Long-Term Environmental Management Plan

Northern Ring Road, Service Pad and Loop Road, Moorebank Precinct West, 400 Moorebank Avenue, Moorebank, NSW

Prepared for: Logos Property Pty Ltd c/- Tactical Group Pty Ltd

EP1489.008_v4 14 September 2022

APPROVED COMPANY ISO 9001 Quality Management Systems QMS Certification Services

APPROVED COMPANY AS/NZS 4801 Occupational Health & Safety Management Systems QMS Certification Services

APPROVED COMPANY ISO 14001 Environmental Management Systems QMS Certification Services

EP RISK

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

14 September 2022

Our Ref: EP1489.008_NRR SP LR_LTEMP_v3

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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 2019).
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.
AOC	Area of Concern	An area identified as containing potential contamination.
As	-	Arsenic
BGS	-	Below Ground Surface
BioBanking Area	BioBanking Agreement Area	Vegetated areas which are to be conserved and no construction to occur.
Bonded ACM	Bonded Asbestos Containing Materials (ACM)	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 2019).
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 and SSD_7709
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
EEC	Endangered Ecological Communities	Vegetated areas inaccessible during SSD 5066 and SSD_7709 and development works. Located within the BioBanking Area of MPW.
EIL	-	Ecological Investigation Level
EO	-	Explosive Ordnance

Abbreviations and Terminology		
Abbreviations	**Term**	**Definition**
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 2019).
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 link as referenced in the MPW Concept Consent or MPE Concept Plan Approval. For the purpose of this LTEMP, this excludes: • Part Lots 5, 6, 7 and 11 in DP 1197707 (see **the Site**); and

Abbreviations and Terminology		
Abbreviations	**Term**	**Definition**
		• Part Lots 6,7 and 12 in DP 1197707.
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	Site	Northern Ring Road and Service Pad. Part Lots 5, 6, 7 and 11 in DP 1197707.
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 for Logos
MAUW	Moorebank Avenue Upgrade Works	The extent of construction works to facilitate the construction of the Moorebank Avenue upgrade. Raising of the vertical alignment of Moorebank Avenue for 1.5 kilometres of its length by approximately two metres, from the northern boundary of the MPE Site to approximately 120 metres south of the MPE Site. The Moorebank Avenue upgrade also includes upgrades to intersections, ancillary works, and the construction of an on-site detention basin to the west of Moorebank Avenue within the MPW Site.

Abbreviations and Terminology		
Abbreviations	**Term**	**Definition**
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 estate road (northern ring road), associated service pad, and loop road (including roundabout) within the Moorebank Precinct West (MPW) site located at 400 Moorebank Avenue, Moorebank NSW, 2170 (the MPW Site).

The Development includes the proposed subdivision of Lot 1 in deposited Plan (DP) 1197707 to partial Lots 5, 6, 7 and 11 in DP 11197707 (the Site). The location of the 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 northern portion of the MPW Site and is approximately 75,570 m^2 in area.

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 BioBanking 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 2**).
- **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 2**).

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 includes MPW Early Works (Stage 1) under State Significant Development (SSD) (SSD 5066), and 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] and Contamination Management Plan (CMP) prepared by EP Risk (2020[2]). At the completion of remediation, A Site Audit Statement (SAS) A2 and Site Audit Report (SAR) for the MPW Site was provided by Enviroview (2020)[3] subject to the implementation of a LTEMP for the MPW Site (EP Risk 2020a)[4]. It is understood that upon completion of placement of fill and prior to construction at the Site, a SAR and SAS for the Site is required to demonstrate the Site is suitable for the intended land use under Condition B171, SSD 7709.

[1] Golder (2016) *Land Preparation Works Stage 1 and Stage 2 – Remediation Action Plan*.
[2] EP Risk (2020) *Contamination Management Plan, Moorebank Precinct West, 400 Moorebank Avenue, Moorebank, NSW*, 30 July 2020 (ref: EP1489.002_v11.0).
[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 (2020a) *Long-Term Environmental Management Plan*, Moorebank Precinct West (MPW), dated 27 October 2020 (ref: EP1489.001_v12).

JBS&G prepared a Northern Ring Road, Service Pad and Loop Road Audit Area Validation Report (JBS&G 2022[5]), intended to summarise the information available for the Site to demonstrate the area is suitable for the intended land use following importation of fill so a SAS A and SAR could be prepared to satisfy Condition B171. JBS&G (2022) concluded remediation, validation, management and importation works had been completed in accordance with the LTEMP (EP Risk 2020a) and RAP (Golder 2016). The Site was considered suitable for its intended land use subject to the implementation of a LTEMP.

This LTEMP is a standalone document that provides an 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. The LTEMP was prepared to inform a SAR and SAS 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 Validation Report (JBS&G 2022) and pertinent information is summarised within **Appendix A**.

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 Development. The objectives of this LTEMP are to:

- Outline the nature and extent of impacted soils, sediment, surface water and groundwater requiring short to long-term management at the Site.
- 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.

[5] JBS&G (2022) *Moorebank Precinct West (MPW): Northern Ring Road, Service Pad and Loop Road – Audit Area Validation Report, Moorebank Avenue, Moorebank NSW,* dated 31 August 2022 (ref: 58753/147310 (Rev 0)).

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 made Enforceable

The LTEMP is prepared in compliance and to satisfy Moorebank Intermodal West Stage 2 Condition B172 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 Lot 1 in DP 1197707 to: Partial Lots 5, 6, 7 and 11 in DP 11197707. The Site boundary is provided as **Figure 1**.
Approximate Site Area	75,570 m^2
Site Owner	National Intermodal Corporation (NI)
Municipality	Liverpool City Council
Site Zoning	IN1 General Industry

The Site is located approximately 27 km south-west of the Sydney Central Business District (CBD) and approximately 26 km west of Port Botany. The Site is situated within the Liverpool Local Government Area (LGA), in Sydney's South West subregion, approximately 2.5 km from the Liverpool City Centre. The Site is located approximately 800 m south of the intersection of Moorebank Avenue and the M5 Motorway. The Site is situated in the northern portion of the MPW Site and is entirely within the MPW Site footprint (ref: **Figure 1**).

2.2 Current Land Use

Based on the validation report (JBS&G 2022) the Site has been raised to design levels with imported fill in preparation for its use as a service pad in the north, northern portion of the ring road and loop road. The Site had been raised to the final fill levels and surface cover comprises exposed soils (JBS&G 2022). JBS&G (2022) noted that two (2) drainage easements and overhead powerlines traverse the Site from east to west. It is understood surface water at the Site is currently managed in accordance with the MPW LTEMP (EP Risk 2020a). The filling layers as presented within the Validation Report (JBS&G 2022) are provided in **Appendix E**.

2.3 Proposed Land Use

Following provision of a SAS to be prepared by the Site Auditor in accordance with Condition B171 of SSD 7709, the proposed land is to include the construction of a service pad, ring road and loop road across the Site. The location of the Site, service pad and loop road is provided within **Figure 1**. Based on the validation report (JBS&G 2022) the service pad will include small-scale services buildings which will be raised above the ground surface (including switch rooms, control rooms and communications rooms). The Site does not include warehousing to the east of the Site, nor the on-site stormwater detention (OSD) basins to the west. Construction works will include "*the potential for relatively minor*

disturbance to underlying soils" (JBS&G 2022) and any excess spoil generated would be addressed under one of the following scenarios (JBS&G 2022):

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

Additional information pertaining to the proposed development and construction of small-scale services buildings within the service pad is provided in the Human Health Risk Assessment (HHRA) (JBS&G 2021[6]) and Validation report (JBS&G 2022).

2.4 Surrounding Land Use

The land surrounding the Site comprises:

- **North:** MPW Site, ABB Building (industrial facility), 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, Rail corridor, Holsworthy Defence land, and residential properties to the west of the Georges River.
- **East:** MPW Site, 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), rail corridor and Casula Station, Leacock Regional Park and low and medium density residential properties beyond.

2.5 Topography

The topography of the Site was generally level to final design levels with batters extending into surrounding areas following filling works. The Site has been covered with imported and site-won fill which is described within the Validation report (JBS&G 2022).

2.6 Hydrology

Drainage at the Site is anticipated to follow the design level contours as overland flow or via drainage channels, swales and detention basins via the MPW Site to the Georges River to the west. Surface water for the MPW Site is managed in accordance with the relevant LTEMP for the land.

The historical drainage system at the Site was replaced by temporary sediment control swales and dams during Stage 2 Construction Works. It is understood temporary draining swales and basins have been backfilled as part of Stage 2 works. During construction of the built surface, it is understood a

[6] JBS&G (2021) *Moorebank Precinct West: Human health Risk Assessment of AEC 1 TCE Contaminated Area,* dated 9 March 2021 (ref: 58753-136088, L287 (Rev A))

stormwater and drainage system will be constructed at the Site which will feed in the greater MPW Site drainage system and OSDs. Based on the information provided, 'trunk lines' have already been constructed which intersect the Site. No OSDs are to be constructed at the Site (JBS&G 2022).

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 north western portion of the Site, closer to the Georges River is underlain by fluvial and estuarine quartz sand, silty sand and clay from the more recent Quaternary aged Holocene epoch. The underlying bedrock consists of interbedded Hawkesbury Sandstone and Ashfield Shale (Wianamatta) from the middle Triassic period.

2.8 Hydrogeology

EP Risk (2018[7]) reported groundwater flow was towards the west and the nearest surface water body, the Georges River. Groundwater ranged from 3.087 m Australian Height Datum (AHD) to 4.157 m AHD.

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

EP Risk (2018) also reported that groundwater was predominantly fresh to brackish water (relatively low electrical conductivity, (EC). Dissolved oxygen (DO) measurements indicated generally anaerobic conditions. The oxidation-reduction potential (ORP) indicated neutral to reducing conditions and the pH measurements were generally slightly acidic.

Groundwater elevation and gauging information is provided as **Appendix G**.

2.9 Acid Sulfate Soil

A review of the Liverpool Local Environmental Plan 2008 indicates 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[8] and Golder 2015[9]) 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.

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[7] EP Risk (2018), *Moorebank Precinct West Site-Wide Per- and Poly- Fluoroalkyl Substances (PFAS) Assessment*, dated 22 August 2018 (ref: EP0748.008 v1).
[8] PB (2014) *Phase 2 Environmental Site Assessment Moorebank Intermodal Terminal*, dated 28 May 2014 (ref: 2103829A-CLM_REP-1 Rev B) Parsons Brinkerhoff Pty Ltd.
[9] Golder (2015) *Post Phase 2 Environmental Site Assessment*. Golder Associates.

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 (2020b[10]) prepared an ASSMP for inclusion as a sub-plan to the Construction Environmental Management Plan (CEMP[11]) for Stage 2 works at the MPW Site in satisfaction of condition C2 of SSD 7709. The purpose of the ASSMP was to deal with any unexpected discovery of actual or potential acid sulfate soil. The ASSMP included procedures for the investigation, handling, treatment and management of such soil and water seepage.

2.10 Summary of Site History

Numerous contamination assessments have been undertaken at the MPW Site (including the Site), the findings of which are summarised in **Appendix A** and Stage 1 and Stage 2 of development are summarised by JBS&G (2022).

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

Table 2 – Summary of 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	The Site had undergone Stage 1 (completed) and Stage 2 development. 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.

[10] EP Risk (2020b), *Acid Sulfate Soils Management Plan, Moorebank Precinct West Site, 400 Moorebank Avenue, Moorebank NSW, d*ated 30 January 2020 (ref: EP1340.001_MPW_ASSMP v5).
[11] SIMTA (2020) Construction Environmental Management Plan, Moorebank Precinct West Stage 2, dated 14 January 2020 (ref: MIC2-QPMS-EN-APP-00001).

3 Description of Existing / Residual Contamination

3.1 Summary of Impacted Media

MPW Site

Remediation works were undertaken at the MPW Site in accordance with the Golder (2016) RAP. A Groundwater Assessment Report (JBS&G 2020[12]) and Supplementary Validation Report for Stage 1 (JBS&G 2020a[13]) have been prepared for the MPW Site. At the completion of remediation activities a SAS A2 (Enviroview 2020) was provided subject to the implementation of an LTEMP (EP Risk 2020a). A summary of the remaining areas of environmental concern (AEC) and contaminants of concern is 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. The service pad portion of the Site is partially within AEC 1.
- 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 historical fire-fighting training.

The location of the AECs is provided as **Figure 3.** A LTEMP for the MPW Site (EP Risk 2020a) was prepared for the management of the abovementioned AECs.

The Site

AEC 1 and AEC 3 management areas are partially within the Site boundary. AEC 2 is located approximately 700 m to the south east and no long-term management is required in relation to the Site. The Site is generally within PFAS Reuse zones 1 and 2 and partially within zone 4 (EP Risk 2020a). During Stage 2 works, PFAS and soils impacted by low levels of asbestos were reused at the Site as discussed below. The location of the AECs and asbestos placement areas at the Site is provided as **Figure 3** and **Figure 7** (respectively). The footprint of AEC 3 has been redefined to include areas where PFAS Reuse has occurred as summarised by JBS&G (2022). A survey of PFAS placement areas included within AEC 3 is provided within **Appendix E**. 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**.

JBS&G (2022) identified three previously identified unexpected asbestos finds (UF278, UF77-4 and UF179-1) at the Site and five (5) new asbestos unexpected finds (UF288 west, UF301, UF347, UF-Standpipe and UF-Standpipe-2). The unexpected finds were managed in accordance with the LTEMP (EP Risk 2020a) and RAP (Golder 2016), which included the removal and validation of the unexpected

[12] JBS&G (2020) *Qube Property Management Services, Site Wide Groundwater Assessment Report, Land Preparation Work – Demolition and Remediation, Moorebank Intermodal Company Property West, Moorebank, NSW*, dated 17 March 2020 (ref: 51997-120679 (rev 0)).
[13] JBS&G (2020a) *MPW Supplementary Validation Report, Moorebank Avenue, Moorebank NSW*, dated 23 September 2020 (ref: 58753/132401 (Rev B)).

finds (JBS&G 2022). An additional unexpected find (UF311) was identified, however no contamination was identified and no validation letter provided (JBS&G 2022).

Golder (2015a[14]) undertook a risk assessment of the potential impact of TCE and cis-DCE impacted soil, soil vapour and groundwater in AEC1 and concluded that overall the risks associated with the VOCs were low and acceptable for the proposed open space land use including roads, road verges and woodland / riparian conservation areas.

Based upon the risk assessment prepared by Golder 2015a, permanent structures including buildings and / or buildings containing basements or other habitable spaces should not be permitted within AEC 1.

Based on a revision to development plans, JBS&G was subsequently engaged to prepare a HHRA to address plans for the construction of small-scale service buildings within the service pad area at the Site (JBS&G 2021). The HHRA concluded that *"given the use of the services buildings is to house electrical and computer equipment and no provision for longer duration worker occupations as described in the Development Plan (Attachment 2 of the HHRA), the levels of chlorinated hydrocarbons as present in soils vapours are not considered to pose an unacceptable human health risk"* (JBS&G 2022). The HHRA and Validation Report recommended the buildings should be constructed and operated for the primary purpose of housing electrical equipment and not provided with amenities that would support occupational use by workers.

Additionally, site-won PFAS containing soils and *"low levels of asbestos impacted soil"* (JBS&G 2022) were placed on-site during filling works as part of Stage 2 in accordance with the MPW LTEMP (EP Risk 2020a). PFAS containing soils were reused within the Loop Road portion of the Site from SP348 sourced from the broader MPW Site and SP426 sourced from the Site and the MPW Site. Other general fill including low levels of asbestos impacted soil was also reused at the Site. Stockpiles SP348 and SP432 contained asbestos at concentrations less than the adopted assessment criteria following the identification of bonded (non-friable) asbestos fragments during stockpile assessments by JBS&G. SP348 was reused within the Loop Road and SP432 was reused within the service pad. The reuse location of SP348 is provided within **Figure 7** and a survey is provided within **Appendix E**. No survey was provided for SP432. As such, the service pad in its entirety has been included as the potential placement area as a conservative approach. The location of the service pad is provided within **Figure 7.**

According to JBS&G (2022) *"Based on information provided by JWP, the low levels of asbestos impacted soil have been covered by 100mm of recycled DGS20 and 200 mm of concrete. The final surface level (top of concrete) is yet to be provided by the contractor."*

Overall, JBS&G (2022) noted *"during construction of the permanent surface works, there is the potential for relatively minor disturbance of underlying soils".* Therefore, this LTEMP has been prepared to address remaining AECs at the Site which may be disturbed during construction and operation of the Site.

A more detailed summary of previous investigations is provided in **Appendix A**.

[14] Golder (2015a) *Onsite Quantitative Human Health Risk Assessment, Moorebank Intermodal Terminal* (ref: 147623070-043-R-Rev1).

3.2 Source – Pathway – Receptor Linkages Requiring Management

Based on the CSM provided in **Appendix A**, a summary of impacted media requiring management in this LTEMP is provided in **Table 3**. However, there is the potential for relatively minor disturbance of underlying soils during construction of permanent surfaces at the Site (JBS&G 2022).

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[15]	Risk Assessment / Management	Source – pathway-receptor linkages requiring management
AEC 1 - North west portion of the Site to the south of the ABB Building.	Chlorinated hydrocarbons: • TCE • cis DCE	**Soil** – TCE Impacted soil likely to be impacted at depths between 3 and 7 mBGL[16] based on XSD[17] responses with a membrane interface probe (MIP). **Groundwater** – Exceedances of Tier 1 criteria (maximum TCE concentration 419 µg/L in MWBHB1). Groundwater was observed between 7 – 9 metres below top of casing (mBTOC). **Soil Vapour** – Elevated TCE levels were reported in shallow soil (44 – 280 mg/m^3).	• Golder (2015a) prepared a HHRA that assessed risks for commercial workers having intermittent use of the area, intrusive maintenance workers within shallow excavations and members of the public having intermittent use of the area. • The health risk to onsite workers was assessed to be low and acceptable for open space land use including road verges and woodland / riparian conservation areas with no buildings. • JBS&G (2021) prepared a HHRA to assess the risk for the construction of small-scale service buildings within the service pad at the Site. Golder (2015a) had not assessed the risk of vapour intrusion to future buildings. • The health risk to users of small-scale buildings to be constructed was acceptable (JBS&G 2021). • Given the backfilling of the site with fill and depth of groundwater in AEC 1, there is a low likelihood that groundwater will be encountered during construction works within this area. • It was considered unlikely by Golder (2015) that chlorinated hydrocarbons would impact the Georges River or the mass flux be affected by the construction of the OSD in this area.	• Vapour intrusion into buildings / permanent structures. • Worker exposure during intrusive maintenance works.

[15] A summary of contamination is provided within **Appendix A**.
[16] mBGL – metres below ground level.
[17] XSD – halogen specific response.

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 impact associated with residue from historical fire-fighting training and site-won PFAS-containing material reused at the Site.	PFAS	**Soil** – Exceedances of Tier 1 ecological indirect commercial / industrial criteria[18].	• EnRiskS (2019)[19] undertook a human health risk assessment of the Site and reported the risk to human health at the Site was low and acceptable, but bioaccumulation and the effects on higher order ecological consumers were unable to be excluded. • EnRiskS (2019a)[20] 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 or intrusive maintenance. • 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.
		Soil leachate – Detectable leachable PFOS + PFHxS concentrations reported within historical soil sampling and within soil placed within reuse zones.		
		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 and from the Georges River. It is understood surface water and unsuitable topsoil has been removed from the Site.		
		Groundwater – Exceedances of Tier 1 criteria.		

[18] Based upon one exceedance of the ecological direct criteria for soil <2mBGL within the Construction Area, which is less than 250% of ecological direct criteria and the 95% UCL_{mean} concentration is less than the ecological direct criteria.
[19] EnRiskS (2019) *Land Human Health and Ecological Risk Assessment (Land HERA)*, dated 6 May 2019 (ref: MICL/19/BIOR001, Revision B – Revised Draft).
[20] EnRiskS (2019a) *Waterway Human Health and Ecological Risk Assessment (Waterway HHERA)*, dated 10 May 2019 (ref: MICL/18/GRR001, Revision E – Revised Draft).

Additional Areas Requiring Management Following Filling

JBS&G (2022) has identified low levels of site-won bonded (non-friable) ACM in soil was placed during filling works below the soil surface in the service pad and loop road (SP348) areas. Concentrations of asbestos in soils were less than the adopted HSL for a commercial / industrial land use (0.05 % weight for weight). There is a potential source, pathway, receptor linkage for via inhalation (asbestos) for construction workers during soil disturbance and excavation works if this material is left on the site surface. The reuse locations (SP348 and service pad) are provided within **Figure 7** and a survey of placement of SP348 is provided within **Appendix E**. No survey was provided for SP432 so the service pad in its entirety has been included as the potential placement area as a conservative approach.

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 (partial Lots 5, 6, 7 and 11 in DP 11197707). 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. • 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.
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).

Table 4 – Responsibilities for LTEMP Implementation		
Position	**Company/Entity**	**Responsibilities**
		• Responsible for the following: ○ Notifying the Client and Principal Contractor of any unexpected finds. ○ Undertaking the assessment, remediation and validation of an unexpected find. ○ Engaging the Ordnance Contractor should UXO or EOW be identified as an unexpected find. ○ 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,

Table 5 – Planning Conditions Specific to the LTEMP	
Condition	**Requirement**
	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 at **Appendix C**.

Table 6 – Responsibilities for LTEMP Implementation		
Planning Approval	**Condition of Consent**	**Notes**
SSD 7709	B171	Provision of a Site Audit Statement 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: • detailed baseline data; • details of: ○ the relevant statutory requirements (including any relevant approval, licence or lease conditions); ○ any relevant limits or performance measures and criteria; and ○ 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;

Table 6 – Responsibilities for LTEMP Implementation		
Planning Approval	**Condition of Consent**	**Notes**

		• a description of the measures to be implemented to comply with the relevant statutory requirements, limits or performance measures and criteria;
		• a program to monitor and report on the:
		  ○ impacts and environmental performance of the development;
		  ○ effectiveness of the management measures set out pursuant to paragraph (c) above;
		• 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;
		• a program to investigate and implement ways to improve the environmental performance of the development over time;
		• a protocol for managing reporting any;
		  ○ incident and any non-compliance (specifically including any exceedance of the impact assessment criteria and performance criteria);
		  ○ complaint;
		  ○ failure to comply with statutory requirements;
		• roles and responsibilities for implementing the plan; and
		• a protocol for periodic review of the plan.

	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
	8 d)	i), ii), iii), iv), v), vi), vii),

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 A2 and SAR and registrations on title to satisfy Condition B171 and B173 of SSD 7709, respectively. Implementation of the LTEMP is required for 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:

Proposed Development Activities

Based upon the description of the proposed development (JBS&G 2022), the following activities are proposed at the Site which may intersect AEC3 and AEC1 (**Figure 3**). Additionally, JBS&G (2022) has identified soil containing asbestos at concentrations less than the HSL is present beneath the imported engineered fill layer at the Site (**Figure 7**).

Phase 2 Construction Works

- Installation of underground services.
- Construction of roadways, small-scale service buildings, and landscaped areas.

Operational Phase

- Sub-surface maintenance works.
- Maintenance of landscaped areas.
- Groundwater Monitoring (as part of EP Risk 2020a).
- Small-scale service buildings.

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) and EP Risk (2020) CMP. The EMPs are provided in **Appendix B** and summarised as follows:

- **EMP 1**– Land use restrictions.
- **EMP 2** – Subsurface works – AEC3.
- **EMP 3** – Materials Tracking.
- **EMP 4** – Stockpile Management.
- **EMP 5** – Minor Excavation.
- **EMP 6** – Off-site disposal of excavated/unsuitable material.
- **EMP 7** – Importation of fill materials/aggregate.
- **EMP 8** – Subsurface maintenance works.
- **EMP 9** – Unexpected finds.
- **EMP 10** – Unexpected Finds Validation Requirements.
- **EMP 11** – Management of groundwater.
- **EMP 12** – Management of surface water.
- **EMP 13** – Training.
- **EMP 14** – Contractor and subcontractor management.
- **EMP 15** – Contingency plan.
- **EMP 16** – Non-compliances with the LTEMP.
- **EMP 17** – Record keeping.
- **EMP 18** – Audit/review of LTEMP implementation.
- **EMP 19** – LTEMP review.
- **EMP 20** – 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 1	Installation of underground services and small-scale service buildings	**EMP 3, EMP 4, EMP 5, EMP 6, EMP 9, EMP 10, EMP 11, EMP 12**
		Construction of roadway, pedestrian access track, service pad and landscaped areas	**EMP 3, EMP 4, EMP 5, EMP 6, EMP 9, EMP 10, EMP 11, EMP 12**
	AEC 3, Asbestos Placement Areas, and Service Pad	Installation of underground services	**EMP 2, EMP 3, EMP 4, EMP 5, EMP 6, EMP 9, EMP 10, EMP 11, EMP 12**
		Construction of roadway, pedestrian access track, service pad and landscaped areas	**EMP 2, EMP 3, EMP 4, EMP 5, EMP 6, EMP 9, EMP 10, EMP 11, EMP 12**
Operation of Proposed Development	AEC 1, AEC 3, Asbestos Placement Areas, and Service Pad	Sub-surface maintenance works	**EMP 8, EMP 9, EMP 10, EMP 11, EMP 12**

In addition to the EMPs provided within **Table 7**, **EMP 13** to **EMP 20** are required within all construction and operational stages.

4.5 Reuse of PFAS Impacted Soil

The Site includes soil reuse Zones 1 and 2, and partially within Zone 4 (EP Risk 2020a). As reported by JBS&G (2022), site-won and imported fill material has been imported to design levels over the entire footprint of the Site, limiting opportunities for the reuse of soil.

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 2022):

- Reuse on remaining portions of the MPW Site in accordance with the POEO Act 1997, POEO Regulation, applicable DA, EPL, CMP or LTEMP for the land.
- Off-site disposal in accordance with EPA 2014.

Based on the proposed development including the construction of roads and a service pad, it is unlikely PFAS impacted soil will be re-used at the Site. However, in the event of reuse, reference should be made to previous analytical results provided within **Appendix A** and assessment by the Environmental Consultant.

Soil excavated beneath the Engineered Fill layer that has been subject to historical PFAS testing, as outlined in **Appendix A,** or which is sampled and tested in accordance with **EMP 5**, should be assessed

by the Environmental Consultant for suitability for re-use on-site in accordance with the PFAS NEMP (2020[21]), MPW LTEMP (EP Risk 2020a), relevant LTEMP for the land or off-site disposal.

Further testing of soil where historical data is absent or limited may be undertaken in accordance with **EMP 5**.

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

The adopted remediation criteria for the validation of unexpected finds during Stage 2 construction works and on-going operation of the Site is provided below. The management of unexpected finds is to be undertaken in accordance with **EMP 9**.

