

Amended Remedial Action Plan

Barangaroo - ORWS Area



Amended Remedial Action Plan

Barangaroo - ORWS Area

Prepared for

Lend Lease (Millers Point) Pty Limited

Prepared by

AECOM Australia Pty Ltd

Level 21, 420 George Street, Sydney NSW 2000, PO Box Q410, QVB Post Office NSW 1230, Australia

T +61 2 8934 0000 F +61 2 8934 0001 www.aecom.com

ABN 20 093 846 925

7 July 2011

60153531

AECOM in Australia and New Zealand is certified to the latest version of ISO9001 and ISO14001.

© AECOM Australia Pty Ltd (AECOM). All rights reserved.

This document was prepared by AECOM Australia Pty Ltd (AECOM) for the sole use of Lend Lease (Millers Point) Pty Ltd, the only intended beneficiary of our work. Any advice, opinions or recommendations contained in this document should be read and relied upon only in the context of the document as a whole and are considered current to the date of this document. Any other party should satisfy themselves that the scope of work conducted and reported herein meets their specific needs before relying on this document. AECOM cannot be held liable for any third party reliance on this document, as AECOM is not aware of the specific needs of the third party. No other party should rely on the document without the prior written consent of AECOM, and AECOM undertakes no duty to, nor accepts any responsibility to, any third party who may rely upon this document.

This document was prepared for the specific purpose described in our proposal dated 16 April 2010 and as agreed to by Lend Lease (Millers Point) Pty Ltd. From a technical perspective, the subsurface environment at any site may present substantial uncertainty. It is a heterogeneous, complex environment, in which small subsurface features or changes in geologic conditions can have substantial impacts on water and chemical movement. Uncertainties may also affect source characterisation assessment of chemical fate and transport in the environment, assessment of exposure risks and health effects, and remedial action performance.

AECOM's professional opinions are based upon its professional judgement, experience, and training. These opinions are also based upon data derived from the testing and analysis described in this document. It is possible that additional testing and analysis might produce different results and/or different opinions. AECOM has limited its investigation to the scope agreed upon with its client. AECOM believes that its opinions are reasonably supported by the testing and analysis that have been done, and that those opinions have been developed according to the professional standard of care for the environmental consulting profession in this area at the date of this document. That standard of care may change and new methods and practices of exploration, testing, analysis and remediation may develop in the future, which might produce different results. AECOM's professional opinions contained in this document are subject to modification if additional information is obtained, through further investigation, observations, or validation testing and analysis during remedial activities.

All rights reserved. No section or element of this document may be removed from this document, extracted, reproduced, electronically stored or transmitted in any form without the prior written permission of AECOM.

Quality Information

Document Amended Remedial Action Plan

Ref 60153531

Date 7 July 2011

Prepared by Andrew Rolfe

Reviewed by Michael Jones

Revision History

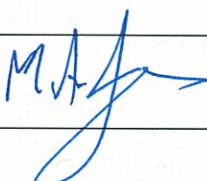
Revision	Revision Date	Details	Authorised	
			Name/Position	Signature
1	21 April 2011	Amended Draft - revised to include findings of ORWS HHERA Addendum (AECOM, 2011c) and ORWS In situ Soil and Fill Validation (AECOM, 2001a)	Michael Jones Associate Director - Environment	
2	13 May 2011	Final – revised to address NSW OEH and Site Auditor comments to the ORWS HHERA Addendum	Michael Jones Associate Director - Environment	
3	22 June 2011	Final – revised to address NSW OEH and Site Auditor comments	Michael Jones Associate Director - Environment	
4	7 July 2011	Final – revised to address NSW OEH and Site Auditor comments	Michael Jones Associate Director - Environment	

Table of Contents

Glossary of Terms and Acronyms	i
Executive Summary	v
1.0 Introduction	1
1.1 Objectives	1
1.2 Scope	2
1.3 Proposed Development and Land Use	2
1.3.1 Proposed Land Uses	2
1.3.2 Basement Groundwater Retention Wall System	4
1.4 Remediation Documentation	4
2.0 Assessment and Approval Process	5
2.1 Planning Approvals	5
2.2 Legislation Relevant to Remediation Works	5
2.2.1 CLM Act (1997)	5
2.2.2 CLM Amendment Act (2008)	6
2.2.3 Protection of the Environment Operations Act (1997)	7
2.2.4 State Environmental Planning Policy 55	7
3.0 Site Identification and History	9
3.1 Site Identification	9
3.2 Development and Basement Areas	9
3.2.1 Proposed Land Uses – Development Area (South)	9
3.2.2 Proposed Land Uses – Public Domain (South)	10
3.2.3 Shallow and Deep Basement Areas	10
3.2.4 Basement Groundwater Retention Wall System	10
3.2.5 Beneficial Reuse	12
3.2.6 Development Design Finalisation	12
3.3 Site History	12
3.3.1 Filling History	14
3.3.2 Gasworks Features (located Off-Site to the North)	14
3.4 Previous Investigations	14
3.4.1 NA&A (1996)	15
3.4.2 Coffey (1998)	15
3.4.3 URS (2001)	16
3.4.4 Jeffery and Katauskas (2006)	16
3.4.5 ERM (2007)	16
3.4.6 Coffey (2008)	17
3.4.7 ERM (2008a)	17
3.4.8 ERM (2008b)	18
3.4.9 ERM (2010)	18
3.4.10 AECOM (2010a)	19
3.4.11 AECOM (2010c)	20
3.4.12 AECOM (2011a)	20
3.4.13 AECOM (2011b)	21
3.4.14 AECOM (2011c)	22
3.4.15 Casey and Lowe (2011)	24
4.0 Site Condition and Surrounding Environment	25
4.1 Current Land Use	25
4.2 Surrounding Land Use	25
4.3 Topography and Drainage	25
4.4 Geology	25
4.5 Hydrogeology	26
4.6 Potentially Sensitive Receptors	27
5.0 Remediation Criteria	28
5.1 Soil and Groundwater Generic Assessment Criteria	28
5.2 HHERA and Development of Site-Specific Target Criteria and Site-Specific Ecological Screening Criteria	28

	5.2.1	Derivation of SSTCs	29
	5.2.2	SSTC Exposure Scenarios	30
	5.2.3	Derivation of SSECs	33
	5.2.4	Beneficial Reuse of Excavated Material	34
5.3		Remediation Criteria	35
	5.3.1	Derivation of Remediation Criteria	35
	5.3.2	Total Toxicity of Mixtures	36
	5.3.3	Key Assumptions for Derivation of Remediation Criteria	37
	5.3.4	Summary of Remediation Criteria	38
5.4		Implementation of the SSTCs and SSECs	39
	5.4.1	Soil SSTCs and SSECs Implementation	39
	5.4.2	Groundwater SSTCs and SSECs Implementation	40
6.0		Confirmed Impacted Material Assessment	41
6.1		Area A - Public Domain (South) – Materials to Remain <i>In Situ</i>	41
	6.1.1	Tar Containing Material	41
	6.1.2	Soil Analytical Results	41
	6.1.3	Groundwater Analytical Results	43
	6.1.4	Area A – Identification of CIM	43
6.2		Area B – Materials to be Excavated During Basement Excavation Works	45
	6.2.1	Tar Containing Material	45
	6.2.2	Soil Analytical Results	45
	6.2.3	Area B – Identification of CIM	46
6.3		Area C - Development Area (South) – Materials to Remain <i>In Situ</i> below Shallow Basement Areas	46
	6.3.1	Tar Containing Material	46
	6.3.2	Soil Analytical Results	46
	6.3.3	Groundwater Analytical Results	46
	6.3.4	Area C - Identification of CIM	47
6.4		Area D – Development Area (South) Materials to be Unexcavated below Commercial Premises	48
	6.4.1	Tar Containing Material	48
	6.4.2	Soil Analytical Results	48
	6.4.3	Groundwater Analytical Results	48
	6.4.4	Area D – Identification of CIM	48
7.0		Remediation Extent	49
	7.1	Development/Remediation Assumptions	49
	7.2	Remediation and Development Areas	50
	7.3	Area A – Extent of Remediation	50
	7.3.1	Vertical Distribution of Copper in Soil	50
	7.3.2	Groundwater Quality	51
	7.3.3	Reduction in Mass in Hydraulic connection with Darling Harbour	51
	7.3.4	Ecologically Sustainable Development Assessment and Remediation Practicalities	51
	7.3.5	Asbestos Impacted Soils	52
	7.3.6	Recommended Remediation Extent (Area A)	52
	7.4	Area B – Extent of Remediation	52
	7.5	Area C - Remediation Requirements Assessment	52
	7.6	Area D - Remediation Requirements Assessment	52
	7.7	Remediation Requirements Compared to ORWS HHERA Addendum Conclusions	53
8.0		Remedial Technology Assessment	55
	8.1	Identification of Remedial Technology Options	55
	8.1.1	In-situ remedial technologies	55
	8.1.2	Ex-situ remedial technologies	56
	8.2	Screening of Remediation Technologies	56
	8.2.1	Feasibility of the Remediation Technology	56
	8.2.2	Sustainability of the Remediation Technology	56
	8.2.3	Screening Outcomes	57
	8.3	Assessment of Remedial Technology Options	57

	8.3.1	Excavation and Ex-Situ Thermal Desorption (on-site)	57
	8.3.2	Excavation and Ex-Situ Thermal Desorption (offsite)	58
	8.3.3	Excavation and Ex-situ Stabilisation or Solidification	58
	8.3.4	Excavation and Surfactant Enhanced Ex-situ Chemical Oxidation	59
	8.3.5	Physical Containment	59
9.0		Preferred Management Strategy	61
	9.1	Area A - Preferred Management Strategy	61
	9.1.1	Strategy Summary	61
	9.1.2	Reasons for Strategy Selection	62
	9.2	Area B – Preferred Management Strategy	63
	9.2.1	Strategy Summary	63
	9.2.2	Reasons for Strategy Selection	64
	9.3	Area C – Preferred Management Strategy	65
	9.4	Area D – Preferred Management Strategy	65
	9.4.1	Strategy Summary	66
	9.4.2	Reasons for Strategy Selection	66
10.0		Remediation Works Overview	68
	10.1	General Works Program Overview	68
	10.2	Project Schedule	68
	10.3	Remediation Works	68
11.0		Site Establishment	70
	11.1	Work to be Completed Prior to Site Establishment	70
	11.2	Site Preparation	70
	11.3	Site Facilities and Procedures	70
	11.3.1	Exclusion Zone	71
	11.4	Site Access and Security	71
	11.4.1	General	71
	11.4.2	Site Haul Roads & Parking Areas	71
	11.4.3	Site Access	71
	11.4.4	OHS Signage	71
	11.4.5	Fencing	72
	11.4.6	Control of Site Entry and Exit	72
12.0		General Remediation Excavation and Materials Management	73
	12.1	Background	73
	12.2	Pre Treatment of Materials	73
	12.3	Excavation Planning	73
	12.4	Excavation Operations	73
	12.5	Dewatering of Excavations	74
	12.6	Excavation Support	74
	12.7	Materials Handling	74
	12.7.1	Background	74
	12.7.2	Materials Tracking	74
	12.7.3	Material Preparation	75
	12.7.4	Crushing/Shredding of Materials	76
	12.7.5	On-site Transportation of Materials	76
	12.7.6	Off-site Transportation of Materials	76
	12.7.7	Stockpiling of Materials	76
	12.7.8	Classification of Treated Materials	77
	12.7.9	Classification for On-site Reuse	77
	12.7.10	Waste Classification for Off-site Disposal	77
	12.8	Material Fate	77
	12.8.1	Recycling	77
	12.8.2	Beneficial Reuse of Materials on-Site	78
	12.8.3	Reinstatement	78
	12.8.4	General Solid Waste	78
	12.8.5	Restricted Solid Waste	78
13.0		Remediation	79
	13.1	Excavation / Remediation Enclosures and Emissions Control System	79

13.2	Excavation Operations	80
13.3	Treatment Operations – Ex-situ Stabilisation	80
13.3.1	Background	80
13.3.2	Pre-Treatment of Materials	80
13.3.3	Ex-situ Treatment Facility and Emission Control System (ECS)	81
13.3.4	Pug Mill Treatment Plant	81
13.3.5	Treated Soil	83
13.4	Treatment Options – Surfactant Enhanced Ex-situ Chemical Oxidation	84
13.4.1	Background	84
13.4.2	Pre-treatment of Materials	84
13.4.3	Ex-situ Treatment Facility and Emission Control System (ECS)	84
13.4.4	Treatment Plant	84
13.4.5	Treated Soil	84
14.0	Management of Water	85
14.1	Surface Water Management Methods	85
14.1.1	Surface Water Management from Undisturbed Areas	85
14.1.2	Surface Water Management from Disturbed Areas	85
14.2	Groundwater Water Management Methods	85
14.3	Wastewater Treatment System	86
14.4	Groundwater Management	86
14.4.1	Groundwater Monitoring Plan	86
14.4.2	During Bulk Excavation Works	87
14.4.3	Post- Bulk Excavation Works	87
14.4.4	Groundwater Monitoring Plan Reporting	87
15.0	Imported Materials	88
16.0	Validation Strategy	89
16.1	Validation Principles	89
16.2	Validation of Human Health and Ecological Risk Assessment Assumptions	90
16.3	Soil Validation	90
16.3.1	Area A – Validation of Limited Excavation Areas	91
16.3.2	Area B - Validation of Materials for Reuse or Off-site Disposal	91
16.3.3	Area C - Validation of Materials to Remain In-situ Below the Shallow Basement	92
16.3.4	Area D - Validation of Materials to Remain In-situ	92
16.3.5	Treatment Area and Stockpiling Areas	93
16.3.6	Validation Laboratory Analysis	93
16.3.7	Analytical Methods	93
16.4	Soil Sampling Methodology	93
16.4.1	Sampling Methodology	93
16.4.2	Sampling Equipment Decontamination	94
16.4.3	Quality Control samples	95
16.4.4	Laboratory QA/QC	95
16.5	Groundwater Validation	96
16.6	Groundwater Sampling Methodology	97
16.7	Validation Data Quality Objectives	98
16.7.1	Step 1 – State the problem	98
16.7.2	Step 2 – Identify the decisions	98
16.7.3	Step 3 - Identify the decision inputs	98
16.7.4	Step 4 – Definition of the boundaries of the remedial works	99
16.7.5	Step 5 – Develop decision rules	99
16.7.6	Step 6 – Specification of the acceptable limits on decision errors	100
16.7.7	Step 7 – Optimisation of the design of the collection of data	101
16.8	Validation Reporting	101
17.0	Environment Management Plan – During Remediation	103
17.1	General	103
17.2	Water Management	103
17.3	Air Quality Management	103
17.3.1	Odours	103

	17.3.2	Dust	104
	17.4	Noise and Vibration Management	104
	17.5	Long Term Environmental Management Plan	105
18.0		Occupational Health and Safety – During Remediation	106
	18.1	General	106
	18.2	Occupational Health & Safety Plan	106
	18.2.1	Responsibilities	106
	18.2.2	OH&S Legislation, Regulations and Standards	107
	18.3	Risk Assessment	107
	18.3.1	Chemical Hazards	108
	18.3.2	Atmospheric Exposure Limits and Recognition Qualities	108
	18.3.3	Additional Hazards and Risks	108
	18.4	Work Zones	108
	18.4.1	Decontamination Stations	109
	18.4.2	Support Zone	109
19.0		Community Engagement	110
20.0		Contingency Planning	112
	20.1	Approach	112
	20.2	Potential Unexpected Events	112
	20.3	Increased Volumes of Contaminated Material	112
	20.4	Variation of Contaminant Depth	113
	20.5	Variation of Contaminant Characteristics	113
	20.6	Management of Bonded Asbestos Containing Materials	113
	20.7	Failure of the preferred treatment approach(es)	114
	20.8	Insufficient Storage Capacity for Stockpiles	114
	20.9	Further Development of the Basement and Retention Wall System Designs	114
	20.10	Area A Groundwater Quality	115
	20.11	Failure of Visual Validation (Tar Containing Material)	116
	20.12	Operational Contingencies	116
21.0		Key Personnel	119
	21.1	Project Director	119
	21.2	Project Manager	119
	21.3	Validation Team	119
	21.4	Site Foreman	120
	21.5	Safety/Quality Officer and Environment	120
	21.6	Subcontractors	120
22.0		References	122
Appendix A			
		Summary Analytical Tables	A
Appendix B			
		Figures	B
Appendix C			
		Lend Lease Development Plans	C
Appendix D			
		Relevant ORWS HHERA Addendum Tables	D

List of Tables

Table 1	Site Identification Details	9
Table 2	Summary of soil analytical results from ERM 2007 and 2008 investigations and ERM (2007) groundwater results	17
Table 3	Summary of Land Use Scenarios Considered in the Declaration Site HHERA	31
Table 4	Landuse and Applicable SSTCs and SSESCs	35
Table 5	Area A - Soil Concentrations exceeding soil SSTC-A and SSESC-A ^{Sat}	42
Table 6	Area A - Groundwater Concentrations exceeding groundwater SSESC-A	43
Table 7	Area B – Soil Concentrations exceeding soil SSTC-B and SSESC-B	45
Table 8	Area C - Groundwater Concentrations exceeding groundwater SSTC-C	47
Table 9	Identified Areas of Concern and Assessment of Required Remediation Works	53
Table 10	Soil Sample Preservations and Storage	94
Table 11	Groundwater Sampling Methodology	97
Table 12	Field and Laboratory Data Quality Indicators	99
Table 13	RPD Assessment Criteria	100
Table 14	Summary of Lend Lease Communication Strategy	110

List of Figures

Figure 1: Site Location	B-1
Figure 2: Site Layout and Surrounding Area Figure	B-1
Figure 3: Proposed Shallow and Deep Basement Plan	B-1
Figure 4: Proposed Land Use	B-1
Figure 5: Site Plan and Sampling Locations	B-1
Figure 6: Area A Soil SSTC-A and SSESC-A Exceedances - Metals, PAHs and TPH	B-1
Figure 7: Area A Groundwater SSESC-A Exceedances	B-1
Figure 8: Area B Soil SSESC-B Exceedances - Metals	B-1
Figure 9: Area B Soil SSTC-B and SSESC-B Exceedances - PAHs and TPH	B-1
Figure 10: Area C SSTC-C Exceedance Naphthalene	B-1
Figure 11: Remediation Decision Making Process Flow Chart	B-1

Glossary of Terms and Acronyms

Term	Description
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
ARC	Asbestos Removal Contractor
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
ASLP	Australian Standard Leaching Procedure
ASSMAC	New South Wales Acid Sulfate Soils Management Advisory Committee
As	Arsenic
Ba	Barium
BACM	bonded asbestos containing material
BaP/ B(a)P	Benzo- α -pyrene
BDA	Barangaroo Delivery Authority
BH	Borehole location
BTEX	Benzene, Toluene, Ethyl benzene and Xylene
CBD	Central Business District
Cd	Cadmium
CIM	Confirmed Impacted Material
CLM	Contaminated Land Management
Co	Cobalt
CoC	Chain of Custody
CO ₂	Carbon Dioxide
Cr	Chromium
CoPC	Chemicals of Potential Concern
Cr 6+/ Cr VI	Hexavalent Chromium
Cu	Copper
CUTEP	Clean Up to the Extent Practicable
Daf	Dilution attenuation factor
DEC	Department of Environment and Conservation NSW (superseded)
DECC	Department of Environment and Climate Change NSW (superseded)
DECCW	Department of Environment, Climate Change and Water NSW (now the NSW OEH)
DGI	Data Gap Investigation
DO	dissolved oxygen
DoP	NSW Department of Planning
DP	Deposited Plan
DQO	Data Quality Objectives
Declaration Site	Declaration Site (Development Works) Remediation Works Area

Term	Description
DSI	Detailed Site Investigation
EC	electrical conductivity
ECS	Emission Control Systems
EE	Excavation Enclosure
EMP	Environment Management Plan
ESCO	Ex-Situ Chemical Oxidation
EPA	Environmental Protection Authority
EPL	Environment Protection License
ESA	Environmental Site Assessment
ESD	Ecologically Sustainable Development
GAC	Generic Assessment Criteria
GMP	Groundwater Management Plan
Hg	Mercury
HHERA	Human Health and Ecological Risk Assessment
HI	Hazard Index
m bgl	metres below ground level
Mn	Manganese
MW	Monitoring Well Location
MSDS	Material Safety Data Sheets
MWQC	Marine Water Quality Criteria
LOR	Limit of Reporting
LLMP	Lend Lease (Millers Point) Pty Limited
NATA	National Association of Testing Authorities
NEPC	National Environment Protection Council
NEPM	(National Environmental Protection (Assessment of Site Contamination) Measure
Ni	Nickel
NHMRC	National Health and Medical Research Council
NSW	New South Wales
NSW OEH	New South Wales Office of Environment and Heritage
OHS/OH&S	Occupational Health and Safety
OHSP	Occupational Health and Safety Plan
OPT	Overseas Passenger Terminal
ORWN	Other Remediation Works (North) Area
ORWS	Other Remediation Works (South) Area
PAH	Polycyclic Aromatic Hydrocarbons
PASS	Potential Acid Sulfate Soils
PDA	Project Delivery Agreement

Term	Description
PID	Photoionisation Detector
PIM	Potential Impacted Material
Pb	Lead
POEO	Protection of the Environment Operations Act 1997 (NSW)
PPE	Personal Protective Equipment
PSI	Preliminary Site Assessment
QA/QC	Quality Assurance/Quality Control
RAP	Remedial Action Plan
RBCL	Risk Based Clean Up Levels
RL	Relative Level
RE	Remediation Enclosure
RWP	Remediation Work Plan
SHFA	Sydney Harbour Foreshore Authority
SIL	Soil Investigation Level
S-ESCO	Surfactant Enhanced Ex-Situ Chemical Oxidation
SPA	Sydney Ports Authority
SPOCAS	Suspension Peroxide Oxidation Combined Acidity & Sulfate
SSESC	Site-specific Ecological Screening Criteria
SSTC	Site Specific Target Criteria
SWL	Standing Water Level
SVM	Site Validation Manager
SVOC	Semi Volatile Organic Compound
TBT	Tributyltin
TCM	Tar Containing Material
TOC	Top of Casing
TPH	Total Petroleum Hydrocarbons
TSC	Terrestrial Soil Criteria
TTM	Total Toxicity of Mixtures
VMP	Voluntary Management Proposal
VOC	Volatile Organic Compound
VP	Validation Plan
VPD	Validation Project Director
UCL	Upper Confidence Level
UCS	Unconfined Compressive Strength
USCS	Unified Soil Classification System
US EPA	United States Environment Protection Agency
VENM	Virgin Excavated Natural Material

Term	Description		
Zn	Zinc		
Units of Measurement			
°C	degrees Celsius	mg	milligrams
cm	centimetre	mS	milli-Siemens
ha	hectare	mV	millivolts
kg	kilogram	ppm	parts per million
km	kilometre	µg	microgram
m	metres	%	percent

Executive Summary

AECOM Australia Pty Limited (AECOM) was commissioned by Lend Lease (Millers Point) Pty Ltd (LLMP) to prepare this Amended Remedial Action Plan (RAP) for Blocks 1, 2 and 3 (including associated Public Domain areas) within the Barangaroo Stage 1 Development, Millers Point, NSW. The specific area covered by this Amended RAP, hereafter referred to as “the Site”, has also been referred to as the “Other Remediation Works (South) Area”. In consideration of the objectives of this Amended RAP and the areas that will be subject to the proposed development, the Site has been split into two areas comprising the proposed ‘Development Area (South)’ and ‘Public Domain (South)’, (refer to **Figure 1** and **Figure 2, Appendix B**).

- Development Area (South) – this area will include the ‘Deep Basement area’ (adjacent to Hickson Road) and the majority of the ‘Shallow Basement area’; and
- Public Domain (South) – the eastern part of this area will comprise the ‘Shallow Basement area’ and the western part will comprise the unexcavated Public Domain (South) area.

This Amended RAP is based on and supersedes the previous document prepared by AECOM in June 2010 (AECOM (2010b)). In particular, this Amended RAP considers the outcomes of the ORWS Human Health and Ecological Risk Assessment (HHERA) Addendum (AECOM 2011c), which is based on the Declaration Site (Development Works) Remediation Works Area HHERA (AECOM 2011b), and includes the additional data produced by the ORWS *In Situ* Soil and Fill Validation works (AECOM 2011a).

The northern portion of the Barangaroo Stage 1 Development, comprising Blocks 4 and 5 and the Southern Cove (and also known as the Department of Environment, Climate Change and Water [DECCW] Declaration Area and Other Remediation Works [North] Area) will be the subject of a separate series of RAPs.

Proposed Development and Land Use

Based on the current LLMP development plans (refer to **Appendix C**), it is understood that the proposed land use across the Site will comprise mixed commercial and high density residential (with minimal access to soil) with associated open space area. Key components of the proposed Site will include:

- Basement car parking across the majority of the Site typically ranging between depths of Relative Level (RL) -20.0 m (Deep Basement area) and RL -6.0 m (Shallow Basement area);
- The basement car parks will be constructed within a basement groundwater control and retention wall system that will extend around the perimeter of the Shallow and Deep Basement areas;
- High density residential and commercial multi storey towers, together with associated open space areas, overlying the basement car parking;
- Public Domain (South) usage will incorporate open space with community, mixed commercial and retail land use, and landscaping (planter boxes, paved areas and parkland). While some excavations will be required for basement car parking along the eastern portion of the Public Domain (South), the existing concrete hardstand surfaces are proposed to be retained (and perforated to facilitate the drainage of water through them) within the Public Domain (South);
- Additionally, the existing caisson walls associated with the historic wharf structures will be retained along the western (Darling Harbour) side of the Public Domain (South);
- The maximum height of any development within the Public Domain (South) will be limited to two storeys;
- Material from the Site may be beneficially reused to build up the elevation of the Public Domain (South); and
- Slab on grade multi storey commercial development (i.e. with no basement excavations) in the southeast corner of the Site only, at the location of the former proposed Sydney Metro Station.

With the exception of the multi storey slab on grade commercial building, the development plans listed above are consistent with the assumptions / recommendations detailed in **Section 5.3.2** and **10.2** of the Declaration Site HHERA (AECOM, 2011b).

It is possible that the final details and configuration of land uses within the Site will be revised from time to time by LLMP as part of the continued development design. However, the proposed land uses - that is a mixture of commercial and high density residential and public open space (incorporating community and related land uses) overlying extensive basements - will remain generally consistent with that described within this Amended RAP. If

the final development design is changed and affects the assumptions in the ORWS HHERA Addendum and this Amended RAP, the ORWS HHERA Addendum and this Amended RAP will be revised, as required, and submitted to the NSW OEH Accredited Site Auditor and the NSW OEH for approval (unless otherwise advised).

Basement Groundwater Retention Wall System

The Shallow and Deep Basement area bulk excavations will be supported by a series of groundwater control walls, specifically:

- Diaphragm walls, extending to and keyed into bedrock and generally constructed around the southern, western and northern boundaries; and
- A secant pile or equivalent walls, extending to and keyed into bedrock and generally constructed along the eastern boundaries.

Where basement excavations extend into bedrock, exposed bedrock surfaces will be covered with shotcrete. It is anticipated that perimeter walls and shotcrete covered bedrock, together with other controls which are standard practice for basement construction, will effectively isolate the basement from surrounding ground conditions.

Objectives

The key objective of the remediation of the Site is to facilitate the future land-use proposed as part of the Barangaroo Stage 1 Development Works. Additional objectives of the remediation works are:

- To ensure the remediated site is protective of human health in the context of the intended future land use;
- To protect the environment (specifically groundwater and the adjacent Darling Harbour) by remediation of the Site to a standard that will minimise the risk of ongoing contamination;
- Comply with applicable legislative requirements including the appropriate requirements of the NSW Department of Planning (DoP) and DECCW (now the NSW Office of Environment and Heritage); and
- To maximise the beneficial reuse of excavated material from the basement excavations within the Public Domain (South).

It is noted that material which may require off-site disposal to landfill will require classification in accordance with the NSW Department of Environment and Conservation (DECC, now the NSW OEH [2008]) *Waste Classification Guidelines*. Further, some material excavated from the Site and designated for off-site disposal may also require treatment prior to validation testing and off-site disposal.

Scope

The scope of work associated with the preparation of this Amended RAP included the following:

- Establishment of Data Quality Objectives (DQOs) for the development of this Amended RAP;
- Review available data from previous environmental investigations undertaken at the Site, including the Data Gap Investigation (AECOM 2010a) and the *In situ* soil and Fill Validation works (AECOM 2011a), to assess the potential for contamination at the Site;
- Confirm the extent of any required remediation works based on consideration of the outcomes of the ORWS HHERA Addendum (AECOM 2011c);
- Undertake an assessment of the potential remediation approaches and technologies;
- Outline how the remediation works will be undertaken to meet the remediation objectives, taking into consideration the information review and technical assessment; and
- Develop procedures to demonstrate that the remediation works have been undertaken to satisfy the remediation objectives.

Remediation Extent

In the first instance, and as detailed in the original RAP (AECOM 2010b), soil impacted by Contaminants of Potential Concern (CoPC) was assessed against the relevant Generic Assessment Criteria for the proposed land uses at the Site. This screening method was used to identify where potential impacted material (PIM) is present at the Site. Following this initial screening, a site-specific human health and ecological risk assessment (DSDW HHERA, AECOM 2011b and ORWS HHERA Addendum (AECOM 2011c) were conducted to determine Site Specific Target Criteria (SSTC) and Site-Specific Ecological Screening Criteria (SSESC).

The ORWS HHERA Addendum utilised the approach developed for the Declaration Site HHERA (AECOM, 2011b) to assess potential human health and ecological risks associated with reported contamination in Blocks 1, 2 and 3 (including the associated public domain areas). The document was prepared as an outcome of the DGI undertaken in relation to Blocks 1 to 3 (AECOM, 2010a).

The ORWS HHERA Addendum determined different SSTCs for different areas/land use scenarios at the Site as well as SSESCs that are considered to be protective of the environment.

The most conservative SSTCs and SSESCs were applied to the Site's soil and groundwater data set (dependant on the relevant land use for a given area of the Site) for each of the identified CoPC. The presence, or otherwise, of CIM was determined by comparing soil and/or groundwater concentrations to these site-specific human health and ecological based assessment criteria. The extent of remediation was determined based on consideration of: (a) soil or groundwater which exceeded the SSTCs and SSESCs (i.e. was found to be CIM); and, (b) the practicalities of remediating the identified CIM with due consideration of the principles of Clean Up To the Extent Practicable and Ecologically Sustainable Development.

Remediation Strategy

The preferred remediation strategy for the Site will involve excavation of CIM, as defined by the ORWS HHERA Addendum (AECOM 2011c), beneficial reuse where possible at Headland Park and/or Public Domain (South) and/or offsite disposal to a licensed landfill. If the Headland Park beneficial reuse option is available, an Addendum to this Amended RAP will be prepared and submitted to the NSW OEH Accredited Site Auditor and the NSW OEH for approval (unless advised otherwise).

In considering the preferred remediation strategy, consideration was given to the fact that the proposed development will include bulk excavation works for basement construction within the Development Area (South) and the eastern portion of the Public Domain (South).

Material not meeting the Public Domain (South) beneficial reuse criteria will be disposed off-site to licensed landfill. Consequently, only material that does not require treatment will be reused in the Public Domain (South). The suitability of materials to remain *in situ* below the proposed basement excavations and of excavated materials for beneficial reuse will be validated based on: (a) the ORWS DGI (AECOM 2010a); (b) the ORWS *In situ* Soil and Fill Validation works (AECOM 2011a); and (c) visual and olfactory observations during the excavation works.

This Amended RAP also details the requirements for:

- Validation works required to confirm that the remediation objectives have been achieved;
- Materials tracking requirements for the cradle to grave tracking of materials during remediation;
- Groundwater monitoring prior to, during and after the remediation works;
- Environmental management measures during the remediation works to mitigate potential impacts to the environment;
- Occupational health and safety measures to ensure the remediation works are conducted in a safe manner; and
- Contingency actions for the identification and management of unexpected issues or events that may occur during the remediation works.

Conclusion

It is concluded that the preferred remediation approach described by this RAP, upon successful implementation, will make the Site suitable for the proposed land uses. Development of the preferred remediation approach has considered the proposed LLMP development plans, including the bulk excavation of the Shallow and Deep Basement areas (as required to accommodate construction of the car park basements) and the construction of the proposed basement groundwater retention wall system.

1.0 Introduction

AECOM Australia Pty Limited (AECOM) was commissioned by Lend Lease (Millers Point) Pty Ltd (LLMP) to prepare this Amended Remedial Action Plan (RAP) for Blocks 1, 2 and 3 (including associated Public Domain [South] areas) within the Barangaroo Stage 1 Development, Millers Point, NSW. The specific area covered by this Amended RAP, hereafter referred to as “the Site”, has been designated as the “Other Remediation Works (South) Area” (refer to **Figure 1** and **Figure 2, Appendix B**).

In consideration of the objectives of this Amended RAP and the areas that will be subject to the proposed development, the Site has been split into two areas comprising the proposed ‘Development Area (South)’ and ‘Public Domain (South)’:

- Development Area (South) – this area will include the ‘Deep Basement area’ (adjacent to Hickson Road) and the majority of the ‘Shallow Basement area’; and
- Public Domain (South) – the eastern part of this area will comprise the ‘Shallow Basement area’ and the western part will comprise the unexcavated Public Domain (South) area.

