Long-Term Environmental Management Plan

Interstate Terminal, Moorebank Precinct West,
400 Moorebank Avenue, Moorebank, NSW

Prepared for: Qube c/- Tactical
EP1489.009_v3 18 November 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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Qube Property Management Services Pty Ltd c/o Tactical Group Pty Ltd
Via email: [redacted]

18 November 2022

Our Ref: EP1489.009_v3

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Table of Contents

1 Introduction 1
1.1 Purpose 3
1.2 Parties Responsible for the Implementation and Review / Maintenance 3
1.3 How the LTEMP will be complied with 3
2 Background 4
2.1 Site Identification 4
2.2 Current Land Use 4
2.3 Proposed Land Use 5
2.4 Surrounding Land Use 5
2.5 Topography 6
2.6 Hydrology 6
2.7 Geology 6
2.8 Hydrogeology 6
2.9 Acid Sulfate Soil 7
2.10 Summary of Site History 7
3 Description of Existing / Residual Contamination 9
3.1 Summary of Impacted Media 9
3.2 Source – Pathway – Receptor Linkages Requiring Management 10
4 Management Activities 14
4.1 LTEMP Roles and Responsibilities 14
4.2 Approval and Licensing Requirements 16
4.3 Implementation of the LTEMP 18
4.4 LTEMP Environmental Management and Monitoring Procedures 19
4.5 Reuse of PFAS Impacted Soil 21
4.6 Compliance Matrix 22
4.7 Adopted Validation Criteria 22
4.8 Validation Sampling Program 23
4.9 Waste Classification 23
4.10 Contingency Plan 24
5 Monitoring and Reporting 25
5.1 Contamination Management Plan Periodic Review 25
5.2 Period of Implementation 25
5.3 Managing and Reporting 25
5.4 Record Keeping 25
5.5 Groundwater and Surface Water Monitoring 26
6 References 27

List of Tables in Body of Report

Table 1 – Site Identification 4
Table 2 – Summary of Site History 8
Table 3 – Identified Areas of Environmental Concern and Impacted Media 11
Table 4 – Responsibilities for LTEMP Implementation 14
Table 5 – Planning Conditions Specific to the LTEMP 16
Table 6 – Planning Approval Conditions of Consent 17
Table 7 – Management of Potentially Contaminating Activities associated with the Proposed Development 20

List of Attached Figures

Figure 1 Site Location
Figure 2 Site Layout and Features
Figure 3 Areas of Environmental Concern
Figure 4 Conceptual Site Model
Figure 5 Soil Reuse Zones
Figure 6 Soil and Groundwater Sampling Locations

List of Appendices

Appendix A Conceptual Site Model
Appendix B Environmental Management Procedures
Appendix C Conditions of Consent Compliance Matrix
Appendix D Unexpected Finds Protocol
Appendix E PFAS Placement Survey PLans (JBS&G 2022)
Appendix F Reporting Registers
Appendix G AEC -2 Proposed Groundwater Monitoring Locations
Appendix H Groundwater Levels
Appendix I Consultation Log

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.
AMP	Asbestos Management Plan	See **(Golder 2016b).**
AOC	Area of Concern	An area identified as containing potential contamination. Can also be referred to as Quarantined Area.
As	-	Arsenic
BGS	-	Below Ground Surface
BioBanking Agreement Area	See also Offset Area	Vegetated areas which are to be conserved and no construction to occur.
Bonded ACM	Bonded Asbestos Containing Materials	Bonded ACM comprises ACM, which is in sound condition, although possibly broken or fragmented, and where the asbestos is bound in a matrix such as cement or resin. This term is restricted to material that cannot pass a 7 mm x 7mm sieve. Equivalent to "non-friable" asbestos in SafeWork NSW *Code of Practice: How to Manage and control asbestos in the workplace* (SafeWork NSW 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
Conservation Area	Same as BioBanking Area	See BioBanking Area
Construction Area	-	Extent of construction works, namely areas to be disturbed during the construction of the Site.
COPC	-	Contaminants of Potential Concern
Cr	-	Chromium
CSM	-	Conceptual Site Model
Cu	-	Copper
DBYD	-	Dial Before You Dig
DNAPL	-	Dense Non-Aqueous Phase Hydrocarbons
DPI&E	-	NSW Department of Planning, Industry and Environment
DQI	-	Data Quality Indicator
DQO	-	Data Quality Objective
DSI	-	Detailed Site Investigation
DUXOP	Defence Unexploded Ordnance Panel	The panel of contractors and consultants from whom the Department of Defence selects remembers for UXO related tasks

Abbreviations and Terminology		
Abbreviations	**Term**	**Definition**
EEC	Endangered Ecological Communities	Vegetated areas inaccessible during SSD 5066 development works. Located within both the Construction and Offset Areas.
EIL	-	Ecological Investigation Level
EO	-	Explosive Ordnance
EOW	-	Exploded Ordnance Waste
EPA	-	Environment Protection Authority
ESL	-	Ecological Screening Level
FA	Fibrous Asbestos	FA comprises friable asbestos material and includes severely weather cement sheet, insulation products and woven asbestos material. Defined as asbestos material that is in a degraded condition such that it can be broken or crumbled by hand pressure. Equivalent to "friable" asbestos in SafeWork NSW *Code of Practice: How to Manage and control asbestos in the workplace* (SafeWork NSW 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

Abbreviations and Terminology		
Abbreviations	**Term**	**Definition**
		link as referenced in the MPW Concept Consent or MPE Concept Plan Approval. For the purpose of this LTEMP, this excludes the Site (see **the Site**)
Ni	-	Nickel
NI	-	National Intermodal Corporation
OCP	-	Organochlorine Pesticides
Offset Area	BioBanking Agreement Area	Vegetated areas which are to be conserved and no construction to occur.
Ordnance	Ordnance	Any item of potential military origin. See Ammunition, Category A and B Ordnance Item and UXO.
PAH	-	Polycyclic Aromatic Hydrocarbons
Pb	-	Lead
PCB	-	Polychlorinated Biphenyls
PFAS	Per- and polyfluoroalkyl substances	Per- and polyfluoroalkyl substances are a diverse group of compounds resistant to heat, water, and oil. These chemicals are persistent, and resist degradation in the environment. They also bioaccumulate, meaning their concentration increases over time in blood and organs.
PFOS, PFOA and PFHxS	Perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA) and perfluorohexane sulfonate (PFHxS)	Man-made chemicals belonging to the group known as PFAS. See PFAS.
PSH	-	Phase Separated Hydrocarbon
PSI	-	Preliminary Site Investigation
QA/QC	-	Quality Assurance and Quality Control
QUBE	QUBE Holdings Ltd	Owners of the Moorebank Precinct
RAE	-	Royal Australian Engineers
Rail Corridor	-	Area defined as the 'Rail Corridor' within the MPE Concept Plan Approval.
Rail Link	-	The rail link from the South Sydney Freight Line to the MPE IMEX Terminal, including the area on either side to be impacted by the construction works included in MPE Stage 1.
RPD	-	Relative Percentage Difference
SAQP	-	Sampling Analysis and Quality Plan
SIMTA	-	Sydney Intermodal Terminal Alliance - a consortium comprising Qube and Aurizon Holdings.
The Site	-	Part of the proposed subdivision of Lot 1 in DP1197707 as parts of proposed Lots 5,7, 8, 9, 12, 13, 61 and 62 (The Site).
SME	-	School of Military Engineering.
SMP	-	Site Management Plan.
SSD	-	State Significant Development.
SSFL	-	South Sydney Freight Line.
SVOC	-	Semi Volatile Organic Compounds.
Tactical	Tactical Group	Project Managers of the Moorebank Precinct.
MAUW	Moorebank Avenue Upgrade Works	The extent of construction works to facilitate the construction of the Moorebank Avenue upgrade. Raising of the vertical alignment of Moorebank Avenue for 1.5 kilometres of its length by approximately two metres, from

Abbreviations and Terminology		
Abbreviations	**Term**	**Definition**
		the northern boundary of the MPE Site to approximately 120 metres south of the MPE Site. The Moorebank Avenue upgrade also includes upgrades to intersections, ancillary works, and the construction of an on-site detention basin to the west of Moorebank Avenue within the MPW Site.
The Moorebank Precinct	-	Refers to the whole Moorebank intermodal precinct, i.e. the MPE Site and the MPW Site.
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

Qube (Qube) Property Management Services Pty Ltd, 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 Interstate Terminal (INTS) following a subdivision, within the Moorebank Precinct West site located at 400 Moorebank Avenue, Moorebank NSW, 2170 (MPW Site).

The LTEMP is specific to the subdivision of lots to form the INTS, including Moorebank Avenue Diversion Road (MADR) within the MPW Site. The development includes the subdivision of part Lot 1 in DP1197707 as parts of proposed Lots 5, 7, 8, 9, 12, 13, 61 and 62 (the Site). The location of the Site and MPW Site is provided as **Figure 1.**

It is understood the MPW Site has been owned by the Commonwealth Government since 1913, used as a Defence facility since the 1940s, and is approximately 190 hectares (ha) in area. The Site is located in the eastern portion of the MPW Site and is approximately 30.1 hectares (ha).

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

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

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

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

In accordance with the conditions of planning consent SSD 5066, remediation of the MPW Site was required in accordance with the approved Remediation Action Plan (RAP) prepared by Golder (2016)[1] and Contamination Management Plan (CMP) prepared by EP Risk (2020[2]).

These works were undertaken in conjunction with remediation of the Rail Access Land Preparation (RALP) area in the southern portion of the Site in accordance with the RALP RAP (Coffey 2019[3]). Remediation and Validation works within the RALP and MADR was undertaken by ADE Consulting Group (ADE 2019[4]) and JBS&G (2020[5]), and a Site Audit Report (SAR) and Site Audit Statement (SAS)

[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] Coffey (2019), *Moorebank Precinct East Stage 1 RALP No. 1, Remediation Action Plan*, dated 9 July 2019 (ref: GEOTLCOV24072AHR02 Rev05).
[4] ADE (2019), *Validation Report, Moorebank Precinct East (MPE) Rail Link – Georges River Bridge to the IMEX terminal, CPB Worksite, Moorebank Avenue, Moorebank NSW*, dated 7 August 2019 (ref: CPB-04-14371/VAL/v1f).
[5] JBS&G (2020) Remediation Validation Report, Land Preparation Work – Demolition and Remediation, Moorebank Intermodal Company Property West, Moorebank NSW, dated 22 July 2020 (ref: 51997-120265/Rev1).

A1 was provided (Enviroview 2019[6]). A SAR and SAS A2 was provided for the remainder of the MPW Site for Stage 1 (Enviroview 2020[7]).

At the completion of remediation and the Supplementary Validation Report (JBS&G 2020a[8]), a Site Audit Statement A2 and Site Audit Report for the MPW Site was provided by Enviroview (2020a)[9] subject to the implementation of a LTEMP for the MPW Site (EP Risk 2020a)[10] and Moorebank Avenue Upgrade Works (MAUW) Contamination Management Plan (CMP) (EP Risk 2019[11]).

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. JBS&G prepared a MPW Stage 2 INTS Summary Report (JBS&G 2022)[12], intended to summarise the information available for the Site, including MADR, to demonstrate the area is suitable for the intended land use following importation of fill so a SAR and SAS A2 could be prepared to satisfy Condition B171.

JBS&G (2022) summarised Stage 1 and Stage 2 works for MADR and INTS, including in-situ PFAS assessments, Unknown Pre-Existing Contamination (UPEC) finds, stockpile assessments, stockpile footprint validation works, materials tracking for placement at the Site and other associated Site works. The majority of the Site has been completed to the final fill level of approximately 0.7 m of engineered fill in preparation for future permanent built surface works including the construction of rail infrastructure, pavements, on-site stormwater detention (OSD) basins and landscaped areas (JBS&G 2022).

JBS&G (2022) concluded remediation, validation, management and importation works had been completed in accordance with EP Risk 2020a and EP Risk 2019. The Site was considered suitable for its intended land use subject to the implementation of an LTEMP.

This LTEMP is a standalone document that provides environmental management framework for the Site and is focused on both short to medium-term management during construction and long-term management of the Proposed Development post construction. 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 JBS&G summary letter (JBS&G 2022) and pertinent information is summarised within **Appendix A**.

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[6] Enviroview (2019), *Rail Access Land Package, Sydney Intermodal, Moorebank Avenue, Moorebank,* 13 August 2019 (ref: 600099_0301-2014).
[7] Enviroview (2020), *Stage 1 Early Works (Land Preparation Works – Demolition and Remediation) Moorebank Precinct West Intermodal and Logistics Park (MLP) Moorebank Avenue, Moorebank, NSW,* dated 19 September 2020, (ref: 0301-1613-7).
[8] JBS&G (2020a) MPW Supplementary Validation Report, Moorebank Avenue, Moorebank NSW, dated 23 September 2020 (ref: 58753/132401 (Rev B)).
[9] Enviroview (2020a) *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 24 November 2020 (ref: 600099_0301-2014).
[10] EP Risk (2020a) *Long-Term Environmental Management Plan*, Moorebank Precinct West (MPW), dated 27 October 2020 (ref: EP1489.001_v12).
[11] EP Risk (2019), *Contamination Management Plan, Moorebank Avenue Upgrade Works, 400 Moorebank Avenue, Moorebank NSW,* dated 8 November 2019 (v4) and revised 26 May 2021, (ref: EP1280.002_v7).
[12] JBS&G (2022), *MPW Stage 2 INTS Summary Report, Moorebank Avenue, Moorebank NSW*, dated 11 November 2022 (ref: 59761/139471 (Rev 1)).

1.1 Purpose

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

- Outline the nature and extent of known impacted soils, sediment, surface water and groundwater requiring short to long-term management at the Site identified by JBS&G (2022).
- Develop management measures for the management of impacted materials encountered during construction works and long-term operation of the Site including monitoring and reporting in satisfaction of relevant health and safety and environmental legislation.
- Assign responsibilities for the implementation of management measures.

1.2 Parties Responsible for the Implementation and Review / Maintenance

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

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

1.3 How the LTEMP will be complied with

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

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

2 Background

2.1 Site Identification

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

Table 1 – Site Identification

Item	Description
Site Address	MPW Site – 400 Moorebank Avenue, Moorebank, NSW, 2170 (see **Figure 1**) The Site – Portion of the MPW Site, as described below.
Legal Description	**The Site:** Proposed subdivision of part Lot 1 in DP 1197707 to: Parts of proposed Lots 5, 7, 8, 9, 12, 13, 61 and 62. The Site boundary is provided as **Figure 1**.
Approximate Site Area	30.1 ha
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 and is located south of the intersection of Moorebank Avenue and the M5 Motorway. The Site is within the MPW Site and MAUW footprints.

The Site is approximately 2,340 m from north to south and is approximately 230 m from east to west at its widest point.

2.2 Current Land Use

At the time of writing, bulk earthworks prior to construction of permanent built surfaces for the MADR footprint of the Site have been completed, with the exception of excavation and construction of OSD10 and OSD3. The majority of the Site has been completed to the final fill level of approximately 0.7 m of Engineered Fill in preparation for future permanent built surface works (JBS&G 2022).

2.3 Proposed Land Use

The development is believed to include the construction of the Interstate Terminal Rail Facility and diversion of Moorebank Avenue. It is understood the permanent built surface works will include rail infrastructure, pavements, landscaped areas and on-site Stormwater Detention (OSD) basins. It is understood there is potential for disturbance of underlying soils during construction works. Excess spoil is unlikely to be suitable as growing medium in landscape areas and would likely be managed under one of the following scenarios (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.
- Off-site disposal in accordance with the Waste Classification Guidelines: Part 1 Classifying Waste (EPA 2014).

It is understood excavation and construction of OSD10 and OSD3 will occur as part of the built surface works. An assessment was undertaken of the OSD10 (JBS&G 2021e[13]) and no residual contamination was identified "as *materials in the OSD10 design boundary had been characterised as below LOR, but the soils remain in-situ"* (JBS&G 2022). Full reference should be made to this report for further information. Additionally, JBS&G considered "*The footprint for OSD3 is outside of AEC3 and there's no known contamination existing in the area"* (JBS&G 2022). Site features are provided within **Figure 2**.

2.4 Surrounding Land Use

The land surrounding the Site comprises:

- **North:** MPW Site, Industrial warehouses, 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:** Moorebank Avenue, MPE, general industrial properties and infrastructure (Defence), Liverpool Fire Station (north-east), Anzac Creek, low density and medium density residential properties beyond.
- **West:** MPW Site, Offset Area, The Georges River (which flows north), Glenfield Tip, rail corridor and Casula Station, Leacock Regional Park and low and medium density residential properties beyond.

[13] JBS&G (2021e), Moorebank Avenue Upgrade Works (MAUW), Moorebank – OSD10 PFAS Investigation Report, dated 29 March 2021, (ref: JBS&G 58693-135925 L029).

2.5 Topography

At the time of writing, the majority of the Site had been completed to the final fill level of approximately 0.7 m of Engineered Fill in preparation for future permanent built surface works (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.

The historical drainage system at the Site was replaced by temporary sediment control swales and dams during Stage 1 and Stage 2 Works. Temporary drainage systems have since been backfilled during importation of Engineered Fill. Additionally, JBS&G (2021[14]) undertook an acid sulfate soils assessment of Anzac Creek prior to excavation, treatment with lime, validation and backfilling works. It is understood Anzac Creek was backfilled with imported and site-won fill prior to placement of imported engineered fill.

It is understood excavation and construction of OSD10 and OSD3 will occur as part of the built surface works.

2.7 Geology

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

The majority of the Site has been backfilled with site-won soils from the MPW Site and covered in a minimum of 0.7 m of Engineered Fill (JBS&G 2022).

2.8 Hydrogeology

EP Risk (2018[15]) reported groundwater flow was towards the west and the nearest surface water body, the Georges River. Groundwater at the Site ranged from 6.081 m Australian Height Datum (AHD) in the central portion of the Site to 6.401 m AHD in the norther portion of the Site. Groundwater depth was noted to be approximately 6.7 m below ground level (mBGL) in the southern portion of the Site (no survey was undertaken).

EP Risk (2018) reported that groundwater was predominantly fresh to brackish water (relatively low electrical conductivity) with the exception of groundwater monitoring well (GMW) GW6019 in the northern portion of the Site which indicated an area of high salinity (> 10,000 µS/cm). Dissolved

[14] JBS&G (2021), Anzac Creek Acid Sulfate Soils Assessment – L065 (Anzac Creek East ASS Assessment), dated 5 January 2021, (ref: L065_Rev 0).

[15] 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.

oxygen (DO) measurements indicated generally anaerobic conditions. The oxidation-reduction potential (ORP) indicated reducing conditions and the pH measurements were generally slightly acidic.

Groundwater elevation and gauging information (EP Risk 2018) is provided in **Appendix H**.

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[16] and Golder 2015[17]) actual and potential acid sulfate soils were identified in shallow soils between 1.0 metres below ground level (mBGL) and 2.0 mBGL in the MPW Site Offset Area along the Georges River to the west of the Site. Golder 2015 concluded the acid generating potential of the soils was not caused by sulfidic material. Both Golder (2015) and PB (2014) recommended an Acid Sulfate Soil Management Plan (ASSMP) was a requirement for future earthworks.

Development consent SSD 7709 Condition B39 for MPW Stage 2, required the preparation of an ASSMP for the MPW Site, which includes the Site. EP Risk (2020c[18]) prepared an ASSMP for inclusion as a sub-plan to the Construction Environmental Management Plan (CEMP)[19] 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.

Acid sulfate soils were encountered within the Site in Anzac Creek, located in the southern portion of the Site. Excavated soils were identified as potential acid sulfate soils (PASS) and treated with lime.

2.10 Summary of Site History

Numerous contamination assessments have been undertaken at the Site as part of assessment of the greater MPW Site, the findings of which are summarised in **Appendix A** and various stages of development are summarised by JBS&G (2022).

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

[16] 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.
[17] Golder (2015) *Post Phase 2 Environmental Site Assessment*. Golder Associates.
[18] EP Risk (2020c), Acid Sulfate Soils Management Plan, Moorebank Precinct West Site, 400 Moorebank Avenue, Moorebank NSW. EP Risk Management Pty Ltd. Dated 30 January 2020. EP1340.001_MPW_ASSMP v5.
[19] SIMTA (2020) Construction Environmental Management Plan, Moorebank Precinct West Stage 2, dated 14 January 2020 (ref: MIC2-QPMS-EN-APP-00001).

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

3 Description of Existing / Residual Contamination

3.1 Summary of Impacted Media

MPW Site

Based on the JBS&G (2022) MPW Stage 2 INTS Summary Report, the following remaining areas of environmental concern (AEC) and contaminants of concern for the Site are provided as follows:

- AEC 1 - Chlorinated hydrocarbons impact (Trichloroethylene (TCE) and Cis-1,2-dichlorothene (cis-DCE)) and total recoverable hydrocarbons (TRH) in the north west portion of the MPW Site to the south of the ABB Building.
- AEC 2 - Petroleum hydrocarbon impact including light non-aqueous phase hydrocarbons (LNAPL) in the eastern portion of the MPW Site.
- AEC 3 - PFAS impact associated with residue from historical fire-fighting activities.

A LTEMP for the MPW Site (EP Risk 2020a) was prepared for the management of the abovementioned AECs.

The Site

The chlorinated hydrocarbon impacted area (AEC 1) is located approximately 240 m north west of the Site, south of the ABB building and is hydraulically downgradient of the Site (JBS&G 2022). AEC 2 is located within the central eastern portion of the Site, near Chatham Avenue and is hydraulically upgradient of the Site. Therefore the known sources of contamination are:

- Petroleum hydrocarbon impacts (AEC 2); and
- PFAS impacts associated with residue from historical fire-fighting activities (AEC 3).

JBS&G (2022) recommended an LTEMP to be prepared to address any potential disturbance works during construction of the permanent built surface works and thereafter, including monitoring requirements for AEC2. GHD (2018a [20]) prepared an Environmental management Plan for the refuelling facility as part of the MPE IMEX Terminal development. The general requirements for the GHD EMP (2018a) have been included within this LTEMP for completeness where they relate to AEC2.

Site-won PFAS containing soils were placed on-site during filling works as part of Stage 2 in accordance with the LTEMP (EP Risk 2020a) (JBS&G 2022). The PFAS Placement Areas have been included within AEC 3. Site-won 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 LTEMP (EP Risk 2020a). According to JBS&G (2022) *"Approximately 0.7 m of Engineered Sandstone Fill has been placed within most of the Audit Area"*. Therefore, it was inferred asbestos in soils, albeit less than the adopted criteria, were not placed within the top 0.7 m of the Site.

[20] GHD (2018a) *Former DNSDC Refuelling Area, Moorebank NSW, Environmental Management Plan* (report reference 21/25471), October 2018.

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

At the time of writing, the majority of the Site had been completed to the final fill level of approximately 0.7 m of Engineered Fill in preparation for future permanent built surface works (JBS&G 2022).

3.2 Source – Pathway – Receptor Linkages Requiring Management

Based on the CSM provided in **Appendix A** for the Site, a summary of impacted media requiring management in this LTEMP is provided in **Table 3**. However, based on the placement of a minimum 0.7 m of Engineered Fill across the majority of the Site (JBS&G 2022), it is considered unlikely underlying soils will be significantly disturbed as part of construction of the Interstate Terminal Facility, with the exception of excavation for OSDs. An assessment was undertaken of the OSD10 and no residual contamination was identified (JBS&G 2022). Additionally, JBS&G considered "*The footprint for OSD3 is outside of AEC3 and there's no known contamination existing in the area"* (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	Risk Assessment / Management	Source – pathway receptor linkages requiring management
AEC 2 - Eastern portion of the Site to the west of the former DNSDC refuelling area.	LNAPL and petroleum hydrocarbons	**Soil** – Exceedance of Tier 1 management limit criteria from VS01_0.9m located at the tank farm on the IMEX site.	• A human health risk assessment was prepared by GHD (2016a)[21] that identified a risk to commercial / industrial workers from inhalation of soil vapours associated with LNAPL if a one storey basement was constructed. • GHD (2018)[22] prepared a validation report for the MPE Site which relied upon the implementation of an EMP (GHD 2018a). There was no risk to ecological receptors identified by GHD (2018). • GHD (2018a)[23] prepared an Environmental management Plan for the refuelling facility. • Golder (2016)[24] prepared a Site Management Plan for the restricted area within Moorebank Avenue. • As the GHD (2018 and 2018a) and Golder (2016) reports have not been prepared for the Site, but for adjacent land to the east, the management protocols within these documents that are applicable to the Site have been integrated into the LTEMP.	• Vapour intrusion into buildings / permanent structures. • Explosive atmospheres.

[21] GHD (2016a) *Former DNSDC Refuelling Area, Moorebank NSW, Human Health and Ecological Risk Assessment* (report reference 21/25471/217592), October 2016.
[22] GHD (2018) *Former DNSDC Refuelling Area Remediation Validation Report - Phase C* (report reference 21\25471\WP\220903), March 2018.
[23] GHD (2018a) *Former DNSDC Refuelling Area, Moorebank NSW, Environmental Management Plan* (report reference 21/25471), October 2018.
[24] Golder (2016a) *Moorebank Avenue – Site Management Plan*, dated 4 July 2016 (ref: 147623070-052-Rev1).

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
		Groundwater – Measurable LNAPL at GW119 and GW146 up to maximum historical apparent thickness of 1.937 m and 1.980 m (respectively), during a site-wide groundwater assessment (JBS&G 2020b[25]). • Historical dissolved phase concentrations in GW119 up to 29 mg/L in the F1 fraction more than the NEPC (2013) HSLs[26]. Groundwater was reported to be approximately 6 mBGL.		
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. **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 on-site sediment.	• EnRiskS (2019)[27] undertook a human health risk assessment of the MPW Site and reported the risk to human health at the MPW Site was low and acceptable, but bioaccumulation and the effects on higher order ecological consumers were unable to be excluded. • EnRiskS (2019a) [28] 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. • Recreational fishing resulting in the consumption by children of more than two serves of fish per month.

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
		Surface water - Exceedances of Tier 1 criteria for samples collected within temporary detention basins during Early Works construction and from the Georges River. **Groundwater** – Exceedances of Tier 1 criteria.		• Bioaccumulation and the effects on higher order ecological consumers.
Additional Areas Requiring Management	Bonded (non-friable) ACM	**Soil -** Concentrations of asbestos in soils were less than the adopted HSL for a commercial / industrial land use (0.05 % weight for weight).	JBS&G (2022) have identified that site-won bonded (non-friable) ACM in soil was placed during filling works below the soil surface and engineered fill. The location of asbestos in soils placement, albeit less than the adopted criteria, was not provided within the Summary Report (JBS&G 2022).	• Inhalation (asbestos) for construction workers during soil disturbance and excavation works beneath the imported sandstone layer or if this material is placed in the top 10 cm.

[25] JBS&G (2020b) Qube Property Management Services, Site Wide Groundwater Assessment Report, Land Preparation Work – Demolition and Remediation, Moorebank Intermodal Company Property West, Moorebank, NSW, dated 22 July 2020 (ref: 51997-120679 (rev 1)).
[26] HSL – Health screening level.
[27] EnRiskS (2019) *Land Human Health and Ecological Risk Assessment (Land HERA)*, dated 6 May 2019 (ref: MICL/19/BIOR001, Revision B – Revised Draft).
[28] EnRiskS (2019a) *Waterway Human Health and Ecological Risk Assessment (Waterway HHERA)*, dated 10 May 2019 (ref: MICL/18/GRR001, Revision E – Revised Draft).

4 Management Activities

4.1 LTEMP Roles and Responsibilities

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

Table 4 – Responsibilities for LTEMP Implementation

Position	Company/Entity	Responsibilities
Land Owner	Commonwealth	To consent to the registration of the LTEMP on title.
Land Owner Representative	National Intermodal Corporation (NI)	To consent to the registration of the LTEMP on title.
Developer (or their representative)	Moorebank Precinct Nominees Pty Ltd	The Developer is responsible for: • The engagement of the Principal Contractor (during construction). • Management of the operation of the Site post construction or engagement of the Operational Managing Entity. • Ensuring that the Principal Contractor or Managing Operational Entity implement the LTEMP.
Principal Contractor (during construction)	To be appointed	• Responsible for the implementation of the LTEMP during construction works and has primary control of the Site (Parts of proposed Lots 5, 7, 8, 9, 12, 13, 61 and 62). 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). • The Environmental Consultant is responsible for the following:

Table 4 – Responsibilities for LTEMP Implementation

Position	Company/Entity	Responsibilities
		o Notifying the Client and Principal Contractor of any unexpected finds. o Undertaking the assessment, remediation and validation of an unexpected find. o Engaging the Ordnance Contractor should unexploded ordnance (UXO) or exploded ordnance waste (EOW) be identified as an unexpected find. o Notifying the Principal Contractor once unexpected finds have been validated and can be reoccupied. • Any environmental monitoring required under the LTEMP.
Construction Worker	Commercial industrial worker during construction	• Any worker on the Site, including any contractor or sub-contractor, must adhere to the requirements of the LTEMP during short to medium term construction. Responsible for undertaking their tasks in a safe manner and notifying the Principal Contractor if they see any items / conditions which may constitute an unexpected find.
Operational worker	Commercial industrial worker during operation	• To adhere to the requirements of the LTEMP during long-term operation of the Proposed Development post construction.

4.2 Approval and Licensing Requirements

SSD 7709 provides specific requirements for the LTEMP which are provided in **Table 5**. The MAUW and MADR works were completed in conjunction with the MPW Site and managed through the MAUW CMP (EP Risk 2019).

Table 5 – Planning Conditions Specific to the LTEMP

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

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

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

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

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 encompasses the following stages:

- Phase 2 Construction Works.
- Operational Phase.

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

Based upon details of the Proposed Development summarised in **Section 2.3**, the following potential activities are proposed to be carried during construction:

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, including PFAS placement areas, and AEC2. 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, however the location was not provided within the Summary Report (JBS&G 2022).

Phase 2 Construction Works

- Installation of underground services.
- Construction of railway, pavements and landscaped areas.
- Construction of OSD10 and OSD3:
    - Excavation of OSD 10 to a maximum depth of 12.50 mAHD[29] (depth of excavation to be approximately 3.4 m above the level of LNAPL contamination)[30].
    - OSD 3 – minimum 13.95 m AHD[31] (depth of excavation to be approximately 4.8 m above the reported groundwater level)[32].
    - Validation (as required).

Operational Phase

- Sub-surface maintenance works.
- Groundwater monitoring (AEC 2).

4.4 LTEMP Environmental Management and Monitoring Procedures

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

- EMP 1 – Land use restrictions.
- EMP 2 – Subsurface works – AEC2.
- EMP 3 – Subsurface works – AEC3.
- EMP 4 – Materials Tracking.
- EMP 5 – Stockpile Management.
- EMP 6– Minor Excavation and Sampling.
- EMP 7– Off-site disposal of excavated / unsuitable material.
- EMP 8 – Subsurface maintenance works.
- EMP 9 – Landscape Maintenance.
- EMP 10 – Unexpected finds.
- EMP 11 – Additional Validation Requirements.
- EMP 12 – Management of groundwater.

[29] Northrop Pty Ltd (2020) *Bulk Earthworks Plan Sheet 01*, Drawing No. MAUW-NRP-CV_DWG-9121, Sheet No. 9121, dated 20.07.2020, rev 09.
[30] EP Risk (2018) reported groundwater at 9.12 mAHD at MW6003, which is the closest surveyed well to the portion of OSD 10 within AEC 2.
[31] Northrop Pty Ltd (2020) *Bulk Earthworks Plan Sheet 02*, Drawing No. MAUW-NRP-CV_DWG-9122, Sheet No. 9122, dated 20.07.2020, rev 04.
[32] EP Risk (2018) reported groundwater at 9.12 mAHD at MW6003, which is the closest surveyed well to the portion of OSD 3 within AEC 3.

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

Summary of Source – Pathway – Receptor Linkages Requiring Management

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

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

Project Stage	AEC	Activity	Management Procedure
General	-	All activities	**EMP 1**
	AEC 2	Groundwater Monitoring	**EMP 12**
Phase 2 Construction Works	AEC 2, AEC 3, and PFAS and Asbestos Placement Areas	Installation of underground services	**EMP 2, EMP 3, EMP 4, EMP 5, EMP 6, EMP 7, EMP 8, EMP 9, EMP 10, EMP 11, EMP 12, EMP 13**
		Construction of railway lines, pavement (concrete / asphalt) and landscaped areas	**EMP 2, EMP 3, EMP 4, EMP 5, EMP 6, EMP 7, EMP 8, EMP 9, EMP 10, EMP 11, EMP 13**
		Excavation of OSD3 and OSD10	**EMP 2, EMP 3, EMP 4, EMP 5, EMP 6, EMP 7, EMP 8, EMP 9, EMP 10, EMP 11, EMP 13**
Operation of Proposed Development	AEC 3, PFAS and Asbestos Placement Areas and AEC2	Sub-surface maintenance works	**EMP 8, EMP 9, EMP 10, EMP 12, EMP 13**

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

4.5 Reuse of PFAS Impacted Soil

The Site includes soil reuse Zones 2, 3, and 4 (EP Risk 2020a). As reported by JBS&G (2022), Engineered Fill material has been imported over the majority of the Site, limiting opportunities for the reuse of PFAS impacted soil from AEC3 (JBS&G 2022), with the exception of proposed excavation works as part of OSDs. The location of the AEC 2 and AEC 3 in relation to the Site is provided as **Figure 3**, and the surveyed location of the PFAS Placement Areas provided within the Summary Report (JBS&G 2022) is provided in **Appendix E**.

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 20221):

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

In the event soil is to be reused on-site, reference should be made to previous analytical results provided within **Appendix A** and the MPW LTEMP (EP Risk 2020a) and Addendum 01 to the MPW LTEMP (EP Risk 2022[33]).

Soil excavated and placed 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 6**, should be assessed by the Environmental Consultant for suitability to remain on-site or classified and disposed off-site. In the event soil is to be reused on-site, reference should be made to previous analytical results provided within **Appendix A** and further testing of soil where historical data is absent or limited may be undertaken in accordance with **EMP 6**.

Further details of the derivation of the soil reuse criteria provided are contained in the EnRiskS (2020) and MPW Site LTEMP (EP Risk 2020a) reports, subsequent letter of advice (EnRiskS 2022[34]), and Addendum 01 to the MPW LTEMP (EP Risk 2022).

Based upon a review of the setting and development proposed for the Site approximate footprints of the soil reuse zones were developed based upon a 200 m[35] buffer distance from waterways and a 50 m[36] buffer distance from stormwater structures.

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

[33] EP Risk (2022), *Addendum 01 – Moorebank Precinct West (MPW) Long-Term Environmental Management Plan (LTEMP) Version 12 – PFAS Re-use in Warehouse Areas 400 Moorebank Avenue, Moorebank NSW*, dated 1 September 2022 (ref: EP1489.012_LTR01_v1).
[34] EnRiskS (2022), *PFAS at MPW: re-use of soil underneath the warehouse area,* dated 23 August 2022
[35] HEPA (2020) NEMP 2.0 – Contact with the environmental regulator must be made before any proposal for reuse within 200 m of a surface water body or wetland area.
[36] A buffer distance of 50 m from stormwater structures was adopted for reuse of soil for all land uses within the Construction Area. The buffer distance of 50m was considered sufficiently protective to reduce the risk of leaching and erosion of soil to stormwater structures with consideration to the urban setting, the intensively developed nature of the Construction Area where greater than 80% of the surface area is covered by hard surfaces and the absence of secondary consumers.

