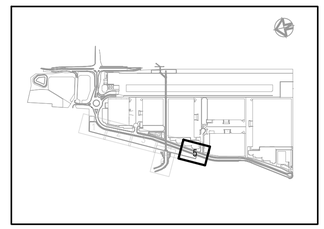
3 2511
2 2511
1 2511

LEGEND

- PROPOSED LAND PREPARATION MAIN WORKS (LPMW) VOLUME 2 LIMIT OF WORKS BOUNDARY
- BASIN WALL (REFER TO VOLUME 3 FOR DETAILS)
- GABION / RENO MATTRESS
- RIP RAP ROCK ARMOUR

NOTES

1. REFER TO THE DESIGN REPORT ASSOCIATED WITH THE CONSTRUCTION PACKAGE FOR GABION / RENO MATTRESS DETAILS. THE DETAILS HAVE BEEN DEVELOPED UPON CONSULTATION OF GEOFABRICS AUSTRALIA
2. REFER TO MACCAFERRI TECHNICAL NOTE, "SPECIFICATION FOR GABION AND MATTRESS ROCK" FOR ROCK FILLING SPECIFICATION.



Issue	Description	Date
A	ISSUE FOR CONSTRUCTION	23/05/2018

0 5 10 15 20 25m
1 : 250

Client: SIMTA SYDNEY INTERMODAL TERMINAL ALLIANCE; TACTICAL GROUP

Status: FOR CONSTRUCTION

Scales	1 : 250	Current Issue Signatures	
		Drawn D.WALL	
Original Size	A1	Designed J.KO	
Height Datum	AHD	Checked G.DUNSTAN	
Grid	MGA	Approved M.KEFFORD	

Filename: LPMW-ARC-CV-DWG-2501-OSDBasinOutletMD05Plan.dwg

Project: MOOREBANK PRECINCT WEST (MPW) - STAGE 2
LAND PREPARATION MAIN WORKS (LPMW)

