

Moorebank Precinct East -Stage 2 Proposal

Contamination Summary Report





SYDNEY INTERMODAL TERMINAL ALLIANCE

Part 4, Division 4.1, State Significant Development

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Qube Property Management Services Pty Ltd c/o Tactical Group

Contamination Summary Report MPE Project Stage 2 Development

> Moorebank Avenue Moorebank, NSW

15 November 2016 51432-105534 (Rev 1) JBS&G

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Abbreviations and Key Terms

Term	Definition	
6:2 FTS	6:2 Flurotelomer Surfactants	
ACM	Asbestos Containing Materials	
AEC	Areas of Environmental Concern	
AHD	Australian Height Datum	
AFFF	Aqueous Film Forming Foam	
As	Arsenic	
Bgs	Below Ground Surface	
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes	
CBD	Central Business District	
Cd	Cadmium	
CLM	Contaminated Land Management	
СМР	Construction Management Plan	
СОРС	Contaminants of Potential Concern	
Construction area	Extent of construction works, namely areas to be disturbed during the construction of the MPE Stage 2 Proposal (the Proposal).	
Cr	Chromium	
CSM	Conceptual Site Model	
Cu	Copper	
DBYD	Dial Before You Dig	
DNSDC	Defence National Storage and Distribution Centre	
DO	Dissolved Oxygen	
DP	Douglas Partners	
DP&E	Department of Planning and Environment	
DQI	Data Quality Indicator	
DQO	Data Quality Objectives	
DSI	Detailed Site Investigation	
EC	Electrical Conductivity	
EES	Environmental and Earth Sciences	
Eh	Redox Potential	
EIL	Ecological Investigation Level	
EIS	Environmental Impact Statement	
EO	Explosive Ordnance	
EOW	Exploded Ordnance Waste	
EPA	NSW Environment Protection Authority	
ESA	Environmental Site Assessment	
ESL	Ecological Screening Level	
GFA	Gross Floor Area	
На	Hectares	
НСВ	Hydrochlorobenzene	
Hg	Mercury	
HIL	Health Investigation Level	



Term	Definition		
HSL	Health Screening Level		
IMEX	Import-Export		
IMT	Intermodal terminal		
ITV	In Terminal Vehicle		
JBS&G	JBS&G Australia Pty Ltd		
LGA	Local Government Agency		
MIC	Moorebank Intermodal Company		
Moorebank Precinct West (MPW) Project (formerly the MIC Project)	The MPW Intermodal Terminal Facility as approved under the MPW Concept Plan Approval (SSD_5066) and the MPW EPBC Approval (No. 2011/6086).		
Moorebank Precinct West (MPW) site (formerly the MIC site)	The site which is the subject of the MPW Concept Plan Approval, MPW EPBC Approval and MPW Planning Proposal. The MPW site does not include the rail link as referenced in the MPW Concept Plan Approval or MPE Concept Plan Approval.		
Moorebank Precinct East (MPE) Concept Plan Approval (formerly the SIMTA Concept Plan Approval)	MPE Concept Plan Approval (SSD_0193) granted by the NSW Department of Planning and Environment on 29 September 2014 for the development of former defence land at Moorebank to be developed in three stages; a rail link connecting the site to the Southern Sydney Freight Line, an intermodal terminal, warehousing and distribution facilities and a freight village.		
Moorebank Precinct East (MPE) Project (formerly the SIMTA Project)	The MPE Intermodal Terminal Facility, including a rail link and warehouse and distribution facilities at Moorebank (eastern side of Moorebank Avenue) as approved by the Concept Plan Approval (MP 10_0913) and the MPE Stage 1 Approval (14_6766).		
Moorebank Precinct East (MPE) Site (formerly the SIMTA Site)	Including the former DSNDC site and the land owned by SIMTA which is subject to the Concept Plan Approval. The MPE site does not include the rail corridor, which relates to the land on which the rail link is to be constructed.		
MPE Stage 1	Stage 1 (14-6766) of the MPE Concept Plan Approval for the development of the MPE Intermodal Terminal Facility, including the rail link at Moorebank. This reference also includes associated conditions of approval and environmental management measures which form part of the documentation for the approval.		
MPE Stage 1 site	Includes the MPE Stage 1 site and the Rail Corridor, i.e. the area for which approval (construction and operation) was sought within the MPE Stage 1 Proposal EIS.		
MPE Stage 2 Proposal / the Proposal	Stage 2 of the MPE Concept Plan Approval including the construction and operation of 300,000m ² of warehousing and distribution facilities on the MPE site and the Moorebank Avenue upgrade within the Moorebank Precinct.		
MPE Stage 2 site	The area within the MPE site which would be disturbed by the MPE Stage 2 Proposal (including the operational area and construction area). The MPE Stage 2 site includes the former DSNDC site and the land owned by SIMTA which is subject to the MPE Concept Plan Approval. The MPE site does not include the rail corridor, which relates to the land on which the rail link is to be constructed.		
Ni	Nickel		
ОСР	Organochlorine Pesticides		
Operational area	Extent of operational activities for the operation of the MPE Stage 2 Proposal (the Proposal).		
РАН	Polycyclic Aromatic Hydrocarbons		
Pb	Lead		
РСВ	Polychlorinated Biphenyls		
PFCs	Perfluorinated Compounds		
PFOA	Perfluorooctanoic acid		
PFOS	Perfluorooctanesulfonic acid		



Term	Definition	
PPR	Preferred Project Report	
PSH	Phase Separated Hydrocarbon	
PSI	Preliminary Site Investigation	
QA/QC	Quality Assurance / Quality Control	
RAE	Royal Australian Engineers	
Rail Corridor	Area defined as the 'Rail Corridor' within the MPE Concept Plan Approval.	
Rail Link	The rail link from the South Sydney Freight Line to the MPE IMEX Terminal, including the area on either side to be impacted by the construction works included in MPE Stage 1.	
RPD	Relative Percent Difference	
SAQP	Sampling, Analysis and Quality Plan	
SEARs	Secretary's Environmental Assessment Requirements	
SIMTA	Sydney Intermodal Terminal Alliance	
SME	School of Military Engineering	
SMP	Site Management Plan	
SoCs	Statements of Commitment	
SSD	State Significant Development	
SSFL	South Sydney Freight Line	
SoC	Statement of Commitments. Recommendations provided in the specialist consultant reports prepared as part of the MPE Concept Plan application to mitigate environmental impacts, monitor environmental performance and/or achieve a positive environmentally sustainable outcome in respect of the MPE Project. The Statement of Commitments have been proposed by SIMTA as the Proponent of the MPE Concept Plan Approval.	
SVOC	Semi Volatile Organic Compounds	
The Moorebank Precinct	Refers to the whole Moorebank intermodal precinct, i.e. the MPE site and the MPW site	
The Moorebank Avenue site	The extent of construction works to facilitate the construction of the Moorebank Avenue upgrade.	
The Moorebank Avenue upgrade	Raising of the vertical alignment of Moorebank Avenue for 1.5 kilometres of its length by about two metres, from the northern boundary of the MPE site to approximately 120 metres south of the MPE site. The Moorebank Avenue upgrade also includes upgrades to intersections, ancillary works and the construction of an on-site detention basin to the west of Moorebank Avenue within the MPW site.	
T&P	Treatment and Preservation Area	
Tactical	Tactical Group	
ТРН	Total Petroleum Hydrocarbons	
TRH	Total Recoverable Hydrocarbons	
UCL	Upper Confidence Limit	
UST	Underground Storage Tank	
UXO	Unexploded Ordnance	
VOC	Volatile Organic Compounds	
Zn	Zinc	



Executive Summary

Background

Concept Plan Approval (MP 10_0193) for an intermodal terminal (IMT) facility at Moorebank, NSW (the Moorebank Precinct East Project (MPE Project) (formerly the SIMTA Project)) was received on 29 September 2014 from the NSW Department of Planning and Environment (DP&E). The Concept Plan for the MPE Project involves the development of an IMT, including a rail link to the Southern Sydney Freight Line (SSFL) within the Rail Corridor, warehouse and distribution facilities with ancillary offices, a freight village (ancillary site and operational services), stormwater, landscaping, servicing, associated works on the eastern side of Moorebank Avenue, Moorebank, and construction or operation of any part of the project, which is subject to separate approval(s) under the *Environmental Planning and Assessment Act 1979* (EP&A Act).

This Environmental Impact Statement (EIS) is seeking approval, under Part 4, Division 4.1 of the EP&A Act, for the construction and operation of Stage 2 of the MPE Project (herein referred to as the Proposal) under the Concept Plan Approval for the MPE Project, being the construction and operation of warehouse and distribution facilities.

This EIS has been prepared to address:

- The Secretary's Environmental Assessment Requirements (SEARs) (SSD 16-7628) for the Proposal, issued by NSW DP&E on 27 May 2016 (Appendix A).
- The relevant requirements of the Concept Plan Approval MP 10_0913 dated 29 September 2014 (as modified) (Appendix A).
- The relevant requirements of the approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (No. 2011/6229, granted in March 2014 by the Commonwealth Department of the Environment (DoE)) (as relevant) (Appendix A).

This EIS also gives consideration to the MPE Stage 1 Project (SSD 14-6766) including the mitigation measures and conditions of consent as relevant to this Proposal.

This EIS has been prepared to provide a complete assessment of the potential environmental impacts associated with the construction and operation of the Proposal. This EIS proposes measures to mitigate these issues and reduce any unreasonable impacts on the environment and surrounding community.

The Proposal site is located on former Defence land previously occupied by the DNSDC. Defence no longer occupy/utilise the area. A number of previous environmental investigations have been undertaken involving the former DNSDC areas dating back to at least 1980, with more recent investigations and summary documents prepared between 2000 and 2016. A non-statutory site audit and Site Audit Report was completed in 2002, for the former DNSDC site (i.e. the SIMTA site), with the Site Auditor certifying the SIMTA site as suitable for ongoing commercial/industrial use subject to implementation of a Site Management Plan (SMP), which was to include a range of actions relating to further investigation, remediation, groundwater monitoring and management controls. It is not known whether a SMP was prepared or implemented, or whether any recommended actions were undertaken. Subsequent to this and at the request of the Department of Defence, another non-statutory site audit was completed for the site in 2016, excluding the former DNSDC Refuelling Area. The Site Auditor certified that the site is suitable for commercial / industrial use subject to compliance with the Environmental Management Plan (EMP) prepared for the site in July 2016.

