Long-Term Environmental Management Plan

Warehouse 3 and 4, Moorebank Precinct West,
400 Moorebank Avenue, Moorebank, NSW

Prepared for: Logos Property Group c/- Tactical Group Pty Ltd
EP1489.016_v0 21 June 2024

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Logos Property Group c/o Tactical Group Pty Ltd
Via email: [redacted]

21 June 2024

Our Ref: EP1489.016_v0

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Abbreviations and Terminology		
Abbreviations	**Term**	**Definition**
AF	Asbestos Fines	AF includes free fibres, small fibre bundles and small fragments of bonded ACM that pass through a 7 mm x 7mm sieve. Equivalent to "friable" asbestos in SafeWork NSW *Code of Practice: How to Manage and control asbestos in the workplace* (SafeWork NSW 2022).
AHD	-	Australian Height Datum
Ammunition	Ammunition	A device charged with explosives, propellants, pyrotechnics, initiating composition, or nuclear, biological, or chemical material for use in connection with defence or offence including demolitions. Certain ammunition can be used for training, ceremonial, or other non-operational purposes.
AMP	Asbestos Management Plan	See **(Golder 2016b).**
AOC	Area of Concern	An area identified as containing potential contamination. Can also be referred to as Quarantined Area.
As	-	Arsenic
BGS	-	Below Ground Surface
BioBanking Agreement Area	See also Offset Area	Vegetated areas which are to be conserved and no construction to occur.
Bonded ACM	Bonded Asbestos Containing Materials	Bonded ACM comprises ACM, which is in sound condition, although possibly broken or fragmented, and where the asbestos is bound in a matrix such as cement or resin. This term is restricted to material that cannot pass a 7 mm x 7mm sieve. Equivalent to "non-friable" asbestos in SafeWork NSW *Code of Practice: How to Manage and control asbestos in the workplace* (SafeWork NSW 2022).
BTEX	-	Benzene, Toluene, Ethylbenzene and Xylenes
Cd	-	Cadmium
CLM	-	Contaminated Land Management
CMP	Contamination Management Plan	EP Risk 2020
CoC	Conditions of Consent	Conditions of Consent SSD 5066
Conservation Area	Same as BioBanking Area	See BioBanking Area
Construction Area	-	Extent of construction works, namely areas to be disturbed during the construction of the Site.
COPC	-	Contaminants of Potential Concern
Cr	-	Chromium
CSM	-	Conceptual Site Model
Cu	-	Copper
DBYD	-	Dial Before You Dig
DNAPL	-	Dense Non-Aqueous Phase Hydrocarbons
DPI&E	-	NSW Department of Planning, Industry and Environment
DQI	-	Data Quality Indicator
DQO	-	Data Quality Objective
DSI	-	Detailed Site Investigation
DUXOP	Defence Unexploded Ordnance Panel	The panel of contractors and consultants from whom the Department of Defence selects remembers for UXO related tasks

Abbreviations and Terminology		
Abbreviations	**Term**	**Definition**
EEC	Endangered Ecological Communities	Vegetated areas inaccessible during SSD 5066 development works. Located within both the Construction and Offset Areas.
EIL	-	Ecological Investigation Level
EO	-	Explosive Ordnance
EOW	-	Exploded Ordnance Waste
EPA	-	Environment Protection Authority
ESL	-	Ecological Screening Level
FA	Fibrous Asbestos	FA comprises friable asbestos material and includes severely weather cement sheet, insulation products and woven asbestos material. Defined as asbestos material that is in a degraded condition such that it can be broken or crumbled by hand pressure. Equivalent to "friable" asbestos in SafeWork NSW *Code of Practice: How to Manage and control asbestos in the workplace* (SafeWork NSW 2022).
Ha	-	Hectares
HCB	-	Hexachlorobenzene
Hg	-	Mercury
HIL	-	Health Investigation Level
HSL	-	Health Screening Level
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
LNAPL	-	Light Non-Aqueous Phase Hydrocarbons
Metallic Debris	Metallic Debris	Debris comprising metal (ferrous) items. May include fragments of former ordnance items.
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 Consent (14_6766).
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.
MPW Project	Moorebank Precinct West Project	The subject of this LTEMP. The MPW Intermodal Terminal Facility as approved under the MPW Concept and Early Works Consent (SSD_5066), MPW EPBC Approval (No. 2011/6086) and MPW Stage 2 Consent (SSD_7709).
MPW Site	Moorebank Precinct West Site	The site which is the subject of the MPW Concept and Early Works (Stage 1) Consent, MPW EPBC Approval and MPW Stage 2 SSD 7709. The MPW Site does not include the rail

Abbreviations and Terminology		
Abbreviations	**Term**	**Definition**
		link as referenced in the MPW Concept Consent or MPE Concept Plan Approval. For the purpose of this LTEMP, this excludes the Site (see **the Site**)
Ni	-	Nickel
NI	-	National Intermodal Corporation
OCP	-	Organochlorine Pesticides
Offset Area	BioBanking Agreement Area	Vegetated areas which are to be conserved and no construction to occur.
Ordnance	Ordnance	Any item of potential military origin. See Ammunition, Category A and B Ordnance Item and UXO.
PAH	-	Polycyclic Aromatic Hydrocarbons
Pb	-	Lead
PCB	-	Polychlorinated Biphenyls
PFAS	Per- and polyfluoroalkyl substances	Per- and polyfluoroalkyl substances are a diverse group of compounds resistant to heat, water, and oil. These chemicals are persistent, and resist degradation in the environment. They also bioaccumulate, meaning their concentration increases over time in blood and organs.
PFOS, PFOA and PFHxS	Perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA) and perfluorohexane sulfonate (PFHxS)	Man-made chemicals belonging to the group known as PFAS. See PFAS.
PSH	-	Phase Separated Hydrocarbon
PSI	-	Preliminary Site Investigation
QA/QC	-	Quality Assurance and Quality Control
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.
RPD	-	Relative Percentage Difference
SAQP	-	Sampling Analysis and Quality Plan
SIMTA	-	Sydney Intermodal Terminal Alliance - a consortium comprising Qube and Aurizon Holdings.
The Site	-	Part of the proposed subdivision of Lot 1 in DP1197707 as parts of proposed Lots 5 and 6 (The Site).
SME	-	School of Military Engineering.
SMP	-	Site Management Plan.
SSD	-	State Significant Development.
SSFL	-	South Sydney Freight Line.
SVOC	-	Semi Volatile Organic Compounds.
Tactical	Tactical Group	Project Managers of the Moorebank Precinct.
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

Abbreviations and Terminology		
Abbreviations	**Term**	**Definition**
		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.
TPH	-	Total Petroleum Hydrocarbons
TRH	-	Total Recoverable Hydrocarbons
UCL	-	Upper Confidence Limit
UST	-	Underground Storage Tank
UXO	Unexploded Ordnance	Explosive ordnance that has been primed, fused, armed or otherwise prepared for action and which has been fired, dropped, launched, projected or placed in such a manner as to constitute a hazard to operations, installations, personnel or material but remains unexploded either by malfunction or design or for any cause. UXO includes items of military ammunition or explosives removed from their original resting place for any reason, including souveniring.
Vegetated Areas	EEC	Refers only to those areas inaccessible during SSD 5066 works.
VOC	-	Volatile Organic Compounds
Zn	-	Zinc

1 Introduction

Logos Property Group (Logos) c/o Tactical Group Pty Ltd (Tactical), engaged EP Risk Management Pty Ltd (EP Risk) to prepare a Long-Term Environmental Management Plan (LTEMP) for the proposed Warehouse 3 and 4 (WH3 and WH4) following a subdivision, within the Moorebank Precinct West site located at 400 Moorebank Avenue, Moorebank NSW, 2170 (MPW Site).

The LTEMP is specific to the subdivision of lots to form Warehouses 3 and 4 within the MPW Site. The development includes the subdivision of part Lot 1 in DP 1197707 as part of proposed Lots 5 and 6 (the Site). The location of the Site and MPW Site is provided as **Figure 1.**

It is understood the MPW Site has been owned by the Commonwealth Government since 1913, used as a Defence facility since the 1940s, and is approximately 190 hectares (ha) in area. The Site is located in the central southern portion of the MPW Site and is approximately 14.26 hectares (ha).

The MPW Site is currently being redeveloped into the Moorebank Intermodal Terminal Development (MITD) (Proposed Development) and comprises land within a developable area, for construction and operation of the Intermodal Terminal (IMT), and land reserved as an offset and conservation area. These areas are identified as follows:

- **Construction Area**: Encompasses the portion of the MPW Site inside the MPW Stage 2 Construction Boundary, including the Site (ref: **Figure 1**).
- **Offset Area**: Comprises the riparian area adjacent the Georges River which is located outside the MPW Stage 2 Construction Area Boundary to the west of the Site (ref: **Figure 1**).

The Site is within the construction area of the MPW Site and does not include the Offset Area of the MPW Site or areas of endangered ecological communities (EEC) present within the greater MPW Site.

Planning consent for the Proposed Development at the MPW Site included MPW Early Works (Stage 1) under State Significant Development (SSD) (SSD 5066), and the Stage 2 Development (SSD 7099).

In accordance with the conditions of planning consent SSD 5066, remediation of the MPW Site was required in accordance with the approved Remediation Action Plan (RAP) prepared by Golder (2016[1]).

To render the MPW Site suitable for the Proposed Development, remedial works were undertaken in accordance with the requirements of the RAP (Golder 2016), and the outcomes provided in the Remediation Validation Report for Land Preparation Work (JBS&G 2020[2]). In summary, JBS&G (2020) concluded that in some areas of the Site, the scope of the RAP (Golder 2016) was constrained by areas mapped as endangered ecological communities (EECs) which could not be disturbed and are fenced / barricaded to prevent access. Management of these restricted areas during construction was recommended via the implementation of a Contamination Management Plan (CMP) prepared by EP Risk (2020[3]). At the completion of close out of these items and the Supplementary Validation Report

[1] Golder (2016) *Land Preparation Works Stage 1 and Stage 2 – Remediation Action Plan*.
[2] JBS&G (2020) Remediation Validation Report, Land Preparation Work – Demolition and Remediation, Moorebank Intermodal Company Property West, Moorebank NSW, dated 22 July 2020 (ref: 51997-120265/Rev1).
[3] EP Risk (2020) *Contamination Management Plan, Moorebank Precinct West, 400 Moorebank Avenue, Moorebank, NSW*, 30 July 2020 (ref: EP1489.002_v11.0).

(JBS&G 2020a[4]), a Site Audit Statement A2 and Site Audit Report for the MPW Site was provided by Enviroview (2020)[5] subject to the implementation of a LTEMP for the MPW Site (EP Risk 2020a[6]).

It is understood that upon completion of placement of fill and prior to construction at the Site, a site audit report (SAR) and site audit statement (SAS) for the Site is required to demonstrate the Site is suitable for the intended land use under Condition B171, SSD 7709.

JBS&G was engaged as the Validation Consultant for Stage 1 and 2 at the MPW Site and prepared a MPW Warehouse 3 and 4 Audit Area Summary Report (JBS&G 2024[7]) for the Site. The summary report was intended to summarise the information available to demonstrate the Site is suitable for the proposed land use following importation of fill so a SAR and SAS A could be prepared to satisfy Condition B171 of SSD 7709. The boundary of the JBS&G (2024) Validation Audit Area is provided within **Figure 1** in relation to the Site.

JBS&G (2024) summarised Stage 1 and Stage 2 works, including per- and polyfluoroalkyl substances (PFAS) reuse areas, Unknown Pre-Existing Contamination (UPEC) finds, stockpile assessments, stockpile footprint validation works, materials tracking for placement at the Site and other associated Site works. The Site has been raised with imported fill to design levels, with PFAS reuse areas (now AEC 3) covered with an average of 1.31 m (WH3) and 1.05 m (WH4) in PFAS reuse areas (AEC 3) and a nominal depth of engineered fill placement across the remainder of the Site, including above existing AEC 3 areas from the MPW LTEMP (EP Risk 2020a) (JBS&G 2024), in preparation for future permanent built surface works including concrete pavement or building slab. Survey drawings for all reuse and placement areas, including overlying engineered fill thickness prepared by JBS&G (2024), has been provided within **Appendix E** for completeness.

JBS&G (2024) concluded remediation, validation, management and importation works had been completed in accordance with EP Risk (2020a) MPW LTEMP and Golder (2016) RAP. Based on the Summary Report (JBS&G 2024), the Site was considered suitable for its intended land use subject to the implementation of an LTEMP.

This LTEMP is a standalone document that provides environmental management framework for the Site and is focused on both short to medium-term management during construction and long-term management of the Proposed Development post construction. Management of areas which also form part of existing LTEMPs have been included within this LTEMP for completeness. The LTEMP was prepared to inform a SAR and SAS A for the Site following placement of fill, consistent with Stage 2 SSD 7709 (Condition B171).

A detailed summary of Site works is provided within the JBS&G summary letter (JBS&G 2024) and pertinent information is summarised within **Appendix A**.

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[4] JBS&G (2020a) MPW Supplementary Validation Report, Moorebank Avenue, Moorebank NSW, dated 23 September 2020 (ref: 58753/132401 (Rev B)).
[5] Enviroview (2020) *Stage 2 Works – Completion of Remediation Pre- Construction (Condition B169 Audit)* Moorebank Precinct West Moorebank Intermodal and Logistics Park (MLP) Moorebank Avenue, Moorebank, NSW, dated 20 November 2020 (ref: 600099_0301-2014)
[6] EP Risk (2020a) *Long-Term Environmental Management Plan*, Moorebank Precinct West (MPW), dated 27 October 2020 (ref: EP1489.001_v12).
[7] JBS&G (2024), *Moorebank Precinct West (MPW) Warehouse 3 and 4 – Audit Area Summary Report, Moorebank Avenue, Moorebank NSW*, dated 19 June 2024 (ref: 58753/158,868 (Rev 0)).

1.1 Purpose

The LTEMP has been prepared in accordance with the requirements of relevant legislation, regulations, codes of practice, Australian Standards and conditions of consent to address the potential risk to human health and the environment from impacted media during construction and operation of the Proposed Site Development. The objectives of this LTEMP are to:

- Outline the nature and extent of known impacted soils, sediment, surface water and groundwater requiring short to long-term management at the Site identified by JBS&G (2024).
- Develop management measures for the management of impacted materials encountered during construction works and long-term operation of the Site including monitoring and reporting in satisfaction of relevant health and safety and environmental legislation.
- Assign responsibilities for the implementation of management measures.

1.2 Parties Responsible for the Implementation and Review / Maintenance

The parties responsible for the implementation and review / maintenance of the LTEMP include:

- Land Owner.
- Land Owner Representative.
- Developer (or their representative)
- Principal Contractor (during construction).
- Operational Managing Entity (post construction).
- Environmental Consultant.
- Construction Worker.
- Operational Worker.

1.3 How the LTEMP will be complied with

The LTEMP is prepared in compliance and to satisfy Moorebank Intermodal West Stage 2 Condition B172 and B173 of SSD 7709, which specifies that: '*Where remediation outcomes for the site require long term environmental management, a suitably qualified and experienced person must prepare a Long-Term Environmental Management Plan (LTEMP), to the satisfaction of the Site Auditor'.* The LTEMP will inform a statutory SAS to be prepared by the Site Auditor.

This LTEMP will be implemented in compliance with Condition C39 of the MPW Stage 3 Consent (SSD 10431).

2 Background

2.1 Site Identification

The site identification details are presented in **Table 1**.

Table 1 – Site Identification

Item	Description
Site Address	MPW Site – 400 Moorebank Avenue, Moorebank, NSW, 2170 (see **Figure 1**) The Site – Portion of the MPW Site, as described below.
Legal Description	**The Site:** Proposed subdivision of part Lot 1 in DP 1197707 to: Parts of proposed Lots 5 and 6 The Site boundary is provided as **Figure 1**.
Approximate Site Area	14.26 hectares (ha)
Site Owner	National Intermodal Corporation (NI)
Municipality	Liverpool City Council
Site Zoning	IN1 General Industry

The MPW Site is located approximately 27 km south-west of the Sydney Central Business District (CBD) and approximately 26 km west of Port Botany. The MPW 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 and is located south of the intersection of Moorebank Avenue and the M5 Motorway. The Site is within the central northern portion of the MPW Site. WH3 is in the northern portion of the Site, is approximately 158 m from north to south and approximately 320 m from east to west at its widest point and covers an area of 4.45 ha. WH4 is located in the southern portion of the Site, is approximately 270 m from north to south and approximately 370 m from east to west at its widest point and is 9.72 ha.

2.2 Current Land Use

At the time of writing, bulk earthworks prior to construction of permanent built surface works of the Site have been completed. The Site has been raised to the design levels with PFAS reuse areas (now AEC 3) covered with engineered fill placement in preparation for future permanent built surface works. Remaining existing AEC 3 areas were covered with a nominal depth as provided within **Appendix E**.

The LTS-SP3A Top Half was designated as containing asbestos in soils (AEC 4) and has been capped in accordance with the management strategy prepared by JBS&G (2022[8]) summarising the removal and capping of residual asbestos. A summary of the findings is provided within **Appendix A**.

[8] JBS&G (2022), *Technical Memo, Moorebank Precinct West (MPW) – Placement of LTS-SP3A Materials, Moorebank Logistics Park, NSW*, dated 21 December 2022 (ref: 58753-149151, Rev 1).

2.3 Proposed Land Use

The development is to include the construction of Warehouses 3 and 4. According to JBS&G (2024) *"The Audit Area will include a concrete pavements or building slabs consistent with the LTEMP PFAS management measures"* and *"Final landscape areas are not currently defined."*

It is understood there is potential for relatively minor disturbance of underlying soils during construction works. Excess spoil is unlikely to be suitable as growing medium in landscape areas and would likely be managed under one of the following scenarios:

- Reuse on remaining portions of the MPW Site in accordance with the POEO Act 1997, applicable Development Application (DA) / SSD, Environmental Protection License (EPL) or LTEMP for the land.
- Off-site disposal in accordance with the Protection of the Environment Operations (Waste) Regulation 2014 (POEO Regulation) and NSW EPA Waste Classification Guidelines: Part 1 Classifying Waste (EPA 2014).
- Reuse on-site in accordance with the management measures within this LTEMP.

2.4 Surrounding Land Use

The land surrounding the Site comprises:

- **North:** MPW Site including existing and future warehousing, Bapaume Road, MPW Site, the M5 motorway, small pockets of remnant bushland and further industrial and residential properties beyond. The Georges River meanders to the north east.
- **South:** MPW Site and existing and proposed warehousing, rail corridor, Holsworthy Defence land, and residential properties to the west of the Georges River.
- **East:** MPW Site including Interstate Terminal, 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:** MPW Site, Offset Area, The Georges River (which flows north), Glenfield Tip, rail corridor and Casula Station, Leacock Regional Park and low and medium density residential properties beyond.

2.5 Topography

The Site has been raised with imported fill to design levels, with PFAS reuse areas (now AEC 3) and asbestos reuse areas in WH3 covered with between 0.05 m and 2.55 m (average 1.31 m), and WH4 covered with between 0.48 and 2.52 (average 1.05 m) of engineered fill placement above site-won reuse (JBS&G 2024). A nominal depth of engineered fill was placement across the remainder of the Site (including above existing AEC 3 areas from the MPW LTEMP (EP Risk 2020a)), in preparation for future permanent built surface works including concrete pavement or building slab. Survey drawings for all reuse and placement areas, including overlying engineered fill thickness prepared by JBS&G (2024), has been provided within **Appendix E**.

2.6 Hydrology

Drainage at the Site is anticipated to follow the design level contours as overland flow via drainage channels and swales to on-site stormwater detention basins (OSD) west of the Site and within the MPW Site. OSDs discharge to the Georges River, west of the Site and MPW Site.

It is understood temporary erosion and sediment control structures such as swales and basins will be utilised during construction of the warehouses in accordance with the Costin Roe Consulting Pty Ltd (2021[9]) Construction Soil and Water Management Plan (or subsequent version).

The historical drainage system at the Site was replaced by temporary sediment control swales and basins during Stage 1 and Stage 2 Works. This included a PFAS water treatment plant and associated sediment basin (Basin WH3), located in the WH3 footprint. Temporary drainage systems, including former Basin WH3 have since been backfilled during importation of Engineered Fill.

A summary of surface water sampling and basin decommissioning is provided within **Appendix A**.

2.7 Geology

Based upon a review of the NSW Government Planning and Environment Resources and Energy Penrith 1:100,000 Geological Map (Sheet 9030, First Edition) (1991), the majority of the Site is underlain by fluvial, clayey quartzose sand and clay from the Tertiary period. The underlying bedrock consists of interbedded Hawkesbury Sandstone and Ashfield Shale (Wianamatta) from the middle Triassic period.

The Site has been raised with imported fill to design levels, with PFAS reuse areas (now AEC 3) covered with an average of 1.31 m (WH3) and 1.05 m (WH4) of engineered fill placement above site-won reuse (JBS&G 2024) and a nominal depth of engineered fill placement across the remainder of the Site (including above existing AEC 3 areas from the MPW LTEMP (EP Risk 2020a)), in preparation for future permanent built surface works including concrete pavement or building slab. Survey drawings for all reuse and placement areas, including overlying engineered fill thickness prepared by JBS&G (2024), has been provided within **Appendix E** for completeness.

[9] Costin Roe Consulting Pty Ltd (2020) Construction Soil and Water Management Plan, Moorebank Logistic Park, Precinct West Stage 2, Moorebank Avenue, Moorebank, NSW, dated 30 November 2021, Revision 18 (ref: 13455.07-03_18.rpt).

2.8 Hydrogeology

EP Risk (2018[10]) and JBS&G (2020b[11]) reported groundwater flow was towards the west and the nearest surface water body, the Georges River. A total of six (6) groundwater monitoring wells were identified at the Site which have since been decommissioned (JBS&G 2024). Historical groundwater levels from previous groundwater gauging events prior to decommissioning (EP Risk 2018 and JBS&G 2020b) ranged from 4.599 m Australian Height Datum (AHD) (MW7006B) and 5.74 m AHD (JBSG_MW06).

EP Risk (2018) reported that groundwater was predominantly fresh to brackish water (relatively low electrical conductivity), with the exception of groundwater monitoring well (GMW) GW6019 in the northern portion of the MPW Site, which indicated an area of high salinity (> 10,000 µS/cm). Dissolved oxygen (DO) measurements indicated generally anaerobic conditions. The oxidation-reduction potential (ORP) indicated reducing conditions and the pH measurements were generally slightly acidic.

Groundwater elevation and gauging information (EP Risk 2018 and JBS&G 2020b) from the on-site groundwater monitoring wells is provided in **Appendix G**.

2.9 Acid Sulfate Soil

A review of the Liverpool Local Environmental Plan 2008 indicated the Site is located within a Class 5 acid sulfate soil (ASS) developmental control area. The surrounding MPW Site is partially within a Class 5 and Class 1 ASS area. Development consent is required for works within 500 metres of adjacent Class 1, 2, 3 or 4 land that is below 5 metres Australian Height Datum by which the water table is likely to be lowered below 1 metre Australian Height Datum on adjacent Class 1, 2, 3 or 4 land.

Based on the review of available information (PB 2014[12] and Golder 2015[13]) actual and potential acid sulfate soils were identified in shallow soils between 1.0 metres below ground level (mBGL) and 2.0 mBGL in the MPW Site Offset Area along the Georges River to the west of the Site. 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 (ASSMP) was a requirement for future earthworks.

Development consent SSD 7709 Condition B39 for MPW Stage 2, required the preparation of an ASSMP for the MPW Site, which includes the Site. EP Risk (2020c[14]) prepared an ASSMP for inclusion as a sub-plan to the Construction Environmental Management Plan (CEMP)[15] for Stage 2 works at the MPW Site in satisfaction of condition C2 of SSD 7709. The purpose of the ASSMP was to outline management procedures for the unexpected discovery of actual or potential acid sulfate soil. The

[10] EP Risk (2018), *Moorebank Precinct West Site-Wide Per- and Poly- Fluoroalkyl Substances (PFAS) Assessment* (ref: EP0748.008 v1, 22.08.18) EP Risk Management Pty Ltd.
[11] JBS&G (2020b) *Qube Property Management Services, Site Wide Groundwater Assessment Report, Land Preparation Work – Demolition and Remediation, Moorebank Intermodal Company Property West, Moorebank, NSW,* dated 22 July 2020 (ref: L51997-120679 (rev 1)).
[12] PB (2014) *Phase 2 Environmental Site Assessment Moorebank Intermodal Terminal*, dated 28.05.14 (ref: 2103829A-CLM_REP-1 Rev B) Parsons Brinkerhoff Pty Ltd.
[13] Golder (2015) *Post Phase 2 Environmental Site Assessment*. Golder Associates.
[14] EP Risk (2020c), Acid Sulfate Soils Management Plan, Moorebank Precinct West Site, 400 Moorebank Avenue, Moorebank NSW. EP Risk Management Pty Ltd. Dated 30 January 2020. EP1340.001_MPW_ASSMP v5.
[15] SIMTA (2020) Construction Environmental Management Plan, Moorebank Precinct West Stage 2, dated 14 January 2020 (ref: MIC2-QPMS-EN-APP-00001).

ASSMP included procedures for the investigation, handling, treatment and management of such soil and water seepage.

Based upon the separation distance of the Site to the Offset area, the ASSMP does not apply to the Site.

2.10 Summary of Site History

Numerous contamination assessments have been undertaken at the Site as part of assessment of the greater MPW Site, the findings of which are summarised in **Appendix A** and various stages of development are summarised by JBS&G (2024).

A summary of the MPW site history is provided in **Table 2**.

Table 2 – Summary of MPW Site History

Year	Summary
1913	The Site, as part of the MPW Site, was purchased by the Commonwealth Government.
1930	The Site was predominantly vacant and covered in bushland / grazing land.
1940s	The Site was used by Australian Defence Force (ADF) as a training base for the Army.
Prior to 1956	The Site had had been developed as a Defence base.
1956 to circa 1995	There was no known fire training activities that occurred within the Site. The MPW Site had undergone various phases of development. A former fire training area (FFTA) approximately 50 m wide and 100 m long was identified close to the Georges River in the southern portion of the MPW Site opposite Jacquinot Road. Fire training involved pouring diesel and other flammable materials into shallow drains, in pans, in above ground storage tanks and car bodies, igniting the fuel and then extinguishing the fire using foam extinguishers. Based upon a review of aerial photographs, it was inferred that fire training activities in this area ceased somewhere between 1991 and 1994. Another fire training area approximately 60 m wide by 160 m long was located in the southern portion of the Dust Bowl. It was understood that fire activities in this area included igniting oil in trays and extinguishing them with foam including AFFF and there was no information available on when fire training activities ceased in this area. Historical excavator training within the Dust Bowl resulted in routine excavation up to depths of 4 m.
2015	The Site and MPW Site was vacated by Defence, with the relocation of military units to new facilities at the nearby Holsworthy Base.

3 Description of Existing / Residual Contamination

3.1 Summary of Impacted Media

MPW Site

Based on the JBS&G (2024) Summary Report, the following remaining areas of environmental concern (AEC) and contaminants of concern for the MPW Site are provided as follows:

- AEC 1 – Chlorinated hydrocarbons impact (Trichloroethylene (TCE) and Cis-1,2-dichlorothene (cis-DCE)) and total recoverable hydrocarbons (TRH) in the north west portion of the MPW Site to the south of the ABB Building.
- AEC 2 – Petroleum hydrocarbon impact including light non-aqueous phase hydrocarbons (LNAPL) in the eastern portion of the MPW Site.
- AEC 3 – PFAS impact associated with residue from historical fire-fighting activities and reuse of excavated PFAS impacted material within the MPW Site.
- AEC 4 – Asbestos Management Area following placement of site-won asbestos impacted soils from LTS-SP3A Top Half.

In addition, low levels of asbestos in soil were reported within AEC 3 reuse areas and the LTS-SP3A Lower Half placement area, which were reported by JBS&G (2024) to not require management beyond placement at depths greater than 0.1m below final design levels. A LTEMP for the MPW Site (EP Risk 2020a) was prepared for the management of the abovementioned AECs (AEC 1, 2 and 3). Existing AEC 4 areas are summarised within the OSD LTEMP (EP Risk 2023a[16]).

The Site

The chlorinated hydrocarbon impacted area (AEC 1) is located approximately 440 m north of the Site, south of the ABB building (JBS&G 2024) and AEC 2 is located approximately 750 m southeast of the Site and is hydraulically cross gradient of the Site.

The historical AEC 3 as described within the MPW LTEMP (EP Risk 2020a) is partially within the Site. Site-won PFAS containing soils were placed on-site during filling works as part of Stage 2 in accordance with the LTEMP (EP Risk 2020a) (JBS&G 2024). The PFAS Placement Areas have been included within AEC 3.

Site-won asbestos impacted soil (JBS&G 2024) were placed on-site during filling works as part of Stage 2 in accordance with the LTEMP (EP Risk 2020a). The concentration of asbestos in soil were less than the adopted Health Screening Level for the land use for the majority of soil reuse, with the exception of soil from LTS-SP3A Top Half, which contained asbestos-containing material (ACM) at concentrations greater than the adopted Health Screening level (HSL) for the land use (0.05% w/w).

[16] EP Risk (2023), *Long-Term Environmental Management Plan OSD Basins and Outlets, Moorebank Precinct West, 400 Moorebank Avenue, Moorebank NSW*, dated 14 September 2023 (ref: EP1489.018_v1).

Consistent with the OSD LTEMP (EP Risk 2023a), this was characterised with AEC 4 for future management in accordance with this LTEMP.

The Site has been raised with imported fill to design levels, with PFAS reuse areas (now AEC 3) covered with an average of 1.31 m (WH3) and 1.05 m (WH4) of engineered fill placement above site-won reuse (JBS&G 2024) and a nominal depth of engineered fill placement across the remainder of the Site (including above existing AEC 3 areas from the MPW LTEMP (EP Risk 2020a)), in preparation for future permanent built surface works including concrete pavement or building slab. Survey drawings for all reuse and placement areas, including overlying engineered fill thickness prepared by JBS&G (2024), has been provided within **Appendix E**.

The location of the AECs at the MPW Site in relation to the Site is provided as **Figure 3**. Further information relating to the AECs is provided in the Conceptual Site Model (CSM) provided as **Appendix A.** A CSM Figure is provided as **Figure 4**.

3.2 Source – Pathway – Receptor Linkages Requiring Management

Based on the CSM provided in **Appendix A** for the Site, a summary of impacted media requiring management in this LTEMP is provided in **Table 3**.

However, based on:

- the placement of imported Engineered Fill across the Site with an average of 1.31 m (WH3) and 1.05 m (WH4) across PFAS placement areas (AEC 3) and asbestos in soils (AEC4) (JBS&G 2024); and
- a nominal depth of engineered fill placement across the remainder of the Site (including above existing AEC 3 areas from the MPW LTEMP (EP Risk 2020a)),

there is the potential for underlying AEC 3 and AEC 4 soils to be disturbed as part of construction of the Warehouses.

Survey drawings for all reuse and placement areas, including overlying engineered fill thickness prepared by JBS&G (2024), has been provided within **Appendix E**. Management of any unidentified contamination is to be managed in accordance with an unexpected finds protocol provided as **Appendix D**.

Table 3 – Identified Areas of Environmental Concern and Impacted Media

Area of Environmental Concern (AEC)	COPC	Impacted Media	Risk Assessment / Management	Source – pathway receptor linkages requiring management
AEC 3 - PFAS-containing material reused at the Site placed at an average depth of approximately 1.31 m (WH3) and 1.05 m (WH4) of engineered fill and a nominal depth engineered fill placement above existing AEC 3. PFAS sourced from impacted areas at the MPW Site associated with residue from historical fire-fighting training.	PFAS	**Soil** – Exceedances of Tier 1 ecological indirect commercial / industrial criteria (**Appendix A**). **Soil leachate** – Detectable leachable PFOS + PFHxS concentrations reported within historical soil sampling at MPW Site (**Appendix A**). **Sediments** - Detectable PFAS concentrations historically reported within sediment at the MPW Site. **Surface water** - Exceedances of Tier 1 criteria for samples collected within temporary detention basins during Early Works construction, Stage 2 and from the Georges River. **Groundwater** – Exceedances of Tier 1 criteria across the MPW Site (**Appendix A**).	• EnRiskS (2019) [17] undertook a human health risk assessment of the MPW Site and reported the risk to human health at the MPW Site was low and acceptable, but bioaccumulation and the effects on higher order ecological consumers were unable to be excluded. • EnRiskS (2019a) [18] reported a potential health risk to children who consume more than two serves of fish per month sourced from the Georges River and potential adverse effects to the aquatic environment by bioaccumulation and the effects on higher order ecological consumers.	• Leaching and erosion of PFAS from soil to surface water and groundwater associated with soil disturbance during construction and operation. • Recreational fishing resulting in the consumption by children of more than two serves of fish per month. • Bioaccumulation and the effects on higher order ecological consumers.
AEC 4 – Asbestos in Soil	Asbestos	**Soil –** Concentrations of asbestos as ACM remain which are greater than the adopted HSL (0.005 % w/w).	JBS&G (2024) summarised the remaining ASBINS associated with LTS-SP3A Top Half. The ASBINS was considered bonded (non-friable). Management included placement of clean capping. A survey is provided within **Appendix E**.	• Inhalation of asbestos during intrusive maintenance works which penetrate the Engineered Fill layer.
Other areas requiring management – AEC 3 reuse areas.	Asbestos	**Soil -** Concentrations of asbestos as Asbestos Fines (AF) / Fibrous Asbestos (FA) and ACM remain which are less than the adopted HSL (0.001 % w/w and 0.05 % w/w, respectively).	JBS&G (2024) summarised the remaining ASBINS comprising low-levels of asbestos not suitable for the top 0.1 m co-mingled with PFAS reuse areas (AEC 3). A survey is provided within **Appendix E**.	• Inhalation of asbestos during intrusive maintenance works which penetrate the Engineered Fill layer.

4 Management Activities

4.1 LTEMP Roles and Responsibilities

This LTEMP has been developed to provide an environmental framework for short to medium term environmental management during construction and operation of the Proposed Development at the Site. The terminology, roles and responsibilities relevant to the LTEMP are provided in **Table 4**.

Table 4 – Responsibilities for LTEMP Implementation

Position	Company/Entity	Responsibilities
Land Owner	Commonwealth	To consent to the registration of the LTEMP on title.
Land Owner Representative	National Intermodal Corporation (NI)	To consent to the registration of the LTEMP on title.
Developer (or their representative)	Moorebank Precinct Nominees Pty Ltd	The Developer is responsible for: • The engagement of the Principal Contractor (during construction). • Management of the operation of the Site post construction or engagement of the Operational Managing Entity. • Ensuring that the Principal Contractor or Managing Operational Entity implement the LTEMP.
Principal Contractor (during construction)	To be appointed	• Responsible for the implementation of the LTEMP during construction works and has primary control of the Site (Parts of proposed Lots 5 and 6). Responsible for inductions, training, notifying the owner, appropriate consultant or contractor in relation to unexpected finds. Also responsible for quarantining unexpected finds requiring management with suitable barricades and informing other workers of its location. • Engage suitably licensed SafeWork NSW Asbestos Removal Contractor (ARC) and independent occupational hygienist / SafeWork NSW Licensed Asbestos Assessor (LAA) for asbestos works and works within AEC 4. • Persons and/or company appropriately qualified to undertake the required management works and has the appropriate insurances and licences. • Responsible for undertaking works in accordance with this LTEMP.
Operational Managing Entity (post construction)	To be appointed	• Responsible for the implementation of the LTEMP at the Proposed Development during long-term operation.

Table 4 – Responsibilities for LTEMP Implementation

Position	Company/Entity	Responsibilities
Environmental Consultant	To be appointed	• As defined under the NEPM (NEPC 2013) (Schedule B9) the environmental consultant is responsible for the assessment of contaminated sites and preparation of assessment reports and should be able to demonstrate relevant qualifications and experience to a level appropriate to the contamination issues at the site under investigation. • The environmental consultant is to have a Certified Environmental Practitioner (Site Contamination) recognised by one of the certifying bodies recognised by the NSW EPA. Any reports prepared should be written or reviewed by the individual Certified Environmental Practitioner (Site Contamination). • The Environmental Consultant is responsible for the following: o Notifying the Client and Principal Contractor of any unexpected finds. o Undertaking the assessment, remediation and validation of an unexpected find. o Engaging the Ordnance Contractor should unexploded ordnance (UXO) or exploded ordnance waste (EOW) be identified as an unexpected find. o Notifying the Principal Contractor once unexpected finds have been validated and can be reoccupied. • Any environmental monitoring required under the LTEMP.
Construction Worker	Commercial industrial worker during construction	• Any worker on the Site, including any contractor or sub-contractor, must adhere to the requirements of the LTEMP during short to medium term construction. Responsible for undertaking their tasks in a safe manner and notifying the Principal Contractor if they see any items / conditions which may constitute an unexpected find.
Operational worker	Commercial industrial worker during operation	• To adhere to the requirements of the LTEMP during long-term operation of the Proposed Development post construction.

4.2 Approval and Licensing Requirements

SSD 7709 provides specific requirements for the LTEMP which are provided in **Table 5**.

Table 5 – Planning Conditions Specific to the LTEMP

Condition	Requirement
SSD 7709 – B171	Upon Completion of importation and placement of fill and prior to construction of permanent built surface works, the Applicant must submit to the Planning Secretary, a Site Audit Report and a Site Audit Statement A for the whole site, prepared in accordance with the *NSW Contaminated Land Management – Guidelines for the NSW Site Auditor Scheme 2017*, which demonstrates the site is suitable for its intended land uses under MPW Stage 2 SSD 7709.
SSD 7709 – B172	Where remediation outcomes for the site require long term environmental management, a suitably qualified and experienced person must prepare a Long-Term Environmental Management Plan (LTEMP), to the satisfaction of the Site Auditor. The plan must: a) be submitted to the Planning Secretary and EPA prior to commencement of construction (other than vegetation clearing); and b) include, but not be limited to: i. a description of the nature and location of any contamination remaining on site, ii. provisions to manage and monitor any remaining contamination, including details of any restrictions placed on the land to prevent development over the containment cell, iii. a description of the procedures for managing any leachate generated from the containment cell, including any requirements for testing, pumping, treatment and/ or disposal, iv. a description of the procedures for monitoring the integrity of the containment cell, v. a surface and groundwater monitoring program, vi. mechanisms to report results to relevant agencies, vii. triggers that would indicate if further remediation is required, and details of any contingency measures that the Applicant is to carry out to address any ongoing contamination.
SSD 7709 – B173	The LTEMP must be registered on the title to the land.

All planning conditions of consent for the Proposed Development relevant to the LTEMP are shown in **Table 6**. Further details of the condition of consent / approval and mitigation measures and how they relate to the LTEMP are provided as a compliance matrix in **Appendix D**.

Table 6 – Planning Approval Conditions of Consent		
Planning Approval	**Condition of Consent**	**Notes**
SSD 7709	B171	Provision of Site Audit Statements to the Planning Secretary upon completion of importation and placement of fill.
	B172	Requirements for the LTEMP
	B173	Registration of the LTEMP
	B180	The Applicant must assess and classify all liquid and non-liquid wastes to be taken off site in accordance with the latest version of the EPA's *Waste Classification Guidelines Part 1: Classifying Waste* (EPA 2014) and dispose of all wastes to a facility that may lawfully accept the materials.
	C1	Management plans required under this consent must be prepared in accordance with relevant guidelines, and include: (a) detailed baseline data; (b) details of: (i) the relevant statutory requirements (including any relevant approval, licence or lease conditions); (ii) any relevant limits or performance measures and 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 management measures; (c) a description of the measures to be implemented to comply with the relevant statutory requirements, limits or performance measures and criteria; (d) a program to monitor and report on the: (i) impacts and environmental performance of the development; (ii) effectiveness of the management measures set out pursuant to paragraph (c) above; (e) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible; (f) a program to investigate and implement ways to improve the environmental performance of the development over time; (g) a protocol for managing reporting any; (i) incident and any non-compliance (specifically including any exceedance of the impact assessment criteria and performance criteria); (ii) complaint; (iii) failure to comply with statutory requirements; (h) roles and responsibilities for implementing the plan; and (i) a protocol for periodic review of the plan.

Table 6 – Planning Approval Conditions of Consent		
Planning Approval	**Condition of Consent**	**Notes**
SSD 7709	Appendix 2 – Applicants Management and Mitigation Measures	OB, 5A, 5I, 6A, 6B, 6C, 6D, 6E, 6F, 6H, 6I, 6J, 7A, 12A,
EPBC 2011/6086	8a	MPW Concept EIS, Soil and Contamination PEMF Section 6.2 – Management controls – Early Works and Construction phase
		MPW Concept EIS, Soil and Contamination PEMF Section 6.4– monitoring
		MPW Concept EIS, Soil and Contamination PEMF Section 6.5 – Management response to incidents and non-compliances
	8b) and c)	REMM 7A, REMM 7B, REMM 7C, REMM 7D, REMM 7E, REMM 7F, REMM 7I, REMM 7J, REMM 7K, REMM 8B, REMM 8D, REMM 8E, REMM 8F, REMM 8G, REMM 8H, REMM 8I, REMM 8J, REMM 8K, REMM 8L, REMM 8M, REMM 8N, REMM 8RO, REMM 8P, REMM 8Q, REMM 8R, REMM 8S, REMM 8T, REMM 8U, REMM 8V, REMM 8W, REMM 8X, REMM 8Y, REMM 8Z, REMM 8AA
	8 d)	i), ii), iii), iv), v), vi), vii),
SSD 10431	C39	The applicant must ensure that the LTEMP prepared under Condition B172 of MPW Stage 2 (SSD 7709) is implemented for the duration of construction and operation of the development.

4.3 Implementation of the LTEMP

The LTEMP will be implemented by the Developer/Principal Contractor and Operational Managing Entity after provision of a SAS A and SAR and registrations on title to satisfy Condition B171 and B173 of SSD 7709, respectively. Implementation of the LTEMP encompasses the following stages:

- Phase 2 Construction Works.
- Operational Phase.

This LTEMP will be implemented in compliance with Condition C39 of the MPW Stage 3 Consent (SSD 10431). Based upon details of the Proposed Development summarised in **Section 2.3**, the following potential activities are proposed to be carried during construction and operation:

Proposed Development Activities

JBS&G (2024) has identified soil containing asbestos at concentrations greater than the HSL (AEC 4) within PFAS reuse areas (now AEC 3) present beneath the imported engineered fill layer at the Site. Low levels of asbestos was reported with stockpiles included within AEC 3 (PFAS Reuse Areas). Additionally, existing AEC 3 areas remain outside of PFAS reuse areas which were not considered by JBS&G (2024) and require management.

Based upon the description of the proposed development (JBS&G 2024), the following activities are proposed at the Site which may intersect AEC 3, AEC 4 and asbestos placement areas.

Phase 2 Construction Works

- Installation of underground services.
- Construction of building footings.
- Implementation of erosion, sedimentation, and stormwater controls during bulk earthworks and sequencing works to minimise the potential for leaching of PFAS to groundwater and surface water.
- Surface water monitoring (as required).
- Construction of pavements and landscaped areas (if required).

Operational Phase

- Sub-surface maintenance works.
- Maintenance of landscaped areas.

4.4 LTEMP Environmental Management and Monitoring Procedures

The approach to managing the potential source – pathway – receptors addressed within the LTEMP is provided in the environmental management procedures (EMP) below and is consistent with the RAP (Golder 2016). The EMPs are provided in **Appendix B** and summarised as follows:

- EMP 1 – Land use restrictions.
- EMP 2 – Subsurface Works – AEC 3.
- EMP 3 – Subsurface Works – AEC 4
- EMP 4 – Materials Tracking.
- EMP 5 – Stockpile Management.
- EMP 6 – Minor Excavation and Sampling.
- EMP 7 – Off-site disposal of excavated / unsuitable material.
- EMP 8 – Subsurface maintenance works.
- EMP 9 – Landscape Management and Maintenance.
- EMP 10 – Unexpected finds.

- EMP 11 – Additional Validation Requirements.
- EMP 12 – Management of groundwater.
- EMP 13 – Management of surface water.
- EMP 14 – Training.
- EMP 15 – Contractor and subcontractor management.
- EMP 16 – Contingency plan.
- EMP 17– Non-compliances with the LTEMP.
- EMP 18 – Record keeping.
- EMP 19 – Audit/review of LTEMP implementation.
- EMP 20 – LTEMP review.
- EMP 21 – Cessation of LTEMP application.

Summary of Source – Pathway – Receptor Linkages Requiring Management

Based upon a review of the source – pathway – receptor linkages reported in **Table 3**, potentially contaminating activities associated with the construction and operation of the Proposed Development which require long term management are provided in **Table 7**.

Table 7 – Management of Potentially Contaminating Activities associated with the Proposed Development

Project Stage	AEC	Activity	Management Procedure
General	-	All activities.	**EMP 1**
Phase 2 Construction Works	AEC 3, Asbestos Placement Areas*	Installation of underground services	**EMP 2, EMP 4, EMP 5, EMP 6, EMP 7, EMP 8, EMP 9, EMP 10, EMP 11, EMP 12, EMP 13**
		Construction of infrastructure, pavement (concrete / asphalt) and landscaped areas (if required)	**EMP 2, EMP 4, EMP 5, EMP 6, EMP 7, EMP 8, EMP 9, EMP 10, EMP 11, EMP 13**
	AEC 4	All works	**EMP 2, EMP 3, EMP 4, EMP 5, EMP 6, EMP 7, EMP 8, EMP 9, EMP 10, EMP 11, EMP 12, EMP 13**
Operation of Proposed Development	AEC 3, AEC 4, Asbestos placement Areas (AEC 3*)	Sub-surface maintenance works	**EMP 2, EMP 3, EMP 8, EMP 9, EMP 10, EMP 12, EMP 13**

* Low level asbestos in soil (JBS&G 2024). Not suitable in top 0.1 m BGL.