This Amended RAP is based on and supersedes the previous document prepared by AECOM (2010b). In particular, this Amended RAP considers the outcomes of the ORWS Human Health and Ecological Risk Assessment (HHERA) Addendum (AECOM 2011c), which is based on the Declaration Site (Development Works, ‘Declaration Site’) Remediation Works Area HHERA (AECOM 2011b), and includes the additional data produced by the ORWS *In Situ* Soil and Fill Validation works (AECOM 2011a).

The northern portion of the Barangaroo Stage 1 Development, comprising Blocks 4 and 5 and the Southern Cove (and also known as the Department of Environment, Climate Change and Water [DECCW] Declaration Area and Other Remediation Works [North] area) will be the subject to a separate series of RAPs.

This Amended RAP has generally been prepared to meet the requirements of:

- NSW Environment Protection Authority (EPA), 1997. Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites;
- Department of Environment and Conservation (DEC), 2006a. Guidelines for the NSW Site Auditor Scheme (2nd edition);
- Contaminated Land Management Amendment Act, (CLM), 2008; and
- National Environment Protection Council, National Environment Protection (Assessment of Site Contamination) Measure (NEPC), 1999a.

1.1 Objectives

The key objective of the remediation of the Site is to facilitate the future land-use proposed as part of the Barangaroo Stage 1 Development Works. Additional objectives of the remediation works are:

- To ensure the remediated site is protective of human health in the context of the intended future land use;
- To protect the environment (specifically groundwater and the adjacent Darling Harbour) by remediation of the Site to a standard that will minimise the risk of ongoing contamination;
- Comply with applicable legislative requirements including the appropriate requirements of the NSW Department of Planning (DoP) and DECCW (now the NSW Office of Environment and Heritage [NSW OEH]); and
- To maximise the beneficial reuse of excavated material from the basement excavations within the Public Domain (South).

It is noted that material which may require off-site disposal to landfill will require classification in accordance with the NSW DECC (now the NSW OEH, 2008) *Waste Classification Guidelines*. Further, some material excavated from the Site and designated for off-site disposal may also require treatment prior to validation testing and off-site disposal.

1.2 Scope

The scope of work associated with the preparation of this Amended RAP included the following:

- Establishment of Data Quality Objectives (DQOs) for the development of this Amended RAP;
- Review available data from previous environmental investigations undertaken at the Site, including the ORWS Data Gap Investigation (AECOM 2010a) and the ORWS In situ soil and Fill Validation works (AECOM 2011a), to assess the potential for contamination at the Site;
- Confirm the extent of any required remediation works based on consideration of the outcomes of the ORWS HHERA Addendum (AECOM 2011c);
- Undertake an assessment of the potential remediation approaches and technologies;
- Outline how the remediation works will be undertaken to meet the remediation objectives, taking into consideration the information review and technical assessment; and
- Develop procedures to demonstrate that the remediation works have been undertaken to satisfy the remediation objectives.

1.3 Proposed Development and Land Use

The proposed development and land uses for the Site are summarised following. Further detail is provided in **Section 3.2**.

It is possible that the final details and configuration of land uses within the Site will be revised by LLMP as part of the continued development design. However, the proposed land uses - that is a mixture of commercial and high density residential and public open space (incorporating community and related land uses) overlying extensive basements - will remain generally consistent with that described within this Amended RAP. If the final development design is changed which affects the assumptions of the ORWS HHERA Addendum and this Amended RAP, the ORWS HHERA Addendum and this Amended RAP will be revised, as required, and submitted to the NSW OEH Accredited Site Auditor and the NSW OEH for approval (unless advised otherwise).

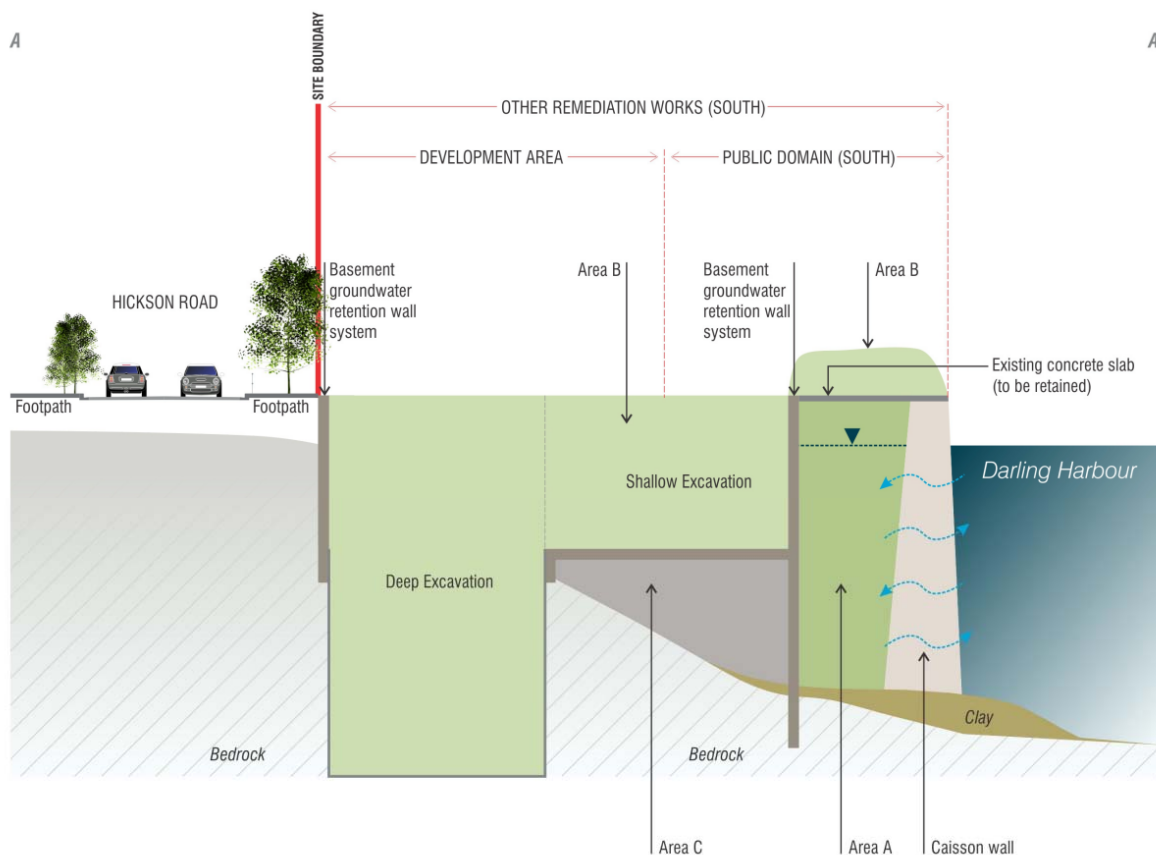
1.3.1 Proposed Land Uses

Based on the current LLMP development plans (refer to **Appendix C**), it is understood that the proposed land uses across the Site will comprise mixed commercial and high density residential (with minimal access to soil) with associated open space area (refer to **Figure 4**). Key components of the proposed Site will include:

- Basement car parking across the majority of the Site typically ranging typically between depths of Relative Level (RL) -20.0 m (Deep Basement area) and RL -6.0 m (Shallow Basement area);
- The basement car parks will be constructed within a basement groundwater control and retention wall system that will extend around the perimeter of the Shallow and Deep Basement areas;
- High density residential and commercial multi storey towers, together with associated open space areas, overlying the basement car parking;
- Public Domain (South) usage will incorporate open space with community, mixed commercial and retail land use, and landscaping (planter boxes, paved areas and parkland). While some excavations will be required for basement car parking along the eastern portion of the Public Domain (South), the existing concrete hardstand surfaces are proposed to be retained and perforated (to facilitate the drainage of water through them) within the Public Domain (South);
- Additionally, the existing caisson walls associated with the historic wharf structures will be retained along the western (Darling Harbour) side of the Public Domain (South);
- The maximum height of development within the Public Domain (South) will be limited to two storeys; and
- Slab on grade multi storey commercial development (i.e. with no basement excavations, currently estimated at 7 storeys) in the southeast corner of the Site only, at the location of the former proposed Sydney Metro Station Site.

The proposed land uses/material types associated with the Site and assessed in this Amended RAP are illustrated in **Figure F1** below (the alignment of this cross-section is shown on **Figure 2, Appendix B**):

Figure F1 Schematic Cross Section A-A'



NOT TO SCALE

The various land uses / material types associated with construction of the basements within the Site (as shown in **Figure F1** above are:

- **Area A** – material to remain *in situ* within the Public Domains, outside the retention wall system and potentially in hydraulic connection with Darling Harbour, where limited or no excavation will be required;
- **Area B** – materials to be removed as part of basement excavations and subject to beneficial reuse (either in the Stage 1 or Stage 2 Public Domain or within the Headland Park – subject to the acceptance criteria to be developed separately by others);
- **Area C** – materials to remain *in situ* below the Shallow Basement area and within the retention wall system and without hydraulic connection with Darling Harbour; and
- **Area D** – materials to remain *in situ* in the southeast corner of the Site only where a commercial slab on grade development is proposed (i.e. upgradient of the retention wall system and with negligible hydraulic connection to Darling Harbour).

1.3.2 Basement Groundwater Retention Wall System

The basement excavations will be supported by a basement groundwater retention wall system as shown in **Figure F1** above. Further detail regarding the basement groundwater retention wall system is provided in **Section 3.2.4**.

In consideration of the thickness and design of the retention wall system(s), together with the additional drainage measures required for construction of the system(s), it is likely that only very small volumes of groundwater and vapour (if any) will be penetrate through the wall. In the unlikely event that groundwater or vapour does penetrate through the wall, it will be prevented from entering the car park basement (including the plenum to be provided as part of the carpark ventilation system) by the dedicated sealed plenum and its associated drainage and venting provisions.

1.4 Remediation Documentation

Supporting Management Plans and Work Procedures that will be prepared prior to commencement of the remediation works include:

- Remedial Work Plan (to be prepared by AECOM);
- Occupational Health and Safety Plan (OH&S);
- Community Consultation Plan;
- Environmental Management Plan;
- Project Management;
- Quality Management; and
- Emergency Response and Contingency Plan.

It should be noted that the RWP will not include any further information (not already in this Amended RAP) regarding confirmation that the Site can be made suitable for the proposed land uses as these conclusions are solely provided within this Amended RAP. The RWP will provide:

- a technical and staging specification for LLMP and its Remediation Contractor to assist in delivery of the bulk excavation works;
- excavation plans for the Shallow and Deep Basement area bulk excavation works; and
- consideration of beneficial reuse and staging options for excavated Area B material with respect to the potential for beneficial reuse in the Public Domain (South).

2.0 Assessment and Approval Process

2.1 Planning Approvals

The planning regime to guide the future redevelopment of the overall Barangaroo site is established by the:

- Planning provisions of Schedule 3 Part 12 of the State Environmental Planning Policy (Major Development), 2005; and
- Barangaroo Concept Plan, as approved on 9 February 2007 and modified on 25 September 2007 and 16 February 2009.

A number of project applications under Part 3A of the Environmental Planning and Assessment Act, 1979 are proposed to be submitted to support the staged development of the Barangaroo Stage 1 by Lend Lease. The Minister for Planning is the consent authority in this regard.

These planning applications will be supported by this Amended RAP which demonstrates that the land is, or can be made, suitable for the proposed use. Implementation of remediation works as part of the Barangaroo Stage 1 Development will be staged (over several years) as the development works progress and undertaken in discrete stages through the life of the development. This Amended RAP addresses the remediation and validation of the area referred to as Other Remediation Works (South) only (refer to **Figure 2**). Site Audit Statements will similarly be staged to progressively validate the Site for the proposed future land use(s).

A "site-wide" Overarching RAP has been prepared by ERM (Final, June 2010) for the BDA, and provides an overarching conceptual remediation framework for the whole of Barangaroo. The Overarching RAP allows for the provision of separate, detailed RAPs for site portions, of which this ORWS RAP is one.

It is noted that there is an option for material excavated from the Site to be beneficially re-used in Headland Park or on other areas of Barangaroo (outside the Barangaroo Stage 1 Development) (refer to **Section 5.2.4.2**). This material would need to satisfy site acceptance criteria established in the separate Headland Park RAP (and a future Barangaroo Central precinct RAP), being prepared by the BDA. AECOM understands that Headland Park Acceptance Criteria are currently being finalised by the BDA.

2.2 Legislation Relevant to Remediation Works

The NSW OEH administers a number of Acts and legislative instruments relevant to the remediation works. These include:

- Contaminated Land Management Act (CLM Act, 1997);
- Contaminated Land Management Amendment Act, (CLM, 2008);
- The Protection of the Environment Operations (POEO) Act (1997), in particular, licensing obligations under that Act; and
- State Environmental Planning Policy (SEPP) 55 – Remediation of Land.

2.2.1 CLM Act (1997)

The CLM Act is the primary Act under which contaminated land is regulated by the NSW OEH. Relevant legislation relating to the CLM Act includes the *Contaminated Land Management Regulation* (2008), which commenced on 1 September 2008 and the *Contaminated Land Management Amendment Act*, (2008) which received assent on 10 December 2008. AECOM notes that the majority of the provisions in the amending Act commenced on proclamation on 1 July 2009 (refer to **Section 2.2.2**).

This section addresses the following aspects of the Act:

- Determination and suitability of a contaminated site for a proposed use including the generation of remediation criteria;
- Existing orders and regulatory instruments applicable to the site; and
- Voluntary remediation proposals and agreements.

The Guidelines for the NSW Site Auditor's Scheme (The Auditor Guidelines) (DEC, 2006a) were prepared by the Department of Environment and Conservation (DEC, now known as the NSW OEH) under the CLM Act (1997). The Auditor Guidelines (DEC, 2006a) describe a decision process for assessing urban redevelopment sites that should be followed by contaminated land consultants. The Guidelines prescribe soil investigation levels (SILs), which are the concentrations of particular contaminants above which further investigation and evaluation (such as through completion of a quantitative risk assessment) are required.

The substances for which SILs have been prescribed do not include all of the Contaminants of Potential Concern (CoPC) identified at the Site. The Guidelines make the following provision for such circumstances:

"...where SILs are not available for particular contaminants, or assessment of contaminants against SILs at a particular site is inconclusive... The auditor must check whether the risk assessment is in accordance with the NEPM [National Environmental Protection (Assessment of Site Contamination) Measures] and any relevant guidelines made or approved by DEC. The auditor must also check that any human health risk assessment satisfies all the requirements in the checklist in Appendix VII. The auditor must check that all site-specific risk assessments are scientifically valid and that the site-specific criteria recommended by the consultant are appropriate to protect public health and the environment."

Adoption of the SILs is generally considered inappropriate for remediation works as this may result in unnecessary increased remediation effort and cost. As such, where site investigations indicate that the SILs are exceeded, it is considered appropriate to adopt a health-based and ecological risk assessment approach in determining suitable criteria for the identified CoPC. With respect to the Site and in accordance with the ERM RAP (2008c), it is considered that a Tier 2 and Tier 3 Human Risk assessment and a qualitative ecological risk assessment may be required in the event that the SILs are exceeded to set site-specific clean up criteria for the proposed future use of the Site, which will be for a combination of residential, commercial and public open space uses. The proposed risk assessment process, by which the site-specific criteria will be derived, is summarised in **Section 5.3**.

The CLM Act also sets out requirements for site audits. The Act requires a site audit to be undertaken under certain circumstances, such as if the land use is proposed to be changed, as is the case with the Site.

2.2.2 CLM Amendment Act (2008)

The majority of the provisions in the amending CLM Act (2008) commenced on 1 July 2009. The purpose of the amendments was to allow contaminated sites to be cleaned up more efficiently while reinforcing the 'polluter pays' principle. The key amendments to the Act included:

- introducing new powers to enable DECCW (now the NSW OEH) to require certain persons to carry out a preliminary investigation of site contamination;
- amalgamation of the investigation and remediation stages into a single 'management' stage that can cover investigation, remediation or both;
- removing the concept of 'significant risk of harm';
- enabling DECCW to declare land to be 'significantly contaminated land' if it has reason to believe that land is contaminated and the contamination is significant enough to warrant regulation;
- enabling management orders to be issued to any one or more persons who are responsible for the contamination of land;
- enabling DECCW to issue a management order or to withdraw its approval of a voluntary management proposal that has not delivered a satisfactory outcome in managing contamination;
- provision of a more objective basis for the duty to notify DECCW of contaminated land based on criteria to be listed in new guidelines; and
- requiring land owners and persons carrying out certain activities to notify DECCW of contamination when it becomes aware of that contamination.

2.2.3 Protection of the Environment Operations Act (1997)

Section 48 of the POEO Act requires a person to obtain a licence from the NSW OEH before carrying out any of the premises-based activities described in Schedule 1 of that Act.

Schedule 1 includes the following activity:

"Contaminated soil treatment works for on-site or off-site treatment (including, in either case, incineration or storage of contaminated soil but excluding excavation for treatment at another site) that:

- (1) handle more than 1,000 cubic metres per year of contaminated soil not originating from the site on which the works are located; or*
- (2) handle contaminated soil originating exclusively from the site on which the works are located; and*
 - (a) incinerate more than 1,000 cubic metres per year of contaminated soil, or*
 - (b) treat otherwise than by incineration and store more than 30,000 cubic metres of contaminated soil, or*
 - (c) disturb more than an aggregate area of 3 hectares of contaminated soil."*

The remediation works for the Site will involve management of contaminated soil originating from the Site only and is not likely to involve the treatment of more than 30,000 m³ of contaminated soil. If soil treatment works are required, and depending on the quantity of treatment required in association with other parts of Barangaroo (specifically Headland Park and Barangaroo Central) a Variation of the existing Environment Protection License (EPL) for the Barangaroo site may be required under the POEO Act.

2.2.4 State Environmental Planning Policy 55

State Environmental Planning Policy (SEPP) 55 – Remediation of Land specifies when remediation work will require Development Consent (i.e. Category 1 remediation work).

Clause 9 of SEPP 55 defines Category 1 remediation works as:

- Designated development; or
- Being carried out or to be carried out on land declared to be critical habitat; or
- Likely to have significant effect on a critical habitat or a threatened species, population or ecological community; or
- Development for which another State environmental policy or regional environmental plan requires development consent; or
- Carried out or to be carried out in an area or zone to which any classifications to the following effect apply under an environmental planning instrument.
 - a) coastal protection;
 - b) conservation or heritage conservation;
 - c) habitat area, habitat protection area, habitat or wildlife corridor;
 - d) environment protection;
 - e) escarpment, escarpment protection or escarpment preservation;
 - f) floodway;
 - g) littoral rainforest;
 - h) nature reserve;
 - i) scenic area or scenic protection; and
 - j) wetland.
- is "carried out or to be carried out on any land in a manner that does not comply with a policy made under the contaminated land planning guidelines by the council for any local government area in which the land is situated".

All other remediation work may be carried out without development consent and is known as Category 2 remediation work.

The remediation works will need to comply with the provisions of SEPP 55 where appropriate.

The Director General's Requirements (DGRs) for the Blocks 1 to 3 Bulk Excavation and Basement Car Parking Development Application required that planning consent be obtained for the proposed remediation works. Conditional planning consent was granted by the DOP on 2 November 2010.

3.0 Site Identification and History

3.1 Site Identification

The following table provides Site identification details.

Table 1 Site Identification Details

Item	Description
Site Owner	Barangaroo Delivery Authority (BDA)
Client	Lend Lease (Millers Point) Pty Limited (LLMP)
Site Address	Wharf 8, Hickson Road (Sussex Street), Barangaroo, NSW 2000
Legal Description (Lot and DP)	Southern portions of Lot 3, Lot 6 and Lot 5 in Deposited Plan (DP) 876514
County and Parish	County of Cumberland, Parish of Saint Phillip
Local Government Authority	City of Sydney
Current Zoning	Part zone B4 Mixed Use and part zone RE1 Public Recreation
Current Land Use	Commercial (Passenger Terminal and Venue Centre)
Proposed Land Use	Blocks 1 to 3: Commercial and High Density Residential (minimal access to soil) with basement car parking and associated Public Open Space Public Domain (South): incorporating open space with community, mixed commercial and retail land use, and landscaping (planter boxes, paved areas and parkland).
Approximate Site Area**	Block 1: 1645 m ² Block 2: 15 640 m ² Block 3: 7 655 m ² Public Domain (South): 17 760 m ²
Approximate Average Elevation	2 - 3 m Australian Height Datum (AHD)
Site Location	Figure 1
Site Layout	Figure 2

Notes:

** Derived from CAD plans provided by LLMP

AHD – Australian Height Datum

3.2 Development and Basement Areas

3.2.1 Proposed Land Uses – Development Area (South)

The indicative LLMP basement plan (to be finalised) is summarised in **Section 1.3** and the Deep and Shallow Basement areas are illustrated in **Figure F1** above and **Figure 3**. The LLMP development plans are provided as **Appendix C**. The proposed development incorporates a combination of high density residential (with minimal access to soils) and commercial development with associated public open space (planter boxes, paved areas and parkland, refer to **Figure 4**).

The various structures to be constructed as part of the development will be generally founded on basement carparks which will extend to various depths across the entire footprint of Blocks 1 to 3. The exception will be the commercial development to be constructed in Area D (in the southeast corner of the Site only at the site of the

former proposed Sydney Metro Station) where no basement excavations will be required. Construction of the proposed basements will necessitate removal of a significant portion of the fill material, some natural soil and some bedrock from the Site. As a consequence, any contamination contained within the materials excavated for construction of the basements will also be removed and will require management as part of the remediation works. The Shallow and Deep Basement areas will be supported by the basement groundwater retention wall system (further detail is provided in **Section 3.2.4**).

The basement groundwater retention wall system will exclude Area D located in the south east corner of the Site. A slab on grade multi-storey commercial development with no basements (currently planned to be 7 storeys) will be constructed in this area.

3.2.2 Proposed Land Uses – Public Domain (South)

The proposed development for the Public Domain (South) incorporates public open space as well as some community and related land use (refer to **Figure 4**). While part of the Shallow Basement area will extend into the eastern portion of the Public Domain (South), the existing concrete hardstand surfaces will be retained and perforated (to facilitate the drainage of water through them) within the Public Domain (South) to the extent practical (refer to **Figure F1** above and **Figure 3**). As such, it is not proposed to excavate the western portion of the Public Domain (South) which is referred to as Area A (refer to **Section 1.3.1**). Additionally, the existing caisson walls associated with the historic wharf structures will be retained along the western (Darling Harbour) side of the Public Domain (South).

3.2.3 Shallow and Deep Basement Areas

Based on the current LLMP basement designs (refer to **Appendix C** and **Figure 3**) it is understood that the following basements will be constructed:

- Deep Basement – typically to be excavated across the eastern portion of the Development Area (South, directly adjacent to Hickson Road) to a typical depth of approximately RL -20.0 m AHD. The entire basement footprint for this area will likely extend into the underlying bedrock which is inferred to range between approximately RL -0.0 m to -11.0 m AHD across the eastern part of Blocks 2 and 3; and
- Shallow Basement – typically to be excavated across the western portion of the Development Area (South) and partly beneath the eastern edge of the Public Domain (South) to a typical depth of approximately RL -6.0 m AHD. It is likely that no bedrock will be excavated during the bulk excavation works in western portion of the Development Area (South).

As noted previously, it is possible that the final details and configuration of land uses within the Site will be revised by LLMP from time to time as part of the continued development design. If the design is changed and affects the assumptions in the ORWS HHERA Addendum and this Amended RAP, the ORWS HHERA Addendum and this Amended RAP will be revised, as required, and submitted to the NSW OEH Accredited Site Auditor and the NSW OEH for approval (unless advised otherwise).

3.2.4 Basement Groundwater Retention Wall System

The basement excavations will be supported by a series of groundwater control walls, specifically (refer to **Figure 3**);

- Diaphragm walls, extending to and keyed into bedrock and generally constructed around the southern, western and northern boundaries; and
- A secant pile or equivalent walls, extending to and keyed into bedrock and generally constructed along the eastern boundaries, and more generally to the Deep Basement area.

Where basement excavations extend into bedrock, exposed bedrock surfaces will be covered with shotcrete. It is anticipated that perimeter walls and shotcrete covered bedrock, together with other controls which are standard practice for basement construction, will effectively isolate the basement from surrounding ground conditions.

Further details of the basement groundwater retention wall system are provided as follows. Reference should also be made to the Development Drawings provided in **Appendix C**, and in particular Sections 01, 02 and 03 in Drawing BB_ASK_BB_00_30. The proposed groundwater retention wall systems depicted in **Appendix C** are briefly described below.

Above the depth of the bedrock:

- Perimeter walls (diaphragm / secant piles) will be constructed with a minimum thickness of 600 mm. As above, the perimeter walls will extend to, and be keyed into, the bedrock (irrespective of the depth of the basement that will be constructed within them);
- In some areas (refer to Section 02 and 03 in Drawing BB_ASK_BB_00_30, **Appendix C**) a secondary reinforced concrete wall (treated with chemical additives for improved waterproofing) will be constructed within the perimeter walls as the car park basement wall; and
- A sealed plenum will be constructed by a 200 mm thick block work wall (bagged to provide a relatively air tight zone) immediately inside the reinforced concrete car park basement wall. The sealed plenum will be configured to:
 - collect and drain seepage water that may permeate through the perimeter and basement car park walls. Seepage water (if any) will drain via a dish drain to a drainage sump located at the lowest basement level (away from the lift wells) from where it will be appropriately disposed; and
 - vent any vapours from seepage water that may permeate through the perimeter and basement car park walls. Vapour will be vented via a passive pipe riser to the height of the roof level of the above buildings.

Below the depth of the bedrock:

- the exposed vertical, sandstone surface will be covered with shotcrete (100mm minimum thickness);
- A secondary 350 mm thick reinforced concrete wall (treated with chemical additives for improved waterproofing) will be constructed within the shotcrete covered sandstone; and
- A sealed plenum will be constructed by a 200 mm thick blockwork wall (bagged to provide a relatively air tight zone) immediately inside the reinforced concrete car park basement wall. The sealed plenum will be configured as described above for above the depth to bedrock.

In addition to the design features of the retention wall system(s) described above, there are a number of drainage features which are required by the construction process, but which will also act to mitigate the risk of water or vapour entering the basement car parks. These include:

- A 500 mm thick gravel filled void between the perimeter wall and the secondary reinforced concrete basement car park wall; and
- A drainage net will be constructed between the exposed sandstone surface and the shotcrete cover. The purpose of the drainage net is to temporarily convey any seepage water away from the excavation face and facilitate construction of the shotcrete cover.

In consideration of the thickness and design of the retention wall system(s), together with the additional drainage measures required for construction of the system(s), it is likely that only very small volumes of groundwater and vapour (if any) will be penetrate through the wall. In the unlikely event that groundwater or vapour does penetrate through the wall, it will be prevented from entering the car park basement (including the carpark ventilation system plenum) by the dedicated sealed plenum and its associated drainage and venting provisions.

The LLMP development plans are provided as **Appendix C**. It is possible that the final details and configuration of the basement groundwater retention wall system will be revised by LLMP as part of the continued development design. However, the basic function of the groundwater retention wall system will remain consistent with that described by this Section, the ORWS HHERA Addendum (AECOM, 2011c) and the Declaration Site HHERA (AECOM, 2011b). If the final development design is changed and affects the assumptions of the ORWS HHERA Addendum and this Amended RAP, the ORWS HHERA Addendum and this Amended RAP will be revised, as required, and submitted to the NSW OEH Accredited Site Auditor and the NSW OEH for approval (unless advised otherwise).

3.2.5 Beneficial Reuse

It is proposed that excavation spoil from the Development within Blocks 1 to 3 will be reused to the extent possible elsewhere within the Barangaroo Development, specifically within:

- the Public Domain (South) adjacent to the Stage 1 Development (refer to Area B in **Figure F1** above), which is proposed to be raised by approximately 1 m.

The beneficial reuse of excavation spoil from the Site in the Public Domain (South) is addressed in **Section 5.2.4.1** of this Amended RAP.

In addition, it may be possible that excavation spoil from the Site is also be beneficially reused within:

- the Public Domain (North) within the Other Remediation Works (North) Area (ORWN, refer to **Figure 2**), which is proposed to be raised by approximately 1 m;
- the Public Domain within the Stage 2 Development (also referred to as Barangaroo Central) which is proposed to be raised by approximately 1 m (subject to compliance with Site Acceptance Criteria to be defined separately); and
- the proposed Headland Park (subject to compliance with the Site Acceptance Criteria to be defined in the Headland Park RAP).

If the beneficial reuse of excavation spoil from the Site in either the Public Domain (North), the Stage 2 Public Domain or Headland Park is determined to be practical, it will be documented in a separate Addendum to this Amended RAP and submitted to the NSW OEH Accredited Site Auditor and the NSW OEH for approval (unless advised otherwise).

3.2.6 Development Design Finalisation

It is possible that the final details and configuration of land uses within the Site will be revised by LLMP from time to time as part of the continued development design. However, the proposed land uses - that is a mixture of commercial and high density residential and public open space (incorporate open space with community, mixed commercial and retail land use, and landscaping) overlying extensive basements - will remain generally consistent with that described within this RAP. If the design is changed and affects the assumptions of the ORWS HHERA Addendum and this Amended RAP, the ORWs HHERA Addendum and this Amended RAP will be revised and submitted to the NSW OEH Accredited Site Auditor and the NSW OEH for approval (unless advised otherwise).

Contingency measures designed to accommodate modification of the development design (for example, minor changes in the depth of the basement or alignment of the retention wall system are detailed in **Section 20.9**.

3.3 Site History

The history of the Millers Point area in which the Site is located, has been detailed in the publication *Land at Millers Point Ownership and Usage* (Broomham, 2007). It is understood that the study was commissioned by the former Gasworks owners (Jemena) and focuses on that portion of the Barangaroo Stage 1 Development area. The historic layout of the gasworks infrastructure (previously located off-site to the north) is detailed in **Figure 2**. AECOM considers the information associated with the former gasworks is relevant to understanding the development history of the broader Stage 1 Development area and potential for Site contamination.

The following summarises historic information presented in Broomham (2007) and ERM (2007, 2008). Those historic activities which relate directly to the Site and/or other parts of Barangaroo are specifically noted.

- **1788-1839:** During early colonial times the shoreline was extended and a wharf and a cottage were constructed near the southern boundary of the original subdivision.
- **1839:** The part of land was occupied by the Australian Gas Light Company (AGL)] in 1839. The gasworks were extended in 1869 to include a retort house and gasholder 100 feet in diameter. The gasworks were located at the eastern boundary of Barangaroo and extended across Hickson Road (north of the Site). The remainder of Barangaroo was used for shipping and manufacturing activities.
- **1882:** AGL acquired an additional land on the north side of the gasworks (north of the Site) and constructed an additional retort house, demolished the first two gas holders and replaced them with a larger 152 foot diameter gas holder. A tramway system and hydraulic lift was also constructed to transport coke to a depot in Kent Street.

- **1897:** The waterfront was extended by a further 40 feet into Darling Harbour.
- **1899:** A building that housed a carburetted water gas plant was constructed (north of the Site).
- **1908:** Wharf frontages to the north of the gasworks were dredged to make way for the rat-proof sea wall.
- **1912:** The Sydney Harbour Trust Commissioners (SHTC) resumed part of the site and leased it to AGL until 1921.
- **1918:** Production at the gasworks was terminated (previously located north of the Site).
- **1921:** SHTC gained possession of the gasworks site (previously located north of the Site).
- **Mid 1920s:** The following activities occurred off-site, north of the Site, in the mid 1920s:
 - Portions of the gasworks (gasholder and purifier beds) were demolished. The previous gasholder was backfilled with reportedly impacted material. The Site was used for workshop and storage facilities.
 - Hickson Road was constructed through the former gasworks site. At those locations where no rock foundation was identified, a 4-inch thick foundation of blue metal followed by an 8 inch thick foundation of concrete was present. A 6-inch thick foundation of concrete was placed in those locations where a rock foundation was identified;
- New jetties and cross-wharf sections of new berths required the complete dismantling of the AGL wharf and excavation into a significant part of the former gasworks;
- The former gasworks site was covered with workshops, including blacksmiths, plumbers, carpenters and a motor garage at the northern end; and
- There was a SHT depot located on the western side of Hickson Road.
- **Late 1930s:** MSB painted creosote on the wharf piles (located across Barangaroo Stage 1, including the Site) to protect them against insects. Part of the Site was transferred to MSB after the SHTC was dissolved in 1936;
- **1951:** Five finger wharfs with approximately a dozen east-west oriented narrow warehouse buildings were present on the western edge of Barangaroo Stage 1, including the Site.
- **1952:** MSB constructed a two storey brick workshop on the southern extremity of the Site.
- **1960s:** The wharfs were reconstructed across the Barangaroo Stage 1, including the Site. This included the construction of parallel berths with large cargo-moving areas, demolition and removal of some old wharf structures and formation of new sea walls by sinking caissons filled with concrete.
- **1968:** By 1968 the area behind (east of) the sea wall was in-filled (with unclassified fill) and the area was now a continuous wharf. These works occurred across the Barangaroo Stage 1, including the Site.
- **1970s and 1980s:** The wharves across the Barangaroo Stage 1 site, including the Site, remained utilised for port activities. The 1972 aerial photograph indicated the finger wharfs had been filled in and the Site comprised a sealed area with two large warehouses, on the northern and western boundary. A smaller workshop building in the southeast corner of the Site.
- **1988:** Southern Cove filled between the Site and Block 4. Ownership of Lot 6 in DP 876514 transferred to the Marine Ministerial Holding Corporation (MMHC).
- **1995:** The longshore wharves at the Barangaroo Stage 1 site, including the Site were leased to Patrick Stevedores No 2 until 2006. The Sydney Ports Corporation (SPC) was also established in 1995.
- **1998:** part of the Site was transferred from MSB to SPC.
- **1999:** The SHFA was formed under the Sydney Harbour Foreshore Authority Act 1998 to consolidate the work and functions of City West Development Corporation, Darling Harbour Authority and Sydney Cove Authority. Lots 3 and 5 of DP 876514 were transferred to SHFA in 2007. Wharf 8 Overseas Passenger Terminal constructed within the Site. The 2004 aerial photograph showed that the two large warehouses had been demolished to make way for the Passenger Terminal building.
- **2007:** Declaration of Investigation Area (located to the north of the Other Remediation Works [South] Area) by NSW EPA.