It is noted that the Secretary's Environmental Assessment Requirements (SEARs) (ref: SSD 16-7628 and dated 27 May 2016) state that an Environmental Impact Statement (EIS) must be developed for



the SIMTA Intermodal Terminal Facility – Stage 2 (warehouse and distribution facilities) SSD. The SEARs state that in relation to the assessment of soil and water impacts for the Stage 2 SSD, the assessment shall:

- *"Include a contamination assessment in accordance with the guidelines made under the Contaminated Land Management Act 1997; and*
- Include an assessment of potentially contaminated areas in accordance with the National Environmental Protection Measure 2013 in addition to an assessment of potential areas of Perfluorinated Compounds."

With regards to Contamination, the SEARs require a *"contamination assessment in accordance with the guidelines under the Contaminated Land Management Act 1997. The assessment shall include the potential environmental and human health risks of site contamination on the project site, a Remedial Action Plan (if required), and consideration of implications of proposed remediation actions on the project design and timing (if relevant)"*.

Purpose

This report has been prepared to address:

- The Secretary's Environmental Assessment Requirements (SEARs) (SSD 16-7628) for the Proposal, issued by NSW DP&E on 27 May 2016;
- The relevant requirements of Concept Plan Approval MP 10_0913 dated 29 September 2014 (as modified); and
- The relevant requirements of the approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (No. 2011/6229, granted in March 2014 by the Commonwealth Department of the Environment (DoE)) (as relevant).

Objective and Methodology

The objective of the assessment is to determine the current contamination status of the Stage 2 SSD area to understand potential constraints to the development and enable appropriate management of any potential contamination during the development works.

The methodology used for the preparation of this contamination summary report includes the following:

- A desktop review of existing reports and background information to identify:
 - \circ The existing environmental setting and condition of the Proposal site; and
 - o Areas of potential concern identified in previous site investigations.
- A site inspection to provide information on current site conditions to assist in the understanding of previous investigations, the site's environmental setting and to aid in the contamination assessment of the site; and
- Preparation of a conceptual site model to determine potential areas of concern and exposure pathways, identify uncertainties with regards to areas of potential concern, and provide a preliminary evaluation of the risk of contamination to human and ecological receptors.

Conclusions and Recommendations

Based on the review of available information, it is noted that historical activities on the former DSNDC site, including the MPE Stage 2 site, may have resulted in the potential contamination of surface soils and the subsurface environment. However, based on the intrusive contamination investigations and site inspections completed for the former DSNDC site and subject to the limitations in **Section 8**, the following conclusions are made:



- Previous investigations have considered potential contamination risk at the Proposal site (including risks associated with perfluorinated compound (PFC) containing aqueous film forming foam (AFFF)). No evidence of widespread residual contamination at the Proposal site has been reported; however, isolated areas of the MPE site, including within the MPE Stage 2 site have been reported to be impacted by lead, ACM, UXO, and EOW. The Construction Environmental Management Plan (CEMP) for the Proposal site should contain a Contamination Management Plan that addresses the aforementioned impacts during the construction works inclusive of an Asbestos Management Plan. The CEMP must also include an unexpected finds protocol (UFP);
- There is no indication that groundwater at the site requires remediation or management under the proposed commercial / industrial land uses; and
- The MPE Stage 2 site has been certified by a NSW EPA-accredited Site Auditor to be suitable for commercial / industrial use subject to all works being carried out in accordance with 2016 GHD EMP.

It is noted that the Moorebank Avenue site was formed as a roadway prior to the development of the MPE site. As such, it is unlikely that the Moorebank Avenue site was subject to significant contaminating activities, with exemption of the hydrocarbon impacted groundwater migrating from the former refuelling facility south west of the Proposal site, which has been recently decommissioned and remediated. The contamination reported in this area can be managed during the construction works through mitigation measures as presented in the CEMP's Contamination Management Plan.

Environmental data required to assist with the on-site reuse or off-site disposal of soils can be incorporated into the Contamination Management Plan in the CEMP to be developed for the Proposal. As such, it is considered that no further investigations are required prior to the commencement of construction work at the site.



1. Introduction

Concept Plan Approval (MP 10_0193) for an intermodal terminal (IMT) facility at Moorebank, NSW (the Moorebank Precinct East Project (MPE Project) (formerly the SIMTA Project)) was received on 29 September 2014 from the NSW Department of Planning and Environment (DP&E). The Concept Plan for the MPE Project involves the development of an IMT, including a rail link to the Southern Sydney Freight Line (SSFL) within the Rail Corridor, warehouse and distribution facilities with ancillary offices, a freight village (ancillary site and operational services), stormwater, landscaping, servicing, associated works on the eastern side of Moorebank Avenue, Moorebank, and construction or operation of any part of the project, which is subject to separate approval(s) under the *Environmental Planning and Assessment Act 1979* (EP&A Act).

This Environmental Impact Statement (EIS) is seeking approval, under Part 4, Division 4.1 of the EP&A Act, for the construction and operation of Stage 2 of the MPE Project (herein referred to as the Proposal) under the Concept Plan Approval for the MPE Project, being the construction and operation of warehouse and distribution facilities.

This EIS has been prepared to address:

- The Secretary's Environmental Assessment Requirements (SEARs) (SSD 16-7628) for the Proposal, issued by NSW DP&E on 27 May 2016 (Appendix A).
- The relevant requirements of the Concept Plan Approval MP 10_0913 dated 29 September 2014 (as modified) (Appendix A).
- The relevant requirements of the approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (No. 2011/6229, granted in March 2014 by the Commonwealth Department of the Environment (DoE)) (as relevant) (Appendix A).

This EIS also gives consideration to the MPE Stage 1 Project (SSD 14-6766) including the mitigation measures and conditions of consent as relevant to this Proposal.

This EIS has been prepared to provide a complete assessment of the potential environmental impacts associated with the construction and operation of the Proposal. This EIS proposes measures to mitigate these issues and reduce any unreasonable impacts on the environment and surrounding community.

The Proposal site is located on former Defence land previously occupied by the DNSDC. Defence no longer occupy/utilise the area. A number of previous environmental investigations have been undertaken involving the former DNSDC areas dating back to at least 1980, with more recent investigations and summary documents prepared between 2000 and 2016. A non-statutory site audit and Site Audit Report was completed in 2002, for the former DNSDC site (i.e. the SIMTA site), with the Site Auditor certifying the SIMTA site as suitable for ongoing commercial/industrial use subject to implementation of a Site Management Plan (SMP), which was to include a range of actions relating to further investigation, remediation, groundwater monitoring and management controls. It is not known whether a SMP was prepared or implemented, or whether any recommended actions were undertaken. Subsequent to this and at the request of the Department of Defence, another non-statutory site audit was completed for the site in 2016, excluding the former DNSDC Refuelling Area. The Site Auditor certified that the site is suitable for commercial / industrial use subject to compliance with the Environmental Management Plan (EMP) prepared for the site in July 2016.

This report outlines the contamination assessment to support the MPE Stage 2 SSD. Previous investigations, including preliminary and intrusive investigations, form the basis of this assessment which provides a current assessment of the contamination status of the site.



This assessment has been developed in accordance with guidelines made or approved by the NSW Environment Protection Authority (EPA) and relevant Australian Standards.

1.1 Purpose of This Report

This report supports the Environmental Impact Statement (EIS) for the Proposal (refer to **Section 1.2** for the Proposal overview), and has been prepared as part of a SSD Application for which approval is sought under Part 4, Division 4.1 of the EP&A Act.

This report has been prepared to address:

- The Secretary's Environmental Assessment Requirements (SEARs) (SSD 16-7628) for the Proposal, issued by NSW DP&E on 27 May 2016;
- The relevant requirements of Concept Plan Approval MP 10_0913 dated 29 September 2014 (as modified); and
- The relevant requirements of the approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (No. 2011/6229, granted in March 2014 by the Commonwealth Department of the Environment (DoE)) (as relevant).

The SEARs and the Concept Plan Conditions of Approval and Statement of Commitments relevant to this study, and the section of this report where they have been addressed are provided in **Table 1.1** and **Table 1.2**, respectively.

Table 1.1: Secretary's Environmental Assessment Req	uirements (SEARs) (SSD 16-7628)	Relevant to
This Study		

Section/Number	Conditions / SEARs	Where Addressed
7. Soil and Water	n. Include a contamination assessment in	This Stage 2 Contamination
	accordance with the guidelines made under the	Assessment (JBS&G 2016).
	Contaminated Land Management Act 1997.	
7. Soil and Water	o. Include an assessment of potentially	This Stage 2 Contamination
	contaminated areas in accordance with the	Assessment (JBS&G 2016).
	National Environmental Protection Measure 2013 in	
	addition to an assessment of potential areas of	
	Perfluorinated Compounds.	
12. Contamination	A contamination assessment in accordance with the	This Stage 2 Contamination
	guidelines under the Contaminated Land	Assessment (JBS&G 2016).
	Management Act 1997. The assessment shall	
	include the potential environmental and human	
	health risks of site contamination on the project	
	site, a Remedial Action Plan (if required), and	
	consideration of implications of proposed	
	remediation actions on the project design and	
	timing (if relevant).	