In addition to the EMPs provided within **Table 7**, **EMP 14** to **EMP 21** are required within all construction and operational stages.

4.5 Reuse of PFAS Impacted Soil

The Site includes soil reuse Zones 3 (EP Risk 2020a). It is noted that Figure 5 within the MPW LTEMP (EP Risk 2020a) depicts zones 3 off proposed land uses and mapping was indicative only. The Site has been raised with imported fill to design levels, with PFAS reuse areas (now AEC 3) covered with an average of 1.31 m (WH3) and 1.05 m (WH4) of engineered fill placement above site-won reuse (JBS&G 2024) and a nominal depth of engineered fill placement across the remainder of the Site (including above existing AEC 3 areas from the MPW LTEMP (EP Risk 2020a)), in preparation for future permanent built surface works including concrete pavement or building slab. Survey drawings for all reuse and placement areas, including overlying engineered fill thickness prepared by JBS&G (2024), has been provided within **Appendix E** for completeness.

JBS&G (2023[19]) undertook a review of management measures provided within the LTEMP (EP Risk 2020a) and considered zone 2/3/4 reuse of soils could take place with a minimum off-set of 30 m from waterbodies, namely:

- Lot 100 wetland;
- Anzac Creek;
- Georges River; and
- OSDs.

The location of AEC 3 in relation to the Site is provided as **Figure 3**, and the surveyed location of the PFAS Placement Area is provided within **Appendix E**.

There is potential for disturbance of underlying soils during construction works. Excess spoil is unlikely to be suitable as a growing medium in landscaped areas and would likely be managed under one of the following scenarios (JBS&G 2024):

- Reuse on remaining portions of the MPW Site in accordance with the POEO Act 1997, applicable DA, EPL, CMP or LTEMP for the land.
- Off-site disposal in accordance with NSW EPA Waste Classification Guidelines.
- Reuse on-site in accordance with the management measures within this LTEMP.

In the event soil is to be reused on-site, reference should be made to previous analytical results provided within **Appendix A**, the MPW LTEMP (EP Risk 2020a), Addendum 01 (EP Risk 2022[20]) and Addendum 02 (EP Risk 2023[21]) to the MPW LTEMP, or applicable LTEMP within the greater MPW Site.

Soil excavated and placed beneath the Engineered Fill layer that has been subject to historical PFAS testing (AEC 3) or asbestos testing (AEC 4 and placement areas) as outlined in **Appendix A,** or which is

[19] JBS&G (2023), *Assessment of Potential Re-Use of PFAS Impacted Soils in Proximity to Surface Waters, Moorebank Intermodal Precinct*, dated 20 September 2023 (ref: L828 58753|154578 Rev 0).
[20] EP Risk (2022), *Addendum 01 – Moorebank Precinct West (MPW) Long-Term Environmental Management Plan (LTEMP) Version 12 – PFAS Re-use in Warehouse Areas 400 Moorebank Avenue, Moorebank NSW*, dated 1 September 2022 (ref: EP1489.012_LTR01_v1).
[21] EP Risk (2023), *Addendum 02 – Moorebank Precinct West (MPW) Long-Term Environmental Management Plan (LTEMP) Version 12 – Engineered Fill in Warehouse PFAS Re-use Zone 3, 400 Moorebank Avenue, Moorebank NSW*, dated 29 June 2023 (ref: EP1489.019_Addendum 02_v1).

sampled and tested in accordance with **EMP 6**, should be assessed by the Environmental Consultant for suitability to remain on-site or classified and disposed off-site.

Further details of the derivation of the soil reuse criteria provided are contained in the EnRiskS (2020) and MPW Site LTEMP (EP Risk 2020a) reports, subsequent letter of advice (EnRiskS 2022 [22]), Addendum 01 (EP Risk 2022) and Addendum 02 (EP Risk 2023) to the MPW LTEMP, and PFAS surface water proximity assessment (JBS&G 2023a).

A copy of the Addendum 02 to the MPW LTEMP is provided within **Appendix H** which provides requirements for reuse of PFAS impacted soils on-site, in addition to **EMP 6** (**Appendix B**).

It should be noted that the reuse zones in **Figure 5** have been prepared based upon the Precinct Master Plan (PMP) provided at the time of the MPW LTEMP (EP Risk 2020a).

4.6 Compliance Matrix

The Development Consent made under *Section 89E of the Environmental Planning and Assessment Act 1979* has listed the conditions of consent for SSD 7709 in **Appendix C** in relation to the LTEMP.

This LTEMP will be implemented in compliance with Condition C39 of the MPW Stage 3 Consent (SSD 10431).

4.7 Adopted Validation Criteria

Soil Criteria

The adopted criteria for the validation of unexpected finds identified during Stage 2 Construction Works and on-going operation of the Site is provided below.

For the purposes of assessing the results of validation analytical testing of soil at the Site, the Environmental Consultant should reference the relevant Guidelines and Standards, including but not limited to the following:

- NSW DEC (2017) Guidelines for the NSW Auditor Scheme (Third Edition).
- National Environment Protection Council (NEPC) 2013, National Environment Protection (Assessment of Site Contamination) Measure 1999 (April 2013), Canberra (ASC NEPM, 2013).
- Friebel, E & Nadebaum, P 2011, Health Screening Levels for Petroleum Hydrocarbons in soil and Groundwater. Part 1: Technical development document, CRC CARE Technical Report no. 10, CRC for Contamination Assessment and Remediation of the Environment, Adelaide, Australia.
- Heads of EPAs Australia and New Zealand (HEPA), *PFAS National Environmental Management Plan*, January 2020 (HEPA NEMP 2020).

[22] EnRiskS (2022), *PFAS at MPW: re-use of soil underneath the warehouse area,* dated 23 August 2022

Asbestos Assessment Criteria

Asbestos Forms

Asbestos contamination can occur in a range of forms, sizes and degrees of deterioration. ASC NEPM (2013) separates asbestos contamination into the following forms:

- Bonded (non-friable) ACM – Asbestos bound in a matrix, and in sound condition e.g. vinyl floor tiles, cement sheeting;
- Fibrous Asbestos (FA) – Friable asbestos material such as weathered ACM and loose fibrous material (insulation products); and
- Asbestos Fines (AF) – Free fibres of asbestos, small fibre bundles and ACM fragments that can pass through a 7 mm x 7 mm sieve.

Asbestos - Health Screening Levels

ASC NEPM (2013) (Schedule B1 *Guideline on the Investigation Levels for Soil and Groundwater*, Section 4.8 and Table 7) provides HSLs for the five exposure settings based on scenario-specific likely exposure levels adopted from the Western Australia Department of Health (WA DoH) *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia,* 2021.

A HSL of 0.05 % w/w asbestos for bonded ACM should be adopted as site criteria for bonded ACM validation based on the intended commercial / industrial land use. Additionally, visible asbestos must not be within the top 0.1 m for any land use.

ASC NEPM (2013) states a criterion of 0.001% for FA and AF (< 7 mm) for all site uses to screen the analytical results. It should be noted that in accordance with Australian Standard AS4964-2004 and the laboratories NATA accreditation, the limit of reporting (LOR) for AF/FA in soil is 0.1 g/kg (0.01 % w/w). The risk assessment of FA and AF in soil to 0.001 % for FA and AF for assessment with ASC NEPM 2013 is reported as a non-NATA accredited result.

Consequently, NATA accredited laboratories provide additional commentary on visual observations made during analysis relating to the presence of visible FA and AF (if present). These observations are noteworthy, based on the weight of evidence approach, in accordance with ASC NEPM (2013).

For the purposes of this assessment a qualitative criterion was adopted (i.e. the laboratory's observation of visible FA/AF in the soil samples) to apply professional judgement and a risk-based approach.

4.8 Validation Sampling Program

Validation of unexpected finds should be undertaken as directed by the Environmental Consultant in accordance with the applicable Guidelines and Standards at the time of the assessment. Reporting must be undertaken in accordance with the NSW EPA *Contaminated Land Guidelines: Consultants Reporting on Contaminated Land* (NSW EPA 2020).

4.9 Waste Classification

Contaminated soils requiring disposal off-site shall be assessed and classified in accordance with the relevant guidelines and **EMP 7**.

4.10 Contingency Plan

In accordance with SSD 7709 – B172, the LTEMP must include '*details of any contingency measures that the Applicant is to carry out to address any ongoing contamination'*. Procedures for the management of unexpected finds (**EMP 10**) and a contingency plan (**EMP 16**) are provided within this plan.

5 Monitoring and Reporting

5.1 Contamination Management Plan Periodic Review

A periodic review of the LTEMP should be undertaken for the following (**EMP 20**, **Appendix B**):

- If there are any regulatory changes relevant to the implementation of the LTEMP.
- If there is any significant change in land use or additional development of the Site.
- Once construction activities have been completed and prior to occupation of the Site (if required).

Any revisions to the LTEMP must be approved by the appointed NSW EPA accredited Site Auditor (**EMP 20**, **Appendix B**). Where the LTEMP is revised, copies should be provided to all current stakeholders, training provided, and induction procedures updated where necessary.

5.2 Period of Implementation

The LTEMP is to be implemented during construction and operation of the Proposed Development and will not cease until the conditions detailed in **EMP 21** (**Appendix B**) are met.

5.3 Managing and Reporting

Incidents and Non-compliances

The requirement is for the owner of the Site to be compliant with conditions of consent and undertake the development in accordance with all consent and planning documentation. However, in the event of an incident and/or non-compliance with the LTEMP, these will be managed in accordance with **EMP 17** (**Appendix B**). Reporting registers are provided as **Appendix F**.

Complaints

All complaints will be managed in accordance with the CEMP (during construction) and the Environmental Management System (during operation).

Continual Improvement

Continual improvement of this LTEMP will be undertaken in accordance with the **EMP 19** and **EMP 20** in **Appendix B.** 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.

5.4 Record Keeping

All documents in relation to the LTEMP will be managed in accordance with **EMP 18** (**Appendix B**).

5.5 Groundwater and Surface Water Monitoring

The requirement for a soil and groundwater monitoring program is provided in the following:

- The Golder (2016) RAP recommended that a routine monitoring regime be established as part of the LTEMP.
- Condition B172 of SSD 7709 requires that the LTEMP must include a surface water and groundwater monitoring program.

Groundwater plumes associated with the following areas at the MPW Site have been identified on-site:

- **AEC 3** – PFAS plume associated with historical firefighting at the Site.

AEC 3: Golder (2016) recommended PFAS concentrations be assessed and where required, a routine monitoring regime established as part of the LTEMP. Groundwater and surface water monitoring of PFAS concentrations will be undertaken during and after construction works to assess effects of redevelopment on PFAS mass flux to the Georges River to inform the appropriateness of mitigation measures provided in the MPW LTEMP. Ongoing groundwater and surface water monitoring will be managed under the MPW LTEMP for the MPW Site (EP Risk 2020a).

Surface water and groundwater sampling is to be conducted as required during disturbance of AEC 3 materials at the Site in accordance with the EMPs within **Section 4.4** and **Appendix B**. Additionally, it is understood temporary erosion and sediment control structures such as swales and basins will be utilised during construction of the warehouses in accordance with the Costin Roe Consulting Pty Ltd (2021[23]) Construction Soil and Water Management Plan (or subsequent version).

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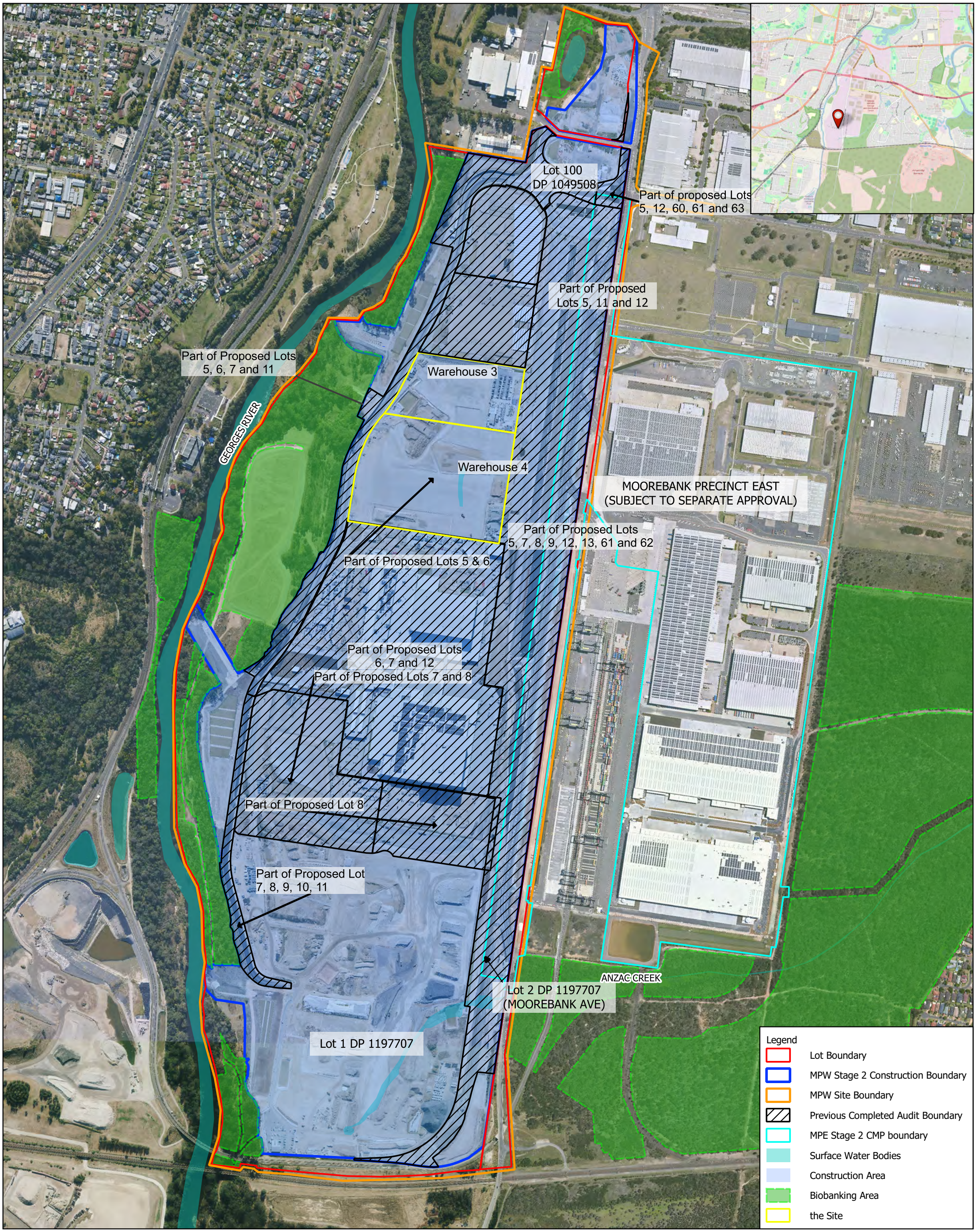
Figures



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Long Term Environmental Management Plan
WH3 & WH4 Audit Area

Figure 1 - Site Location

Job No: EP1489
Date: 03/06/2024
Drawing Ref: Fig 1
Version No: v1

N

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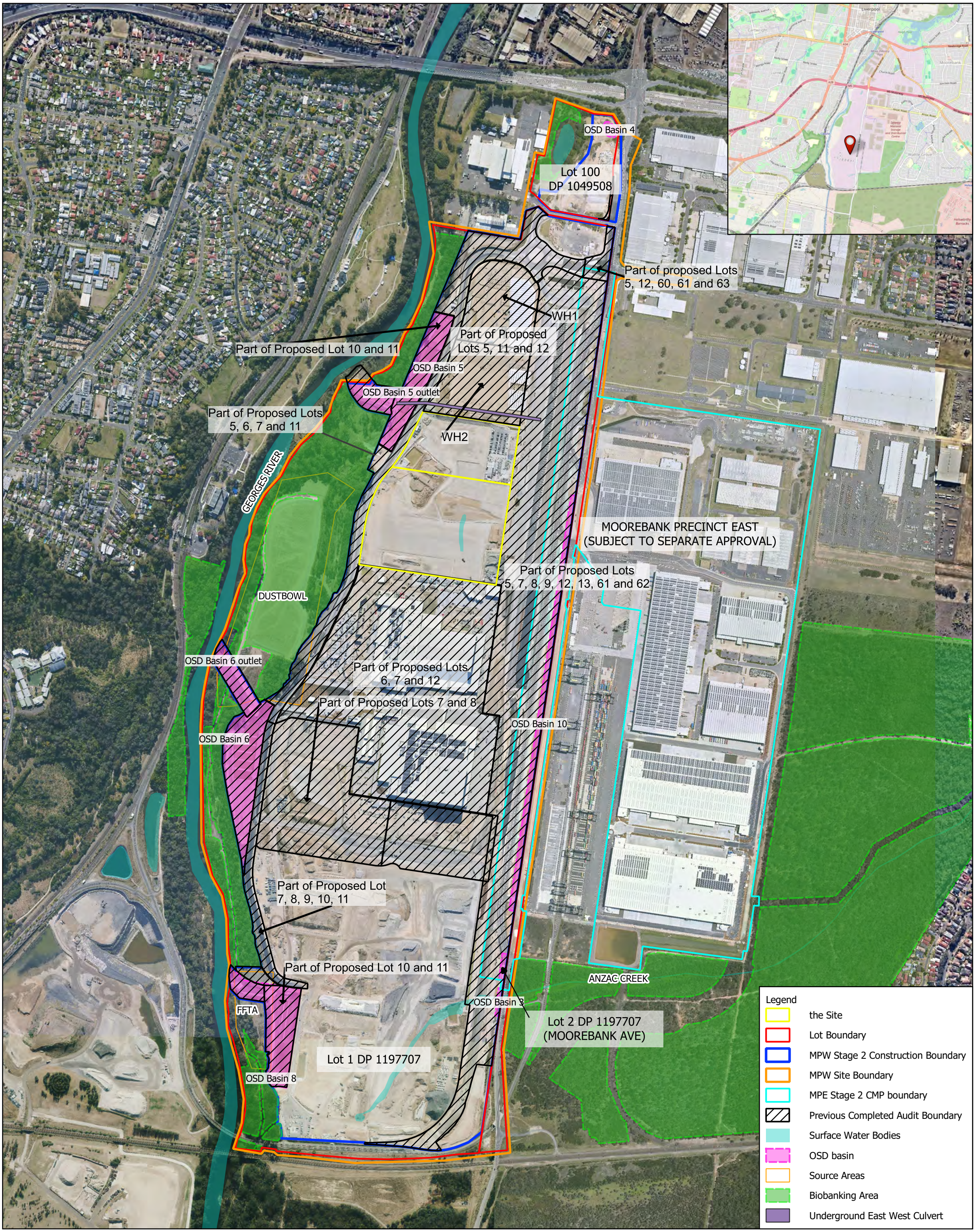
Approximate Scale Only

Coordinate System: MGA 56
Drawn by: OG Checked by: AT
Scale of regional map not shown
Source: Near Maps

ISO 9001 Quality
ISO 45001 OH&S
ISO 14001 Environment



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Long Term Environmental Management Plan
WH3 & WH4 Warehouse Audit Area

Figure 2 - MPW Project Layout and Features

Job No: EP1489
Date: 30/05/2024
Drawing Ref: Fig 2
Version No: v1

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Approximate Scale Only

Coordinate System: MGA 56
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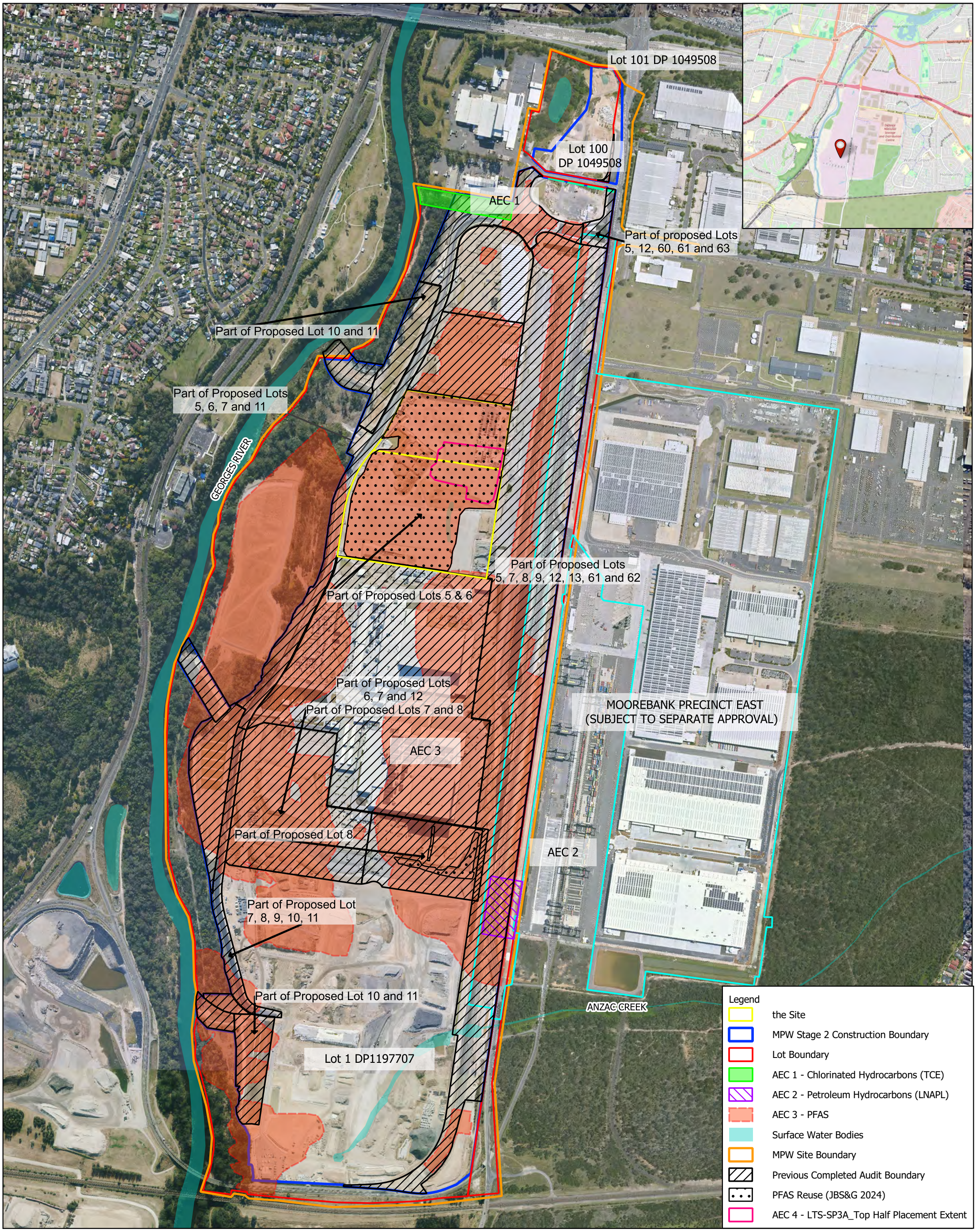
Source: Near Maps

ISO 9001 Quality management system
ISO 45001 OH&S management system
ISO 14001 Environment management system



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Long Term Environmental Management Plan
WH3 & WH4 Warehouse Audit Area

Figure 3 - Areas of Environmental Concern

Job No: EP1489
Date: 03/06/2024
Drawing Ref: Fig 3
Version No: v3

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Approximate Scale Only

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Source: Near Maps

ISO 9001 Quality
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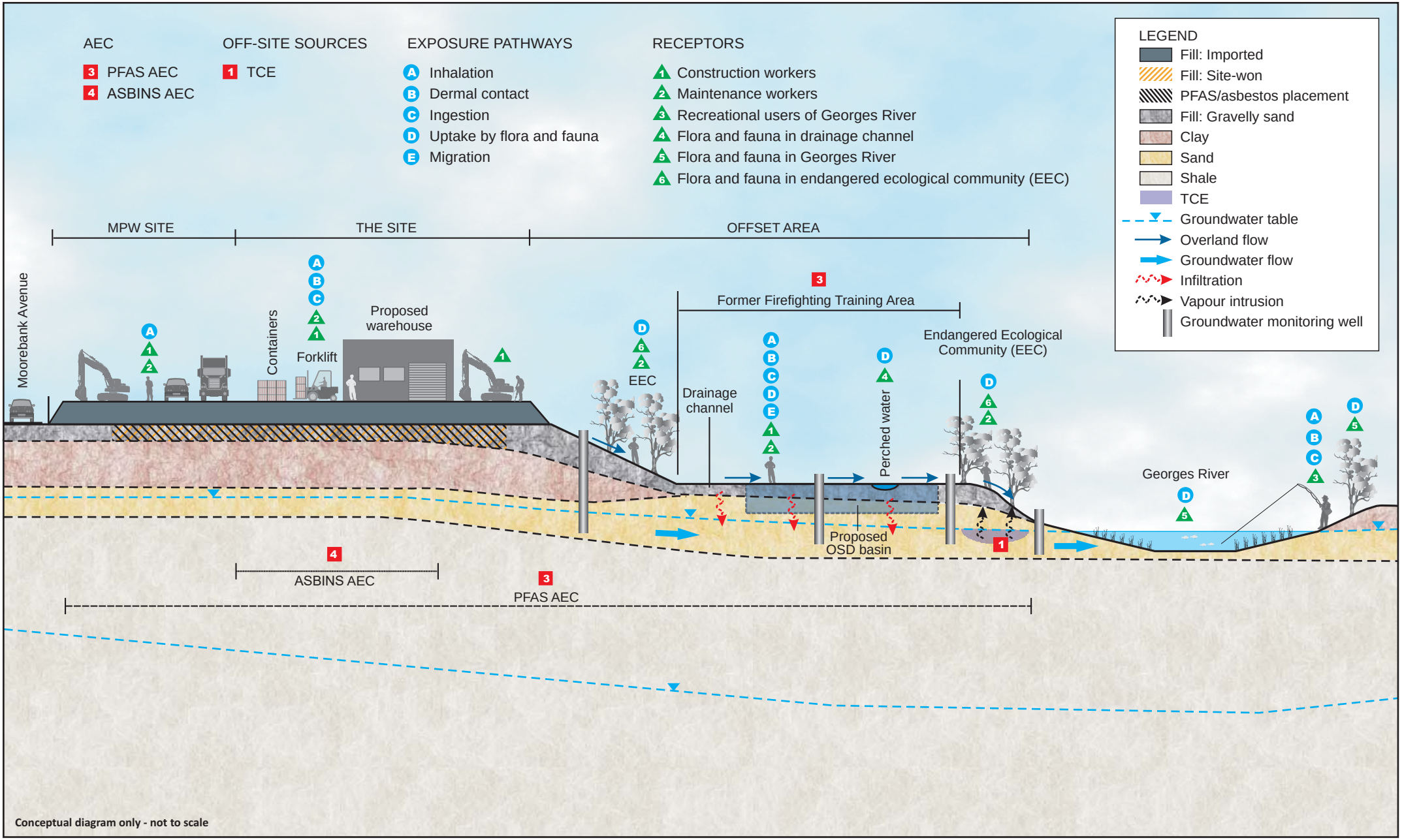


EP RISK

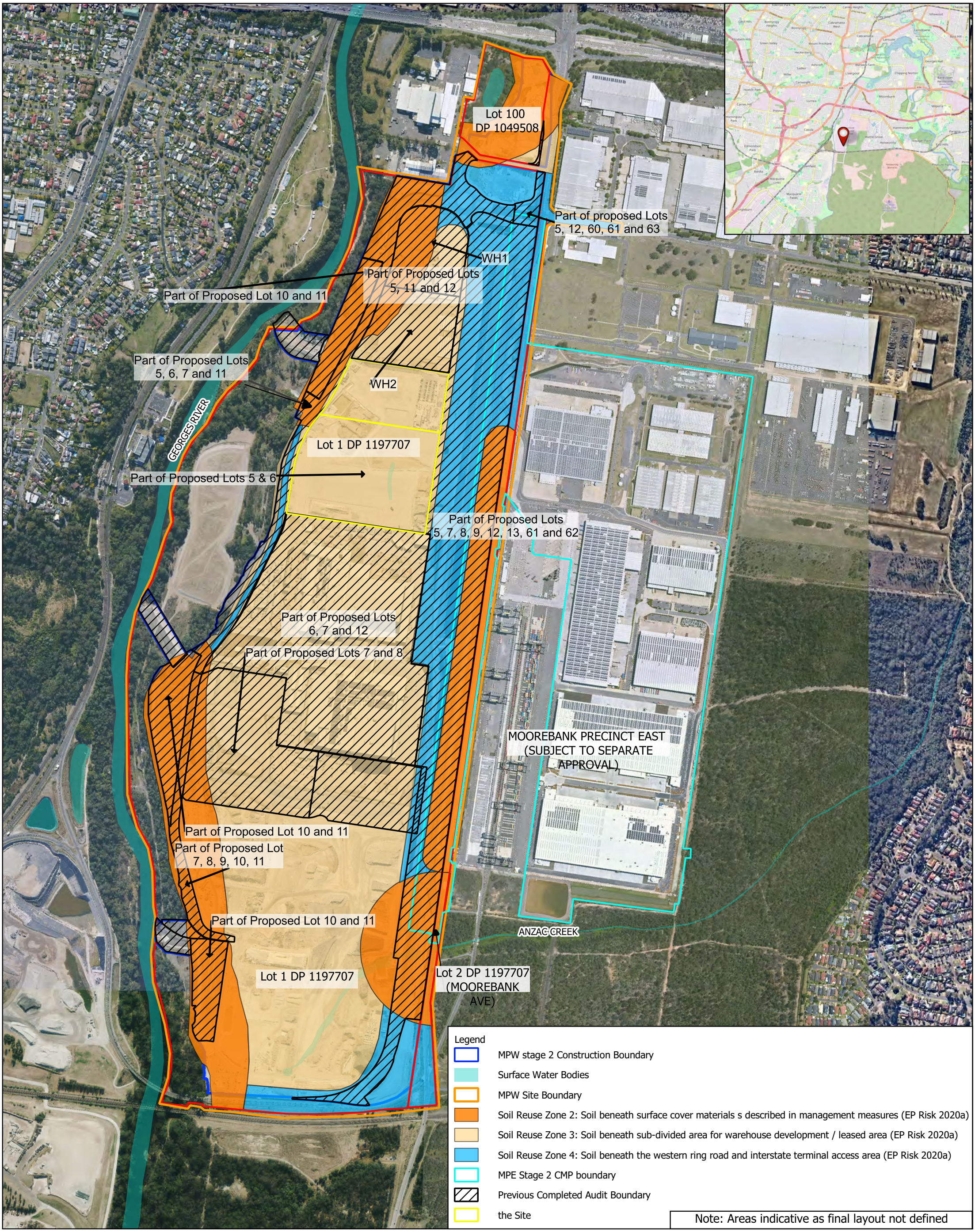
Long Term Environmental Management Plan
Warehouse 3 and 4

Job No: EP0489
Date: 31/05/2024
Drawing Ref: EP0489_016.cdr
Version No: v1

Figure 4 - Conceptual Site Model

Drawn By: B.W.
Checked By: A.T.

ISO 9001 Quality
ISO 45001 OH&S
ISO 14001 Environment



Long Term Environmental Management Plan
WH3 & WH4 Warehouse Audit Area

Figure 5 - Soil Reuse Zones (MPW LTEMP)

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Job No: EP1489
Date: 30/05/2024
Drawing Ref: Fig 5
Version No: v1

N

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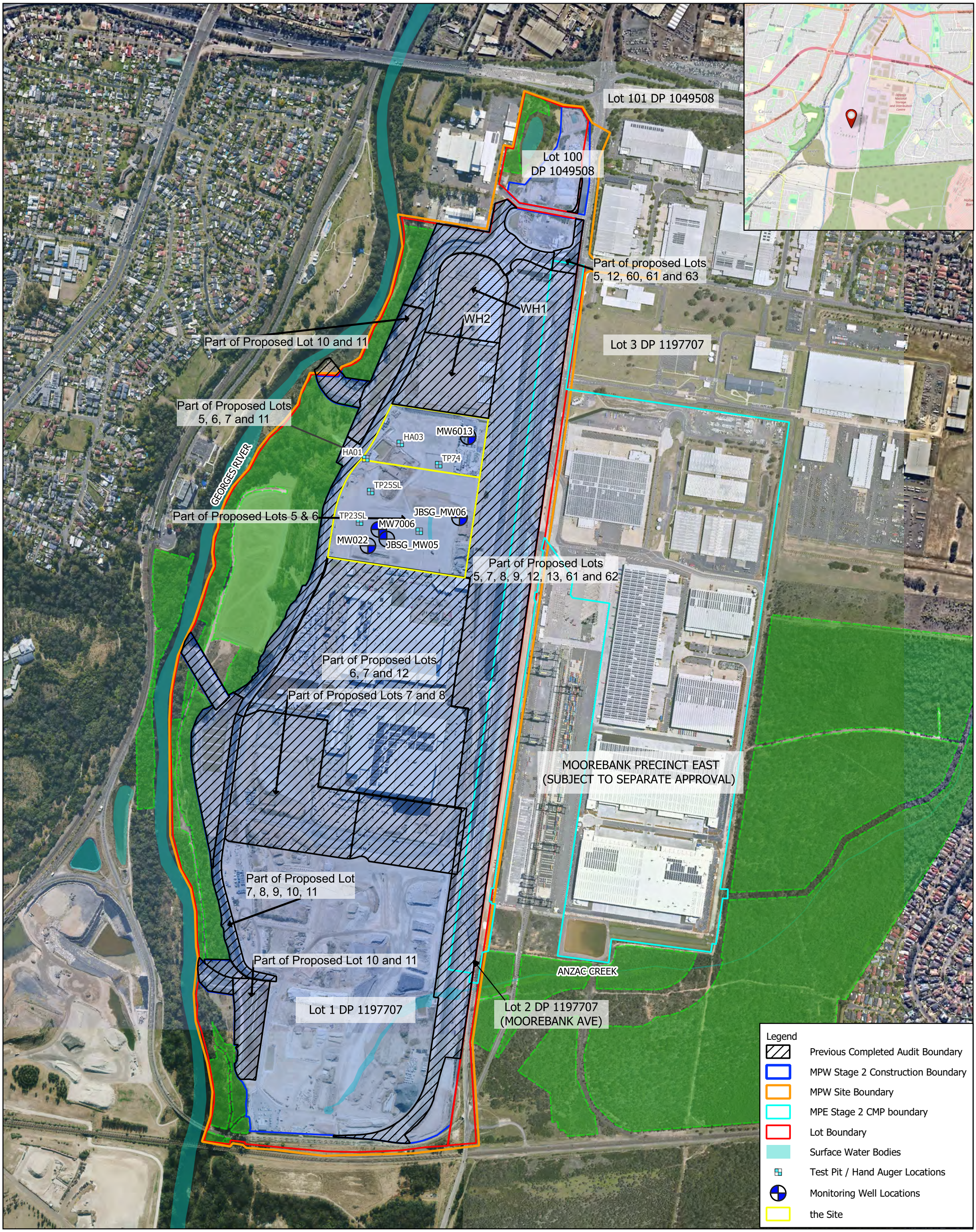
Approximate Scale Only

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

ISO 9001 Quality
ISO 45001 OH&S
ISO 14001 Environment



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Long Term Environmental Management Plan
WH3 & WH4 Warehouse Audit Area

Figure 6 - Soil and Groundwater Sampling Locations

Job No: EP1489
Date: 30/05/2024
Drawing Ref: Fig 6
Version No: v3

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Approximate Scale Only

Coordinate System: MGA 56
Drawn by: OG Checked by: AT
Scale of regional map not shown
Source: Near Maps

ISO 9001 Quality
ISO 45001 OH&S
ISO 14001 Environment

Appendix A
CONCEPTUAL SITE MODEL

Conceptual Site Model

The information provided in this section together with the figures included in this report aid in presenting a conceptual site model (CSM) for the Site with respect to PFAS and asbestos based on a review of the validation reports for Warehouse 3 and 4 (JBS&G 2024). Relevant background historical site information and the investigation works undertaken at the MPW Site to date have also been included.

ASC NEPM (2013) identifies a CSM as a representation of site related information regarding contamination sources, receptors, and exposure pathways between those sources and human / ecological receptors. The development of a CSM is an essential part of all site assessments and remediation activities.

ASC NEPM (2013) identified the essential elements of a CSM as including:

- Known and potential sources of contamination and contaminants of concern including the mechanism(s) of contamination.
- Potentially affected media (soil, sediment, groundwater, surface water, indoor and ambient air).
- Human and ecological receptors.
- Potential and complete exposure pathways.
- Potential preferential pathways for vapour migration (if potential for vapours identified).

Site Description

The Site has been raised with imported fill to design levels, with PFAS reuse areas (now AEC 3) covered with an average of 1.31 m (WH3) and 1.05 m (WH4) of engineered fill placement above site-won reuse (JBS&G 2024) and a nominal depth of engineered fill placement across the remainder of the Site (including above existing AEC 3 areas from the MPW LTEMP (EP Risk 2020a)), in preparation for future permanent built surface works including concrete pavement or building slab. Survey drawings for all reuse and placement areas, including overlying engineered fill thickness prepared by JBS&G (2024), has been provided within **Appendix E** for completeness.

The Site is located in the central northern portion of the MPW Site and is approximately 14.26 ha.

The two PFAS source areas were located in the Offset Area of the MPW Site, known as the Dust Bowl and the FFTA (EP Risk 2018), west and southwest of the Site (respectively), and PFAS impacted areas within AEC 3 are located across the majority of the Site. The petroleum hydrocarbon impacted area (AEC 2) is located in the eastern portion of the MPW Site, approximately 750 m southeast of the Site, and AEC 1 is located approximately 440 km north of the Site. JBS&G (2024) has identified soil containing asbestos at concentrations less than the HSL is present beneath the imported engineered fill layer at the Site (within AEC 3 PFAS reuse areas and LTS-SP3A Lower Half placement area) and greater than the HSL within soil placement sourced from LTS-SP3A Top Half (now AEC 4). The location of the Dust Bowl and FFTA, AEC 1, AEC 2, AEC 3 (including PFAS Placement Areas) and AEC 4 in relation to the Site is provided as **Figure 3** and the surveyed location of the PFAS Placement Areas and AEC 4 described by JBS&G (2024), and the existing AEC 3 areas is provided in **Appendix E**.

Proposed Development

The development is believed to include the construction of Warehouse 3 and 4 located in the central northern portion of the MPW Site. It is understood the permanent built surface works will include pavements and landscaped areas (if present). There is potential for relatively minor disturbance of underlying soils during construction works. Excess spoil is unlikely to be suitable as a growing medium in landscaped areas and would likely be managed under one of the following scenarios (JBS&G 2024):

- Reuse on remaining portions of the MPW Site in accordance with the POEO Act 1997, applicable DA, EPL, CMP or LTEMP for the land.
- Off-site disposal in accordance with NSW EPA Waste Classification Guidelines.
- Reuse on-site in accordance with the management measures within this LTEMP.

In the event soil is to be reused on-site, reference should be made to previous analytical results provided within **Appendix A,** the MPW LTEMP (EP Risk 2020a), Addendum 01 (EP Risk 2022), Addendum 02 (EP Risk 2023) to the MPW LTEMP, and PFAS surface water proximity assessment (JBS&G 2023a).

Summary of Environmental Investigations (MPW Site)

A summary of remediation works and previous environmental reports at the Site is provided within the JBS&G Validation Summary (JBS&G 2024). Information pertaining to AEC 1 and AEC 2 is not included within this LTEMP as these AECs are not within the Audit Area.

AEC 3 – Historical PFAS Contamination (MPW Site)

[redacted] of Enviroview Pty Ltd was engaged in 2016 as the Site Auditor in relation to the Moorebank Intermodal Terminal and reviewed the RAP (Golder 2016) for the MPW Site. [redacted]s concluded *'…the RAP provided meets the requirements of the guidelines and it is my opinion that the site can be made suitable with the implementation of the RAP…'* (Enviroview 2016[24]).

The Golder (2016) RAP contained recommendations that PFAS be assessed and where required, a routine monitoring regime be established as part of the LTEMP. Numerous investigations at the MPW Site have been undertaken PFAS (PB 2014[25], Golder 2015b[26], Golder 2016b[27], Golder 2016c[28], Golder

[24] Enviroview (2016) *Site Audit Interim Advice – Golder Associates, Moorebank Intermodal Terminal Stage Specific Remediation Action Plan*, Letter to Tactical Group dated 22 August 2016 from [redacted]
[25] PB (2014) *Phase 2 Environmental Site Assessment Moorebank Intermodal Terminal*, dated 28.05.14 (ref: 2103829A-CLM_REP-1 Rev B) Parsons Brinkerhoff Pty Ltd.
[26] Golder (2015b) *Preliminary Aqueous Film Forming Foam Investigation* (ref: 147623070-035-M-Rev0, FINAL, 28.10.15) Golder Associates Pty Ltd.
[27] (Golder 2016b) *Moorebank Intermodal Terminal, Per- and Poly-fluoroalkyl Substances Investigations: Stage 1 Onsite Screening Assessment* (ref: 147623070-059-R-Rev0, FINAL, 29.10.16) Golder Associates Pty Ltd.
[28] Golder (2016c) *Perfluoroalkyl Substances Surface Water and Sediment Investigation Georges River*, dated 22 March 2016 (ref: 147623070-047-R-Rev0).

2016d[29], Golder 2016e[30], Golder 2017[31], Coffey 2017[32], EP Risk 2017[33], EP Risk 2017a[34], EP Risk 2017b[35], EP Risk 2017c[36], JBS&G 2019[37] and JBS&G 2020). The findings of these reports have identified PFAS concentrations in soil below the human health-based guidelines for commercial / industrial land use but exceeding the indirect ecological criteria. Impacted sediment, groundwater and surface water was reported at the MPW Site sourced from historical firefighting activities undertaken at the former FFTA and Dust Bowl in the western portion of the MPW Site. EP Risk (2017) was engaged to prepare a Tier 2 PFAS human health and ecological risk assessment for the development and identified the potential human health risk to workers through dermal exposure to PFAS impacted water and a potential risk to ecological receptors in the Georges River from PFAS impacted soil, sediments, surface water and groundwater at the MPW Site.

MIC (now NI) engaged EnRiskS (2019[38] and 2019a[39]) to prepare updated human health and ecological risk assessments for the MPW Site and the Georges River. The risk assessments included sampling of biota in the Georges River to assess the risk of PFAS exposure to both on-site and off-site receptors. EnRiskS (2019) reported the risk to human health at the MPW Site was low and acceptable, but bioaccumulation and the effects on higher order ecological consumers were unable to be excluded. EnRiskS (2019a) reported additional unknown sources of PFAS to biota in the Georges River, but the location of these additional sources could not be identified. However, EnRiskS (2019a) reported a potential health risk to children who consume more than two serves of fish per month sourced from the Georges River and potential adverse effects to the aquatic environment by bioaccumulation and the effects on higher order ecological consumers.

MIC (now NI) engaged GHD (2019) [40] to prepare a summary report of historical PFAS investigations for the MPW Site and prepare a conceptual site model. Based upon the findings by EnRiskS (2019 and 2019a) and GHD (2019), MIC (now NI) engaged GHD to prepare a PFAS Management Plan (2019a) to outline the strategy for long term management of the off-site migration of PFAS from the MPW Site to the Georges River. The GHD (2019a) PFAS Management Plan was not implemented and was superseded.

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[29] Golder (2016d) *Moorebank Intermodal Terminal, Per- and Poly-fluoroalkyl Substances Investigation: Stage 2 Onsite Delineation* (ref: 147623070-064-R-Rev1, FINAL, 29.10.2016) Golder Associates Pty Ltd.
[30] Golder (2016e) *Moorebank Intermodal Terminal, Preliminary PFAS in Groundwater Remedial Options Appraisal, Moorebank Intermodal Terminal, Moorebank, NSW* (ref: 147623070-065-R-Rev0, 01.09.16) Golder Associates Pty Ltd (Golder 2016c).
[31] Golder (2017) *Moorebank Intermodal Terminal, Per-fluoroalkyl Substances Surface Water and Sediment Investigation Georges River*, dated 22 March 2017 (ref: 147623070-047-R-Rev0) Golder Associates Pty Ltd.
[32] Coffey (2017) *PFAS Assessment Report – Royal Australian Engineers (RAE) Golf Course*, dated 29 September 2017 (ref: GEOTLCOV24072AF-CD) Coffey.
[33] EP Risk (2017) *Literature Review, Criteria for Assessment of PFAS and Risk Assessment, Moorebank Intermodal Terminal Development* (ref: EP0448.001, v3, 03.10.17) EP Risk Management Pty Ltd.
[34] EP Risk (2017a) *Per- and Poly-fluoroalkyl Substances (PFAS) Data Gap Investigation* (ref: EP00464.002, v2, 20.11.17) EP Risk Management Pty Ltd.
[35] EP Risk (2017b) *Per- and Poly-fluoroalkyl Substances (PFAS) Nested Well Investigation* (ref: EP00561.002, v1, 10.07.17) EP Risk Management Pty Ltd.
[36] EP Risk (2018) *Moorebank Precinct West Site-Wide Per- and Poly- Fluoroalkyl Substances (PFAS) Assessment* (ref: EP0748.008 v1, 22.08.18) EP Risk Management Pty Ltd.
[37] JBS&G (2019b) *Moorebank Precinct West, Moorebank Intermodal Terminal, NSW – Dust Bowl Assessment* (ref: JBS&G 51997-125644 L342 (Dust Bowl Assessment) Rev A, dated 8 November 2019).
[38] EnRiskS (2019) *Land Human Health and Ecological Risk Assessment (Land HERA)*, dated 6 May 2019 (ref: MICL/19/BIOR001, Revision B – Revised Draft).
[39] EnRiskS (2019a) *Waterway Human Health and Ecological Risk Assessment (Waterway HHERA)*, dated 10 May 2019 (ref: MICL/18/GRR001, Revision E – Revised Draft).
[40] GHD (2019) *Moorebank Precinct West, Report Summarising PFAS Investigations to February 2019*, dated April 2019 (ref: 2128111).