- **2008:** The wharf to the north of the Site vacated and warehouses demolished in preparation for development.
- **2009:** Declaration of Remediation Site (located to the north of the Other Remediation Works [South] Area).
- **2010:** part of the Site remains in use as an Overseas Passenger Terminal for visiting cruise ships.

3.3.1 Filling History

Based on a review of historic aerial photographs and maps of Barangaroo, the history of filling may be summarised as follows.

- **1836 to 1888:** there appeared to be some limited filling around Millers Point towards Darling and Sydney Harbours (north of the Site);
- **1888 to 1897:** filling occurred into Darling Harbour in the area in the vicinity of the Gas Works site and there were several finger wharves constructed at the southern end of Barangaroo (within the footprint of the Site);
- **1897 to 1951:** further filling around Millers Point (to the west and north) and four finger wharfs were constructed in the central portion of Barangaroo (between Millers Point and the gas works site) (north of the Site);
- **1951 to 1968:** the southern-most portion of Barangaroo (the current Overseas Passenger Terminal Area) was filled in to the current eastern extent of the Darling Harbour shoreline (within the Site);
- **1968 to 1986:** the area between the Southern Cove and Millers Point was filled in after the finger wharves were demolished (north of the Site);
- **1986 to 1988:** the Southern Cove was filled in (at the northern edge of the Site); and
- **1988 to present:** no more significant filling occurred.

It should be noted that, notwithstanding the filling history that can be inferred from site history, it is difficult to identify, based on observations from the ORWS DGI (AECOM, 2010a), *In situ* soil and fill validation works (AECOM 2011a) and previous investigations, distinct differences in fill type relative to the historical filling sequence at the Site. Further, it appears that the majority of the Site, with the possible exception of the north east corner toward the former gasworks, was filled in a single campaign between 1951 and 1968.

3.3.2 Gasworks Features (located Off-Site to the North)

The former AGL (now Jemena) gasworks occupied an area of land immediately to the north of the Site, corresponding with the eastern limit of Blocks 4 and 5, and extending to the area now occupied by Hickson Road. It is noted that no historic gasworks infrastructure has been identified beneath the Site, although historic gasworks infrastructure was present close to the north east corner of the Site (refer to **Figure 2**).

URS (2001) estimated the footprint of the former gasworks to encompass approximately 5,420 m² and comprised the following structures:

- Retort House;
- Meter House;
- Gasholders; and
- Purifier Beds

Previous investigations have identified existing gasworks features that extend across Hickson Road, including part of the annulus of the former gasholder, a smaller secondary gasholder and a tar well (Coffey, 2008).

3.4 Previous Investigations

A number of previous investigations have been completed in respect of the Site. It is noted that these investigations also included parts of the Barangaroo Stage 1 Development not included in the Site that is considered by this RAP. The reports considered relevant to this RAP include the following:

- NA&A 1996. Initial Environmental Assessment, Sydney Ports Corporation, Darling Harbour Berths 3-8 Hickson Road, Darling Harbour. June.
- Coffey (1998). Environmental Soil Quality Assessment of Wharf 8, Darling Harbour.

- URS (2001). Contamination Review for Darling Harbour.
- Jeffery and Katauskas (J&K). 2006. Geotechnical Report development of Wharves 3-8 at East Darling Harbour. August.
- ERM. 2007. Environmental Site Assessment, East Darling Harbour, Sydney, NSW, Final Report. 21 June.
- Coffey Environments. 2008. Preliminary Environmental Investigation, 30-38 Hickson Road, Millers Point, NSW 2000. 12 May.
- ERM. 2008a. Additional Investigation Works at Barangaroo, Hickson Road, Millers Point, NSW. July.
- ERM. 2008b. Preliminary Sediment Screening Works at East Darling Harbour, Adjacent to Barangaroo, NSW, Draft, Rev 03. August.
- ERM. 2010. Overarching Remedial Action Plan for The Barangaroo Project Site, Sydney. June.
- ARUP. 2008. Barangaroo Development, East Darling Harbour Geotechnical Desk Top Study. 28 October.
- AECOM, 2010a. Data Gap Investigation, Other Remediation Works (South) Area, Barangaroo. May.
- AECOM, 2010b. Remedial Action Plan (original version), Other Remediation Works (South) Area, Barangaroo. 2 June 2010.
- AECOM, 2010c. Groundwater Discharge Study, Stage 1 Barangaroo Development. 3 November.
- AECOM, 2011a. *In situ* Soil and Fill Validation. Other Remediation Works (South) Area. 20 January.
- AECOM, 2011b. HHERA, Declaration Site (Development Works) Remediation Works Area. April.
- AECOM, 2011c. ORWS HHERA Addendum, Other Remediation Works (South) Area (Including Associated Public Domain Areas). April.

These reports are summarised in **Sections 3.4.1 to 3.4.14** below.

Investigation locations from the previous investigations are presented in **Figure 5**.

In addition to the above investigations, the following additional documentation was reviewed and considered during the preparation of this RAP:

- LLMP supplied CD, 2010. BDA Supplied Historical Work As Executed Drawings for the Former Wharf Structures at Berths 3 to 8, Barangaroo. CD dated 21 January.
- LLMP supplied CD, 2010. Geotechnical Information - Barangaroo Area (including CBD Metro Geotechnical and Environmental Investigations, completed by Coffey). CD dated 21 January.
- LLMP Scheme CAD files provided to AECOM in December 2009.
- LLMP Design Drawings provided to AECOM in February 2011.

In addition to the above environmental investigations, archaeological works have also been undertaken at the Site by Casey and Lowe Pty Limited. A summary of these works is provided in **Section 3.4.15**.

3.4.1 NA&A (1996)

Noel Arnold and Associates (NA&A) were commissioned by the Sydney Ports Corporation to undertake an Initial Environmental Assessment at Berths 3-8 Hickson Road, Darling Harbour, NSW.

The report details results of an initial contamination assessment and provides options for remedial management of the area investigated. Known and potential contamination was not determined to be a risk to the ongoing use by the then occupant providing subsurface materials were not disturbed. Impact was identified in the area of the former AGL Gasworks located to the north of the Site.

3.4.2 Coffey (1998)

Coffey was engaged by Sydney Ports Corporation to undertake an Environmental Soil Quality Assessment of Wharf 8, Darling Harbour.

The investigation was a limited site assessment including soil sampling at Wharf 8 to identify contamination and provide options for disposal of excavated soil associated with proposed development. The ESA reported limited

PAH contamination and identified material required for off-site disposal that would likely require industrial or hazardous waste classification.

3.4.3 URS (2001)

URS was commissioned by SHFA to conduct a Contamination Review for Darling Harbour – Berths 3/8, which comprised a review of the contamination issues collated from 11 reports produced between 1993 to 2001. The review identified soil and groundwater contamination associated with the former gasworks, including off-site migration, and soil contamination associated with current vehicle maintenance operations.

3.4.4 Jeffery and Katauskas (2006)

Jeffery and Katauskas Pty Ltd (J&K) undertook a Geotechnical Investigation for the East Darling Harbour property (Barangaroo). The investigation was undertaken concurrently with the ERM (2007) Environmental Site Assessment (ESA) which is summarised in **Section 3.4.5** below.

Key geotechnical findings from the J&K investigation were:

- Fill was sandy and increased in clay content with depth and refusal occurred within fill at several locations across the Site;
- The fill contained large pieces of rubble and was poorly compacted;
- The alluvial sediments consisted predominantly of sandy clays which extended to sandstone bedrock; and
- Sandstone bedrock was generally shallower at the eastern portions of the Site and deepest over the western portion towards Darling Harbour.

3.4.5 ERM (2007)

ERM was commissioned by SHFA to undertake an ESA which consisted of a Stage 1 Preliminary Site Investigation (PSI) and Stage 2 Detailed Site Investigation (DSI) for the East Darling Harbour property (Barangaroo). The investigation was undertaken concurrently with the J&K (2006) investigation (summarised in **Section 3.4.4** above). The following provides information related to the Site.

The PSI component of the investigation reported that the Site was historically used for port/wharf activities and workshops. The AGL gasworks site was also located to the north of the Site (off-site) and reclamation activities had historically occurred at the Site for the construction of the wharfs.

Based on the historical information ERM concurred with URS (2001) investigation that the contaminants of potential concern (COPC) for the Site were TPH, BTEX, Heavy Metals, PAHs, PCBs, Cyanide, Sulfates, OCPs and OPPS.

The ESA made the following conclusions:

- Impacts to soil and groundwater were identified predominantly within the area of the former gasworks infrastructure and the reclaimed northwest portion of the Site, with the primary contaminants of concern confirmed as lead, TPH/BTEX and PAH;
- No Non aqueous phase liquids (NAPLs) were observed during the investigation, however concentrations of organic contaminants such as TPH indicated that NAPL was likely present in the vicinity of the former gasworks area located immediately north of the Site;
- The groundwater regime within the site was likely strongly influenced by tidal fluctuation; and
- There appeared to be potential for both migration of contamination onto the site from the east and migration of contamination from the site into adjacent properties and into Darling Harbour.
- The ESA included the following key recommendations:
- The extent of the risks to human health and the environment should be assessed through further investigations and a site specific quantitative risk assessment; and
- Additional delineation investigations and assessment of vapour flux from impacted areas and further assessment of hydrogeological conditions should be undertaken before developing a RAP.

A summary of soil and groundwater results from the ESA is included in **Table 2** in **Section 3.4.7** along with the additional soil data from the 2008 ERM additional investigation.

3.4.6 Coffey (2008)

Coffey Environments Pty Ltd (Coffey) was commissioned by the Council of the City of Sydney to undertake a Preliminary Environmental Investigation (PEI) at the segment of Hickson Road (between numbers 30 to 38), Millers Point, NSW, which is located immediately northeast of the Site.

Soil samples were analysed for Heavy Metals, TPH, BTEX, PAH, phenols, chlorinated hydrocarbons and asbestos. Groundwater samples were analysed for Heavy Metals, TPH, BTEX, PAH, phenols, chlorinated hydrocarbons and ammonia.

The general ground conditions encountered during the intrusive investigation comprised asphalt overlaying concrete and fill ranging in depth between 3.1 and 9.4 m bgl. The fill generally consisted of gravelly sand and sandy gravels with minimal anthropogenic inclusions. The fill was generally underlain by sandstone, with the exception of residual clayey sand and sand soils at two locations (BH3 and BH2).

Tar was encountered in two boreholes which were located in the southern portion of the investigation area.

Concentrations of heavy metals, phenols and chlorinated hydrocarbons were either less than the laboratory limit of reporting (LOR) or the adopted assessment criteria in all samples analysed. Asbestos fibres were not detected in any sample analysed.

3.4.7 ERM (2008a)

ERM was commissioned by SHFA to undertake additional soil and groundwater investigation works at Barangaroo. The objectives of the works were to fill in data gaps in soil and groundwater data to enable a RAP to be developed for the Site.

A summary of the results from within the Site are provided in **Table 2** below, which also includes the ERM (2007) ESA results.

Table 2 Summary of soil analytical results from ERM 2007 and 2008 investigations and ERM (2007) groundwater results

Analyte	No. Soil Results	Soil Results	Groundwater Results
Heavy Metals	73	Concentrations of metals in samples were all less than NSW (DEC) SIL ₄ Criteria with the following concentration ranges: Lead (<5 -1320 mg/kg) Arsenic (<5 - 16 mg/kg) Cadmium (<1- 2 mg/kg) Total Chromium (<2 - 81 mg/kg) Copper (<5 - 228 mg/kg) Mercury (<0.1 - 5.9 mg/kg) Nickel (<2 - 22 mg/kg) Zinc (<5 - 1890 mg/kg)	Arsenic – all results <LOR Cadmium – all results less than LOR with exception of MW09 (1.3 ug/L) Chromium - all results less than LOR with exception of MW20 (2 ug/L) Copper – all results less than LOR with exception of MW17 (2 ug/L) Mercury – all results less than LOR Nickel – results ranged between <10 to 24 ug/L Zinc – Concentrations ranged between 0.015 (MW10) and 0.128 (MW09)
TPH C ₆ -C ₉	53	All concentrations were <LOR with exception of 3 results BH117_10-10.5 (10mg/kg) BH117_15-15.5 (244 mg/kg) BH110_23.3-23.8 (46 mg/kg)	All concentrations < LOR with exception of: MW21 – 60 ug/L
TPH C ₁₀ -C ₃₆	53	All concentrations were <LOR with exception of 13 results which ranged between 150 mg/kg to 5580 mg/kg. Results greater than EPA (1994) Criteria were from BH100_3-3.45 (1005 mg/kg), BH117_15-15.5 (5580 mg/kg) and BH195_10.5 (2215 mg/kg).	All concentrations < LOR with exception of: MW09 – 985 ug/L MW20 – 2870 ug/L MW21 – 385 ug/L

Analyte	No. Soil Results	Soil Results	Groundwater Results
BTEX	53	Benzene: All <LOR with exception of 2 results BH110_23.3-23.8 (7.8 mg/kg) and BH117_15-15.5 (19.4 mg/kg) which exceed the NSW EPA (1994) Criteria. Ethylbenzene, Toluene and Total Xylene were detected in 3 samples at concentrations less than the NSW (EPA) 1994 Criteria.	All concentrations < LOR with exception of: MW21 – Benzene (3 ug/L), Toluene (8 ug/L), Ethylbenzene (2 ug/L) and Total Xylene (21 ug/L)
PAHs	38	Concentrations of Total PAHs ranged between 4.35 mg/kg and 826.3 mg/kg. One sample exceeded the NSW (DEC) SIL ₄ Criteria (BH117_15-15.5 – 826.3 mg/kg). Benzo(a)pyrene ranged between <0.5 and 11.4 mg/kg. Three samples exceeded the NSW (DEC) SIL ₄ Criteria (BH100 3.0_3.45, BH117_15-15.5 and BH195_10.5).	All concentrations < LOR with exception of: MW21- Total PAH (25.1 ug/L) and B(a)P (0.7 ug/L) MW18 - Total PAH (8.65 ug/L) and Naphthalene (0.7 ug/L)
Phenols	18	Concentrations of Phenols were < LOR in all samples.	-
PCBs	8	Concentrations of PCBs were < LOR in all samples.	All results less than LOR
OCPs/ OPPs	1	Concentrations were all < LOR.	All results less than LOR in MW20

The ERM Additional Investigation made the following recommendations:

- A quantitative human health and ecological risk assessment (HHERA) should be undertaken once further details of future redevelopment are known;
- Results of the investigation should be assessed with reference to previous investigations undertaken for Barangaroo;
- Routine groundwater monitoring should be considered to assess temporal variations in CoPC;
- Considering asbestos was identified in only one sample, it was unlikely that asbestos contamination was wide spread, however it was recommended that further work is required to determine the extent and nature of asbestos in fill; and
- A RAP should be developed and following completion of a RAP, a Remedial Work Plan (RWP) should be developed.

3.4.8 ERM (2008b)

ERM was commissioned by SHFA to undertake Preliminary Sediment Screening Works at East Darling Harbour, adjacent to Barangaroo. The preliminary sediment screening works were conducted in East Darling Harbour to identify potential offsite migration of contamination from the Site to sediments in Darling Harbour.

Sediment cores were collected from the Harbour adjacent to Barangaroo along 7 transects, two of which were adjacent to the Site (Transects 1 and 2). Screening identified PAH, tributyl tin (TBT) and metals exceeding ANZECC/ARMCANZ (2000) interim sediment quality guidelines (low). Elevated concentrations of TPH C₁₀-C₃₆ were also reported. The report concluded that remediation of sediments in Darling Harbour would not be required.

3.4.9 ERM (2010)

ERM was commissioned by SHFA to complete a conceptual Overarching RAP for Barangaroo. The conceptual RAP envisaged the following scope of works for the site remediation and management of various areas of the Site:

- Completion of a Quantitative HERA to develop Risk Based Cleanup Levels (RBCLs) for each area of the site;
- Preparation of a Remedial Works Plan (RWP), Remediation EMP, OH&S Plan, Community Consultation Plan, a Long Term EMP;
- Planning and approvals;
- Site establishment for remediation; and
- Demolition of and appropriate disposal of remaining structures.

The Site was divided into four areas (Area 1 to Area 4) for the purposes of the RAP. The Site (Blocks 1 to 3) is located within Area 2. The following remedial works were envisaged within Area 2:

- Excavation to permit construction of basements;
- Abstraction and treatment of contaminated groundwater collected within excavations;
- On-site treatment/stabilisation of excavated materials followed by reinstatement in an appropriately engineered placement area;
- Classification and off-site disposal of surplus fill materials;
- Offsite treatment for materials assessed as too heavily impacted to be treated on-site;
- Sampling and validation of excavated surfaces, backfilled materials and sampling of groundwater;
- Preparation of a Site Audit report; and
- Ongoing groundwater monitoring following completion of remedial works.

3.4.10 AECOM (2010a)

The following scope of work was undertaken to achieve the DGI (AECOM 2010a) objectives:

- A total of 35 boreholes were advanced across the Site at the locations shown on **Figure 5**. Soil samples were collected from each borehole location;
- An additional four boreholes were advanced across the Site for the installation of four soil vapour wells at the locations shown on **Figure 5**;
- Seven of the boreholes were converted to groundwater monitoring wells at the locations shown on **Figure 5**; and
- Preparation of a DGI report, discussing the methodologies, the investigation results and conclusions regarding the requirements for management and/or remediation of the Site during the re-development works.

The results of the DGI are briefly summarised below:

- Fill was encountered at the site overlying natural sands, gravelly sands, clays and weathered sandstone bedrock. The fill was generally shallower (up to 3 m bgl) in the eastern portion of the Site (near Hickson Road) and trended deeper (up to 19.2 m bgl) towards Darling Harbour;
- Soil impacts appeared to be associated with the historical presence of the former gasworks located immediately north of the Site and the fill materials used for land reclamation activities;
- Soil vapour results indicated some gasworks-derived impacts in locations closest to the former gasworks area, and low concentrations of CoPC (below soil vapour and ambient air guidelines) in some locations;
- Groundwater was present beneath the Site within fill materials at approximately 2.0 m bgl and was subject to tidal fluctuation. Tidal influence extended as far east (inland) as Hickson Road; and
- Groundwater impacts associated with the former gasworks infrastructure were limited to the north-eastern corner of the Site. Groundwater contamination associated with the remaining gasworks infrastructure located to the north of the Site did not appear to be migrating into the Harbour.

The DGI made the following conclusions with respect to the risks associated with contamination identified by the DGI and previous historical investigations.

- **Future Land Use for Residential/Commercial Purposes within the Development Area (South):** Whilst the current asphalt and concrete ground surface was considered adequate to limit exposure by Site users to underlying contamination, future earthworks/remediation/development at the Site may complete the exposure pathway.
- **Future Land Use for Passive Recreation at the Public Domain (South):** The area designated as Public Domain (South) is currently covered with concrete and/or asphalt with no complete exposure pathway to underlying soil or groundwater. Given the limited extent of contamination identified within the Public Domain (South), AECOM considered this area of the Site presents a low risk to human health in its current condition.
- **Environment:** The DGI identified potential risks to the down gradient environmental receptor (Darling Harbour). Based on the proposed development plan (i.e. excavation of basements), up gradient contaminant sources will be removed and therefore reduce the potential risk in the future.

The DGI provided the following recommendations:

- A RAP should be prepared to address hotspot remediation and management of potentially impacted materials that may be encountered during the excavation of the Site for future development;
- Additional assessment of the materials should be undertaken in accordance with the RAP in the event that materials encountered during the excavation and remediation works are different to those found during the DGI and/or previous investigations; and
- An Acid Sulfate Soil Management Plan may be required for the management of PASS during future excavation works in natural materials.

3.4.11 AECOM (2010c)

In order to support the Declaration Site HHERA (AECOM, 2011b), a key pathway and receptor that needed to be considered was the interaction of contaminated groundwater with Darling Harbour. A primary objective of the Groundwater Discharge Study (AECOM 2010c) was to inform the Declaration Site HHERA with respect to likely attenuation factors for contaminant mass flux due to mixing of seawater prior to discharge.

AECOM installed a transect of multilevel piezometers, comprising two arrays of three piezometers each, as well as a stilling well in Darling Harbour, immediately adjacent to the multilevel piezometer transect. Instantaneous hydraulic head measurements, groundwater and surface samples and hydraulic head time series data (hydrographs) were collected from these installations during the investigation.

Relative to that occurring from the fill sequence, groundwater discharge volumes and therefore contaminant mass flux from the marine sediments was considered to be negligible from a hydrogeological perspective. Groundwater discharge occurring via the basal Hawkesbury Sandstone was not considered significant in the context of contaminant flux due to very low values of permeability reported for this formation in the literature.

The tidal exchange prism is defined as the area immediately behind the caisson wall where full inundation of sea water occurs during the incoming and outgoing tide. The dimensions of the tidal exchange prism have been defined as being a rectangular volume extending 10 metres, on average, landward of the existing caisson wall. Where leachable source material is present within the tidal exchange prism, any resultant groundwater contamination is expected to discharge largely without further attenuation.

The Study indicated that of the total flux towards the Harbour in any given ebb tide, approximately 10% represents water from up gradient, which equates to a groundwater (including connate seawater) to seawater mixing ratio of approximately 1:10. However, given potential uncertainty regarding the original shoreline location and dates for the commencement of reclamation activities, attenuation factors for groundwater up gradient of the tidal exchange prism were conservatively estimated as a factor of 5. It was concluded that contamination which has migrated into, or is otherwise present within the tidal exchange prism, was not expected to undergo further attenuation prior to discharging to the Harbour.

3.4.12 AECOM (2011a)

The purpose of the ORWS *In situ* Soil and Fill Validation works (AECOM (2011a) was to:

- Confirm the classification and characteristics of soil and fill materials underlying the Site, including both material proposed to be excavated and that remaining *in situ* as part of the proposed development; and
- Facilitate identification of additional areas of contamination in order to confirm the requirements outlined in this Amended RAP and expedite the proposed bulk earthworks program.

The objectives of the ORWS *In Situ* Soil and Fill Validation works (AECOM 2011a) were to:

- Characterise the subject materials with a scope, extent and test frequency that will result in a robust data set (including both current and new data) sufficient to evaluate the suitability of the soil and fill materials from the Development Area (South) to either:
 - remain *in situ*; or
 - to be excavated and disposed of or to be placed within other parts of Barangaroo including Headland Park; and
 - Present the field and analytical data from the Site to inform the RAP, which documents the remedial approach for the Site.
- The scope of works involved the following works:
- Setting out a 20 m x 20 m grid for proposed borehole locations prior to drilling;
- Drilling and soil sampling of 57 boreholes (designated BH300 to BH356) on a surveyed grid; and
- Laboratory analysis of soil and fill samples for CoPCs.

At the completion of the above works, AECOM considered that the investigation had:

- Characterised the soil and fill materials to remain *in situ* and produced sufficient data for this Amended RAP;
- Characterised the soil and fill materials underlying the Site for the purposes of confirming the remediation strategy in this Amended RAP and progressing the proposed excavation and development works program;
- Identified additional areas of contamination which were not encountered during the ORWS Area DGI (AECOM, 2010a) through the investigation of soil and fill materials on a grid basis; and
- Characterised the soil and fill materials to evaluate the suitability of the soil and fill materials to be excavated and disposed of or to be placed within other parts of Barangaroo or Headland Park and inform this Amended RAP.

Based on the reported results, it was concluded that remediation and/or management actions would be required as part of the proposed excavation program to make the Site suitable for the proposed development and to confirm suitability for reuse of excavated materials within Barangaroo (including Headland Park).

3.4.13 AECOM (2011b)

The Declaration Site HHERA (AECOM, 2011b) was prepared to develop Site-specific target criteria (SSTC) (soil and groundwater concentrations) and Site SSEC (if applicable) that remediation would have to achieve to allow redevelopment for the land uses described in the proposed Declaration Site development plans. The SSTCs and SSECs are concentrations that would not give rise to unacceptable risks to both human health and the environment under the specified land use.

The Declaration Site HHERA comprised the following key steps with respect to derivation of SSTCs:

- Identification of CoPC in environmental media, based on comparison to relevant human health based 'Tier 1' screening criteria;
- Qualitative and quantitative assessment of the toxicity of each CoPC;
- Development of Conceptual Site Models (CSMs) for land use scenarios relevant to future development of the Site;
- Quantitative Exposure Assessment for each land use scenario, in order to estimate the extent to which human receptors may be exposed to CoPC at the Site, including vapour and dust migration modelling where relevant;
- Adoption of acceptable risk levels to derive SSTC; and
- Derivation of media and chemical specific SSTC for each CoPC based on consideration of toxicity criteria, exposure parameters, contaminant transport modelling and acceptable risk levels.

Based on the Declaration Site development plans, the broad land use scenarios for which SSTC have been derived are:

- Scenario 1 - lower-most basement car park level below the water table;
- Scenario 2 - upper-most basement car park level, partially above the water table;
- Scenario 3 - unpaved public domain / open space;
- Scenario 4 - paved public domain / open space;
- Scenario 5 - typical commercial slab on ground construction;
- Scenario 6 - short term ground-intrusive maintenance, and
- Scenario 7 - typical residential residence with basement construction.

Site-specific ecological screening criteria (SSESC) were also derived for soil (both total concentrations and neutral leachable concentrations) and groundwater. The SSESCs were derived to be protective of water quality in Darling Harbour.

The report (AECOM 2011b) should be referred to for detail regarding the conclusions and recommendations.

3.4.14 AECOM (2011c)

The objective of the ORWS HHERA Addendum was to develop human health based SSTC and SSESCs that remediation would have to achieve to allow redevelopment of the Site for the proposed land uses. The SSTCs and SSESCs were considered to be concentrations that would not give rise to unacceptable risks to both human health and the environment, respectively, under the specified land use.

Application of the derived SSTC to the Site was considered appropriate based on the following considerations:

- The sources of contamination within the Site are the same as those identified within the Declaration Site HHERA;
- The CoPC for which SSTC were derived in the Declaration Site HHERA were selected based on the available environmental analytical data for the entire Barangaroo Development, i.e. based on soil and groundwater analytical data for Blocks 1 to 5 and Hickson Road;
- The geological and hydrogeologic conditions reported across the Barangaroo Precinct (including the Site, ORWN and DECCW Declaration Areas) are similar (although it is noted that conditions are highly variable through the precinct due to the history of reclamation and presence of underlying caisson and finger wharf structures); and
- The LLMP development plans and associated land use scenarios for which SSTC were derived in the Declaration Site HHERA are broadly similar to those for the Site.

Unacceptable human health risks were not expected to be associated with Scenario 3 (Unpaved Recreation) and Scenario 4 (Paved Recreation) as the SSTC for these scenarios were not exceeded by reported Site concentrations, or the nature, extent and/or location of the exceedences were insignificant. The exposure duration for human health receptors for paved and unpaved areas of the Site are significantly less in duration than those considered in Scenario 2, 5 and 7.

The human health-based SSTC have accounted for potential exposures to mixtures of chemicals.

Based on comparison of derived health/odour criteria (SSTC) to available Site data and with consideration of the uncertainties and limitations of available data and information, the ORWS HHERA Addendum identified soil and groundwater CoPC concentrations in localised areas which exceeded the SSTCs and SSESCs for the following land use scenarios (as described in **Section 3.4.13**):

- Scenario 1 (Lower Basement);
- Scenario 2 (Upper Basement);
- Scenario 5 (Commercial Slab on Ground);
- Scenario 6 (Intrusive Maintenance);
- Scenario 7 (High Density Residential).
- Scenario 8 (Commercial Slab on Ground with Advection).

The ORWS HHERA Addendum recommendations included the following:

- a) Basement design plans must include engineering controls to ensure that contaminated groundwater does not accumulate in compartments which are ventilated to basement airspaces since potentially adverse health risks and odours have been estimated to arise from low concentrations of volatile groundwater contaminants if water enters basements. The following is also recommended:
- 1) Basement levels should be maintained at a lower pressure than occupied areas above in accordance with AS 1668.2 (Standards Australia, 2002).
 - 2) Sump rooms should be placed as far as possible from lift wells.
 - 3) Air exchange rates within the basement areas should be maintained at a minimum of the Australian Standard 4 per hour.
- b) Soil and groundwater remaining within the Site should be remediated to meet relevant health/odour criteria (SSTC). The specific health/odour SSTC to be met in different Site locations will depend on the land use(s) relevant to the area. In the case where more than one Scenario is applicable to the area, the most conservative (i.e. the lowest value) of the applicable SSTCs will be adopted as the remediation goal.
- c) Unpaved open space (Scenario 3) areas will be covered in a minimum of 0.5 m of suitable fill. Suitable fill of greater than 0.5 m thickness is recommended in areas where deeper rooting trees will be planted. For the purposes of unpaved open space (Scenario 3), suitable fill is defined as either:
- 1) virgin excavated natural material (VENM); or
 - 2) soil which contains contaminant concentrations below the Terrestrial Soil Criteria (developed for the maintenance of plant health, refer to **Table T17**).
- d) It is recommended that paved open space (Scenario 4) areas will be covered in a minimum of 0.5 m of suitable fill (directly under the pavement). This is to account for the potential that paved areas may in the future be unpaved areas. Therefore for the purposes of definition, suitable fill will be defined as for unpaved open space areas (see above).
- e) The median groundwater concentrations at the point of discharge to Darling Harbour should, on average, not exceed the Marine Water Quality Criteria (MWQC).
- f) Soil to be retained within the Public Domain (South, Area A) should meet relevant SSEC developed in this HHERA Addendum (in addition to the relevant SSTCs). Marginal exceedences of SSEC in soil would not be expected to adversely impact on ecological receptors within Darling Harbour, provided that median concentrations at the point of discharge to Darling Harbour and/or Southern Cove do not exceed the MWQC.
- g) For mixtures of CoPC in groundwater within the Public Domain (South, Area A), the Total Toxicity of Mixtures (TTM) method as described by ANZECC (2000) should be adopted during validation (refer to **Section 5.3.2**).
- h) Soil proposed to be beneficially reused in open space areas of the Public Domain (South, Area B) should meet relevant SSEC developed in this HHERA Addendum (in addition to the relevant SSTCs). The risk based acceptance criteria for material that might be placed in the future Headland Park will be developed separately by others.
- i) Validation of soil and groundwater following remediation should be undertaken using appropriate statistical methodologies to ensure that the arithmetic average concentration of contaminants are below relevant screening criteria, in accordance with NSW EPA (1995) guidance. The validation process should therefore include:
- 1) use of systematic sampling patterns;
 - 2) collection of an appropriate number of samples for estimation of the arithmetic average concentration of contaminant(s) within relevant environmental media and land use areas (land use areas should be determined based on specific development plans with consideration to areas of soil and groundwater from which vapours may enter a given basement structure and/or from which CoPC may enter surface water bodies); and
 - 3) estimation of the 95% upper confidence limit (UCL) of the arithmetic average concentration within relevant environmental media and exposure areas.

3.4.15 Casey and Lowe (2011)

Archaeological works have been undertaken at the Site by Casey and Lowe Pty Limited from January to June 2011. It is understood that the works were conducted in the eastern part of the Site to investigate the alignment of the original wharf structures previously located in these areas and involved the following works:

- Archaeological excavations to a depth of approximately 2.0 m bgl, corresponding with the depth of groundwater. The excavations were conducted across three grid areas measuring approximately 1,650 m² and identified as 'Area B' to 'D';
- Most of the approximately 3,300 m³ of excavated material was used to backfill the excavations while the remainder has been temporarily stockpiled; and
- Asbestos cement fragments were visually observed in 6 areas during the excavation works. It is understood that the asbestos fragments were appropriately removed by a licensed Asbestos Removal Contractor and the impacted area suitably validated via visual site inspection and airborne asbestos fibre monitoring. Details of asbestos removal validation will be included in the future Validation Report.

The potential for asbestos fragments to be present within the Site is addressed as part of the validation works required for the excavated Area B material (refer to **Section 6.2**). Contingency measures for the management of asbestos, should it be identified, are described in **Section 20.6**.

4.0 Site Condition and Surrounding Environment

4.1 Current Land Use

The Site covers an irregularly shaped area of approximately 4.27 ha (based on existing LLMP supplied Site plans). The location of the Site is presented on **Figure 1** and the Site layout is illustrated in **Figure 2**.

The Site currently consists of:

- An electrical substation located in the southeast corner which is due for demolition in the near future;
- Hard standing across the remainder of the Site with the exception of thin layers of asphalt which has been used to resurface the footprints of recently demolished structures and buildings (i.e. the former Wharf 8 Overseas Passenger Terminal [OPT] and former Sydney Ports Authority [SPA] workshop in the northeast of the area); and
- Lend Lease temporary/demountable sites shed.

