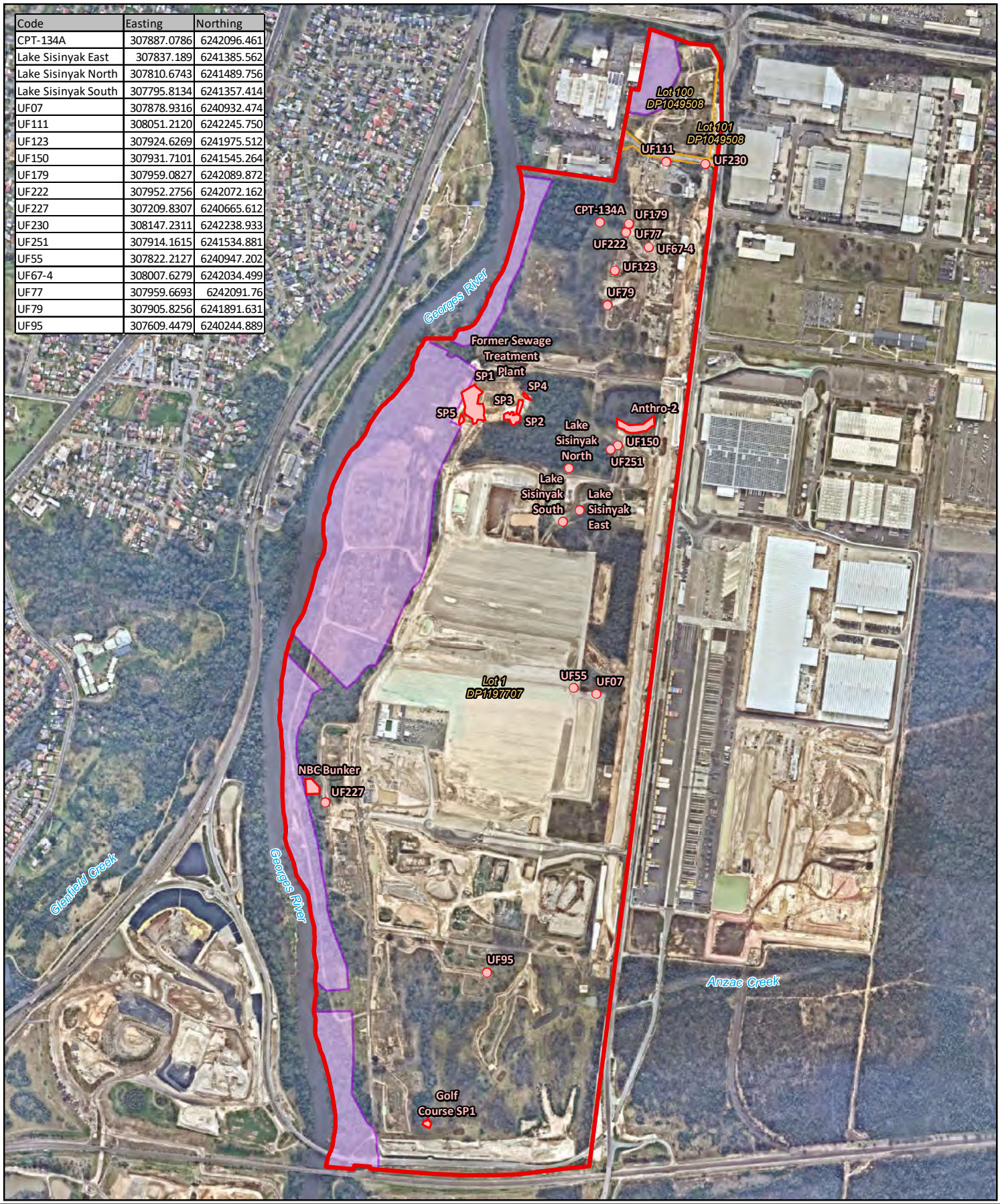
Additional Areas Requiring Management Following **C**MP Works

Code	Easting	Northing
CPT-134A	307887.0786	6242096.461
Lake Sisinyak East	307837.189	6241385.562
Lake Sisinyak North	307810.6743	6241489.756
Lake Sisinyak South	307795.8134	6241357.414
UF07	307878.9316	6240932.474
UF111	308051.2120	6242245.750
UF123	307924.6269	6241975.512
UF150	307931.7101	6241545.264
UF179	307959.0827	6242089.872
UF222	307952.2756	6242072.162
UF227	307209.8307	6240665.612
UF230	308147.2311	6242238.933
UF251	307914.1615	6241534.881
UF55	307822.2127	6240947.202
UF67-4	308007.6279	6242034.499
UF77	307959.6693	6242091.76
UF79	307905.8256	6241891.631
UF95	307609.4479	6240244.889



Legend:

- Approximate Site Boundary
- NSW Cadastre (DFSI, 2020)
- Locations Closed Out
- Areas Closed Out
- Offset Area

Scale 1:12,500 — 0 150 300 metres

CS GDA 1994 MGA Zone 56

Job No: 58753

Client: J Wyndham Prince

Version: R01 Rev B | Checked By: LL

Date 10/09/2020 | Drawn By: AS

MPW, Moorebank, NSW

CMP UNEXPECTED FINDS CLOSE OUT

FIGURE: 3

JBS&G

File Name: \\JBSG-NSW-FS01\Company Data\Projects\J Wyndham Prince\58753 Moorebank Precinct West Stage 2\GIS\Maps\R01 Rev A\58753_03_CMP_UFCloseOut.mxd
Reference: Nearmap 03-08-2020

Legend:

- Existng Water Body - "Swamp"
- Anthropogenic Area

JBS&G

Job No: 51997

Client: Tactical Group

Version: LTEMP	Date: 25-Aug-2020
Drawn By: AS	Checked by: LL

Scale 1:1,000

0 20

metres

Coor. Sys. GDA 1994 MGA Zone 56

MPW
Moorebank, NSW

ANTHROPOGENIC MANAGEMENT AREA

FIGURE: 1

File Name: \\jbsg-nsw-fs01\Company Data\Projects\J Wyndham Prince\58753 Moorebank Precinct West Stage 2\GIS\Maps\ZzMisc\20200825_LL_LTEMP\58753_01_ANTHRO2.mxd
Reference: www.nearmap.com - Imagery 16-06-2020

Legend:

Stockpile Location

JBS&G

Job No: 51997

Client: Tactical Group

Version: LTEMP	Date: 25-Aug-2020
Drawn By: AS	Checked by: LL

Scale 1:1,000

0 20

metres

Coor. Sys. GDA 1994 MGA Zone 56

MPW
Moorebank, NSW

STP-SP10

FIGURE: 2

File Name: \\jbsg-nsw-fs01\Company Data\Projects\J Wyndham Prince\58753 Moorebank Precinct West Stage 2\GIS\Maps\ZzMisc\20200825_LL_LTEMP\58753_02_STP-SP10.mxd
Reference: www.nearmap.com - Imagery 03-08-2020

Appendix D

ENVIRONMENTAL MANAGEMENT PROCEDURES

Land use restrictions		EMP01
Responsibility:	Site Owner (or nominated representative)	
Frequency:	As required	
Objective:	To manage risk to human health and the environment through land use restrictions	
Areas of the Site	AEC 1, AEC 2, AEC 3 and Offset Area	

AEC 1 – TCE Impacted Area

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

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

The MPW Master Plan (**Appendix B**) does not identify any OSDs, buildings and / or buildings containing basements or other habitable spaces within AEC 1. Should the design of the Proposed Development change, then an additional site-specific risk assessment should be undertaken and the LTEMP will need to be revised.

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 AEC2 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.

The MPW Master Plan (**Appendix B**) does not identify any 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 I** 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 Impacted Area

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 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 future design of the OSD basins and associated spillways must include impermeable base and walls. The base and walls should consist of an appropriately sized clay liner with a minimum permeability of $1x10^{-9}$ m/s (or equivalent). Should the design of the OSDs require a permeable base, 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.

Off-Set Area

The JBS&G (2020a) Remediation and Validation Report states that: '*the site is suitable for the intended Intermodal Terminal, subject to implementation of a CMP during the construction phase, and biobanking areas with restricted access.*'

In order to achieve '*restricted access*' within the Offset Area, only the following low frequency and short duration activities are permitted:

- persons undertaking ecological surveys once or twice per year (non-intrusive).
- persons undertaking maintenance of the fire trail, fencing, environmental control (e.g. erosion control) and service easements.
- Persons undertaking weeding, planting, micro habitat relocation, and waste removal, as necessary.

As required by the Arcadis (2020) BIMP, the Offset Area must be adequately fenced and secured to restrict access to recreational users and any other workers not involved in the above activities.

Should any additional activities be undertaken within the Offset Area then a site-specific risk assessment should be undertaken and the LTEMP will need to be revised and / or a PFAS Management Strategy prepared.

Georges River

EnRiskS (2019a) reported there is a human health risk to children who consume more than two serves of fish per month caught from the section of the Georges River adjacent to the Site.

Short to medium-term management of fishing in the Georges River has been implemented through restrictions placed by the government relating to fishing.

EnRiskS (2019a) reported that: *"Do not eat fish or shellfish" signs by NSW DPI Fisheries have been in place in sections of the Georges River since April 2016 due to high levels of industrial pollutants. This sign covers the Georges River and its tributaries upstream from Rabaul Road Boat Ramp (i.e. the area investigated by this HHERA). This area is 'catch and release only' - fishers are advised not to consume fish and shellfish in these waters due to the presence of high levels of industrial pollutants*'.

The current institutional controls implemented by the government to restrict fishing within the Georges River must remain in place. Should these restrictions be removed then the LTEMP will need to be revised and / or a PFAS Management Strategy prepared.

Beneficial Use of Groundwater

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

Landscaped Areas

Reuse of soil should preferentially only occur in areas outside of proposed landscaped areas. However, should soil reuse within landscaped areas by required then the restrictions relating to landscape maintenance within these areas must be undertaken in accordance with **EMP13**.

Future Excavation within Reuse Zones

EnRiskS (2020) has provided criteria (**Table 8)** for the reuse of PFAS in soil within reuse zones at the Construction Area that are predicated on the implementation of management measures relating to future

Land use restrictions	EMP01

excavation. The management measures for future excavation within the reuse zones are provided as **EMP02, EMP03, EMP04, EMP07** and **EMP12.**

Cessation of Land Use Restrictions

The land use restrictions provided in EMP01 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 1		EMP02
Responsibility:	Site Owner (or nominated representative)	
Frequency:	During Stage 2 works	
Objective:	To protect human health and the environment	
Areas of the Site	AEC 1 - TCE Impacted Area	

Human Health

Based upon the Golder (2015a) HHRA and the depth to groundwater between 7 – 9 m BTOC, there was no risk to commercial workers and intrusive workers working within AEC 1 in a trench posed by the presence of identified chlorinated hydrocarbons in soil, soil vapour and groundwater. The conclusions in the Golder HHRA are based upon the proposed open space land use including roads, road verges and woodland / riparian areas. With reference to the MPW Master Plan provided as **Appendix B**, the only infrastructure proposed for AEC 1 is a roadway, pedestrian access way and landscaped areas; therefore, the conclusions provided by Golder (2015a) are relevant to the Proposed Development.

Based upon the cut and fill plans for AEC 1 provided by Costin Roe Consulting Pty Ltd[120] soil is not proposed to be cut from AEC 1 and the area is to be raised with greater than 2m of fill to design levels.

Ecological

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 **EMP06**.
- 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 **Table 8** as soon as practicable.
- Reuse of any materials won from excavations in the reuse zones can only be undertaken as detailed in **Table 8** and **EMP07** unless a further additional risk assessment is conducted as detailed in **Section 4.5**.

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

Refer to **EMP01** for land use restrictions within AEC 1. Please refer to **EMP14** for the management of any unexpected finds during sub-surface works.

[120] Costin Roe Consulting Pty Ltd (2020) Cut and Fill Plan, Drawing Number LPWPIW-COS-CV-DWG-0301, Issue 3, dated 12.06.20 and Costin Roe Consulting Pty Ltd (2020) Bulk Earthworks Sections, Sheet 3, Section 11, Drawing Number LPWPIW-COS-CV-DWG-0353, Issue 2, dated 12.06.20.

Subsurface Works – AEC 2		EMP03
Responsibility:	Site Owner (or nominated representative)	
Frequency:	During Stage 2 Works	
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). 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 WorkSafe 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 of personal protective equipment ('PPE'), which shall include as a minimum:

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

Subsurface Works – AEC 2	EMP03

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 OSD 10 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 CATA for assessment in accordance with **EMP06** and materials tracking undertaken in accordance with **EMP05**. 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 **EMP17** for management of surface water).

Any hydrocarbon impacts identified during excavation should be handled as an unexpected find in accordance with **EMP14**.

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 **EMP06**.
- 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 **Table 8** as soon as practicable.
- Reuse of any materials won from excavations in the reuse zones can only be undertaken as detailed in **Table 8** and **EMP07** unless a further additional risk assessment is conducted as detailed in **Section 4.5**.

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

Subsurface Works – AEC 3		EMP04
Responsibility:	Site Owner (or nominated representative)	
Frequency:	Stage 2 Works	
Objective:	To protect human health and the environment	
Areas of the Site	AEC 3 – PFAS Impacted Areas	

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:

- 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 **EMP06**.
- Erosion and sediment controls outlined in **EMP17** to be adopted to minimize the potential for leaching and migration to surface water bodies.
- Excavated PFAS impacted soil should be temporarily stockpiled on impermeable surfaces (e.g. hardstand, high density polyethylene ('HDPE') plastic or geomembrane) within a specially designed CATA.
- Appropriate bunding (e.g. hay bales or silt fences) should be placed around stockpiles.

- Stockpiling areas should not be located near stormwater drains, pits or gutters.
- Water runoff from stockpiling areas should be managed and retained on-site and not be allowed to flow into the Offset Area and off-site to surface water bodies (Anzac Creek and Georges River) (refer to **EMP17** 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 **EMP10**.
- 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.

Bulk Earthworks and OSD Excavation

Where soil is excavated during bulk earthworks as part of the general cut and fill plan[121] and excavation to facilitate OSD construction soil reuse opportunities should be adopted in accordance with **EMP07**.

Excavation within PFAS in Soil Reuse Areas

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 **EMP06**.
- 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 **Table 8** as soon as practicable.
- Reuse of any materials won from excavations in the reuse zones can only be undertaken as detailed in **Table 8** and **EMP07** unless a further additional risk assessment is conducted as detailed in **Section 4.5**.

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

[121] Costin Roe Consulting Pty Ltd (2020) *Cut and Fill Plan*, Drawing Number LPWPIW-COS-CV-DWG-0301, Issue 3, dated 12.06.20.

Materials Tracking		EMP05
Responsibility:	Site Owner (or nominated representative)	
Frequency:	Stage 2 Works	
Objective:	To protect human health and the environment	
Areas of the Site	AEC 1, AEC 2 and AEC 3	

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

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

Information relating to stockpiles impacted or potentially impacted with PFAS as at the date of this Plan is provided as **Appendix L**. The information in Appendix L should be updated as site works progress and further excavation takes place in accordance with **EMP05**.

Stockpile Management		EMP06
Responsibility:	Site Owner (or nominated representative)	
Frequency:	As required in the event of the stockpiling of soil	
Objective:	To minimise the risk to human health and the environment from the stockpiling of soil.	
Areas of the Site	AEC 1, AEC 2 and AEC 3	

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 the proposed Stage 2 works, which are located outside of AEC 1, AEC 2 or AEC 3 may temporarily generate excess material which may be stockpiled for re-use. 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 **EMP14** and as detailed below.

Contaminated Stockpiles

If assessment by the Environmental Consultant or the Ordnance Contractor identifies contamination in soil excavated from the Site, or a stockpile is observed to be contaminated, then the Environmental Consultant will assess the stockpile in accordance with the unexpected finds protocol (**EMP14**) 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 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). A CATA will be established to allow assessment and treatment of contaminated soil.

The following protocols will be applied at each CATA:

- Stockpiles would only be constructed in areas of the Construction Area 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.
- 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 un-remediated areas of the Construction Area or at locations that did not pose any risk of environmental impairment of the stockpile area or surrounding areas (e.g. hardstand areas).
- The CATA will be located outside of flood zones and separated from stormwater channels or overland flow areas.
- A designated CATA will be set up for the management of each type of contaminated soil to make sure that materials contaminated with different contaminants are segregated.
- All preparatory works associated with the construction of the CATA would be undertaken prior to the placement of material in the stockpile.
- All new stockpiles will be given a unique identifier and their location recorded. A stockpiling and materials tracking procedure is to be developed as part of the CEMP and implemented during Stage 2 Works.
- 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 and to prevent seepage of leachate to groundwater or surface water.
- Contaminated material will be covered to prevent increased moisture from rainwater infiltration and to reduce windblown dust or odour emission.
- Surface water will be diverted away from the stockpiles using bunds or water diversion measures to ensure surface water does not become contaminated.
- Any leachate collected from the CATA must be tested and treated or disposed off-site.
- Temporary stockpiles of asbestos containing material ('ACM') soil if encountered as an unexpected find would be covered to minimise dust and potential asbestos release.
- 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.
- The CATA will be sign posted noting that contaminated soils are stored there and inspected weekly to ensure proper containment and management.
- Before the reuse of any material on-site, it would be validated with respect to the proposed use.
- Should the soil be surplus to requirements then it will be classified in accordance with **EMP10** prior to off-site disposal. The fate of the material from each CATA will be recorded as will its final location and classification as described in **EMP05**.

- Following the completion of the works these areas will be assessed and validated by the environmental consultant.
- The source and fate of all stockpiled soil will be recorded by the implementation of the materials tracking plan.

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 EMP06_1** should be applied for PFAS impacted soil.

Table EMP06_1 – Temporary PFAS Stockpile Management

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

Soil Reuse – AEC 3		EMP07
Responsibility:	Site Owner (or nominated representative)	
Frequency:	Stage 2 works	
Objective:	To ensure that appropriate reuse of PFAS impacted soil is achieved during Stage 2 works to ensure that there are no additional risks to human health or the Environment.	

Reuse of Soil

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

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

Soil Reuse Zone 1 (all areas)

Soil that meets the criteria in **Table 8** for Soil Reuse Zone 1 (all areas) can be used anywhere at the Site, subject to the following management measures:

- *Materials must be placed at least 1 m above groundwater (seasonal maximum).*
- *This criteria relates to material that may be placed adjacent to OSD basins and overflow drainage channels that have a clay liner or equivalent geosynthetic liner.*

The clay liner/geosynthetic liner for the OSD Basins and overflow drainage channels must comply with the requirements provided as **EMP08**.

Soil Reuse Zone 2 (beneath surface cover materials as described in management measures)

Soil that meets the criteria in **Table 8** for Soil Reuse Zone 2 (beneath surface cover materials as described in management measures) can be used within the areas presented in **Figure 5**, subject to the following management measures:

- *Materials must be placed at least 1 m above groundwater (seasonal maximum).*
- *Materials must be placed beneath Engineered Fill, concrete or a clay liner or equivalent geosynthetic liner.*
- *The clay liner/geosynthetic liner must comply with the following requirements:*
  - *Install clay liners (or equivalent geosynthetic liners) through embankments and basin floors (minimum 600 mm) and under bio-retention basins (minimum 300 mm), as well as OSD overflow drainage channels to mitigate any preferential pathways for soil leachate to directly enter surface water and stormwater to migrate to groundwater. The clay/geosynthetic liner should meet a maximum permeability of $1x10^{-9}$ m/s.*
  - *The liners should be monitored via inspection if possible (minimum yearly) or by installation and testing of monitoring well(s) and repaired if damaged or deteriorated.*
  - *All works undertaken in the area of the OSD stormwater infrastructure should not damage these liners. If damage occurs the liners need to be repaired as soon as practicable.*
- *Engineered Fill of a minimum 1 m thickness is to conform to one of the following:*
  - *Sandstone Fill from road header excavation, tunnel boring machine excavation or ripped or rock hammer excavation.*

- *Approved imported fill materials.*
- *Site won VENM or excavated natural material (ENM).*
- *Where the thickness of Engineered Fill is less than 1m, the surface cover must also include concrete pavement or a building slab.*

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

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

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

- *Materials must be placed at least 1 m above groundwater (seasonal maximum).*
- *Materials must be placed beneath Engineered Fill, concrete or a clay liner or equivalent geosynthetic liner.*
- *Engineered Fill of a minimum 1 m thickness is to conform to one of the following:*
  - *Sandstone Fill from road header excavation, tunnel boring machine excavation or ripped or rock hammer excavation*
  - *Approved imported fill materials*
  - *Site won VENM or excavated natural material (ENM).*
  - *Where the thickness of Engineered Fill is less than 1m, the surface cover must also include concrete pavement or a building slab.*
- *Engineered Fill shall be placed in accordance with the following requirements:*
  - *In near horizontal, laterally extensive layers of uniform material and thickness, deposited systematically across the work area as determined by the Geotechnical Inspection and Testing Authority (GITA).*
  - *The compacted thickness of each layer shall be equal to or less than 300 mm. Engineered Fill shall only be placed on subgrade in accordance with the Moorebank Intermodal Logistics Precinct: Bulk Earthworks Specification Area A, B, D (EPSM3813-021S REV 1) and approved by the GITA.*
  - *Engineered Fill shall be placed and compacted to a Dry or Hilf Density Ratios (Standard Compaction) of between 98% and 102%.*
  - *The placement moisture variation or Hilf moisture variation shall be controlled to be between 2% dry of optimum and 2% wet of optimum.*

Soil Reuse – AEC 3	EMP07

Soil reuse for landscaped areas within Soil Reuse Zone 3 must be placed beneath a clay liner/geosynthetic liner of minimum thickness 0.5 m.

- *The clay liner/geosynthetic liner must comply with the following requirements:*
  - *The clay/geosynthetic liner should meet a maximum permeability of $1x10^{-9}$ m/s.*
  - *The liners should be monitored via inspection if possible (minimum yearly) or by installation and testing of monitoring well(s) and repaired if damaged or deteriorated.*

All works undertaken in landscaped areas should not damage these liners and be undertaken in accordance with **EMP13**. If damage occurs the liners need to be repaired as soon as practicable.

Soil Reuse Zone 4 (beneath western ring road and interstate terminal/access areas)

Soil that meets the criteria in **Table 8** for Soil Reuse Zone 4 (beneath western ring road and interstate terminal/access areas) can be used within the areas presented in **Figure 5**, subject to the following management measures:

- *Materials must be placed at least 1 m above groundwater (seasonal maximum).*
- *Materials must be placed beneath Engineered Fill, concrete or a clay liner or equivalent geosynthetic liner.*
- *Engineered Fill of a minimum 1 m thickness is to conform to one of the following:*
  - *Sandstone Fill from road header excavation, tunnel boring machine excavation or ripped or rock hammer excavation*
  - *Approved imported fill materials*
  - *Site won VENM or excavated natural material (ENM).*
  - *Where the thickness of Engineered Fill is less than 1m, the surface cover must also include concrete pavement or a building slab.*
- *Engineered Fill shall be placed in accordance with the following requirements:*
  - *In near horizontal, laterally extensive layers of uniform material and thickness, deposited systematically across the work area as determined by the Geotechnical Inspection and Testing Authority (GITA).*
  - *The compacted thickness of each layer shall be equal to or less than 300 mm. Engineered Fill shall only be placed on subgrade in accordance with the Moorebank Intermodal Logistics Precinct: Bulk Earthworks Specification Area A, B, D (EPSM3813-021S REV 1) and approved by the GITA.*
  - *Engineered Fill shall be placed and compacted to a Dry or Hilf Density Ratios (Standard Compaction) of between 98% and 102%.*
  - *The placement moisture variation or Hilf moisture variation shall be controlled to be between 2% dry of optimum and 2% wet of optimum.*

Soil reuse for landscaped areas within Soil Reuse Zone 4 must be placed beneath a clay liner/geosynthetic liner of minimum thickness 0.5 m.

- *The clay liner/geosynthetic liner must comply with the following requirements:*
  - *The clay/geosynthetic liner should meet a maximum permeability of $1x10^{-9}$ m/s.*

The liners should be monitored via inspection if possible (minimum yearly) or by installation and testing of

monitoring well(s) and repaired if damaged or deteriorated.

Assessment of Soil for Reuse

The result of soil and leachate (neutral pH) PFAS testing results from the proposed cut areas during Stage 2 works are provided as **Appendix J**. Prior to bulk excavation the soil and leachate (neutral pH) analytical results summarised in **Appendix J** should be reviewed to identify areas of soil that may qualify for reuse in accordance with **Table 8**.

Where additional excavation is required within AEC 3 to that proposed in the Cut and Fill Plan[122] then additional assessment / delineation may be required where there is insufficient data is available. Additional insitu sampling or stockpiling sampling must be undertaken in accordance with the sampling methodology for *Data Gap Assessments* provided Section 7.3 of the Golder (2016) RAP which is summarised as follows:

- Sampling should be undertaken by a suitably qualified Environmental Consultant.
- Additional insitu / delineation sampling to be undertaken in accordance with the NSW EPA Sampling Design Guidelines (1995).
- Samples to be collected from 0-0.2 mBGL, 0.5 mBGL, 1.0 mBGL and every metre thereafter to a maximum depth of 0.5 mBGL beyond the maximum proposed depth of excavation.
- Stockpile sampling to be undertaken in accordance with the sampling methodology provided in **EMP10**.

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; or
- Soil in the stockpile has been excavated from AEC 3 and has not been sampled or tested; or
- Soil tracking documentation identifying the source location of the stockpile is not available.

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

- One test per 25 m^3 for soils assessed for volumes less than 200 m^3; or
- The use of the 95% upper confidence level of the arithmetic mean ('UCL_{mean}') value for the data set from each stockpile, with a total number of samples of not less than 10 collected from each stockpile (e.g. for a maximum size stockpile of 2,500 m^3, the sampling frequency of one test per 250 m^3 will be adopted).

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

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

The results of analytical testing are to be compared to the Soil Reuse Criteria in **Table 8**. Sample results that are below all the criteria in **Table 8** can be reused in the respective soil reuse zones provided as **Figure 5**. Where practicable soil excavated from AEC 3 that is reported below the Soil Reuse Criteria should be preferentially placed beneath imported fill areas, paved areas or building footprints.

[122] Costin Roe Consulting Pty Ltd (2020) *Cut and Fill Plan*, Drawing Number LPWPIW-COS-CV-DWG-0301, Issue 3, dated 12.06.20.

Soil Reuse – AEC 3	EMP07

Documentation of Reuse Zones

The following procedures should be implemented to document the reuse zones:

- Supervision of soil reuse by a suitably qualified Environmental Consultant.
- Soil tracking should be undertaken in accordance with **EMP05**.
- Survey of the specific placement location and the lateral and vertical depth of placement of the reused soil.
- Surveys of the lateral and vertical profile of surface cover over reused soil should be undertaken during construction.
- Geotechnical testing of surface cover must be undertaken to confirm compliance with permeability design criteria (where applicable).
- Photographs of surface cover layers should be taken during installation of cover layers.
- Records of soil tracking, site surveys, geotechnical testing results and site photographs should be maintained in accordance with **EMP23**.
- At the completion of soil reuse works, the LTEMP should be revised with all relevant documentation pertaining to excavation, soil tracking, soil placement and surface cover within reuse zones in accordance with **EMP25**.

Site Specific Risk Assessment

Future works that require excavation of soil in the reuse zones can only be undertaken in accordance with **Table 8** and the management procedures provided as **EMP07**, unless a further additional site-specific risk assessment is conducted.

Short to Medium-Term Engineered Stockpiling

Where PFAS impacted soil exceeds the reuse criteria provided as **Table 8** and is not acceptable to be reused at the Site, or where there are limited opportunities for reuse, then the soil is to be placed within an Engineered Stockpile to be constructed at the Site in accordance with the concept design provided as **Appendix H**.

Proposed OSD 6 and OSD 8 are located in AEC 3 near former PFAS training areas where elevated concentrations of PFAS have been reported by EP Risk (2018) above the trigger values provided in **Table 8**. It is estimated that approximately 200,000 m^3 (**Appendix K**) of PFAS impacted soil will be won from the excavation of OSD 6 and OSD 8 and associated bulk earthworks within AEC 3.

The conceptual design of the engineered stockpile has been based upon the volume of PFAS impacted soil excavated from OSD 6 and OSD 8. The on-site storage and containment of the excavated soil will be required to facilitate the construction program until appropriate treatment options become available. The conceptual design of the Engineered Stockpile is provided as **Appendix H** and the final detailed design will depend upon the outcome of the site-specific detailed risk assessment.

Lining of OSD 5, OSD 6 and OSD 8	EMP08
Responsibility:	Site Owner (or nominated representative)
Frequency:	Stage 2 works
Objective:	To ensure that construction and operation of OSD 5, OSD 6 and OSD 8 does not result in preferential groundwater pathways.

The construction of the Proposed Development will alter the spatial permeability of the surface of the Site, the hydrology and stormwater management. There was a risk that due to the size and location of OSDs along the western boundary and the large catchment, the OSDs may increase infiltration within their footprints and exacerbate migration of contamination from PFAS source areas to the Georges River.

EnRiskS (2020) has provided the following management measures for clay liners in the OSDs:

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

In order to manage this risk, the base and walls of the OSDs are proposed to be lined in accordance with the following 'for construction' plans provided as **Appendix B**:

- Costin Roe Consulting Pty Ltd (2020) Basin 5 Plan, Drawing Number LPWPIW-COS-CV-DWG-0433, Issue 1, dated 25.05.20.
- Costin Roe Consulting Pty Ltd (2020) Basin 6 Sections, Drawing Number LPWPIW-COS-CV-DWG-0437, Issue 1, dated 25.05.20.
- Costin Roe Consulting Pty Ltd (2020) Basin 8 Sections, Drawing Number LPWPIW-COS-CV-DWG-0438, Issue 1, dated 25.05.20.

Based upon the construction plans prepared by Costin Roe, the basin liner is proposed to consist of a clay liner consisting of 600 mm minimum thickness through embankments and basin floors and 300 mm minimum thickness under bioretention basins with a maximum clay permeability of 1×10^{-9} m/s.

Once construction of the OSDs is complete a survey of the OSD liners must be undertaken and geotechnical testing completed to confirm the lateral extent, thickness and maximum permeability of the liners have met the design criteria. The LTEMP must be revised with as-built drawings of the OSDs in accordance with **EMP25**.

Where groundwater is encountered during excavation works, management of groundwater to be undertaken in accordance with **EMP16**.

Application of Cover Over Layer in the Offset Area		EMP09
Responsibility:	Site Owner (or nominated representative)	
Frequency:	Stage 2 works	
Objective:	To ensure that construction and operation of OSD 5, OSD 6 and OSD 8 does not result in preferential groundwater pathways	

The EnRiskS (2019) Land HHERA reported the potential ecological risk to terrestrial ecological higher order consumers from bioaccumulation of PFAS was unable to be excluded.

The proposed management activities include the application of a cover over layer in areas where impacted soil exceeds the adopted Tier 1 ecological criteria. The application of the cover over layer is proposed during revegetation of the Offset Area undertaken during the construction phase of works as outlined in the Arcadis (2020) BIMP.

The purpose of the cover over layer will provide habitat for terrestrial organisms (insects / invertebrates) living primarily in the surface soil. The cover over layer is to be applied at a minimum thickness of 0.5 m and consist of an appropriate growing medium suitable for the species of flora proposed by Arcadis (2020). The extent of the proposed cover over layer is provided as **Figure 6**.

The cover over layer should be applied immediately prior to seeding or planting during revegetation works as proposed in the Arcadis (2020) BIMP and appropriate sediment and stormwater controls applied.

Off-site Disposal of Excavated / Unsuitable Material		EMP10
Responsibility:	Site Owner (or nominated representative)	
Frequency:	Continuous	
Objective:	To ensure that surplus material is appropriately classified for off-site disposal or reuse and lawfully disposed from the site.	

Minimise Waste

It is recommended that disturbance of soil within AEC1, AEC 2 and AEC 3 should be minimised by incorporating the following into the construction methodology:

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

Stockpile Classification

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

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

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

The requirements for use of licensed vehicles, waste tracking, 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 Environmental Protection License 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 **EMP23**. 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	EMP10

ACM conduits or ACM 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

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

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

Liquid Wastes

All liquid wastes requiring offsite disposal should be classified in accordance with NSW EPA (2014).

Importation of Fill Material / Aggregate		EMP11
Responsibility:	Site Owner (or nominated representative)	
Frequency:	Stage 2 Works and Operation	
Objective:	To ensure that only material fit for purpose and lawfully able to be brought onto site is imported either temporarily or permanently onto the subject site.	

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

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

- *A review of the site use, history and material properties of the source of the material in order to assess potential for the presence of contaminants.*
- *Depending upon the outcome of the review, soil samples may need to be collected if it cannot be established that the materials satisfy the definition of VENM (refer to Section 7.2.3). If required, sampling will be collected from the imported fill at the following sampling frequency and results screened against the adopted criteria suitable for classify the material as Class 1 or Class 2 materials[123].*
    - *One test per 25 m^3 for soils assessed for volumes less than 200 m^3; or*
    - *The use of the 95% UCL value for the data set, with a total number of samples not less than 10 and a minimum sampling frequency of 1 per 500 m^3; and*
    - *Testing shall be for the analytes identified as potential contaminants of concern through the review of the site use, and history of the material source.*
- *An inspection of the material on arrival at the Site to ensure that the material is consistent with information provided by the Remediation Contractor.*

It should be noted that natural soil intended for use as backfill may contain concentrations of contaminants above the adopted validation criteria. Any background concentrations of contaminants need to be less that validation criteria[124], unless agreed with Environmental Consultant and the Auditor.".

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

Subsurface Maintenance Works		EMP12
Responsibility:	Site Owner (or nominated representative)	
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 to the Site will be in excess of 2m over the majority of the Construction Area, 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 natural site soil then the following procedure should be followed.

Work Health and Safety

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

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

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

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

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

Subsurface Maintenance Works	EMP12

Ecological

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

- Stockpiling of excavated soil to be managed in accordance with **EMP06**.
- 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 **EMP07**.
- Movement of soil should be tracked in accordance with **EMP05**.
- All surplus groundwater and soil removed from excavations must be classified in accordance with NSW EPA (2014) Waste Classification Guidelines NSW EPA (2016) Addendum for PFAS prior to disposal at an appropriately licensed facility in accordance with **EMP10**.
- Recontoured site surfaces must permit free drainage and not permit ponding of surface water.

Management Measures for Surface Cover over Reused Soil

Subsurface maintenance works within reuse zones where surface cover over reused soil is present must implement the following management measures in accordance with EnRiskS (2020):

- Ensuring groundwater is not extracted and used for any purpose subject to the requirements of **EMP16**.
- All excavations minimise the area of PFAS contaminated soil at any one time.
- Stockpiles of PFAS contaminated soil require management in accordance with **EMP06** to ensure water runoff to the offset area or off-site waterbodies does not occur, and appropriate erosion and sediment control measures are implemented.
- All discharges of water from the site comply with the EPL.
- The surface cover placed over reused soil with PFAS impacts must be maintained.
- If the surface cover over reused soil is damaged during maintenance works, the surface cover must be repaired as soon as practicable in accordance with **EMP07** and **Table 8**.
- Any future works that require excavation of soil in the reuse zones can only reuse these materials as detailed in **Table 8** unless a further additional site-specific risk assessment is conducted. Failing this, materials must be appropriately classified and disposed to a licenced landfill in accordance with **EMP10** or stored onsite in accordance with **EMP07**.

Landscape Maintenance		EMP13
Responsibility:	Site Owner (or nominated representative)	
Frequency:	Operation	
Objective:	To ensure that landscape maintenance works will not result in risk to human health and the environment.	

Landscape Maintenance Outside Areas of Reuse

Given that the depth of fill material imported to the Site will be in excess of 2m over the majority of proposed landscape areas within the Construction Area, and the depth of any anticipated landscape maintenance activities will not penetrate depths greater than 2 mBGL, the risk to landscape contractors undertaking routine landscape maintenance is considered to be low outside of areas of reuse.

Landscape Maintenance Inside Areas of Reuse

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:

Construction

- PFAS in soil to be preferentially placed outside of landscaped areas.
- Where soil reuse within landscaped areas is required then the following measures should be adopted:
    - Reuse of soil within landscaped areas to be supervised by a suitably qualified Environmental Consultant.
    - where an Engineered Fill layer of a minimum 1.0 m thickness is not present, a clay liner or equivalent geosynthetic liner must be constructed over reused soil in accordance with **EMP07**.
    - A growth medium of thickness greater than the maximum root depth of vegetation proposed within the landscaped areas should be placed above the Engineered fill / clay liner / equivalent geosynthetic liner.
    - Mulching of the surface of the growth medium should be applied and maintained to reduce the risk of erosion and exposure of the cover layer.
    - Plants with maximum root depths greater than the depth of growth medium applied are prohibited within these areas.
    - As the final design of the Proposed Development has not been finalised, the LTEMP is to be revised in accordance with **EMP25** once construction of landscaped areas is complete with details of soil tracking, survey drawings, capping construction and long term management requirements.