To render the MPW Site suitable for the Proposed Development, remedial works were undertaken in accordance with the requirements of the RAP (Golder 2016), and the outcomes provided in the Remediation Validation Report for Land Preparation Work (JBS&G 2020). In summary, JBS&G (2020) concluded that in some areas of the Site, the scope of the RAP (Golder 2016) was constrained by areas mapped as endangered ecological communities (EECs) which could not be disturbed and are fenced / barricaded to prevent access. Management of these restricted areas during construction was recommended via the implementation of a CMP. JBS&G (2020) concluded that the MPW Site was suitable for the intended Intermodal Terminal subject to the implementation of a CMP for restricted access areas during the construction phase and biobanking areas with restricted access.

Management and close out of remaining contamination within the EECs, as identified in the EP Risk (2020) CMP was completed by JBS&G (2020a) to the extent practicable. However, JBS&G (2020a) identified a number of areas where it was not practicable to complete validation works due to site constraints which required on-going management during construction works.

EnRiskS (2020)[41] prepared a material reuse risk assessment in relation to the presence of PFAS in soil to inform management procedures in the LTEMP, which presents revised criteria for PFAS in soil to be reused in the Construction Area, which can be implemented in conjunction with the management measures within the MPW LTEMP (EP Risk 2020a).

Summary of Preparatory Works Summary (JBS&G 2024)

The Site works were undertaken by Liberty Industrial until January 2020 and Georgiou thereafter. Civil and remedial works were supervised by JBS&G.

Based on the Validation Report (JBS&G 2024), a number of in-situ and ex-situ assessments were conducted as part of Stage 2 filling works at the Site. The scope of works as part of validation included the following:

- Assessment and management of unexpected finds identified following completion of the works documented in the Remediation Validation Report (JBS&G 2020a) and Supplementary Validation Report (JBS&G 2020a), including:
    - Characterisation of excavated materials and preparation of waste classification reports for off-site disposal where required;
    - Completion of air monitoring during excavation / remediation of asbestos fines / fibrous asbestos (AF/FA) impacted material;
    - Visual inspection and validation of final excavation extents and any associated stockpiles;
    - Review of off-site waste disposal dockets for all material disposed to landfill; and
    - Documentation of the validation process.
- Assessment of stockpile for potential contamination (including PFAS, asbestos and other contaminants) prior to reuse.
- Review of materials tracking and survey details provided by Georgiou in relation to stockpiling and placement of fill, including PFAS (now AEC 3) and Asbestos (including AEC 4).

[41] EnRiskS (2020) Moorebank Intermodal Terminal: LTEMP Material Reuse Risk Assessment for PFAS, dated 9 October 2020.

- Review of documentation available for unexploded ordnance (UXO) and explosive ordnance waste (EOW), if any, encountered during civil works.
- Review of documentation provided by Construction and Remediation Advisory Services (CARAS) and Georgiou for imported fill material intended to raise the site level.

It was reported by JBS&G (2024) that management of UPECs, soil contamination and sampling was undertaken in accordance with the CMP (EP Risk 2021) and MPW LTEMP (EP Risk 2020a).

Unexpected Finds

During civil works, a number of unexpected finds (UF) were identified, removed and validated by JBS&G. Unexpected finds were related to the presence of anthropogenic fill or the observation of ACM. Where contamination was confirmed, they were allocated a UF number, excavated, stockpiled and subsequently characterised for on-site suitability, or management/containment or disposal to landfill. The majority of the Site was not within AEC 3 and therefore PFAS was not analysed in many of the stockpiled materials sourced from the Site (JBS&G 2024).

Once all UFs were removed the excavations were validated (JBS&G 2024).

In-Situ PFAS Assessments

No In-situ PFAS Assessments were undertaken at the Site during Stage 2 works by JBS&G.

All soils excavated or stockpiled from AEC 3 within the MPW Site were assessed for PFAS for potential reuse and placement in accordance with the MPW LTEMP (EP Risk 2020a).

Stockpile LTS-SP3A

LTS-SP3A was generated from soils across the MPW Site which had elevated concentrations of PFAS and bonded/friable asbestos (JBS&G 2024). JBS&G was engaged to reassess the stockpile in two portions including LTS-SP3A Top Half and LTS-SP3A Lower Half.

The LTS-SP3A Top Half assessment (JBS&G 2023a[42]) identified asbestos as ACM within 23 of 115 sampling locations with 3 exceeding the adopted HSL (0.05 % w/w). Asbestos as AF/FA was reported below the assessment criteria (0.001 % w/w)) in all samples. PFAS was reported at concentrations less than the reuse criteria for Soil Reuse Zones 3 and 4. JBS&G considered concentrations of PFAS were acceptable for reuse within Soil Reuse Zones 3 and 4, however soils were marked as requiring containment measures for asbestos. LTS-SP3A Top Half was placed with minimal capping and LTS-SP3A Lower Half was placed on top and later covered as per **Appendix E**.

LTS-SP3A Lower Half was similarly reassessed for suitability by JBS&G (2023b[43]) with a technical memo prepared for management (JBS&G 2023c[44]). Asbestos as ACM was observed at 16 of 173 locations,

[42] JBS&G (2023a), *Moorebank Precinct West (MPW) – Long Term Stockpile 3A (LTS-SP3A) Assessment (Top Half),* dated 5 September 2023 (ref: L721: 58753-148657 (Rev 1))
[43] JBS&G (2023b), *Moorebank Precinct West (MPW) – Long Term Stockpile 3A (LTS-SP3A) Assessment (Lower Half),* dated 24 August 2023 (ref: 801: 58753-154058 (Rev 0))
[44] JBS&G (2023c), *Moorebank Precinct West (MPW) – Assessment of LTS-SP3A Lower Half Materials, Moorebank Intermodal Precinct, NSW,* dated 19 July 2023 (ref: 801: 58753-153002 (Rev 2))

with seven (7) sampling locations exceeding the adopted HSLP (0.05 % w/w). Asbestos as AF/FA was identified in 7 laboratory samples, with four (4) greater than the adopted HSL for AF/FA (0.001 % w/w). Concentrations of PFAS were less than the criteria for Soil Reuse Zones 3 and 4. Based on the presence of asbestos as ACM and AF/FA exceeding the adopted HSL, these grid/depth locations were removed and transported for placement on the greater MPW Site. The remaining portion of LTS-SP3A Lower Half was placed within the Site and surveyed. The location of LTS-SP3A Top Half (AEC 3/4) and Lower Half (AEC 3) is provided within **Figure 3** and the survey provided within the Summary Report (JBS&G 2024) is provided in **Appendix E**.

Soil Placement

PFAS soil (including the abovementioned portions of LTS-SP3A) was reused within the Site in accordance with the MPW LTEMP (EP Risk 2020a) and Addendums (EP Risk 2022 and 2023). The locations of placement of these soils have been included within AEC 3. According to the Summary Report (JBS&G 2024) *"The Audit Area will generally include concrete pavements or building slabs consistent with the LTEMP PFAS management measures. Final landscape areas are not currently defined. Should there be overlap between the final landscape design and areas of PFAS soil reuse, "retrofitting" of the capping for landscape areas as per the LTEMP (EP Risk 2020) will be required during the construction phase. Retrofitting may require the management of surplus PFAS impacted spoil, either within MPW or disposed off-site. Retrofitting will be managed under an area specific LTEMP."*

Stockpile assessment reports were provided within the JBS&G (2024) Summary Report.

The locations of AEC 3 and AEC 4 are provided within **Figure 3** and the surveys provided within the Summary Report (JBS&G 2024) is provided in **Appendix E**. A summary of historical PFAS concentrations and asbestos in soils (AEC 4) is provided within **Table A1** to **Table A6** within **Appendix A**.

Following soil placement and capping of AEC 4, three portions of the Site were used as contractor compound areas. Imported materials for compound construction were removed following occupation and the areas were inspected to ensure all materials had been removed.

UXO Assessment

Unexploded ordnance (UXO) / explosive ordnance waste (EOW) was previously reported in JBS&G 2020a and 2020a. No UXO/EOW was identified at the Site.

Stormwater Structures

JBS&G prepared a Technical Memo (JBS&G 2021a[45]) clarifying stormwater structures and the placement of PFAS impacted soil for the Site in accordance with EnRiskS (2020[46]) and EP Risk (2020a) and considered that following development of the Site the risk of offsite migration of PFAS to sensitive

[45] JBS&G (2021a), *Technical Memo, Moorebank Precinct West (MPW) – Stormwater Structures and the Placement of PFAS Impacted Soil, Moorebank Logistics Park, NSW,* dated 19 May 2021 (ref: 51997 – 136836 (rev 2)).
[46] EnRiskS (2020) Moorebank Intermodal Terminal: LTEMP Material Reuse Risk Assessment for PFAS, dated 9 October 2020.

receptors via the stormwater system is considered negligible. JBS&G (2021a) described the mitigation factors as:

- *The reuse of soil at or near surface are required to meet appropriately protective total soil and leachable PFAS criteria (NEMP 2020). Therefore, runoff into the development's stormwater system is anticipated to be within acceptable PFAS concentrations;*
- *Other PFAS impacted soils proposed to be reused on site will be isolated by pavements and imported fill, and infiltration water would not reach (or would be negligible in) the underlying PFAS contaminated soil. Therefore, there would be no driver for PFAS to be mobilised;*
- *In order that the development is not geotechnically/structurally compromised, the stormwater system is designed to retain water for discharge offsite. Therefore, exfiltration from the network would not be expected to exacerbate leaching to groundwater to any significant extent; and*
- *The stormwater system is above the groundwater table and therefore the system would not be a preferential flow path for impacted groundwater.*

Based on the JBS&G (2021a) Technical Memo *"It is therefore considered that the management measures detailed in the LTEMP are sufficiently protective of the proposed MPW stormwater system and a setback from enclosed stormwater infrastructure is not warranted, nor contemplated by the approved LTEMP* (JBS&G 2021a). Additionally, JBS&G considered the use of asphalt as a suitable cover (**Appendix I**) as referenced by EnRiskS (2020).

Surface Water (JBS&G 2024)

Surface water was managed as per the MPW LTEMP (EP Risk 2020a), the MPE Stage 2 CEMP (SIMTA 2021), and the EPL (EPL 21054) for the MPW Site. The surface water sampling program was subject to routine reporting to the NSW EPA by Aspect Environmental Pty Ltd. Surface water at the Site and within the Georges River is reported on a quarterly basis. As summarised by JBS&G (2024), PFOS concentrations were generally reported above the EPL criteria in basins and ponded water located within AEC 3. Historically, PFAS was not identified within the northern portion of the MPW Site and surface water was not sampled for PFAS (JSB&G 2024). Between 2022 and 2023, during placement of low-level PFAS impacted soil within catchments on-site, elevated concentrations of PFOS in water were reported greater than the EPL (0.13 µg/L) in basins and ponded waters in WH3 and WH4. JBS&G (2024) noted *"that low levels of PFAS in soils can result in elevated PFAS detected in runoff water. However, experience at the site has indicated that at the concentration PFAS is present in waters, otherwise clean soils do not report elevated PFAS concentrations caused by contact with PFAS impacted runoff water. Therefore, while PFAS readily migrates in waters, there is no evidence that this leads to significant cross contamination of soils, nor is it an indication of more significantly contaminated soils within the catchment."*

JBS&G (2024) reported that all surface water exceeding the criteria was treated at the Synergy PFAS water treatment plant located in the WH3 warehouse footprint with Basin WH3 often used as a holding basin prior to treatment. There was no reported incidences of leaks or discharges which had the potential to impact underlying soils.

It is understood ongoing management of stormwater within basins will be via a CEMP, relevant EPL and LTEMP for the land at the time.

Summary of Contamination at the Site

A summary of remediation works and previous environmental reports at the Site is provided within the JBS&G (2024) Summary Report.

Based on the JBS&G (2024) Summary, the following remaining areas of environmental concern (AEC) and contaminants of concern for the Site is provided as follows:

- AEC 3 - PFAS impact associated with residue from historical fire-fighting activities and reuse.
- AEC 4 – Asbestos associated with the consolidation and placement of ASBINS generated through MPW Site works.

In addition, low levels of asbestos in soil were reported within AEC 3 reuse areas, which were reported by JBS&G (2024) to not require management beyond placement at depths greater than 0.1m below final design levels.

The Site has been raised with imported fill to design levels, with PFAS reuse areas (now AEC 3) covered with an average of 1.31 m (WH3) and 1.05 m (WH4) of engineered fill placement above site-won reuse (JBS&G 2024) and a nominal depth of engineered fill placement across the remainder of the Site (including above existing AEC 3 areas from the MPW LTEMP (EP Risk 2020a)), in preparation for future permanent built surface works including concrete pavement or building slab. Survey drawings for all reuse and placement areas, including overlying engineered fill thickness prepared by JBS&G (2024), has been provided within **Appendix E** for completeness.

AEC 3 - PFAS Contamination in Affected Media Onsite

The historical soil, soil ASLP and groundwater PFAS analytical results at the Site reported by PB (2014), Golder (2015), Golder (2016b), EP Risk (2017a, 2017b and 2018a) and JBS&G (2019b), as summarised by EP Risk (2018 and 2020) in the Site-Wide PFAS Assessment, are presented in **Table A1**, **Table A2** and **Table A3** respectively. The corresponding sampling locations are provided in **Figure 6**.

Ecological criteria were only compared to the data set from 0 to 2 mBGL in accordance with the requirements of the ASC NEPM (2013) as this horizon corresponds with the root zone and habitation zone of many species. Figures illustrating the locations of PFAS impacts and historical sampling locations are provided at the end of **Appendix A**.

PFAS Placement Areas (JBS&G 2024)

JBS&G (2024) provided a comprehensive review of the PFAS Soil Reuse across the Site and concluded "*all material excavated from AEC3 was assessed for PFAS for potential site reuse. The reuse of PFAS impacted soils was completed in accordance with the LTEMP (EP Risk 2020a)"* (JBS&G 2024). Therefore, soil was considered suitable for reuse within Zone 3 (i.e under the warehouse footprint). Full reference should be made to the JBS&G Validation Summary Report for further information. The corresponding PFAS reuse areas provided within the Summary Report (JBS&G 2024) is provided in **Appendix E**.

AEC 4 – ASBINS Placement Areas (JBS&G 2024)

A review of ASBINS excavated from the greater MPW Site, stockpiled as LTS-SP3A Top Half and placed at the Site as summarised by JBS&G (2024) is provided within **Table A4** and **Table A5**. ASBINS Placement Areas have been included within AEC 4 and a survey is provided in **Appendix E.**

Historical PFAS Assessments (EP Risk 2018 and EP Risk 2020)

Table A1 – Summary of Historical Soil PFOA, PFOS + PFHxS and PFOA Concentrations On-site[47]

Area	Depth (mBGL)	Analyte	No. of samples	Min. Conc. (mg/kg)	Max. Conc. (mg/kg)	Mean Conc. (mg/kg)	Standard Deviation (mg/kg)	No. Samples >LOR	No. Samples > Criteria[48]	No. Samples > 250% Criteria	95% UCL_{mean}[49] (mg/kg)[50]	95% UCL_{mean} Exceedance of Criteria[51]
The Site	<2	PFOA	11	<0.0001	0.0021	0.00042	0.00003	1	0	0	N/A	N/A[1]
		PFOS	11	<0.0001	0.0052	0.0014	0.0017	6	0	0	0.00205[52]	N/A[1]
		PFOS + PFHxS	11	<0.0001	0.0065	0.0023	0.0023	6	0	0	0.00311[53]	N/A[1]
	≥2	PFOA	3	<0.0001	0.001	0.0007	0.00052	0	0	0	N/A	N/A[1]
		PFOS	3	<0.001	0.0003	0.00077	0.00040	EC (ind.)[54] –1	EC (ind.) – 0	0	N/A	N/A[1]
		PFOS + PFHxS	3	<0.005	0.0004	0.0035	0.0027	1	0	0	N/A	N/A[1]

[1] 95% UCL was not calculated due to an insufficient sample size.

[47] All data was rounded to a maximum of two (2) decimal places.
[48] Health based criteria assuming commercial / industrial land use and for soil <2m and >2m. Ecological criteria assuming industrial commercial for soil <2m (PFAS NEMP). Ecological criteria assuming industrial commercial for the Construction Area and public open space / residential for the Offset Area for soil <2m (PFAS NEMP).
[49] UCL_{mean} – Upper confidence limit of the arithmetic mean.
[50] Excluding samples results greater than 250% of the adopted criteria.
[51] Standard deviation must be less than 50% of the adopted criteria.
[52] Suggested UCL= 95% Student's-t UCL
[53] Suggested UCL= 95% Student's-t UCL
[54] EC (ind.) – interim soil – ecological indirect exposure (PFAS NEMP) The ecological indirect exposure criteria of 0.14 mg/kg was adopted for the Construction Area on the basis that the Site has been intensively developed in the past and further intensive development is proposed which will limit the presence of secondary consumers and the potential for indirect ecological exposure.

Table A2 – Summary of ASLP PFOA, PFOS + PFHxS and PFOA Concentrations On-site

Area	Depth (mBGL)	Analyte	No. of samples	Minimum conc. (µg/L)	Maximum Conc. (µg/L)	Mean Conc. (µg/L)	Standard Deviation (µg/L)	No. Samples >LOR	95% UCL_{mean} (µg/L)
The Site	< 2	PFOA	8	<0.01	<0.05	N/A	N/A	0	N/A[1]
		PFOS	8	<0.01	<0.05/ 0.01	0.04	0.019	1	N/A[1]
		PFOS + PFHxS	8	<0.01	<0.05/0.01	0.01	0	1	N/A[1]
	≥2	PFOA	2	<0.05	<0.05	N/A	N/A	0	N/A[1]
		PFOS	2	<0.05	<0.05	N/A	N/A	0	N/A[1]
		PFOS + PFHxS	2	<0.01	<0.01	N/A	N/A	0	N/A[1]

*Laboratory EQLs/ LORs different depending on laboratory and time of testing. Samples without < are above LOR.

[1] 95% UCL was not calculated due to an insufficient sample size.

Table A3 – Summary of Historical Groundwater PFOA, PFOS + PFHxS and PFOA Concentrations On-site

Area	Analyte	No. of Wells	No. of samples	Minimum conc. (µg/L)	Maximum Conc. (µg/L)	Mean Conc. (µg/L)	Standard Deviation (µg/L)	No. Samples >LOR	No. Samples > Criteria[55]	95% UCL_{mean} (µg/L)	95% UCL_{mean} Exceedance of Criteria
The Site	PFOA	5	5	0.001[2]	0.27	0.056	0.12	4	0	N/A[3]	N/A[3]
	PFOS	5	5	0.01	0.12	0.041	0.045	5	5	N/A[3]	N/A[3]
	PFOS + PFHxS	5	4[1]	0.02	3.62	0.94	1.79	4	1	N/A[3]	N/A[3]

Notes:

[1] Sum (PFHxS + PFOS) not analysed for sample MW022_160414.

[2] An inconsistent laboratory limit of reporting (LOR) was noted for the analysis of PFOA in sample MW022_160414 (0.002 µg/L). Half of the LOR value was conservatively adopted for the statistical assessment of PFOA as sample MW022_160414 reported a concentration of <0.002 µg/L.

[3] 95% UCL was not calculated due to an insufficient sample size.

[55] Criteria adopted for human health (drinking water and recreational water quality) and ecological (Freshwater 99% species protection) (PFAS NEMP).

JBS&G (2024) AEC 4

Table A4 – AEC 4 – Summary of Placed Soil for ACM (JBS&G 2024)

Area	Analyte	No. of Samples	Samples with ACM (>7mm)	Min. %w/w ACM	Max. %w/w ACM	No. Samples > Criteria
LTS-SP3A (Top Half)	Asbestos	115	23	No visible ACM	0.136	3[56]

Table A5 – AEC 4 – Summary of Placed Soil for AF/FA (JBS&G 2024)

Area	Analyte	No. of Samples	Identified Asbestos (AS 4964)[57]	Identified Trace Asbestos	No. Samples > Criteria
SP3A	Asbestos	115	0*	0	0

*No asbestos detected at reporting limit of 0.1g/kg (AS4964). Amosite asbestos detected within sample QA-05 below reporting limit 0.1g/kg (0.0001 % w/w).

[56] Samples SP3A-TP27-2-3 (0.14%w/w), SP3A-TP30-0-1 (0.1%w/w) & SP3A-TP34-0-1 (0.065%w/w) were above 0.05 %w/w (commercial / industrial).
[57] No asbestos detected at the reporting limit of 0.001% w/w.

Assessment of Precursors

EP Risk (2018) reported that total oxidising precursor assay (TOPA) results indicated that total oxidising concentrations of PFOS and PFHxS + PFOS were generally decreasing in concentration post oxidation under laboratory conditions using a strong oxidant. Based on the laboratory results, it was considered unlikely that significant transformation of PFAS precursors would occur under the less oxidising conditions present on-site.

Sensitive Receptors

Sensitive receptors identified at and near the Site are:

- On-site receptors:
    - Construction and subsurface maintenance workers and future commercial / industrial site users.
    - Future terrestrial flora and fauna in proposed landscaped areas (if present).
- Off-site receptors:
    - Construction, remediation and subsurface maintenance workers and future commercial / industrial site users at the MPW Site.
    - Recreational users of the Georges River.
    - Recreational users who trespass on the Offset Area.
    - Terrestrial flora and fauna including threatened species in the Offset Area.
    - Terrestrial and aquatic flora and fauna dependent upon the Georges River and Anzac Creek.

Source-Pathway-Receptor Linkages

Based upon the findings of the most recent human health and ecological risk assessments prepared for the Site and the Georges River by EnRiskS (2019 and 2019a), and Golder 2016, GHD 2018 and JBS&G 2020, an analysis of the potential source-pathway-receptor linkages are provided in **Table A4** and illustrated in **Figure 4** in the '**Figures**' section of the report.

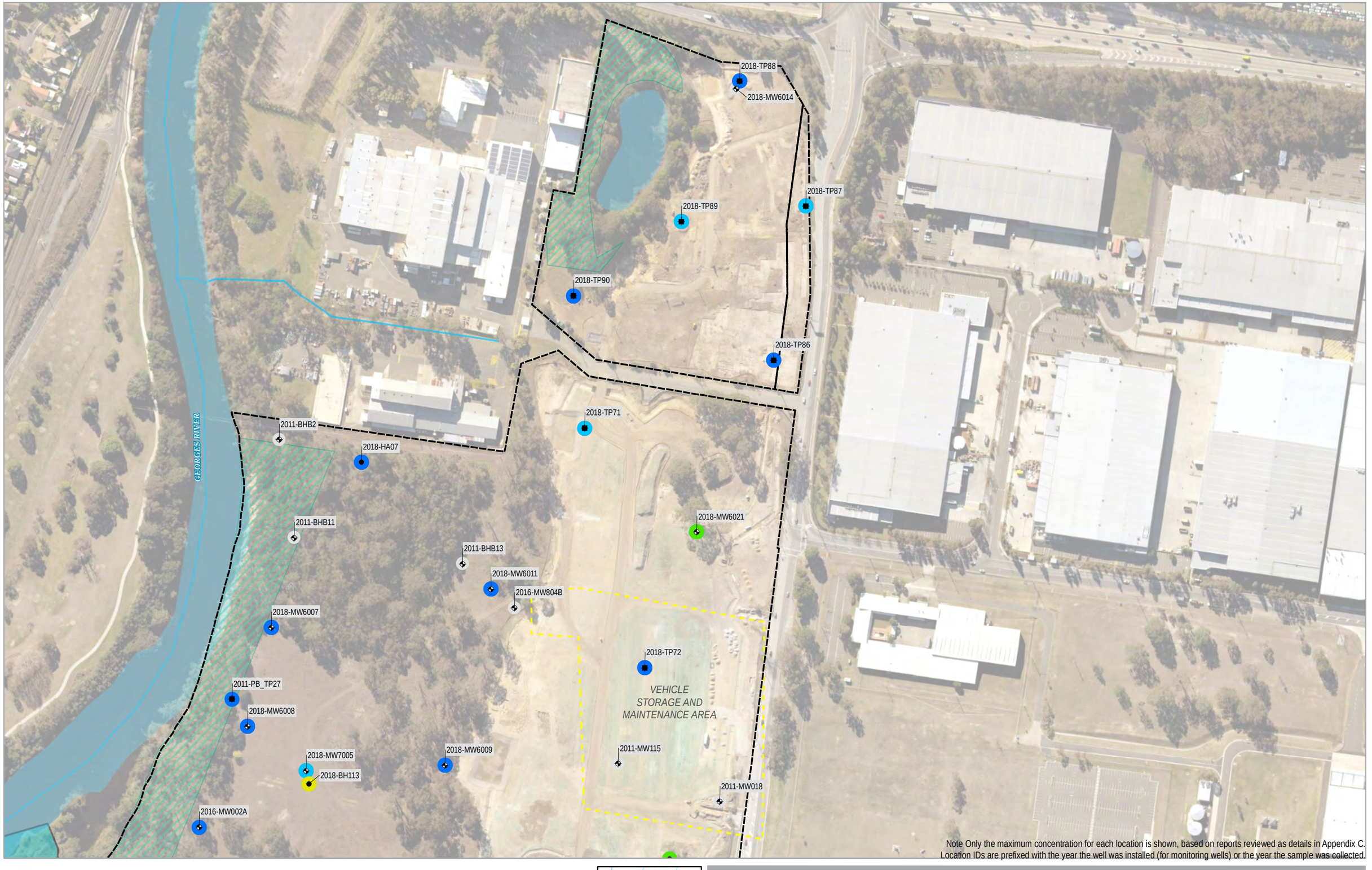
Table A4 – Source-Pathway-Receptor Linkages

Sources		Pathways		Receptors	Linkages
Primary	**Secondary**	**Transport Mechanisms**	**Exposure Pathways**		
AEC 3 – PFAS Placement Areas and Existing AEC 3					
PFAS impact associated with residue from historical fire-fighting training	PFAS impacted soil and sediment within primary source areas and surrounding land.	- Leaching of PFAS through the soil profile to groundwater. - Leaching of PFAS from exposed soil to surface water. - Generation of dust from exposed soil.	Human Health: - Incidental ingestion. - Dermal contact. - Inhalation of dust.	- Construction, remediation, subsurface maintenance workers. - Future commercial / industrial site users.	Incomplete given PFAS concentrations below health-based criteria and assuming appropriate health, safety and environmental controls, and PPE are implemented during construction or sub-surface maintenance works.
			Ecological (direct): - Direct uptake.	Terrestrial flora and fauna exposed to soil (<2 mBGL).	Potentially complete if appropriate soil management controls are not implemented during excavation works.
			Ecological (indirect) - Bioaccumulation and biomagnification.	Terrestrial flora and fauna exposed to soil (<2 mBGL).	Potentially complete if appropriate soil management controls are not implemented during excavation works.
	PFAS impacted groundwater, surface water.	Groundwater migration, leaching and surface water flow to the OSD basins, temporary basins, Georges River and Anzac Creek.	Human Health: - Incidental ingestion. - Dermal contact.	- Construction, remediation, subsurface maintenance workers. - Future commercial / industrial site users.	Incomplete as it is unlikely that groundwater would be encountered during construction works or extracted for a beneficial use. Surface water incomplete assuming appropriate health, safety and environmental controls, and PPE are implemented during construction or sub-surface maintenance works.
			Ecological: - Bioaccumulation and biomagnification.	Ecosystems dependent upon the Georges River and Anzac Creek.	Potentially complete if appropriate soil and water management controls are not implemented during construction due to the high leachability of PFAS in soils. Excavation of OSDs will not encounter groundwater due to the reported groundwater depth below design levels.

Table A4 – Source-Pathway-Receptor Linkages

Sources		Pathways		Receptors	Linkages
Primary	**Secondary**	**Transport Mechanisms**	**Exposure Pathways**		
AEC 4 – ASBINS Management Area (LTS-SP3A Top Half)					
Asbestos in capped area	N/A	Wind and Mechanical Disturbance	Human Health: - Inhalation of Dust. Aesthetic: - Visual	- Construction and Maintenance Workers - Future site users	Potentially complete if appropriate soil / asbestos management controls are not implemented.
Additional Areas Requiring Management					
Asbestos in soil beneath the Engineered Fill layer	Asbestos in Soil	Wind and Mechanical Disturbance	Human Health: - Inhalation of Dust. Aesthetic: - Visual	- Construction and Maintenance Workers - Future site users	Potentially complete if appropriate soil / asbestos management controls are not implemented.

AEC 3



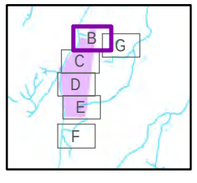
Note Only the maximum concentration for each location is shown, based on reports reviewed as details in Appendix C. Location IDs are prefixed with the year the well was installed (for monitoring wells) or the year the sample was collected.

LEGEND

- Investigation Area
- Other Potential PFAS Source
- Moorebank Offset
- Drainage Basin (Approximate)
- Borehole/Hand Auger/Surface
- Monitoring Well
- Testpit

Max PFOS + PFHxS Concentration (mg/kg)

- <LOR
- LOR - 0.01
- >0.01
- >1
- >5
- >10
- No PFAS Data



Note: The location of 2018-BH113 has been provided in error in this drawing

Paper Size ISO A3

0 20 40

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

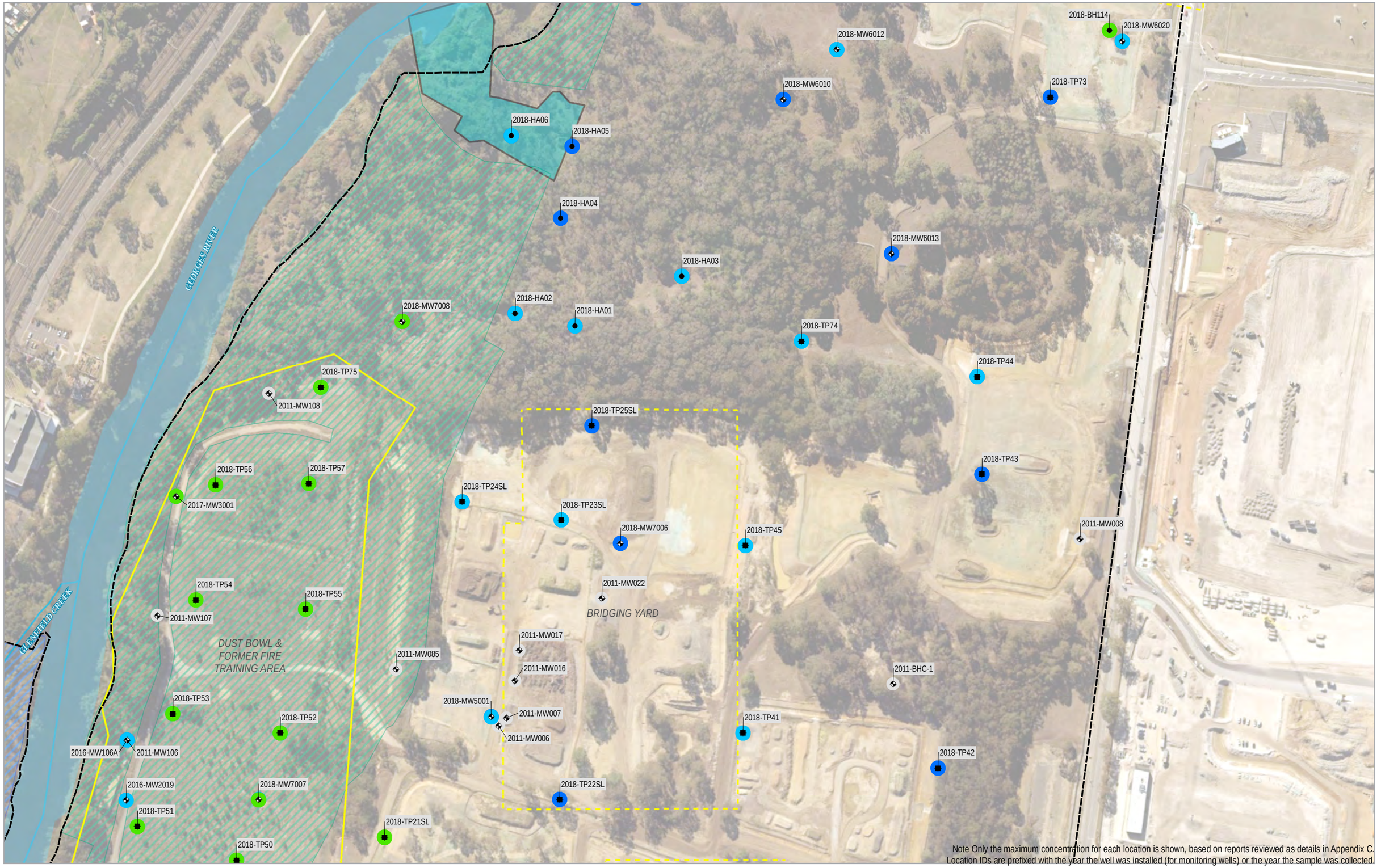
Moorebank Intermodal Company Limited
Summary Report PFAS Investigations
Moorebank Precinct West

Soil
PFOS + PFHxS Results
Grid 1

Project No.	21-28111
Revision No.	A
Date	12 Apr 2019

FIGURE 6B

Data source: General Topo - NSW LPI DTDB 2018 (Date Extracted: 18 Feb 2019). Cadastre - NSW LPI DCDB 2018 (Date Extracted: 18 Feb 2019). Aerial Imagery - Sixmaps 2018. . Created by: mweber



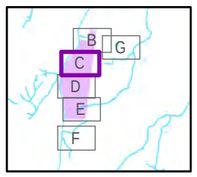
Note Only the maximum concentration for each location is shown, based on reports reviewed as details in Appendix C.
Location IDs are prefixed with the year the well was installed (for monitoring wells) or the year the sample was collected.

LEGEND

- Investigation Area
- Key PFAS Source
- Other Potential PFAS Source
- Casula (Hourglass) Offset Biobank Site
- Moorebank Offset
- Drainage Basin (Approximate)
- Borehole/Hand Auger/Surface
- Monitoring Well
- Testpit

Max PFOS + PFHxS Concentration (mg/kg)

- <LOR
- LOR - 0.01
- >0.01
- >1
- >5
- >10
- No PFAS Data



Paper Size ISO A3

0 20 40

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

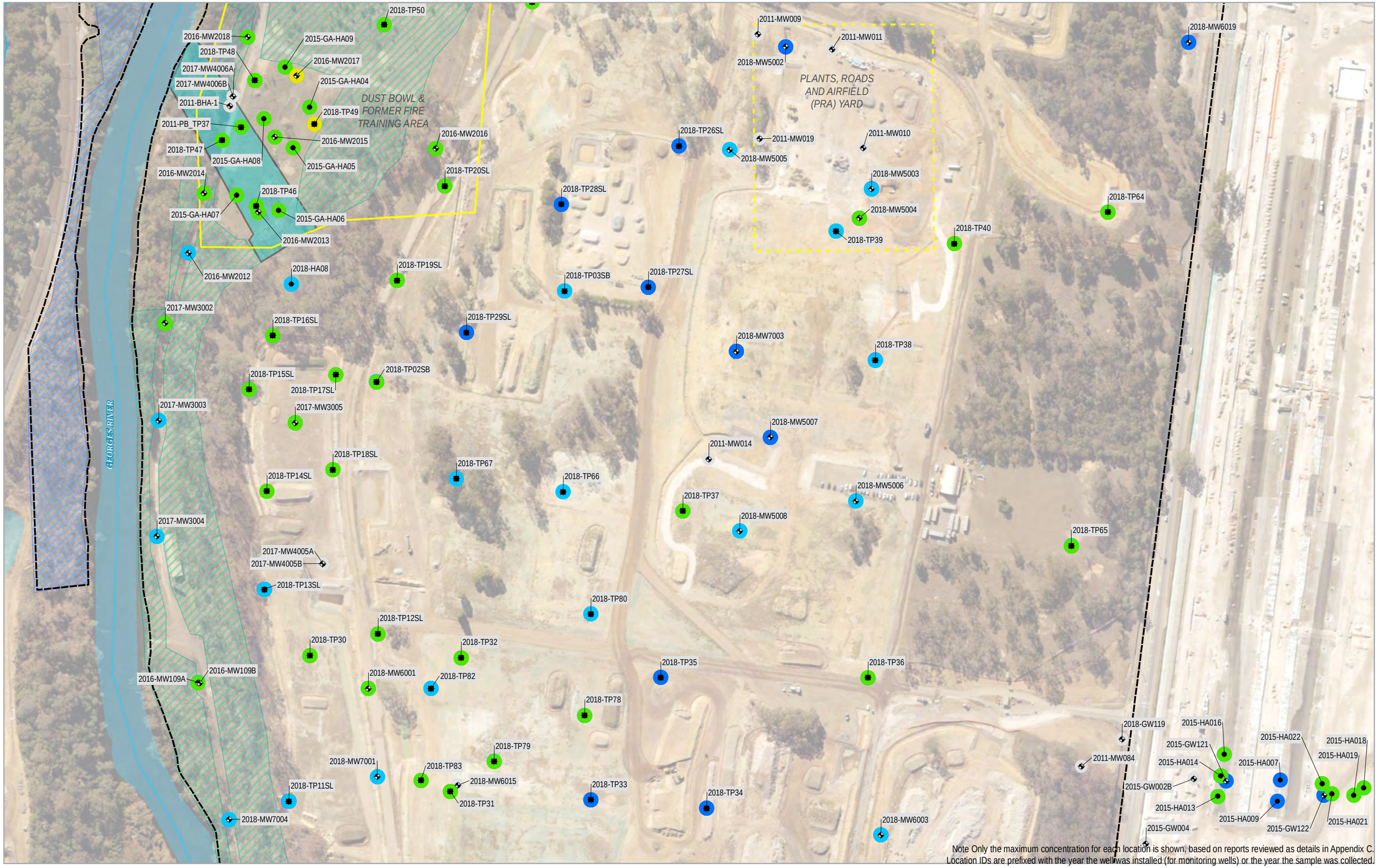
Moorebank Intermodal Company Limited
Summary Report PFAS Investigations
Moorebank Precinct West

Soil
PFOS + PFHxS Results
Grid 2

Project No.	21-28111
Revision No.	A
Date	12 Apr 2019

FIGURE 6C

Data source: General Topo - NSW LPI DTDB 2018 (Date Extracted: 18 Feb 2019). Cadastre - NSW LPI DCDB 2018 (Date Extracted: 18 Feb 2019). Aerial Imagery - Sixmaps 2018. . Created by: mweber



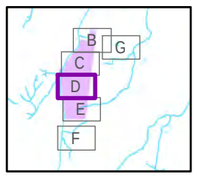
Note Only the maximum concentration for each location is shown, based on reports reviewed as details in Appendix C.
Location IDs are prefixed with the year the well was installed (for monitoring wells) or the year the sample was collected.

LEGEND

- Investigation Area
- Key PFAS Source
- Other Potential PFAS Source
- Casula (Hourglass) Offset Biobank Site
- Moorebank Offset
- Drainage Basin (Approximate)
- Borehole/Hand Auger/Surface
- Monitoring Well
- Testpit

Max PFOS + PFHxS Concentration (mg/kg)

- <LOR
- LOR - 0.01
- >0.01
- >1
- >5
- >10
- No PFAS Data



Paper Size ISO A3

0 20 40

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

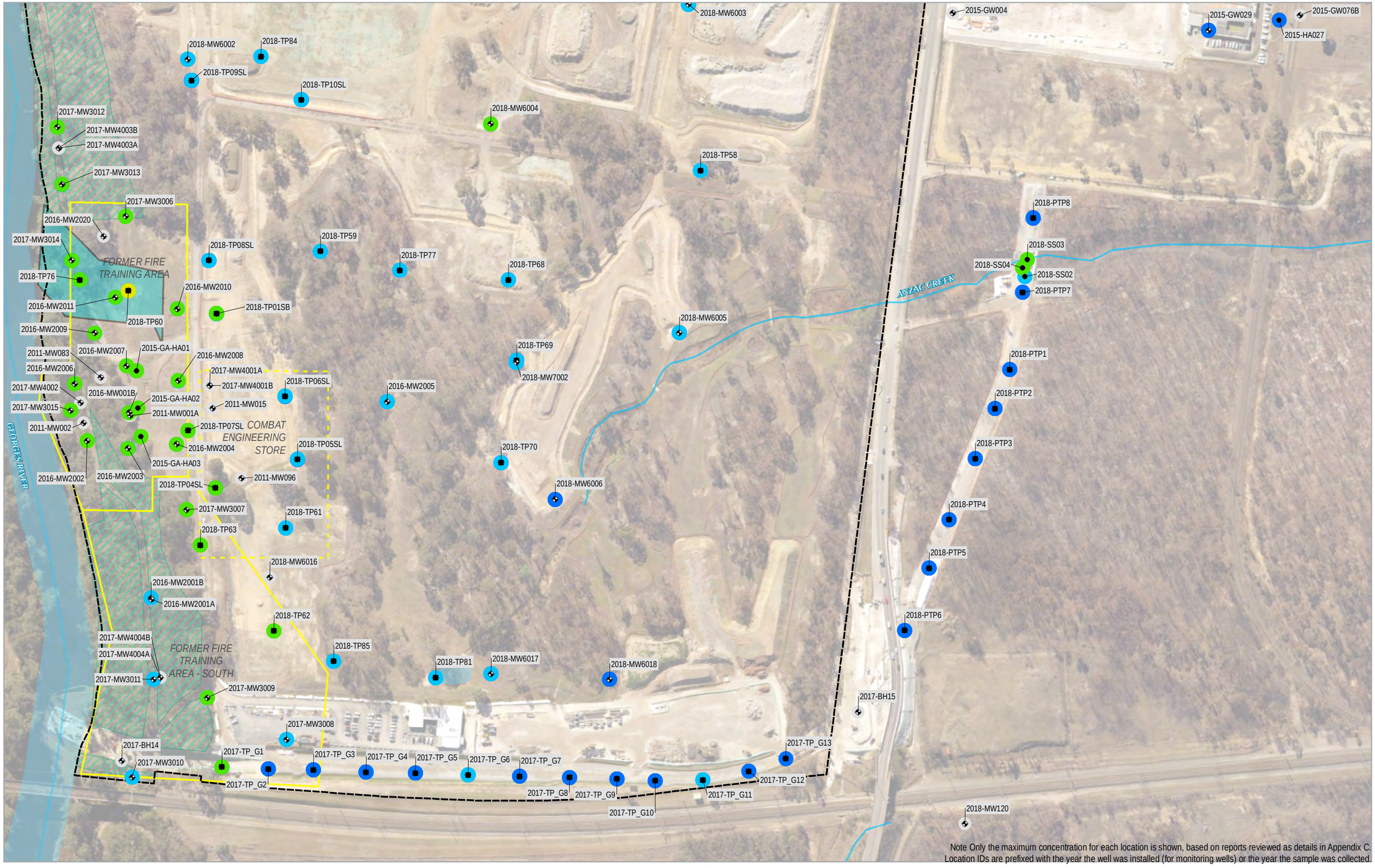
GHD

Moorebank Intermodal Company Limited
Summary Report PFAS Investigations
Moorebank Precinct West

Soil
PFOS + PFHxS Results
Grid 3

Project No.	21-28111
Revision No.	A
Date	12 Apr 2019

FIGURE 6D



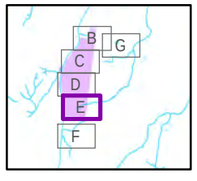
Note Only the maximum concentration for each location is shown, based on reports reviewed as details in Appendix C.
Location IDs are prefixed with the year the well was installed (for monitoring wells) or the year the sample was collected.

LEGEND

- Investigation Area
- Key PFAS Source
- Other Potential PFAS Source
- Moorebank Offset
- Drainage Basin (Approximate)
- Borehole/Hand Auger/Surface
- Monitoring Well
- Testpit

Max PFOS + PFHxS Concentration (mg/kg)

- <LOR
- LOR - 0.01
- >0.01
- >1
- >5
- >10
- No PFAS Data



Paper Size ISO A3

0 20 40

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Moorebank Intermodal Company Limited
Summary Report PFAS Investigations
Moorebank Precinct West

Soil
PFOS + PFHxS Results
Grid 4

Project No. 21-28111
Revision No. A
Date 12 Apr 2019

FIGURE 6E

Data source: General Topo - NSW LPI DTDB 2018 (Date Extracted: 18 Feb 2019). Cadastre - NSW LPI DCDB 2018 (Date Extracted: 18 Feb 2019). Aerial Imagery - Sixmaps 2018. . Created by: mweber

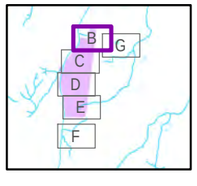
Note Only the maximum concentration for each location is shown, based on reports reviewed as details in Appendix C.
Location IDs are prefixed with the year the well was installed (for monitoring wells) or the year the sample was collected.