Title: OSD BASIN OUTLET 5 (MD05) PLAN

ARCADIS
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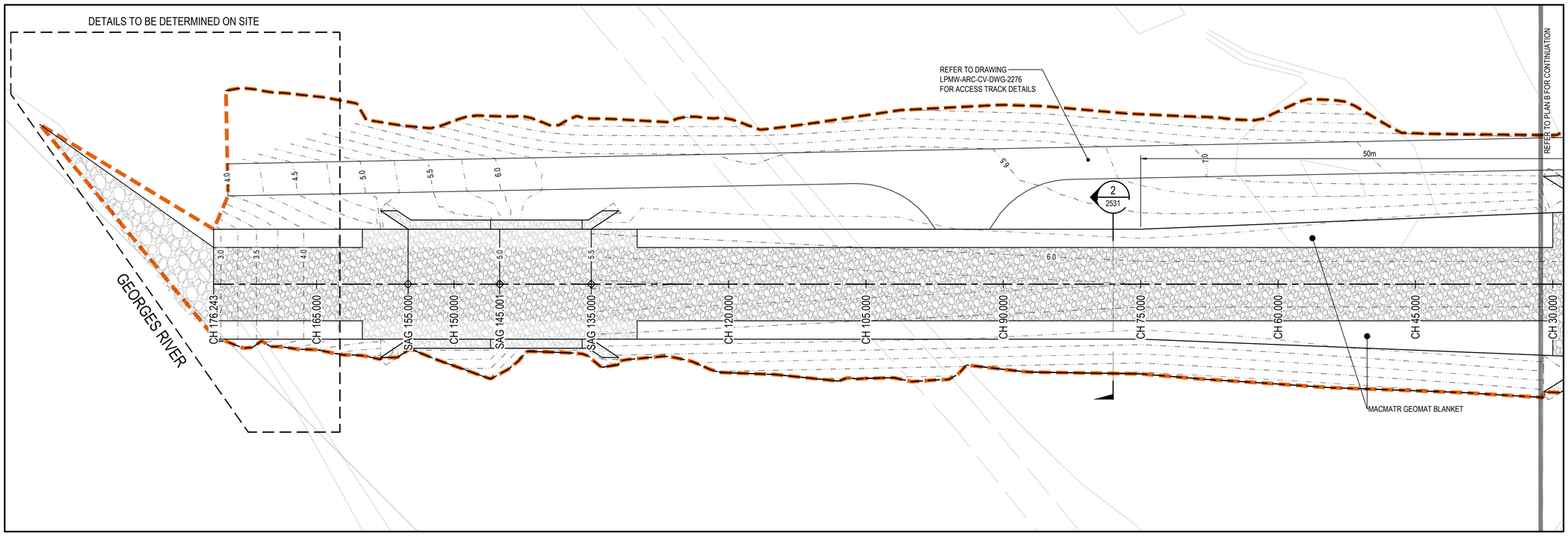
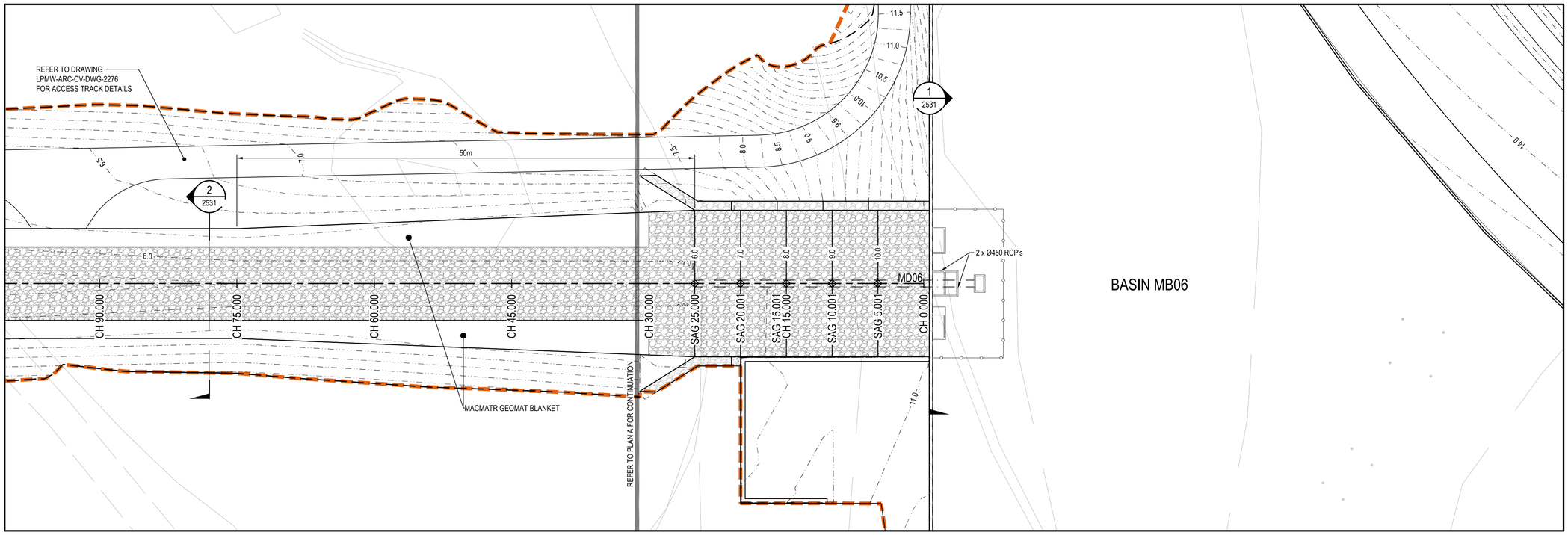
Volume No. 02
Project No. AA009335
Drawing No. LPMW-ARC-CV-DWG-2501 - Issue A

100mm on Original

Date Plotted: 23 May 2018 - 01:28PM File Name: F:\AA009335\1_LPMW\CV\DWG\LPMW-ARC-CV-DWG-2501-OSDBasinOutletMD05Plan.dwg V1



PLAN A



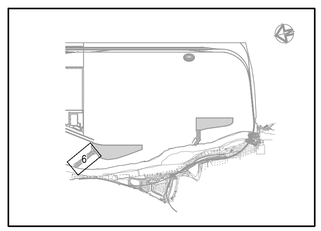
PLAN B

LEGEND

- PROPOSED LAND PREPARATION MAIN WORKS (LPMW) VOLUME 2 LIMIT OF WORKS BOUNDARY
- BASIN WALL (REFER TO VOLUME 3 FOR DETAILS)
- GABION / RENO MATTRESS
- RIP RAP ROCK ARMOUR