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 **EMP19**.
- 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 **EMP12** must be followed.
  - Where landscaping maintenance works damage the surface cover over reused soil, then the surface cover must be repaired in accordance with the specifications provided as **EMP07** and **Table 8**.

Unexpected finds		EMP14
Responsibility:	Site Owner (or nominated representative)	
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)[125] 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 F** 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)[126] to inform management of any unexpected finds involving UXO.

During Operation

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

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

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

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

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

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

[125] SIMTA (2018) Unexpected Finds Protocol, Moorebank Precinct West Stage 2, dated 26 October 2018 (ref: MIC2-QPMS-EN-APP-00022).
[126] 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).

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.

Additional Validation Requirements		EMP15
Responsibility:	Site Owner (or nominated representative)	
Frequency:	As required	
Objective:	To ensure contamination management activities and unexpected finds have been appropriately characterised and validation for the intended land use.	

JBS&G (2020) has prepared a validation assessment for the Site for all accessible areas outside the identified endangered ecological communities and subject to the implementation of the EP Risk (2020) Contamination Management Plan (CMP) and this LTEMP. A number of the contamination management activities outlined in the LTEMP 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 the validation relevant to the LTEMP is provided below.

AEC 1 – TCE impacted Area

EMP01 requires that no buildings or buildings with underground habitable spaces are constructed in AEC 1. Validation that the land use restrictions outlined in EMP01 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.

AEC 2 – Petroleum Hydrocarbon Impacted Area

EMP01 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 EMP01 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.

Preparatory works including excavation of soil within the proposed OSD 10 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.
- Validation sampling data of stockpiled soil in accordance with **EMP06**.
- Soil classification data and landfill receipts for soil disposed offsite.

AEC 3 – PFAS Impacted Area

Preparatory works including excavation of soil within the proposed OSD 3, OSD 6, OSD 8 and OSD 10 footprints will require the following information to verify that appropriate reuse or off-site disposal of surplus material has been undertaken:

- Soil tracking data to confirm the source and final location of PFAS impacted soil reused at the Site in accordance with EMP07.
- Soil sampling and analytical results to confirm that the soil meets the requirements for reuse outlined in **EMP07** and the reuse criteria provided in **Table 8**.
- Survey data to confirm the location and depth of PFAS impacted soil reused at the Site under the conditions of restricted reuse provided in **EMP07**.

Additional Validation Requirements	EMP15

- Soil classification data and landfill receipts for soil disposed off-site.
- As-built drawings, permeability laboratory reports and photographs of the constructed Engineered Stockpile to verify that it was constructed in accordance with the Detailed Design.

As-built drawing, permeability laboratory reports and photographs to confirm that the liners of OSD 5, OSD 6 and OSD 8 have been constructed in accordance with the detailed design drawings provided as **Appendix B**.

Offset Area

The following information will be required to verify that the cover over layer has been applied to the Offset Area as required in **EMP09:**

- Survey drawings detailing the lateral extent and depth of the cover over layer applied to the Offset Area.
- Confirmation of appropriate classification of the cover over material prior to importation to the 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 Areas Requiring Management Following Completion of CMP Works

Validation of additional areas requiring management following completion of CMP Works 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).

On-going Monitoring

The results of ongoing monitoring collected in accordance with **EMP18** will be required to verify whether the redevelopment works have resulted in reducing or stable PFAS groundwater and surface water concentrations at the Site.

Validation reporting

Validation reporting should be prepared in accordance with Section 12 of the Golder (2016) RAP and the NSW EPA (2020) *Guidelines for Consultants Reporting on Contaminated Land*.

Management of Groundwater		EMP16
Responsibility:	Site Owner (or nominated representative)	
Frequency:	As required	
Objective:	To ensure that groundwater is managed so as not to present a risk to human health or the environment.	

Based upon previous assessments undertaken, elevated levels of chlorinated hydrocarbons (AEC 1), petroleum hydrocarbons (AEC 2) and PFAS (AEC 3) in groundwater samples collected have been reported at the Site (**Appendix C**). 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. Based upon the proposed commercial / industrial land use of the Proposed Development and the availability of a reticulated water supply, it is considered the requirement for the beneficial use of groundwater at the Site is low.

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

Worker Health and Safety

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

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

Groundwater Monitoring

Groundwater monitoring will be required during construction to assess the short -term effects of construction on groundwater migration and mass flux. The details of the groundwater monitoring program are provided in **EMP18**.

Management of surface water		EMP17
Responsibility:	Site Owner (or nominated representative)	
Frequency:	As required	
Objective:	To ensure that surface water is managed so as not to present a risk to human health or the environment.	

Based upon previous assessments undertaken, disturbance of soil in AEC 3 has the potential to leach PFAS to stormwater. Further discussion of surface water management is provided below.

Management of On-site Surface Water

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

During construction works 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.
- Disturbed soils within AEC 3 should be capped or covered to the extent practicable to prevent leaching of PFAS to stormwater.
- Temporary sediment basins and swales constructed in a catchment located within AEC 3 should be lined with an impermeable geotextile liner to prevent infiltration of PFAS impacted stormwater to underlying groundwater.
- Stormwater in sediment basins should be tested prior to being discharged. PFAS impacted stormwater may be reused for dust suppression or discharged to the Georges River provided the results of analytical testing meets the criteria provided in the PFAS NEMP and the Environmental Protection Licence ('EPL').
- Discharge of stormwater to the Georges River during construction work will be a temporary requirement, and then only a last resort if the ten-day holding requirement cannot be met and alternative dust suppression options are not available.

Water Treatment

During prolonged rain events, the option to use stormwater for dust suppression will be limited and another contingency to manage large stormwater volumes and diminishing storage capacity should be considered.

Although implementation of the prevention measures listed above will reduce long-term PFAS stormwater concentrations in the sediment basins, an on-site water treatment system should be designed and commissioned at the Site as a contingency to treat stormwater which exceeds the adopted PFAS stormwater disposal criteria during prolonged rain events. The system should be designed to treat PFAS concentrations to below the adopted PFAS stormwater disposal criteria.

Priority should be given to treatment of PFAS impacted stormwater with the highest reported concentrations.

The storage capacity of the Water Treatment Plant ('WTP') must take into account:

- Catchment area of each PFAS impacted temporary stormwater basin.
- Other basins in the vicinity that may accumulate runoff with PFAS concentrations above the discharge concentrations listed in the Environment Protection Licence.

- Run off from unexpected finds of PFAS and dewatering (if required) of any PFAS remediation works.
- All temporary construction stormwater basins must have their design capacity available within 5-days of a rainfall event.
- A treatment rate of 2 to 5 litres per second.

The water treatment plant will be designed to achieve the required flow rate and discharge criteria and will consist of the following elements:

- Flow Balance Storage Pond.
- pH Adjustment.
- Coagulation & Flocculation.
- Clarifier.
- Ion exchange Adsorption System.
- Granular Activated Carbon Filtration System.
- Treated Water Storage/ Disposal.
- Sludge Management.
- Sludge Thickener.
- Sludge Dewatering.

Compliance testing of treated effluent is to be undertaken to confirm concentration of PFAS are below the adopted criteria (provided in the EPL). The compliance sampling frequency will involve:

- Batch sampling for a proof of performance period of up to two weeks; and
- Regular sampling during continuous discharge following the proof of performance period, at a frequency to be determined based upon the results from the proof of performance period.

The Environmental Consultant must approve in writing the waters are suitable once water has been tested and meets all the criteria for discharge offsite or for reuse on site. Subsequently, the Environment Advisor must authorise the discharge by signing the Discharge or Reuse Water Approval. All sediment basins are required to maintain their design capacity, within 5 days following any rainfall event.

As a contingency, water that does not meet the discharge criteria will be:

- Retreated on-site through the treatment plant. The water will then be retested to confirm compliance; or
- Disposed of off-site to a suitably licenced facility lawfully able to accept the waste.

Worker Health and Safety

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.

Management of surface water	EMP17

- 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.

Surface Water Monitoring

Surface water monitoring will be required during construction to assess the effects of construction on contamination migration and mass flux. The details of the surface water monitoring program are provided in **EMP18**.

Groundwater and Surface Water Monitoring		EMP18
Responsibility:	Site Owner (or nominated representative)	
Frequency:	As required	
Objective:	To ensure that groundwater and surface water is managed during and post construction so as not to present a risk to human health or the environment.	

Monitoring of groundwater and surface water will be required during construction to assess any impact to the migration of PFAS impacted groundwater and PFAS mass flux to the Georges River as a result of construction of the Proposed Development and the effectiveness of the management measures implemented.

Post construction monitoring will establish whether the residual groundwater PFAS contamination plume is shrinking, stable, or increasing, and whether natural attenuation and/or migration is occurring according to expectations through line-of-evidence collection.

Although there are monitoring wells present at the Site which may be used for monitoring, there is the potential additional wells may be required. This section details monitoring well installation and monitoring procedures. The monitoring program has been tailored to address assessment of PFAS trends in groundwater and surface water associated with historical firefighting training at the Site.

Groundwater monitoring of petroleum hydrocarbon impacts has been recommended by GHD (2018a) for AEC 2, however as these monitoring requirements are associated with the adjacent MPE property to the east and a separate Site Audit, no monitoring of AEC 2 will be undertaken as a requirement of this LTEMP. The location of the monitoring wells recommended by GHD (2018a) are provided as **Appendix I** and additional controls to manage the protection of wells during construction and future access is provided as **EMP01**.

No monitoring of TCE impacted groundwater was recommended by Golder (2015a) to assess the stability or risk of harm to human health or the environmental associated with AEC 1.

Frequency of Monitoring

The following monitoring frequency should be implemented during construction:

- Conduct quarterly sampling during and at completion of the Stage 2 construction works.
- Sample targeted monitoring wells along the western downgradient boundary with the Georges River as presented in **Figure EMP18_1**.
- Sampling of surface water from the Georges River should be undertaken in conjunction with groundwater sampling. The location of surface water sampling locations is presented in **Figure EMP18_1**.

The following monitoring frequency should be implemented post construction:

- Monitoring should be undertaken at the same monitoring locations that were sampled during construction presented in **Figure EMP18_1**.
- Conduct quarterly sampling after completion of the Stage 2 construction works for a minimum period of 2 years to ensure a range of seasonal and river flow variations is assessed in accordance with the Final Compilation of Mitigation Measures (FCMMs).
- The long-term monitoring program should be established to gather concentration trend data at key locations before, during, and after the major construction works at the site. An endpoint to the monitoring programme should be discussed following review of the trends after completion of construction works and the 2 year post-occupation period. The LTEMP should be revised at this point in time.

Monitoring Well Installation Scope

The groundwater monitoring strategy will utilise existing monitoring wells where practicable. However, where existing monitoring wells have been destroyed during construction works, installation of replacement monitoring wells will be completed in accordance with the following methodology:

- Advance bores using hollow stem augers to the final depth of the groundwater monitoring well. The final depth will be dependent on groundwater conditions at each of the proposed sample locations.
- Log soil in accordance with the Unified Soil Classification System (USCS). In addition to geological parameters, the presence of fill, and any evidence of contamination, will be recorded.
- Construct wells using 50 mm diameter, Class 18 uPVC screen and blank riser. The annular space will be backfilled with washed 8/16" sand to a minimum of 0.5 m above the slotted screen. Approximately 0.5 m of hydrated bentonite will be placed above the sand. The well will then be completed using cement/bentonite grout to the surface, and protected with a traffic-rated metal, bolt-down cover. Alternatively, the PVC may extend above the ground and be covered with a protective, lockable standpipe. The final method will be dependent on the location of each well and with consideration for proper access. Some well installation details such as annular seal may require modification in areas with shallow groundwater.
- Develop each well using a submersible pump to improve the connectivity with the surrounding formation. During development, water quality parameters pH, electrical conductivity, dissolved oxygen, redox potential, turbidity and temperature will be collected sing a calibrated water quality meter and flow through cell. Development will continue until the well is dry, the water is clear, or ten well volumes have been removed.
- Survey the location and elevation of each newly installed groundwater monitoring well.
- Collect any contaminated soil cuttings in a sealed drum pending off-site disposal at an appropriately licensed facility.
- Allow the wells a minimum of seven days to stabilise prior to sampling.

Groundwater Monitoring Well Sampling

The proposed groundwater sampling program scope is as follows:

- Gauge depth to groundwater in all existing and newly installed wells using an electronic water level sounder.
- Purge and sample groundwater from all existing and newly installed wells using a low-flow Micropurge® bladder sampling pump. This is in accordance with NSW recognised best practice sampling techniques. The inlet of the pump will be lowered to approximately 1 m below the groundwater level, and the pump rate adjusted to minimise drawdown. If drawdown exceeds the maximum allowance of 0.2 m, the well will be purged dry, allowed to recharge, and sampled using the low-flow pump.
- Field parameters pH, electrical conductivity, dissolved oxygen, redox potential, and temperature will be recorded during purging using a calibrated water quality meter and flow through cell. The wells will only be sampled when all parameters have stabilised to within 10%.
- Groundwater samples will be collected in laboratory prepared and appropriately preserved glass and plastic bottles specific to each analyte, with the sample details added to the label on the jar.
- Quality samples will be collected in accordance with the NEPC and AS4482.1 and will include approximately one blind and one split duplicate per 20 primary samples analysed (1 in 10 for PFAS analysis), and a rinsate and trip blank for each day of sampling to verify decontamination and transport procedures.
- The samples will be placed immediately on ice after sampling and transported to the NATA accredited

laboratories under appropriate chain-of-custody documentation for analytical testing of PFAS.

Surface water Sampling

The proposed surface water sampling program scope is as follows:

- Surface water sampling locations will be identified by GPS co-ordinates to ensure that each sampling event will be undertaken at the same location.
- Sampling of surface water will be undertaken at the same time as groundwater sampling.
- Field parameters pH, electrical conductivity, dissolved oxygen, redox potential, and temperature will be recorded prior to sampling using a calibrated water quality meter.
- Surface water samples will be collected from the bank of the river using a grab sampler and placed in laboratory prepared and appropriately preserved glass and plastic bottles specific to each analyte, with the sample details added to the label on the jar.
- Quality samples will be collected in accordance with the NEPC and AS4482.1 and will include approximately one blind and one split duplicate per 20 primary samples analysed (1 in 10 for PFAS), and a rinsate and trip blank for each day of sampling to verify decontamination and transport procedures.
- The samples will be placed immediately on ice after sampling and transported to the NATA accredited laboratories under appropriate chain-of-custody documentation for analytical testing of PFAS chemicals.

Onsite Surface Water Sampling During Construction within AEC 3

To confirm and maintain the effectiveness of the PFAS stormwater preventative measures outlined in **EMP17**, the following should be undertaken during construction works:

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

Groundwater investigation Levels (GILs)

The GILS adopted for Tier 1 assessment of the analytical results are per the ASC NEPM (2013) and PFAS NEMP.

Quality Assurance and Quality Control

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, which lists the following precautions during sampling:

- Prohibited for sampling personnel:
  - New clothing;
  - Clothing with stain-resistant, or waterproof coatings/treated fabric (e.g. GORE-TEX®);
  - Tyvek® clothing; and
  - Fast food wrappers/containers and pre-wrapped foods.
  - Prohibited sampling equipment and containers at the Site:

  - Teflon®-containing or coated field equipment;
  - Teflon®-lined lids on containers;
  - Glass sample containers.
  - Drilling fluids or drilling water; and
  - Decontamination solutions.

- Other products prohibited at the Site:
  - Aluminium foil;
  - Self-sticking notes (e.g. 3M Post-it notes);
  - Waterproof paper, notebooks and labels;
  - Drilling fluid containing PFAS;
  - Detergents and decontamination solutions (e.g. Decon 90®);
  - Reusable chemical or gel ice packs (e.g. BlueIce®); and
  - Sunscreen;
  - Cosmetics; and
  - Fast food wrappers.

EP Risk notes that additional guidance on Quality Assurance and Quality Control is provided in the PFAS NEMP.

Decontamination and Rinsate Preparation

Prior to the commencement of sampling activities, any non-disposable sampling equipment, including sampling trowel/knife was cleaned with a water and a brush, rinsed deionised water, sprayed with deionised water and then air dried. The equipment was then inspected to ensure that no soil, oil, debris or other contaminants were apparent on the equipment prior to the commencement of works. Sampling equipment was subsequently decontaminated using the above process between each sampling location.

Rinsate samples were collected following decontamination of all non-disposable sampling equipment during each of the soil and groundwater sampling events.

Duplicate and Triplicate Sample Preparation

Field soil and groundwater duplicate and triplicate samples were obtained during the field works. The collected samples were divided laterally into three samples with minimal disturbance and placed in three sets of the appropriate sampling containers. Each sample was then labelled with a primary, duplicate or triplicate sample identification before being placed in the same chilled esky for laboratory transport.

Reporting

Preparation of a report after each monitoring round, in accordance with the NSW EPA (2020) *Consultants Reporting on Contaminated Sites*, including:

- A clear definition of the sampling and analysis completed.
- A clear definition of the contamination assessment criteria.
- Figures displaying sampling locations.
- Analytical summary tables comparing results to the Tier 1 assessment criteria provided in the ASC NEPM 2013 and PFAS NEMP.
- Field records (e.g. sampling logs, field instrument calibration records and photographs).
- Chain of custody documentation and laboratory analytical reports.
- An assessment of data reliability.
- A discussion of the field observations, analytical results and groundwater trends against baseline

conditions.

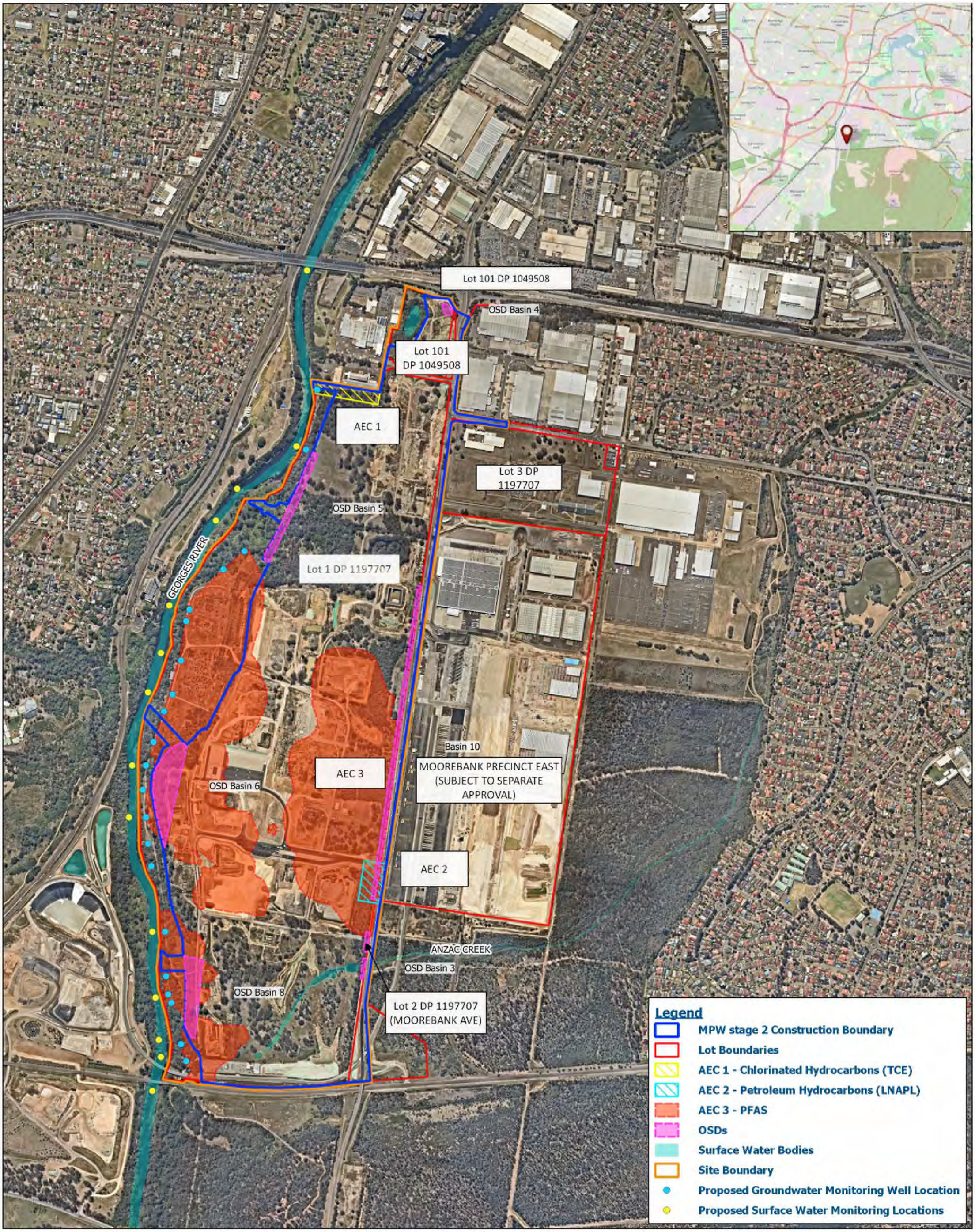
- Establish whether the residual groundwater contamination plume is shrinking, stable, or increasing, and whether natural attenuation and/or migration is occurring according to expectations through line-of-evidence collection.
- Detect changes in environmental conditions (e.g. hydrogeologic, geochemical 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.
- Recommendations for any changes to future monitoring scope or procedures.

Cessation of Monitoring

At the end of the 2 year post construction monitoring program, should stable or reducing concentrations in surface water, groundwater and stable or reducing groundwater mass flux be reported then a recommendation from a suitably qualified consultant to cease monitoring can be made for approval by the Site Auditor and / or NSW EPA.

Should stable or reducing conditions not be reported then additional monitoring will be required in accordance with recommendations by the suitably qualified consultant and a long-term monitoring program should be developed.

Groundwater monitoring can be ceased prior to completion of the 2 year post construction period, subject to completion of a human health and ecological risk assessment that concludes there is no risk to human health or the environment and approval by the Site Auditor and / or NSW EPA.



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Long Term Environmental Management Plan
Moorebank Precinct West

Figure EMP18_1 - Monitoring Locations

Job No: EP1489.001
Date: 2/09/2020
Drawing Ref: EMP18_1

N

0 170 340 510 m

Approximate Scale Only

Coordinate System: MGA 84
Drawn by: SL Checked by: PS
Scale of regional map not shown
Source: Near Maps

APPROVED COMPANY ISO 9001 Quality Management Systems QMS
APPROVED COMPANY AS/NZS 4801 OH&S Management Systems QMS
APPROVED COMPANY ISO 14001 Environmental Management Systems QMS

Training		EMP19
Responsibility:	Site Owner (or nominated representative)	
Frequency:	As required	
Objective:	Suitably trained personnel will be available to implement the requirements of the LTEMP.	

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

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

As a minimum the induction will include the following:

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

The Site Occupant shall maintain records of personnel engaged in the nominated tasks and their relevant training/qualifications for the period of implementation of the LTEMP in accordance with **EMP23** and with the document control system outlined in the CEMP.

Works involving contractors and subcontractors will be managed in accordance with **EMP20**.

Contractor and Subcontractor Management		EMP20
Responsibility:	Site Owner (or nominated representative)	
Frequency:	As required	
Objective:	Ensure that all persons who may be exposed to contaminated material are suitably aware of conditions and requirements of this LTEMP.	

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

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

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

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

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

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

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

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

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

Contingency Plan		EMP21
Responsibility:	Site Owner (or nominated representative)	
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 (**EMP14**), 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 **EMP22** to **EMP24** 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 **EMP23** and where appropriate, amendment(s) to the LTEMP will be undertaken as outlined in **EMP24**.

Non-compliance with LTEMP		EMP22
Responsibility:	Site Owner (or nominated representative)	
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 **EMP25** 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.

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; and
- Where required, notify regulatory authorities.

Record Keeping		EMP23
Responsibility:	Site Owner (or nominated representative)	
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	EMP24
Responsibility:	Site Owner (or nominated representative)
Frequency:	Once every 12 months
Objective:	The implementation of the LTEMP requires to be audited in accordance with EPA guidance publications to identify areas of non-compliance or partial compliance with relevant legislation/regulations and/or the requirements of this plan.

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

- Relevant legislation / regulations; and
- This plan.

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

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

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

Where a non-compliance is detected during the audit process, then the non-compliance shall be informed as per the requirements of **EMP22**: Non-Compliances with LTEMP.

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

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

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

Audit / Review of LTEMP Implementation	EMP24
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		EMP25
Responsibility:	Site Owner (or nominated representative)	
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 **EMP24**;
- Any non-compliances with the LTEMP that have been unable to be resolved;
- Practicalities and efficiencies of management measures and whether there are more effective ways to improve environmental compliance;
- Any changes in state or national environmental protection legislation or guidelines that impact any part of the LTEMP; or
- Any proposed changes in land-use of the site or adjoining sites which may impact upon exposure pathways.

If the 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.

This plan is to be revised at the completion of Stage 2 earthworks 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.

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

Cessation of LTEMP Application		EMP26
Responsibility:	Site Owner (or nominated representative)	
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 groundwater and surface water monitoring and trend analysis and will require an additional site-specific human health and ecological risk assessment.

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

Appendix E

CONDITIONS OF CONSENT COMPLIANCE MATRIX

Table E1 – Conditions of Consent (CoC) – SSD 5066			
CoC	**Requirement**	**Document Reference**	**How Addressed**
B2	The approved works (including and excavation required for remediation) must not occur below 5 metres Australian Height Datum (AHD) and lower the water table below 1 m AHD on adjacent class 1, 2, 3, 4 land in accordance with the Liverpool Local Environmental Plan ('LEP') (2008).	EP Risk (2020b) ASSMP	All works below 5 m AHD to be undertaken in accordance with an acid sulfate soil management plan.
B3	The subject site is to be remediated in accordance with: a) The approved Remedial Action Plan; b) State Environmental Planning Policy No. 55 – Remediation of Land; and c) The guidelines in force under the Contaminated Land Management Act.	Golders (2016) RAP and JBS&G (2020) Remediation Validation Report prepared.	JBS&G (2020) reported that remediation was undertaken in accordance with the Golders (2016) RAP, which includes compliance with SEPP 55 and the CLM Act.
	Amendments to the approved Remedial Action Plan required as a result of further site investigations must be approved by the site auditor, in consultation with the EPA.		No amendments to the RAP have been prepared.
	Within 3 months after completion of the remediation works, a notice of completion, including a validation and/ or monitoring report is to be provided to the Secretary. This notice must be consistent with State Environmental Planning Policy No. 55 – Remediation of Land.	JBS&G (2020) Remediation Validation Report	The JBS&G (2020) Remediation Validation Report will be provided to the Secretary pending approval by the Site Auditor.
	The validation and monitoring report is to be independently audited and a Site Audit Statement issued. The audit is to be carried out by an independent auditor accredited by the Environmental Protection Authority. Any conditions recorded on the Site Audit Statement are to be complied with.		The JBS&G (2020) Remediation Validation Report has been provided to the Site Auditor for review in the preparation of a site audit statement (pending).

Table E2 – Conditions of Consent (CoC) – SSD 7709			
CoC	**Requirement**	**Document Reference**	**How Addressed**
B161	Prior to the commencement of any works, the Applicant must engage a Site Auditor accredited under the Contaminated Land Management Act 1997 NSW Site Auditor Scheme.	Section 1.3	Site Auditor engaged
B162	Prior to construction, the Applicant must provide the EPA [Environment Protection Authority] with a copy of all reports to date relating to the assessment of PFAS undertaken for the development and in relation to contamination from the development.		Post the Provision of the MPW S 2 Site Audit Statement including the subsequent approval of the LTEMP all records will be provided to the EPA
B163	Should the Applicant identify a potential risk to off-site receptors due to PFAS contamination, the Applicant must contact the EPA as soon as practicable to discuss requirements for community consultation.		EnRiskS (2019) has prepared an off-site Waterway Human Health and Ecological Risk Assessment that has been provided to the Site Auditor. The Site Auditor has reviewed the EnRiskS (2019) report and provided his review and the EnRiskS (2019) report to the EPA.

Table E2 – Conditions of Consent (CoC) – SSD 7709			
CoC	**Requirement**	**Document Reference**	**How Addressed**
B164	Prior to vegetation clearing: • The Applicant must identify contamination within vegetated areas and prepare options for remediation in those areas, with the objectives to: - retain vegetation to the greatest extent possible beyond the completion of remediation; - minimise land disturbance in accordance with Condition B41; and - not reduce the ability to provide connectivity and habitat corridors in accordance with Conditions B2 and B152; • Where remediation requires vegetation clearing, an appropriate assessment of the impact of clearing on contaminated land must be prepared by a suitably qualified and experienced consultant; and • Where contamination is identified as occurring within those areas where vegetation is proposed to be cleared, a Contamination Management Plan must be prepared in consultation with the Site Auditor detailing the location and nature of the contamination and the proposed remediation and/ or management measures that will be undertaken to address the on-site and potential off-site impacts.	EP Risk (2020) CMP	A CMP was prepared and all vegetation removal works are complete. Any residual contamination remaining post CMP works are outlined in Appendix C with management procedures provided in
B165	A copy of the assessment required by Condition B164 above and any associated update of the CEMP required must be provided to the Planning Secretary for approval one month before commencement of vegetation clearing. Evidence of consultation with the Site Auditor must be included.	EP Risk (2020) CMP	Qube has provided CMP to the Planning Secretary.

Table E2 – Conditions of Consent (CoC) – SSD 7709			
CoC	**Requirement**	**Document Reference**	**How Addressed**
B166	Following vegetation clearing and prior to the commencement of other construction activities, the Applicant must complete remediation of the site in accordance with any relevant Remedial Action Plan (RAP) to the satisfaction of the Planning Secretary. The RAP must include options to remediate and/or manage PFAS impacted areas across the site, including the conservation area. The RAP must be submitted to the accredited site auditor and the NSW EPA for comment prior to implementation. If any amendments are required to the RAP, the amendments must be approved by an EPA accredited Site Auditor.	Golder (2016) RAP and JBS&G (2020) Remediation and Validation Report	The Golder (2016) RAP has been prepared and approved by the Site Auditor and no amendments have been made. Remediation of the site has been completed following vegetation clearing and prior to construction activities as detailed in the JBS&G (2020) Remediation Validation Report.

Table E2 – Conditions of Consent (CoC) – SSD 7709			
CoC	**Requirement**	**Document Reference**	**How Addressed**
B167	The Applicant must prepare a Validation Report for the Stage 1 development. The Validation Report must: • Be reviewed by an EPA accredited Site Auditor; • Be prepared in accordance with the RAP and the Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites (OEH 2011); - Include, but not be limited to: - comment on the extent and nature of the remediation undertaken, - describe the location, nature and extent of any remaining contamination on site, - sampling and analysis plan and sampling methodology, - details of the volume of treated material emplaced within any remaining containment cell, - results of any validation sampling, compared to relevant guidelines/ criteria, and - discussion of the suitability of the remediated areas for the intended future land uses described under SSD 5066 and SSD 7709 – Stage 2 (including for the raised landform and imported fill characteristics and the drainage outlet structures in the riparian corridor).	JBS&G (2020) Remediation Validation Report	JBS&G (2020) Remediation Validation Report prepared and submitted to the Site Auditor for approval.
B168	A copy of the Validation Report must be provided to the Planning Secretary, EPA and the Certifying Authority prior to commencement of construction (other than the vegetation clearing required for remediation).	JBS&G (2020) Remediation Validation Assessment Report	To be provided to the Planning Secretary after approval by the Site Auditor.

Table E2 – Conditions of Consent (CoC) – SSD 7709			
CoC	**Requirement**	**Document Reference**	**How Addressed**
B169	Upon completion of the remediation required in relation to Stage 1 (SSD 5066) and this development and prior to the commencement of construction (other than the vegetation clearing required for remediation) in relation to this approval (i.e. Stage 2 SSD 7709), 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 Stage 2 SSD 7709 including for the: a) importation and placement of fill, b) construction of a warehouse estate including warehouse buildings, c) development of an intermodal terminal, and protection of the conservation area including riparian corridor and biodiversity offset sites.	JBS&G (2020) Remediation and Validation Assessment Report. This Plan	• JBS&G (2020) Remediation Validation Report prepared in accordance with the Golder (2016) RAP. • The JBS&G (2020) Remediation Validation Report states that the site is suitable for the intended land use subject to the implementation of this Plan. • The JBS&G (2020) Remediation Validation Report and this Plan have been provided to the Site Auditor for approval.
B170	To ensure that no residual contaminated land on site is impacted by this approval, the requirements of Site Audit Statement required by Condition B169 cannot be staged.	NA	To be actioned by the Site Auditor
B171	Upon completion of importation and placement of fill and prior to construction of permanent built surface works, the Applicant must submit to the Planning Secretary, a Site Audit Report and a Site Audit Statement A for the whole site, prepared in accordance with the NSW Contaminated Land Management - Guidelines for the NSW Site Auditor Scheme 2017, which demonstrates the site is suitable for its intended land uses under MPW Stage 2 SSD 7709.	NA	To be actioned by the Site Auditor
B172	Where remediation outcomes for the site require long term environmental management, a suitably qualified and experienced person must prepare a Long-Term Environmental Management Plan (LTEMP), to the satisfaction of the Site Auditor. The plan must:	This Plan	LTEMP prepared by a suitably qualified and experienced person – Certified Environmental Practitioner – Contaminated Land (CEnvP CL). This Plan has been sent to the Site Auditor for approval.

Table E2 – Conditions of Consent (CoC) – SSD 7709			
CoC	**Requirement**	**Document Reference**	**How Addressed**
	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 C** 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 D** of the LTEMP provides Environmental Management Procedures including details of restrictions. A containment cell is not proposed in this Plan, however a conceptual design for a short to medium term engineered stockpile is provided as **Appendix H**.
	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, however **Appendix H** of this Plan provides conceptual design and description of leachate management for the short to medium term engineered stockpile.
	iv. a description of the procedures for monitoring the integrity of the containment cell,		A containment cell is not proposed in this Plan, however **Appendix H** of this Plan provides description of leak detection and monitoring for the short to medium term engineered stockpile.
	v. a surface and groundwater monitoring program,		The surface and groundwater monitoring program is detailed in Section 5 of this Plan and **EMP18** in **Appendix D** of this Plan.
	vi. mechanisms to report results to relevant agencies,		Reporting mechanisms provided in Section 5 and **Appendix D** of this Plan. EMP18 in Appendix D provides protocols for the cessation of monitoring post development subject to approval by the Site Auditor and / or NSW EPA.
	vii. triggers that would indicate if further remediation is required, and		An unexpected finds protocol to manage further remediation is provided as Appendix F of the LTEMP.

Table E2 – Conditions of Consent (CoC) – SSD 7709			
CoC	**Requirement**	**Document Reference**	**How Addressed**
	viii. details of any contingency measures that the Applicant is to carry out to address any ongoing contamination.		A contingency plan is provided as **EMP21** in **Appendix D** 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 D	**EMP10** in **Appendix D** addresses liquid and non-liquid waste classification
C1	The applicant must ensure that the environmental management plans required under this consent are prepared in accordance with any relevant guidelines, and include: a) Baseline data; b) A description of: (i) The relevant statutory requirements (including any relevant approval, licence or lease conditions); (ii) Any relevant limits or performance measures/criteria; and (iii) The specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any measurement measures; 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;	a) Section 3 and Appendix C b) i) Section 4 ii) Appendix D iii) Appendix D c) Appendix D d) i) Appendix D ii) Section 5 e) EMP21 f) EMP24 g) EMP22 h) Section 4.1 i) EMP25	a) Includes known site conditions and summarised remaining contamination issues. b) (i) Covers any relevant approval and/or licence. (ii) Specifies adopted criteria to be used for assessment and validation. (iii) Specifies sampling and validation plans and the decision questions needing to be answered for each different type of assessment/validation. c) Specifies the details of each management plan as required by Golder (2016a). d) (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.

Table E2 – Conditions of Consent (CoC) – SSD 7709			
CoC	**Requirement**	**Document Reference**	**How Addressed**
	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.		f) Continual improvement for the LTEMP is discussed. g) Appendix D provides protocols and reporting: (i) Specifies how incidents and non-compliances will be managed. (ii) Specifies how complaints in relation to contamination will be managed. (iii) Specifies how non-compliance to statutory requirements will be managed. h) Lists the responsibilities for the LTEMP Implementation. i) Specified how the LTEMP will be reviewed/updated.