LEGEND

- Investigation Area
- Other Potential PFAS Source
- Moorebank Offset
- Drainage Basin (Approximate)
- Sediment Sample

Max PFOS + PFHxS Concentration (mg/kg)

- <LOR
- LOR - 0.01
- >0.01
- >1
- >5
- >10
- No PFAS Data



Paper Size ISO A3

0 20 40

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

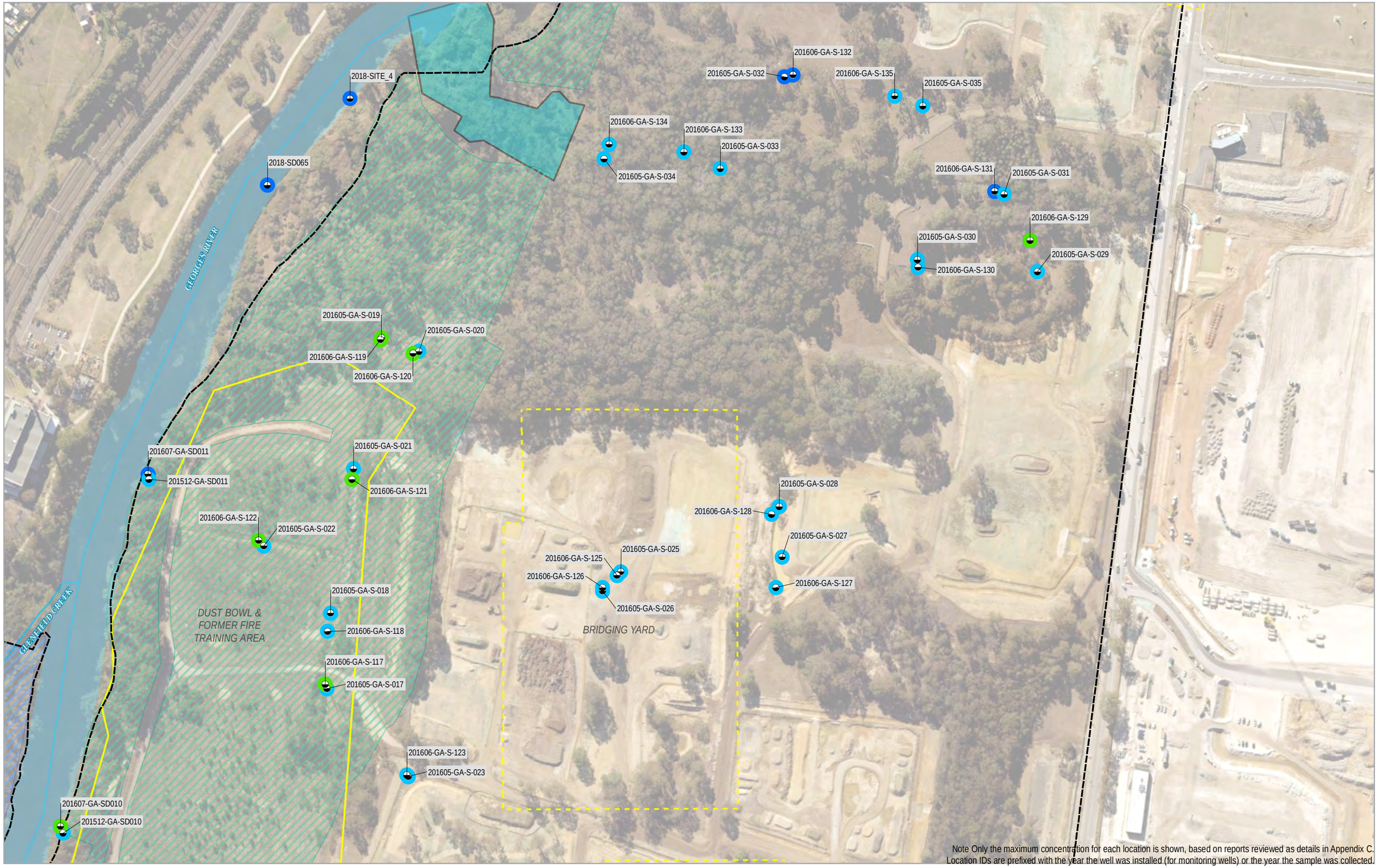
Moorebank Intermodal Company Limited
Summary Report PFAS Investigations
Moorebank Precinct West

Sediment
PFOS + PFHxS Results
Grid 1

Project No. 21-28111
Revision No. A
Date 12 Apr 2019

FIGURE 7B

Data source: General Topo - NSW LPI DTDB 2018 (Date Extracted: 18 Feb 2019). Cadastre - NSW LPI DCDB 2018 (Date Extracted: 18 Feb 2019). Aerial Imagery - Sixmaps 2018. . Created by: mweber



Note Only the maximum concentration for each location is shown, based on reports reviewed as details in Appendix C.
Location IDs are prefixed with the year the well was installed (for monitoring wells) or the year the sample was collected.

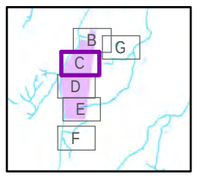
LEGEND

- Investigation Area
- Key PFAS Source
- Other Potential PFAS Source
- Casula (Hourglass) Offset Biobank Site
- Moorebank Offset
- Drainage Basin (Approximate)

- Sediment Sample

Max PFOS + PFHxS Concentration (mg/kg)

- <LOR
- LOR - 0.01
- >0.01
- >1
- >5
- >10
- No PFAS Data



Paper Size ISO A3

0 20 40

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

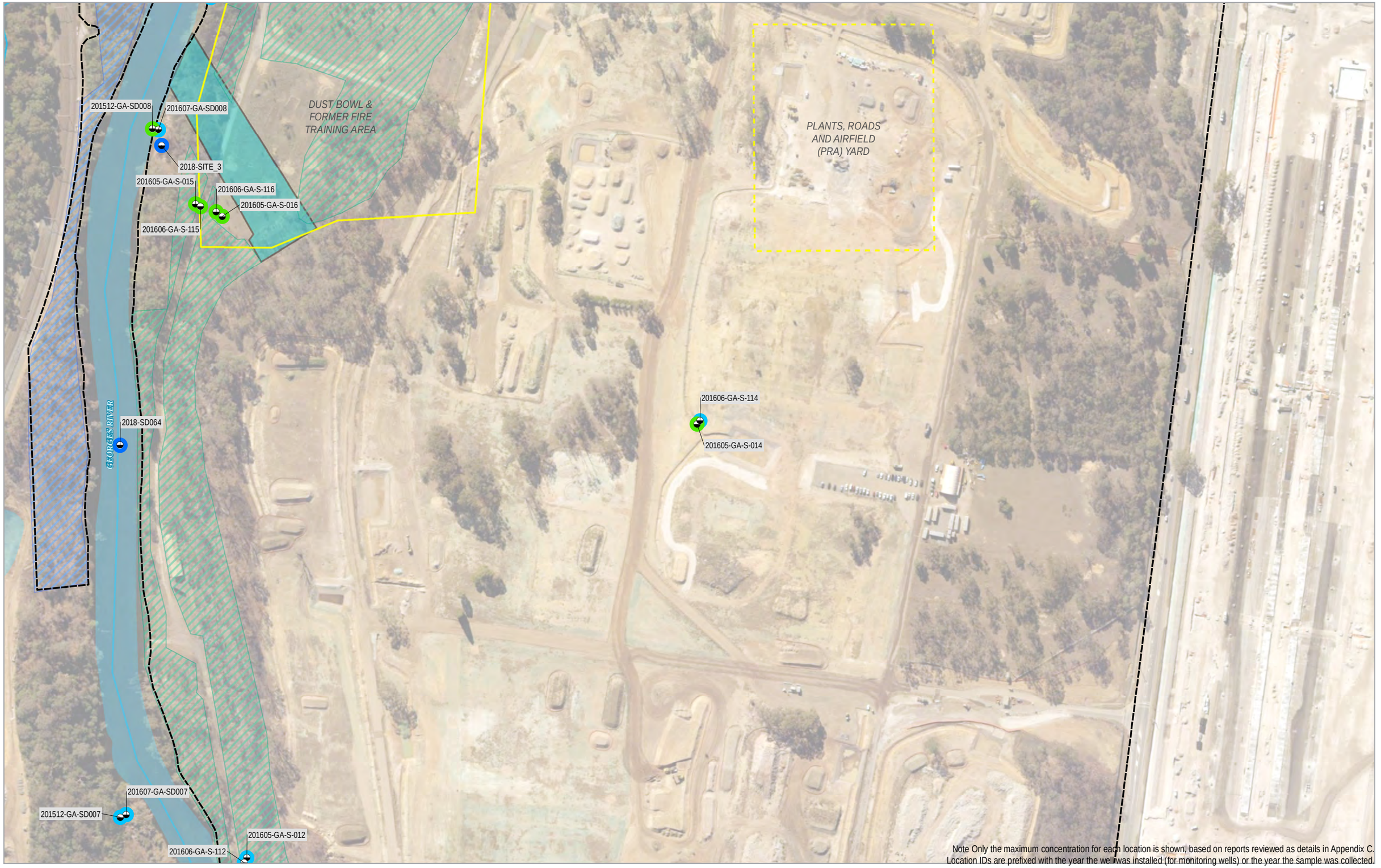
Moorebank Intermodal Company Limited
Summary Report PFAS Investigations
Moorebank Precinct West

Sediment
PFOS + PFHxS Results
Grid 2

Project No. 21-28111
Revision No. A
Date 12 Apr 2019

FIGURE 7C

Data source: General Topo - NSW LPI DTDB 2018 (Date Extracted: 18 Feb 2019). Cadastre - NSW LPI DCDB 2018 (Date Extracted: 18 Feb 2019). Aerial Imagery - Sixmaps 2018. . Created by: mweber



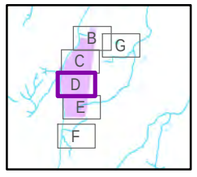
Note Only the maximum concentration for each location is shown, based on reports reviewed as details in Appendix C.
Location IDs are prefixed with the year the well was installed (for monitoring wells) or the year the sample was collected.

LEGEND

- Investigation Area
- Key PFAS Source
- Other Potential PFAS Source
- Casula (Hourglass) Offset Biobank Site
- Moorebank Offset
- Drainage Basin (Approximate)
- Sediment Sample

Max PFOS + PFHxS Concentration (mg/kg)

- <LOR
- LOR - 0.01
- >0.01
- >1
- >5
- >10
- No PFAS Data



Paper Size ISO A3

0 20 40

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

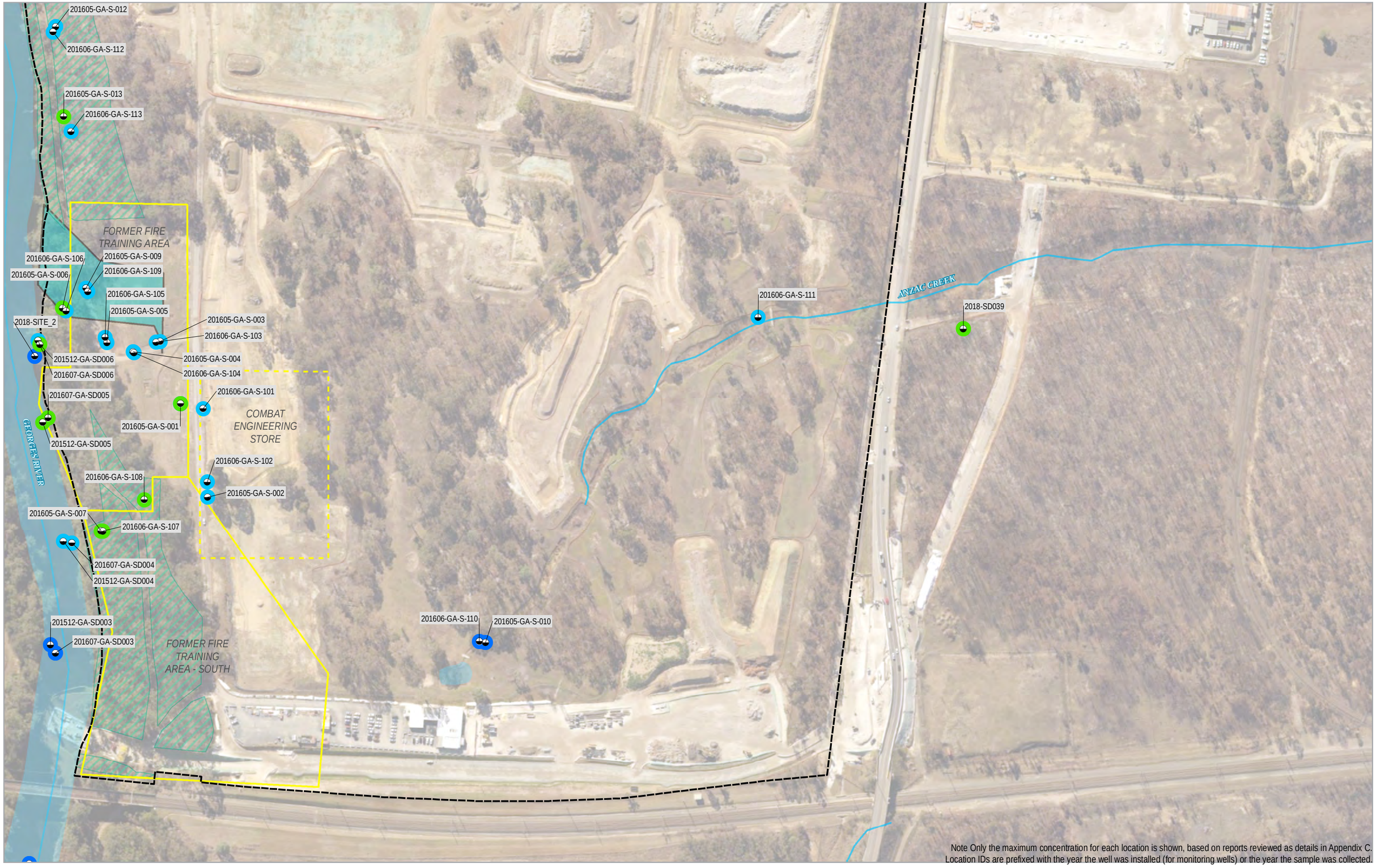
Moorebank Intermodal Company Limited
Summary Report PFAS Investigations
Moorebank Precinct West

Sediment
PFOS + PFHxS Results
Grid 3

Project No. 21-28111
Revision No. A
Date 12 Apr 2019

FIGURE 7D

Data source: General Topo - NSW LPI DTDB 2018 (Date Extracted: 18 Feb 2019). Cadastre - NSW LPI DCDB 2018 (Date Extracted: 18 Feb 2019). Aerial Imagery - Sixmaps 2018. . Created by: mweber



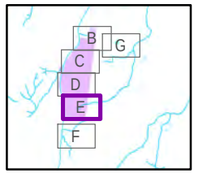
Note Only the maximum concentration for each location is shown, based on reports reviewed as details in Appendix C.
Location IDs are prefixed with the year the well was installed (for monitoring wells) or the year the sample was collected.

LEGEND

- Investigation Area
- Key PFAS Source
- Other Potential PFAS Source
- Moorebank Offset
- Drainage Basin (Approximate)
- Sediment Sample

Max PFOS + PFHxS Concentration (mg/kg)

- <LOR
- LOR - 0.01
- >0.01
- >1
- >5
- >10
- No PFAS Data



Paper Size ISO A3

0 20 40

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Moorebank Intermodal Company Limited
Summary Report PFAS Investigations
Moorebank Precinct West

Sediment
PFOS + PFHxS Results
Grid 4

Project No. 21-28111
Revision No. A
Date 12 Apr 2019

FIGURE 7E

Data source: General Topo - NSW LPI DTDB 2018 (Date Extracted: 18 Feb 2019). Cadastre - NSW LPI DCDB 2018 (Date Extracted: 18 Feb 2019). Aerial Imagery - Sixmaps 2018. . Created by: mweber

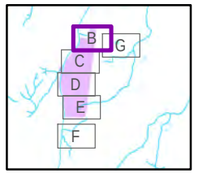
Note Only the maximum concentration for each location is shown, based on reports reviewed as details in Appendix C.
Location IDs are prefixed with the year the well was installed (for monitoring wells) or the year the sample was collected.

LEGEND

- Investigation Area
- Other Potential PFAS Source
- Moorebank Offset
- Drainage Basin (Approximate)
- Surface Water

Max PFOS + PFHxS Concentration (µg/L)

- <LOR
- LOR - 0.13
- >0.13
- >0.7
- >10
- >100
- No PFAS Data



Paper Size ISO A3

0 20 40

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Moorebank Intermodal Company Limited
Summary Report PFAS Investigations
Moorebank Precinct West

Surface Water
PFOS + PFHxS Results
Grid 1

Project No. 21-28111
Revision No. A
Date 12 Apr 2019

FIGURE 8B

Data source: General Topo - NSW LPI DTDB 2018 (Date Extracted: 18 Feb 2019). Cadastre - NSW LPI DCDB 2018 (Date Extracted: 18 Feb 2019). Aerial Imagery - Sixmaps 2018. . Created by: mweber

Note Only the maximum concentration for each location is shown, based on reports reviewed as details in Appendix C.
Location IDs are prefixed with the year the well was installed (for monitoring wells) or the year the sample was collected.

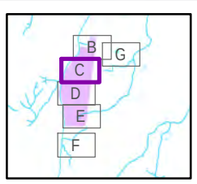
LEGEND

- Investigation Area
- Key PFAS Source
- Other Potential PFAS Source
- Casula (Hourglass) Offset Biobank Site
- Moorebank Offset
- Drainage Basin (Approximate)

- Surface Water

Max PFOS + PFHxS Concentration (µg/L)

- <LOR
- LOR - 0.13
- >0.13
- >0.7
- >10
- >100
- No PFAS Data



Paper Size ISO A3

0 20 40

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

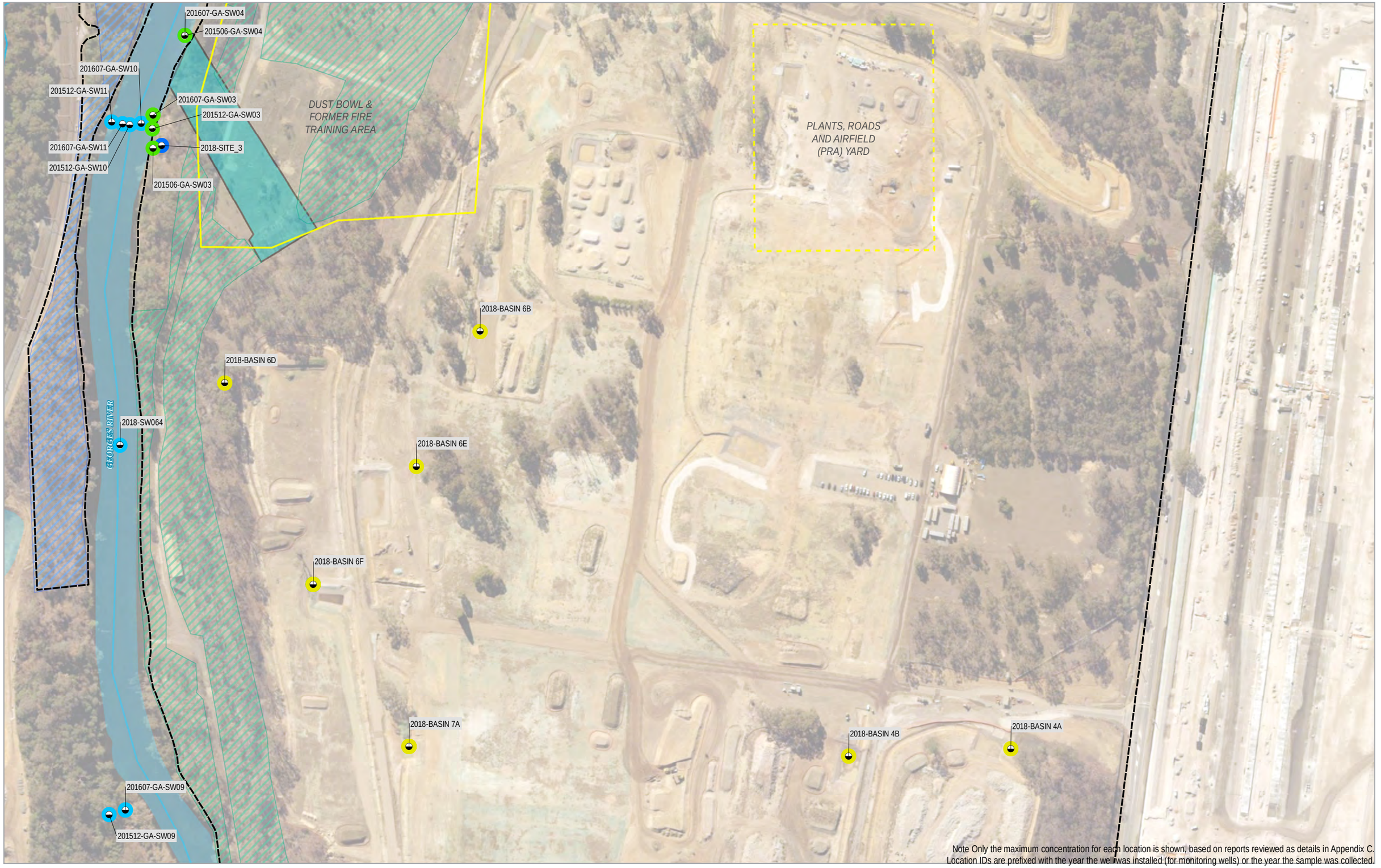
GHD

Moorebank Intermodal Company Limited
Summary Report PFAS Investigations
Moorebank Precinct West

Surface Water
PFOS + PFHxS Results
Grid 2

Project No. 21-28111
Revision No. A
Date 12 Apr 2019

FIGURE 8C



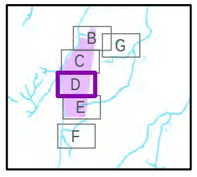
Note Only the maximum concentration for each location is shown, based on reports reviewed as details in Appendix C.
Location IDs are prefixed with the year the well was installed (for monitoring wells) or the year the sample was collected.

LEGEND

- Investigation Area
- Key PFAS Source
- Other Potential PFAS Source
- Casula (Hourglass) Offset Biobank Site
- Moorebank Offset
- Drainage Basin (Approximate)
- Surface Water

Max PFOS + PFHxS Concentration (µg/L)

- <LOR
- LOR - 0.13
- >0.13
- >0.7
- >10
- >100
- No PFAS Data



Paper Size ISO A3

0 20 40

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

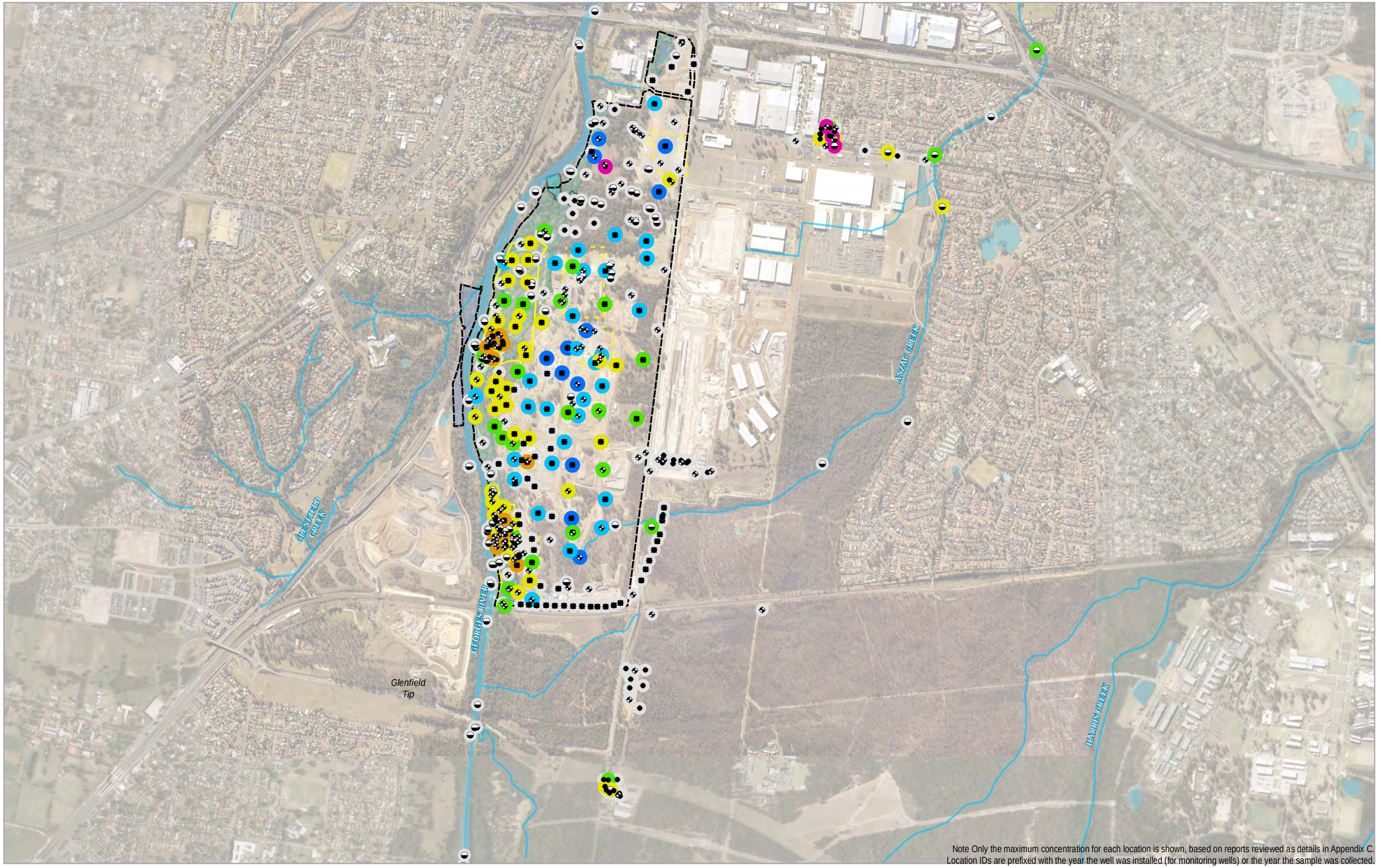
Moorebank Intermodal Company Limited
Summary Report PFAS Investigations
Moorebank Precinct West

Surface Water
PFOS + PFHxS Results
Grid 3

Project No.	21-28111
Revision No.	A
Date	12 Apr 2019

FIGURE 8D

Data source: General Topo - NSW LPI DTDB 2018 (Date Extracted: 18 Feb 2019). Cadastre - NSW LPI DCDB 2018 (Date Extracted: 18 Feb 2019). Aerial Imagery - Sixmaps 2018. . Created by: mweber



Note Only the maximum concentration for each location is shown, based on reports reviewed as details in Appendix C.
Location IDs are prefixed with the year the well was installed (for monitoring wells) or the year the sample was collected.

LEGEND

- Investigation Area
- Liverpool Fire Station
- Key PFAS Source
- Other Potential PFAS Source
- Casula (Hourglass) Offset Biobank Site
- Moorebank Offset
- Drainage Basin (Approximate)
- Borehole/Hand Auger/Surface
- Monitoring Well
- Testpit
- Sediment Sample

Max PFOS + PFHxS Concentration (µg/L)

- LOR - 0.13
- >0.13
- >0.7
- >10
- >100
- No PFAS Data

Paper Size ISO A3

0 200 400

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Moorebank Intermodal Company Limited
Summary Report PFAS Investigations
Moorebank Precinct West

Soil & Sediment ASLP

PFOS + PFHxS Results Overview

Project No. 21-28111
Revision No. A
Date 12 Apr 2019

FIGURE 11

Appendix B
ENVIRONMENTAL MANAGEMENT PROCEDURES

Land use restrictions		**EMP 1**
Responsibility:	Entity responsible for implementation of LTEMP (as per **Table 4**)	
Frequency:	As required	
Objective:	To manage risk to human health and the environment through land use restrictions	
Areas of the Site	AEC 3	

AEC 3 – PFAS

The construction of the Proposed Development is generally anticipated to provide a reduction in infiltration, leaching and groundwater mass flux of PFAS entering the Georges River resulting is a corresponding reduction in long-term exposure of PFAS to potential sensitive receptors.

The Site is within AEC 3, however, is hydraulically upgradient from the PFAS source areas along the Georges River. Reuse of PFAS impacted soil was in accordance with the MPW LTEMP (JBS&G 2024). Should unexpected finds of additional source areas be encountered which may pose a risk to PFAS infiltration or leaching to surface water, then additional site-specific risk assessment and / or groundwater modelling will be required and may require revision of the LTEMP.

AEC 4 – ASBINS

AEC 4 must be managed in accordance with **EMP 3.**

Beneficial Use of Groundwater

Groundwater from the Site must not be utilised for any beneficial use.

Future Excavation

The management measures for future excavation within AEC 3, AEC 4 and across the Site must be conducted in accordance with **EMP 2, EMP 3, EMP 4, EMP 5, EMP 6, EMP 7, EMP 8, EMP 10,** and **EMP 11.**

Cessation of Land Use Restrictions

The land use restrictions provided in **EMP 1** can be removed where a site-specific human health and ecological risk assessment concludes that a risk to human health and the environment is no longer present and subject to approval by a NSW EPA accredited Site Auditor and / or the NSW EPA.

Landscaped Areas

Reuse of soil should preferentially only occur in areas outside of proposed landscaped areas. However, should soil reuse within landscaped areas by required then the restrictions relating to landscape construction and maintenance within these areas must be undertaken in accordance with **EMP 9.**

Subsurface Works – AEC 3		**EMP 2**
Responsibility:	Entity responsible for implementation of LTEMP (as per **Table 4**)	
Frequency:	Stage 2 Works and Operation	
Objective:	To protect human health and the environment	
Areas of the Site	AEC 3 underlying the Engineered Fill (**Figure 3**)	

Human Health

Based on the EnRiskS (2019) Land HHERA, the potential risk to human health associated with workers having direct contact with PFAS in soil, sediment and water was low and acceptable on the assumption that typical workplace safety protocols. The HHERA did not consider any reduction in exposure to PFAS due to the use of PPE. In order to manage exposure of PFAS to workers at the Site, the following management controls should be implemented during excavation works within PFAS impacted areas:

- Project inductions to identify areas with high risk of PFAS contamination.
- Prepare SWMS to identify risks associated with PFAS and appropriate control measures.
- Where appropriate, the area of the excavation/disturbance shall be appropriately separated from the balance of the Site to minimise inadvertent traffic and/or worker exposure.
- PPE used in the PFAS impacted areas (AEC 3) is to be assessed by the Environmental Consultant prior to intrusive works and is to include standard construction site PPE, including but not limited to:
  - Long sleeve shirt and trousers.
  - Steel capped boots/gum boots.
  - Gloves for manual handling (waterproof nitrile gloves preferred).
- Signage placed in ablution blocks to ensure all workers wash hands and face prior to eating, regardless if gloves are worn.
- Maintain personal hygiene and wash hands prior to breaks. If worker's skin comes into contact with PFAS impacted water, ensure skin is immediately washed with clean water and wet clothing is removed immediately after work is complete.
- Dewatering of water in excavations impacted with PFAS should be avoided where practicable.

In addition, low levels of asbestos in soil were reported within AEC 3 reuse areas, which were reported by JBS&G (2024) to not require management beyond placement at depths greater than 0.1m below final design levels. Management of these areas is further detailed in **EMP 2, EMP 6, EMP 7** and **EMP 8.** Surveys showing cover of AEC 3 areas is provided within **Appendix E**.

Ecological

EnRiskS (2019) reported PFAS impacted soil is leachable and the following control measures should be implemented to minimise the risk to ecological receptors during construction:

- Excavation to be scheduled to minimise the area of PFAS impacted soil exposed at any one time.
- All soils excavated from AEC 3 should be handled in alignment with the requirements for PFAS-

Subsurface Works – AEC 3	EMP 2

Impacted Stockpiles in **EMP 5**.

- Erosion and sediment controls outlined in **EMP 13** to be adopted to minimize the potential for leaching and migration to surface water bodies.
- When PFAS impacted soil is to be temporarily stockpiled, it should be stockpiled on impermeable surfaces (e.g. hardstand, high density polyethylene (HDPE) plastic or geomembrane) within a designated area.
- Appropriate bunding (e.g. hay bales or silt fences) should be placed around stockpiles.
- Stockpiling areas should not be located near stormwater drains, pits or gutters.
- Water runoff from stockpiling areas should be managed and retained at the Site or under the relevant management plan for the receiving area of the MPW Site and not be allowed to flow into the Offset Area and off-site to surface water bodies (Anzac Creek and Georges River) (refer to **EMP 13** for management of surface water).
- During windy weather conditions, dust control measures should be implemented (e.g. fine water spray or covers).
- Odour suppressant should be applied to the soil where odorous soils are encountered.
- Where practicable, excavated soil should be backfilled in the excavation in the reverse order to which it was excavated.
- Where excavated soil is surplus to requirements, then the soil should be classified in accordance with **EMP 7**.
- Materials tracking, and off-site disposal records and documentation should be retained for all soil that is to be reused on-site or disposed offsite in accordance with **EMP 4** and **EMP 7**.

Earthworks and Excavation

Where soil is excavated during earthworks, soil reuse opportunities should be adopted in accordance with **EMP 6**.

In addition, low levels of asbestos in soil were reported within AEC 3 reuse areas and the LTS-SP3A Lower Half placement area, which were reported by JBS&G (2024) to not require management beyond placement at depths greater than 0.1m below final design levels. Management of these areas is further detailed in **EMP 6, EMP 7** and **EMP 8.**

Subsurface Works – AEC 4		**EMP 3**
Responsibility:	Entity responsible for implementation of LTEMP (as per **Table 4**)	
Frequency:	Stage 2 Works and Operation	
Objective:	To protect human health and the environment	
Areas of the Site	AEC 4 underlying the Engineered Fill (**Figure 3** and **Appendix E**)	

AEC 4 – Management of Asbestos in Soils

During excavation works beneath the imported fill layer at the Site, involving the potential disturbance of asbestos impacted soil from AEC 4, including ASBINS as ACM greater than HSL AF/FA, the following should be implemented:

- Historical analytical results should be referenced as reported within **Appendix A** and JBS&G (2024).
- A suitably qualified Environmental Consultant / Occupational Hygienist should be engaged to address the risk to construction workers prior to any excavation works below the imported fill layer.

Pending review by the Environmental Consultant, the following management practices must be adopted:

Legislation, Regulations, Codes of Practice and Standards

This LTEMP has been prepared in accordance with requirements from the following documents:

- Work Health and Safety Act 2011 (NSW) (WHS Act 2011) (Commonwealth and NSW).
- Work Health and Safety Regulation 2017 (NSW) (WHS Regulation 2017).
- SafeWork NSW Code of Practice: How to Safely Remove Asbestos, 2022 (SafeWork 2022).
- SafeWork NSW Code of Practice: How to Manage and Control Asbestos in the Workplace, 2022 (SafeWork 2022a).
- SafeWork NSW Code of Practice: Construction Work (2019) (SafeWork 2019c).
- Safe Work Australia (SWA), Workplace Exposure Standards for Airborne Contaminants (2019) (SWA 2019).
- Australia National Occupational Health and Safety Commission (NOHSC) (2005) Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres, 2nd Edition [NOHSC: 3003 (2005)],
- Australian Standard (AS) 4964-2004, Method for the qualitative identification of asbestos in bulk samples.
- NSW EPA Waste Locate User Guides Asbestos Waste Transporters, (NSW EPA, 2016).
- Australian Standard (AS) 1319 - 1994 – Safety Signs for the Occupational Environment.
- National Code of Practice: Safe Use of Synthetic Mineral Fibres [NOHSC:2006(1990)];
- National Code of Practice: Control of Workplace Hazardous Substances, [NOHSC:2007(1994)];
- Australia/New Zealand Standard (AS/NZS) 4360:2004 Risk Management;
- AS/NZS 1716 – 2012 Respiratory Protective Devices; and
- AS/NZS 1715 2009 Selection, use and maintenance of respiratory equipment.

Subsurface Works – AEC 4	EMP 3

Asbestos Removal Contractor

Asbestos removal within AEC 4 must be undertaken by an independent asbestos removal contractor (ARC) where their responsibilities include but are not limited to:

- Hold the appropriate license for type of asbestos removal (Class A (friable) or Class B (non-friable) in accordance with Section 1.3 of the SafeWork NSW (2022).
- Notify all receptors that may be impacted by the asbestos removal works as outlined in Section 3.3 of the SafeWork NSW (2022).
- Prepare an asbestos removal control plan (ARCP) and submit a notification to SafeWork NSW.
- Provide an exclusion zone and signage during asbestos removal works.
- Ensure all personnel involved in the asbestos removal work are appropriately trained.
- Environmental management and WH&S procedures would be put in place for the asbestos removal during excavation to protect workers, surrounding residents and the environment in accordance with SafeWork NSW (2022).
- Provide appropriate PPE and decontamination facilities e.g. disposable coveralls, respirators, gloves and boot covers, face wipes, water spray bottles, gaffe tape and 200 um thick HDPE bags with an appropriate asbestos warning label.
- Waste must be classified in accordance with NSW EPA 2014 as Special Waste (Asbestos) and disposed to a waste facility lawfully able to accept the waste (see **EMP 7**).
- All asbestos removal, transport and disposal must be performed in accordance with the Work Health and Safety Regulation 2011 (WH&S Regulation).
- Where ASBINS is identified to remain on-site following intrusive excavation / removal works, the area must be surveyed, the 0.5 m clean capping layer must be re-instated (as verified by survey), and a clearance certificate provided.
- This LTEMP must be updated to reflect the findings in accordance with **EMP 20**.

In addition to **EMP 5**, the following additional mitigation measures must be undertaken during excavation and stockpiling works:

- Dust levels shall be managed by ensuring:
    - All stockpiles will be either periodically wetted down or covered to control dusts.
    - Water sprays will be used on the excavation areas, stockpiles and haulage pathways;
    - Excavated imported fill material that was stockpiled separately after excavation is to be returned to the excavations in the reverse order to which it came out if there is no chance for cross contamination within the underlying ASBINS.
    - Any haulage vehicles shall be covered and leave via the designated (stabilised) site access;
    - All haulage vehicles and plant and equipment shall be washed down whenever they leave the asbestos work area and clearance provided.
    - All access roads are sufficiently maintained to ensure no visible dust at the site boundary.
- If dust is visible at the boundary of the work area, then additional dust control measures shall be employed, which may include:
    - Temporarily suspending activities until winds speeds reduce; and / or

Subsurface Works – AEC 4	EMP 3

- Additional use of water sprays.

- Stockpile footprint must be cleared by a SafeWork NSW licensed asbestos assessor (LAA).

Supervision / Air Monitoring / Clearances

For any subsurface / intrusive works being undertaken within this material (**Appendix E**) control asbestos air monitoring is recommended within AEC 4 and in accordance with SafeWork NSW (2022). A monitoring program will be required to ensure that the control measures being implemented at the Site are effective, the following monitoring procedures will be implemented:

- A suitably qualified SafeWork NSW LAA (friable) or competent person (non-friable) must be engaged to address the risk to construction workers prior to any excavation works below the imported fill layer.
- Historical analytical results should be referenced as reported within **Appendix A** and JBS&G 2024.
- Daily static airborne asbestos fibre monitoring at work area boundaries during significant asbestos works; and
- Clearance Monitoring (for friable asbestos).
- Site Inspections.

Airborne asbestos fibre monitoring must be performed using calibrated portable air sampling pumps. Monitoring should be conducted at a minimum of four locations around the work area boundaries each day over the work period and targeting any neighbouring sensitive receptors and with consideration to the daily location of works.

At the end of each monitoring period the pump and attached filter will be collected and analysed at a NATA-accredited laboratory in accordance with NOHSC Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition (NOHSC:3003 [2005]).

The results of air monitoring will be available on a 24-hour turnaround time basis. Daily air monitoring reports shall be displayed in a common area outside of the asbestos work area (e.g. site office or lunch shed) or be able to be produced upon request.

The following action levels will be applied upon receipt of daily results, as outlined in the SWA (2020a):

- Reading of less than 0.01 fibres/mL – control measures in place are working effectively, site works to continue.
- Reading between 0.01 and 0.02 fibres/mL – a review of control measures shall be completed in the work area.
- Reading greater than 0.02 fibres/mL – works shall cease until the cause of contamination is identified and rectified. Notification to SafeWork may be required.

It is noted that these action levels adopted are more conservative than the exposure standard for airborne asbestos (0.1 fibres/mL [time weighted average (TWA)]) as outlined in the Adopted National Exposure Standards for Workplace Exposure Standards for Airborne Contaminants (Safe Work Australia 2020a) for an 8-hour shift.

Clearance asbestos air monitoring is required to be undertaken within the work area following the removal of friable asbestos. Clearance air monitoring can also be undertaken for non-friable works if the Asbestos Consultant/LAA considers it appropriate for the location or circumstance. Air monitoring is to be conducted in the work area, including specific removal enclosures and decontamination units for friable removal works. A clearance cannot be provided until a result of < 0.01 fibres/mL is achieved. Therefore, the designated

Subsurface Works – AEC 4	EMP 3
controls/enclosure cannot be removed when airborne fibre results ≥ 0.01 fibres/mL are returned for a clearance monitoring shift. The work area will be required to be cleaned again and an additional clearance air monitoring shift be undertaken until airborne fibre levels return a result of < 0.01 fibres/mL. A final clearance air monitoring shift should be undertaken once the asbestos removal enclosure has been dismantled and removed. Following removal of any ASBINS at the Site, soil validation sampling must be undertaken in accordance with ASC NEPM 2013 and WA DoH (2020) including sampling of the walls and base of the excavated area. An asbestos removal clearance certification would be prepared by a SafeWork NSW LAA (friable) or the Environmental Consultant (non-friable) at the completion of the removal work. This would follow the systematic removal of asbestos containing materials and any affected soils from the Project site and validation of these areas (through visual inspection and laboratory analysis of selected soil samples). Where ASBINS is identified to remain on-site following intrusive excavation / removal works, a high visibility marker layer, survey and 0.5 m clean capping layer must be re-instated, and a clearance certificate provided. The objective of the asbestos clearance certificate is to determine if asbestos has been remediated (capped) as far as reasonably practicable in accordance with relevant legislation with no visible evidence of ASBINS associated with the works is evident on the ground surface across the Site. At the conclusion of the visual inspection, an asbestos clearance certificate must be issued to the person conducting the business or undertaking (PCBU) by an LAA (friable) or Environmental Consultant (non-friable). The clearance certificate should describe the extent of removal and capping, refer to air monitoring and clearance air monitoring undertaken (if required), and make a statement on the suitability of the area for reoccupation. In addition, low levels of asbestos in soil were reported within AEC 3 general reuse areas, which were reported by JBS&G (2024) to not require management beyond placement at depths greater than 0.1m below final design levels. Management of AEC 3 reuse areas is included within **EMP 2, EMP 6, EMP 7** and **EMP 8.**	

Materials Tracking		**EMP 4**
Responsibility:	Entity responsible for implementation of LTEMP (as per **Table 4**)	
Frequency:	Stage 2 Construction Works	
Objective:	To protect human health and the environment	
Areas of the Site	AEC 3, AEC 4 and Unexpected Finds	

Impacted materials generated as part of the construction works will be tracked via a Materials Tracking Plan (MTP) by the Principal Contractor. The aim of the MTP is to identify the source and destination of all materials on the Site at any time and requires the following tasks:

- Establish and maintain a nomenclature system for identification of all source and destination areas for soil both on and off the Site. This includes excavations, stockpiles (both clean and potentially contaminated), soils for treatment or disposal (including destination) and offsite sources of material.
- Use appropriate signage to identify the classification of the material and area number for each excavation prior to soil movement using the project documentation or in consultation with the Contract Administrator, prior to work being undertaken.
- Complete a 'Record of Soil Movement' sheet identifying the source of the materials, classification, volume, and destination area of each load of material moved on or off-site.
- Place the soil in an approved location for the material based on its soil classification.
- Maintain the location of the soil without mixing with other soil classes.
- Educate all operators in the requirements of the system.
- Monitoring and Review.

AEC 4 and Unexpected Asbestos finds

Asbestos in soils should be managed in accordance with **EMP 3** and SafeWork NSW 2022.

Stockpile Management		EMP 5
Responsibility:	Entity responsible for implementation of LTEMP (as per **Table 4**)	
Frequency:	As required in the event of the stockpiling of soil	
Objective:	To minimise the risk to human health and the environment from the stockpiling of soil.	
Areas of the Site	AEC 3, AEC 4 and Unexpected Finds	

General Stockpiles

All stockpiles will be managed in accordance with the CEMP and sub-plans, and in accordance with the EPBC Act conditions of approval for 2011/6086 and maintained in an orderly and safe condition. Batters would be formed with sloped angles that are appropriate to mitigate collapse or sliding of the stockpiled materials. Stockpiles are to be placed at approved locations and would be strategically located to mitigate environmental impacts while facilitating handling requirements. Stockpiles would only be constructed in areas of the Project site that had been prepared in accordance with the requirements of the Project Preliminary RAP in Appendix G of Technical Paper 5 – Environmental Site Assessment (Phase 2), Volume 4. All such preparatory works would be undertaken prior to the placement of material in the stockpile. Stockpiles must be located on sealed surfaces such as sealed concrete, asphalt, high density polyethylene or a mixture of these, to appropriately mitigate potential cross contamination of underlying soil. All stockpiling to be undertaken in accordance with the Costin Roe Consulting Pty Ltd (2020) Construction Soil and Water Management Plan.

Earthworks undertaken as part of construction and ongoing works within the Site, which are located outside of AEC 3 and AEC 4 may temporarily generate excess material which may be stockpiled for re-use subject to assessment by the Environmental Consultant (as required). Unless some event or observation indicates the material excavated and placed into the stockpile is potentially contaminated, no treatment is required other than normal dust suppression, and erosion controls in accordance with relevant CEMP requirements.

Where temporary stockpiling is permitted such stockpiles shall be installed and maintained to eliminate risk to workers and other people due to exposure to contaminants in dust or vapours and risk to the environment as a result of silt or contamination of stormwater in accordance with the any site materials management and tracking plan as part of the CEMP.