4.6 Compliance Matrix

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

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

4.7 Adopted Validation Criteria

Soil Criteria

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

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

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

Asbestos Assessment Criteria

Asbestos Forms

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

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

Asbestos - Health Screening Levels

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

A HSL of 0.05 % w/w asbestos for bonded ACM should be adopted as site criteria for bonded ACM validation based on the intended commercial / industrial land use. Additionally, 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. 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 **EMP 7**.

4.10 Contingency Plan

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

5 Monitoring and Reporting

5.1 Contamination Management Plan Periodic Review

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

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

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

5.2 Period of Implementation

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

5.3 Managing and Reporting

Incidents and Non-compliances

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

Complaints

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

Continual Improvement

Continual improvement of this LTEMP will be undertaken in accordance with the **EMP 19** and **EMP 20** in **Appendix C.** Continuous improvement will be achieved by the ongoing evaluation of environmental management performance and effectiveness of this plan against the environmental policies, objectives, and targets.

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

5.4 Record Keeping

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

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 2** – The LNAPL plume in the eastern portion of the Site; and
- **AEC 3** – PFAS plume associated with historical firefighting at the Site.

AEC 2: Based upon a review of the Site Audit Report (Enviroview 2019)[37] prepared for the adjacent IMEX Site and the GHD (2018a) EMP, ongoing monitoring of the LNAPL groundwater plume is required until such time as it can be demonstrated the Site is suitable for commercial / industrial land use as an intermodal terminal without ongoing management. It is a requirement that groundwater monitoring of the LNAPL groundwater plume at the Site is undertaken in accordance with the GHD (2018a) EMP. However, monitoring of the IMEX site and wells located at the Site is required to be undertaken to close out conditions of the Site Audit Statement[38] for the IMEX site and to satisfy the conditions within this LTEMP. Further details pertaining to the requirements within the GHD EMP (2018a) are provided within **EMP 12 (Appendix B)**. The proposed monitoring wells will be installed at the Site at the completion of Stage 2 construction works, with the locations provided as **Appendix G**.

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

Surface water sampling is to be conducted for the Site in accordance with the relevant EPL for the land.

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- Enviroview (2020e) *Site Audit Interim Advice 37 – Review of Revised Long-Term Environmental Management Plan (LTEMP) (v5) for Moorebank Precinct West*.
- Enviroview (2020f) *Site Audit Interim Advice 38 – Review of Revised Long-Term Environmental Management Plan (LTEMP) (v6) for Moorebank Precinct West*.
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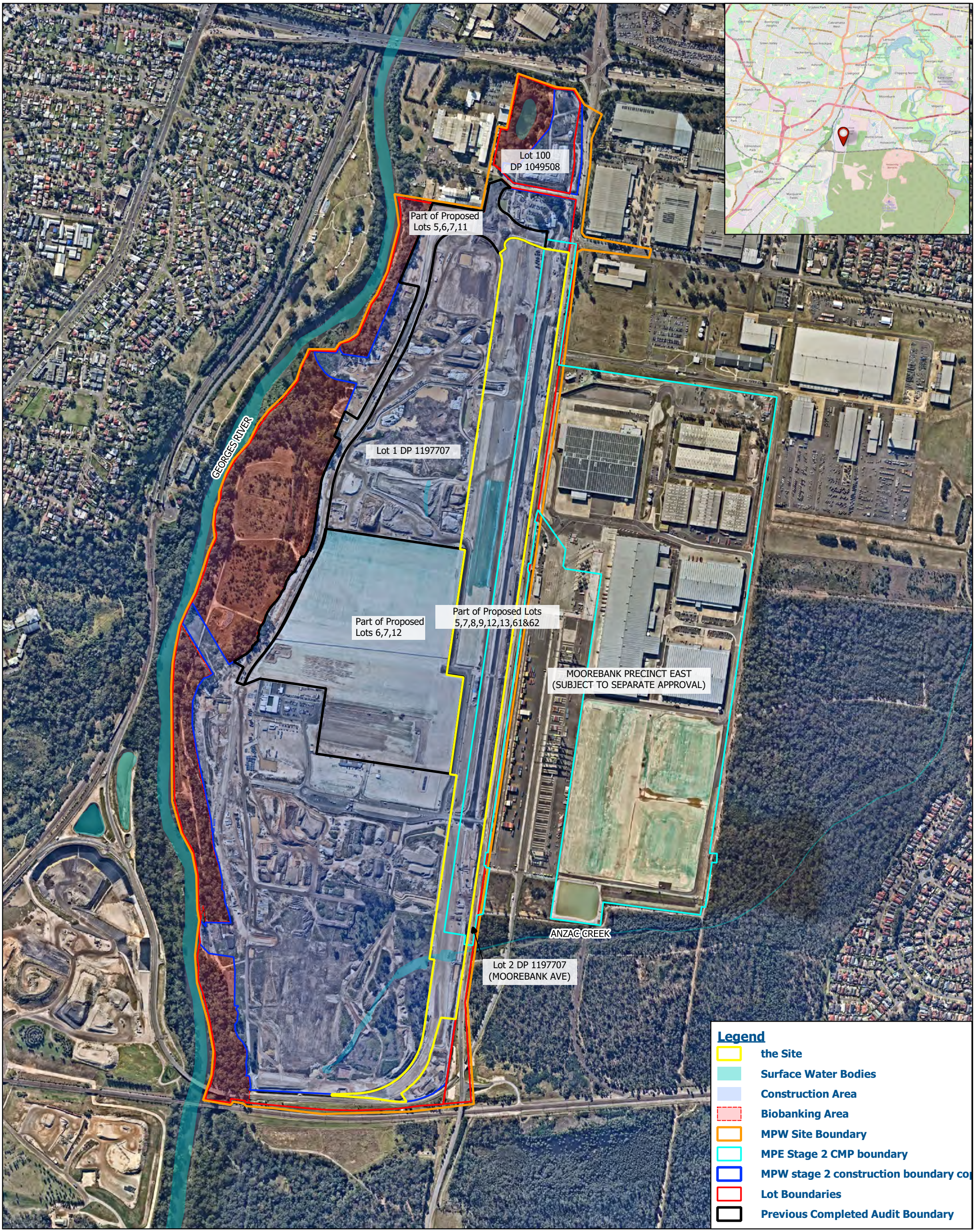
Figures



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Long Term Environmental Management Plan
Interstate Terminal Audit Area

Figure 1 - Site Location

Job No: EP1489
Date: 20/10/2022
Drawing Ref: Fig 1
Version No: v3

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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 QMS Certification Services
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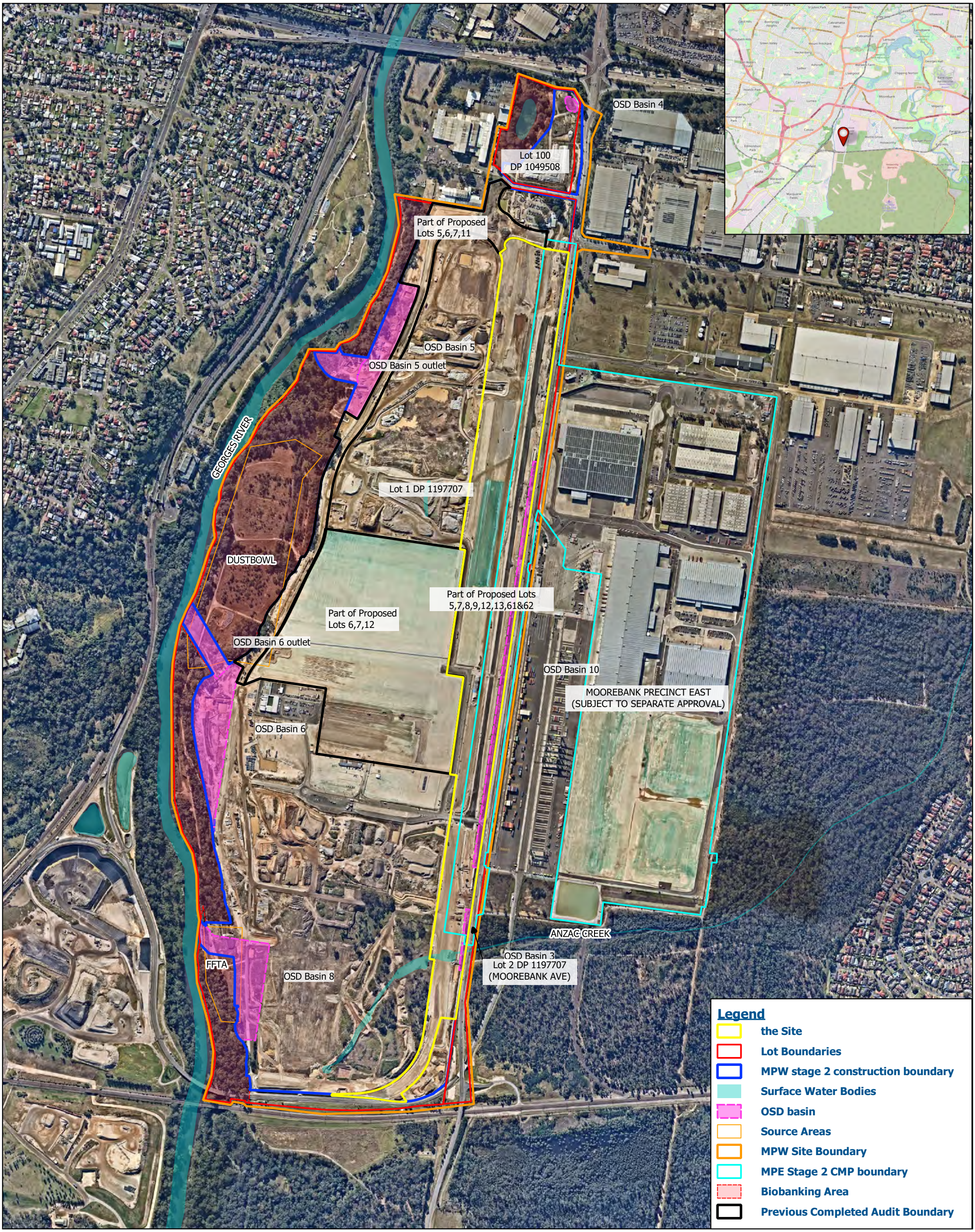

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Long Term Environmental Management Plan
Interstate Terminal Audit Area

Figure 2 - MPW Project Lavout and Features

Job No: EP1489.008
Date: 20/10/2022
Drawing Ref: Fig 2
Version No: v3

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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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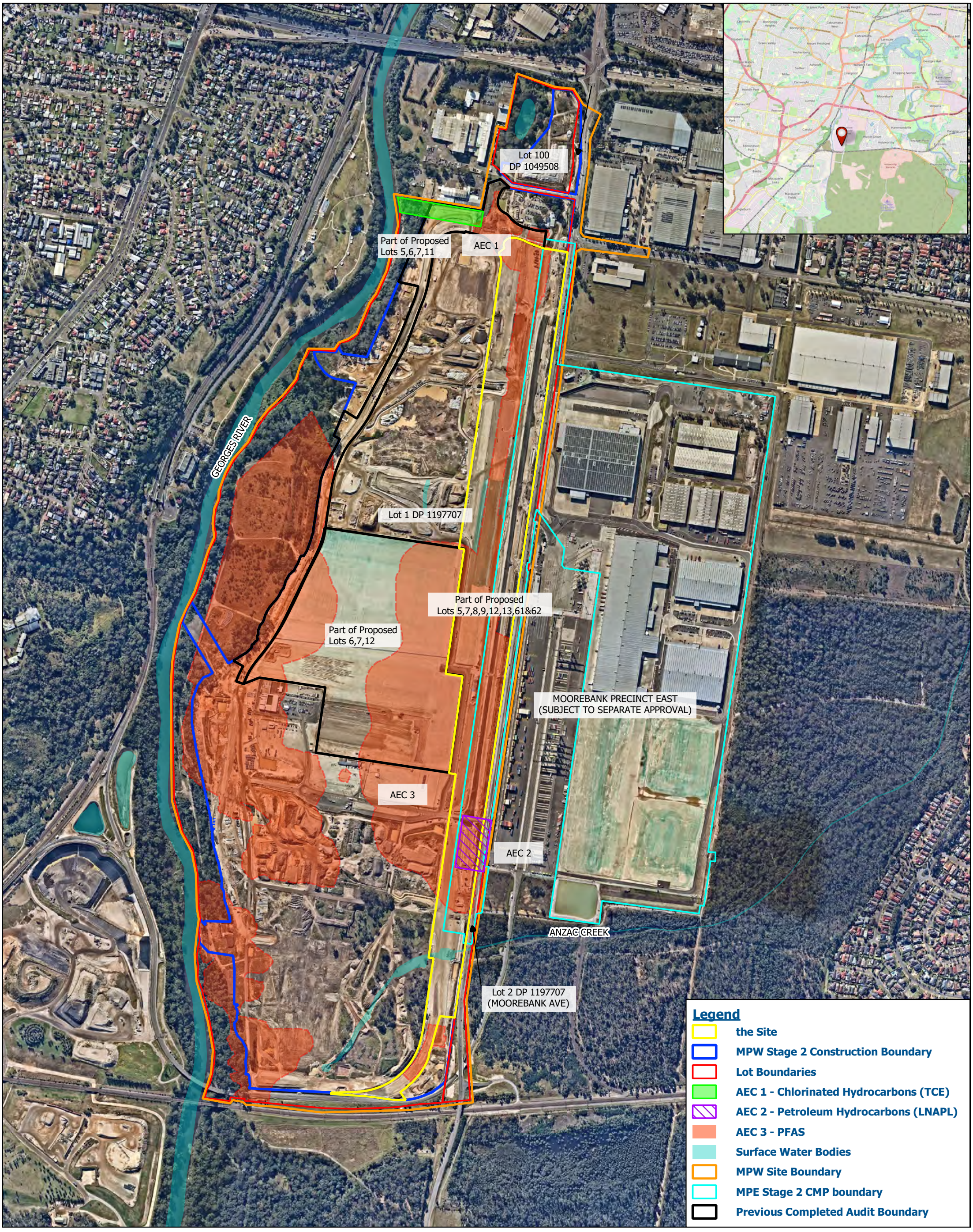

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Long Term Environmental Management Plan
Interstate Terminal Audit Area

Figure 3 - Areas of Environmental Concern

Job No: EP1489.008
Date: 20/10/2022
Drawing Ref: Fig 3
Version No: v3

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Approximate Scale Only

Coordinate System: WGS 84
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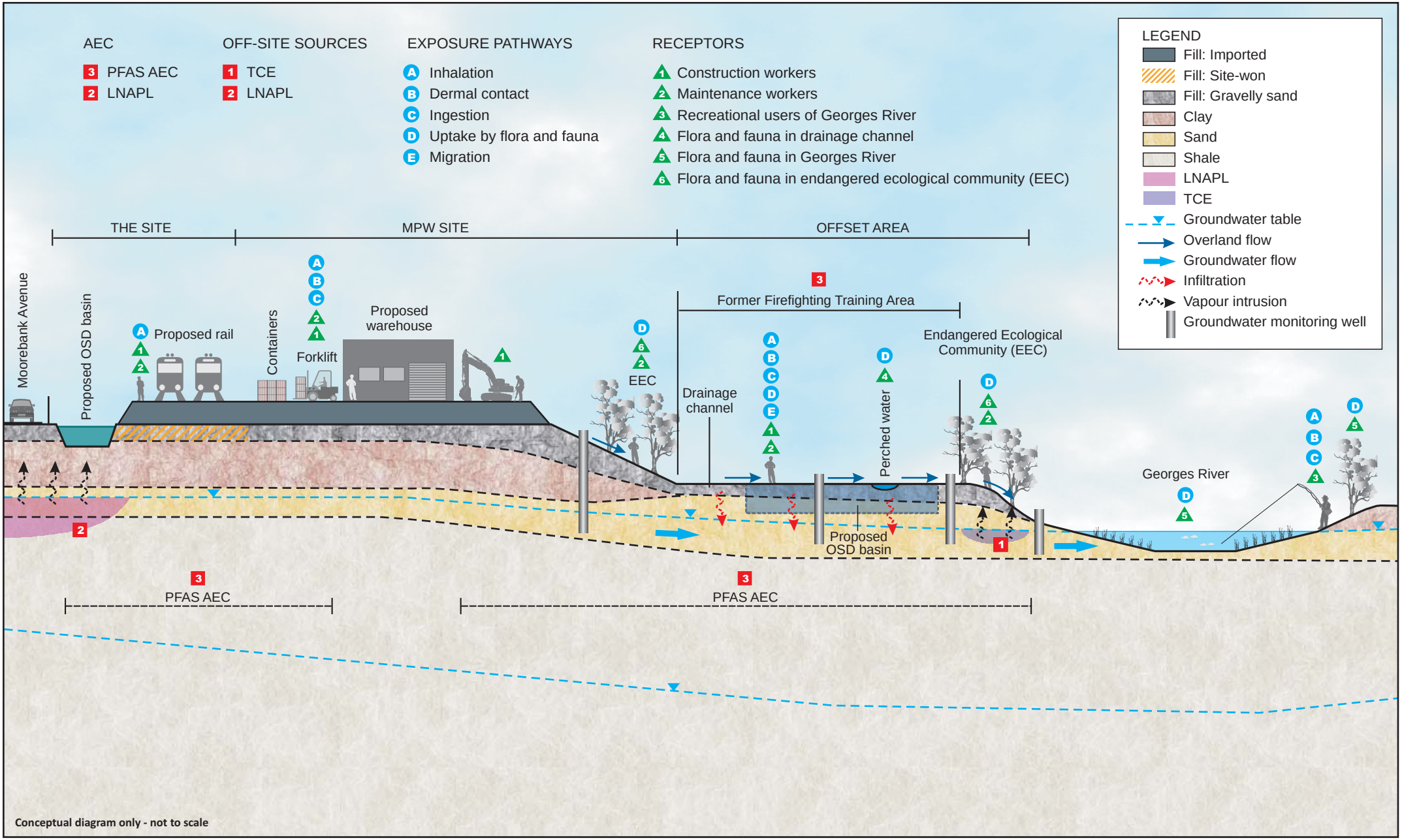

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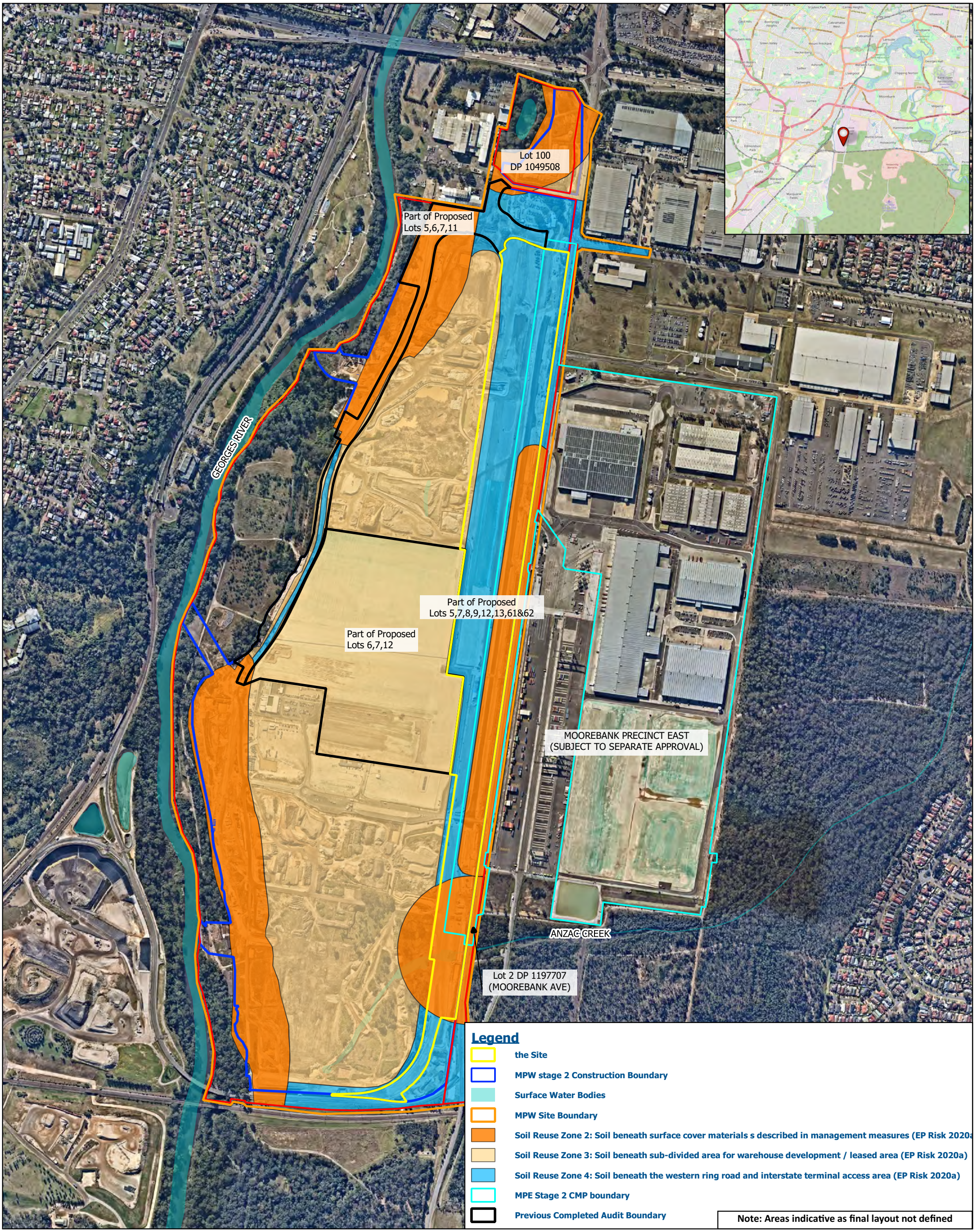
Long Term Environmental Management Plan
Part Lot 6, 7 and 12 - Moorebank Precinct West

Figure 4 - Conceptual Site Model

Job No: EP1489
Date: 17/3/2022
Drawing Ref: EP1489_004.cdr
Version No: v1

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



Long Term Environmental Management Plan
Interstate Terminal Audit Area

Figure 5 - Soil Reuse Zones (MPW LTEMP)

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Job No: EP1489.009
Date: 20/10/2022
Drawing Ref: Fig 5
Version No: v3

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Approximate Scale Only

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Source: Near Maps

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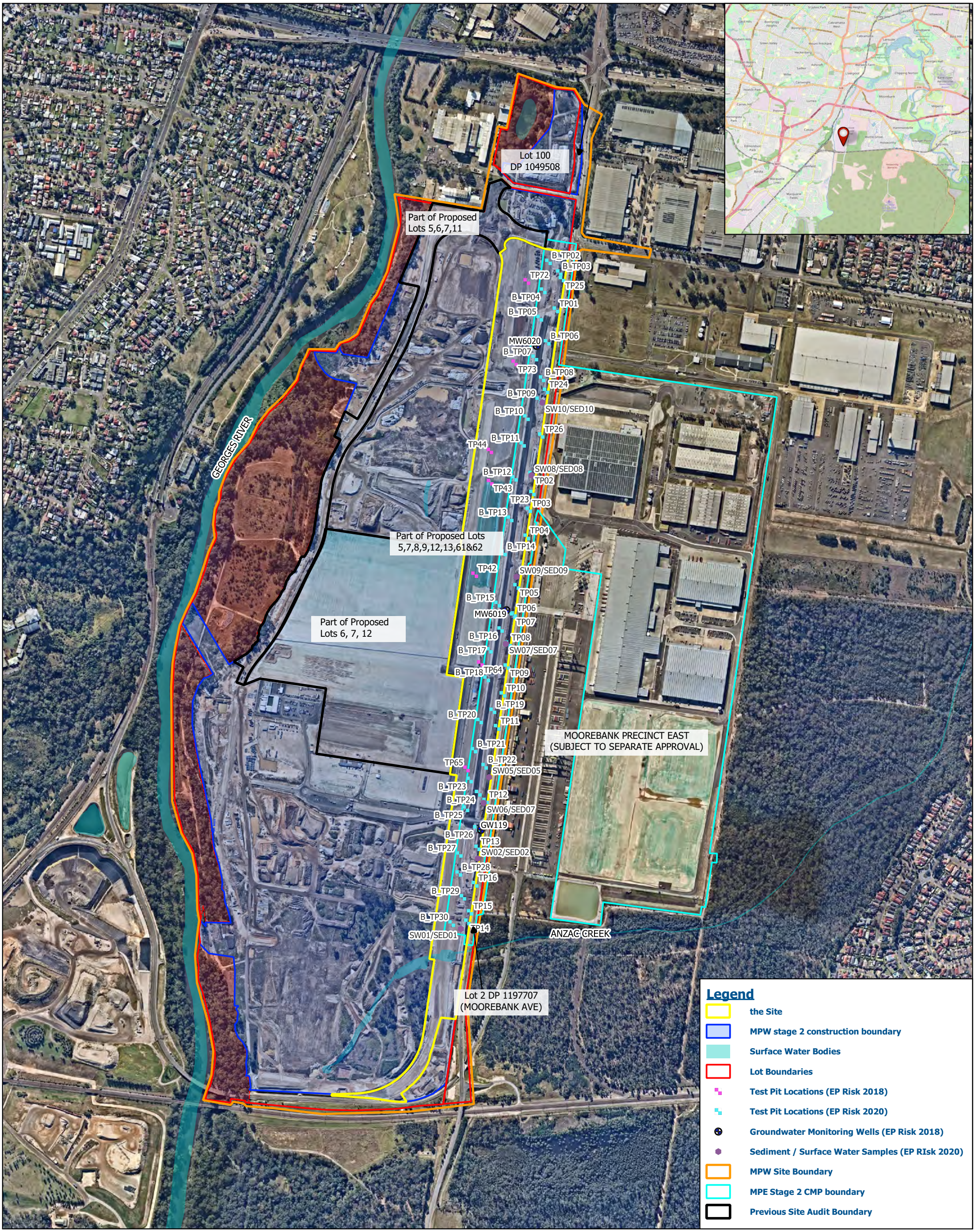

Long Term Environmental Management Plan
Interstate Terminal Audit Area

Figure 6 - Soil and Groundwater Sampling Locations

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Job No: EP1489.009
Date: 20/10/2022
Drawing Ref: Fig 6
Version No: v3

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Approximate Scale Only

Coordinate System: WGS 84
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Source: Near Maps

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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, petroleum hydrocarbon contamination and asbestos based on a review of the Summary Report (JBS&G 2022), relevant background historical site information and the investigation works undertaken at the MPW Site 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 majority of the Site had been covered with a minimum of 0.7 m Engineered Fill (JBS&G 2022). The Site is located in the eastern portion of the MPW Site and is approximately 31.8 hectares (ha). The Site is approximately 2,340 m from north to south and is approximately 230 m from east to west at its widest point.

The two PFAS source areas were located in the Offset Area of the MPW Site, known as the Dust Bowl and the FFTA (EP Risk 2018), west of the Site and PFAS impacted areas within AEC 3 are located partially on-site. The petroleum hydrocarbon impacted area (AEC 2) is located in the eastern portion of the Site. JBS&G (2022) have identified soil containing asbestos at concentrations less than the HSL is present beneath the imported engineered fill layer at the Site. The location of the Dust Bowl and FFTA, AEC 2 and AEC 3 (including PFAS Placement Areas) in relation to the Site is provided as **Figure 3** and the surveyed location of the PFAS Placement Areas described by JBS&G (2022) is provided in **Appendix E**.

Proposed Development

The development is believed to include the construction of the Interstate Terminal Rail Facility and diversion of Moorebank Avenue. It is understood the permanent built surface works will include rail infrastructure, pavements, landscaped areas and on-site Stormwater Detention (OSD) basins, namely OSD10 and OSD3. It is understood there is potential for disturbance of underlying soils during

construction works. Excess spoil is unlikely to be suitable as growing medium in landscape areas and would likely be managed under one of the following scenarios (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), Environmental Protection License (EPL), Contamination Management Plan (CMP) or LTEMP for the land.
- Off-site disposal in accordance with the NSW EPA Waste Classification Guidelines.

Summary of Environmental Investigations (MPW Site)

AEC 2 – Hydrocarbon Contamination

Investigations of a petroleum hydrocarbon refuelling facility located on the MPE site to the east was undertaken by GHD (2014[39], 2015[40] and 2015a[41]) who reported that LNAPL had migrated onto the eastern portion of the MPW Site. Remediation of the refuelling facility was undertaken in accordance with the GHD (2015b) RAP[42] and GHD (2016) technical specification[43] and included removal of underground storage tanks (USTs), excavation of impacted soil, removal of LNAPL by multi-phase vacuum extraction (MPVE), preparation of a human health and ecological risk assessment (2016a[44]) and preparation of staged validation reports (GHD 2016a[45]and GHD 2018[46]). Residual LNAPL is present at the refuelling facility and the impacted portion of the Site requiring on-going management in accordance with the GHD (2018a) EMP[47]. Recent gauging of LNAPL concentrations within this portion of the Site was undertaken by JBS&G (2020)[48] where increased LNAPL apparent thicknesses were reported in some wells. These increases were attributed to the low saturations of LNAPL within the effective porosity of the fine-grained soils at the Site, consistent with the low recoverability of LNAPL reported by GHD (2018). JBS&G (2020) undertook a detailed risk assessment that reported the LNAPL does not pose a potential health risk subject to the implementation of a LTEMP.

Andrew Lau of JBS&G was commissioned as the Site Auditor for the MPE Site and prepared a Site Audit Statement (SAS) and Site Audit Report (SAR) (JBS&G 2018[49]) in 2018 for the MPE Site concluding the LNAPL plume was stable or declining and residual contamination could be appropriately managed by the GHD (2018a) EMP.

[39] GHD (2014) *Stage 1 contamination assessment and data gap analysis report* (report reference 21/24133/204711), December 2014.
[40] GHD (2015) *Intrusive site investigations* (Ref 21/24133/207651), November 2015.
[41] GHD (2015a) Additional site investigations and remedial options evaluation (report reference 21/24133/209789), November 2015.
[42] GHD (2015b) *DNSDC Moorebank – Refuelling Area Remedial Action Plan* (21/24133/211259).
[43] GHD (2016) *DNSDC Refuelling Area Technical Specification* (2125471), May 2016.
[44] GHD (2016a) *Former DNSDC Refuelling Area, Moorebank NSW, Human Health and Ecological Risk Assessment* (report reference 21/25471/217592), October 2016.
[45] GHD (2016b) *Validation Report – Phase A* (report reference 21/25471/217655), September 2016.
[46] GHD (2018) *Former DNSDC Refuelling Area Remediation Validation Report - Phase C* (report reference 21\25471\WP\220903), March 2018.
[47] GHD (2018a) *Former DNSDC Refuelling Area, Moorebank NSW, Environmental Management Plan* (report reference 21/25471), October 2018.
[48] 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)).
[49] JBS&G (2018) *Site Audit Report 0503-1907 Former Defence National Storage and Distribution Centre (DNSDC) – Licensed Area Moorebank Avenue, Moorebank NSW*. 30 October 2018 (ref. 51732-114653).

[redacted] of Enviroview was subsequently engaged as the Site Auditor of the IMEX Terminal portion of the MPE Site (which included the refuelling facility) and issued a SAS and SAR (Enviroview 2019a[50]). The SAS concluded that the IMEX Site was suitable for commercial / industrial land use subject to compliance with the GHD (2018a) EMP and excluding the construction of basements.

A Site Management Plan (SMP) was prepared by Golder (2016a)[51] for Moorebank Avenue to inform management of LNAPL that had migrated off-site from the refuelling facility at the MPE Site to Moorebank Avenue.

AEC 3 – Historical PFAS Contamination (MPW Site)

[redacted] of Enviroview Pty Ltd was engaged in 2016 as the Site Auditor in relation to the Moorebank Intermodal Terminal and reviewed the RAP (Golder 2016) for the MPW Site. [redacted] 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[52]).

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[53], Golder 2015b[54], Golder 2016b[55], Golder 2016c[56], Golder 2016d[57], Golder 2016e[58], Golder 2017[59], Coffey 2017[60], EP Risk 2017[61], EP Risk 2017a[62], EP Risk 2017b[63], EP Risk 2017c[64], JBS&G 2019[65] 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

[50] Enviroview (2019a) *Site Audit Report, IMEX Terminal Site Moorebank Precinct East, Sydney Intermodal 402 Moorebank Avenue, Moorebank, NSW* (ref: 600099_0301-1613-2), dated August 2019.
[51] Golder (2016a) *Moorebank Avenue – Site Management Plan*, dated 4 July 2016 (ref: 147623070-052-Rev1).
[52] 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].
[53] 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.
[54] Golder (2015b) *Preliminary Aqueous Film Forming Foam Investigation* (ref: 147623070-035-M-Rev0, FINAL, 28.10.15) Golder Associates Pty Ltd.
[55] (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.
[56] Golder (2016c) *Perfluoroalkyl Substances Surface Water and Sediment Investigation Georges River*, dated 22 March 2016 (ref: 147623070-047-R-Rev0).
[57] 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.
[58] 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).
[59] 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.
[60] Coffey (2017) *PFAS Assessment Report – Royal Australian Engineers (RAE) Golf Course*, dated 29 September 2017 (ref: GEOTLCOV24072AF-CD) Coffey.
[61] 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.
[62] EP Risk (2017a) *Per- and Poly-fluoroalkyl Substances (PFAS) Data Gap Investigation* (ref: EP00464.002, v2, 20.11.17) EP Risk Management Pty Ltd.
[63] EP Risk (2017b) *Per- and Poly-fluoroalkyl Substances (PFAS) Nested Well Investigation* (ref: EP00561.002, v1, 10.07.17) EP Risk Management Pty Ltd.
[64] 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.
[65] 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).

firefighting activities undertaken at the former FFTA and Dust Bowl in the western portion of the MPW Site. EP Risk (2017) was engaged to prepare a Tier 2 PFAS human health and ecological risk assessment for the development and identified the potential human health risk to workers through dermal exposure to PFAS impacted water and a potential risk to ecological receptors in the Georges River from PFAS impacted soil, sediments, surface water and groundwater at the MPW Site.

MIC engaged EnRiskS (2019[66] and 2019a[67]) 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 engaged GHD (2019) [68] 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 engaged GHD to prepare a PFAS Management Plan (2019a) to outline the strategy for long term management of the off-site migration of PFAS from the MPW Site to the Georges River. The GHD (2019a) PFAS Management Plan was not implemented and 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)[69] 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

[66] EnRiskS (2019) *Land Human Health and Ecological Risk Assessment (Land HERA)*, dated 6 May 2019 (ref: MICL/19/BIOR001, Revision B – Revised Draft).
[67] EnRiskS (2019a) *Waterway Human Health and Ecological Risk Assessment (Waterway HHERA)*, dated 10 May 2019 (ref: MICL/18/GRR001, Revision E – Revised Draft).
[68] GHD (2019) *Moorebank Precinct West, Report Summarising PFAS Investigations to February 2019*, dated April 2019 (ref: 2128111).
[69] EnRiskS (2020) Moorebank Intermodal Terminal: LTEMP Material Reuse Risk Assessment for PFAS, dated 9 October 2020.

reused in the Construction Area, which can be implemented in conjunction with the management measures within the MPW LTEMP.