Soil Criteria

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; and
- Heads of EPAs Australia and New Zealand (HEPA), *PFAS National Environmental Management Plan*, January 2020 (HEPA NEMP 2020).

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;

[21] Heads of EPA Australia and New Zealand (2020) *PFAS National Environmental Management Plan Version 2.0*.

- 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, 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 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 and in accordance with **EMP 10**. 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 NSW EPA 2014 and **EMP 6**.

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 9**) and a contingency plan (**EMP 15**) 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 19**):

- 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 19**). 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 20** are met.

5.3 Managing and Reporting

Incidents and Non-compliances

The requirement is for the owner / developer 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 16**. Reporting registers are provided as **Appendix F**.

Complaints

All complaints will be managed in accordance with the applicable environmental management system.

Continual Improvement

Continual improvement of this LTEMP will be undertaken in accordance with the **EMP 18** and **EMP 19.** 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 17**.

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 Site have been identified:

- **AEC 1** – The chlorinated hydrocarbon plume in the north west portion of the Site and MPW Site; and
- **AEC 3** – PFAS plume associated with historical firefighting at the Site.

AEC 2 is an upgradient source and was not considered to be a complete pathway for contamination onto the Site (JBS&G 2022).

AEC 1: Based upon a review of the Golder (2015a) risk assessment and Golder (2016) RAP, JBS&G (2020) concluded further groundwater monitoring and / or remediation of the TCE plume was not necessary to satisfy the Golder (2016) RAP. Therefore, future groundwater monitoring of the TCE plume has not been included in the LTEMP.

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 to assess effects of redevelopment on PFAS mass flux to the Georges River in accordance with the MPW LTEMP (EP Risk 2020a) or relevant LTEMP.

JBS&G (2022) noted the presence of one (1) groundwater monitoring well at the Site which is to be sampled as part of the requirements within the MPE LTEMP (EP Risk 2020a) and subsequent LTEMP for the land. Requirements for groundwater and surface water monitoring are provided within **EMP 11** and **EMP 12** respectively. The location of the groundwater monitoring well is provided within **Figure 6.**

6 References

- *Site Audit Report and Site Audit Statement Moorebank Intermodal Terminal, Moorebank, NSW*, AECOM Australia Pty Ltd Mr Frank Mohen NSW EPA accredited Site Auditor No.9801, 10 July 2014 (AECOM 2014).
- [redacted] (2017) *PFAS Assessment Report – Royal Australian Engineers (RAE) Golf Course*, dated 29 September 2017 (ref: GEOTLCOV24072AF CD) Coffey.
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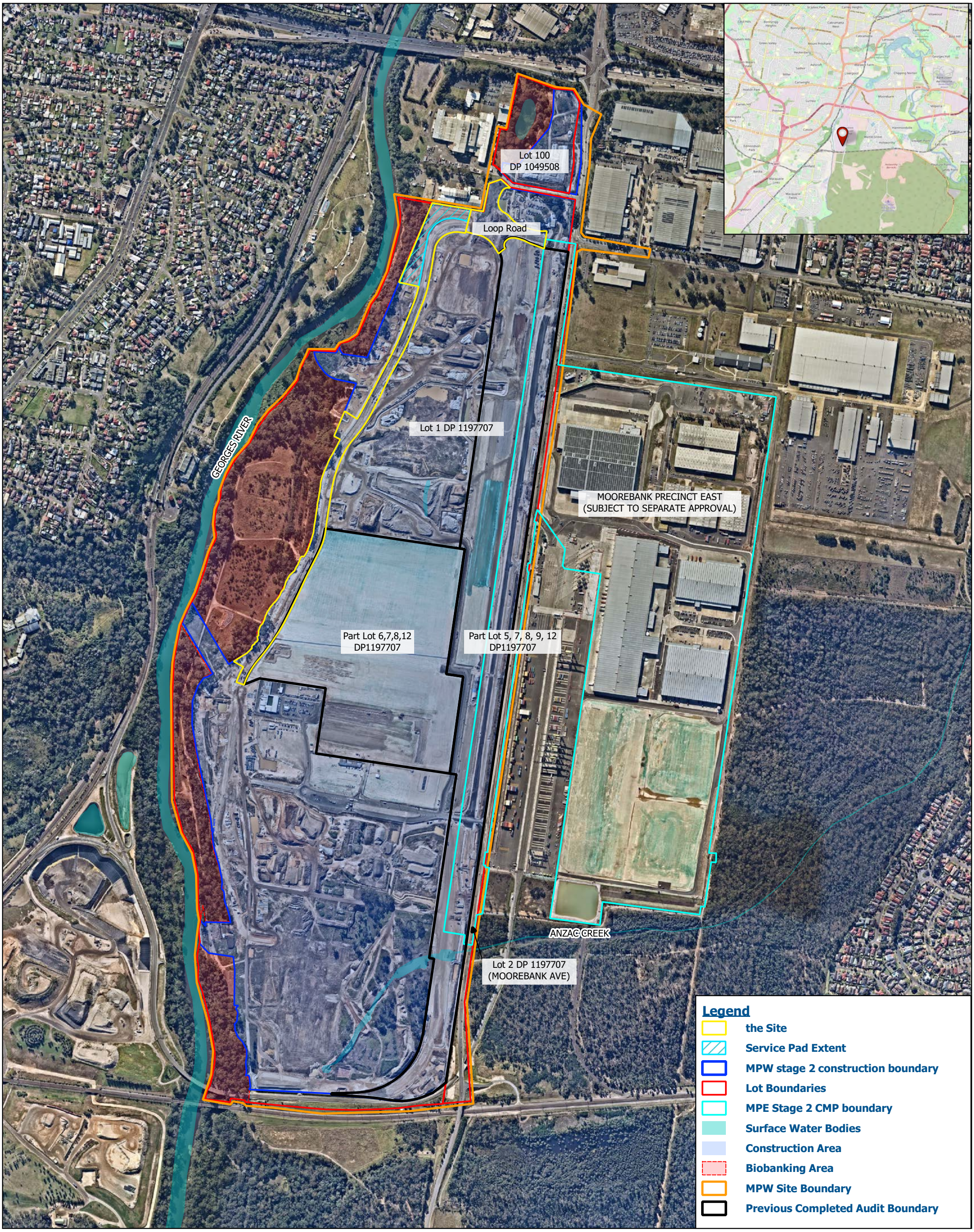
Figures



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Long Term Environmental Management Plan
Northern Ring Road Service Pad and Loop Road

Figure 1 - Site Location

Job No: EP1489
Date: 27/06/2022
Drawing Ref: Fig 1
Version No: v2

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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

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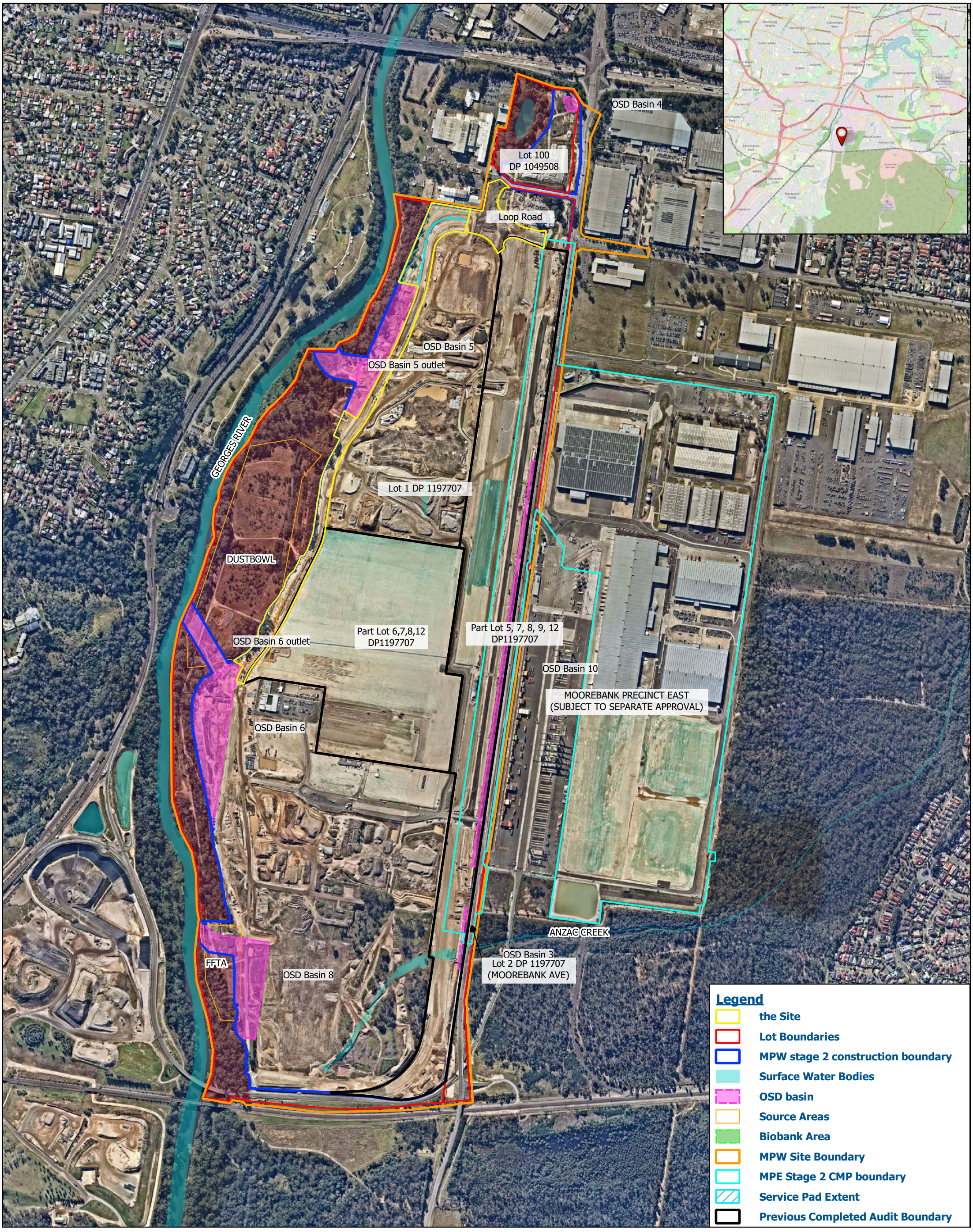
APPROVED COMPANY ISO 14001 Environmental Management Systems QMS Certification Services



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Long Term Environmental Management Plan
Northern Ring Road, Service Pad and Loop Road

Figure 2 - MPW Project Lavout and Features

Job No: EP1489.008
Date: 27/06/2022
Drawing Ref: Fig 2
Version No: v1

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Approximate Scale Only

Coordinate System: WGS 84
Drawn by: OG **Checked by:** AT
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Source: Near Maps

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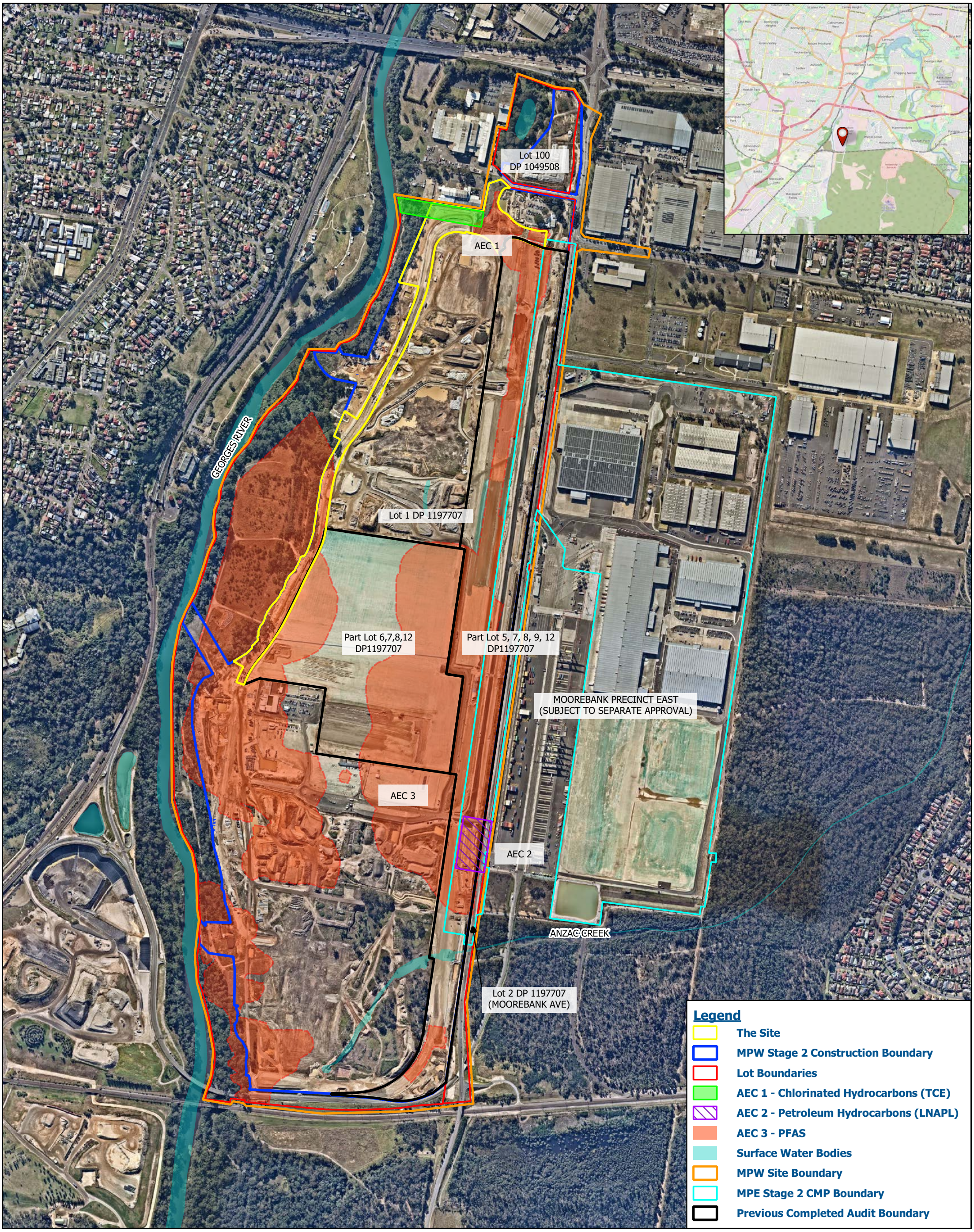

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Long Term Environmental Management Plan
Northern Ring Road, Service Pad and Loop Road

Figure 3 - Areas of Environmental Concern

Job No: EP1489.008
Date: 14/09/2022
Drawing Ref: Fig 3
Version No: v1

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Approximate Scale Only

Coordinate System: WGS 84
Drawn by: OG **Checked by:** AT
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Source: Near Maps

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APPROVED COMPANY AS/NZS 4801 Occupational Health & Safety Management Systems QMS Certification Services
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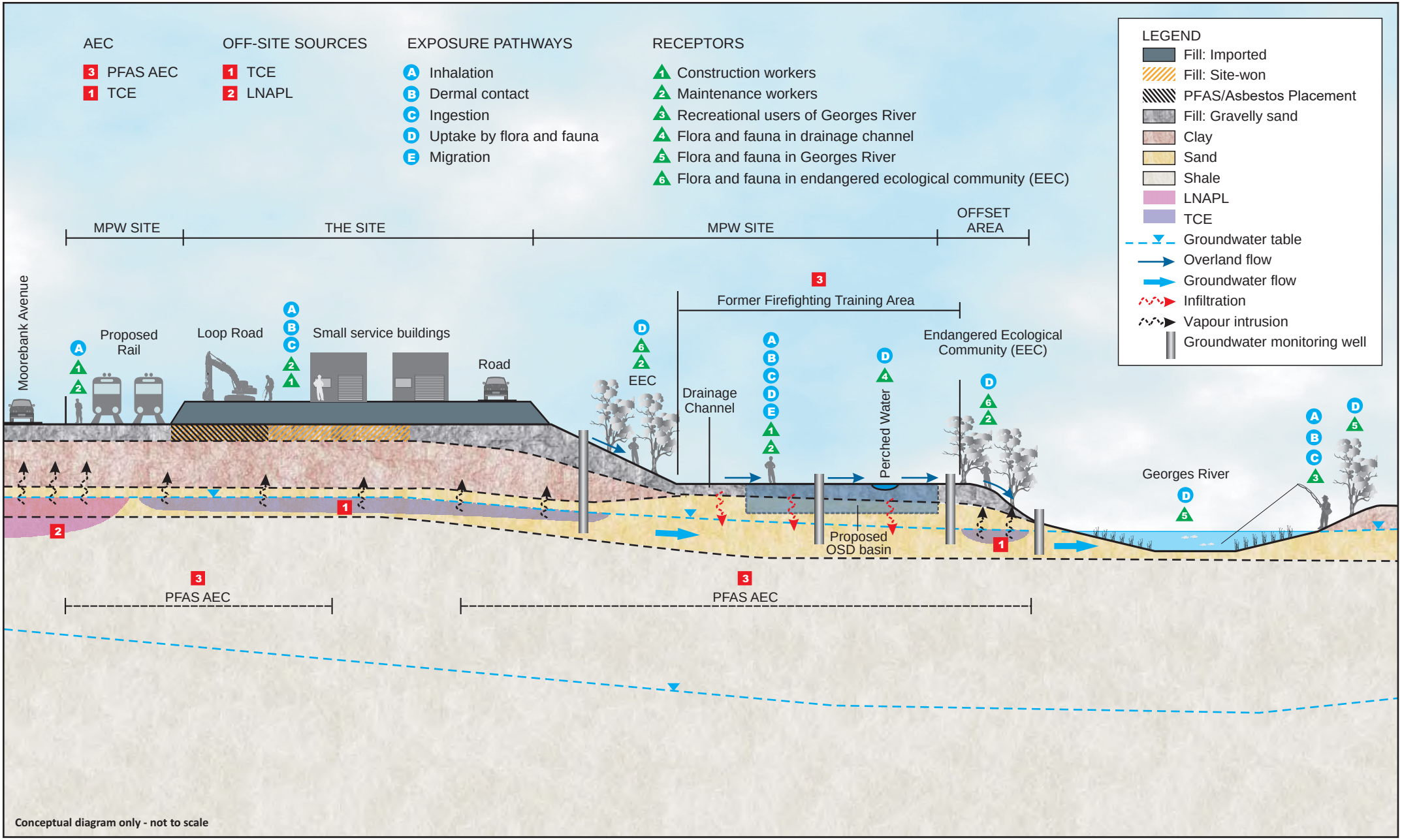

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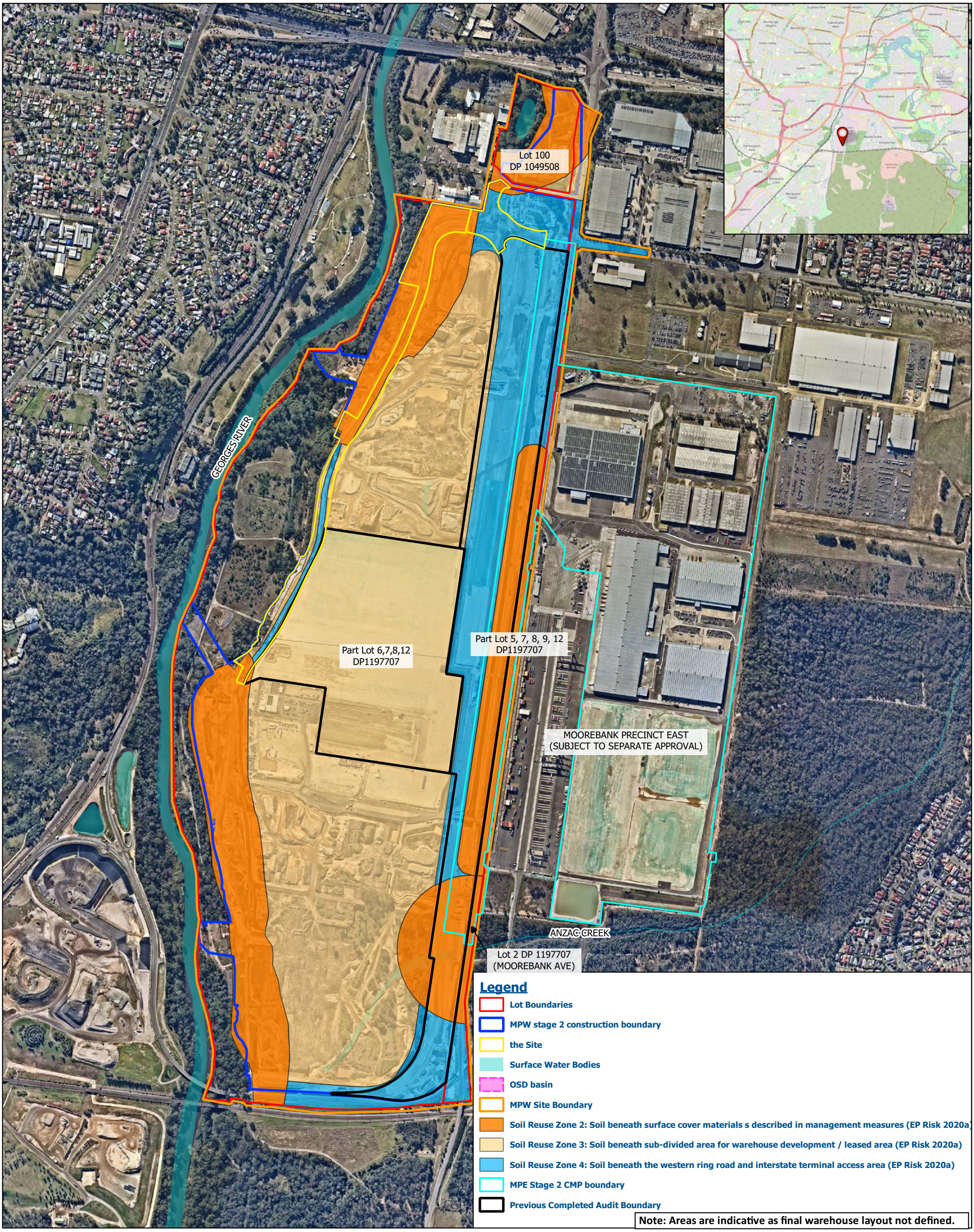
Long Term Environmental Management Plan
Moorebank Precinct West

Figure 4 - Conceptual Site Model

Job No: EP1489
Date: 22/6/2022
Drawing Ref: EP1489_008.cdr
Version No: v1

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



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Long Term Environmental Management Plan
Northern Ring Road, Service Pad and Loop Road

Figure 5 - Soil Reuse Zones

Job No: EP1489.008
Date: 27/06/2022
Drawing Ref: Fig 5
Version No: v1

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Approximate Scale Only

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

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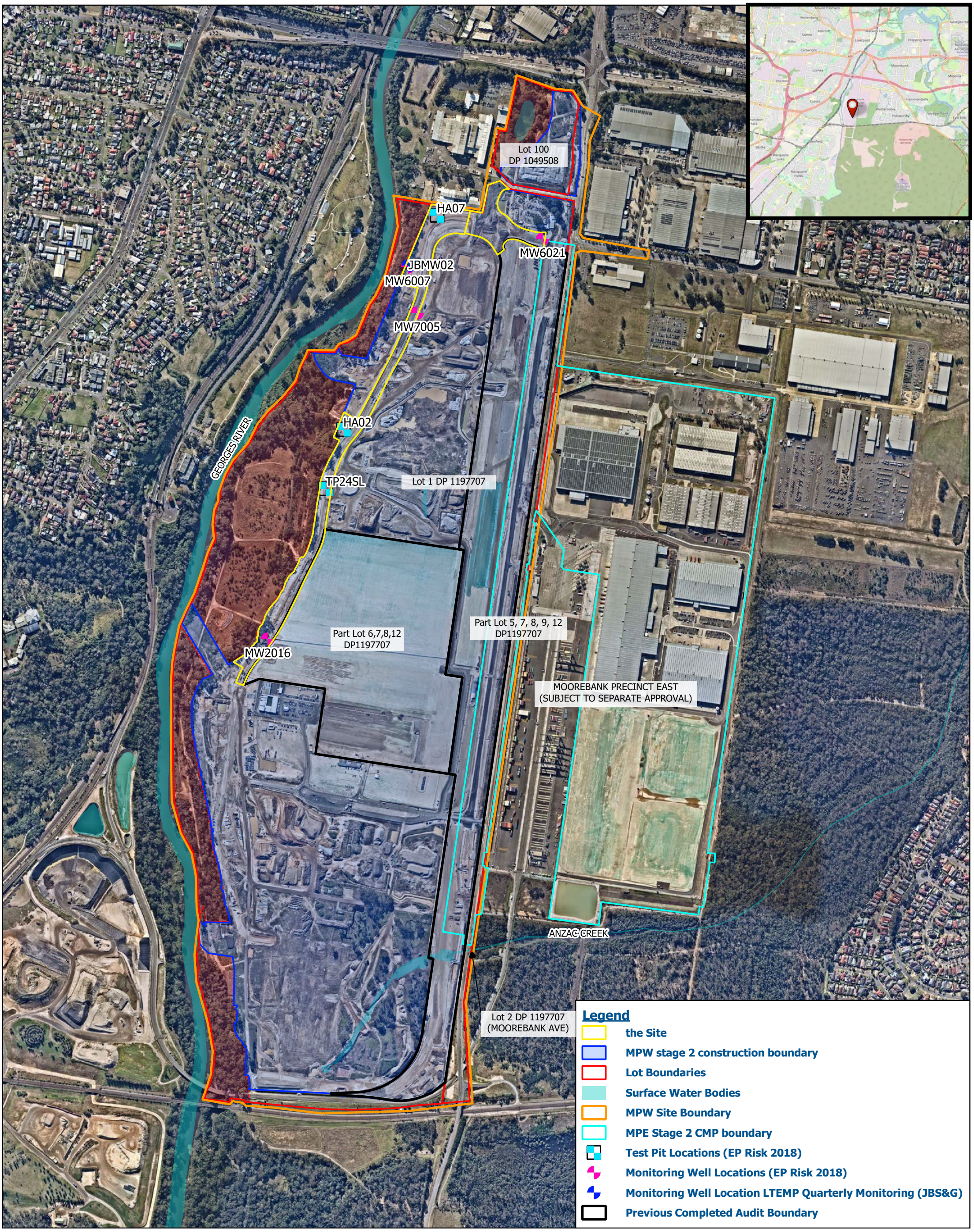

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Long Term Environmental Management Plan
Northern Ring Road, Service Pad and Loop Road