If cover is required, they shall extend beyond the footprint of the stockpiles and shall be secured to prevent being blown away by wind. Stockpiles must be placed in a secure location onsite and covered if to remain for more than 24 hours. Stockpiles will be placed at approved locations and located to mitigate environmental impacts while facilitating material handling requirements.

Where the material is suspected to be contaminated then it should be managed in accordance with the Unexpected Finds Protocol provided in **EMP 10.**

Contaminated Stockpiles

If assessment by the Environmental Consultant or the Ordnance Contractor identifies contamination in soil excavated from the Site, or a stockpile is observed to be contaminated, then the Environmental Consultant will assess the stockpile in accordance with the unexpected finds protocol (**EMP 10**) to delineate the contamination and assess the extent of management, if required.

Contaminated or potentially contaminated materials would only be stockpiled within areas of the Site or at locations that did not pose any risk of environmental impairment of the stockpile area or surrounding areas

Stockpile Management	EMP 5

(e.g. hardstand areas).

AEC 4 and Unexpected Asbestos finds

Asbestos in soils should be managed in accordance with **EMP 3**, **EMP 6** and SafeWork NSW 2022.

PFAS Impacted Stockpiles

In addition to the general and contaminated stockpile management controls provided above, the following additional management controls in accordance with the PFAS NEMP provided in **Table 1_EMP 5** should be applied for PFAS impacted soil, which exceeds the adopted site criteria. Historical concentration of PFAS within soil and groundwater are provided within **Appendix A**.

Table 1_EMP 5 – Temporary PFAS Stockpile Management

Stockpile Description	**Timeframe**	**Storage infrastructure for solid wastes and contaminated equipment**
Transient	Less than 48 hours with no rain predicted	Covered stockpile or storage area on impervious bottom liner (e.g. tarp, plastic sheeting, membrane, etc.).
Temporary	From 48 hours to 6 months	Managed stockpile, covered, on impervious, bunded hardstand, with effective stormwater controls (e.g. diversion drains, banks, etc.).
Short-term	From 6 months to 2 years	Constructed stockpile with robust anchored covers, impervious bottom liner, and effective stormwater controls to ensure that rainwater and sheet flow do not contact impacted solids.
Medium-term	From 2 to 5 years	Engineered containment facility, with effective stormwater controls.
Long-term •	More than 5 years	Engineered containment facility, with effective stormwater controls.

Excavation and Sampling		EMP 6
Responsibility:	Entity responsible for implementation of LTEMP (as per **Table 4**)	
Frequency:	Stage 2 Works and Operation	
Objective:	To ensure that risks to human health or the Environment are managed during minor excavation.	

Reuse of Soil (on-site)

There is potential for disturbance of underlying soils during construction works (JBS&G 2024), however, excess spoil is unlikely to be suitable as growing medium in landscape areas and would likely be disposed of off-site, reused/managed on-site or transported to other parts of the MPW Site in accordance with the relevant management plan for the land and **EMP 7**. Additional unexpected finds or assessments for reuse (if required) would be subject to reuse requirements below or a separate risk assessment.

Soil can be reused at the Site in accordance with the PFAS trigger values provided in **Table 8** of Addendum 02 (**Appendix H**) within reuse zones provided as **Figure 5** without further assessment of risk, but are subject to the implementation of the following management measures provided by EnRiskS (2020).

When placing soil within the reuse zones, soil must not be placed within 2m of the lateral boundary of the reuse zone, where the adjacent area does not have equivalent management measures in place.

Soil Reuse Zone 3 (beneath sub-divided area for warehouse development / lease area)

Soil that meets the criteria in **Table 8** (**Appendix H)** for Soil Reuse Zone 3 (beneath sub-divided area for warehouse development / lease area) can be used within the areas presented in **Figure 5**, subject to the following management measures:

- Materials must be placed at least 1 m above groundwater (seasonal maximum).
- Materials must be placed beneath Engineered Fill, concrete or a clay liner or equivalent geosynthetic liner.
- Engineered Fill is to conform to one of the following:
    - Sandstone Fill from road header excavation, tunnel boring machine excavation or ripped or rock hammer excavation.
    - Approved imported fill materials.
    - Site won VENM or excavated natural material (ENM).
    - Where the thickness of Engineered Fill is less than that described below, the surface cover must also include concrete pavement or a building slab.
- Engineered Fill acceptance is subject to confirmation testing of permeability by an accredited laboratory and must comply with the following:
    - Shale – one layer of ≥300 mm assuming a permeability of $1x10^{-8}$ m/s;
    - OR
    - Site won Clay and Sandy Clay – two layers of ≥300 mm assuming a permeability of between $1x10^{-8}$ and $5x10^{-8}$ m/s.
    - Sandy site won material is unlikely to be suitable."

In addition, low levels of asbestos in soil were reported within AEC 3 reuse areas, which were reported by JBS&G (2024) to not require management beyond placement at depths greater than 0.1m below final design levels. Therefore, soil must not be placed within the top 0.1 m without further assessment and

Excavation and Sampling	EMP 6

interpretation of analytical results within the JBS&G Validation Summary (JBS&G 2024) and **Appendix A** of this LTEMP.

Assessment of Soil for Reuse

The result of historical soil and leachate (neutral pH) PFAS testing and reuse material from EP Risk (2018 and 2020) and JBS&G (2024) are provided in **Appendix A**. Prior to breaching of the Engineered Fill layer, the soil and leachate (neutral pH) analytical results summarised in **Appendix A** should be reviewed and assessment should be made by the Environmental Consultant as to whether soil can remain on-site in accordance with the requirements set out within this LTEMP, relevant guidelines and Addendum 02 (**Appendix H**), be transported to the MPW Site in accordance with the LTEMP for the land or whether waste classification is required.

Where additional excavation is required within AEC 3 then additional assessment / delineation may be required where there is insufficient data available. Additional in-situ sampling or stockpiling sampling must be undertaken in accordance with the following as a minimum:

- Sampling should be undertaken by a suitably qualified Environmental Consultant.
- Additional insitu / delineation sampling to be undertaken in accordance with the NSW EPA Contaminated Land Guidelines: Sampling Design Part 1 – Application (2022).
- Samples to be collected from 0-0.2 mBGL, 0.5 mBGL, 1.0 mBGL and every metre thereafter to a maximum depth of 0.5 mBGL beyond the maximum proposed depth of excavation.
- Stockpile sampling to be undertaken in accordance with the sampling methodology provided in **EMP 7**.

Additional testing of site won stockpiles will be required where:

- Stockpiles have reported detectable PFAS total concentrations above the laboratory limit of reporting, but leachate testing was not undertaken.
- Soil in the stockpile has been excavated from AEC 3 and has not been sampled or tested.
- Soil is excavated from an area where PFAS soils were reused as part of Stage 2 works (JBS&G 2024).
- Soil tracking documentation identifying the source location of the stockpile is not available.

Sampling of stockpiles should be undertaken in accordance with the following:

- One test per 25 m^3 for soils assessed for volumes less than 200 m^3.
- The use of the statistical assessment of the data set from each stockpile in accordance with the ASC NEPM (2013), with a total number of samples of not less than 10 collected from each stockpile (e.g. for a maximum size stockpile of 2,500 m^3, the sampling frequency of one test per 250 m^3 will be adopted).

Analytical testing of additional soil sampling for assessment of reuse opportunities at the Site should include the following analytes:

- PFAS suite (28 analytes).
- AUS leaching Procedure (neutral pH) for PFAS.

Soil results should be compared against the relevant standards for site suitability if to remain on-site or

Excavation and Sampling	EMP 6

requirements for the receiving site's LTEMP.

Management of Asbestos in Soils

During excavation works beneath the imported fill layer at the Site, involving the potential disturbance of asbestos impacted soil (AEC 3) with previously identified low levels of asbestos in soils, reported as less than the HSL (JBS&G 2024), the following should be implemented:

- Historical analytical results should be referenced as reported within **Appendix A** and JBS&G (2024).
- A suitably qualified Environmental Consultant / Occupational Hygienist should be engaged to address the risk to construction workers prior to any excavation works below the imported fill layer.
- Where asbestos in soil is identified:
    - All asbestos removal, transport and disposal must be performed in accordance with the Work Health and Safety Regulation 2011 (WH&S Regulation).
    - The removal works would be conducted in accordance with the SafeWork NSW Code of Practice – How to Safely Remove Asbestos (SafeWork NSW 2022).
    - Excavated imported fill material that was stockpiled separately after excavation is to be returned to the excavations in the reverse order to which it came out.
    - An appropriate asbestos removal licence issued by SafeWork NSW would be required for the removal of asbestos impacted soil in accordance SafeWork NSW 2022.
    - Environmental management and WH&S procedures (including PPE/RPE) would be put in place for the asbestos removal during excavation to protect workers, surrounding residents and the environment SafeWork NSW 2022.
    - Temporary stockpiles of asbestos in soils would be covered to minimise dust and potential asbestos release.
    - An asbestos removal clearance certification would be prepared by an occupational hygienist at the completion of the removal work. This would follow the systematic removal of asbestos containing materials and any affected soils from the Project site and validation of these areas (through visual inspection and laboratory analysis of selected soil samples).
    - Asbestos fibre air monitoring would be undertaken during the removal of the asbestos materials and in conjunction with the visual clearance inspection. The monitoring would be conducted in accordance with SafeWork NSW 2022.

Site Specific Risk Assessment

Future works that require excavation of soil in the reuse zones can only be undertaken in accordance with the management procedures provided as **EMP 6**, unless a further additional site-specific risk assessment is conducted.

Off-site Disposal of Excavated / Unsuitable Material		EMP 7
Responsibility:	Entity responsible for implementation of LTEMP (as per **Table 4**)	
Frequency:	Continuous	
Objective:	To ensure that surplus material is appropriately classified for off-site disposal or reuse and lawfully disposed from the site.	

Minimise Waste

It is recommended that disturbance of soil within AEC 3 and AEC 4 should be minimised by incorporating the following into the construction methodology:

- Conventional footings where practical should not penetrate below the imported fill layer, to minimise the requirements for disposal of excavated contaminated material.
- Where pier footings are required, screw piles would be recommended over bored piers.
- Minimise excavation of materials below the imported fill layer to reduce disposal costs of excavated material.
- Reuse and retain material on the Site where lawful and practicable.

Given the nominal thickness of the imported fill layer is an average of 1.31 m (WH3) and 1.05 m (WH4) in PFAS reuse areas (AEC 3) and nominal depth in existing AEC 3, it may not be practicable to avoid disturbance of soil during construction works and additional management may be required.

Stockpile Classification

Where the Site Owner (or nominated representative) identifies the requirement to remove material from the Site, the material is required to be characterised by an Environmental Consultant to evaluate potential off-site removal options.

The Environmental Consultant shall consider the relevant requirements of NSW legislation, regulations, and guidelines in the identification of appropriate options for off-site disposal / reuse including, but not limited to the following:

- NSW EPA Waste Classification Guidelines (EPA 2014):
  - Part 1: Classifying waste.
  - Part 2: Immobilising Waste.
  - Part 3: Waste containing radioactive material.
  - Part 4: Acid Sulfate Soils.
  - Addendum to Part 1: Classifying Waste.
- Excavated Natural Material Exemption (2014) and Excavated Natural Material Order (2014).
- Relevant resource recovery orders and resource recovery exemptions made by the NSW EPA.

The requirements for use of licensed vehicles, waste tracking, covering of vehicles, etc. as noted in the POEO (Waste) Regulation (2014) will be identified by the Environmental Consultant and documented as part of a waste classification report to facilitate off-site disposal of waste material to a facility with the appropriate NSW EPA EPL to accept the classified material.

Disposal records for all material removed from the site shall be required to be provided to the Site Owner or appointed representative, by the appointed contractor upon completion of the disposal works. These records

Off-site Disposal of Excavated / Unsuitable Material	EMP 7

will be maintained in accordance with **EMP 18**. The records will be made available to the Environmental Consultant engaged to prepare final site condition reports upon request to demonstrate the lawful off-site disposal of material from the Site.

AEC 4

Based on the previous identification of ACM and AF/FA (albeit below the LOR) within historical soil samples within AEC 4, soil within the surveyed placement area (**Appendix E**) is classified as Special Waste (asbestos) in combination with other classes of waste (if applicable). The NSW EPA (2014) Waste Classification Guidelines, states the following definition with respect to pre-classified waste:

"Special Waste (Asbestos) - 'Special waste' is a class of waste that has unique regulatory requirements. The potential environmental impacts of special waste need to be managed to minimise the risk of harm to the environment and human health."

Asbestos waste is to be tracked in accordance with Clauses 76 and 79 of the POEO (Waste) Regulation 2014.

Stockpile Classification Testing for Off-site Disposal

Stockpile classification testing will be undertaken by the Environmental Consultant in accordance with the following:

- All stockpiles must be classified prior to off-site disposal. Stockpiles of general fill (non-soil) may be classified visually based on their waste content and observations. All other stockpiles will be classified based on classification testing, with samples scheduled for laboratory analysis of the contaminants of concern corresponding with the source of the stockpile.
- Classification testing will be undertaken by the Environmental Consultant, and classification samples will be collected from the stockpiled material at the following sampling frequency:
    - One test per 25 m^3 for soils assessed for volumes less than 200 m^3.
    - The use of the 95% UCL_{mean} value for the data set from each stockpile, with a total number of samples of not less than 10 collected from each stockpile (e.g. for a maximum size stockpile of 2,500 m^3, the sampling frequency of one test per 250 m^3 will be adopted).
- Sampling densities for resource recovery should be undertaken in accordance with the respective resource recovery order and exemption.

Liquid Wastes

All liquid wastes requiring offsite disposal should be classified in accordance with NSW EPA Waste Classification Guidelines or the applicable EPL for the land.

Subsurface Maintenance Works		EMP 8
Responsibility:	Entity responsible for implementation of LTEMP (as per **Table 4**)	
Frequency:	Operation	
Objective:	To ensure that subsurface maintenance works will not result in risk to human health and the environment.	

The Site has been raised to design levels with imported fill (average of 1.31 m (WH3) and 1.05 m (WH4) in PFAS reuse areas (AEC 3) and nominal depth in existing AEC 3). Subsurface maintenance activities will likely penetrate depths greater than the capping layer, however, given appropriate controls, the risk to subsurface maintenance contractors undertaking routine subsurface maintenance is considered to be low.

Should subsurface maintenance works exceed the depth of imported fill material and encounter underlying site soil then the following procedure should be followed.

Work Health and Safety

All works are to comply with the Work Health and Safety Act (2011). Note any works involving confined spaces should also be carried out in accordance with AS 2865: Safe Working in a Confined Space (2009) and any revisions. Pits or excavations may be considered confined spaces due to the limitations on egress and the potential accumulation of vapours or presence of depleted oxygen within the pits or excavations.

Any subsurface works that penetrate the capping layer shall include the following measures:

- Providing a SWMS, which shall be reviewed and authorised by the Site Owner (or their representative) or any future occupier.
- All upstream stormwater flow to be redirected around the work area.
- All stormwater from the works area to be diverted through sediment controls.
- If encountered, groundwater is always to be kept contained.
- Where asbestos in soil is encountered the UFP (**EMP 10**) must be implemented.
- If any strong odours are present on breaching sealed surfaces, or in an excavation, a precautionary approach shall be applied to consider if additional management measures are required to manage vapour inhalation risk prior to proceeding. The UFP (**EMP 10**) must be implemented.
- Additional controls may include the use of blowers to increase flushing of the trench/excavation with fresh air.
- Respiratory protective equipment (RPE) would also be provided for subsurface works where necessary in confined spaces or for asbestos related works (**EMP 10**).
- Air monitoring would be mandatory for entry into confined space works within excavations or where friable asbestos is identified.

All workers potentially exposed to PFAS impacted materials are required to wear appropriate levels of PPE as assessed by the Environmental Consultant, which shall include but are not limited to:

- Long sleeve shirt and trousers.
- Steel capped boots.
- Gloves for manual handling (waterproof nitrile gloves preferred).

PPE and RPE requirements shall be assessed by the Environmental Consultant prior to intrusive works which

Subsurface Maintenance Works	EMP 8

may breach AEC 3, for unexpected finds or during asbestos related works.

All workers potentially exposed to asbestos impacted materials are required to wear appropriate levels of PPE as assessed by the Environmental Consultant, in accordance with **EMP 6.**

Ecological

Excavation and reinstatement of excavations should consider the following general principles:

- Stockpiling of excavated soil to be managed in accordance with **EMP 5**.
- Excavated imported fill material that was stockpiled separately after excavation is to be returned to the excavations in the reverse order to which it came out.
- Reuse of excavated soil to be undertaken in accordance with **EMP 6**.
- Movement of soil should be tracked in accordance with **EMP 4**.
- All surplus soil removed from excavations must be classified in accordance with NSW EPA (2014) Waste Classification Guidelines and NSW EPA (2016) Addendum for PFAS prior to disposal at an appropriately licensed facility in accordance with **EMP 7**.
- Recontoured site surfaces must permit free drainage and not permit ponding of surface water.
- All discharges of water from the site comply with the relevant EPL.

AEC 4 and Unexpected Asbestos finds

Asbestos in soils should be managed in accordance with **EMP 3** and SafeWork NSW 2022.

Landscape Area Management and Maintenance		EMP 9
Responsibility:	Entity responsible for implementation of LTEMP (as per **Table 4**)	
Frequency:	Stage 2 Construction Works and Operation	
Objective:	To protect human health and the environment	
Areas of the Site	AEC 3 and Unexpected Finds	

Landscape management and maintenance for areas within and outside PFAS reuse areas and AEC 3 is described below.

Proposed Landscape Areas Inside AEC 3 (including PFAS reuse areas)

According to the Validation Report (JBS&G 2024), *"Final landscape areas are not currently defined."*

According to the Summary Report (JBS&G 2024) *"The Audit Area will generally include a concrete pavement or building slab consistent with the LTEMP PFAS management measures. Final landscape areas are not currently defined. Should there be overlap between the final landscape design and areas of PFAS soil reuse, "retrofitting" of the capping for landscape areas as per the LTEMP (EP Risk 2020) will be required during the construction phase. Retrofitting may require the management of surplus PFAS impacted spoil, either within MPW or disposed off-site. Retrofitting will be managed under an area specific LTEMP."*

AEC 3 areas (**Figure 3**) will require additional management by the landscape contractor during future construction and operation of the Site. The following management measures are proposed during construction and operation of landscaped areas:

Construction

Where landscaped areas are required within AEC 3 (including PFAS reuse areas) then the following measures should be adopted:

- Proposed landscape areas should be preferentially placed outside of areas of AEC 3 (**Figure 3**).
- Soil reuse for landscaped areas within the Site must be placed beneath a clay liner/geosynthetic liner of minimum thickness 0.5 m.
    - *The clay liner/geosynthetic liner must comply with the following requirements:*
        - *The clay/geosynthetic liner should meet a maximum permeability of 1x10^{-9} m/s.*
        - *The liners should be monitored via inspection if possible (minimum yearly) or by installation and testing of monitoring well(s) and repaired if damaged or deteriorated.*
- Landscaping works within these areas to be supervised by a suitably qualified Environmental Consultant.
- A clay liner or equivalent geosynthetic liner must be constructed over PFAS reused soil in accordance with **EMP 2, EMP 4, EMP 5, EMP 6**.
- A growth medium of thickness greater than the maximum root depth of vegetation proposed within the landscaped areas should be placed above the Engineered fill / clay liner / equivalent geosynthetic liner.
- Mulching of the surface of the growth medium should be applied and maintained to reduce the risk of erosion and exposure of the cover layer.

Landscape Area Management and Maintenance	EMP 9

- Plants with maximum root depths greater than the depth of growth medium applied are prohibited within these areas.

As the final design of the Proposed Development has not been finalised, the LTEMP is to be revised in accordance with **EMP 20** once construction of landscaped areas is complete with details of soil tracking, survey drawings, capping construction and long term management requirements.

Where capping for landscape areas is not present, 'Retrofitting' will be required to meet the abovementioned requirements and surplus PFAS impacted soil must be managed in accordance with **EMP 2, EMP 4, EMP 5, EMP 6, EMP 7** and **EMP 8**.

Operation

Where landscaped areas have been constructed within AEC 3 or reuse areas then the following management measures are to be implemented during future operation of the Site:

- All landscape staff to undertake a site induction and appropriate training of the management measures provided in the LTEMP in accordance with **EMP 14**.
- Prior to the commencement of operation, a landscape management plan to be prepared, which will include (as a minimum) the following management measures:
    - Identification of AEC 3 and soil reuse areas where additional management is required.
    - Requirements for the replacement of plants and vegetation to only permit species with a maximum root depth less than the depth of growth medium to not penetrate and damage the integrity of the surface cover over reused soil.
    - Should any landscape maintenance works exceed the depth of imported fill material or encounter the clay liner or equivalent geosynthetic liner, then the procedure provided as **EMP 8** must be followed.

Prior to excavation works involving the potential disturbance of AEC 3 and asbestos impacted soil, the following should be undertaken:

- Historical analytical results should be referenced as reported within **Appendix A** and JBS&G (2024).
- A suitably qualified Environmental Consultant / Occupational Hygienist should be engaged to address the risk to construction workers prior to any excavation works below the imported fill layer.

Where landscaping maintenance works damage the surface cover over reused soil, then the surface cover must be repaired in accordance with the specifications provided within this EMP.

Landscape Maintenance Outside AEC 3

Given that the Site has been raised to final fill levels and validated by JBS&G (2024), the risk to landscape contractors undertaking routine landscape maintenance is low outside of AEC 3 or where the requirements above have been followed. Intrusive maintenance works must be undertaken in accordance with **EMP 6, EMP 8** and **EMP 10**.

Unexpected finds		EMP 10
Responsibility:	Entity responsible for implementation of LTEMP (as per **Table 4**)	
Frequency:	Stage 2 Works and Operation	
Objective:	To minimise exposure of contractors and site personnel to impacted sub-surface soils during future excavation works beneath the Site.	

During Stage 2 Works

An unexpected finds protocol (UFP) has been prepared by SIMTA (2018)[58] for the Stage 2 works in accordance with SSD 7709. This UFP has been developed to manage the unexpected discovery of contamination within imported spoil, heritage items, threatened flora and fauna, and onsite contamination during the construction phase of Stage 2 Works. A copy of the SIMTA 2018 UFP is provided as **Appendix D** and has been incorporated into the CEMP for Stage 2 Works. An unexploded ordnance (UXO) Risk Review and Management Plan has been prepared by Gtek (2019)[59] to inform management of any unexpected finds involving UXO.

During Operation

During subsurface maintenance works post construction, there is a possibility some hazards within the Site have not been identified to date. The nature of hazards which may be present, and which may be discovered are expected to generally be detectable through visual or olfactory means, for example:

- The presence of significant aggregates of friable or non-friable asbestos materials (visible) including redundant services conduits.
- Excessive quantities of Construction/Demolition Waste (visible).
- Hydrocarbon impacted materials (visible/odorous).
- Drums or underground storage tanks (USTs) (visible).
- Oily Ash and/or oily slag contaminated soils/fill materials (visible/odorous).

As a precautionary measure to ensure the protection of the workforce, should any of the abovementioned substances (or any other unexpected potentially hazardous substance) be uncovered during ground disturbance activities, then the following should be immediately implemented:

- Stop work within the area. Isolate the affected area via the placement of temporary barriers or other appropriate measures (i.e. plastic sheeting, geotextile fabric covers, polymer dust suppressant spray, etc.) to prevent exposure to site personnel and/or off-site airborne dust migration.
- an Environmental Consultant should be immediately contacted to determine an appropriate course of action regarding the assessment and/or management of the “Unexpected Find”.

It is envisaged the assessment strategy will be aimed at determining the nature of the substance – that is, is it hazardous and, if so, is it at concentrations which pose an unacceptable risk to human health or the environment.

The Environmental Consultant will also be responsible for any reporting necessary to document the details of the Unexpected Find and the results of the validation sampling and will be responsible for providing

[58] SIMTA (2018) Unexpected Finds Protocol, Moorebank Precinct West Stage 2, dated 26 October 2018 (ref: MIC2-QPMS-EN-APP-00022).
[59] Gtek (2019) Unexploded Ordnance (UXO) Risk Review and Management Plan, Moorebank Precinct West Stage 2 (MPW2) Incorporating Moorebank Avenue Upgrade Works (MAUW) Moorebank, NSW, dated 9 October 2019 (ref: 17114EPR1, version 1.01).

Unexpected finds	EMP 10

clearance certificates stating it is suitable to resume works at the remediated Unexpected Find area.

The UFP for the operational facility post construction should be developed at the completion of Stage 2 works when the LTEMP is updated.

Management of Unexpected Asbestos Finds

Should asbestos be identified as an unexpected find during soil disturbance works, the following procedures for the safe removal of asbestos must be adopted:

- All asbestos removal, transport and disposal must be performed in accordance with the Work Health and Safety Regulation 2011 (WH&S Regulation).
- The removal works would be conducted in accordance with the SafeWork NSW 2022.
- An appropriate asbestos removal licence issued by SafeWork NSW would be required for the removal of asbestos impacted soil.
- Environmental management and WH&S procedures would be put in place for the asbestos removal during excavation to protect workers, surrounding residents and the environment.
- Temporary stockpiles of asbestos containing material (ACM) soils would be covered to minimise dust and potential asbestos release.
- An asbestos removal clearance certification would be prepared by an occupational hygienist at the completion of the removal work. This would follow the systematic removal of asbestos containing materials and any affected soils from the Project site and validation of these areas (through visual inspection and laboratory analysis of selected soil samples).
- Asbestos fibre air monitoring should be undertaken during the removal of the asbestos materials and in conjunction with the visual clearance inspection. The monitoring would be conducted in accordance with SafeWork 2022.

Additional Validation Requirements		EMP 11
Responsibility:	Entity responsible for implementation of LTEMP (as per **Table 4**)	
Frequency:	As required	
Objective:	To ensure contamination management activities and unexpected finds have been appropriately characterised and validation for the intended land use.	

Unexpected Finds requiring remediation or soil reuse will require validation which should be undertaken in accordance with the methodology and criteria provided in Section 7 of the Golder (2016) RAP. Additional information relating to validation relevant to the LTEMP is provided below.

AEC 3

The following information to verify that appropriate reuse or off-site disposal of surplus material is to be undertaken:

- Soil tracking data to confirm the source and final location of PFAS impacted soil reused at the Site in accordance with **EMP 4**.
- Soil sampling and analytical results to confirm that the soil meets the requirements for reuse outlined in **EMP 6** and the receiving LTEMP.
- Survey data to confirm the location and depth of PFAS impacted soil reused at the Site under the conditions of reuse provided in **EMP 6**.
- Soil classification data and landfill receipts for soil disposed off-site.

AEC 4

The following information to verify that appropriate management has been undertaken:

- Soil tracking data for asbestos waste is to be tracked in accordance with Clauses 76 and 79 of the POEO (Waste) Regulation 2014.
- Review of previous analytical results, sampling and validation (if required) by the Environmental Consultant in accordance with ASC NEPM (2013).
- Survey data to confirm the location and depth of AEC 4 if ASBINS is replaced or re-capped at the Site.
- Soil classification data and landfill receipts for soil disposed off-site.

Unexpected Finds

Validation of Unexpected Finds will be undertaken as per Section 8 of the RAP (Golder 2016). The usability of the data collected during the validation program will be assessed in accordance with Section 8.7 of the RAP (Golder 2016).

Validation reporting

Validation reporting should be prepared in accordance with the NSW EPA (2020) *Guidelines for Consultants Reporting on Contaminated Land*.

Management of Groundwater		**EMP 12**
Responsibility:	Entity responsible for implementation of LTEMP (as per **Table 4**)	
Frequency:	As required	
Objective:	To ensure that groundwater is managed so as not to present a risk to human health or the environment.	

Based upon previous assessments undertaken at the MPW Site, elevated levels of PFAS in groundwater samples collected have been reported. Further discussion of groundwater management is provided below.

Groundwater Extraction

Groundwater extraction during and post construction is not permitted at the Site for any beneficial use in accordance with **EMP 1**. Based upon the proposed commercial / industrial land use of the Proposed Development and the availability of a reticulated water supply, it is considered the requirement for the beneficial use of groundwater at the Site is low.

It is not anticipated that groundwater will be encountered during construction of the Proposed Development and construction dewatering of contaminated groundwater should be avoided where practicable. However, should construction dewatering be unavoidable then a Dewatering Management Plan must be prepared which details appropriate control measures to manage and treat contaminated groundwater which is generated from dewatering. An extraction licence should be sought from the appropriate regulatory authority prior to commencing dewatering in accordance with the relevant legislation (if required).

Worker Health and Safety

In order to manage workers exposure to contaminated groundwater the following should be implemented for works where groundwater is expected to be encountered:

- Project inductions should be undertaken to identify areas with high risk of groundwater contamination.
- SWMS and job safety Analysis (JSA) to identify hazards associated with contaminated groundwater and detail appropriate control measures.
- PPE used in high-risk areas including:
  - Disposable overall suits including boots.
  - Disposable waterproof nitrite gloves in addition to standard glove requirements.
  - All other standard PPE required for works on Site.
- Signage placed in ablution blocks to ensure all workers wash hands and face prior to eating, regardless if gloves are worn.
- If worker's skin comes into contact with contaminated water, ensure skin is immediately washed with clean water and wet clothing is removed immediately after work is complete.

Groundwater Monitoring

Groundwater monitoring is not required for the Site unless required to address unexpected finds or if groundwater is expected to be encountered during construction / operation. Ongoing groundwater monitoring is for the MPW Site is described within the MPW LTEMP (2020a).

Management of Surface Water		EMP 13
Responsibility:	Entity responsible for implementation of LTEMP (as per **Table 4**)	
Frequency:	As required	
Objective:	To ensure that surface water is managed so as not to present a risk to human health or the environment.	

Based upon previous assessments undertaken, disturbance of soil in AEC 3 has the potential to leach PFAS to stormwater during future excavation works. Further discussion of surface water management is provided below. Additionally, based on the placement of PFAS impacted soils at the Site, there is also the potential to leach PFAS to stormwater during excavation in these areas.

Management of On-site Surface Water

Use of contaminated surface water at the Site is not permitted for any beneficial use.

During construction / maintenance works below the layer of Engineered Fill and within AEC 3, the following precautions should be implemented:

- Excavation to be scheduled to minimise the area of soil exposed at any one time.
- To reduce PFAS impacted sediment, stormwater controls should be designed to limit infiltration of run-off into areas where PFAS impacted soils are located.
- Excavated soil should be removed from Site or returned to the excavation as soon as reasonably practicable to prevent leaching of PFAS to stormwater.
- The UFP (**EMP 10**) must be implemented.
- Stormwater in any sediment basins (if required through construction) should be tested prior to being discharged. PFAS impacted stormwater must be managed in accordance with the PFAS NEMP, the EPL, and the requirements within the relevant PFAS LTEMP for the applicable area of the MPW Site.

As the depth and permeability of cover over remaining existing AEC 3 areas is not known, the requirement for immediate surface water management must be assessed by the Environmental Consultant with consideration for historical data provided within **Appendix A**.

Water Treatment

If water treatment is required, it should be undertaken in accordance with the relevant standard, EPL and LTEMP.

Worker Health and Safety

If encountered, in order to manage workers exposure to contaminated surface water the following should be implemented for works where groundwater is expected to be encountered:

- Project inductions should be undertaken to identify areas with high risk of surface water contamination.
- SWMS and JSAs to identify hazards associated with contaminated surface water and detail appropriate control measures.
- PPE used in high risk areas including:
    - Disposable overall suits including boots.
    - Disposable waterproof nitrite gloves in addition to standard glove requirements.

Management of Surface Water	EMP 13

- All other standard PPE required for works on Site.

- Signage placed in ablution blocks to ensure all workers wash hands and face prior to eating, regardless if gloves are worn.
- If worker's skin comes into contact with contaminated water, ensure skin is immediately washed with clean water and wet clothing is removed immediately after work is complete.

Surface Water Monitoring

In the event contaminated water is encountered, surface water must be sampled in accordance with the relevant LTEMP, EPL and HEPA NEMP or applicable regulations at the time of the assessment by the Environmental Consultant.

Fieldwork must be undertaken in accordance with Table A1 of the Western Australia Department of Environment Regulation (WA DER), Interim Guideline on the Assessment and Management of PFAS, 2016 (WA DER 2016), and the PFAS NEMP.

Given that the PFAS Placement Areas (AEC 3) is covered with and average of 1.31 m (WH3) and 1.05 m (WH4) in PFAS reuse areas (AEC 3) and nominal depth in existing AEC 3, there may be no direct surface water monitoring requirement prior to excavation works, subject to the ongoing integrity of this layer during construction works and after storm events. However, as the depth and permeability of cover over remaining existing AEC 3 areas is not known, the requirement for immediate surface water management must be assessed by the Environmental Consultant with consideration for historical data provided within **Appendix A**.

Onsite Surface Water Sampling During Construction within AEC 3

To confirm and maintain the effectiveness of the PFAS stormwater preventative measures outlined in **EMP 2**, the following should be undertaken during construction works:

- Sample stormwater from lined basins after rain events to test the effectiveness of capping in reducing PFAS concentrations.
- Inspect capping layers after storm events to ensure the integrity of the capping layer and liners. Undertake repairs / upgrades to capping layers and liners where required.
- Where new temporary stormwater basins are constructed, or significant soil disturbance occurs to existing catchments, additional testing of stormwater should be undertaken to determine if additional preventative measures require implementation.
- Stormwater in basins and swales must be sampled and the results must be below the discharge criteria provided in the EPL prior to discharge.

Training		**EMP 14**
Responsibility:	Entity responsible for implementation of LTEMP (as per **Table 4**)	
Frequency:	As required	
Objective:	Suitably trained personnel will be available to implement the requirements of the LTEMP.	

The Site owner or nominated responsible party, shall ensure that any personnel engaged in the implementation of nominated tasks for which the Site Occupant is responsible, have been provided with adequate training to manage the site contamination and hazardous materials conditions which may be encountered during site ground disturbance activities.

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.

As a minimum the induction will include the following:

- Existence and requirements of this LTEMP.
- Relevant legislation, penalties, fines.
- Roles and responsibilities for Contamination Management.
- Landscape management measures.
- Asbestos identification and management requirements.
- Stockpile management measures.
- Material movement and tracking measures.
- Unexpected finds.
- Toolbox meetings will also be undertaken, as and when required.

The Site Occupant shall maintain records of personnel engaged in the nominated tasks and their relevant training/qualifications for the period of implementation of the LTEMP in accordance with **EMP 18** and with the document control system outlined in the CEMP.

Works involving contractors and subcontractors will be managed in accordance with **EMP 15**.

AEC 4

All works within AEC 4 must be undertaken by a suitably licensed asbestos removal contractor with air monitoring and clearances by a SafeWork NSW LAA (friable) or suitably qualified occupational hygienist in accordance with SafeWork NSW (2022).

Contractor and Subcontractor Management		**EMP 15**
Responsibility:	Entity responsible for implementation of LTEMP (as per **Table 4**)	
Frequency:	As required	
Objective:	Ensure that all persons who may be exposed to contaminated material are suitably aware of conditions and requirements of this LTEMP.	

The Site Owner (or nominated representative) is required to ensure that Contractors and Sub-contractors are advised of potential safety and environmental issues on site during site-specific induction training. This induction shall include the occupational health and safety responsibilities, requirements and controls for all (sub)contractors working on site. In addition, all site workers, including contractors and subcontractors shall be made aware that they are required to implement the provisions of this LTEMP.

All subcontractor activities will be monitored by the Site Owner, or a nominated representative, to ensure compliance with the requirements of this LTEMP.

They shall be solely responsible for the health and safety of their employees and shall comply with all applicable laws and regulations. All contractors and subcontractors are responsible for:

1. Providing their own personal protective equipment.
2. Training their employees in accordance with applicable laws.
3. Providing medical surveillance and obtaining medical approvals for their employees.
4. Ensuring their employees are advised of and meet the minimum requirements of this LTEMP and any other additional measures required by their site activities.
5. Designating their own site safety officer.

All contractors/subcontractors must sign an acceptance form prior to commencing work on site.

Part 6.5 of the *Work Health and Safety Regulation 2011* required that an employer of employees undertaking construction work must ensure that the employees have completed induction training as specified by the Regulation. In addition, the Principal Contractor (if required) must not allow any person to carry out construction work unless he/she is satisfied that the person has undergone work health and safety induction training, including:

- General occupational health and safety training for construction work.
- Work activity-based health and safety training (job specific training).
- Site specific health and safety induction training.

The Site Owner (or nominated representative) shall require all contractors completing such works to maintain, for each person carrying out construction/maintenance works, for a period of three years:

- A copy of relevant statements of OHS induction training, or a statement indicating that the Principal Contractor is satisfied that the relevant OHS induction training has been undertaken; and
- A brief description of the site-specific training undertaken by the person.

Contingency Plan		**EMP 16**
Responsibility:	Entity responsible for implementation of LTEMP (as per **Table 4**)	
Frequency:	As required	
Objective:	Ensure that in the event of unplanned exposure of impacted materials all appropriate measures are implemented to minimise the risk to on-site personnel and the environment.	

In the event site operations or conditions result in the disturbance of significant impacted material without the prior preparation of specific works/management procedures and implementation of appropriate exposure minimisation measures, or alternatively an environmental incident occurs (contaminant leak/spill, identification of asbestos in imported material, etc.), the following shall be implemented:

- Isolation of the affected area via the placement of temporary barriers or other appropriate measures (i.e. plastic sheeting, geotextile fabric covers, polymer dust suppressant spray, etc.) to prevent exposure to site personnel and/or off-site airborne dust migration; and
- Implementation of applicable EMPs with respect to personnel and site management, or where appropriate the Unexpected Finds Protocol included in this LTEMP (**EMP 10**), and subsequent appropriate removal/management of the identified impacted material via excavation and off-site removal or otherwise containment/treatment as applicable.

Where considered appropriate by the Site Owner (or its nominated representative), an appointed Environmental Consultant shall undertake an assessment of the impacted area such it can be confirmed the disturbance of material has not resulted in conditions with unacceptable risks to site users or the environment. This may include inspections, and or soil/water sampling within the site and subsequent analysis of samples for identified contaminants of concern at the site.

Following implementation of these procedures to ensure there are no further unacceptable exposures to site workers and/or environmental emissions, consideration shall be given to the requirements of **EMP 17** to **EMP 19** inclusive, in relation to documentation and renewal of the LTEMP to minimise the potential for future exposure of impacted material. This should include a formal review of the incident by an appropriately qualified person appointed by the Site Owner (or nominated representative) with the objective of identifying the cause of the incident and providing recommendations on alternative procedures or systems to be implemented at the site and/or within the LTEMP to prevent/minimise the likelihood of the incident reoccurring.

The incident shall be documented within the activity register as outlined in **EMP 18** and where appropriate, amendment(s) to the LTEMP will be undertaken as outlined in **EMP 20**.

Non-compliance with LTEMP		**EMP 17**
Responsibility:	Entity responsible for implementation of LTEMP (as per **Table 4**)	
Frequency:	As required	
Objective:	To ensure the LTEMP is implemented as intended.	

Non-compliances with the intent and procedures of the LTEMP may occur during the implementation of the LTEMP.

Where a non-compliance is identified by a responsible organisation, they shall inform the affected organisations of the non-compliance in writing. Where a non-compliance with the LTEMP is identified by another organisation (in the activities of an alternate organisation), then they shall have the responsibility of informing the non-complying party in writing of the non-compliance. The non-complying party will be required to rectify the non-conformity as soon as possible, as per the requirements of the relevant procedure(s) where non-compliance has occurred.

Detail of the action taken to rectify the non-compliance shall be provided to each of the affected organisations in writing. Where a non-compliance cannot be rectified, then the LTEMP will require to be reviewed as per the requirements of **EMP 20** LTEMP Review.

Where contaminated soil/spoil, water and hazardous materials have not been appropriately managed (i.e. classification, handling, storage, transport, and disposal / discharge) this will constitute a non-conformance to be managed under the CEMP or Environmental Management System.

Where contaminated soil/spoil, water and hazardous materials have not been appropriately managed (i.e. classification, handling, storage, transport, and disposal / discharge) the following will be undertaken:

- Where required, isolation of the affected area via the placement of temporary barriers or other appropriate measures (i.e. plastic sheeting, geotextile fabric covers, polymer dust suppressant spray, etc) to prevent exposure to site personnel and/or off-site airborne dust migration.
- Implementation the Unexpected Finds Protocol included in this LTEMP, and subsequent appropriate removal/management of the identified impacted material via excavation and off-site removal or otherwise containment/treatment as applicable.
- Fill out incident response form and raise a non-conformance for improvement.
- Where required, notify regulatory authorities.

Record Keeping		**EMP 18**
Responsibility:	Entity responsible for implementation of LTEMP (as per **Table 4**)	
Frequency:	As required	
Objective:	Records of the implementation of the LTEMP require to be retained.	
The Site Owner (or nominated representative) shall be responsible for the maintenance of all documents relating to the implementation of the LTEMP. This shall include any contamination assessments and validation undertaken, registers for the maintenance of the LTEMP (site inspection forms, works approval checklists, revised plans, *etc.*) and any relevant correspondence between the Site Owner (or nominated representative), Contractors and/or any other party. All records shall be retained by the Site Owner (or nominated representative) throughout the time of implementation of the LTEMP. In the event that the role of the Site Owner (or nominated representative) is transferred from one organisation to another, control of all relevant (historical and current) documents will be transferred for safe keeping to the current Site Owner (or nominated representative).		

Audit / Review of LTEMP Implementation		**EMP 19**
Responsibility:	Entity responsible for implementation of LTEMP (as per **Table 4**)	
Frequency:	Once every 12 months	
Objective:	The implementation of the LTEMP requires to be audited in accordance with EPA guidance publications to identify areas of non-compliance or partial compliance with relevant legislation/regulations and/or the requirements of this plan.	

An environmental audit shall be undertaken annually from implementation of this LTEMP to ensure ongoing compliance with the LTEMP requirements. The audit shall be undertaken by an Environmental Consultant in general compliance with the DEC '*Compliance Audit Handbook*' (DEC, Feb 2006) and identify areas of non-compliance or partial compliance with the requirements of:

- Relevant legislation / regulations; and
- This plan.

The findings of the audit should be documented and form the basis of the subsequent management review process as outlined following.

Specific tasks that will be undertaken as part of the audit include:

- Review of records generated by the Site Owner, and their respective contractors to ensure they meet the intended scope of the LTEMP.
- Review of the works register documenting ground disturbance activities completed at the site and associated work method statements, monitoring/validation activities to ensure that the management activities undertaken have met the intended scope of the LTEMP.
- Periodic review and inspection of the Site condition, including annual inspection of liners within the OSDs and overflow drainage channels.

Where a non-compliance is detected during the audit process, then the non-compliance shall be informed as per the requirements of **EMP 17**: Non-Compliances with LTEMP.

The Site Owner (or nominated representative) is required to maintain records of the audit review. Records will require to be maintained on site and made available to relevant authorities in the event of a site inspection.

The results of the audit will be considered as part of a broader review of the LTEMP to be undertaken on an annual basis by an Environmental Consultant in conjunction with the Site Owner. This review shall consider:

- The results of the LTEMP Audit as outlined above.
- Any non-compliances with the LTEMP that have been unable to be resolved.
- Practicalities and efficiencies of management measures and whether there are more effective ways to improve environmental compliance.
- Any changes in state or national environmental protection legislation or guidelines that impact any part of the LTEMP.
- Any proposed changes in land-use of the site or adjoining sites which may impact upon exposure pathways.

Audit / Review of LTEMP Implementation	EMP 19
Where a review identifies items, which are required to be modified, or added to the LTEMP, then a revision of the LTEMP shall be prepared by a Suitably Qualified Person. The revised LTEMP will require approval by relevant stakeholders prior to implementation of the revised plan.	

LTEMP Review		**EMP 20**
Responsibility:	Entity responsible for implementation of LTEMP (as per **Table 4**)	
Frequency:	As required	
Objective:	The LTEMP requires review to ensure its continued appropriateness to be used on the Site.	

A review of the LTEMP shall be undertaken as required by an Environmental Consultant in conjunction with the Site Owner (or nominated representative). This review shall consider:

- The results of the LTEMP Audit as outlined in **EMP 19**.
- Any non-compliances with the LTEMP that have been unable to be resolved.
- Practicalities and efficiencies of management measures and whether there are more effective ways to improve environmental compliance.
- Any changes in state or national environmental protection legislation or guidelines that impact any part of the LTEMP.
- Any proposed changes in land-use of the site or adjoining sites which may impact upon exposure pathways.

If the Site Owner ceases to be recognised as the Site Manager, a review of the LTEMP document and compliance measures will be necessary to identify suitable replacement LTEMP compliance mechanisms.

In addition, where a review identifies items which are required to be modified, or added to the LTEMP, then a revision of the LTEMP shall be prepared by a suitably qualified person.

Any revisions to the LTEMP must be approved by the by the NSW EPA or appointed NSW EPA accredited Site Auditor.

Cessation of LTEMP Application		**EMP 21**
Responsibility:	Entity responsible for implementation of LTEMP (as per **Table 4**)	
Frequency:	As required	
Objective:	To ensure impacts associated with residual issues requiring management at the Site during construction and operation of the Proposed Development been appropriately resolved to ensure the ongoing suitability of the site for the proposed land use.	
To address potential residual soil and groundwater issues after the scope of the remediation is completed, the Golder (2016) RAP envisaged implementation of a LTEMP to provide a management, monitoring and review framework. Cessation of the application of the LTEMP will be dependent upon the results of additional assessment and will require a revised site-specific human health and ecological risk assessment. Once the Environmental Consultant is satisfied that the residual contamination at the Site does not present a risk of harm to human health and the environment, then the final site-specific human health and ecological risk assessment will include recommendations for cessation of the LTEMP for approval by the NSW EPA or appointed NSW EPA accredited Site Auditor.		