4.2 Surrounding Land Use

The Site is surrounded by the following land use:

- North: Barangaroo Stage 1 Development Blocks 4 and 5 and the Southern Cove (open space/concrete hardstand) with the temporary OPT beyond;
- South: Shelley Street followed by high-rise office buildings and King Street Wharf;
- East: Hickson Road followed by commercial and high density residential buildings; and
- West: Darling Harbour.

4.3 Topography and Drainage

The topography of the Site is relatively flat having been the subject of significant cut and fill reclamation works for its previous use as a stevedoring facility. The closest surface water body to the Site is Darling Harbour, located immediately west and north of the Site. The entire Site is covered in hardstand (concrete and bitumen), with the exception of several narrow garden beds along the southern and eastern boundary and along the main driveway through the Site.

The majority of stormwater runoff from the site is captured by a network of sub-surface stormwater drains which spread across the Site and drain into Darling Harbour.

4.4 Geology

Reference to the *1:100,000 Geological Survey of NSW (Sydney) Sheet 9130 (Ed 1), 1983* indicates that the stratigraphy of the Site comprises man-made fill material, marine clays and Hawkesbury Sandstone.

As described by **Section 3.3**, historical information indicates that the former 1880s shoreline ran approximately along the western edge of Hickson Road (i.e. along the eastern edge of the proposed Stage 1 Development). The area to the west of Hickson Road is understood to have been progressively reclaimed. Aerial photographs from the 1950s indicate that the area between Hickson Road and the current shoreline was occupied by a number of finger wharves, extending from Hickson Road. It is understood that the space between the historical finger wharfs and seawalls were infilled in several stages between the 1960's and 1980's with various types of material. The former Southern Cove is understood to have been filled in 1988.

ERM (2007) identified and summarised the following subsurface conditions across the broader Barangaroo site:

- Hardstand (0 to 0.46 m bgl): consisting of concrete, asphalt and bitumen, generally in good condition with minimal staining;
- Road Base Fill (0 to 0.5 m bgl);
- Fill (0 to 18 m bgl): Fill materials consisting of sandstone, building rubble, bricks and concrete, silty gravelly sand. Black staining and odours (particularly around the former gasworks);
- Marine Clay/Sand (3.0 to 18.4 m bgl): Interbedded Clayey Sand and Sandy Clay, dark greyish brown, saturated, some shell fragments and organic matter, Sandy Clay (soft, high plasticity), Clayey Sand and Sand (loose to dense, low plasticity, fine to coarse sand, low to non plasticity);
- Marine Clay/Sand (4.9 to 32.75 m bgl): Interbedded Clayey Sand, Sandy Clay and Sand, pale yellowish brown, white, reddish brown or dark greyish brown. Sandy Clay-stiff to hard, medium to high plasticity. Clayey Sand and Sand – loose to dense, fine to coarse sand, low or no plasticity; and
- Bedrock (1.3 to 32.75 m bgl): Weathered Sandstone, white, light yellowish, brown, olive brown and reddish brown, white, wet, fine to coarse grained, some fracturing noted.

It is noted that the above summary does not relate specifically to the Site but also incorporates the wider Barangaroo precinct to the north of the Site.

The ORWS DGI (AECOM 2010a) and ORWS *In situ* soil and fill validation work (AECOM 2011a) summarised the fill materials, natural soils and bedrock beneath the Site to comprise the following:

- Fill materials were observed to be highly heterogeneous with ash, timber, steel and other extraneous materials present. Some slightly gaseous, tarry, hydrocarbon and organic odours were noted with occasional black staining;
- Natural soils comprised silty sands, gravelly sands, clays, weathered sandstone and sand with components of clay. Gradual boundaries noted between the strength and extent of weathering reflects changes in the energy regime during deposition; and
- Bedrock encountered was sandstone in every instance except for AECOM borehole BH13 where shale was encountered at 12.7 m bgl. The depth to bedrock encountered during the investigation was variable across the Site, with sandstone depths ranging from 3.0 m bgl (BH11) to 19.2 m bgl (BH28). Bedrock was generally shallower in the eastern portion of the Site closest to Hickson Road and deeper in the western portion of the Site. The thickness of fill material generally increased from east to west across the Site (refer to the cross sections in the DGI for further detail).

4.5 Hydrogeology

A search of the NSW Department of Natural Resources (DNR) groundwater bore data base was reported in ERM (2007) and indicated that there were 32 registered groundwater bores within a 4 km radius of the Site. Groundwater bore information indicated that the bores were registered for either recreation, irrigation or monitoring purposes.

The DGI (AECOM 2010a) and ORWS *In situ* soil and fill validation work (AECOM 2011a) reported the following findings:

- Groundwater was encountered within both the fill and natural soil and sediments at the Site. Groundwater levels were relatively shallow (between 1.6 to 2.6 m bgl) which was expected given the Site's location adjacent Darling Harbour.
- The groundwater level gauging produced variable results, with no distinct flow direction ascertained. The variable results are considered a result of tidal fluctuations and the presence of subsurface structures (including the caisson wall along the Site boundary) which are likely to affect groundwater flow directions.
- The cation/anion chemistry of groundwater at the Site is dominated by chloride and sodium, with the proportion of sodium and chloride ions tending towards seawater composition. The presence of sodium and chloride dominated groundwater is expected due to the Site's location adjacent to Darling Harbour and the saline groundwater encountered at the Site.

- Biodegradation of hydrocarbons (natural attenuation) most commonly occurs by means of aerobic, nitrate-reducing, Fe (III)-reducing, sulphate-reducing, and methanogenic respiration. The geochemistry results for MW08 indicate that natural attenuation processes are actively occurring. MW08 was also the only well to report TPH concentrations above the laboratory Limit of Reporting (LOR).
- The results of MW08 reported increased alkalinity and TOC concentrations and significantly reduced sulphate and calcium concentrations when compared to the other reported groundwater results. Increased alkalinity often occurs in areas of microbial activity. Increases in alkalinity result from the dissolution of clays by the production of carbon dioxide from the metabolism of microorganisms. Alkalinity is important in the maintenance of pH as it buffers the groundwater system against acids generated during aerobic and anaerobic biodegradation.
- Reduced concentrations of sulphate in MW08, when compared to the all other groundwater samples collected at the Site, indicate that sulphate reduction is likely to be occurring.
- Standing water levels within MW19 and MW26 were monitored over a three day period to assess the extent and amplitude of tidal influence across the Site. The data collected from the two wells reported water level fluctuations of 0.727 m in MW19 and 0.809 m in MW26. The data shows the Site is tidally influenced, with the influence extending inland beyond MW19.
- Water level data collected from MW61, located in Hickson Road (north of Blocks 1 to 3), reported a maximum water fluctuation of 0.07 m, indicating that tidal influence extends as far as Hickson Road, although at a much reduced amplitude. This is supported by the presence of highly saline water within wells located in Hickson Road and along the eastern boundary of the Site.

4.6 Potentially Sensitive Receptors

The nearest receptor for groundwater and surface water coming from the Site is Darling Harbour, which forms part of the larger Sydney Harbour and would be classified according to ANZECC (2000) as a 'highly disturbed system'.

The Site is situated in a mixed commercial and residential area. No other environmentally sensitive receptors have been identified.

Potential human exposure to CoPC in impacted soil/fill materials and/or groundwater may occur via the following potential exposure pathways:

- Direct dermal contact with impacted materials;
- Incidental ingestion of impacted materials;
- Inhalation of volatile potential contaminants of concern; and
- Inhalation of potential contaminants of concern sorbed to air-borne particulates.

The following potential human receptors have been identified:

- Workers engaged in future remediation / redevelopment of the Site;
- Workers on the Site entering confined spaces or exposed to subsurface materials during maintenance work;
- The general public;
- Child care facilities, commercial tenants and passenger terminal users;
- Future residents inhabiting the Site;
- Off-site workers conducting construction, road or other sub-surface works in the vicinity of the Site; and
- Residents in neighbouring properties.

5.0 Remediation Criteria

5.1 Soil and Groundwater Generic Assessment Criteria

The current Generic Assessment Criteria (GAC) used in NSW to evaluate possible human health risk from soil analytical results are based on the:

- NSW DEC (2006) Guidelines for the NSW Site Auditor Scheme;
- NSW DEC (2006) Guidelines for Assessing Service Station Sites; and
- National Environment Protection (Assessment of Site Contamination) Measure (NEPC, 1999).

These guidelines present a range of Health-Based Soil Investigation Levels (SILs), sensitive land use thresholds and expected background concentration ranges for urban redevelopment sites in NSW.

As discussed in **Section 2.2.1**, SILs are not available for all CoPCs identified at the Site and are generally considered inappropriate and potentially unnecessarily conservative for remediation works. Therefore, it is necessary and appropriate to adopt a site-specific health-based and ecological risk assessment approach in determining SSTCs and SSECs for soil and groundwater to define the level of remediation required for the proposed future use of the Site.

In the absence of site-specific health and ecological risk based criteria having been developed for the Site, the original RAP (AECOM, 2010b) used the GAC to identify potentially impacted material (PIM) present at the Site. Confirmation of whether the PIM identified by this screening assessment represents a risk to human health or the environment (i.e. it is confirmed impacted material [CIM]) and the resultant remediation extent will be determined by comparison with the SSTC and SSEC developed by the Declaration Site HHERA (AECOM, 2011b) and ORWS HHERA Addendum (AECOM, 2011c).

To this end, this Amended RAP assesses whether, based on the proposed land uses for the Site:

- PIM (identified by comparison of soil analytical results against the GAC) actually represents an unacceptable risk to human health or the environment and is therefore (by comparison against the applicable SSTCs and SSECs) representative of Confirmed Impacted Material (CIM); and
- The extent of remediation necessary to mitigate the identified risk.

In specific circumstances, consideration has also been given to the principles of Clean Up To the Extent Practicable (CUTEP) and Ecologically Sustainable Development (ESD). For example:

- CUTEP may define the extent of remediation where the depth or location of material relative to other structures makes active remediation impractical; or
- ESD may define the extent of remediation where the energy usage, carbon emissions or other "environmental cost" (for example use of landfill capacity) required to remediate further are inconsistent with the environmental benefit that will be realised.

5.2 HHERA and Development of Site-Specific Target Criteria and Site-Specific Ecological Screening Criteria

The following sections summarise development of the SSTC and SSEC for soil and groundwater at the Site as detailed in **Section 5.3**. The SSTC for soil and groundwater were developed in the Declaration Site HHERA (AECOM, 2011b) and the SSEC for soil and groundwater developed in the ORWS HHERA Addendum (AECOM, 2011c).

The objective of the Declaration Site HHERA and the ORWS HHERA Addendum was to develop SSTC and SSEC for soil and groundwater for use in defining the remediation end-point for the Site. The remediation end-point is defined as that required to render the Site suitable for use following redevelopment in accordance with the proposed Site development plans. For the purposes of the Declaration Site HHERA and ORWS HHERA Addendum, a 'suitable for use' endpoint was considered to be that required to ensure that unacceptable risks to human health or the environment will not occur.

5.2.1 Derivation of SSTCs

The SSTCs for soil and groundwater derived in the Declaration Site HHERA (AECOM, 2011b) and applied to the Site in the ORWS HHERA Addendum (AECOM 2011c, refer to **Section 5.4.2** for further detail regarding the suitability for SSTCs derived for the Declaration Site to the Site) were developed to provide human health risk-based concentrations that can be used:

- As assessment criteria applicable to areas of the Site based on the proposed land uses: if all CoPCs in samples are below the applicable SSTCs, then further assessment of the health risks would not be warranted; and
- As assessment criteria applicable for the beneficial reuse of excavated material (either treated or untreated) within the Barangaroo Stage 1 Development: if all CoPC in samples are below the SSTCs, then further assessment of the health risks would not be warranted.

Further details on how the SSTCs have been derived are provided in the Declaration Site HHERA (AECOM, 2011b) and ORWS HHERA Addendum (AECOM 2011c).

Key assumptions on which the SSTC derivation was based are summarised following. These assumptions are further detailed in the ORWS HHERA Addendum (AECOM 2011c).

Soil:

- The development of SSTCs has assumed that tar (if present) will be removed from the immediate vicinity of outer basement walls to the extent practicable, and basement design and engineering controls should ensure that tar seepage into basements does not occur;
- The derivation of SSTCs has been based on plans and design assumptions provided by LLMP (as described by **Section 3.2** and **Appendix C**). Key provisions of the design that are relevant to derivation of the SSTCs include;
 - the retention wall system(s) will be effectively isolate the basements (and Area C fill material remaining *in situ* below the basements) from the surrounding ground conditions; and
 - in the unlikely event that groundwater or vapour does penetrate through the wall (into the sealed plenum), it will be prevented from entering the ventilation plenum and/or car park basement by drainage and venting within the sealed plenum.
- There are significant biodegradation processes occurring within sub-surface soils based on measured oxygen concentrations beneath the sub-surface. To account for these biodegradation processes, a 10 fold factor (Davis, 2009) has been adopted for SSTC for soil for the paved and unpaved areas of the Site, where biodegradation processes are considered to be significant;
- The current theoretical estimation of soil concentrations within indoor and outdoor air is based on partitioning modelling which has been demonstrated to overestimate concentrations between 10-1,000 fold. To account for this conservatism, an adjustment factor of 10 has been applied. In all scenarios a soil partitioning factor of 10 has been applied to BTEX, TPH (fractions C₆-C₉ and C₁₀-C₁₄ to account for the overconservative nature of vapour modelling associated with these chemicals [CCME 2008a, CRC 2010]);
- Risks associated with mixtures of chemicals have been modelled by applying proportional risks as follows: BTEX (Hazard Index [HI] 0.25 each), PAH (HI 0.2), TPH (HI 0.25 total for aliphatic and aromatic per fraction), all other chemicals HI = 1;
- Chemicals are assumed to be volatile if Henry's Law constant is greater than 1×10^{-5} atm-m³/mole (USEPA, 2004);
- The air exchange rate within the basement car park has been assumed to be 4 per hour (in accordance with AS 1668.2); and
- In the unpaved recreation scenarios (Scenario 3 and Scenario 4) it has been assumed that the upper 0.5 m of soil is composed of "suitable fill" as defined by Section 5.3.7, Declaration Site HHERA (AECOM 2011b).

Groundwater:

- The derivation of SSTCs has been based on plans and design assumptions provided by LLMP (as described in **Appendix C**);

- There are significant biodegradation processes occurring within sub-surface soils based on measured oxygen concentrations beneath the sub-surface. To account for these biodegradation processes, a 10 fold factor (Davis, 2009) has been adopted for site specific target criteria for soil for the paved and unpaved areas of the Site, where biodegradation processes are considered to be significant;
- Risks associated with mixtures of chemicals have been modelled by applying proportional risks as follows: BTEX (HI 0.25 each), PAH (HI 0.2), TPH (HI 0.25 total for aliphatic and aromatic per fraction), all other chemicals HI = 1;
- The lower and upper basements have been modelled using the Water 9 model (USEPA, 1994);
- In the lower and upper basements a windspeed of 0.03 m/sec within the basements (Scenario 1, 2 and 7) has been modelled;
- Chemicals are assumed to be volatile if Henry's Law constant is greater than 1×10^{-5} atm-m³/mole (USEPA, 2004);
- The air exchange rate within the basement car park has been assumed to be 4 per hour (in accordance with AS 1668.2);
- In basement scenarios (1, 2 and 7) it has been assumed that no more than two walls will be in contact with contaminated soil / groundwater (with Scenario 1 also considering exposures to the floor). Based on building plans provided by LLMP, it has been assumed that the Shallow and Deep Basement areas will be compartmentalised with each compartment adjacent to basement areas leaving a maximum of 2 exposed walls; and
- The basement groundwater retention wall system will comprise a diaphragm/secant pile wall or similar, extending to and keyed into bedrock, with a reinforced concrete basement wall, constructed on the inside. A sealed plenum constructed immediately inside the reinforced concrete basement wall will include: (a) passive ventilation to the atmosphere; and (b) dish drains that will drain any seepage (**Appendix C**);

Area D

- Assumes a multi-story commercial slab on ground construction (approximately seven storeys high) where vapour intrusion via advective flows may be a consideration when accounting for exposures to commercial workers;
- An internal elevator system will be installed in the commercial premises;
- Advection is the dominant driving force for vapour intrusion into the commercial premises. Following a request from the OEH, AECOM has also included considerations of advection for groundwater;
- The proposed southern extent of the Deep Basement area in Block 1 (and associated retention wall system on the north and west side of Area D) is subject to further design development and finalisation.

5.2.2 SSTC Exposure Scenarios

Based on the Development Plans and associated assumptions (refer to **Appendix C** and **Section 3.2**), the Declaration Site HHERA considered land use scenarios for which applicable SSTCs for the Site were derived. In consideration of risk to human health, the following scenarios were considered:

- **Scenario 1:** Lower-most basement car park level (below water table) with some groundwater seepage through the basement walls and floor;
- **Scenario 2:** Upper-most basement car park level (above water table) with no groundwater seepage through the basement walls and floor (surfaces are dry in top 2 m);
- **Scenario 3:** Unpaved Recreation, Public Domain (South) with no concrete/hardstand paving;
- **Scenario 4:** Paved Recreation, Public Domain (South) with concrete/hardstand paving;
- **Scenario 5:** Typical commercial slab on ground construction;
- **Scenario 6:** Short term ground-intrusive maintenance;
- **Scenario 7:** High density residential (above a car park basement); and
- **Scenario 8:** Commercial slab on ground (with advection).

Error! Reference source not found. below summarises the land use scenarios and assumptions as discussed in the Declaration Site HHERA.

Table 3 Summary of Land Use Scenarios Considered in the Declaration Site HHERA

Scenario Number	Name and Description	Most Sensitive Human Receptor	General Assumptions
1	Lower Basement Lower-most basement car park level (below water table), with groundwater seepage through walls and floor (i.e. limited groundwater seepage may be present at inner surface of outer wall and on floor surface).	Adult or Child Resident Exposed up to 1 hour per day (while en route to and from car), 350 days/year, for 70 years.	Conservative scenario to assess risk if water seeps all the way through walls and floor of lower most basement level. Small layer of groundwater is assumed to be permanently present on some sections of the two walls and floor (within plenum (walls) up to a total of 525m ² across two walls and floor, equivalent to 50% of the surface area) surface area and to act as continuous vapour source. This is considered to be a conservative assumption. Advective flow of vapours is assumed to be negligible (airflow through saturated zone cannot occur due to zero air filled porosity).
2	Upper Basement Upper-most basement car park level, partially above water table. May be used for loading/unloading, or have full time car park attendant present.	Adult Worker Exposed up to 8 hr/day, 240 days/year, for 30 years.	Upper 2 m of walls may have soil directly adjacent to walls as a source of vapour. Lower 1 metre of 2 of the 4 walls may have water seepage through the wall. It has been conservatively assumed that 25m ² of the two walls will be covered in water seepage (50% of the total wall area). Advective vapour flow considered possible through unsaturated soils (upper 2 m).
3	Unpaved Recreation Public domain area with no concrete/hardstand paving, but 50 cm of clean fill at surface.	Assumed to be exposed 2 hrs/day, 365 days/year, for 70 years.	Open Space with no Concrete Surface Covering. Assumed that areas are landscaped with at least 50 cm of clean fill overlying contaminated soil. Assume that there is significant oxygen movement through the top 2 m of soil based on the oxygen measurements collected during soil gas sampling conducted at the Declaration Site. Groundwater (GW) depth assumed to be 2 m bgl.
4	Paved Recreation Public Domain area with concrete/hardstand paving. Contaminated soil may be present directly underlying concrete surface cover.		Open Space with Concrete surface covering. Assume that there is significant oxygen movement through the top 2m of the soil based on the oxygen measurements collected during soil gas sampling at the Declaration Site. Concrete assumed to be minimum 15 cm thick and to have crack fraction of 0.001 (to account for higher cracking possible in surface covering)
5	Commercial Slab on Ground Typical commercial slab on ground scenario for public domain area where basement car park is not present.	Adult worker. Exposed up to 8 hr/day, 240 days/year, for 30 years. Scenario also protective of child who may visit premises on a less frequent basis.	Assumes typical slab on grade commercial premises at ground level. With a maximum of 2 storeys. To account for potential coffee shop, convenience store, restaurant, etc., that could be constructed within the Public Domain.

Scenario Number	Name and Description	Most Sensitive Human Receptor	General Assumptions
6	Intrusive Maintenance Short term intrusive maintenance scenario, e.g. for maintenance of utility services.	Adult worker 8 hrs/day, 15 days/year for 1 year. Water contact may occur due to shallow water – no more than 1 hour per day. Vapour may be derived from pooled GW or from exposed soils in trench.	Post development, short term maintenance work may be required. Assumed not to exceed 3 working weeks per year by same worker.
7	High Density Residential	Adult or child resident. Assumed to be exposed 24 hrs/day, 350 days/year, for 70 years.	Assuming that the AS 1668.2 car park ventilation rates will be met (approximately 4 exchanges per hour). Assumes that vapours which enter the upper level basement are uniformly mixed and 1/10 of the concentration migrates to the overlying residential property on the ground floor. Within the basement, the upper 2 m of walls may have soil directly adjacent to walls as a source of vapour. Lower 1 metre of 2 of the 4 walls may have water seepage through the wall. It has been conservatively assumed that 25m ² of the two walls will be covered in water seepage (50% of the total wall area). This scenario would be protective of residential receptors in higher than ground floor premises, where vapour concentrations would be expected to be further diluted than if only mixed within one overlying residential level.
8	Commercial Slab on Ground (with advection). Multi-storey commercial slab on ground scenario at Area D.	Adult worker. Exposed up to 8 hr/day, 240 days/year, for 30 years. Scenario also protective of child who may visit premises on a less frequent basis.	It has been assumed that there is potential for a typical slab on grade commercial premises of approximately seven storeys in height to be constructed in a single location (referred to here-in as Area D). It has been assumed that a building of this type may contain an elevator and thus advective forces may be acting to draw VOCs present within soil into the first floor of the building. AECOM has also considered advective transport for groundwater following a request from the OEH.

5.2.3 Derivation of SSECs

The ORWS HHERA Addendum (AECOM 2011c) recommends that median groundwater concentrations at the point of discharge to Darling Harbour should, on average, not exceed the MWQC (refer to **Section 3.4.14**). The SSECs were developed in the ORWS HHERA Addendum (AECOM 2011c) for soil and groundwater based on consideration of the potential for material remaining at the Site to contribute to discharge of CoPC in groundwater to Darling Harbour.

For the purposes of the ecological risk assessment, CoPC were considered to be those chemicals which are known or suspected to be present at concentrations which may warrant inclusion in the ORWS HHERA Addendum. In general, a chemical was selected as a CoPC if it has been reported to be present in environmental media at the Site above the relevant GAC for the protection of marine water quality within Darling Harbour, and at concentrations which would warrant further, more detailed assessment. The CoPC screening process for selection of CoPC which warrant derivation of SSECs was undertaken based on the dataset from those parts of the Site which will be in hydraulic connection with Darling Harbour.

As described in **Section 3.2**, it is proposed that a large portion of the Site will be encapsulated by a basement groundwater retention wall system that will extend to and be keyed into bedrock and will effectively isolate both the basement car park within the retention wall system and any material remaining *in situ* under it from the surrounding ground conditions and Darling Harbour. The development of SSECs for the areas of Site within the retention wall system is therefore not considered to be required for ecological protection (i.e. Area C). Furthermore, the basement groundwater retention wall system will effectively inhibit direct migration from Area D which is to be excluded from the basement groundwater retention system. In consideration of the distance between the materials to remain *in situ* in Area C and D and Darling Harbour, the development of SSECs for these areas is not considered to be required for ecological protection.

A summary of the Area A and B soil and groundwater SSECs from the ORWS HHERA Addendum (AECOM 2011c) is provided in **Appendix D**.

Based on the LL development plans, the SSECs have been adopted in defining whether reported CoPC concentrations represent CIM for:

- Material to remain *in situ* in hydraulic connection with Darling Harbour within the Public Domain (South, Area A, refer **Section 1.3.1**). SSEC for Area A have been derived for both unsaturated materials ('soil SSEC-A^{Unsat}') and saturated materials ('soil SSEC-A^{Sat}') within the tidal prism and upgradient of the tidal prism (refer to **Appendix D**); and
- Area B material that might be beneficially reused by placement above the existing ground level (and hardstand) within the Public Domain (South) (refer to **Section 1.3.1**). SSEC for Area B have been derived for unsaturated materials ('soil SSEC-B') within the tidal prism and upgradient of the tidal prism (refer to **Appendix D**).

Further details on how the SSECs have been derived are provided in the ORWS HHERA Addendum (AECOM 2011c).

Key assumptions on which the SSEC derivation was based are summarised following. These assumptions are further detailed in the ORWS HHERA Addendum (AECOM 2011c).

- The existing concrete hardstand surfaces are proposed to be retained and perforated (to facilitate the drainage of water through them) within the Public Domain (South);
- The existing caisson walls associated with the historic wharf structures will be retained along the western (Darling Harbour) side of the Public Domains;
- Because the basement groundwater retention wall system will be keyed into the underlying bedrock around the entire perimeter of the car park basement it is expected that this system will effectively isolate both the basement car park and any material remaining *in situ* adjacent or under it (Area C) from the surrounding ground conditions and Darling Harbour;
- As a result of the proposed basement groundwater retention wall systems, only Area A will continue to have hydraulic connection with Darling Harbour;
- The ecological risk assessment and development of the SSECs is only relevant to areas within ORWS that are down-gradient of the basement groundwater retention wall system (Area A and Area B beneficial reuse);

- Suitable soil from the Site may be beneficially reused to raise the elevation in the Public Domain (South) subject to meeting appropriate SSTC and SDESC; and
- The AECOM Groundwater Discharge Study, review of actual analytical data from the Public Domain, and consideration of USEPA guidance conservatively support application of the compound specific dilution and attenuation factors (Dafs) for CoPC in Area A.

5.2.4 Beneficial Reuse of Excavated Material

5.2.4.1 Public Domain (South)

It is understood that material and/or soil from the Site which meets relevant SSTC and SDESC may also be re-used to build up the elevation of the Public Domain (South).

The SSTC derived for Scenarios 3 to 6 above (unpaved recreation, paved recreation, commercial slab on ground and intrusive maintenance) are therefore considered to be broadly applicable to material re-used within the Public Domains, depending on the specific land uses in the vicinity of the re-use locations. While slight refinement/modification of SSTC for re-use scenarios would result from consideration of more specific design and landscaping details, the Scenario 3 to 6 SSTC are likely to be appropriate to provide an initial estimate of human health based SSTC for re-use, provided that the exposure and vapour modelling assumptions described above are met within the specific re-use areas.

The SDESCs derived for material that might be beneficially reused by placement above the existing ground level (and handstand) are considered applicable to beneficial reuse within the Public Domain (South).

As detailed in **Section 6.0** of the ORWS HHERA Addendum, the upper 0.5 m of soils to be used in the Public Domain will be required to meet the Terrestrial Soil Criteria (TSC, refer to **Table T17**) which are protective of plant health. The TSC are also suitably protective of human health in this land use scenario (i.e. the TSC are more stringent than the SSTC-B).

Materials removed as part of the basement excavations that are not suitable for reuse in landscaped areas of the Public Domain (South) will be considered contaminated (for the purpose of beneficial reuse) and will require offsite disposal. Only Area B material that does not require treatment will be reused in the Public Domain (South).

5.2.4.2 Headland Park and Barangaroo Stage 2 Public Domain

An additional alternative for the beneficial reuse of Area B materials removed as part of the basement excavations at the Site may be placement within either the Headland Park or the Barangaroo Stage 2 Public Domain (also referred to as Barangaroo Central). Separate HHERAs and RAPs (prepared by the BDA) will be applicable in defining the standard that must be achieved for soils excavated from the Site and proposed for beneficial reuse within either the proposed Headland Park or Barangaroo Central Public Domain.

If this alternative for beneficial reuse of suitable Area B materials is available, an Addendum to this Amended RAP will be prepared and submitted to the NSW OEH Accredited Site Auditor and the NSW OEH for approval (unless advised otherwise). The Addendum will include details of the treatment approach and methodology (if required) to ensure that the materials comply with the requirements of the relevant RAP and HHERA.

5.3 Remediation Criteria

5.3.1 Derivation of Remediation Criteria

The SSTCs and SSECs that are applicable to the different landuse scenarios are presented in **Table 4** below. The SSTCs and SSECs have been selected in terms of four Areas, which share common proposed land uses (as illustrated in **Figure F1, Section 1.0**):

- **Area A** – material to remain within the Public Domain (South), outside the retention wall system and potentially in hydraulic connection with Darling Harbour, where limited or no excavation will be required;
- **Area B** – materials to be removed as part of basement excavations and subject to beneficial reuse, including potential beneficial reuse by raising the existing ground elevation in the Public Domain (South);
- **Area C** – materials to remain *in situ* below the Shallow Basement areas and within the retention wall system which will effectively remove hydraulic connection with Darling Harbour; and
- **Area D** – materials to remain *in situ* in the southeast corner of the Site only (i.e. upgradient of the retention wall system and with negligible hydraulic connection to Darling Harbour).

For land use scenarios where more than one SSTC is applicable, the lowest (i.e. most conservative) SSTC or SSEC has been adopted to appropriately assess soil and groundwater quality in the four Site areas (refer to **Table 4** below).

The SSTCs and SSECs applied to each of the four Site areas (as illustrated in **Figure F1, Section 1.0**) are described in **Table 4** below and are detailed in **Table T1** and **T2**.

Table 4 Landuse and Applicable SSTCs and SSECs

Area	Proposed Land Use	Applicable SSTCs and SSECs
Area A	Public Domain (South), Limited or No Excavation Area (also referred to as the unexcavated Public Domain) outside the basement groundwater retention wall system and in hydraulic connection with the Harbour	Soil SSTC-A: - SSTC for Scenario 2 - Upper Basement - SSTC for Scenario 4 - Paved Recreation land use - SSTC for Scenario 5 - Commercial Slab on Grade - SSTC for Scenario 6 - Intrusive Maintenance Worker - SSTC for Scenario 7 - High density residential (above a car park basement)
		Soil SSEC-A: - SSEC^{Unsat} for Area A soil remaining in the unsaturated tidal prism - SSEC^{Sat} for Area A soil remaining in the saturated tidal prism
		Groundwater SSTC-A: - SSTC for Scenario 1 - Lower Basement - SSTC for Scenario 2 - Upper Basement - SSTC for Scenario 4 - Paved Recreation - SSTC for Scenario 5 - Commercial Slab on Grade - SSTC for Scenario 6 - Intrusive Maintenance Worker - SSTC for Scenario 7 - High density residential (above a car park basement) Groundwater SSEC-A: - SSEC-A within the tidal prism - at the point of discharge (assumed to be inside tidal prism, refer to Section 3.4.14 for the list of CoPC), groundwater remaining in hydraulic connection with the Harbour

Area	Proposed Land Use	Applicable SSTCs and SSECs
Area B	Material to be excavated from basement areas and potentially beneficially reused in the Public Domains above the existing concrete slabs (to be retained and perforated). This soil will likely be placed in landscaped areas at a depth of 0.5 to 1.0 m depth. This material will be overlaid by a 0.5 m thick phytotoxicity suitable layer complying with the TSC (refer to Section 5.2.4.1).	Soil SSTC-B: - SSTC for Scenario 3 – Unpaved Recreation - SSTC for Scenario 4 – Paved Recreation - SSTC for Scenario 5 – Commercial Slab on Grade - SSTC for Scenario 6 – Intrusive Maintenance Worker Soil SSEC-B: - SSEC^{Unsat} for Area B soil remaining on top of the perforated Area A concrete slab in the unsaturated tidal prism (refer to Section 5.3.3 for further detail)
Area C	Development Area - <i>in situ</i> Material below the Shallow Basement – commercial, residential & retail with basements (the footprint of the proposed Shallow Basement is in the eastern portion of the Public Domain [South])	Groundwater SSTC-C: - SSTC for Scenario 1 - Lower Basement
Area D	Residual materials to remain <i>in situ</i> upgradient of the retention wall system in the southeast corner of the Site and with negligible hydraulic connection to Darling Harbour.	Soil SSTC-D: - SSTC for Scenario 2 - Upper Basement - SSTC for Scenario 3 – Unpaved Recreation - SSTC for Scenario 4 - Paved Recreation - SSTC for Scenario 5 - Commercial Slab on Grade - SSTC for Scenario 6 - Intrusive Maintenance Worker - SSTC for Scenario 7 - High density residential (above a car park basement) - SSTC for Scenario 8 - Commercial slab on ground (with advection). Groundwater SSTC-D: - SSTC for Scenario 1 - Lower Basement - SSTC for Scenario 3 – Unpaved Recreation - SSTC for Scenario 4 - Paved Recreation - SSTC for Scenario 5 - Commercial Slab on Grade - SSTC for Scenario 6 - Intrusive Maintenance Worker - SSTC for Scenario 7 - High density residential (above a car park basement) - SSTC for Scenario 8 - Commercial slab on ground (with advection).

5.3.2 Total Toxicity of Mixtures

As detailed in Section 5.6 of the ORWS HHERA Addendum (AECOM, 2011c), while the selected Marine Water Quality Criteria (MWQC) for individual toxicants are inherently conservative, the complex nature of the chemical residues detected in certain areas of Barangaroo means that mixtures of chemicals may be encountered in certain locations. Chemicals with a similar toxicity mechanism may cause additive effects whereas other agents, such as metals, exhibit different and independent modes of toxicity. As required by ANZECC (2000), it is therefore important to consider the potential ecological risks associated with the cumulative effects of mixtures of chemicals with similar toxicological endpoints.