Table 1.2: Concept Plan Conditions of Approval and Statement of Commitments Relevant to This Study

Section/Number	Conditions / SEARs	Where Addressed
Concept Approval	d. Include a contamination assessment in	In the SIMTA Intermodal Terminal
Schedule 3, Section 2.1,	accordance with the guidelines made under the	Facility – Stage 1 Remediation
Soil and Water	Contaminated Land Management Act 1997 and in	Action Plan (RAP) (JBS&G 2015a), in
	consultation with the EPA for the subject site	the Phase 2 Environmental Site
	including the Glenfield Waste Facility. The	Assessment report (JBS&G 2015b)
	Assessment shall include:	and this report as it applies to the
	i. the potential environmental and human health	Moorebank Precinct East Project
	risks of contamination on the project site;	(MPE Project) Stage 2.
	ii. a Remediation Action Plan	
	iv. a Phase 2 environmental site assessment of the	
	project site including rail corridor	
Statement of	Developing a Contamination Management Plan	This requirement is proposed to be
Commitments,	with detailed procedures on:	incorporated within the
Contamination	- Handling, stockpiling and assessing potentially	Construction Environmental
	contaminated materials encountered during the	Management Plan (CEMP) for the
	development works;	Proposal, as well as for the MPE
	- Landfill gas management during the excavation,	Stage 1 Project.
	handling, and stockpiling of waste materials, if	
	excavation is required during the development, in	
	the area of the Glenfield Quarry and Landfill;	
	- Assessment, classification and disposal of waste in	
	accordance with relevant legislation; and	
	- A contingency plan for unexpected contaminated	
	materials, such as materials that is odorous, stained	
	or containing anthropogenic materials, that may be	
	encountered during site works.	
	Developing and implementing a contamination	To be developed as part of the
	management plan as part of the project	CEMP for the Proposal and the MPE
	construction environmental management plan for	Stage 1 Project.
	managing contaminated materials either expected	
	or unexpectedly encountered during the	
	construction of the rail corridor. The contamination	
	management plan would include detailed	
	nrocedures on:	
	- Handling, stockniling and assessing notentially	
	contaminated materials on countered during the	
	dovelopment works:	
	Assessment, classification and dispesal of waste in	
	- Assessment, classification and uisposal of Waste III	
	A contingencies plan for unexpected	
	- A contingencies plan for unexpected	
	contaminated materials, such as materials that is	
	outorous, stained or containing anthropogenic	
	materials that may be encountered during site	
	works.	

1.2 Overview of the Proposal

The Proposal involves the construction and operation of Stage 2 of the MPE Project, comprising warehousing and distribution facilities on the MPE site, as well as upgrades to approximately 1.4 kilometres of Moorebank Avenue between the northern MPE site boundary and 120 metres south of the southern MPE site boundary.

Key components of the Proposal include:

- Warehousing comprising approximately 300,000m² GFA, additional ancillary offices and the ancillary freight village.
- Establishment of an internal road network, and connection of the Proposal to the surrounding public road network.



- Ancillary supporting infrastructure within the Proposal site, including:
 - Stormwater, drainage and flooding infrastructure;
 - Utilities relocation and installation; and
 - Vegetation clearing, remediation, earthworks, signage and landscaping.
- Subdivision of the MPE Stage 2 site.
- The associated Moorebank Avenue upgrade comprises the following key components:
 - Modifications to the existing lane configuration, including some widening;
 - Earthworks, including construction of embankments and tie-ins to existing Moorebank Avenue road level at the Proposal's southern and northern extents;
 - Raking of the existing pavement and installation of new road pavement;
 - Establishment of temporary drainage infrastructure, including temporary basins and / or swales;
 - Raising the vertical alignment by about two metres from the existing levels, including kerbs, gutters and a sealed shoulder; and
 - Signalling and intersection works.
- Upgrading existing intersections along Moorebank Avenue, including:
 - Moorebank Avenue / MPE Stage 2 access;
 - Moorebank Avenue / MPE Stage 1 northern access;
 - Moorebank Avenue / MPE Stage 2 central access; and
 - MPW Northern Access / MPE Stage 2 southern emergency access.

The Proposal would interact with the MPE Stage 1 Project (SSD_6766) via the transfer of containers between the MPE Stage 1 IMT and the Proposal's warehousing and distribution facilities. This transfer of freight would be via a fleet of heavy vehicles capable of being loaded with containers and owned by SIMTA. The fleet of vehicles would be stored and used on the MPE Stage 2 site, but registered and suitable for on-road use. The Proposal is expected to operate 24 hours a day, seven days per week.

An overview of the Proposal is shown in **Figure 2** (**Appendix A**). To facilitate operation of the Proposal, the following construction activities would be carried out across and surrounding the Proposal site (area on which the Proposal is to be developed):

- Vegetation clearance;
- Remediation works;
- Demolition of existing buildings and infrastructure on the Proposal site;
- Earthworks and levelling of the Proposal site, including within the terminal hardstand;
- Drainage and utilities installation;
- Establishment of hardstand across the Proposal site, including the terminal hardstand;
- Construction of a temporary diversion road to allow for traffic management along the Moorebank Avenue site during construction (including temporary signalised intersections adjacent to the existing intersections) (the Moorebank Avenue Diversion Road);



- Construction of warehouses and distribution facilities, ancillary offices and the ancillary freight village; and
- Construction works associated with signage, landscaping, stormwater and drainage works.

The Proposal would operate 24 hours a day, 7 days a week.

The footprint and operational layout of the Proposal are shown on Figure 2 (Appendix A).

1.3 Objectives of This Report

The objective of the assessment is to determine the current contamination status of the Stage 2 SSD area to understand potential constraints to the development and enable appropriate management of any potential contamination during the development works.

1.4 Referenced Reports

A number of investigations and related works have been undertaken at the site since the 1980s. The following reports related to the works completed since 2000 were made available for review for completion of this contamination summary assessment:

- Egis (2000) Preliminary Site Investigation at the Defence National Supply and Distribution Centre, Moorebank Defence Lands, September 2000;
- Graham Brooks and Associates (2002) *Heritage Assessment Defence National Storage Distribution Centre (DNSDC) Moorebank Defence Site, Moorebank*, October 2002;
- URS (2002a) Assessment of DNSDC Buildings Supplement to Egis 2000 Stage 1 Preliminary Site Investigation of Areas A1 to A6, March 2002;
- HLA (2002) Soil and Groundwater Investigation, Precinct H (DNSDC), Moorebank Defence Lands, November 2002;
- URS (2002b) Investigation Review Report DNSDC, Moorebank Defence Lands, 10 December 2002;
- Contamination Management (CM 2002) *Summary Site Audit Report* and *Site Audit Statement, DNSDC Site, Moorebank*, December 2002;
- Environmental and Earth Sciences (EES 2002a) *Memorandum: Review of Reports Pertinent to Environmental Investigations Conducted at DNSDC, Moorebank, NSW*, 12 December 2002;
- EES (2002a) Memorandum: Review of Investigation Review Report DNSDC, Moorebank Defence Lands (URS) and Site Audit Statement WRR118 (Dr William Ryall), 16 December 2002;
- Milsearch (2002) Ordnance Investigation, 2002;
- Douglas Partners (DP 2009) Summary Environmental Conditions, Proposed Intermodal Freight Terminal, DNSDC Site Moorebank Avenue, Moorebank, December 2009;
- GHD (2015) DNSDC Moorebank Intrusive Site Investigations, September 2015;
- GHD (2016) Former DNSDC, Moorebank NSW Environmental Management Plan, July 2016;
- JBS&G (2016a) Site Audit Statement Part Lot 1 in DP 1048263, 26 September July 2016; and
- JBS&G (2016b) Site Audit Report 0503-1611 Part Lot 1 in DP 1048263 Former Defence National Storage and Distribution Centre (DNSDC) Moorebank Avenue, Moorebank, NSW, 26 September 2016.

Only information relevant to the areas of investigation targeted in the Stage 2 SDD area are dealt with in this assessment. A summaru of the relevant data is provided in **Section 4**.



2. Methodology

The methodology used for the preparation of this contamination summary report includes the following:

- A desktop review of existing reports and background information (Sections 3, 4 and 5) to identify:
 - The existing environmental setting and condition of the Proposal site; and
 - o Areas of potential concern identified in previous site investigations.
- A site inspection to provide information on current site conditions to assist in the understanding of previous investigations, the site's environmental setting and to aid in the contamination assessment of the site (Section 5.3); and
- Preparation of a conceptual site model to determine potential areas of concern and exposure pathways, identify uncertainties with regards to areas of potential concern (data gaps), and provide a preliminary evaluation of the risk of contamination to human and ecological receptors (refer to **Section 6**).



3. Site History

The site condition information provided in this section has been summarised from the previous investigation reports listed in **Section 1.4**. The summary below addresses the investigation area associated with the Proposal site area, and is taken from information reported by Egis (2000) in its Preliminary Site Investigation (PSI) report:

- The area within which the Proposal is located was first settled by Europeans around 1800, with Thomas Moore receiving a land grant in 1805 and setting up an estate called Moore Bank in 1809;
- In 1840, the Moore Bank property transferred to the Church of England. Between 1840 and 1880, the Moore Bank Estate land was cleared for pasture, farming, vineyards and orchards;
- Records indicate Defence used the land in the Moorebank/Holsworthy area for Defence-related purposes from at least the late 1800s;
- The trustees of the Church of England subdivided the Moore Bank Estate in 1888. The subdivided block within which the MPE Stage 2 site is located were sold in the early 1890s, and the Department of Defence acquired land as part of the Holsworthy complex in the early 1900s. Brooks (2002) reports land including the former DNSDC site was acquired in 1913 for Defence purposes, with the MPE site reported to have been used for military-related storage since 1915, with plans at the time indicating its use as a "Mobilisation Store";
- A storage centre had been established in the 1940s where the former DNSDC is located, with the former DNSDC as such being established in the 1990s, which involved the removal of former structures to slab level and construction of updated storage facilities;
- Aerial photographs confirm development of storage facilities and roads within and adjacent Stage 2 was underway in 1949 with 22 buildings visible in the central and southern sections of the site, together with a number of smaller buildings situated in the northern portion of the site. Additional car parking and minor building additions were noted between 1949 and 1986, including the paving and forming of roads;
- The northeast corner of the Proposal site area was reported to contain both the 21 Supply Battalion disposal area (World War II) and the Board of Survey disposal area (1970s to 1980s). Evidence indicates the following regarding the aforementioned area:
 - Reportedly comprised of trenches said to be used for post-World War II disposal by burn, bash and bury of stores from the 21 Supply Battalion (formerly located on the site) and related material from workshops.
 - Location of an authorised major burial ground and disposal area. These comprised Board of Survey disposal pits where burn, bash and bury disposal activities occurred. Anecdotal evidence suggests that a large portion of the buried material was removed by Thiess contractors for disposal during the mid-1990s.
- Based on aerial photographs, by 1986, several of the previously identified storage sheds in the southern portion of the site were replaced by a single larger structure (i.e. B16). The 1998 aerial photograph shows the current layout of the site, with no discernible changes to the land observed between the 1998 and 2008 aerial images.