JBS&G was engaged to conduct two (2) comprehensive PFAS Assessments (JBS&G 2021c[70] and JBS&G 2021d[71]) of the greater ring road, OSD basins, and stormwater culvert at the MPW Site. The scope of work included the progression of 307 test pits within the greater area and the collection of soils samples. It was reported that concentrations of PFAS outside of AEC3 (EP Risk 2020a) reported no concentrations of PFOS greater than the laboratory limit of reporting (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. 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).

AEC 3 – Historical PFAS Contamination (MAUW)

A Site Assessment for PFAS was undertaken at the MAUW Site (EP Risk 2020b[72]) to satisfy a variation to the Conditions of Approval under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) EPBC 2011/6086. EP Risk (2020b) observed the following:

- Detectable PFAS concentrations were generally reported below the assessment criteria across all media, and all areas of the Assessment Area.
- Leachable concentrations of PFHxS + PFOS and PFOA from total concentrations are present in soils, albeit generally below assessment criteria.
- From the acquired data no Site sourced contamination or hotspot areas are identified, with the exception of one sample within the MPW portion which recorded a concentration in excess of 250% the ecological criteria for leachable PFOS. The recorded concentration was within the range of previously identified contamination at the MPW portion (MADR) of the Site which is being managed under a LTEMP (EP Risk 2020b). Low levels of PFAS are relatively uniform over the whole Site area.

It was recommended PFAS impacted soil, sediment and surface water at the Site is to be managed by the implementation of the MAUW CMP (EP Risk 2019) during the construction phase of MAUW and the EP Risk (2020a) MPW LTEMP during construction and operation of the Site.

Summary of Preparatory Works Summary (JBS&G 2022)

The Site, which includes MADR and INTS were subject to two earthworks contracts. INTS works were supervised by JBS&G and MADR works were generally supervised by Prensa Pty Ltd (Prensa). Documentation prepared by Prensa was provided for review against the MAUW CMP (EP Risk 2019) by JBS&G (JBS&G 2022). Based on the Validation Summary Report (JBS&G 2022), a number of in-situ

[70] JBS&G (2021c) *Moorebank Precinct West (MPW): PFAS Investigation Report,* dated 11 February 2021 (ref: 58753/134234, L076 (Rev B)).
[71] JBS&G (2021d) *Moorebank Precinct West (MPW): OSD6 and OSD8 Outlet Structure Investigations,* dated 26 April 2021 (ref: 58753/136716, L315 (Rev B)).
[72] EP Risk (2020b), *Site Assessment for Poly-Fluoroalkyl Substances (PFAS) - Soil, Sediment and Surface Water, Moorebank Avenue Upgrade Works, Moorebank Avenue NSW*, dated 21 December 2020, (ref: EP1691.002_v2).

and ex-situ assessments were conducted as part of Stage 2 filling works at the Site across both MADR and INTS. The scope of works as part of validation included the following:

- Review of MADR documentation, including UPECs assessed by Prensa;
- Assessment and management of UPECs subsequent to JBS&G (2020 and 2020a);
- Assessment for reuse of soils sourced from AEC 3 including in-situ, stockpile and concrete assessments;
- Review of materials tracking and survey information provided by the Contractors, and Construction and Remediation Advisory Services Pty Ltd (CARAS) for imported fill;
- Assessment and management of potential and actual acid sulfate soils;
- Assessment of the concrete and asphalt stockpiles as well as reviewing UXO and EOW encountered during preparatory works.

It was reported by JBS&G (2022) that management of UPECs, soil contamination and sampling was undertaken in accordance with the MAUW CMP (EP Risk 2019) and MPW LTEMP (EP Risk 2020a).

A number of UPECs were identified at the Site and included:

- Asbestos in soil;
- PFAS in soil;
- PFAS in sediment basins; and
- Potential and actual acid sulfate soils.

In-Situ PFAS Assessments

In-situ PFAS Assessments were conducted in four (4) areas of the MADR and three (3) areas of the INTS to characterise soils located within AEC 3., including the following assessments:

- MADR:
  - JBS&G - In-Situ Soft Spot PFAS Assessment – L015 (In-Situ Soft Spot PFAS Assessment) Rev 0, dated 15 December 2020;
  - JBS&G - OSD10 PFAS Investigation – L029 (OSD10 PFAS Investigation) Rev 0, dated 29 March 2021;
  - JBS&G - Drain Line and Shared Trench PFAS Assessment – L033 (Drain Line and Shared Trench PFAS Assessment) Rev 0, dated 25 March 2021; and
  - JBS&G - SRM South Chatham PFAS Investigation -L042 (SRM South Chatham PFAS Investigation) Rev 0, dated 14 May 2021.
- INTS:
  - JBS&G - AEC3 Cut Area Assessment – L036 (AEC3 Cut Area Assessment) Rev 0, dated 11 November 2020;
  - JBS&G - Turkey's Nest South PFAS Assessment – L045 (Turkey's Nest South PFAS Assessment) Rev 0, dated 23 November 2020; and
  - JBS&G - South of Chatham PFAS Assessment – L036 (South of Chatham PFAS Assessment) Rev 1, dated 6 January 2021.

All soils excavated from AEC 3 were assessed for PFAS for potential reuse and placement in accordance with the MPW LTEMP (EP Risk 2020a), with the exception of some soil transported from the Georgiou contract area, west of the Site as described below.

PFAS Placement Material from the Greater MPW Site

PFAS-containing soils from the Georgiou contract area were transported and reused within the Site (JBS&G 2022). These areas have been included within AEC 3, as provided with **Figure 3**. The soil and reuse zones are described below:

- Zone 4:
  - Stockpile 238 – L053 (Stockpile 238 Assessment) Rev 1.
  - Stockpile 239 – L054 (Stockpile 239 Assessment) Rev 0.
  - Stockpile 172 – L014 (Stockpile 172 – Waste Classification) Rev 0.
  - Stockpile 426 - L076 (MPW PFAS Investigation) Rev B (JBS&G 2021c).
  - OSD6 Hotspot – L076 (MPW PFAS Investigation) Rev B (JBS&G 2021c).
  - OSD-SP426 - L076 (MPW PFAS Investigation) Rev B (JBS&G 2021c).
- Zone 2, 3 and 4:
  - Stockpile 237 – L018 (Stockpile 237 – Waste Classification) Rev 0
  - AS-F1 – L267 (Asphalt Stockpile Assessment) Rev 2

Stockpile assessment reports were provided within the JBS&G (2022) Summary Report.

JBS&G (2022) noted that all soils sampled for PFAS were reused in appropriate zones at the Site *"with the exception of some materials transported from the Georgiou contract area*". Due to a change in battering of the walls of OSD10, the western batter of OSD10 encroached 10 m within Zone 1 and 2 reuse areas where material had been placed. Therefore, PFAS impacted stockpiles, SP239, SP172, SP426, OSD-SP426 and OSD Hotspot were placed 40 m from OSD10. For PFAS impacted soils, a statistical approach was adopted using the average of an in-situ dataset following correspondence with the Auditor (Enviroview 2021[73]).

JBS&G (2022) considered the PFAS material placed 40 m from the proposed OSD "*meet the objectives of the LTEMP"* based on the following considerations:

- There is approximately 0.7 m of engineered fill overlying the area with hard stand to be constructed, minimising the surface water interaction;
- The placement is within the proposed rail line which will include the construction of an engineered stormwater system;
- OSD10 is to be constructed of concrete and considered very unlikely to be impacted by groundwater.

The locations of AEC 3 is provided within **Figure 3** and the survey provided within the Summary Report (JBS&G 2022) is provided in **Appendix E**.

[73] Enviroview (2021), *RE: Site Audit Interim Advice – Review of Application of Statistics to PFAS Data by Consultant JBS&G*, 32 February 2021, Ref IA 0301- 2020-3_01.

JBS&G prepared a Technical Memo (JBS&G 2021a[74]) clarifying stormwater structures and the placement of PFAS impacted soil for the Site in accordance with EnRiskS (2020[75]) and EP Risk (2020b) 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;*
- *In order that the development is not geotechnically/structurally compromised, the stormwater system is designed to retain water for discharge offsite. Therefore, exfiltration from the network would not be expected to exacerbate leaching to groundwater to any significant extent; and*
- *The stormwater system is above the groundwater table and therefore the system would not be a preferential flow path for impacted groundwater.*

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

Surface Water (JBS&G 2022)

JBS&G (2022) reported elevated concentrations of PFAS within sediment and ponded surface water above the EPL for the Site which were designated UPEC numbers. Where PFAS was found to have exceeded the site EPL criteria surface water in sediment basins, or in ponded water, the water was pumped to an onsite water treatment plant. It was noted that PFAS greater than the EPL in basins were in areas where PFAS impacted soils suitable for reuse (zone 3 and Zone 4) were placed, or PFAS where there was a marginal exceedance for a short period of time.

The UPECS from stormwater were not reported within the Summary Report (JBS&G 2022) as they are managed under the CEMPs and EPL (EPL 21054) for the Site. It is understood ongoing management of stormwater within basins will be via a CEMP and the relevant EPL at the time.

Acid Sulfate Soils (JBS&G 2022)

[74] JBS&G (2021a), *Technical Memo, Moorebank Precinct West (MPW) – Stormwater Structures and the Placement of PFAS Impacted Soil, Moorebank Logistics Park, NSW,* dated 19 May 2021 (ref: 51997 – 136836 (rev 2)).

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

Acid sulfate soils were encountered within the Site in Anzac Creek, located in the southern portion of the Site. Excavated soils were potential acid sulfate soils (PASS) and treated with lime before being located to the greater MPW Site.

Summary of Contamination

A summary of remediation works and previous environmental reports at the Site is provided within the JBS&G (2022) Summary Report.

Based on the JBS&G (2022) summary letter, the following remaining areas of environmental concern (AEC) and contaminants of concern for the MPW Site 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.
- AEC 2 - Petroleum hydrocarbon impact including light non-aqueous phase hydrocarbons (LNAPL) in the eastern portion of the MPW Site.
- AEC 3 - PFAS impact associated with residue from historical fire-fighting activities.

The chlorinated hydrocarbon impacted area (AEC 1) is located approximately 240 m north west of the Site, south of the ABB building and is hydraulically downgradient of the Site (JBS&G 21021). AEC 2 is located within the central eastern portion of the Site, near Chatham Avenue and is hydraulically upgradient of the Site. Therefore the known sources of contamination are petroleum hydrocarbon impacts (AEC 2), and PFAS impacts associated with residue from historical fire-fighting activities (AEC 3). Additionally, site-won PFAS containing soils were placed on-site during filling works as part of Stage 2 in accordance with the LTEMP (EP Risk 2020a) (JBS&G 2022).

Asbestos in soil below the adopted health-based criteria was reported below the imported Engineered Fill layer within the Site during filling works. The location of such materials was not summarised within the Summary Report (JBS&G 2022), however, all asbestos in soil was considered suitable to remain on the Site by JBS&G. 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). Some asbestos in soil at the Site that was reported below the adopted criteria was not considered suitable for the surface (<0.1 mBGS) of the Site (JBS&G 2022). Additionally, a surface emu-pick was conducted following the identification of ACM on the proposed excavation footprint of OSD10.

It is understood excavation and construction of OSD10 and OSD3 will occur as part of the built surface works. An assessment was undertaken of the OSD10 (JBS&G 2021e[76]) and no residual contamination was identified (JBS&G 2022). Full reference should be made to this report for further information.

The location of the AECs at the MPW Site in relation to the Site is provided as **Figure 3**. A CSM Figure is provided as **Figure 4**.

[76] JBS&G (2021e), Moorebank Avenue Upgrade Works (MAUW), Moorebank – OSD10 PFAS Investigation Report, dated 29 March 2021, (ref: JBS&G 58693-135925 L029).

At the time of writing, the majority of the Site had been completed to the final fill level of approximately 0.7 m of Engineered Fill in preparation for future permanent built surface works (JBS&G 2022).

AEC 2 –Petroleum Hydrocarbon Impacted Area

A summary of the historical petroleum hydrocarbon gauging and analytical results reported by Golder 2016, GHD 2018 and JBS&G 2020 identified the following COC at AEC 2:

- TRH;
- Benzene, toluene, ethylbenzene and xylene (BTEX);
- Naphthalene;
- Lead; and
- Polycyclic aromatic hydrocarbons (PAH).

A summary of petroleum hydrocarbon exceedances at AEC 2 are as follows:

- One soil sample reported a TRH (C_{10}-C_{16}) concentration more than the adopted management limit.
- LNAPL in three monitoring wells (GW119, GW120 and GW146) located in the eastern portion of the Site, downgradient of the former DNSDC refuelling facility located on the MPE Site to the east.
- LNAPL thickness was gauged in November 2016, October 2017 and January 2019 (JBS&G 2020b) as follows:
    - GW19: 0.032 m – 1.937 m;
    - GW20: 0.061 m - 1.47 m; and
    - GW146: 0.007 m – 1.980 m.

Figures illustrating the locations of petroleum impacted groundwater are provided at the end of **Appendix C**.

AEC 3 - PFAS Contamination in Affected Media Onsite

The historical soil, soil leachate, groundwater, surface water and sediment PFAS analytical results at the Site reported by PB (2014), Golder (2015), Golder (2016b), EP Risk (2017a, 2017b and 2018a) and JBS&G (2019b), as summarised by EP Risk (2018 and 2020) in the Site-Wide PFAS Assessment and MAUW SCA, are presented in **Table A1, Table A2**, **Table A3**, **Table A4** and **Table A5** respectively. The corresponding sampling locations are provided in **Figure 6**.

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

PFAS Placement Areas (JBS&G 2022)

A review of PFAS-containing soils and soil leachate (ASLP) excavated from the greater MPW Site, MADR and INTS footprints and reused within the Site, as summarised by JBS&G (2022) is provided within **Table A6** and **Table A7**, respectively. The corresponding reuse areas provided within the Summary Report (JBS&G 2022) is provided in **Appendix E**.

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

Table A1 – 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[77]	No. Samples > 250% Criteria	95% UCL_{mean}[78] (mg/kg)[79]	95% UCL_{mean} Exceedance of Criteria[80]
The Site	<2	PFOA	104	<0.0001	0.0008	0.00008	0.00009	14	0	0	0.00012	-
		PFOS	104	<0.0001	0.0650	0.00183	0.00674	67	0	0	0.00471	-
		PFOS + PFHxS	104	<0.0001	0.0689	0.00220	0.00719	71	0	0	0.00528	-
	>2	PFOA	3	<0.0001	<0.0001	<0.0001	-	0	0	0	-[81]	-
		PFOS	3	<0.0001	0.0001	0.00007	0.0114	1	0	0	-	-
		PFOS + PFHxS	3	<0.0001	0.0003	0.00013	0.0121	1	0	0	-	-

[77] Criteria adopted for health assuming commercial / industrial land use for the Construction Area and recreational criteria for the Offset Area for soil (PFAS NEMP). Ecological criteria assuming industrial commercial for the for soil (PFAS NEMP)
[78] UCL_{mean} – Upper confidence limit of the arithmetic mean. Results <LOR are taken to be half the value of the LOR.
[79] Excluding samples results greater than 250% of the adopted criteria.
[80] Standard deviation must be less than 50% of the adopted criteria.
[81] The adopted minimum number of samples required to perform UCL calculations is taken to be 10.

Table A2 – 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	74	<0.01	0.05	0.0058	0.0055	2	0.0069
		PFOS	74	<0.01	1.9	0.0620	0.2280	31	0.1770
		PFOS + PFHxS	74	<0.01	2.13	0.0745	0.2560	38	0.2040
	> 2	PFOA	2	<0.01	<0.01	0.0050	-	0	-
		PFOS	2	<0.01	0.05	0.0275	0.1558	1	-
		PFOS + PFHxS	2	<0.01	0.05	0.0275	0.1558	1	-

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

Area	Analyte	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[82]	95% UCL_{mean} (µg/L)	95% UCL_{mean} Exceedance of Criteria
The Site	PFOA	3	<0.001	0.0020	0.0010	0.0009	1	0	-	-
	PFOS	3	0.0025	0.0085	0.0058	0.0030	3	3	-	-
	PFOS + PFHxS	3	0.0063	0.2325	0.0874	0.1260	3	1	-	-

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

Table A4 – Summary of Historical Surface Water PFOS, PFOS + PFHxS and PFOA Concentrations On-site

Area	Analyte	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[83]	95% UCL_{mean} (µg/L)	95% UCL_{mean} Exceedance of Criteria
The Site	PFOA	8	0.002	0.01	0.00066	0.0030	8	0	-	-
	PFOS	8	0.038	1.00	0.23538	0.3200	8	4	-	-
	PFOS + PFHxS	8	0.038	1.00	0.23563	0.3200	8	1	-	-

Table A5 – Summary of Historical Sediment PFOS, PFOS + PFHxS and PFOA Concentrations On-site

Area	Analyte	No. of samples	Minimum conc. (mg/kg)	Maximum Conc. (mg/kg)	Mean Conc. (mg/kg)	Standard Deviation (mg/kg)	No. Samples >LOR	No. Samples > Criteria[84]	95% UCL_{mean} (mg/kg)	95% UCL_{mean} Exceedance of Criteria
The Site	PFOA	9	<0.0001	<0.0001	0.00005	0.0	0	0	-	-
	PFOS	9	<0.0001	0.0130	0.00291	0.0044	8	0	-	-
	PFOS + PFHxS	9	<0.0001	0.0137	0.00310	0.0046	8	0	-	-

[83] Criteria adopted for marine species (Interim Marine 95%) (PFAS NEMP) and health based on NHMRC Guidance on PFAS in recreational water.
[84] Criteria adopted for health assuming commercial / industrial land use for the Construction Area and recreational criteria for the Offset Area for soil (PFAS NEMP). Ecological criteria assuming industrial commercial for the for soil (PFAS NEMP)

JBS&G (2022) Reuse Material Summary[85]

Table A6 – Summary of Historical Soil PFOS, PFOS + PFHxS and PFOA Concentrations

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
The Site	PFOA	295	<0.005	<0.005	<0.005	-	0	0	0	-[86]	-
	PFOS	295	<0.005	0.380	0.018	0.0444	62	10	2[87]	0.0293	-
	PFOS + PFHxS	225	<0.005	0.380	0.019	0.0463	68	0	0	0.0307	-

Table A7 – Summary of Historical Neutral pH Leachate PFOS, PFOS + PFHxS and PFOA Concentrations (JBS&G 2020 and 2022)

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	3	<0.01	0.03	0.015	0.0132	2	-
		PFOS	3	0.15	2.10	0.957	1.0177	3	-
		PFOS + PFHxS	3	0.22	2.55	1.203	1.2067	3	-

[85] For standalone OSD10 in-situ FPAS analytical data see OSD10 PFAS Investigation Report (JBS&G 2021e).
[86] No samples reported above LOR.
[87] These two samples correspond to OSD6_TP27_0.1-0.5 and OSD6_TP26_0.2-0.5, taken from JBS&G (2020) L076 MPW Pfas Investigation Rev B.

Assessment of Precursors

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

Sensitive Receptors

Sensitive receptors identified at and near the Site are:

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

Source-Pathway-Receptor Linkages

Based upon the findings of the most recent human health and ecological risk assessments prepared for the Site and the Georges River by EnRiskS (2019 and 2019a), and Golder 2016, GHD 2018 and JBS&G 2020, an analysis of the potential source-pathway-receptor linkages are provided in **Table 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**		
AEC 2 – Petroleum Hydrocarbon Impacted Area					
Petroleum hydrocarbon impacted groundwater from the adjoining property to the east	Soil	Direct contact	Human Health: - incidental ingestion. - Dermal contact. - Dust inhalation.	- Sub-surface maintenance workers. - Future commercial / industrial site users. - General public	Incomplete as soil impact is located at depths below the likely maximum depth of excavation in this area. Soil impacts (if present) would likely be associated with LNAPL impacted groundwater which was reported at depths greater than 5 mBGL, whilst the maximum depth of excavation is 2.5 to 3.0 mBGL[88].
			Explosive atmospheres.	Damage to buried infrastructure or aesthetic impacts to human receptors.	Unlikely to be complete given the marginal exceedance, the location of the exceedance at the source area of the IMEX Site and the fact that all other samples were below management limits.
			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.	Future commercial / industrial site users in a building with a basement.	Potentially complete if appropriate health and safety controls and personal protective equipment (PPE) are not implemented during construction or sub-surface maintenance works and if the future land use includes buildings or permanent structures with basements in this area.

[88] Northrop Pty Ltd (2020) Bulk Earthworks Plan Sheet 02, Drawing No. MAUW-NRP-CV_DWG-9122, Sheet No. 9122, dated 20.07.2020, rev 04.

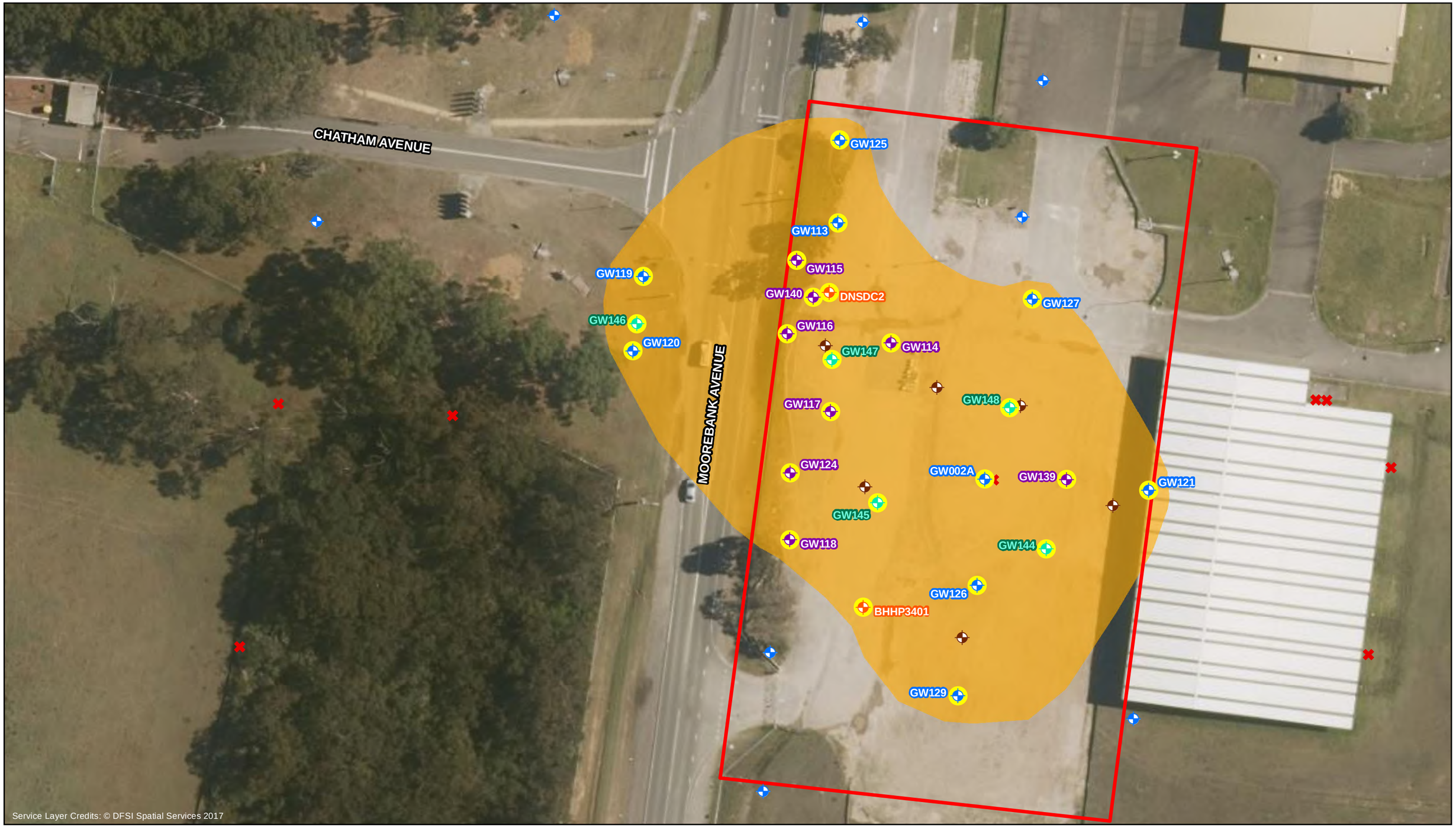
Table A8 – Source-Pathway-Receptor Linkages

Sources		Pathways		Receptors	Linkages
Primary	**Secondary**	**Transport Mechanisms**	**Exposure Pathways**		
	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	Ecosystems dependent upon the Georges River and Anzac Creek.	Incomplete as it is unlikely that petroleum impacted groundwater would migrate to the Georges River.
AEC 3 – PFAS Impacted Areas and PFAS Placement 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 during excavation works.
			Ecological (indirect) - Bioaccumulation and biomagnification.	Terrestrial flora and fauna exposed to soil (<2 mBGL).	Potentially complete if appropriate soil management controls are not implemented during excavation works.
	PFAS impacted groundwater, surface water.	Groundwater migration and surface water flow to the	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.

Table A8 – Source-Pathway-Receptor Linkages

Sources		Pathways		Receptors	Linkages
Primary	**Secondary**	**Transport Mechanisms**	**Exposure Pathways**		
		Georges River and Anzac Creek.	Ecological: - Bioaccumulation and biomagnification.	Ecosystems dependent upon the Georges River and Anzac Creek.	Potentially complete if appropriate soil and water management controls are not implemented during construction due to the high leachability of PFAS in soils. Excavation of OSDs will not encounter groundwater due to the reported groundwater depth below design levels.
Additional Areas Requiring Management					
Asbestos in soil beneath the Engineered Fill layer	Asbestos in Soil	Wind and Mechanical Disturbance	Human Health: - Inhalation of Dust. Aesthetic: - Visual	- Construction and Maintenance Workers - Future site users	Potentially complete if appropriate soil management controls are not implemented.

AEC 2



Paper Size A4

0 5 10 20

Metres

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

N

LEGEND

- Site Boundary
- Inferred LNAPL extent (October 2017)
- LNAPL Present (October 2017)
- Observed Existing Groundwater Wells
- Groundwater Well Location (GHD, 2015)
- Groundwater Extraction Well Location (GHD, 2015)
- Groundwater Extraction Well (OPEC, 2016)
- Soil Vapour Wells (GHD, Sept 2016)
- Well Destroyed / Not Accessible

Department of Defence
DNSDC Refuelling Area Remediation
Moorebank Ave, Moorebank NSW

Job Number	21-25471
Revision	A
Date	18 Dec 2017

LNAPL extent
Validation results - 11-12 October 2017

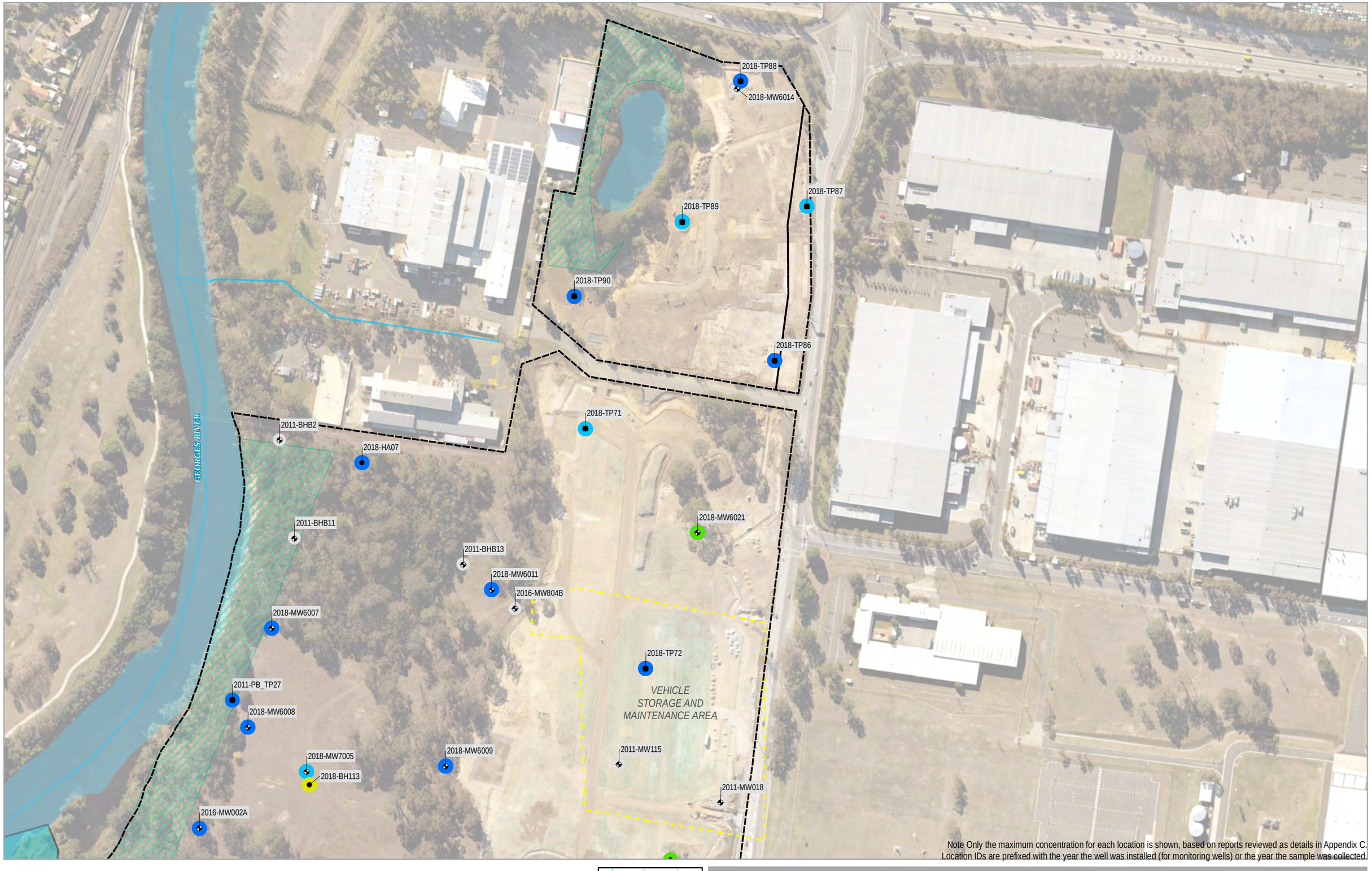
Figure 7

N:\AU\Sydney\Projects\21\25471\GIS\Maps\Deliverables\DNSDC_November2017\21_25471_Z042_LNAPL_Extent.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

Data source: Aerial imagery - SIXmaps 2017; General topo - NSW LPI DTDB 2012. Created by:jrprice

AEC 3



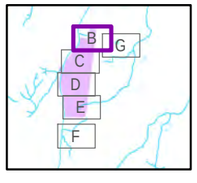
Note Only the maximum concentration for each location is shown, based on reports reviewed as details in Appendix C.
Location IDs are prefixed with the year the well was installed (for monitoring wells) or the year the sample was collected.

LEGEND

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

Max PFOS + PFHxS Concentration (mg/kg)

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



Paper Size ISO A3

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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

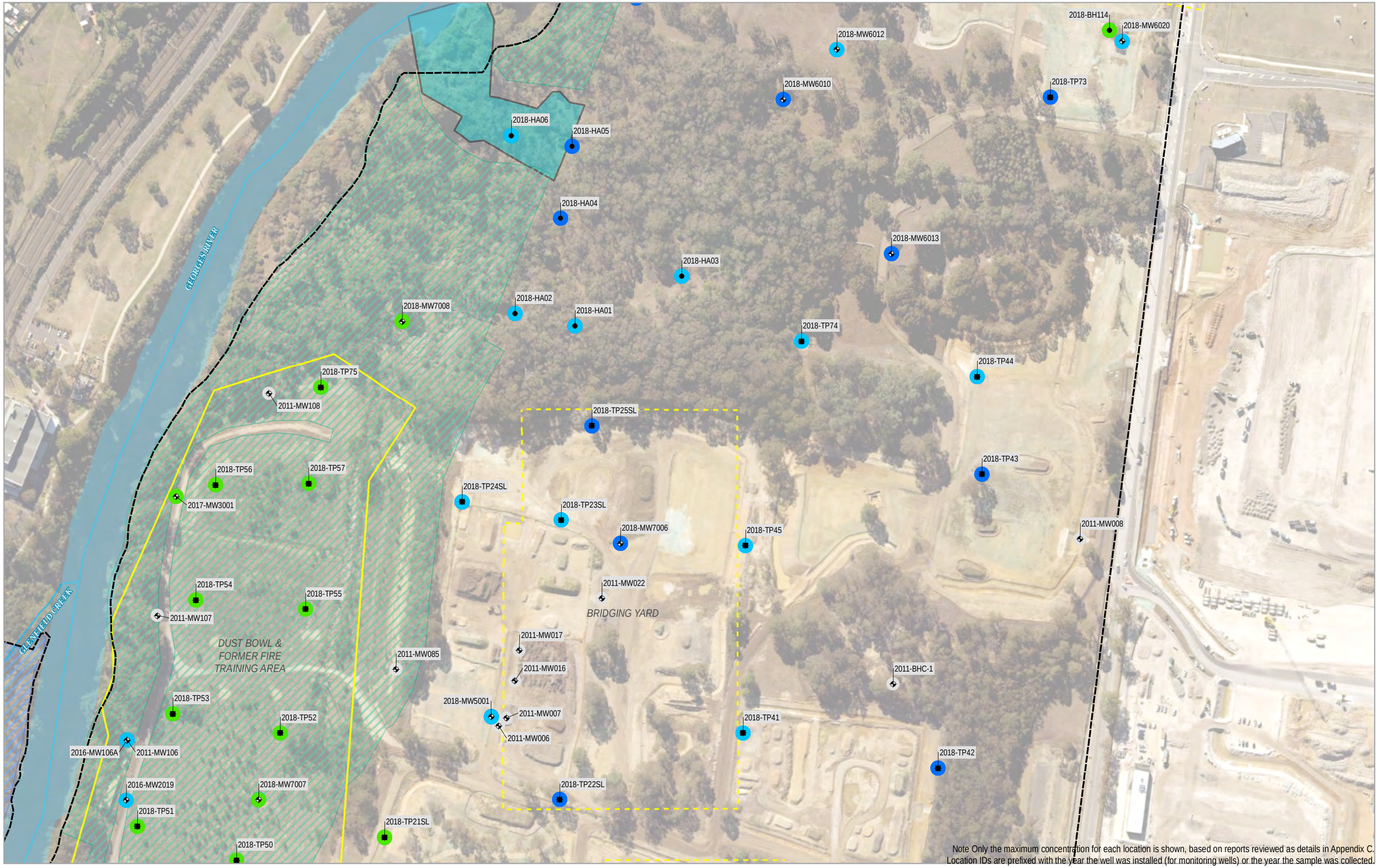
Soil
PFOS + PFHxS Results
Grid 1

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



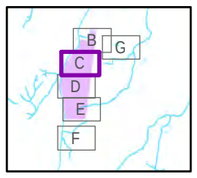
Note Only the maximum concentration for each location is shown, based on reports reviewed as details in Appendix C.
Location IDs are prefixed with the year the well was installed (for monitoring wells) or the year the sample was collected.