Consequently, the Total Toxicity of Mixtures (TTM) approach described by ANZECC (2000) will be considered. The TTM approach is site-specific and considers the sum of the ratio of the detected concentration to the trigger value for each toxicant in a relevant mixture. This sum of ratios should be less than or equal to one. This approach ensures that only those toxicants actually present are measured.

The process adopted for applying the TTM approach is summarised following:

- The TTM approach will be applied to PAHs in Area B only;

- Results reported as being less than the LOR will be assumed to be 50% of the LOR for the purpose of applying the TTM approach;
- The TTM approach will be applied to individual samples at which the ratio of detected concentration to the MWQC for one or more CoPC is greater than or equal to 0.5;
- Samples for which the TTM approach is applied and for which the sum of the ratio of detected concentrations to the trigger value for a given CoPC exceed 1 will be considered to have exceeded the relevant SDESC.

The results of applying of the TTM approach, as described above, to the Area B analytical data set are as follows:

- Area B
 - PAHs – only 4 soil samples (BH117 10_10.5 BH329_5.0-5.5 and BH336_7.0-7.5) out of the 481 analysed were reported to contain concentrations that approached 50% of the SDESC (and did not exceed the SDESC). Of these samples, the ratios of the reported concentration to SDESC were less than 1 in of the 4 samples. Of the remaining 3 samples, the impacted soils were located at depths vertically adjacent to material which also exceeded the SDESC for individual compounds and, as such, would already require remediation.

Based on the above results, it is evident from application of the TTM approach that the cumulative effects of mixtures within Area B is not significant and will not influence assessment of the presence of CIM or definition of the extent of any remediation required.

5.3.3 Key Assumptions for Derivation of Remediation Criteria

The following key assumptions are important with respect to the derivation of Remediation Criteria for Area A to D as described in **Table 4**:

- Area A:
 - In assessing the applicable SSTCs in Area A, potential land uses both within (Scenario 4, Scenario 5 and Scenario 6) and adjacent to the area (Scenario 2) have been considered;
 - It should be noted that SSTCs for the protection of human health in Area A are only required for those materials present above the depth of groundwater (i.e. to appropriately protect human health for workers in the adjacent upper basement and intrusive maintenance workers in Area A).
 - It has been assumed that the existing concrete pavement hardstand will remain in place (but perforated, refer to **Section 3.2.2** within Area A. As such, and noting the beneficial reuse of Area B materials within the Public Domain (South), Scenario 3 – Unpaved Recreation land use, has not been considered.
 - The soil and groundwater SDESCs for Area A materials within the tidal prism has been adopted as part of the SDESC-A. These SDESC are based on the assumption that all material is located within the tidal prism and that application of the SDESC within tidal prism criteria is appropriate. This is a conservative assumption as at least half of the material in Area A will be upgradient of the tidal prism.
- Area B:
 - The soil SDESC for materials to be beneficially reused within the tidal prism has been adopted as part of the SDESC-B. This SDESC is based on the assumption that all material is located within the tidal prism and that application of the SDESC within tidal prism criteria is appropriate. This is a conservative assumption as at least half of the material reused within Area B (i.e. placed on top of the perforated concrete slab) will be upgradient of the tidal prism.
 - The existing public domain concrete slabs will be retained and perforated to allow free movement/infiltration of seepage waters from the beneficially reused material (Area B) into the underlying Area A fill materials. This assumption is consistent with that adopted in the ORWS HHERA Addendum.
 - As detailed in **Section 5.3.2**, the TTM approach described by ANZECC (2000) has been adopted for materials outside the retention wall system.
- Area C:

- As detailed in **Section 1.3.2**, the basement groundwater retention wall system will be keyed into the underlying bedrock around the entire perimeter of the proposed Shallow and Deep Basement areas. This system will effectively isolate both the basement car park and any material remaining *in situ* under it (Area C material) from the surrounding ground conditions and Darling Harbour. Therefore, the application of the soil SSECs for the Area C material is not warranted; and
 - As the basement excavations will be extended to below groundwater (i.e. within the saturated zone), contaminants dissolved in groundwater will also reflect soil impacts. Further, vapour concentrations would be equal to that in equilibrium with pore water (groundwater). Therefore, soil SSTCs are not applicable to the Area C material and only groundwater SSTCs are relevant.
- **Area D:**
- In assessing the applicable SSTCs in Area D, potential land uses both within (Scenario 3, Scenario 4, Scenario 6 and Scenario 8) and adjacent to Area D (Scenario 2) have been considered;
 - As detailed in **Section 1.3.2**, the basement groundwater retention wall system will be keyed into the underlying bedrock around the north and west perimeter of Area D. Consequently, there will be negligible hydraulic connection with *in situ* Area D materials and Darling Harbour. Therefore, the application of the soil SSECs for the Area D material is not warranted; and
 - The proposed southern extent of the Deep Basement area in Block 1 (and associated retention wall system on the north and west side of Area D) is subject to further design development and finalisation. If the design is changed and affects the assumptions in the ORWS HHERA Addendum and this Amended RAP, the ORWS HHERA Addendum and this Amended RAP will be revised, as required, and submitted to the NSW OEH Accredited Site Auditor and the NSW OEH for approval (unless advised otherwise).

5.3.4 Summary of Remediation Criteria

The soil and groundwater SSTCs and SSECs derived from the Declaration Site HHERA and ORWS HHERA Addendum are detailed in **Table T1** and **T2**, **Appendix A**.

The Area A analytical data is compared to the applicable soil and groundwater SSTC-A and SSEC-A in **Table T3** to **T7**.

The Area B analytical data is compared to the applicable soil and groundwater SSTC-B and SSEC-B for potential beneficial reuse of excavated material within the Public Domain (South) in **Table T8** and **T9**.

Area C analytical data is compared to the applicable groundwater SSTC-C in **Table T10** to **T13**. As discussed in **Section 5.3.3** soil SSTCs and SSECs are not applicable to Area C.

Area D analytical data is compared to the soil and groundwater SSTC-D in **Table T14**.

5.4 Implementation of the SSTCs and SSECs

SSTCs and SSECs have been derived by the Declaration Site HHERA (AECOM, 2011b) and ORWS HHERA Addendum (AECOM, 2011c) have been developed based on the proposed development and land use scenarios. These criteria define:

- Soil concentrations that will not represent an unacceptable risk to human health (or the environment in the case of Area A and B) if the material is:
 - left *in situ* at the Site between the basement groundwater retention wall system and the Harbour (SSTC-A and SSEC-A);
 - beneficially reused to raise the elevation of the Public Domain (South) (SSTC-B and SSEC-B); and
 - left *in situ* at the Site outside the basement groundwater retention wall system and with negligible hydraulic connection with the Harbour (SSTC-D) as is the case for Area D due to its location upgradient of the retention wall system (refer to **Figure 2**).
- Groundwater concentrations that will not represent an unacceptable risk to human health or the environment (in the case of Area A).

5.4.1 Soil SSTCs and SSECs Implementation

The process for assessing the extent of remediation based on CIM identified from the SSTCs and SSECs is described by the Remediation Decision Making Process Flow Chart illustrated in **Figure 11**. The flow chart details the various stages of assessment required for determining the fate and remediation requirements (if any) of PIM (refer to **Section 5.1**).

The outcomes of the Remediation Decision Making Process Flow Chart are documented in **Section 7.0**. The only exception is the assessment of excavated materials for their suitability for beneficial reuse in Headland Park. If this alternative for beneficial reuse is available, this assessment as well as a description of the proposed treatment approach and methodology (if required) will be documented in an Addendum to this Amended RAP and submitted to the NSW OEH Accredited Site Auditor and the NSW OEH for approval (unless advised otherwise).

In, summary, the decision process described schematically by **Figure 11** is:

Scenario No. 1 (right side of **Figure 11**) - assessment of PIM within the Site against the appropriate SSTCs and SSECs (refer to **Section 5.3**) confirms the material to be CIM:

- if CIM will be excavated as part of the basement excavations (i.e. Area B material):
 - assessment against the applicable SSTC-B and SSEC-B (for beneficial reuse within the Public Domain (South) to determine whether it is suitable for beneficial reuse (without treatment, i.e. is the material contaminated for the purposes of beneficial reuse); and
 - classification in accordance with the NSW DECC (2008) *Waste Classification Guidelines* for disposal (with or without treatment) to an off-site licensed landfill.
- if CIM is located below or outside the proposed basement excavations (i.e. Area A, Area C or Area D):
 - conduct a detailed review of location-specific data to determine whether remediation works are required;
 - if remediation is not warranted, no further action is required;
 - if remediation is warranted:
 - if over excavation is practicable or consistent with the principles of CUTEP and ESD, manage the material as if it would have been excavated as part of the basement excavations; and
 - if over excavation is not practicable or consistent with the principles of CUTEP and ESD, consider implementation of contingency measures (refer to **Section 20.0**).
 - In the case of Area D, any CIM (if identified during the validation program) will be subject to remediation in accordance with **Section 16.3.4**.

Scenario No. 2 (left side of **Figure 11**) – assessment of PIM within the Site against the appropriate SSTCs and SSECs (refer to **Section 5.3**) confirms that the material is **not** CIM (i.e. is unimpacted material):

- if material will be excavated as part of the basement excavations (i.e. Area B material):
 - assessment against the applicable SSTC-B and SDESC-B (for beneficial reuse within the Public Domain [South]) to determine whether it is suitable for beneficial reuse (without treatment) (i.e. is the material contaminated for the purposes of beneficial reuse); and
 - classification in accordance with the NSW DECC (2008) *Waste Classification Guidelines* for disposal (with or without treatment) to an off-site licensed landfill. If material is located below or outside the proposed basement excavations (i.e. Area A, Area C or Area D) no further action is required.
- If material is located below or outside the proposed basement excavations (i.e. Area A, Area C or Area D) no further action is required.

5.4.2 Groundwater SSTCs and SDESCs Implementation

Groundwater quality at selected monitoring wells in Area A, Area C and Area D have been assessed against the groundwater SSTCs and SDESCs for the purposes of assessing the presence of CIM as discussed in **Section 6.0**.

Details regarding the preparation of a Groundwater Management Plan (GMP) to manage groundwater quality during remediation and following the completion of the remediation works is provided in **Section 14.4.1** and groundwater validation requirements are detailed in **Section 16.5**.

It is noted that for the purposes of this RAP, the 'point of discharge' will be considered to be the eastern edge of the existing caisson wall, within the tidal prism.

6.0 Confirmed Impacted Material Assessment

The results of previous intrusive investigation programs within the ORWS Area are reported in ERM (2007), the ORWS DGI (AECOM 2010a) and *In situ* Soil and Fill Validation report (AECOM, 2011a). The results of soil and groundwater samples analysed as part of these investigations are reiterated in **Tables T3 to T11** and compared against the SSTCs and SSESCs (as applicable, refer to **Section 5.0**). Where required, the results of statistical analysis of the various data sets are provided in **Table T12 to T16**. A summary of the results is provided in the following sections in the context of the following areas:

- **Area A** - material to remain *in situ* outside the basement groundwater retention wall system and potentially in hydraulic connection with the Harbour;
- **Area B** – materials to be excavated during basement excavation works and potentially beneficially reused in the Public Domain (South);
- **Area C** - material to remain *in situ* below the proposed Shallow Excavation which includes the area majority of Development Area (South) and part of the proposed Public Domain (South) and without hydraulic connection with the Harbour; and.
- **Area D** - material to remain *in situ* below the proposed commercial premises in the southeast corner of the Site and negligible hydraulic connection with Darling Harbour.

As described by **Section 5.2.4.2**, material from Area B may also be beneficially reused in either Headland Park and/or Barangaroo Central Public Domain. If this alternative is available, it will be described in an Addendum to this Amended RAP and issued to the NSW OEH Accredited Site Auditor and the NSW OEH for approval (unless advised otherwise).

The borehole and groundwater monitoring well locations are presented on **Figure 5**. The contaminant concentrations which exceed the SSTCs and SSESCs are presented in **Figure 6 to Figure 10**.

6.1 Area A - Public Domain (South) – Materials to Remain *In Situ*

The presence of CIM in Area A was assessed using soil and groundwater analytical data from 12 boreholes (BH345 to BH356) drilled as part of the ORWS *In Situ* Soil and Fill Validation works (AECOM 2011a). Whilst there are no groundwater wells located directly within Area A, groundwater data from five groundwater monitoring wells located adjacent to the area and still within the proposed Public Domain (South), are considered to be representative of groundwater quality within Area A and therefore representative of the groundwater quality entering the Harbour.

6.1.1 Tar Containing Material

No TCM was identified in Area A by the previous investigations.

6.1.2 Soil Analytical Results

The analytical results from soil samples collected within Area A during the ORWS *In Situ* Soil and Fill Validation works (AECOM 2011a) are presented in **Table T3** and **T4** (asbestos only). The results of statistical analysis of the Area A data sets for saturated and unsaturated materials are provided in **Table T12 to T16**. A summary of the analytical data from Area A which reported concentrations exceeding the soil SSTC-A and SSESC-A^{Sat} is presented in **Table 5**. All other analytes reported concentrations below the soil SSTC-A and SSESC-A^{Sat}.

Table 5 Area A - Soil Concentrations exceeding soil SSTC-A and SSEC-A^{Sat}

CoPC (SSTC-A & SSEC-A ^{Sat} , mg/kg)	Number		Concentration Range (mg/kg)		Mean (SD)	Median	95% UCL (excluding natural materials)	Number of Results > SSTC-A & SSEC-A ^{Sat}	Exceed.
	Results	Detections	Min	Max					
Arsenic (5 ¹)	136	29	<5	168	5.3 (15)	2.5	4.1	27	Refer to Figure 6
Copper (42 ¹)	136	116	<5	355	55 (91)	16	96.9	38	
Lead (440 ¹)	136	134	<5	2450	113 (232)	58.5	149	3	
Zinc (55 ¹)	136	133	<5	2070	96 (184)	61.5	173.8	76	
TPH C ₁₀ - C ₁₄ (50 ¹)	128	3	<50	70	26 (5)	25	NC	1	BH348_10.5-10.6 (70 mg/kg)
CPAH (67 ²)	127	72	0.5	412.6	12 (38)	2.25	NC	3 (in saturated soils)	BH346_17.0-17.4 (76.8 mg/kg), BH347_12.0-12.4 (412.6 mg/kg), BH353_10.5-10.9 (79.4 mg/kg)

Notes: ¹ based on the soil SSEC-A^{Sat}, and

² based on the soil SSTC-A.

NC – 95% UCLs were not calculated as CoPC concentrations were below the relevant soil SSTC or SSEC with the exception of CPAH concentrations which were reported in materials at greater than 10 m depth in Area A. I.e. no risk to human health (Scenario 6: short term intrusive maintenance worker).

The statistical analysis of the unsaturated and saturated fill material (excluding natural material samples) data sets is provided in **Table T12 to T16** and is discussed in **Section 6.1.4**.

A total of 15 soil samples (collected from locations where fill was identified) from within Area A were also analysed for asbestos (refer to **Table T4**). Chrysotile asbestos was detected in the following four samples:

- BH352_4.5-5.0 in gravelly sand fill;
- BH354_1.5-1.7 in clayey sandy gravel with inclusions of brick and bituminous gravels;
- BH356_3.0-3.5 in sandy gravel fill with brick and concrete fragments; and
- BH356_9.0-9.4 in clayey gravelly fill.

No visual evidence of bonded fibre cement or possible asbestos fibres was observed by AECOM during the intrusive investigations within Area A.

6.1.3 Groundwater Analytical Results

Groundwater analytical results for the following groundwater monitoring wells, are considered to be representative of groundwater quality within Area A (refer to **Figure 5**):

- ERM MW10;
- ERM MW16;
- ERM MW17;
- ERM MW18; and
- ERM MW20.

The analytical results from groundwater samples collected from these locations, reported as part of the ORWS DGI (AECOM 2010a), are presented in **Table T5** and the historic groundwater results in **Table T6**. A summary of the analytical data from Area A which reported concentrations above the relevant groundwater SSEC-A, and the median CoPC concentrations are presented in **Table 6** below. All other analytes reported concentrations below the groundwater SSTC-A and SSEC-A.

Table 6 Area A - Groundwater Concentrations exceeding groundwater SSEC-A

CoPC (groundwater SSEC-A, ug/L)	Number		Concentration Range (ug/L)		Mean (standard deviation)	Median	Number of Exceedences (Non Detects)	Number of Results > groundwater SSTC-A and SSEC-A	Exceedences
	Results	Detects	Min	Max					
Copper (6.5)	5	3	<1	79	20 (33)	7	0	3	MW10 (7 ug/L), MW16 (14 ug/L), MW18 (79 ug/L)
Zinc (75)	5	5	6	188	66 (76)	36	0	1	MW18 (188 ug/L).

Notes: **Bold text** - median CoPC concentrations in groundwater marginally exceed the groundwater SSEC-A.

95% UCLs have not been calculated because there is not a sufficient number of samples to compute meaningful statistics

As illustrated above, median copper concentrations in the Area A groundwater exceed groundwater SSEC-A and therefore are discussed further in **Section 6.1.4** below and **Section 7.3**.

6.1.4 Area A – Identification of CIM

The results of soil and groundwater analysis from Area A indicate that concentrations of selected metals and PAHs are present in Area A at concentrations above the relevant SSTC-A and SSEC-A. Overall assessment of the soil and groundwater results indicates the following:

- **Asbestos** – asbestos was detected in four of the soil samples analysed. The material in Area A is not expected to be excavated and/or exposed as part of the proposed Development Works;
- **Arsenic** – arsenic soil concentrations were generally below the LOR. Eighteen of the 93 collected and analysed from saturated fill material (greater than 2.0 m bgl) reported arsenic concentrations exceeding soil SSEC-A^{Sat}. Five samples exceeded these criteria in the underlying natural clays underlying the fill (where the flux to the groundwater system would be negligible, refer to **Section 3.4.11**) and the reported concentrations may be indicate of naturally occurring, background arsenic concentrations. Statistical assessment of the analytical data sets representing the unsaturated and saturated fill materials indicates that:
 - Unsaturated fill material samples – all arsenic concentrations in soil (27 samples) were reported to be less than the soil SSEC-A^{Unsat} (20.0 mg/kg, refer to **Table T13**); and
 - Saturated fill material samples (excluding samples collected from natural materials) – the 95% UCL (6.8 mg/kg) exceeds the soil SSEC-A^{Sat} (5 mg/kg, refer to **Table T14**). However, arsenic concentrations less than the laboratory LOR were reported in 82% of the 93 samples and the accuracy

of the 95% UCL calculation is compromised given that the reported laboratory LOR equals the soil SDESC-A^{Sat} (5.0 mg/kg).

All arsenic concentrations reported in groundwater were below the groundwater SDESC-A indicating that the soil concentrations are not resulting in contamination of groundwater (refer to **Table T5**). Therefore, the reported concentrations of arsenic in the Area A soil and groundwater are not considered representative of CIM and is not considered to warrant remediation;

- **Copper** – copper was detected at concentrations above the soil SDESC-A^{Sat} in 17 of the 93 samples analysed from saturated material (greater than 2 m bgl). Of these, 3 samples (i.e. BH346, BH347 and BH351) were collected from the natural clays underlying the fill (where flux to the groundwater system would be negligible refer to **Section 3.4.11**). Statistical assessment of the analytical data sets representing the unsaturated and saturated fill materials indicates that:
 - Unsaturated fill material samples – the 95% UCL (290 mg/kg) was in the same order of magnitude as the soil SDESC-A^{Unsat} (170 mg/kg, refer to **Table T13**); and
 - Saturated fill material samples – the 95% UCL (32.6 mg/kg) was less than the soil SDESC-A^{Sat} (42 mg/kg, refer to **Table T14**).

Copper concentrations at 3 of the 5 monitoring wells exceeded the groundwater SDESC-A (6.5 µg/L) with a maximum concentration of 79 µg/L (MW18, refer to **Table T5**). **Based on the reported soil and groundwater analytical results for copper, CIM is considered to be present in Area A and, as such, is discussed further in Section 7.3;**

- **Lead** - lead was detected at concentrations above the soil SDESC-A^{Sat} in 3 of the 136 analysed soil samples. The maximum concentration (2,450 mg/kg) was reported in a sample collected from BH353 (10.5 to 10.9 m bgl). Statistical assessment of the analytical data sets representing the unsaturated and saturated fill materials indicates that:
 - Unsaturated fill material samples – the 95% UCL (208.6 mg/kg) was significantly less than the soil SDESC-A^{Unsat} (1,700 mg/kg, refer to **Table T13**); and
 - Saturated fill material samples – the 95% UCL (154.9 mg/kg) was significantly less than the soil SDESC-A^{Sat} (440 mg/kg, refer to **Table T14**).

All lead concentrations reported in groundwater were less than the groundwater SDESC-A (44 µg/L, refer to **Table T5**). Based on the discussed groundwater analytical results, concentrations of lead in the Area A soil and groundwater are not considered representative of CIM and are not considered to warrant remediation;

- **Zinc** - zinc was detected at concentrations above the soil SDESC-A^{Sat} in 76 of the 136 soil samples analysed. The maximum zinc concentration (2,070 mg/kg) was reported for a sample collected from BH01 (2.0-2.2 m bgl). Statistical assessment of the analytical data sets representing the unsaturated and saturated fill materials indicates that:
 - Unsaturated fill material samples – the 95% UCL (90.77 mg/kg) was significantly less than the soil SDESC-A^{Unsat} (220 mg/kg, refer to **Table T13**); and
 - Saturated fill material samples – the 95% UCL (116.9 mg/kg) was within one order of magnitude of the soil SDESC-A^{Sat} (55 mg/kg, refer to **Table T14**).

With the exception of MW18 (188 µg/L), all zinc concentrations reported in groundwater were less than the groundwater SDESC-A (75 µg/L) (refer to **Table T5**). The median groundwater concentration (36 µg/L) is also less than the groundwater SDESC-A indicating that the soil concentrations are not resulting in contamination of groundwater. Based on the discussed soil and groundwater analytical results, concentrations of zinc in the Area A soil and groundwater are not considered representative of CIM and are not considered to warrant remediation;

- **TPH C₁₀-C₁₄** – TPH C₁₀-C₁₄ concentrations were generally reported to be less than the laboratory LOR in the 128 analysed soil samples analysed. Of the 3 samples which reported concentrations above the laboratory LOR, only 1 (BH348_10.5-10.6 m bgl) was greater than the soil SDESC-A^{Unsat} and SDESC-A^{Sat}.

All TPH C₁₀-C₁₄ concentrations in groundwater in Area A were reported at concentrations less than the laboratory LOR (refer to **Table T5**). Consequently, the reported concentrations of TPH C₁₀-C₁₄ in the Area A soil and groundwater are not considered to be CIM and are not considered to warrant remediation; and

- **Other PAHs** – in relation to the PAH compounds detailed in **Section 5.4.2** (acenaphthene, acenaphthylene, anthracene, fluoranthene, fluorene, naphthalene and phenanthrene concentrations) were all reported to be less than the relevant groundwater SSEC-A (refer to **Table T5**). Consequently, these compounds are not considered to be CIM and do not warrant remediation.

6.2 Area B – Materials to be Excavated During Basement Excavation Works

The presence of CIM in Area A was assessed using soil analytical data from boreholes drilled as part of the ERM (2007), ORWS DGI (AECOM 2010a) and ORWS *In Situ* Soil and Fill Validation works (AECOM 2011a) site investigations.

6.2.1 Tar Containing Material

No TCM was been identified within Area B by the previous investigations.

6.2.2 Soil Analytical Results

The analytical results from soil samples collected in Area B during the AECOM and ERM investigations are presented in **Table T8**. The Area B analytical data has been compared to soil SSTC-B and SSEC-B for assessing material suitability for potential beneficial reuse in the Public Domain (South). A summary of the analytical data from Area B which reported concentrations exceeding the soil SSTC-B and SSEC-B is presented in **Table 7** below. All other analytes reported concentrations below the soil SSTC-B and SSEC-B.

Table 7 Area B – Soil Concentrations exceeding soil SSTC-B and SSEC-B

CoPC (soil SSTC-B and SSEC-B, mg/kg)	Number		Concentration Range (mg/kg)		Mean (standard deviation)	95% UCL	Median	Number of Results > soil SSTC-B and SSEC-B	Exceedences
	Results	Detections	Min	Max					
Lead (1,700)	554	502	<5	2050	102 (217)	144	27.5	2	Refer to Figure 9 & 10
Arsenic (20)	551	114	<5	50	4.2 (4.7)	6.5	2.5	9	
Copper (170)	551	387	<5	472	42 (77)	56.6	11	53	
Zinc (220)	551	485	<5	1340	69 (121)	91.6	38	36	
Acenaphthene (8)	481	42	<0.5	18.1	0.52 (1.5)	0.9	0.25	5	
Acenaphthylene (5)	481	72	<0.5	118	1.1 (6.6)	1.8	0.25	13	
Anthracene (5)	481	92	<0.5	146	1.6 (8.5)	2.6	0.25	22	
Fluoranthene (8)	481	203	<0.5	353	4.7 (23)	6.8	0.25	44	
Fluorene (5)	481	51	<0.5	131	1 (6.7)	1.9	0.25	14	
Naphthalene (21)	481	52	<0.5	462	2.5 (24)	7.6	0.25	7	
Phenanthrene (4)	481	138	<0.5	455	4.2 (26)	6.6	0.25	52	
TPH C ₁₀ - C ₁₄ (50)	490	29	<50	4390	50 (251)	100.8	25	26	
TPH C ₆ - C ₉ (39)	490	9	<2	244	6.5 (16)	12.9	5	6	
CPAH (67)	481	162	0.5	1097.1	13 (64)	NC	2.25	17	

Notes: NC - not calculated for the summed CPAHs.

No visual evidence of bonded fibre cement or possible asbestos fibres was observed by AECOM during the intrusive investigations within Area B. Of the 37 soil samples analysed for asbestos, chrysotile asbestos was identified in a single sample within Area B at location BH340_6.0-6.1 in silty gravelly sand fill.

Asbestos fragments were identified in the near surface fill material during archaeological excavation works undertaken in the eastern part of the Site (identified as 'Area B' to 'D' by Casey and Lowe Pty Limited, refer to **Section 3.4.15**). Validation works in this part of the Site will need to be conducted in accordance with **Section 20.6**.

6.2.3 Area B – Identification of CIM

The results of soil analysis from the Area B material indicate that concentrations of selected metals and PAHs are present in this Area at concentrations above the relevant soil SSTC-B and SDESC-B. The location of these exceedances are shown on **Figure 8** and **Figure 9**. Overall assessment of the soil results indicates the following:

Soils:

- Copper concentrations exceed the soil SDESC-B in 53 of the 554 soil samples (9.5%);
- Lead concentrations exceed the soil SDESC-B in 2 of the 554 soil samples (0.4%);
- Zinc concentrations exceed the soil SDESC-B in 36 of the 554 soil samples (6.5%);
- Anthracene concentrations exceed the soil SDESC-B in 22 of the 554 soil samples (4.0%); and
- Phenanthrene concentrations exceed the soil SDESC-B in 52 of the 554 soil samples (9.4%).

Based on the above results, it is anticipated that between 10% and 20% of the material excavated as part of the basement excavations will contain concentrations of CoPC that will make it unsuitable for beneficial reuse onsite within the Public Domain (South, i.e. the material could be considered contaminated for the purpose of beneficial reuse). Given the history of filling conducted at the Site and the heterogeneous nature of the fill material, it is likely that the distribution of the materials with concentrations exceeding the beneficial reuse criteria will be sporadic throughout the fill material and that an increased proportion of the excavated material may therefore not be suitable for beneficial reuse. Contaminated materials which are not suitable for reuse in Area B (i.e. in the landscaped areas of the Public Domain [South]) are likely to require treatment/validation and/or offsite disposal.

6.3 Area C - Development Area (South) – Materials to Remain *In Situ* below Shallow Basement Areas

The presence of CIM in Area C was assessed using soil and groundwater analytical data from the ERM (2007), ORWS DGI (AECOM 2010a) and ORWS *In Situ* Soil and Fill Validation works (AECOM 2011a) site investigations. The borehole and groundwater monitoring well locations are presented on **Figure 5**.

6.3.1 Tar Containing Material

No TCM was identified in Area C by the previous investigations.

6.3.2 Soil Analytical Results

The analytical results from soil samples collected in Area C during the AECOM and ERM investigations are presented in **Table T8**. As described by **Section 5.3.1**, soil SSTC and SDESC are not applicable for the assessment of potential remediation requirements in Area C. Therefore, an assessment of soil CoPC concentrations in this area was not warranted. Instead the assessment of whether CIM is present in Area C is based on consideration of the groundwater concentrations relative to the groundwater SSTC-C (refer to **Section 5.3**).

6.3.3 Groundwater Analytical Results

The analytical results from groundwater samples collected from Area C during the ORWS DGI (AECOM 2010a) are presented in **Table T9** and the historic results are in **Table T10**. A summary of the analytical data from Area C which reported concentrations above the groundwater SSTC-C (naphthalene only) are presented in **Table 8** below and illustrated in **Figure 10**. All other analytes were reported at concentrations below the groundwater SSTC-C.

Table 8 Area C - Groundwater Concentrations exceeding groundwater SSTC-C

CoPC (groundwater SSTC-C, µg/L)	Number		Concentration Range (µg/L)		Mean (SD)	Median	Number of Results > groundwater SSTC-C	Exceedences
	Results	Detections	Min	Max				
Naphthalene (920)	12	2	<0.1	4,440	370 (1282)	0.5	1	MW08 (BH08) 4,440 µg/L

Notes: 95% UCL has not been calculated as the small data set is too skewed to compute reliable statistics

6.3.4 Area C - Identification of CIM

The results of groundwater analysis from Area C indicate that only naphthalene concentrations exceed the groundwater SSTC-C. The concentration of naphthalene reported at MW08 (4,440 µ/L, located in the north east corner of Area C, close to the former gasworks infrastructure within the adjacent Declaration Site) exceeded the groundwater SSTC-C. All other groundwater concentrations were reported to be either below the laboratory LOR (at 10 of the 12 locations) or less than the SSTC-C (at one of the 12 locations - MW21). MW08 is located just outside (east) of Area C (i.e. directly east of the alignment of the proposed retention wall system and within the proposed Deep Basement area).

The identified naphthalene impact at MW08 is not considered to be CIM for the following reasons:

- Naphthalene concentrations in the closest neighbouring monitoring well MW09 (located approximately 15 m to the south east of MW08) were reported below the LOR (refer to **Table T13**). With the exception of MW21 (1.4 µg/L) (located to the west of MW08), all naphthalene concentrations in groundwater across Area C (10 monitoring wells) were reported below the LOR. Consequently, the groundwater impacts in the MW08 area are considered to be localised and not indicative of broader impacts in Area C;
- Naphthalene concentrations in soil from BH08/MW08 (including other CoPCs typically associated with gas works contamination) (refer to Table T8), demonstrate that the soil impacts are limited vertically, likely due to the presence of the underlying sandstone bedrock (present at approximately 14.1 m bgl).
- The naphthalene concentrations in soil at neighbouring boreholes BH117 and BH307 (refer to **Table T8**), and lack of naphthalene impacts at surrounding boreholes, indicate that soil impacts are limited to an approximate 15 m radius to the north and south of MW08.
- The fill and natural material in the vicinity of MW08 (and the area to the east which includes BH117 and BH307) will be excavated as part of the Deep Basement works which will extend down to, and beyond, the depth of bedrock (present at approximately 14.1 m bgl). MW08 was installed to a depth of 14.1 m bgl and was screened from 10.5 to 14.1 m bgl. The Deep Basement will extend into bedrock to a depth of approximately 21.5 m bgl (20 RL m AHD). As such, significant source removal works will be included as part of the proposed development plans;
- The ORWS HHERA Addendum assumes that the SSTC groundwater concentration for naphthalene (900 µg/L) is present across the entire surface area of two basement walls with infiltration and groundwater seepage across 50% of the surface area of the two walls and floor (which is considered to be conservative). Given that the MW08 impact is localised (i.e. surrounding groundwater quality is below the groundwater SSTC-C) and that the bulk of the most impacted soils at the Site (with regards to naphthalene concentrations at the BH117 and BH307) will be removed as part of the proposed Deep Basement works, the localised elevated concentrations of naphthalene reported at MW08 are not considered to pose an unacceptable risk to human health.

Based on the above information, the reported concentrations of naphthalene at MW08 (Area C) are not considered representative of CIM and is not considered to warrant remediation.

6.4 Area D – Development Area (South) Materials to be Unexcavated below Commercial Premises

The presence of CIM in Area D was assessed using soil analytical data from BH094 drilled as part of the ERM (2007) site investigation. The analytical results from soil samples collected from boreholes immediately surrounding Area D (BH306 and BH310 to BH312) have also been referenced as these results are likely to be representative of soil quality in Area D. The borehole locations are presented on **Figure 5**.

6.4.1 Tar Containing Material

No TCM was identified within Area D by the previous investigations.

6.4.2 Soil Analytical Results

The analytical results from soil samples collected and analysed from BH094 in Area D during the ERM (2007) investigation are presented in **Table T11**. The Area D analytical data has been compared to soil SSTC-D to assess materials suitability for the proposed commercial slab on grade development. As described by **Section 5.3.1**, soil SSEC are not applicable for the assessment of potential remediation requirements in Area D.

All CoPCs were reported at concentrations significantly less than soil SSTC-D.

The analytical results from soil samples collected from boreholes immediately surrounding Area D (BH306 and BH310 to BH312) were also considered as being representative of soil quality in Area D (refer to **Table T3**). All CoPCs reported in the 58 analysed soil samples were reported at concentrations significantly less than the soil SSTC-D.