NOTES

1. REFER TO THE DESIGN REPORT ASSOCIATED WITH THE CONSTRUCTION PACKAGE FOR GABION / RENO MATTRESS DETAILS. THE DETAILS HAVE BEEN DEVELOPED UPON CONSULTATION OF GEOFABRICS AUSTRALIA
2. REFER TO MACCAFERRI TECHNICAL NOTE, "SPECIFICATION FOR GABION AND MATTRESS ROCK" FOR ROCK FILLING SPECIFICATION.
3. REFER TO MACCAFERRI TECHNICAL DETAILS FOR MACMATR PRODUCT INFORMATION.



Issue	Description	Date
A	ISSUE FOR CONSTRUCTION	23/05/2018

0 5 10 15 20 25m

1 : 250

Client: SIMTA SYDNEY INTERMODAL TERMINAL ALLIANCE; TACTICAL GROUP

Status: FOR CONSTRUCTION

		Current Issue Signatures	
Scales	1 : 250	Drawn D.WALL	
Original Size	A1	Designed J.KO	
Height Datum	AHD	Checked G.DUNSTAN	
Grid	MGA	Approved M.KEFFORD	

Filename: LPMW-ARC-CV-DWG-2521-OSDBasinOutletMD06Plan.dwg

Project: MOOREBANK PRECINCT WEST (MPW) - STAGE 2
LAND PREPARATION MAIN WORKS (LPMW)

Title: OSD BASIN OUTLET 6 (MD06) PLAN

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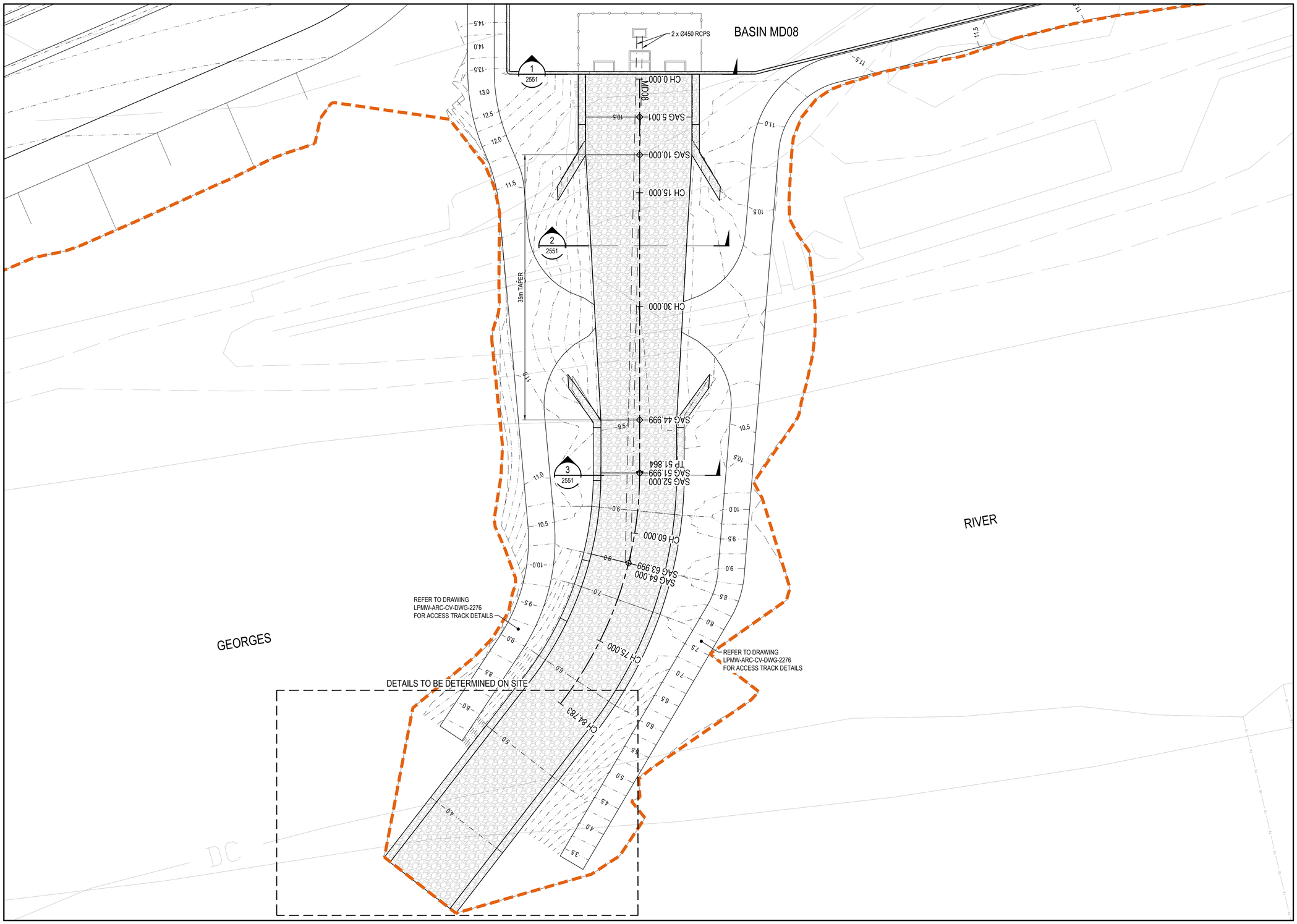
Volume No. 02
Project No. AA009335
Drawing No. LPMW-ARC-CV-DWG-2521 - Issue A