Table E3 – 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 D** – **EMP14** 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	**EMP06** and **EMP10**
		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.	**EMP06**
		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).	**EMP14**
		The removal works would be conducted in accordance with the National Occupational Health and Safety Commission Code of Practice for the Safe Removal of	**EMP14**

Table E3 – 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.	**EMP14**
		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.	**EMP14**
		Temporary stockpiles of asbestos containing material (ACM) soils would be covered to minimise dust and potential asbestos release	**EMP14**
		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).	**EMP14**
		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	**EMP14**

Table E3 – 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.	**EMP06**
		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).	**EMP06**
		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.	**EMP06**
		The stockpiles of contaminated material would be covered with a waterproof membrane (such as polyethylene sheeting) to prevent increased moisture from rainwater	**EMP06**

Table E3 – 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	**EMP06 and EMP07**
		Where required, contaminated materials and wastes generated from the Project remediation and construction works would be taken to suitable licensed offsite disposal facilities	**EMP10**
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;	**EMP22, EMP 23 and EMP24**
		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 E3 – 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).	**EMP05, EMP06, EMP07, EMP10**
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 E3 – 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.	**EMP06 and EMP10**
	REMM 7J	All offsite disposals would be carried out by approved transport operators and to approved facilities	**EMP10** 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 E3 – 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 C** along with the management measures in **Appendix D**
	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.	**Appendix H**
	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 E3 – 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.	**EMP05** and **EMP06**
	REMM 8I	Contaminated soil/fill material present will be 'chased out' during the excavation works based on visual, olfactory and preliminary field test results.	**EMP01, EMP02, EMP03, EMP04**
	REMM 8J	Excavated soil would be temporarily stockpiled, sampled and analysed for waste classification processes. Subject to receipt of waste classification results, the material would be transported to a licensed offsite waste disposal facility as soon as practicable to minimise dust and odour issue through storage of materials on site.	**EMP06** and **EMP10**
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	**EMP06**
	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 E3 – 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)	**EMP14**
	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).	**EMP14**
	REMM 8RO	An appropriate asbestos removal licence issued by WorkCover NSW would be required for the removal of asbestos contaminated soil.	**EMP14**
	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.	**EMP14**
	REMM 8Q	Temporary stockpiles of asbestos containing material (ACM) soils would be covered to minimise dust and potential asbestos release	**EMP14**
	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)	**EMP14**

Table E3 – 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).	**EMP14**
	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	**EMP06**
	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)	**EMP06**
	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	**EMP06**

Table E3 – 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	**EMP06**
	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.	**EMP07**
	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	**EMP10**
	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 groundwater monitoring is proposed in **EMP18** in **Appendix D**.
8 d)	-	In relation to management of PFAS:	

Table E3 – 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 D** 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) **EMP04, EMP05, EMP06, EMP07, EMP08, EMP09, EMP14, EMP21**
	iii)	detail soil, groundwater and surface water PFAS contamination monitoring requirements and testing and	**EMP18**

Table E3 – 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	**EMP25**
	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 D**

Table E3 – 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	

Table E4 – Final Compilation of Mitigation Measures (FCMMs)

FCMM	Requirement	Document Reference	How Addressed
OB	The CEMP, or equivalent, for the Proposal would be based on the PCEMP (Appendix I of this EIS), and include the following preliminary management plans: • Preliminary Construction Traffic Management Plan (PCTMP) (Appendix M of the EIS) • Air Quality Management Plan (Appendix O of the EIS) • Erosion and Sediment Control Plans (ESCPs) and Bulk Earthworks Plans, within the Stormwater Drainage Design Drawings (Appendix R of the EIS) As a minimum, the CEMP would include the following sub-plans: • Construction Traffic Management Plan (CTMP) • Construction Noise and Vibration Management Plan (CNVMP), prepared in accordance with the Interim Construction Noise Guideline • Cultural Heritage Assessment Report/Management Plan • Construction Air Quality Management Plan • Construction Soil and Water Management Plan (SWMP), prepared in accordance with Managing Urban Stormwater, 4th Edition, Volume 1, (2004) • ESCP • Flood Emergency Response and Evacuation Plan • UXO, EO, and EOW Management Plan • Acid Sulfate Soils Management Plan • Bushfire Management Strategy • Community Information and Awareness Strategy. • Flora and Fauna Management Plan (FFMP) • Groundwater Monitoring Program (GMP)	**CEMP**	CEMP prepared by the Principal Contractor during construction

Table E4 – Final Compilation of Mitigation Measures (FCMMs)

FCMM	Requirement	Document Reference	How Addressed
5A	A SWMP and ESCP, or equivalent, would be prepared for the Proposal. The SWMP and ESCPs would be prepared in accordance with the principles and requirements of the Blue Book and based on the Preliminary ESCPs provided in the Stormwater and Flooding Assessment Report (refer to Appendix R of the EIS). The following aspects would be addressed within the SWMP and ESCPs: Stockpiles would be located away from flow paths on appropriate impermeable surfaces, to minimise potential sediment transportation. Where practicable, stockpiles would be stabilised if the exposed face of the stockpile is inactive more than ten days, and would be formed with sediment filters in place immediately downslope	**CEMP**	While this plan is separate to the SWMP and ESCP it does include this requirement for the management of stockpiles.
5I	Stockpile sites established during construction are to be managed in accordance with stockpile management principles set out in Appendix L of this RtS. Mitigation measures within the Stockpile Management Protocol include: In order to accept fill material onto site, material characterisation reports/certification showing that the material being supplied is virgin excavated natural material (VENM) / excavated natural material (ENM) must be provided. Each truck entering the Site will be visually checked and documented to confirm that only approved materials that are consistent with the environmental approvals are allowed to enter the site. Only fully tarped loads are to be accepted by the gatekeeper. Environmental Assurance of imported fill material will be conducted to confirm that the materials comply with the NSW EPA Waste Classification Guidelines and the Earthworks Specification for the MPW site. The	**EMP06, EMP10** and **CEMP**	These measures have been included in the LTEMP.

Table E4 – Final Compilation of Mitigation Measures (FCMMs)

FCMM	Requirement	Document Reference	How Addressed
	frequency of assurance testing will be as nominated by the Environmental assuror/auditor. All trucks accessing the site for the purpose of clean general fill importation would enter and exit via the existing main Site access located from Moorebank Avenue. Ingress and egress to the stockpiling areas would be arranged so that the reversing of trucks within the site is minimised. Stockpiles would not exceed ten-metres in height from the final site levels, with battered walls at gradients of 1V:3H For any stockpile heights greater than 4 m, benching would be implemented. Where reasonable and feasible, and to minimise the potential for erosion and sedimentation of stockpile(s), stockpile profiles would typically be at angle of repose (the steepest angle at which a sloping surface formed of loose material is stable) with a slight concave slope to limit the loss of sediments off the slope, or through the profile and the formation of a toe drain. The top surface of the stockpile(s) would be slightly sloped to avoid ponding and increase run off. Topsoil stockpiles would be vegetated to minimise erosion. Stockpiles would be protected from upslope stormwater surface flow through the use of catch drains, berms, or similar feature(s) to divert water around the stockpile(s). A sediment control device, such as a sediment fence, berm, or similar, would be positioned downslope of the stockpile to minimise sediment migration. Any water seepage from stockpiles would be directed by toe drains at the base of the stockpiles toward the sediment basins or check dams and away from the emplacement or extraction working face.		

Table E4 – Final Compilation of Mitigation Measures (FCMMs)

FCMM	Requirement	Document Reference	How Addressed
	Newly formed stockpiles would be compacted (sealed off) using a smooth drum roller at the end of each working day to minimise water infiltration. Haul roads would be located alongside the stockpile to the work/tipping area. As per best practice, the catchment area of haul roads for surface water runoff would be approximately 2530 m lengths, facilitated by the provision of spine drains which would convey water from the haul road to toe drains at the base of the stockpile, and then to sediment basins. Temporary sediment basins would be established in accordance with the ESCP prepared for the site. Stockpiling of clean fill material is to be carried out during Works Period A (pre-construction) and Works Period D (bulk earthworks). Any imported clean general fill material that would be subject to stockpiling within the Proposal site for more than a 10-day period without being worked on, would be subject to stabilisation works, to minimise the potential for erosion. Where the material being stockpiled is less coarse or has a significant component of fines then surface and slope stabilisation would be undertaken. Methods for slope stabilisation may include one or a combination of the following: – Application of a polymer to bind material together – Application of hydro-seed or hydromulch – Covering batters with mulch to provide ground cover – Covering batters with geofabric – Use of a simple sprinkler system for temporary stockpiles, including use of radiating sprinkler nozzles to maintain fine spray over exposed surfaces		

Table E4 – Final Compilation of Mitigation Measures (FCMMs)

FCMM	Requirement	Document Reference	How Addressed
	– Other options identified by the Contractor Topsoil stockpiles would be seeded with a grass/legume or nitrogen fixing species (such as acacia) to assist in erosion control and reduce loss of beneficial soil nutrients and micro-organisms		
6A	The CEMP would identify the actions to be taken should additional contamination be identified during the development of the site (i.e. an unexpected finds protocol), and will address REMM items 8H, 8T, 8U, 8V and 8W (of the MPW Concept Plan Approval (SSD 5066)).	**CEMP**	To be addressed in the CEMP.
6B	A site-specific Remediation Action Plan (RAP) is not considered to be required for the Proposal. The following documentation would be utilised for the purposes of remediating the site: • The Preliminary Remediation Action Plan (PB, 2014a) • The Validation Plan – Principles (Golder, 2015b) • The Demolition and Remediation Specification (Golder 2015c) • Any other contamination documentation prepared for the remediation activities undertaken for MPW Early Works (Stage 1).	**JBS&G 2020**	Currently Stage 1 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) 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	**Golder 2016b**	The asbestos in soils management plan has been developed in accordance with current Guidelines and codes of practice.

Table E4 – Final Compilation of Mitigation Measures (FCMMs)			
FCMM	**Requirement**	**Document Reference**	**How Addressed**
	• How to Manage and Control Asbestos in the Workplace (2011).		
6E	An Acid Sulfate Soils Management Plan (ASSMP) (or equivalent) would be prepared as part of the CEMP in accordance with the ASSMAC Assessment Guidelines (1998), for areas identified as being of low or high risk i.e. works within close vicinity of the Georges River (Figure 13-2 of this EIS). In addition, a risk assessment quantifying the risks associated with the volumes of soil to be disturbed, the laboratory results from ASS testing undertaken, the end use of the materials and the proximity to sensitive environments is to be undertaken. All offsite disposal would be in accordance with the *NSW Waste Classification Guidelines Part 4: Acid Sulfate Soils* (2009).	**EP Risk 2020b**	A separate ASSMP has been prepared for the Site.
6F	The existing groundwater monitoring undertaken for the Proposal would continue. A GMP would be developed at the conclusion of remediation activities for the Proposal and included as part a Long-Term Environmental Management Plan (LTEMP) (to be prepared for approval by the Accredited Site Auditor and in association with the OEMP). The main purpose of the GMP would be to assist in the management of groundwater contamination (particularly PFAS impacts) at the site, and to minimise potential harm to human health and the environment. The GMP would achieve the following objectives: Establish whether the residual groundwater contamination plume is shrinking, stable, or increasing, and whether natural attenuation and/or migration is occurring according to expectations through line-of-evidence collection Provide appropriate groundwater investigation levels (GILs) for groundwater contaminants, in accordance with the National	**EMP18**	A groundwater sampling strategy is included in **EMP18**.

Table E4 – Final Compilation of Mitigation Measures (FCMMs)

FCMM	Requirement	Document Reference	How Addressed
	Environment Protection (Assessment of Site Contamination) Measure 1999 (ASC NEPM). Should exceedances be identified, contingency plans for further investigations or remediation would be prepared. Provide appropriate trigger levels for key contaminants (where available), based on the receptor of interest and identified contaminants Serve as a compliance program, so that potential impacts to down-gradient receptors are identified before adverse effect occurs (relative to above objectives) Detect changes in environmental conditions (e.g. hydrogeologic, geochemical or other changes) that may reduce the efficacy of any natural attenuation processes or that could lead to a change in the nature of impact. Establish groundwater conditions (i.e. concentrations and/or trends) which indicated that groundwater monitoring could be reduced or ceased and the requirements of the GMP absolved. The monitoring program is to be undertaken for two years post operation of the Proposal to ensure a range of seasonal and river flow variations is assessed. At the completion of the two-year period, subject to analysis of results, consideration would be given to whether this monitoring is required to continue. The approach to PFAS management will be confirmed following further monitoring in consultation with, and the approval of, the NSW EPA Accredited Site Auditor.		
6H	At the conclusion of remediation works, a Remediation and Validation Report (RVR) is to be prepared for the Proposal to facilitate the Auditor's review of remediation and validation activities. The RVR is to document the remediation and validation activities completed within specific areas of the Proposal, including:	**JBS&G 2020**	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) under review by the Site NSW EPA Accredited Auditor.

Table E4 – Final Compilation of Mitigation Measures (FCMMs)

FCMM	Requirement	Document Reference	How Addressed
	• Information relating to the materials used in the separation layers such as the soil types, geotextile materials, and sealant types etc. (if required) • An as-constructed plan of the site showing the locations, depths and materials of the separation layers installed at the site.		
6I	The existing site-wide Long-Term Environmental Management Plan (LTEMP), such as the one established at the completion of Early Works, is to be revised at the completion of the Proposal remediation activities to include protocols for ongoing maintenance and/or monitoring or any long term remedial/mitigation measures to be implemented following completion of the Site Audit Statement.	**This Plan**	Provides requirements to revise the LTEMP post construction.
6J	In order to accept fill material onto site, the following will be undertaken: • Material characterisation reports/certification showing that the material being supplied is VENM/ENM must be provided. • Each truck entry will be visually checked and documented to confirm that only approved materials that are consistent with the environmental approvals are allowed to enter the site. Only fully tarped loads are to be accepted by the gatekeeper. Environmental Assurance of imported fill material will be conducted to confirm that the materials comply with the NSW EPA Waste Classification Guidelines and the Earthworks Specification for the MPW site. The frequency of assurance testing will be as nominated by the Environmental assuror/auditor.	**Golder 2016 RAP** **EMP11**	Both requirements for the acceptance of fill are stated within this section.
7A	The following measures would be included in the CEMP (or equivalent) to minimise hazards and risks: • Procedures for safe removal of asbestos	**CEMP**	This plan includes procedures for the safe removal of asbestos.

Table E4 – Final Compilation of Mitigation Measures (FCMMs)			
FCMM	**Requirement**	**Document Reference**	**How Addressed**
	• Provision for safe operational access and egress for emergency service personnel and workers would be provided at all times • An Incident Response Plan that would include a Spill Management Procedure.		The remaining two requirements are not the scope of this plan.
12A	The following mitigation measures would be implemented as part of the CEMP (or equivalent) for waste management: • Characterisation of construction waste streams in accordance with the NSW Waste Classification Guidelines • Management of any identified hazardous waste streams • Procedures to manage construction waste streams, including handling, storage, classification, quantification, identification and tracking • Mitigation measures for avoidance and minimisation of waste materials • Procedures and targets for re-use and recycling of waste materials.	**CEMP**	To be included in the CEMP

Appendix F

UNEXPECTED FINDS PROTOCOL

Construction

UNEXPECTED FINDS PROTOCOL

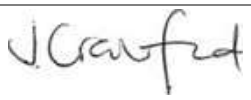
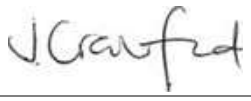
Moorebank Precinct West Stage 2

02 AUGUST 2019

SYDNEY INTERMODAL TERMINAL ALLIANCE

Moorebank Precinct East Stage 2

Unexpected Finds Protocol

Author	Ketan Patel	
Checker	Jamie Crawford	
Approver	Jamie Crawford	

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REVISIONS

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

ACRONYMS AND DEFINITIONS

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

CONTENTS

APPENDICES

LIST OF TABLES

1 INTRODUCTION

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

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

1.1 Objectives and Targets

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

Table 1 Objectives and Targets

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

2 ENVIRONMENTAL MANAGEMENT

2.1 Compliance Matrices

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

Table 2 Conditions of Consent (CoCs)

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

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

Table 3 Revised Compilation of Mitigation Measures (RCMMs)

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

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) approval for the MPW Concept was granted by the Commonwealth Department of the Environment and Energy (DoTEE) in September 2016 (No. 2011/6086). This approval was provided for the impact of the MPW Project on listed threatened species and communities (Sections 18 and 18A of the EPBC Act) and Commonwealth action (Section 28 of the EPBC Act).

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

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

Table 4 Commonwealth Approvals

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

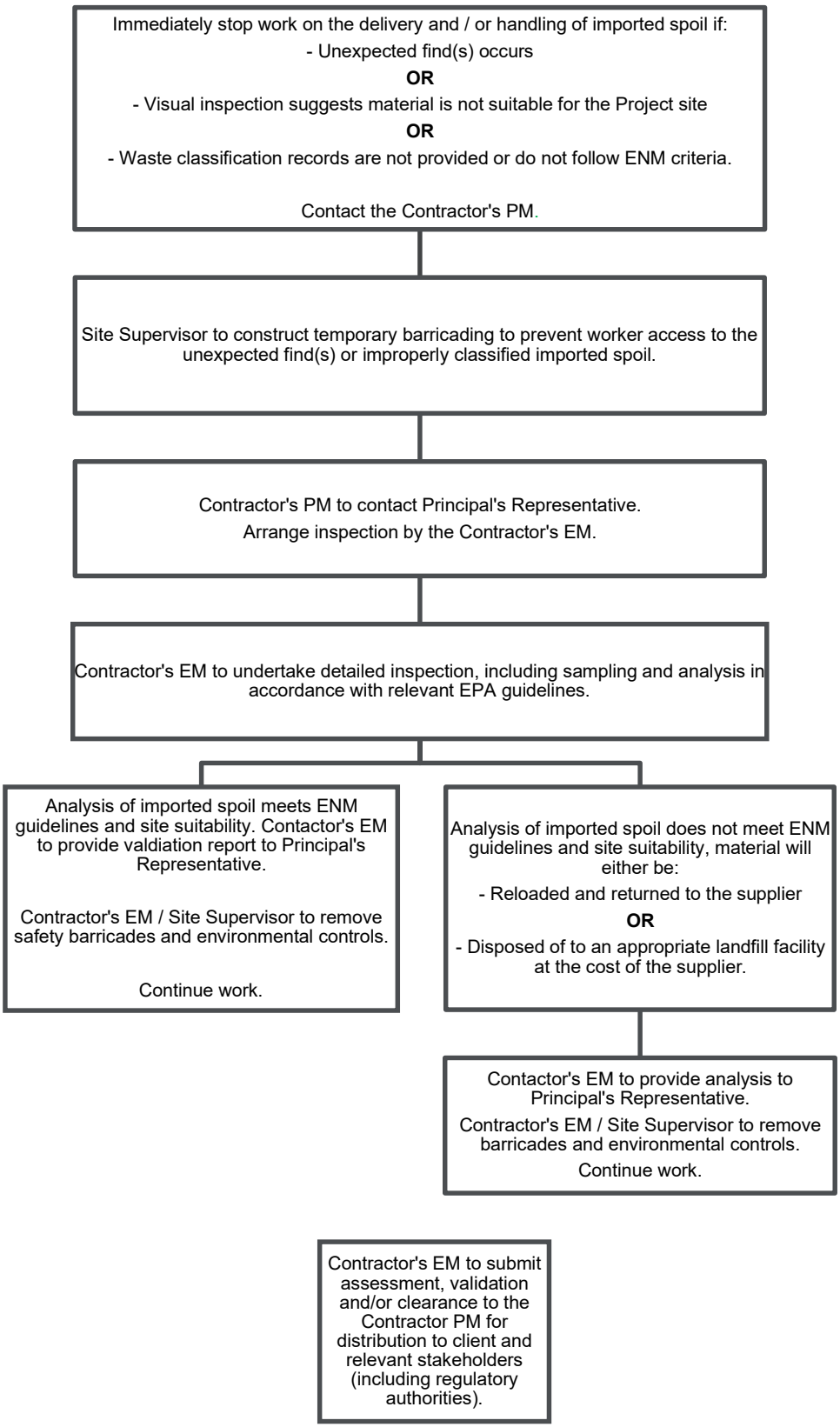
2.2 Unexpected Finds Protocols

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

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

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

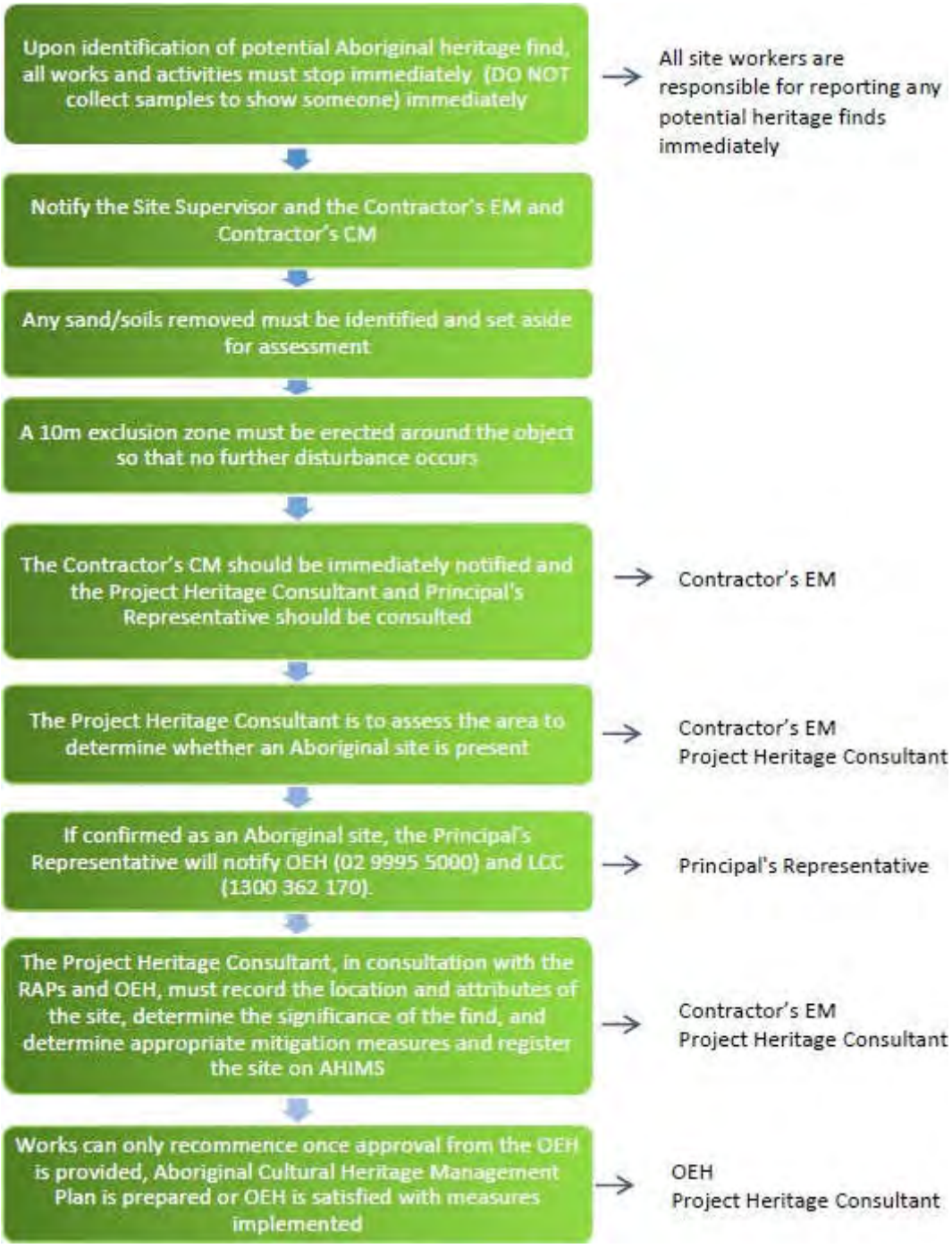
APPENDIX A UNEXPECTED (CONTAMINATION WITHIN IMPORTED SPOIL) FINDS PROTOCOL


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

APPENDIX B UNEXPECTED (HERITAGE) FINDS

Unexpected (Heritage) Finds Protocol

Aboriginal Heritage



Examples of Potential Unexpected Aboriginal Finds

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

Typical characteristics of flaked stone tools include:

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

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

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

Skeletal Remains

Non-Aboriginal Heritage

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

APPENDIX C UNEXPECTED (BIODIVERSITY) FINDS

Unexpected (Biodiversity) Finds protocol

Purpose

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

Training

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

Protocol

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

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

APPENDIX D UNEXPECTED (ONSITE CONTAMINATION) FINDS PROTOCOL

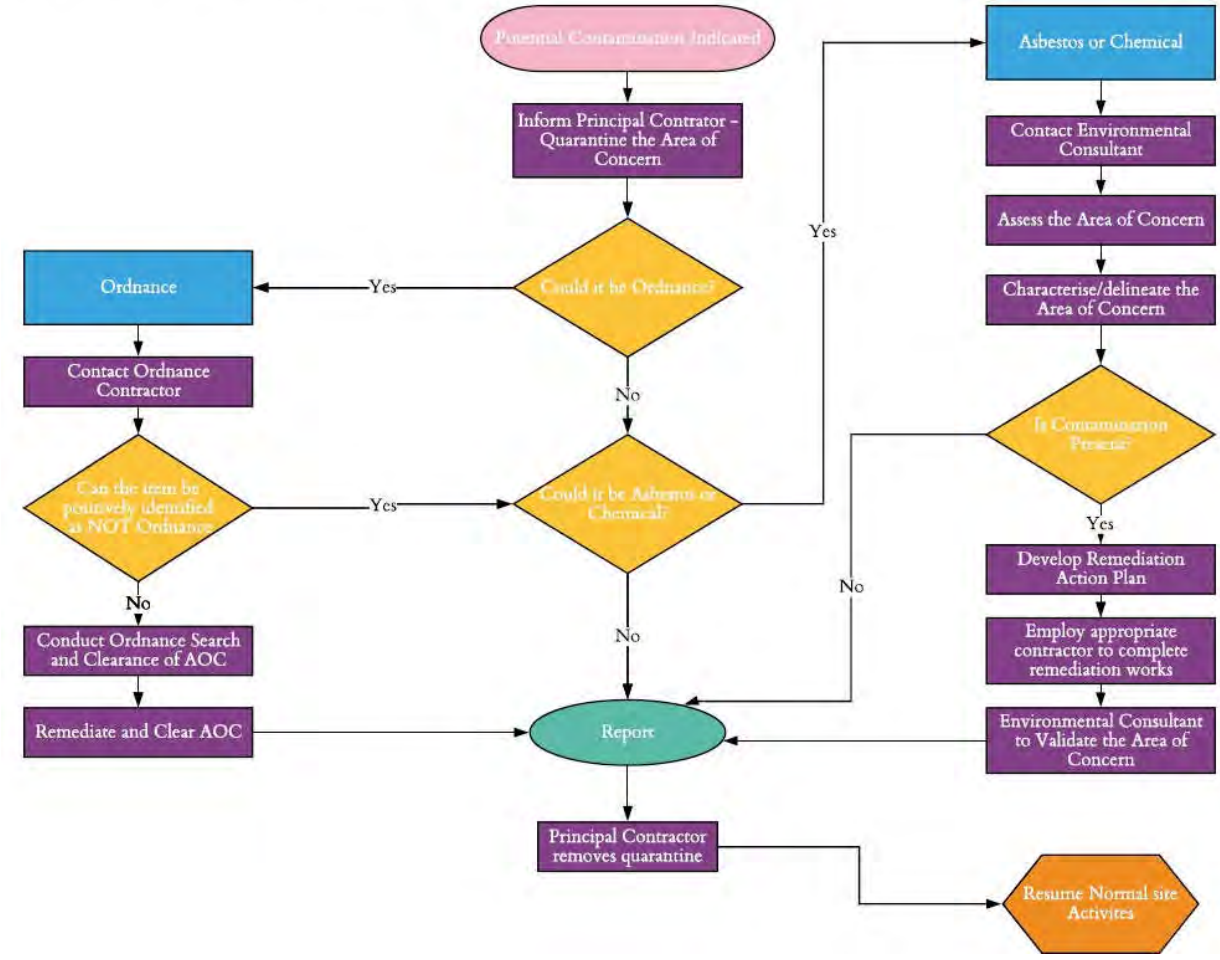
Potential Site Hazards

If you SEE or SMELL anything unusual

STOP WORK & contact Site Foreman

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

Unexpected Finds Protocol (UFP)



Operation

8D – Process Report Form

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

Problem Description (D2)

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

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

Root Causes (D4)		% Contribution

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

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

Prevent Recurrence / Lessons Learned (D7)

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

WI_007

Appendix G
REPORTING REGISTERS

Appendix G

Table G-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 G

Table G-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 H

ENGINEERED STOCKPILE CONCEPT DESIGN

Appendix H – Engineered Stockpile Conceptual Design

Section 10 of NEMP 2.0 2020[1] identifies three common methods used for on-site capping including engineered stockpiles, capping and covering and engineered containment facilities. All are designed to minimise release of PFAS to the environment through, dust generation, storm water flow and infiltration or groundwater inflow and migration. Section 10 of NEMP 2.0 2020 also outlines guidance on siting and controls for PFAS impacted materials with PFAS concentrations above 0.14 mg/kg and below 50 mg/kg.

Table 6 of the NEMP 2.0 2020 describes five classes of stockpiles and the hierarchy of controls required for transient through to medium and long-term storage of PFAS impacted soil in stockpiles. The stockpile class is determined by the timeframe they are to be present for, including transient (<48 hours), temporary (48 hours to six months), short-term (six months to two years), medium-term (two to five years) and long-term (> five years).

Stockpile controls range from anchored covers and earthen bunds on impervious base or hardstand for temporary stockpiles, to engineered containment infrastructure with composite covers and liners, leachate collection systems and monitoring systems for medium-term and long-term stockpiles. Given the potential for PFAS contaminated soils to be stored for more than two years and with reference to specifications for engineered stockpiles prepared by Defence 2018[2] the medium-term stockpile controls were adopted for the conceptual design.

Based on the anticipated volume of soil to be excavated from OSD 6 and OSD 8 of approximately 200,000 m^3 and the MPW project layout and proposed staging, the preferred option for short-term to medium-term on-site management of the low level PFAS impacted soil materials is storage in an engineered stockpile. The location for the proposed short to medium-term engineered stockpile is shown in **Figure H1** in **Appendix H**.

The design criteria for the short-term to medium-term engineered stockpile from Section 10 of NEMP 2.0 2020 are presented in **Table H1**.

[1] PFAS National Environmental Management Plan (NEMP), National Chemicals Working Group of the Heads of EPAs Australia and New Zealand (HEPA), Version 2.0 dated January 2020

[2] Defence PFAS Engineered Stockpile Facility Performance Specification, V 1.0 (WIP) 12 March 2018

Table H1 – Engineered Stockpile Design Criteria – Short to Medium-Term[3]	
Item	**Description**
Stockpile Location	The stockpile will be located above the Georges River flood zone, at an elevation greater than 2m above the groundwater table, with a design life to consider climatic conditions and with suitable buffers and setbacks.
Stockpile Height and Batter	The stockpile will be sited in accordance with the Development Consent[4], 1V:3H, which permits stockpiles up to 10 m high with benches > 4m.
Management Plan	Ongoing management of the stockpile will be in accordance with this LTEMP, which includes ongoing monitoring, maintenance and management
Access	Access for preparation, monitoring, maintenance and unloading/removing of stockpile.
Storm Water Management	The stockpile design will include measures to divert stormwater flow away from the stockpile, to minimise drainage into the stockpile and manage flow off clean stormwater off the stockpile. Earthen bunds around the stockpile ensure surface stormwater is diverted away and will also be used to manage clean stormwater run-off from the surface of the stockpile. The proposed batter of 1:3 to 1:4 and surface drainage layer will prevent water pooling on the liner and allows clean surface stormwater to be diverted off the stockpile minimising infiltration and generation of leachate.
Protection Layer	The design will include a protection vegetated topsoil layer to prevent damage from site construction and maintenance activities, plant growth and burrowing animals.
Drainage Layer	A subsurface drainage layer will be incorporated into the design to prevent pooling of surface stormwater on the liner and allow clean surface water infiltration to be diverted off the stockpile.
Composite Cap and Side Lining	The cap will include a composite lining system designed to limit the medium-term to long-term seepage through the cap and side lining. The design will be based on composite layers of geosynthetic and low permeability clay to provide a permeability less than $1x10^{-9}$ m/s.
Composite Base Lining	The liner will include a composite lining system designed to limit the medium-term to long-term seepage through the baseliner. The cap and liner system should also be joined where possible to fully encapsulate the PFAS contaminated soils.
Leachate Drainage and Capture	The design will incorporate a drainage layer to minimise hydraulic pressure on the liner and capture leachate and allow for leachate collection system. The liner and liner drainage layer will grade to the side of the stockpile to allow maintenance. A sump will be used to collect leachate and will incorporate a pump and leachate storage tank/s to allow for storage, testing and collection for off-site disposal of leachate.
Detailed Design	A detailed design of the engineered stockpile will be developed by the Stage 2 contractor prior to implementation.

[3] Adopted from Section 10 of NEMP 2.0 2020

[4] Development Consent, Moorebank Precinct West Stage 2 (MPW Stage 2), under Section 4.38 of the Environmental Planning and Assessment Act 1979, dated November 2019

Table H1 – Engineered Stockpile Design Criteria – Short to Medium-Term[3]	
Item	**Description**
Construction Quality Plan and Quality Control Measures	A construction quality assurance plan will be developed to ensure preparation of stockpile area and installation of composite liners, drainage layers and leachate collection infrastructure in accordance with design specifications and manufactures installation instructions. PFAS impacted soil will also need to be suitably placed and compacted to minimise stockpile settlement or sharp objects/surfaces which could damage or compromise the cap liners.
Leak Detection and Monitoring	A leak detection system, such as a drainage layer under the liner and sump, will be installed to monitor liner and leachate collection system performance. Groundwater monitoring wells will be installed up and down gradient of the engineered stockpile to monitor PFAS concentrations in groundwater flow migrating toward and away from the stockpile. Groundwater monitoring will be undertaken in accordance with **EMP18**.
Maintenance	An operation and maintenance plan will be prepared after finalisation of the detailed design. The operation and maintenance plan will detail the timing and scope of inspection and maintenance of the capping layer to prevent pooling of surface water and ensure timely repairs to liner damaged by site activities or settlement.

A conceptual cross section of the engineered stockpile, illustrating the main design elements is illustrated in **Figure H2** in **Appendix H,** adopted from NEMP 2.0 2020 and United States Environmental Protection Agency, Citizen's Guide to Capping (US EPA 2012)[5].