Figure 6 - Soil and Groundwater Sampling Locations

Job No: EP1489.008
Date: 27/06/2022
Drawing Ref: Fig 6
Version No: v1

N

0 130 260 390 m

Approximate Scale Only

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

APPROVED COMPANY ISO 9001 Quality Management Systems QMS Certification Services
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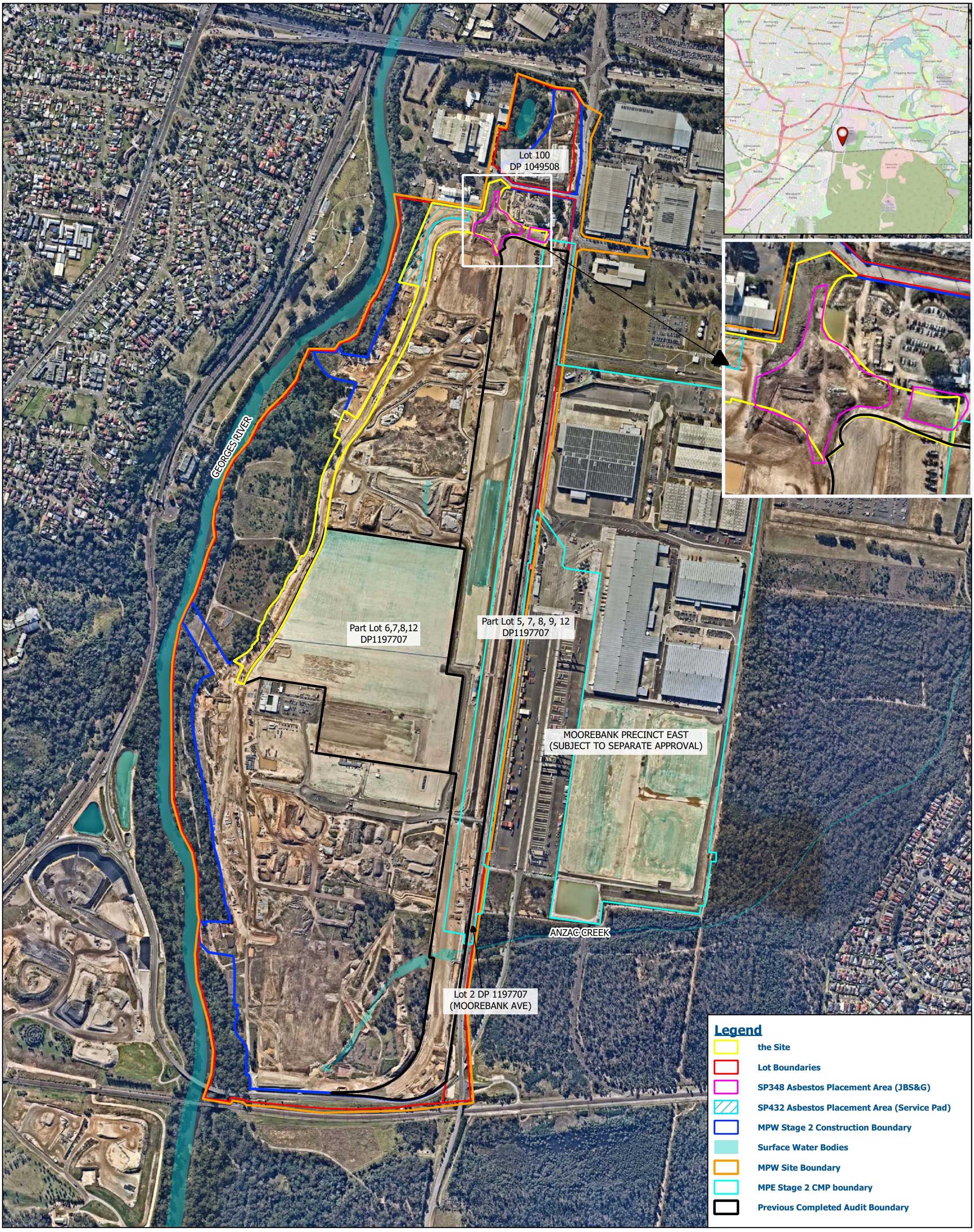

Long Term Environmental Management Plan
Northern Ring Road, Service Pad and Loop Road

Figure 7 - Asbestos Placement Areas

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Job No: EP1489.008
Date: 14/09/2022
Drawing Ref: Fig 7
Version No: v5

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Approximate Scale Only

Coordinate System: WGS 84
Drawn by: OG Checked by: AT
Scale of regional map not shown
Source: Nearmap / OpenStreetMap

APPROVED COMPANY ISO 9001 Quality Management Systems — QMS Certification Services
APPROVED COMPANY AS/NZS 4801 Occupational Health & Safety Management Systems — QMS Certification Services
APPROVED COMPANY ISO 14001 Environmental Management Systems — QMS Certification Services

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, TCE and asbestos contamination (service pad), based on a review of relevant background historical site information and the investigation works undertaken to date.

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

At the time of writing, the Site had been raised to design levels using imported fill in preparation for the proposed use as a service pad in the north, the western portion of the northern ring road located south of the service pad area, and the loop road to the east of the service pad (**Figure 1**). The Site has been developed to final design levels (JBS&G 2022). There are two (2) easements for water drainage and overhead powerlines which traverse the Site from east to west. The Site is approximately 340 m from east to west at its widest point and up to 1,545 m from south to north. The Site covers an area of approximately 75,570 m^2 and does not include any warehousing or on-site stormwater detention basins, which are located to the east and west of the Site respectively. The elevation of the Site does not include the batters to the adjacent land. Survey levels from the Validation Report (JBS&G 2022) are provided in **Appendix E**.

Proposed Development

Following provision of a SAS to be prepared by the Site Auditor in accordance with Condition B171 of SSD 7709, the proposed land use is to include the construction of a service pad, ring road and loop road (roundabout) across the Site. The location of the Site and service pad is provided within **Figure 1**. Based on the validation report (JBS&G 2022) the service pad will include small-scale services buildings which will be raised above the ground surface (including switch rooms, control rooms and communications rooms). Construction works will include "*the potential for relatively minor disturbance to underlying soils*" (JBS&G 2022) and any excess spoil generated would be addressed under one of the following scenarios (JBS&G 2022):

- Reuse on remaining portions of the MPW Site in accordance with the POEO Act 1997, POEO Regulation, applicable DA, EPL, CMP or LTEMP for the land.
- Off-site disposal in accordance with EPA 2014.

Additional information pertaining to the proposed development and construction of small-scale services buildings within the service pad is provided in the Human Health Risk Assessment (HHRA) (JBS&G 2021) and Validation report (JBS&G 2022).

Summary of Environmental Investigations

MPW Site Summary

Golder Associates Pty Ltd (Golder) was commissioned by the Moorebank Intermodal Company (MIC) (now NI) to undertake a data gap investigation (Golder 2015[22]) and Quantitative Human Health Risk Assessment (Golder 2015a[23]) of chlorinated hydrocarbon impacted soil and groundwater in the north western portion of the MPW Site to the south of the ABB Building. Trichloroethylene (TCE) and Cis-1,2-dichlorothene (cis-DCE) was reported in soil and groundwater in this portion of the MPW Site and the health risk to onsite workers was assessed to be low and acceptable for the proposed open space land use including road verges and woodland / riparian conservation areas with no buildings. Subsequent testing of shallow soil and soil gas by Golder (2018)[24] did not detect any chlorinated hydrocarbon soil concentrations above the adopted criteria, however soil vapour concentrations of TCE were reported above the adopted HIL C (recreational open space) and HIL D (commercial / industrial) criteria and cis-1,2-dichloroethene above the adopted HIL D (commercial / industrial) criteria. Groundwater assessment of this portion of the Site by JBS&G (2020) reported TCE groundwater concentrations were stable when compared to the results reported by Golder (2015).

Golder was commissioned to amend the RAP (Golder 2016) with the objective to remediate and/or manage contamination risks at the MPW Site, to render the MPW Site suitable for the proposed commercial / industrial and conservation / open space land use.

[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] 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[25]).

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 for per- and poly-fluoroalkyl substances (PFAS) (PB 2014[26], Golder 2015b[27],

[22] Golder (2015) *Post Phase 2 Environmental Site Assessment*. Golder Associates.
[23] Golder (2015a) *Onsite Quantitative Human Health Risk Assessment, Moorebank Intermodal Terminal* (ref: 147623070-043-R-Rev1).
[24] Golder (2018) *Technical Memorandum, Results – Additional Soil and Soil Vapour Investigation of TCE Contamination* (ref: 147623070-078-M-Rev0).
[25] 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]
[26] 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.
[27] Golder (2015b) *Preliminary Aqueous Film Forming Foam Investigation* (ref: 147623070-035-M-Rev0, FINAL, 28.10.15) Golder Associates Pty Ltd.

Golder 2016b[28], Golder 2016c[29], Golder 2016d[30], Golder 2016e[31], Golder 2017[32], Coffey 2017[33], EP Risk 2017[34], EP Risk 2017a[35], EP Risk 2017b[36], EP Risk 2017c[37], JBS&G 2019[38] 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)[39] 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[40] and 2019a[41]) 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) [42] 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

[28] (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.
[29] Golder (2016c) *Perfluoroalkyl Substances Surface Water and Sediment Investigation Georges River*, dated 22 March 2016 (ref: 147623070-047-R-Rev0).
[30] 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.
[31] 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).
[32] 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.
[33] Coffey (2017) *PFAS Assessment Report – Royal Australian Engineers (RAE) Golf Course*, dated 29 September 2017 (ref: GEOTLCOV24072AF-CD) Coffey.
[34] 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.
[35] EP Risk (2017a) *Per- and Poly-fluoroalkyl Substances (PFAS) Data Gap Investigation* (ref: EP00464.002, v2, 20.11.17) EP Risk Management Pty Ltd.
[36] EP Risk (2017b) *Per- and Poly-fluoroalkyl Substances (PFAS) Nested Well Investigation* (ref: EP00561.002, v1, 10.07.17) EP Risk Management Pty Ltd.
[37] 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.
[38] 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).
[39] EP Risk (2017c) *Literature Review, Criteria for Assessment of PFAS and Risk Assessment, Moorebank Intermodal Terminal Development* (ref: EP0448.001, v.3, 03.10.17).
[40] EnRiskS (2019) *Land Human Health and Ecological Risk Assessment (Land HERA)*, dated 6 May 2019 (ref: MICL/19/BIOR001, Revision B – Revised Draft).
[41] EnRiskS (2019a) *Waterway Human Health and Ecological Risk Assessment (Waterway HHERA)*, dated 10 May 2019 (ref: MICL/18/GRR001, Revision E – Revised Draft).
[42] GHD (2019) *Moorebank Precinct West, Report Summarising PFAS Investigations to February 2019*, dated April 2019 (ref: 2128111).

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 has/will be superseded.

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)[43] 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.

A validation report was prepared by JBS&G (2022) to summarise works undertaken up to the point of final levels to inform a SAR and SAS for the Site, consistent with Stage 2 SSD 7709 (Condition B171).

Summary of Preparatory Assessment Works (JBS&G 2022)

Unexpected Finds

Unexpected finds were encountered during civil works at the Site by Georgiou. Unexpected finds were generally associated with observations of asbestos-containing material (ACM) subject to assessment by JBS&G were considered an unexpected find.

There was a total of nine (9) unexpected finds including three previously identified unexpected asbestos finds (UF278, UF77-4 and UF179-1) at the Site and five (5) new asbestos unexpected finds (UF288 west, UF301, UF347, UF-Standpipe and UF-Standpipe-2). An additional unexpected find (UF311 was identified, however no contamination was identified and no validation letter provided (JBS&G 2022). The unexpected finds were managed in accordance with the LTEMP (EP Risk 2020a) and RAP (Golder 2016), which included the removal and validation of the unexpected finds (JBS&G 2022).

AEC 1 – HHRA

JBS&G engaged to prepare a HHRA to address plans for the construction of small-scale service buildings within the service pad area at the Site (JBS&G 2021). The HHRA concluded that based on the

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

proposed development of the service pad, the levels of chlorinated hydrocarbons as present in soils vapours are not considered to pose an unacceptable human health risk. The HHRA recommended the findings be presented within the LTEMP and there should be no amenities that would support occupational use by workers.

Surface Water

Management of surface water during civil works was in accordance with the MPW LTEMP (EP Risk 2020a) and construction management procedures included within the CEMP, EPL and was subject to routine reporting to the NSW EPA by Aspect Environmental Pty Ltd (JBS&G 2022). Groundwater and the surface water of the Georges River were also sampled in accordance with the MPW LTEMP (EP Risk 2020a). During Stage 2 construction works at the Site, there were exceedances of the EPL criteria in surface water within basins 0A, E/W2 and STP2. Elevated concentrations of PFAS within surface water were attributed to soils placed in these areas through construction, or minor exceedances which were subsequently recorded as below the adopted EPL criteria in following sampling events (JBS&G 2022). JBS&G (2022a) concluded "*It is 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 found in waters, otherwise clean soils do 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*".

Stockpile Assessments

Stockpiles were generated during civil works at the Site from unexpected finds, topsoil and geotechnically unsuitable material. Stockpiled soil was generally assessed for asbestos and PFAS based on their source location and segregated into categories based on reuse opportunities. Stockpiles were generally characterised as (JBS&G 2022):

- *"Suitable for site reuse (subject to geotechnical assessment, LTEMP (EP Risk 2020a) requirements and in some cases not being used on the final development surface)….; or*
- *Assessed as unsuitable for site use and not amenable to treatment (generally due to the presence of friable asbestos)…"*

A detailed summary of the stockpile assessments and tracking for the service pad and northern ring road, and loops road is provided within the Validation Report (JBS&G 2022).

In-Situ PFAS Assessments

JBS&G was engaged to conduct two (2) comprehensive PFAS Assessments (JBS&G 2021b[44] and JBS&G 2021c[45]) of the greater ring road (the Site), OSD basins, and stormwater culvert. The scope of work included the progression of 307 test pits within the greater area and the collection of soil samples. It was reported that concentrations of PFAS outside of AEC3 (as defined within EP Risk 2020a) reported

[44] JBS&G (2021b) *Moorebank Precinct West (MPW): PFAS Investigation Report,* dated 11 February 2021 (ref: 58753/134234, L076 (Rev B)).
[45] JBS&G (2021c) *Moorebank Precinct West (MPW): OSD6 and OSD8 Outlet Structure Investigations,* dated 26 April 2021 (ref: 58753/136716, L315 (Rev B)).

no concentrations of PFOS greater than the laboratory LOR. A total of three (3) PFAS hotspots with concentrations in soils greater than the adopted assessment criteria (> 0.07 mg/kg) were identified within the MPW Site. These hotspots were reportedly removed. Based on an assessment of mean concentrations of remaining soil following removal of hotspots, concentrations were below the trigger value for reuse in Zones 1 to 4 of the MPW LTEMP (JBS&G 2022). Based on the information provided, it is understood the assessments were limited to the areas of proposed cut and unsuitable material or unexpected finds based on information from the Principal Contractor (Georgiou).

An updated statistical assessment was undertaken by JBS&G (2021d [46]) following additional assessment of OSD 6 and 8 outlets, as well as the proposed Warehouse 12, south of the Site. JBS&G (2022) considered that by excluding soils with PFOS concentrations ≥0.06 mg/kg in the OSD 6 and 8 outlets (south west of the Site), remaining soil was suitable for reuse in Zones 1 to 3. However, it was noted no materials from OSD6 and 8 were reused within the Site (JBS&G 2022).

PFAS hotspots identified within the in-situ assessment were designated for separation and reuse in Zone 4 areas. This hotspot material was excavated and stockpiled as SP426. Remaining material within 'Area 2' were below the level for reuse in Zones 1 to 3.

AEC 3 – PFAS Placement Areas

PFAS soils were reused within the loop road portion of the Site (JBS&G 2022) and included as AEC 3 (**Figure 3**). The PFAS impacted material was from SP348, sourced from the greater MPW Site, and SP426, sourced from the Site and greater MPW Site (JBS&G 2022). SP426 included in-situ material from the southern portion of the northern ring road as detailed in the comprehensive PFAS Assessment (JBS&G 2021b), and SP10, SP72, SP200 and PD-SP102, generated from the greater MPW Site. Based on the tracking information provided, SP426 included Zone 4 PFAS impacted materials removed from hotspot locations and the greater MPW Site with similar classification. This material was reuse within the loop road portion of the Site and the Interstate Terminal, in the eastern portion of the MPW Site.

All soils excavated from AEC 3 were sampled for PFAS to determine the most appropriate reuse opportunity and reuse was in accordance with the LTEMP (EP Risk 2020a) (JBS&G 2022). Based on the inspection undertaken by JBS&G, PFAS impacted soils were reused within the loop road portion of the Site which met the Soil Reuse Zone 4 criteria within the LTEMP (EP Risk 2020a).

The Validation Report (JBS&G 2022) indicated PFAS impacted soil was placed within the 200 m buffer distance presented within the LTEMP (EP Risk 2022) based on the proximity of the PFAS Placement Area to the existing waterbody in Lot 100, north of the Site in the MPW Site. JBS&G (2022) considered the waterbody within Lot 100 was an OSD as it *"is considered to be part of the site stormwater management system and functions as an OSD"*. It was also considered the PFAS material was placed hydraulically cross gradient of the OSD, at a distance of 152 m from the southern extent of the OSD. Additionally, PFAS material was placed within 200 m of the Georges River (eastern shoreline). As it was only marginally within the buffer zone (192 m) JBS&G considered *"the paving of the area and the*

[46] JBS&G (2021d) *Moorebank Precinct West (MPW): Updated Area 2 PFAS Assessment, dated* 21 May 2021 (ref: 58753/137160, L338 (Rev 1)).

distance from the Georges River is considered sufficiently protective of the water body as per the objectives of the LTEMP"

The location of the revised AEC 3 is provided within **Figure 3** and the survey of PFAS Placement Areas provided within the Validation Report (JBS&G 2022) is provided in **Appendix E**.

JBS&G noted low levels of asbestos impacted soil, less than the adopted assessment criteria, were placed within the service pad (SP432) and loop road (SP348) located in the northern part of the Site.

A review of stockpile SP432 tracking information (JBS&G 2022) indicated the stockpile was consolidated from SP310 and a portion of SP313. Two (2) fragments of bonded (non-friable) ACM were identified on the surface of SP310 and one fragment of bonded (non-friable) ACM was identified on the surface of SP313. Two (2) fragments of bonded (non-friable) ACM were identified on the surface of SP348. The fragments were removed at the time of the inspection. Asbestos quantification was conducted and no fragments of asbestos were identified. The stockpiles were deemed suitable for reuse and it was recommended *"Because of the potential presence of undetected asbestos, the materials should not be used on the final site surface (0- 0.1 m)."* (JBS&G 2022). The reuse location of SP348 is provided within **Figure 7** and a survey is provided within **Appendix E**. The reuse location of SP432 (service pad) is provided within **Figure 7**.

According to the Validation Report (JBS&G 2022) "*the low levels of asbestos impacted soil have been covered by 100mm of recycled DGS20… and 200 mm of concrete. The final surface level (top of concrete) is yet to be provided by the contractor."*

Material Import

A detailed summary of imported material is provided within the Supplementary Validation Report (JBS&G 2020a) and Validation Report for the Site (JBS&G 2022). Full reference should be made to these reports for further information.

Stormwater Structures

JBS&G prepared a Technical Memo (JBS&G 2021a[47]) clarifying stormwater structures and the placement of PFAS impacted soil for the Site in accordance with EnRiskS (2020) and EP Risk (2020a) and considered that following development of the Site the risk of offsite migration of PFAS to sensitive 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;*

[47] JBS&G (2021), *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)).

- *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 H**) as referenced by EnRiskS (2020).

Summary of Contamination at the Site

Based on the JBS&G (2022) Validation report, the following remaining areas of environmental concern (AEC) and contaminants of concern for the Site is provided as follows:

- AEC 1 - Chlorinated hydrocarbons impact TCE, cis-DCE and TRH in the north west portion of the Site and MPW Site to the south of the ABB Building.
- AEC 3 - PFAS impact associated with residue from historical fire-fighting activities.

In addition, the following potential off-site sources of contamination have been identified:

- AEC 2 - Petroleum hydrocarbon impact including LNAPL in the eastern portion of the MPW Site.

AEC 1 and AEC 3 management areas are partially within the Site. AEC 2 is located approximately 700 m to the south east and no long-term management is required in relation to the off-site impact within the Site. The Site is generally within PFAS Reuse zones 1 and 2 and partially within zone 4 (EP Risk 2020a).

PFAS impacted soils were reused within the Loop Road portion of the Site in addition to low levels of asbestos impacted soils reused within the service pad area located in the northern part of the Site. The asbestos impacted soil was from Stockpile SP432 which was consolidated from SP310 and a portion of SP406. Concentrations of bonded (non-friable) asbestos in soils were less than the adopted HSL for a commercial / industrial land use (0.05 % weight for weight). The material was reportedly reused within the Pumpstation Pad (inferred service pad area) (JBS&G 2022) (**Figure 1**).

JBS&G (2021) identified one previously identified unexpected asbestos find (UF278) at the Site and two (2) new asbestos unexpected finds (UF288 west and UF301). The unexpected finds were managed in accordance with the LTEMP (EP Risk 2020a) and RAP (Golder 2016), which included the removal and validation of the unexpected finds (JBS&G 2021).

Golder (2015a) undertook a risk assessment of the potential impact of TCE and cis-DCE impacted soil, soil vapour and groundwater in AEC1 and concluded that overall the risks associated with the VOCs were low and acceptable for the proposed open space land use including roads, road verges and woodland / riparian conservation areas.

Based upon the risk assessment prepared by Golder 2015a, permanent structures including buildings and / or buildings containing basements or other habitable spaces should not be permitted within AEC 1.

JBS&G was subsequently engaged to prepare a HHRA to address plans for the construction of small-scale service buildings within the service pad area at the Site (JBS&G 2022). The HHRA concluded that *"given the use of the services buildings is to house electrical and computer equipment and no provision for longer duration worker occupations as described in the Development Plan (Attachment 2 of the HHRA), the levels of chlorinated hydrocarbons as present in soils vapours are not considered to pose an unacceptable human health risk"* (JBS&G 2021). The HHRA recommended the findings be presented within the LTEMP and there should be no amenities that would support occupational use by workers.

Overall, JBS&G (2022) noted *"during construction of the permanent surface works, there is the potential for relatively minor disturbance of underlying soils"*. Therefore, *"the Audit Area* (Site) *is considered complete, including the importation and placement of fill, and considered suitable for its intended land use subject to implementation of a site-specific LTEMP."* This LTEMP has been prepared to address remaining AECs at the Site which may be disturbed during construction and operation of the Site.

The location of the AECs is provided as **Figure 3.** Asbestos placement areas are provided within **Figure 7** and the survey of PFAS and Asbestos Placement Areas provided within the Validation Report (JBS&G 2022) are provided in **Appendix E**. The survey location of the asbestos placement for stockpile SP432 was not provided within the Validation report (JBS&G 2022), however, was inferred to have been placed within the service pad area. A summary of these areas is provided below.

AEC 1 – Chlorinated Hydrocarbons Impacted Area

In order to summarise the contamination status of the portion of the Site within AEC 1, the historical results for the entire AEC 1, including portions within the surrounding MPW Site have been included as a 'worst-case' assessment in accordance with the HHRA's undertaken at the Site (Golder 2015a and JBS&G 2021).

A summary of the historical chlorinated hydrocarbon analytical results compiled by Golder 2015, Golder 2015a, Golder 2018 and JBS&G 2020 identified the following contaminants of potential concern in AEC 1:

- TCE;
- Cis-DCE; and
- TRH.

Golder (2015a) and JBS&G (2020a) provided a summary of historical chlorinated hydrocarbon concentrations reported at AEC 1 as follows:

- Groundwater concentrations of volatile organic compounds (VOCs) and TRH above the laboratory limit of reporting (LOR) were historically reported at MWBHB1 – MWBHB11, MWBHB14 and concentrations of TCE, cis-DCE and TRH were reported above the laboratory LOR in groundwater collected from MWBHB1, MWBHB2, MWBHB3 and MWBHB7.

- The maximum TCE and cis-DCE concentrations of 0.419 mg/L and 0.028 mg/L at MWBHB1 and a TCE concentration of 0.303 mg/L at MWBHB3.
- Shallow soil chlorinated hydrocarbon concentrations were below laboratory LOR with the exception of GA-HA13 with a TCE concentration of 0.6 mg/kg.
- Screening of deeper soil with the membrane interface probe (MIP) identified elevated XSD responses between 3 and 7 mBGL, indicative of vertical migration through the soil profile.
- Elevated soil vapour TCE concentrations at two locations, screened in the unsaturated zone.

A summary of groundwater and soil vapour concentrations reported in AEC 1 is provided in **Table A1** and **Table A2**.

Table A1 – Summary of Historical Groundwater Chlorinated Hydrocarbon Concentrations (AEC 1)

Constituent	Adopted Criteria (mg/L)	Maximum Concentration (mg/L)	Exceedance
cis-1,2- DCE	0.06	0.028	No
TCE	0.07	0.419	Yes
Tetrachloroethene (PCE)	0.05	0.003	No

Table A2 – Summary of Historical Soil Vapour Chlorinated Hydrocarbon and Petroleum Hydrocarbon Concentrations (AEC 1)

Constituent in Soil Vapour	Criteria (µg/m^3)		Maximum Concentration (µg/m^3)	Exceedance
	HSL / HIL C	HSL / HIL D		
cis-1,2- DCE	2000	300	2900	Yes
Trans 1,2-Dichloroethene (trans-DCE)	2000	300	120	No
Chloroform	430	430	120	No
Benzene	2,400,000	10,000	19.2	No
TCE	400	80	280,000	Yes
Toluene	NL	16,000,000	74.2	No
PCE	40,000	8,000	440	No

JBS&G was subsequently engaged to prepare a HHRA to address plans for the construction of small-scale service buildings within the service pad area at the Site (JBS&G 2021). The HHRA concluded that based on the proposed development of the service pad, the levels of chlorinated hydrocarbons as present in soils vapours are not considered to pose an unacceptable human health risk. The HHRA recommended the findings be presented within the LTEMP and there should be no amenities that would support occupational use by workers.

Figures illustrating the locations of elevated chlorinated hydrocarbon concentrations is provided at the end of **Appendix C**.

AEC 3 – PFAS Contamination in Affected Media Onsite

The historical soil, soil leachate and groundwater PFAS analytical results reported by PB (2014), Golder (2015), Golder (2016b), EP Risk (2017a, 2017b and 2018) and JBS&G (2019b), as summarised within the Site-wide PFAS Assessment are presented in **Table A3, Table A4** and **Table A5** (respectively). 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 are provided in **Figure 3** within the '***Figures'*** section of this report.