6.4.3 Groundwater Analytical Results

No groundwater monitoring wells are currently located in Area D. The screening for Scenario 8 has been undertaken in the ORWS HHERA Addendum (AECOM 2011c) by comparison of the derived groundwater SSTC-D to BH21/MW21 (which is adjacent to the proposed building location). No exceedances of the groundwater SSTC-D was reported at this location.

As detailed in **Section 16.3.4**, the results of the additional soil investigations to be undertaken in Area D will be used to determine whether an assessment of the groundwater quality is required.

6.4.4 Area D – Identification of CIM

The results of soil analysis from Area D and its surrounds indicate that the reported concentrations of all CoPC were significantly less than soil SSTC-D and are generally below the laboratory LOR.

Based on the available data, CIM has not been identified in Area D and no remediation work is likely to be required. However, as only one borehole is located in Area D (comprising approximately 600 m²), additional validation testing of the soils in this area should be conducted to ensure the sampling density for Area D is sufficient to properly characterise this material (refer to **Section 16.3.4**). Based on the findings of these additional investigations, an assessment of whether CIM is present within Area D will be undertaken in consultation with the NSW OEH Accredited Site Auditor. If required, remediation and subsequent validation works will be undertaken in Area D.

7.0 Remediation Extent

The preferred remediation strategy is to remediate soil contamination which has been demonstrated to represent a source of groundwater contamination and risk to human health or the environment. This approach is supported by the findings of the DGI (AECOM 2010a) and *In situ* Soil and Fill Validation report (2011a), and the recommendations of the ERM RAP (ERM, 2010). The extent of remediation required in accordance with this approach has been assessed by comparing soil and groundwater CoPC concentrations against the relevant SSTCs and SSECs (as discussed in **Section 6.0**).

The extent of soil remediation required to accomplish the goal of source removal at the Site will be predominantly defined by:

- The distribution of CIM determined as an outcome of:
 - An assessment of soil and groundwater concentrations against the SSTCs and SSECs (where applicable, refer to **Section 5.3**); and
 - Implementation of the Remediation Decision Making Process Flow Chart discussed in **Section 5.4.1** and detailed in **Figure 11**.
- Consideration of the proposed basement designs and land uses (refer to **Section 3.2**) and the location of the associated basement groundwater retention wall system; and

The outcomes of this assessment for Areas A to D are detailed in **Section 7.3** to **Section 7.6**.

It should be noted that a RWP will be prepared for the following purposes:

- to provide a technical and staging specification for LLMP and its Remediation Contractor to assist in delivery of the bulk excavation works;
- to provide excavation plans for the Shallow and Deep Basement area bulk excavation works; and
- to detail beneficial reuse and staging options for excavated Area B material with respect to the potential for beneficial reuse in:
 - the Public Domain (South); and/or
 - Headland Park (pending the finalisation of acceptance criteria in the Headland Park HHERA).

Consequently, the RWP will not include any further information regarding confirmation that the Site can be made suitable for the proposed land uses as these conclusions are solely provided within this Amended RAP.

7.1 Development/Remediation Assumptions

The following provides a summary of the key assumptions made in assessing the remediation extent and remediation approach for Area A to Area D at the Site.

- The assumptions detailed in the ORWS HHERA Addendum (AECOM 2011c) and summarised in **Section 5.2.1** on which the SSTCs and SSECs used to identify CIM are based;
- Visual and olfactory observations of soil quality can be used as a guide for the characterisation of soil contamination. This approach is consistent with AECOM experience during remediation of other former gasworks sites and has been validated by the additional characterisation sampling undertaken as part of the ORWS *In Situ* Soil and Fill Validation works (AECOM 2011a, refer to **Section 16.3.1**);
- Basement excavations at the Site will require excavation of fill and potentially some natural soils as described by **Section 3.2**. The final basement design and related Shallow and Deep Basement bulk excavation works will be subject to finalisation and potential development. If the design is changed and affects the assumptions in the ORWS HHERA Addendum and this Amended RAP, the ORWS HHERA Addendum and Amended RAP will be revised, as required, and submitted to the NSW OEH Accredited Site Auditor and the NSW OEH for approval (unless advised otherwise);
- The basement groundwater retention wall system will be keyed into the underlying bedrock around the entire perimeter of the proposed basement area (as detailed in **Section 1.3.2**). Consequently, it is expected that

this system will effectively isolate both the basement car park and any material remaining *in situ* under it (Area C material) from the surrounding ground conditions and Darling Harbour;

- Material that is surplus to the development requirements at the Site, including material generated by the remedial works which is determined to be suitable, may be beneficially reused in the development of the Public Domain (South); and
- Dewatering and treatment of water, where required, will be undertaken as part of the bulk excavation works for the development basements. Appropriate management of surface water generated as part of the earthworks program and soil remediation works will also be required (refer to **Section 14.0**).

It is noted that the remediation strategy will need to be cognisant of, and take into account, the high profile of the development, its proximity to the CBD and the additional scrutiny which the project is therefore likely to receive (refer to **Section 19.0** for details on the proposed approach to Community Engagement).

7.2 Remediation and Development Areas

AECOM has identified that the likely remediation extent required such that the Site is rendered suitable for the proposed land use and does not present an unacceptable risk, will be driven by the remediation of CIM. As such, the proposed extent of remediation (if required) has been determined based on consideration of the reported soil and groundwater concentrations against the relevant SSTCs and SSECs.

Within this context, it is noted that the proposed development will include bulk excavation works for basement construction within the Development Area (South) and the eastern part of the Public Domain (South).

If the practical constraints of remediating identified CIM are considered to outweigh the actual benefits in terms of reduced risk to the environment and/or human health, consideration will also be given to the principles of CUTEP and ESD in defining the extent of remediation.

This assessment is summarised for Areas A to D in the following **Section 7.3** to **7.6** respectively.

7.3 Area A – Extent of Remediation

Based on the analytical data and findings presented in **Section 6.1**, CIM has been identified in Area A based on copper concentrations in soil and groundwater which were reported to exceed the relevant SSECs.

These impacts are not, however, considered to require remediation for the following reasons, which are detailed in the following Sections:

- The limited vertical distribution of copper in soil;
- The reported groundwater quality in Area A;
- The reduction in contaminant mass in hydraulic connection with Darling Harbour; and
- The principles of ecologically sustainable development and remediation practicalities.

7.3.1 Vertical Distribution of Copper in Soil

Further statistical analysis of the vertical distribution of copper concentrations in the Area A fill material was undertaken to assess the likely impacts this metal may be having on the groundwater within Area A which is hydraulically connected to the Harbour. In particular:

- The 95% UCL for copper concentrations in saturated fill materials (below a depth of 2 m, and excluding samples collected from the natural sediments) is 32.6 mg/kg, which is less than the soil SSEC-A^{Sat} of 42 mg/kg (refer to **Table T16**);
- The 95% UCL for all copper concentrations within the fill material is 96.9 mg/kg (refer to **Table T15**), which is less than the soil SSEC-A^{Unsat} of 170 mg/kg; and
- The 95% UCL for copper concentrations in unsaturated fill materials (above a depth of 2 m) is 290 mg/kg which is higher, but in the same order of magnitude, as the soil SSEC-A^{Unsat} of 170 mg/kg.

These results indicate that the higher copper concentrations are predominantly present above the groundwater table where leaching of copper is likely to be minimised by the limited infiltration permitted by the existing, hardstand (which will be retained and perforated as part of the development). The beneficial reuse of material

over the existing hardstand within Area A will further limit infiltration and therefore the potential for leaching of copper from above the groundwater table will also be reduced.

Based on the discussed vertical distribution of copper concentrations in fill material above and below the groundwater table in Area A and the 95 % UCL for copper concentrations in fill material below the depth of groundwater (which are less than the soil SDESC-A^{Sat}), copper is unlikely to represent an ongoing significant source of contamination to the Harbour and therefore remediation based on the reported copper soil and groundwater concentrations is not considered to be warranted.

7.3.2 Groundwater Quality

Copper groundwater concentrations in 3 of the 5 monitoring wells exceeded the SDESC-A (6.5 µ/L). Of these results:

- MW10 (7 µ/L) was almost equal to the SDESC-A (6.5 µ/L);
- MW16 (14 µ/L) was in the same order of the SDESC-A; and
- Only MW18 (79 µ/L) was significantly greater than the SDESC-A.

Copper was not detected at concentrations above the LOR in the other 2 monitoring wells (MW17 and MW20). The median copper concentration (7 µ/L) only marginally exceeded the SDESC-A and is not considered to be significant. Consequently, the Area A copper groundwater concentrations are considered to be broadly consistent with the requirement for median groundwater concentrations (as required by the ORWS HHERA Addendum, refer to **Section 5.4.2**).

7.3.3 Reduction in Mass in Hydraulic connection with Darling Harbour

Implementation of the proposed LLMP development plans (i.e. the construction of the retention wall system and bulk excavation works required in the basement areas) will greatly reduce the currently available contaminant mass (of heavy metals and PAHs) present in the saturated zone and potentially impacting groundwater quality at the Site. In particular, construction of the retention wall system will remove the hydraulic connection between the majority (approximately 75%) of the identified contamination and the environment (Darling Harbour).

In addition, the bulk excavation program is expected to physically remove significant volumes of fill material from the Site as follows:

- **Area B** – contains approximately 196,000 m³ (59% of all fill material at the Site). Of this volume, approximately 146,000 m³ (44% of all fill material at the Site) is currently located below the depth of groundwater and will be removed as part of the basement excavation program.

In summary, construction of the groundwater retention wall system and excavation of a significant quantity of fill material as part of the basement construction are expected to have a beneficial effect on the quality of groundwater within Area A and, subsequently, the quality of groundwater ultimately entering Darling Harbour.

7.3.4 Ecologically Sustainable Development Assessment and Remediation Practicalities

The distribution of copper contamination in soil within Area A would mean that if remediation of Area A was required based on the copper concentrations identified in soil and groundwater above the SDESCs, removal of all fill materials down to the depth of the underlying natural materials (up to approximately 17 m bgl) would likely be required. Such an approach would be both inconsistent with the principles of CUTEP and ESD and impractical because the scope of work would:

- increase the depth and western extent of the retention wall system with associated increases in emissions from the related plant and volumes of concrete required for the construction of the additional 600 mm thick retention wall system;
- significantly increase dewatering requirements in the area of the Site with the greatest depth of fill (i.e. groundwater would need to be dewatered to depths of 15-17 metres depth behind the extended retention wall system to facilitate the required excavation works);
- significantly increase the dewatering, water treatment, earthworks, materials handling, separation and drying requirements, therefore increasing emissions from diesel operated equipment and machinery;

- significantly increase the quantity of excavation required and therefore increase emissions from diesel operated equipment and machinery;
- significantly increase the quantities of materials that require off-site disposal if such materials could not be beneficially reused at Headland Park and/or there was insufficient capacity for it to be reused at the Park;
- inconsistent with the principles of the *Waste Avoidance and Resource Recovery Act* (2001) which seeks to avoid generation of wastes by avoidance (including action to reduce the amount of waste created), resource recovery (including reuse, recycling and reprocessing) and, where required/unavoidable, disposal in the most environmentally responsible manner; and
- increase the potential for fugitive emissions and odours to be generated from the handling of low level contaminated material, therefore increasing the risk of adverse stakeholder concerns.

7.3.5 Asbestos Impacted Soils

As detailed in **Section 6.1.2** asbestos fibres (chrysotile) were detected at four locations in the southern portion of Area A. Three of the sampling locations were located below the depth of groundwater where excavation works are not proposed and where the asbestos impacted material will remain saturated following development. Due to the proposed works to raise Area A levels by 1.0 m, the asbestos detected at a depth of 1.5-1.7 m bgl at BH354 is not likely to be excavated during possible limited excavation works associated with intrusive maintenance works (i.e. this material would be located at a depth of 2.5 m bgl). Consequently, this material is unlikely to be disturbed during the works and no remediation works are required.

7.3.6 Recommended Remediation Extent (Area A)

Based on the information provided above, the identified CIM in Area A (copper) is not considered to pose a significant risk to human health or the environment and therefore is not considered to warrant remediation.

7.4 Area B – Extent of Remediation

All Area B material will be excavated from the Shallow and Deep Basement areas. It is noted that should the development plans for the basement areas be developed further, this will not affect the 'remediation and validation' of the Area B material as it is not a specific Site area which requires validation as part of this RAP.

Based on the analytical data and findings presented in **Section 6.2**, CIM that will not be suitable for beneficial reuse within the Public Domain (South) (Area B) has been identified based on heavy metals (specifically copper, lead and zinc) and PAHs (anthracene and phenanthrene in particular) concentrations in soil which were reported to exceed the relevant soil SSTC-B and SSEC-B. Remediation of contaminated Area B excavated material may therefore be required to facilitate beneficial reuse of some materials in the Public Domain (South).

As detailed in **Section 3.4.15**, asbestos cement fragments were noted in the eastern part of the Site. These materials will be managed appropriately and the areas validated in accordance with **Section 20.6**.

7.5 Area C - Remediation Requirements Assessment

Based on the analytical data and findings presented in **Section 6.3.4** CIM has not been identified in Area C.

7.6 Area D - Remediation Requirements Assessment

Based on the analytical data and findings presented in **Section 6.4** CIM has not been identified in Area D.

However, as noted in **Section 6.4**, additional samples should be collected from this Area to ensure that the material to remain *in situ* is properly characterised in accordance with **Section 16.3.4**. Based on the findings of these additional investigations, an assessment of whether CIM is present within Area D will be undertaken in accordance with the process described in **Section 5.4** and **Section 16.3.4** and in consultation with the NSW OEH Accredited Site Auditor. If required, remediation and subsequent validation works will be undertaken in Area D.

7.7 Remediation Requirements Compared to ORWS HHERA Addendum Conclusions

The Conclusions of the ORWS HHERA Addendum (AECOM, 2011c), identifies soil and/or groundwater CoPC concentrations which exceed the SSTCs for the various land use scenarios in localised areas of the Site. It is noted, however, that not all of the land use scenarios described by the ORWS HHERA Addendum will apply to all areas of the Site. In consideration of this, **Table 14** below clarifies whether, in the context of the proposed LLMP development and associated the Shallow and Deep Basements, remediation of these identified areas is required.

Table 9 Identified Areas of Concern and Assessment of Required Remediation Works

Identified Area of Concern (taken from ORWS HHERA Addendum Conclusions)	Is remediation (in addition to the proposed bulk excavation works) required?
a) <i>Scenario 1 (Lower Basement): Reported maximum concentrations of naphthalene in groundwater have the potential to result in an unacceptable human health risks from vapour inhalation in the basement airspace.</i>	No remediation works are required based on Scenario 1 as the identified impacts will be removed as part of the Deep Basement works (refer to Section 7.5).
b) <i>Scenario 2 (Upper Basement): Reported maximum soil concentrations of benzene, 1,2,4-trimethylbenzene and naphthalene have the potential to result in unacceptable human health risks from inhalation of vapours in indoor air spaces. It should be noted however that these exceedances were at reported at depths greater than 13 m bgl and are not considered likely to remain in place following basement development. Reported groundwater concentrations of naphthalene exceeded SSTC in a single location (BH08/MW08). Current LL development plans indicate that this location will be excavated to approximately 20 m bgl. The location of this groundwater exceedance, along with the installation of a groundwater retention wall system is assumed to reduce contaminant concentrations in groundwater at the Site.</i>	No remediation works are required based on Scenario 2 as the identified impacts will be removed as part of the Deep Basement works (refer to Section 7.5).
c) <i>Scenario 5 (Commercial Slab on Ground): Reported maximum soil concentrations of naphthalene within the Block 3 (BH08/MW08) have the potential to pose unacceptable human health risks from vapour intrusion into indoor air. It should be noted that the exceedances were reported at depths greater than 15 m bgl and are within areas that the current LL development plans indicate to be basement carparking areas and thus commercial slab on ground buildings are unlikely to be built over these locations.</i>	No remediation works are required based on Scenario 5 as the identified impacts will be removed as part of the Deep Basement works (refer to Section 7.5).
d) <i>Scenario 6 (Intrusive Maintenance): Reported sum total concentrations of carcinogenic PAHs have the potential to pose unacceptable human health risks within Blocks 1-3 at one location BH20 (1.0-1.2 m bgl). The maximum reported groundwater concentration of benzene reported at a single location (BH08/MW08) has the potential to pose an unacceptable human health risk. However the locations where soil and groundwater exceedances were reported are in areas of the Site that are proposed to be excavated for construction of a basement carpark. Therefore it is considered unlikely that intrusive maintenance workers will be exposed to unacceptable chemical concentrations in soil or groundwater.</i>	No remediation works are required based on Scenario 6 as the identified impacted soils at BH20 will be excavated as part of the Shallow Basement works and the impacts at depth at BH08/MW08 will be excavated as part of the Deep Basement works (refer to Section 7.5).
e) <i>Scenario 7 (High Density Residential): Reported maximum soil concentrations of naphthalene have the potential to pose unacceptable human health risks. Reported soil exceedances were at depths greater than 15 m bgl and were not considered likely to pose a risk to residential receptors following excavation of basement areas.</i>	No remediation works are required based on Scenario 7 as the impacted soils at BH117 will be excavated as part of the Deep Basement works and the impacts at BH37 (22.2 m bgl) will be located at depth below the Shallow Basement area.
f) <i>Scenario 8 (Commercial Slab on Ground - with advection): The</i>	No remediation works are

Identified Area of Concern (taken from ORWS HHERA Addendum Conclusions)	Is remediation (in addition to the proposed bulk excavation works) required?
<i>comparison of available soil and groundwater data in and surrounding the proposed area of the Site (south east corner) where Scenario 8 (multi storey commercial slab on grade) is considered to be relevant indicates that no exceedances of the SSTCs were reported.</i>	required based on Scenario 8 based on limited available data. However, additional validation works are required in this area (refer to Section 16.3.4).

8.0 Remedial Technology Assessment

A wide range of technology options were considered for remediation of CIM that may be expected to be encountered during the proposed bulk excavation works in accordance with the nominated SSTCs and SSERCs and objectives. This technology assessment also considers the potential remediation of excavated materials which, based on available analytical data, would require remediation to facilitate beneficial reuse of material at Headland Park and/or other Barangaroo site areas (pending the outcomes of the Headland Park RAP).

This section describes the Remedial Technology Assessment process which was applied by AECOM and Lend Lease towards selection of the preferred remediation alternative(s) described by this section. In undertaking this evaluation, AECOM and Lend Lease were cognisant of the fact that the most cost-effective and sustainable remediation approach may be a combination of one or more individual remedial technologies.

As described above the SSTCs and SSERCs and remediation extent are focussed on removal, to the extent practicable, and management of materials which represent a source of groundwater contamination (CIM) or risk to human health and/or the environment. Therefore, the remedial technology assessment was focussed primarily on soil remediation technologies.

The remedial technology assessment process involved the following phases:

- **Identification of Remedial Technology Options** – a review of the primary information sources to identify potential treatment technologies for the Site;
- **Screening of Remedial Technology Options** – an initial comparison of all identified technologies to assess their suitability for implementation at the Site; and
- **Assessment of Remedial Technology Options** – a more detailed review of the highest rating technologies from the screening stage, against the key remediation objectives.

The remedial technology assessment has also drawn on previous direct experience that Lend Lease and members of the AECOM project team has had at The Bond and other remediation projects.

8.1 Identification of Remedial Technology Options

A review of primary information sources identified more than twenty remedial technology options that were potentially applicable to the remediation of the identified contaminated soils at the Site. The remediation technology options identified are presented in **Table T18** and summarised following.

8.1.1 In-situ remedial technologies

- In-situ Stabilisation or Solidification;
- In-situ Chemical Oxidation;
- Thermal Conductive Heating;
- Monitored Natural Attenuation;
- Soil Vapour Extraction;
- In-situ Enhanced Bioremediation;
- In-situ Containment;
- Phytoremediation;
- Electrical Resistive Heating;
- In-situ Vittrification;
- In-situ Steam Stripping;
- Surfactant and/or co-solvent injection; and
- Permeable reactive barrier.

8.1.2 Ex-situ remedial technologies

- Ex-situ Stabilisation or Solidification;
- Ex-situ Thermal Desorption;
- Co-burning;
- Asphalt batching;
- Ex-situ Bioremediation (biopiles, bioreactor and landfarming);
- Ex-situ chemical oxidation;
- Soil Washing;
- Supercritical Water Oxidation; and
- Electrokinetics.

8.2 Screening of Remediation Technologies

Based on AECOM's current understanding of the soil and groundwater contamination at the Site, the identified remedial technologies were screened in consideration of the following key parameters. A weighting factor, as summarised below, was assigned to each of the key parameters following a review process with Lend Lease and AECOM. A score ranging from 1 (low) to 5 (high) was then assigned to each of the key parameters for each of the identified remedial technologies (note that in the case of the financial category, a higher ranking relates to a lower cost alternative). The total score for each remedial technology was then calculated by summing the product of the weighting factor and score for each key parameter.

8.2.1 Feasibility of the Remediation Technology

- Sustainability (35%) - refer to **Section 8.2.2** for details.
- Technical constraints (30%) – including:
- Applicability of the technology to the identified contamination (specifically type, location, quantity and concentration);
- Ability of the technology to achieve the required SSTCs and SSESCs; and
- Acceptance of technology by local and international remediation practitioners and regulators (including anticipated regulatory acceptance);
- Financial (15%) – relative cost of implementing the technology at the Site including capital costs associated with equipment purchase and commissioning and continuing costs associated with operation, maintenance and water treatment/disposal;
- Logistical (10%) – additional factors that may limit the ability to implement the technology within the particular constraints of the Site, the associated development, and the surrounding land uses; and
- Timing (10%) – timeframe required to complete feasibility assessments, pilot trials and design of remediation system, and duration required until achievement of the SSTCs and SSESCs.

8.2.2 Sustainability of the Remediation Technology

- Resource Use (6%) – specifically energy and water;
- Waste Generation (6%) – production of by-products requiring further treatment or management for appropriate disposal;
- Material Reusability (6%) – potential for reuse or recycling;
- Carbon dioxide (CO₂) Generation (6%) – resulting from emissions during the remedial works;
- Community Impact (6%) – including likelihood of community acceptance of proposed strategy, community impact during the remedial works, and continuing impact from legacies remaining upon conclusion of the remediation; and

- Ongoing Management and Risk (5%) – continuing short term and long term maintenance and monitoring obligations and the risk of additional remedial works being required into the future.

8.2.3 Screening Outcomes

The results of the screening assessment are presented in **Table T18**.

As an outcome of the screening assessment, many of the remedial technologies were discounted from further detailed consideration. Technologies were typically eliminated from further consideration on the basis that they:

- Are not suitable for the identified contaminants of concern;
- Are impractical in the context of addressing the identified contamination; or
- Have a very high cost in comparison with other technologies.

Those technologies which were considered to be potentially suitable, based on the nature of the identified soil contamination and the screening assessment, were evaluated in more detail against each of the remediation objectives. Based on the initial screening process, seven remediation technologies were selected for further detailed consideration as follows:

- 1) Excavation and Ex-Situ Thermal Desorption (on-site): Desorption and/or destruction of organic contaminants in excavated soil by heating, usually by a direct heating thermal unit;
- 2) Excavation and Ex-Situ Thermal Desorption (off-site): Desorption and/or destruction of organic contaminants in excavated soil by heating, usually by direct heating thermal unit. Requires transport of materials to an off-site thermal desorption facility;
- 3) Excavation and Ex-Situ Stabilisation (on-site): Encapsulation of contaminant by ex-situ blending with chemical binders to immobilise contaminants of concern. Stabilised material could be disposed off-site or re used on-site;
- 4) Excavation and surfactant enhanced ex-situ chemical oxidation (S-ESCO): Treatment of organic compounds by dissolving tar materials using a surfactant and then oxidising the resulting tar and surfactant mixture; and
- 5) Physical Containment: Containment or capping of contaminated soil to prevent or significantly reduce contaminant migration and to prevent human and environmental exposure.

8.3 Assessment of Remedial Technology Options

The four remedial technologies selected based on the screening assessment were each subjected to a more detailed assessment against the key remediation objectives for the Site, namely:

- Ability to reduce potential risks to human health or the environment; and
- Ability to facilitate the proposed future land use.

8.3.1 Excavation and Ex-Situ Thermal Desorption (on-site)

This process heats excavated waste materials to high temperatures that will volatilise water and organic contaminants. Thermal desorption employs mechanical tumbling and heating to drive the organics from the soil into the gas phase. Temperatures and residence times are designed to volatilise selected contaminants, but not oxidize them. Waste gases are further oxidised in a secondary combustor and other wastes are treated or sent to a licensed facility for destruction.

Factors that may limit the applicability and effectiveness of a thermal desorption system include particle size requirements for handling, presence of fine grained clay and silty soils, high organic content, high metals content, high moisture content, presence of tarry soils/sediments and presence of abrasive material.

Significant materials handling including separation, dewatering, and drying would be required prior to thermal desorption of contaminated material. A pilot or demonstration project would likely be required to demonstrate the efficacy of the approach. Residual waste streams would also require further treatment which would increase treatment costs. Finally, it is considered highly unlikely that an on-site thermal desorption facility located on-site and adjacent to the Sydney CBD would receive regulatory or community endorsement. Thermal desorption is highly energy intensive and, depending on the treatment methods adopted to manage waste by products, will result in significant CO₂ emissions.

8.3.2 Excavation and Ex-Situ Thermal Desorption (offsite)

Section 8.3.1 provides a description of the thermal desorption process which is applicable to thermal desorption implemented both on-site and off-site.

The key difference between on-site and off-site thermal desorption is the likelihood of regulatory and community endorsement. It is considered more likely that regulatory approval of a thermal desorption facility would be received if established off-site. However, additional logistical limitations associated with the transport of large quantities of contaminated soil either through CBD streets or via Sydney Harbour would likely significantly inhibit the validity of this alternative.

8.3.3 Excavation and Ex-situ Stabilisation or Solidification

Ex-situ Solidification or Stabilisation reduces the mobility of contaminants through both physical and chemical means. Stabilisation or Solidification does not destroy the contaminants but alters the conditions of the material such that risks are significantly reduced. The main changes are reduced permeability of the treated mass and decreased mobility of the contaminants. The geotechnical properties are also improved.

Chemical additives (i.e., Portland Cement, lime, organic polymers, silicates, flyash, slag, kiln dust) are added to the contaminated matrix to limit the waste's solubility and mobility, and lower its toxicity. This technology can be applied ex-situ, by excavating and mixing the materials with the solidifying/stabilising agent and then placing the solidified material in an appropriate location. Soil is excavated, screened to remove materials too large to be effectively treated and its moisture content amended to suit treatment. The chemical additives are blended into the soil typically using a pugmill.

Stabilisation or Solidification can treat a broad range of contaminants including petroleum hydrocarbons, PAHs and metals. In-situ and ex-situ Stabilisation or Solidification processes have been used extensively in North America and Australia to address high levels of contaminants at former manufactured gas plants. Of specific relevance is the previous remediation of the adjacent Bond development in Hickson Road by Lend Lease in 2002, which successfully utilised ex-situ stabilisation / solidification to treat gas works waste, including tar, from the same gas works as is present within Blocks 4, 5 and Hickson Road. For the Bond remediation, approximately 13,000 tonnes of contaminated material were excavated and treated, including 1000 tonnes removed from the 9m deep gasholder annulus trench.

Depending on the quality of the treated material, capping and containment of the stabilised or solidified material can be undertaken to facilitate future land use.

Future monitoring may be required should the stabilised or solidified material be placed on-site or on Headland Park, to assess ongoing groundwater conditions.

A bench scale trial (EnviroPacific, 2010) which addressed the potential implementation of ex-situ stabilisation has been prepared in support of its implementation at the Site. In summary, the bench scale trial concluded that:

- Ex-situ stabilisation of impacted materials could be undertaken to a standard which would facilitate offsite disposal. If stabilisation of excavated material is required to facilitate offsite disposal, an Immobilisation Approval may be sought from the NSW OEH and would be included in the RWP. The recommended treatment regimes would include Portland cement and fly ash.
- Should beneficial reuse of material in Headland Park be an option, the suitability of ex-situ stabilisation for the treatment of material for beneficial reuse within Headland Park would be dependent on acceptance criteria for Headland Park (to be prepared by the BDA). Specific considerations include whether:
 - the acceptance criteria will incorporate a UCS requirements; and
 - whether the acceptance criteria will incorporate leachability based criteria.
- Subject to confirmation of the acceptance criteria, it is expected that treatment by stabilisation could achieve a standard suitable for beneficial reuse for materials with "low" to "moderate" gasworks impacts. It may not be possible to achieve the required acceptance criteria for beneficial reuse of materials with "high" gasworks impacts. The recommended treatment regimes included various combinations of the proprietary product RemBind FO and Portland cement; and
- Ex-situ remediation approaches, including stabilisation or solidification, are consistent with the proposed development regime for the Site which requires excavation of the Shallow and Deep Basements.

8.3.4 Excavation and Surfactant Enhanced Ex-situ Chemical Oxidation

Chemical oxidation converts hazardous contaminants to non-hazardous or less toxic compounds that are more stable, less mobile, and/or inert. The oxidizing agents most commonly used are ozone, hydrogen peroxide / Fenton's Reagent (including modified Fenton's Reagent), permanganates, hypochlorites, chlorine, sodium persulphate, and chlorine dioxide. Chemical oxidation has been used on a number of sites to address chlorinated solvents, petroleum hydrocarbons and "by-product like material" (tar) associated with former manufactured gas works plants.

The presence of separate phase product (tar) is sometimes considered to be a factor which limits the applicability of chemical oxidation. The key challenges with the remediation of tar using ISCO are:

- Oxidant demand/dose requirements – the majority of the tar mass at the former gas works site is non-target hydrocarbons as opposed to specific chemicals of concern which otherwise drive the remediation. As a result, in the case of highly saturated tar, a relatively large oxidant dose is required making chemical oxidation less cost effective than it might otherwise be for lower saturation NAPL;
- Delivery and heterogeneity – in the case of highly saturated tar, the relative permeability of the tar will be lower than the surrounding strata making it difficult to ensure delivery of the oxidant to the tar;
- An additional risk, sometimes attributed to the remediation of tar using ISCO is the precipitation of metals, such as iron, as a result of the oxidation process and encrusting on the outside of the tar. This is not considered to be a significant issue, rather the key challenge is the relative permeability of the tar to the surrounding strata.

Each of these challenges can be addressed through the use of surfactant enhanced chemical oxidation.

Surfactant enhanced chemical oxidation is a innovative technology which has successfully been implemented at former gas works sites in both *in situ* and *ex situ* applications. The process works by emulsifying the tar material using a surfactant and then oxidising the resulting tar and surfactant emulsion.

The *ex-situ* nature of the surfactant enhanced *ex situ* remediation (S-ESCO) and the ability to physically amend the material prior to treatment reduces the reliance on the surfactant enhancement. Soil is excavated, screened to remove materials too large to be effectively treated and its moisture content amended to suit treatment. Chemical dosing of the soil (chemicals including the surfactant, oxidant and catalyst) is accomplished in parallel with physical mixing using specially designed injection equipment. The rate of chemical dosing can be adjusted to accommodate variations in the feed material quality and contaminant concentration. The combination of chemical dosing and physical mixing provides a greater degree of confidence in comparison to *in-situ* approaches. Treatment of the contamination (i.e. conversion of hazardous contaminants to non-hazardous compounds) takes place within a week of chemical dosing and mixing. The treated material is generally non-odorous and has the same geotechnical properties as the un-treated material (with the exception of having a higher moisture content).

A bench scale trial (VeruTEK, 2010) which addressed the potential implementation of S-ESCO (and surfactant enhanced *in situ* chemical oxidation) has been prepared in support of the implementation of S-ESCO at the Site. In summary, the bench scale trial concluded that:

- S-ESCO™ batch tests on materials from Block 4 (selected as being representative of material impacted by gasworks residues) proved to be effective with alkaline activated persulfate, as well as Fe-TAML catalysed peroxide. In particular, up to an 81% reduction of CoPCs was achieved with alkaline persulfate, and an 89% reduction of CoPCs was achieved with Fe-TAML peroxide.
- Given these tests ran for only 14 days, the effectiveness of S-ESCO would be expected to improve to near complete destruction during full scale implementation when the treatment process would last for about 1 month.
- An increased peroxide dose in the treatability tests resulted in more rapid treatment using the S-ESCO process.

SESCO is consistent with the proposed development regime for the Site which requires excavation of basements founded at or deep within bedrock in Blocks 1 to 3.

8.3.5 Physical Containment

Physical containment involves the construction and placement of barriers that sever the pathway between the contaminant source and the receptor. Containment barriers may be placed around its perimeter, as a cover, or in

all of these areas, as dictated by site-specific conditions. Containment barriers can be constructed of clean materials, impermeable clay layers, and/or geomembranes.

Subsurface barriers, such as sheetpiles and bentonite clay walls, can also be used to contain groundwater, NAPLs and vapours. Monitoring systems are required to detect contaminant leaching and to ensure the continued integrity of the barrier systems.

Although physical containment does not remove or destroy the contamination, containment technologies can effectively manage exposure risks, can be implemented in a timely manner, and are generally economical. Physical containment technologies have been selected for use at other former manufactured gas works sites within Australia and around the world.

Physical Containment would contain, but not destroy, the identified contamination. Notwithstanding, it is considered unlikely that physical containment alone would be considered acceptable by regulators nor would containment satisfactorily address the DECCW (now the NSW OEH) declaration of investigation/remediation area.