[5] United States Environmental Protection Agency, Office of Solid Waste and Emergency Response (5102G), EPA 542-F-12-004, September 2012

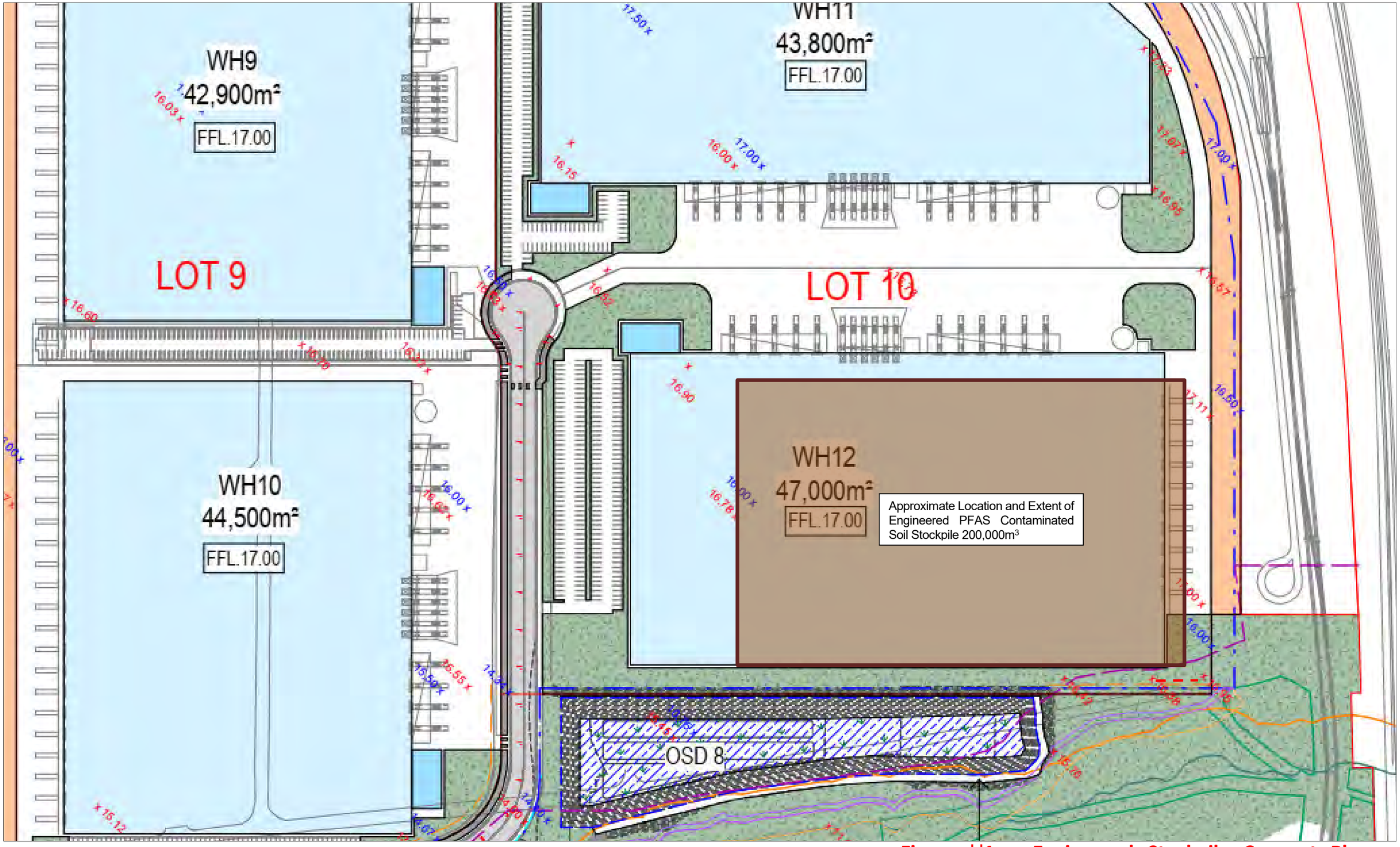


Figure H1 – Engineered Stockpile Concept Plan –Medium Term - Layout – Plan View

EP RISK

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Qube Property Management Services Pty Ltd
Moorebank Precinct West (MPW), Long Term Environmental Management Plan

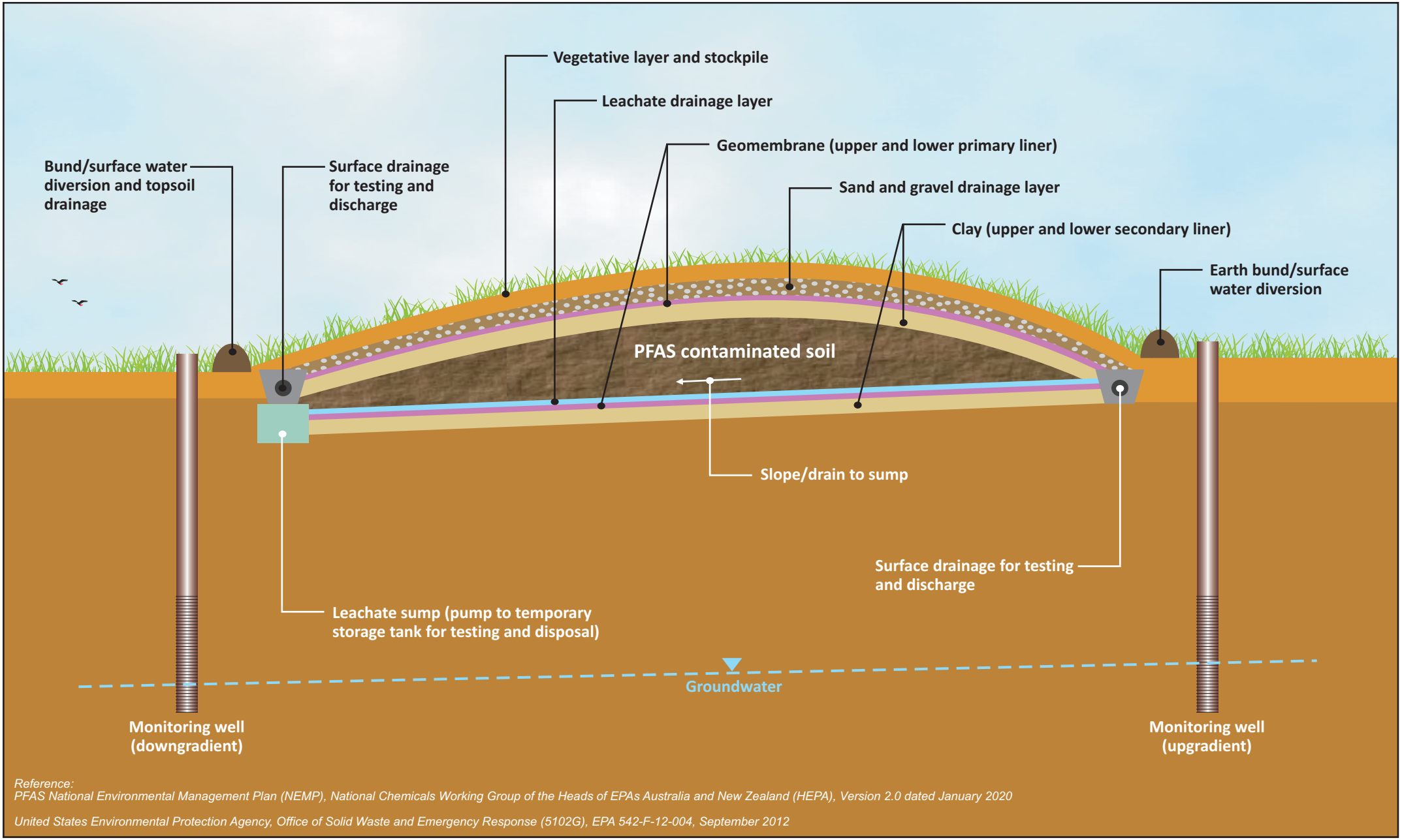
Job No: EP1489.001
Date: 3/08/2020
Drawing Ref:EP1489.001 FigH1
Version No: v1

N

0 50 100 200
Approximate Scale Only (m)

Co-ordinate system: MGA 56
Drawn by: TR Checked by: PS
Source: NearMaps

APPROVED COMPANY ISO 9001 Quality Management Systems QMS Certification Services
APPROVED COMPANY AS/NZS 4801 OH&S Management Systems QMS Certification Services
APPROVED COMPANY ISO 14001 Environmental Management Systems QMS Certification Services



Reference:
PFAS National Environmental Management Plan (NEMP), National Chemicals Working Group of the Heads of EPAs Australia and New Zealand (HEPA), Version 2.0 dated January 2020

United States Environmental Protection Agency, Office of Solid Waste and Emergency Response (5102G), EPA 542-F-12-004, September 2012

EP RISK

Qube Property Management Services Pty Ltd
Moorebank Precinct West (MPW), Long Term Environmental Management Plan

Job No: EP1489
Date: 31.07.2020
Drawing Ref: EP11489.001._03.cdr
Version No: v5

Schematic diagram only - not to scale

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

Figure H2 - Engineered Stockpile Concept Plan - Medium Term - Cross Section

Appendix I

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 J

SOIL REUSE DATA

Summary of Existing Soil PFOS and Leachate PFOS + PFHxS Data

EP Risk (2018) undertook soil and leachate (neutral pH) PFAS testing in proposed cut and fill areas at the Site. A summary of soil PFAS and leachable PFAS (neutral pH) results are summarised in **Table J1**, with all analytical results collected from OSD 6, OSD 8 and general cut areas provided in **Table J2.**

Additional sampling data collected from the Site outside of OSD6, OSD 8 and proposed cut areas is also data provided in **Table J3.** The corresponding sampling locations are provided in the figure contained within this Appendix (EP0745.008 Figure 6, EP Risk 2018).

Table J1 – Soil and leachate (neutral pH) within OSD 6, OSD 8 and general cut areas										
Area	**No. Samples**	**Analytes**	**Criteria**	**>EIE**	**>ADWG**	**Min**	**Max**	**SD**	**Mean**	**95% UCL_{mean}[127]**
OSD 6, OSD 8	15	Soil - PFOS	0.14 mg/kg	4	-	<0.0001 mg/kg	1.6 mg/kg	0.41 mg/kg	0.2 mg/kg	0.56 mg/kg
			0.01 mg/kg	11						
		Soil leachate (neutral pH) – PFOS + PFHxS	0.07 µg/L	-	14	<0.01 µg/L	80.7 µg/L	20.6 µg/L	10 µg/L	26.4 µg/L
General cut and Fill	57	Soil - PFOS	0.14 mg/kg	4	-	<0.0001 mg/kg	0.96 mg/kg	0.14 mg/kg	0.04 mg/kg	0.122 mg/kg
			0.01 mg/kg	16						
		Soil leachate (neutral pH) – PFOS + PFHxS	0.07 µg/L	-	26	<0.01 µg/L	43.2 µg/L	5.96 µg/L	1.62 µg/L	5.06 µg/L

[127] 95% UCL_{mean} – 95% upper confidence level of the arithmetic mean.

Table J2 - Leachability of Soil (Neutral pH) in Proposed Bulk Earthworks Cut Areas, OSD 6 and OSD 8

General Cut and fill		Soil leachate (neutral ph) - Sum (PFHxS + PFOS)	Soil - Perfluorooctane sulfonic acid (PFOS)
Units	ug/L		mg/kg
PQL		0.01	0.0001
Guideline		0.07	0.14 / 0.01
BH6006_0.5	<0.01		<0.0001
BH6006_2.0	<0.01		<0.0001
TP17SL_2.0		0.57	<0.001
TP18SL_0.5		3.63	0.057
TP18SL_2.0		3.80	0.054
TP19SL_0.2		0.15	0.0037
TP19SL_1.0		0.54	0.016
TP20SL_0.5		1.21	0.033
TP20SL_3.0		0.03	<0.001
TP21SL_0.2		0.78	0.016
TP21SL_2.0		0.58	0.02
TP27SL_0.5	<0.01		<0.001
TP27SL_3.0	<0.01		<0.001
TP28SL_1.0	<0.01		<0.001
TP28SL_4.0	<0.01		<0.001
TP30_0.2		0.05	0.0038
TP30_2.0		0.39	0.014
TP31_0.5		43.24	0.96
TP31_2.0		5.62	0.14
TP32_0.2		1.53	0.031
TP32_1.0		9.70	0.31
TP33_0.5		0.03	<0.0001
TP33_1.0	<0.01		<0.0001
TP34_0.5	<0.01		<0.0001
TP34_3.0	<0.01		<0.0001
TP35_0.2		0.02	<0.0001
TP35_3.0	<0.01		<0.0001
TP37_0.2		0.60	0.014
TP37_2.0		0.22	<0.0001
TP38_0.2		0.03	0.0009
TP38_0.5		0.02	<0.0001
TP39_0.2		0.09	0.0019
TP39_1.0		0.04	<0.0001
TP40_0.5		1.60	0.04
TP40_2.0		6.10	0.29
TP41_0.2		0.36	0.0064
TP41_0.5		0.28	0.0053
TP42_0.2	<0.01		<0.0001
TP42_1.0		0.04	<0.0001
TP43_0.2	<0.01		<0.0001
TP43_3.0		0.05	<0.0001
TP58_0.2		0.02	0.0002
TP58_0.5	<0.01		<0.0001
TP59_0.2		0.08	0.0019
TP59_0.5		0.03	0.0002
TP61_0.2		0.30	0.0063
TP61_2.0		0.06	0.0003
TP62_0.2		7.96	0.21
TP62_1.0		1.77	0.089
TP66_0.15		0.10	0.0022
TP66_0.5		0.12	<0.0001
TP67_0.15		0.06	0.0013
TP67_2.0		0.05	0.0005
TP68_0.5	<0.01		<0.0001
TP68_2.0	<0.01		<0.0001
TP69_0.15		0.07	0.0018
TP69_1.0	<0.01		<0.0001

Number	57	57
Min	<0.01	<0.001
max	43.24	0.96
SD	5.96	0.139
Mean	1.62	0.04
95% UCL	5.06	0.122

OSD 6 and OSD 8		Soil leachate (neutral ph) - Sum (PFHxS + PFOS)	Soil - Perfluorooctane sulfonic acid (PFOS)
Units	ug/L		mg/kg
PQL		0.01	0.0001
Guideline		0.07	0.14 / 0.01
TP13SL_0.5		0.01	<0.001
TP13SL_3.0		0.15	<0.001
TP14SL_0.2		2.17	0.055
TP14SL_2.0		2.13	0.067
TP15SL_0.5		1.24	0.035
TP15SL_4.0		0.12	<0.001
TP16SL_0.5		6.47	0.15
TP16SL_2.0		2.96	<0.001
TP17SL_0.2		1.67	0.056
TP47_0.5		25.10	0.52
TP47_3.0		9.70	0.12
TP60_0.2		2.79	0.058
TP60_1.0		80.66	1.6
TP63_0.5		11.23	0.27
TP63_3.0		3.60	0.067

Number	15	15
Min	<0.01	<0.0001
max	80.66	1.60
SD	20.60	0.41
Mean	10.00	0.20
95% UCL	26.39	0.56

Notes:

Soil - Exceedance of PFAS NEMP Indirect Ecological Criteria (commercial / industrial)

Soil - Exceedance of PFAS NEMP Indirect Ecological Criteria (all uses)

Leachate - Exceedance of ADWG HBGVs

Table J3 - Leachability of Soil (neutral pH)

		Soil leachate (neutral ph) - Sum (PFHxS + PFOS)	Soil - Perfluorooctane sulfonic acid (PFOS)
All data			
Units	ug/L		mg/kg
PQL		0.01	0.0001
Guideline		0.07	0.14 / 0.01
BH5001_0.2		0.22	0.0032
BH5001_1.0		0.08	<0.0001
BH5002_0.5	<0.01		<0.0001
BH5002_2.0	<0.01		<0.0001
BH5003_0.2		0.08	<0.0001
BH5003_0.5		0.04	<0.0001
BH5004_0.5		1.68	0.03
BH5004_3.0	<0.01		<0.0001
BH5005_0.2		0.03	0.0005
BH5005_1.0		0.10	0.0017
BH5006_0.2		0.17	0.0046
BH5006_1.0		0.05	0.0004
BH5007_0.5		0.02	<0.0001
BH5007_2.0	<0.01		<0.0001
BH5008_0.5		0.09	<0.0001
BH5008_1.0		0.02	<0.0001
BH6001_0.5		0.24	0.0049
BH6001_2.0		0.36	0.014
BH6002_0.2		0.10	0.0033
BH6002_1.0	<0.01		<0.0001
BH6003_0.2		0.25	0.0075
BH6003_2.0		0.02	<0.0001
BH6004_0.2		0.27	0.0086
BH6004_1.0		0.84	<0.0001
BH6005_0.5		0.02	<0.0001
BH6005_1.0	<0.01		0.0002
BH6006_0.5	<0.01		<0.0001
BH6006_2.0	<0.01		<0.0001
BH6007_5.0	<0.01		<0.005 - 0.0048
BH6008_4.0	<0.01		<0.0001
BH7001_0.2	<0.01		0.0006
BH7001_2.0		0.08	<0.0001
BH7002_0.2		0.14	0.0051
BH7002_0.5		0.05	<0.0001
BH7003_0.5	<0.01		<0.0001
BH7003_1.0	<0.01		<0.0001
BH7006_0.2		0.01	<0.0001

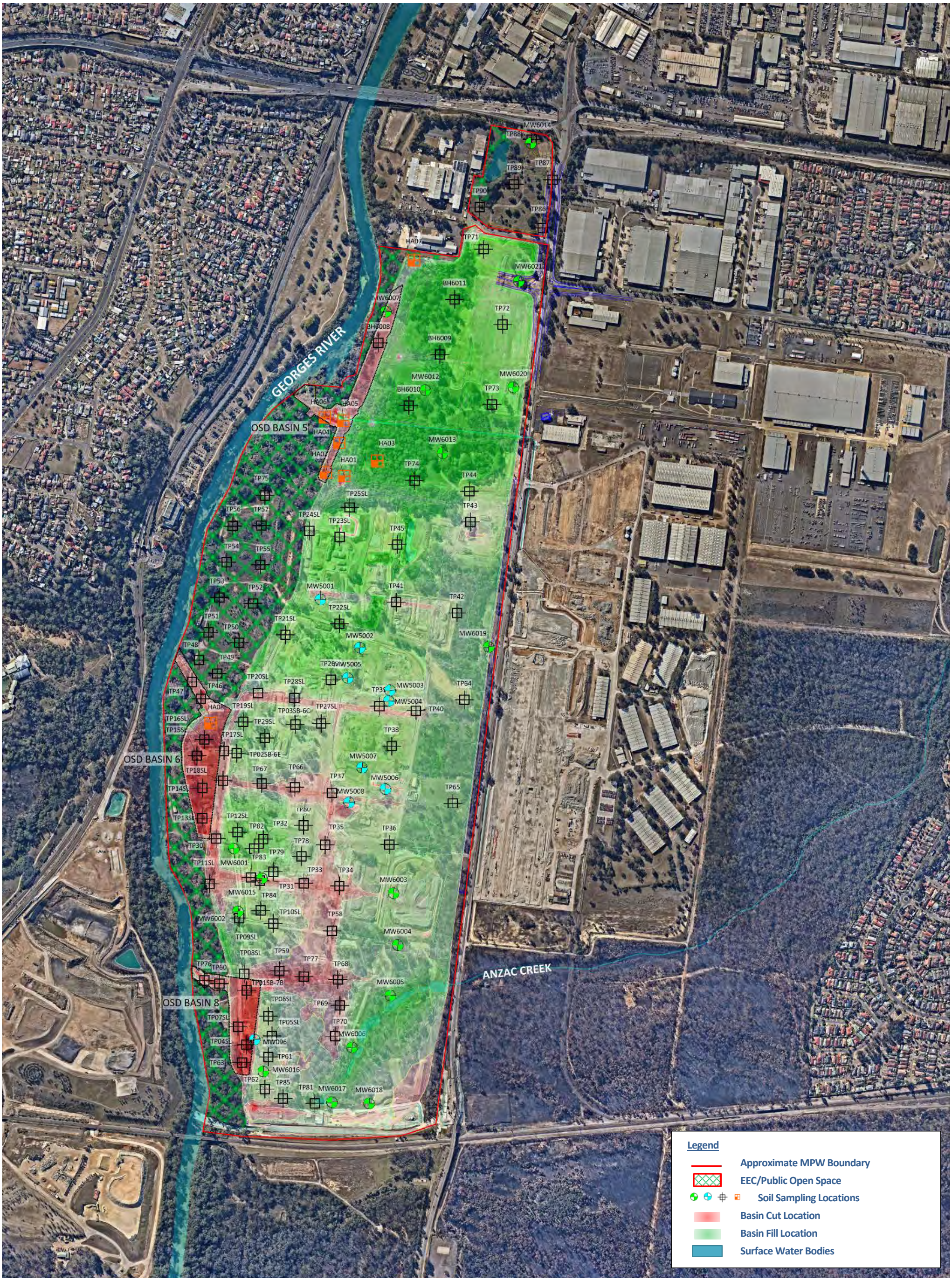
BH7006_1.0	<0.01	<0.0001	
BH7007_0.5	2.07	<0.0001	
BH7007_3.0	0.05	<0.0001	
BH7008_0.2	0.37	<0.0001	
BH7008_2.0	0.22	<0.0001	
TP12SL_0.2	0.88	0.019	
TP12SL_2.0	0.06	<0.001	
TP13SL_0.5	0.01	<0.001	
TP13SL_3.0	0.15	<0.001	
TP14SL_0.2	2.17	0.055	
TP14SL_2.0	2.13	0.067	
TP15SL_0.5	1.24	0.035	
TP15SL_4.0	0.12	<0.001	
TP16SL_0.5	6.47	0.15	
TP16SL_2.0	2.96	<0.001	
TP17SL_0.2	1.67	0.056	
TP17SL_2.0	0.57	<0.001	
TP18SL_0.5	3.63	0.057	
TP18SL_2.0	3.80	0.054	
TP19SL_0.2	0.15	0.0037	
TP19SL_1.0	0.54	0.016	
TP20SL_0.5	1.21	0.033	
TP20SL_3.0	0.03	<0.001	
TP21SL_0.2	0.78	0.016	
TP21SL_2.0	0.58	0.02	
TP22SL_0.5	0.01	<0.001	
TP22SL_2.0	<0.01	<0.001	
TP23SL_0.2	0.26	0.0052	
TP23SL_3.0	0.02	<0.001	
TP24SL_0.2	0.13	0.002	
TP24SL_1.0	<0.01	<0.001	
TP25SL_0.5	0.02	<0.001	
TP25SL_2.0	<0.01	<0.001	
TP26SL_0.2	<0.01	<0.001	
TP26SL_1.0	<0.01	<0.001	
TP27SL_0.5	<0.01	<0.001	
TP27SL_3.0	<0.01	<0.001	
TP28SL_1.0	<0.01	<0.001	
TP28SL_4.0	<0.01	<0.001	
TP29SL_0.2	0.11	<0.001	
TP29SL_2.0	<0.01	<0.001	
TP30_0.2	0.05	0.0038	
TP30_2.0	0.39	0.014	
TP31_0.5	43.24	0.96	
TP31_2.0	5.62	0.14	
TP32_0.2	1.53	0.031	
TP32_1.0	9.70	0.31	
TP33_0.5	0.03	<0.0001	
TP33_1.0	<0.01	<0.0001	
TP34_0.5	<0.01	<0.0001	
TP34_3.0	<0.01	<0.0001	
TP35_0.2	0.02	<0.0001	
TP35_3.0	<0.01	<0.0001	
TP36_0.2	1.81	0.04	

TP36_1.0		0.28	0.0038
TP37_0.2		0.60	0.014
TP37_2.0		0.22	<0.0001
TP38_0.2		0.03	0.0009
TP38_0.5		0.02	<0.0001
TP39_0.2		0.09	0.0019
TP39_1.0		0.04	<0.0001
TP40_0.5		1.60	0.04
TP40_2.0		6.10	0.29
TP41_0.2		0.36	0.0064
TP41_0.5		0.28	0.0053
TP42_0.2	<0.01		<0.0001
TP42_1.0		0.04	<0.0001
TP43_0.2	<0.01		<0.0001
TP43_3.0		0.05	<0.0001
TP44_0.5		0.02	0.0003
TP44_2.0	<0.01		<0.0001
TP45_0.2		0.06	0.0015
TP45_1.0	<0.01		0.003
TP46_0.5		19.50	0.35
TP46_1.0		20.50	0.28
TP47_0.5		25.10	0.52
TP47_3.0		9.70	0.12
TP58_0.2		0.02	0.0002
TP58_0.5	<0.01		<0.0001
TP59_0.2		0.08	0.0019
TP59_0.5		0.03	0.0002
TP60_0.2		2.79	0.058
TP60_1.0		80.66	1.6
TP61_0.2		0.30	0.0063
TP61_2.0		0.06	0.0003
TP62_0.2		7.96	0.21
TP62_1.0		1.77	0.089
TP63_0.5		11.23	0.27
TP63_3.0		3.60	0.067
TP64_0.1		0.54	0.067
TP64_0.5		0.13	0.0042
TP65_0.5		0.32	0.0088
TP65_1.0		0.15	0.0005
TP66_0.15		0.10	0.0022
TP66_0.5		0.12	<0.0001
TP67_0.15		0.06	0.0013
TP67_2.0		0.05	0.0005
TP68_0.5	<0.01		<0.0001
TP68_2.0	<0.01		<0.0001
TP69_0.15		0.07	0.0018
TP69_1.0	<0.01		<0.0001
TP70_0.15		0.09	0.0023
TP70_3.0	<0.01		<0.0001
TP71_0.2		0.09	0.0016
TP71_2.0	<0.01		0.0001
TP72_0.5	<0.01		<0.0001
TP72_2.0	<0.01		<0.0001
TP73_0.2	<0.01		<0.0001

TP73_1.0	<0.01	<0.0001	
TP74_0.5	0.03	0.0009	
TP74_1.0	0.07	0.0013	
TP75_0.5	1.15	0.0013	
TP75_3.0	0.03	0.0013	

Notes:

	Soil - Exceedance of PFAS NEMP Indirect Ecological Criteria (commercial / industrial)
	Soil - Exceedance of PFAS NEMP Indirect Ecological Criteria (all uses)
	Leachate - Exceedance of ADWG HBGVs



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Site Wide PFAS Assessment
Moorebank Precinct West

Figure 4 – Soil Sampling Locations

Job No: EP0745
Date: 13/08/2018
Drawing Ref: Fig4
Version No: v1

N

0 100 200 400
Approximate Scale Only (m)

Co-ordinate system: MGA 56
Drawn by: VG Checked by: AT
Scale of regional map not shown
Source: Near Maps

	A	B	C	D	E	F	G	H	I	J	K	L
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7	Confidence Coefficient	95%										
8	Number of Bootstrap Operations	2000										
9												
10												
11	Cut and Fill Areas - Leachate (neutral pH) PFOS + PFHxS											
12												
13	General Statistics											
14	Total Number of Observations				57			Number of Distinct Observations			33	
15								Number of Missing Observations			0	
16	Minimum				0.01			Mean			1.615	
17	Maximum				43.24			Median			0.06	
18	SD				5.956			Std. Error of Mean			0.789	
19	Coefficient of Variation				3.687			Skewness			6.386	
20												
21	Normal GOF Test											
22	Shapiro Wilk Test Statistic				0.301			Shapiro Wilk GOF Test				
23	5% Shapiro Wilk P Value				0			Data Not Normal at 5% Significance Level				
24	Lilliefors Test Statistic				0.394			Lilliefors GOF Test				
25	5% Lilliefors Critical Value				0.117			Data Not Normal at 5% Significance Level				
26	Data Not Normal at 5% Significance Level											
27												
28	Assuming Normal Distribution											
29	95% Normal UCL							95% UCLs (Adjusted for Skewness)				
30	95% Student's-t UCL				2.935			95% Adjusted-CLT UCL (Chen-1995)			3.626	
31								95% Modified-t UCL (Johnson-1978)			3.046	
32												
33	Gamma GOF Test											
34	A-D Test Statistic				5.107			Anderson-Darling Gamma GOF Test				
35	5% A-D Critical Value				0.883			Data Not Gamma Distributed at 5% Significance Level				
36	K-S Test Statistic				0.221			Kolmogrov-Smirnoff Gamma GOF Test				
37	5% K-S Critical Value				0.129			Data Not Gamma Distributed at 5% Significance Level				
38	Data Not Gamma Distributed at 5% Significance Level											
39												
40	Gamma Statistics											
41	k hat (MLE)				0.261			k star (bias corrected MLE)			0.259	
42	Theta hat (MLE)				6.197			Theta star (bias corrected MLE)			6.245	
43	nu hat (MLE)				29.72			nu star (bias corrected)			29.49	
44	MLE Mean (bias corrected)				1.615			MLE Sd (bias corrected)			3.176	
45								Approximate Chi Square Value (0.05)			18.09	
46	Adjusted Level of Significance				0.0458			Adjusted Chi Square Value			17.86	
47												
48	Assuming Gamma Distribution											
49	95% Approximate Gamma UCL (use when n>=50))				2.633			95% Adjusted Gamma UCL (use when n<50)			2.667	
50												
51	Lognormal GOF Test											
52	Shapiro Wilk Test Statistic				0.882			Shapiro Wilk Lognormal GOF Test				
53	5% Shapiro Wilk P Value				7.6254E-6			Data Not Lognormal at 5% Significance Level				
54	Lilliefors Test Statistic				0.148			Lilliefors Lognormal GOF Test				
55	5% Lilliefors Critical Value				0.117			Data Not Lognormal at 5% Significance Level				
56	Data Not Lognormal at 5% Significance Level											
57												

58	Lognormal Statistics										
59				Minimum of Logged Data	-4.605			Mean of logged Data	-2.227		
60				Maximum of Logged Data	3.767			SD of logged Data	2.278		
61											
62	Assuming Lognormal Distribution										
63				95% H-UCL	5.266			90% Chebyshev (MVUE) UCL	3.001		
64				95% Chebyshev (MVUE) UCL	3.794			97.5% Chebyshev (MVUE) UCL	4.896		
65				99% Chebyshev (MVUE) UCL	7.06						
66											
67	Nonparametric Distribution Free UCL Statistics										
68	Data do not follow a Discernible Distribution (0.05)										
69											
70	Nonparametric Distribution Free UCLs										
71				95% CLT UCL	2.913			95% Jackknife UCL	2.935		
72				95% Standard Bootstrap UCL	2.913			95% Bootstrap-t UCL	5.744		
73				95% Hall's Bootstrap UCL	7.139			95% Percentile Bootstrap UCL	3.08		
74				95% BCA Bootstrap UCL	4.17						
75				90% Chebyshev(Mean, Sd) UCL	3.982			95% Chebyshev(Mean, Sd) UCL	5.054		
76				97.5% Chebyshev(Mean, Sd) UCL	6.542			99% Chebyshev(Mean, Sd) UCL	9.465		
77											
78	Suggested UCL to Use										
79				95% Chebyshev (Mean, Sd) UCL	5.054						
80											
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
82	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)										
83	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.										
84	For additional insight the user may want to consult a statistician.										
85											

	A	B	C	D	E	F	G	H	I	J	K	L
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7	Confidence Coefficient	95%										
8	Number of Bootstrap Operations	2000										
9												
10												
11	General Cut and Fill - Soil PFOS											
12												
13	General Statistics											
14	Total Number of Observations					57		Number of Distinct Observations				28
15								Number of Missing Observations				0
16	Minimum					2.0000E-4		Mean				0.0413
17	Maximum					0.96		Median				0.001
18	SD					0.139		Std. Error of Mean				0.0185
19	Coefficient of Variation					3.37		Skewness				5.563
20												
21	Normal GOF Test											
22	Shapiro Wilk Test Statistic					0.34		Shapiro Wilk GOF Test				
23	5% Shapiro Wilk P Value					0		Data Not Normal at 5% Significance Level				
24	Lilliefors Test Statistic					0.384		Lilliefors GOF Test				
25	5% Lilliefors Critical Value					0.117		Data Not Normal at 5% Significance Level				
26	Data Not Normal at 5% Significance Level											
27												
28	Assuming Normal Distribution											
29	95% Normal UCL							95% UCLs (Adjusted for Skewness)				
30	95% Student's-t UCL					0.0722		95% Adjusted-CLT UCL (Chen-1995)				0.0862
31								95% Modified-t UCL (Johnson-1978)				0.0745
32												
33	Gamma GOF Test											
34	A-D Test Statistic					7.623		Anderson-Darling Gamma GOF Test				
35	5% A-D Critical Value					0.872		Data Not Gamma Distributed at 5% Significance Level				
36	K-S Test Statistic					0.293		Kolmogrov-Smirnoff Gamma GOF Test				
37	5% K-S Critical Value					0.129		Data Not Gamma Distributed at 5% Significance Level				
38	Data Not Gamma Distributed at 5% Significance Level											
39												
40	Gamma Statistics											
41	k hat (MLE)					0.282		k star (bias corrected MLE)				0.279
42	Theta hat (MLE)					0.147		Theta star (bias corrected MLE)				0.148
43	nu hat (MLE)					32.12		nu star (bias corrected)				31.77
44	MLE Mean (bias corrected)					0.0413		MLE Sd (bias corrected)				0.0783
45								Approximate Chi Square Value (0.05)				19.89
46	Adjusted Level of Significance					0.0458		Adjusted Chi Square Value				19.64
47												
48	Assuming Gamma Distribution											
49	95% Approximate Gamma UCL (use when n>=50))					0.066		95% Adjusted Gamma UCL (use when n<50)				0.0669
50												
51	Lognormal GOF Test											
52	Shapiro Wilk Test Statistic					0.825		Shapiro Wilk Lognormal GOF Test				
53	5% Shapiro Wilk P Value					7.3055E-9		Data Not Lognormal at 5% Significance Level				
54	Lilliefors Test Statistic					0.277		Lilliefors Lognormal GOF Test				
55	5% Lilliefors Critical Value					0.117		Data Not Lognormal at 5% Significance Level				
56	Data Not Lognormal at 5% Significance Level											
57												

58	Lognormal Statistics										
59				Minimum of Logged Data	-8.517			Mean of logged Data	-5.658		
60				Maximum of Logged Data	-0.0408			SD of logged Data	2.012		
61											
62	Assuming Lognormal Distribution										
63				95% H-UCL	0.0731			90% Chebyshev (MVUE) UCL	0.0524		
64				95% Chebyshev (MVUE) UCL	0.0653			97.5% Chebyshev (MVUE) UCL	0.0832		
65				99% Chebyshev (MVUE) UCL	0.118						
66											
67	Nonparametric Distribution Free UCL Statistics										
68	Data do not follow a Discernible Distribution (0.05)										
69											
70	Nonparametric Distribution Free UCLs										
71				95% CLT UCL	0.0717			95% Jackknife UCL	0.0722		
72				95% Standard Bootstrap UCL	0.0716			95% Bootstrap-t UCL	0.118		
73				95% Hall's Bootstrap UCL	0.166			95% Percentile Bootstrap UCL	0.0747		
74				95% BCA Bootstrap UCL	0.0936						
75				90% Chebyshev(Mean, Sd) UCL	0.0967			95% Chebyshev(Mean, Sd) UCL	0.122		
76				97.5% Chebyshev(Mean, Sd) UCL	0.157			99% Chebyshev(Mean, Sd) UCL	0.225		
77											
78	Suggested UCL to Use										
79				95% Chebyshev (Mean, Sd) UCL	0.122						
80											
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
82	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)										
83	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.										
84	For additional insight the user may want to consult a statistician.										
85											

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8	Number of Bootstrap Operations	2000										
9												
10												
11	OSD 6 and OSD 8 - Soil PFOS											
12												
13	General Statistics											
14	Total Number of Observations					15		Number of Distinct Observations				11
15								Number of Missing Observations				0
16	Minimum					0.001		Mean				0.2
17	Maximum					1.6		Median				0.058
18	SD					0.41		Std. Error of Mean				0.106
19	Coefficient of Variation					2.051		Skewness				3.248
20												
21	Normal GOF Test											
22	Shapiro Wilk Test Statistic					0.516		Shapiro Wilk GOF Test				
23	5% Shapiro Wilk Critical Value					0.881		Data Not Normal at 5% Significance Level				
24	Lilliefors Test Statistic					0.349		Lilliefors GOF Test				
25	5% Lilliefors Critical Value					0.229		Data Not Normal at 5% Significance Level				
26	Data Not Normal at 5% Significance Level											
27												
28	Assuming Normal Distribution											
29	95% Normal UCL							95% UCLs (Adjusted for Skewness)				
30	95% Student's-t UCL					0.387		95% Adjusted-CLT UCL (Chen-1995)				0.469
31								95% Modified-t UCL (Johnson-1978)				0.402
32												
33	Gamma GOF Test											
34	A-D Test Statistic					0.651		Anderson-Darling Gamma GOF Test				
35	5% A-D Critical Value					0.819		Detected data appear Gamma Distributed at 5% Significance Level				
36	K-S Test Statistic					0.168		Kolmogrov-Smirnoff Gamma GOF Test				
37	5% K-S Critical Value					0.238		Detected data appear Gamma Distributed at 5% Significance Level				
38	Detected data appear Gamma Distributed at 5% Significance Level											
39												
40	Gamma Statistics											
41	k hat (MLE)					0.377		k star (bias corrected MLE)				0.346
42	Theta hat (MLE)					0.53		Theta star (bias corrected MLE)				0.578
43	nu hat (MLE)					11.32		nu star (bias corrected)				10.39
44	MLE Mean (bias corrected)					0.2		MLE Sd (bias corrected)				0.34
45								Approximate Chi Square Value (0.05)				4.188
46	Adjusted Level of Significance					0.0324		Adjusted Chi Square Value				3.715
47												
48	Assuming Gamma Distribution											
49	95% Approximate Gamma UCL (use when n>=50)					0.497		95% Adjusted Gamma UCL (use when n<50)				0.56
50												
51	Lognormal GOF Test											
52	Shapiro Wilk Test Statistic					0.862		Shapiro Wilk Lognormal GOF Test				
53	5% Shapiro Wilk Critical Value					0.881		Data Not Lognormal at 5% Significance Level				
54	Lilliefors Test Statistic					0.243		Lilliefors Lognormal GOF Test				
55	5% Lilliefors Critical Value					0.229		Data Not Lognormal at 5% Significance Level				
56	Data Not Lognormal at 5% Significance Level											
57												