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

GHD

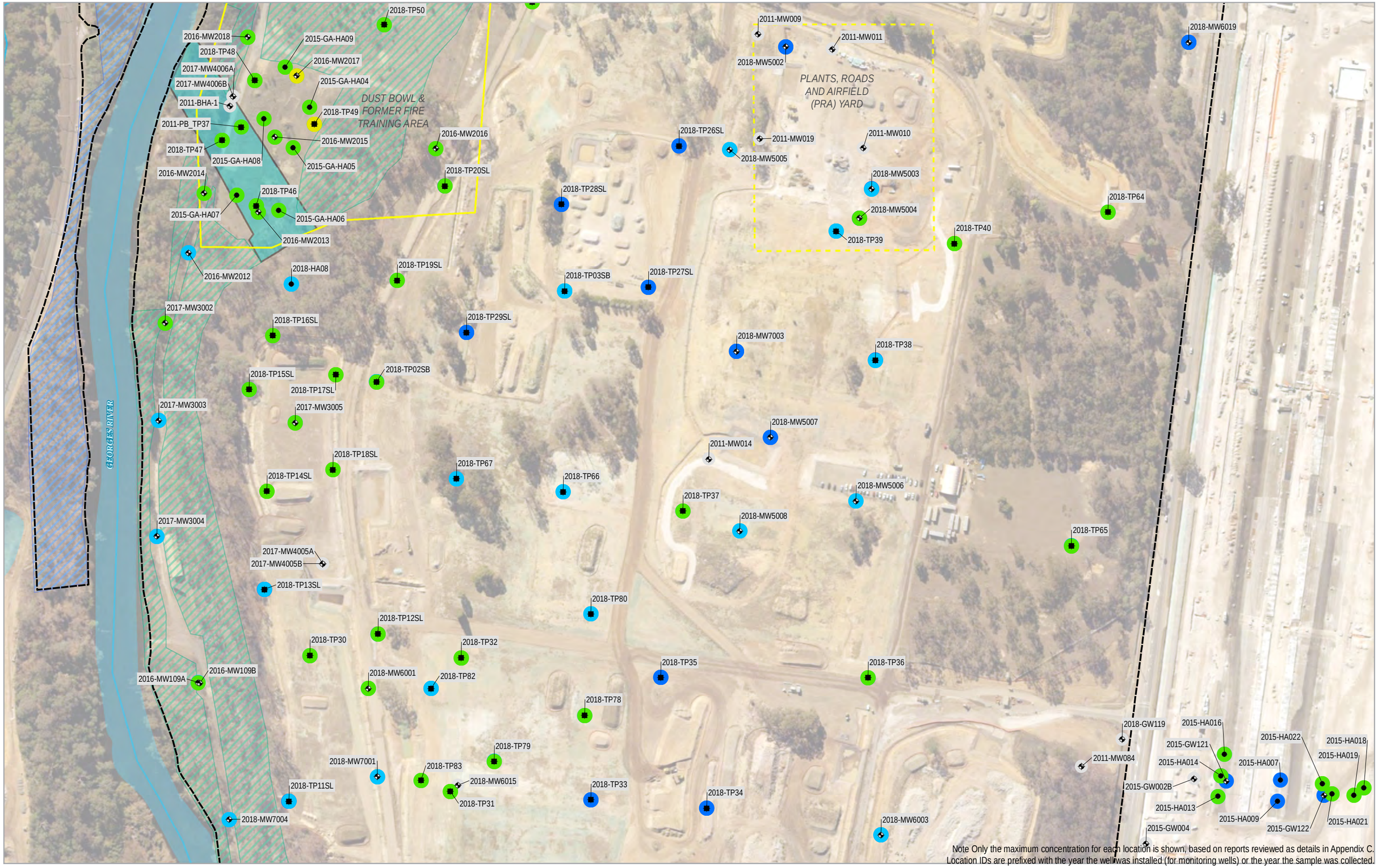
Moorebank Intermodal Company Limited
Summary Report PFAS Investigations
Moorebank Precinct West

Soil
PFOS + PFHxS Results
Grid 2

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

FIGURE 6C

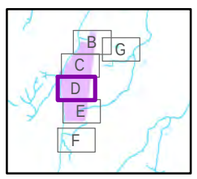
Data source: General Topo - NSW LPI DTDB 2018 (Date Extracted: 18 Feb 2019). Cadastre - NSW LPI DCDB 2018 (Date Extracted: 18 Feb 2019). Aerial Imagery - Sixmaps 2018. . Created by: mweber



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

LEGEND

- Investigation Area
- Key PFAS Source
- Other Potential PFAS Source
- Casula (Hourglass) Offset Biobank Site
- Moorebank Offset
- Drainage Basin (Approximate)
- Borehole/Hand Auger/Surface
- Monitoring Well
- Testpit
- Max PFOS + PFHxS Concentration (mg/kg)
- <LOR
- LOR - 0.01
- >0.01
- >1
- >5
- >10
- No PFAS Data



Paper Size ISO A3

0 20 40

Meters

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

N

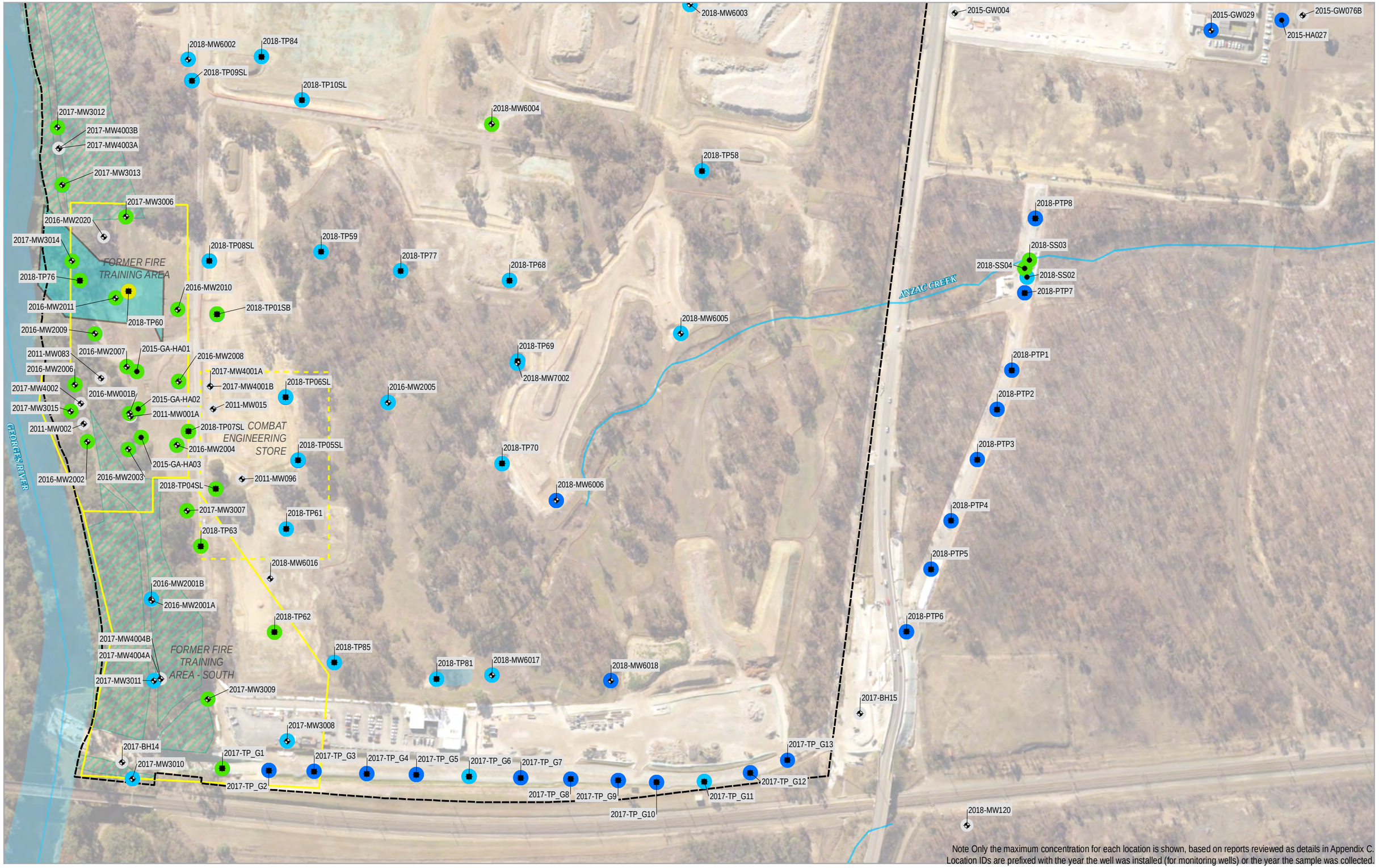
GHD

Moorebank Intermodal Company Limited
Summary Report PFAS Investigations
Moorebank Precinct West

Soil
PFOS + PFHxS Results
Grid 3

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

FIGURE 6D



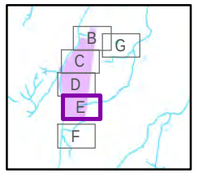
Note Only the maximum concentration for each location is shown, based on reports reviewed as details in Appendix C.
Location IDs are prefixed with the year the well was installed (for monitoring wells) or the year the sample was collected.

LEGEND

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

Max PFOS + PFHxS Concentration (mg/kg)

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



Paper Size ISO A3

0 20 40

Meters

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

N

Moorebank Intermodal Company Limited
Summary Report PFAS Investigations
Moorebank Precinct West

Soil
PFOS + PFHxS Results
Grid 4

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

FIGURE 6E

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

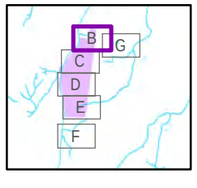
Note Only the maximum concentration for each location is shown, based on reports reviewed as details in Appendix C.
Location IDs are prefixed with the year the well was installed (for monitoring wells) or the year the sample was collected.

LEGEND

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

Max PFOS + PFHxS Concentration (mg/kg)

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



Paper Size ISO A3

0 20 40

Meters

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

N

GHD

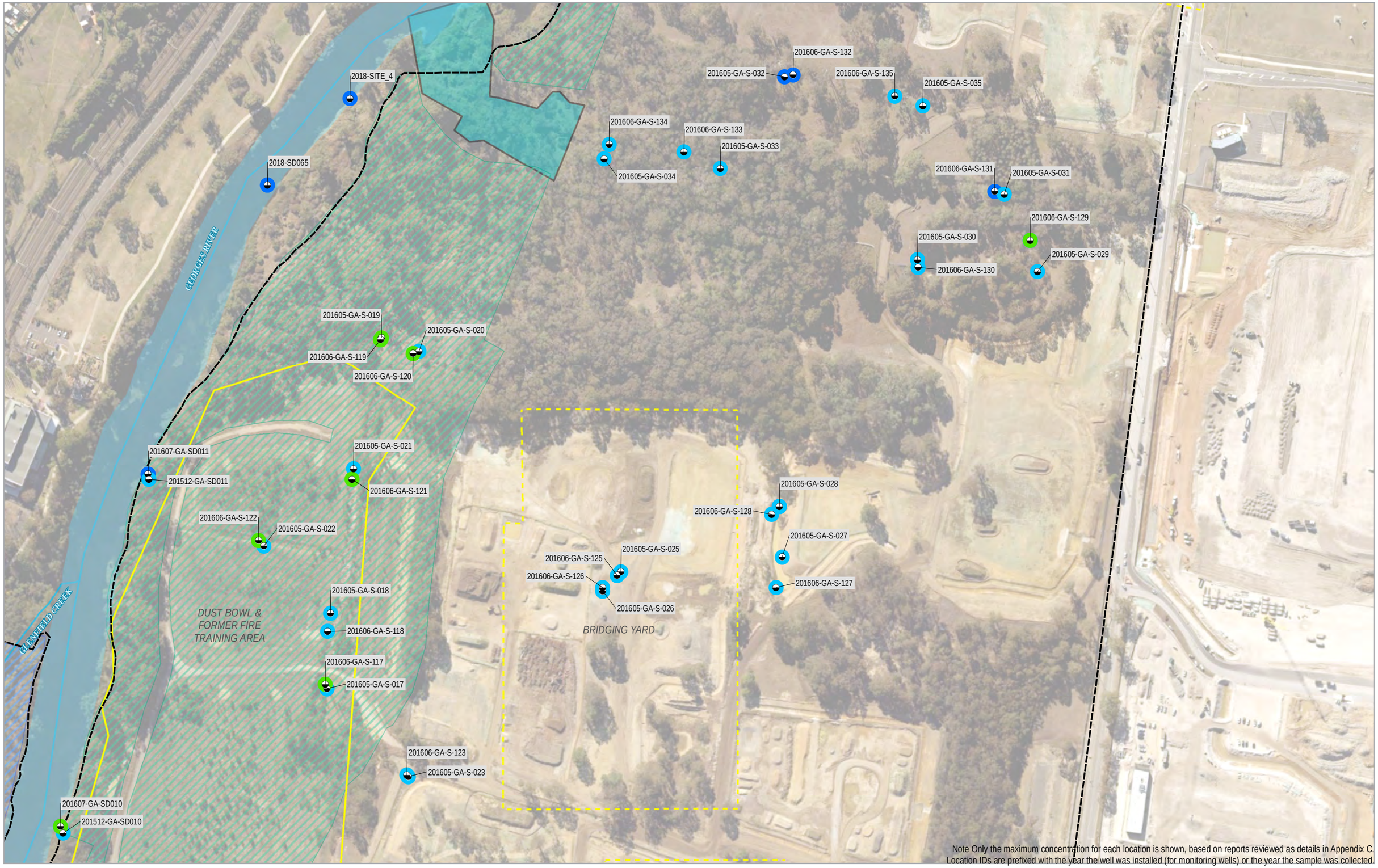
Moorebank Intermodal Company Limited
Summary Report PFAS Investigations
Moorebank Precinct West

Sediment
PFOS + PFHxS Results
Grid 1

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

FIGURE 7B

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



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

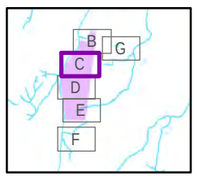
LEGEND

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

- Sediment Sample

Max PFOS + PFHxS Concentration (mg/kg)

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



Paper Size ISO A3

0 20 40

Meters

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

N

GHD

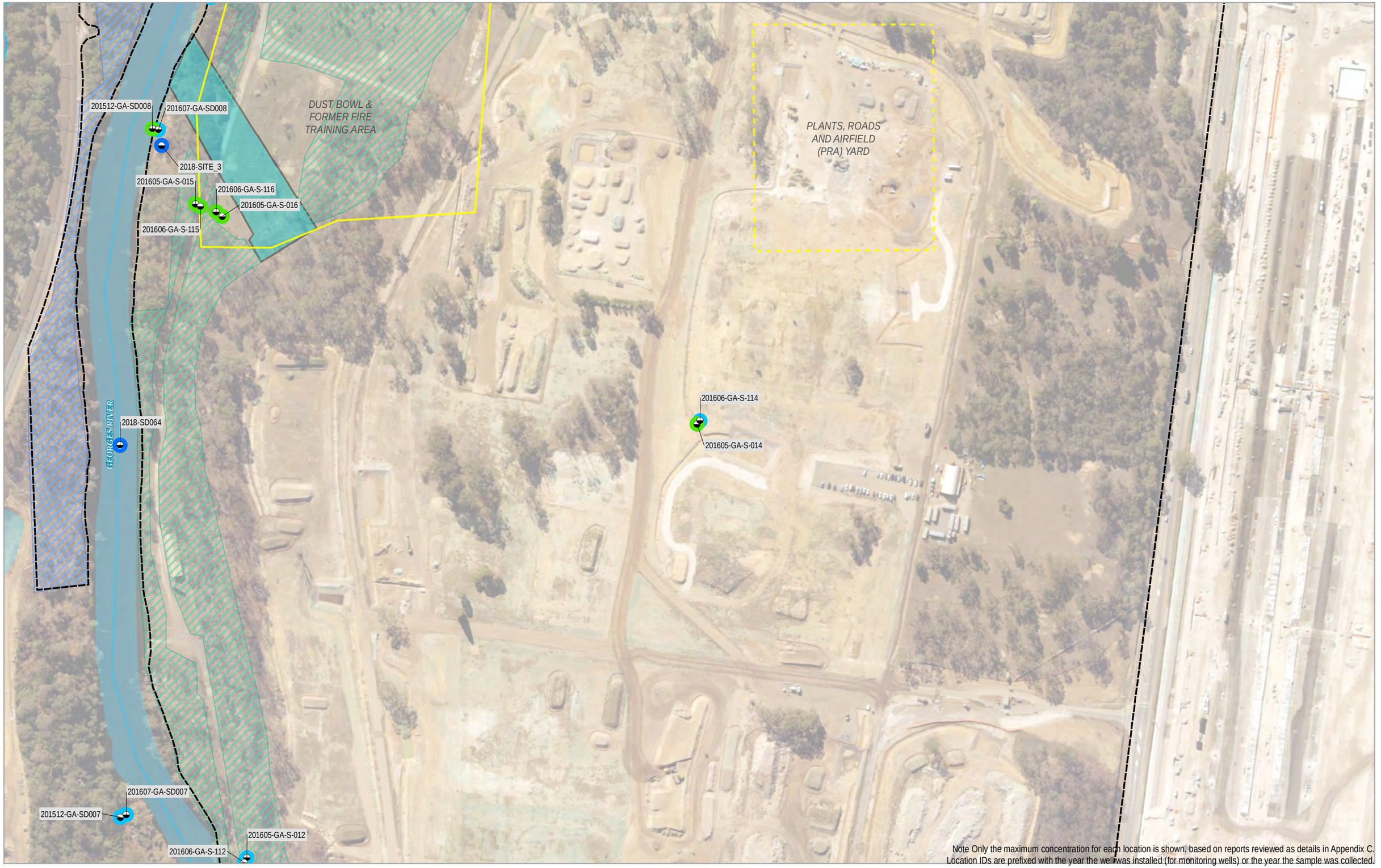
Moorebank Intermodal Company Limited
Summary Report PFAS Investigations
Moorebank Precinct West

Sediment
PFOS + PFHxS Results
Grid 2

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

FIGURE 7C

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



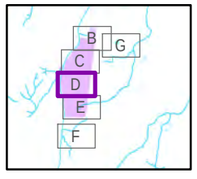
Note Only the maximum concentration for each location is shown, based on reports reviewed as details in Appendix C.
Location IDs are prefixed with the year the well was installed (for monitoring wells) or the year the sample was collected.

LEGEND

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

Max PFOS + PFHxS Concentration (mg/kg)

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



Paper Size ISO A3

0 20 40

Meters

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

N

GHD

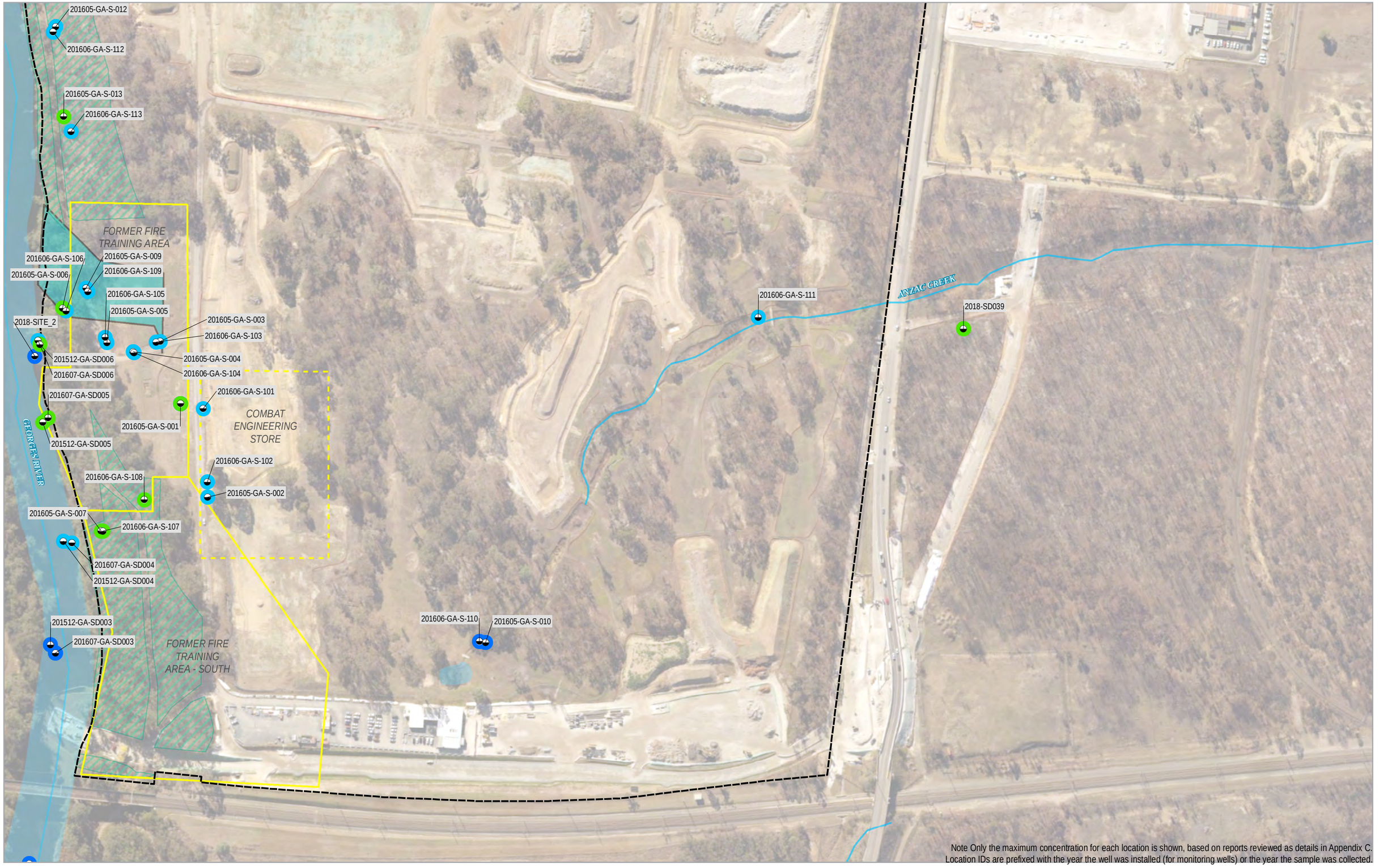
Moorebank Intermodal Company Limited
Summary Report PFAS Investigations
Moorebank Precinct West

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



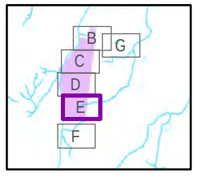
Note Only the maximum concentration for each location is shown, based on reports reviewed as details in Appendix C.
Location IDs are prefixed with the year the well was installed (for monitoring wells) or the year the sample was collected.

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

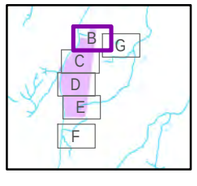
Note Only the maximum concentration for each location is shown, based on reports reviewed as details in Appendix C.
Location IDs are prefixed with the year the well was installed (for monitoring wells) or the year the sample was collected.

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.

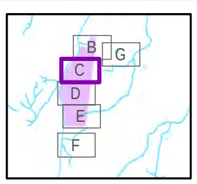
LEGEND

- 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

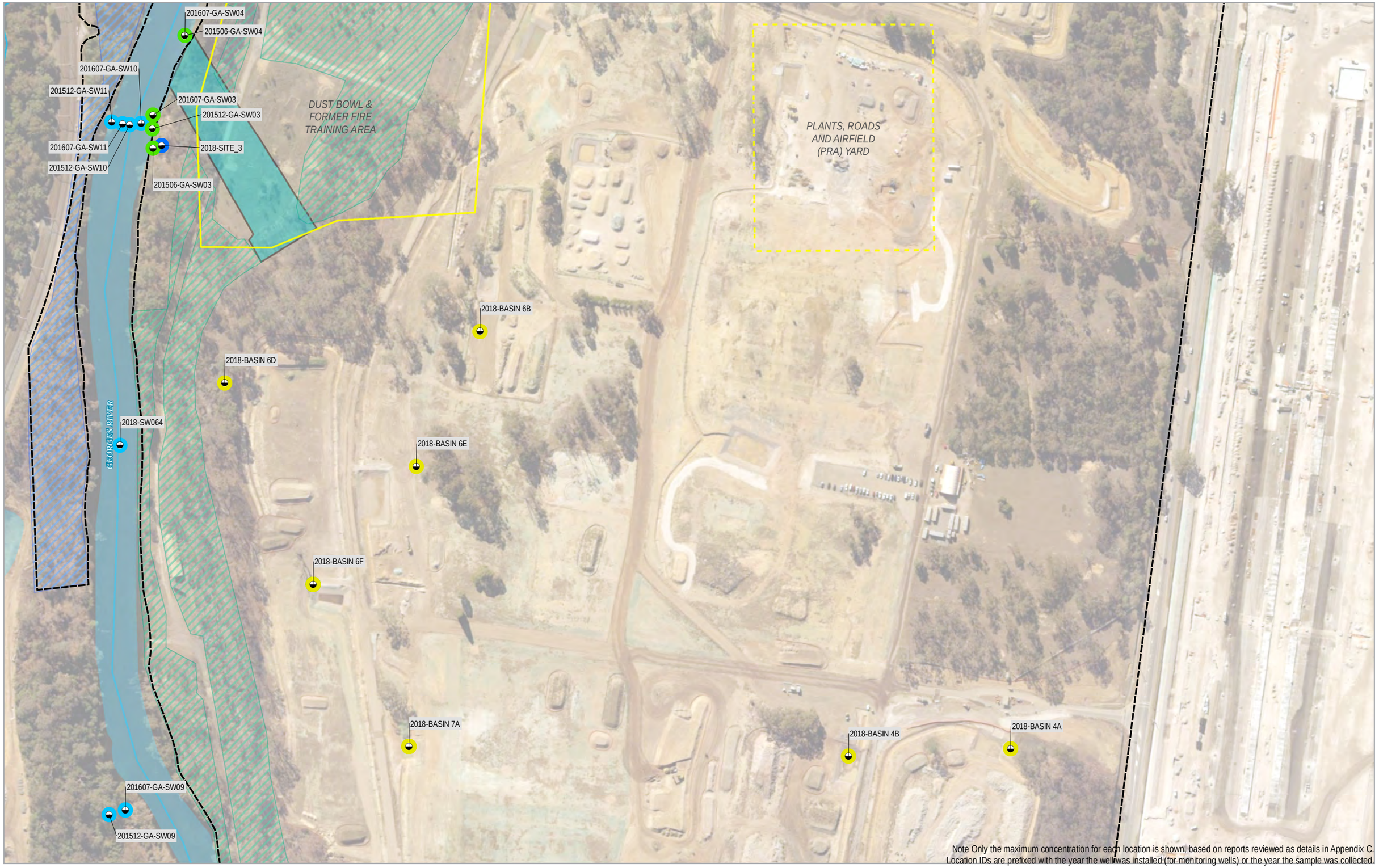
GHD

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



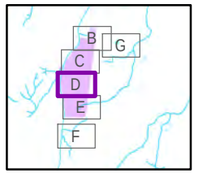
Note Only the maximum concentration for each location is shown, based on reports reviewed as details in Appendix C.
Location IDs are prefixed with the year the well was installed (for monitoring wells) or the year the sample was collected.

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

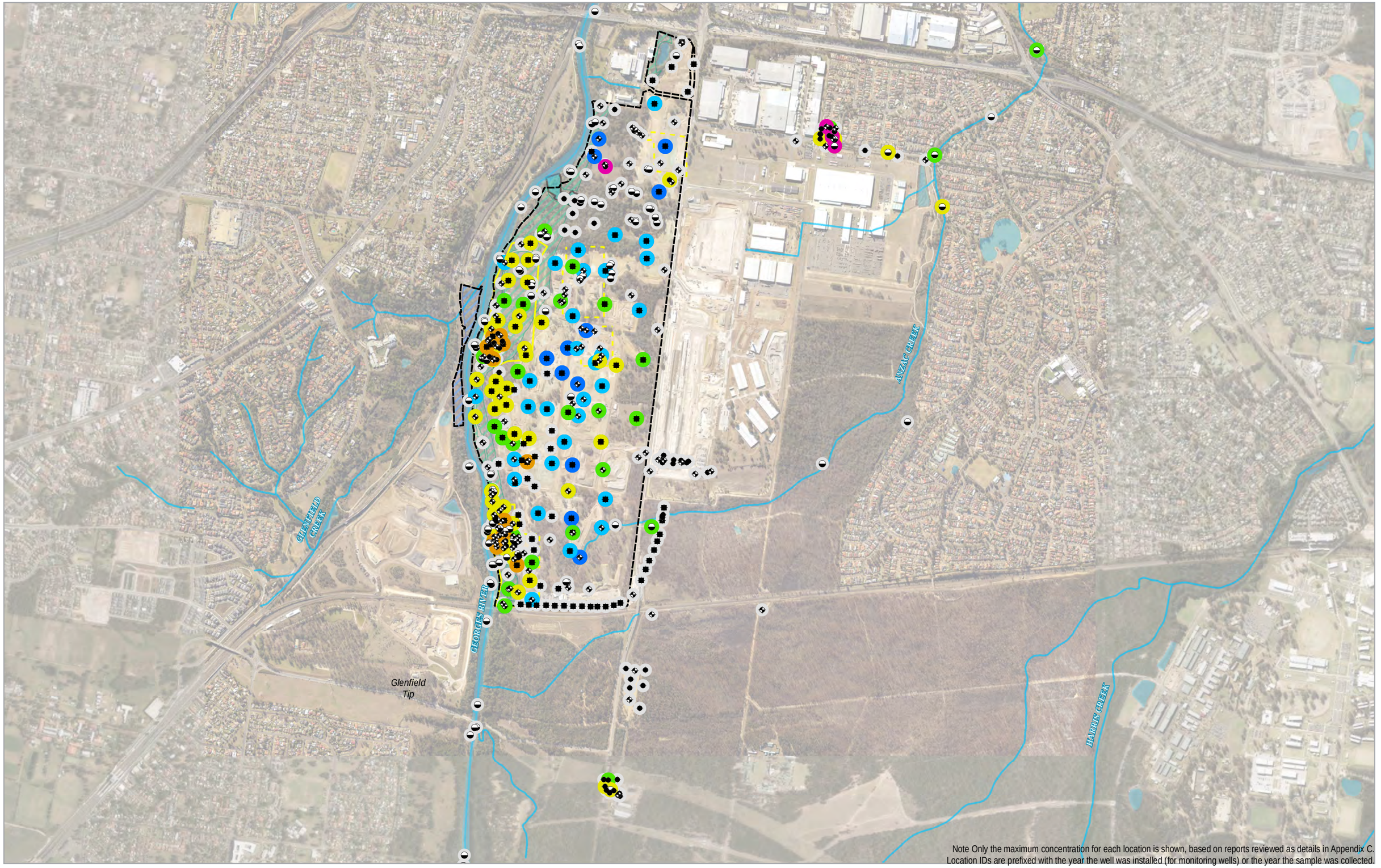
GHD

Moorebank Intermodal Company Limited
Summary Report PFAS Investigations
Moorebank Precinct West

Surface Water
PFOS + PFHxS Results
Grid 3

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

FIGURE 8D



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

LEGEND

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

Max PFOS + PFHxS Concentration (µg/L)

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

Paper Size ISO A3

0 200 400

Meters

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

N

GHD

Moorebank Intermodal Company Limited
Summary Report PFAS Investigations
Moorebank Precinct West

Soil & Sediment ASLP
PFOS + PFHxS Results
Overview

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

FIGURE 11

Appendix B
ENVIRONMENTAL MANAGEMENT PROCEDURES

Land use restrictions		**EMP 1**
Responsibility:	Entity responsible for implementation of LTEMP (as per **Table 4**)	
Frequency:	As required	
Objective:	To manage risk to human health and the environment through land use restrictions	
Areas of the Site	AEC 2 and AEC 3	

AEC 2 – Petroleum Hydrocarbon Impacted Area

GHD (2016b) undertook a risk assessment of the potential impact of petroleum hydrocarbon impacted soil, soil vapour and groundwater in AEC 2 and concluded that there was a theoretical risk to users on site based on the future commercial/industrial land use scenario from the inhalation of soil vapours associated with LNAPL, if a one storey basement was to be constructed. No risks were identified to offsite ecological receptors (Georges River nor a commercial/industrial land use scenario (with no basement).

Based upon the risk assessment prepared by Golder 2015a, buildings containing basements or other subterranean habitable spaces should not be permitted within AEC 2.

Based on the information provided, there are no proposed buildings and / or buildings containing basements or other habitable spaces within AEC 2. 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.

In accordance with the GHD (2018a) EMP, three monitoring wells are to be installed and monitored as part of the IMEX Audit close out works. The location of the monitoring wells is provided as **Appendix G** and once installed these wells will require protection and appropriate access provided. Any construction or ground disturbance at the location of these monitoring wells will need to be managed to protect the integrity of the wells. Where these wells are destroyed, then they will need to be replaced in the same location.

AEC 3 – PFAS

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

However, it has been identified that the OSDs may increase and concentrate infiltration within PFAS source areas (Dust Bowl and FFTA as presented in **Figure 2**) should the design of the OSDs include a permeable base layer. The increased infiltration within the PFAS source areas could have the unintended effect of promoting leaching of PFAS from soil to groundwater and increase the mass flux of PFAS impacted groundwater to the Georges River.

The Site is within AEC 3, however, is hydraulically upgradient from the PFAS source areas along the Georges River. Reuse of PFAS impacted soil was in accordance with the MPW LTEMP (EP Risk 2020a), referenced EnRiskS (2020) PFAS Reuse Risk Assessment and validation by JBS&G (2022) during Stage 2 civil works. The MPW LTEMP (EP Risk 2020a) included within the Site Audit Statement (Enviroview 2020a) did not contemplate lining of OSD 10 or OSD 3 as the proposed footprints of these structures are not within the identified PFAS source areas (**Figure 2**). Should unexpected finds of additional source areas be encountered which may pose a risk to PFAS infiltration through OSD 10 or OSD 3, then additional site-specific risk assessment and / or groundwater modelling will be required to inform the OSD design and may require revision of the LTEMP.

Beneficial Use of Groundwater

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

Land use restrictions	EMP 1

Future Excavation

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

Cessation of Land Use Restrictions

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

Subsurface Works – AEC 2		**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 2 – Petroleum Hydrocarbons Impacted Area	

GHD (2018a) identified there is a low potential for explosive atmospheres to be encountered during subsurface works at the area impacted by petroleum hydrocarbons (AEC 2).