4. Previous Investigations

A brief summary of the previous investigations listed in the referenced reports in **Section 1.4** is provided below for areas within the Proposal site that have been subject of site investigations. It is noted that references to DNSDC in the previous investigations pertain to the former DNSDC site (i.e. the MPE site). Furthermore, it is noted that select buildings that are within the Proposal site have been approved for demolition and remediation under the MPE Stage 1 SSD. This includes B07, B08, B09, B10, B11, B16, B17, B18, B24, B25, B26 and B27.

Locations discussed below have been referred to via building identification numbers (B50, B51, etc.), as shown on **Figures 5A** and **5B** (**Appendix A**). These buildings and previously identified potential areas of environmental concern (AEC) are identified on **Figure 4** (**Appendix A**). Historical sampling locations are shown in **Figures 5A** and **5B**, as well as in the figures in **Appendix C**.

4.1 Egis (2000) Preliminary Site Investigation of DNSDC

Egis (2000) included the following relevant to the Proposal site:

- Waste materials (unspecified) were reportedly removed from burial pits in the south east and southwest of the DNSDC. There was considered to be a moderate to high risk of occurrence of contaminants in this area. Egis noted that potential contaminants could include unexploded ordnance (UXO) contamination and fragments of exploded ordnance waste (EOW), but considered that UXO contamination at the DNSDC was not an issue based on the age of the DNSDC, "as any UXOs would probably have been removed during the construction of the warehouses".
- The Dangerous Goods stores (B25 and B26) comprised two compressed gas stores on unbunded concrete slabs. These stores contained a selection of non-flammable materials including refrigerants and pressurised gases. Risk of contamination associated with this area was considered to be low.
- The radiation store (B27) and associated holding well were located in the southern portion of the Proposal site. Risk of contamination associated with this area was considered to be low.
- The explosives store (B32) which stored kits containing rocket distress flares and compressed gas. Risk of contamination associated with this area was considered to be low.
- The magnetics storage yard (east of B40) which contained several elongated steel structures which were identified as being "Magnetic". Risk of contamination associated with this area was considered to be low.
- The battery service centre (B49) which was compartmentalised into three separate internal areas. A vehicle wash facility was located immediately west of this structure. Risk of contamination associated with this area was considered to be moderate.
- The grit blasting and spray painting workshops (B83) which were partially enclosed and contained steam cleaning and outboard motor repair facilities. Adjacent to the western side of the spray painting workshop was a fully enclosed chemical store. Risk of contamination associated with this area was considered to be moderate.
- The general equipment armament company workshop (B80) which was utilised for the maintenance and repair of various types of machinery and equipment. This structure was identified to contain various vehicle maintenance facilities, burner repair facilities, gun parts storage areas, and filtering and welding equipment. There were also provisions for the use of compressed air and natural gas. A waste oil sump was located adjacent to the internal eastern wall of the workshop (north of the eastern vehicle entrance). Spills were evident in this area. Risk of contamination associated with this area was considered to be moderate.



- The waste oil UST (adjacent to the eastern external wall of B80), comprising a 27 400 litres, connected to the waste oil sump in B80 (described above). Risk of contamination associated with this area was considered to be high.
- The electrical store (B73) contained several forms of communication equipment, small transformers, propane cylinders, battery chargers, power supplies and various electrical devices requiring maintenance and repair. Risk of contamination associated with this area was considered to be low.
- The mechanical equipment store (B75). Risk of contamination associated with this area was considered to be low.
- Part of the vehicle parking / storage area comprising a large bitumen and concrete paved parking area. Risk of contamination associated with this area was considered to be low.

4.2 Graham Brooks and Associates (2002) Heritage Assessment

This report states that the former DNSDC site has not been included in the Cubbitch Barta National Estate area listed in the *Register of the National Estate* by the Australian Heritage Commission. Furthermore, it has not been listed on the State Heritage Register by the NSW Heritage Council or identified as a heritage item on the Liverpool LEP 1997. It is however, located within the Holsworthy Landscape Conservation Area, which has been classifies by the *National Trust of Australia*.

The following elements were considered to have a high significance at the former DNSDC site:

- The eastern boundary of the site, which follows the alignment of Thomas Moore's grants along the Georges River, dating from the early 1800s;
- The northern and western boundary alignments of the site, which follow the alignments of the 1888 Moorebank Farms subdivision;
- The remnant evidence of the alignment of part of the forme Liverpool Anzac Rifle Range Holsworthy military railway line and sidings; and
- The collection of remaining timber post and beam buildings, which date from World War II, and which retain the internal timber structure essentially intact.

The QM Store and Carpentry Workshop are considered to have a moderate significance, as smaller and altered versions of the timber post and beam warehouses. Low significance was considered for the remaining buildings at the former DNSDC site, for their contribution to the ongoing use of the site for military storage purposes since 1915.

4.3 URS (2002a) Building Assessment of DNSDC Buildings

The URS (2002a) assessment was reported as being supplementary to an Egis (2000) Preliminary Site Investigation (PSI) of Areas A1 to A6¹ (March 2002), which is different to the abovementioned Egis (2000) PSI of the DNSDC area (September 2000), and which JBS&G has not cited. The Egis (2000) PSI report reviewed above refers to Area A2, the DNSDC area. Relevant information from URS (2002a) to the Proposal site area is summarised as follows:

• This report referred to a former DNSDC building layout plan in an appendix, however the plan itself was not included in the report provided to JBS&G. The former building layout plan may have been useful in identifying the former footprint of demolished buildings and the potential for asbestos containing material (ACM) and lead paint impacts.

¹ Areas A1 to A6 include the MPW site (A1), the former DNSDC site (A2), the area directly east and south of the former DNSDC site (including the boot lands, A3 and A4), the area south of the MPW site (A5), and a small area directly west of the MPW site.



- Several pages of this report appeared to be missing, including a portion of Table 2 containing information relating to potential contamination sources associated with the investigation area (Items 88, 89, 90 and 91 located in the north eastern portion of the Proposal site area). The following areas of concern were identified from the supplied portion of Table 2:
 - The former Radiac store located in the north western corner of B50. Soil was reportedly removed during demolition of the former store and construction of B50. Risk of contamination associated with this area was considered to be low.
 - The former Chemical/Utility store, identified with cracked and stained flooring associated with B32. The risk of contamination associated with this area was considered to be moderate to high.
 - The former Palletted Store, located in the eastern portion of B7, and identified with potential impact from historical chemical spills and poor pavement condition. The risk of contamination associated with this area was considered to be low to moderate.
 - The former Flammable Liquids Store and T&P area associated with storage of petrol, oils and chemicals, potential solvent spills and dip tank presence in the north eastern portion of B16. The risk of contamination associated with this area was considered to be low to high.
 - A small parcel of land located to the east of B22 was formerly used as a Dangerous Goods Store for larger items of flammable and combustible liquids (20 L to 200 L drums). The contamination associated with this area was considered moderate to be high.

4.4 HLA (2002a) Soil and Groundwater Investigation, Precinct H DNSDC

The results of the HLA (2002a) investigation of the Proposal site, referred to as Precinct H of the broader Commonwealth land in Moorebank, were utilised in preparation of the URS (2002b) investigation review report summarised below. HLA performed the investigations under the direction of URS. Results are summarised in **Section 4.6**.

4.5 Milsearch (2002) Ordnance Investigation

Milsearch completed an ordnance investigation and hazard analysis of approximately 82 ha of the DNSDC site, including portions of the Proposal site. Relevant findings are summarised below:

- Three pits were reported in the area located at the southern portion of the site. The largest pit (88 m x 6m x 6m deep) than ran parallel to the railway, contained general stores rubbish including shelving, metal mugs, building tie bars, small arms ammunition boxes (all empty). The other two pits contained large metal objects and surplus stores. In addition, debris from World War II era 36M hand grenades were noted on the surface in this area;
- One pit (84m x 6m x 5m deep) containing general stores rubbish including shelving, metal mugs, building tie bars, small arms ammunition boxes (all empty) and remnants of old building material was reported south and east of B25 and B26;
- Two significant anomalies were noted in the area east of B54. Remnants of a shallow burning pit (6m x 4m x 2x deep) and a more extensive burning pit (18m x 3m x 2m deep) were reported; and
- Two large pits in the area south of B32 were found to have large quantities of surplus stores equipment including shelving and binning material.