Appendix C
CONDITIONS OF CONSENT COMPLIANCE MATRIX

Table C1 – Conditions of Consent (CoC) – SSD 7709			
CoC / FCMM	**Requirement**	**Document Reference**	**How Addressed**
B171	Upon completion of importation and placement of fill and prior to construction of permanent built surface works, the Applicant must submit to the Planning Secretary, a Site Audit Report and a Site Audit Statement A for the whole site, prepared in accordance with the NSW Contaminated Land Management - Guidelines for the NSW Site Auditor Scheme 2017, which demonstrates the site is suitable for its intended land uses under MPW Stage 2 SSD 7709.	NA	To be actioned by the Site Auditor
B172	Where remediation outcomes for the site require long term environmental management, a suitably qualified and experienced person must prepare a Long-Term Environmental Management Plan (LTEMP), to the satisfaction of the Site Auditor. The plan must:	This Plan	LTEMP prepared by a suitably qualified and experienced person – Certified Environmental Practitioner – Contaminated Land (CEnvP CL). This Plan has been sent to the Site Auditor for approval.
	a) be submitted to the Planning Secretary and EPA prior to commencement of construction (other than vegetation clearing); and		Qube to provide this Plan to the Planning Secretary once approved by the Site Auditor.
	b) include, but not be limited to:		
	i. a description of the nature and location of any contamination remaining on site,		**Appendix A** of this Plan.
	ii. provisions to manage and monitor any remaining contamination, including details of any restrictions placed on the land to prevent development over the containment cell,		**Appendix B** of the LTEMP provides Environmental Management Procedures including details of restrictions. A containment cell is not proposed in this Plan.
	iii. a description of the procedures for managing any leachate generated from the containment cell, including any requirements for testing, pumping, treatment and/ or disposal,		A containment cell is not proposed in this Plan.
	iv. a description of the procedures for monitoring the integrity of the containment cell,		A containment cell is not proposed in this Plan.

Table C1 – Conditions of Consent (CoC) – SSD 7709			
CoC / FCMM	**Requirement**	**Document Reference**	**How Addressed**
	v. a surface and groundwater monitoring program,		The surface and groundwater monitoring program is detailed in **Section 5** of this Plan and **EMP 12** and **EMP 13** in **Appendix B** of this Plan.
	vi. mechanisms to report results to relevant agencies,		Reporting mechanisms provided in Section 5 and **Appendix B** of this Plan. **EMP 20** in **Appendix B** provides protocols for the cessation of monitoring post development subject to approval by the Site Auditor and / or NSW EPA.
	vii. triggers that would indicate if further remediation is required, and		An unexpected finds protocol to manage further remediation is provided as **Appendix D** of the LTEMP.
	viii. details of any contingency measures that the Applicant is to carry out to address any ongoing contamination.		A contingency plan is provided as **EMP 16** in **Appendix B** of this Plan.
B173	The LTEMP must be registered on the title to the land.	This Plan	**Section 1.3** and **Section 1.4**
B180	The Applicant must assess and classify all liquid and nonliquid wastes to be taken off site in accordance with the latest version of EPA's Waste Classification Guidelines Part 1: Classifying Waste (NSW EPA 2014) and dispose of all wastes to a facility that may lawfully accept the waste.	**Appendix B**	**EMP 6** in **Appendix B** addresses liquid and non-liquid waste classification
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;	a) **Section 3** and **Appendix B** b) i) **Section 4** ii) **Appendix B** iii) **Appendix B** c) **Appendix B** d) i) **Appendix B** ii) **Section 5** e) **EMP 16** f) **EMP 19** g) **EMP 16 and 17** h) **Section 4.1** i) **EMP 28**	a) Includes known site conditions and summarised remaining contamination issues. b) (i) Covers any relevant approval and/or licence. (ii) Specifies adopted criteria to be used for assessment and validation. (iii) Specifies sampling and validation plans and the decision questions needing to be answered for each different type of assessment/validation. c) Specifies the details of each management plan as required by Golder (2016a).

Table C1 – Conditions of Consent (CoC) – SSD 7709			
CoC / FCMM	**Requirement**	**Document Reference**	**How Addressed**
	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.		d) (i) Describes the sampling analysis and reporting program for each contamination issue requiring management; and (ii) The sampling and validation programs will report on the effectiveness of the management measures. e) Details the Unexpected Finds Procedure in relation to contamination. f) Continual improvement for the LTEMP is discussed. g) **Appendix B** provides protocols and reporting: (i) Specifies how incidents and non-compliances will be managed. (ii) Specifies how complaints in relation to contamination will be managed. (iii) Specifies how non-compliance to statutory requirements will be managed. h) Lists the responsibilities for the LTEMP Implementation. i) Specified how the LTEMP will be reviewed/updated.
OB	The CEMP, or equivalent, for the Proposal would be based on the PCEMP (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)	**CEMP**	CEMP prepared by the Principal Contractor during construction

Table C1 – Conditions of Consent (CoC) – SSD 7709			
CoC / FCMM	**Requirement**	**Document Reference**	**How Addressed**
	• 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) • ESCP • 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)		
5A	A SWMP and ESCP, or equivalent, would be prepared for the Proposal. The SWMP and ESCPs would be prepared in accordance with the principles and requirements of the Blue Book and based on the Preliminary ESCPs provided in the Stormwater and Flooding Assessment Report (refer to Appendix R of the EIS). The following aspects would be addressed within the SWMP and ESCPs: Stockpiles would be located away from flow paths on appropriate impermeable surfaces, to minimise potential sediment transportation.	**CEMP**	While this plan is separate to the SWMP and ESCP it does include this requirement for the management of stockpiles.

Table C1 – Conditions of Consent (CoC) – SSD 7709			
CoC / FCMM	**Requirement**	**Document Reference**	**How Addressed**
	Where practicable, stockpiles would be stabilised if the exposed face of the stockpile is inactive more than ten days, and would be formed with sediment filters in place immediately downslope		
5I	Stockpile sites established during construction are to be managed in accordance with stockpile management principles set out in Appendix L of this RtS. Mitigation measures within the Stockpile Management Protocol include: In order to accept fill material onto site, material characterisation reports/certification showing that the material being supplied is virgin excavated natural material (VENM) / excavated natural material (ENM) must be provided. Each truck entering the Site will be visually checked and documented to confirm that only approved materials that are consistent with the environmental approvals are allowed to enter the site. Only fully tarped loads are to be accepted by the gatekeeper. Environmental Assurance of imported fill material will be conducted to confirm that the materials comply with the NSW EPA Waste Classification Guidelines and the Earthworks Specification for the MPW site. The frequency of assurance testing will be as nominated by the Environmental assuror/auditor. All trucks accessing the site for the purpose of clean general fill importation would enter and exit via the existing main Site access located from Moorebank Avenue. Ingress and egress to the stockpiling areas would be arranged so that the reversing of trucks within the site is minimised.	**EMP 4, EMP 6** and **CEMP**	These measures have been included in the LTEMP.

Table C1 – Conditions of Consent (CoC) – SSD 7709			
CoC / FCMM	**Requirement**	**Document Reference**	**How Addressed**
	Stockpiles would not exceed ten-metres in height from the final site levels, with battered walls at gradients of 1V:3H For any stockpile heights greater than 4 m, benching would be implemented. Where reasonable and feasible, and to minimise the potential for erosion and sedimentation of stockpile(s), stockpile profiles would typically be at angle of repose (the steepest angle at which a sloping surface formed of loose material is stable) with a slight concave slope to limit the loss of sediments off the slope, or through the profile and the formation of a toe drain. The top surface of the stockpile(s) would be slightly sloped to avoid ponding and increase run off. Topsoil stockpiles would be vegetated to minimise erosion. Stockpiles would be protected from upslope stormwater surface flow through the use of catch drains, berms, or similar feature(s) to divert water around the stockpile(s). A sediment control device, such as a sediment fence, berm, or similar, would be positioned downslope of the stockpile to minimise sediment migration. Any water seepage from stockpiles would be directed by toe drains at the base of the stockpiles toward the sediment basins or check dams and away from the emplacement or extraction working face. Newly formed stockpiles would be compacted (sealed off) using a smooth drum roller at the end of each working day to minimise water infiltration. Haul roads would be located alongside the stockpile to the work/tipping area. As per best practice, the catchment area of haul roads for surface water runoff would be approximately 2530 m lengths, facilitated by the provision of spine drains which would convey water		

Table C1 – Conditions of Consent (CoC) – SSD 7709			
CoC / FCMM	**Requirement**	**Document Reference**	**How Addressed**
	from the haul road to toe drains at the base of the stockpile, and then to sediment basins. Temporary sediment basins would be established in accordance with the ESCP prepared for the site. Stockpiling of clean fill material is to be carried out during Works Period A (pre-construction) and Works Period D (bulk earthworks). Any imported clean general fill material that would be subject to stockpiling within the Proposal site for more than a 10-day period without being worked on, would be subject to stabilisation works, to minimise the potential for erosion. Where the material being stockpiled is less coarse or has a significant component of fines then surface and slope stabilisation would be undertaken. Methods for slope stabilisation may include one or a combination of the following: – Application of a polymer to bind material together – Application of hydro-seed or hydromulch – Covering batters with mulch to provide ground cover – Covering batters with geofabric – Use of a simple sprinkler system for temporary stockpiles, including use of radiating sprinkler nozzles to maintain fine spray over exposed surfaces – Other options identified by the Contractor Topsoil stockpiles would be seeded with a grass/legume or nitrogen fixing species (such as acacia) to assist in erosion control and reduce loss of beneficial soil nutrients and micro-organisms		
6A	The CEMP would identify the actions to be taken should additional contamination be identified during the development of the site (i.e. an	**CEMP**	To be addressed in the CEMP.

Table C1 – Conditions of Consent (CoC) – SSD 7709			
CoC / FCMM	**Requirement**	**Document Reference**	**How Addressed**
	unexpected finds protocol), and will address REMM items 8H, 8T, 8U, 8V and 8W (of the MPW Concept Plan Approval (SSD 5066)).		
6B	A site-specific Remediation Action Plan (RAP) is not considered to be required for the Proposal. The following documentation would be utilised for the purposes of remediating the site: • The Preliminary Remediation Action Plan (PB, 2014a) • The Validation Plan – Principles (Golder, 2015b) • The Demolition and Remediation Specification (Golder 2015c) Any other contamination documentation prepared for the remediation activities undertaken for MPW Early Works (Stage 1).	**JBS&G 2022**	Currently Stage 2 works are completed and have been completed in accordance with the RAP (Golder 2016) and MPW TLEMP (EP Risk 2020a). The outcomes of the remediation are documented in the Validation Report (JBS&G 2022) under review by the Site NSW EPA Accredited Auditor.
6C	The CEMP would include the preparation of a site-wide UXO, EO, and EOW management plan (or equivalent) based on the UXO Risk Review and Management Plan (G-Tek, 2016). This plan would be implemented to address the discovery of UXO or EOW during construction, to ensure a safe environment for all staff, visitors and contractors.	**CEMP**	The plan outlines the review and actions required to manage any unexpected finds in relation to the UXO Risk.
6D	An Asbestos in Soils Management Plan (AMP) is to be implemented as part of the CEMP in accordance with the Safe Work NSW requirements, including but not limited to: • the Guidelines for Managing asbestos in or on soil (2014), and • Codes of Practice - How to Safely Remove Asbestos (2011) and How to Manage and Control Asbestos in the Workplace (2011).	**Golder 2016b**	The asbestos in soils management plan has been developed in accordance with current Guidelines and codes of practice.
6E	An Acid Sulfate Soils Management Plan (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). In addition, a risk assessment quantifying the risks associated with the volumes of soil to be disturbed, the laboratory results from ASS testing	**EP Risk 2020b**	A separate ASSMP has been prepared for the Site.

Table C1 – Conditions of Consent (CoC) – SSD 7709			
CoC / FCMM	**Requirement**	**Document Reference**	**How Addressed**
	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).		
6F	The existing groundwater monitoring undertaken for the Proposal would continue. A GMP would be developed at the conclusion of remediation activities for the Proposal and included as part a Long-Term Environmental Management Plan (LTEMP) (to be prepared for approval by the Accredited Site Auditor and in association with the OEMP). The main purpose of the GMP would be to assist in the management of groundwater contamination (particularly PFAS impacts) at the site, and to minimise potential harm to human health and the environment. The GMP would achieve the following objectives: Establish whether the residual groundwater contamination plume is shrinking, stable, or increasing, and whether natural attenuation and/or migration is occurring according to expectations through line-of-evidence collection Provide appropriate groundwater investigation levels (GILs) for groundwater contaminants, in accordance with the National Environment Protection (Assessment of Site Contamination) Measure 1999 (ASC NEPM). Should exceedances be identified, contingency plans for further investigations or remediation would be prepared. Provide appropriate trigger levels for key contaminants (where available), based on the receptor of interest and identified contaminants	**EMP 12**	A groundwater sampling strategy is included in **EMP 12**.

Table C1 – Conditions of Consent (CoC) – SSD 7709			
CoC / FCMM	**Requirement**	**Document Reference**	**How Addressed**
	Serve as a compliance program, so that potential impacts to down-gradient receptors are identified before adverse effect occurs (relative to above objectives) Detect changes in environmental conditions (e.g. hydrogeologic, geochemical or other changes) that may reduce the efficacy of any natural attenuation processes or that could lead to a change in the nature of impact. Establish groundwater conditions (i.e. concentrations and/or trends) which indicated that groundwater monitoring could be reduced or ceased and the requirements of the GMP absolved. The monitoring program is to be undertaken for two years post operation of the Proposal to ensure a range of seasonal and river flow variations is assessed. At the completion of the two-year period, subject to analysis of results, consideration would be given to whether this monitoring is required to continue. The approach to PFAS management will be confirmed following further monitoring in consultation with, and the approval of, the NSW EPA Accredited Site Auditor.		
6H	At the conclusion of remediation works, a Remediation and Validation Report (RVR) is to be prepared for the Proposal to facilitate the Auditor's review of remediation and validation activities. The RVR is to document the remediation and validation activities completed within specific areas of the Proposal, including: • Information relating to the materials used in the separation layers such as the soil types, geotextile materials, and sealant types etc. (if required) • An as-constructed plan of the site showing the locations, depths and materials of the separation layers installed at the site.	**JBS&G 2022**	Currently Stage 1 works are completed and have been completed in accordance with the RAP (Golder 2016a) and MPW LTEMP (EP Risk 2020a). The outcomes of the remediation are documented in the Validation Report (JBS&G 2022) under review by the Site NSW EPA Accredited Auditor.

Table C1 – Conditions of Consent (CoC) – SSD 7709			
CoC / FCMM	**Requirement**	**Document Reference**	**How Addressed**
6I	The existing site-wide Long-Term Environmental Management Plan (LTEMP), such as the one established at the completion of Early Works, is to be revised at the completion of the Proposal remediation activities to include protocols for ongoing maintenance and/or monitoring or any long term remedial/mitigation measures to be implemented following completion of the Site Audit Statement.	**This Plan**	Provides requirements to revise the LTEMP post construction.
6J	In order to accept fill material onto site, the following will be undertaken: • Material characterisation reports/certification showing that the material being supplied is VENM/ENM must be provided. Each truck entry will be visually checked and documented to confirm that only approved materials that are consistent with the environmental approvals are allowed to enter the site. Only fully tarped loads are to be accepted by the gatekeeper. Environmental Assurance of imported fill material will be conducted to confirm that the materials comply with the NSW EPA Waste Classification Guidelines and the Earthworks Specification for the MPW site. The frequency of assurance testing will be as nominated by the Environmental assuror/auditor.	**Golder 2016 RAP** **EMP 4**	Both requirements for the acceptance of fill are stated within this section.
7A	The following measures would be included in the CEMP (or equivalent) to minimise hazards and risks: • Procedures for safe removal of asbestos • Provision for safe operational access and egress for emergency service personnel and workers would be provided at all times An Incident Response Plan that would include a Spill Management Procedure.	**CEMP**	This plan includes procedures for the safe removal of asbestos. The remaining two requirements are not the scope of this plan.

Table C1 – Conditions of Consent (CoC) – SSD 7709			
CoC / FCMM	**Requirement**	**Document Reference**	**How Addressed**
12A	The following mitigation measures would be implemented as part of the CEMP (or equivalent) for waste management: • Characterisation of construction waste streams in accordance with the NSW Waste Classification Guidelines • Management of any identified hazardous waste streams • Procedures to manage construction waste streams, including handling, storage, classification, quantification, identification and tracking • Mitigation measures for avoidance and minimisation of waste materials Procedures and targets for re-use and recycling of waste materials.	**CEMP**	To be included in the CEMP
OB	The CEMP, or equivalent, for the Proposal would be based on the PCEMP (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	**CEMP**	CEMP prepared by the Principal Contractor during construction

Table C1 – Conditions of Consent (CoC) – SSD 7709			
CoC / FCMM	**Requirement**	**Document Reference**	**How Addressed**
	• Construction Soil and Water Management Plan (SWMP), prepared in accordance with Managing Urban Stormwater, 4th Edition, Volume 1, (2004) • ESCP • 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)		
5A	A SWMP and ESCP, or equivalent, would be prepared for the Proposal. The SWMP and ESCPs would be prepared in accordance with the principles and requirements of the Blue Book and based on the Preliminary ESCPs provided in the Stormwater and Flooding Assessment Report (refer to Appendix R of the EIS). The following aspects would be addressed within the SWMP and ESCPs: Stockpiles would be located away from flow paths on appropriate impermeable surfaces, to minimise potential sediment transportation. Where practicable, stockpiles would be stabilised if the exposed face of the stockpile is inactive more than ten days, and would be formed with sediment filters in place immediately downslope	**CEMP**	While this plan is separate to the SWMP and ESCP it does include this requirement for the management of stockpiles.
5I	Stockpile sites established during construction are to be managed in accordance with stockpile management principles set out in Appendix L of this RtS. Mitigation measures within the Stockpile Management Protocol include: In order to accept fill material onto site, material characterisation reports/certification showing that the material being supplied is virgin	**EMP 4, EMP 7** and **CEMP**	These measures have been included in the LTEMP.

Table C1 – Conditions of Consent (CoC) – SSD 7709			
CoC / FCMM	**Requirement**	**Document Reference**	**How Addressed**
	excavated natural material (VENM) / excavated natural material (ENM) must be provided. Each truck entering the Site will be visually checked and documented to confirm that only approved materials that are consistent with the environmental approvals are allowed to enter the site. Only fully tarped loads are to be accepted by the gatekeeper. Environmental Assurance of imported fill material will be conducted to confirm that the materials comply with the NSW EPA Waste Classification Guidelines and the Earthworks Specification for the MPW site. The frequency of assurance testing will be as nominated by the Environmental assuror/auditor. All trucks accessing the site for the purpose of clean general fill importation would enter and exit via the existing main Site access located from Moorebank Avenue. Ingress and egress to the stockpiling areas would be arranged so that the reversing of trucks within the site is minimised. Stockpiles would not exceed ten-metres in height from the final site levels, with battered walls at gradients of 1V:3H For any stockpile heights greater than 4 m, benching would be implemented. Where reasonable and feasible, and to minimise the potential for erosion and sedimentation of stockpile(s), stockpile profiles would typically be at angle of repose (the steepest angle at which a sloping surface formed of loose material is stable) with a slight concave slope to limit the loss of sediments off the slope, or through the profile and the formation of a toe drain. The top surface of the stockpile(s) would be slightly sloped to avoid ponding and increase run off. Topsoil stockpiles would be vegetated to minimise erosion.		

Table C1 – Conditions of Consent (CoC) – SSD 7709			
CoC / FCMM	**Requirement**	**Document Reference**	**How Addressed**
	Stockpiles would be protected from upslope stormwater surface flow through the use of catch drains, berms, or similar feature(s) to divert water around the stockpile(s). A sediment control device, such as a sediment fence, berm, or similar, would be positioned downslope of the stockpile to minimise sediment migration. Any water seepage from stockpiles would be directed by toe drains at the base of the stockpiles toward the sediment basins or check dams and away from the emplacement or extraction working face. Newly formed stockpiles would be compacted (sealed off) using a smooth drum roller at the end of each working day to minimise water infiltration. Haul roads would be located alongside the stockpile to the work/tipping area. As per best practice, the catchment area of haul roads for surface water runoff would be approximately 2530 m lengths, facilitated by the provision of spine drains which would convey water from the haul road to toe drains at the base of the stockpile, and then to sediment basins. Temporary sediment basins would be established in accordance with the ESCP prepared for the site. Stockpiling of clean fill material is to be carried out during Works Period A (pre-construction) and Works Period D (bulk earthworks). Any imported clean general fill material that would be subject to stockpiling within the Proposal site for more than a 10-day period without being worked on, would be subject to stabilisation works, to minimise the potential for erosion. Where the material being stockpiled is less coarse or has a significant component of fines then surface and slope stabilisation would be		

Table C1 – Conditions of Consent (CoC) – SSD 7709			
CoC / FCMM	**Requirement**	**Document Reference**	**How Addressed**
	undertaken. Methods for slope stabilisation may include one or a combination of the following: – Application of a polymer to bind material together – Application of hydro-seed or hydromulch – Covering batters with mulch to provide ground cover – Covering batters with geofabric – Use of a simple sprinkler system for temporary stockpiles, including use of radiating sprinkler nozzles to maintain fine spray over exposed surfaces – Other options identified by the Contractor Topsoil stockpiles would be seeded with a grass/legume or nitrogen fixing species (such as acacia) to assist in erosion control and reduce loss of beneficial soil nutrients and micro-organisms		

Table C2 – Conditions of Approval (CoA) – EPBC 2011/6086			
CoA	**Reference**	**Condition Requirement**	**Document Reference and How Addressed**
8a)	MPW Concept EIS, Soil and Contamination PEMF Section 6.2 – Management controls – Early Works and Construction phase	Contaminated soil/fill material present will be 'chased out' during the excavation works based on visual, olfactory and preliminary field test results.	**Section 3** provides an overview on the remaining contamination issues remaining at the Site. **Appendix B** – **EMP 5-9** describes the chase out of impacted soils and fill for unexpected finds.
		Excavated soil would be temporarily stockpiled, sampled and analysed for waste classification processes. Following receipt of waste classification results, the material would be transported to a licensed off-site waste disposal facility as soon as practicable to minimise dust and odour issue through storage of materials on-site	**EMP 4, EMP5, EMP 6, EMP 7**, **EMP 10** and **EMP 11**
		Stockpiled soils would be stored on a sealed surface and the stockpiled areas would be securely bunded using silt fencing to prevent silt laden surface water from entering or leaving the stockpiles or the Project site.	**EMP 2, EMP 3, EMP 4** and **EMP 5**
		All excavation works would be undertaken by licensed contractor experienced in remediation projects and the handling of contaminated soils.	**Section 4**
		All asbestos removal, transport and disposal must be performed in accordance with the Work Health and Safety Regulation 2011 (WH&S Regulation).	**EMP 3, EMP 4, EMP 5** and **EMP7**
		The removal works would be conducted in accordance with the National Occupational Health and Safety Commission Code of Practice for the Safe Removal of	**EMP 3, EMP 4, EMP 5** and **EMP7**

Table C2 – Conditions of Approval (CoA) – EPBC 2011/6086			
CoA	**Reference**	**Condition Requirement**	**Document Reference and How Addressed**
		Asbestos, 2nd Edition [NOHSC 2002 (2005)] (NOHSC 2005a).	
		An appropriate asbestos removal licence issued by WorkCover would be required for the removal of asbestos impacted soil.	**EMP 3, EMP 4, EMP 5** and **EMP7**
		Environmental management and WH&S procedures would be put in place for the asbestos removal during excavation to protect workers, surrounding residents and the environment.	**EMP 3, EMP 4, EMP 5** and **EMP7**
		Temporary stockpiles of asbestos containing material (ACM) soils would be covered to minimise dust and potential asbestos release	**EMP 3, EMP 4, EMP 5** and **EMP7**
		An asbestos removal clearance certification would be prepared by an occupational hygienist at the completion of the removal work. This would follow the systematic removal of asbestos containing materials and any affected soils from the Project site and validation of these areas (through visual inspection and laboratory analysis of selected soil samples).	**EMP 3, EMP 4, EMP 5, EMP 6, EMP7, EMP 10** and **EMP 11**
		Asbestos fibre air monitoring would be undertaken during the removal of the asbestos materials and in conjunction with the visual clearance inspection. The monitoring would be conducted in accordance with the National Occupational Health and Safety Commission Guidance Note on the Membrane Filter Method for the Estimating	**EMP 3, EMP 6** and **EMP 10**

Table C2 – Conditions of Approval (CoA) – EPBC 2011/6086			
CoA	**Reference**	**Condition Requirement**	**Document Reference and How Addressed**
		Airborne Asbestos Fibre, 2nd Edition [NOHSC 3003 (2005)] (NOHSC 2005b).	
		All stockpiles would be maintained in an orderly and safe condition. Batters would be formed with sloped angles that are appropriate to prevent collapse or sliding of the stockpiled materials.	**EMP 5**
		Stockpiles would be placed at approved locations and would be strategically located to mitigate environmental impacts while facilitating material handling requirements. Contaminated or potentially contaminated materials would only be stockpiled in unremediated areas of the Project site or at locations that did not pose any risk of environmental impairment of the stockpile area or surrounding areas (e.g. hardstand areas).	**EMP 5**
		Stockpiles would only be constructed in areas of the Project site that had been prepared in accordance with the requirements of the Project Preliminary RAP in Appendix G of Technical Paper 5 – Environmental Site Assessment (Phase 2), Volume 4. All such preparatory works would be undertaken prior to the placement of material in the stockpile. Stockpiles must be located on sealed surfaces such as sealed concrete, asphalt, high density polyethylene or a mixture of these, to appropriately mitigate potential cross contamination of underlying soil.	**EMP 5**
		The stockpiles of contaminated material would be covered with a waterproof membrane (such as polyethylene sheeting) to prevent increased moisture from rainwater	**EMP 5**

Table C2 – Conditions of Approval (CoA) – EPBC 2011/6086			
CoA	**Reference**	**Condition Requirement**	**Document Reference and How Addressed**
		infiltration and to reduce windblown dust or odour emission	
		Before the reuse of any material on-site, it would be validated so that the lateral and vertical extent of the contamination is defined	**EMP 2, EMP 3, EMP 6, EMP 10** and **EMP 11**
		Where required, contaminated materials and wastes generated from the Project remediation and construction works would be taken to suitable licensed offsite disposal facilities	**EMP 7**
8a)	MPW Concept EIS, Soil and Contamination PEMF Section 6.4– monitoring	Within each of the Project specific management plans, the private sector developer would need to detail what monitoring would be undertaken to ensure compliance with the following:	
		The Project's EIS, with respect to the commitments made as well as the management and mitigation measures proposed;	**EMP 17, EMP 18, EMP 19** and **EMP 20**
		Project approvals issued under the EPBC Act and EP&A Act;	Approval provided
		Contractual requirements established between MIC and the developer and operator for the Project;	N/A
		Other permits and/or licences required during the Project; and	N/A
		Objectives, targets and indicators as presented in this PEMF.	CEMP

Table C2 – Conditions of Approval (CoA) – EPBC 2011/6086			
CoA	**Reference**	**Condition Requirement**	**Document Reference and How Addressed**
8a)	MPW Concept EIS, Soil and Contamination PEMF Section 6.5 – Management response to incidents and non-compliances	Contaminated soil/spoil and hazardous materials have not been appropriately managed (i.e. classification, handling, storage, transport, and disposal).	**EMP 2, EMP 3, EMP 4, EMP 5, EMP 6** and **EMP 10**
8b) and c)	REMM 7A	To minimise the risk of leakages involving natural gas, liquid natural gas (LNG) and flammable and combustible liquids to the atmosphere: appropriate standards for a gas reticulation network, including AS 2944-1 (2007) and AS 2944-2 (2007), would be referred to in the detailed design process; correct schedule pipes would be used; a fire protection system would be installed if necessary for gas users; cathodic protection would be installed for external corrosion if appropriate; and access to the Project site would be secure.	CEMP
	REMM 7B	To minimise the risks of leakage of LNG and liquid petroleum gas (LPG) and flammable liquids during transport: materials would be transported according to the Australian Dangerous Goods (ADG) Code, relevant standards and regulations; and contractors delivering the gas would be trained, competent and certified by the relevant authorities	CEMP

Table C2 – Conditions of Approval (CoA) – EPBC 2011/6086			
CoA	**Reference**	**Condition Requirement**	**Document Reference and How Addressed**
	REMM 7C	To minimise hazards associated with venting of natural gas, LNG and LPG: LNG storage would be designed to AS/NZS 1596-2008 standards; access to the Project site would be secure; and significant separation distances to residences and other assets would be put in place	CEMP
8b) and c)	REMM 7D	Storage of flammable/combustible liquids would be carried out in accordance with AS 1940, with secondary containment in place and location away from drainage paths	CEMP
	REMM 7E	Standby or emergency generators and transformers would all have secondary containment	CEMP
	REMM 7F	Oil coolers would generally be located in areas where leaks and runoff are appropriately controlled at source or in a retention basin.	CEMP
	REMM 7I	No hazardous or regulated wastes would be disposed of onsite.	**EMP 4 and EMP 6**
	REMM 7J	All offsite disposals would be carried out by approved transport operators and to approved facilities	**EMP 6** and CEMP
	REMM 7K	Other dangerous goods, including any waste materials present on the Project site, would be suitably contained, with secondary containment and runoff controls implemented where appropriate to prevent leaks or spills	CEMP

Table C2 – Conditions of Approval (CoA) – EPBC 2011/6086			
CoA	**Reference**	**Condition Requirement**	**Document Reference and How Addressed**
		migrating to environmentally sensitive areas, in particular via stormwater systems that drain to the Georges River.	
	REMM 8B	Before construction, a remediation program would be implemented in accordance with the Moorebank Intermodal Terminal Preliminary Remediation Action Plan (RAP) (or equivalent). The program will have been formally reviewed and approved by the Site Auditor under Part 4 of the NSW Contaminated Land Management Act 1997 (CLM Act).	Currently Stage 1 works have been completed in accordance with the RAP (Golder 2016a) and MPW LTEMP (EP Risk 2020a). The outcomes of the remediation are documented in the JBS&G (2022) Summary Report under review by the Site NSW EPA Accredited Auditor. The remaining contamination is documented in this Plan in **Appendix A** along with the management measures in **Appendix B**
	REMM 8D	An unexploded ordnance (UXO) management plan (or equivalent) would be developed for the Project site. This plan would detail a framework for addressing the discovery of UXO or explosive ordnance waste (EOW) to ensure a safe environment for all Project staff, visitors and contractors.	**EMP 10**
	REMM 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).	EP Risk (2020b) has prepared an Acid Sulfate Soil Management Plan which has been included in the CEMP for Stage 2 works.
	REMM 8F	Further testing of residual sediments would be undertaken to gather data to inform the management of sediments likely to be disturbed/dewatered during construction.	Further testing of sediments has been undertaken by JBS&G 2018a[1] as part of greater MPW works during Stage 1.

[1] L144 (PFAS Soil Assessment - Swales and Basins) Rev 0. JBS&G April 2018.

Table C2 – Conditions of Approval (CoA) – EPBC 2011/6086			
CoA	**Reference**	**Condition Requirement**	**Document Reference and How Addressed**
	REMM 8G	Ground penetrating radar (GPR) or similar techniques would be used to locate and document all existing and underground tank infrastructure across the Project site.	This process was conducted as part of the Stage 1 MPW works and is documented in the validation report (JBS&G 2022).
	REMM 8H	A management tracking system for excavated materials would be developed to ensure the proper management of the material movements at the Project site, particularly during excavation works.	**EMP 3** and **EMP 4**
	REMM 8I	Contaminated soil/fill material present will be 'chased out' during the excavation works based on visual, olfactory and preliminary field test results.	**EMP 1, EMP 2, EMP 3, EMP 6, EMP 10** and **EMP 11**
	REMM 8J	Excavated soil would be temporarily stockpiled, sampled and analysed for waste classification processes. Subject to receipt of waste classification results, the material would be transported to a licensed offsite waste disposal facility as soon as practicable to minimise dust and odour issue through storage of materials on site.	**EMP 4** and **EMP 6**
8b) and c)	REMM 8K	Stockpiled soils would be stored on a sealed surface and the stockpiled areas would be securely bunded using silt fencing to prevent silt laden surface water from entering or leaving the stockpiles or the Project site	**EMP 2, EMP 3, EMP 4, EMP 5, EMP 6** and **EMP 10**
	REMM 8L	All excavation works associated with potential contaminated lands would be undertaken by licensed contractors, experienced in remediation projects and the handling of contaminated soils.	**Section 4**

Table C2 – Conditions of Approval (CoA) – EPBC 2011/6086			
CoA	**Reference**	**Condition Requirement**	**Document Reference and How Addressed**
	REMM 8M	All asbestos removal, transport and disposal would be performed in accordance with the Work Health and Safety Regulation 2011 (WHS Regulation)	**EMP3, EMP 5, EMP 6, EMP 8** and **EMP 10**
	REMM 8N	The removal works would be conducted in accordance with the National Occupational Health and Safety Commission Code of Practice for the Safe Removal of Asbestos, 2nd Edition [NOHSC 2002 (2005)] (NOHSC 2005a).	**EMP3, EMP 5, EMP 6, EMP 8** and **EMP 10**
	REMM 8RO	An appropriate asbestos removal licence issued by WorkCover NSW would be required for the removal of asbestos contaminated soil.	**EMP3, EMP 5, EMP 6, EMP 8** and **EMP 10**
	REMM 8P	Environmental management and WHS procedures would be put in place for the asbestos removal during excavation to protect workers, surrounding residents and the environment.	**EMP3, EMP 5, EMP 6, EMP 8** and **EMP 10**
	REMM 8Q	Temporary stockpiles of asbestos containing material (ACM) soils would be covered to minimise dust and potential asbestos release	**EMP 3, EMP 5** and **EMP 10**
	REMM 8R	An asbestos removal clearance certification would be prepared by an occupational hygienist at the completion of the removal work. This would follow the systematic removal of asbestos containing materials and any affected soils from the Project site, and validation of these areas (through visual inspection and laboratory analysis of selected soil samples)	**EMP 3, EMP 6, EMP 10** and **EMP 11**

Table C2 – Conditions of Approval (CoA) – EPBC 2011/6086			
CoA	**Reference**	**Condition Requirement**	**Document Reference and How Addressed**
8b) and c)	REMM 8S	Asbestos fibre air monitoring would be undertaken during the removal of ACMs and in conjunction with the visual clearance inspection. The monitoring would be conducted in accordance with the National Occupational Health and Safety Commission Guidance Note on the Membrane Filter Method For the Estimating Airborne Asbestos Fibre, 2nd Edition [NOHSC 3003 (2005)] (NOHSC 2005b).	**EMP 3**, **EMP 6** and **EMP 10**
	REMM 8T	All stockpiles would be maintained in an orderly and safe condition. Batters would be formed with sloped angles that are appropriate to prevent collapse or sliding of the stockpiled materials	**EMP 5**
	REMM 8U	Stockpiles would be placed at approved locations and would be strategically located to mitigate environmental impacts while facilitating material handling requirements. Contaminated or potentially contaminated materials would only be stockpiled in unremediated areas of the Project site or at locations that did not pose any risk of environmental impairment of the stockpile area or surrounding areas (e.g. hardstand areas)	**EMP 5**
	REMM 8V	Stockpiles would only be constructed in areas of the Project site that had been prepared in accordance with the requirements of the Project Preliminary RAP in Appendix G of Technical Paper 5 – Environmental Site Assessment (Phase 2), Volume 5A and 5B. All such preparatory works would be undertaken before material is placed in the stockpile. Stockpiles must be located on sealed surfaces such as sealed concrete, asphalt, high density	**EMP 5**

Table C2 – Conditions of Approval (CoA) – EPBC 2011/6086			
CoA	**Reference**	**Condition Requirement**	**Document Reference and How Addressed**
		polyethylene or a mixture of these, to appropriately mitigate potential cross contamination of underlying soil	
8b) and c)	REMM 8W	Any stockpiles of contaminated material would be covered with a waterproof membrane (such as polyethylene sheeting) to prevent increased moisture from rainwater infiltration and to reduce windblown dust or odour emission	**EMP 5**
	REMM 8X	Before the reuse of any material on site, it would be validated so that the lateral and vertical extent of the contamination is defined.	**EMP 2, EMP 3, EMP 10** and **EMP 11**
	REMM 8Y	Where required, contaminated materials and wastes generated from the Project remediation and construction works would be taken to suitable licensed offsite disposal facilities	**EMP 7**
	REMM 8Z	Where necessary, consider undertaking further investigations to determine whether other buildings have organochlorine pesticides (OCP) impacts subgrade materials, and to quantify the volume of OCP impacted materials across the site	Not relevant as all buildings have been removed as part of the Stage 1 Early Works.
	REMM 8AA	Additional Aqueous Film Forming Foam assessment (AFFF) be undertaken to determine if any direct remedial and/or management actions are required. A stage approach is considered appropriate and is detailed in the Preliminary AFFF Assessment (Golder Associates 2015b).	Additional PFAS Investigations have been undertaken on the Site and are summarised by EP Risk (2018) and ongoing requirements presented in **Appendix B**.
8 d)	-	In relation to management of PFAS:	

Table C2 – Conditions of Approval (CoA) – EPBC 2011/6086			
CoA	**Reference**	**Condition Requirement**	**Document Reference and How Addressed**
	i)	be consistent with: • National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) (ASC NEPM 2013). • Australian and New Zealand Guidelines for Fresh and Marine Water Quality (under the National Water Quality Management Strategy) including the draft default guideline values for perfluorooctanoic acid (PFOS) and perfluorooctane sulfonic acid (PFOA) in freshwater as applied by the State government • relevant Commonwealth environmental management guidance on PFOS and PFOA	**Section 4** and **Appendix B** of this Plan are consistent with these guidelines (where relevant).
	ii)	detail implementation and operational procedures, appropriate to the risk posed by any contamination, including: • roles and responsibilities • management of potential PFAS contaminated sites as yet un-investigated • management of areas of known PFAS contamination, including strategies to reduce runoff, dewatering and migration of contamination across and off the proposed site • a contingency action plan for unexpected PFAS contaminant discoveries	**Section 4.1** EP Risk (2018) **EMP 2, EMP 3, EMP 4, EMP 5, EMP6, EMP 7, EMP 8, EMP 9, EMP 10, EMP 12, EMP 13 and EMP 16**
	iii)	detail soil, groundwater and surface water PFAS contamination monitoring requirements and testing and	**EMP 12** and **EMP 13**

Table C2 – Conditions of Approval (CoA) – EPBC 2011/6086			
CoA	**Reference**	**Condition Requirement**	**Document Reference and How Addressed**
		disposal procedures appropriate to the risk posed by any contamination	
	iv)	include requirements for site validation reports appropriate to the risk posed by any contamination	Golder 2016a RAP
	v)	include requirements for remedial action plans appropriate to the risk posed by any contamination	Golder 2016a RAP
	vi)	detail review procedures appropriate to the risk posed by any contamination	**EMP 19**
	vii)	impose the following performance measures for managing earthworks and the potential for effects to occur due to disturbance of PFAS contaminated soils during construction: • contaminated sediment to be discharged outside the site of the action to be minimised • contaminated waste material, including excavated soil, to be released through dewatering to be handled appropriately to the risk posed by the contamination and disposed of in an environmentally sound manner such that potential for the PFAS content to enter the environment is minimised contaminated waste material, including excavated soil, with a PFOS or PFOA content above 50 milligrams per kilogram (mg / kg) to be stored or disposed of in an environmentally sound manner, such that PFAS content does not enter the environment	**Appendix B**

Table C2 – Conditions of Approval (CoA) – EPBC 2011/6086			
CoA	**Reference**	**Condition Requirement**	**Document Reference and How Addressed**
		• all soil remaining at the site of the action to be suitable for purpose	

Appendix D
UNEXPECTED FINDS PROTOCOL

Construction

UNEXPECTED FINDS PROTOCOL

Moorebank Precinct West Stage 2

02 AUGUST 2019

SYDNEY INTERMODAL TERMINAL ALLIANCE

Moorebank Precinct East Stage 2

Unexpected Finds Protocol

[redacted]

Author [redacted]

Checker [redacted]

Approver [redacted]

Report No MIC2-QPMS-EN-APP-00022

Date 27/08/2019

Revision Text 005

Author Details

Author Details	Qualifications and Experience
[redacted]	PhD Molecular and Cellular Biology BS Biochemistry [redacted] has over 15 years of experience including post-approval environmental management and compliance on large infrastructure projects.

REVISIONS

Revision	Date	Description	Prepared by	Approved by
001	27/07/2018	Draft for review	[redacted]	[redacted]
002	14/09/2018	Second draft for client review	[redacted]	[redacted]
003	26/10/2018	Issued for ER Review	[redacted]	[redacted]
004	02/08/2019	Updated based on Conditions of Consent	[redacted]	[redacted]
005	27/08/2019	Updated to reflect the CFFMP	[redacted]	[redacted]

ACRONYMS AND DEFINITIONS

Acronym/Term	Meaning
BAR	Biodiversity Assessment Report
CFFMP	Construction Flora and Fauna Management Plan
CoCs	Conditions of Consent
DoTEE	Commonwealth Department of the Environment and Energy
EM	Contractor's Environment Manager
EP&A Act	*Environmental Planning and Assessment Act, 1979*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
MPW	Moorebank Precinct West
OEH	NSW Office of Environment and Heritage
PE	Project Ecologist
PFAS	Per & Poly-Fluoroalkyl Substances
RCMM	Revised Compilation of Mitigation Measures
SIMTA	Sydney Intermodal Terminal Alliance
SSD	State significant development
UFP	Unexpected Finds Protocol

CONTENTS

APPENDICES

LIST OF TABLES

1 INTRODUCTION

The Sydney Intermodal Terminal Alliance (SIMTA) received approval for the construction and operation of Stage 2 of the Moorebank Precinct West (MPW) Project (SSD 7709), which comprises the second stage of development under the MPW Concept Approval (SSD 5066). This Unexpected Finds Protocol (UFP) has been developed to manage the unexpected discovery of contamination within imported spoil, heritage items, threatened flora and fauna, and onsite contamination during the construction phase of Stage 2 of the Moorebank Precinct West (MPW) Project (the Project).

Within this protocol, a strategy has been established to demonstrate the Construction Contractor's approach to the management of unexpected discoveries.

1.1 Objectives and Targets

Refer to Table 1 for high level objectives and targets set for the Project for the management of unexpected discoveries.

Table 1 Objectives and Targets

Objective	Target	Timeframe	Accountability
To implement the unexpected finds protocol to minimise impacts of imported spoil	STOP works in 100% cases where potential contamination is identified in accordance with the Unexpected (Contamination within Imported Spoil) Finds Protocol (Appendix A)	Duration of works	Contractor's CM
To implement the unexpected finds protocol to minimise impacts on unknown heritage items	STOP works in 100% cases where potential heritage is identified in accordance with the Unexpected (Heritage) Finds Protocol (Appendix B)	Duration of works	Contractor's CM
To implement the unexpected finds protocol to minimise impacts on threatened flora and/or fauna species or threatened ecological communities that have not been previously recorded within the Project Site	Stop relevant works in 100% of cases where potential threatened flora and/or fauna species or threatened ecological communities are identified in accordance with the Unexpected (Biodiversity) Finds Protocol (Appendix C)	Duration of works	Contractor's CM
To implement the unexpected finds protocol to minimise the impacts of onsite contamination that has not previously been recorded within the Project site.	Stop relevant works in 100% of cases where potential contamination is identified in accordance with the Unexpected Finds (Onsite Contamination) Protocol (Appendix D)	Duration of works	Contractor's CM

2 ENVIRONMENTAL MANAGEMENT

2.1 Compliance Matrices

The Project is being delivered under Part 4, Division 4.7 of the *Environmental Planning and Assessment Act, 1979* (EP&A Act). The Conditions of Consent (CoCs) include requirements to be addressed in this protocol and delivered during the Project. These requirements, and how they are addressed are provided within Table 2.

Table 2 Conditions of Consent (CoCs)

CoC	Requirement	Plan Section	How Addressed
B174	Unexpected Ordnance (UXO), Exploded Ordnance (EO) and Exploded Ordnance Waste (EOW) protocols must be prepared by an UXO contractor listed on the Defence Panel of suitably qualified UXO consultants and contractors.	Appendix D	This Protocol
B175	The CEMP required under **Condition C2** must include an Unexpected Finds Protocol(s) for, but not limited to, contamination, ordnances, Aboriginal sites, non-indigenous heritage and flora and fauna.	Appendix B	This Protocol

The Revised Compilation of Mitigation Measures (RCMMs) were prepared as part of the Response to Submissions (Arcadis 2017). A list of the RCMMs as relevant to the Project and how they have been complied within this protocol are provided in Table 3.

Table 3 Revised Compilation of Mitigation Measures (RCMMs)

RCMM	Requirement	Document Reference
6A	The CEMP would identify the actions to be taken should additional contamination be identified during the development of the site (i.e. an unexpected finds protocol), and will address REMM items 8H, 8T, 8U, 8V and 8W (of the MPW Concept Approval (SSD 5066)).	Appendix D
9E	An unexpected finds procedure would be included in the ACHAR and in place for the construction phase of the Proposal.	Appendix B
9G	Consultation with RAPs would continue throughout the life of the Proposal, as necessary. Ongoing consultation with RAPs would take place throughout the reburial of retrieved artefacts and in the event of the discovery of any unexpected Aboriginal objects.	Appendix A Appendix B
10C	An unexpected finds protocol (or equivalent) would be included within the CEMP. If unexpected finds are identified during works, a suitably qualified archaeological consultant would be engaged to assess the significance of the finds and the NSW Heritage Council notified. In this instance, further archaeological work or recording may be required.	Appendix B

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) approval for the MPW Concept was granted by the Commonwealth Department of the Environment and Energy (DoTEE) in September 2016 (No. 2011/6086). This approval was provided for the impact of the MPW 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 Project has been designed to be consistent with the EPBC Act Approval conditions, where relevant. EPBC Act Approval conditions for the Project include specific conditions

and commitments that are required to be addressed in this UFP. These conditions relevant to this UFP are identified below in Table 4.