AEC 3 – PFAS Placement Areas (JBS&G 2022)

A review of PFAS-containing soils and soil leachate (TCLP) excavated from the greater MPW Site and the Site, and reused within the Site, as summarised by JBS&G (2022) is provided within **Table A6** and **Table A7**, respectively. PFAS Placement Areas have been included within AEC 3 and a survey is provided in **Appendix E**.

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

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	9	<0.0001	0.0006	0.00051	0.00003	1	0	0.	0.00053	N
		PFOS	9	<0.0001	0.144	0.017	0.045	4	1	0	0.1344	EC (ind.)[52] - Y
		PFOS + PFHxS	9	<0.0001	0.145	0.017	0.045	4	0	0	0.0867	N
	>2	PFOA	5	<0.0001	0.0002	0.00012	0.000067	2	0	0	0.000192	N
		PFOS	5	<0.0001	0.0055	0.0021	0.0025	2	0	0	0.0485	N
		PFOS + PFHxS	5	<0.0001	0.0115	0.014	0.02	3	0	0	0.364	N

[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).
[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] 'EC (ind.)' – interim soil – ecological indirect exposure (PFAS NEMP) The ecological indirect exposure criteria of 0.14 mg/kg was adopted for the Site 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 A4 – Summary of Historical Neutral pH Leachate PFOS, 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	2	<0.01	<0.01	N/A	N/A	0	N/A
		PFOS	2	<0.01	0.13	N/A	N/A	1	N/A
		PFOS + PFHxS	2	<0.01	0.13	N/A	N/A	1	N/A
	>2	PFOA	1	<0.01	<0.01	N/A	N/A	0	N/A
		PFOS	1	<0.01	<0.01	N/A	N/A	0	N/A
		PFOS + PFHxS	1	<0.01	<0.01	N/A	N/A	0	N/A

Table A5 – Summary of Historical Groundwater PFOS, 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[53]	95% UCL_{mean} (µg/L)	95% UCL_{mean} Exceedance of Criteria
The Site	PFOA	6	9	0.001	0.851	0.0195	0.02352	8	0	N/A	N/A
	PFOS	6	9	<0.001	0.45	0.0523	0.0449	8	9	N/A	N/A
	PFOS + PFHxS	6	9	0.077	1.03	0.2973	0.05	8	9	N/A	N/A

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

Table A6 – Summary Reused Soil PFOS, PFOS + PFHxS and PFOA Concentrations (JBS&G 2022)

Area	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	No. Samples > 250% Criteria	95% UCL_{mean} (mg/kg)	95% UCL_{mean} Exceedance of Criteria
SP384	PFOA	13	N/A	<0.005	N/A	N/A	0	N/A	N/A	N/A	N/A
	PFOS	13	0.0062	0.25	0.0433	0.0744	13	0	N/A	0.133	N/A
	PFOS + PFHxS	13	0.0062	0.257	0.0438	0.0761	13	0	N/A	0.136	N/A
SP426	PFOA	79	<0.001	<0.005	N/A	N/A	0	N/A	N/A	N/A	N/A
	PFOS	79	0.0025	0.31	0.0343	0.049	47	0	N/A	0.0584	N/A
	PFOS + PFHxS	79	0.0025	0.31	0.0343	0.049	47	0	N/A	0.0584	N/A

Table A7 – Summary of Reused TCLP PFOS, PFOS + PFHxS and PFOA Concentrations (JBS&G 2022)

Area	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)
SP426	PFOS	1	N/A	<0.01	N/A	N/A	0	N/A

Assessment of Precursors

An assessment of precursors was undertaken as part of the wider assessment of the MPW Site. 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.

Asbestos in Soils

Based on a review of the JBS&G (2022) validation report, site-won bonded (non-friable) ACM impacted soil was placed during filling works below the soil surface in the service pad area. The asbestos impacted soil was from Stockpile SP432 which was consolidate from SP310 and a portion of SP406. Concentrations of asbestos in soils were less than the adopted HSL for a commercial / industrial land use (0.05 % weight for weight). The asbestos impacted material was considered suitable for reuse as general fill, however *"Should not be used on the final surface due to the potential for unidentified ACM to remain in the stockpile"* (JBS&G 2022).

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.
    - Commercial users of small-scale service buildings in the service pad area.
    - Future terrestrial flora and fauna in proposed landscaped areas.
- 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 conclusions of the validation report (JBS&G 2022) and findings of the most recent human health and ecological risk assessments prepared for the Site and the Georges River by EnRiskS (2019 and 2019a), Golder (2015a) and JBS&G (2021), an analysis of the potential source-pathway-receptor linkages are provided in **Table A8** and illustrated in **Figure 4** in the '**Figures**' section of the report.

Table A8 – Source-Pathway-Receptor Linkages

Sources		Pathways		Receptors	Linkages
Primary	**Secondary**	**Transport Mechanisms**	**Exposure Pathways**		
AEC1 – Chlorinated Hydrocarbon Impacted Area					
Chlorinated hydrocarbon impacted groundwater from the adjoining property to the north	Soil	Direct contact	Human Health: - incidental ingestion. - Dermal contact. - Dust inhalation	- Sub-surface maintenance workers. - Future commercial / industrial site users. - General public	Incomplete due to filling works undertaken in the service pad as part of Stage 2 works.
			Ecological (direct) - Direct uptake.	Terrestrial flora and fauna exposed to soil (<2 mBGL).	Incomplete as soil impact is located at depths greater than 2m.
	Soil vapour	Vapour migration	Human Health: - inhalation of vapour.	- Sub-surface maintenance workers. - Future commercial / industrial site users. - Users of small-scale service buildings - General public.	Potentially complete if controls on building design not implemented based on the HHRAs for the proposed development and intrusive works (Golder 2015a and JBS&G 2021).
	Impacted groundwater	Groundwater migration	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.
			Ecological - Direct uptake. - Bioaccumulation and biomagnification.	Ecosystems dependent upon the Georges River and Anzac Creek.	Incomplete as it is unlikely that chlorinated impacted groundwater would migrate to the Georges River.

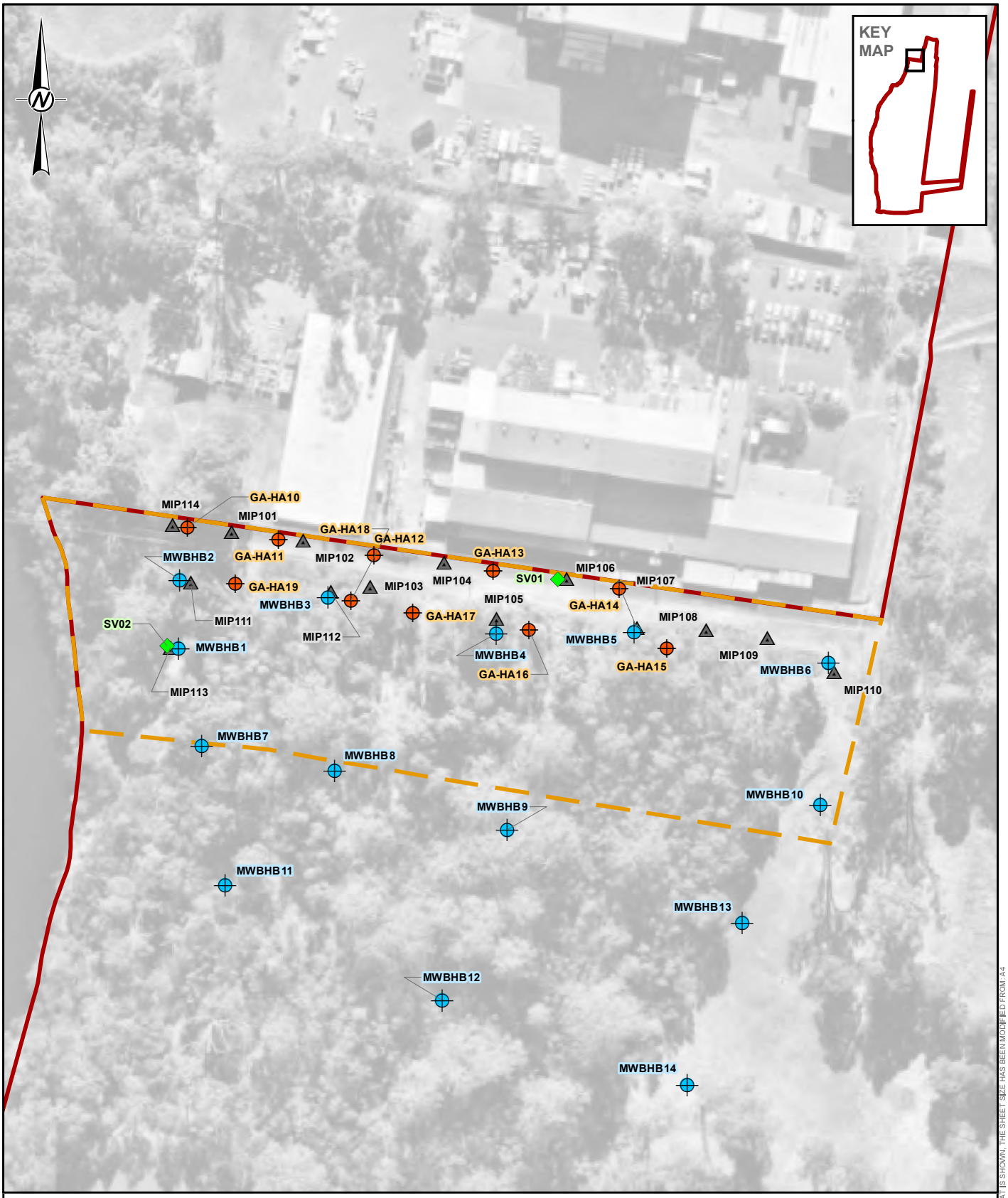
Table A8 – Source-Pathway-Receptor Linkages

Sources		Pathways		Receptors	Linkages
Primary	**Secondary**	**Transport Mechanisms**	**Exposure Pathways**		
AEC3 – PFAS Impacted Areas					
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.	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 and safety 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.
			Ecological (indirect) - Bioaccumulation and biomagnification.	Terrestrial flora and fauna exposed to soil (<2 mBGL).	Potentially complete if appropriate soil management controls are not implemented.
	PFAS impacted groundwater and surface water.	Groundwater migration and surface water flow to the 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.
			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.

Table A8 – Source-Pathway-Receptor Linkages

Sources		Pathways		Receptors	Linkages
Primary	**Secondary**	**Transport Mechanisms**	**Exposure Pathways**		
Additional Areas Requiring Management					
Asbestos impacted soil (Service Pad and SP348)	ACM 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 management controls are not implemented and asbestos in soil is left on the surface of the Site.

AEC 1



LEGEND

- Approximate Site Boundary
- Tier 2 QRA Assessment
- MIP
- Grounwater Well
- Soil Vapour Well
- Hand Auger Well

NOTES

1. The Approximate Site Boundary represents the spatial extent of the Golder Geotechnical and Geochemical project.

REFERENCE

1. Aerial Photography Copyright NearMap Pty Ltd.

0 5 10 20 30 40 50 Metres

REFERENCE SCALE: 1:1,500 (at A4)
PROJECTION: GDA 1994 MGA Zone 56

CLIENT
MOOREBANK INTERMODAL COMPANY

PROJECT
MOOREBANK INTERMODAL TERMINAL

TITLE
INVESTIGATION LOCATIONS

CONSULTANT
Golder Associates

YYYY-MM-DD	2015-07-31
PREPARED	AOB
DESIGN	-
REVIEW	RB
APPROVED	GVS

PROJECT	DOCUMENT	Rev.	FIGURE
147623070	078	0	1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM A4
25mm
0

Path: \\golder.gds\gap\Melbourne\GIS\Commonwealth\MCL Project\Deliverable\035-Rev A\147623070-035-R-0004-Rev0.mxd

AEC 3

Legend:

- Approximate Site Boundary
- Areas Of Potential Concern
- Services Excavation
- UST
- Stormwater
- Sewerage
- Sample Location

JBS&G

Job No: 51997

Client: Tactical Group

Version: L277 Rev A	Date: 18-Jan-2019
Drawn By: FH	Checked By: JS

Scale 1:1,800

0 20 40
metres

Coor. Sys. GDA 1994 MGA Zone 56

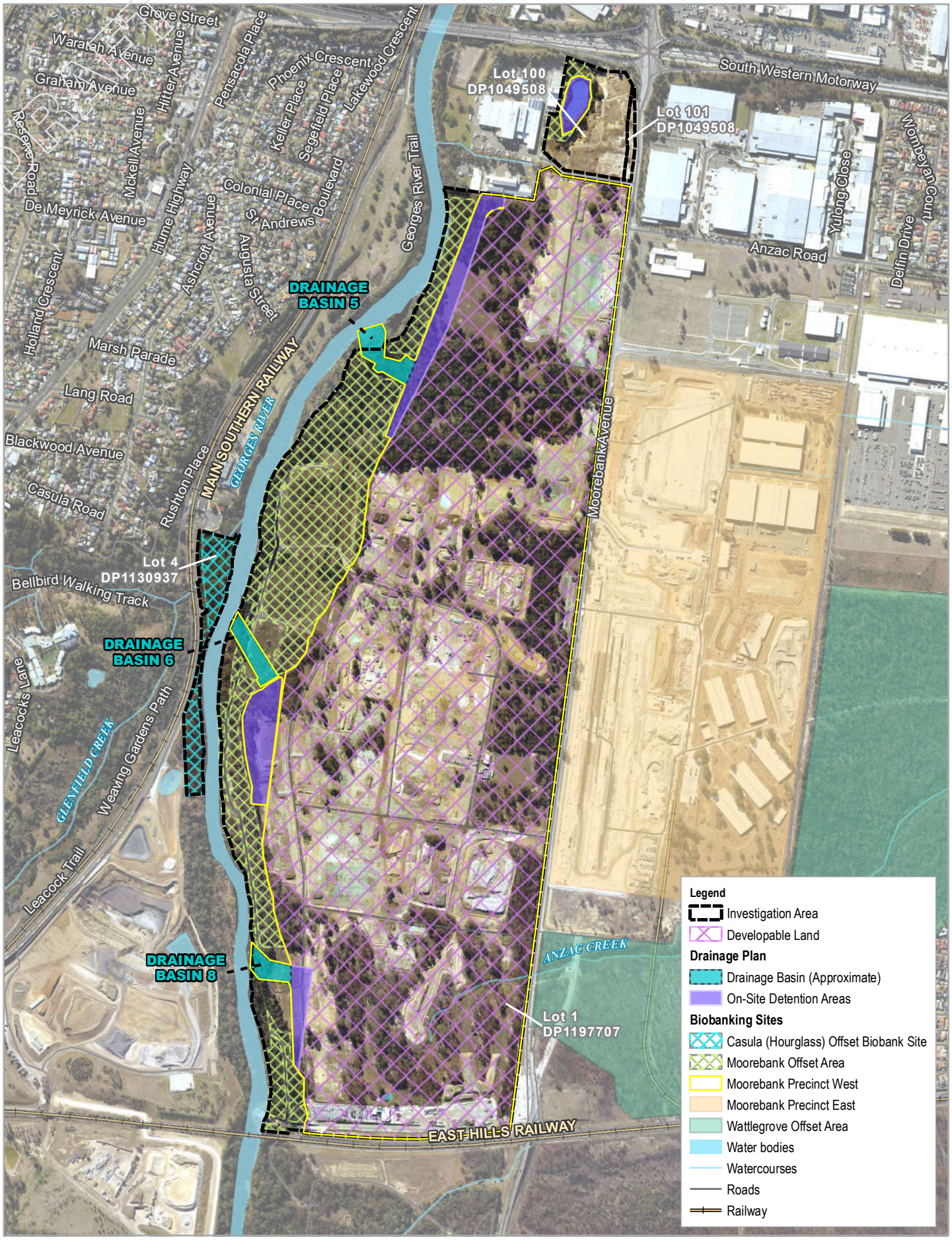
Assessment of High Risk Services

Chatham Avenue Moorebank, NSW

SITE LAYOUT AREA 20 AND 22

FIGURE: 3D

File Name: N:\Projects\Tactical Group\51997 Moorebank LPWDR Consulting\GIS\Maps\L277 Rev A\51997_03_DDP.mxd
Reference: Nearmap http://www.nearmap.com.au - Imagery 17-07-2018



Paper Size ISO A4

0 125 250 375 500

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

Project No. **21-28111**
Revision No. **B**
Date **17/ 04/ 2019**

Site Layout - Proposed Development

FIGURE 2

G:\21\28111\GIS\Maps\Deliverables\21_28111_Z003_Moorebank_SiteLayout_ProposedDevelopment.mxd
Print date: 17 Apr 2019 - 15:14

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: kqvelasco

Paper Size ISO A4

0 125 250 375 500

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

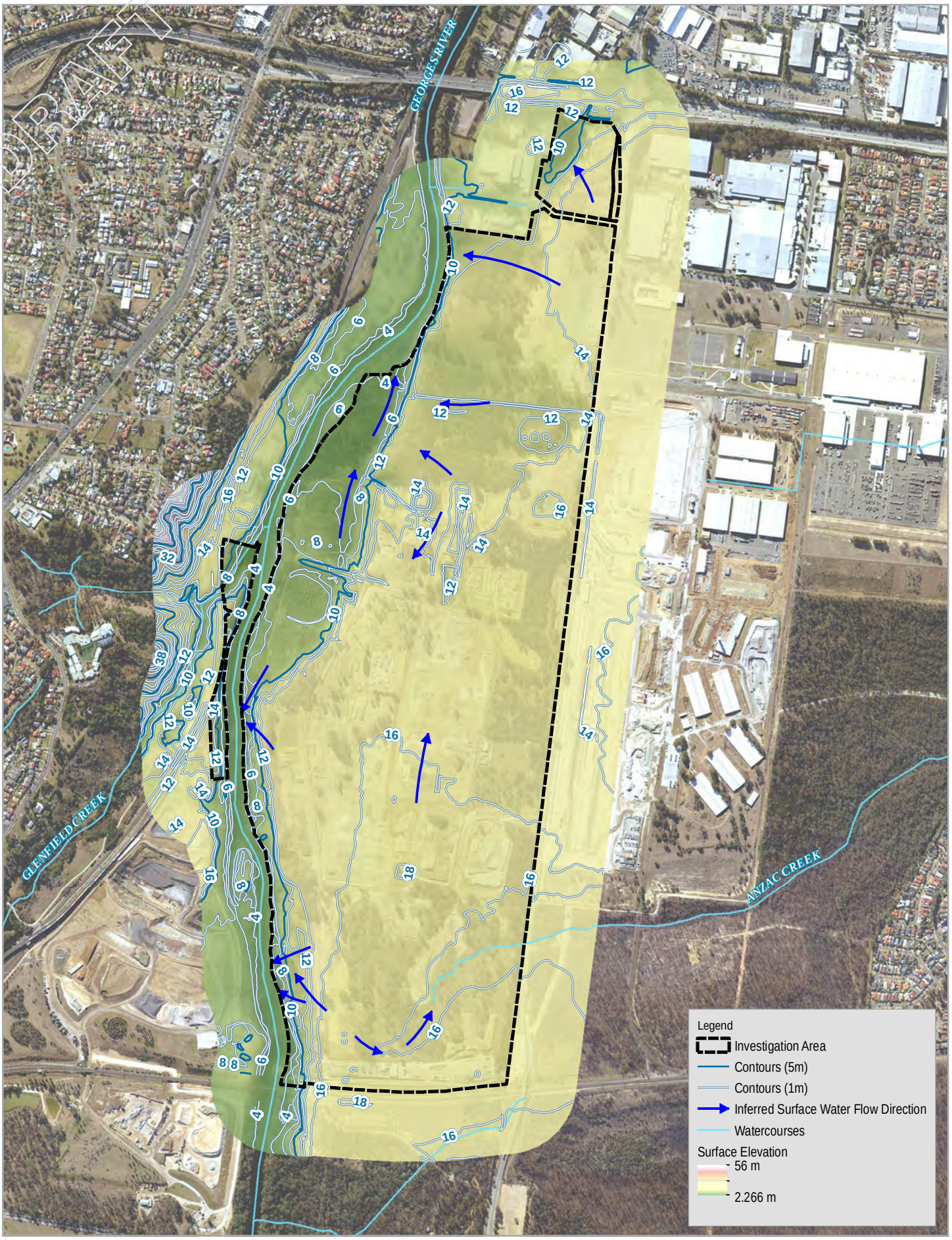
Project No. **21-28111**
Revision No. **B**
Date **17/ 04/ 2019**

PFAS Source Areas

FIGURE 3

G:\21\28111\GIS\Maps\Deliverables\21_28111_Z004_Moorebank_PFASSourceAreas.mxd
Print date: 17 Apr 2019 - 14:08

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: kqvelasco



Paper Size ISO A4

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Meters

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

N

GHD

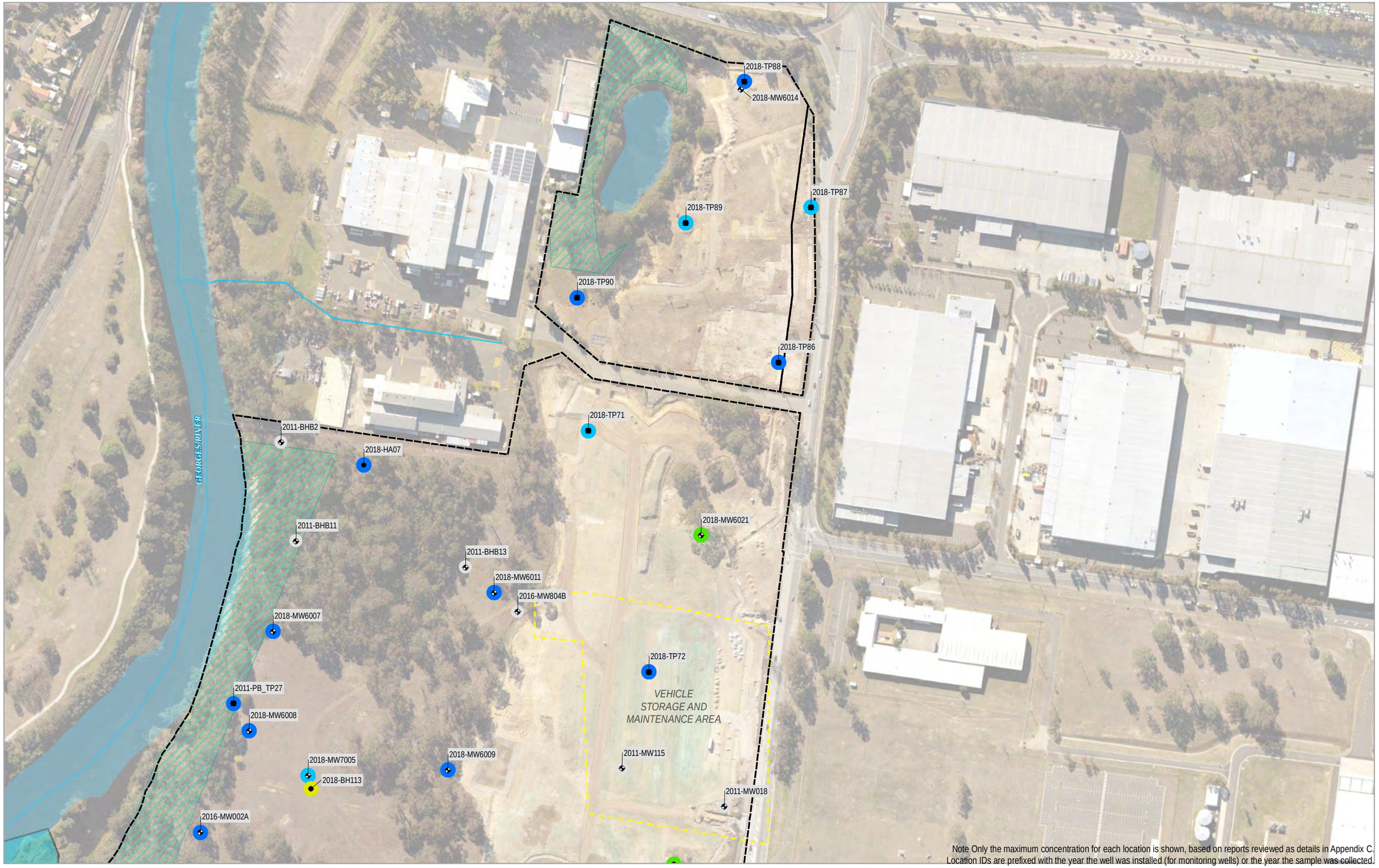
Moorebank Intermodal Company Limited
Summary Report PFAS Investigations
Moorebank Precinct West

Project No. 21-28111
Revision No. B
Date 17/ 04/ 2019

Topography and Surface Water Flows

FIGURE 4

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: kqvelasco



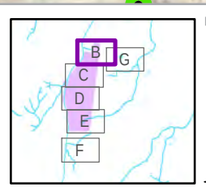
Note Only the maximum concentration for each location is shown, based on reports reviewed as details in Appendix C.
Location IDs are prefixed with the year the well was installed (for monitoring wells) or the year the sample was collected.