58	Lognormal Statistics											
59					Minimum of Logged Data	-6.908			Mean of logged Data	-3.369		
60					Maximum of Logged Data	0.47			SD of logged Data	2.417		
61												
62	Assuming Lognormal Distribution											
63					95% H-UCL	20.77			90% Chebyshev (MVUE) UCL	1.165		
64					95% Chebyshev (MVUE) UCL	1.522			97.5% Chebyshev (MVUE) UCL	2.019		
65					99% Chebyshev (MVUE) UCL	2.995						
66												
67	Nonparametric Distribution Free UCL Statistics											
68	Data appear to follow a Discernible Distribution at 5% Significance Level											
69												
70	Nonparametric Distribution Free UCLs											
71					95% CLT UCL	0.374			95% Jackknife UCL	0.387		
72					95% Standard Bootstrap UCL	0.367			95% Bootstrap-t UCL	0.938		
73					95% Hall's Bootstrap UCL	0.997			95% Percentile Bootstrap UCL	0.385		
74					95% BCA Bootstrap UCL	0.501						
75					90% Chebyshev(Mean, Sd) UCL	0.518			95% Chebyshev(Mean, Sd) UCL	0.662		
76					97.5% Chebyshev(Mean, Sd) UCL	0.862			99% Chebyshev(Mean, Sd) UCL	1.255		
77												
78	Suggested UCL to Use											
79					95% Adjusted Gamma UCL	0.56						
80												
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
82	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
83	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
84	For additional insight the user may want to consult a statistician.											
85												

	A	B	C	D	E	F	G	H	I	J	K	L
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7	Confidence Coefficient	95%										
8	Number of Bootstrap Operations	2000										
9												
10												
11	OSD 6 and OSD 8 - Leachate (neutral pH) PFHxS + PFOS											
12												
13	General Statistics											
14	Total Number of Observations	15					Number of Distinct Observations	15				
15							Number of Missing Observations	0				
16	Minimum	0.01					Mean	10				
17	Maximum	80.66					Median	2.79				
18	SD	20.6					Std. Error of Mean	5.319				
19	Coefficient of Variation	2.06					Skewness	3.3				
20												
21	Normal GOF Test											
22	Shapiro Wilk Test Statistic	0.508					Shapiro Wilk GOF Test					
23	5% Shapiro Wilk Critical Value	0.881					Data Not Normal at 5% Significance Level					
24	Lilliefors Test Statistic	0.343					Lilliefors GOF Test					
25	5% Lilliefors Critical Value	0.229					Data Not Normal at 5% Significance Level					
26	Data Not Normal at 5% Significance Level											
27												
28	Assuming Normal Distribution											
29	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
30	95% Student's-t UCL	19.37					95% Adjusted-CLT UCL (Chen-1995)	23.59				
31							95% Modified-t UCL (Johnson-1978)	20.12				
32												
33	Gamma GOF Test											
34	A-D Test Statistic	0.476					Anderson-Darling Gamma GOF Test					
35	5% A-D Critical Value	0.81					Detected data appear Gamma Distributed at 5% Significance Level					
36	K-S Test Statistic	0.178					Kolmogrov-Smirnoff Gamma GOF Test					
37	5% K-S Critical Value	0.236					Detected data appear Gamma Distributed at 5% Significance Level					
38	Detected data appear Gamma Distributed at 5% Significance Level											
39												
40	Gamma Statistics											
41	k hat (MLE)	0.42					k star (bias corrected MLE)	0.38				
42	Theta hat (MLE)	23.83					Theta star (bias corrected MLE)	26.3				
43	nu hat (MLE)	12.59					nu star (bias corrected)	11.41				
44	MLE Mean (bias corrected)	10					MLE Sd (bias corrected)	16.22				
45							Approximate Chi Square Value (0.05)	4.838				
46	Adjusted Level of Significance	0.0324					Adjusted Chi Square Value	4.323				
47												
48	Assuming Gamma Distribution											
49	95% Approximate Gamma UCL (use when n>=50)	23.57					95% Adjusted Gamma UCL (use when n<50)	26.39				
50												
51	Lognormal GOF Test											
52	Shapiro Wilk Test Statistic	0.932					Shapiro Wilk Lognormal GOF Test					
53	5% Shapiro Wilk Critical Value	0.881					Data appear Lognormal at 5% Significance Level					
54	Lilliefors Test Statistic	0.206					Lilliefors Lognormal GOF Test					
55	5% Lilliefors Critical Value	0.229					Data appear Lognormal at 5% Significance Level					
56	Data appear Lognormal at 5% Significance Level											
57												

	A	B	C	D	E	F	G	H	I	J	K	L
58	Lognormal Statistics											
59					Minimum of Logged Data	-4.605			Mean of logged Data			0.747
60					Maximum of Logged Data	4.39			SD of logged Data			2.243
61												
62	Assuming Lognormal Distribution											
63					95% H-UCL	537			90% Chebyshev (MVUE) UCL			50.7
64					95% Chebyshev (MVUE) UCL	65.95			97.5% Chebyshev (MVUE) UCL			87.13
65					99% Chebyshev (MVUE) UCL	128.7						
66												
67	Nonparametric Distribution Free UCL Statistics											
68	Data appear to follow a Discernible Distribution at 5% Significance Level											
69												
70	Nonparametric Distribution Free UCLs											
71					95% CLT UCL	18.75			95% Jackknife UCL			19.37
72					95% Standard Bootstrap UCL	18.61			95% Bootstrap-t UCL			51.62
73					95% Hall's Bootstrap UCL	51.53			95% Percentile Bootstrap UCL			19.69
74					95% BCA Bootstrap UCL	25.38						
75					90% Chebyshev(Mean, Sd) UCL	25.96			95% Chebyshev(Mean, Sd) UCL			33.18
76					97.5% Chebyshev(Mean, Sd) UCL	43.22			99% Chebyshev(Mean, Sd) UCL			62.92
77												
78	Suggested UCL to Use											
79					95% Adjusted Gamma UCL	26.39						
80												
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
82	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
83	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
84	For additional insight the user may want to consult a statistician.											
85												

Appendix K

ESTIMATE OF PFAS IMPACTED SOIL WON FROM EXCAVATION OF OSD 6 AND OSD 8

Appendix K - Estimate of PFAS impacted soil won from excavation of OSD 6 and OSD 8

An estimate of the volume of soil won from the excavation of OSD 6 and OSD 8 was prepared with consideration to the following construction drawings:

- Costin Roe (2020) DWG-SK-010; and
- Costin Roe (2020) DWG-SK-023.

The proposed cut and fill estimates for OSD 6 and OSD 8 are presented in **Figure K1** and **Figure K2,** respectively.

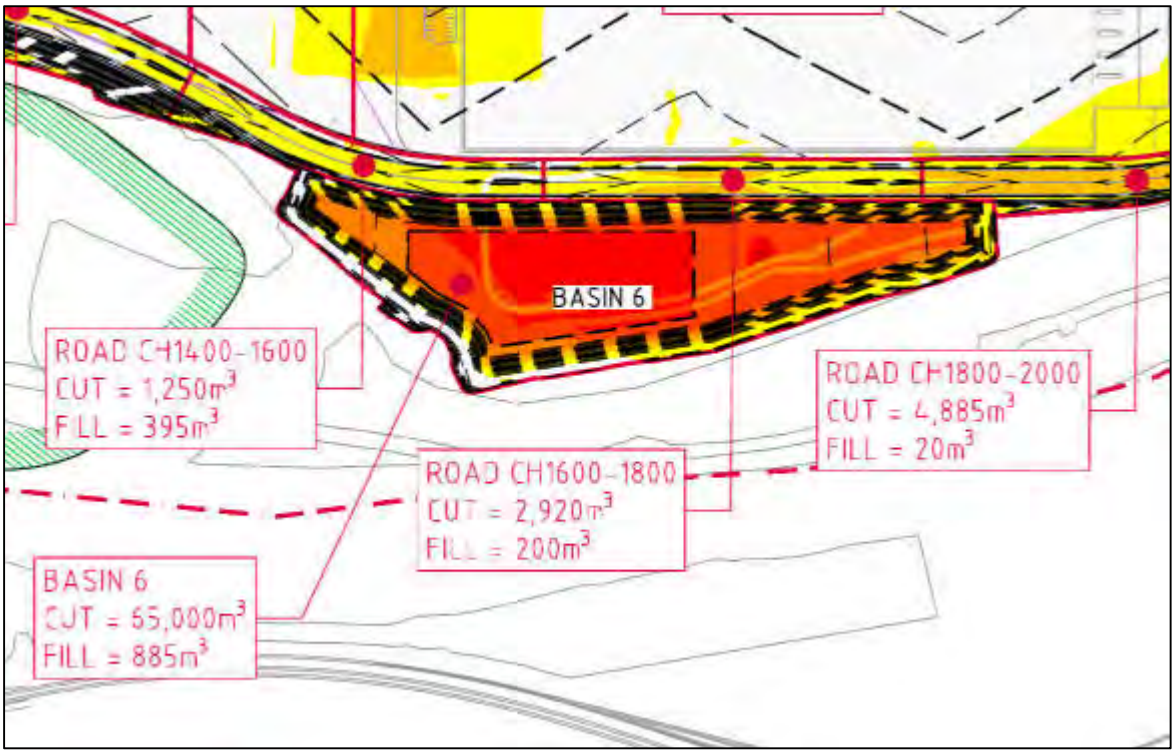

Figure K1 – Cut and Fill Plan for OSD 6

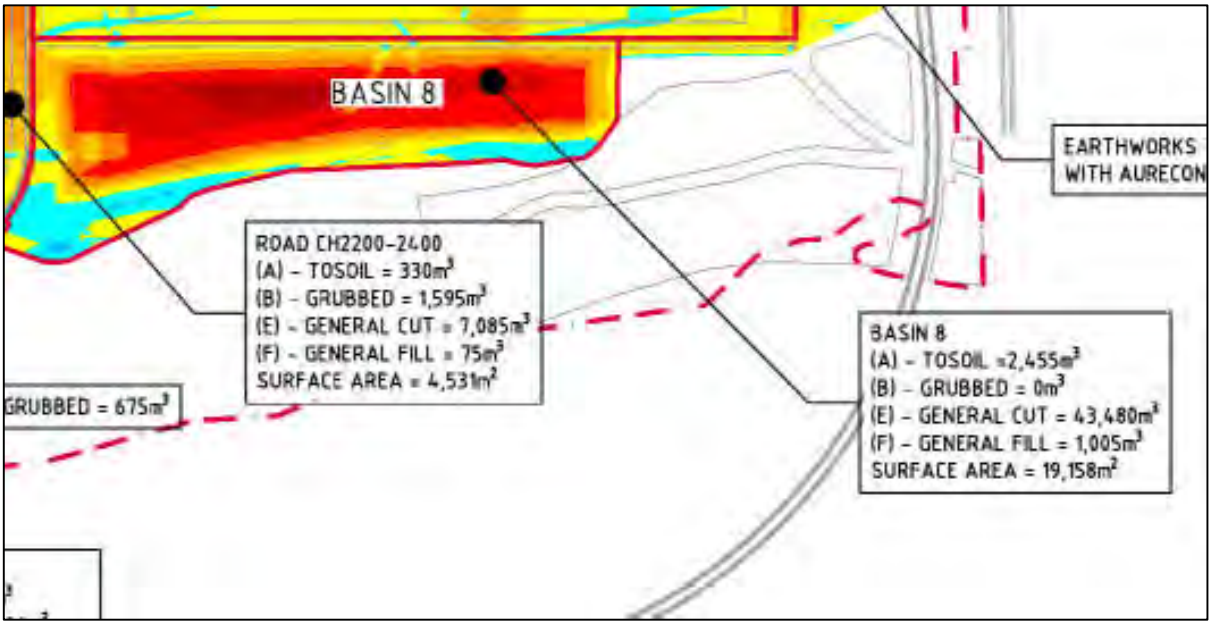

Figure K1 – Cut and Fill Plan for OSD 8

The estimate of fill to be won from the excavation of OSD 6 and OSD 6 is presented in **Table K1**.

Table K1 – Estimate of Fill Won from OSD 6 and OSD 8 Excavation

Excavation Area	Estimate of Volume (m^3)
OSD 6 - per Costin Roe (2020) DWG-SK-010	65,000
OSD 6 – additional excavation to install clay liner	15,000
OSD 8 – per Costin Roe (2020) DWG-SK-023	48,480
OSD 8 – additional excavation to install clay liner	15,000
Contingency allowance of for stormwater, drainage and service excavation	60,000
Total	**198,480 (round to 200,000)**

Appendix L
STOCKPILE SUMMARY TABLE

Appendix L - MPW Stockpile Assessment Register

JWP/Georgiou Stockpile Tracking Register					LTEMP v12 Comparision - JBS&G					
SP #	**SP source**	**Material Type**	**SP Location**	**Approximate volumes**	**Zone 1 (all areas, incl. surface), ≤0.01 mg/kg PFOS, and ASLP ≤0.07 µg/L PFOS**	**Zone 2 (beneath surface cover materials), ≤0.01 mg/kg PFOS**	**Zone 3 (beneath warehouses), ≤0.01 mg/kg PFOS**	**Zone 4 (beneath ring road and INTS), ≤0.14 mg/kg PFOS**	**Further sampling required under v11?**	**Comments**
Asphalt SP	Asphalt	Asphalt	Stockpile yard		**PFAS analysis required if soils are to be used as general fill.**	-	-	-	-	PFAS analysis required if soils are to be used as general fill.
Brick SP	Demolition and Remediation works	Brick	Stockpile yard		Potentially suitable subject to ASLP assessment.	Suitable	Suitable	Suitable	Only if selected for use in Zone 1 (all areas)	PFOS <0.01 mg/kg
Concrete SP CSP1	Demolition and Remediation works	Concrete	Stockpile yard		Potentially suitable subject to ASLP assessment.	Suitable	Suitable	Suitable	Only if selected for use in Zone 1 (all areas)	PFOS <0.01 mg/kg
Concrete SP CSP2	Demolition and Remediation works	Concrete	Stockpile yard		Potentially suitable subject to ASLP assessment.	Suitable	Suitable	Suitable	Only if selected for use in Zone 1 (all areas)	PFOS <0.01 mg/kg
Concrete SP CSP3	Demolition and Remediation works	Concrete	Stockpile yard		Not suitable	Not suitable	Not suitable	Suitable	No	Soils > 0.01 mg/kg and < 0.14 mg/kg PFOS
Concrete SP CSP4	Demolition and Remediation works	Concrete	Stockpile yard		Potentially suitable subject to ASLP assessment.	Suitable	Suitable	Suitable	Only if selected for use in Zone 1 (all areas)	PFOS <0.01 mg/kg
Concrete SP CSP5	Demolition and Remediation works	Concrete	Stockpile yard		Potentially suitable subject to ASLP assessment.	Suitable	Suitable	Suitable	Only if selected for use in Zone 1 (all areas)	PFOS <0.01 mg/kg
Concrete SP CSP6	Demolition and Remediation works	Concrete	Stockpile yard		Potentially suitable subject to ASLP assessment.	Suitable	Suitable	Suitable	Only if selected for use in Zone 1 (all areas)	PFOS <0.01 mg/kg
MIC SP	SP M and SP M2, various materials from site.		North of Pad C	25500	**STOCKPILE SAMPLED 21-22/10/20 - PENDING ANALYSIS**					
SP10	Golf Course SP Consolidation of SP61, 134PRO, 142, 154PRO, 156, 162, 176, 177, 179, 181, 187, 191. SP155, SP188, SP214, SP226, SP233, SP241, and SP243.	General Fill	Stockpile yard	10000	Not suitable	Not suitable	Not suitable	Suitable	No	Soils > 0.01 mg/kg and < 0.14 mg/kg PFOS
SP11			Stockpile yard	450	Potentially suitable subject to ASLP assessment.	Suitable	Suitable	Suitable	Only if selected for use in Zone 1 (all areas)	Detection of PFOS in QA sample at 0.0024 mg/kg would require ASLP analysis. Soils would require screening for anthropogenics if selected for use on site surface.
SP132	Bridging yard coal material	Coal Material	South of stockpile yard, West of OSD 8	90	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	No	PFAS assessment for waste disposal only (if requested). Otherwise, no PFAS assessment necessary.
SP135/SP136 (SP29)	Zone B and Zone B carpark basins (1A, 1C) and surrounding swales - stockpiles combined and additional materials added	Topsoil	South of Turkey's Nest	220	Potentially suitable subject to ASLP assessment.	Suitable	Suitable	Suitable	Only if selected for use in Zone 1 (all areas)	Partially assessed for PFAS due to mixed stockpile. Most of stockpile did not require PFAS assessment. PFAS assessment for waste disposal only (if requested). Otherwise, no PFAS assessment necessary. **Note: stockpile is being reused on BMD INTS site.**
SP137	Topsoil pile west of SP111	Topsoil	South of Bapaume Rd	2000	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	No	PFAS assessment for waste disposal only (if requested). Otherwise, no PFAS assessment necessary.
SP138	North topsoil stockpile	Topsoil	OSD 6 Footprint	350	Not suitable	Not suitable	Not suitable	Suitable	No	Soils > 0.01 mg/kg and < 0.14 mg/kg PFOS
SP140 West	conc yard swale topsoil	Topsoil	South of stockpile yard, West of OSD 8	275	**PFAS ANALYSIS REQUIRED**	-	-	-	Yes	PFAS assessment required for reuse on site.
SP150	South of concrete yard	Topsoil	South of concrete stockpile at stockpile yard, West of OSD 8	200	**PFAS ANALYSIS REQUIRED**	-	-	-	Yes	PFAS assessment required for reuse on site.
SP155	CATA B north swale bricks	General Fill	Pad D footprint	-	**PFAS ANALYSIS REQUIRED**	-	-	-	Yes	PFAS assessment required for reuse on site.
SP161-1	Golf course swale and basin topsoil	Topsoil	Stockpile yard	240	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	No	PFAS assessment for waste disposal only (if requested). Otherwise, no PFAS assessment necessary.
SP161-2	Brick yard asphaltic material	General Fill	Stockpile yard	130	**PFAS ANALYSIS REQUIRED**	-	-	-	Yes	
SP161-3	Golf course swale and basin topsoil	Topsoil	Stockpile yard	580	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	No	PFAS assessment for waste disposal only (if requested). Otherwise, no PFAS assessment necessary.
SP161-4	unknown testing ongoing	unknown testing ongoing	Stockpile yard	1000	Potentially suitable subject to ASLP assessment.	Suitable	Suitable	Suitable	Only if selected for use in Zone 1 (all areas)	Detection of PFOS < 0.01 mg/kg, would require ASLP analysis for use on site surface.

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JWP/Georgiou Stockpile Tracking Register					LTEMP v12 Comparision - JBS&G					
SP #	**SP source**	**Material Type**	**SP Location**	**Approximate volumes**	**Zone 1 (all areas, incl. surface), ≤0.01 mg/kg PFOS, and ASLP ≤0.07 µg/L PFOS**	**Zone 2 (beneath surface cover materials), ≤0.01 mg/kg PFOS**	**Zone 3 (beneath warehouses), ≤0.01 mg/kg PFOS**	**Zone 4 (beneath ring road and INTS), ≤0.14 mg/kg PFOS**	**Further sampling required under v11?**	**Comments**
SP161-5	unknown testing ongoing	unknown testing ongoing	Stockpile yard	400	Not suitable	Not suitable	Not suitable	Suitable	No	Soils > 0.01 mg/kg and < 0.14 mg/kg PFOS
SP163	Basin 6E unsuitable material	Topsoil	South of stockpile yard, West of OSD 8	70	**PFAS ANALYSIS REQUIRED**	-	-	-	Yes	Limited PFAS samples available for the stockpile. Preliminary results indicate PFOS >0.01 mg/kg.
SP164	Services topsoil	Topsoil	South of stockpile yard, West of OSD 8	250	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	No	PFAS assessment for waste disposal only (if requested). Otherwise, no PFAS assessment necessary.
SP165	Services and ESC topsoil	Topsoil	South of stockpile yard, West of OSD 8	1300	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	No	PFAS assessment for waste disposal only (if requested). Otherwise, no PFAS assessment necessary.
SP170	Zone E Heritage area	Topsoil	South of stockpile yard, West of OSD 8	20	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	No	PFAS assessment for waste disposal only (if requested). Otherwise, no PFAS assessment necessary.
SP172	Swales surrounding basin 6D	Topsoil	OSD 6 Footprint	1100	Not suitable	Not suitable	Not suitable	Suitable	No	Soils > 0.01 mg/kg and < 0.14 mg/kg PFOS
SP188	Basin 7A and swales north of basin 7A	General Fill	Stockpile yard	-	Not suitable	Not suitable	Not suitable	Suitable	No	Soils > 0.01 mg/kg and < 0.14 mg/kg PFOS
SP192	Zone F Haunted House topsoil clearance for Variation 59	Topsoil	Stockpile yard	400	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	No	PFAS assessment for waste disposal only (if requested). Otherwise, no PFAS assessment necessary.
SP192A	Generated during LPWPIW		Stockpile yard	600	Potentially suitable subject to ASLP assessment.	Suitable	Suitable	Suitable	Only if selected for use in Zone 1 (all areas)	Detection of PFOS in QA sample at 0.0013 mg/kg, would require ASLP analysis for use on site surface.
SP192B	Generated during LPWPIW		Stockpile yard	170	Not suitable	Not suitable	Not suitable	Suitable	No	Soils > 0.01 mg/kg and < 0.14 mg/kg PFOS
SP197	Lot 100 Swales and Basins Topsoil	Topsoil	South of stockpile yard, West of OSD 8	170	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	No	PFAS assessment for waste disposal only (if requested). Otherwise, no PFAS assessment necessary.
SP198	Lot 100 swales	General Fill	North of Bapaume Rd	640	-	-	-	-	-	**Stockpile does not remain on site, replaced by Lot100-SP02.**
SP199	Lot 100 Swales and Basins Rubble	Topsoil	South of stockpile yard, West of OSD 8	30	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	No	PFAS assessment for waste disposal only (if requested). Otherwise, no PFAS assessment necessary.
Lot100-SP01	Lot 100		Lot 100		Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	No	PFAS assessment for waste disposal only (if requested). Otherwise, no PFAS assessment necessary.
Lot100-SP02	Lot 100		Lot 100		Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	No	PFAS assessment for waste disposal only (if requested). Otherwise, no PFAS assessment necessary.
SP200	Service Removal	General Fill	South of OSD 6	580	Not suitable	Not suitable	Not suitable	Suitable	No	Soils > 0.01 mg/kg and < 0.14 mg/kg PFOS
SP201	Topsoil from services removal	General Fill	South of OSD 6	680	Not suitable	Not suitable	Not suitable	Suitable	No	Soils > 0.01 mg/kg and < 0.14 mg/kg PFOS
SP202	Topsoil from swale crossing near CPB	Topsoil	South Western Corner of site, north west of CPB	40	Potentially suitable subject to ASLP assessment.	Suitable	Suitable	Suitable	Only if selected for use in Zone 1 (all areas)	No PFAS detected in samples.
SP203	Overburden from Basin 8A and swales	General Fill	South Western Corner of site, north west of CPB	950	Not suitable	Not suitable	Not suitable	Suitable	No	Soils > 0.01 mg/kg and < 0.14 mg/kg PFOS
SP204 North	Overburden from Basin 8A and swales	General Fill	South Western Corner of site, north west of CPB	510	Not suitable	Not suitable	Not suitable	Not suitable	No	**Soils > 0.14 mg/kg PFOS**
SP204 South	Topsoil from Basin 8A and swales	Topsoil	South Western Corner of site, north west of CPB	170	Not suitable	Not suitable	Not suitable	Suitable	No	Soils > 0.01 mg/kg and < 0.14 mg/kg PFOS
SP209	Topsoil from Basin 7B and swales	Topsoil	OSD 8 Footprint	860	Not suitable	Not suitable	Not suitable	Suitable	No	Soils > 0.01 mg/kg and < 0.14 mg/kg PFOS

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JWP/Georgiou Stockpile Tracking Register					LTEMP v12 Comparision - JBS&G					
SP #	**SP source**	**Material Type**	**SP Location**	**Approximate volumes**	**Zone 1 (all areas, incl. surface), ≤0.01 mg/kg PFOS, and ASLP ≤0.07 µg/L PFOS**	**Zone 2 (beneath surface cover materials), ≤0.01 mg/kg PFOS**	**Zone 3 (beneath warehouses), ≤0.01 mg/kg PFOS**	**Zone 4 (beneath ring road and INTS), ≤0.14 mg/kg PFOS**	**Further sampling required under v11?**	**Comments**
SP210	Lot 100 unsuitable swale material	Topsoil	South of stockpile yard, West of OSD 8	240	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	No	PFAS assessment for waste disposal only (if requested). Otherwise, no PFAS assessment necessary. **NOTE: inconsistency between MTS and JBS&G assessment for SP source, however neither locations require PFAS assessment.**
SP211	Lot 100 unsuitable swale material	Topsoil	South of stockpile yard, West of OSD 8	130	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	No	PFAS assessment for waste disposal only (if requested). Otherwise, no PFAS assessment necessary. **NOTE: inconsistency between MTS and JBS&G assessment for SP source, however neither locations require PFAS assessment.**
SP215	Variation 97 CPB rd repairs	General Fill	South of stockpile yard, West of OSD 8	110	Not suitable	Not suitable	Not suitable	Suitable	No	Soils > 0.01 mg/kg and < 0.14 mg/kg PFOS
SP221	Lot 100 topsoil	Topsoil	South of stockpile yard, West of OSD 8	110	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	No	PFAS assessment for waste disposal only (if requested). Otherwise, no PFAS assessment necessary.
SP222	Zone F Swales	Topsoil	South of stockpile yard, West of OSD 8	160	Not suitable	Not suitable	Not suitable	Suitable	No	Soils > 0.01 mg/kg and < 0.14 mg/kg PFOS
SP222B	Existing stockpile	General Fill	South of stockpile yard, West of OSD 8	110	Potentially suitable subject to ASLP assessment.	Suitable	Suitable	Suitable	Only if selected for use in Zone 1 (all areas)	Detection of PFOS in QA sample at 0.0004 mg/kg, would require ASLP analysis for reuse on site surface.
SP237	New compound swale	General Fill	OSD 6 Footprint	760	Potentially suitable subject to ASLP assessment.	Suitable	Suitable	Suitable	Only if selected for use in Zone 1 (all areas)	Detection of PFOS at 0.007 mg/kg, would require ASLP analysis for use on site surface.
SP238	New compound bulk cut (Suitable)	General Fill	Stockpile yard	7200	Not suitable	Not suitable	Not suitable	Suitable	No	Soils > 0.01 mg/kg and < 0.14 mg/kg PFOS
SP239	Bulk cut works (Unsuitable Wet Material)	General Fill	Stockpile yard	11450	Not suitable	Not suitable	Not suitable	Suitable	No	Soils > 0.01 mg/kg and < 0.14 mg/kg PFOS
SP247	PFAS Capping	Topsoil	Stockpile yard	2950	Not suitable	Not suitable	Not suitable	Suitable	No	Soils > 0.01 mg/kg and < 0.14 mg/kg PFOS
SP248	Lot 100 Strip	Topsoil	North of Bapaume Rd	200	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	No	PFAS assessment for waste disposal only (if requested). Otherwise, no PFAS assessment necessary. **NOTE: current SP248 assessment (58753 L052) refers to stockpile relabelled as SP348. See L167.**
SP249	Lot 100 Strip	Topsoil	North of Bapaume Rd	200	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	No	PFAS assessment for waste disposal only (if requested). Otherwise, no PFAS assessment necessary. **Note: documented as L167.**
SP250	Lot 100 Strip	Topsoil	North of Bapaume Rd	200	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	No	PFAS assessment for waste disposal only (if requested). Otherwise, no PFAS assessment necessary. **Note: documented as L167.**
CPB STOCKPILE	CPB	General Fill	CPB	35000	Potentially suitable subject to ASLP assessment.	Suitable	Suitable	Suitable	Only if selected for use in Zone 1 (all areas)	**Not suitable for use on the final site surface due to ACM.** Soils <0.01 mg/kg PFOS.
CPB STOCKPILE	CPB	Topsoil	CPB	6000	Potentially suitable subject to ASLP assessment.	Suitable	Suitable	Suitable	Only if selected for use in Zone 1 (all areas)	**Not suitable for use on the final site surface due to ACM.** Soils <0.01 mg/kg PFOS.
SP252	Topsoil Strip from Bund Footprint	Topsoil	South of concrete stockpile at stockpile yard, West of OSD 8	600	**PFAS ANALYSIS REQUIRED**					PFAS assessment required for reuse of soils on site. Note: soils from accoustic bund.
SP258	Golf course swale excavation	General Fill	South of concrete stockpile at stockpile yard, West of OSD 8	100	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	Suitable - no PFAS assessment required (soils not from AEC3)	No	PFAS assessment for waste disposal only (if requested). Otherwise, no PFAS assessment necessary.
SP301	Existing stockpile	General Fill	South Eastern Corner of site / Eastern end of CPB Area	1000	-	-	-	-	-	See CPB Stockpile - Topsoil
SP302	Existing stockpile	Sandstone	South Eastern Corner of site / Eastern end of CPB Area	8000	-	-	-	-	-	See CPB Stockpile - General Fill

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SP #	**SP source**	**Material Type**	**SP Location**	**Approximate volumes**	**Zone 1 (all areas, incl. surface), ≤0.01 mg/kg PFOS, and ASLP ≤0.07 µg/L PFOS**	**Zone 2 (beneath surface cover materials), ≤0.01 mg/kg PFOS**	**Zone 3 (beneath warehouses), ≤0.01 mg/kg PFOS**	**Zone 4 (beneath ring road and INTS), ≤0.14 mg/kg PFOS**	**Further sampling required under v11?**	**Comments**
SP303	Existing stockpile		South Eastern Corner of site / Eastern end of CPB Area	30	-	-	-	-	-	See CPB Stockpile - General Fill
SP304	Existing stockpile		South Eastern Corner of site / Eastern end of CPB Area	150	-	-	-	-	-	See CPB Stockpile - General Fill
SP305	Existing stockpile		South Eastern Corner of site / Eastern end of CPB Area	30	-	-	-	-	-	See CPB Stockpile - General Fill
SP306	EW Culvert area	Topsoil	Northern Stockpile area	4500	Potentially suitable subject to ASLP assessment.	Suitable	Suitable	Suitable	Only if selected for use in Zone 1 (all areas)	Detection of PFOS < 0.01 mg/kg in QA sample during in-situ E-W Culvert sampling, would require ASLP analysis for reuse on site surface. **NOTE: stockpile is TP-SP18.**
SP307	Stockpile yard open drains	GSW	OSD 6 footprint	50	Potentially suitable subject to ASLP assessment.	Suitable	Suitable	Suitable	Only if selected for use in Zone 1 (all areas)	Detection of PFOS in QA sample at 0.0036 mg/kg, would require ASLP analysis for reuse on site surface.
SP348	(Existing SP248 was renamed to SP348 to avoid confusion with SP248 in lot 100)	Topsoil	Stockpile yard	2995	Not suitable	Not suitable	Not suitable	Suitable	No	Soils > 0.01 mg/kg and < 0.14 mg/kg PFOS. **NOTE: stockpile assessment is documented as SP248.**
SP72	Zone F West trenches	General Fill	OSD 6 Footprint	35	Not suitable	Not suitable	Not suitable	Suitable	No	Soils > 0.01 mg/kg and < 0.14 mg/kg PFOS
SP-SERV-07	Zone C South	Topsoil	Stockpile yard	740	Not suitable	Not suitable	Not suitable	Not suitable	No	**Soils > 0.14 mg/kg PFOS**
SP-SERV-10	Zone F	Topsoil	OSD 6 Footprint	730	Not suitable	Not suitable	Not suitable	Suitable	No	Soils > 0.01 mg/kg and < 0.14 mg/kg PFOS
SP-SERV-10S	Zone F	Topsoil	OSD 6 Footprint	20	Not suitable	Not suitable	Not suitable	Suitable	No	Soils > 0.01 mg/kg and < 0.14 mg/kg PFOS
STP - SP014	STP (orange area)	Bonded ACM	STP		*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*No*	Not suitable for use on the final site surface due to ACM.
STP-SP08	STP		STP	20	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*No*	Not suitable for use on the final site surface due to ACM.
STP-SP09	STP		STP	15	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*No*	Not suitable for use on the final site surface due to ACM.
STP-SP10	STP		STP	2900	Potentially suitable subject to ASLP assessment.	Suitable	Suitable	Suitable	Only if selected for use in Zone 1 (all areas)	Not suitable for use on the final site surface due to ACM.
STP-SP11	STP		STP	90	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*No*	Not suitable for use on the final site surface due to ACM.
STP-SP277	STP		STP	10	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*No*	Not suitable for use on the final site surface due to ACM.
STP-SP-Concrete	STP	Concrete	STP	50	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*No*	
STP-SP-PADS	STP		STP	150	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*No*	Not suitable for use on the final site surface due to ACM.
STP-SP-VEG	STP	VEG	STP	100	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*No*	Not suitable for use on the final site surface due to ACM.
STP-SP-Wire	STP	Reinforcing	STP	45	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*No*	
SP17	Eastern and central scrape of STP		Northern Stockpile	70	Potentially suitable subject to ASLP assessment.	Suitable	Suitable	Suitable	Only if selected for use in Zone 1 (all areas)	Not suitable for use on the final site surface due to ACM.
SP13	Scrapped UF264		Northern Stockpile	100	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*No*	Not suitable for use on the final site surface due to ACM.

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SP #	**SP source**	**Material Type**	**SP Location**	**Approximate volumes**	**Zone 1 (all areas, incl. surface), ≤0.01 mg/kg PFOS, and ASLP ≤0.07 µg/L PFOS**	**Zone 2 (beneath surface cover materials), ≤0.01 mg/kg PFOS**	**Zone 3 (beneath warehouses), ≤0.01 mg/kg PFOS**	**Zone 4 (beneath ring road and INTS), ≤0.14 mg/kg PFOS**	**Further sampling required under v11?**	**Comments**
SP25	EW Haul Rd Scrape		Northern Stockpile	100	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*No*	Not suitable for use on the final site surface due to ACM.
SP28	STP east scrape to natural		Northern Stockpile	100	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*No*	Not suitable for use on the final site surface due to ACM.
SP24	EW Haul Rd scrape TPHR central		Northern Stockpile	100	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*No*	Not suitable for use on the final site surface due to ACM.
SP27	STP haul rd scrape material		Northern Stockpile	100	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*No*	Not suitable for use on the final site surface due to ACM.
SP26	EW Haul Rd decon scrape		Northern Stockpile	100	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*No*	Not suitable for use on the final site surface due to ACM.
TP-SP34	Terrace pad ramp excavated clean material		Northern Stockpile	100	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*No*	Not suitable for use on the final site surface due to ACM.
SP33			Northern Stockpile	100	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*No*	Not suitable for use on the final site surface due to ACM.
SP36			Northern Stockpile	100	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*No*	Not suitable for use on the final site surface due to ACM.
SP39			Northern Stockpile	20	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*No*	Not suitable for use on the final site surface due to ACM.
HA-SP45	Hardstand A	Concrete	North EW culvert East of OSD 5		*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*No*	
HA-SP47	Hardstand A		North EW culvert East of OSD 5		*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*No*	Not suitable for use on the final site surface due to ACM.
HA-SP48	Hardstand A	Topsoil	North EW culvert East of OSD 5		*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*No*	Not suitable for use on the final site surface due to ACM.
HA-SP48A	Swale drain North East of hardstand A	Topsoil	North EW culvert East of OSD 5		*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*No*	Not suitable for use on the final site surface due to ACM.
HA-SP49	Hardstand A	GSW-MIC	North EW culvert East of OSD 5		*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*No*	Not suitable for use on the final site surface due to ACM.
HA-SP51	Hardstand A	Mixed concrete GSW	North EW culvert East of OSD 5		*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*No*	Not suitable for use on the final site surface due to ACM.
HA-SP51A	Hardstand A	Mixed concrete GSW	North EW culvert East of OSD 5		*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*No*	Not suitable for use on the final site surface due to ACM.
HA-SP52	Hardstand A	GSW-MIC	North EW culvert East of OSD 5		*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*Suitable - no PFAS assessment required (soils not from AEC3)*	*No*	Not suitable for use on the final site surface due to ACM.