Table 4 Commonwealth Approvals

Commonwealth	Requirement	Document Reference
8	Sections of the CEMP and OEMP relating to contamination and soils must be prepared by a suitably qualified expert and must: … (d) in relation to management of PFAS: … ii) detail implementation and operational procedures, appropriate to the risk posed by any contamination, including: … • a contingency action plan for unexpected PFAS contaminant discoveries	Refer to the Moorebank Precinct West – Early Works Per & Poly-Fluoroalkyl Substances (PFAS) Management Plan

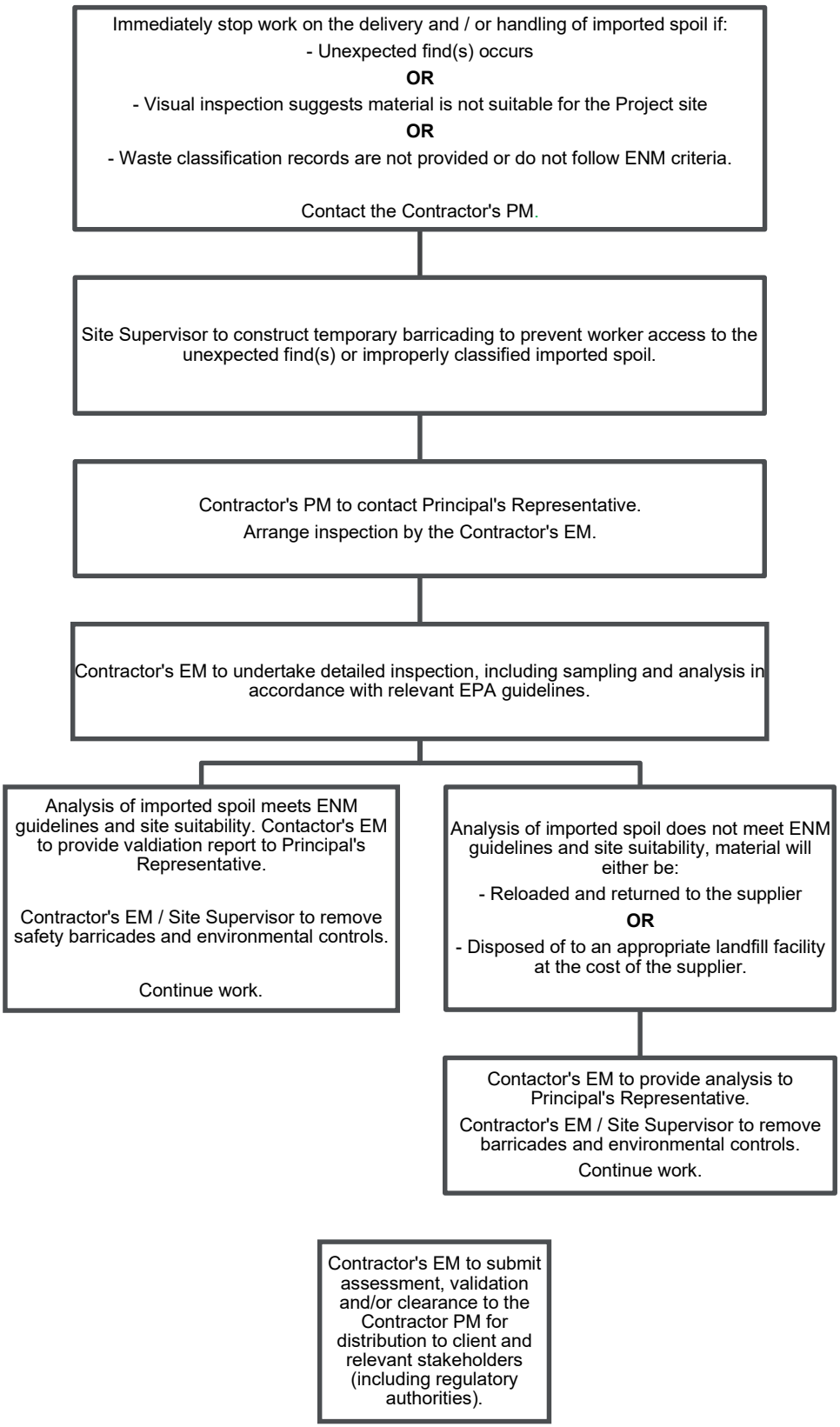
2.2 Unexpected Finds Protocols

Specific protocols for the discovery of unexpected finds have been developed for potential:

- Contamination within imported spoil
- Aboriginal and non-Aboriginal finds
- Threatened flora and/or fauna species or threatened ecological communities
- Onsite contamination including ordnance.

Each of these specific protocols is included in the following appendices.

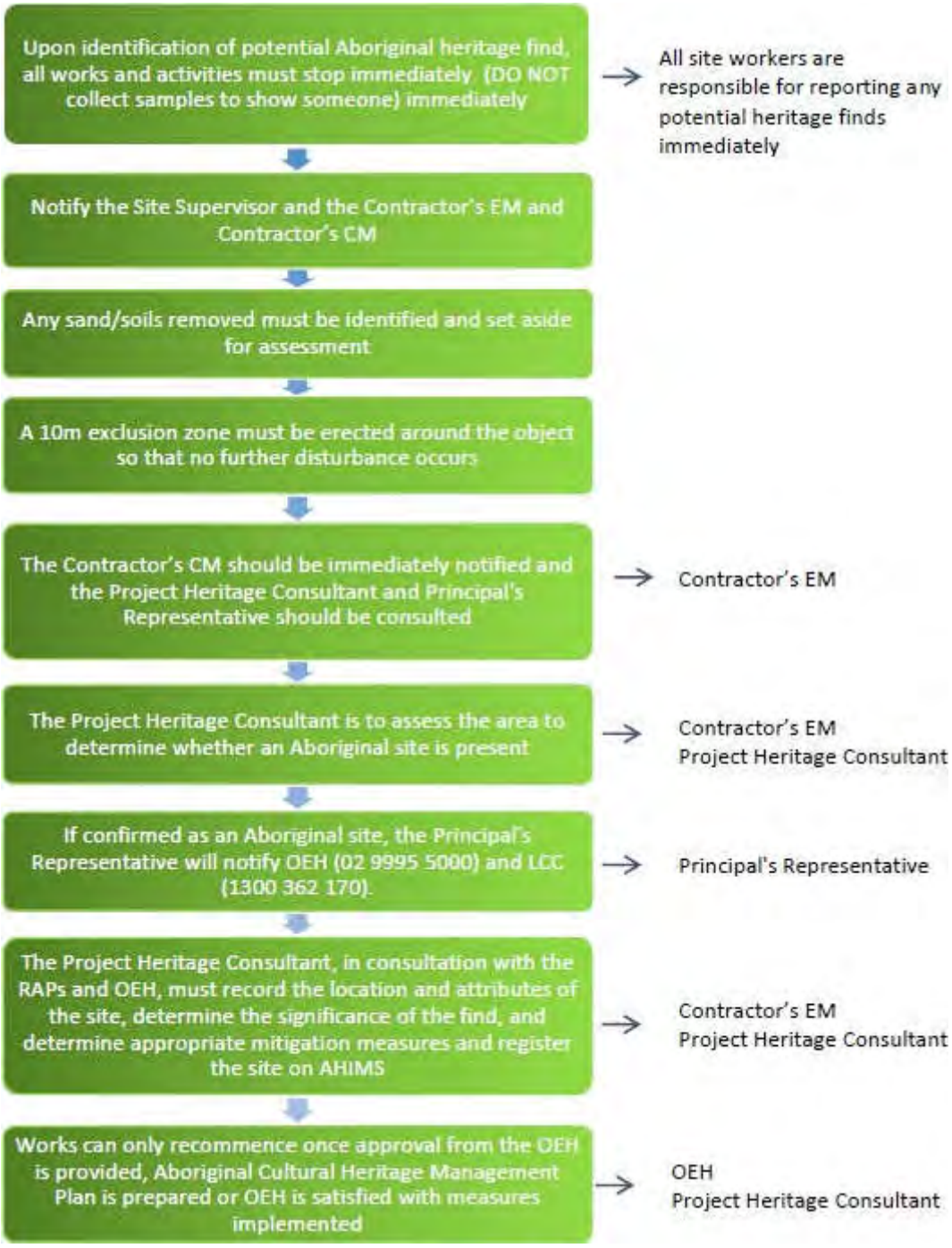
APPENDIX A UNEXPECTED (CONTAMINATION WITHIN IMPORTED SPOIL) FINDS PROTOCOL


Immediately stop work on the delivery and / or handling of imported spoil if:
- Unexpected find(s) occurs
OR
- Visual inspection suggests material is not suitable for the Project site
OR
- Waste classification records are not provided or do not follow ENM criteria.
Contact the Contractor's PM.
Site Supervisor to construct temporary barricading to prevent worker access to the unexpected find(s) or improperly classified imported spoil.
Contractor's PM to contact Principal's Representative.
Arrange inspection by the Contractor's EM.
Contractor's EM to undertake detailed inspection, including sampling and analysis in accordance with relevant EPA guidelines.
Analysis of imported spoil meets ENM guidelines and site suitability. Contactor's EM to provide valdiation report to Principal's Representative.
Contractor's EM / Site Supervisor to remove safety barricades and environmental controls.
Continue work.
Analysis of imported spoil does not meet ENM guidelines and site suitability, material will either be:
- Reloaded and returned to the supplier
OR
- Disposed of to an appropriate landfill facility at the cost of the supplier.
Contactor's EM to provide analysis to Principal's Representative.
Contractor's EM / Site Supervisor to remove barricades and environmental controls.
Continue work.
Contractor's EM to submit assessment, validation and/or clearance to the Contractor PM for distribution to client and relevant stakeholders (including regulatory authorities).

APPENDIX B UNEXPECTED (HERITAGE) FINDS

Unexpected (Heritage) Finds Protocol

Aboriginal Heritage



Examples of Potential Unexpected Aboriginal Finds

It is highly unlikely that any Aboriginal artefacts will be identified on the site due to the historical disturbance of the area. However, the most likely finds are isolated finds such as flaked stone tools.

Typical characteristics of flaked stone tools include:

- Sharp edges.
  - Retouch along one or more edges.
  - Stone rich in silica.

  - Stone type often different to the natural rock in the area.
- Flakes
  - Usually less than 50 mm long.
  - A ‘striking platform’ visible.
  - Impact point often present on the striking platform.
  - A ‘bulb of percussion’ often present below the striking platform.
  - May have been shaped into a recognisable tool form, such as a point or scraper.
- Cores
- May be fist-sized or smaller.
- May have one or more scars where flakes have been removed.

It is noted that not all features can be seen on each stone tool and some require an experienced eye to identify them. Breakage can remove key features.

Skeletal Remains

Non-Aboriginal Heritage

Note: In the context of this UFP, an unexpected find is defined as a previously unknown heritage item or evidence of heritage value. It does not include uncovering findings within previously identified potential archaeological deposits.

APPENDIX C UNEXPECTED (BIODIVERSITY) FINDS

Unexpected (Biodiversity) Finds protocol

Purpose

This Unexpected Finds Protocol explains the actions and measures to be implemented if any threatened flora and/or fauna species or threatened ecological communities that have not been previously recorded within the Project Site (as identified in the documents outlined in CoC A3) are identified during construction.

Training

All personnel undertaking construction activities within the Project site will be inducted on the identification of known and potential threatened species and ecological communities occurring on site, and will be trained in this protocol through Toolbox Talks or a site induction.

Protocol

Upon detection of a threatened species or ecological community during construction activities, the following steps must be followed.

1. **STOP ALL WORK** in the vicinity of the find. Immediately notify the Contractor's Environment Manager (Contractor's EM) who will notify the Project Ecologist (PE) and Principal's Representative. The project ecologist must confirm the presence of the threatened species.
2. **EXCLUSION ZONE.** In consultation with the PE, create a buffer zone/ exclusion zone around the find
3. **EXTERNAL NOTIFICATION.** Principal's Representative to notify OEH of previously unidentified species
4. **ASSESS IMPACT**. An assessment is to be undertaken by the Contractor's EM, PE and Principal's Representative in consultation with OEH to identify the flora and/or fauna species level, the likely impact to them and appropriate management options, such as re-location measures.
5. **OBTAIN APPROVALS**. Obtain any relevant licences, permits or approvals required if the threatened species / ecological community is likely to be significantly impacted. Consultation with OEH must be completed for any proposed amendments to the location or reclassification of threatened species, populations and ecological communities as identified in the updated BAR.
6. **RECOMMENCE WORKS**. Construction works may recommence once the Contractor's EM has:
    a. Obtained approvals as required, and
    b. Confirmed that all corrective actions and additional mitigation measures have been implemented.
7. **UPDATE PLANS AND PROCEDURES**. The Contractor's EM must ensure that the threatened species / ecological community is included in subsequent site plans and/or sensitive area drawings, inductions and Toolbox Talks. The Contractor's EM must provide information to enable an update of ecological monitoring and/ or biodiversity offset requirements

APPENDIX D UNEXPECTED (ONSITE CONTAMINATION) FINDS PROTOCOL

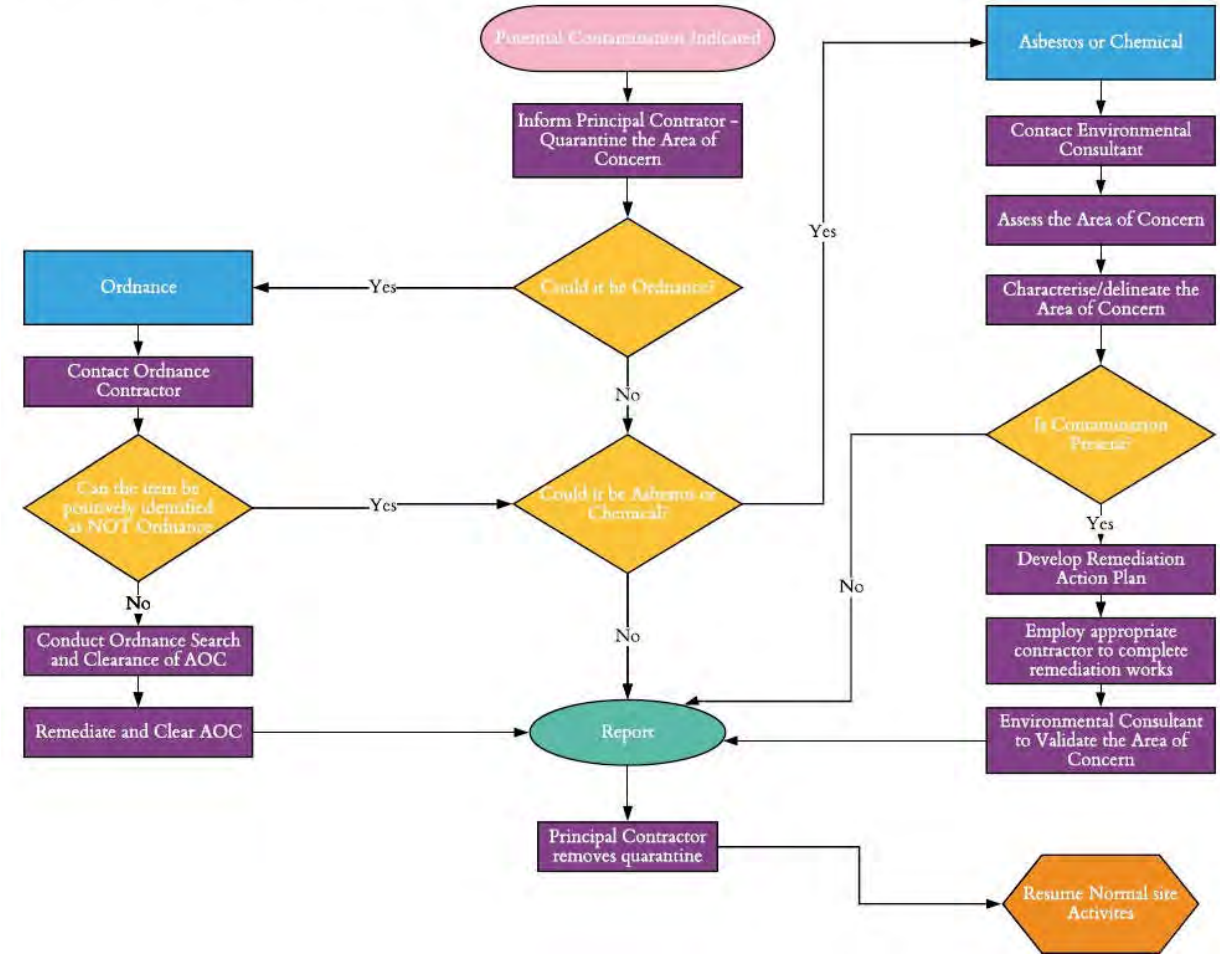
Potential Site Hazards

If you SEE or SMELL anything unusual

STOP WORK & contact Site Foreman

Do not restart work before the area has been investigated and cleared by an Environmental Consultant

Unexpected Finds Protocol (UFP)



Operation

8D – Process Report Form

Customer:		Report no:	
Report Title:			
Project Number:			
Project Description:			
Date Opened:		Updated:	
Team Leader:			
Team Members: (D1)			

Problem Description (D2)

Immediate Containment Action (D3)	Responsibility	Effective Date(s):

Verification of Containment Action (D3)	By Whom	Date(s):

Root Causes (D4)		% Contribution

Permanent Corrective/Preventative Action (Short and/or Long Term) (D5)	Responsibility	Effective Date(s):

Verification of Permanent Corrective/Preventative Action (D6)	By Whom	Date(s):

Prevent Recurrence / Lessons Learned (D7)

Signature & Congratulate Team (D8)		
Team Leader:		**Quality Systems Manager**
Date:		*for external customers*
		Other signatures - nominate as required **Date:**

WI_007

Appendix E

AEC 3 AND AEC 4 PLACEMENT SURVEY PLANS (JBS&G 2024)

NOTES:

ACM BASE PROOF ROLL

WH 4

ELEVATIONS

CLIENT: Georgiou

INTEGRAL SURVEYS

QUALITY RECORD			
REVIEW	NAME	SIGNATURE	DATE
SURVEYED BY	AL	-	08/03/2023
DRAWN BY	LS	-	06/02/2024
CHECKED	-	-	-
DATE CREATED	Tuesday, February 06, 2024		

FILE LOCATION: X:\190050 - BELL, Georgiou\01. 12d\1.2 Surveyors Projects\Adam Working Project\FIELD WORK BACKUP\TABLET BACKUP\Project Bell\Project Bell.dtm

SCALE: 1:1000

DATUM: A.H.D / M.G.A

PRECINCT INFRASTRUCTURE WORKS WEST

TITLE: MRW - Project Bell
Chatham Ave
Moorebank

THIRD ANGLE PROJECTION

Sheet No. 1

PLOT FILE: Page 1

PLOT TIME: Tuesday, February 06, 2024

12D PRJOJECT: Adam Field Work

PROJECT NO. 190050

NOTES:

ACM TOP OF CONTAMINATION

RL REPORT

WH3 & WH4

CLIENT: Georgiou

INTEGRAL SURVEYS

QUALITY RECORD			
REVIEW	NAME	SIGNATURE	DATE
SURVEYED BY	-	-	-
DRAWN BY	BK	-	28/08/2023
CHECKED	-	-	-
DATE CREATED	Mon Aug 28 08:55:09 2023		

FILE LOCATION: X:\190050 - BELL, Georgiou\01. 12d\1.1 Controlled Projects\SITEWIDE EARTHWORKS\New SP3A Placement Works WH3 and WH4

SCALE: 1:1000

DATUM: A.H.D / M.G.A

PRECINCT INFRASTRUCTURE WORKS WEST

TITLE: MRW - Project Bell Chatham Ave Moorebank

THIRD ANGLE PROJECTION

Sheet No. 1

PLOT FILE: Page 1

PLOT TIME: Mon Aug 28 08:55:09 2023

12D PRJOJECT: New SP3A Placement Works WH3 and WH4

PROJECT NO. 190050

NOTES:

MPW NORTHERN WAREHOUSES

SP 3A PLACEMENT AREA

PROOF ROLL

CLIENT:

Georgiou

INTEGRAL SURVEYS

QUALITY RECORD			
REVIEW	NAME	SIGNATURE	DATE
SURVEYED BY	BK	-	VRS
DRAWN BY	LS	-	25/01/2024
CHECKED	-	-	-
DATE CREATED	Thu Jan 25 15:59:08 2024		

FILE LOCATION: X:\190050 - BELL, Georgiou\01. 12d\1.1 Controlled Projects\SITEWIDE EARTHWORKS\New SP3A Placement Works WH3 and WH4

SCALE: 1:1250

DATUM: A.H.D / M.G.A

PRECINCT INFRASTRUCTURE WORKS WEST

TITLE

MRW - Project Bell
Chatham Ave
Moorebank

THIRD ANGLE PROJECTION

Sheet No. 1

PLOT FILE: Page 1

PLOT TIME: Thu Jan 25 15:59:08 2024

12D PRJOJECT: New SP3A Placement Works WH3 and WH4

PROJECT NO. 190050

NOTES:

MPW NORTHERN WAREHOUSES

SP 3A PLACEMENT AREA

PROOF ROLL

CLIENT:

Georgiou

INTEGRAL SURVEYS

QUALITY RECORD			
REVIEW	NAME	SIGNATURE	DATE
SURVEYED BY	BK	-	VRS
DRAWN BY	LS	-	25/01/2024
CHECKED	-	-	-
DATE CREATED	Thu Jan 25 15:59:08 2024		

FILE LOCATION: X:\190050 - BELL, Georgiou\01. 12d\1.1 Controlled Projects\SITEWIDE EARTHWORKS\New SP3A Placement Works WH3 and WH4

SCALE: 1:1250

DATUM: A.H.D / M.G.A

PRECINCT INFRASTRUCTURE WORKS WEST

TITLE

MRW - Project Bell
Chatham Ave
Moorebank

THIRD ANGLE PROJECTION

Sheet No. 1

PLOT FILE: Page 1

PLOT TIME: Thu Jan 25 15:59:08 2024

12D PRJOJECT: New SP3A Placement Works WH3 and WH4

PROJECT NO. 190050

NOTES:

WH 3 / 4

SP 3A MATERIAL PLACEMENT

CONFORMANCE ELEVATIONS

CLIENT: Georgiou

INTEGRAL SURVEYS

QUALITY RECORD			
REVIEW	NAME	SIGNATURE	DATE
SURVEYED BY	AL	-	VRS
DRAWN BY	LS	-	06/02/2024
CHECKED	-	-	-
DATE CREATED	Tuesday, February 06, 2024		

FILE LOCATION: X:\190050 - BELL, Georgiou\01. 12d\1.1 Controlled Projects\SITEWIDE EARTHWORKS\New SP3A Placement Works WH3 and WH4

SCALE: 1:1250

DATUM: A.H.D / M.G.A

PRECINCT INFRASTRUCTURE WORKS WEST

TITLE: MRW - Project Bell
Chatham Ave
Moorebank

THIRD ANGLE PROJECTION

Sheet No. 1

PLOT FILE: Page 1 | PLOT TIME: Tuesday, February 06, 2024 | 12D PRJOJECT: New SP3A Placement Works WH3 and WH4 | PROJECT NO. 190050

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X = 307910.006
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Coords:
X = 307641.226
Y = 6241474.688

Coords:
X = 307896.226
Y = 6241448.341

NOTES:

WAREHOUSE 3/4

SP3A PLACEMENT AREA

CURRENT SITE LEVEL

CLIENT: Georgiou

INTEGRAL SURVEYS

QUALITY RECORD			
REVIEW	NAME	SIGNATURE	DATE
SURVEYED BY	VRS	-	VRS
DRAWN BY	LS	-	08/02/2024
CHECKED	-	-	-
DATE CREATED	Friday, February 09, 2024		

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SCALE: 1:1000

DATUM: A.H.D / M.G.A

PRECINCT INFRASTRUCTURE WORKS WEST

TITLE: MRW - Project Bell
Chatham Ave
Moorebank

THIRD ANGLE PROJECTION

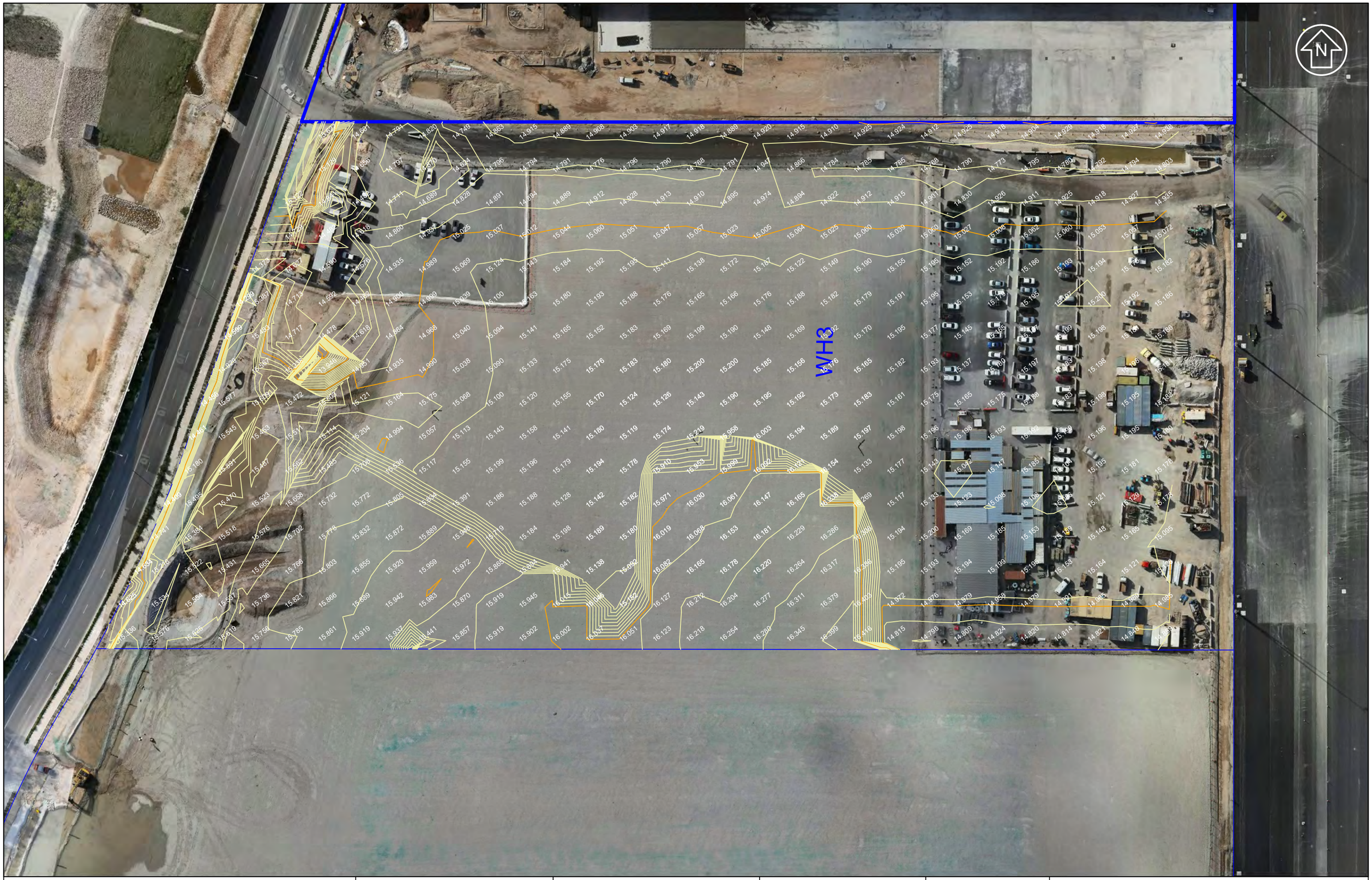
Sheet No. 1

PLOT FILE: Page 1

PLOT TIME: Friday, February 09, 2024

12D PRJOJECT: SITEWIDE EARTHWORKS

PROJECT NO. 190050



NOTES:

MPW MATERIAL PLACEMENT

TOP OF CONTAMINATION

WH3

CLIENT: Georgiou

INTEGRAL SURVEYS

QUALITY RECORD			
REVIEW	NAME	SIGNATURE	DATE
SURVEYED BY	VRS	-	VRS
DRAWN BY	LS	-	10/05/2024
CHECKED	-	-	-
DATE CREATED	Friday, May 10, 2024		

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SCALE: 1:1000

DATUM: A.H.D / M.G.A

PRECINCT INFRASTRUCTURE WORKS WEST

TITLE: MRW - Project Bell Chatham Ave Moorebank

THIRD ANGLE PROJECTION

Sheet No. 1

PLOT FILE: Page 1

PLOT TIME: Friday, May 10, 2024

12D PRJOJECT: New SP3A Placement Works WH3 and WH4

PROJECT NO. 190050

NOTES:

MPW NORTHERN WAREHOUSES
CONTAMINATION PLACEMENT
TOP OF CONTAMINATION

CLIENT:

Georgiou

INTEGRAL SURVEYS

QUALITY RECORD			
REVIEW	NAME	SIGNATURE	DATE
SURVEYED BY	AL/BK/JN	-	VRS
DRAWN BY	LS	-	25/01/2024
CHECKED	-	-	-
DATE CREATED	Thu Jan 25 14:32:31 2024		

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SCALE: 1:1250

DATUM: A.H.D / M.G.A

PRECINCT INFRASTRUCTURE WORKS WEST

TITLE: MRW - Project Bell
Chatham Ave
Moorebank

THIRD ANGLE PROJECTION

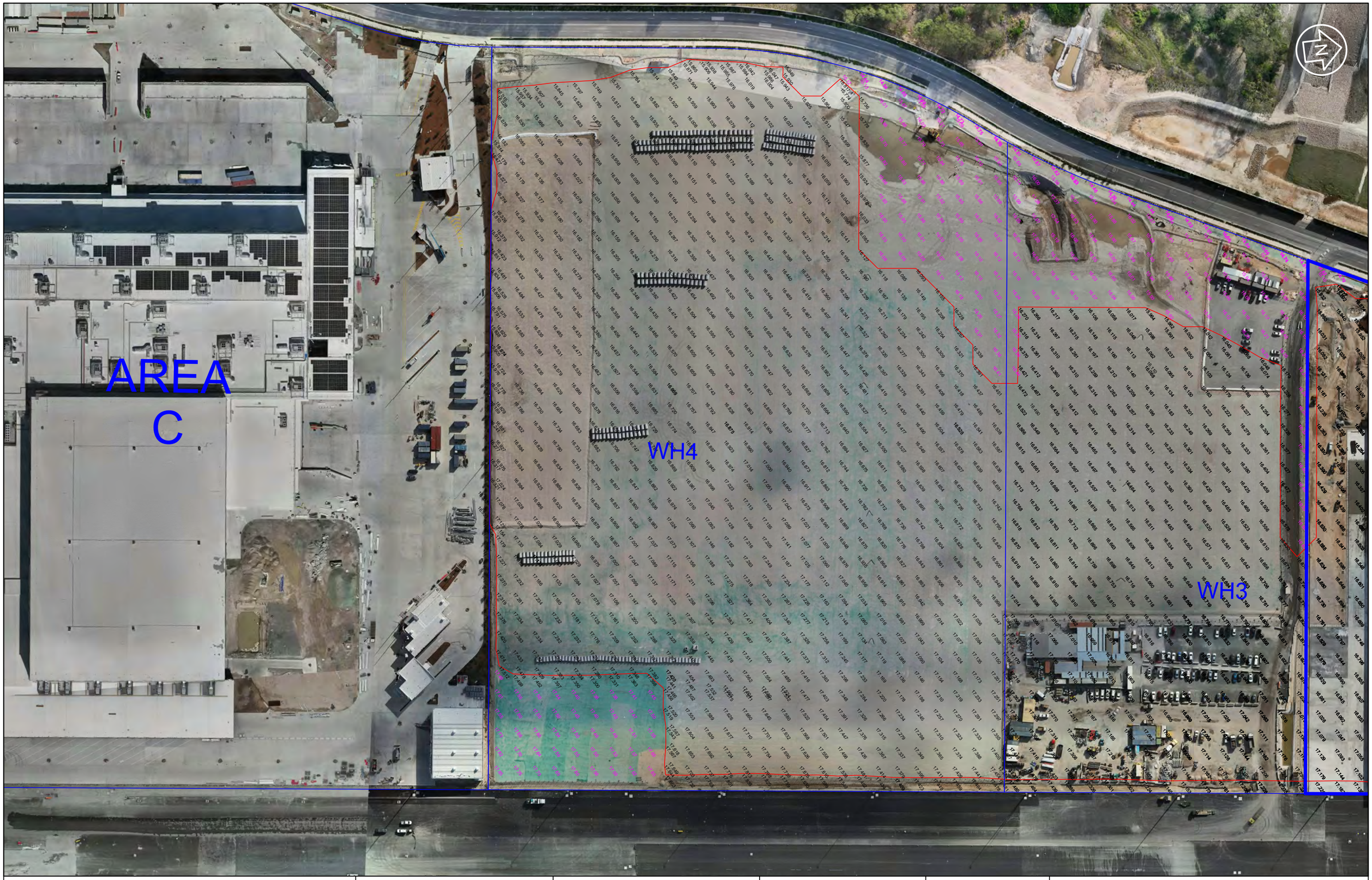
Sheet No. 1

PLOT FILE: Page 1

PLOT TIME: Thu Jan 25 14:32:31 2024

12D PRJOJECT: New SP3A Placement Works WH3 and WH4

PROJECT NO. 190050



NOTES:

SITEWIDE CONFORMANCES

NORTHERN LOTS

TRIMMED AREA

CLIENT:

Georgiou

INTEGRAL SURVEYS

QUALITY RECORD			
REVIEW	NAME	SIGNATURE	DATE
SURVEYED BY	VRS	-	VRS
DRAWN BY	LS	-	09/05/2024
CHECKED	-	-	-
DATE CREATED	Thursday, May 09, 2024		

FILE LOCATION: X:\190050 - BELL, Georgiou\01. 12d\1.1 Controlled Projects\SITEWIDE EARTHWORKS

SCALE: 1:1750

DATUM: A.H.D / M.G.A

PRECINCT INFRASTRUCTURE WORKS WEST

TITLE: MRW - Project Bell
Chatham Ave
Moorebank

THIRD ANGLE PROJECTION

Sheet No. 1

PLOT FILE: Page 1

PLOT TIME: Thursday, May 09, 2024

12D PRJOJECT: SITEWIDE EARTHWORKS

PROJECT NO. 190050

Appendix F
REPORTING REGISTERS

Appendix F

Table F-1: Incidents and Non-conformances Register

Name of Person Who Raised Issue	Date Raised	Category (Int Audit, NCR, Injury/Incident, System Imp, Inspection)	Details of Issue	Has it already been resolved? How?	What action was or will be taken to prevent recurrence of the problem or improve the system?	Responsibility	Verification Results: Action verified as effective? Verification outcomes	Open / Closed?	Name & date when action veified as effective

Appendix F

Table F-2: Complaints Register

Name of Person Who Complained	Date Raised	Contact details - address	Contact details - Phone	Contact details - email	Details of Complaint	Action taken to prevent recurrence of the problem or improve the system?	Responsibility	Verification Results: Action verified as effective? Verification outcomes	Open / Closed?	Name & date when action veified as effective

Appendix G
GROUNDWATER LEVELS

Table G1 - Groundwater Gauging

Well ID	Date	Easting	Northing	Well RL (m AHD)	Standing Water Level (mBTOC)	Reduced Water Level	Temp.	Electrical Cond.	DO	Redox	pH	Salinity	TDS	Intake Depth (m BTOC)	Comments
MW6013	22.06.18	307877.415	6241652.807	13.564	8.774	4.79	19.6	1001	0.21	38.4	5.81	0.49	650	11.07	Light brown, no sheen, no odour
MW7006A	13.06.18	307643.848	6241401.574	14.415	9.815	4.6	19.3	321.5	1.24	129.3	5.79	0.2	212.15	10.52	Clear, no sheen, no odour
MW7006B	14.06.18	307645.703	6241402.8	14.394	9.795	4.599	19.3	439.3	5.6	78.2	6.33	0.21	285.35	14.56	Clear, no sheen, no odour
JBS&G_MW05	16.01.19	307674.162	6241381.932	14.8	9.923	4.877	22.1	197	0.77	19.8	5.1	N/A	N/A	N/A	Brown, high turbidiy, no sheen or odours
JBS&G_MW06	15.01.19	307851.627	6241443.608	15.53	9.79	5.74	21.6	176.5	1.25	187.2	4.68	N/A	N/A	N/A	Colourless, clear, no sheen or odours
MW022															
Minimum Value				13.564	8.774	4.599	19.3	176.5	0.21	19.8	4.68	0.2	212.15		
Maximum Value				15.53	9.923	5.74	22.1	1001	5.6	187.2	6.33	0.49	650		
Average				14.5406	9.6194	4.9212	20.38	427.06	1.814	90.58	5.542	0.3	382.5		

Notes 1. MW022 was not referenced within the Site Wide Groundwater Assessment Report prepared by JBS&G, reference 51997-120679 (Rev 1) issued 22 July 2020.

Appendix H
ADDENDUM 02 (EP RISK 2023)

29 June 2023
Ref: EP1489.019_Addendum 02_v1

Logos Property Pty Ltd
Level 29 / Aurora Place
88 Phillip Street
Sydney NSW 2000
Via email: [redacted]

Attention: [redacted]

Addendum 02 – Moorebank Precinct West (MPW) Long-Term Environmental Management Plan (LTEMP) Version 12 – Engineered Fill in Warehouse PFAS Re-use Zone 3
400 Moorebank Avenue, Moorebank NSW

INTRODUCTION

Logos Property Pty Ltd (Logos) engaged EP Risk Management Pty Ltd (EP Risk) to prepare this Addendum (02) to the Moorebank Precinct West (MPW) Long-Term Environmental Management Plan (LTEMP) (EP Risk 2020[1]) for the reuse of soil with Per- and Poly-Fluoroalkyl Substances (PFAS) underneath the warehouse areas (Zone 3, EP Risk 2020) at 400 Moorebank Avenue, Moorebank NSW (the Site).

BACKGROUND

Environmental Risk Sciences Pty Ltd (enRiskS) prepared a risk assessment (EnRiskS 2020[2]) in relation to the reuse of PFAS in soil at the Site. EP Risk was subsequently engaged to prepare an LTEMP for the Site (EP Risk 2020) which was approved by the NSW Environmental Protection Authority (EPA) Accredited Site Auditor (Enviroview 2020[3]).

Prior to completion of filling works at the Site, EP Risk was engaged to prepare an Addendum (01) (EP Risk 2022[4]) to the MPW LTEMP (EP Risk 2022). The Addendum (01) refined the allowable reuse concentration of Perfluorooctane sulfonate (PFOS) within Zone 3 (Warehouse Areas) to return to ≤0.14 mg/kg and was approved by the Auditor via Interim Advice (Enviroview 2022[5]).

EnRiskS (2022[6]) was engaged to prepare a letter outlining a potential reduction to the minimum thickness and material changes of engineered fill within Zone 3 (EP Risk 2020) previously defined by EnRiskS (2020). EnRiskS (2022) concluded the following:

[1] EP Risk (2020), *Long-Term Environmental Management Plan, Moorebank Precinct West (MPW),* dated 27 October 2020 (ref: EP1489.001_v12).
[2] enRiskS (2020) *Moorebank Intermodal Terminal: LTEMP Material Reuse Risk Assessment for PFAS,* letter dated 9 October 2020.
[3] Enviroview (2020) *Stage 2 Works – Completion of Remediation Pre- Construction (Condition B169 Audit)* Moorebank Precinct West Moorebank Intermodal and Logistics Park (MLP) Moorebank Avenue, Moorebank, NSW, dated 20 November 2020 (ref: 600099_0301-2014)
[4] EP Risk (2022), *Addendum 01 – Moorebank Precinct West (MPW) Long-Term Environmental Management Plan (LTEMP) Version 12 – PFAS Re-use in Warehouse Areas 400 Moorebank Avenue, Moorebank NSW*, dated 1 September 2022 (ref: EP1489.012_LTR01_v1).
[5] Enviroview (2022), *RE: Site Audit Interim Advice 0301-2020-0_06 – Review of the EP Risk MPW LTEMP v12 Addendum 01 – PFAS Re-use in Warehouse Areas,* dated 20 September 2022 (ref: IA 0301-2020-0_06).
[6] enRiskS (2022), PFAS at MPW: engineered fill in the warehouse area, letter dated 14 October 2022.

1. *"The potential for the leaching of PFAS from re-used soil beneath inside and outside pavements is negligible; this means that the exposure pathway between PFAS in re-used soil beneath pavements and environmental receptors is incomplete, and there are no environmental risks following the re-use of soil.*
2. *The placement of engineered fill beneath inside and outside pavements, or any other management measures to manage leaching to the environment, is not considered necessary (although it is acknowledged that the placement of fill may be required for geotechnical reasons or site levelling).*
3. *The required thickness of engineered fill in areas not covered by pavements is as follows:*
    - *Engineered fill permeability of ≥1x10^{-7} m/s: ≥0.8 m; or*
    - *Engineered fill permeability of ≥1x10^{-8} m/s: ≥0.1 m; or*
    - *Engineered fill permeability ≥1x10^{-9} m/s: to ≥0.01m.*
4. *It is the permeability and depth of the engineered fill that determines leaching potential, not the type of fill per se, hence, all reviewed engineered fill types are considered appropriate for use so long as they comply with all other requirements including those specified in the LTEMP for total concentrations of PFAS.*
5. *It is acceptable to "mix and match" engineered fill types depending on availability and/or compaction and development considerations, to maximise project outcomes and the re-use of soil with PFAS at MPW, in accordance with the NSW waste hierarchy."*

The letter was reviewed by Enviroview (2022a[7]), who agreed with the abovementioned points with the exception of point 3: *"However, the auditor does not agree that either 10cm or 1cm of fill (as discussed), in the absence of a slab/pavement, would be sufficient (though it is noted that this is not specifically the consultant's recommendation)".* No further update to the enRiskS (2022) letter was recommended. Instead it was recommended an addendum to the LTEMP would be an adequate way to address engineered fill changes to the approved LTEMP.

JBS&G prepared a Technical Memo (JBS&G 2023[8]) for the capping of areas of PFAS reuse. The Technical Memo included a summary of previous information provided by EnRiskS (2022) and the LTEMP (EP Risk 2020) indicating:

- The risk assessment assumed a permeability value for engineered fill of around 1x10^{-7} m/s which related to mixtures of sand, silt and clay (likely uncompacted).
- *"In relation to proposed landscape areas a clay* (maximum permeability of 1x10^{-9} m/s) *cap of 0.5 m (or geosynthetic liner) is required,"* and "*a growth medium greater than the maximum root depth of vegetation above the clay (LTEMP 2020). However, reuse of PFAS under proposed landscape areas has not been finalised and therefore the extent of clay capping required (or equivalent geosynthetic liners) is not currently defined."* (JBS&G 2023).

[7] Enviroview (2022a), *RE: Site Audit Interim Advice 07 – Review of the EnRiskS letter discussing PFAS at MPW – engineered fill in the warehouse area,* dated 31 October 2022 (ref: IA 0301-2020-0_07).
[8] JBS&G (2023), *Technical Memo: Moorebank Precinct West (MPW) – Capping for Areas of PFAS Reuse, Moorebank Intermodal Precinct (MIP), NSW,* dated 6 March 2023 (ref: 58753-150453 (Rev 0)

Additional information provided by Pells Sullivan Meynink (PSM) (via email) was summarised by JBS&G as follows:

- *"Conservatively, imported shale fill would have a permeability in place of less than 10^{-8} m/s;*
- *The site won material is variable, varying between sand, silty sand, clayey sand to sandy clays. Site won clay or sandy clay is likely to have a permeability between $1x10^{-8}$ and $5x10^{-8}$ m/s. The clayey sands and silt sand probably has permeability in the order of $1x10^{-7}$ m/s;*
- *In relation to the EnRiskS estimate of minimum required thickness of Engineered Fill (October 2022), the geotechnical advice is that:*
    - *1 layer - 300 mm of imported shale would be sufficient to satisfy permeability requirements.*
    - *2 layers - 600 mm of site won clay and sandy clay would be sufficient. Some testing to confirm advice would be required.*
    - *Sandy site won material is unlikely to be suitable.*
- *Nevertheless, from a geotechnical suitability point of view, two layers of imported shale, or imported shale blended with site won or sandstone fill provides advantages regarding long term trafficability, reactivity, and potentially CBR."*

For landscaping areas, reworking of capping thickness may be required to satisfy EMP 13 of the MPW LTEMP (EP Risk 2020) during the construction phase (JBS&G 2023). JBS&G (2023) considered the placement of engineered fill to satisfy geotechnical requirements would satisfy the requirements of the LTEMP, and the placement of site imported materials and/or site won VENM / ENM would also be advantageous for the management of potential PFAS impacted stormwater runoff and infiltration.

Enviroview (2023[9]) reviewed the Technical Memo and reiterated advice within an earlier Interim Advice (Enviroview 2022a). The Auditor recommended EP Risk prepare this Addendum (02) to version 12 of the MPW LTEMP (EP Risk 2020) to be read in conjunction with the MPW LTEMP and Addendum 01 (EP Risk 2022), or relevant LTEMP for the land.