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



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

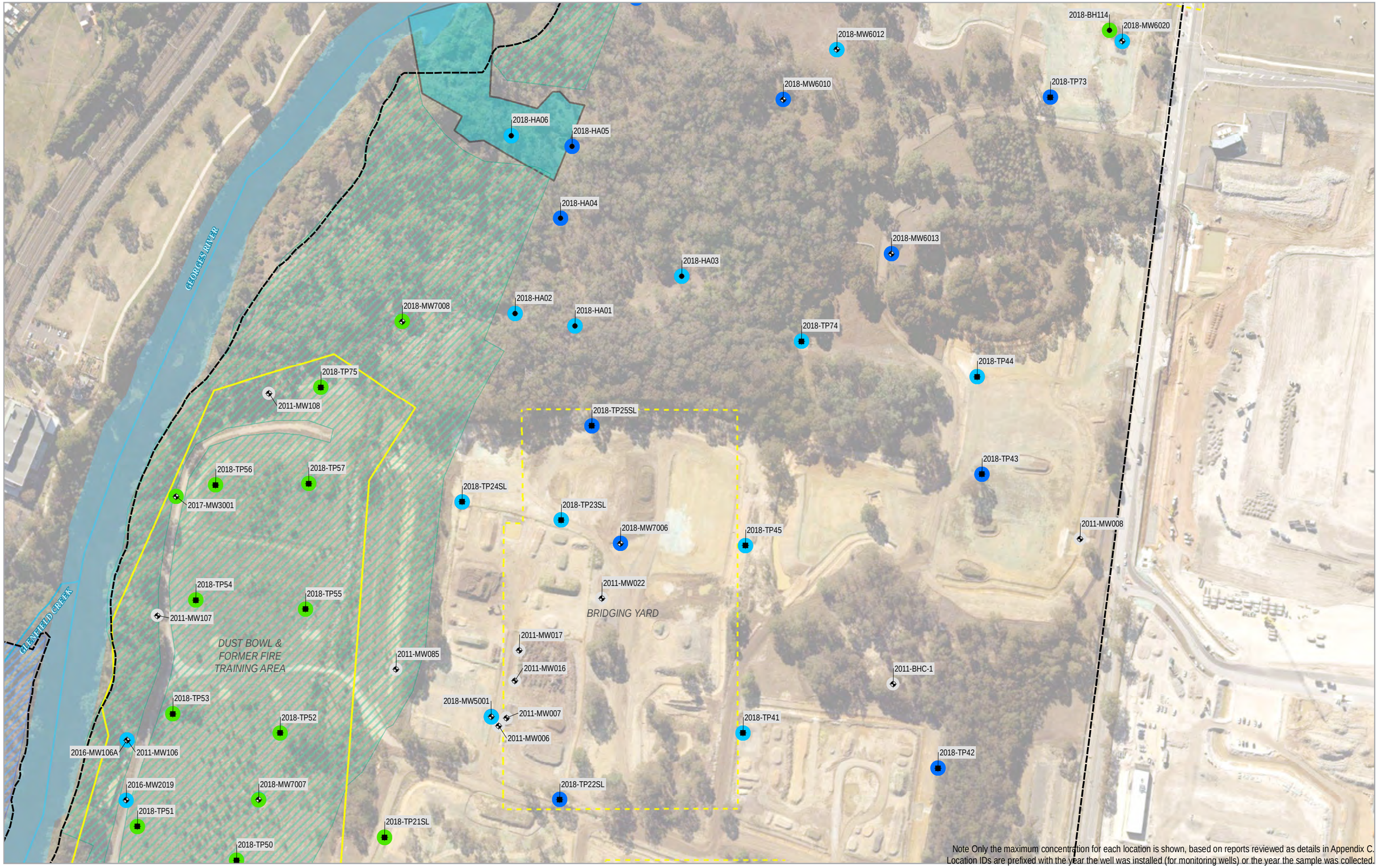
Soil
PFOS + PFHxS Results
Grid 1

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

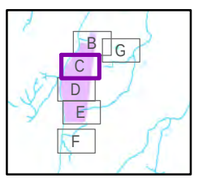
Note: The location of 2018-BH113 has been provided in error in this drawing



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

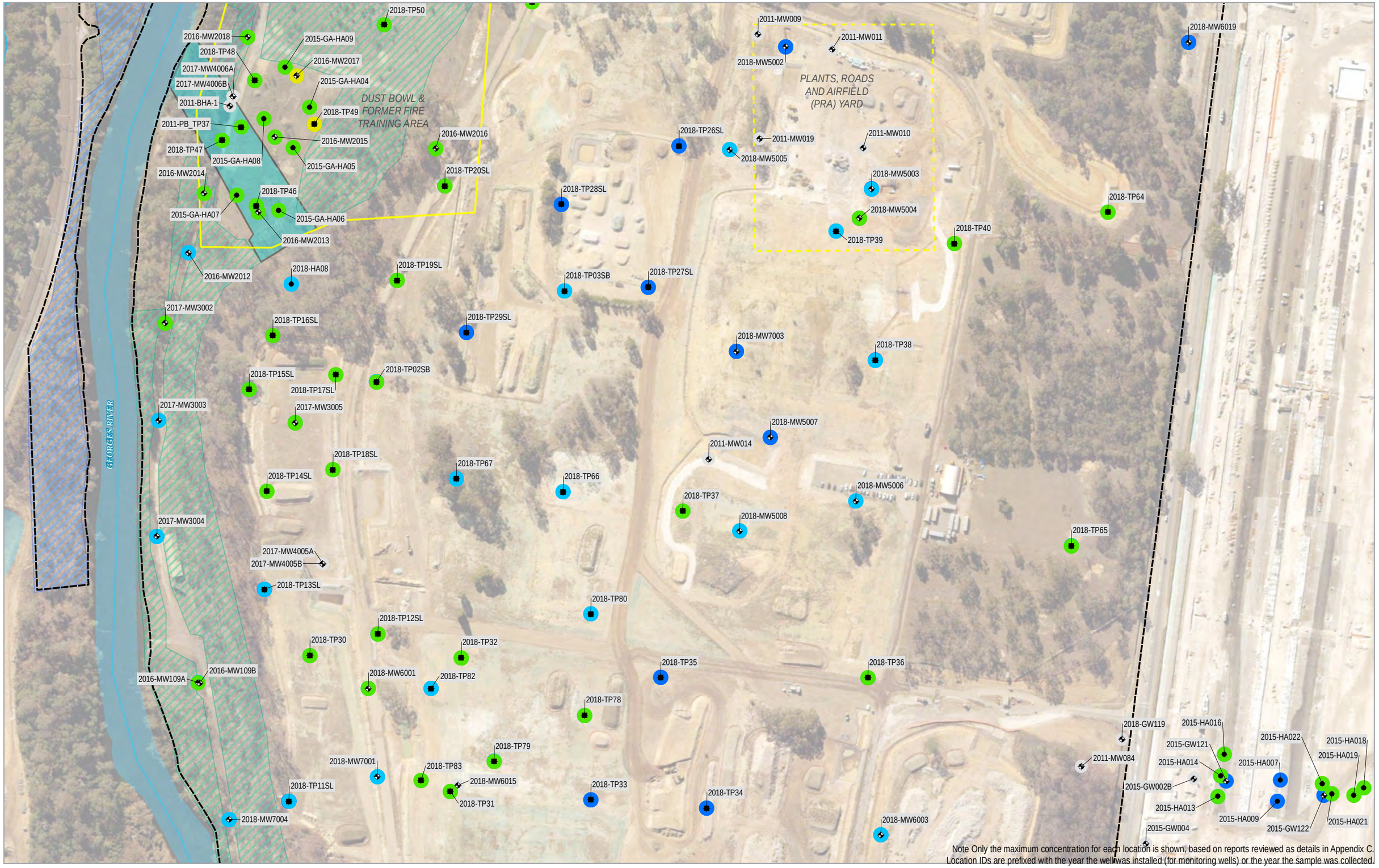
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

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



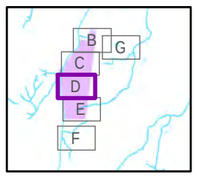
Note Only the maximum concentration for each location is shown, based on reports reviewed as details in Appendix C.
Location IDs are prefixed with the year the well was installed (for monitoring wells) or the year the sample was collected.

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

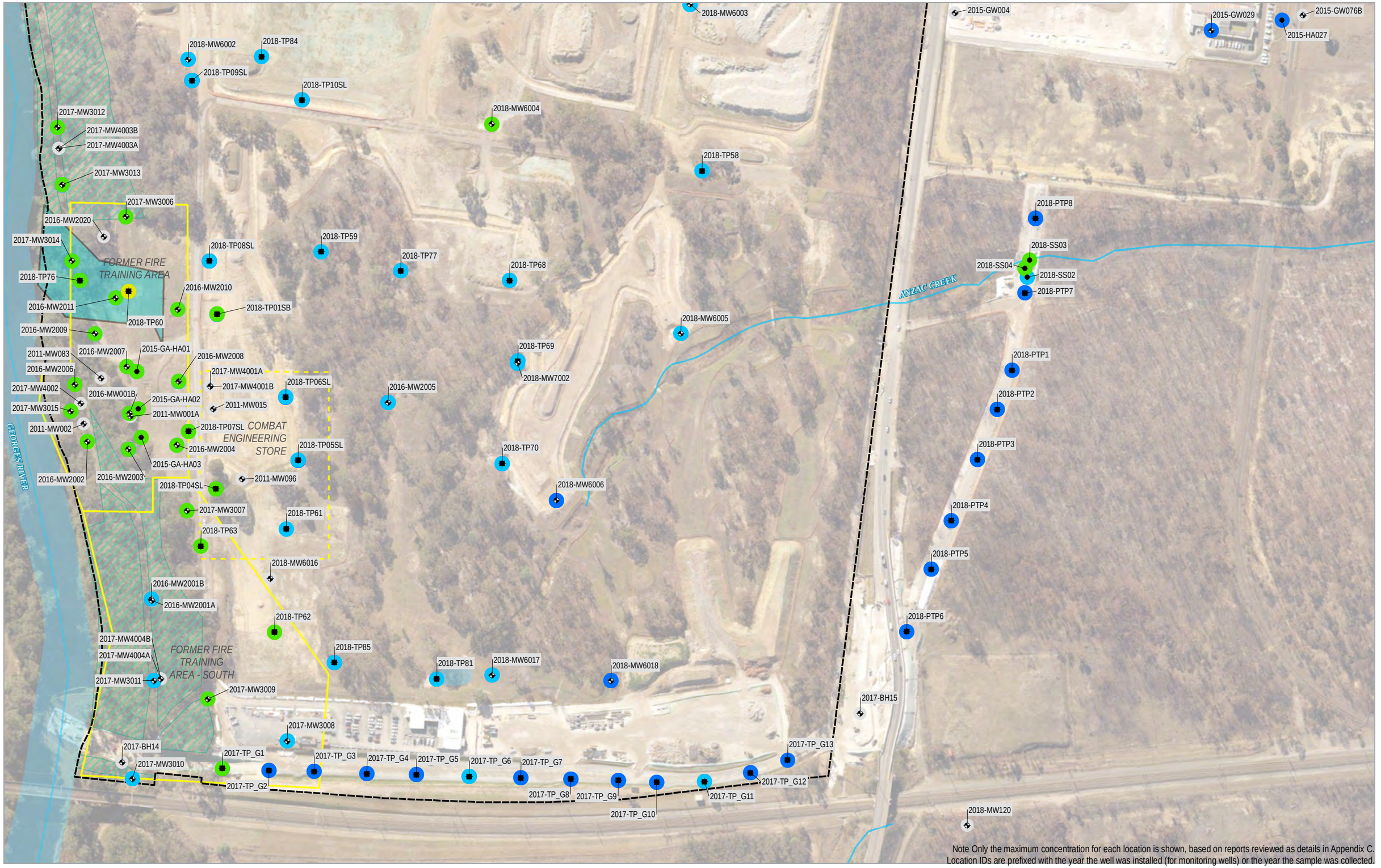
GHD

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



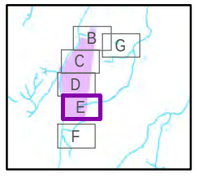
Note Only the maximum concentration for each location is shown, based on reports reviewed as details in Appendix C.
Location IDs are prefixed with the year the well was installed (for monitoring wells) or the year the sample was collected.

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

GHD

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

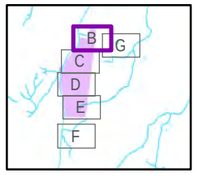
Data source: General Topo - NSW LPI DTDB 2018 (Date Extracted: 18 Feb 2019). Cadastre - NSW LPI DCDB 2018 (Date Extracted: 18 Feb 2019). Aerial Imagery - Sixmaps 2018. . Created by: mweber

201607-GA-SD019
201512-GA-SD019
201605-GA-S-038
GEORGES RIVER
201512-GA-SD013
201607-GA-SD013
201606-GA-S-136
VEHICLE STORAGE AND MAINTENANCE AREA
201605-GA-S-037
201606-GA-S-137
201607-GA-SD012
201512-GA-SD012

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



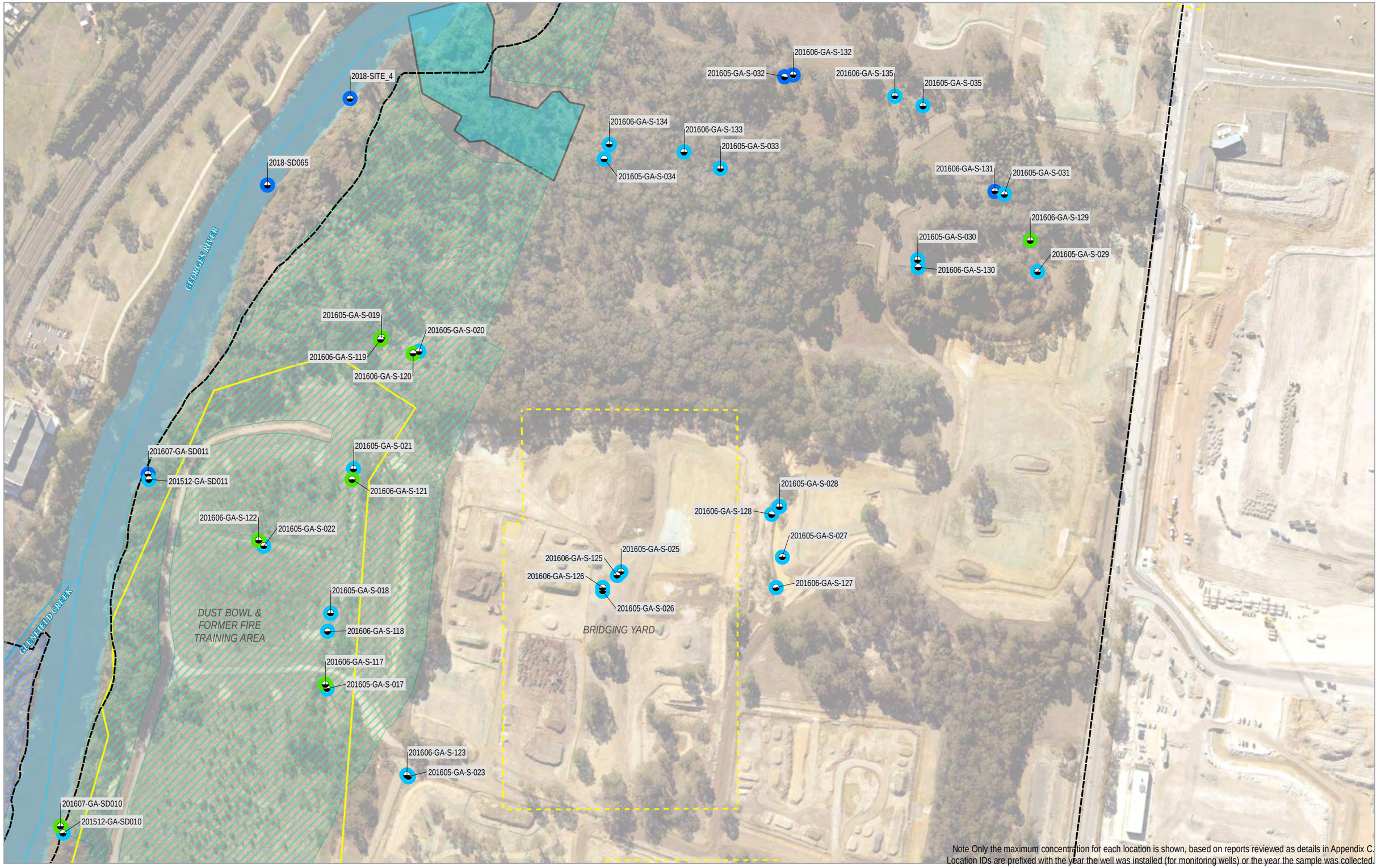
Paper Size ISO A3
0 20 40
Meters
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

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



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.

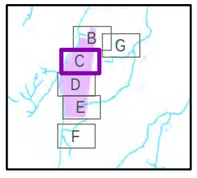
LEGEND

- 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

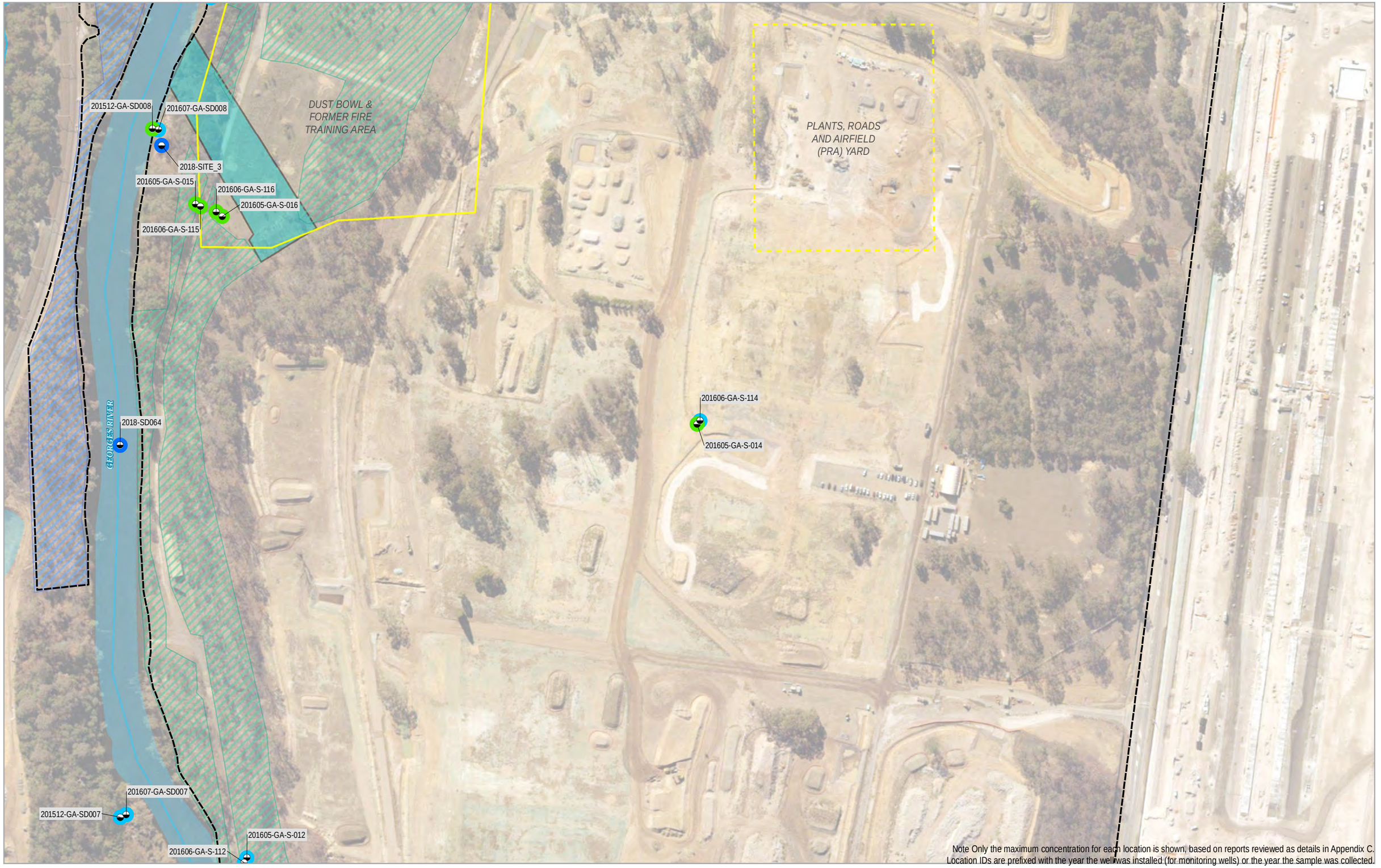
Moorebank Intermodal Company Limited
Summary Report PFAS Investigations
Moorebank Precinct West

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



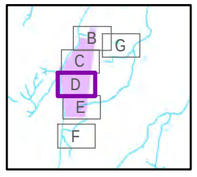
Note Only the maximum concentration for each location is shown, based on reports reviewed as details in Appendix C.
Location IDs are prefixed with the year the well was installed (for monitoring wells) or the year the sample was collected.

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

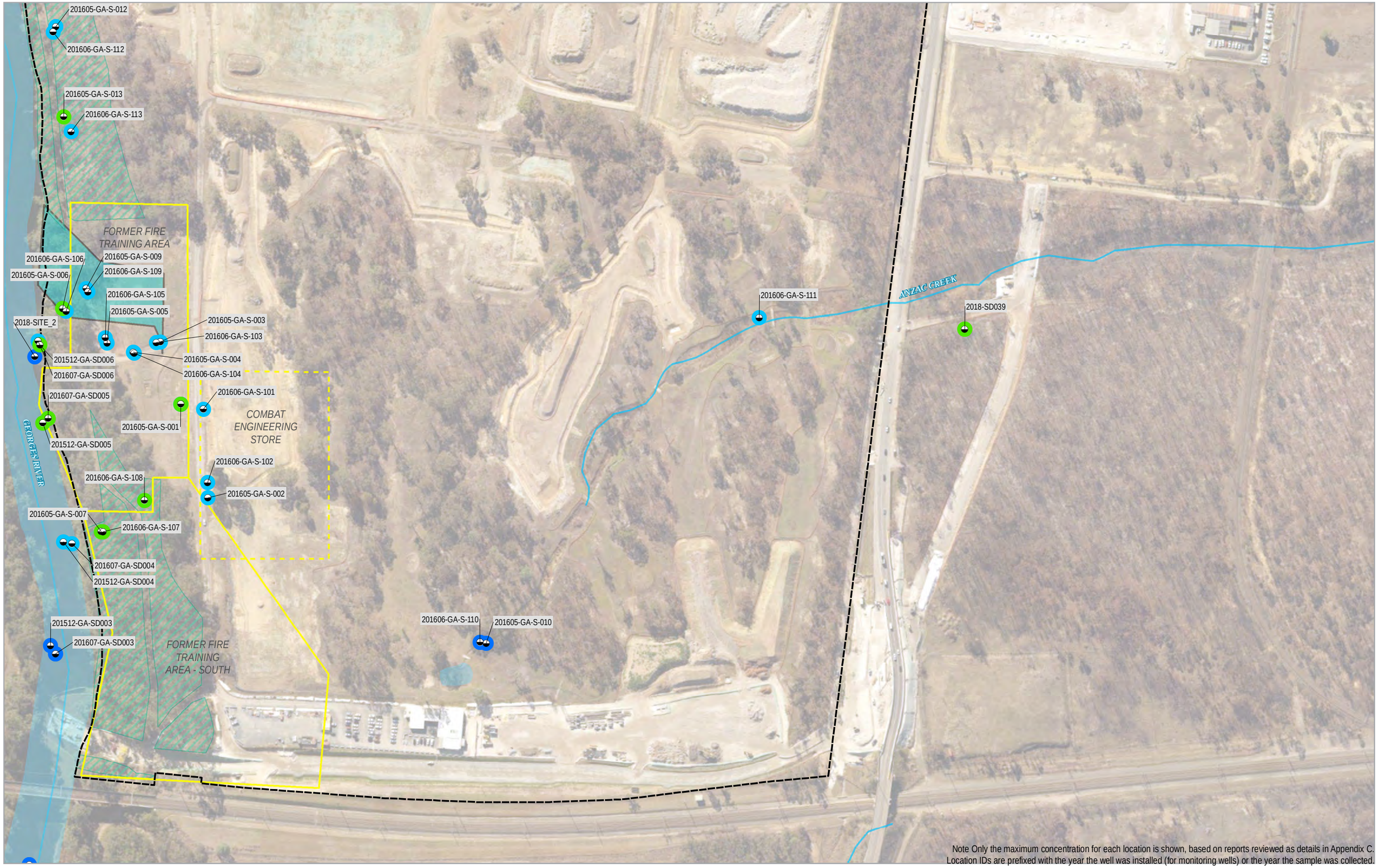
Moorebank Intermodal Company Limited
Summary Report PFAS Investigations
Moorebank Precinct West

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



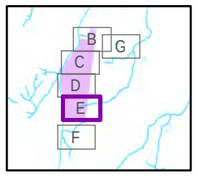
Note Only the maximum concentration for each location is shown, based on reports reviewed as details in Appendix C.
Location IDs are prefixed with the year the well was installed (for monitoring wells) or the year the sample was collected.

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

GHD

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

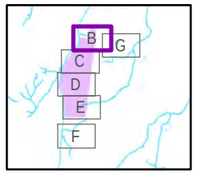
Note Only the maximum concentration for each location is shown, based on reports reviewed as details in Appendix C.
Location IDs are prefixed with the year the well was installed (for monitoring wells) or the year the sample was collected.

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

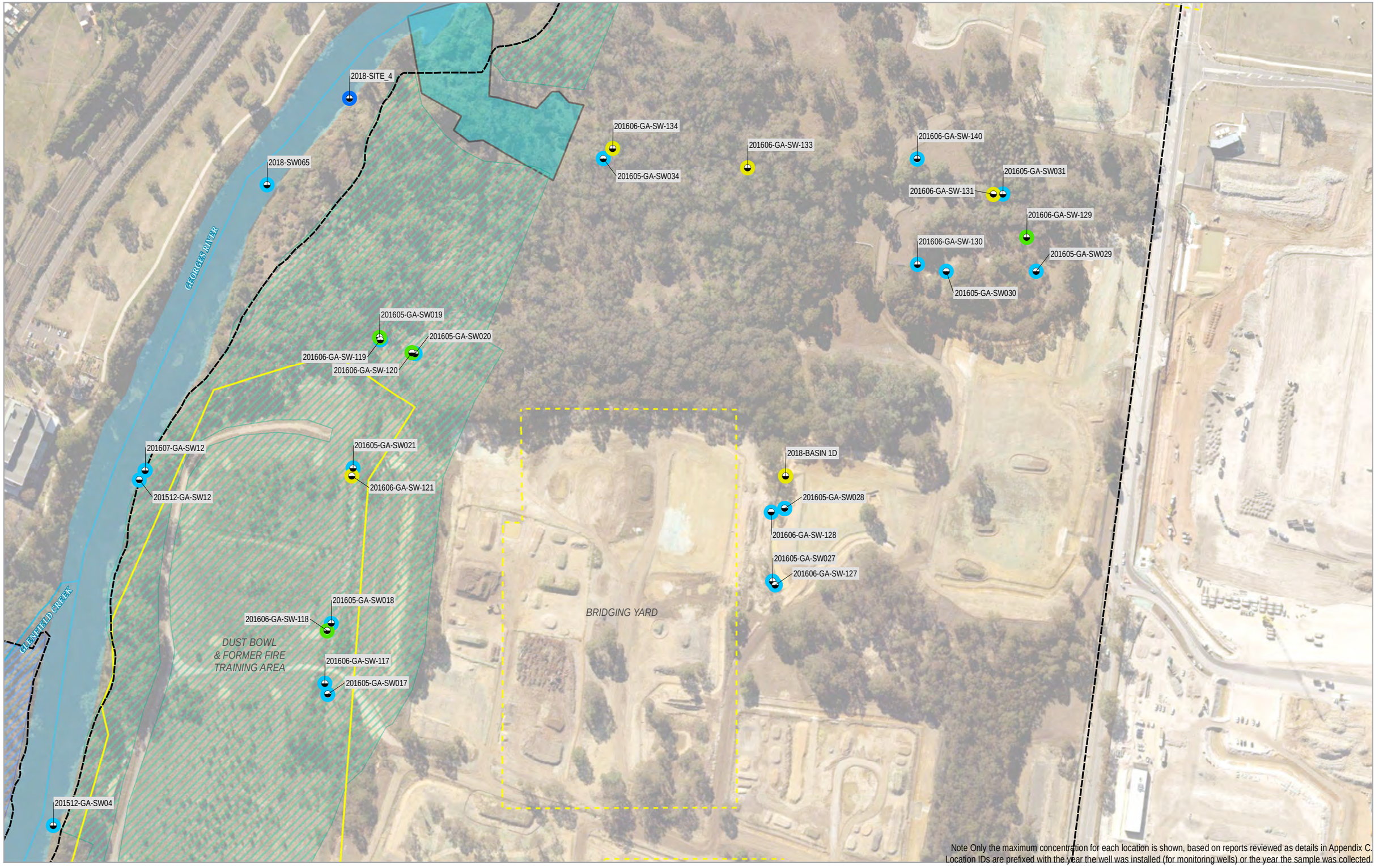
Moorebank Intermodal Company Limited
Summary Report PFAS Investigations
Moorebank Precinct West

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



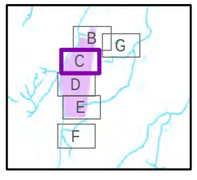
Note Only the maximum concentration for each location is shown, based on reports reviewed as details in Appendix C.
Location IDs are prefixed with the year the well was installed (for monitoring wells) or the year the sample was collected.