During the soil investigation works of OSD 10 (JBS&G 2021e), located partly within AEC 2, five test pits were excavated. The maximum depth of the excavation was 4 m BGL and it was estimated groundwater was a further 3.4 m deeper (JBS&G 2022). No sign of odours or staining were recorded during the intrusive assessment and soil excavated from OSD 10 were considered unlikely to be affected by the groundwater plume (JBS&G 2022). Based upon the low risk, GHD (2018a) recommended the following management protocols be adopted for subsurface works:

Human Health

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.

All subsurface works involving the disturbance of the impacted soil must be undertaken in accordance with relevant health and safety guidelines and SafeWork NSW provisions including:

Any subsurface works 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.
- 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 all excavations and confined space works.
- 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 PPE, which shall include as a minimum:

- Long sleeve shirt and trousers;
- Appropriate respirator;

Subsurface Works – AEC 2	EMP 2

- Head covering;
- Over boots; and
- Gloves.

Explosion risk management onsite will include:

- Comprehensive health, safety and environmental planning prior to undertaking any work on-site.
- Preparation personal safety risk assessments and/or job hazard analysis for specific tasks.
- Preparation of specific requirements permitting hot work or cold work these should be confirmed with the site's owner or operator.
- Recording of concentrations of methane, TRH – photoionization detector (PID) and the lower explosive limit (LEL) during soil vapour sampling events.
- Assessing the obtained results against the Action Level criteria as per CRC Care Technical Report No. 23, July 2013 in accordance with Table 2, Action Levels for immediate short-term response, action level subsurface near foundations.
- Prevention of unpermitted entry to confined spaces.

Ecological

The Proposed OSD10 is in AEC 2 and will involve the excavation of large volumes of potentially impacted soil to a maximum depth of 2.5 – 3.0 mBGL. Given that groundwater has been reported at depths greater than 5 mBGL (EP Risk 2018), the proposed excavation is not considered likely to intersect groundwater potentially containing LNAPL.

Stockpiling of surplus excavated soil within AEC 2 should be minimised with surplus soil transported to the Contamination Assessment and Treatment Area (CATA) for assessment in accordance with the LTEMP for the land and materials tracking undertaken in accordance with **EMP 4**. Water runoff from excavation and temporary stockpiling areas should be managed and retained on-site and not be allowed to flow off-site to surface water bodies (Anzac Creek and Georges River) (refer to **EMP 13** for management of surface water).

Any hydrocarbon impacts identified during excavation should be handled as an unexpected find in accordance with **EMP 10**.

The following management procedures are to be implemented when excavating within areas where PFAS in soil has been placed within re-use zones:

- All excavations must minimise the area of PFAS contaminated soil at any one time.
- Stockpiles of PFAS contaminated soil must be managed in accordance with **EMP 5**.
- The surface cover placed over re-use of soil must be maintained and reinstated after excavation in accordance with the specifications listed as footnotes to in Table 8 of the LTEMP (EP Risk 2020b) as soon as practicable in accordance with the LTEMP for the land.
- Reuse of any materials won from excavations in the reuse zones can only be undertaken as detailed in the LTEMP for the land and **EMP 6** unless a further additional risk assessment is conducted.

The location of PFAS reuse zones are provided as **Figure 5**.

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

Human Health

Based on the EnRiskS (2019) Land HHERA, the potential risk to human health associated with workers having direct contact with PFAS in soil, sediment and water was low and acceptable on the assumption that typical workplace safety protocols 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 5**.
- Erosion and sediment controls outlined in **EMP 13** to be adopted to minimize the potential for leaching and migration to surface water bodies.
- When PFAS impacted soil is to be temporarily stockpiled, it should be stockpiled on impermeable surfaces (e.g. hardstand, high density polyethylene (HDPE) plastic or geomembrane) within a designated area.
- Appropriate bunding (e.g. hay bales or silt fences) should be placed around stockpiles.

Subsurface Works – AEC 3	EMP 3

- Stockpiling areas should not be located near stormwater drains, pits or gutters.
- Water runoff from stockpiling areas should be managed and retained at the Site or under the relevant management plan for the receiving area of the MPW Site and not be allowed to flow into the Offset Area and off-site to surface water bodies (Anzac Creek and Georges River) (refer to **EMP 13** for management of surface water).
- During windy weather conditions, dust control measures should be implemented (e.g. fine water spray or covers).
- Odour suppressant should be applied to the soil where odorous soils are encountered.
- Where practicable, excavated soil should be backfilled in the excavation in the reverse order to which it was excavated.
- Where excavated soil is surplus to requirements, then the soil should be classified in accordance with **EMP 7**.
- Materials tracking, and off-site disposal records and documentation should be retained for all soil that is to be reused on-site or disposed offsite in accordance with **EMP 4** and **EMP 7**.

Earthworks and Excavation

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

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

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

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

Stockpile Management		**EMP 5**
Responsibility:	Entity responsible for implementation of LTEMP (as per **Table 4**)	
Frequency:	As required in the event of the stockpiling of soil	
Objective:	To minimise the risk to human health and the environment from the stockpiling of soil.	
Areas of the Site	AEC 2, AEC 3 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 10.**

Contaminated Stockpiles

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

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

Stockpile Management	EMP 5

(e.g. hardstand areas).

PFAS Impacted Stockpiles

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

Table 1_EMP 5 – Temporary PFAS Stockpile Management

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

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

Reuse of Soil (on-site)

There is potential for disturbance of underlying soils during construction works on-site, however, excess spoil is unlikely to be suitable as growing medium in landscape areas and would likely be disposed of off-site, transported to MPW and managed under all regulations and the LTEMP for land. 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.

OSD10

An assessment has been undertaken for the proposed OSD10 excavation works at the Site. The assessment identified concentrations of PFAS less than the LOR and the site assessment criterion for Zone 1 (subject to leachate testing), 2, 3 and 4. An asbestos find (UPEC40, JBS&G 2022) was identified within the exaction footprint. The asbestos find was emu picked and cleared (JBS&G - L060 (UPEC40 Visual Asbestos Clearance) Rev 0, as referenced in JBS&G 2022).

Where the OSD10 intersects AEC 2, there was no reported hydrocarbon odour and as such, no samples were collected for laboratory analysis of hydrocarbons. Additionally, based on the information provided within **Section 4.3** excavation will not intersect groundwater and LNAPL.

Assessment of Soil for Reuse

The result of historical soil and leachate (neutral pH) PFAS testing and reuse material from JBS&G (2022) are provided in **Appendix A**. Prior to breaching of the Engineered Fill layer, the soil and leachate (neutral pH) analytical results summarised in **Appendix A** should be reviewed and assessment should be made by the Environmental Consultant as to whether soil can remain on-site, be transported to the MPW Site in accordance with the LTEMP for the land or whether waste classification is required.

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

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

Additional testing of site won stockpiles will be required where:

- Stockpiles have reported detectable PFAS total concentrations above the laboratory limit of reporting, but leachate testing was not undertaken.
- Soil in the stockpile has been excavated from AEC 3 and has not been sampled or tested.

Minor Excavation and Sampling	EMP 6

- Soil is excavated from an area where PFAS soils were reused as part of Stage 2 works (JBS&G 2022).
- Soil tracking documentation identifying the source location of the stockpile is not available.

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

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

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

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

Soil results should be compared against the relevant standards for site suitability if to remain on-site or requirements for the receiving site's LTEMP.

Management of Asbestos in Soils

During excavation works beneath the imported fill layer at the Site, involving the potential disturbance of asbestos impacted soil, 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.
- Where asbestos in soil is identified:
    - All asbestos removal, transport and disposal must be performed in accordance with the Work Health and Safety Regulation 2011 (WH&S Regulation).
    - The removal works would be conducted in accordance with the 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 in soils would be covered to minimise dust and potential asbestos release.
    - An asbestos removal clearance certification would be prepared by an occupational hygienist at the completion of the removal work. This would follow the systematic removal of asbestos containing materials and any affected soils from the Project site and validation of these areas (through visual inspection and laboratory analysis of selected soil samples).
    - Asbestos fibre air monitoring would be undertaken during the removal of the asbestos

Minor Excavation and Sampling	EMP 6
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 6**, unless a further additional site-specific risk assessment is conducted.	

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

Minimise Waste

It is recommended that disturbance of soil within AEC 3 and AEC 2 should be minimised by incorporating the following into the construction methodology:

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

Stockpile Classification

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

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

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

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

Disposal records for all material removed from the site shall be required to be provided to the Site Owner or appointed representative, by the appointed contractor upon completion of the disposal works. These records will be maintained in accordance with **EMP 18**. The records will be made available to the Environmental Consultant engaged to prepare final site condition reports upon request to demonstrate the lawful off-site disposal of material from the Site.

Off-site Disposal of Excavated / Unsuitable Material	EMP 7

Asbestos or asbestos impacted soils 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 for Off-site Disposal

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

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

Liquid Wastes

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

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

Given that the depth of fill material imported across the majority of the Site is approximately 0.7 m, 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 encounter underlying site soil then the following procedure should be followed.

Work Health and Safety

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

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

- Providing a SWMS, which shall be reviewed and authorised by the Site Owner (or their representative) or any future occupier.
- All upstream stormwater flow to be redirected around the work area.
- All stormwater from the works area to be diverted through sediment controls.
- If encountered, groundwater is always to be kept contained.
- Where asbestos in soil is encountered the UFP (**EMP 10**) must be implemented.
- If any strong odours are present on breaching sealed surfaces, or in an excavation, a precautionary approach shall be applied to consider if additional management measures are required to manage vapour inhalation risk prior to proceeding. The UFP (**EMP 10**) must be implemented.
- 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 or where friable asbestos is identified.
- 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.

Subsurface Maintenance Works	EMP 8

- Gloves.

Ecological

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

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

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

Landscape Maintenance Outside Areas of Reuse

Given that the depth of fill material imported to the Site will be is approximately 0.7 m over the majority of proposed landscape areas at the Site, and the site has been validated by JBS&G (2022), the risk to landscape contractors undertaking routine landscape maintenance is considered to be low outside of areas of reuse. Intrusive maintenance works must be undertaken in accordance with **EMP 6, EMP 8** and **EMP 10**.

Landscape Maintenance Inside Areas of Reuse

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

- 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.

Landscaped areas where PFAS in soil has been reused will require additional management by the landscape contractor during future operation of the Site. The following management measures are proposed during construction and operation of landscaped areas:

Operation

Where soil has been reused within landscaped areas then the following management measures are to be implemented during future operation of the Site:

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

Where landscaping maintenance works damage the surface cover over reused soil, then the surface cover must be repaired and replaced in accordance with the MPW LEMP (2020a).

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

During Stage 2 Works

An unexpected finds protocol (UFP) has been prepared by SIMTA (2018)[89] 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)[90] to inform management of any unexpected finds involving UXO.

During Operation

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

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

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

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

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

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

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

Unexpected finds	EMP 10

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

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

Management of Unexpected Asbestos Finds

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

- All asbestos removal, transport and disposal must be performed in accordance with the Work Health and Safety Regulation 2011 (WH&S Regulation).
- The removal works would be conducted in accordance with the 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 should be undertaken during the removal of the asbestos materials and in conjunction with the visual clearance inspection. The monitoring would be conducted in accordance with Code of Practice – How to Safely Remove Asbestos (SafeWork NSW, August 2019).

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

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

AEC 2 – Petroleum Hydrocarbon Impacted Area

EMP 1 requires that no buildings or buildings with underground habitable spaces are constructed in AEC 2. Information required to validate that 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 buildings with underground habitable spaces.

An assessment has been undertaken for the proposed OSD10 excavation works at the Site. The assessment identified concentrations of PFAS less than the LOR and the site assessment criterion for Zone 1 (subject to leachate testing), 2, 3 and 4. Preparatory works including excavation of soil within the proposed OSD10 footprint to depths ranging from 2.5 to 3.0 mBGL require the following information:

- Soil tracking data to confirm the location where the soil was reused at the Site or within the LTEMP for the land.
- Validation sampling data of stockpiled soil (if required).
- Soil classification data and landfill receipts for soil disposed offsite.

AEC 3

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

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

Unexpected Finds

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

Additional Validation Requirements	EMP 11
Validation reporting Validation reporting should be prepared in accordance with the NSW EPA (2020) *Guidelines for Consultants Reporting on Contaminated Land*.	

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

Based upon previous assessments undertaken, elevated levels petroleum hydrocarbons (AEC 2) 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 from the appropriate regulatory authority prior to commencing dewatering in accordance with the relevant legislation (if required).

Worker Health and Safety

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

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

Groundwater Monitoring

<u>Hydrocarbons – AEC 2</u>

Groundwater monitoring of petroleum hydrocarbon impacts has been recommended by GHD (2018a) and JBS&G (2022) for AEC 2, associated with the adjacent MPE property to the east and a separate Site Audit. The location of the monitoring wells recommended by GHD (2018a) are provided as **Appendix G** and additional

Management of Groundwater	EMP 12

controls to manage the protection of wells during construction and future access is provided as **EMP 1**.

If works are completed by the Environmental Consultant for the IMEX Site in accordance with the GHD EMP (2018a), then the relevant reports should be provided for review by the Environmental Consultant for the Site (INTS Site). The EMP states that *"Once construction works are completed, a network of groundwater wells shall be reinstalled at the site. Following installation of the new wells groundwater monitoring events shall commence"* (GHD 2018a).

In the event sampling works are not undertaken through implementation of the GHD EMP (2018a) for the IMEX Site, details of the groundwater monitoring program as detailed within Procedure 02 – Groundwater Monitoring within the GHD EMP (2018a) are provided below.

- *"It is understood that all monitoring wells have been decommissioned since the final monitoring event (October 2017)"* (GHD 2018a).
- The location of the wells will be determined in communication with the Land Owner, Land Owner Representative or Developer.
- The aim of the additional monitoring is to assess groundwater regime and monitor latent contaminant concentrations or LNAPL thicknesses post MPVE and redevelopment of the site and verify stability of the dissolve phase and LNAPL plume. This work is to be in conjunction with the requirements for the IMEX Site for which the EMP was prepared (GHD 2018a).
- Scope of works:
    - Install a minimum of three (3) wells on the Site as per **Appendix G** to 15 m plus the final capping thickness at the time of installation.
    - Biannual groundwater gauging and sampling.
    - LNAPL gauging should be conducted for a minimum two years post installation using calibrated equipment and include the following:
        - Gauging and survey of groundwater levels to m BGL and m AHD.
        - Monitoring of LNAPL using a interface probe.
        - Measuring of field parameters such as pH, Electrical Conductivity (EC), dissolved oxygen, redox and temperature.
        - Collection of samples using low flow techniques.
        - Analysis of collected samples for TRH/BTEX/PAH and Monitored Natural Attenuation (MNA) parameters, Manganese (filtered) and Total Organic Carbon (TOC).
        - Collection of QA/QC samples including inter and intra laboratory duplicates, trip spikes and trip blanks.
    - Data is to be assessed against the relevant criteria and standards.
    - Provision of a progress report for submission to the Environmental Consultant for the IMEX Site to allow for the preparation of reports in satisfaction of the GHD EMP (2018a), including but not limited to:
        - Date of monitoring.

Management of Groundwater	EMP 12

- Site observations.
- Methodology.
- Summary of analytical results.
- Comparison of results against relevant criteria.
- Comparison of results to historical assessments and gauging events.

- A copy of all reports must be provided to the land owner and representative with clear conclusions and recommendations.
- All records are to be retained by the Land Owner in accordance with **EMP 18.**

- *"Shall results from the two years biannual monitoring indicate concentrations of LNAPL and CoPC are stable / declining, no further groundwater monitoring would be required."* (GHD 2018a).

PFAS – AEC 3

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

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

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

Management of On-site Surface Water

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

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

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

Water Treatment

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

Worker Health and Safety

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

- Project inductions should be undertaken to identify areas with high risk of surface water contamination.
- SWMS and JSAs to identify hazards associated with contaminated surface water and detail appropriate control measures.
- PPE used in high risk areas including:
    - Disposable overall suits including boots.
    - Disposable waterproof nitrite gloves in addition to standard glove requirements.
    - 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 13

regardless if gloves are worn.

- If worker's skin comes into contact with contaminated water, ensure skin is immediately washed with clean water and wet clothing is removed immediately after work is complete.

Surface Water Monitoring

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

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

Given that the Site is covered with a minimum of 1m of imported fill material and groundwater is unlikely to be encountered during construction works, groundwater monitoring at the Site is not considered to be warranted.

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

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

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

As a minimum the induction will include the following:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Record Keeping		**EMP 18**
Responsibility:	Entity responsible for implementation of LTEMP (as per **Table 4**)	
Frequency:	As required	
Objective:	Records of the implementation of the LTEMP require to be retained.	

The Site Owner (or nominated representative) shall be responsible for the maintenance of all documents relating to the implementation of the LTEMP. This shall include any contamination assessments and validation undertaken, registers for the maintenance of the LTEMP (site inspection forms, works approval checklists, revised plans, *etc.*) and any relevant correspondence between the Site Owner (or nominated representative), Contractors and/or any other party.

All records shall be retained by the Site Owner (or nominated representative) throughout the time of implementation of the LTEMP. In the event that the role of the Site Owner (or nominated representative) is transferred from one organisation to another, control of all relevant (historical and current) documents will be transferred for safe keeping to the current Site Owner (or nominated representative).

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

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

- Relevant legislation / regulations; and
- This plan.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Cessation of LTEMP Application		**EMP 21**
Responsibility:	Entity responsible for implementation of LTEMP (as per **Table 4**)	
Frequency:	As required	
Objective:	To ensure impacts associated with residual issues requiring management at the Site during construction and operation of the Proposed Development been appropriately resolved to ensure the ongoing suitability of the site for the proposed land use.	

To address potential residual soil and groundwater issues after the scope of the remediation is completed, the Golder (2016) RAP envisaged implementation of a LTEMP to provide a management, monitoring and review framework.

Cessation of the application of the LTEMP will be dependent upon the results of additional assessment and will require a revised site-specific human health and ecological risk assessment.

Once the Environmental Consultant is satisfied that the residual contamination at the Site does not present a risk of harm to human health and the environment, then the final site-specific human health and ecological risk assessment will include recommendations for cessation of the LTEMP for approval by the NSW EPA or appointed NSW EPA accredited Site Auditor.

Appendix C
CONDITIONS OF CONSENT COMPLIANCE MATRIX

Table C1 – Conditions of Consent (CoC) – SSD 7709			
CoC / FCMM	**Requirement**	**Document Reference**	**How Addressed**
B171	Upon completion of importation and placement of fill and prior to construction of permanent built surface works, the Applicant must submit to the Planning Secretary, a Site Audit Report and a Site Audit Statement A for the whole site, prepared in accordance with the NSW Contaminated Land Management - Guidelines for the NSW Site Auditor Scheme 2017, which demonstrates the site is suitable for its intended land uses under MPW Stage 2 SSD 7709.	NA	To be actioned by the Site Auditor
B172	Where remediation outcomes for the site require long term environmental management, a suitably qualified and experienced person must prepare a Long-Term Environmental Management Plan (LTEMP), to the satisfaction of the Site Auditor. The plan must:	This Plan	LTEMP prepared by a suitably qualified and experienced person – Certified Environmental Practitioner – Site Contamination (CEnvP SC). 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. Proposed monitoring wells for AEC 2 from the EMP (GHD 2018a) are provided within **Appendix G**. A containment cell is not proposed in this Plan.
	iii. a description of the procedures for managing any leachate generated from the containment cell, including any requirements for testing, pumping, treatment and/ or disposal,		A containment cell is not proposed in this Plan.
	iv. a description of the procedures for monitoring the integrity of the containment cell,		A containment cell is not proposed in this Plan.

Table C1 – Conditions of Consent (CoC) – SSD 7709			
CoC / FCMM	**Requirement**	**Document Reference**	**How Addressed**
	v. a surface and groundwater monitoring program,		The surface and groundwater monitoring program is detailed in **Section 5** of this Plan and **EMP 12** and **EMP 13** in **Appendix B** of this Plan. Surface water monitoring to be undertaken in accordance with EPL.
	vi. mechanisms to report results to relevant agencies,		Reporting mechanisms provided in **Section 5** and **Appendix B** of this Plan. **EMP 21** 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 in **EMP 10** and as **Appendix D** of the LTEMP.
	viii. details of any contingency measures that the Applicant is to carry out to address any ongoing contamination.		A contingency plan is provided as **EMP 16** in **Appendix B** of this Plan.
B173	The LTEMP must be registered on the title to the land.	This Plan	**Section 1.3**
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 7** 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	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 10** and **EMP 16** f) **EMP 19** g) **EMP 17** and **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.

Table C1 – Conditions of Consent (CoC) – SSD 7709			
CoC / FCMM	**Requirement**	**Document Reference**	**How Addressed**
	guide the implementation of, the development or any measurement measures; c) A description of the management measures to be implemented to comply with the relevant statutory requirements, limits or performance measures/criteria; d) A program to monitor and report on the: (i) Impacts and environmental performance of the development; and (ii) Effectiveness of any management measures (see (c) above); e) A contingency plan to manage any unpredicted impacts and their consequences; f) A program to investigate and implement ways to improve the environmental performance of the development over time; g) A protocol for management and reporting any: (i) Incidents and non-compliances; (ii) Complaints; (iii) Non-compliances with statutory requirements; and h) Roles and responsibilities for implementing the plan; and i) A protocol for periodic review of the plan.	h) **Section 4.1** i) **EMP 19 and 21**	c) Specifies the details of each management plan as required by Golder (2016a). d) (i) Describes the sampling analysis and reporting program for each contamination issue requiring management; and (ii) The sampling and validation programs will report on the effectiveness of the management measures. e) Details the Unexpected Finds Procedure in relation to contamination. f) Continual improvement for the LTEMP is discussed. g) **Appendix B** provides protocols and reporting: (i) Specifies how incidents and non-compliances will be managed. (ii) Specifies how complaints in relation to contamination will be managed. (iii) Specifies how non-compliance to statutory requirements will be managed. h) Lists the responsibilities for the LTEMP Implementation. i) Specified how the LTEMP will be reviewed/updated.
OB	The CEMP, or equivalent, for the Proposal would be based on the PCEMP (Appendix I of this EIS), and include the following preliminary management plans: • Preliminary Construction Traffic Management Plan (PCTMP) (Appendix M of the EIS) • Air Quality Management Plan (Appendix O of the EIS)	**CEMP**	CEMP prepared by the Principal Contractor during construction

Table C1 – Conditions of Consent (CoC) – SSD 7709			
CoC / FCMM	**Requirement**	**Document Reference**	**How Addressed**
	• Erosion and Sediment Control Plans (ESCPs) and Bulk Earthworks Plans, within the Stormwater Drainage Design Drawings (Appendix R of the EIS) As a minimum, the CEMP would include the following sub-plans: • Construction Traffic Management Plan (CTMP) • Construction Noise and Vibration Management Plan (CNVMP), prepared in accordance with the Interim Construction Noise Guideline • Cultural Heritage Assessment Report/Management Plan • Construction Air Quality Management Plan • Construction Soil and Water Management Plan (SWMP), prepared in accordance with Managing Urban Stormwater, 4th Edition, Volume 1, (2004) • ESCP • Flood Emergency Response and Evacuation Plan • UXO, EO, and EOW Management Plan • Acid Sulfate Soils Management Plan • Bushfire Management Strategy • Community Information and Awareness Strategy. • Flora and Fauna Management Plan (FFMP) • Groundwater Monitoring Program (GMP)		
5A	A SWMP and ESCP, or equivalent, would be prepared for the Proposal. The SWMP and ESCPs would be prepared in accordance with the principles and requirements of the Blue Book and based on the Preliminary ESCPs provided in the Stormwater and Flooding Assessment Report (refer to Appendix R of the EIS). The following aspects would be addressed within the SWMP and ESCPs: Stockpiles would be located away from flow paths on appropriate impermeable surfaces, to minimise potential sediment transportation.	**CEMP**	While this plan is separate to the SWMP and ESCP it does include this requirement for the management of stockpiles.

Table C1 – Conditions of Consent (CoC) – SSD 7709			
CoC / FCMM	**Requirement**	**Document Reference**	**How Addressed**
	Where practicable, stockpiles would be stabilised if the exposed face of the stockpile is inactive more than ten days, and would be formed with sediment filters in place immediately downslope		
5I	Stockpile sites established during construction are to be managed in accordance with stockpile management principles set out in Appendix L of this RtS. Mitigation measures within the Stockpile Management Protocol include: In order to accept fill material onto site, material characterisation reports/certification showing that the material being supplied is virgin excavated natural material (VENM) / excavated natural material (ENM) must be provided. Each truck entering the Site will be visually checked and documented to confirm that only approved materials that are consistent with the environmental approvals are allowed to enter the site. Only fully tarped loads are to be accepted by the gatekeeper. Environmental Assurance of imported fill material will be conducted to confirm that the materials comply with the NSW EPA Waste Classification Guidelines and the Earthworks Specification for the MPW site. The frequency of assurance testing will be as nominated by the Environmental assuror/auditor. All trucks accessing the site for the purpose of clean general fill importation would enter and exit via the existing main Site access located from Moorebank Avenue. Ingress and egress to the stockpiling areas would be arranged so that the reversing of trucks within the site is minimised.	**EMP 5, EMP 7** and **CEMP**	These measures have been included in the LTEMP.

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

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

Table C1 – Conditions of Consent (CoC) – SSD 7709			
CoC / FCMM	**Requirement**	**Document Reference**	**How Addressed**
	unexpected finds protocol), and will address REMM items 8H, 8T, 8U, 8V and 8W (of the MPW Concept Plan Approval (SSD 5066)).		
6B	A site-specific Remediation Action Plan (RAP) is not considered to be required for the Proposal. The following documentation would be utilised for the purposes of remediating the site: • The Preliminary Remediation Action Plan (PB, 2014a) • The Validation Plan – Principles (Golder, 2015b) • The Demolition and Remediation Specification (Golder 2015c) • Any other contamination documentation prepared for the remediation activities undertaken for MPW Early Works (Stage 1).	**JBS&G 2020 and JBS&G 2021**	Currently Stage 2 works are completed and have been completed in accordance with the RAP (Golder 2016). The outcomes of the remediation are documented in the Validation Report (JBS&G 2020) and summary (JBS&G 2021) under review by the Site NSW EPA Accredited Auditor.
6C	The CEMP would include the preparation of a site-wide UXO, EO, and EOW management plan (or equivalent) based on the UXO Risk Review and Management Plan (G-Tek, 2016). This plan would be implemented to address the discovery of UXO or EOW during construction, to ensure a safe environment for all staff, visitors and contractors.	**CEMP**	The plan outlines the review and actions required to manage any unexpected finds in relation to the UXO Risk.
6D	An Asbestos in Soils Management Plan (AMP) is to be implemented as part of the CEMP in accordance with the Safe Work NSW requirements, including but not limited to: • the Guidelines for Managing asbestos in or on soil (2014), and • Codes of Practice - How to Safely Remove Asbestos (2011) and • How to Manage and Control Asbestos in the Workplace (2011).	**Golder 2016b**	The asbestos in soils management plan has been developed in accordance with current Guidelines and codes of practice.
6E	An Acid Sulfate Soils Management Plan (ASSMP) (or equivalent) would be prepared as part of the CEMP in accordance with the ASSMAC Assessment Guidelines (1998), for areas identified as being of low or high risk i.e. works within close vicinity of the Georges River (Figure 13-2 of this EIS).	**EP Risk 2020b**	A separate ASSMP has been prepared for the Site.

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

Table C1 – Conditions of Consent (CoC) – SSD 7709			
CoC / FCMM	**Requirement**	**Document Reference**	**How Addressed**
	Serve as a compliance program, so that potential impacts to down-gradient receptors are identified before adverse effect occurs (relative to above objectives) Detect changes in environmental conditions (e.g. hydrogeologic, geochemical or other changes) that may reduce the efficacy of any natural attenuation processes or that could lead to a change in the nature of impact. Establish groundwater conditions (i.e. concentrations and/or trends) which indicated that groundwater monitoring could be reduced or ceased and the requirements of the GMP absolved. The monitoring program is to be undertaken for two years post operation of the Proposal to ensure a range of seasonal and river flow variations is assessed. At the completion of the two-year period, subject to analysis of results, consideration would be given to whether this monitoring is required to continue. The approach to PFAS management will be confirmed following further monitoring in consultation with, and the approval of, the NSW EPA Accredited Site Auditor.		
6H	At the conclusion of remediation works, a Remediation and Validation Report (RVR) is to be prepared for the Proposal to facilitate the Auditor's review of remediation and validation activities. The RVR is to document the remediation and validation activities completed within specific areas of the Proposal, including: • Information relating to the materials used in the separation layers such as the soil types, geotextile materials, and sealant types etc. (if required) • An as-constructed plan of the site showing the locations, depths and materials of the separation layers installed at the site.	**JBS&G 2020** and **JBS&G 2021**	Currently Stage 1 works are completed and have been completed in accordance with the RAP (Golder 2016a). The outcomes of the remediation are documented in the Validation Report (JBS&G 2020) and summary (JBS&G 2021) under review by the Site NSW EPA Accredited Auditor.

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

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

Table C2 – Conditions of Approval (CoA) – EPBC 2011/6086			
CoA	**Reference**	**Condition Requirement**	**Document Reference and How Addressed**
8a)	MPW Concept EIS, Soil and Contamination PEMF Section 6.2 – Management controls – Early Works and Construction phase	Contaminated soil/fill material present will be 'chased out' during the excavation works based on visual, olfactory and preliminary field test results.	**Section 3** provides an overview on the remaining contamination issues remaining at the Site. **Appendix B** – **EMP 6-11** describes the chase out of impacted soils and fill for unexpected finds.
		Excavated soil would be temporarily stockpiled, sampled and analysed for waste classification processes. Following receipt of waste classification results, the material would be transported to a licensed off-site waste disposal facility as soon as practicable to minimise dust and odour issue through storage of materials on-site	**EMP 4, EMP5, EMP 6** and **EMP 7**
		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 5**
		All excavation works would be undertaken by licensed contractor experienced in remediation projects and the handling of contaminated soils.	**Section 4**
		All asbestos removal, transport and disposal must be performed in accordance with the Work Health and Safety Regulation 2011 (WH&S Regulation).	**EMP 6, EMP 7, EMP 8, EMP 9, EMP 10** and **EMP 14**
		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 6, EMP 7, EMP 8, EMP 9, EMP 10** and **EMP 14**

Table C2 – Conditions of Approval (CoA) – EPBC 2011/6086			
CoA	**Reference**	**Condition Requirement**	**Document Reference and How Addressed**
		Asbestos, 2nd Edition [NOHSC 2002 (2005)] (NOHSC 2005a).	
		An appropriate asbestos removal licence issued by WorkCover would be required for the removal of asbestos impacted soil.	**EMP 6** 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 6** and **EMP 8**
		Temporary stockpiles of asbestos containing material (ACM) soils would be covered to minimise dust and potential asbestos release	**EMP 6** 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 6** 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 6** and **EMP 8**

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

Table C2 – Conditions of Approval (CoA) – EPBC 2011/6086			
CoA	**Reference**	**Condition Requirement**	**Document Reference and How Addressed**
		infiltration and to reduce windblown dust or odour emission	
		Before the reuse of any material on-site, it would be validated so that the lateral and vertical extent of the contamination is defined	**EMP 4, EMP 5** and **EMP 11**
		Where required, contaminated materials and wastes generated from the Project remediation and construction works would be taken to suitable licensed offsite disposal facilities	**EMP 7**
8a)	MPW Concept EIS, Soil and Contamination PEMF Section 6.4– monitoring	Within each of the Project specific management plans, the private sector developer would need to detail what monitoring would be undertaken to ensure compliance with the following:	
		The Project's EIS, with respect to the commitments made as well as the management and mitigation measures proposed;	**EMP 17, EMP 18, EMP 19 and EMP 20**
		Project approvals issued under the EPBC Act and EP&A Act;	Approval provided
		Contractual requirements established between MIC and the developer and operator for the Project;	N/A
		Other permits and/or licences required during the Project; and	N/A
		Objectives, targets and indicators as presented in this PEMF.	CEMP

Table C2 – Conditions of Approval (CoA) – EPBC 2011/6086			
CoA	**Reference**	**Condition Requirement**	**Document Reference and How Addressed**
8a)	MPW Concept EIS, Soil and Contamination PEMF Section 6.5 – Management response to incidents and non-compliances	Contaminated soil/spoil and hazardous materials have not been appropriately managed (i.e. classification, handling, storage, transport, and disposal).	**EMP 17**
8b) and c)	REMM 7A	To minimise the risk of leakages involving natural gas, liquid natural gas (LNG) and flammable and combustible liquids to the atmosphere: appropriate standards for a gas reticulation network, including AS 2944-1 (2007) and AS 2944-2 (2007), would be referred to in the detailed design process; correct schedule pipes would be used; a fire protection system would be installed if necessary for gas users; cathodic protection would be installed for external corrosion if appropriate; and access to the Project site would be secure.	CEMP
	REMM 7B	To minimise the risks of leakage of LNG and liquid petroleum gas (LPG) and flammable liquids during transport: materials would be transported according to the Australian Dangerous Goods (ADG) Code, relevant standards and regulations; and contractors delivering the gas would be trained, competent and certified by the relevant authorities	CEMP

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

Table C2 – Conditions of Approval (CoA) – EPBC 2011/6086			
CoA	**Reference**	**Condition Requirement**	**Document Reference and How Addressed**
		migrating to environmentally sensitive areas, in particular via stormwater systems that drain to the Georges River.	
	REMM 8B	Before construction, a remediation program would be implemented in accordance with the Moorebank Intermodal Terminal Preliminary Remediation Action Plan (RAP) (or equivalent). The program will have been formally reviewed and approved by the Site Auditor under Part 4 of the NSW Contaminated Land Management Act 1997 (CLM Act).	Currently Stage 1 works have been completed in accordance with the RAP (Golder 2016a). The outcomes of the remediation are documented in the JBS&G (2020) Remediation Validation Report under review by the Site NSW EPA Accredited Auditor. The remaining contamination is documented in this Plan in **Appendix A** along with the management measures in **Appendix B**
	REMM 8D	An unexploded ordnance (UXO) management plan (or equivalent) would be developed for the Project site. This plan would detail a framework for addressing the discovery of UXO or explosive ordnance waste (EOW) to ensure a safe environment for all Project staff, visitors and contractors.	**EMP 10**
	REMM 8E	An ASS management plan (or equivalent) would be developed in accordance with the ASSMAC Assessment Guidelines (1998), with active ongoing management through the construction phases. Offsite disposal would need to be in accordance with the NSW Waste Classification Guidelines Part 4: Acid Sulfate Soils (2009).	EP Risk (2020b) has prepared an Acid Sulfate Soil Management Plan which has been included in the CEMP for Stage 2 works.
	REMM 8F	Further testing of residual sediments would be undertaken to gather data to inform the management of sediments likely to be disturbed/dewatered during construction.	Further testing of sediments has been undertaken by JBS&G 2018a[1].