Appendix M

GROUNDWATER SUMMARY TABLE

Job No. EP1489.001
Site: MPW LTEMP
Table Groundwater gauging summary

Location	Well	Easting	Northing	Top of casing	Stand pipe	Bottom of casing	Surface level	Well depth	Well depth	Screened interval	Groundwater elevation (mAHD)												Maximum groundwater level	Depth to surface
				(mAHD)	(m)	(mAHD)	(mAHD)	(mBTOC)	(mBGL)	(mBGL)	12/07/2016	13/07/2016	14/07/2016	28/02/2017	1/03/2017	2/03/2017	6/03/2017	27/03/2017	28/03/2017	30/03/2017	24/05/2017	18/06/2018	(m AHD)	(m)
North	MW6012	307830.275	6241827.41	13.343																		4.544	4.544	
North	BHB2	307727.161	307727.161	11.285																			2.98	
North	PB_MW2A	307638.598	6241866.802	13.781	0.72	1.351	13.061	12.43	11.71	9.0 - 12.0			4.371									3.8	4.371	8.69
Dust Bowl	BHA-1	307180.382	6241059.802											3.526				3.657			3.658	3.294	3.658	
Dust Bowl	MW085	307450.611	6241294.749											4.643				4.842			4.908	4.158	4.908	
Dust Bowl	MW106	307219.037	6241233.919											3.109				3.366			3.249		3.366	
Dust Bowl	MW106A	307219.073	6241234	8.83	0.68	1.09	8.15	7.74	7.06	3.0 - 7.5			3.42										3.42	4.73
Dust Bowl	MW107	307245.195	6241340.934											3.091				3.379			3.255	2.863	3.379	
Dust Bowl	MW108	307341.167	6241532.488											3.737				4.233			3.963	3.214	4.233	
Dust Bowl	MW109B	307154.511	6240563.005	8.103	0.72	-0.047	7.383	8.15	7.43	4.5 - 7.5	3.594				3.361			3.813			3.406	2.897	3.813	3.57
Dust Bowl	MW2012	307144.489	6240933.614	7.708	0.68	2.028	7.028	5.68	5	3.5 - 5.0			3.658	3.168				3.353			3.275	3.015	3.658	3.37
Dust Bowl	MW2013	307204.781	6240968.798	8.146	0.71	2.536	7.436	5.61	4.9	3.5 - 5.0		3.976		3.458				3.615			3.609	3.261	3.976	3.46
Dust Bowl	MW2014	307157.862	6240985.143	8.119	0.65	2.459	7.469	5.66	5.01	2.0 - 5.0		3.909		3.407				3.572			3.543		3.909	3.56
Dust Bowl	MW2015	307218.888	6241033.430	8.613	0.72	2.013	7.893	6.6	5.88	3.0 - 6.0		4.053		3.577				3.715			3.73	3.347	4.053	3.84
Dust Bowl	MW2016	307357.690	6241023.612	14.937	0.67	0.647	14.267	14.29	13.62	12.0 - 13.5		4.497			4.239			4.334			4.466	3.898	4.497	9.77
Dust Bowl	MW2017	307237.819	6241086.328	8.402	0.74	1.762	7.662	6.64	5.9	4.5 - 6.0		4.082		3.727				3.849			3.866	3.442	4.082	3.58
Dust Bowl	MW2018	307195.528	6241119.422	8.698	0.72	1.958	7.978	6.74	6.02	3.0 - 6.0			3.878	3.581				3.69			3.705	3.337	3.878	4.1
Dust Bowl	MW2019	307218.260	6241182.130	8.866	0.71	1.636	8.156	7.23	6.52	5.0 - 6.5			3.866	3.607				3.708			3.733	3.335	3.866	4.29
Dust Bowl	MW3001	307261.171	6241443.760	8.722	0		7.654		7	3.0 - 7.0						2.885		3.057			2.817	2.78	3.057	4.597
Dust Bowl	MW3002	307124.573	6240873.010	7.623	0		6.693		7	3.0 - 7.0						2.837		2.868			2.775	2.927	2.927	3.766
Dust Bowl	MW3003	307118.887	6240789.281	4.777	0		4.114		3.5	1.0 - 3.5						3.068		3.148			2.832	2.632	3.148	**0.966**
Dust Bowl	MW3004	307117.220	6240689.368	5.040	0		4.191		3	1.0 - 3.0						2.905		3.025			2.788	2.828	3.025	1.166
Dust Bowl	MW3005	307236.393	6240787.334	15.533	0		14.893		13.5	7.0 - 13.0						4.246		4.287			4.387	3.763	4.387	10.506
Fire Training	MW083	307233.977	6240109.739														3.039			3.159	3.152	4.302	4.302	
Fire Training	MW096	307355.457	6240022.849												3.418				3.538		4.716	3.086	4.716	
Fire Training	MW15	307330.490	6240083.161														3.387		3.6		3.619	3.019	3.619	
Fire Training	MW1A	307259.691	6240078.073												3.016					3.187	3.167		3.187	
Fire Training	MW1B	307258.410	6240079.580	11.034	0.72	1.294	10.314	9.74	9.02	7.5 - 9.0	3.594				3.005					3.184	3.169	2.77	3.594	6.72
Fire Training	MW2	307218.904	6240070.301												3.007					3.168	3.157	2.783	3.168	
Fire Training	MW2001B	307277.277	6239919.558	12.224	0.68	0.574	11.544	11.65	10.97	8.0 - 11.0			3.324		2.976				3.195		3.082	2.768	3.324	8.22
Fire Training	MW2002	307222.142	6240055.083	7.616	0.7	1.416	6.916	6.2	5.5	2.5 - 5.5		3.566			2.995					3.173	3.161	2.746	3.566	3.35
Fire Training	MW2003	307257.294	6240048.588	11.011	0.73	1.231	10.281	9.78	9.05	6.0 - 9.0	3.611				2.997					3.191	3.166	2.754	3.611	6.67
Fire Training	MW2005	307481.150	6240088.942	17.51	0.65	2.29	16.86	15.22	14.57	11.0 - 17.0	5.29				5.106				5.15		5.24	4.383	5.29	11.57
Fire Training	MW2006	307211.446	6240104.484	8.137	0.74	1.987	7.397	6.15	5.41	2.5 - 5.5			3.547		2.993					3.146	3.144		3.547	3.85
Fire Training	MW2007	307255.997	6240119.908	11.125	0.7	1.515	10.425	9.61	8.91	7.5 - 9.0	3.585						3.048			3.177	3.168		3.585	6.84
Fire Training	MW2008	307300.908	6240106.836	9.97	0.65	-2.01	9.32	11.98	11.33	8.5 - 11.5	3.968						3.524		3.929		3.608		3.968	5.352
Fire Training	MW2009	307228.722	6240148.142	10.044	0.71	0.304	9.334	9.74	9.03	6.0 - 9.0		3.554					3.044			3.148	3.15		3.554	5.78
Fire Training	MW2010	307300.142	6240168.854	14.3	0.7	2.56	13.6	11.74	11.04	8.0 - 11.0	4.05						3.396		3.611		3.534	3.067	4.05	9.55
Fire Training	MW2011	307246.297	6240178.824	12.533	0.68	0.793	11.853	11.74	11.06	9.5 - 11.0	3.573						3.049		3.15		3.164	2.779	3.573	8.28
Fire Training	MW2020	307236.181	6240231.628														3.044		3.14		3.158	2.8	3.158	
Fire Training	MW3006	307255.360	6240248.906	13.310	0		12.276		12	7.0 - 12.0						3.02			3.144		3.167	1.784	3.167	9.109
Fire Training	MW3007	307307.78	6239995.71	14.808	0		14.143		14	8.0 - 14.0						3.187			3.363		3.402	2.899	3.402	10.741
Fire Training	MW3012	307196.317	6240326.015	8.326	0		7.437		7	3.0 - 7.0							3.024			3.061	3.038	2.701	3.061	4.376
Fire Training	MW3013	307200.328	6240276.333	8.650	0		7.787		7.5	3.0 - 7.5							3.026			3.081	3.065	2.791	3.081	4.706
Fire Training	MW3014	307208.783	6240210.917	9.662	0		8.745		8	3.5 - 8.0							3.044			3.142	3.156	2.787	3.156	5.589
Fire Training	MW3015	307207.821	6240081.235	7.218	0		6.225		5	2.0 - 5.0						2.997				3.155	3.148	2.762	3.155	3.07
South	MW3008	307394.258	6239797.386	18.154	0		17.375		18.7	12.5 - 18.7						7.642			11.522		9.599		11.522	5.853
South	MW3009	307325.815	6239833.468	16.802	0		16.048		17	11.0 - 17.0						3.083			3.514		3.353	2.876	3.514	12.534
South	MW3010	307260.804	6239764.781	8.408	0		7.690		7	3.0 - 7.0						2.881			3.276		2.935		3.276	4.414
South	MW3011	307279.382	6239849.183	11.248	0		10.691		11	6.0 - 11.0							2.942		3.168		2.984	2.771	3.168	7.523

Minimum	0.966
Maximum	10.506

Appendix B

LTEMP Material Reuse Risk Assessment for PFAS (EnRiskS 2020)

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9 October 2020

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Moorebank Intermodal Terminal: LTEMP Material Reuse Risk Assessment for PFAS

1.0 Introduction

Environmental Risk Sciences Pty Ltd (enRiskS) has been engaged by Moorebank Intermodal Company (MIC) to conduct a risk assessment in relation to the presence of per- and polyfluoroalkyl substances (PFAS) in soil, that is proposed for reuse at the Moorebank Intermodal Terminal Development (MITD) site. The proposed re-use of soil is detailed in the Long-Term Environmental Management Plan (LTEMP).

MIC has entered into agreements with Sydney Intermodal Terminal Alliance (SIMTA), under the special purpose vehicle Precinct Developer Co (PDC), to develop and operate the MIT. SIMTA is a wholly owned subsidiary of Qube Holdings, one of Australia's largest operators in the freight logistic industry.

The site is split into two areas – Moorebank Precinct East (MPE) which is land owned by Qube and Moorebank Precinct West (MPW) which is land owned by the Commonwealth.

MIC's cost responsibility includes site remediation of pre-existing known and unknown contamination on the Commonwealth land/MPW. PDC is responsible to undertake the works in accordance with approvals and legislation.

The management of remediation works is certified progressively by an Accredited Site Auditor (ASA) in line with the relevant Planning Approval conditions. Each certification by the ASA requires the issue of a Site Audit Statement (SAS) and is subject to one or more management plans. Ongoing works must comply with the relevant approved management plan(s).

An upcoming SAS will permit major excavation and fill placement across MPW. This SAS will be subject to the LTEMP.

The LTEMP covers the development footprint of MPW and selected parts of the biodiversity area adjacent to the Georges River within which the On-Site Detention (OSD) basins and their associated overflow channels will be placed.

The material being excavated is from:

- the OSD basins and associated overflow channels with known PFAS contaminants; and

- site wide cut to fill operations in which material is being cut in the southern part of the site, some of which contains PFAS, and placed in the north of the site, provided the cut material is suitable for placement in the northern part of the site.

Following the cut to fill operation, around 1 million m^3 of imported approved imported fill materials from bulk excavation projects in the Sydney basin will be imported and placed on the site. The approved imported fill materials will be placed under the terminal development, including under the warehouses.

The LTEMP includes guidelines or criteria for PFAS in soil to be reused. These criteria include guidelines for PFAS in soil and soil leachate, consistent with the default recommendations for soil reuse detailed in the PFAS National Environmental Management Plan (the "PFAS NEMP")(HEPA 2020).

The application of the proposed PFAS trigger level for soil leachate will result in the majority of material excavated around the site exceeding the trigger level for reuse and, therefore, being consigned to stockpile. Based on the currently available soil testing data, approximately 90% of the OSD material and 46% of the general cut to fill would not comply. Keeping and managing such stockpiles will substantially increase the cost of long-term storage on-site or, at worst, result in off-site disposal of a resource that could otherwise be reused as fill material across the site.

Consistent with the PFAS NEMP a risk assessment is required to further evaluate the potential for PFAS to leach from the soil proposed to be reused where additional management measures are considered.

2.0 Objectives and scope of works

The objective of the work is to undertake a review of the available information and provide a risk assessment to better understand the potential for leaching of PFAS from soil proposed to be reused where additional control or management measures are incorporated and implemented.

More specifically the scope of works includes the following:

- Review of the available information in the LTEMP regarding how soil will be reused at the site;
- Review the available information in relation to the presence of PFAS in soil proposed to be reused;
- Review the relevance of applying a leachate criteria for soil to be reused at this site. This aspect will be risk-based and address the placement of the materials and management of the areas where materials will be located; and
- Provide details on the appropriate management measures for the reused materials.

3.0 Methodology

In general, the approach taken for the assessment of human health and environmental risks is in accordance with guidelines/protocols endorsed by Australian regulators, including:

- National Environmental Protection Measure – Assessment of Site Contamination (ASC NEPM) including:
    - Schedule B1 Investigation Levels for Soil and Groundwater (NEPC 1999 amended 2013a)
    - Schedule B4 Guideline on Health Risk Assessment Methodology (NEPC 1999 amended 2013b)
    - Schedule B5 Guideline on Ecological Risk Assessment (NEPC 1999 amended 2013c)
    - Schedule B6 Guideline on Risk Based Assessment of Groundwater Contamination (NEPC 1999 amended 2013d)
    - Schedule B7 Guideline on Health-Based Investigation Levels (NEPC 1999 amended 2013e)
- Australian and New Zealand Fresh and Marine Water Guidelines (ANZG 2018)
- enHealth Environmental Health Risk Assessment, Guidelines for Assessing Human Health Risks from Environmental Hazards (enHealth 2012).

In addition, the following PFAS-specific guidance has been considered:

- PFAS National Environmental Management Plan (the "PFAS NEMP"), Version 2.0, January 2020 (HEPA 2020).

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

Available information:

This assessment has considered the information provided in the following reports:

- GHD 2019, Detailed Site Investigation (DSI) Summary Report, Moorebank Intermodal Company Limited, Moorebank Precinct West. Report dated July 2019;
- EP Risk 2020, Long-Term Environmental Management Plan, Moorebank Precinct West (MPW). Reference EP1489.001 version 10, dated 24 September 2020. This is referred to as the LTEMP; and
- NSW EPA 2019, Environment Protection Licence (EPL) 21054.

In addition, this review has referenced previous risk assessment works completed be enRiskS in relation to PFAS in environmental media located to the west of the MPW, and presented in the following reports:

- enRiskS (2019a), Land Human Health and Ecological Risk Assessment (Land HHERA), Report to Moorebank Intermodal Company Limited, Draft, 6 May 2019.
- enRiskS (2019b), Waterway Human Health and Ecological Risk Assessment (Waterway HHERA), Report to Moorebank Intermodal Company Limited, Draft, 6 May 2019.

4.0 Review of issues

4.1 Site description

This assessment relates to the reuse of soil within MPW which is located at 400 Moorebank Avenue, Moorebank NSW, 2170 (the Site).

The site is located approximately 28 km west southwest of the Sydney Central Business District. The site is bound by the Georges River to the west, the East Hills Railway Line to the south, MPE to the east, and industrial properties to the north.

The Site is legally described as Lot 1 in Deposited Plan (DP) 1197707, Lot 2 in DP 1197707, Part Lot 3 in DP 1197707, Lot 100 in DP 1049508, Lot 101 in DP 1049508, Part Anzac Road and Moorebank Avenue public road reserves, refer to **Figure 1**.

It is understood the 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 with the Liverpool City Council area and is zoned IN1 General Industry and E3 Environmental Management.

The GHD DSI (GHD 2019) identified the presence of 3 primary PFAS source areas. These relate to historic firefighting training operations occurring at the Former Fire Training Area (FFTA) in the southwest corner of the site and in the southern portion of the "Dust Bowl" area in the western central portion of the site. The third area, referred to as the FE Training Area (believed to be "Fire Engineer Training Area") is located to the south of the FFTA.

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Long Term Environmental Management Plan
Moorebank Precinct West

Figure 1 - Site Location

Job No: EP1489.001
Date: 17/06/2020
Drawing Ref: Fig 1
Version No: v1

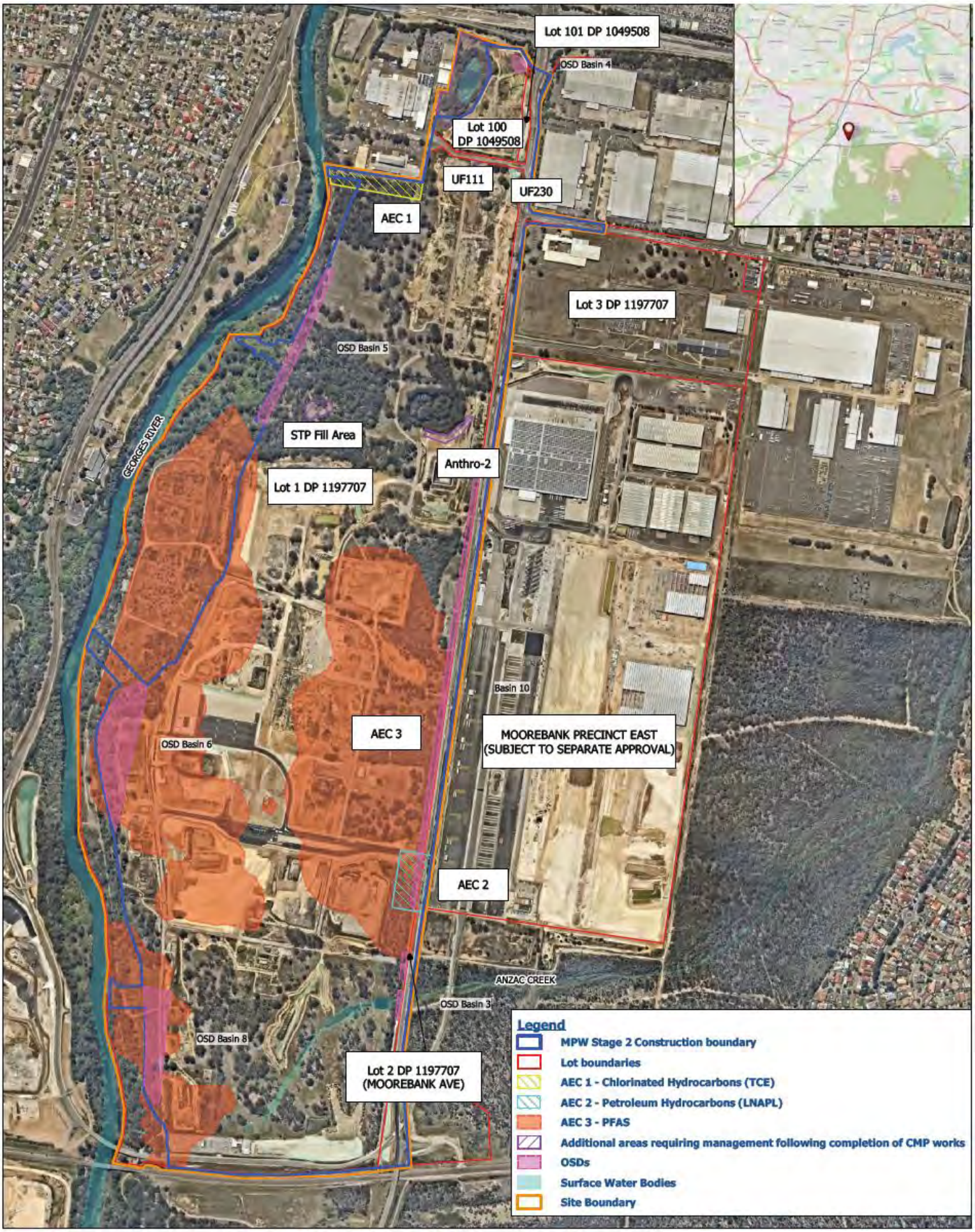
N

0 130 260 390 m

Approximate Scale Only

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

APPROVED COMPANY ISO 9001 Quality Management Systems QMS
APPROVED COMPANY AS/NZS 4801 OH&S Management Systems QMS
APPROVED COMPANY ISO 14001 Environmental Management Systems QMS



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Long Term Environmental Management Plan
Moorebank Precinct West

Figure 2 – Areas of Environmental Concern

Job No: EP1489.001
Date: 24/09/2020
Drawing Ref: Fig 3
Version No: v4

N

0 100 200 300 m

Approximate Scale Only

Coordinate System: MGA 84
Drawn by: SL Checked by: SL
Scale of regional map not shown
Source: Near Maps

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The LTEMP identified contamination source areas as Areas of Environmental Concern (AEC) with AEC 3 identified as PFAS contaminated material (refer to **Figure 2**).

4.2 Proposed works

The 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 Site inside the MPW Stage 2 Construction Boundary and includes the proposed on-site stormwater detention basins (OSD; refer to **Figure 1**); and
- **Offset Area**: Comprises the riparian area adjacent the Georges River which is located outside the MPW Stage 2 Construction Area Boundary in the western portion of the Site (refer to **Figure 1**).

Minor low disturbance works are proposed for the Offset Area which include re-vegetation and maintenance works in accordance with the Biobanking Agreement, executed between the Commonwealth and Office of Environment and Heritage (OEH) in April 2019.

Activities associated with construction of the Proposed Development are limited to the Construction Area of the Site and this assessment relates to measures within the LTEMP relevant to the Construction Area only. The reuse of soil in the Construction Area is limited to the findings of this assessment, unless subject to further additional location specific risk assessment to permit reuse with appropriate controls.

This assessment does not address the Offsite Area. Clean and low level PFAS material may be placed in the Offset Area to enhance biodiversity value, which would be subject to a separate site-specific risk assessment.

The development of the site involves a number of phases which require management within the LTEMP for the Construction Area:

- Phase 1 – Early Works, understood to have been completed and where the LTEMP is to be implemented to address further works below;
- Phase 2 – Contamination Management Works, including excavation works and the implementation of erosion, sedimentation and stormwater controls during bulk earthworks;
- Phase 3 – Site preparation Works, which includes the importation of fill materials to raise site levels;
- Phase 4 – Construction Works, which involves construction of the facilities and installation of underground services; and
- Operation – Where some sub-surface maintenance works may be required

4.3 Proposed development

The proposed development involves the covering of the bulk of the MPW with sealed surfaces that include rail infrastructure, access roads, warehousing and paved areas (refer to Appendix B of the LTEMP). There are some small areas that are proposed to be landscaped but these areas will still have engineered fill to manage potential for flooding. The stormwater infrastructure OSD 5, OSD 6 and OSD 8 will be located in the western side of the site. The proposed development is illustrated on **Figure 3**.

Figure 3: Proposed site development plan

4.4 EPL

EPL number 21054 has been issued to Qube in relation to the Moorebank Precinct, that includes MPW, and applies to all activities on the premises such as bulk earthworks, importing fill and road construction. In relation to stormwater runoff during the proposed development of the site, the licence includes the following limits to be applied to any discharges from the site into the Georges River (DP3, DP4) or Anzac Creek (DP5) (illustrated in **Figure 4**):

- PFOS = 0.7 µg/L
- PFHxS = 0.7 µg/L
- PFOA = 5.6 µg/L

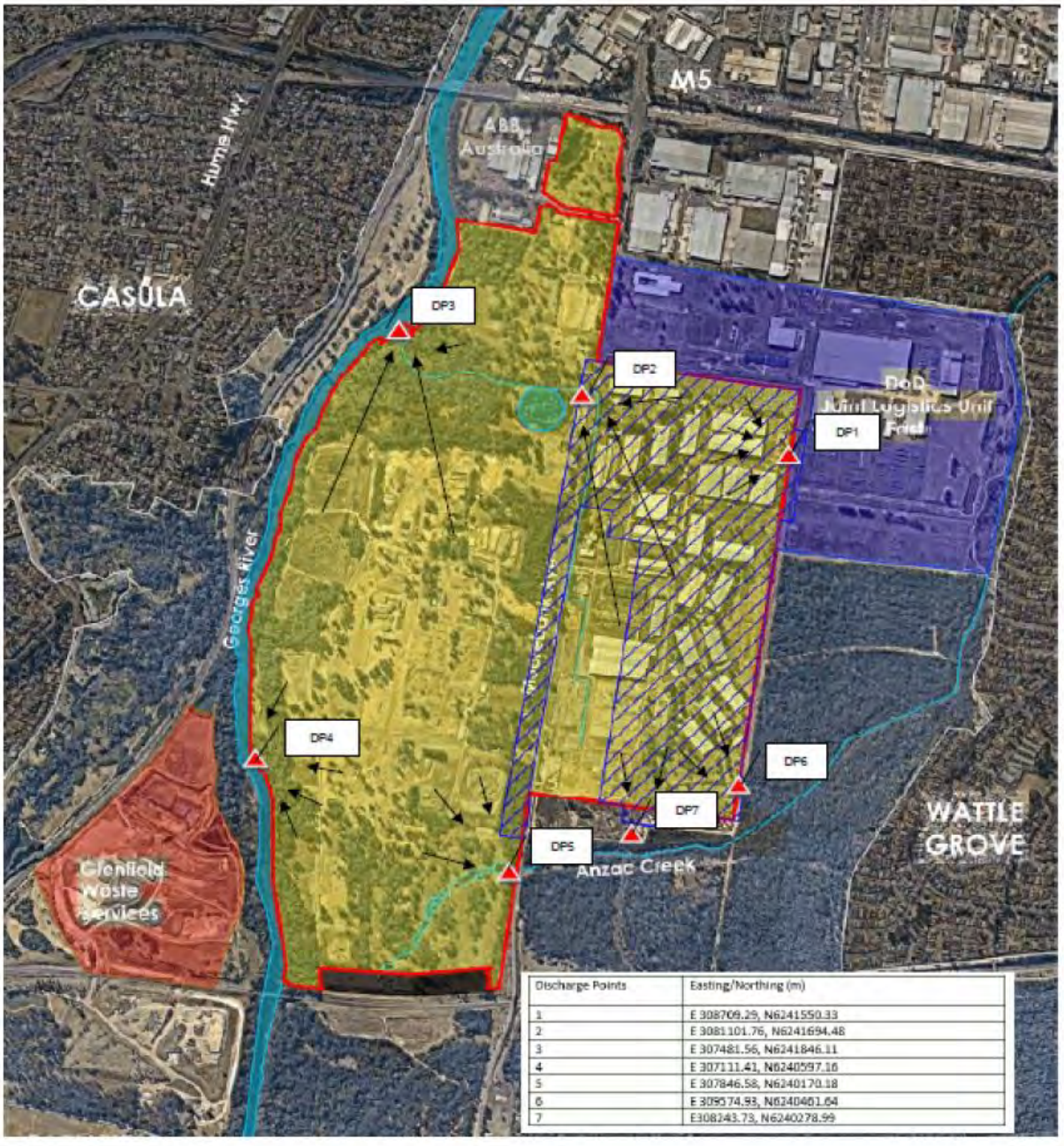


Figure 4: water discharge points requiring monitoring (EPL 21054)

These discharge criteria are 10 times the drinking water guideline relevant to these PFAS compounds (noting also that the drinking water guideline relates to PFOS+PFHxS rather than for PFOS and PFHxS individually).

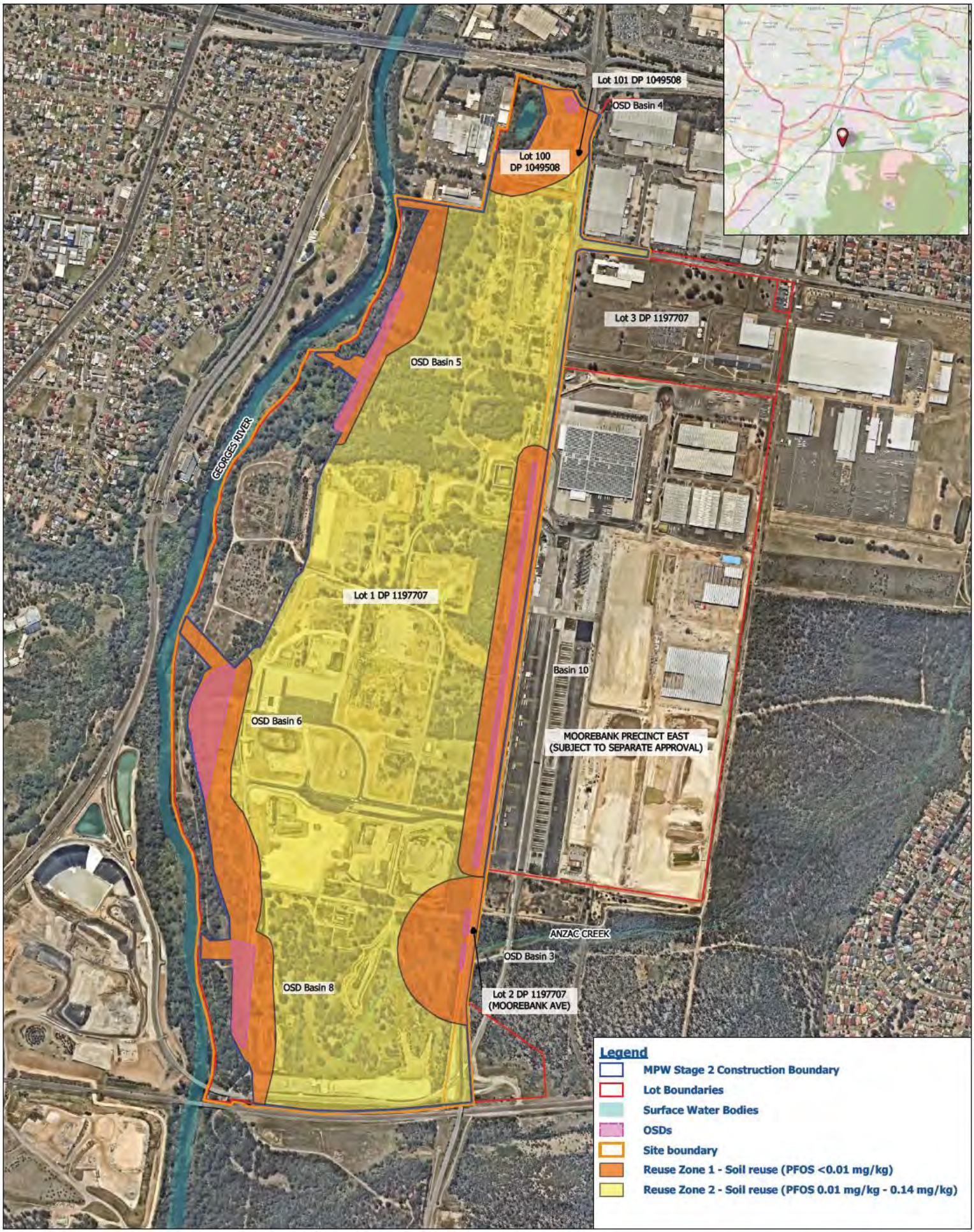
Monitoring is required on a monthly basis during discharge.

4.5 Proposed reuse of PFAS impacted soil

The LTEMP states that the critical pathways that require management in relation to the reuse of soil that has PFAS are:

- transport of PFAS to surface water and groundwater through leaching from PFAS contaminated material; and
- bioaccumulation in plants and animals, in particular, those consumed by humans and animals (which can only occur as a result of the migration of PFAS off-site to aquatic environments).

The LTEMP established 2 zones for the re-use of material, depending on the concentration of PFAS in soil – as detailed in **Table 1**. Soil with concentrations less than these criteria may be used in these zones. These zones are illustrated in **Figure 5**.



Long Term Environmental Management Plan
Moorebank Precinct West

Figure 5 - Soil Reuse Zones

EP RISK

www.eprisk.com.au

Job No: EP1489.001
Date: 03/08/2020
Drawing Ref: Fig 5
Version No: v2

N

0 130 260 390 m

Approximate Scale Only

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

APPROVED COMPANY ISO 9001 Quality Management Systems QMS

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

APPROVED COMPANY ISO 14001 Environmental Management Systems QMS

Table 1: PFAS trigger levels for soil reuse within the construction area (as presented in the LTEMP, EP Risk 2020)

Soil re-use zone	Analyte	Land use	Trigger level	Criteria source
Soil Reuse Zone 1	Soil – PFOS	All land uses	0.01 mg/kg	Ecological indirect exposure for all landuse from NEMP (HEPA 2020)
	Leachate (neutral pH) – PFOS+PFHxS		0.07 µg/L	Drinking water guidelines (NHMRC 2011 updated 2018)
Soil Reuse Zone 2	Soil – PFOS	Intensively developed sites	0.14 mg/kg	Ecological indirect exposure for intensively developed industrial sites from NEMP (HEPA 2020)
	Leachate (neutral pH) – PFOS+PFHxS		0.07 µg/L	Drinking water guidelines (NHMRC 2011 updated 2018)

These zones apply as follows:

- **Soil Reuse Zone 1** relates to areas (or a buffer zone) that are within 200 m of waterways and 50 m of stormwater structures (as shown in orange shading on **Figure 5**); and
- **Soil Reuse Zone 2** comprises the construction area outside of the buffer zones of 200 m from waterways and 50 m from stormwater structures (as shown in yellow shading in **Figure 5**). This zone comprises the bulk of the proposed soil reuse area.

The criteria adopted in the LTEMP for the reuse of PFAS contaminated soil are derived from the default values outlined in Section 12 of the PFAS NEMP (HEPA 2020). Section 12 of the PFAS NEMP specifically relates to the reuse of PFAS-contaminated materials including soil and water. The NEMP indicates that the reuse of soil must not lead to an unacceptable risk to human health and/or the environment, or an increase in the level of risk at or near the location in which it is used. The term reuse relates to the permanent or long-term placement of materials for a beneficial purpose in compliance with environmental legislation. The NEMP provides a decision tree for soil reuse (which is included as **Figure 6**). Where a risk assessment is not undertaken, the criteria presented in the decision tree for soil concentrations and leachate must be used. These are the guidelines that are summarised in **Table 1** and included in the LTEMP.

The decision tree (**Figure 6**) requires consideration of the default values for soil and leachate, as well as other aspects such as groundwater and surface water receptors.

In relation to leachate, where the default values cannot be compiled with, there is the opportunity to undertake an assessment of risk, which may include consideration of additional management measures to manage the risks. This is the purpose of this assessment.

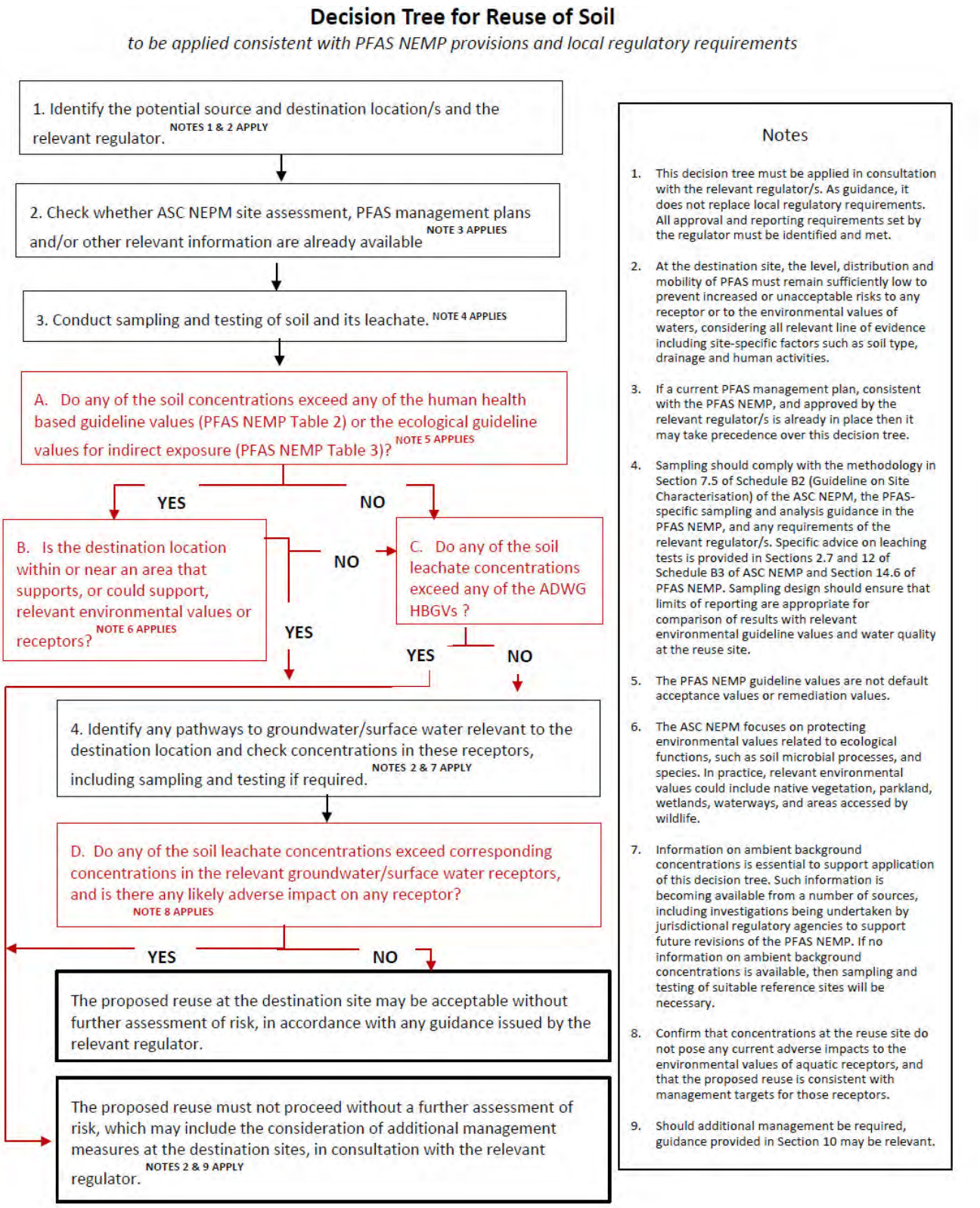


Figure 6: Decision tree for reuse of soil, as presented in PFAS NEMP (HEPA 2020)

5.0 Risk assessment

5.1 PFAS impacts in soil

PFAS contamination in the MPW has been characterised in the GHD DSI report (2019). This report provides a summary of all available data relevant to the MPW prior to any of the proposed works associated with the proposed development.