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

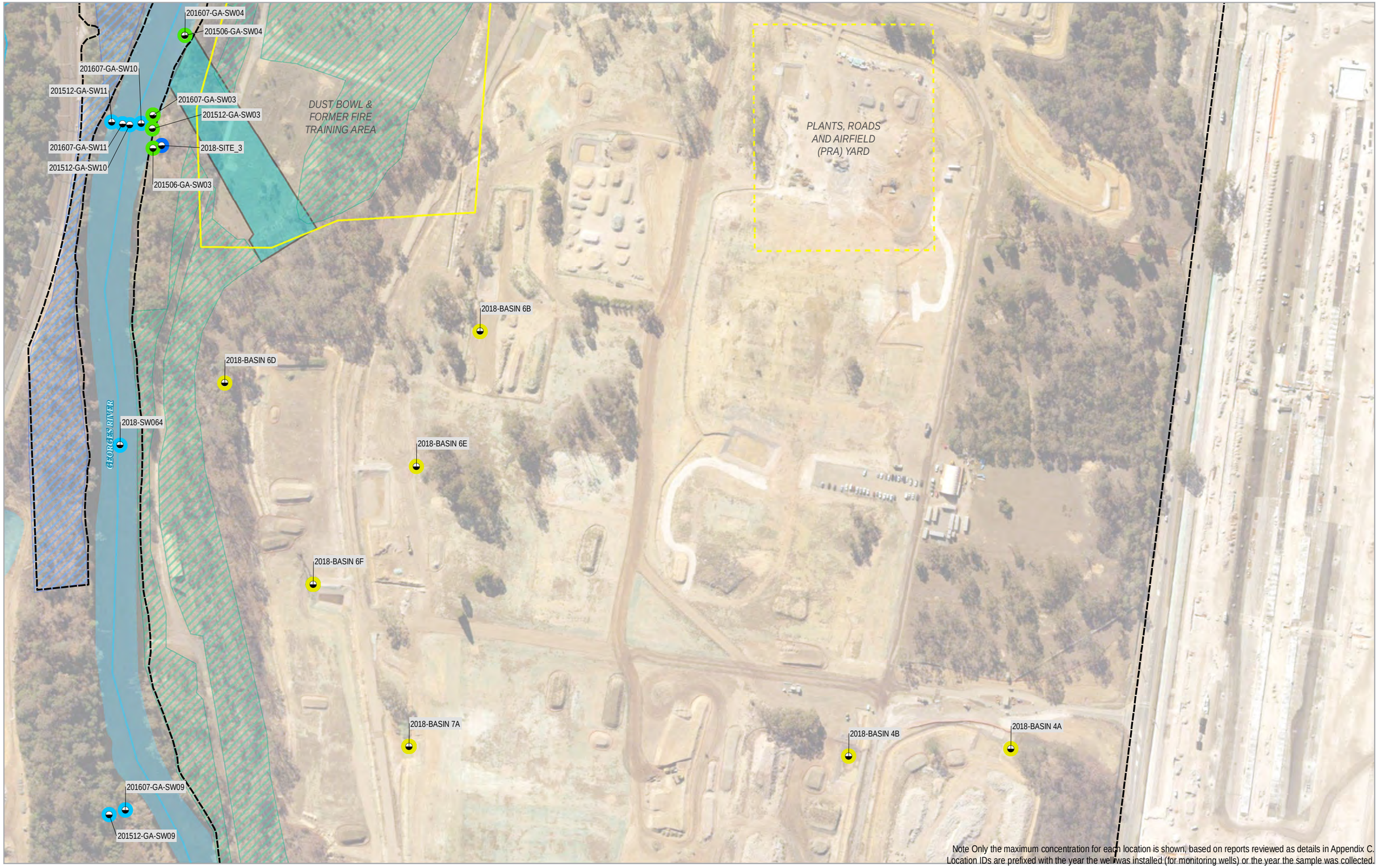
GHD

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



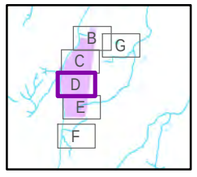
Note Only the maximum concentration for each location is shown, based on reports reviewed as details in Appendix C.
Location IDs are prefixed with the year the well was installed (for monitoring wells) or the year the sample was collected.

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

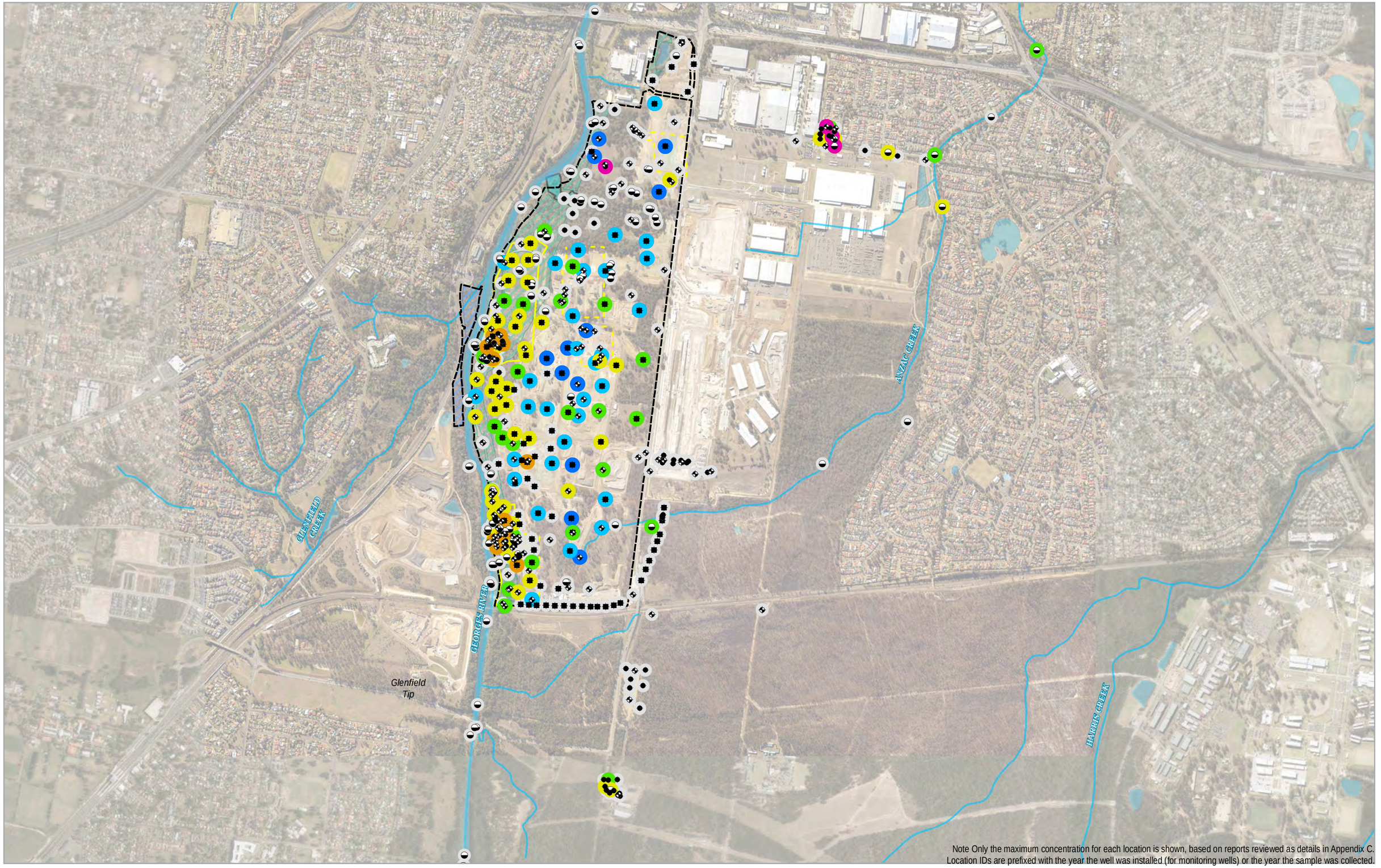
N

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



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

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

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 1, AEC 3 and AEC 3	

AEC 1 – TCE Impacted Area

Based upon the Golder (2015a) HHRA and the depth to groundwater between 7 – 9 m BTOC, there was no risk to commercial workers and intrusive workers working within AEC 1 in a trench posed by the presence of identified chlorinated hydrocarbons in soil, soil vapour and groundwater.

Golder 2015a undertook a risk assessment of the potential impact of TCE and cis-DCE impacted soil, soil vapour and groundwater in AEC1 and concluded that overall the risks associated with the VOCs were low and acceptable for the proposed open space land use including roads, road verges and woodland / riparian conservation areas. Based upon the risk assessment prepared by Golder 2015a, permanent structures including buildings and / or buildings containing basements or other habitable spaces should not be permitted within AEC 1.

JBS&G was subsequently engaged to prepare a HHRA to address plans for the construction of small-scale service buildings within the service pad area at the Site (JBS&G 2021). The HHRA concluded that *"given the use of the services buildings is to house electrical and computer equipment and no provision for longer duration worker occupations as described in the Development Plan (Attachment 2 of the HHRA), the levels of chlorinated hydrocarbons as present in soil vapours are not considered to pose an unacceptable human health risk"* (JBS&G 2022). The HHRA recommended the findings be presented within the LTEMP and there should be no amenities that would support occupational use by workers.

JBS&G (2021) did not identify any OSDs, permanently occupied buildings and / or buildings containing basements or other habitable spaces within AEC 1. Should the design of the Proposed Development change, then an additional site-specific risk assessment should be undertaken and the LTEMP will need to be revised.

AEC3

JBS&G (2022) noted the presence of one (1) groundwater monitoring well (JBMW02) at the Site which is to be sampled as part of the requirements within the MPW LTEMP (EP Risk 2020a) and any subsequent LTEMP for the land. The location of the monitoring well is provided in **Figure 6** and will require long-term protection and appropriate access provided. The well must remain visible, serviceable and clearly labelled as JBMW02. Any construction or ground disturbance at the location of the monitoring well will need to be managed to protect the integrity of the well. Where the well is destroyed, it will need to be replaced in the same location in accordance with the relevant standards and MPW LTEMP.

EnRiskS (2020) has provided criteria for the reuse of PFAS in soil within reuse zones at the Construction Area that are predicated on the implementation of management measures relating to future excavation. The management measures for future excavation within the reuse zones are provided as **EMP 2**, **EMP 3**, **EMP 4, EMP 5, EMP 6, EMP 9, EMP 10, EMP 11, EMP 12**.

ACM Impacted Fill (Service Pad Area and Loop Road)

Based on the recommendations within the validation report (JBS&G 2022) and as recommended within ASC NEPM (2013), visible asbestos must not be within the top 0.1 m for any land use. Therefore, site-won fill impacted by asbestos from the service pad area (SP432) and loop road (SP348) (**Figure 7** and **Appendix E**)

Land use restrictions	EMP 1
must not be reused on the soil surface. Asbestos in soils should be managed in accordance with **EMP 5.** ***Beneficial Use of Groundwater*** Groundwater must not be abstracted from the Site for any beneficial use. ***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.	

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 – AEC 3 underlying the Engineered Fill **Figure 3**.	

The location of AEC 3 is provided within **Figure 3** a survey of PFAS placement areas included within AEC3 is provided within **Appendix E**.

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 and PPE are implemented. 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 area to include:
  - Disposable coverall 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 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.

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-Impacted Stockpiles in **EMP 4**.
- Erosion and sediment controls outlined in **EMP 12** 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

Subsurface Works – AEC 3	EMP 2

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 on-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 12** 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 6**.
- 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.

Earthworks and Excavation

Where soil is excavated during earthworks, the suitability for the soil to remain on-site should be assessed in accordance with **EMP 5**.

Materials Tracking		**EMP 3**
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 1 and AEC 3, Unexpected Finds and Service Pad / Loop Road (site-won fill)	

All 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; and
- Educate all operators in the requirements of the system.
- Monitoring and review.

Stockpile Management		**EMP 4**
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 1, AEC 3, Service Pad / Loop Road (site-won fill) 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 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 9** and as detailed below.

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 9**) 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

Stockpile Management	EMP 4

locations that did not pose any risk of environmental impairment of the stockpile area or surrounding areas (e.g. hardstand areas).

ACM Impacted Fill (Service Pad and Loop Road Area)

Asbestos in soils should be managed in accordance with **EMP 5.**

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 EMP 4_1** 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 EMP 4_1 – 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.

Minor Excavation		EMP 5
Responsibility:	Entity responsible for implementation of LTEMP (as per **Table 4**)	
Frequency:	Stage 2 Construction and Operation	
Objective:	To ensure that risks to human health or the Environment are managed during minor excavation.	

Reuse of Soil

There is potential for relatively minor disturbance of underlying soils during construction works (JBS&G 2022) involving minor excavation, however, excess spoil is unlikely to be suitable as growing medium in landscape areas and would likely be disposed of off-site, managed on-site or transported to other parts of the MPW Site in accordance with the relevant management plan and **EMP 6**. Additional unexpected finds or assessments for reuse (if required) would be subject to the implementation of the following measures provided by EnRiskS (2020) or a separate risk assessment.

Assessment of Soil for Reuse

The results of analytical testing within AEC 1, AEC 3 and site-won material placed in the Service Pad and Loop Road are provided as **Appendix A**. Prior to breaching of the Engineered Fill layer, the soil 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, be transported to the MPW Site 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 is available. Additional insitu 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 Sampling Design Guidelines (1995).
- 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 6**.

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 (subject to reuse zones within the relevant LTEMP for the receiving land); or
- Soil in the stockpile has been excavated from AEC 3 and has not been sampled or tested; or
- 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; or
- 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.

Minor Excavation	EMP 5

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); and
- AUS leaching Procedure (neutral pH) for PFAS.

Soil results should be compared against the relevant standards for site suitability (including the requirements provided in the PFAS NEMP) if to remain on-site or requirements for the receiving site's LTEMP.

Management of Asbestos in Soils (Service Pad and Loop Road underlying FILL)

During excavation works beneath the imported fill layer of the service pad (SP432) and loop road (SP348) (**Figure 7**), involving the potential disturbance of bonded (non-friable) ACM impacted soil, the following should be implemented:

- Historical analytical results should be referenced as reported within **Appendix A** and JBS&G 2022.
- 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.
- 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 Code of Practice – How to Safely Remove Asbestos (SafeWork NSW 2019).
- 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 2019.
- 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 SafeWork NSW 2019.
- 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 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 2019.

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 5**, unless a further additional site-specific risk assessment is conducted.

Off-site Disposal of Excavated / Unsuitable Material		EMP 6
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 AEC1, AEC 3 and site-won fill containing ACM from the Service Pad / Loop Road area 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 practicable.

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; and
    - 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 and covering of vehicles 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 Environmental Protection License to accept the classified material.

Disposal records for all material removed from the Site shall be provided to the Site Owner, or appointed representative, by the appointed contractor upon completion of the disposal works. These records will be maintained in accordance with **EMP 17**. 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

Off-site Disposal of Excavated / Unsuitable Material	EMP 6

material from the Site.

ACM or ACM impacted soils excavated from the service pad area or identified as unexpected finds must be disposed offsite as Special Waste (Asbestos) in combination with other classes of waste (if applicable). Asbestos waste is to be tracked in accordance with Clauses 76 and 79 of the POEO (Waste) Regulation 2014.

Stockpile Classification Testing

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; or
    - The use of the 95% upper confidence level of the arithmetic mean ('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 (2014) or the applicable EPL for the land.

Importation of Fill Material / Aggregate		**EMP 7**
Responsibility:	Entity responsible for implementation of LTEMP (as per **Table 4**)	
Frequency:	Stage 2 Construction Works and Operation	
Objective:	To ensure that only material fit for purpose and lawfully able to be brought onto site is imported either temporarily or permanently onto the subject site.	

The verification of imported fill material has been developed in the Golder (2016) RAP and is provided below.

"The verification of imported soils required for construction will be based upon a review by the environmental consultant of the information provided by the remediation contractor. Imported fill will meet specified geotechnical parameters as well as demonstration of the classification of imported soil by:

- *A review of the site use, history and material properties of the source of the material in order to assess potential for the presence of contaminants.*
- *Depending upon the outcome of the review, soil samples may need to be collected if it cannot be established that the materials satisfy the definition of VENM (refer to Section 7.2.3). If required, sampling will be collected from the imported fill at the following sampling frequency and results screened against the adopted criteria suitable for classify the material as Class 1 or Class 2 materials[54].*
    - *One test per 25 m^3 for soils assessed for volumes less than 200 m^3; or*
    - *The use of the 95% UCL value for the data set, with a total number of samples not less than 10 and a minimum sampling frequency of 1 per 500 m^3; and*
    - *Testing shall be for the analytes identified as potential contaminants of concern through the review of the site use, and history of the material source.*
- *An inspection of the material on arrival at the Site to ensure that the material is consistent with information provided by the Remediation Contractor.*

It should be noted that natural soil intended for use as backfill may contain concentrations of contaminants above the adopted validation criteria. Any background concentrations of contaminants need to be less that validation criteria[55], unless agreed with Environmental Consultant and the Auditor.".

[54] Refer to Section 7.2.3 of the Golder (2016) RAP.
[55] Refer to Section 6.0 and Appendix C of the Golder (2016) RAP.

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.

Given that the depth of fill imported to the Site, and the depth of any anticipated subsurface maintenance activities will not likely penetrate depths greater than 2 mBGL, 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 into site-won fill within the Site or encounter natural 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 imported fill layer shall include the following measures:

- Providing a safe work method statement (SWMS). This 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.
- 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.
- Respiratory protective equipment (RPE) would also be provided for subsurface works where necessary.
- Air monitoring would be mandatory for entry into confined space works within excavations.
- Additional controls may include the use of blowers to increase flushing of the trench/excavation with fresh air.

All workers potentially exposed to impacted materials are required to wear appropriate levels of PPE, which shall include as a minimum:

- Long sleeve shirt and trousers;
- Appropriate respirator;
- Head covering;
- Over boots; and
- Gloves.

Subsurface Maintenance Works	EMP 8

Additional PPE requirements for PFAS impacted areas are provided in **EMP 2.**

Ecological

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

- Stockpiling of excavated soil to be managed in accordance with **EMP 4**.
- 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.
- Movement of soil should be tracked in accordance with **EMP 3**.
- All surplus groundwater and soil removed from excavations must be classified in accordance with NSW EPA (2014) Waste Classification Guidelines NSW EPA (2016) Addendum for PFAS prior to disposal at an appropriately licensed facility in accordance with **EMP 6**.
- 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.

Unexpected finds		**EMP 9**
Responsibility:	Entity responsible for implementation of LTEMP (as per **Table 4**)	
Frequency:	Stage 2 Construction 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 Construction Works

An unexpected finds protocol (UFP) has been prepared by SIMTA (2018)[56] 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)[57] 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); and
- 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; and
- 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

[56] SIMTA (2018) Unexpected Finds Protocol, Moorebank Precinct West Stage 2, dated 26 October 2018 (ref: MIC2-QPMS-EN-APP-00022).
[57] 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 9

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 Code of Practice – How to Safely Remove Asbestos (SafeWork NSW, August 2019).
- 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 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 Code of Practice – How to Safely Remove Asbestos (SafeWork NSW, August 2019).

Additional Validation Requirements	EMP 10
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.

Contamination management activities and 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 1 – TCE impacted Area

EMP 1 requires that only small-scale service buildings for utility purposes can be constructed as per the JBS&G HHRA (2021). No other buildings or buildings with underground habitable spaces are to be constructed in AEC 1. Validation that the land use restrictions outlined in **EMP 1** have been implemented during Stage 2 Works include the following:

- Preparation of 'As-built' survey drawings of the infrastructure constructed during Stage 2 works to confirm the absence of permanently occupied buildings, buildings with underground basements or other habitable spaces.

AEC 3

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

- Soil tracking data to confirm the source and final location of PFAS impacted soil reused at the Site in accordance with **EMP 5**.
- Soil sampling and analytical results to confirm that the soil meets the requirements for reuse outlined in **EMP 5** and the receiving sites LTEMP.
- Survey data to confirm the location and depth of PFAS impacted soil reused at the Site under the conditions of restricted reuse provided in **EMP 5**.
- Soil classification data and landfill receipts for soil disposed off-site.

Unexpected Finds

Validation of Unexpected Finds will be undertaken by the Environmental Consultant in accordance with all applicable laws and regulations.

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 11
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, elevated levels of chlorinated hydrocarbons (AEC 1) and PFAS (AEC 3) in groundwater samples collected have been reported at the Site (**Appendix A**). 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 form 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 JSAs 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. JBS&G (2022) noted the presence of one (1) groundwater monitoring well at the Site which is to be sampled as part of the requirements within the MPW LTEMP (EP Risk 2020a) and any subsequent LTEMP for the land. The location of the groundwater monitoring well is provided within **Figure 6**. Restrictions associated with this well (JBMW02) are provided within **EMP 1**.

Management of surface water		**EMP 12**
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 the AEC 3 has the potential to leach PFAS to stormwater during future minor excavation works. 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. Further discussion of surface water management is provided below.

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 9**) 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.

Water Treatment

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

Worker Health and Safety

In order to manage workers exposure to contaminated surface water the following should be implemented:

- 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.
    - 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,

Management of surface water	EMP 12

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.

Given that the Site is covered with a minimum of 1m of imported fill material surface water is unlikely to come in direct contact with PFAS impacted soils unless intrusive works are occurring within AEC 3.

Training		**EMP 13**
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; and
- 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 17** and with the document control system outlined in the CEMP.

Works involving contractors and subcontractors will be managed in accordance with **EMP 14**.

Contractor and Subcontractor Management		**EMP 14**
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; and
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); and
- 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 15**
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 9**), 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 16** to **EMP 18** 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 17** and where appropriate, amendment(s) to the LTEMP will be undertaken as outlined in **EMP 18**.

Non-compliance with LTEMP		**EMP 16**
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 19** 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 17**
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 18**
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; and
- 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 16**: 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; or
- Any proposed changes in land-use of the site or adjoining sites which may impact upon exposure pathways.

Audit / Review of LTEMP Implementation	EMP 18
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 19**
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 18**;
- 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; or
- Any proposed changes in land-use of the site or adjoining sites which may impact upon exposure pathways.

If the Developer or 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 NSW EPA or appointed NSW EPA accredited Site Auditor.

Cessation of LTEMP Application		**EMP 20**
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 an additional 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	**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	**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 11 and 12** 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 15** in **Appendix B** of this Plan.
B173	The LTEMP must be registered on the title to the land.	This Plan	**Section 1.3**
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 A** b) i) **Section 4** ii) **Appendix B** iii) **Appendix B** c) **Appendix B** d) i) **Appendix B** ii) **Section 5** e) **EMP 15** f) **EMP 18** g) **EMP 16** h) **Section 4.1** i) **EMP 19**	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). d)

Table C1 – Conditions of Consent (CoC) – SSD 7709

CoC	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.		(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.

Table D2 – 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** and **Appendix A** provides an overview on the remaining contamination issues remaining at the Site. **Appendix B** – **EMP 9** and **Appendix D** describes 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** and **EMP 6**
		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 4**
		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 5 and EMP 8**
		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 5 and EMP 8**

Table D2 – 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 5 and EMP 8**
		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 5 and EMP 8**
		Temporary stockpiles of asbestos containing material (ACM) soils would be covered to minimise dust and potential asbestos release	**EMP 5 and EMP 8**
		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 5 and EMP 8**
		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 5 and EMP 8**

Table D2 – 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 4**
		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 4**
		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 4**
		The stockpiles of contaminated material would be covered with a waterproof membrane (such as polyethylene sheeting) to prevent increased moisture from rainwater	**EMP 4**

Table D2 – 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 4, EMP 5** and **EMP 10**
		Where required, contaminated materials and wastes generated from the Project remediation and construction works would be taken to suitable licensed offsite disposal facilities	**EMP 6**
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 15, EMP 16 and EMP 17**
		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.	Environmental Management System

Table D2 – 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**
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.	Environmental Management System
	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	Environmental Management System

Table D2 – 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	Environmental Management System
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	Environmental Management System
	REMM 7E	Standby or emergency generators and transformers would all have secondary containment	Environmental Management System
	REMM 7F	Oil coolers would generally be located in areas where leaks and runoff are appropriately controlled at source or in a retention basin.	Environmental Management System
	REMM 7I	No hazardous or regulated wastes would be disposed of onsite.	**EMP 4, EMP 6** and **EMP 7**
	REMM 7J	All offsite disposals would be carried out by approved transport operators and to approved facilities	**EMP 6** and Environmental Management System
	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	Environmental Management System

Table D2 – 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 2 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) Remediation Validation Report under review by the Site NSW EPA Accredited Auditor. The remaining contamination is documented in this Plan in **Appendix A**
	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].

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

Table D2 – 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 2020).
	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, EMP 4** and **EMP 6**
	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 5** and **EMP 9**
	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 4**
	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 D2 – 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)	**EMP 5**
	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).	**EMP 5**
	REMM 8RO	An appropriate asbestos removal licence issued by WorkCover NSW would be required for the removal of asbestos contaminated soil.	**EMP 5**
	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.	**EMP 5**
	REMM 8Q	Temporary stockpiles of asbestos containing material (ACM) soils would be covered to minimise dust and potential asbestos release	**EMP 5**
	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 5**

Table D2 – 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 5**
	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 4**
	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 4**
	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 4**

Table D2 – 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 4**
	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 5, EMP 10**
	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 6**
	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).