4.6 URS (2002b) Investigation Review Report DNSDC

URS (2002b) utilised the HLA (2002a) and Milsearch (2002) results, with the scope for each investigation developed by URS, acting as Principal Environmental Advisor to the Defence Property Disposal Task Force (PDTF). Relevant information presented in the DNSDC is summarised as follows, and sampling locations relevant to this report are provided on **Figure 5A** and **Figure 5B** (**Appendix A**):



- The investigation adopted a judgemental strategy targeting areas of potential concern reported previously by Egis (2000) and URS (2002a), as well as a broad assessment of fill, soils, sediment and groundwater, and a UXO hazard analysis and investigation in potential areas impacted by former waste burial.
- The greatest filling was identified in the southern area of the DNSDC, particularly in the south eastern area. The average depth of fill was reported as approximately 1 m while the greatest fill depth was 2.2 m bgs in test pits excavated in the southeast of Proposal site area. The fill material in the southeast included various waste materials including ACM.
- The north western portion of the Proposal site had several concentrations of total petroleum hydrocarbons (TPH) above the site adopted criteria. These included samples at locations SSH005, BHHP460, BHH128 and BBHP49. Heavy metals and asbestos fragments were also identified in this area, at the south of B80.
- The southern and south eastern portions of the Proposal site had scattered criteria exceedances for heavy metals (including arsenic, lead and zinc), TPH, asbestos and in one location, hydrochlorobenzene (HCB). The exceedances were reported to the east of B26 and to the south of B33.
- Monitoring wells were installed at six locations across the Proposal site area (refer to Figures 5A and 5B (Appendix A)). Groundwater monitoring reported heavy metal exceedances on the north western and south eastern boundaries, and detection of polycyclic aromatic hydrocarbons (PAHs) and phenols in monitoring well BHH039 located on the south eastern boundary.
- Recommendations made by URS that relate to the site include further groundwater monitoring across the DNSDC and further investigation of the waste oil tank area (B80), and consideration of the Milsearch (2002) ordnance investigation outcomes during future development. These actions were to be incorporated into a Site Management Plan (SMP) for implementation at the site.

4.7 CM (2002a and 2002b) Site Audit, DNSDC

Mr Bill Ryall of CM undertook a Site Audit resulting in preparation of a Summary Site Audit Report (CM 2002a SSAR) and Site Audit Statement (CM 2002b SAS) relating to the DNSDC area. CM (2002a) concurred with the findings and recommendations of URS (2002b), and the SMP requirements as reported by URS (2002b) were noted as a condition of the CM (2002b) SAS certification that the DNSDC site was suitable for commercial / industrial use.

4.8 EES (2002a and 2002b) Memorandums, DNSDC

EES (2002a) prepared a memorandum following review of Egis (2000), Milsearch (2002), HLA (2002a) and URS (2002a). The memorandum presented a summary of key findings and did not make any conclusions with regards to contamination, other than to note that the targeted investigations by HLA (2002a) were appropriate for a "first pass assessment" but that further grid based sampling would be required should the land use change in future.

EES (2002b) prepared another memorandum following review of URS (2002b) and the CM (2002b) SAS. The memorandum provided an outline of key investigation findings including reference to the SMP requirements recommended by URS and included as conditions on the SAS. It was noted that, technically, site audits under the NSW Contaminated Land Management Act (CLM Act) do not have any jurisdiction on Commonwealth land, and that it was unusual for a SAS to have "so many conditions". EES noted that "a significant amount of work is still required before the magnitude of some of the issues (and how best to address them) is identified".



4.9 DP (2009a) Summary Environmental Conditions, DNSDC

DP prepared a summary of environmental conditions within the DNSDC for the proposed intermodal freight terminal. The report did not provide any additional information or data in previous investigation reports to that reported herein. DP did not review the HLA or Egis reports. It was noted that DP were not aware whether any identified AECs from previous investigations had been addressed or whether the previously recommended SMP had been developed.

DP (2009a) recommended addressing outstanding items associated with the identified AECs, and any potential contaminating activities since the 2002 investigations.

4.10 GHD (2015) Intrusive Site Investigations

GHD was commissioned by Defence to undertake intrusive site investigations at targeted areas across the former DNSDC site. The intrusive site investigations were completed to address the data gaps outlined in the *Stage 1 Contamination Assessment & Data Gap Analysis Report* (GHD 2014, not made available to JBS&G).

The investigation scope included the following:

- Preliminary tasks, including the preparation of safety and environmental documentation and sampling location clearances for underground services and UXOs within the southern portion of the site.
- Intrusive soil investigations targeting areas of potential concern identified in the data gap analyses, including the collection of soil samples from 79 boreholes, 29 test pits and 15 hand auger locations;
- Installation of 23 new groundwater monitoring wells at targeted locations across the site and subsequent monitoring including the collection of groundwater samples from six existing and 23 newly installed wells; and
- Radiological clearance of Building 27 by a professional sub-contractor (ANSTO).

Locations targeted in this investigation are shown in Appendix C.

The findings of this investigation noted that TRH, PAHs, VOCs and aqueous film forming foam (AFFF) compounds, which contain Perfluorinated compounds (PFCs) were present in soils and groundwater at some locations, however, concentrations were typically low and below the nominated investigation levels with the following exceptions relating to the Proposal site:

- Elevated concentrations of hydrocarbons in soil and groundwater in the vicinity of the refuelling area (west of the Proposal site) and the presence of light non aqueous phase liquid (LNAPL) at several locations in the south western portion of the site, including two off-site locations;
- Elevated concentrations of lead were reported in shallow soils from a depth of approximately 0.7 to 0.8 metres in one location adjacent to the rail spur (TP062), corresponding with field observations of a white, waxy material. The extent of the impact appeared to be limited both vertically and horizontally and the material was not encountered at any other test pit locations across the site; and
- Fragments of ACM were noted on the ground surface and shallow soils at several locations within the southern burial pits and adjacent to the rail spur within the southern area of the Proposal site. The potential for widespread presence of ACM on the surface across this portion of the site cannot be discounted.

GHD notes that the investigations undertaken at the site addressed the issues raised in the 2002 Site Audit Statement.



In addition to the intrusive investigations listed above, GHD engaged the Australian Nuclear Science and Technology Organisation (ANSTO) to undertake a radiological clearance in the area around Building 27, where radioactive materials were previously stored. The report concluded that the surveyed area is *cleared for free release disposal as set out in RPS No. 6 – National Directory for Radiological Protection*.

GHD recommended the following in relation to the site:

- The presence of fragments of ACM on the ground surface within the southern burial pits should be noted and managed as part of any further works within this area of the site; and
- Whilst the potential for exposure to contamination is considered to be low, management of the localised lead hotspot at TP062, located adjacent to the rail spur, is recommended as part of any further works in this area of the site.

4.11 GHD (2016) Environmental Management Plan

An Environmental Management Plan (EMP) was prepared by GHD for the former DNSDC site excluding the Refuelling Area located in the south-western corner of the MPE site and outside of the Proposal footprint. The EMP outlined procedures to control exposure to potential human health and environmental receptors from residual contaminated soil, ACM and potential UXO.

4.12 JBS&G (2016) Site Audit Statement and Site Audit Report

A Section A Site Audit Statement (SAS) was provided by Andrew Lau, a Site Auditor accredited under the CLM Act, in September 2016. The SAS certified that the former DNSDC, excluding the former Refuelling Area that is located outside of the Proposal footprint, and including the Proposal site, is suitable for commercial / industrial use subject to compliance with the GHD 2016 EMP.

The Site Audit Report (SAR) noted that previous investigations identified concentrations of CoPCs below the adopted site assessment criteria with the exception of the following:

- Lead at TP062 0.7-0.8 mbgs, located within the site, east of B26;
- ACM in shallow fill at TP062, TP056 and BH107 (within the site) and extending off-site to the south; and
- Potential risk of UXO or EOW relating to the southern burial pits in the southern portion of the site.

In addition, hydrocarbon impacted groundwater was noted in monitoring wells adjacent to the boundary with a Licensed Area relating to the former Refuelling Area (west of the site). The SAR states that there are no levels of CoPCs in groundwater that are considered to require remediation or management under the proposed uses. In addition, it was considered that there was no evidence of potential or actual migration of contaminants from the former audited area that may result in unacceptable risks to surrounding human or ecological receptors.

It is noted that asbestos and perflourinated compounds (PFCs), which were raised as contaminants that required further investigation / management by the Auditor, were later considered by the Auditor to be adequately addressed in the GHD 2015 intrusive investigation and the GHD 2016 EMP.

The Auditor noted that relatively limited sampling has been conducted beneath the current buildings, but the soil data from the audited area as a whole does not indicate that any additional contamination issues are likely to be present. Should existing building slabs / pavements be removed, then the requirements in the EMP relating to the management of asbestos / lead / UXO / EOW, or any other forms of contamination as directed by the unexpected finds protocol, should be adhered to.



5. Site Condition and Surrounding Environment

The site condition information provided in this section has generally been summarised from the previous investigation reports listed in **Section 1.4**, for the area of investigation. Where appropriate, JBS&G has independently verified the accuracy of the information provided in the previous reports through desktop review and site inspection.

5.1 Regional Context

The MPE site, including the Proposal site, is located approximately 27 km south-west of the Sydney Central Business District (CBD) and approximately 26 km west of Port Botany. The MPE site is situated within the Liverpool Local Government Area (LGA), in Sydney's South West subregion, approximately 2.5 km from the Liverpool City Centre.

The MPE site is located approximately 800 m south of the intersection of Moorebank Avenue and the M5 Motorway. The M5 Motorway provides the main road link between the MPE site, and the key employment and industrial areas within Sydney's West and South-Western subregions, the Sydney orbital network and the National Road Network. The M5 connects with the M7 Motorway to the west, providing access to the Greater Metropolitan Region and NSW road network. Similarly, the M5 Motorway is the principal connection to Sydney's north and north-east via the Hume Highway.

The location of the Project site is shown in **Figure 1** (**Appendix A**). The layout of the area of the Proposal site area and regional context is shown in **Figure 2** (**Appendix A**). Cadastral boundaries are shown in **Figure 3** (**Appendix A**). It is noted that not all lots shown are included in this assessment, but relevant land for this assessment is associated with part of Lot 1 DP 1048263.

5.2 Local Context

The Proposal site is located approximately 2.5 km south of the Liverpool City Centre, 800 m south of the Moorebank Avenue/M5 Motorway interchange and one kilometre to the east of the SSFL providing convenient access to and from the site for rail freight (via a dedicated freight rail line) and for trucks via the Sydney Motorway Network.