Physical containment is consistent with the proposed development of the Headland Park which, it is understood, will require significant volumes of fill material for it to be regraded to match the original headland topography.

9.0 Preferred Management Strategy

Based on the available information, as described above, AECOM has identified that the preferred strategy for rendering the Site suitable for the proposed land use should be focussed on:

- Excavation of the proposed basement bulk excavations, including removal CIM (if identified) as part of the proposed excavations;
- Physical containment of Area A material remaining *in situ* below the proposed car park basements by the basement groundwater retention wall system; and
- Beneficial reuse of material, to the extent possible, within the Public Domain (South); and
- Offsite disposal of material that is surplus to the requirements of the ORWS development to licensed landfill (including treatment if required).

As described by **Section 5.2.4.2** an additional alternative may be the beneficial reuse of excavated materials in either the Headland Park or the Barangaroo Stage 2 Public Domain. If this alternative is available, an Addendum to this Amended RAP will be prepared documenting the proposed approach, including treatment methodology, and submitted to the NSW OEH Accredited Site Auditor and the NSW OEH for approval (unless advised otherwise).

In recommending the preferred management strategy, consideration has been given to the fact that the proposed development will include bulk excavation works in the Shallow and Deep Basement areas of the Site.

The recommended and preferred management strategy for the Site is summarised in the following sections.

9.1 Area A - Preferred Management Strategy

No CIM warranting remediation or management has been identified in Area A (refer to **Section 7.3**).

Therefore, noting that no significant excavation works are currently proposed within Area A as part of the development, the preferred strategy for Area A is:

- construction of the basement groundwater retention wall system;
- excavation as required by the proposed development (likely to be small volumes only);
- beneficial reuse of Area B material in Area A (i.e. landscaped areas in the Public Domain [South]) subject to compliance with the SSTC-B and SDESC-B;
- treatment of excavated Area A material (if required) to facilitate off-site disposal to licensed landfill;
- off-site disposal of excavated Area A material to licensed landfill (if required, subject to classification in accordance with the NSW DECC (2008) *Waste Classification Guidelines*);
- retention of all remaining Area A material *in situ* (i.e. in between the existing caisson wall and the basement groundwater retention wall system); and
- beneficial reuse of Area B material excavated from the basement excavations in the Public Domain (South) by raising the ground elevation by 1.0 m. Note the upper 0.5 m of material to be reused within the Public Domain (south) must comply with the Terrestrial Soil Criteria (refer to **Table T17** and **Section 5.2.4.1**).

It is expected, based on the available information, that the majority of excavated material (if required during the Public Domain development works) will be suitable for placement in Public Domain (South) with only limited treatment (if any). However, this will require confirmation following validation of the excavated material in accordance with **Section 16.3.2**.

9.1.1 Strategy Summary

The strategy for the preferred management actions in Area A (in the event that limited excavation of materials is required) is summarised following:

- Assessment of excavated Area B materials against soil SSTC-B and SDESC-B detailed in **Table T1** to determine whether the material can be beneficially reused within the Public Domain (South) and potentially other Public Domain Areas (pending finalisation of site specific remediation goals);
- Physical separation of recyclable and oversize material, including timber, rock, concrete, steel and brick, from contaminated material;
- Stockpiling of material for processing and beneficial reuse (where required);
- If excavated Area A materials require treatment or off-site disposal, treatment via ex-situ stabilisation/solidification and/or S-ESCO will be undertaken and the material's suitability assessed via validation testing. Selection of the final treatment approach (that is ex-situ stabilisation / solidification or S-ESCO) will be dependent on a range of considerations including: the type of contamination that requires treatment (for example, S-ESCO is not suitable for remediation of heavy metals contamination); the quantity of material requiring treatment; the end use of the treated material (for example, off-site disposal to landfill or beneficial reuse within Barangaroo); the timing of the material treatment, relative the overall remediation works; and, the requirement for treatment (if any) of materials originating from remediation of other areas within Barangaroo South, outside the Site. It is anticipated that a decision regarding selection of the preferred treatment approach will be made during detailed excavation planning for the various stages of remediation works and/or as part of any applications that may be required for off-site landfill disposal (eg. immobilisation approval);
- Off-site disposal of Area A materials that are: considered unsuitable for beneficial reuse; or, for which insufficient capacity is available for reuse; and
- Groundwater monitoring and assessment of groundwater CoPC concentrations against the relevant MWQC in accordance with a GMP (refer to **Section 16.4.2**).

9.1.2 Reasons for Strategy Selection

Feasibility

- If materials are excavated in Area A, it is anticipated that most materials removed will be suitable for beneficial reuse in the Public Domain (South);
- If required, either ex-situ stabilisation/solidification and/or S-ESCO is likely to be the most practical, cost effective, and established remediation technology for management of the excavated material based on the type of contaminants identified in the DGI (AECOM 2010a) and *in situ* validation report (AECOM, 2011d);
- The Public Domain (South) is to be developed open space with community, mixed commercial and retail land use, and landscaping (planter boxes, paved areas and parkland). Excavation of the public space is not necessarily required to facilitate this end land use;
- Retention of the existing concrete and asphalt hardstand and caisson structures, will effectively manage potential exposure pathways for future site users and the environment to the underlying material;
- Retention of Area A material in-situ is considered the most practical and cost effective remediation technology for materials not otherwise requiring excavation as part of the development based on the type of contaminants anticipated and the risk they represent to human health and the environment; and
- Retention of Area A material in-situ has been successfully implemented on a number of previously remediated foreshore sites around Sydney Harbour.

Sustainability

The nominated strategy is considered a sustainable solution to management of the identified CIM within the Area A because:

- The retention of material in-situ in conjunction with excavation as required by the development works will:
 - minimise earthworks, materials handling, separation, dewatering and drying requirements, therefore minimising emissions from diesel operated equipment and machinery and the overall carbon footprint for the development;
 - minimise fugitive emissions and odours from handling of contaminated material, therefore minimising the risk of adverse stakeholder concerns. It will minimise the quantities of material that requires off-site disposal to landfill; and

- appropriately manage the risks that the CIM within Area A represents (specifically exposure to environmental receptors) without unnecessary and resource intensive remediation works.
- If required, excavation and ex-situ remediation works followed by beneficial reuse will:
 - Utilise equipment and infrastructure also required for the development and remediation of other parts of the Barangaroo Stage 1 Development, therefore minimising duplication and maximising utilisation of the required equipment;
 - Maximise the opportunity for recycling and reuse of material through segregation of oversize materials, timber and steel, etc; and
 - minimise waste disposal to landfill, therefore minimising: CO₂ emissions through reduced transport requirements; and, community impacts by reducing vehicle movements.

9.2 Area B – Preferred Management Strategy

To achieve a sustainable solution for Barangaroo, a key component of the management strategy for the Site is to maximise the reuse of Area B materials excavated as part of the Shallow and Deep Basement bulk excavation works. To achieve this, the following opportunity for beneficial reuse has been identified:

- The Public Domain (South) which will be raised in elevation by approximately 1 m as part of the development.

Additionally, and as described by **Section 5.2.4.2**, there may be an opportunity to also beneficially reuse excavated in either:

- 1) The Headland Park at Barangaroo which may require significant volumes of fill to create the new, elevated topography;
- 2) The Public Domain (North) which will be raised in elevation by approximately 1 m as part of the development; and
- 3) The Public Domain to Barangaroo Central, which is proposed to be raised in elevation by approximately 1 m.

The entire Barangaroo development has the potential to realise significant gains by applying a strategy of transferring suitable material removed from the Stage 1 Development to the Headland Park and Public Domains. This will minimise the off-site disposal of material from the Stage 1 Development. However, it should be noted that the option for the beneficial reuse of material outside of Barangaroo South has not yet been confirmed.

Accordingly, the preferred management strategy for the management of excavated material from Area B involves:

- construction of the basement groundwater retention wall system;
- excavation as required to remove identified CIM and for the proposed development (shallow and deep basements);
- Beneficial reuse of material, to the extent possible, within the Public Domain (South) subject to compliance with the SSTC-B and SSEC-B;
- Treatment of excavated material (if required) to facilitate off-site disposal to licensed landfill;
- where the volume of excavated Area B fill material exceeds the available capacity of the Public Domain (South), the material will be disposed of to licensed landfill (subject to classification in accordance with the NSW DECC (2008) *Waste Classification Guidelines*).

It is assumed that only material that can be beneficially reused in the Public Domain (South) without treatment will be reused in this area. It is expected, based on the available information, that up to approximately 50% of excavated material from Area B will be suitable for placement in Public Domain (South) without treatment.

9.2.1 Strategy Summary

The strategy for the management of the beneficial reuse of materials from Area B in Public Domain (South) is summarised as following:

- Excavation of basements as required for the development, including visual and olfactory observations during excavation, to confirm its suitability for beneficial reuse as Area B material (refer to **Section 5.2.4** and **Section 16.3.2**);

- Physical separation of recyclable and oversize material, including timber, rock, concrete, steel and brick, from other material;
- Stockpiling of material for processing and beneficial reuse (where required);
- Any Area B excavated material generated by the basement excavations and over-excavation (if required), that meets the SSTC-B and SDESC-B, will be beneficially reused in the Public Domain (South) – subject to capacity limitations;
- If excavated Area B materials require treatment for off-site disposal, treatment via ex-situ stabilisation/solidification and/or S-ESCO will be undertaken and the material's suitability assessed via validation testing. Selection of the final treatment approach (that is ex-situ stabilisation / solidification or S-ESCO) will be dependent on a range of considerations including: the type of contamination that requires treatment (for example, S-ESCO is not suitable for remediation of heavy metals contamination); the quantity of material requiring treatment; the end use of the treated material (for example, off-site disposal to landfill or beneficial reuse within Barangaroo); the timing of the material treatment, relative the overall remediation works; and, the requirement for treatment (if any) of materials originating from remediation of other areas within Barangaroo South, outside the Site. It is anticipated that a decision regarding selection of the preferred treatment approach will be made during detailed excavation planning for the various stages of remediation works and/or as part of any applications that may be required for off-site landfill disposal (eg. immobilisation approval); and
- Off-site disposal will be undertaken for material that exceeds the available capacity of the Public Domain (South) and/or, are considered unsuitable for beneficial reuse.

9.2.2 Reasons for Strategy Selection

Feasibility

- The placement of treated material within the Public Domain (South), or other Barangaroo Public Domains, in accordance with the SSTC-B and SDESC-B (in the case of the Public Domain (South)) or other risk based remediation criteria developed for the Barangaroo Central Public Domain is technically sound and will not impact on land use within the Public Domains.
- The beneficial reuse of treated material has been successfully implemented as part of remediation projects at a number of former industrial sites within Sydney (including the Allied Feeds and Lednez sites at Rhodes, with which AECOM personnel have had direct involvement as the NSW OEH Accredited Site Auditor);
- If required, either ex-situ stabilisation/solidification and/or S-ESCO is likely to be the most practical, cost effective, and established remediation technology for treatment of the excavated material prior to off-site disposal, based on the type of contaminants identified in the DGI (AECOM 2010a) and *in situ* validation report (AECOM, 2011d); and
- With respect to the option for the beneficial reuse of material within the Headland Park (or the Barangaroo Central Public Domain), if it is available:
 - The Headland Park RAP and associated risk assessment will use an established process to calculate contaminant concentration thresholds which do not represent an unacceptable risk to human health or the environment if placed in Headland Park;
 - The placement of treated material within Headland Park, in accordance with the findings of the Headland Park RAP, is technically sound and will not impact on land use at Headland Park. Reuse of suitable treated material is consistent with the current Modification to a Major Projects Application by SHFA for the Headland Park (MP 06-0162), which contemplates containment of any existing Headland Park contamination on-site;

Sustainability

The nominated strategy of beneficial reuse of excavated materials in the Public Domain (South) (and other areas if available) is considered a sustainable solution due to the following considerations:

- It will reduce the quantities of materials that require off-site disposal;
- It will minimise earthworks and materials handling requirements, therefore minimising emissions from diesel operated equipment and machinery;

- It maximises the opportunity for recycling and reuse of material through segregation of oversize materials, timber and steel, etc; and
- It will minimise the carbon footprint of the overall Barangaroo re-development.

It should also be noted that off-site disposal of material (including excavation spoil which is essentially "clean") under the NSW DECC (2008) *Waste Classification Guidelines* will require that the material be classified as a waste. Further, if treatment of the waste is required prior to off-site disposal to landfill, it will be necessary to apply for and receive an Immobilisation Approval from the NSW OEH prior to treatment and disposal of the waste.

9.3 Area C – Preferred Management Strategy

No CIM warranting remediation or management has been identified in Area C (refer to **Section 7.5**).

Therefore, the preferred management strategy for Area C is:

- construction of the basement groundwater retention wall system;
- excavation of Area B overlying Area C material as required by the proposed development and management of the excavated material as described in **Section 9.2**; and
- retention of all Area C material that does not require excavation as part of the proposed development *in situ* (i.e. within the basement groundwater retention wall system and below the Shallow Basement car park).

9.3.1.1 Strategy Summary

The management strategy in Area C is summarised following:

- Assessment of groundwater quality against the groundwater SSTC-C;
- Excavation of basements as required for the development, including visual and olfactory observations during excavation, and management of the excavated material as described in **Section 9.2** including confirmation of its suitability for beneficial reuse as Area B material (refer to **Section 5.2.4** and **Section 16.3.2**);

9.3.1.2 Reasons for Strategy Selection

Feasibility

- The basement design requires excavation of Area B material overlying Area C as required for the Shallow Basement excavation works. Consequently, as discussed in **Section 7.3.3**, a large volume of Area B material (including material that has been identified as CIM) is being removed as part of the bulk excavation works.

Sustainability

The nominated management strategy is considered a sustainable solution to management of the identified the localised area of naphthalene CIM adjacent to Area C because:

- It will utilise equipment and infrastructure also required for the Shallow and Deep Basement bulk excavation works, therefore minimising duplication and maximising utilisation of the required equipment;
- It maximises the opportunity for recycling and reuse of material through segregation of oversize materials, timber and steel, etc; and
- The reuse of material in Public Domain (South) will minimise waste disposal off-site therefore minimising: CO₂ emissions through reduced transport requirements; and Community impacts by reducing vehicle movements.

9.4 Area D – Preferred Management Strategy

As described in **Section 7.6**, and based on the limited available soil and groundwater analysis results within and adjacent to Area D, remediation is not considered likely to be warranted in this area. However, additional validation sampling is required to demonstrate this (refer to **Section 16.3.4**).

Therefore, the preferred management strategy for Area D is:

- Collection of additional soil validation samples to adequately characterise soil quality within Area D (refer to **Section 16.3.4**)

- If the results of the soil validation program confirm that the concentrations of CoPCs in Area D are less than the soil SSTC-D and that the groundwater concentrations within Area D are likely to be consistent with those already reported:
 - Additional validation against the groundwater SSTC-D will not be warranted; and
 - No further remedial works will be required
- If the results of the soil validation program indicate that the concentrations of CoPCs in Area D are greater than the soil SSTC-D and that groundwater concentrations within Area D may be greater than those already reported:
 - Additional groundwater investigations to facilitate validation against the groundwater SSTC-D will be undertaken (refer to **Section 16.3.4**); and
 - The CIM identified by the soil validation program will be remediated.
- retention of all material that does not require excavation as part of the proposed development *in situ* (i.e. below the proposed slab on grade development).

9.4.1 Strategy Summary

The management strategy in Area D is summarised following:

- Confirmation of the presence, or otherwise, of CIM through collection of additional soil validation samples to adequately characterise soil quality within Area D (refer to **Section 16.3.4**)
- If the results of the soil validation program indicate that the concentrations of CoPCs in Area D are less than the soil SSTC-D:
 - Additional validation against the groundwater SSTC-D will not be warranted; and
 - No further remedial works will be required.
- If the results of the soil validation program indicate that the concentrations of CoPCs in Area D are greater than the soil SSTC-D and that the groundwater concentrations within Area D may be greater than those already reported:
 - Additional groundwater investigations to facilitate validation against the groundwater SSTC-D will be undertaken (refer to **Section 16.3.4**); and
 - The CIM identified by the soil validation program will be excavated and managed as follows.
 - Physical separation of recyclable and oversize material, including timber, rock, concrete, steel and brick, from other Area D CIM;
 - Stockpiling of Area D CIM for processing and beneficial reuse (where appropriate);
 - beneficial reuse of Area D CIM in the Public Domain (South) subject to compliance with the SSTC-B and SDESC-B – subject to capacity limitations;
 - If treatment is required for off-site disposal, treatment via ex-situ stabilisation/solidification and/or S-ESCO will be undertaken and the Area D CIMs suitability assessed via validation testing;
 - off-site disposal to licensed landfill (subject to classification in accordance with the NSW DECC (2008) *Waste Classification Guidelines* of excavated Area D CIM that: exceeds the available capacity of the Public Domain (South); and/or, are considered unsuitable for beneficial reuse;
- retention of all material that does not require excavation as part of the proposed development *in situ* (i.e. below the proposed slab on grade development).

9.4.2 Reasons for Strategy Selection

Feasibility

- It is anticipated, based on the available data that remediation of Area D will not be required. Further, the basement design for Area D does not require excavation. Notwithstanding, additional validation sampling is required to demonstrate that CIM is not present in Area D and that remediation is not required;

- Retention of material *in situ* is considered the most practical and cost effective management approach for materials not otherwise requiring excavation as part of the development or remediation based on the absence of CIM and therefore risk to human health;
- If required, either ex-situ stabilisation/solidification and/or S-ESCO is likely to be the most practical, cost effective, and established remediation technology for treatment of the excavated material prior to off-site disposal, based on the type of contaminants identified in the DGI (AECOM 2010a) and *in situ* validation report (AECOM, 2011d).

Sustainability

The nominated management strategy is considered a sustainable solution to management Area D because:

- minimise earthworks, materials handling, separation, dewatering and drying requirements, therefore minimising emissions from diesel operated equipment and machinery and the overall carbon footprint for the development;
- If required, the nominated remediation approach will utilise equipment and infrastructure also required for the Shallow and Deep Basement bulk excavation works, therefore minimising duplication and maximising utilisation of the required equipment;
- It maximises the opportunity for recycling and reuse of material through segregation of oversize materials, timber and steel, etc; and
- The reuse of material in Public Domain (South) will minimise waste disposal off-site therefore minimising: CO₂ emissions through reduced transport requirements; and Community impacts by reducing vehicle movements.

10.0 Remediation Works Overview

10.1 General Works Program Overview

The following sections do not include consideration of planning requirements which are described in **Section 2.0**. Planning activities have been undertaken in parallel with the preparation of this RAP. The planning process will necessarily be concluded prior to execution of the full scale remediation works.

As described by **Section 3.2**, the proposed LLMP development plans are still to be finalised and may be subject further development. Consequently, this may affect the nature of the proposed excavation works described herein and how these works are staged across the Site. Notwithstanding, the proposed land uses (that is a mixture of commercial and high density residential and public open space overlying extensive basements) will remain generally consistent with that described this RAP.

10.2 Project Schedule

The proposed excavation works at the Site will be scheduled under the following tasks:

- Approvals process, including concept, project and development approval and Immobilisation Approval, if required for off-site disposal of excavated to landfill (refer to **Section 12.7.10**);
- Preparation of a RWP (refer to **Section 1.4**);
- Site Establishment and construction of treatment plant (if required);
- Excavation and treatment (as required);
- Tracking of all excavated materials in accordance with the Materials Tracking Procedure (refer to **Section 12.7.2**);
- Validation (progressive and concurrent with excavation and treatment) to demonstrate compliance with the requirements of this RAP;
- Reporting;
- Decommissioning and demobilisation; and
- Groundwater monitoring in Area A will be undertaken and the groundwater results compared to both the MWQC and the SDESC-A (within the tidal prism) and SSTC-A derived by the ORWS HHERA Addendum (AECOM, 2011c) in accordance with the GMP to be prepared for the Site (refer to **Section 14.4**).

10.3 Remediation Works

Summary detail of the proposed remediation works to be completed is provided following:

- Assessment of Area B material to be removed as part of the bulk excavation works against soil SSTC-B and SDESC-B detailed in **Table T1** to determine whether the material can be beneficially reused within the Public Domain (South).
- if CIM is identified, based on visual and olfactory observations, in previously unidentified areas during the bulk excavations works based on the process detailed in **Section 5.4.1** and **Figure 11**:
 - Selectively excavate CIM in parallel with the broader Area B excavations required for the development basement excavations;
 - Selectively over-excavate CIM, in addition to the Area B excavation requirements of the development basements (if required); and
 - Confirm the presence of CIM based on visual and olfactory observations during excavation.
- Physical separation of recyclable and oversize material, including timber, rock, concrete, steel and brick from contaminated material;
- Stockpiling of excavated material, as and if required, for processing and beneficial reuse;

- Ex-situ stabilisation/solidification and/or S-ESCO of excavated Area B as required to facilitate off-site disposal to landfill (subject to an Immobilisation Approval from NSW OEH);
- Tracking of all excavated materials in accordance with the Materials Tracking Procedure (refer to **Section 12.7.2**);
- Transfer of material characterised as being suitable for beneficial reuse within the Public Domain (South, without treatment), for subsequent beneficial reuse;
- Where required, material determined as unsuitable for re-use in the Public Domain (South, for example tar containing material or treated tar containing material, if encountered) or there is insufficient capacity, off-site disposal to a licensed landfill;
- Validation (progressive and concurrent with remediation excavation and treatment) to demonstrate compliance with the requirements of this RAP; and
- Groundwater monitoring in Area A and assessment of groundwater Area A CoPC concentrations compared to both the MWQC and the SDESC-A (within the tidal prism) and SSTC-A derived by the ORWS HHERA Addendum (AECOM, 2011c) in accordance with the GMP to be prepared for the Site (refer to **Section 14.4**).

11.0 Site Establishment

11.1 Work to be Completed Prior to Site Establishment

Prior to site establishment, all plans, programs, licences, certificates and other documents necessary for the commencement of work will be completed. These documents will include, but not be limited to the following:

- Remedial Work Plan (to be prepared by AECOM as described in **Section 1.4**).
 - Technical and staging specifications for use by Lend Lease and its Remediation Contractor to assist in delivery of the bulk excavation works; and
 - Excavation plans for Shallow and Deep Basement bulk excavation works describing the inferred material types expected to be encountered during the excavation program.
- An Immobilisation Approval from the NSW OEH, if the treatment of soils is required prior to off-site disposal.
- Management Plans and Work Procedures for the remedial program addressing:
 - Occupational Health and Safety (OH&S);
 - Environmental Management;
 - Project Management;
 - Quality Management; and
 - Emergency Response and Contingency.
- Detailed work program and logic diagram;
- All necessary licences and approvals from regulatory authorities (including a variation to the existing EPL if treatment of material is required – refer to Section 2.2.3;
- Submission of all WorkCover Authority notifications;
- Commissioning and Mobilisation of Plant; and
- Utilities and Recourses.

11.2 Site Preparation

Works to be undertaken prior to remediation works include:

- Establishment of site offices;
- Demolition of existing structures and removal of concrete pavements, where required;
- Installation of the basement groundwater retention wall system, where required;
- Establishment of exclusion zones;
- Establishment of an Excavation Enclosure (EE) and related Emissions Control System (ECS) (if required) for those areas where excavation within an enclosure is required to manage odorous materials (for example, the northeast corner of Block 3); and
- Establishment of the Remediation Enclosure (RE) (if required, refer to **Section 13.1**) and Ex-situ Treatment Facility and related ECS.

11.3 Site Facilities and Procedures

Site facilities required for the remediation works will be established in compliance with the relevant regulations. These facilities will be connected to appropriate utilities as required. All connections and reticulations will be carried out by licensed and qualified personnel in accordance with statutory requirements and standards.

The following facilities will be established for the Remediation Works at the Site:

- Ex-situ treatment facility (if required);

- EE and related ECS (if required) for the management of odours and volatile emissions associated with the excavation of CIM ; and
- RE and related ECS (if required) for the ex-situ treatment facilities (if required).

It is intended that the ex-situ treatment facility will be established in a central location; likely situated on the Public Domain (North). Material excavated from the Site requiring treatment will be transferred to this facility.

Other activities for the set-up of site offices adjacent to the RE, fencing, decontamination stations, environmental control measures and other associated facilities include:

- Wheel wash zones at the entrance and exit points to the EE and RE;
- Stores, work sheds, lunchrooms and changing areas for the use of subcontractors and consultants;
- Temporary site sheds, first aid and emergency facilities, bathroom facilities and decontamination units, and
- Any additional site facilities to facilitate work in other areas of the Site, or in areas requiring additional safety measures.

11.3.1 Exclusion Zone

Exclusion Zones are areas of the Site that will be outlined in the occupational health and safety plan (OHSP) that either require additional protective measures or may require the adoption of additional OH&S requirements and work practices. Exclusion Zones may also include other areas affected by emissions from the works being undertaken at any point in time. All Exclusion Zones will incorporate a buffer area along the boundary of the zone.

The boundaries of the Exclusion Zones will be defined by fencing and safety signs erected at regular intervals around each exclusion zone warning of the boundary of the exclusion zone, the nature of the hazard associated with it and access restrictions that apply for entry into the zone. Access of personnel into and out of the Exclusion Zones, will be controlled at a Decontamination Station, and will depend on the personnel classification. The location and extent of Exclusion Zones will be detailed in the OHSP and outlined in the Site-Specific Safety Induction.

The EE, ex-situ treatment facility and RE will be nominated as an Exclusion Zone at the Site.

11.4 Site Access and Security

11.4.1 General

Only authorised personnel and equipment will be allowed into the exclusion zones and other areas associated with the remediation works. Access will be strictly controlled throughout the course of the remediation works using the following procedures.

11.4.2 Site Haul Roads & Parking Areas

Existing concreted areas will be utilised as haul roads to the extent practicable. Traffic movements on-site will be directed around areas that are the subject of remediation works.

11.4.3 Site Access

The primary access route to the Site will be either via Hickson Road (to be confirmed as part of the application process and determined as part of the site staging). The entry point will control access to and around the Site during the remediation works.

All site personnel entering and leaving the Remediation works will be required to pass through the clean/dirty zone and the decontamination station.

11.4.4 OHS Signage

Signage will be installed at the site entrance detailing the location of the site offices, Remediation works, decontamination units, first aid facilities and parking. Traffic restrictions will be installed to limit access further into the Site to the north and ensure the safety of site visitors.

Signage at the main gate will include after hours contact details.

As detailed in **Section 11.4.4**, additional signage will be erected along Exclusion Zone boundaries to restrict access to these areas to authorised personnel only.

11.4.5 Fencing

Security fencing will be established around the remediation works areas. Additional fencing will be erected where necessary to secure portions of the Site.

11.4.6 Control of Site Entry and Exit

Entry to any designated remediation works areas will be controlled through the use of a sign-on/sign-off log system at the main gate. Only authorised personnel will be allowed into the remediation works area.

Personnel will gain access to the remediation works area only after they have:

- Attended and completed a site safety induction briefing (applicable to all site workers and visitors);
- Are wearing all applicable PPE as detailed in the OHSP; and
- Been inducted into the OHSP.

All construction vehicles and delivery vehicles will enter the Site through the nominated main gate.

In the event of an emergency on-site and the need for emergency services personnel to access the site works, the site access process may be expedited. In these situations, which require the need to minimise delays in accessing injured site personnel, prior arrangement will be made for special site access procedures. However, given the nature of the remediation works, all PPE and decontamination protocols will remain in effect at all times.

An Emergency Response Plan will be developed prior to site establishment detailing the specific procedures relating to site emergencies.

12.0 General Remediation Excavation and Materials Management

12.1 Background

This section addresses works associated with the excavation of CIM during the Area B excavation works and subsequent materials management. CIM will be determined by:

- comparison of any additional characterisation works undertaken following the excavation of unexpected materials to the relevant SSTCs and SSECs (as detailed in **Section 5.3**); and
- visual and olfactory observations during excavation.

Any CIM that requires treatment will be transferred to the central treatment facility and treated in accordance with the processes outlined in **Section 13.0**.

12.2 Pre Treatment of Materials

Prior to excavation of materials, some preparation and pre-treatment of material may be necessary as summarised in **Section 12.7.3**.

12.3 Excavation Planning

The materials to be excavated comprise heterogeneous fill materials, soil, bedrock, as well other potentially gas works related waste (for example ash). Therefore, prior to commencement of excavations, detailed excavation plans will be prepared and documented in the RWP. The excavation plans will outline the anticipated classification of materials based on all available data. Correlations between field observations (both visual and olfactory) and analytical data will also be used to guide the visual characterisation of fill materials during excavation.

All remediation excavation works of CIM will be undertaken in accordance with the following procedures, in sequence:

- Prior to commencement of excavations on each work shift, all necessary environmental, OH&S measures and related equipment will be established and all worker PPE and respiratory controls will be checked to ensure they are in full working order in accordance with the OH&S Management Plans;
- All excavation plant operators, haulage operators and supervisors will be made familiar with the excavation strategy, and all workers will be made aware of their responsibilities prior to the commencement of each shift;
- Stockpile areas will be prepared with adequate capacity to receive the contaminated materials after excavation prior to the commencement of excavation;
- Exclusion zones will be set up around the active remediation works areas and as required;
- All truck haulage roads will be made suitable for transportation and haulage of the excavated materials;
- All haulage trucks will be covered prior to exiting the exclusion zone/excavation area and will be decontaminated at the end of each shift of haulage operations in accordance with the environmental management plan (EMP). All haulage trucks will be fitted with liquid seals which will be inspected daily to ensure their integrity; and
- All personnel, vehicles and equipment leaving the excavation enclosure will be properly decontaminated in accordance with the EMP.

12.4 Excavation Operations

Where CIM has been identified, excavation operations will commence by the removal of unimpacted overburden material. The overlying unimpacted material will be classified based on the current data set (as appropriate) to determine whether it meets the suitability criteria for beneficial reuse.

Excavations will be regularly inspected by a suitably experienced environmental engineer or scientist to confirm that the visual and olfactory characteristics of the excavated materials are consistent with expectations. Odorous materials will be managed as per the requirements of **Section 13.0** and **Section 17.3**. These regular inspections will also serve to identify additional hotspots of CIM that may not otherwise have been identified by the site investigations conducted to date.

CIM will be removed and kept separate from uncontaminated materials. Depending on the level of contamination in excavated material (relative to the SSTCs and SSECs), excavated CIM will be either:

- transferred to the ex-situ treatment facility for treatment;
- transferred to stockpile pending ex-situ treatment for beneficial reuse;
- transferred to stockpile pending beneficial reuse in the Public Domain (South); or
- transferred directly to landfill, in accordance with the appropriate waste tracking requirements (refer to **Section 12.7.2**).

In the event that material is unsuitable for beneficial reuse it will be designated for off-site recycling or disposal in accordance with **Section 12.7** and **12.8**.

12.5 Dewatering of Excavations

De-watering during the remediation will be undertaken in parallel with the dewatering program required for the bulk earthworks program. Management of water and groundwater within excavations will be undertaken in accordance with the procedures outlined in **Section 14.0**.

12.6 Excavation Support

As detailed in **Section 3.2.4**, excavation of the basements required by the proposed development will include construction of a basement groundwater retention wall system around the Shallow and Deep Basement area. The basement groundwater retention system will comprise:

- Diaphragm walls, extending to and keyed into bedrock and generally constructed around the southern, western and northern boundaries; and
- A secant pile or equivalent walls, extending to and keyed into bedrock and generally constructed along the eastern boundaries, and more generally to the Deep Basement area.

Where basement excavations extend into bedrock, exposed bedrock surfaces will be covered with shotcrete. It is anticipated that perimeter walls and shotcrete covered bedrock, together with other controls which are standard practice for basement construction, will effectively isolate the basement from surrounding ground conditions.

Final structure details for the retention wall system and the basement layout will be finalised during the detailed design phase of the project so may be subject to further refinement and development. However, the key central elements of the design are not expected to change.

12.7 Materials Handling

12.7.1 Background

This section outlines the procedures for materials handling following excavation, specific procedures relating to materials tracking and the required environmental controls.

12.7.2 Materials Tracking

All materials handled during the remediation works will be tracked in order to allow verification of the correct movement and handling. The system will track materials from cradle-to-grave, and will provide detailed information on the location and quantity of all material movements both on and off-site, so that the material being handled can be identified and accounted for. The tracking system shall include accurate tracking of stockpiles throughout the entire material handling stage and will include confirmation of stockpile locations via registered survey. This is to reduce the risk of cross-contamination between stockpiles.

As part of this process, accurate records shall be kept to ensure that backfilling of excavations (where required) and beneficial reuse of material only occurs following the successful validation of the subject materials. Plans will

be made with respect to the extent of each excavation. A register of all analytical results for stockpiles and excavations will be maintained throughout the validation works.

Standard forms shall be prepared as part of the Materials Tracking Procedure, the details of which will be developed collaboratively between LLMP and the BDA and included in the RWP. The forms and their function shall include, but not be limited to:

- **Off-site Transport/Disposal Form** - Providing a record of materials removed from the Site and including the material type, quantity, origin, shipping destination and an approval by the nominated environmental consultant that the material meets the disposal requirements;
- **Imported Fill Form** - Providing a record of materials imported to the Site including the date, material type, quantity, point of origin, intended use and the suitability of the material for use as backfill at the Site;
- **Material Excavation Form** - Providing a record of excavated materials for each excavation on the Site including the date, material type, excavated quantity, origin and intended destination;
- **Material Treatment Form** – Providing a record of material treatment including the date, material type, treatment regime, stockpile of origin and destination stockpile;
- **Material Stockpiling Form** - Provides a record of all materials placed in stockpiles. The form will include the date, material type, stockpiled quantity, origin and intended end use; and
- **Material Placement Form** - This form provides a record of all materials backfilled on the Site and includes the date, material type, quantity backfilled and origin.