In relation to the presence of PFOS+PFHxS in soil which may be required to be excavated and reused on the site (cut and fill activities), the following is noted:

- Soil impacts within the MPW sit between <LOR and 0.01 mg/kg in the bulk of the site. However, there are some locations in the southern central portion and northern portion of the MPW with concentrations that sit in the range of 0.01 mg/kg to 0.14 mg/kg or >0.14 mg/kg (refer to **Figure 7**).
- Leachable concentrations of PFOS+PFHxS that exceed the Australian Drinking Water Guideline (ADWG) (NHMRC 2011 updated 2018) are present throughout the MPW.

The LTEMP (EP Risk 2020) provides a summary of existing concentrations of PFOS+PFHxS in soil within the soil reuse zones.

It is also noted that elevated concentrations of PFOS+PFHxS are present in groundwater and surface water in the MPW, with higher concentrations reported in groundwater wells located in the western portion of the area.

5.2 Existing risks

The MPW is modified as a result of the completion of early works. This includes the demolition of previous buildings, roadways and services, the importation of soil for some works, and the installation of swales and sediment basins. Exposed soil has been sprayed with a polymer to reduce erosion. Apart from workers involved in early works, and additional works proposed on the site, there are no other receptors (human or terrestrial) relevant to the existing site. Groundwater is not to be extracted and used for any purpose on the site.

The key receptors of importance for the MPW (and proposed development) relate to the terrestrial environment of the offset areas (to the west of the MPW) and aquatic environments of the Georges River (to the west) and Anzac Creek. Risks to human health and the environment relevant to the Georges River and land associated with the offset area were evaluated by enRiskS (2019a and 2019b).

These human health and ecological risk assessments (HHERAs) identified that the key risk issues related to the leaching of PFAS from soil which may contribute to aquatic impacts (including bioaccumulation risks) in the Georges River. The PFAS source areas were identified as the Dust Bowl, FFTA and former Fire Training Area South.

The consumption of recreationally caught fish from the Georges River is already managed through advice issued by the NSW Government limiting the consumption of fish from the Georges River (due to the presence of PFAS in edible fish species). There are numerous sites contributing to the concentrations of PFAS in the Georges River.

The reuse of soil in the MPW needs to consider the leaching of PFAS from soil, and any resulting changes to the existing risk profile in terms of leaching and migration of PFAS from the MPW to off-site areas (including the offset area and Georges River).

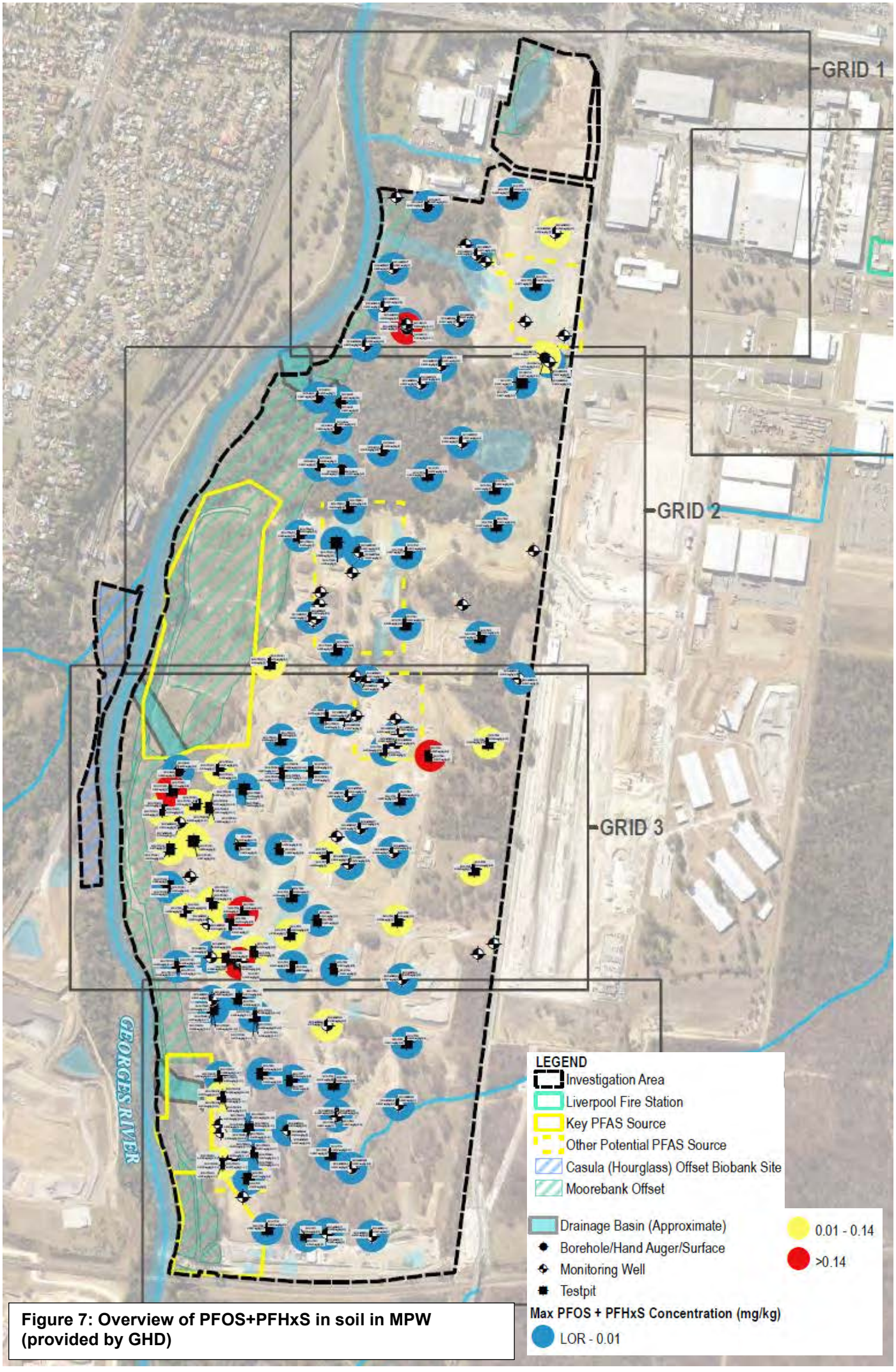


Figure 7: Overview of PFOS+PFHxS in soil in MPW (provided by GHD)

The land HHERA (enRiskS 2019a) identified that where stormwater infrastructure is proposed to cross the offset area, this infrastructure requires additional management measures (such as lining) to prevent the infiltration of stormwater runoff from the developed site infiltrating and changing the leach potential in the offset area. These management measures have been further considered below.

5.3 Potential risks post development

The proposed development of the MPW area is described in **Section 4.3**. The development will require cut and fill activities using existing soil, with the excavated soil expected to have varying levels of PFAS contamination. The reuse of this material is proposed for 2 zones as described in **Section 4.5**, however it is noted that within Soil Reuse Zone 2, the soil criteria requires further refinement to address commercial agreements established for the area, as follows:

- Soil beneath the warehouse area: PFOS ≤ 0.01 mg/kg
- Soil beneath the western ring road and interstate terminal/access - PFOS ≤ 0.14 mg/kg

In terms of the potential for risks to human health or the environment following completion of the proposed development, the following provides further discussion.

All reuse zones:

Where PFOS meets the criteria of 0.01 mg/kg or 0.14 mg/kg for soil reuse (based on ecological protection), there would not be expected to be any risk issues of concern for workers and visitors to the site (including works involved in maintenance works) as these soil criteria are below the commercial/industrial soil guidelines in the NEPM (HEPA 2020) (20 mg/kg for PFOS+PFHxS). It is noted that all existing concentration of PFOS+PFHxS in soil on the MPW are below the commercial/industrial guideline.

Soil Reuse Zone 1:

For this zone, where the soil concentrations (in material to be reused in this area) meet the guideline of 0.01 mg/kg PFOS+PFHxS and the materials are present at the surface or in the root zone of plant species expected to be grown, no direct toxicity effects or indirect toxicity effects are expected to be of concern for terrestrial environments in these areas as this guideline is the lowest of the NEMP guidelines that is protective for these effects.

For these areas, where leachate concentrations of PFOS+PFHxS are below 0.07 µg/L, impacts to groundwater (following rain) would not be expected to change the existing risk profile and any migration to groundwater and discharge to an aquatic environment would be expected to include dilution and mixing, resulting in much lower concentrations in off-site aquatic environments.

Where OSD basins and overflow channels are present in this zone, if these features are not lined (base and walls), there would be a more direct pathway for leachate from surface soil to migrate to and directly impact on water quality. In addition, where water is retained in the proposed basins infiltration of water into the subsurface would be increased, increasing the potential migration of PFAS leachate from soil in these areas. These risks can be managed through the implementation of appropriate management measures.

The management measures required are as follows:

- Install clay liners (or equivalent geosynthetic liners) through embankments and basin floors (minimum 600 mm) and under bio-retention basins (minimum 300 mm), as well as OSD overflow channels to mitigate any preferential pathways for soil leachate to directly enter surface water and stormwater to migrate to groundwater. The clay/geosynthetic liner should meet a maximum permeability of $1x10^{-9}$ m/s.

- The liners should be monitored via inspection if possible (minimum yearly) or by installation and testing of monitoring well(s) and repaired if damaged or deteriorated.
- All works undertaken in the area of the OSD basins and overflow channels should not damage these liners. If damage occurs the liners need to be repaired as soon as practicable.

Where leachate concentrations of PFOS+PFHxS exceed 0.07 µg/L, the potential for leaching to groundwater and impacts to aquatic environments increases. Given the complexity of the existing PFAS contamination at the site and the proposed development, for Reuse Zone 1 where soil may be placed close to existing waterways it is not considered sufficiently protective of the aquatic environment (including bioaccumulation) for soil exceeding the leachate criteria to be present in this area.

Further management of leaching can be achieved through the placement of these materials above the groundwater table (i.e. not in the saturated soil zone) and the placement of compacted clean fill or another barrier (such as concrete or a geosynthetic liner) to prevent/minimise rainwater infiltration through these materials (refer to **Section 5.4**).

Soil Reuse Zone 2:

For this zone, there are limited areas present where exposed soil may be present as most of the zone is expected to be covered with concrete, warehouses and roads. For the small areas of exposed soil, where PFOS concentrations are less than either 0.01 mg/kg or 0.14 mg/kg (depending on where these areas are located in this zone), there would not be expected to be any risk issues of concern for terrestrial receptors relevant to this highly disturbed environment.

For these areas, where leachate concentrations of PFOS+PFHxS are below 0.07 µg/L, impacts to groundwater (following rain) would not be expected to change the existing risk profile and any migration to groundwater and discharge to an aquatic environment would be expected to include dilution and mixing, resulting in much lower concentrations in off-site aquatic environments. This zone is noted to be outside of the buffer zones of 200 m from a waterway and 50 m from the OSD infrastructure, hence this dilution and mixing would occur prior to any leachate reaching and entering an aquatic environment. There are no water features present in this zone.

Where leachate concentrations of PFOS+PFHxS exceed 0.07 µg/L, the potential for leaching to groundwater and impacts to aquatic environments increases. Given the complexity of the existing PFAS contamination at the site and the proposed development, further consideration of management measures is required to ensure that leachate from these materials does not result in impacts to the aquatic environment (including bioaccumulation).

Further management of leaching can be achieved through the placement of these materials above the groundwater table (i.e. not in the saturated soil zone) and the placement of compacted clean fill or another barrier (such as concrete or a geosynthetic liner) to prevent/minimise rainwater infiltration of these materials (refer to **Section 5.4**).

5.4 Consideration and assessment of additional management measures

As discussed in **Section 5.3**, when considering risks related to soil that may be reused in Soil Reuse Zones 1 and 2 that have leachate concentrations of PFOS+PFHxS that exceed 0.07 µg/L, there is the potential for leachate to migrate to groundwater, mix in groundwater and discharge to and mix in an aquatic environment at levels that may be of concern in relation to aquatic toxicity (including bioaccumulation). For the use of soil with these higher levels of leachable concentration to be able to be used, additional risk management measures must be adopted.

A key management measure required to be implemented is the placement of this material above the groundwater table. This is to ensure that soil with leachable concentrations of PFOS+PFHxS >0.07 µg/L are not placed in the saturated zone where leaching and direct impacts to groundwater would occur. To address this issue, these materials should be placed at least 1 m above the maximum groundwater level (seasonal).

To minimise or prevent rainwater infiltrating the PFAS impacted soil these materials can be covered with surface materials that include a minimum of 1 m of compacted fill/engineered fill, concrete pavements, buildings, clay liners or geosynthetic liners (for OSD basins and overflow channels in Soil Reuse Zone 1).

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

For water to infiltrate to the soil containing PFAS (which could result in the leaching of PFAS from such soil), it would need to move through the compacted fill materials and/or the overlying impervious surfaces.

Pavements

Impervious pavements expected to be present on the site post development include:

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

These concrete and asphalt pavements would be essentially impervious to rainwater. Approximately 33% of the pavements on the site would be within warehouses, where the warehouse building would ensure no water was present on the concrete, at any time, and hence no infiltration can occur.

For the remainder of the pavement area, that is outdoors, this would receive rainfall. The published permeability of concrete is around $1x10^{-11}$ m/s for brick aggregate concrete and hardened concrete (Ahmad & Hossain 2017).

Engineered Fill

Engineered Fill, of at least 1 m thickness, is proposed to be placed beneath warehouses and the terminal development (roads, hardstand and railway lines) to achieve the required land surface and be suitable (geotechnically) for the construction. It is acknowledged that the thickness of fill may be less in some areas (for the proposed development), however these would also include a surface cover of concrete.

In relation to the engineered fill, these materials are expected to meet the following specifications:

- Engineered Fill is to conform to one of the following:
    1. Sandstone Fill from road header excavation, tunnel boring machine excavation or ripped or rock hammer excavation.
    2. Approved imported fill materials
    3. Site won VENM or ENM.
- Engineered Fill shall be placed in accordance with the following requirements:
    1. In near horizontal, laterally extensive layers of uniform material and thickness, deposited systematically across the work area as determined by the Geotechnical Inspection and Testing Authority (GITA).

2. The compacted thickness of each layer shall be equal to or less than 300 mm. Engineered Fill shall only be placed on subgrade in accordance with the Moorebank Intermodal Logistics Precinct: Bulk Earthworks Specification Area A, B, D (EPSM3813-021S REV 1) and approved by the GITA.

- Engineered Fill shall be placed and compacted to a Dry or Hilf Density Ratios (Standard Compaction) of between 98% and 102%.
- The dry bulk density for the imported sandstone VENM is approximately 2100 kg/m^3 loose material. Compaction, as specified, would increase the bulk density (and decrease porosity).
- The placement moisture variation or Hilf moisture variation shall be controlled to be between 2% dry of optimum and 2% wet of optimum.

Compaction is the compression of a non-saturated soil resulting in reduction of the volume and increase in the density of a given mass of soil. Compaction is used to maximise dry density, reduce compressibility and decrease permeability. The more compacted the material, the lower the porosity, and the lower the potential for infiltration of water through (and subsequent leaching of PFAS from) soil. Hence, the permeability of compacted materials is expected to be low. Where conservatively considered to be in the range of semi-permeable (which is conservative), the permeability of such materials may be 1x10^{-5} to 1x10^{-11} m/s [1]. A value around 1x10^{-7} m/s relates to mixtures of sand, silt and clay (likely uncompacted) and would be a conservative estimate for this type of material. The compaction of these materials is necessary to achieve the geotechnical characteristics required for the development.

OSDs and associated infrastructure

The stormwater in the OSD detention basins and associated overflow channels is unlikely to significantly contribute to the infiltration rate, as these structures are required to be lined with clay (or equivalent geosynthetic liner) with low permeability of 1x10^{-9} m/s.

Assessment of water infiltration through management measures

The following provides a review of the potential for water to infiltrate the surface cover materials proposed or expected to be used in the soil reuse zones. Rainfall would need to penetrate these surface materials before reaching the PFAS contaminated soil, where this water could then leach PFAS from the soil and transport it further (where sufficient ongoing infiltration may occur) to groundwater.

For all areas:

- Where at least 1 m of compacted fill with a permeability of 1x10^{-7} m/s is present, the time required for continuous rainfall to penetrate 1 m of this material is 116 days; and/or
- The clay liner materials in the OSD basins and associated overflow channels will range in thickness from 0.3 to 0.6 m and have a permeability of 1x10^{-9} m/s (with a geosynthetic liner assumed to achieve the same specifications). The time required for continuous rainfall or water to penetrate through these materials is 3,500 to 7,000 days; and/or
- For the concrete pavement outdoors which ranges in thickness from 0.15 m to 0.5 m and has a permeability of 1x10^{-11} m/s, the time for continuous rainfall to penetrate this material is >17,000 days (noting that this value is for concrete 0.15 m thick (the smallest proposed for the site)). For areas where the compacted fill has a thickness less than 1 m, these would include a concrete surface. For these areas the infiltration rate would be dominated by the impervious nature of the concrete; and/or
- For concrete beneath warehouse buildings, there would be no rainfall on these surfaces, and no infiltration.

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

For the Moorebank area, the annual rainfall is on average 866.4 mm/year, with 81.3 days recording more than 1 mm rain (average for Bankstown Airport for 1968 to 2020)[2]. It is noted that evaporation would also occur. These are fewer rain days (and not expected to be continuous) than calculated above needed for continuous rain in order to infiltrate the surface materials proposed to be present above the re-used soil.

Based on the above, rain and seepage from stormwater in the detention basins, would also not be expected to penetrate the overlying materials and reach the PFAS impacted soil. For the compacted soil (Engineered Fill), if this does not meet the proposed compaction standard, then the permeability may be higher. The volume of infiltration that may occur, however, would be minimal as long as the material still was sufficient for the geotechnical requirements to be applied to the ground surface.

Where infiltration through the surface materials is negligible or does not occur, infiltration water would not reach (or would be negligible in) the underlying PFAS contaminated soil. Where this occurs, there is no (or a negligible) mechanism for leaching of PFAS to occur. Where no (or negligible) leaching can occur, there would be no migration of PFAS from these materials to groundwater.

Hence, it is concluded that for soil reused above the groundwater table and beneath any or all of the above management measures, it is not necessary to specify a trigger value for leachable concentrations of PFOS+PFHxS in the LTEMP.

Adopting these management measures mitigates the identified risks to aquatic environments from the leaching of PFAS from soil reused on the site.

5.5 Proposed PFAS criteria and management measures

Based on the assessment presented above **Table 2** presents revised criteria for PFAS in soil proposed to be reused in the Construction Area. It is noted that the criteria presented can only be implemented where the management measures outlined below **Table 2** are adopted.

[2] http://www.bom.gov.au/climate/averages/tables/cw_066137.shtml

Table 2: PFAS trigger levels for soil re-use within the Construction Area

Soil re-use zone	Analyte	Land use	Criteria	Management measures required for zone/area
Soil Reuse Zone 1 (all areas)	Soil – PFOS	All land uses	≤ 0.01 mg/kg	Materials must be placed at least 1 m above groundwater (seasonal maximum). This criteria relates to material that may be placed adjacent to OSD basins and overflow drainage channels that have a clay liner or equivalent geosynthetic liner (refer to Note 1)
	Leachate (neutral pH) – PFOS+PFHxS		≤ 0.07 µg/L	
Soil Re-use Zone 1 (beneath surface cover materials as described in management measures)	Soil – PFOS	All land uses	≤ 0.01 mg/kg	Materials must be placed at least 1 m above groundwater (seasonal maximum). Materials must be placed beneath Engineered Fill, concrete or a clay liner or equivalent geosynthetic liner (refer to Notes 1 and 2)
Soil Re-use Zone 2 – Soil beneath the warehouse area	Soil – PFOS	Intensively developed sites	≤ 0.01 mg/kg	Materials must be placed at least 1 m above groundwater (seasonal maximum). Materials must be placed beneath Engineered Fill or concrete (refer to Notes 1 and 2)
Soil Re-use Zone 2 – Soil beneath the western ring road and interstate terminal/access areas	Soil – PFOS	Intensively developed sites	≤ 0.14 mg/kg	Materials must be placed at least 1 m above groundwater (seasonal maximum). Materials must be placed beneath Engineered Fill or concrete (refer to Notes 1 and 2)

Note 1:

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

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

Note 2:

Engineered Fill of a minimum 1 m thickness is to conform to one of the following:

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

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

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

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

In addition to the management measures noted above, the LTEMP must also include the following:

- Ensuring groundwater is not extracted and used for any purpose;
- All excavations minimise the area of PFAS contaminated soil at any one time, stockpiles of PFAS contaminated soil require management to ensure water runoff to the offset area or off-site waterbodies does not occur, and appropriate erosion and sediment control measures are implemented such that all discharges of water from the site are in compliance with the EPL (refer to **Section 4.4**);
- The surface cover placed over reused soil with PFAS impacts must be maintained. If damaged during maintenance works, the surface cover (complying with the relevant specifications listed in the footnotes to **Table 2**) must be repaired as soon as practicable
- Any future works that require excavation of soil in the reuse zones can only reuse these materials as detailed in **Table 2** unless a further additional site-specific risk assessment is conducted. Failing this, materials must be appropriately classified and disposed to a licenced landfill or stored onsite for future reuse.

6.0 Limitations

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

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

The methodology adopted and sources of information used are outlined in this report. Environmental Risk Sciences Pty Ltd has made no independent verification of this information beyond the agreed scope of works and assumes no responsibility for any inaccuracies or omissions.

This report was prepared in September/October 2020 and is based on the information provided and reviewed at that time. Environmental Risk Sciences Pty Ltd disclaims responsibility for any changes that may have occurred after this time.

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

If you require any additional information or if you wish to discuss any aspect of this report, please do not hesitate to contact me on (02) 9614 0297 or 0425 206 295

Yours sincerely,

Dr Jackie Wright (Fellow ACTRA)
Principal/Director
Environmental Risk Sciences Pty Ltd

References

Ahmad, SI & Hossain, MA 2017, 'Water Permeability Characteristics of Normal Strength Concrete Made from Crushed Clay Bricks as Coarse Aggregate', *Advances in Materials Science and Engineering,* vol. 2017, 2017/11/06, p. 7279138.

ANZG 2018, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, A joint initiative of the Australian and New Zealand Governments in partnership with the Australian state and territory governments, Online. viewed August 2018, <http://www.waterquality.gov.au/anz-guidelines>.

enHealth 2012, *Environmental Health Risk Assessment, Guidelines for assessing human health risks from environmental hazards*, Commonwealth of Australia, Canberra. <http://www.health.gov.au/internet/main/publishing.nsf/content/804F8795BABFB1C7CA256F1900045479/$File/DoHA-EHRA-120910.pdf >.

HEPA 2020, *PFAS National Environmental Management Plan Version 2.0*, The National Chemicals Working Group (NCWG) Of The Heads of EPAs Australia and New Zealand (HEPA). <http://www.environment.gov.au/protection/chemicals-management/pfas>.

NEPC 1999 amended 2013a, *Schedule B1, Guideline on Investigation Levels For Soil and Groundwater, National Environment Protection (Assessment of Site Contamination) Measure*, National Environment Protection Council. <https://www.legislation.gov.au/Details/F2013L00768/Download>.

NEPC 1999 amended 2013b, *Schedule B4, Guideline on Site-Specific Health Risk Assessment Methodology, National Environment Protection (Assessment of Site Contamination) Measure*, National Environment Protection Council. <https://www.legislation.gov.au/Details/F2013L00768/Download>.

NEPC 1999 amended 2013c, *Schedule B5 Guideline for Ecological Risk Assessment, National Environment Protection (Assessment of Site Contamination) Measure*, National Environment Protection Council.

NEPC 1999 amended 2013d, *Schedule B6 Guideline on Risk Based Assessment of Groundwater Contamination, National Environment Protection (Assessment of Site Contamination) Measure*, National Environment Protection Council. <https://www.legislation.gov.au/Details/F2013L00768/Download>.

NEPC 1999 amended 2013e, *Schedule B7, Guideline on Derivation of Health-Based Investigation Levels, National Environment Protection (Assessment of Site Contamination) Measure*, National Environment Protection Council. <https://www.legislation.gov.au/Details/F2013L00768/Download>.

NHMRC 2011 updated 2018, *Australian Drinking Water Guidelines 6, Version 3.5 Updated August 2018, National Water Quality Management Strategy*, National Health and Medical Research Council, National Resource Management Ministerial Council, Canberra.

Appendix C

NSW EPA Site Audit

Approval of LTEMP and Site Specific Risk Assessment

18 November 2020

Ref: IA 0301-2014_06

Noel McGowan
Moorebank Intermodal Company
Suite 33.3, Level 33
1 O'Connell Street
Sydney NSW 2000

Via email only: noel.mcgowan@micl.com.au

Dear Mr McGowan,

RE: Site Audit Interim Advice 06 – Review of Revised LTEMP for MPW, Moorebank Intermodal Terminal.

James Davis of Enviroview Pty Ltd has been engaged to provide the services of a NSW EPA Contaminated Land Accredited Site Auditor, to conduct a Site Audit in relation to the land to be developed for the Moorebank Intermodal Terminal located at Moorebank Avenue, Moorebank, NSW, in accordance with the *Contaminated Land Management Act 1997* and relevant guidelines made or approved under s.105 of that Act.

The objective of the Site Audit is to provide a Site Audit Report and Site Audit Statement to certify, in relation to contaminated land, the Auditor's opinion of whether the site is suitable for the proposed commercial/industrial development.

A Site Audit Interim Advice is provided by a Site Auditor to assist in the management of contamination issues in regard to the requirements of the Site Audit at a particular stage of the Site Audit, prior to issuing the Site Audit Statement. An interim advice does not constitute a Site Audit Statement or a Site Audit Report and does not pre-empt the final Site Audit conclusions. A Site Audit Report and Site Audit Statement will be prepared at the conclusion of the Site Audit.

The purpose of this interim advice is to provide comment with regard to the review of the following revised report:

> EP Risk. *Moorebank Intermodal West (MPW) – Long-Term Environmental Management Plan.* (Report Ref.: EP1489.001 v12). 27 October 2020.

The auditor has previously reviewed earlier drafts of this report as documented in Interim Advice # 32, dated 5th March 2020, Interim Advice # 35 dated 28th July 2020, Interim Advice # 37 dated 11th August 2020, Interim Advice # 38 dated 19th August 2020, Interim Advice # 0301-2014-02 dated 22 September 2020, and Interim Advice # 0301-2014-05 dated 22 October 2020. A version of the LTEMP (v8) formed a condition of a Site Audit Statement (0301-1613-7) that was issued regarding the site suitability by the site auditor for MPW on the 18 September 2020.

The LTEMP was further developed by the consultant to incorporate necessary updates following the completion of addition remediation and validation works conducted at the site in accordance with the Contamination Management Plan (CMP) (EP Risk, July 2020) and as

documented in the Supplementary Validation Report (JBS&G, Sept 2020) with subsequent versions (v9) further incorporating these works and developing the future approach to residual soils impacted with PFAS at the site.

In order to further refine decision points for reuse of PFAS-impacted materials at the site, EnRiskS developed the *Moorebank Intermodal Terminal – LTEMP Material Reuse Risk Assessment for PFAS*. The final version of this risk assessment was dated 9 October 2020. The auditor reviewed this document as reported in Interim Advice 0301-2014-03 and 0301-2014-04 dated 1 October 2020 and 14 October 2020 respectively.

The subsequent version 11 (v11) of the LTEMP was developed by the consultant to incorporate the recommendations from the EnRiskS risk assessment document with regard to reuse of PFAS-impacted soils on site. Following auditor review of v11 as documented in Interim Advice # 0301-2014-05, and incorporation of comments as pertinent, the current version 12 (v12) of the LTEMP was prepared by the consultant.

Revised LTEMP v12 (27 October 2020)

A response to auditor comments from IA # 0301-2014-05 on version 11 of the LTEMP, provided by the consultant EP Risk, was submitted together with the revised version 12 of the document.

The auditor has reviewed the final (v12) version of the LTEMP and finds that it has sufficiently incorporated prior audit review comments.

The LTEMP should be implemented going forward as pertinent for residual contamination issues during Stage 2 construction works at the site as defined within the plan, and will form a condition to the Site Audit Statement that is currently being prepared and will be issued at the completion of this Site Audit

Thank you for your time regarding this matter. If you require additional information or clarification, please do not hesitate to contact me.

Yours sincerely

James Davis
NSW EPA Contaminated Land Site Auditor
Enviroview Pty Ltd

14 October 2020

Ref: IA 0301-2014_04

Noel McGowan
Moorebank Intermodal Company
Suite 33.3, Level 33
1 O'Connell Street
Sydney NSW 2000

Via email only: noel.mcgowan@micl.com.au

Dear Mr McGowan,

RE: Site Audit Interim Advice 04 – Review of Revised LTEMP Material Reuse Risk Assessment for PFAS for Moorebank Intermodal Terminal.

James Davis of Enviroview Pty Ltd has been engaged to provide the services of a NSW EPA Contaminated Land Accredited Site Auditor, to conduct a Site Audit in relation to the land to be developed for the Moorebank Intermodal Terminal located at Moorebank Avenue, Moorebank, NSW, in accordance with the *Contaminated Land Management Act 1997* and relevant guidelines made or approved under s.105 of that Act.

The objective of the Site Audit is to provide a Site Audit Report and Site Audit Statement to certify, in relation to contaminated land, the Auditor's opinion of whether the site is suitable for the proposed commercial/industrial development.

A Site Audit Interim Advice is provided by a Site Auditor to assist in the management of contamination issues in regard to the requirements of the Site Audit at a particular stage of the Site Audit, prior to issuing the Site Audit Statement. An interim advice does not constitute a Site Audit Statement or a Site Audit Report and does not pre-empt the final Site Audit conclusions. A Site Audit Report and Site Audit Statement will be prepared at the conclusion of the Site Audit.

The purpose of this interim advice is to provide comment with regard to the review of the following revised report:

> EnRiskS. *Moorebank Intermodal Terminal – LTEMP Material Reuse Risk Assessment for PFAS.* 9 October 2020.

The risk assessment document cited above was previously reviewed (version dated 30 September 2020) with comments presented in Interim Advice # 03 dated 1 October 2020.

LTEMP Material Reuse Risk Assessment for PFAS, EnRiskS

The revised LTEMP Material Reuse Risk Assessment for PFAS by EnRiskS, dated 9 October 2020, is accepted as appropriately addressing the auditor's concerns, as presented in Interim Advice #03 dated 1 October 2020, and therefore can be considered 'final' with no further modifications to this document required.

Path Forward and LTEMP

It is anticipated that the LTEMP (EP Risk, latest version is v.10 dated 24 September 2020) will now be thoroughly updated to incorporate as appropriate all relevant discussion and recommendations from EnRiskS in their risk assessment document discussed above.

With regard to this update to the LTEMP document – the following points are noted.

1. The LTEMP should include clear update in the text and figures for the proposed soil reuse zones – in alignment with the 'groupings' and notes presented in Table 2 of the risk assessment document.
2. Please ensure that the "warehouse area" is well understood and clearly depicted.
3. Will the "warehouse areas" include the associated 'landscaping' areas adjacent to each lot? If so – what surface cover will be placed in these landscaped areas?
4. It is noted that the consultant (EnRiskS) mentions reuse of soils beneath the 'western ring road' – please ensure that the portion of this road within 'Zone 2' is clearly defined and is not confused with the portion of this road that lies within 'Zone 1'.
5. The site auditor would prefer that soil reuse areas do not extend to the lateral boundary of each "area". In other words – if for example an area of reuse is defined as 10m x 10m then the actual reuse below this area should provide a small buffer (8m x 8m for example). This should be based on the management measures to be implemented for the area and whether the adjacent area provides equivalent cover/management measures.
6. Additional management procedures / EMPs or modifications to existing procedures will be required in alignment with the recommendations for the maintenance of surface cover for each zone (see Section 5.5/EnRiskS).
7. Similarly, land-use restrictions will be required relative to future excavation within reuse zones and the recommendations in the report (see Section 5.5/EnRiskS).
8. The consultant (EnRiskS) mentions in the risk assessment that there will be small areas of exposed soil and areas where the compacted fill may be less than 1m. These areas should be defined so they can be appropriately managed in alignment with the risk assessment recommendations.
9. The LTEMP should include procedures to specifically document, survey, and monitor areas of reuse to ensure that each area incorporates the appropriate cover material.

Thank you for your time regarding this matter. If you require additional information or clarification, please do not hesitate to contact me.

Yours sincerely

James Davis
NSW EPA Contaminated Land Site Auditor
Enviroview Pty Ltd

Appendix D

PFAS Laboratory Analytes and Limits of Reporting (ALS)

16. ANALYTES & LORS

GROUP / ANALYTES	WATER Std. Level (µg/L)	WATER Low Level (µg/L)	[5]WATER Super Trace (µg/L)	SOIL(mg/kg)	BIOTA* (µg/kg)	PRODUCT (mg/kg)
Method Code	EP231X	EP231X-LL	EP231X-ST	EP231X	EP231X	EP231X
Perfluoroalkane Sulfonic Acids						
Perfluorobutane sulfonic acid (PFBS) *included in Short Suite*	0.02	0.002	0.0005	0.0002	1	0.02
Perfluoropentane sulfonic acid (PFPeS)	0.02	0.002	0.0005	0.0002	1	0.02
Perfluorohexane sulfonic acid (PFHxS) *included in Short Suite*	0.02	0.002	0.0005	0.0002	1	0.02
Perfluoroheptane sulfonic acid (PFHpS)	0.02	0.002	0.0005	0.0002	1	0.02
Perfluorooctane sulfonic acid (PFOS) *included in Short Suite*	0.01	0.002	0.0003	0.0002	1	0.01
Perfluorodecane sulfonic acid (PFDS)	0.02	0.002	0.0005	0.0002	1	0.02
Perfluoroalkane Carboxylic Acids						
Perfluorobutanoic acid (PFBA) *included in Short Suite*	0.1	0.01	0.002	0.001	5	0.1
Perfluoropentanoic acid (PFPeA) *included in Short Suite*	0.02	0.002	0.0005	0.0002	1	0.02
Perfluorohexanoic acid (PFHxA) *included in Short Suite*	0.02	0.002	0.0005	0.0002	1	0.02
Perfluoroheptanoic acid (PFHpA) *included in Short Suite*	0.02	0.002	0.0005	0.0002	1	0.02
Perfluorooctanoic acid (PFOA) *included in Short Suite*	0.01	0.002	0.0005	0.0002	1	0.01
Perfluorononanoic acid (PFNA)	0.02	0.002	0.0005	0.0002	1	0.02
Perfluorodecanoic acid (PFDA)	0.02	0.002	0.0005	0.0002	1	0.02
Perfluoroundecanoic acid (PFUnDA)	0.02	0.002	0.0005	0.0002	1	0.02
Perfluorododecanoic acid (PFDoDA)	0.02	0.002	0.0005	0.0002	1	0.02
Perfluorotridecanoic acid (PFTrDA)	0.02	0.002	0.0005	0.0002	1	0.02
Perfluorotetradecanoic acid (PFTeDA)	0.05	0.005	0.0005	0.0005	2	0.05
Perfluoroalkyl Sulfonamides						
Perfluorooctane sulfonamide (FOSA)	0.02	0.002	0.0005	0.0002	1	0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	0.05	0.005	0.001	0.0005	2	0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	0.05	0.005	0.001	0.0005	2	0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	0.05	0.005	0.001	0.0005	2	0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	0.05	0.005	0.001	0.0005	2	0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	0.02	0.002	0.0005	0.0002	1	0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	0.02	0.002	0.0005	0.0002	1	0.02
(n:2) Fluorotelomer Sulfonic Acids						
4:2 Fluorotelomer sulfonic acid (4:2 FTS) *included in Short Suite*	0.05	0.005	0.001	0.0005	2	0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS) *included in Short Suite*	0.05	0.005	0.001	0.0005	2	0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS) *included in Short Suite*	0.05	0.005	0.001	0.0005	2	0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS) *included in Short Suite*	0.05	0.005	0.001	0.0005	2	0.05
Sums						
Sum of PFAS	0.01	0.002	0.0003	0.0002	-	-
[1]Sum of PFHxS and PFOS	0.01	0.002	0.0003	0.0002	-	0.01
[2]Sum of PFAS (WA DER List)	0.01	0.002	0.0003	0.0002	-	-
[3]Sum of the total oxidisable precursors for C7 to C14 compounds (TOPA C7-C14) as fluorine	-	-	-	-	-	0.01
[4]Sum of TOPA C4-C14 plus C4-C8 sulfonates	0.01	0.002	-	0.0002	-	0.01

[1]: Sum required for enHealth drinking water guideline and QLD Foam Policy for short-chain fluorous AFFF.
[2]: PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS,PFHxS, PFOS, 6:2-FTS and 8:2-FTS
[3]: Queensland Operational Policy on Environmental Management of Firefighting Foam (6.2.1 and 6.2.2). Foams not meeting criteria must be withdrawn from service.
[4]: Queensland Operational Policy on Environmental Management of Firefighting Foam (6.4.2).guidance set for disposal of foam concentrates and waste waters. General analytical requirement for all matrices – see *Fluorinated organic compound analyses* in the definitions section.
[5]: Super trace method is not suitable for waste waters. These will not be accepted for this test.