The land surrounding the Proposal site comprises:

- The MPW site, formerly the School of Military Engineering (SME), on the western side of Moorebank Avenue directly adjacent to the MPE site (subject to the MPW Concept Plan Approval), which is owned by the Commonwealth;
- The East Hills Rail Corridor to the south of the MPE site, which is owned and operated by Sydney Trains;
- The Holsworthy Military Reserve, to the south of the East Hills Rail Corridor, which is owned by the Commonwealth; The Boot Land, to the immediate east of the MPE site between the eastern site boundary and the Wattle Grove residential area, which is owned by the Commonwealth; and
- The southern Boot Land, to the immediate south of the MPE site between the southern site boundary and the East Hills Rail Corridor, which is owned by the Commonwealth.

Glenfield Waste Services, south-west of the Proposal is proposing to develop a Materials Recycling Facility on land owned by the Glenfield Waste Services Group within the boundary of the current landfill site at Glenfield. The facility is proposed to recycle a maximum of 450,000 tonnes of material per year. The Glenfield Waste Services Proposal is the subject of a DA (SSD_6249) under Part 4, Division 4.1 of the EP&A Act.



A number of residential suburbs are located in proximity to the Proposal site. The approximate distances of these suburbs to the MPE Stage 2 site and the Moorebank Avenue site are provided in **Table 5.1** below.

Suburb	Distance to MPE Stage 2 Site	Distance to Moorebank Avenue Site
Wattle Grove	360 m to the north-east	865 m to the north-east
Moorebank	1300 m to the north	1430 m to the north
Casula	820 m to the west	760 m to the west
Glenfield	1830 m to the south-west	1540 m to the south-west

Table 5.1: Distance to Residential Suburbs from the Proposal Site

The closest industrial precinct to the Proposal is at Moorebank, comprising around 200 hectares of industrial development. This area includes (but is not limited to) the Yulong and ABB sites to the south of the M5 Motorway and the Goodman MFive Business Park and Miscellaneous industrial and commercial development to the north of the M5 Motorway. The majority of this development is located to the north of the M5 Motorway between Newbridge Road, the Georges River and Anzac Creek. The Moorebank Industrial Area supports a range of industrial and commercial uses, including freight and logistics, heavy and light manufacturing, offices and business park developments.

There are other areas of industrial development near the Proposal at Warwick Farm to the north, Chipping Norton to the north-east, Prestons to the west and Glenfield and Ingleburn to the southwest.

5.3 Site Description

5.3.1 MPE Stage 2 Site

A site inspection of the Proposal was completed on 22 June 2016 by JBS&G. The purpose of the site inspection was to visually assess any potentially contaminated areas identified during the desktop review. AECs were inspected for typical evidence of contamination, including features such as:

- Evidence of filling, such as unusual landforms;
- Stockpiled waste;
- Disturbed soil;
- Discolouration;
- Odours;
- Proximity to suspected areas of contamination; and
- Building of an age that could typically include asbestos.

The results of this site inspection were used to provide information on current site conditions, to assist in the understanding of previous investigations and the site's environmental setting and to aid in contamination assessment of the site.

The MPE Stage 2 site is mostly located within Lot 1, DP 1048263, which formerly contained the DNSDC site and is characterised by:

- Concrete and bituminous concrete access roads providing access to a number of enclosed warehouse/storage structures;
- Existing buildings; and
- Open storage/parking areas bordered by various open grassed areas.



Existing buildings on the MPE Stage 2 site and descriptions of structures within and adjacent to the Proposal site are shown on **Figures 5A** and **5B** (**Appendix A**).

The MPE Stage 2 site lies predominantly to the north and east of the MPE Stage 1 Project and includes the construction area as presented in **Figure 2** (**Appendix A**). The eastern portion of the MPE Stage 2 site includes a variety of buildings which have been previously used to store various items, including batteries, electrical equipment and chemicals. The area along the northern boundary of the MPE Stage 2 site is currently being used for the storage of vehicles. A portion of the northern area is noted to be underlain by areas of historical waste disposal. It is also noted that a spray painting shop (B83) and a waste oil UST (B79) are located near the eastern boundary of the site. What appears to be a recently installed groundwater monitoring well was noted directly downgradient of the aforementioned UST.

The area east of the Stage 1 site includes the following:

- Palletised stores used to store larger pieces of equipment (i.e. B07, B09). It is noted that B07 was reported by URS (2002) to have been potentially used as a warehouse;
- Dangerous Goods Stores (i.e. B25 and B26). These stores are large open warehouses that are used to store dangerous goods including solvents, fuels, lubricants and compressed gas. The warehouse floors are concrete lined and bunded;
- Timber post and beam stores (i.e. B33, B34, B35, B39, B40, B44, B45, B46 and B48) used to store miscellaneous items such as radio equipment, timber, steel;
- A raised rail track located in the middle of the MPE site in a north-south alignment;
- Explosives store (i.e. B32) west of B34 and B35;
- A portion of B16 that was reported to have been used as a treatment and preservation (T&P) area. This building was noted to have solvent dipping and water rinsing tanks for cleaning equipment, as well as solvent tanks that drained into above ground storage tanks. Two underground oil/water separator or interceptor pits were reported to be observed near the entrance of the T&P area;
- Bulk Pallet Silos (i.e. B10, B11, B17, B18) reportedly used for sorting and packing materials and equipment; and
- An open, grassed elevated area east of warehouses B40 and B45 that was once used as a magnetic store yard.

The southernmost grassed portion of the Proposal site was reportedly used as waste disposal areas, which may have included burial of disused Explosive Ordnances (EO). The buried waste in this area is said to have been largely removed, however this has not been confirmed (Egis 2000).

A summary table of each of the buildings and / or areas of interest is presented in Table 5.2.

Building / Area	Location	Former Use			
B06	Eastern portion of the site	Warehouse.			
B07	Eastern portion of the site	Palleted store for large equipment. Cracked concrete floor and possible workshop.			
B08	Eastern portion of the site	Unknown			
B09	Eastern portion of the site	Palleted store for large equipment. Cracked concrete floor and possible workshop.			
B10	Eastern portion of the site	Bulk Pallet Silos			
B11	Eastern portion of the site	Bulk Pallet Silos			

Table 5.2: Proposal site Areas and Former Use (Egis 2000 and URS 2002)



Building / Area	Location	Former Use
B13	Eastern portion of the site	Quarter Master's (Q) Store – including a flammable liquids cabinet which was noted to contain rodenticide.
B14	Eastern portion of the site	Unknown
B15	Eastern portion of the site	Flammable Liquids Store – noted to contain petrol and chemicals used in the Treatment and Preservation Area (B16), potential for chlorinated solvents.
B16	Southern portion of the site	Treatment and Preservation Area (T&P) noted in the north-eastern corner of the building (including a dip tank).
B17	Southern portion of the site	Bulk Pallet Silos
B18	Southern portion of the site	Bulk Pallet Silos
B24	Southern portion of the site	Dangerous Goods Store used for combustible solids, batteries and flammable liquids
B25	Southern portion of the site	Dangerous Goods Storehouse No. 1
B26	Southern portion of the site	Dangerous Goods Storehouse No. 2
B27	Southern portion of the site	Radiac Store reportedly noted to contain small quantities of Class 7 radioactive materials.
B31	Western portion of the site	Utility Store Office
B32	Western portion of the site	Utility Store or Explosives Store
B33	Western portion of the site	Store reportedly containing radio equipment
B34	Western portion of the site	Store reportedly containing archives
B35	Western portion of the site	Store reportedly containing general stores and parachute equipment
B37	Western portion of the site	Carpentry shop and vehicle maintenance
B38	Western portion of the site	Covered timber storage rack
B39	Western portion of the site	Joint Operation Warehouse – detergents, herbicides and insecticides were noted to be stored in this building
B40	Western portion of the site	Asbestos and Minmag store
B41	Western portion of the site	Unknown
B42	Western portion of the site	Amenities
B43	Western portion of the site	Unknown
B44	Western portion of the site	Returns Store
B45	Western portion of the site	Aerial Delivery Equipment Platoon
B46	Western portion of the site	Rotatable Store
B47	Western portion of the site	Armory
B48	Western portion of the site	Store for unrepairable items for disposal and overflow items from Returns Store
B49	Northern portion of the site	Battery shop / Service Centre
в50	Northern portion of the site	Transport Store
B51	Northern portion of the site	Steel Store



Building / Area	Location	Former Use		
B52	Northern portion of the site	Ration Store		
B53	Northern portion of the site	Oversized Pallet Silos		
B54	Northern portion of the site	Oversized Pallet Silos		
B67	Northern portion of the site	Small Arms Base Repair Facility / Indoor Firing Range		
B68	Northern portion of the site	Weapons Store		
B69	Northern portion of the site	Electrical Repair Facility		
В70	Northern portion of the site	Electronic Instrument Repair and Plant Room		
B71	Northern portion of the site	Amenities		
В72	Northern portion of the site	Electricals Store		
В73	Northern portion of the site	General Engineering Store / Vehicle Maintenance		
B74	Northern portion of the site	Amenities		
B75	Northern portion of the site	Mechanical Store		
В79	Northern portion of the site	Waste Oil UST		
B80	Northern portion of the site	General Equipment Armament Company Workshop / Vehicle Maintenance		
B81	Northern portion of the site	Grit Blasting Store		
B82	Northern portion of the site	Warehouse		
B83	Northern portion of the site	Spray Painting Shop (SPS)		
B84	Northern portion of the site	Flammable Liquids Store for SPS		
В90	Northern portion of the site	Turnstile		
B91	Northern portion of the site	OH&S Facility		
B92	Northern portion of the site	Offices		
В93	Northern portion of the site	Unknown		
B162	Northern portion of the site	Unknown		
B164	Northern portion of the site	Unknown		
Northern most portio	on of the site	Vehicle parking area		
North-eastern corner of the site, north of B54		Board of Survey disposal area used to "burn, bash and bury" waste which was reportedly largely removed for appropriate disposal in the mid-1990s.		
East of B53 and B54		21 Supply Battalion disposal area – noted to potentially have been remediated during the construction of the DNSDC. Reported to have been used to "burn, bash and bury" World War II waste material.		
Mounded area on the	e west of B40 and B45	Magnetics Store Yard		
Grassed southern po	rtion of the site	Potentially remediated waste disposal area		

5.3.2 Moorebank Avenue Site

The 1.4 km stretch of Moorebank avenue west of the MPE Stage 2 site is a 2-lane thoroughfare. The portion of the Moorebank Avenue that is proposed to be upgraded as part of the Proposal, encompasses the existing roadway, as well as a portion of the MPW site (refer to **Figure 2** (**Appendix A**)).