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

Table C2 – Conditions of Approval (CoA) – EPBC 2011/6086			
CoA	**Reference**	**Condition Requirement**	**Document Reference and How Addressed**
	REMM 8G	Ground penetrating radar (GPR) or similar techniques would be used to locate and document all existing and underground tank infrastructure across the Project site.	This process was conducted as part of the Stage 1 MPW works and is documented in the validation report (JBS&G 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 4, EMP 5**
	REMM 8I	Contaminated soil/fill material present will be 'chased out' during the excavation works based on visual, olfactory and preliminary field test results.	**EMP 1, EMP 2, EMP 3** and **EMP 11**
	REMM 8J	Excavated soil would be temporarily stockpiled, sampled and analysed for waste classification processes. Subject to receipt of waste classification results, the material would be transported to a licensed offsite waste disposal facility as soon as practicable to minimise dust and odour issue through storage of materials onsite.	**EMP 4, EMP 5, EMP 6** and **EMP 7**
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 5**
	REMM 8L	All excavation works associated with potential contaminated lands would be undertaken by licensed contractors, experienced in remediation projects and the handling of contaminated soils.	**Section 4**

Table C2 – Conditions of Approval (CoA) – EPBC 2011/6086			
CoA	**Reference**	**Condition Requirement**	**Document Reference and How Addressed**
	REMM 8M	All asbestos removal, transport and disposal would be performed in accordance with the Work Health and Safety Regulation 2011 (WHS Regulation)	**EMP 6, EMP 7** and **EMP 8**
	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 6, EMP 7** and **EMP 8**
	REMM 8RO	An appropriate asbestos removal licence issued by WorkCover NSW would be required for the removal of asbestos contaminated soil.	**EMP 6, EMP 7** and **EMP 8**
	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 6, EMP 7** and **EMP 8**
	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 6, EMP 7** and **EMP 8**

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

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

Table C2 – Conditions of Approval (CoA) – EPBC 2011/6086			
CoA	**Reference**	**Condition Requirement**	**Document Reference and How Addressed**
	i)	be consistent with: • National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) (ASC NEPM 2013). • Australian and New Zealand Guidelines for Fresh and Marine Water Quality (under the National Water Quality Management Strategy) including the draft default guideline values for perfluorooctanoic acid (PFOS) and perfluorooctane sulfonic acid (PFOA) in freshwater as applied by the State government • relevant Commonwealth environmental management guidance on PFOS and PFOA	**Section 4** and **Appendix B** of this Plan are consistent with these guidelines (where relevant).
	ii)	detail implementation and operational procedures, appropriate to the risk posed by any contamination, including: • roles and responsibilities • management of potential PFAS contaminated sites as yet un-investigated • management of areas of known PFAS contamination, including strategies to reduce runoff, dewatering and migration of contamination across and off the proposed site • a contingency action plan for unexpected PFAS contaminant discoveries	**Section 4.1** EP Risk (2018) **EMP 3, EMP 4, EMP 5, EMP 6** and **EMP 7,** **EMP 16**
	iii)	detail soil, groundwater and surface water PFAS contamination monitoring requirements and testing and	**EMP 7, EMP 10, EMP 11**, **EMP 12** and **EMP 13**

Table C2 – Conditions of Approval (CoA) – EPBC 2011/6086			
CoA	**Reference**	**Condition Requirement**	**Document Reference and How Addressed**
		disposal procedures appropriate to the risk posed by any contamination	
	iv)	include requirements for site validation reports appropriate to the risk posed by any contamination	Golder 2016a RAP
	v)	include requirements for remedial action plans appropriate to the risk posed by any contamination	Golder 2016a RAP
	vi)	detail review procedures appropriate to the risk posed by any contamination	**EMP 19 and 21**
	vii)	impose the following performance measures for managing earthworks and the potential for effects to occur due to disturbance of PFAS contaminated soils during construction: • contaminated sediment to be discharged outside the site of the action to be minimised • contaminated waste material, including excavated soil, to be released through dewatering to be handled appropriately to the risk posed by the contamination and disposed of in an environmentally sound manner such that potential for the PFAS content to enter the environment is minimised contaminated waste material, including excavated soil, with a PFOS or PFOA content above 50 milligrams per kilogram (mg / kg) to be stored or disposed of in an environmentally sound manner, such that PFAS content does not enter the environment	**Appendix B**

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

Appendix D
UNEXPECTED FINDS PROTOCOL

Construction

UNEXPECTED FINDS PROTOCOL

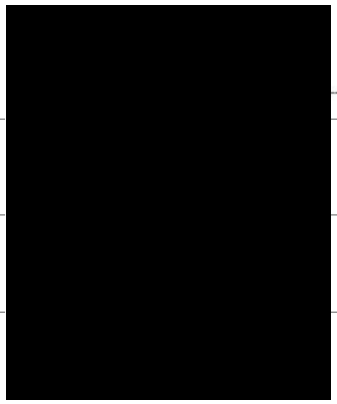
Moorebank Precinct West Stage 2

02 AUGUST 2019

SYDNEY INTERMODAL TERMINAL ALLIANCE

Moorebank Precinct East Stage 2

Unexpected Finds Protocol



Author [redacted]

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Approver [redacted]

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Date 27/08/2019

Revision Text 005

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REVISIONS

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

ACRONYMS AND DEFINITIONS

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

CONTENTS

REVISIONS ..... **II**
ACRONYMS AND DEFINITIONS ..... **III**
1 INTRODUCTION **1**
1.1 Objectives and Targets 1
2 ENVIRONMENTAL MANAGEMENT **2**
2.1 Compliance Matrices 2
2.2 Unexpected Finds Protocols 3

APPENDICES

APPENDIX A UNEXPECTED (CONTAMINATION WITHIN IMPORTED SPOIL) FINDS PROTOCOL
APPENDIX B UNEXPECTED (HERITAGE) FINDS
APPENDIX C UNEXPECTED (BIODIVERSITY) FINDS
APPENDIX D UNEXPECTED (ONSITE CONTAMINATION) FINDS PROTOCOL

LIST OF TABLES

Table 1 Objectives and Targets 1
Table 3 Conditions of Consent (CoCs) 2
Table 4 Revised Compilation of Mitigation Measures (RCMMs) 2
Table 5 Commonwealth Approvals 3

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

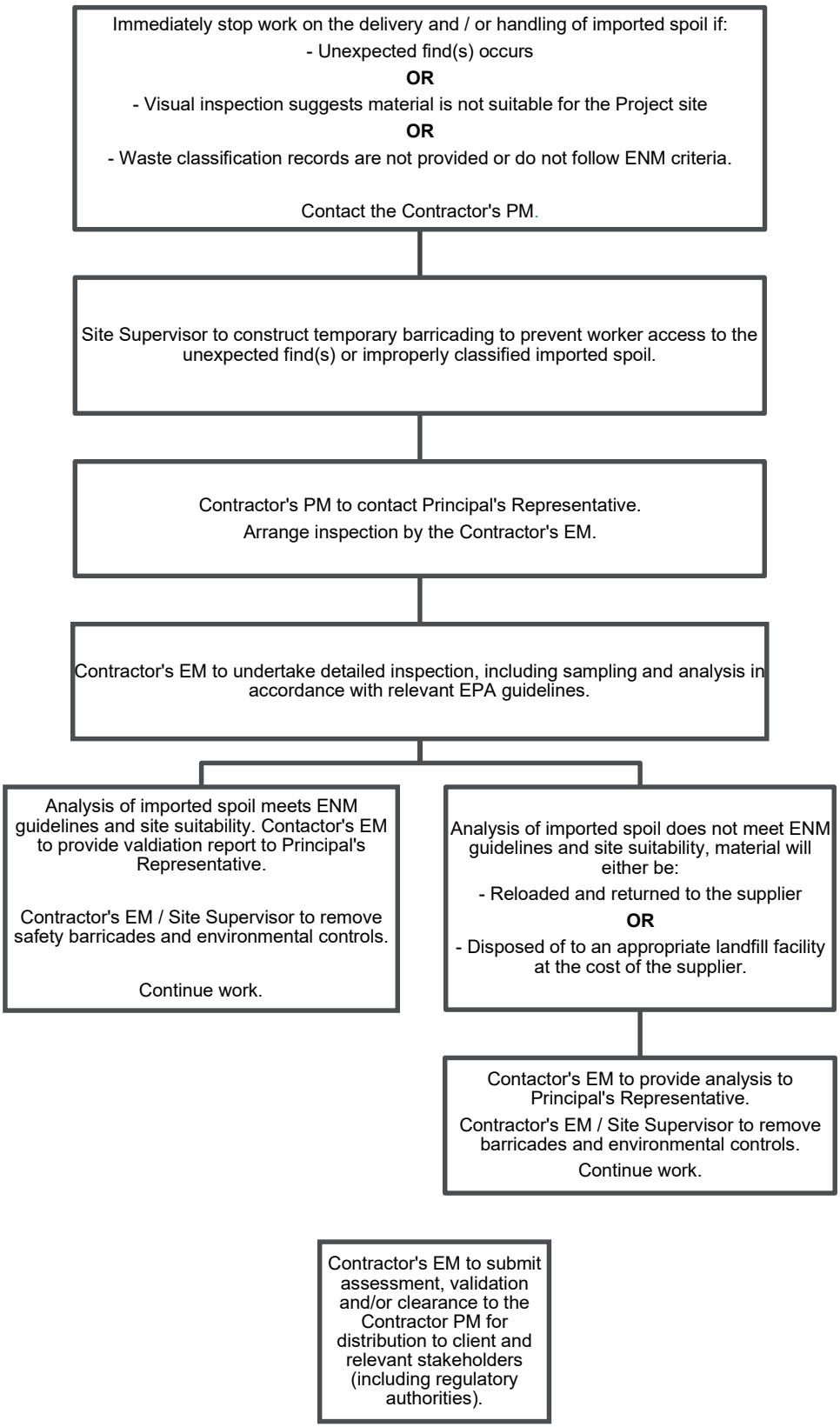
2.2 Unexpected Finds Protocols

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.

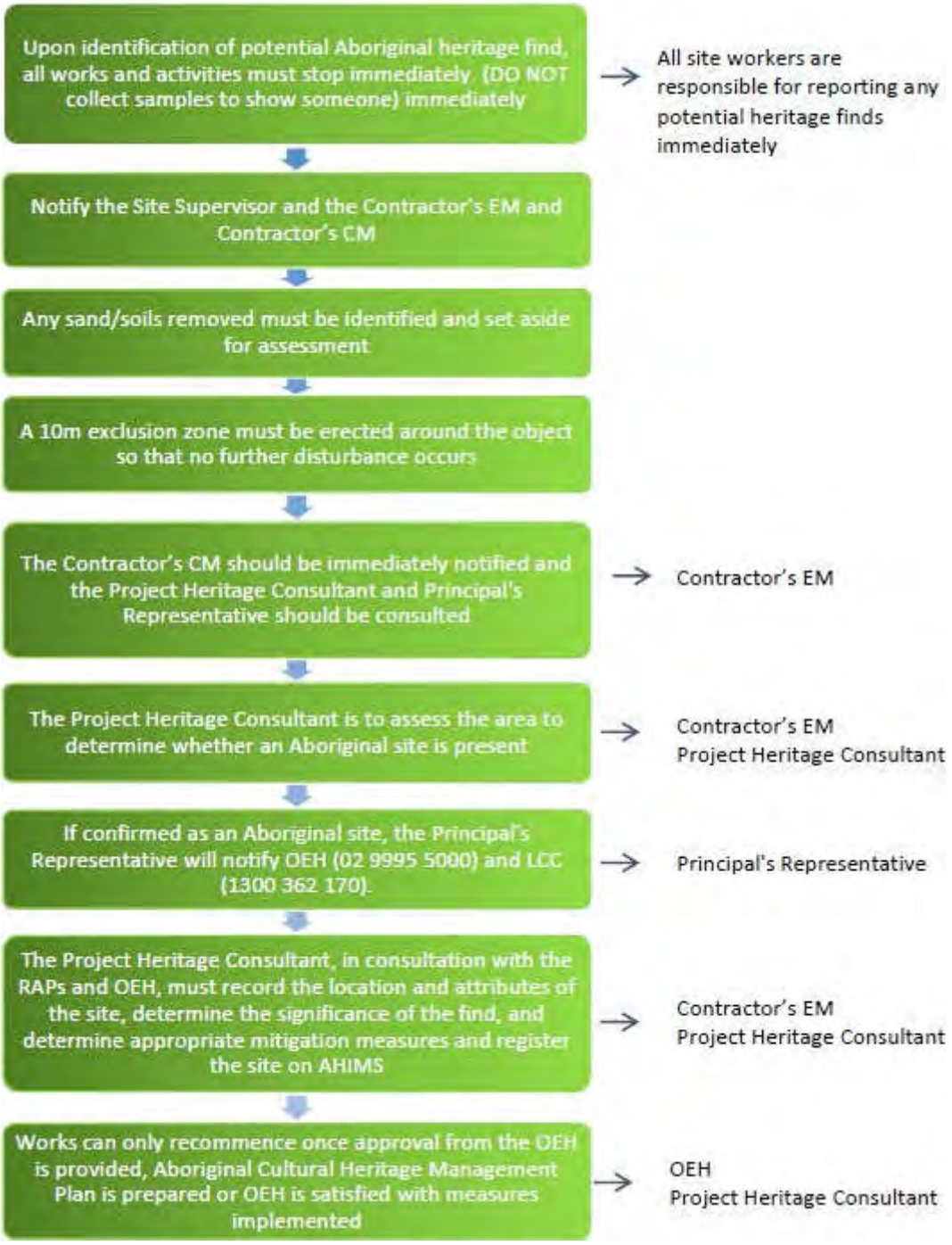
APPENDIX A UNEXPECTED (CONTAMINATION WITHIN IMPORTED SPOIL) FINDS PROTOCOL


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

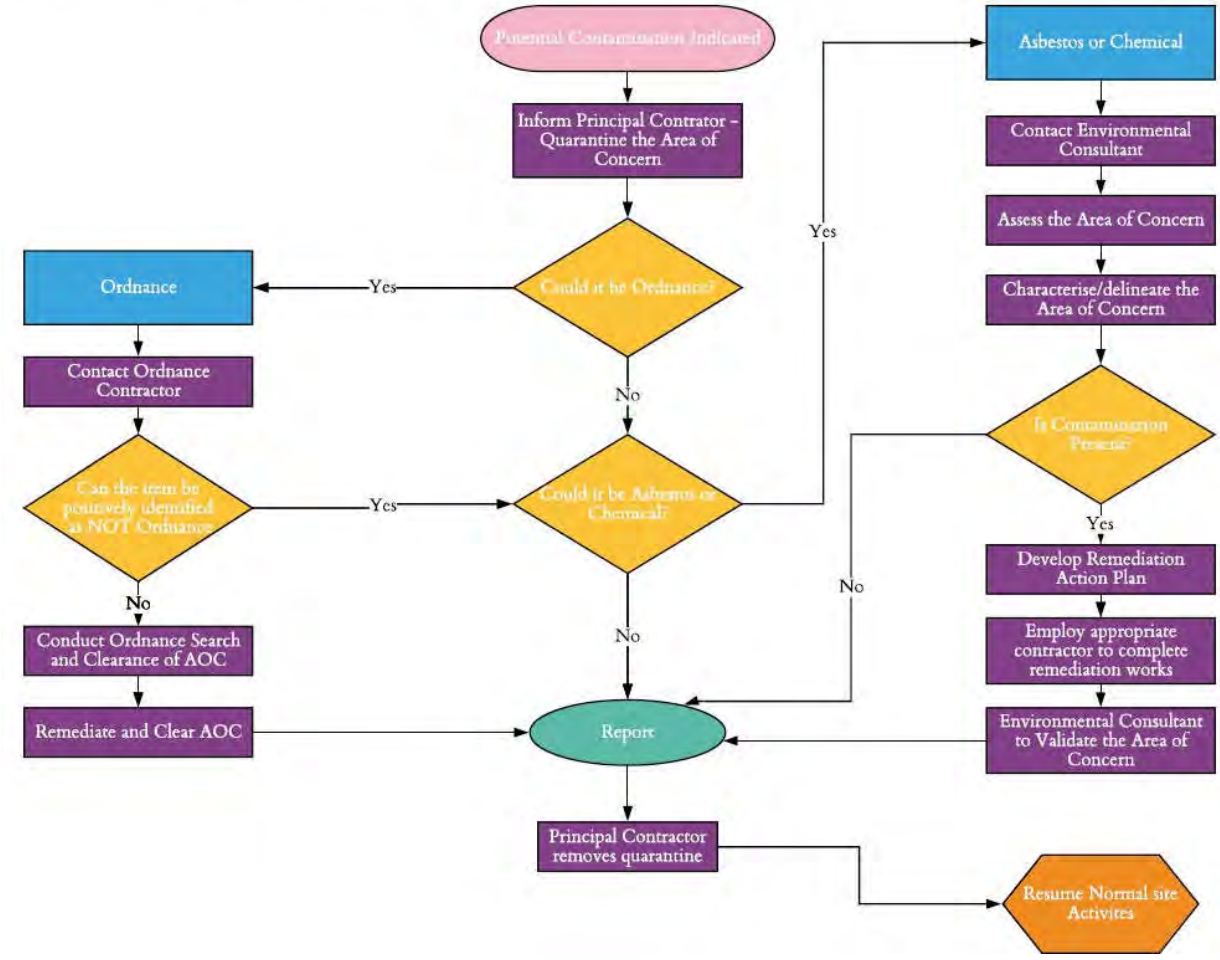
Potential Site Hazards

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:

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Appendix E

PFAS PLACEMENT SURVEY PLANS (JBS&G 2022)

FIGURE 6A - Foundation RLs 1/6

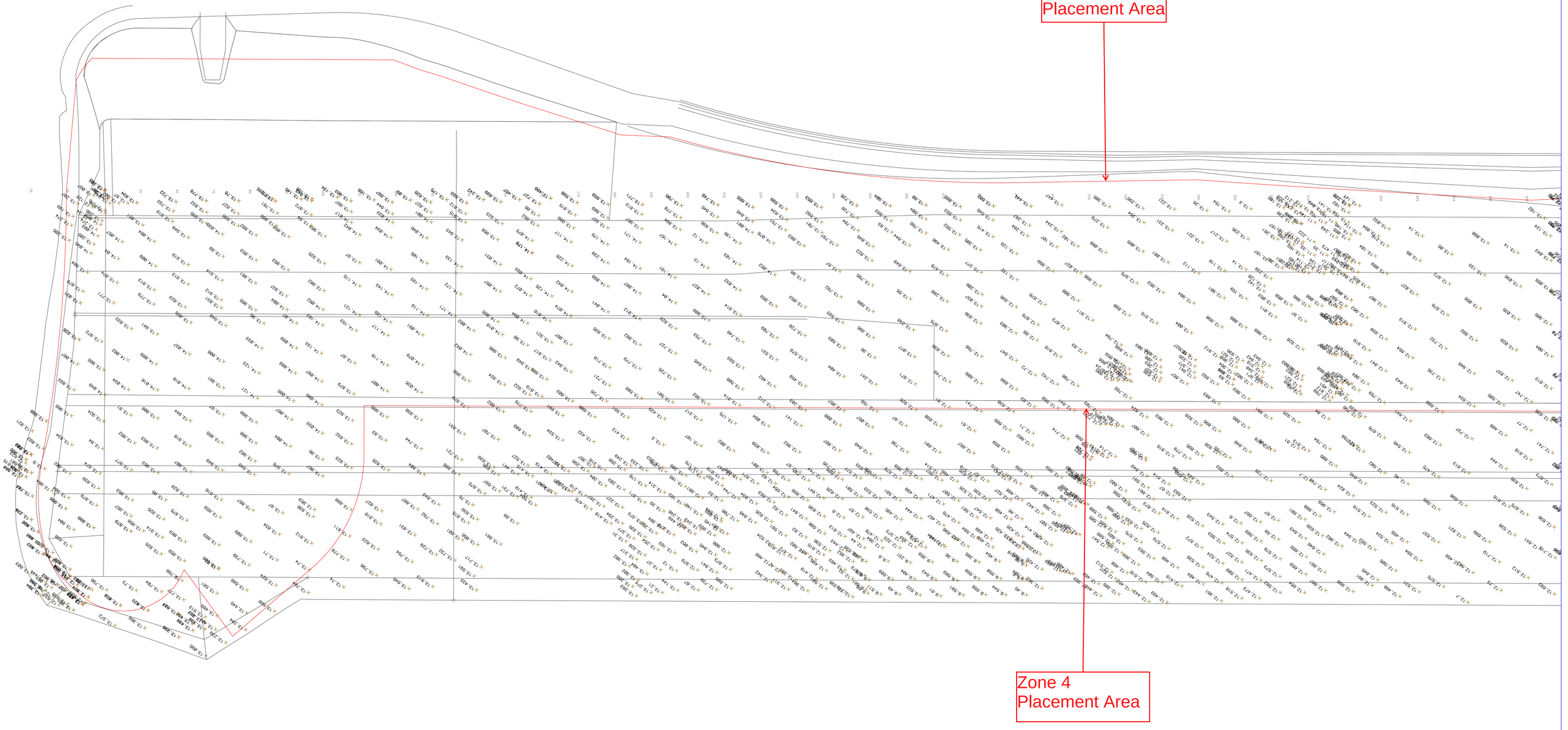


FIGURE 6A - Foundation RLs 2/6

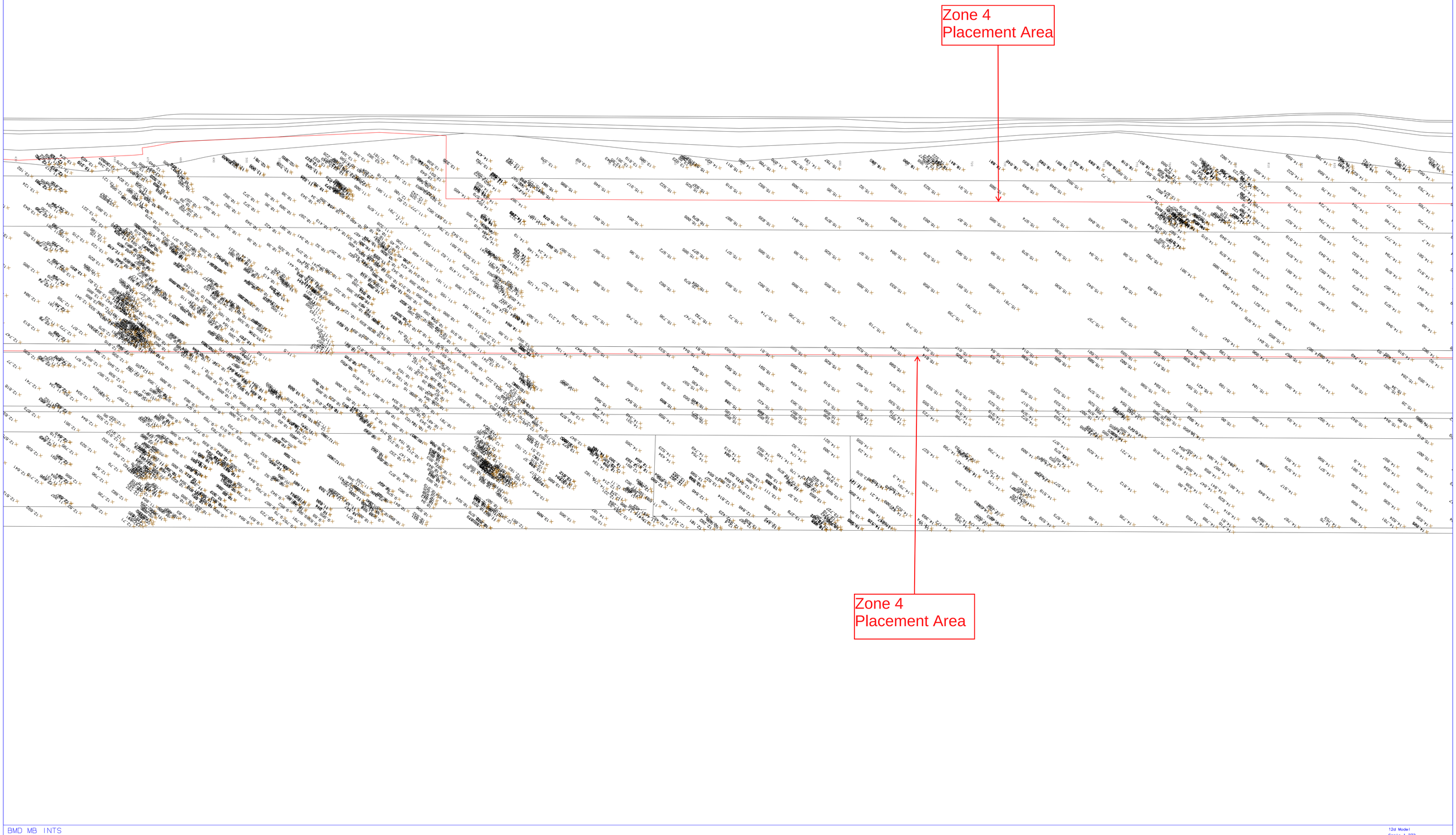


FIGURE 6A - Foundation RLs 3/6

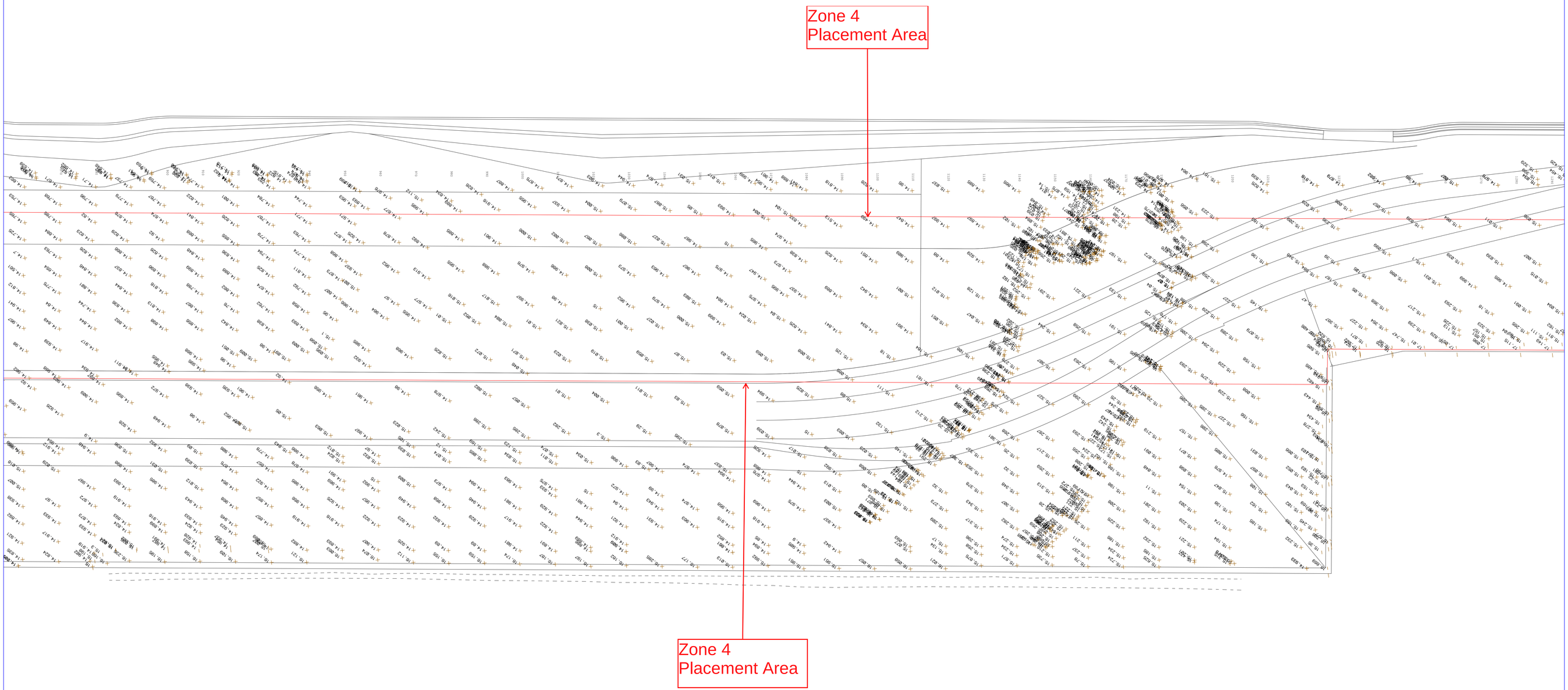


FIGURE 6A - Foundation RLs 4/6

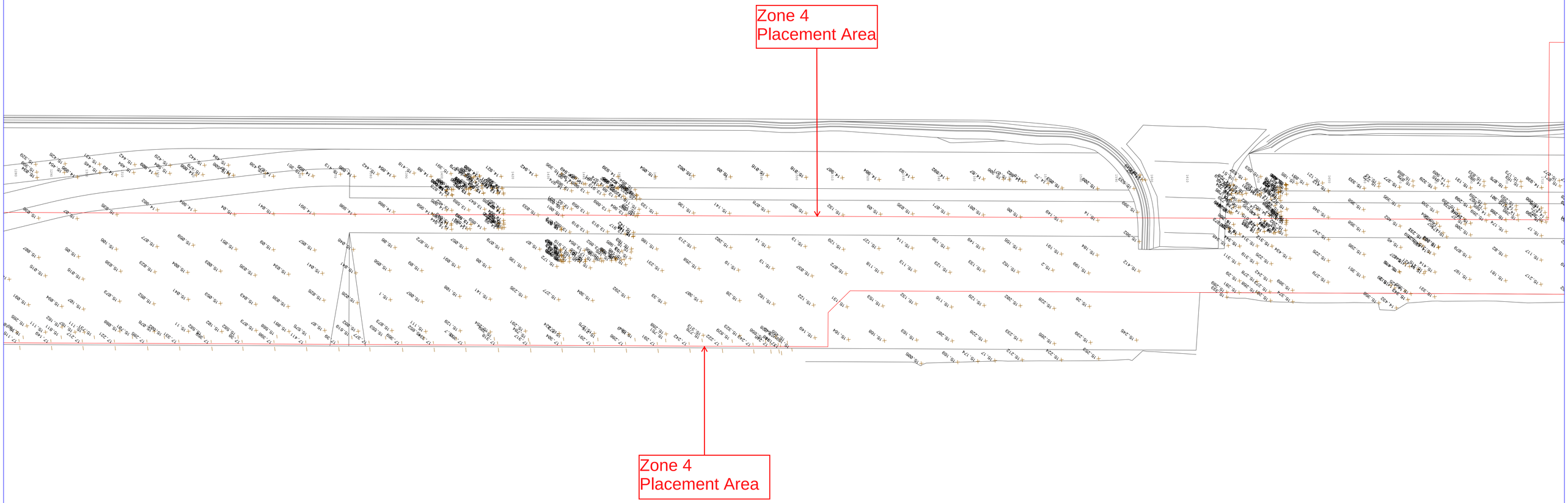
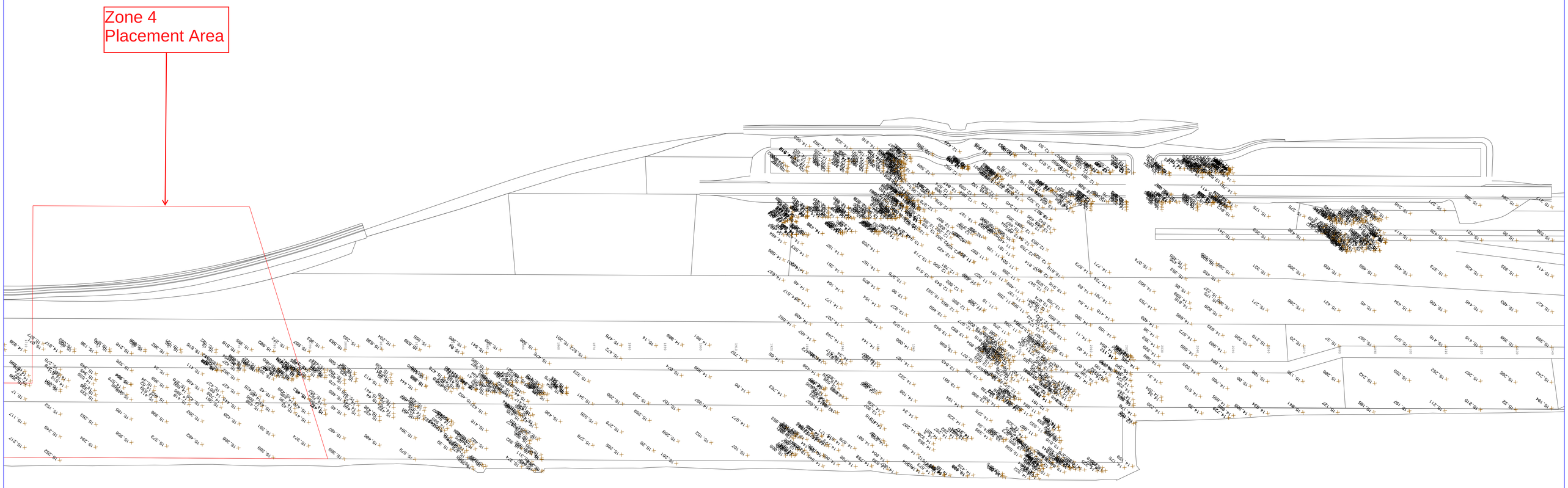