Table D2 – Conditions of Approval (CoA) – EPBC 2011/6086			
CoA	**Reference**	**Condition Requirement**	**Document Reference and How Addressed**
8 d)	-	In relation to management of PFAS:	
	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) and EP Risk (2020a) **EMP 2, EMP 3, EMP 4, EMP 5, EMP 9,** **EMP 15**

Table D2 – Conditions of Approval (CoA) – EPBC 2011/6086			
CoA	**Reference**	**Condition Requirement**	**Document Reference and How Addressed**
	iii)	detail soil, groundwater and surface water PFAS contamination monitoring requirements and testing and disposal procedures appropriate to the risk posed by any contamination	**N/A**
	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 18**
	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	**Appendix B**

Table D2 – Conditions of Approval (CoA) – EPBC 2011/6086			
CoA	**Reference**	**Condition Requirement**	**Document Reference and How Addressed**
		manner, such that PFAS content does not enter the environment • all soil remaining at the site of the action to be suitable for purpose	

Table D3 – Final Compilation of Mitigation Measures (FCMMs)

FCMM	Requirement	Document Reference	How Addressed
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 • 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)	**CEMP**	CEMP prepared by the Principal Contractor during construction

Table D3 – Final Compilation of Mitigation Measures (FCMMs)

FCMM	Requirement	Document Reference	How Addressed
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 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	**EMP 4, EMP 6** and **CEMP**	These measures have been included in the LTEMP where appropriate.

Table D3 – Final Compilation of Mitigation Measures (FCMMs)

FCMM	Requirement	Document Reference	How Addressed
	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. 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.		

Table D3 – Final Compilation of Mitigation Measures (FCMMs)

FCMM	Requirement	Document Reference	How Addressed
	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 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		

Table D3 – Final Compilation of Mitigation Measures (FCMMs)

FCMM	Requirement	Document Reference	How Addressed
	– 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 unexpected finds protocol), and will address REMM items 8H, 8T, 8U, 8V and 8W (of the MPW Concept Plan Approval (SSD 5066)).	**CEMP**	To be addressed in the CEMP.
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 2021**	Currently Stage 1 works are completed and have been completed in accordance with the RAP (Golder 2016). JBS&G (2021) have provided a validation report for the Site at the completion of filling works.
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	**Golder 2016b**	The asbestos in soils management plan has been developed in accordance with current Guidelines and codes of practice.

Table D3 – Final Compilation of Mitigation Measures (FCMMs)			
FCMM	**Requirement**	**Document Reference**	**How Addressed**
	• How to Manage and Control Asbestos in the Workplace (2011).		
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 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).	**EP Risk 2020b**	A separate ASSMP has been prepared for the Site.
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	**EMP 11**	A groundwater sampling strategy is included in **EMP 11**.

Table D3 – Final Compilation of Mitigation Measures (FCMMs)

FCMM	Requirement	Document Reference	How Addressed
	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 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:	**JBS&G 2021 and JBS&G 2022**	Currently Stage 1 and Stage 2 filling works are completed and have been completed in accordance with the RAP (Golder 2016) and MPW LTEMP (2020a). JBS&G (2021 and 2022) have provided a validation report for the Site at the completion of filling works.

Table D3 – Final Compilation of Mitigation Measures (FCMMs)

FCMM	Requirement	Document Reference	How Addressed
	• 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.		
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 7**	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	**CEMP** and **EMP 5**	This plan includes procedures for the safe removal of asbestos.

Table D3 – Final Compilation of Mitigation Measures (FCMMs)

FCMM	Requirement	Document Reference	How Addressed
	• 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.		The remaining two requirements are not the scope of this plan.
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

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]

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Revision Text 005

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REVISIONS

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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

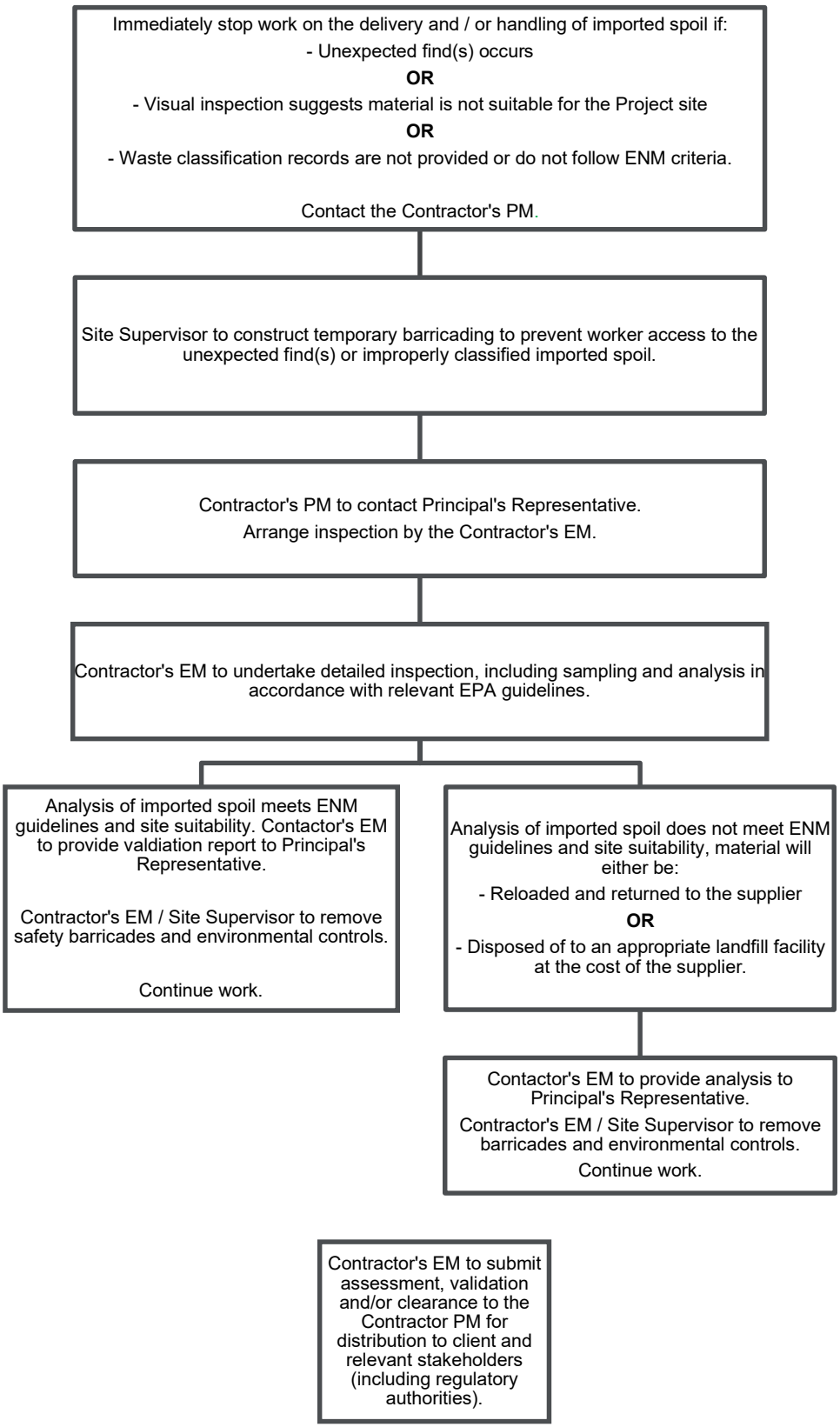
2.2 Unexpected Finds Protocols

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.

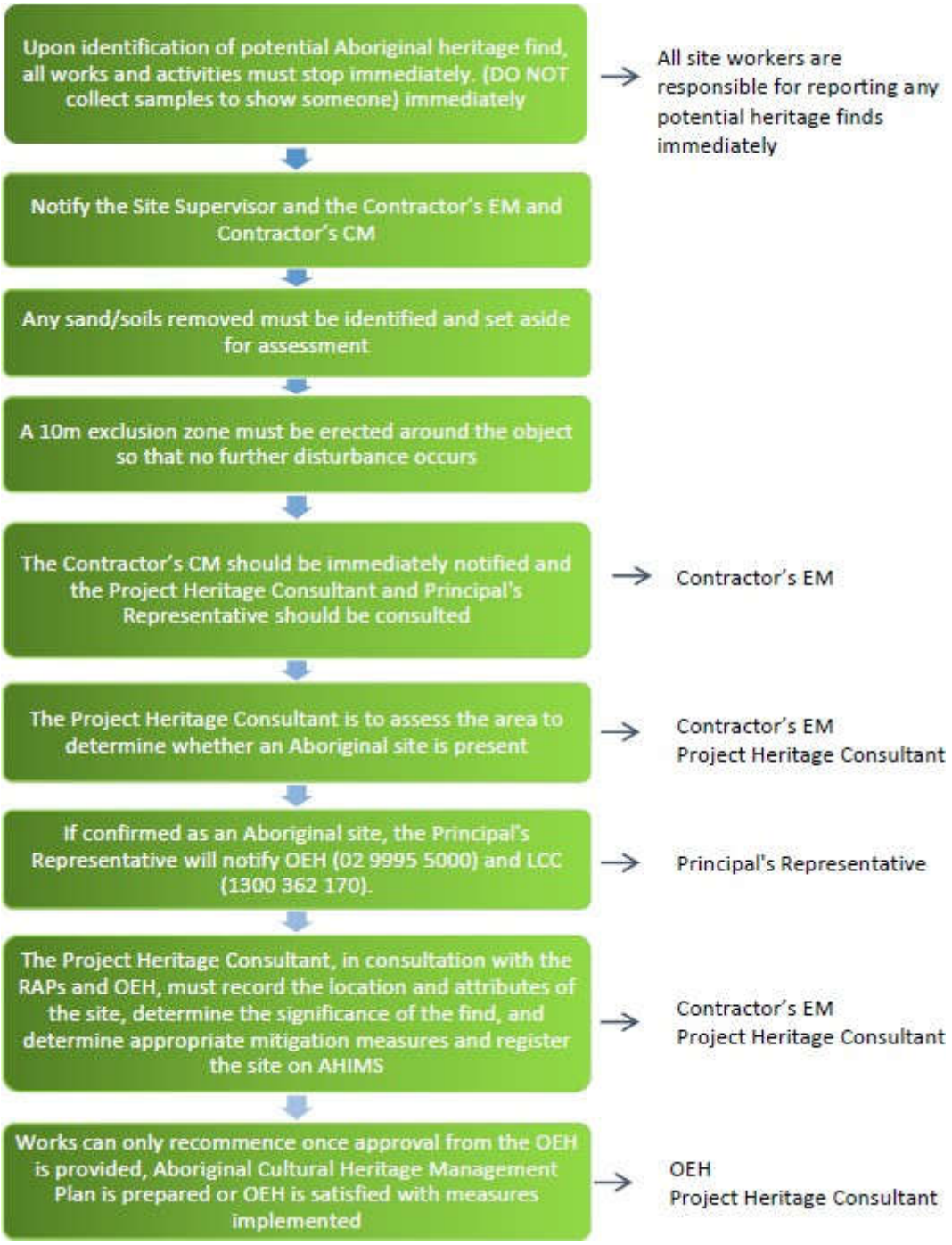
APPENDIX A UNEXPECTED (CONTAMINATION WITHIN IMPORTED SPOIL) FINDS PROTOCOL


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

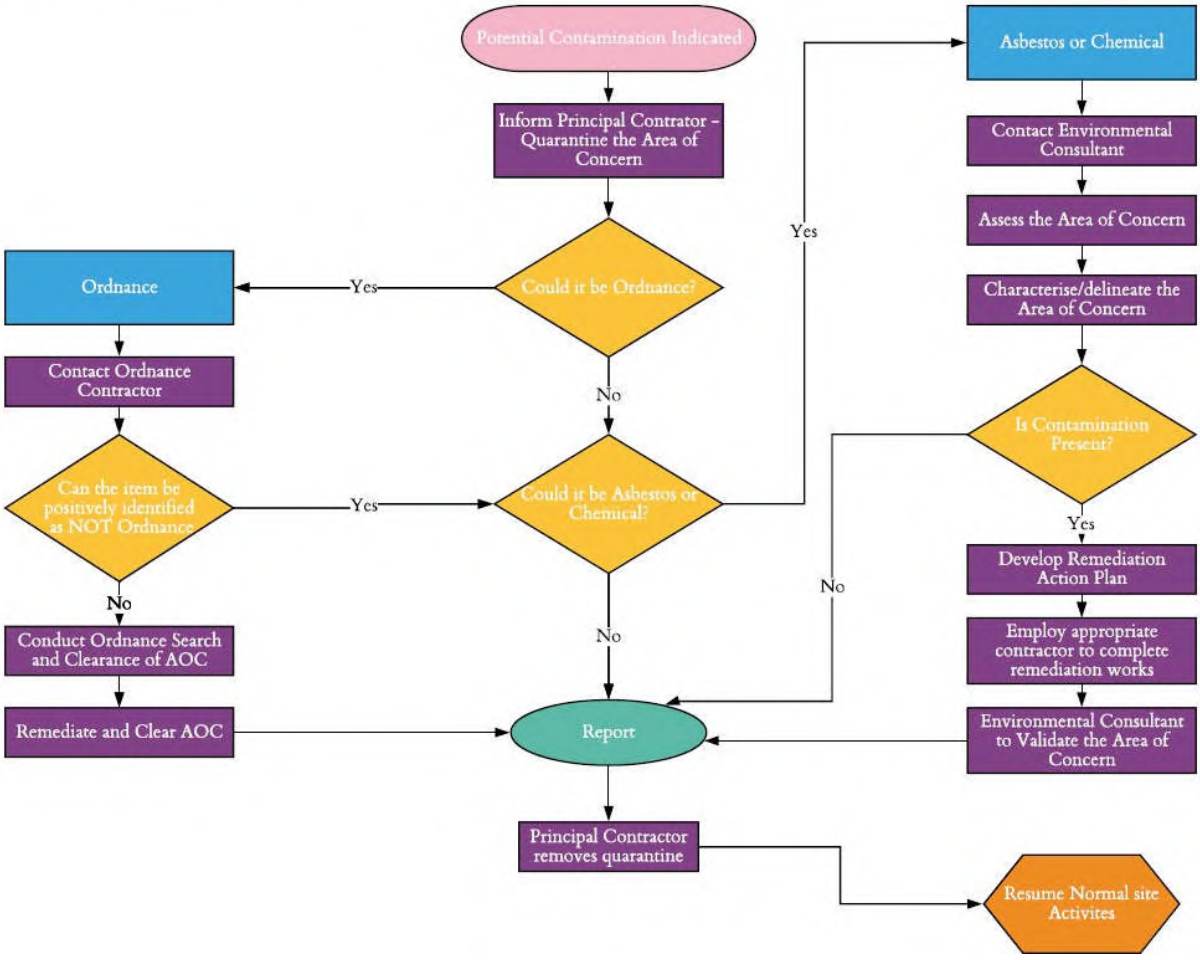
Potential Site Hazards

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):

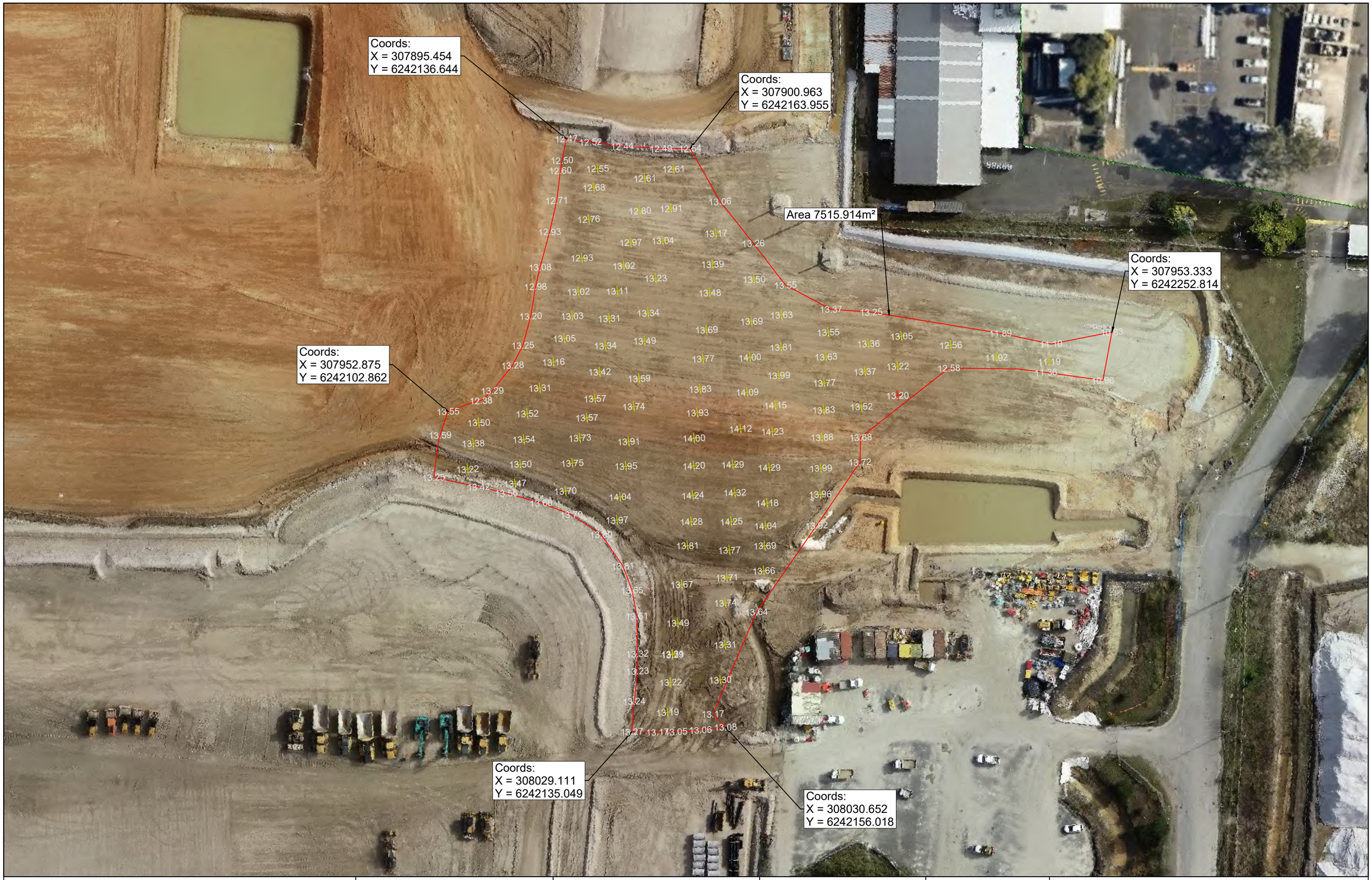
Prevent Recurrence / Lessons Learned (D7)

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

WI_007

Appendix E

PFAS AND ASBESTOS PLACEMENT SURVEY PLANS (JBS&G 2022)



NOTES:

TOP OF BLENDED MATERIAL

SP426 : SANDSTONE

LOOP RD

CLIENT: Georgiou

INTEGRAL SURVEYS

QUALITY RECORD			
REVIEW	NAME	SIGNATURE	DATE
SURVEYED BY	BP	-	10/09/2021
DRAWN BY	BP	-	10/09/2021
CHECKED	BP	-	10/09/2021
DATE CREATED	10/09/21		

FILE LOCATION: C:\12d\14.00\Brad Working Project\Brad Working Project

SCALE: 1:750

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

PRECINCT INFRASTRUCTURE WORKS WEST

TITLE: MRW - Project Bell
Chatham Ave
Moorebank

THIRD ANGLE PROJECTION

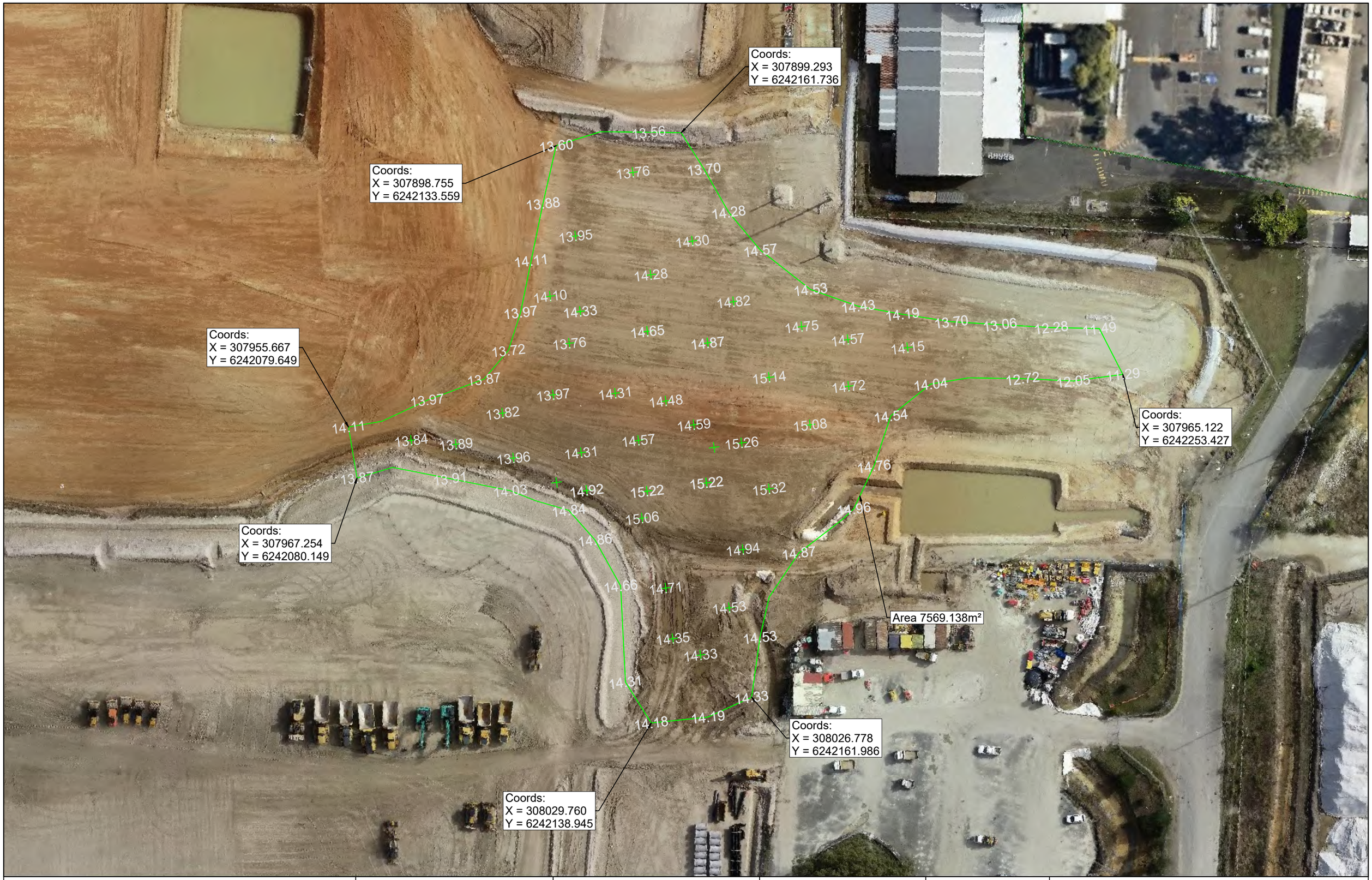
Sheet No. 1

PLOT FILE: C:\Users\Crk\Documents\Brads 12d Files\04 SKETCHES\2109\210910BP - HEIGHTS AND AREA MINUS SANDSTONE1

PLOT TIME: 10/09/21

12D PRJOJECT: Brad Working Project

PROJECT NO. 190050



NOTES:

TOP OF ACM LAYER

SP 348

LOOP RD

CLIENT: Georgiou

INTEGRAL SURVEYS

QUALITY RECORD			
REVIEW	NAME	SIGNATURE	DATE
SURVEYED BY	BP	-	10/09/2021
DRAWN BY	BP	-	10/09/2021
CHECKED	BP	-	10/09/2021
DATE CREATED	10/09/21		

FILE LOCATION: C:\12d\14.00\Brad Working Project\Brad Working Project

SCALE: 1:750

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: C:\Users\Crk\Documents\Brads 12d Files\04 SKETCHES\2109\210910BP - HEIGHTS AND AREA LAYER BEFORE SANDSTONE1