The areas of interest relating to the Moorebank Avenue site are:

- The potential for surficial contamination along the length of the Moorebank Avenue site from spills / leaks of fuels relating to the use of this area as a roadway;
- The southern portion of the Moorebank Avenue site is directly adjacent and downgradient of the former refuelling facility (part of the Stage 1 MPE Project). Groundwater underneath this portion of the site is reportedly impacted by hydrocarbons that have migrated from the former refuelling facility (GHD 2016³); and
- Part of northern portion of the Moorebank Avenue site was reported to be an AEC in the 2000 Egis report. This portion of the Moorebank Avenue site (refer to **Figure 4** (**Appendix A**)) was reportedly used for Explosive Ordnance Demolition (EOD) and dog training area. As such, it was considered that there was a low possibility of this portion of the Moorebank Avenue site being impacted by explosives, UXOs and metals.

5.4 Surrounding Land Use

Based on information provided in previous investigation reports, a review of aerial photographs⁴, and observations made by JBS&G personnel during site inspections, the following land uses have been identified at adjacent properties to the Proposal site, or across adjacent roadways:

- North Defence Joint Logistic Unit (DJLU) land comprising of car parking, administration / warehousing buildings and vegetated areas (grass covered with a scattering of trees). Beyond the DJLU land, and across Anzac Road lies former DNSDC land which was redeveloped in 2006 for industrial / commercial warehousing and administration buildings (Yulong and ABB Business Parks).
- East to the south-east of the Proposal site lies Commonwealth land formerly used by Defence, and which is currently heavily vegetated and known as the Boot Land. A transmission line easement passes in a north-south orientation along the eastern boundary of the former DNSDC site. To the north-east of the Proposal site area is DJLU land comprising of large warehouse structures, parking and storage areas, access roads and grassed areas (comprising predominantly grassed area with some small trees). Beyond the Commonwealth and DJLU land to the east, across a concrete lined drainage channel, the suburb of Wattle Grove is located comprising of low density residential properties.
- South the southern portion of the Boot Land is located to the south of the Proposal site. There
 is a cleared area and narrow fire-trail with overhead power lines accessed via a locked gate from
 Moorebank Avenue, along the southern boundary of the Proposal site. This cleared area
 separates the Proposal site from areas of dense bushland. A disused rail siding transects this
 dense vegetation and cleared area which between the Proposal site and the East Hills rail
 corridor to the south.
- West The MPE Stage 1 site is located immediately west of the MPE Stage 2 site, and includes a
 former fuel dispensing station that has been approved to be demolished and remediated under
 the MPE Stage 1 SSD approval. This former fuel dispensing station includes underground storage
 tanks (USTs) and fuel bowers, a Dangerous Goods Store, a former meat store, a treatment and
 preservation (T&P) area, warehouses, landscaped recreational green areas and car parking.
 Moorebank Avenue is located to the west of the MPE site, with the MPW site occupying the land
 west of Moorebank Avenue to the Georges River.

³ GHD (2016), Department of Defence Former DNSDC Refuelling Area, Moorebank, NSW Human Health and Ecological Risk Assessment, September 2016

⁴ Available via Google Maps <u>https://www.google.com.au/maps</u> and Google Earth (viewed 15/06/2016)



The nearest sensitive receptors include the open space land comprising the bushland on Commonwealth land within, to the east and to the west of the site, the Georges River located in a westerly direction from the site, and current occupants of the DNDSC land immediately to the north and north east of the Proposal site.

5.5 Topography and Drainage

The existing topography of the Proposal site is defined by a ridge, which runs along the central portion of the MPE Project site, running parallel to Moorebank Avenue. This ridge results in surface water drainage flowing in an easterly direction towards Anzac Creek to the east of the ridge and towards Moorebank Avenue and the Georges River to the west.

The surface drainage regime of the MPE Project site is divided into three internal catchment areas and two smaller offsite upstream catchments that drain onto the MPE Project site. All surface water runoff within the MPE Project site is collected through an existing drainage system comprising a mixture of concrete and open channels and discharged to three drainage outlets. Two outlets (Outlets A and B) discharge eastward into Anzac Creek, while the remainder of flows are collected and discharged into the Georges River via the neighbouring MPW site from Outlet C.

5.6 Hydrology

The closest significant water body to the Proposal is the Georges River, located approximately 700 m to the west of the Proposal site. The Georges River flows through to Lake Moore, which is situated approximately 2.5 km north, north east of the Proposal site, and into Chipping Norton Lake, located approximately 5.6 km north east of the Proposal site. The Proposal site is situated near the upstream portion of Georges River, which flows in a general north, then east / south easterly direction towards Botany Bay which is located approximately 20 km south south-east of the investigation site.

Other surface water bodies identified in the surrounding area include:

- Anzac Creek, located approximately 250 m to the south and east of the site. Anzac Creek is east-west aligned and flows generally north-east to its confluence with the Georges River, approximately 5 km north of the Proposal site. The western extent of Anzac Creek appears to exist in the former Royal Australian Engineers (RAE) Golf Course on the western side of Moorebank Avenue (within the MPW site), where the creek appears to have been modified into a series of water features (dams/ponds).
- Another series of dams/ponds are visible on the northern portion of the property situated to the west of Moorebank Avenue. The visible bodies range in shape, area and distance from the Proposal site as follows:
 - A rough rectangular shaped pond is present with an approximate area of 550 m², situated approximately 300 m to the west of the site boundary; and
 - A circular body of water is present with a diameter of 60 m, and an approximate area of 3000 m2. This pond is situated approximately 100 m to the west of the site boundary.

5.7 Geology

According to historical geotechnical investigations and reports (Golder et al), the Proposal site is reportedly underlain by Tertiary fluvial deposits comprising clayey sand and clay, as well as silty clay with some ironstone. Clay is present to depths of at least 10 m to 12 m below ground surface (bgs). Surface cover material overlying the clay includes silty sand topsoil to approximately 0.3 m bgs and clay fill to variable depth between 0.5 m and 1.5 m bgs (HLA 2002a, DP 2009a, DP 2009b).

Surface material and fluvial deposits are underlain at depth by shale associated with Ashfield Shale deposits (DP 2009a). Registered bores immediately west of the Georges River, associated with the Glenfield Waste Facility, indicate sandy clay and sands to 10 m overlying shale to 20 m overlying sandstone to 30 m depth (Golder 2011a).



URS (2002b) reported as part of the Investigation Review Report noted that shale bedrock was encountered in the eastern portion of the Proposal site, while sandstone bedrock was reported in the southern portion of the Proposal site.

5.8 Hydrogeology

The regional geology consists of Tertiary aged fluvial deposits of clayey quartzose sand clay overlying a thin band of Middle Triassic ages Ashfield Shale of the Wianamatta Group overlying Hawkesbury Sandstone.

Based on previous investigations undertaken at the former Proposal site, shale bedrock was encountered in the western portion of the former Proposal site whilst weathered sandstone bedrock was encountered on the southern portion of the former Proposal site (GHD 2014⁵).

Groundwater was intercepted at varying depths across the site, though generally found between 4 m and 5 m depth (URS 2002b). Groundwater was noted within a number of geological units including the fill material, shale and sandy clays. Groundwater is expected to flow in a westerly or north-westerly direction towards the Georges River.

URS (2002b) reported as part of its Investigation Review Report that deeper groundwater generally exhibiting high salinity and therefore having little or no beneficial use. Shallow groundwater was reported to have lower salinity, potentially as a result of local recharge via surface infiltration.

⁵ GHD (2014(, Department of Defence Stage 1 Contamination Assessment & Data Gap Analysis Defence National Storage and Distribution Centre, November 2014, DRAFT



6. Conceptual Site Model

The information in this section of the contamination summary report, together with the figures (**Appendix A** and **C**) included in this report aid in presenting a conceptual site model (CSM) for the Proposal site, based on a review of relevant background historical site information.

The National Environment Protection (Assessment of Site Contamination) Measure, NEPC, 1999 (as amended 2013, NEPC 2013) identifies a conceptual site model (CSM) as a representation of site related information regarding contamination sources, receptors, and exposure pathways between those sources and receptors. The development of a CSM is an essential part of all site assessments and remediation activities.

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

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

6.1 Potential Areas and Substances of Environmental Concern

Based on a review of the historical activities of the Proposal site potential AECs and associated contaminants of potential concern (COPC) have been summarised and are presented in **Table 6.1**.