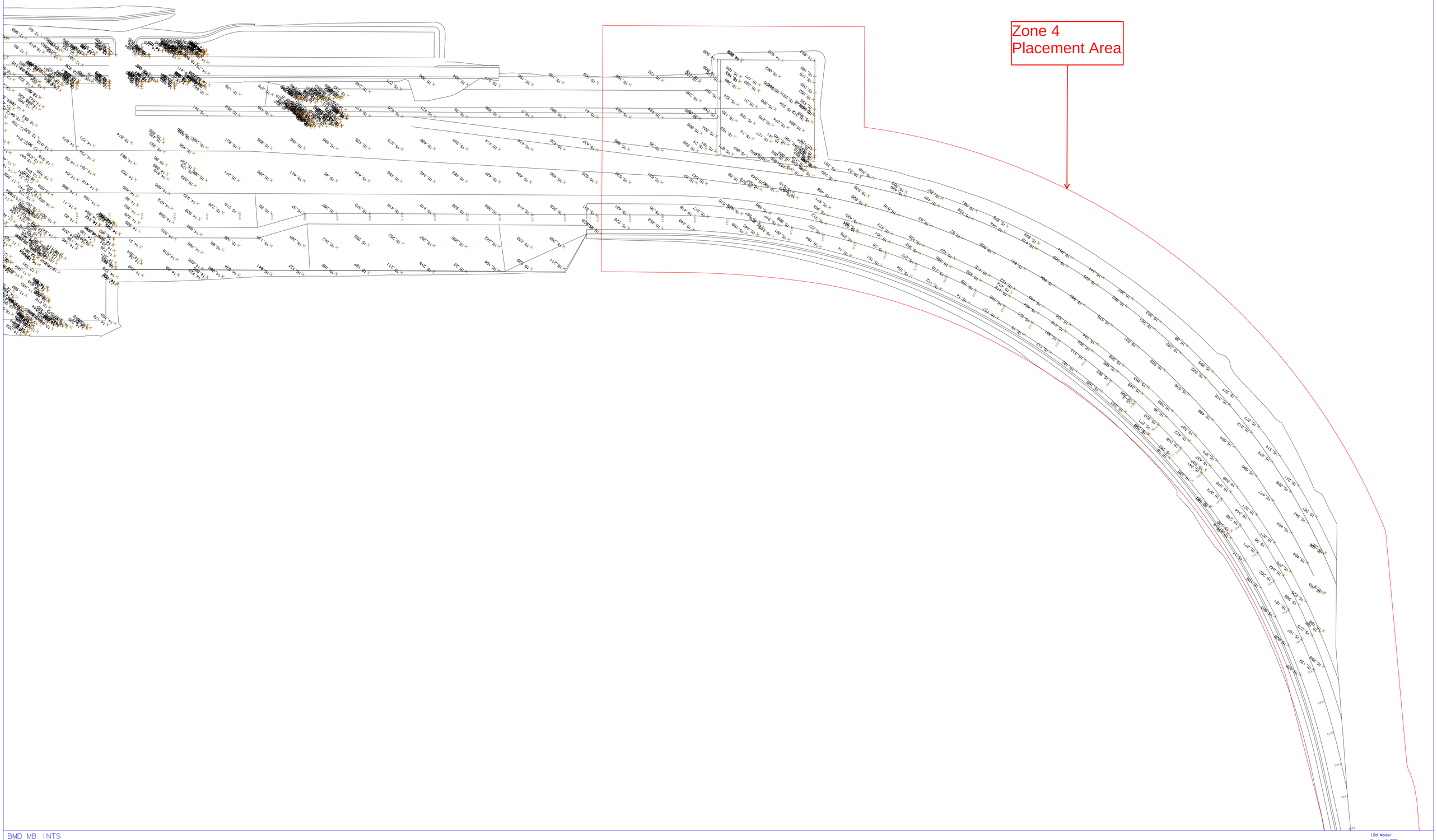
FIGURE 6A - Foundation RLs 5/6



BMD MB INTS
20210806 INTS FDN RLs plot SRF1370

12d Model
Scale 1:373
Fri Aug 6 15:25:36 2021

FIGURE 6A - Foundation RLs 6/6



BMD MB INTS
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12d Model
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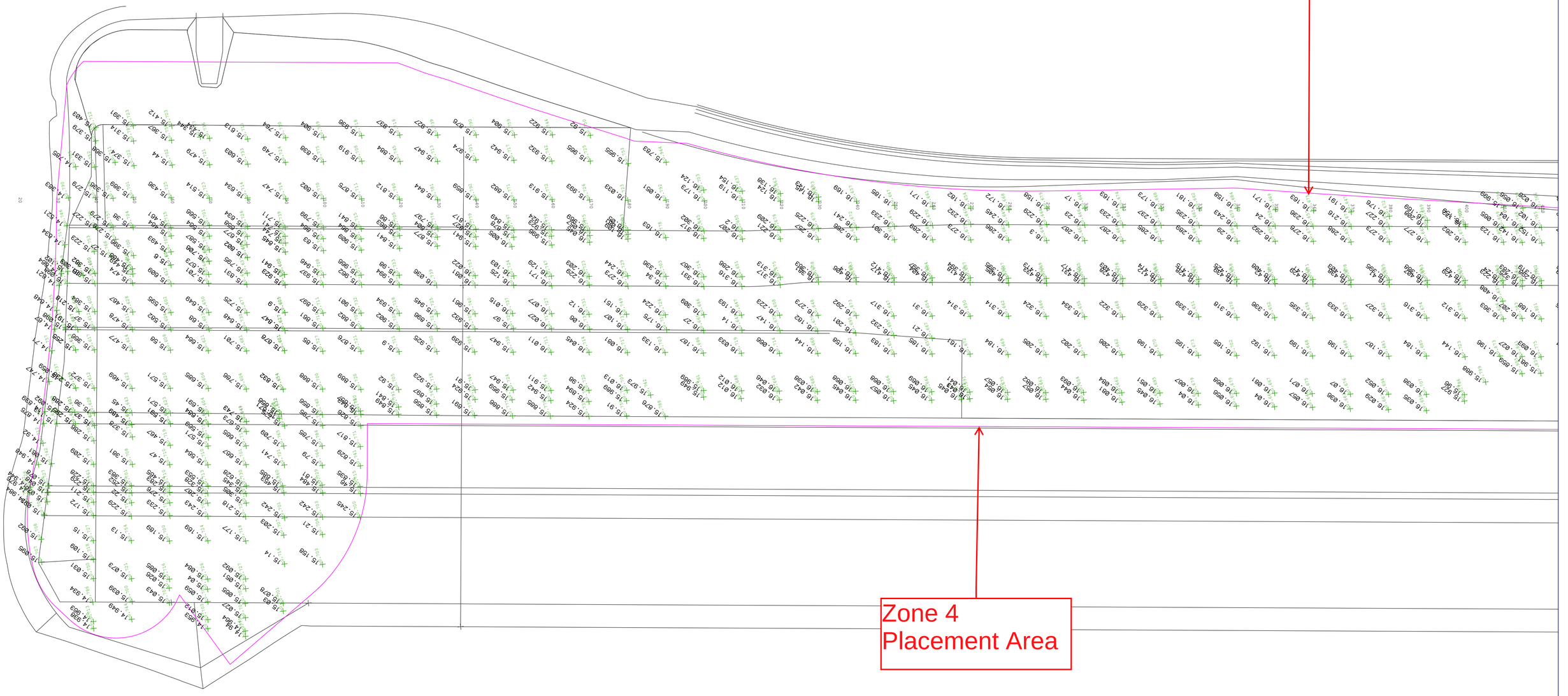
Fri Aug 6 15:26:00 2021

FIGURE 6B - PFAS Fill RLs 1/6



BMD MB INTS
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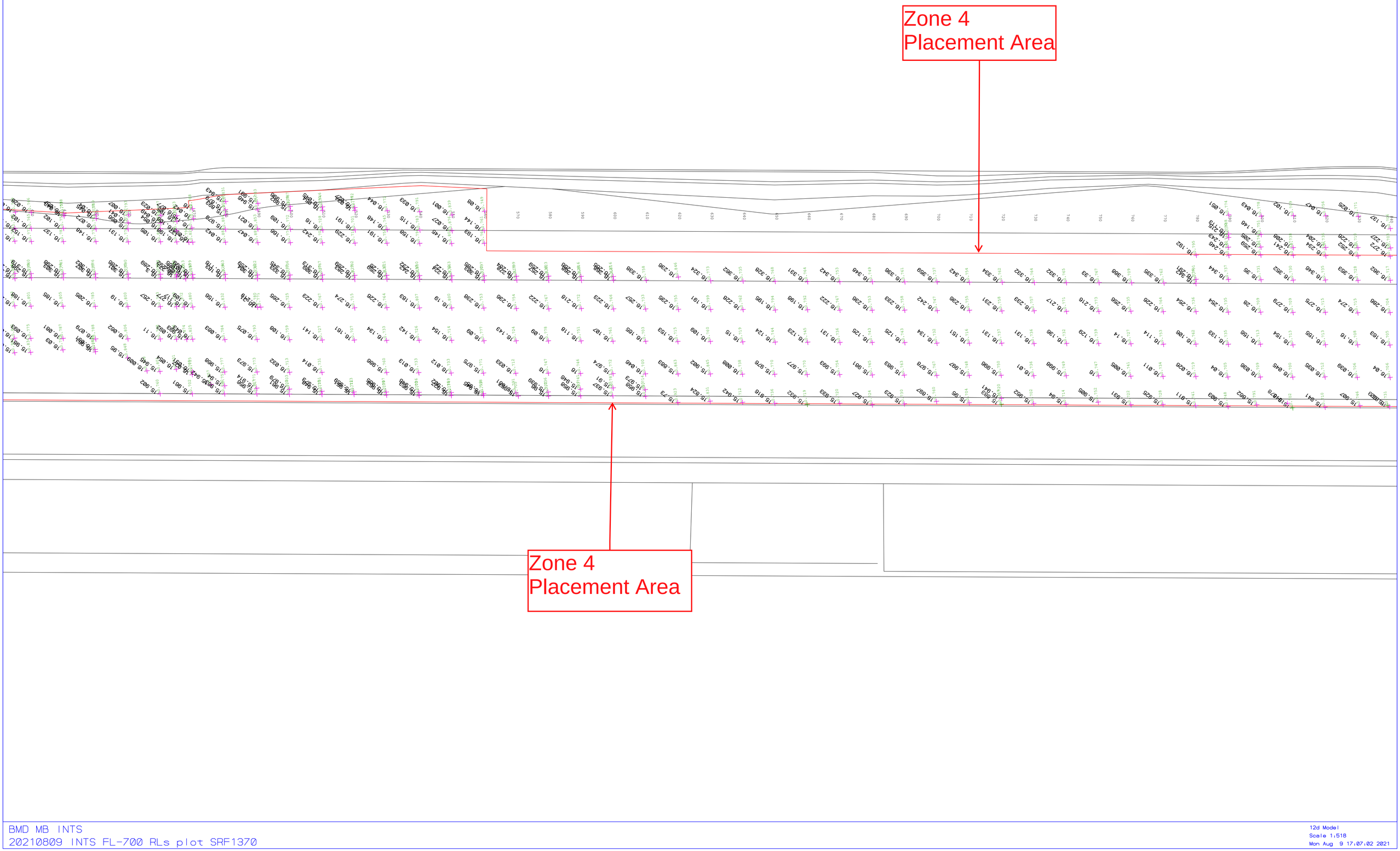
12d Model
Scale 1:513
Wed Sep 22 09:57:02 2021

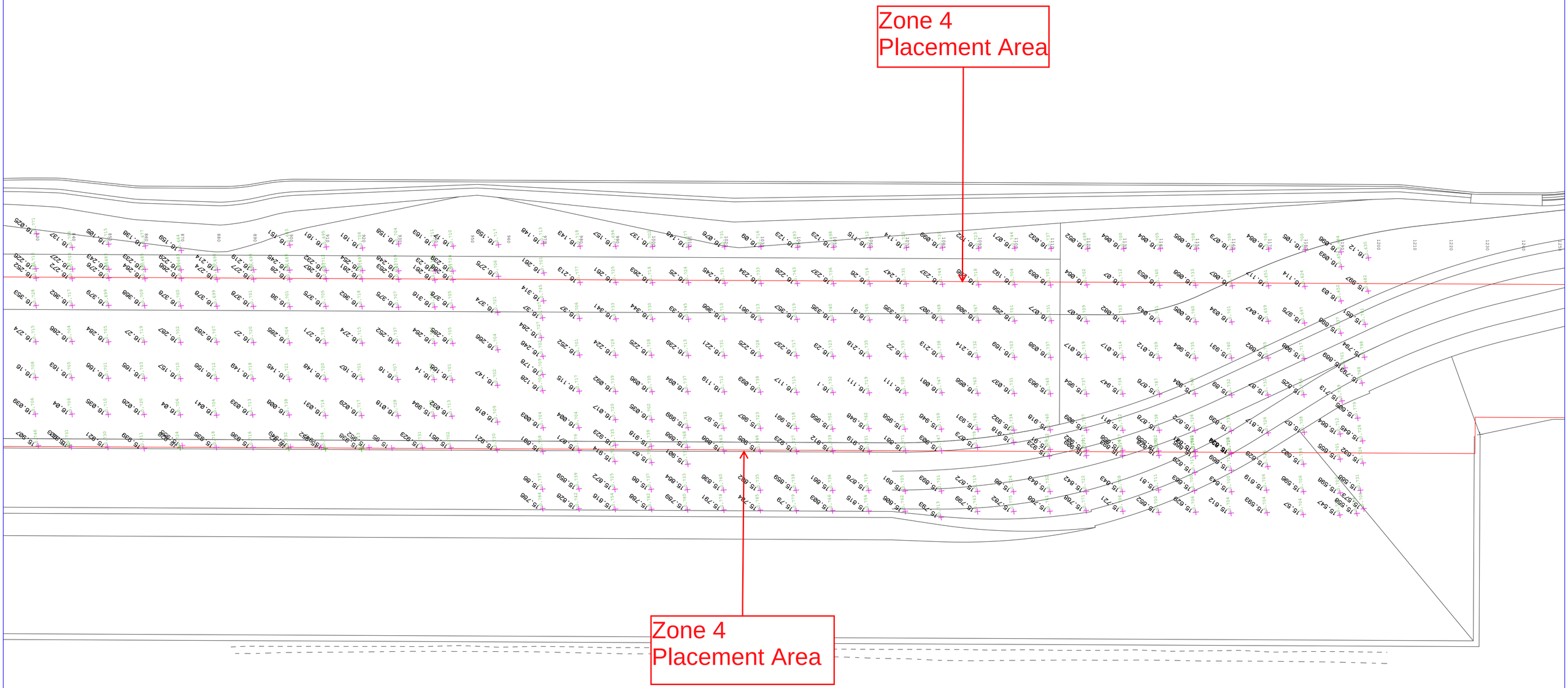
FIGURE 6B - PFAS Fill RLs 2/6



BMD MB INTS
20210809 INTS FL-700 RLs plot SRF1370

12d Model
Scale 1:518
Mon Aug 9 17:07:02 2021

FIGURE 6B - PFAS Fill RLs 3/6



BMD MB INTS
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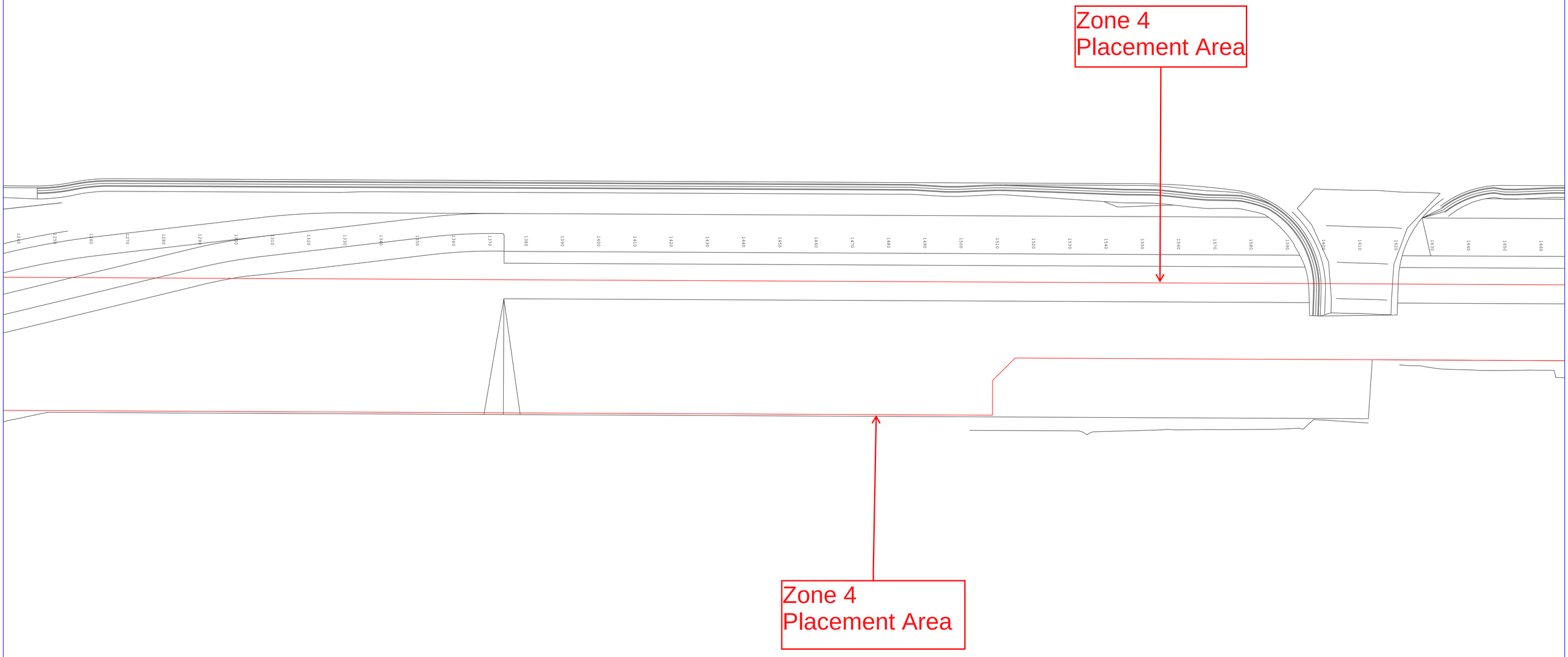
12d Model
Scale 1:518
Mon Aug 9 17:07:27 2021

FIGURE 6B - PFAS Fill RLs 4/6



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12d Model
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Mon Aug 9 17:07:55 2021

FIGURE 6B - PFAS Fill RLs 5/6

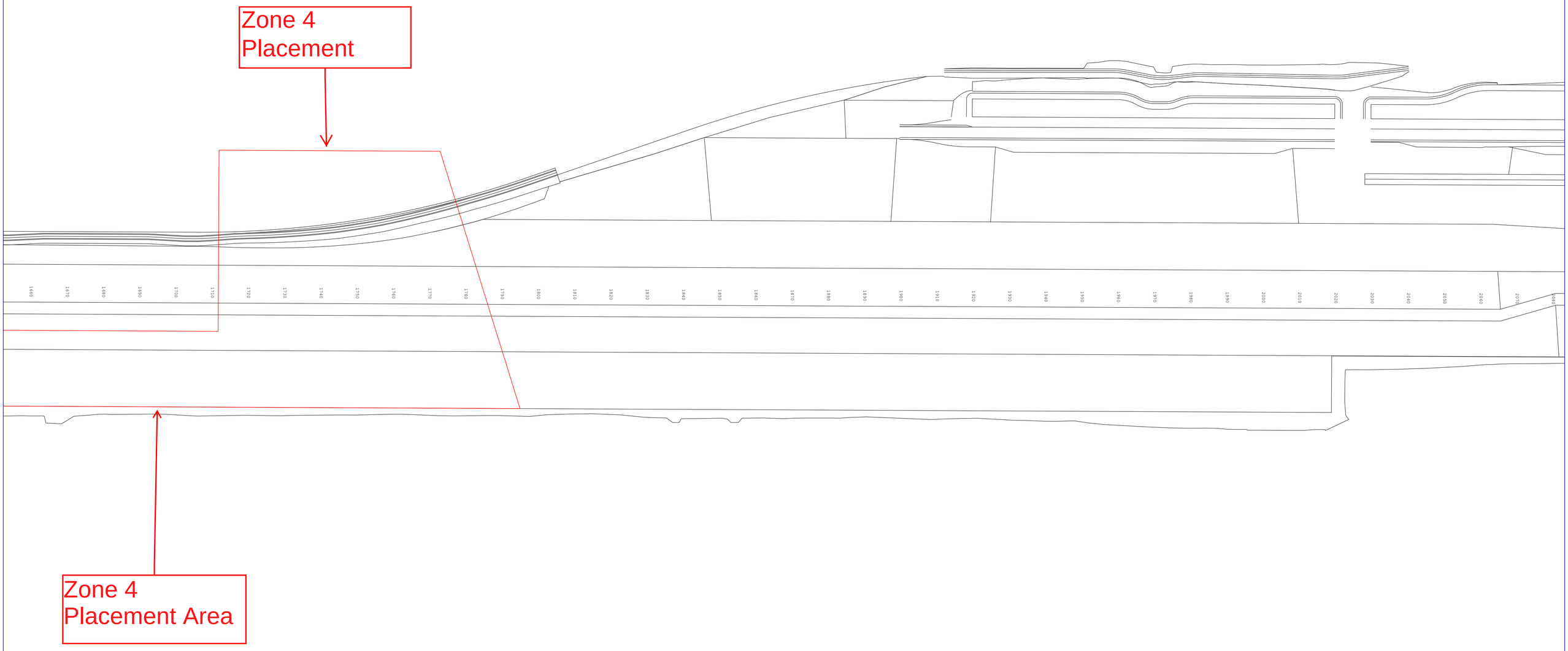
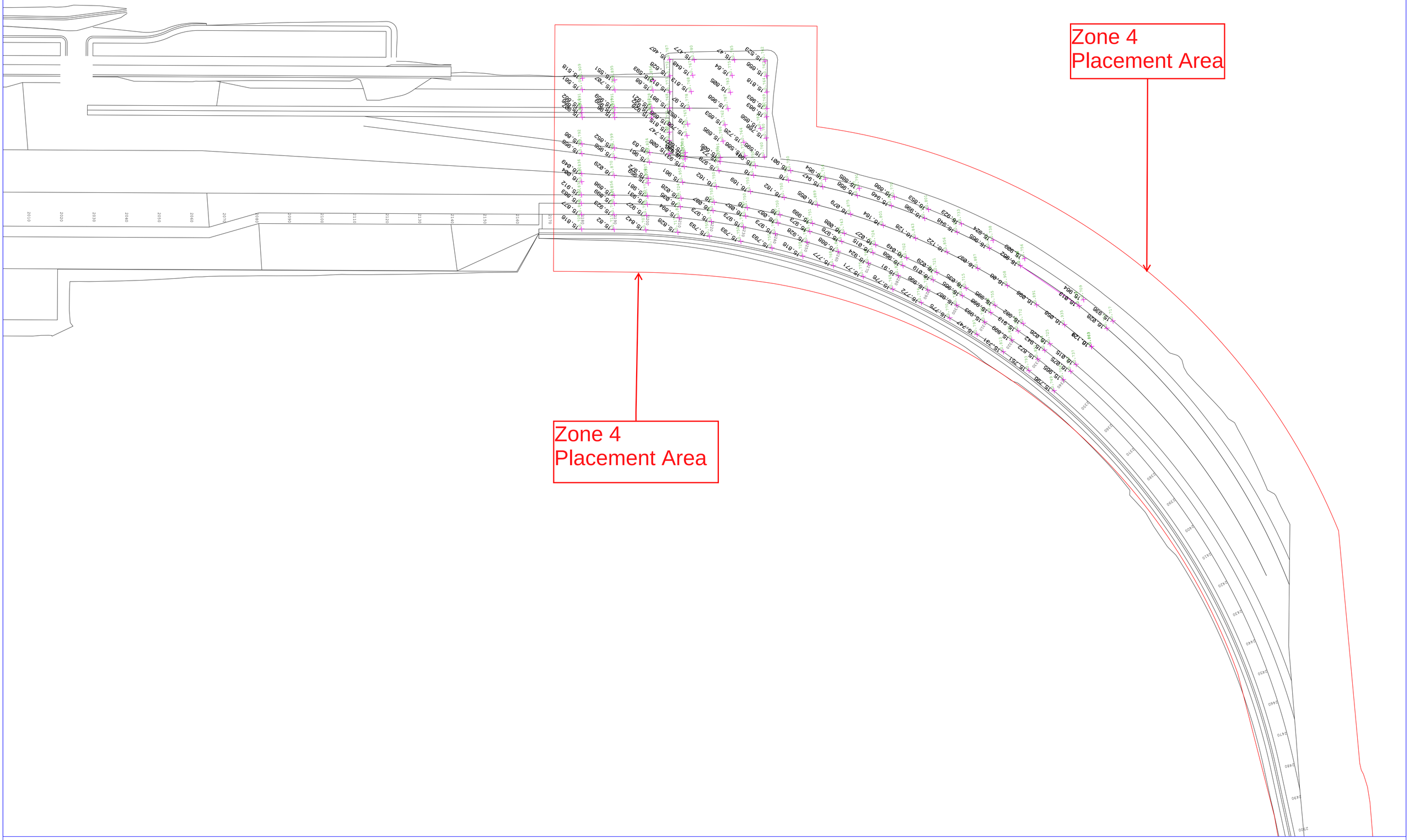


FIGURE 6B - PFAS Fill RLs 6/6



BMD MB INTS
20210809 INTS FL-700 RLs plot SRF1370

12d Model
Scale 1:518
Mon Aug 9 17:08:25 2021

FIGURE 6C - Final Level RLs 1/6

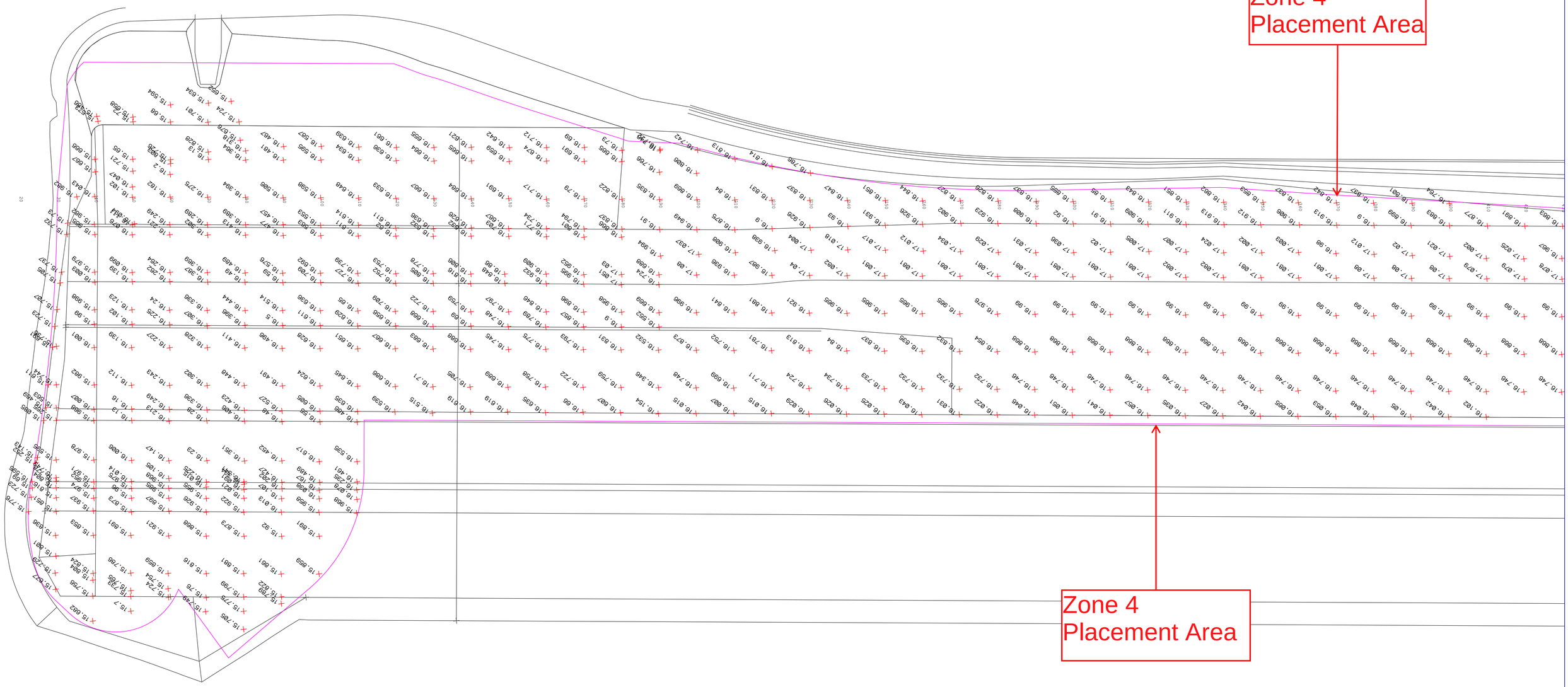
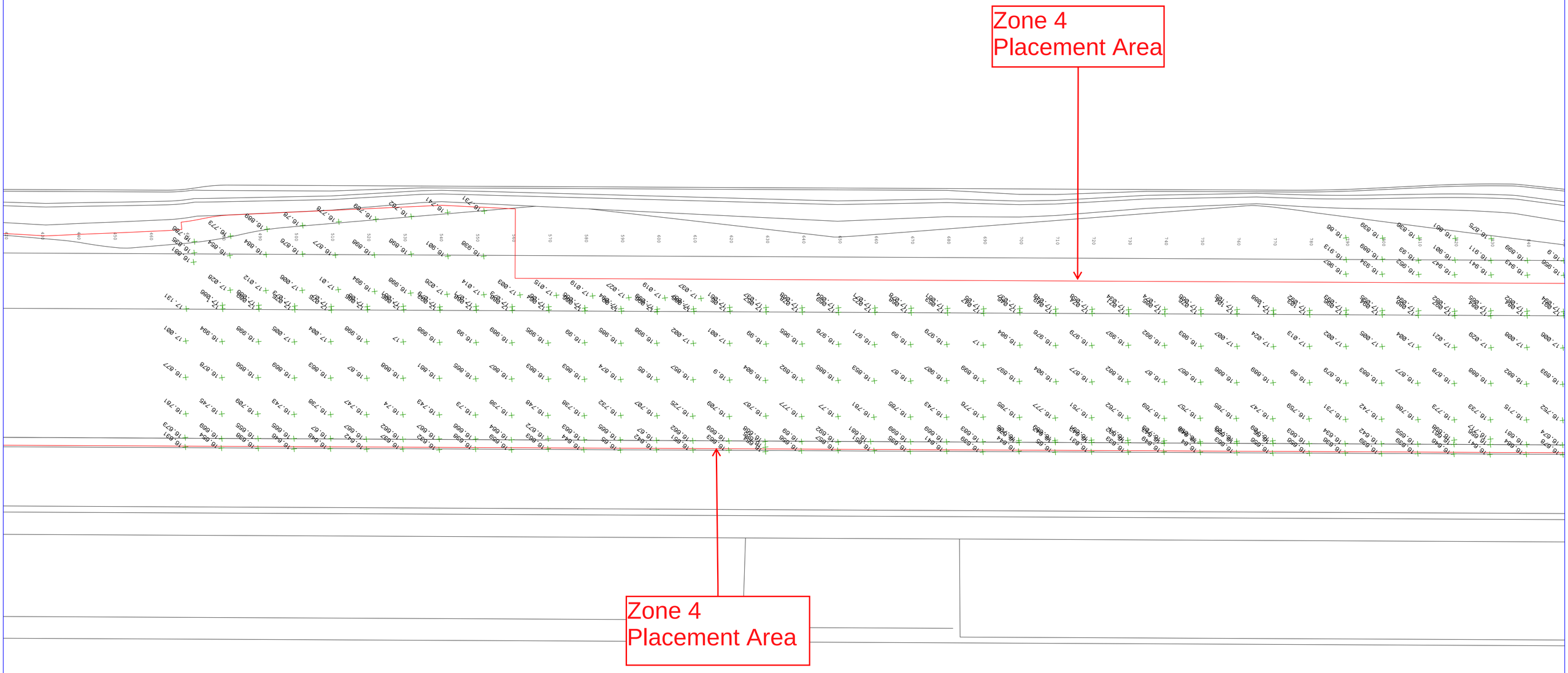


FIGURE 6C - Final Level RLs 2/6



BMD MB INTS
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12d Model
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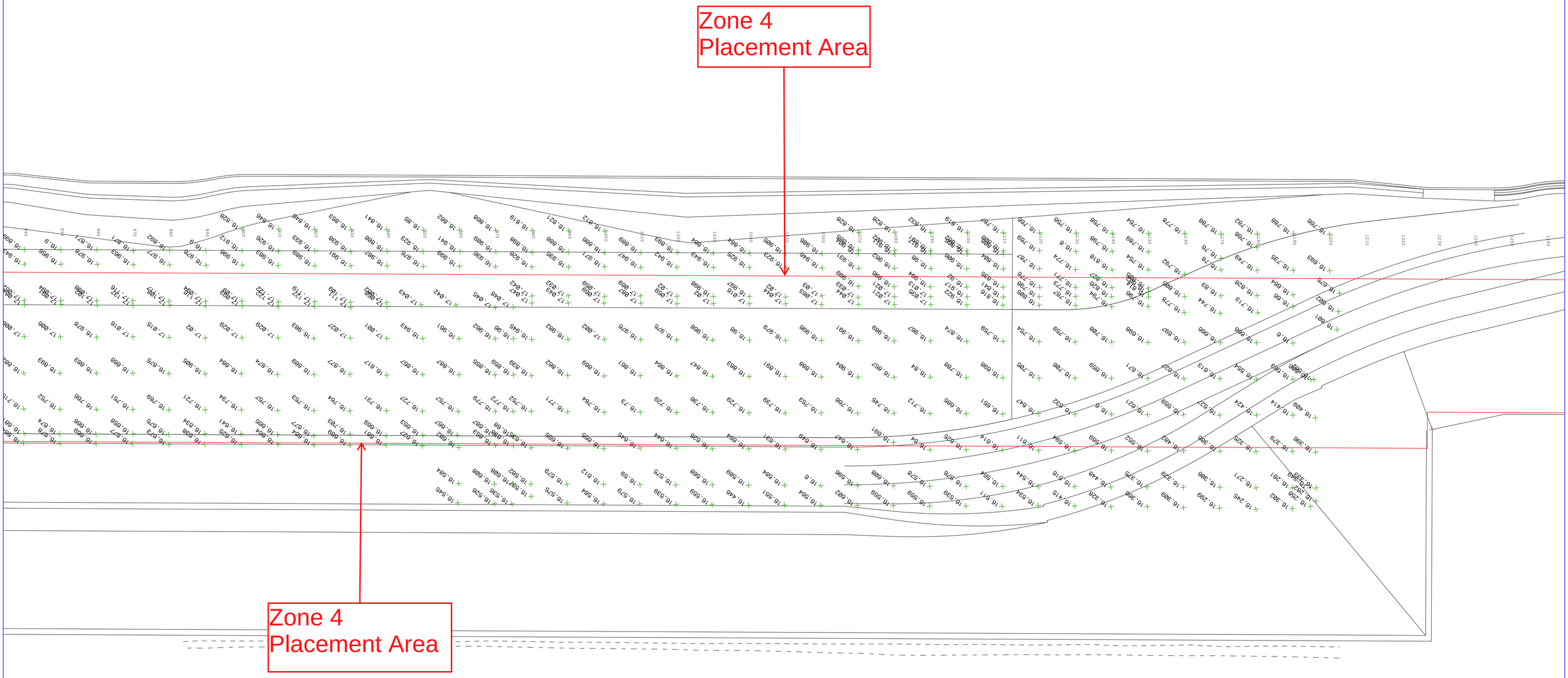
FIGURE 6C - Final Level RLs 3/6