100mm on Original

Date Plotted: 23 May 2018 - 01:29PM File Name: F:\AA009335\1_LPMW\CV\DWG\LPMW-ARC-CV-DWG-2521-OSDBasinOutletMD06Plan.dwg V1

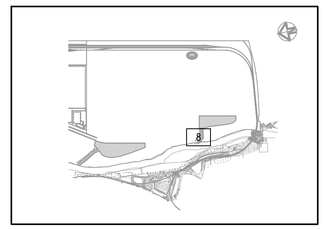


LEGEND

- PROPOSED LAND PREPARATION MAIN WORKS (LPMW) VOLUME 2 LIMIT OF WORKS BOUNDARY
- BASIN WALL (REFER TO VOLUME 3 FOR DETAILS)
- GABION / RENO MATTRESS

NOTES

1. REFER TO THE DESIGN REPORT ASSOCIATED WITH THE CONSTRUCTION PACKAGE FOR GABION / RENO MATTRESS DETAILS. THE DETAILS HAVE BEEN DEVELOPED UPON CONSULTATION OF GEOFABRICS AUSTRALIA
2. REFER TO MACCAFERRI TECHNICAL NOTE, "SPECIFICATION FOR GABION AND MATTRESS ROCK" FOR ROCK FILLING SPECIFICATION.



Issue	Description	Date
A	ISSUE FOR CONSTRUCTION	23/05/2018

100mm on Original

0 5 10 15 20 25m

1 : 250

Client: SIMTA SYDNEY INTERMODAL TERMINAL ALLIANCE; TACTICAL GROUP

Status: FOR CONSTRUCTION

		Current Issue Signatures	
Scales	1 : 250	Drawn D.WALL	
Original Size	A1	Designed J.KO	
Height Datum	AHD	Checked G.DUNSTAN	
Grid	MGA	Approved M.KEFFORD	

Filename: LPMW-ARC-CV-DWG-2541-OSDBasinOutletMD08Plan.dwg

Project: MOOREBANK PRECINCT WEST (MPW) - STAGE 2
LAND PREPARATION MAIN WORKS (LPMW)

Title: OSD BASIN OUTLET 8 (MD08) PLAN

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arcadis.com

Volume No. 02
Project No. AA009335
Drawing No. LPMW-ARC-CV-DWG-2541-
Issue A

Date Plotted: 23 May 2018 - 01:29PM File Name: F:\AA00933511_LPMW\CV\DWG\LPMW-ARC-CV-DWG-2541-OSDBasinOutletMD08Plan.dwg V1