A copy of the enRiskS (2022), JBS&G (2023) and PSM (2023) email is provided within **Attachment 1- 3** (respectively).

[9] Enviroview (2023), *RE: Site Audit Interim Advice 0301-2020-0_11 – Review of the JBS&G Technical Memo – Capping for Areas of PFAS Reuse, MPW,* dated 23 March 2023 (ref: IA 0301-2020-0_11).

SUMMARY

EnRiskS (2022) proposed an "*Engineered fill permeability of ≥1x10^{-7} m/s: ≥0.8 m*". PSM (2023) proposed the following as an equivalent capping:

- *"1 layer - 300 mm of imported shale would be sufficient to satisfy permeability requirements."*

  OR

- *2 layers - 600 mm of site won clay and sandy clay would be sufficient. Some testing to confirm advice would be required."*

Noting that: *"Sandy site won material is unlikely to be suitable."* (PSM 2023).

Therefore, based on the information provided by EnRiskS (2022), JBS&G (2023) and PSM (2023), the acceptable capping thickness is:

- Imported shale – one layer of ≥300 mm assuming a permeability of 1x10^{-8} m/s would be sufficient;

  OR

- Site won Clay and Sandy Clay – two layers of ≥300 mm assuming a permeability of between 1x10^{-8} and 5x10^{-8} m/s would be sufficient.

CHANGES TO THE MPW LTEMP (EP RISK 2020)

Changes to the existing MPW LTEMP (EP Risk 2020) include an update to **Table 8** footnotes as provided below in RED. No changes are proposed for **Figure 5** with the MPW LTEMP (EP Risk 2020), which has been provided as **Attachment 1**.

Section 4.5 – Table 8

Changes to **Table 8** from the MPW LTEMP (EP Risk 2020) are provided below.

Table 8 – PFAS Trigger Levels for Soil Reuse Within the Construction Area				
Soil Reuse Zone	**Analyte**	**Land use**	**Criteria**	**Management Measures**
Soil Reuse Zone 1 (all areas)	Soil - PFOS[10]	All land uses	≤ 0.01 mg/kg	Materials must be placed at least 1 m above groundwater (seasonal maximum). These criteria relate to material that may be placed adjacent to OSD basins and overflow drainage channels that have a clay liner or equivalent geosynthetic liner[11].
	Leachate (neutral pH) -PFOS + PFHxS[12]		≤ 0.07 µg/L	
Soil Reuse Zone 2 (beneath surface cover materials as described in management measures)	Soil - PFOS	All land uses	≤ 0.01 mg/kg	Materials must be placed at least 1 m above groundwater (seasonal maximum). Materials must be placed beneath Engineered Fill[13], concrete or a clay liner or equivalent geosynthetic liner[11].
Soil Reuse Zone 3 – Soil beneath subdivided area for warehouse development / lease area.	Soil - PFOS	Intensively developed sites	≤ 0.14 mg/kg	Materials must be placed at least 1 m above groundwater (seasonal maximum). Materials must be placed beneath Engineered Fill[13], concrete, or a clay liner or equivalent geosynthetic liner [11].
Soil Reuse Zone 4 – Soil beneath the western ring road and interstate terminal/access areas	Soil - PFOS	Intensively developed sites	≤ 0.14 mg/kg	Materials must be placed at least 1 m above groundwater (seasonal maximum). Materials must be placed beneath Engineered Fill[13], concrete, or a clay liner or equivalent geosynthetic liner[11].

[10] PFOS - Perfluorooctane sulfonate.

[11] The clay liner/geosynthetic liner must comply with the following requirements:

- Install clay liners (or equivalent geosynthetic liners) through embankments and basin floors (minimum 600 mm) and under bio-retention basins (minimum 300 mm), as well as OSD overflow drainage channels to mitigate any preferential pathways for soil leachate to directly enter surface water and stormwater to migrate to groundwater. The clay/geosynthetic liner should meet a maximum permeability of $1x10^{-9}$ m/s.
- The liners should be monitored via inspection if possible (minimum yearly) or by installation and testing of monitoring well(s) and repaired if damaged or deteriorated.
- All works undertaken in the area of the OSD stormwater infrastructure should not damage these liners. If damage occurs the liners need to be repaired as soon as practicable.

[12] PFHxS – Perfluorohexane sulfonate.

[13] Engineered Fill ~~of a minimum 1 m thickness~~ is to conform to one of the following:

- Sandstone Fill from road header excavation, tunnel boring machine excavation or ripped or rock hammer excavation.
- Approved imported fill materials.
- Site won VENM or Excavated Natural Material (ENM).

Engineered Fill acceptance is subject to confirmation testing of permeability by an accredited laboratory and must comply with the following:

- Shale – one layer of ≥300 mm assuming a permeability of $1x10^{-8}$ m/s;
  OR
- Site won Clay and Sandy Clay – two layers of ≥300 mm assuming a permeability between $1x10^{-8}$ and $5x10^{-8}$ m/s.
- Sandy site won material is unlikely to be suitable.

Where the thickness of Engineered Fill is less than ~~1m~~ that described above, the surface cover must also include concrete pavement or a building slab.

Engineered Fill shall be placed in accordance with the following requirements:

- In near horizontal, laterally extensive layers of uniform material and thickness, deposited systematically across the work area as determined by the Geotechnical Inspection and Testing Authority (GITA).
- The compacted thickness of each layer shall be equal to or less than 300 mm. Engineered Fill shall only be placed on subgrade in accordance with the Moorebank Intermodal Logistics Precinct: Bulk Earthworks Specification Area A, B, D (EPSM3813-021S REV 1) and approved by the GITA.
- Engineered Fill shall be placed and compacted to a Dry or Hilf Density Ratios (Standard Compaction) of between 98% and 102%.
- The placement moisture variation or Hilf moisture variation shall be controlled to be between 2% dry of optimum and 2% wet of optimum.

Appendix D – EMP07

References to capping and engineered fill requirements also reflected within procedure EMP07 (**Appendix D**):

"Soil Reuse Zone 3 (beneath sub-divided area for warehouse development / lease area)

Soil that meets the criteria in Table 8 for Soil Reuse Zone 3 (beneath sub-divided area for warehouse development / lease area) can be used within the areas presented in Figure 5, subject to the following management measures:

- *Materials must be placed at least 1 m above groundwater (seasonal maximum).*
- *Materials must be placed beneath Engineered Fill, concrete or a clay liner or equivalent geosynthetic liner.*
- *Engineered Fill ~~of a minimum 1 m thickness~~ is to conform to one of the following:*
    - *Sandstone Fill from road header excavation, tunnel boring machine excavation or ripped or rock hammer excavation.*
    - *Approved imported fill materials.*
    - *Site won VENM or excavated natural material (ENM).*
    - *Where the thickness of Engineered Fill is less than ~~1m~~ that described below, the surface cover must also include concrete pavement or a building slab.*
- *Engineered Fill acceptance is subject to confirmation testing of permeability by an accredited laboratory and must comply with the following:*
    - *Shale – one layer of ≥300 mm assuming a permeability of $1x10^{-8}$ m/s;*
      OR
    - *Site won Clay and Sandy Clay – two layers of ≥300 mm assuming a permeability of between $1x10^{-8}$ and $5x10^{-8}$ m/s.*
    - *Sandy site won material is unlikely to be suitable."*

RECOMMENDATIONS

The capping of landscape areas is required under the MPW LTEMP (EP Risk 2020). Additional excavation in areas of PFAS reuse may be required to satisfy the MPW LTEMP (EP Risk 2020) or LTEMP for the land.

If the capped surface is to remain exposed for extended periods prior to completion of surface works, desiccation, wetting up and erosion of the pad surface is possible. To reduce the likelihood of damage and to maintain the cap integrity, the following should be considered (PSM 2023):

- Placement of a sacrificial layer (comprising road base or equivalent).
- Grade the pad surface to reduce standing water and likelihood of concentrated flows.
- Minimise time between bulk earthworks and surface completion works.
- Limit vehicular and plant access.
- Provide routine inspections.

If the surface is damaged, it must be replaced in accordance with the MPW LTEMP (EP Risk 2020) and this Addendum (02).

Additional management measures are included within the CostinRoe Consulting (ContinRoe 2021[14]) Construction Soil and Water Management Plan (CSWMP).

Temporary management of the capping surface is to be included within the LTEMP for the land.

CLOSURE

This summary letter has been prepared by [redacted], a Certified Environmental Practitioner (CEnvP) of EP Risk Management Pty Ltd. Please feel free to contact the undersigned on 0433 309 328 should you have any queries.

Yours sincerely,

[redacted]

[redacted]
Senior Environmental Scientist
Certified Environmental Practitioner (1403)
EP Risk Management Pty Ltd
ABN: 81 147 147 591

[14] ConstinRoe (2021), *Construction Soil and Water Management Plan,* dated 30 November 2021 (ref: Co13455.07-03_18.rpt)

Attachments:
Attachment 1 – EnRiskS (2022)
Attachment 2 – JBS&G (2023)
Attachment 3 – PSM (2023)

QUALITY CONTROL

Version	Author	Date	Reviewer	Date	Quality Review	Date
vA_DRAFT	[redacted]	15.05.2023	[redacted]	15.05.2023	[redacted]	15.05.2023
vB_DRAFT	[redacted]	29.05.2023	[redacted]	29.05.2023	[redacted]	29.05.2023
v1	[redacted]	29.06.2023	[redacted]	29.06.2023	[redacted]	29.06.2023

DOCUMENT CONTROL

Version	Date	Reference	Submitted to
vA_DRAFT	*15.05.2023*	*EP1489.019_Logos_MPW LTEMP Addendum 02_Zone 3 Reuse_vA_DRAFT*	*Logos Property Pty Ltd*
vB_DRAFT	*29.05.2023*	*EP1489.019_Logos_MPW LTEMP Addendum 02_Zone 3 Reuse_vB_DRAFT*	*Logos Property Pty Ltd*
v1	*29.06.2023*	*EP1489.019_Logos_MPW LTEMP Addendum 02_Zone 3 Reuse_v1*	*Logos Property Pty Ltd*

LIMITATIONS

This Addendum 02 – Moorebank Precinct West (MPW) Long-Term Environmental Management Plan (LTEMP) Version 12 – Engineered Fill in Warehouse PFAS Re-use Zone 3 was conducted on the behalf of Logos Property Pty Ltd for the purpose/s stated above.

EP Risk has prepared this document in good faith, but is unable to provide certification outside of areas over which EP Risk had some control or were reasonably able to check. The report also relies upon information provided by third parties. EP Risk has undertaken all practical steps to confirm the reliability of the information provided by third parties and do not accept any liability for false or misleading information provided by these parties.

It is not possible in an Addendum 02 – Moorebank Precinct West (MPW) Long-Term Environmental Management Plan (LTEMP) Version 12 – Engineered Fill in Warehouse PFAS Re-use Zone 3 to present all data, which could be of interest to all readers of this report. Readers are referred to any referenced investigation reports for further data.

Users of this document should satisfy themselves concerning its application to, and where necessary seek expert advice in respect to, their situation.

All work conducted and reports produced by EP Risk are based on a specific scope and have been prepared for Logos Property Pty Ltd and therefore cannot be relied upon by any other third parties unless agreed in writing by EP Risk.

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29 June 2023
Ref: EP1489.019_Addendum 02_v1

Attachment 1 – EnRiskS (2022)

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14 October 2022

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Attn: [redacted]

PFAS at MPW: engineered fill in the warehouse area

1.0 Introduction and background

Environmental Risk Sciences Pty Ltd (enRiskS) has been engaged by Logos Property (Logos) to prepare a letter in relation to the re-use of soil with per- and polyfluoroalkyl substances (PFAS) at Moorebank Precinct West (MPW).

The letter relates to the re-use of soil in *Soil Re-use Zone 2 – soil beneath the warehouse areas* previously considered by enRiskS in our risk assessment entitled:

- enRiskS (2020), *Moorebank Intermodal Terminal: LTEMP Material Reuse Risk Assessment for PFAS*, letter to Moorebank Intermodal Company, dated 30 September 2020 and updated on 9 October 2020.

It is noted that this area is described as *Soil Re-use Zone 3 – soil beneath subdivided area for warehouse development/lease area* in Table 8 of the EP Risk (2020) *Long-Term Environmental Management Plan*, Moorebank Precinct West (MPW), reference EP1489.001 version 12, 27 October 2020 (the "LTEMP").

The enRiskS (2020) risk assessment considered 2 management measures that were proposed to be implemented for this soil re-use zone comprising the presence of impervious pavements and the presence of at least 1 m thickness of engineered fill. Logos have indicated that the thickness and type of engineered fill is currently being reviewed and have requested further assessment to determine the required thickness and type of engineered fill, without reinstating the need for leachability testing of the fill for PFAS.

Relevant background information for MPW is provided in enRiskS (2020) and is not repeated in this letter.

2.0 Objectives

The objectives of the risk assessment presented in this report are to:

- determine the required minimum thickness of engineered fill
- review the required type of engineered fill from the following options:
  - sandstone fill from road header excavation, tunnel boring machine excavation or ripped or rock hammer excavation
  - approved imported fill materials
  - site won virgin excavated natural material (VENM) or excavated natural material (ENM)
  - site won materials that are not VENM or ENM

The presence of impervious pavements has also been addressed for completeness.

This assessment comprises as review of the enRiskS (2020) risk assessment in relation to the required depth and type of engineered fill (as specified above) in the context of PFAS risk issues relevant to *Soil Re-use Zone*

2 – soil beneath the warehouse area, based on the information available to 26 September 2022. No other risk issues, parts of MPW or requirements of the LTEMP have been considered.

3.0 Methodology

Consistent with enRiskS (2020), the approach taken for the assessment of human health and environmental risks is in accordance with guidelines/protocols endorsed by Australian regulators, including:

- Australian and New Zealand Fresh and Marine Water Guidelines (ANZG 2018)
- enHealth Environmental Health Risk Assessment, Guidelines for Assessing Human Health Risks from Environmental Hazards (enHealth 2012).
- PFAS National Environmental Management Plan (the "PFAS NEMP"), Version 2.0, January 2020 (HEPA 2020)
- National Environmental Protection Measure – Assessment of Site Contamination (ASC NEPM).

Additional guidance has been sought from international sources, and referenced within this document where relevant, however, international guidance has not been adopted where it is inconsistent with Australian regulatory or policy settings.

It is noted that enRiskS (2020) was based on existing information assessments including the following:

- enRiskS (2019a), *Land Human Health and Ecological Risk Assessment (Land HHERA)*, Report to Moorebank Intermodal Company Limited, Draft, 6 May 2019
- enRiskS (2019b), *Waterway Human Health and Ecological Risk Assessment (Waterway HHERA)*, Report to Moorebank Intermodal Company Limited, Draft, 6 May 2019
- EP Risk (2020), *Long-Term Environmental Management Plan, Moorebank Precinct West (MPW)*, reference EP1489.001 version 10, 24 September 2020 (the "LTEMP")
- GHD (2019), *Detailed Site Investigation (DSI) Summary Report, Moorebank Intermodal Company Limited, Moorebank Precinct West*, July 2019
- NSW EPA (2019), *Environment Protection Licence (EPL) 21054*.

4.0 Review of risk issues

4.1 Soil Re-use Zone 2

Logos have indicated that 90% of Soil Re-use Zone 2 will be covered with impervious pavements comprising warehouses/offices, hard landscaping, car parks and internal access roads. The remainder of the zone is required to be covered with soft landscaping.

Given the significant coverage of this zone with impervious pavements, and the highly disturbed nature of the environment in this zone post construction, there are not expected to be any risk issues of concern for terrestrial receptors. Potential risks to terrestrial ecosystems have not been considered further in this assessment. However, water may infiltrate the surface in areas of the zone with soft landscaping, and there is the potential for the leaching of PFAS to groundwater and the aquatic environment of the Georges River following the re-use of soil with PFAS. This may result in PFAS impacts to the aquatic environment, through direct toxicity or following bioaccumulation.

There are no water features present in Soil Re-use Zone 2, and this zone is located over 200 m away from the Georges River (to the west) and 50 m away from the OSD infrastructure (also to the west). Hence, significant dilution and mixing of PFAS would occur prior to any water with PFAS sourced from the re-used soil reaching and entering the aquatic environment of Georges River. Irrespective of this, the potential for leaching has been considered further in this assessment.

The key factor that affects the potential for the leaching of PFAS from soil to groundwater/surface water is the rate of water infiltration through the overlying (PFAS free) materials and then through the re-used soil containing PFAS. The infiltration rate describes the gradual movement of water (rainwater or stormwater) through an unsaturated zone comprising layers of soil (or other materials including pavements). The infiltration rate is directly related to the permeability of the materials and the permeability of the materials is dependent on the porosity of the materials. This process is very different to the movement of water in a saturated zone, such as an aquifer, where there is a hydraulic head which causes flow under pressure.

For water to infiltrate to the soil containing PFAS (which could result in the leaching of PFAS from such soil), it would need to move through the compacted fill materials and/or the overlying impervious pavements. Where infiltration through the surface materials is negligible or does not occur, infiltration water would not reach the underlying soil with PFAS. Hence, there is no (or a negligible) mechanism for the leaching of PFAS to occur. Where no (or negligible) leaching can occur, there would be no migration of PFAS from re-used soil to groundwater and surface water.

Further discussion is provided below.

4.2 Presence of impervious pavements

Impervious pavements expected to be present in Soil Re-use Zone 2 post development include:

- warehouse slabs – expected to be between 0.25 and 0.5 m thick
- terminal pavements that include concrete or asphalt overlying a cementitious base course – expected to be between 0.3 to 0.5 m thick
- roads, car parks and other areas with asphalt paving – expected to be between 0.15 to 0.2 m thick.

Logos have indicated that 44% of these pavements would be within warehouses, where the warehouse building would ensure no water was present on the concrete, at any time, and hence no infiltration can occur. For concrete beneath warehouse buildings, there would be no rainfall on these surfaces, and no infiltration. Where there is no infiltration of water, there is no potential for the leaching of PFAS from re-used soil. This means that the exposure and transport pathway between PFAS in re-used soil and groundwater and environmental receptors within the Georges River is incomplete. Where there are no exposures to PFAS in re-used soil, there are no environmental risks from PFAS in re-used soil, and no need for any further assessment of risks.

The remainder of the pavement area, that is outdoors, would receive rainfall. This rainfall would need to penetrate the pavement before reaching the soil with PFAS, where this water could then leach PFAS from the soil and transport it further (where sufficient ongoing infiltration may occur) to groundwater. However, the published permeability of concrete is very low, around $1x10^{-11}$ m/s for brick aggregate concrete and hardened concrete (Ahmad & Hossain 2017). The time in days for rainfall to penetrate pavements proposed for Soil Re-use Zone 2, based on a permeability of $1x10^{-11}$ m/s, is (in round figures):

- minimum pavement thickness of 0.15 m: 174,000 days[1]
- maximum pavement thickness of 0.5 m: 579,000 days.[2]

For the Moorebank area, the annual rainfall is on average 868 mm/year, with 82.3 days/year recording ≥1 mm rain (average for Bankstown Airport for 1968 to 2022)[3]. This number of rain days is orders of magnitude less than needed for infiltration of the proposed impervious pavements that will be present above the re-used soil. Based on an upper bound estimate of 82 rain days/year, the time in years for rainfall to penetrate

[1] Calculated as follows: 0.15 m divided by $1x10^{-11}$ m/s, divided by 86,400 s/d.
[2] Calculated as follows: 0.5 m divided by $1x10^{-11}$ m/s, divided by 86,400 s/d.
[3] http://www.bom.gov.au/climate/averages/tables/cw_066137.shtml.

pavements proposed for Soil Re-use Zone 2 (assuming no evaporation and no runoff), based on a permeability of $1x10^{-11}$ m/s, is (in round figures):

- minimum pavement thickness of 0.15 m: 2,000 years
- maximum pavement thickness of 0.5 m: 7,000 years.

In addition, rainfall on these surfaces would be expected to runoff or evaporate between rainfall events, which means the water would not accumulate on the concrete surface for sufficient time for infiltration to occur.

Hence, the exposure pathway between PFAS in re-used soil beneath outside pavements and environmental receptors is also considered to be incomplete, and there is no need for any further assessment of risks.

As there is not expected to be any infiltration through impervious pavements, either inside of outside of buildings, the placement of engineered fill beneath the pavements, or any other management measures to manage leaching to the environment, is not considered necessary (although it is acknowledged that the placement of fill may be required for geotechnical reasons or site levelling).

The need for the placement of engineered fill in areas of Soil Re-use Zone 2 with no impervious pavements is considered in **Section 4.3**.

4.3 Engineered fill

In areas not covered by impervious pavements, the potential for PFAS in re-used soil to leach to the environment will depend on the permeability of the engineered fill, the thickness of the engineered fill, and the amount of rainfall on the engineered fill (where evaporation is neglected).

The following information is available in relation to how the engineered fill will be placed:

1. Engineered Fill shall be placed in accordance with the following requirements:
    a) In near horizontal, laterally extensive layers of uniform material and thickness, deposited systematically across the work area as determined by the Geotechnical Inspection and Testing Authority (GITA).
    b) The compacted thickness of each layer shall be equal to or less than 300 mm. Engineered Fill shall only be placed on subgrade in accordance with the Moorebank Intermodal Logistics Precinct: Bulk Earthworks Specification Area A, B, D (EPSM3813-021S REV 1) and approved by the GITA.
2. Engineered Fill shall be placed and compacted to a Dry or Hilf Density Ratios (Standard Compaction) of between 98% and 102%.
3. The dry bulk density for the imported sandstone VENM is approximately 2,100 kg/m^3 loose material. Compaction, as specified, would increase the bulk density (and decrease porosity).
4. The placement moisture variation or Hilf moisture variation shall be controlled to be between 2% dry of optimum and 2% wet of optimum.

It is understood that compaction of engineered fill is required to achieve the geotechnical characteristics required for the development. Compaction is the compression of a non-saturated soil resulting in reduction of the volume and increase in the density of a given mass of soil. Compaction is used to maximise dry density, reduce compressibility and decrease permeability. The more compacted the material, the lower the porosity, and the lower the potential for infiltration of water through (and subsequent leaching of PFAS from) soil. Hence, the permeability of compacted materials is expected to be low. The permeability of such materials may be $1x10^{-5}$ to $1x10^{-11}$ m/s [4], with a value around $1x10^{-7}$ m/s relevant to mixtures of sand, silt and

[4] http://www.fao.org/tempref/FI/CDrom/FAO_Training/FAO_Training/General/x6706e/x6706e09.htm

clay (likely uncompacted) and understood to be a conservative and achievable estimate for the engineered fill.

The time for continuous rainfall to penetrate the engineered fill proposed for Soil Re-use Zone 2, based on assumed permeabilities of $1x10^{-7}$ to $1x10^{-9}$ m/s, and a range of potential engineered fill depths, is summarised in **Table 4.1**. As noted above, the upper bound average number of rain days for MPW is conservatively assumed to be 82 days/year. These calculations assume no evaporation occurs and the rainfall does not runoff but can pool at the surface allowing infiltration to occur following rainfall. Hence these calculations are considered to be conservative.

Table 4.1: Summary of calculated infiltration times based on permeability and thickness of fill

Assumed permeability of engineered fill	Assumed thickness of engineered fill (m)	Calculated infiltration time (days)	Calculated infiltration time (years) based on 82 days/year rain
$1x10^{-7}$ m/s	0.1	12	0.1
	0.2	23	0.3
	0.3	34	0.4
	0.4	46	0.6
	0.5	58	0.7
	0.6	69	0.9
	0.7	81	1.0
	0.8	93	1.1
	0.9	104	1.3
	1.0	116	1.4
$1x10^{-8}$ m/s	0.1	116	1.4
	0.2	231	2.8
	0.3	347	4.2
	0.4	463	5.6
	0.5	597	7.1
	0.6	694	8.5
	0.7	810	10
	0.8	926	11
	0.9	1,042	13
	1.0	1,157	14
$1x10^{-9}$ m/s	0.1	1,157	14
	0.2	2,315	28
	0.3	3,472	42
	0.4	4,630	57
	0.5	5,787	71
	0.6	6,944	85
	0.7	8,102	99
	0.8	9,259	113
	0.9	10,417	127
	1.0	11,574	141

Review of **Table 4.1** indicates that there is little difference in the calculated infiltration time in days for 0.8 m, 0.9 m and 1.0 m thickness of engineered fill with a permeability of $1x10^{-7}$ m/s. For these fill thicknesses, the calculated infiltration time in days is greater than the upper bound average estimate of 82 rain days/year. Hence, the required thickness of engineered fill with a permeability of $1x10^{-7}$ m/s can be decreased from 1.0 m to ≥0.8 m.

Where the permeability of the engineered fill is ≥$1x10^{-8}$ m/s, the thickness of the engineered fill can be reduced to ≥0.1 m to achieve the same outcome.

Where the permeability of the engineered fill is ≥1x10^{-9} m/s, the thickness of the engineered fill can be reduced to ≥0.01 m to achieve the same outcome.

The following types of engineered fill are proposed for the site (refer to **Section 2.0**):

- sandstone fill from road header excavation, tunnel boring machine excavation or ripped or rock hammer excavation
- approved imported fill materials
- site won VENM or ENM
- site won materials that are not VENM or ENM.

All the above types of engineered fill are considered appropriate for use, so long as they comply with all other requirements including those specified in the LTEMP for total concentrations of PFAS. As noted above, it is the permeability and depth of the engineered fill that determines leaching potential, not the type of fill *per se*. Hence, it is acceptable to "mix and match" engineered fill types depending on availability and/or compaction and development considerations, to maximise project outcomes and the re-use of soil with PFAS at MPW, in accordance with the NSW waste hierarchy.

4.4 Uncertainties

The assessment has assumed that the upper bound average estimate of 82 rain days/year. This upper bound average estimate is considered conservative as it assumes that:

- rain days are consecutive
- water pools at the surface allowing for infiltration to occur
- all rainwater infiltrates the soil profile:
    - there is no drying of soil in between rain days
    - there is no runoff
    - there is no transpiration (water uptake by plants which is released as vapour into the air)
    - there is no evaporation of water from the soil surface.

It is also unlikely that 1 mm rainfall would be adequate to facilitate the leaching of PFAS from re-used soil to the environment; higher rainfall volumes are likely to be required. The number of days with ≥10 mm and ≥20 mm rainfall relevant to MPW over the last 14 months is presented in **Table 4.2**.

Table 4.2: Summary of MPW rainfall (BOM Bankstown Airport AWS)

Year	Number of days with ≥1 mm rainfall	Number of days with ≥10 mm rainfall	Number of days with ≥20 mm rainfall
August 2021	3	2	2
September 2021	3	1	0
October 2021	9	2	0
November 2021	10	8	2
December 2021	7	3	1
January 2022	11	4	4
February 2022	18	8	5
March 2022	20	15	11
April 2022	14	3	2
May 2022	12	4	1
June 2022	1	0	0
July 2022	16	5	4
August 2022	7	0	0
TOTAL	**131**	**55**	**32**

Review of **Table 4.2** indicates that the use of rainfall averages ≥1 mm for the assessment is conservative, as rainfall of ≥10 mm and ≥20 mm, which would be more likely to facilitate leaching, is 42% and 24% less likely

to occur respectively. If the upper bound average estimate of 82 rain days/year was decreased to 34 rain days/year (i.e. 42% of the value), the thickness of fill with a permeability of $1x10^{-7}$ m/s could be decreased to ≥0.3 m (refer to **Table 4.1**).

5.0 Conclusions

The following can be concluded based on the assessment undertaken and considering the identified uncertainties:

- the potential for the leaching of PFAS from re-used soil beneath inside and outside pavements is negligible; this means that the exposure pathway between PFAS in re-used soil beneath pavements and environmental receptors is incomplete, and there are no environmental risks following the re-use of soil
- the placement of engineered fill beneath inside and outside pavements, or any other management measures to manage leaching to the environment, is not considered necessary (although it is acknowledged that the placement of fill may be required for geotechnical reasons or site levelling).
- the required thickness of engineered fill in areas not covered by pavements is as follows:
    - engineered fill permeability of ≥$1x10^{-7}$ m/s: ≥0.8 m
    - engineered fill permeability of ≥$1x10^{-8}$ m/s: ≥0.1 m
    - engineered fill permeability ≥$1x10^{-9}$ m/s: to ≥0.01
- it is the permeability and depth of the engineered fill that determines leaching potential, not the type of fill *per se*, hence, all reviewed engineered fill types are considered appropriate for use so long as they comply with all other requirements including those specified in the LTEMP for total concentrations of PFAS
- it is acceptable to "mix and match" engineered fill types depending on availability and/or compaction and development considerations, to maximise project outcomes and the re-use of soil with PFAS at MPW, in accordance with the NSW waste hierarchy.

6.0 Limitations

Environmental Risk Sciences Pty Ltd has prepared this report for the use of Logos in accordance with the usual care and thoroughness of the consulting profession. It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this report.

It is prepared in accordance with the scope of work and for the purpose outlined in this report.

The methodology adopted and sources of information used are outlined in this report. Environmental Risk Sciences Pty Ltd has made no independent verification of this information beyond the agreed scope of works and assumes no responsibility for any inaccuracies or omissions. No indications were found that information contained in the reports provided for use in this assessment was false.

This report was prepared in August to October 2022 and is based on the information provided and reviewed at that time. Environmental Risk Sciences Pty Ltd disclaims responsibility for any changes that may have occurred after this time.

This report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties. This report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.

Yours sincerely,

Dr [redacted] (Fellow ACTRA)
Principal/Director
Environmental Risk Sciences Pty Ltd

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Attachment 2 – JBS&G (2023)

TECHNICAL MEMO
JBS&G 58753-150453 (Rev 0)

DATE: 6 March 2023

TO: [redacted]

CC: [redacted]

FROM: [redacted]

Moorebank Precinct West (MPW) – Capping for Areas of PFAS Reuse, Moorebank Intermodal Precinct (MIP), NSW

Introduction

JBS&G Australia Pty Ltd (JBS&G) was engaged by LOGOS Property (LOGOS, the Client) to provide environmental services for Moorebank Precinct West (MPW) at the Moorebank Intermodal Precinct (MIP), Moorebank, NSW. LOGOS requested JBS&G to review recent advice regarding the capping of PFAS impacted soils in reuse areas and summarise the approach to be adopted for the ongoing capping at Moorebank.

The reviewed documents included:

- LTEMP Material Reuse Risk Assessment for PFAS. 9 October 2020. Environmental Risk Sciences Pty Ltd (EnRiskS 2020)
- Long-Term Environmental Management Plan, Moorebank Precinct West. 27 October 2020. EP Risk Management Pty Ltd. EP1489.001 v12. (LTEMP, EP Risk 2020)
- PFAS at MPW – Engineered Fill in the Warehouse Area. 14 October 2022. Environmental Risk Sciences Pty Ltd (EnRiskS October 2022).
- Site Audit Interim Advice 07 – Review of the EnRiskS letter discussing PFAS at MPW – engineered fill in the warehouse area. 31 October 2022. Enviroview (IA 0301-2020-0_07)
- Approved Imported Fill for PFAS Capping Technical Memo. 16 December 2022. JBS&G (58753-149068 (Rev 0)).
- Email: Memo - LTEMP 1m Cap. Enviroview 19 December 2022
- Email RE: Permeability of Materials on site. Pells Sullivan Meynink (PSM) 22 February 2023

Background

Where site won PFAS soils are reused on site, the management measures outlined in the LTEMP Table 8 and EMP07 indicate that for Soil Reuse Zone 2, 3 and 4, materials must be placed at least 1 m above groundwater (seasonal maximum), and materials must be placed beneath Engineered Fill, concrete, or a clay liner or equivalent geosynthetic liner.

The risk assessment on which PFAS management measures were based (enRiskS 2020), assumed a permeability value of around $1x10^{-7}$ m/s for Engineered Fill and relates to “mixtures of sand, silt and clay (likely uncompacted)”.

The LTEMP requires Engineered Fill to be a minimum of 1 m thickness, and conform to one of the following:

- Sandstone Fill from road header excavation, tunnel boring machine excavation or ripped or rock hammer excavation.

- Approved imported fill materials.
- Site won VENM or Excavated Natural Material (ENM).

Following a review of assessments provided to LOGOS, and interim advice from the Site Auditor, the following is noted in relation capping of PFAS reuse areas within the developable portion of MPW:

- Under pavements/warehousing there is no depth requirement for Engineering Fill within a PFAS reuse, or other, areas (LTEMP 2020).
- In relation to proposed landscape areas a clay[1] cap of 0.5 m (or geosynthetic liner) is required, and/or a growth medium greater than the maximum root depth of vegetation above the clay (LTEMP 2020). However, reuse of PFAS under proposed landscape areas has not been finalised and therefore the extent of clay capping required (or equivalent geosynthetic liners) is not currently defined.
- Further to the assessments undertaken by EnRiskS in support of the LTEMP (EP Risk 2020), EnRiskS undertook an assessment of the required minimum thickness of Engineered Fill (EnRiskS October 2022) for MPW. While it was estimated by EnRiskS that the minimum required thickness of Engineered Fill in areas not covered by pavements were as follows:
    - engineered fill permeability of ≥$1x10^{-7}$ m/s: ≥0.8 m
    - engineered fill permeability of ≥$1x10^{-8}$ m/s: ≥0.1 m
    - engineered fill permeability ≥$1x10^{-9}$ m/s: to ≥0.01,

  the Auditor did not agree that either 10cm or 1cm of fill, in the absence of a slab/pavement, would be sufficient (Enviroview, October 2022). He notes the fill serves the purpose to also provide a clear 'isolating' layer above the PFAS-impacted materials and where no pavement is proposed it provides a 'durable' surface material to protect from damage over time.

- Geotechnical permeability testing (PSM 2023) has established:
    - Conservatively, imported shale fill would have a permeability in place of less than 10^{-8} m/s;
    - The site won material is variable, varying between sand, silty sand, clayey sand to sandy clays. Site won clay or sandy clay is likely to have a permeability between $1x10^{-8}$ and $5x10^{-8}$ m/s. The clayey sands and silt sand probably has permeability in the order of $1x10^{-7}$ m/s;
    - In relation to the EnRiskS estimate of minimum required thickness of Engineered Fill (October 2022), the geotechnical advice is that:
        - 1 layer - 300 mm of imported shale would be sufficient to satisfy permeability requirements.
        - 2 layers - 600 mm of site won clay and sandy clay would be sufficient. Some testing to confirm advice would be required.
        - Sandy site won material is unlikely to be suitable.
    - Nevertheless, from a geotechnical suitability point of view, two layers of imported shale, or imported shale blended with site won or sandstone fill provides advantages regarding long term trafficability, reactivity, and potentially CBR.

[1] Maximum permeability of $1x10^{-9}$ m/s.

Advice

Under proposed pavements/warehousing the placement of Engineering Fill to satisfy geotechnical requirements would satisfy the requirements of the LTEMP. The placement of imported materials and/or site won VENM/ENM would additionally have an advantage in reducing the generation of PFAS impacted stormwater runoff prior to the construction of pavements/warehousing and reduce water management costs, as well as mitigate the potential migration of PFAS to groundwater.

In landscape areas a clay cap of 0.5 m (or geosynthetic liner) and a growing medium is required, however the location of PFAS impacted soil reuse coincident with landscaping is not currently defined. It is recommended that consideration be given to “retrofitting” the capping of landscape areas required under the under LTEMP (EP Risk 2020) during the construction phase. Retrofitting may require the management of surplus PFAS impacted spoil, either within MPW or disposed offsite. Retrofitting could be managed under an area specific LTEMP.

The Site Auditor should be consulted in relation to the retrofitting of capping requirements in landscape areas overlying PFAS impacted soils reuse areas.

Attachments:

1) Limitations

Attachment 1 - Limitations

This advice has been prepared for use by the client who has commissioned the works in accordance with the project brief only, and has been based in part on information obtained from the client and other parties.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

JBS&G accepts no liability for use or interpretation by any person or body other than the client who commissioned the works. This report should not be reproduced without prior approval by the client, or amended in any way without prior approval by JBS&G, and should not be relied upon by other parties, who should make their own enquires.

Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements.

Limited sampling and laboratory analyses were undertaken as part of the investigations undertaken, as described herein. Ground conditions between sampling locations and media may vary, and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

This advice does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS&G reserves the right to review the advice in the context of the additional information.

Attachment 3 – PSM (2023)

[redacted]

From: [redacted]
Sent: Thursday, 30 March 2023 12:31 PM
To: [redacted]
Cc: [redacted]
Subject: FW: Permeability of Materials on site.

Hi [redacted]

PSM email as discussed.

[redacted]

[redacted] | Senior Principal | JBS&G
Gadigal Country | Level 1, 50 Margaret Street, Sydney, NSW
T: 02 8245 0300 | [redacted] | W: jbsg.com.au | L: Conditions and Limitations

Exceptional Outcomes

From: [redacted]
Sent: Wednesday, 22 February 2023 9:23 AM
To: [redacted]
Cc: [redacted]
Subject: RE: Permeability of Materials on site.

[redacted]

1. Minimum thickness of imported shale fill cap

Based on the information provided in your email on 14 February, where the permeability of the "capping" is 10^{-8} m/s a minimum capping thickness of 0.1 m can be adopted.

Based on the testing completed to date we consider that it would be appropriately conservative to assume that imported shale fill shall have a permeability in place of less than 10^{-8} m/s. The lab permeabilities are an order of magnitude less than this.

It follows that a single layer of 300 mm imported shale fill would provide sufficient capping from an environmental point of view.

2. Use of site won materials as the environmental cap

The site won material is variable, varying between sand, silty sand, clayey sand to sandy clays.

Site won material that can be characterised by the GITA as comprising clay or sandy clay is likely to have a permeability between $1x10^{-8}$ and $5x10^{-8}$ m/s site won material. Our understanding of the email you have provided indicates that for such materials a thickness of between 0.4 m and 0.5 m would be equivalent to the 0.8 m of $1x10^{-7}$ m/s. Some testing of the site won material would be useful to confirm an appropriate permeability.

The clayey sands and silt sand probably has permeability in the order of $1x10^{-7}$ m/s. The sands with minor fine components would be more permeable than this. It would be difficult to consider these materials for use as the capping.

3. Geotechnical implications

Our IGDA for the project says the following relating to the surface material:

> *We note that desiccation or wetting up and erosion of the pad surface is possible should it be exposed to the*
> *elements for an extended period of time following completion of the bulk earthworks and prior to the builder*
> *taking responsibility for the pad.*
> *To reduce the likelihood of this and to preserve the pad condition we recommend the following should be*
> *considered following completion of the bulk earthworks:*
>
> - *Placement of a sacrificial layer comprising road base or other equivalent material.*
> - *Grade the pad surface to:*
>   - *Reduce the extent and severity of standing water during and after weather events*
>   - *Reduce the likelihood of concentrated flows resulting in localised channel erosion*
> - *Minimise the time between the completion of earthworks and the builder commencing construction of the warehouse roof.*
> - *Limit vehicular and plant access until a roof has been installed.*

Where the more sandy site won material has been used and has been exposed to the weather it has resulted in need for reworking and sometimes deeper than a few 100 mm as well. The same risks could be present for the sandy clays and clays should they be used as the capping.

Using at least 600 mm of Sandstone or Shale fill on the surface significantly reduces the risk of exposure of finished surfaces resulting in need for reworking of the surface. Sandstone Fill also increases the CBR and reduces the shrink reactivity. Shale fill may also reduce the reactivity.

That is from a geotechnical performance point of view keeping imported fill or a blend of imported and site won fill in the upper 600 mm has significant up side.

4. Summary

From contamination point of view:

- 1 layer - 300 mm of imported shale would be sufficient
- 2 layers – 600 mm of site won clay and sandy clay would be sufficient. Some testing to confirm would be helpful.
- Sandy site won material is unlikely to be suitable.

From a geotechnical point of view:

- 2 layers of imported shale, or imported shale blended with site won or sandstone fill provides upsides with long term trafficability, reactivity, and potentially CBR.

Please do not hesitate to contact the undersigned should you have any queries.

[redacted]
Principal | BE Civil (Hons), MEngSc, NER
Direct: **02 9812 5025** | [redacted]

From: [redacted]
Sent: Tuesday, February 21, 2023 3:09 PM
To: [redacted]
Cc: [redacted]

[redacted]
Subject: RE: Permeability of Materials on site.

[redacted]

Have you had a chance to review?

Thanks,

[redacted]

[redacted]
[redacted]
[redacted]
[redacted]
logosproperty.com

LOGOS

From: [redacted]
Sent: Tuesday, 14 February 2023 2:57 PM
To: [redacted]
Cc: [redacted]
Subject: Permeability of Materials on site.

[redacted]

We are investigating whether we can replace the entire top 1m of the site with a material as an alternative to Sandstone.

Sandstone is identified in the LTEMP as suitable due a risk analysis (attached) which references a permeability of 10^{-7}m/s. It also references a range of permeabilities:

- the required thickness of engineered fill in areas not covered by pavements is as follow
  - engineered fill permeability of ≥1x10^{-7} m/s: ≥0.8 m
  - engineered fill permeability of ≥1x10^{-8} m/s: ≥0.1 m
  - engineered fill permeability ≥1x10^{-9} m/s: to ≥0.01

As per your testing below, it indicates that we are actually achieving 10^{-9}m/s which would allow a significant reduction in the capping thickness (at least environmentally).

Is there a way we can assume all shale we import will meet this? Is there any due diligence we should undertake?

Further, is there a way we can characterise materials won on site as achieving a certain permeability under the compaction specified in the specification so that we can utilise site won materials as well?

Kind regards,

[redacted]

logosproperty.com

LOGOS

From: [redacted]
Sent: Tuesday, 24 January 2023 1:14 PM
To: [redacted]
Subject: FW: PSM3813 - Permeability tests on shale fill

[redacted]

Please find attached completed reports from the lab.

Reports confirm the material meets the requirement of:

- Minimum permeability: 10^{-7}m/s

[redacted]
Geotechnical Engineer | BE (Hons)
Direct: **02 9812 5932** | [redacted]

From: [redacted]
Sent: Monday, 23 January 2023 10:47 AM
To: [redacted]
Cc: [redacted]
Subject: PSM3813 - Permeability tests on shale fill

[redacted],

We have received preliminary results from the lab via email regarding the permeability testing of the shale sampled on 10th Jan 2023 from crushed shale materials located within WH1. See email below for preliminary results.

The results of all the permeability testing satisfy the requirement of:

- Minimum permeability: 10^{-7} m/s.

The complete report from the lab is expected to arrive Tuesday or Wednesday.

Regards,

[redacted]
Geotechnical Engineer | BE (Hons)
Direct: **02 9812 5932** | [redacted]

From: [redacted]
Sent: Monday, 23 January 2023 10:14 AM
To: [redacted]
Cc: [redacted]
Subject: RE: PSM3813 - Permeability tests on shale fill

Hi [redacted],

Please find a table of the concluded triaxial permeability test results for the 5 shale samples below.

Alliance Lab ID	Sample Source	MDD & OMC	Permeability (m/s)
23-22975A	Shale Sample #1	2.12 t/m^3 & 8.5%	$1*10^{-9}$
23-22975B	Shale Sample #2	2.06 t/m^3 & 8.5%	$2*10^{-9}$
23-22975C	Shale Sample #3	2.12 t/m^3 & 8.5%	$5*10^{-10}$
23-22975D	Shale Sample #4	2.21 t/m^3 & 7.5%	$9*10^{-10}$
23-22975E	Shale Sample #5	2.12 t/m^3 & 8.5%	$2*10^{-9}$

We are waiting for the index test results to finalise the sample descriptions shown on the reports, which will be ready tomorrow. The finalised reports will be forwarded to you by COB this Tuesday.

Regards,

[redacted]
PhD, MEng, BEng

Soil and Rock Technical Manager, Geotechnical Engineer

[redacted]

alliance
geotechnical & environmental solutions

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Appendix I
CONSULTATION LOG

Consultation Log – Long Term Environmental Management Plan (LTEMP) – Warehouse 3 and 4							
Item	**Original Version**	**Date**	**Stakeholder**	**Communication Method**	**Comments**	**Changes**	**Finalised Version**
1	-	05.10.2021	JBS&G	*Email – JBS&G email to Tactical (05.10.2021)*	Provision of Technical Memo: *JBS&G 51997 – 136836 (Rev 2),* dated 19 May 2021. Email: *"It is recommended that it be confirmed with the Auditor that the use of asphalt paving as a isolating layer/management measure is appropriate and consistent with the risk assessment, and that subsequently asphalt paving as an isolating layer be explicitly incorporated into future LTEMPs applying to MPW."*	Section 4.5.	vA_DRAFT
2	-	20.01.2023	Logos / Tactical	N/A	Issued to Client (vA_DRAFT)	N/A	vA_DRAFT
3	-	03.02.2023	Logos / Tactical	N/A	Issued to Client (vB_DRAFT)	N/A	vB_DRAFT
4	vB_DRAFT	24.05.2035	JBS&G	*JBS&G (2024), Moorebank Precinct West (MPW) Warehouse 3 and 4 – Audit Area Summary Report, Moorebank Avenue, Moorebank NSW, dated 24 May 2024 (ref: 58753/158,868 (Rev A) DRAFT).*		-	vC_DRAFT
5	-	03.06.2024	Logos / Tactical	N/A	Issued to Client (vC_DRAFT)	N/A	vC_DRAFT
6	vC_DRAFT	19.06.2035	JBS&G	*JBS&G (2024), Moorebank Precinct West (MPW) Warehouse 3 and 4 – Audit Area Summary Report, Moorebank Avenue, Moorebank NSW, dated 19 June 2024 (ref: 58753/158,868 (Rev 0)).*		-	v0
7	-	21.06.2024	Logos / Tactical	N/A	Issued to Client (v0)	N/A	v0