Table 6.1: General Areas of Potential Environmental Concern and Associated Contaminants of)f
Concern	

Site	Area/Aspect of Environmental Concern	Location	Contaminants of Potential Concern (COPCs)
MPE Stage 2 site	General site areas where filling and burial/burning of waste material may have occurred.	General site areas, identified former building areas, fill material. Burial/burn pits were anecdotally identified in the north eastern and south eastern corners of the site.	 Metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc) Asbestos Total petroleum hydrocarbons (TPH) Benzene, toluene, ethylbenzene, xylenes (BTEX) Polycyclic aromatic hydrocarbons (PAHs)
MPE Stage 2 site	Potential soil and groundwater impacts from the storage of dangerous goods, radiation, explosives, magnetics, electrical equipment, impact resulting from the drainage collection and work areas	Dangerous Goods stores (B25, B26) including the former storage area to the west of B22, Radiation store (B27), explosives store (B32), Magnetics storage yard (east of B40), Electrical store (B73), Radiac store (north west corner of B50), and the former Palletted Store (eastern portion of B7).	 TPH Volatile organic compounds (VOCs) Semi-volatile organic compounds (SVOCs) PAHS, Phenols Metals Perfluorinated compounds (PFCs)
MPE Stage 2 site	Fill around building footprint and leakage/potential spills from waste oil pits associated with mechanical	Battery service centre (B49), General equipment armament company workshop (B80), Mechanical Equipment store	TPHPAHs



	and battery repairs and maintenance,	(B75), former T&P areas (north	•	VOCs
	impacting soil and groundwater	east of B16), waste oil UST (B79)	•	Phenols
			•	Polychlorinated biphenyls (PCBs)
			•	Asbestos
			•	Metals
MPE Stage	Former storage areas for vehicles,	Northern portion of the site, and	•	Metals (extended suite), pH
2 site	heavy machinery and containers.	south west area (associated with	•	ТРН
		previous stage 1 works)	•	VOCs/SVOCs
MPE Stage	Potential asbestos and lead paint	Proposal site area	•	Asbestos
2 site	impacts from demolition of former		•	Metals
	structures. Illegal waste dumping		•	TPH. BTEX. PAH. OCP. PCB
MPE Stage	Potential exploded ordnance waste	South-eastern corner of the site		
2 site	(EOW) from former grenade range			
Manuahauk	Anna and an filling and have		•	Explosive residues
Avenue site	Areas where filling may have	General site areas.	•	ТРН
/wende site			•	PAHs
			•	VOCs
			•	Phenols
			•	Asbestos
			•	Metals
Moorebank	Areas subject to surficial leaks and	General site areas.	•	ТРН
Avenue site	spills of fuel		•	BTEX
			•	Lead
			•	PAHs
Moorebank	Potential soil and groundwater	Southern portion of the	•	ТРН
Avenue site	impacts from adjacent former	Moorebank Avenue site,	•	BTEX
		refuelling facility	•	Lead
			•	PAHs
Moorebank	Reported use as of a for EOD and dog	Small area of the northern	•	UXO/EOW/EO
Avenue site	training	portion of the site	•	Explosive residues
			•	metals



Following a review of the findings of intrusive investigations and in which AECs were investigated and assessed, the remaining AECs and COPCs have been identified in **Table 6.2** below:

Site	Area/Aspect of Environmental Concern	Location	Contaminants of Potential Concern (COPCs)
MPE Stage 2 site	General site areas where filling may have occurred.	Lead - TP062 0.7-0.8 mbgs, located within the site, east of B26. Asbestos - TP062, TP056 and BH107 (within the site) and extending off-site to the south. Beneath existing building slabs and pavements.	LeadAsbestos
MPE Stage 2 site	General site areas where burial/burning of waste material may have occurred.	Southern burial pits	UXO/EOW/EOExplosive residues
Moorebank Avenue site	Areas where filling may have occurred.	General site areas.	 TPH PAHs VOCs Phenols Asbestos Metals
Moorebank Avenue site	Areas subject to surficial leaks and spills of fuel	General site areas.	 TPH BTEX Lead PAHs
Moorebank Avenue site	Potential soil and groundwater impacts from adjacent former refuelling facility	Southern portion of the Moorebank Avenue site, downgradient of the former refuelling facility	 TPH BTEX Lead PAHs

Table 6.2: Areas of Identified Environmental Concern and Associated Contaminants of Concern

6.2 Potentially Contaminated Media

Potentially contaminated media present at the site may include:

- Fill material, including buried wastes;
- Surface soil (potential dust);
- Natural soils;
- Groundwater; and
- Stormwater/surface water.

Filling across areas of the Proposal site has been reported in previous investigations, and the potential for unidentified buried wastes has also been reported for various areas at the site. As such, fill material is considered a potentially contaminated medium.

Due to the potential presence of asbestos fibres in ballast / fill in unsealed surfaces in some, surface soils which could become wind-blown dust therefore has the potential to be a contaminated media.



Given the potential for downward migration of contaminants through fill, particularly in open areas where infiltration is possible, and the identified presence of contaminated soils and groundwater in soils, the natural soils across the site are considered a potentially contaminated medium.

There is the potential for leaching of contaminants vertically from fill into groundwater, or from spillage or use of chemicals. In addition, hydrocarbon impacted groundwater has been reported to be present beneath the southern portion of the Moorebank Avenue site. While groundwater impacts may not necessarily impact on the development and future use of the site, groundwater is nevertheless considered a potentially contaminated medium.

6.3 Potential for Migration

Contaminants generally migrate from site via a combination of windblown dusts, rainwater infiltration, groundwater migration and surface water runoff. The potential for contaminants to migrate is a combination of:

- The nature of the contaminants (solid/liquid and mobility characteristics);
- The extent of the contaminants (isolated or widespread);
- The location of the contaminants (surface soils or at depth); and
- The site topography, geology, hydrology and hydrogeology.

The potential contaminants identified as part of the site history review and site inspection are present in solid (e.g. impacted soil or fill, asbestos), liquid (e.g. dissolved in water or as PSH) and gaseous / vapour forms.

The site inspection has indicated that there are some unsealed ground surfaces where there is bare or exposed soil / fill. Therefore, there is the limited potential for migration of contaminants via wind-blown dust.

Due to unsealed surfaces in some areas, there is the potential for migration of contamination via overland flow and potential groundwater discharge to impact surface water bodies.

Rainfall infiltration at the site is expected to occur in unsealed areas. There is therefore the potential to impact shallow groundwater.

Given the presence of soil and groundwater impacts resulting from historic activities, there is the potential for contaminants to migrate in groundwater.

6.4 Potential Exposure Pathways

Potential exposure pathways include:

- Dermal;
- Ingestion; and
- Inhalation.

Due to the presence of exposed impacted soil / fill on ground surfaces, dermal exposure must be considered a potential exposure pathway.

The potential for ingestion of soil through eating soil is considered relatively low due to the occupational and restricted access environment at the site, however, should dust be generated, ingestion must be considered a potential exposure pathway. Although groundwater is not used at the site, other than for monitoring purposes, and previous reports indicate groundwater has no beneficial use, there is the potential, albeit low in an occupational environment, for ingestion of contaminants via groundwater.



As there is the possibility for generation of dust in unsealed areas where potentially impacted soil / fill is present, inhalation is also considered a potential exposure pathway.

6.5 Summary Assessment

Previous investigations conducted within the MPE Stage 2 site and the Moorebank Avenue Upgrade site have not identified widespread residual contamination and as such, the risk posed by contamination on the Proposal site is considered to be low. However, this finding does not preclude the possibility of encountering unexpected and incidental contamination during the construction and operation of the Proposal.



7. Conclusions and Recommendations

Based on the review of available information, it is noted that historical activities on the former DSNDC site, including the MPE Stage 2 site, may have resulted in the potential contamination of surface soils and the subsurface environment. However, based on the intrusive contamination investigations and site inspections completed for the former DSNDC site and subject to the limitations in **Section 8**, the following conclusions are made:

- Previous investigations have considered potential contamination risk at the Proposal site (including risks associated with PFC-containing AFFF). No evidence of widespread residual contamination at the Proposal site has been reported; however, isolated areas of the MPE site, including within the MPE Stage 2 site have been reported to be impacted by lead, ACM, UXO, and EOW. The CEMP for the Proposal site should contain a Contamination Management Plan that addresses the aforementioned impacts during the construction works inclusive of an Asbestos Management Plan. The CEMP must also include an unexpected finds protocol (UFP);
- There is no indication that groundwater at the site requires remediation or management under the proposed commercial / industrial land uses; and
- The MPE Stage 2 site has been certified by a NSW EPA-accredited Site Auditor to be suitable for commercial / industrial use subject to all works being carried out in accordance with 2016 GHD EMP.

It is noted that the Moorebank Avenue site was formed as a roadway prior to the development of the MPE site. As such, it is unlikely that the Moorebank Avenue site was subject to significant contaminating activities, with exemption of the hydrocarbon impacted groundwater migrating from the former refuelling facility south west of the Proposal site, which has been recently decommissioned and remediated. The contamination reported in this area can be managed during the construction works through mitigation measures as presented in the CEMP's Contamination Management Plan.

Environmental data required to assist with the on-site reuse or off-site disposal of soils can be incorporated into the Contamination Management Plan in the CEMP to be developed for the Proposal. As such, it is considered that no further investigations are required prior to the commencement of construction work at the site.



8. Limitations

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

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

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

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

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

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

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



Appendix A Figures







File Name: 51432_03 Reference: Near Map www.nearmap.com, imagery date 13-02-2016, accessed 17-06-2016







File Name: 51432_05B Reference: Near Map www.nearmap.com, imagery date 13-02-2016, accessed 17-06-2016



Appendix B Development Master Plan

PROPOSED STAGE 2 SITE PLAN







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on site b	efore commencing work. Report all
discrepa	ncies to project manager prior to
construc	ion. Figured dimensions to be taken
in prefere	ence to scaled drawings. All work is
to confor	m to relevant Australian Standards
and othe	r Codes as applicable, together with
other Au	chorities' requirements and
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Issue	Description	Date	Ver	Auth	Γ
А	PRELIMINARY ISSUE	27/06/2016			
В	PRELIMINARY ISSUE	29/07/2016			
С	PRELIMINARY ISSUE	22/08/2016			
D	PRELIMINARY ISSUE	26/08/2016			
E	PRELIMINARY ISSUE	07/10/2016			
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Appendix C GHD (2016) Sample Locations





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Department of Defence DNSDC, Moorebank NSW Stage 2 Contamination Assessment Job Number 21-24133 Revision Date

Α 12 Jun 2015

Figure 2

Investigation Locations





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	Hand Auger Location (GHD, 2015)
	Test Pit Location (GHD, 2015)
197-4	A Sediment Sampling Location (GHD, 2015)

Department of Defence DNSDC, Moorebank NSW Stage 2 Contamination Assessment Job Number 21-24133 Revision Date

А 12 Jun 2015

Investigation Locations







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Figure 4

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