BMD MB INTS
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12d Model
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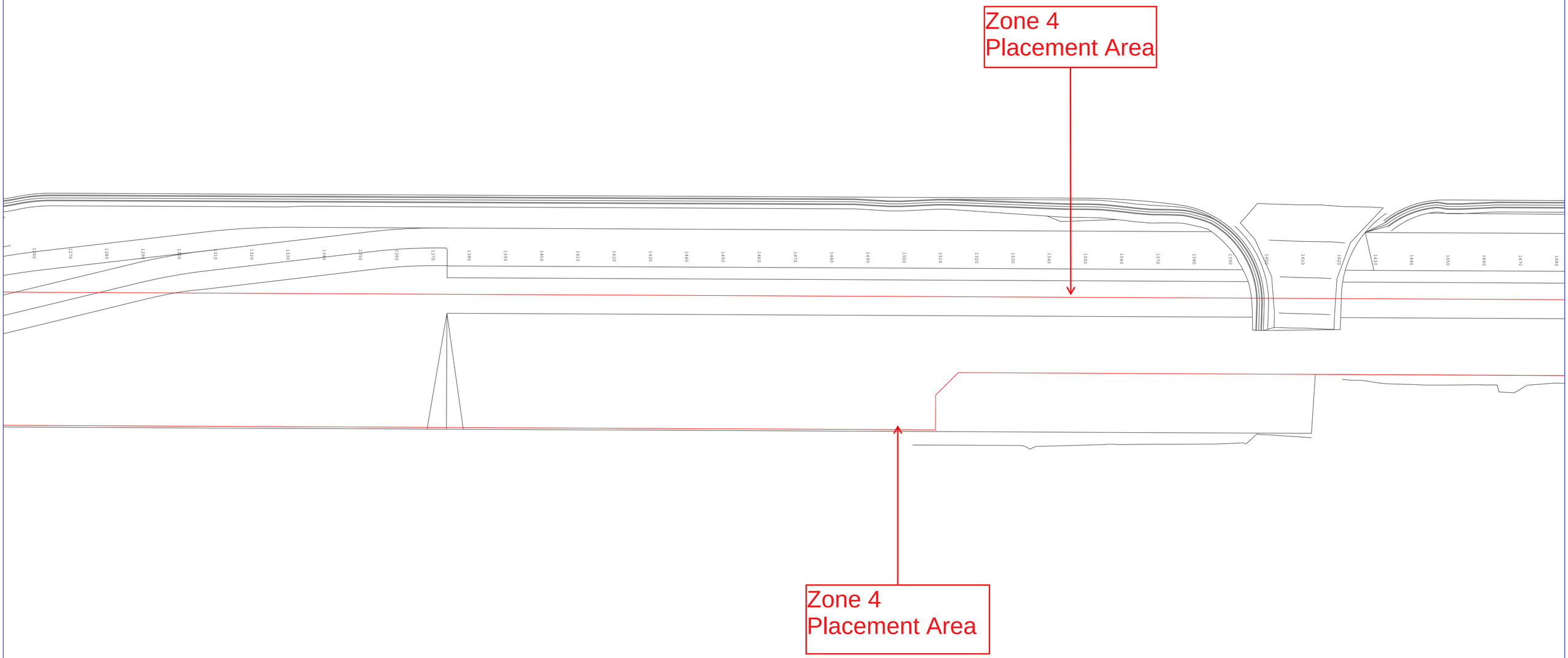
FIGURE 6C - Final Level RLs 4/6



BMD MB INTS
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12d Model
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FIGURE 6C - Final Level RLs 5/6

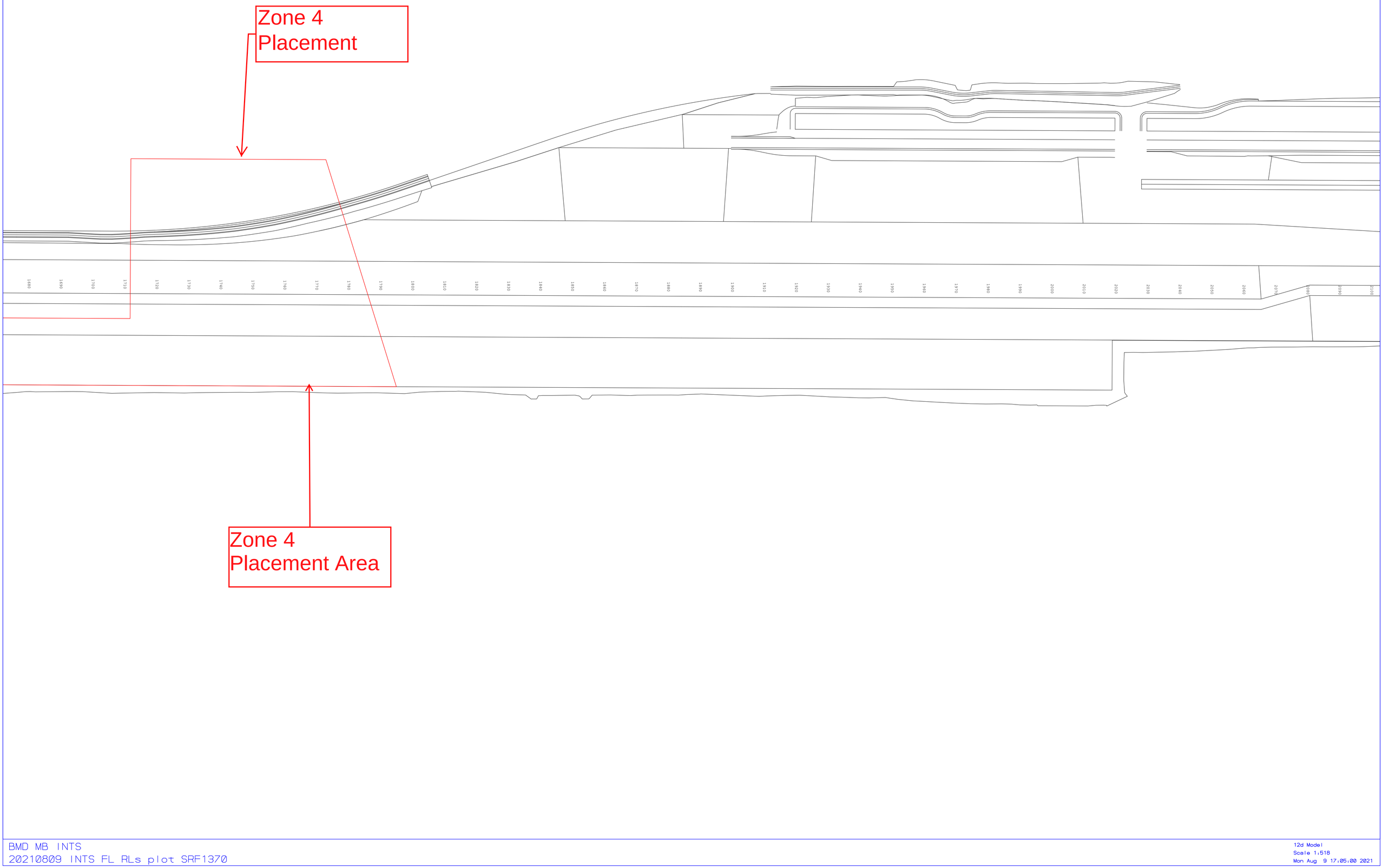
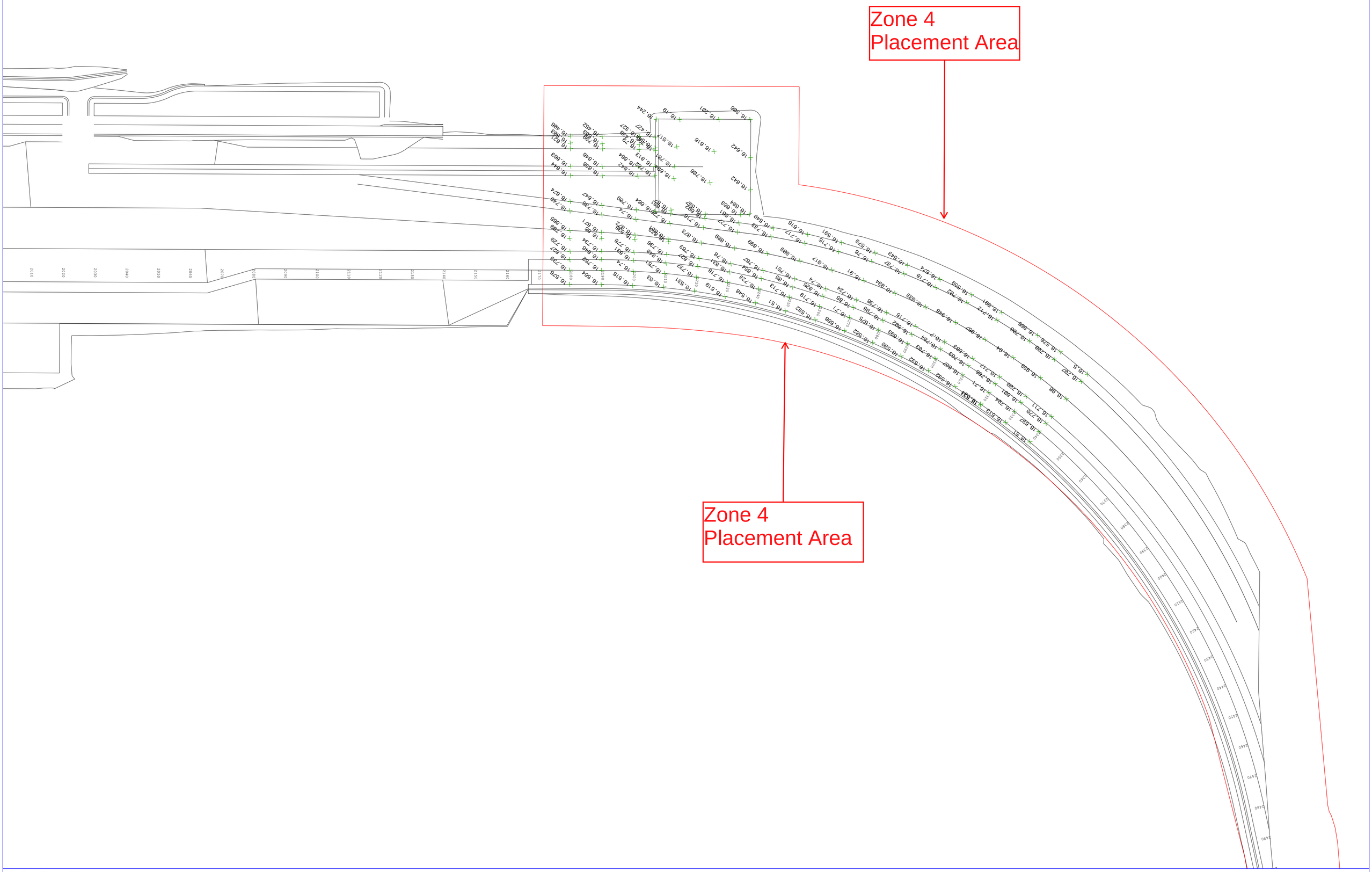


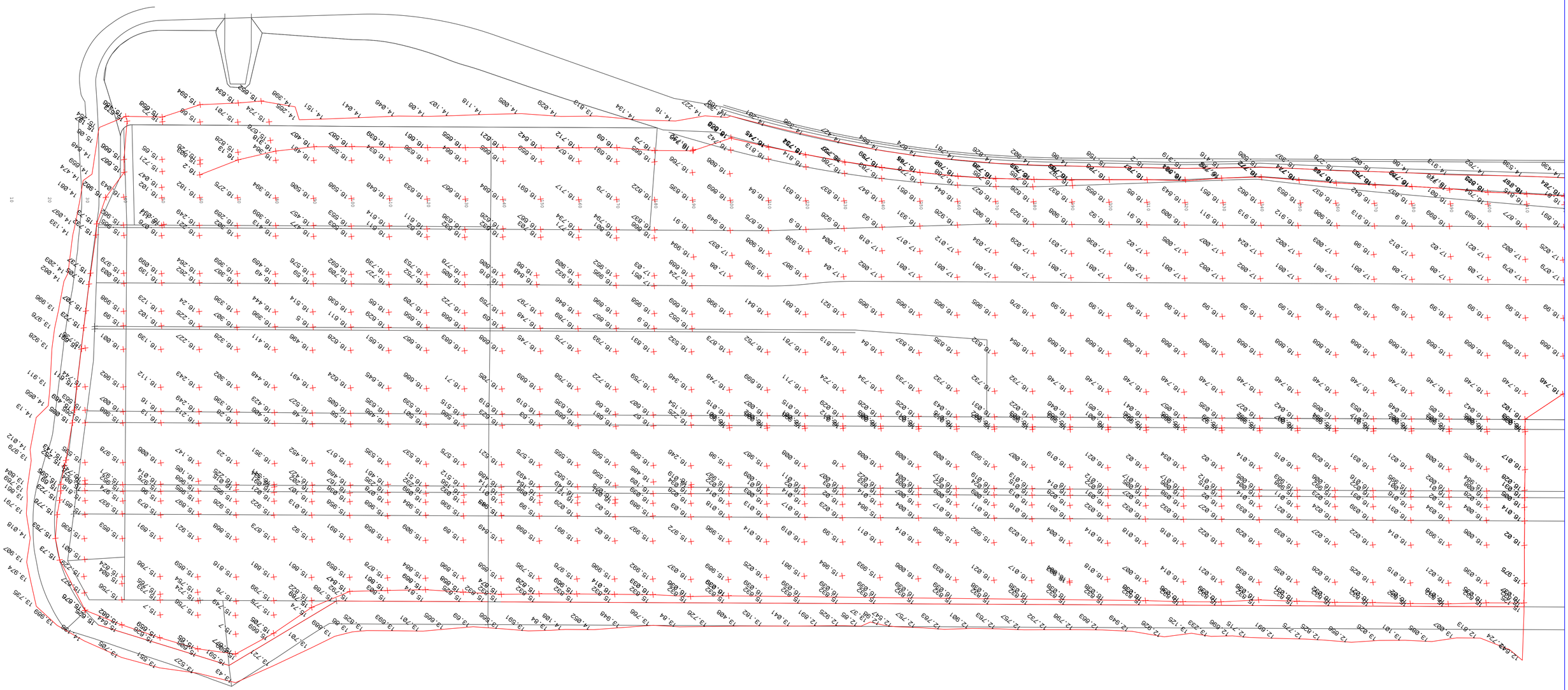
FIGURE 6C - Final Level RLs 6/6



BMD MB INTS
20210809 INTS FL RLs plot SRF1370

12d Model
Scale 1:518
Mon Aug 9 17:05:20 2021

FIGURE 6D - Audit Area Sandstone Fill RLs 1/6



BMD MB INTS
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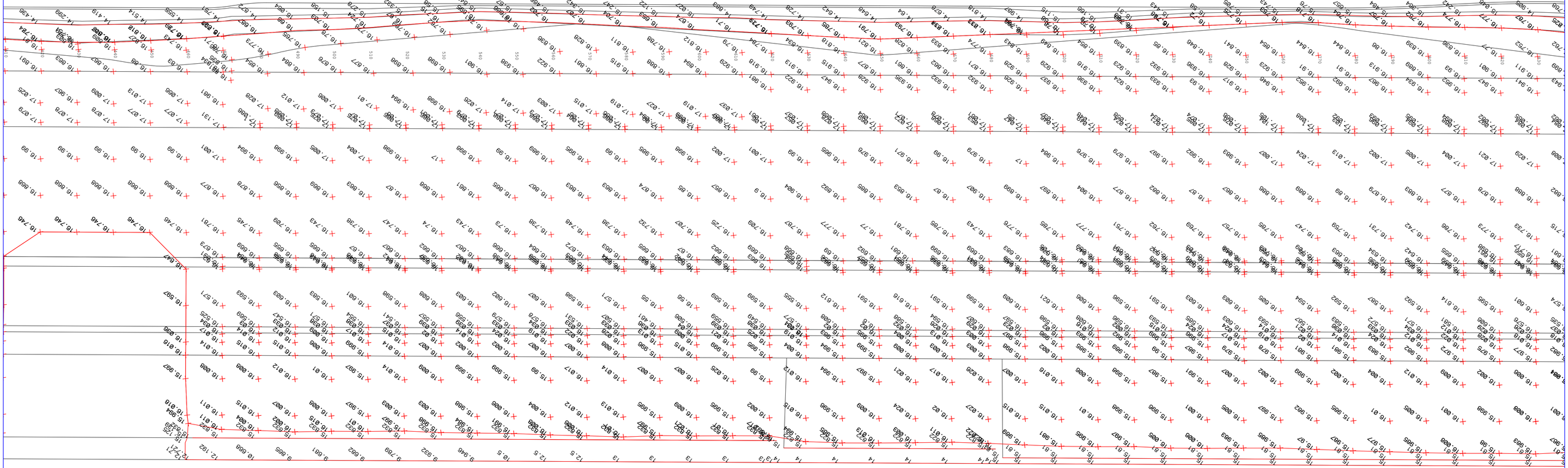
12d Model
Scale 1:515
Mon Sep 20 16:15:00 2021

FIGURE 6D - Audit Area Sandstone Fill RLs 2/6



BMD MB INTS
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12d Model
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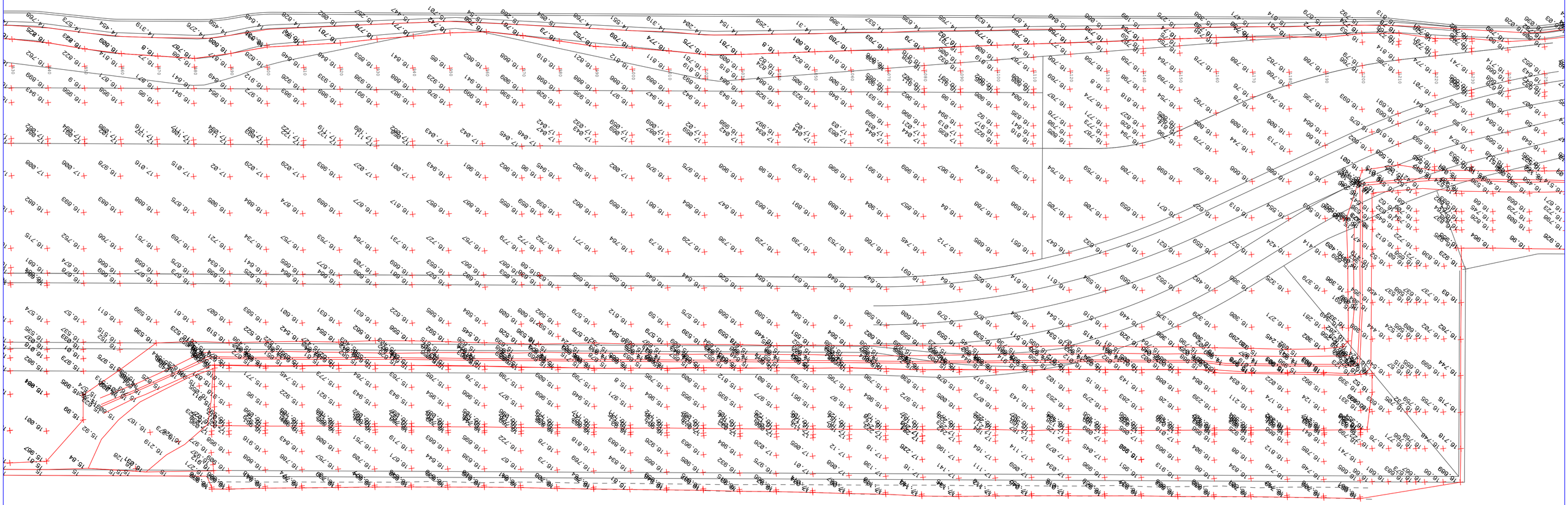
FIGURE 6D - Audit Area Sandstone Fill RLs 3/6



BMD MB INTS
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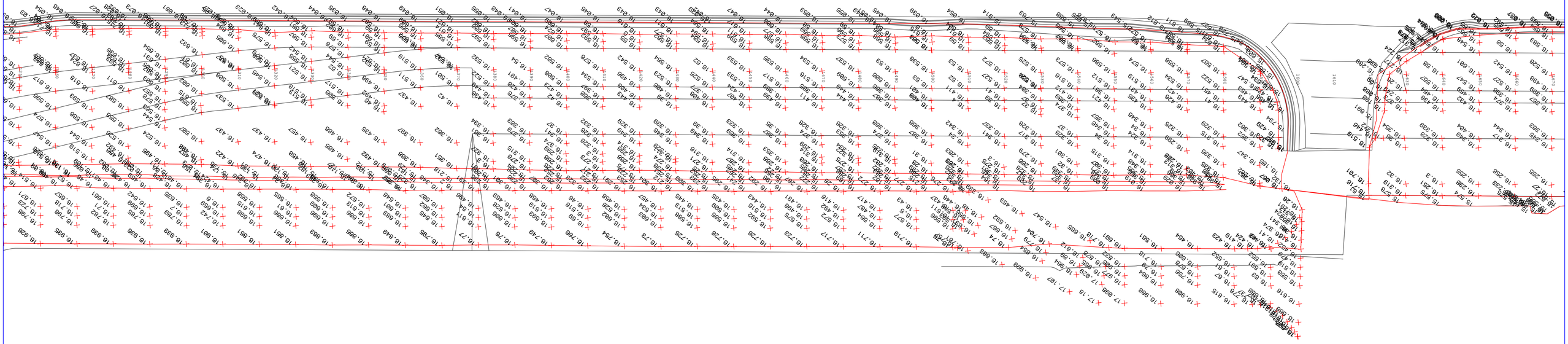
FIGURE 6D - Audit Area Sandstone Fill RLs 4/6



BMD MB INTS
20210920 INTS FL RLs plot SRF1370

12d Model
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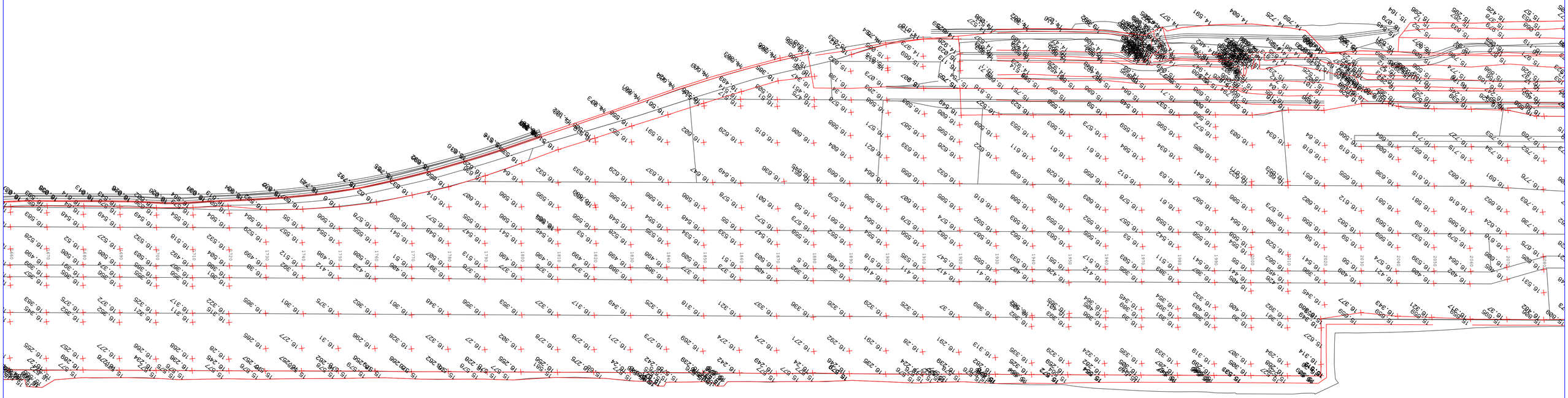
Mon Sep 20 16:16:05 2021

FIGURE 6D - Audit Area Sandstone Fill RLs 5/6



BMD MB INTS
20210920 INTS FL RLs plot SRF1370

12d Model
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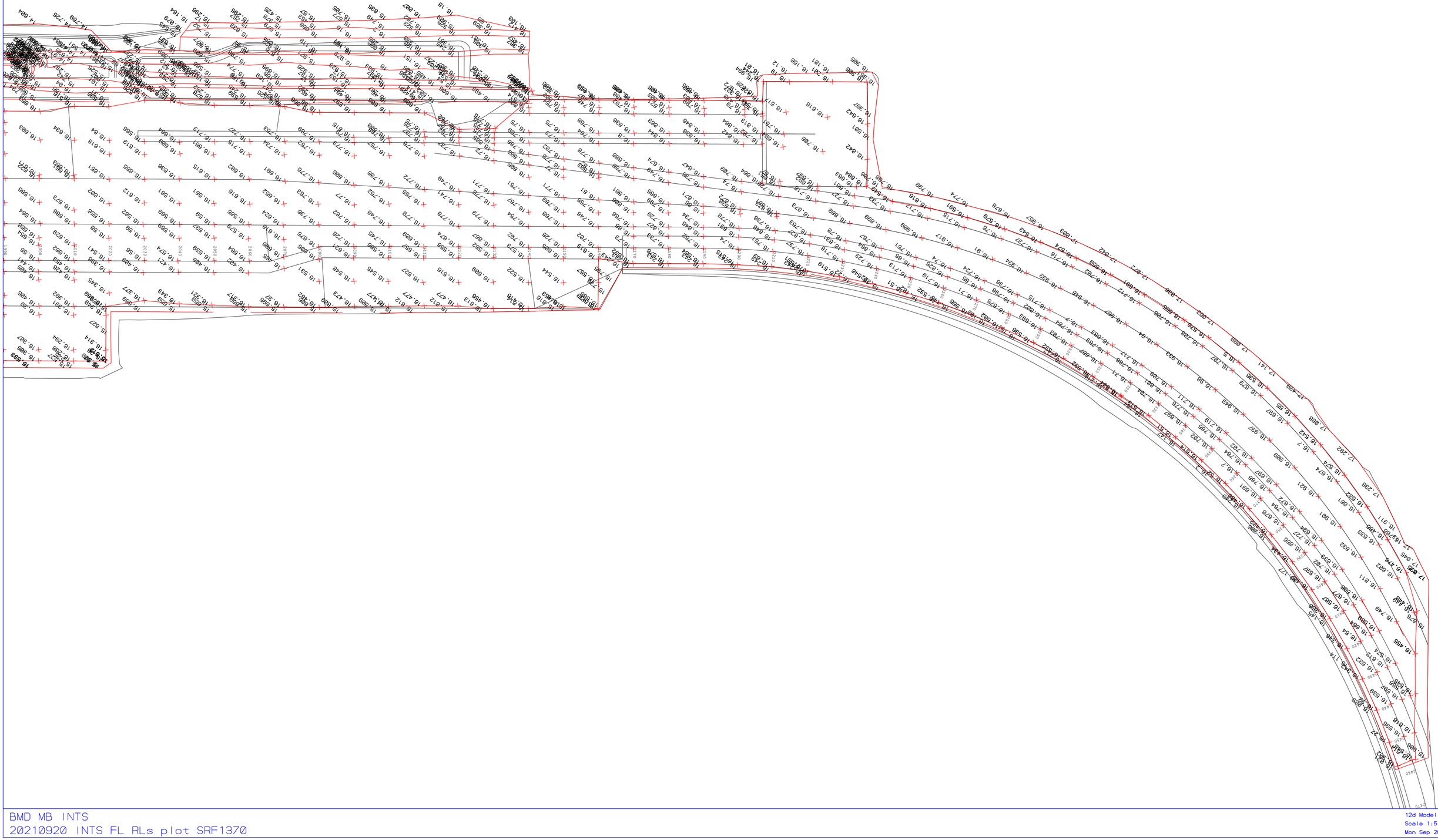
FIGURE 6D - Audit Area Sandstone Fill RLs 6/6



BMD MB INTS
20210920 INTS FL RLs plot SRF1370

12d Model
Scale 1:515
Mon Sep 20 16:16:47 2021

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

AEC -2 PROPOSED GROUNDWATER MONITORING LOCATIONS

0 10 20 30 40
Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 56

N

LEGEND

Site Boundary

Proposed groundwater wells

Department of Defence
DNSDC Refuelling Area Remediation
Environmental Management Plan

Job Number	21-24133
Revision	A
Date	02 Oct 2018

Proposed groundwater monitoring locations

Figure 6

\\ghdnet\ghd\AU\Sydney\Projects\21\25471\GIS\Maps\Deliverables\21_25471_Z047_DNSDC_ProposedEMPLocations.mxd

Data Source: Aerial Imagery - Sixmaps (2018 - DFSI). mweber

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

Appendix H
GROUNDWATER LEVELS

Table H1 - 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
GW119	27.06.18	-	-	-	6.777	-	19.4	1677	-	33.8	5.25	0.85	1092	8.8	Clear/yellow, shiny sheen, LNAPL 2mm, very strong hydrocarbon odour
MW6019	26.06.18	308006.323	6241114.324	16.359	10.278	6.081	20.3	12222	-	152.4	4.46	7.04	7975.5	12.75	Clear, minor brown sediment, no sheen, no odour
MW6020	22.06.18	308074.639	6241835.173	14.602	8.201	6.401	20.5	128.9	2.9	193.8	5.05	0.06	83.85	10.57	Mostly clear, minor brown / red sediment, no sheen, no odour
Minimum Value						0	19.4	128.9	2.9	33.8	4.46	0.06	83.85		
Maximum Value						0	20.5	12222	2.9	193.8	5.25	7.04	7975.5		
Average						0	20.07	4675.97	2.9	126.67	4.92	2.65	3050.45		

Appendix I
CONSULTATION LOG

Consultation Log – Long Term Environmental Management Plan (LTEMP) – Interstate Terminal Facility							
Item	**Original Version**	**Date**	**Stakeholder**	**Communication Method**	**Comments**	**Changes**	**Finalised Version**
1	-	05.10.2021	JBS&G	*Email – JBS&G email to Tactical (05.10.2021)*	Provision of Technical Memo: *JBS&G 51997 – 136836 (Rev 2),* dated 19 May 2021. Email: *"It is recommended that it be confirmed with the Auditor that the use of asphalt paving as a isolating layer/management measure is appropriate and consistent with the risk assessment, and that subsequently asphalt paving as an isolating layer be explicitly incorporated into future LTEMPs applying to MPW."*	Section 4.5.	-
2	-	31.03.2022	Qube / Tactical	N/A	Issued to Client (vA_DRAFT)	N/A	vA_DRAFT
3	vA_DRAFT	01.06.2022	ER	*Email – PDF with comments*	Client name.	-	vB_DRAFT
4	vA_DRAFT	07.07.2022	Enviroview	*Enviroview (2022), Site Audit Interim Advice 0301-2020-4_01 - Review of the draft MPW Stage 2 INTS Summary Report, Moorebank Avenue, Moorebank NSW – an area within Moorebank Precinct West, dated 7 July 2022 (ref: IA 0301-2020-4_01).*	Comments on JBS&G DRAFT MPW Stage 2 INTS Summary Report, dated 24 September 2021 (Report ref.: 59761/139471_R01_Rev-B).	IA Response provided in relation to relevant comments.	vB_DRAFT
5	vA_DRAFT	07.07.2022	Enviroview	*Enviroview (2022), RE: Site Audit Interim Advice 0301-2020-4_02 – Review of the draft LTEMP Interstate Terminal, Moorebank Avenue,*	Comments on EP Risk DRAFT LTEMP Interstate Terminal, dated 31 March 2022 (Report ref.: EP0489.008_vA_DRAFT).	IA response provided.	vB_DRAFT

Consultation Log – Long Term Environmental Management Plan (LTEMP) – Interstate Terminal Facility							
Item	**Original Version**	**Date**	**Stakeholder**	**Communication Method**	**Comments**	**Changes**	**Finalised Version**
				Moorebank NSW – an area within Moorebank Precinct West, dated 7 July 2022 (ref: IA 0301-2020-4_02).			
6	vA_DRAFT	29.07.2022	Tactical / JBS&G	*Meeting – Tactical, JBS&G and EP Risk.*	a) Requirements for AEC 2 monitoring. b) Potential for reuse of MPW Site PFAS soils in Eagles Beak. c) Inclusion of reuse sections within LTEMP.	Amended.	vB_DRAFT
7	vA_DRAFT	10.08.2022	JBS&G	*JBS&G (2022), DRAFT MPW Stage 2 INTS Summary Report, Moorebank Avenue, Moorebank NSW, dated 10 August 2022 (ref: 59761/139471 (Rev D).*		Update to LTEMP to reflect JBS&G 2022 (Rev D).	vB_DRAFT
8	vA_DRAFT	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, Moorebank NSW – an area within Moorebank Precinct West.*	Comments on EP Risk DRAFT LTEMP Northern Ring Road, Service Pad and Loop Road, dated 22 July 2022 (Report ref.: EP1489.008_v2_Rev C).	Relevant Changes: a) AEC 3 redefined to include PFAS Placement Areas and referenced throughout.	vB_DRAFT
9	vA_DRAFT	24.08.2022	JBS&G	*JBS&G (2022a), Technical Memo: Moorebank Precinct West (MPW) – Placement of Zone 4 PFAS Materials in the Eagles Beak Acoustic Mound, Moorebank Logistic Park, NSW, dated 24 August 2022 (ref: JBS&G 57853-146901 (rev 1)).*		EMP 10 added for landscape maintenance. Eagles beak included within 'proposed	vB_DRAFT

Consultation Log – Long Term Environmental Management Plan (LTEMP) – Interstate Terminal Facility							
Item	**Original Version**	**Date**	**Stakeholder**	**Communication Method**	**Comments**	**Changes**	**Finalised Version**
						development' description.	
10	-	01.09.2022	Qube Tactical	N/A	Issued to Client (vB_DRAFT)	N/A	vB_DRAFT
11	vB_DRAFT	19.10.2022	Tactical / JBS&G	*Meeting – Tactical, JBS&G and EP Risk.*	a) Change in INTS boundary to exclude Part Lot 13, south eastern portion of MPW Site. b) Removal of reference to Eagles Beak and JBS&G Technical Memo (JBS&G 2022a). c) Removal of reuse references as unlikely for reuse of PFAS soils on-site.	a) Boundary updated. b) Reference and relevant sections removed. c) Section 4.5 reduced, EMP for soil reuse AEC 3 removed, EMP landscape maintenance reduced.	vC_DRAFT
12	vB_DRAFT	21.10.2022	JBS&G	*JBS&G (2022), DRAFT MPW Stage 2 INTS Summary Report, Moorebank Avenue, Moorebank NSW, dated 21 October 2022 (ref: 59761/139471 (Rev E) – Not sighted prior to release of this LTEMP.*		Update to LTEMP to reflect items from meeting (item 11).	vC_DRAFT
13	-	21.10.2022	Qube Tactical	N/A	Issued to Client (vC_DRAFT)	N/A	vC_DRAFT
14	vC_DRAFT	27.10.2022	Tactical	*Email to JBS&G and EP Risk.*	*Comments on JBS&G (2022) following discussion with Auditor.* Update to final report.	Update to v1. Reference to updated Validation Report (JBS&G 2022).	v1
15	-	27.10.2022	Qube / Tactical	N/A	Issued to Client (v1)	N/A	v1
16	v1	10.11.2022	Tactical	*Email to EP Risk with Site Auditor correspondence.*	Updated lot boundary to: Part LOT 1 DP1197707 (current property description)	Amended.	v2

Consultation Log – Long Term Environmental Management Plan (LTEMP) – Interstate Terminal Facility							
Item	**Original Version**	**Date**	**Stakeholder**	**Communication Method**	**Comments**	**Changes**	**Finalised Version**
					Parts of proposed Lots 5, 7, 8, 9, 12, 13, 61 & 62 with subdivision plan (see plans SY073909.013.12.6 & SY073909.011.16 SUBDIVISION PLAN(2020)) Removal of reference to MPE COC.		
17	-	11.11.2022	Qube / Tactical	N/A	Issued to Client (v2)	N/A	v2
18	v2	16.11.2022	Tactical	*Email to EP Risk from Tactical..*	Forward of Email from Enviroview. Request to update Figures to reflect 'part of proposed Lots'.	Amended.	v3
19	v2	17.11.2022	Tactical / JBS&G	*Meeting – Tactical, JBS&G and EP Risk.*	As above	Amended. Provision of revised Figures to Tactical. Verbal figure approval provided. Update of report to v3.	v3
20	-	18.11.2022	Qube / Tactical	N/A	Issued to Client (v3)	N/A	v3