Appendix E

Remediation Action Plan (RAP) (Golder 2016)

REMEDIATION ACTION PLAN

9 August 2016

MOOREBANK INTERMODAL COMPANY PROPERTY WEST

Land Preparation Works Stage 1 and Stage 2 - Remediation Action Plan

Submitted to:
Tactical Group
Level 15
124 Walker Street
North Sydney NSW 2060

Report Number. 1651776-005-R-Rev0

Distribution:

Tactical Group - 1 electronic copy
EnviroView - 1 electronic copy

Golder Associates

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APPENDICES

1.0 INTRODUCTION

Tactical Group Pty Ltd (Tactical) commissioned Golder Associates Pty Ltd (Golder) to prepare a Remediation Action Plan (RAP) for the Moorebank Intermodal Terminal, located at Moorebank, NSW.

The Moorebank Intermodal Terminal project involves the construction and operation of an Intermodal terminal (IMT) facility and approximately 215,000 m^2 gross floor area (GFA) of warehousing. When completed the IMT facility will have the necessary infrastructure to support a container freight throughput volume of 500,000 twenty-foot equivalent units (TEUs) per annum.

Development of the IMT will be staged, with the remediation works included within the Moorebank Intermodal Terminal concept approval (SSD 5066[1]) as *"Early Works (Stage 1)"*.

The remediation / management works generally include, the demolition and remediation of high risk infrastructure and contaminated hotspots, including:

- Underground storage tanks (USTs); and
- Contamination hotspots containing lead and hydrocarbons in soil and stockpiles containing asbestos in soils.

The remediation works will also require the implementation of management approaches to unexploded ordnance (UXO) and explosive ordnance waste (EOW) (if found) and asbestos in or on soils. The site wide approach to the management of UXO and asbestos in soils are presented in the following documents, respectively:

- "UXO Risk Review and Management Plan," prepared by G-Tek (draft report dated 7 June 2016, reference number 14037GOLD, as amended);
- "Asbestos in Soils Management Plan," prepared by Golder Associates (draft report dated 4 July 2016 reference number 1416224-035-R-RevA, as amended).

The Site is the subject of an environmental audit in accordance with Part 4 of the *Contaminated Land Management Act 1997*. An accredited Environmental Site Auditor, Mr Frank Mohen of AECOM Pty Ltd, has completed the review of the current site investigation documentation and prepared a Section B Site Audit Statement based on a preliminary RAP prepared by PB (2014b). For the proposed remediation activities, accredited Environmental Site Auditor, Mr James Davis of EnviroView Pty Ltd, has been appointed.

The site locality, property boundaries and an overview of the remediation areas are presented in Figures 1, 2, and 3 respectively (Appendix A), and described further in Section 2.

The remediation works are part of the wider land preparation works which are being completed in two stages, Stage 1 and Stage 2 with the Stage 1 works initially being completed within Priority Area 1 (PA1), followed by works within the remaining portions of the site, referred to as Priority Area 2 (PA2). Refer to Figure 1 in Appendix A for the PA1 and PA2 areas.

1.1 Remediation Objectives

Generally, the objectives of the remediation works is to remediate and/or manage contamination risks at the site, such that the site is suitable for the proposed commercial / industrial land use or conservation / open space land use.

1.2 RAP Purpose

The purpose of this RAP is to provide details of the remediation strategy and validation approach to render the site suitable for the proposed commercial/ industrial land use, as well facilitate the remediation required to establish a riparian conservation zone adjacent to the Georges River (ecological conservation zone).

[1] http://www.majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=5066

At this stage it is not clear if public access to the riparian zone will be allowed. Should public access be allowed the areas made available to the public will need to be re-considered as recreational/open space.

This RAP documents the proposed remediation and environmental validation works associated with land preparation works including:

- A site description, a summary of the site history, site conditions and surrounding environment;
- A description of the soil contamination that has been identified within the site and the extent of remediation required;
- Identification of regulatory compliance requirements and development permissions granted for the development of the IMT;
- Documenting the nominated remediation and/or management approaches for impacted materials located at the site; and
- Identifying the suitable validation protocols, including criteria, for the remediation works.

1.3 Overview of Project Documentation

The development of the site is progressing through the statutory approvals process under both the Commonwealth and NSW Government processes. Under the Commonwealth process the project is a 'controlled action' under the Commonwealth *Environmental Protection and Biodiversity Conservation Act, 1999 (EPBC Act)* and requires approval from the Commonwealth Minister for the Environment. A final Environmental Impact Statement (EIS) has been prepared and is currently undergoing assessment (refer to http://www.micl.com.au/environment/view-the-final-environmental-impact-statement.aspx viewed on 04 July 2016). Under the NSW Government process a staged development approval is required. On Friday 3 June 2016, the NSW Planning and Assessment Commission approved MIC's Stage 1 State Significant Development (SSD) Concept Approval for an intermodal terminal on the MIC land at Moorebank (refer to http://www.micl.com.au/environment/mics-concept-approval.aspx viewed on 04 July 2016).

To satisfy the requirements of the approvals processes, Parsons Brinckerhoff Australia (PB) prepared a Phase 2 Environmental Site Assessment (ESA) report (PB, 2014a) and a Preliminary Remediation Action Plan (RAP) (PB, 2014b) for inclusion within the EIS. NSW EPA accredited Site Auditor Frank Mohen, reviewed the PB ESA and Preliminary RAP, and prepared a Section B Site Audit Statement (2012) and Site Audit Report (update in 2014). The Site Audit Statement declares that the RAP is appropriate and the IMT site can be made suitable for the proposed (commercial/ industrial) land use if the site is remediated / managed in accordance with the Preliminary Remediation Action Plan (PB, 2014b).

The overall remediation strategy presented within the Preliminary RAP (PB, 2014b), i.e. a strategy to address the identified risks while providing opportunity for containment and beneficial reuse of material on the site, was considered appropriate. However, the Preliminary RAP (2014b) presented generic approaches to remediation and validation, and if implemented (without amendment) was unlikely to efficiently achieve the overall remediation objective. The Preliminary RAP (PB, 2014b) also recommended further investigation to augment the existing environmental data. The additional investigations were substantially completed as part of the Post Phase 2 ESA investigation works completed by Golder (2015a).

As the Preliminary RAP was included within the EIS and was also subject of the Section B Site Audit Statement, it was agreed with the Auditor to retain the Preliminary RAP (PB, 2014b) in its current form and to supplement the Preliminary RAP with an additional document the Validation Plan – Principles (Golder, 2015c). The Validation Plan - Principles (Golder, 2015c) sets out the principles for validation and provides guidance for the validation strategy appropriate to support the successful completion of remediation works during specific stages of the site development.

The Validation Plan – Principles (Golder, 2015c) and Preliminary RAP (PB, 2014b) indicated that stage specific RAPs were going to be required to facilitate the staged development of the site. Subsequent to the preparation of these documents, it has been determined that the remediation works will be completed in two primary stages, with the majority of the remediation works occurring during Stage 1. The Stage 1 works will

initially being completed within Priority Area 1, followed by works within the remaining portions of the site, (referred to as Priority Area 2). The remediation Stages include:

- Stage 1- which includes the remediation activities approved within the Moorebank Intermodal Company (MIC) Concept Plan Approval (SSD 5066[2]) as Early Works; and
- Stage 2 – which includes the remediation activities proposed as part of the Moorebank Precinct West Stage 2 Proposal (application number pending).

As such, there was limited benefit in preparing multiple stage specific RAPs, and an overall Land Preparation Works RAP has been prepared (*this report)*.

The Validation Plan – Principles (Golder, 2015c) included an outline of additional documents expected to be either developed and /or implemented to facilitate the progression of the remediation and redevelopment of the site. The site wide documents which will require implementation include:

- Site Wide EOW and UXO Management Plan – a site wide, EOW/UXO Management Plan has been developed to ensure a safe working environment is established during the remediation and development earthworks. These are detailed in the **"UXO Risk Review and Management Plan,"** prepared by G-Tek (draft report dated 7 June 2016, reference number 14037GOLD, as amended). The UXO Management Plan also includes protocols for un-expected finds of UXO / EOW during future development earth works. It is expected that where warranted the UXO / EOW will be updated based on experience/learnings from earlier stages and reissued as each stage of development is completed. *Subsequently, reference should be made to UXO / EOW for the preferred approaches to the management of UXO / EOW, and actions associated with the management of UXO / EOW have been excluded from this RAP.*
- Site Wide Asbestos in Soils Management Plan (AMP) – a site wide plan has been developed to ensure a safe working environment is established during the remediation and development earth works **"Asbestos in Soils Management Plan,"** prepared by Golder Associates (draft report dated 4 July 2016 reference number 1416224-035-R-RevA, as amended). The AMP presents the most up to date information available on asbestos in or on soils across the site, and defines the actions, roles and responsibilities associated with the remediation and management of asbestos in or on soils during the proposed development works. The AMP includes consultation requirements, licencing requirements, health monitoring and air monitoring requirements. The AMP also includes protocols for un-expected finds of asbestos during future development earth works. It is expected that where warranted the AMP will be updated based on experience/learnings from earlier stages and reissued as each stage of development is completed. *Subsequently, reference should be made to the AMP for the preferred approaches to the remediation and or management of asbestos in soils, and actions associated with the remediation of asbestos in soils have been excluded from this RAP. Notwithstanding this, the remediation and management required in the AMP are considered to be remediation tasks required to be completed and validated, prior to a Site Audit statement being prepared, i.e. consistent with the other remediation/management tasks nominated within this RAP.*
- Earthworks Specification – a site wide earth works specification has been developed to define the geotechnical requirements of any earthworks on the site such that an imported fill platform (The Earthworks Platform) is established to facilitate the proposed commercial / industrial development of the site. These are detailed in the **"MIC Stage 2 – Earthworks Specification,"** prepared by Golder Associates (draft report dated 29 June 2016, reference number 1416224-034-R-RevA). *Subsequently, while general reference is included in this RAP with regards to the verification of imported materials, requirements associated with the geotechnical management of remediation earthworks have been excluded from this RAP.*

The documents which will require development and implementation include:

[2] http://www.majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=5066

- Construction Environmental Management Plan (CEMP) – a CEMP will need to be developed by the Principal Contractor specific to each stage of remediation and or development. Where required the CEMP will draw on the processes described in the Preliminary RAP (PB, 2014a), the Validation Plan - Principles and the Remediation Specification (Golder 2015c), as well as this Land Preparation Works RAP. Furthermore the CEMP will need to follow the requirements of the site wide EOW/UXO and Asbestos in Soils management plans. The CEMP must also stipulate the actions to be taken should additional contamination be identified during the development of the site (i.e. an unexpected finds protocol) and must include a waste management plan and materials tracking plan.
- Stage specific Remediation and Validation Reports (RVR) – at the appropriate time, a RVR will be prepared for a development area. These reports will document the remediation and validation activities completed within a specific area or across the site. These reports will facilitate the Auditor's review of the remediation and validation activities;
- Long Term Environmental Management Plan (LTEMP) – a site wide LTEMP will need to be developed for any remedial or mitigation measures implemented during the remediation that requires ongoing maintenance/monitoring. The LTEMP will also stipulate the actions to be taken should additional contamination be identified during the post development occupation of the site (i.e. an unexpected finds protocol and UXO/EOW response plan). It is expected that where warranted the LTEMP will be updated and reissued as each stage of development is completed.

2.0 BACKGROUND

2.1 Site Identification

Table 1 summarises the site identification information, the site and the associated property boundaries are shown on Figure 2

Table 1: Site Identification

Item	Details
Address	Moorebank Avenue, Moorebank, NSW
Title Identification Details/ Legal Description	Portion of Lot 1, DP1197707, MIC Property West (MPW) and Lot 100 and Lot 101 DP1049508, Northern Commonwealth Land.
Local Government Authority (LGA)	Liverpool
Total IMT Site area	Approximately 230 hectares

2.2 Site Description

The site is generally bounded by the Georges River to the west, Moorebank Avenue to the east, the East Hills Railway Line to the south and the M5 Motorway, and industrial properties to the north. It is located on Moorebank Avenue, Moorebank and forms portion of Lot 1 in Deposited Plan (DP) 1197707, which is leased from the Commonwealth by the MIC. The site also contains Lots 100 and 101 DP1049508, which are located north of Bapaume Road and west of Moorebank Avenue.

The key existing features of the site are:

- Relatively flat topography, with the western edge flowing down towards the Georges River, which forms the western boundary to the MPW site;
- A number of linked ponds in the south-west corner of the site, within the existing golf course, that link to Anzac Creek, which is an ephemeral tributary of the Georges River;
- An existing stormwater system comprising pits, pipes and open channels;
- Direct frontage to Moorebank Avenue, which is a publicly used private road, south of Anzac Road and a publicly owned and used road north of Anzac Road;
- The majority of the site has been developed and comprises low-rise buildings, including warehouses, administrative offices, operative buildings, residential buildings, access roads, open areas, landscaped fields for the former School of Military Engineering (SME) and the Royal Australian Engineers (RAE) Golf Course and Club. Defence has since now vacated the site. All buildings on the site are currently unoccupied and will be removed during the Stage 1 works;
- Native vegetation is scattered across the site and borders the majority of the western edge of the site; and
- The riparian area of the Georges River lies to the west of the site and contains a substantial corridor of native and introduced vegetation. The riparian vegetation corridor (generally 25 metres wide) provides a wildlife corridor and a buffer for the protection of soil stability, water quality and aquatic habitats. This area has been defined as a conservation area as part of the MPW Concept Plan Approval (refer to Figure 2).

As stated above, the majority of the site has been developed, however heritage and biodiversity values still remain on the site;

- A strip of land (up to approximately 250 metres wide) along the western edge of the MPW site lies below the 1% annual exceedance probability (AEP) flood level; and

- The site is leased from the Commonwealth by the MIC and subleased by SIMTA. The site has previously been occupied by the Department of Defence, comprising the SME and other minor Defence units. These have been relocated as part of the Moorebank Units Relocation project, with the SME relocated to Holsworthy Barracks.

A number of residential suburbs are located in proximity to the site, including:

- Wattle Grove, located approximately 1,000 m from the site to the east. The Rail link, which will be used during operation of the Proposal is 1,260 m to the west of Wattle Grove at its closest point
- Moorebank, located approximately 630 m to the north.
- Casula, located approximately 330 m from the site to the west.
- Glenfield, located approximately 820 metres from site to the south-west.

2.3 Site History

A detailed history of the site is presented in the Phase 1 Environmental Assessment complete by PB (PB, 2014a), which is augmented with additional investigations completed by Golder in 2015 (Golder, 2015a).

In summary the earliest available aerial photographs, from the 1930's, show the land to be cleared bushland and fields up to the edge of the Georges River. There are small tracks and paths across the site and meandering streams cross the IMT site, with Moorebank Avenue is present in the photograph. By 1956, the military facility had been developed, comprising Steele Barracks and the Defence National Storage Distribution Centre (DNSDC) on the eastern side of Moorebank Avenue.

In the period between 1956 and approximately 1995 the site was predominately used for military training purposes, as the School of Military Engineering (SME). The activities on the base included various schools, and training facilities. These included;

- Heavy vehicle training (including maintenance and operation);
- Bridge building and waterman ship training;
- Explosive detection and disposal training including dog training and handling facilities; and
- Firefighting training activities.

Over the period of use the site included several stages of redevelopment with the most recent completed in the 1990's. As of April 2015, the military units on the SME site had vacated the site relocating to new facilities at Holsworthy in preparation for the proposed change in land use from a military facility to the proposed intermodal terminal.

2.4 Surrounding Environment

The adjoining land uses are as follows:

- North: Commercial / industrial land use, including ABB Australia Pty Limited and park land including Rifle Range Park.
- South: East Hills Railway Line followed by Defence land.
- East: Moorebank Avenue followed by the former Defence National Storage and Distribution Centre (DNSDC), which is owned by SIMTA. This area will be included within the wider IMT precinct development.
- West: Georges River followed by a variety of land uses including park land (Leacock Regional Park), Casula Powerhouse, Casula train station, a railway line and Glenfield Landfill.

2.5 Geology

The published 1:100,000 Penrith Geological Map (NSW Department of Minerals, 1991) indicates that the site is underlain by Tertiary fluvial (river) deposits (Ta) of Pliocene age with terraces of more recent Quarternary (Holocene) age (<10,000 years) fluvial and estuarine deposits (Qha) adjacent to the Georges River. The geological map indicates that the underlying rock conditions in the area are either Triassic Hawkesbury Sandstone (Rh) or Ashfield Shale (Rwa). In general, the Ashfield Shale occurs in areas of higher elevation, where it forms a cap over the Hawkesbury Sandstone. Geological conditions at the IMT site are discussed in further detail in the Geotechnical Interpretive Report (doc ref. 147623070-011-R-RevA, Golder 2014).

2.6 Hydrogeology

There are two main aquifer systems on the site, a shallow system within alluvial soils and a deeper regional aquifer within the bedrock. Based on contouring of the gauging results from previous groundwater monitoring events undertaken on the IMT site (PB, 2014a), groundwater in the shallow alluvial aquifer generally flows towards the Georges River. Groundwater levels in the shallow aquifer have historically been between approximately 2 m Australian Height Datum (mAHD) nearest to the Georges River and 6 mAHD on the terrace in the eastern portion of the IMT site.

2.7 Surface Water

The dominant water feature of the area is the Georges River which is adjacent to the western boundary of the Project site.

Within the Project site there is a small creek (Anzac Creek) which flows through the golf course to the north east away from the Georges River (east), prior to re-joining the river at Lake Moore, located approximately 1.8 km north east of the Project site. There are also some small dams in the northern part of the Project site including Lake Sisinyak and dams which form part of the golf course in the southern part of the site. A number of drainage systems in the northern part of the Project site drain west towards Georges River including a concrete lined channel.

2.8 Acid Sulfate Soils

The Australian Soil Resource Information System (ASRIS) indicates that the majority of the IMT site has no known occurrence of Acid Sulfate Soils (ASS). A small western portion of the IMT site located on the flood plain and a small north-eastern portion of the IMT site both have a low probability of ASS, and the area immediate surrounding Georges River has a high probability of ASS.

It is noted that, based on the results of the PB (2014a) assessment, there is potential for acid sulphate soils to exist on the IMT site. These were investigated further during the Golder (2015a) investigation, and it was concluded that the acidic soils did not appear to be associated with the oxidisation of sulphide minerals. The source of acidity was not known, however, the acidic soils will require management during construction. It is envisaged that the management of the acidic soils will be addressed within the Construction Environmental Management Plan.

3.0 REMEDIATION REGULATORY REQUIREMENTS

3.1 *Environmental Protection and Biodiversity Conservation Act, 1999 (EPBC Act)*

Under the Commonwealth process the wider development project (inclusive of the remediation activities) is a 'controlled action' under the Commonwealth *Environmental Protection and Biodiversity Conservation Act, 1999 (EPBC Act)* and requires approval from the Commonwealth Minister for the Environment. Under the NSW Government process and staged development approval will be sought under the NSW approvals process as a State Significant Development (SSD) under the *NSW Environmental Planning and Assessment Act 1979 (EP&A Act)*.

3.2 Contaminated Land Management Act 1997

In NSW, the management of contaminated land is shared by the NSW EPA, the NSW Department of Planning & Infrastructure (NSW DoPI) and planning consent authorities (usually local councils).

Under the *Contaminated Land Management Act (CLM Act) 1997*, the NSW EPA regulates contaminated sites where the contamination is Significant Enough to Warrant Regulation (SEWR). Contaminated sites that are not regulated by the NSW EPA are managed by local councils through land use planning processes (such as change of land use, or some remediation works).

The NSW EPA also administers the NSW Site Auditor scheme under Part 4 of the *CLM Act*. The NSW EPA accredits individuals under the Act as Site Auditors to provide independent review of work conducted by contaminated site consultants.

3.2.1 Guidelines under the CLM Act

Section 105 of the CLM Act allows the EPA to make of approve guidelines connected with the objectives of the CLM Act. These guidelines must be taken into consideration by the EPA and by accredited site auditors when conducting a site audit.

The current list of guidelines made or approved by the EPA under the CLM Act are available on the NSW EPA http://www.epa.nsw.gov.au/clm/guidelines.htm.

The NSW EPA approved guidelines include the national guidance on the assessment of contaminant concentrations on sites is presented in the *National Environment Protection (Assessment of Site Contamination) Measure 1999* (NEPC 2013), herein referred to as the ASC NEPM (NEPC, 2013). The ASC NEPM (NEPC, 2013) present generic Tier 1 trigger values for contaminant concentrations in both soil and groundwater. These are derived based on exposure settings for particular land uses such as low and high density residential; recreational/open space; and commercial / industrial land uses.

As the site is proposed for commercial / industrial purposes it is considered appropriate to compare the results of soil analysis against the investigation levels for commercial / industrial land. The western portion of the site, immediately adjacent to the Georges River, will be retained and rehabilitated as a natural riparian conservation zone. At this stage it is understood public access to the riparian zone will be restricted. However, as a conservative approach, is it has been assumed that public access may be allowed, as such the health investigation levels for the recreational/open space exposure setting will be applied. The adopted screening criteria are discussed in greater detail in Appendix C and proposed conservation zone where open / space land use is shown on Figure 3.

3.3 Environmental Planning and Assessment Act 1979

Under the NSW Government process and staged development approval will be sought under the NSW approvals process as a State Significant Development (SSD) under the *NSW Environmental Planning and Assessment Act 1979 (EP&A Act)*.

3.3.1 SEPP 55 – Remediation of Land

The *State Environmental Planning Policy No. 55 (SEPP 55) – Remediation of Land* under the *Environmental Planning and Assessment Act (EP&A Act) 1979* provides a state wide planning approach for the remediation of contaminated land. In particular, *SEPP 55* provides for Category 1 and Category 2 remediation. Projects classified as Category 1 require development consent.

On Friday 3 June 2016, the NSW Planning and Assessment Commission approved MIC's Stage 1 State Significant Development (SSD) Concept Approval for an intermodal terminal on the MIC land at Moorebank (refer to http://www.micl.com.au/environment/mics-concept-approval.aspx). As the works are included within a development for which requires development consent, the works are considered Category 1 remediation works, and the Stage 1 remediation was approved under the *Early works* component of the MIC SSD Concept Approval.

3.4 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act* 1997 (NSW*) (POEO Act)* is the key piece of environment protection legislation administered by the NSW EPA.

The POEO Act provides a single integrated licensing arrangement to control the air, noise, water and waste impacts of an activity. The NSW EPA is the regulatory authority for the licensing of activities specified under Schedule 1 of the *POEO Act* (scheduled activities) and in most cases councils are the regulatory authority for non-scheduled activities. Licences can also be issued to regulate water pollution from activities that are not in Schedule 1. Such licences can provide protection against prosecution for water pollution if the licence conditions are complied with.

An Environmental Protection Licence (EPL) is required for contaminated soil treatment where it treats contaminated soils originating exclusively on site and it has the capacity;

- To incinerate more than 1000 m^3 per year of contaminated soils;
- To treat and store more than 30,000 m^3 of contaminated soil; or
- To disturb more than an aggregate area of more than 3 ha of contaminated soil.

The total volume of "contaminated soils" associated with the USTs, and hotspots is expected to be less than the above mentioned volumes. However, an EPL will be required if the contamination assessment and treatment area (CATA) is used to process geotechnically unsuitable materials extracted from the anthropogenic fill areas and the stockpile areas, as the areas and volumes will exceed the above mentioned thresholds. The CATA will need to be licenced Schedule 1 parts 15 Contaminated Soil Treatment and part 16 Crushing, grinding and separating.

The *POEO Act* also provides the key mechanisms (including the issuing of three types of environment protection notices including: clean-up, prevention and prohibition notices) for protecting the environment. It also provides the regulatory regime for waste management under the Protection of the Environment Operations (Waste) Regulation 2005 (Waste Regulation).

All remediation works completed at the site will be conducted in compliance with the relevant requirements of the *POEO Act*.

3.4.1 Protection of the Environment Operations (Waste) Regulation 2005

The following outlines the required documentation and approvals required for the handling, off site transport and disposal of waste during the remediation works in accordance with the *Protection of the Environment Operations (POEO) (Waste) Regulation 2005* and the *POEO Act 1997.*

The *POEO Act* defines **waste** as:

a) any substance (whether solid, liquid or gaseous) that is discharged, emitted or deposited in the environment in such volume, constituency or manner as to cause an alteration in the environment, or

b) any discarded, rejected, unwanted, surplus or abandoned substance, or

c) any otherwise discarded, rejected, unwanted, surplus or abandoned substance intended for sale or for recycling, processing, recovery or purification by a separate operation from that which produced the substance, or

d) any processed, recycled, re-used or recovered substance produced wholly or partly from waste that is applied to land, or used as fuel, but only in the circumstances prescribed by the regulations, or

e) any substance prescribed by the regulations to be waste.

A substance is not precluded from being waste for the purposes of this Act merely because it is or may be processed, recycled, re-used or recovered.

Waste Classification

Wastes need to be characterised in accordance with the NSW EPA (DECCW, NSW, November 2014) *Waste Classification Guidelines, Part 1: Classifying Waste*. The following characteristics of the waste must also be determined:

- The form of the waste (the physical state e.g. solid);
- The waste code;
- The waste description; and
- The Dangerous Goods properties (if applicable).

Waste classification is a six step process, which includes answering the following questions:

1) *Is the waste special waste?* – This includes determining if the waste is asbestos waste, which are defined as "Any waste that contains asbestos,"

2) *Is the waste liquid waste?*

3) *Is the waste pre-classified?* – This includes waste gazetted[3] by the NSW EPA in particular pre-classifications, such as building and demolition waste, and virgin excavated natural materials.

4) *Does the waste possess hazardous characteristics?* – Which stipulates a waste must be classified 'hazardous waste' if it is a dangerous good under the Transport of Dangerous Goods Code.

5) *Determine a waste classification using chemical assessment.*

6) *Is the waste putrescible or non-putrescible?*

If an immobilisation approval applies to a waste, a generator who complies with the terms of that approval may classify the waste as set out in the approval, rather than the Waste Classification Guidelines.

Where it can be demonstrated that a specific type of waste can safely be used for another purpose, rather than being disposed of in accordance with the waste regulations, the NSW EPA may grant permission for that waste to be used for the specific purpose, subject to strict conditions. In these cases, the NSW EPA will issue a resource recovery order and resource recovery exemption[4]. These are to be considered within the waste classification process.

Waste Transport Requirements

Under Schedule 1, Part 2 of the *POEO Act 1997* the transport of several classifications of waste in loads exceeding 200 kilograms is declared to be a scheduled activity for which a licence is required. As such the

[3] http://www.epa.nsw.gov.au/waste/types.htm

[4] http://www.epa.nsw.gov.au/wasteregulation/orders-exemptions.htm

proposed transport of the selected wastes from the site to off-site disposal facilities will require the use of licensed transporters.

Under the POEO (Waste) Regulations 2014 the proximity principle was introduced which makes it an offence to transport waste generated in NSW by motor vehicle for disposal more than 150 kilometres from the place of generation, unless the waste is transported to one of the two nearest lawful disposal facilities to the place of generation.

Waste Tracking Requirements

The *POEO (Waste) Regulation 2005* specifies requirements for the tracking of waste both within NSW and interstate. The wastes that must be tracked are listed in the Schedule 1 of the Regulation (this Schedule includes soil contaminated with waste oil/ water, hydrocarbons/ water mixtures or emulsions).

A NSW EPA on line tracking system is available to track waste that is transported within NSW or into NSW from other states or territories.

Waste Disposal Facilities Licences

Before wastes are transported from the site, it is necessary to confirm that the facility (e.g. landfill/ recycling facility) where the waste is being transported to is legally able to accept the waste. These include facilities licenced to receive and process soils.

Waste Records

If not using an approved on line tracking system records must be maintained of the waste transport certificates for at least four years. The use of the NSW EPA on line tracking system removes the requirement to maintain these records.

3.5 Work Health and Safety Act 2011

The *Work Health and Safety Act* 2011 (NSW) *(WHS Act)* is the key piece of work safety legislation administered by SafeWork NSW, and provides the regulatory mechanism for the management of asbestos within NSW. Those specific to the management of asbestos include, but are not limited to:

- Work Health and Safety Act & Regulation 2011.
- SafeWork NSW Code of Practice – How to manage and control asbestos in the work place, 2011
- SafeWork NSW Code of Practice – How to safely remove asbestos, 2011
- SafeWork NSW Code of Practice – Work Health and Safety, Consultation, Co-operation and Co-ordination, 2011
- SafeWork NSW Guidelines – Managing asbestos in or on soil, 2014
- AS 1715 - 2009 Selection use and maintenance of respiratory protective devices;
- AS 1716 - 2012 respiratory protective devices;
- AS/NZS 2161.1:2000 Occupational protective gloves - Selection, use and maintenance.
- AS/NZS 2161.2:2005 Occupational protective gloves - General requirements
- Department of Environment, Climate Change (EPA 2014) and Waste Classification Guidelines Part 1: Classifying Waste.
- Western Australia Department of Health (WA DOH, 2009), *Guidelines for the assessment, remediation and management of asbestos contaminated sites in Western Australia.*

3.5.1 Asbestos Removal / Assessor Licensing

A person must hold the following to conduct asbestos removal works:

- Class A – to remove friable asbestos, which allows removal of friable asbestos, non-friable asbestos and any asbestos contaminated dust or debris (ACD).
- Class B – to remove non friable asbestos, which allows removal of non-friable asbestos, and only contaminated dust or debris (ACD) that is directly associated with the removal of non-friable asbestos.
- A person must hold an asbestos assessor licence to conduct the following: Air monitoring for Class A asbestos removal work
- Clearance inspections for Class A asbestos removal work
- Issuing clearance certificates in relation to Class A asbestos removal work.

3.5.2 Regulator Notification and Removal Control Plan

The regulator must be notified in writing at least five days before licensed asbestos removal work commences. It is the responsibility of the Licenced Asbestos Removal contractor to prepare the asbestos removal plan and submit the required removal notifications.

4.0 CONTAMINATION STATUS

4.1 Previous Investigations

A number of environmental investigations have been previously carried out at the site (refer to **Table 2**). Earth Tech (2006) included a comprehensive review of investigations completed prior to its 2006 Stage 2 investigation, and PB (2014a) included a detailed review of the Earth Tech investigation and partial reviews of other selected investigations completed prior to the Earth Tech (2006) report.

Table 2: Previous Investigations

Author	Report Title
Groundwater Technology (1994)	Environmental Site Assessment
Dames and Moore (1996)	Environmental Management Plan and Environmental Audit
CMPS&F, July (1998)	School of Military Engineering (SME) and adjoining areas, Preliminary Environmental Investigation
Egis Consulting Australia (2000)	Stage 1 Preliminary Site Investigation, Moorebank Defence Site
HLA Envirosciences (2002)	Soil & Groundwater Investigation Precinct H (DNSDC) Moorebank Defence Land
HLA (2003)	Preliminary Groundwater Study, Moorebank Defence Land (2003)
URS (2003)	Investigation of Potential Sources of TCE, North West Precinct of Moorebank Defence Lands
GHD (2003)	Asbestos Report and Register for the Liverpool Military Area, Updated Registers
GHD (2004a)	Estimated Asbestos Removal and Reinstatement Costs, Liverpool Military Area
GHD (2004b)	Groundwater Investigation of the North Western Portion of the Moorebank Defence Land
GHD (2005)	Proposed Intermodal Freight Hub, Moorebank, Summary of Environmental Planning Reports
HLA Envirosciences (2005)	AST and UST Management Plan, Volume 10, Sydney West Defence Region
Earth Tech (2006)	Stage 2 Environmental Investigation
ERM (2006)	Technical Advice Document, related to Earth Tech (2006) Stage 2 Environmental Investigation
HLA Envirosciences (2006)	Defence Integrated Distribution System (DIDS) Baseline Investigation
GHD (2006)	Proposed Inter-modal Freight Hub Moorebank – Summary of Environmental Planning Reports
G-tek (2011)	Explosive Ordnance Assessment and Safeguarding, Moorebank Intermodal Terminal – Post Activity Report
Parsons Brinckerhoff (2011)	Moorebank Intermodal Terminal - Geotechnical Investigation Report (document no. 2103829A_PR_036)**
Parsons Brinckerhoff (2013)	Steele Barracks Moorebank – Dust Bowl Asbestos Management Plan
Parsons Brinckerhoff (2014a)	Phase 2 Environmental Site Assessment, Moorebank Intermodal Terminal (document no. 2103829A-CLM-REP-1 Rev B)
Parsons Brinckerhoff (2014b)	Preliminary Remedial Action Plan (RAP), Moorebank Intermodal Terminal (document no. 2189293C-CLM-REP-2 Rev C) – *included within PB 2014a*

Author	Report Title
Parsons Brinckerhoff (2014c)	Phase 1 Environmental Site Assessment, Moorebank Intermodal Terminal (document no. 2103829C-CLM-REP-3321 Rev C) – *included within PB 2014a*
AECOM (2014)	Site Audit Report and Site Audit Statement, Moorebank Intermodal Terminal, Moorebank, NSW (document no. 60327260_SAR_10JUL2014)
Golder (2015a)	Post Phase 2 Environmental Site Assessment Moorebank Intermodal Terminal (document reference: 147623070-019-Rev0)
Golder (2015b)	Remediation and Demolition Specification Moorebank Intermodal Terminal (document reference: 147623070-023-Rev0)
Golder (2015c)	Validation Plan - Principles Moorebank Intermodal Terminal (document reference: 147623070-022-Rev1)
Golder (2015d)	Onsite Quantitative Human Health Risk Assessment Moorebank Intermodal Terminal (document reference: 147623070-043-R-Rev1)
Golder (2016b)	Preliminary Site Investigation – Moorebank Ave Moorebank Intermodal Terminal (document reference 147623070-50-R-Rev1)
Golder (2016c)	Moorebank Avenue Site Management Plan – Moorebank Intermodal Terminal (document reference 147623070-052-Rev0)

** - Includes soil data pertinent to geochemical assessment and contamination management.

4.2 Summary of Previous Investigations

Earth Tech (2006) completed intrusive investigations at 39 areas of interest, these areas were primarily based on the Egis (2000) Stage 1 Preliminary Site Investigations, however also included information from the other reports reviewed and information gathered during the investigations. Based on the results of the intrusive investigations, Earth Tech (2006) qualitatively assessed the risks associated with each area of interest using the Defence Contamination Risk Assessment Tool (C-RAT), and remedial or management actions were recommended for 12 areas of interest.

The PB (2014c) Phase 1 investigation identified 28 areas of potential concern, most of which were areas of interest or an amalgamation of areas of interest identified by Earth Tech (2006). PB (2014c) identified several additional areas of interest, however, the majority of these were considered low risk. The PB Phase 2 (2014a) also included several additional areas not identified during the PB Phase 1 (2014c) and additional investigation locations to assess offsite sources, or improve the general site assessment coverage.

The Golder 2015 Post Phase 2 investigations were focused on the key data gaps identified in the PB Preliminary RAP (PB, 2014b), as well as the requirement to acquire additional information for the Demolition and Remediation Specification. As part of the investigations, several data gaps additional to those identified in the Preliminary RAP (PB, 2014b) were identified, including the assessment of the former Viet Cong training village, the former Plant Roads and Airfield (PRA) yard, the assessment of potential fill areas in the northwest corner of the current parade ground, and a filled draining channel north of the museum storage area.

The Preliminary RAP (PB, 2014b) and the Golder Validation Plan Principles (Golder 2015c) included a critical review of the historical investigations with reference to the proposed land use, and identified the areas warranting direct remediation, which are discussed further within Section 5.1. This assessment included a review of the use of the riparian zone for public recreation, in particular a public path or walk way. The review completed by Golder (2015c) did not identify areas warranting direct remediation, with the exception of the hot spot identified in the northern portion of the dust bowl, which has been included within this RAP.

In 2016, Golder completed a preliminary site investigation (PSI) for the current Moorebank Avenue alignment (Golder, 2016), located along the eastern boundary of the site. The PSI identified the presence of Light Non Aqueous Phase Liquids (LNAPL) beneath Moorebank Avenue, and beneath the eastern portion of the site