PLOT TIME: 10/09/21

12D PRJOJECT: Brad Working Project

PROJECT NO. 190050

```
=====================================================
12D MODEL - SURVEY CONFORMANCE REPORT: PAVEMENT
File: C:\Users\LLS-JohnH\Desktop\SRF2195 TRQ2171 MAAI PFAS 220517.rpt
Page: 1
-----------------------------------------------------

Original Survey File     : 2195
Lot Number               : TRQ2171
Lot Location             : MAAI West Leg
Lot Description          : SRF2195 TRQ2171 MAAI PFAS 220517

Project                  : BMD Moorebank 200602
Control String           : "DES MAAI 85 Align->MC20"
Design Pavement Tin      : "1044BH0334CBOP5"

Depth From Design        : 0 (vertical)

Tolerances Measured      : vertical
Upper Tolerance          : 10.000
Lower Tolerance          : -10.000

-----------------------------------------------------
Point        Point      Point      Point        Point
Desc      Chainage     Offset      Level  Conformance
-----------------------------------------------------
PPFAS       79.992    -16.153     13.900        0.130
PPFAS       79.051    -15.779     13.947        0.181
PPFAS       80.032    -10.070     14.118        0.322
PPFAS       79.034    -10.016     14.143        0.352
PPFAS       80.047     -7.873     14.165        0.370
PPFAS       79.111     -7.847     14.183        0.390
PPFAS       80.002     -4.000     14.239        0.437
PPFAS       79.594     -3.980     14.243        0.442
PPFAS       79.609     -0.022     14.359        0.538
PPFAS       80.046      0.003     14.342        0.519
PPFAS       79.729      2.942     14.410        0.562
PPFAS       79.962      3.002     14.422        0.573
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PPFAS       79.296      8.654     14.525        0.631
PPFAS       80.060      9.964     14.521        0.621
PPFAS       79.090     10.009     14.542        0.651
PPFAS       79.983     12.742     14.560        0.664
PPFAS       78.950     12.773     14.586        0.701
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PPFAS	110.014	17.034	14.308	0.390
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PPFAS	132.731	-15.029	13.806	0.021
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POINTS PROCESSED : 77

VERTICAL SUMMARY

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Within Tolerance	:	77 (100.0%)
Too High	:	0 (0.0%)
Too Low	:	0 (0.0%)
Maximum Conformance	:	0.777
Minimum Conformance	:	0.003
Average Conformance	:	0.325
Standard Deviation	:	0.170

Signed:  _____

Tue 17-May-2022 14:01:44

BLACK = Top PFAS RL
Red = Underside PFAS RL
Green = Thickness of PFAS

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Coords:
X = 308102.548
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Coords:
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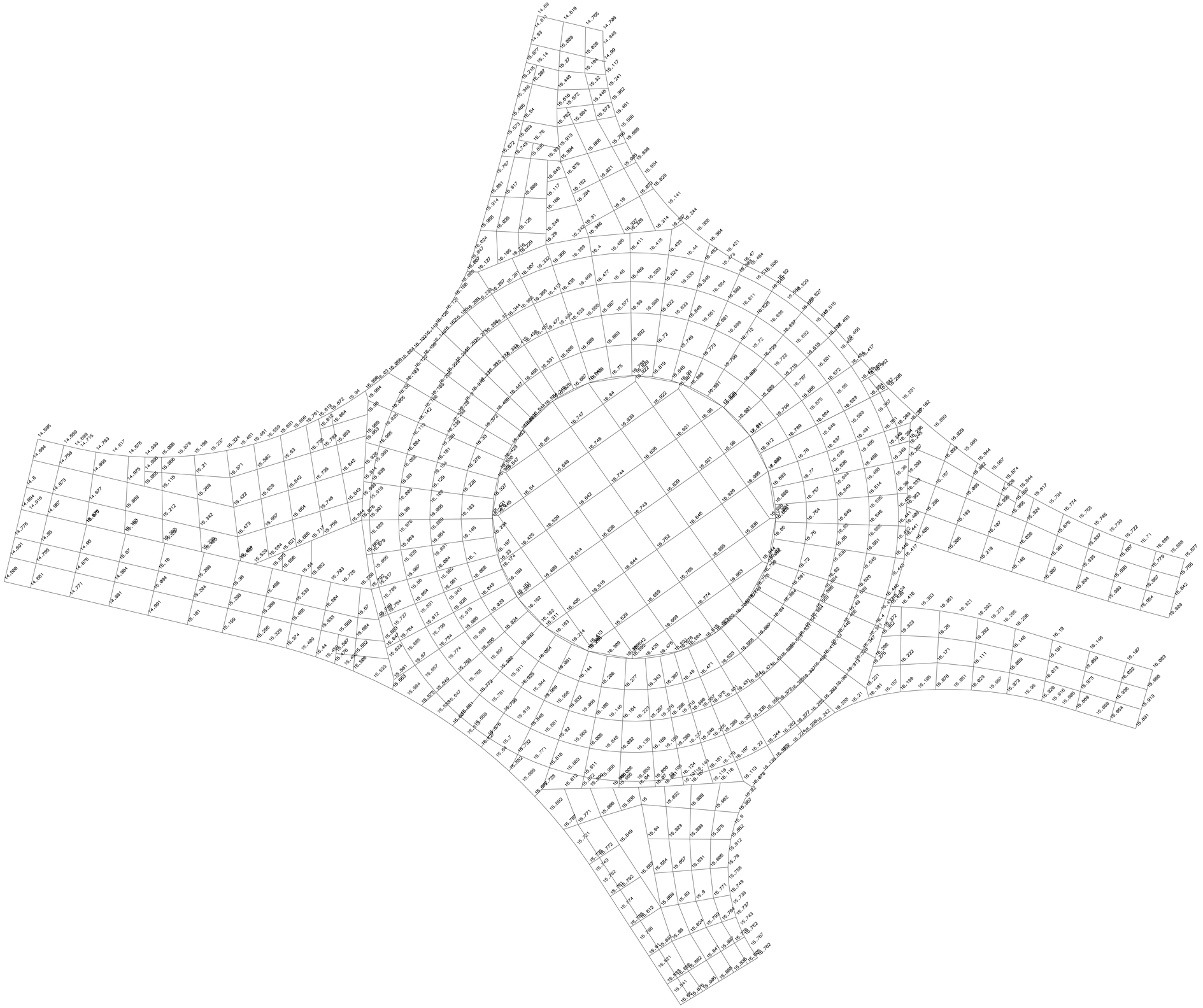


BMD MB LOOP
LOOP Design FSL Levels jointing 220719 plot

12d Model
Scale 1:100
Tue Jul 19 12:10:01 2022

NOTES:

Verge

Ring Road Pump Station

FBS Report

CLIENT: Georgiou

INTEGRAL SURVEYS

QUALITY RECORD			
REVIEW	NAME	SIGNATURE	DATE
SURVEYED BY	NO	-	24/04/21
DRAWN BY	NO	-	07/05/21
CHECKED		-	
DATE CREATED	Fri May 7 11:08:02 2021		

FILE LOCATION: Y:\190050 - BELL, Georgiou\01. 12d\1.2 Surveyors Projects\Nathan Working Project\PROJECT BELL

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: 210506 RING ROAD VERGE PUMP STATION FBS1

PLOT TIME: Fri May 7 11:08:02 2021

12D PRJOJECT: WORKING PROJECT

PROJECT NO. 190050

Legend:

- Approximate Site Boundary
- Northern Ring Road, Service Pad, Loop Road Audit Area
- Surplus SP348 placement
- SP348 Placement
- SP426 Placement

JBS&G

0 50
metres

MPW,
Moorebank, NSW

AUDIT AREA
- PFAS PLACEMENT IN MAAI

Job No: 58753		Scale: 1:1,750		
Client: J Wyndham Prince		Coord. Sys. GDA 1994 MGA Zone 56		
Drawn By: JA	Checked By: KY	Version: R03 Rev C	Date: 01-Jun-2022	**FIGURE 7**

File Name: N:\Projects\J Wyndham Prince\58753 Moorebank Precinct West Stage 2\GIS\Maps\R03 Rev C\58753_07_PFASPlacement.mxd
Reference: Nearmap - www.nearmap.com.au (Capture Date: 17/02/2022)

Legend:

- Approximate Site Boundary
- Northern Ring Road, Service Pad, Loop Road Audit Area
- SP426 Placement

JBS&G

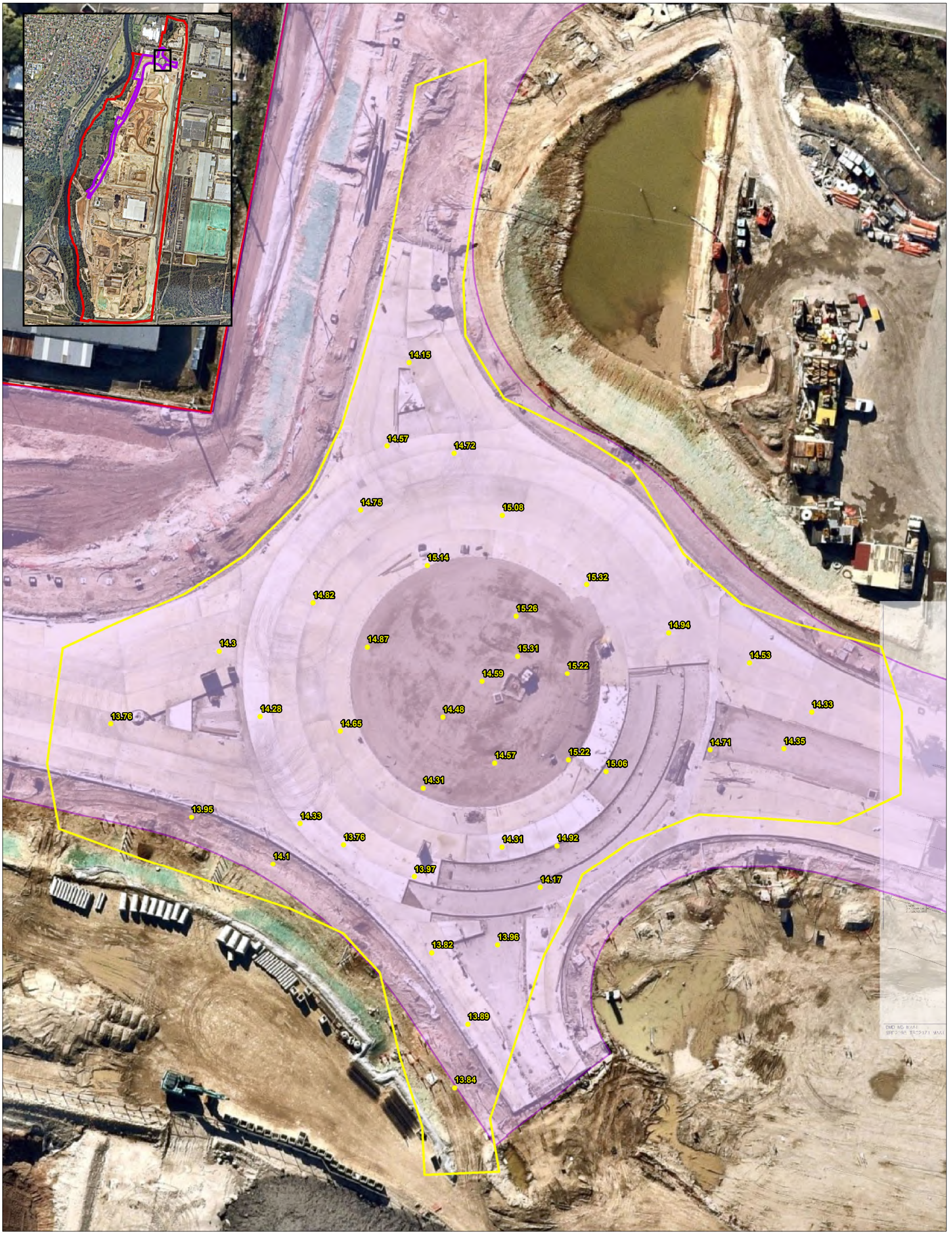
0 10 metres

MPW, Moorebank, NSW

FINAL FINISHED SURVEY LEVEL OF PFAS REUSE AREA (TOP OF BLENDED PFAS MATERIAL)

Job No: 58753		Scale: 1:550		
Client: J Wyndham Prince		Coord. Sys. GDA 1994 MGA Zone 56		
Drawn By: EP	Checked By: LH	Version: R03 Rev C	Date: 19-Aug-2022	**FIGURE 8A**

File Name: N:\Projects\J Wyndham Prince\58753 Moorebank Precinct West Stage 2\GIS\Maps\R03 Rev C\58753_08A_PFASPlacementRLs_Blended.mxd
Reference: Nearmap - www.nearmap.com.au (Capture Date: 19/08/2022)



Legend:

- Approximate Site Boundary
- Northern Ring Road, Service Pad, Loop Road Audit Area
- SP348 Placement

JBS&G

0 10 metres

MPW, Moorebank, NSW

FINAL FINISHED SURVEY LEVEL OF PFAS REUSE AREA

Job No: 58753		Scale: 1:541		
Client: J Wyndham Prince		Coord. Sys. GDA 1994 MGA Zone 56		
Drawn By: EP	Checked By: LH	Version: R03 Rev C	Date: 31-Aug-2022	**FIGURE 8**

File Name: N:\Projects\J Wyndham Prince\58753 Moorebank Precinct West Stage 2\GIS\Maps\R03 Rev D\58753_08_PFASPlacementRLs.mxd
Reference: Nearmap - www.nearmap.com.au (Capture Date: 17/02/2022)

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Legend:

- Approximate Site Boundary
- Northern Ring Road, Service Pad, Loop Road Audit Area
- Surplus SP348 placement

JBS&G

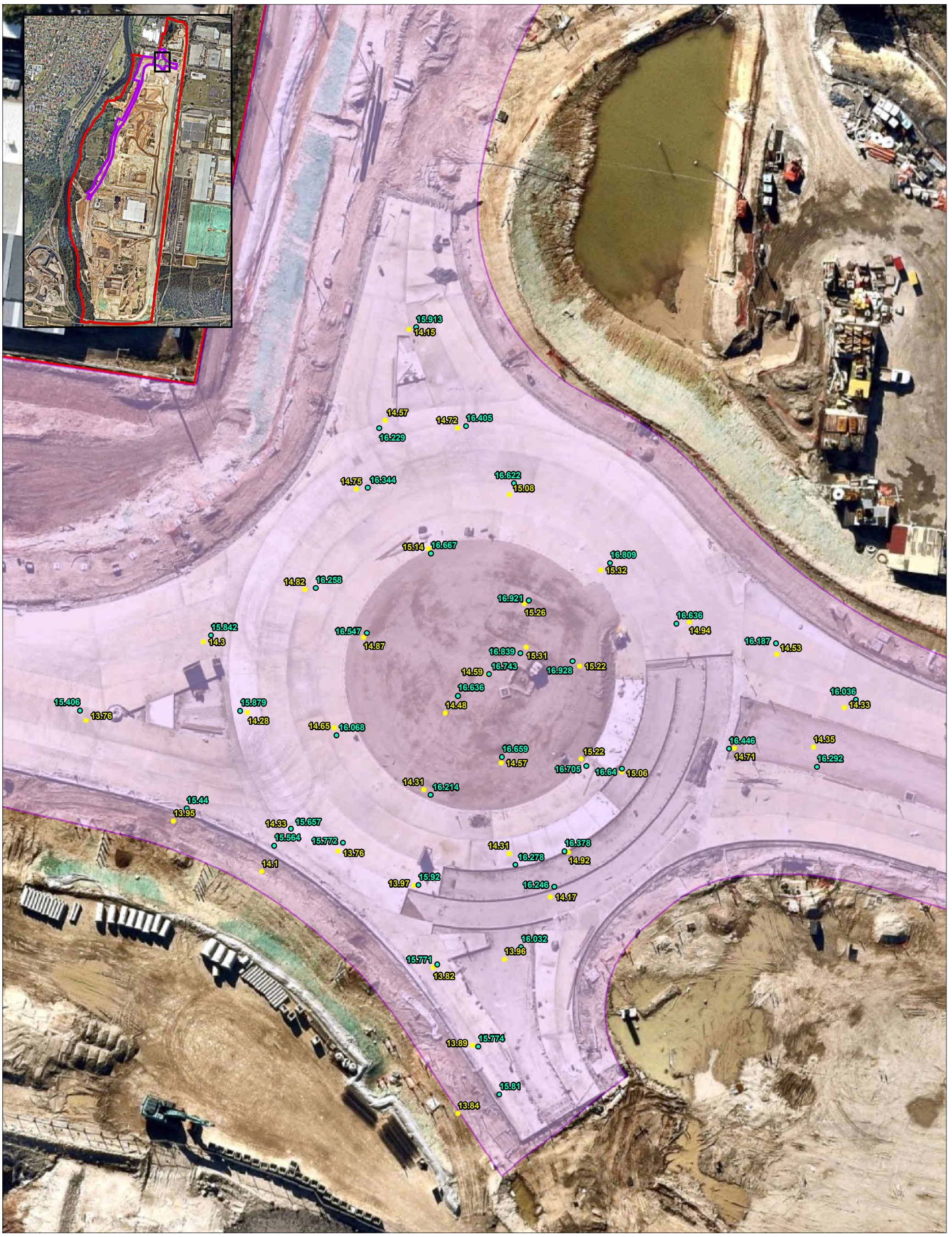
0 8
metres

MPW,
Moorebank, NSW

FINAL FINISHED SURVEY LEVEL OF PFAS REUSE AREA (TOP OF PFAS MATERIAL)

Job No: 58753		Scale: 1:250		
Client: J Wyndham Prince		Coord. Sys. GDA 1994 MGA Zone 56		
Drawn By: EP	Checked By: LH	Version: R03 Rev C	Date: 31-Aug-2022	**FIGURE 8C**

File Name: N:\Projects\J Wyndham Prince\58753 Moorebank Precinct West Stage 2\GIS\Maps\R03 Rev C\58753_08A_PFASPlacementRLs_PfasAcm.mxd
Reference: Nearmap - www.nearmap.com.au (Capture Date: 19/08/2022)



Legend:

- Approximate Site Boundary
- Northern Ring Road, Service Pad, Loop Road Audit Area

Reduced Level Survey Points

- Top of PFAS + ACM Layer RLs
- Top of Concrete Pavement/Subgrade RLs

JBS&G

0 10
metres

Job No: 58753		Scale: 1:500	
Client: J Wyndham Prince		Coord. Sys. GDA 1994 MGA Zone 56	
Drawn By: EP	Checked By: EH	Version: R03 Rev 0	Date: 31-Aug-2022

MPW,
Moorebank, NSW

LOOP ROAD SURVEY LEVEL OF CONCRETE PAVEMENT/ SUBGRADE AND PFAS REUSE AREA

FIGURE 9

File Name: N:\Projects\J Wyndham Prince\58753 Moorebank Precinct West Stage 2\GIS\Maps\R03 Rev C\58753_089_ConcreteCapRLs.mxd
Reference: Nearmap - www.nearmap.com.au (Capture Date: 19/08/2022)

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 SUMMARY TABLE

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
MW2016	12.06.18	307357.69	6241023.612	14.879	10.931	3.948	19.2	1027	0.64	214.3	4.67	0.51	664.5	11.98	Clear, no sheen, no odour
MW6007	25.06.18	307720.778	6242045.963	13.81	10.723	3.087	18.6	875	3.23	230.9	4.67	0.46	598	13.36	Clear, no sheen, no odour
MW2021	25.06.18	308089.378	6242130.142	14.829	9.102	5.727	18.5	295.1	0.39	189.7	4.84	0.14	191.75	10.35	Clear / light brown, no sheen, no odour
MW7005A	25.06.18	307748.986	6241921.38	13.77	9.755	4.015	19.9	1051	1.02	87.7	5.69	0.55	721	12.22	Light brown, no sheen, no odour
MW7005B	25.06.18	307750.391	6241920.867	13.794	9.637	4.157	19.5	5544	0.51	105.6	5.27	3.01	3607.5	15.705	Clear / light brown, no sheen, no odour
MW7005C	25.06.18	307752.346	6241920.101	13.808	9.765	4.043	21	1440	0.32	-30.9	6.5	0.72	936	8.8	Clear / slightly grey, no sheen, no odour
Minimum Value						3.087	18.5	295.1	0.32	-30.9	4.67	0.14	191.75		
Maximum Value						5.727	21	5544	3.23	230.9	6.5	3.01	3607.5		
Average						4.162833333	19.45	1705.35	1.018333	132.8833333	5.273333333	0.898333333	1119.791667		

Appendix H
CONSULTATION LOG

Consultation Log – Long Term Environmental Management Plan (LTEMP) – Northern Ring Road, Service Pad and Loop Road							
Item	**Original Version**	**Date**	**Stakeholder**	**Communication Method**	**Comments**	**Changes**	**Finalised Version**
1	-	06.07.2021	Qube / Tactical	N/A	Issued to Client (v1)	N/A	v1
2	v1	07.07.2021	JBS&G	Email	a) Minor textual comments throughout. b) Referencing. c) Figures	Amended as required.	v2
3	v1	08.07.2021	Enviroview	EP1489.007 Comments: *IA_301-2020-1_04R1_RE: Site Audit Interim Advice 03 – RE: Site Audit Interim Advice 04R1 – Review of the revised (v2) Woolworths Audit Area Long-Term Environmental Management Plan (LTEMP),* dated 8 July 2021.	a) Section 1.3, How the LTEMP will be made Enforceable. b) Section 4, Table 4. c) Appendix B – EMPs.	a) Section 1.3 Amended. b) Section 4, Table 4. c) Appendix B – EMPs.	v2
4	v1	24.08.2021	Tactical	King & Wood Mallesons Letter	Letter on enforcement of the LTEMP.	Section 1 and Table 4 amended.	v2
5	v1	23.09.2021	JBS&G	Email	a) EMP 7 – NSW EPA approval. b) Removal of references to MPE.	a) EMP 7 Amended. b) Amended where appropriate.	v2
6	v1	23.09.2021	Qube / Tactical	N/A	Issued to Client (v1)	N/A	v2
7	v2	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*	Section 4.5.	v2_RevA

Consultation Log – Long Term Environmental Management Plan (LTEMP) – Northern Ring Road, Service Pad and Loop Road							
Item	**Original Version**	**Date**	**Stakeholder**	**Communication Method**	**Comments**	**Changes**	**Finalised Version**
					assessment, and that subsequently asphalt paving as an isolating layer be explicitly incorporated into future LTEMPs applying to MPW."		
8	v2	22.10.2021	Tactical	*Email*	a) Remove Letter from Lawyers (Appendix G) and all references. b) Remove enforcement and reference to B172 in combined Section 1.3 and 1.4.	a) Removed b) Amended	v2_RevA
9	v2	01.12.2021	Qube /Tactical	*Email*	Insert: *"This LTEMP will be implemented in compliance with Condition C39 of the MPW Stage 3 Consent (SSD 10431)."* Section 1.3 and 4.3	Section 1.3 and 4.3	v2_RevA
10	v2	14.12.2021	Qube / Tactical	*N/A*	Issued to Tactical as Tracked Changes version for comment (v2_RevA)	N/A	v2_RevA
11	v2_RevA	14.12.2021	Enviroview	*IA_0301-2020-3_02: RE: Site Audit Interim Advice – Review of the Northern Ring Road and Service Pad – Audit Area Validation Report, Moorebank Avenue, Moorebank NSW – an area within Moorebank Precinct West,* dated 13 December 2021.	a) Restrictions on small-scale buildings within AEC 1. LTEMP to be updated in line with JBS&G HHRA for AEC 1. b) LTEMP to be updated following receipt of Validation report to include changes.	a) Updated restrictions in AEC 1 as per JBS&G HHRA. b) LTEMP updated.	v2_RevB
12	v2_RevA	10.02.2022	Tactical	*Email*	Inclusion of Loop Road into Northern Ring Road and Service Pad LTEMP.	Loop road included.	v2_RevB

Consultation Log – Long Term Environmental Management Plan (LTEMP) – Northern Ring Road, Service Pad and Loop Road							
Item	**Original Version**	**Date**	**Stakeholder**	**Communication Method**	**Comments**	**Changes**	**Finalised Version**
13	v2_RevA	01.06.2022	JBS&G	*JBS&G 51997-143720, L376 (Response to Interim Advice IA_0301-2020-3_Service_Area_Val_Rpt) Rev 0, dated 1 June 2022*	*JBS&G Response: It is understood the proposed LTEMP for the Northern Ring Road, Service Pad and Loop Road Site Audit Area has been updated to note the findings of the HHRA. It is understood that the site-wide MPW LTEMP (EP Risk 2020) will be superseded for the areas where an area-specific LTEMP is endorsed by the Site Auditor.*	N/A	v2_RevB
14	v2_RevA	01.06.2022	JBS&G	*JBS&G (2022) Moorebank Precinct West (MPW): Northern Ring Road, Service Pad and Loop Road – Audit Area Validation Report, Moorebank Avenue, Moorebank NSW, dated 1 June 2022 (ref: 58753/144361 (Rev C)).*		Update to LTEMP to reflect update. Inclusion of Loop Road.	v2_RevB
15	v2_RevB	27.06.2022	Logos / Tactical	N/A	Issued to Client (v2_RevB)	N/A	v2_RevB
16	v2_RevB	28.06.2022	Enviroview	*IA_0301-2020-3_05: RE: Site Audit Interim Advice – Review of the Northern Ring Road, Service Pad, and Loop Road – Audit Area Validation Report, Moorebank Avenue, Moorebank NSW – an area within Moorebank Precinct West.*	Comments on JBS&G Audit Area Validation Report (Report ref.: 58753/144361_R03_Rev-C). 1 June 2022.	IA Response provided in relation to relevant comments.	v2_RevC
17	v2_RevB	30.06.2022	Aspect	*PDF Comments*	Various planning reference comments.	Updated where appropriate following discussions with Tactical.	v2_RevC
18	v2_RevB	04.07.2022	JBS&G	*Email*	a) EMP2 – Inclusion of PFAS Reuse Areas in relation to AEC 3.	Amended all.	v2_RevC

Consultation Log – Long Term Environmental Management Plan (LTEMP) – Northern Ring Road, Service Pad and Loop Road							
Item	**Original Version**	**Date**	**Stakeholder**	**Communication Method**	**Comments**	**Changes**	**Finalised Version**
					b) Minor reference correction. c) Reference to leach testing only required for zone 1.		
19	v2_RevB	07.07.2022	NIC	*Email*	a) Reference to NIC. b) Signage on Georges River. c) Query on placement on title.	a) Updated. b) Only relevant to Off-site Risk Assessment. c) No change required following discussion with Tactical.	v2_RevC
20	v2_RevB	19.07.2022	JBS&G	*JBS&G 51997-146,255, L381 (Response to Interim Advice IA_0301-2020-3_05_revised_Service_Area_Val_Rpt) Rev 0, dated 19 July 2022*	Response to Enviroview.	IA Response provided in relation to relevant comments.	v2_RevC
21	v2_RevB	19.07.2022	JBS&G	*JBS&G (2022) Moorebank Precinct West (MPW): Northern Ring Road, Service Pad and Loop Road – Audit Area Validation Report, Moorebank Avenue, Moorebank NSW, dated 19 July 2022 (ref: 58753/146279 (Rev D)).*		Update to LTEMP to reflect JBS&G 2022 (Rev D).	v2_RevC
22	v2_RevC	22.07.2022	Logos / Tactical	N/A	Issued to Client (v2_RevC)	N/A	v2_RevC
23	v2_RevC	23.08.2022	Enviroview	*IA_0301-2020-3_06: RE: Site Audit Interim Advice 06 – Review of the Northern Ring Road, Service Pad, and Loop Road – Audit Area Long-Term Environmental Management Plan (LTEMP), Moorebank Avenue,*	a) Section 3.1 – Asbestos b) Section 4.3 – AEC 3 definition c) Section 4.5 – Reuse d) EMP01 – protection of wells	IA Response provided in relation to relevant comments.	v2_RevC

Consultation Log – Long Term Environmental Management Plan (LTEMP) – Northern Ring Road, Service Pad and Loop Road							
Item	**Original Version**	**Date**	**Stakeholder**	**Communication Method**	**Comments**	**Changes**	**Finalised Version**
				Moorebank NSW – an area within Moorebank Precinct West.			
24	v2_RevC	29.08.2022	JBS&G	*Email*	Comments on discrepancy between survey and Figures. No changes to boundary required. Update to Loop Road survey to be updated.	N/A	V2_RevD
25	v2_RevD	29.08.2022	Logos / Tactical	N/A	Issued to Client (v2_RevD)	N/A	v2_RevD
26	v2_RevB	31.08.2022	JBS&G	*JBS&G (2022) Moorebank Precinct West (MPW): Northern Ring Road, Service Pad and Loop Road – Audit Area Validation Report, Moorebank Avenue, Moorebank NSW, dated 31 August 2022 (ref: 58753/147310 (Rev 0)).*		Update to LTEMP to reflect JBS&G 2022 (Rev 0).	v3
27	v3	01.09.2022	Logos / Tactical	N/A	Issued to Client (v3)	N/A	v3
28	v3	14.09.2022	Logos / Tactical	Email	Request for changes to site boundary in Figure 3 and Figure 7	Updated Figure 3 and Figure 7	V4