Each form shall be completed on a weekly basis and collated into a cumulative log for each process on a weekly basis.

12.7.3 Material Preparation

Excavated materials may require preparation prior to transport for beneficial reuse, placement into stockpiles and/or transport to the on-site ex-situ treatment facility.

Material preparation may include, but not be limited to:

- Mixing of wet material *in-situ* (i.e. within the excavation area) to make the material spadeable prior to stockpiling. This may be achieved by either mixing with other soils or by addition of fly ash, lime or cement (with appropriate volatile emission and odour controls as described below);
- Drainage and drying of saturated excavated materials. Granular materials will be drained by temporarily mounding the material within the excavation area to allow drainage of the entrained water (with appropriate volatile emission and odour controls) before removal of the material from the excavation. This will require installation of appropriate measures to control run off. Fine grained materials may be dried by either evaporation (in the case of non-odorous materials) or mixing with other soils or additives to create a spadeable mixture (with appropriate volatile emission and odour controls as described below); and
- Screening of material to separate oversize and/or materials suitable for recycling (e.g. steel, concrete footings/historic sea walls, brick and rock fill, timber piles, construction and demolition waste). Physical separation will be achieved by a combination of:
 - Manual separation using excavators fitted with grabs or skeleton buckets; and
 - Power screens.

It is recognised that the proposed approach to material preparation (in particular the addition of lime and or cement) may result in increased volatile emissions and/or odour generation. In consideration of this, where preparation of materials with potential for volatile or odorous emissions is required, the management and mitigation measures described in **Section 13.0** and **Section 17.3** will be implemented. Specific management and mitigation measures may include:

- preparation of materials within an Excavation Enclosure (refer to **Section 13.0**);
- minimisation of the quantity or surface area of materials;
- conduct of activities during favourable weather conditions;
- use of surface covers (soil and / or tarps); and/or

- use of odour suppressant sprays or foams (refer **Section 17.3**).

12.7.4 Crushing/Shredding of Materials

The crushing of oversize excavated materials may be necessary to ensure that the excavated materials can either be beneficially reused or can be treated in the ex-situ treatment facility.

12.7.5 On-site Transportation of Materials

Materials at the Site will be excavated, handled, moved, treated and stockpiled in a manner designed to minimise exposure to the environment. The following materials handling requirements will be developed for trucks transporting materials within the Site:

- Trucks carrying excavated materials will be covered and decontaminated in the wheel wash facility within the excavation area before exiting the area;
- Trucks will proceed directly to the on-site ex-situ treatment facility or soil stockpile area, as appropriate, along the predetermined haul roads;
- Trucks carrying contaminated materials will not be permitted to drive over areas of the Site which have previously been excavated, validated or reinstated;
- Trucks carrying contaminated materials will remain covered until authorised to unload within the on-site ex-situ treatment facility. The trucks will be decontaminated at the on-site ex-situ treatment facility and the truck body covered before exiting the area;
- Empty trucks will return directly to the excavation area along predetermined haul roads; and
- The validated excavation will be effectively isolated from contaminated areas of the Site by the use of physical means such as the placement of clean material bunds, temporary fences and by use of signage.

12.7.6 Off-site Transportation of Materials

The following materials handling requirements will be developed for trucks transporting materials off the Site:

- Trucks carrying excavated materials will be covered and decontaminated in the wheel wash facility before exiting the excavation area and exiting the Site;
- Trucks carrying contaminated materials will be covered prior to exiting the Site and will remain covered until authorised to unload at the destination;
- Trucks will be fitted with seals to ensure that the movement of potentially saturated materials is undertaken appropriately. The integrity of the seals will be inspected and tested prior to commencement of each day's haulage works; and
- Trucks will exit the Site through predetermined exit points and will follow a predetermined transport route to the destination (landfill or other).

12.7.7 Stockpiling of Materials

Stockpile Locations

Treated and validated soil materials will be stockpiled within a designated stockpile area. The stockpiled soil will then be transported directly from the stockpile area to the Public Domain (South) for placement and compaction as backfill (as appropriate). The location of stockpiles will be confirmed via registered survey as part of the Materials Tracking System.

Where possible, in-situ testing of material may be undertaken prior to excavation, to pre-classify materials and minimise interim stockpiling requirements (refer to the ORWS In situ Validation Report (AECOM, 2011a).

Stockpile Area Preparation

During site establishment, stockpile areas will be prepared using the following methods:

- Noting that the majority of the Barangaroo Stage 1 Development site is covered by an existing hardstand surface, works will be undertaken initially to clear the area of rubbish, rubble, structures and vegetation;

- Diversion drains and bunds will be constructed around the perimeter of the stockpile areas. Additional sediment and erosion control measures including silt fencing and hay bales will be installed where necessary;
- Signs will be erected at the entrance to the stockpile area and at locations around the stockpile specifying individual stockpile numbers and the type of materials stored; and
- Buffer zones will be established around each stockpile area to enable access to the stockpiles and minimise impacts of the stockpile area on the surrounding facilities.

Stockpile Construction and Maintenance

The drainage, sediment and erosion control measures installed within stockpiling areas at the commencement of the project will be maintained, repaired and replaced where necessary for the duration of the stockpiling activities.

Where necessary, all long term soil stockpiles on-site will be covered or stabilised with spray grass seeding or other suitable measures to reduce dust generation and erosion.

If stockpiling of TCM or odorous material is required, the stockpiles will be managed as follows:

- The TCM will be stockpiled separately to all other materials and clearly identified with signage;
- If required, odour suppressant sprays or foams will be sprayed onto stockpile surfaces to mitigate odours during construction of the stockpile;
- The TCM will be securely covered with a high density polyethylene (HDPE) liner and surface water controls will be constructed around the perimeter (as required for all stockpiled materials); and
- Daily monitoring of the TCM stockpile will be undertaken and will include qualitative assessment of odour around the perimeter of the stockpile.

All stockpiles will be maintained in a tidy and safe condition with stable batter slopes.

12.7.8 Classification of Treated Materials

Following treatment of materials within the on-site ex situ treatment facility, materials will be classified for off-site disposal in accordance with the NSW DECC (2008) *Waste Classification Guidelines* and the requirements of the Immobilisation Approval (if any) (refer to **Section 12.7.10**).

12.7.9 Classification for On-site Reuse

Stockpiled and treated material will be assessed for its suitability for beneficial reuse by collection of representative samples and chemical analysis for the CoPC for associated with the site.

Where possible, in-situ testing of material may be undertaken prior to excavation, to pre-classify materials directly for on-site reuse and minimise stockpiling requirements (refer to the ORWS In situ Validation Report (AECOM, 2011a).

The analytical results will be assessed against the relevant SSTCs and SSECs established by this RAP, for materials to be beneficially reused within the Public Domain (South).

12.7.10 Waste Classification for Off-site Disposal

Materials deemed not suitable for reuse in the Public Domain (South) will be assessed for off-site disposal in accordance with the NSW DECC (2008) *Waste Classification Guidelines* or Part 4 of those guidelines in the case of potential acid sulphate soils (PASS) and acid sulphate soils (ASS).

If required, in-situ testing of material may be undertaken prior to excavation, to pre-classify materials directly for off-site disposal and minimise stockpiling requirements (refer to the ORWS Insitu Validation Report (AECOM, 2011a). If treatment of excavated material is required to facilitate offsite disposal, an Immobilisation Approval will be sought from the NSW OEH prior to offsite disposal.

12.8 Material Fate

12.8.1 Recycling

LLMP will aim to maximise recycling of all excavated materials. Where possible, materials won from the screening of excavated materials will be assessed for their recycling suitability as follows:

- Steel materials will be transported to appropriate off-site steel recyclers;
- Concrete, brick and rock may be crushed to create fill for use in other areas of the development (as required) and for construction of haul roads or recycled off-site; and
- Timber will be recycled off-site, where possible.

12.8.2 Beneficial Reuse of Materials on-Site

Materials deemed suitable for beneficial reuse on-Site (i.e. within the Public Domain (South)) will be either stockpiled for future use or used directly for reinstatement.

12.8.3 Reinstatement

Where material is used for reinstatement purposes, the material will be placed in accordance with specific geotechnical requirements which will be dependent on the area of reinstatement (e.g. parks, roads, under buildings). The geotechnical requirements will be determined as part of the Technical Specifications for the Development.

12.8.4 General Solid Waste

If off-site disposal is required, materials classified as General Solid Waste in accordance with the NSW DECC (2008) *Waste Classification Guidelines* will be transported off-site and disposed of at a landfill licensed to accept Solid Unrestricted Waste.

12.8.5 Restricted Solid Waste

If off-site disposal is required, materials classified as Restricted Solid Waste in accordance with the NSW DECC (2008) *Waste Classification Guidelines* will be transported off-site and disposed of at a landfill licensed to accept Solid Restricted Waste.

If treatment of excavated material is required to facilitate offsite disposal, an Immobilisation Approval will be sought from the NSW OEH prior to off-site disposal.

13.0 Remediation

In addition to the general excavation and materials management outlined in **Section 12.0**, any works related to the treatment of CIM at the Site will be subject to particular controls due to the nature of the contamination.

This section outlines the proposed additional controls that will be implemented to manage materials that require treatment at the Site as well as outlining the proposed treatment methodology.

13.1 Excavation / Remediation Enclosures and Emissions Control System

Part of the proposed odour management system for works will include a remediation enclosure (RE) and, if required, an excavation enclosure (EE). An emissions control system (ECS) will be used to manage volatile emissions within both the RE and EE (if required). An EE may be used, where practical, during excavation of particularly odorous areas or areas where it is anticipated that fugitive emissions will be significant. It is anticipated that an EE will not be required for the excavation of materials within Block 1 and 2 of the Development Area (South), and the Public Domain (South).

It is likely that the RE and associated Ex-situ Treatment Facility will be located in the ORWN (located off-Site directly to the north).

Given the potentially odorous nature of the materials to be excavated at the Site, significant 'source' material excavation works (for example those required in relation to the north east corner of Block 3) will be undertaken within an EE, where practical. The purpose of the EE will be to mitigate, to the extent practical, uncontrolled emissions during excavation and truck loading processes and to ensure these emissions are vented to atmosphere through an ECS.

It is noted that an EE may not be practical in all excavation areas, particularly in areas where CIM may have been identified in a series of discontinuous hotspots. In the event that an EE is not considered practical, additional, alternative rigorous odour control measures will be implemented as described by **Section 13.2**.

Operation of the EE and associated ECS will be in accordance with operation and maintenance management systems developed on completion of the final design of the system. An overview of the controls to be designed into the system is provided below.

- The EE will be a temporary structure that can be erected over relevant parts of the CIM excavation area. The final design of the EE will be developed prior to the start of the remediation works. The structure is likely to include a negative pressure working enclosure with an air-lock doorway and an air extraction system for the control of odours and diesel exhaust.
- Where practical, excavations for remediation of identified CIM will be undertaken within the EE. Excavated material will be placed into temporary stockpiles within the EE by use of tracked excavator and a rubber tyred loader prior to be hauled to the RE for treatment (as required). The structure will be equipped with personnel entrances and a truck entrance. The truck entrance will comprise an automated door to minimise any impact on negative air pressure whilst the truck exits and enters the EE. The negative air pressure will be maintained for the duration of the excavation works.
- The ECS for the EE and RE will consist of a ductwork system, induced draft fan, particulate control device, activated carbon adsorption system and stack. The ECS would be designed with sufficient capacity to provide a safe working environment within the EE and RE. The ductwork system will consist of a central header that will be suspended along the centreline of the EE and RE. There will be hoods located along the length of the header.
- The air exhausted from the EE and RE will first pass through a particulate control device (bag-house or pleated paper filter system) to remove fugitive dust. The particulate control system will include a system to remove particulates from the filter media. Dust removed will be collected in enclosed drums or hoppers.
- After the exhaust gas exits the particulate filter, it will pass through an activated carbon adsorption system. The activated carbon system will be equipped with a number of monitoring ports. A monitoring protocol will be developed for the various ports along the activated carbon adsorption system. This protocol will form the basis for deciding when activated carbon beds need to be replaced. Air would be exhausted to the atmosphere via a stack.

13.2 Excavation Operations

To the extent practical, excavation of CIM (based on volatile or odorous CoPC concentrations) will be conducted within an EE with an associated ECS. As above, the plant operating within the EE is likely to comprise a tracked excavator and a loader for excavation, interim stockpiling and truck loading purposes.

Excavation operations will commence by the removal of the unimpacted overburden material. The unimpacted overburden material will be classified based on the available analytical data to determine whether it meets the SSTCs and SSECs for beneficial reuse.

The management of odours is recognised as a critical aspect of the management of the proposed remediation works. Based on the results of historical investigations at the Site, it is considered unlikely that odorous materials will be encountered across the majority of the Site. Notwithstanding, odorous materials, in particular odorous materials associated with gasworks derived contamination, are expected in some localised areas within the Site.

Specific management and mitigation measures for odorous materials may include (refer to **Section 17.3**):

- excavation within an Excavation Enclosure (refer to **Section 13.1**);
- minimisation of the quantity or surface area of exposed odorous materials;
- covering of exposed odorous materials progressively or at the completion of each work period;
- conduct of activities during favourable weather conditions; and/or
- the use of odour suppressant sprays or foams.

Selection of the appropriate management and mitigation measures will be based on consideration of:

- the quantity of odorous materials that require remediation;
- the duration of the required remediation works;
- the proximity of the proposed remediation works to sensitive receptors;
- the prevailing and forecast weather conditions; and/or
- other activities being undertaken at the Site in parallel with the remediation work.

As above, it is noted that an EE may not be practical in all excavation areas where odorous materials are encountered; for example, in areas where CIM has been identified in a series of discontinuous hotspots. In the event that an EE is not practical, additional and/or alternative rigorous odour control measures will be implemented over and above the environment control measures provided during excavation of non-odorous materials. As described above, additional measures may include: minimisation of exposed excavation surfaces, limiting excavation to favourable weather conditions; and the use of odour suppressants and covers (refer to **Section 17.3** for further details).

13.3 Treatment Operations – Ex-situ Stabilisation

13.3.1 Background

As detailed in **Section 9.0**, ex-situ stabilisation is one of the preferred remedial technologies for CIM which requires treatment prior to beneficial reuse or offsite disposal.

This section describes the methodologies to be employed for preparing and treating the nominated materials using ex-situ stabilisation. The suitability of ex-situ stabilisation was assessed by a treatability study undertaken by EnviroPacific (2010) (refer to **Section 8.3.3**).

13.3.2 Pre-Treatment of Materials

The pre-treatment of CIM, if required, will be undertaken in two stages. Initially, the excavated material may be blended at the excavation face to make the material 'spadeable' (as detailed in **Section 12.7.3**). CIM requiring treatment prior to beneficial reuse will be transported to the Ex-situ Treatment Facility in the RE, where further screening and testing of this material will take place.

The CIM will be stockpiled in the RE using a front end loader before undergoing secondary screening through a power screen to achieve a grade of 40 mm minus. This is the minimum size requirement for material to feed into a pug mill. All screened overburden material will be set aside into type for potential crushing/recycling. The power

screening of the contaminated material will achieve a relatively homogenous feed material prior to being loaded into the feed hopper of the pug mill and minimise the quantity of material which requires treatment.

13.3.3 Ex-situ Treatment Facility and Emission Control System (ECS)

The ex-situ treatment facility will be enclosed within the RE. The purpose of the RE and ECS is to control emissions during remediation treatment activities and ensure these emissions are vented to atmosphere through an ECS. Operation of the RE and associated ECS will be in accordance with operation and maintenance management systems developed on completion of the final design of the system. An overview of the controls to be designed into the system is provided below.

- The RE will be a clear span shed constructed of a steel frame with metal sheeting (or equivalent). The building will be sized to contain the power screen and pugmill and have sufficient room for truck access, machinery and stockpiles. It will include doors, lights, electrical, adjustable louvers and other ancillary facilities that are required for safe and efficient operation.
- The building will contain approximately a 2-3 day working inventory of feed soil plus a sufficient buffer for soil curing and other pre-treatment activities. This inventory volume is designed to provide adequate storage capacity to feed the treatment plant during periods when unforeseen conditions interfere with normal excavation activities.
- ECS will consist of a ductwork system, induced draft fan, particulate control device, activated carbon adsorption system and stack. The ECS would be designed with sufficient capacity to provide a safe working environment within the RE. The ductwork system will consist of a central header that will be suspended along the centreline of the RE. There will be hoods located along the length of the header.
- The final design of the RE will be developed prior to the start of the remediation works. The structure is likely to include a negative pressure working enclosure with an air-lock doorway and an air extraction system for the control of odours and diesel exhaust.
- The air exhausted from the RE will first pass through a particulate control device (bag-house or pleated paper filter system) to remove fugitive dust. The particulate control system will include a system to remove particulates from the filter media. Dust removed will be collected in enclosed drums or hoppers.
- After the exhaust gas exits the particulate filter, it will pass through an activated carbon adsorption system. The activated carbon system will be equipped with a number of monitoring ports. A monitoring protocol will be developed for the various ports along the activated carbon adsorption system. This protocol will form the basis for deciding when activated carbon beds need to be replaced. Air would be exhausted to the atmosphere via a stack.
- The ECS for the RE will operate in the same way as the system for the EE, as described in **Section 13.2**.

13.3.4 Pug Mill Treatment Plant

Ex-situ stabilisation of contaminated soils during the full scale remediation phase is intended to be accomplished by using a pugmill fed by a loader/excavator. The nature and quantity of agents used for stabilisation will be the subject of a stabilisation trial. The pugmill mixing chamber and computer controlled weight cells will allow the complete mixing of the additives with the soil matrix. A pugmill has been selected in recognition that the NSW OEH prefers aggressive mixing techniques (such as a pugmill) because they provide for complete mixing of the materials.

These analysis results will be used to demonstrate that the treated material is suitable for disposal to an appropriately licensed off-site landfill (in accordance with the NSW OEH).

Pug mill plants typically have a rated capacity of 600-1,000 tons per hour. This rate will vary depending on the physical properties of the soil, amount and type of additive, and the desired production rate.

Based on the results of the ex-situ stabilisation trials, it is expected that the stabilisation / solidification of material for the purpose of off-site disposal to landfill will be based on addition of between 5% and 10% of cement. Details of the proposed approach, including the percentage of additives for various material contaminant concentrations potentially requiring treatment will be detailed in the Immobilisation Approval application.

The type of treatment plant will be based on the final design by the treatment contractor. Below is a description of the potential major components that may comprise a plant system.

Self-erecting Silo

The silo is filled pneumatically from bulk tankers. Additives such as cement, fly ash, lime and bentonite are blown into the silo.

The silo is equipped with a dust control system.

Material feed hopper

This hopper is fed with the soil(s) to be processed. It may be divided so as to accommodate two types of soil or aggregate. The hopper and may be fed one of three ways. First, a front-end loader can feed the hopper directly by building a ramp perpendicular to the hopper. Second, material may be conveyed into the hopper. Third, a screen can process directly into the hopper.

Twin shaft paddle pugmill

The pugmill is designed to achieve a violent mixing action throughout its length resulting in a well mixed homogeneous product. This type of mixing, with no slump or low moisture products, is more effective than a drum type mixer that merely folds the product.

Hydrostatic cleated belt additive feeder

The additive is fed to the pugmill at the beginning of the mixing operation by means of the computer controlled cleated belt. Accuracies of better than plus/minus 2% of the design proportioning of the additive are achieved.

Water tank

The water requirement is determined by the mix design and the native water in the material to be mixed. Water is fed from an outside source into the plant's onboard water tanks. This water is fed at the design rate into the mixing chamber by two hydraulic pumps which are computer controlled.

Discharge belt

The mixed product is discharged from the pugmill on this conveyor belt. The finished product is continuously and cumulatively weighted on a Ramsey belt scale.

Gob Hopper

The gob hopper is utilized to interrupt the continuous flow of mixed material allowing trucks to enter and exit the loading area. If trucks are used to transport the mixed material away from the plant, the direction of travel of the trucks should be with the driver's side closest to the plant so that he/she may see the plant operator. The gob hopper maybe left open continuously so that a conveyor may be used to remove the finished product from the mixing plant.

Particulate Additive

Fine particulate additives such as cement, fly ash, lime and bentonite are pneumatically transferred from bulk tankers and stored in the self erecting silo. If more than one type of additive is required, an optional self erecting auxiliary silo may be set up next to the plant. The silos are equipped with negative pressure dust control systems, which filter and evacuate the pressurized air entering the silo. This process maintains constant silo pressure so as not to affect the consistency of the feeder.

Mixing Chamber

All ingredients enter simultaneously at the beginning of the mixing chamber allowing them maximum mixing time. The mixing chamber houses an interlaced twin shaft variable speed paddle pugmill designed to achieve a violent mixing action throughout its length resulting in a well-mixed homogeneous product. This type of mixing, with no slump or low moisture products, is greatly more effective and efficient than a drum type mixer that merely folds the product.

Control System

The Programmable Logic Controller and colour active matrix Operator Interface is directed by control software. Designed for harsh industrial environments, this versatile and reliable system has extensive self-diagnostics and is completely modular, making diagnosing and repairing problems as easy as plugging in a new module.

The software provides fully automated plant control and monitoring of all plant systems including engine, flow meters, sensors and switches. Displays indicate all flow rates, set points, feeder speeds, totals and status of all feeds and processes. All critical mechanical systems are monitored to alleviate damage and prevent down time. Inventory of fine particulate and admixture are computed and tracked.

13.3.5 Treated Soil

The RE will have a base capacity to stockpile between 2-3 days of treated soils from the pug mill. Treated materials stored in this area will undergo validation testing and classification to determine whether the treatment process has been effective. Materials that have not been treated to an acceptable level will be retreated.

Stockpiles would be then moved outside of the RE to a main stockpile area. Where required, stockpiles will be covered with suitable material or wetted to control dust.

13.4 Treatment Options – Surfactant Enhanced Ex-situ Chemical Oxidation

13.4.1 Background

As detailed in **Section 9.0**, surfactant enhanced ex-situ chemical oxidation (S-ESCO) is also considered one of the preferred remedial technologies of CIM which requires treatment prior to beneficial reuse or offsite disposal.

This section describes the methodologies to be employed for preparing and treating the nominated materials using S-ESCO. The suitability of S-ESCO was assessed by a bench scale treatability trial undertaken by VeruTEK (2010) (refer to **Section 8.3.4**).

13.4.2 Pre-treatment of Materials

The pre-treatment of CIM, if required as a precursor to S-ESCO would be as described for ex-situ stabilisation in **Section 13.3.2**.

13.4.3 Ex-situ Treatment Facility and Emission Control System (ECS)

As for the ex-situ stabilisation option, the S-ESCO ex-situ treatment facility will be enclosed within a Remediation Enclosure (RE) that will control emissions during remediation the treatment and ensure that these emissions are vented to atmosphere through an ECS. The design and operation of the RE and ECS for S-ESCO will be generally as described for ex-situ stabilisation in **Section 13.3.3**.

13.4.4 Treatment Plant

As for the ex-situ stabilisation treatment option, S-ESCO treatment will be affected using a pugmill. The design and operation of the pugmill is expected to be generally similar to that described in **Section 13.3.4** for ex-situ stabilisation with the exception that additives (surfactants, oxidants and catalysts) will be dosed in liquid form using specially designed injection equipment. The rate of chemical dosing will be adjusted to accommodate variations in the feed material quality and contaminant concentration.

13.4.5 Treated Soil

Soil treated by S-ESCO will be generally managed in accordance with the procedures described in **Section 13.3.5** for ex-situ stabilisation.

14.0 Management of Water

14.1 Surface Water Management Methods

14.1.1 Surface Water Management from Undisturbed Areas

Clean water will be generated from surface water collected from remediated and undisturbed areas of the Site. Undisturbed surface water runoff will continue to follow existing drainage patterns, unless diversion from active site areas is warranted. Surface water drainage will also be arranged so that surface water run-off from disturbed or contaminated areas does not enter remediated or undisturbed areas.

Clean water collected from undisturbed areas will be retained on-site and used to the maximum extent possible for dust suppression. Excess clean water will be discharged to stormwater or sewer in accordance with the discharge conditions for the site. Formal discharge criteria for surface waters will be negotiated with Council and the NSW OEH as part of the remediation works and likely included as a condition of the POEO license and Trade Waste License for the project. It is anticipated that the discharge criteria will be based on the contaminant concentrations, sediment and turbidity levels of existing surface water runoff from the site.

To assist in the collection of surface waters from undisturbed areas of the site, a sediment basin may be constructed in a suitable location to be determined during site establishment. The location of the basin will be selected to provide for the whole remediation works.

14.1.2 Surface Water Management from Disturbed Areas

Surface water management is critical to successful remediation of the Site and reduction of cross contamination issues and to prevent impact to the Harbour. Successful management of site water is also essential for materials handling and management.

Surface water flows and stormwater will be managed by segregating clean water from impacted water and preventing the inflow of surface water to excavation areas using surface bunds, silt fences and drainage diversions. The preferred hierarchy for management of water on-site is as follows:

- Minimise volume of contaminated water during the works wherever possible by directing surface water away from excavations, depressions, pits and stockpiles by the construction of drainage works such as bunds and diversion drains. These measures will minimise the flow of clean water into other areas of the Site that contain contaminated materials;
- Recycling water where possible by using on-site as dust suppression for other site operations including wheel washing and truck washing. To ensure that the use of recycled water does not impact on surrounding areas, the following data will be obtained prior to undertaking these activities:
- Chemical data which demonstrates that the water to be recycled complies with the reuse criteria, including consideration of potential for odour generation;
- Definition of the area where the water is to be discharged;
- Details of environmental protection measures installed to ensure that the use of recycled water will have no adverse environmental impact;
- Appropriate tracking of recycled water reused at the Site; and
- Discharge to stormwater or sewer, with or without treatment, as per regulatory guidelines and in accordance with a POEO license and Trade Waste License to be obtained for the project.

14.2 Groundwater Water Management Methods

Groundwater encountered during excavation (for basements and/or as part of remedial works) will require management. The basement groundwater retention wall system will be installed to minimise groundwater infiltration into excavations as part of the development, where required. Dewatering and control of groundwater seepages will also be required.

Groundwater collected from the excavations will be transferred to the on-site water treatment plant (where required), prior to discharge to stormwater with appropriate approvals. If required, limited contaminated water may be disposed off-site with use of truck tankers.

14.3 Wastewater Treatment System

A wastewater treatment system will be established for the remediation works and is likely to consist of at least the following process units:

- Pumps and a buffer storage for transferring flows to the plant;
- Dissolved Air Flotation unit for the removal of fats, oils, greases and hydrocarbons which might also include a coagulant and surfactant dosing to assist with solids removal;
- A chemical dosing step to adjust the pH and promote chelation and precipitation of heavy metal complexes;
- Reaction & mixing vessels to facilitate the metals removal process providing flow buffering and adequate reaction times;
- Activated carbon filtration, as required to polish specific residual or trace contaminants from the groundwater and ensure compliance with specific trade waste requirements;
- Sludge handling and/or sludge thickening equipment (or at least a tank, sludge separator) to minimise the residuals that require disposal off-site; and
- Effluent balancing storage (in holding tank) prior to pumping to the transfer sump.

Duty / standby pumps (variable speed drives) control the pumped outflow to the Sydney Water sewerage system or stormwater if appropriate testing is conducted and approvals obtained.

14.4 Groundwater Management

14.4.1 Groundwater Monitoring Plan

A Groundwater Monitoring Plan (GMP) will be prepared to detail the required groundwater monitoring works during and after completion of the installation of the basement groundwater retention wall system and basement construction works at the Site.

It is expected that the existing groundwater monitoring well network will be removed as part of the basement construction works. Therefore, a groundwater monitoring well network will be installed within the Area A, at the point of compliance for groundwater migration from the Site. For the purpose of the GMP, the point of compliance will be considered to be the eastern or landward side of the existing caisson wall (i.e. within the tidal prism). The new groundwater monitoring network will comprise of 5 groundwater monitoring wells located at 50 m intervals along the Site boundary with Darling harbour.

The objectives of the groundwater monitoring plan will be to:

- measure the effectiveness of the remedial works that have been undertaken (specifically source removal and subsequent groundwater quality improvement) with respect to groundwater quality migrating from the Site and the associated risk to aquatic ecosystems;
- make provision for any necessary management measures (contingency measures) that may be required to respond to the monitoring results (refer to **Section 20.10**); and
- Comply with legislative requirements and the appropriate requirements of NSW OEH.

The GMP will include the following information:

- Monitoring objectives;
- Scope of works;
- Groundwater sampling methodology;
- QA/QC assessment;
- DQO/DQI assessment; and
- Reporting requirements.

14.4.2 During Bulk Excavation Works

Groundwater monitoring will be undertaken from the new groundwater monitoring well network in accordance with the GMP on a quarterly basis during the bulk excavation works to build a robust data set for groundwater quality at the Site and to demonstrate that the continuing bulk excavation works are not having a detrimental impact on the environment. The suite of analytes will include, but may not necessarily be limited to, the main contaminants of concern: arsenic, copper, lead, zinc, anthracene, phenanthrene, TPH C₆-C₉ and TPH C₁₀ to C₁₄ and compared to both the MWQC and the SDESC-A (within the tidal prism) and SSTC-A derived by the ORWS HHERA Addendum (AECOM, 2011c). The methodology for the groundwater sampling is detailed in **Section 16.5**.

It is noted that the proposed bulk excavation works will remove all existing wells within the Shallow and Deep Basement areas. However, due to the presence of the basement groundwater retention wall system, ongoing groundwater monitoring in this part of the Site is not required.

14.4.3 Post- Bulk Excavation Works

Following completion of the bulk excavation works, the groundwater monitoring program discussed in **Section 14.4.1** will be continued in Area A to compare CoPC concentrations in groundwater to both the MWQC and the SDESC-A (within the tidal prism) and SSTC-A derived by the ORWS HHERA Addendum (AECOM, 2011c, refer to **Table T2**). The suite of analysis will be as per **Section 14.4.2**.

The post-remediation groundwater monitoring program in Area A will consist of quarterly groundwater monitoring of all groundwater monitoring wells installed at the point of compliance (refer to **Section 14.4.1**) for a period of two years following completion of the basement groundwater retention wall system.

Specific details of the post-remediation groundwater monitoring program (including the groundwater monitoring network) will be detailed in the GMP that will be developed prior to completion of the basement groundwater retention wall system and in consultation with the NSW OEH Accredited Site Auditor.

14.4.4 Groundwater Monitoring Plan Reporting

A groundwater monitoring report will be prepared within 8 weeks of completing each monitoring event for provision to the NSW OEH Accredited Site Auditor and NSW OEH. The report will include the following:

- Details of groundwater monitoring program methodology and scope of works;
- Construction details and logs of any new or replaced groundwater monitoring wells;
- Results of groundwater monitoring well levels, field parameters and laboratory analysis, including NATA certified laboratory reports and chain of custody records;
- Comment on laboratory and field quality assurance / quality control program and analytical data validation;
- Interpretation of the data, including quality of groundwater with respect to both the MWQC and the SDESC-A (within the tidal prism) and SSTC-A and interpretation of groundwater elevation contours;
- Conclusions and recommendations with respect to continuation or otherwise of the groundwater monitoring program; and
- Conclusions and recommendations on whether Groundwater Monitoring Plan or other related documents/programs need to be updated.

15.0 Imported Materials

Due to the extent of excavations required for the proposed basements as part of the development, it is expected that the requirement for importation of material will be limited. However, material may be required to be imported for use on the Site for purposes such as road construction and landscaping for public open space areas.

Materials imported to the Site will be required to meet the environmental and geotechnical requirements specified for the particular end use.

It is expected that materials imported to the Site as part of the development will generally meet the requirements of:

- Virgin Excavated Natural Material (VENM) in accordance with the NSW DECC (2008) *Waste Classification Guidelines*;
- Excavated Natural Material (ENM) in accordance with the Protection of the Environment Operations (Waste Regulation 2005 – General Exemption under part 6, Clause 51 and 51A, July 2008; and
- The SSTC-B and SDESC-B (refer to **Table T1**) and TSC (refer to **Table T17**, depending on the depth the material will be placed in Area B).

The frequency of validation sampling will be dependent on the source of the fill material. If the material is brought onto the Site from a quarry, and the material is homogeneous, validation will consist of:

- a certificate warranting that the material is VENM or demonstrating the physical and chemical quality of the fill, including supporting test data; and
- visual confirmation that the material is free from contamination as it is imported to Site.

If the imported material (including landscaping materials such as mulch) cannot be certified as VENM or clean quarry material, the following works will occur:

- site inspection of the source site and the reporting of these findings in the relevant validation reports; and
- One sample per 100m³ will be collected and analysed or a minimum of 3 samples per source; and
- Visual confirmation that the material is free from contamination as it is imported to Site.

Whenever possible, samples will be collected from the source location, prior to import of the material to the Site.

All soil samples will be analysed for the following suite of potential contaminants (which is based on NSW EPA, 1994):

- Metals (As, Cd, Cr, Cu, Ni, Pb, Zn and Hg);
- Polycyclic Aromatic Hydrocarbons and phenols;
- TPH/BTEX;
- Organophosphate and organochlorine pesticides;
- Polychlorinated biphenyls; and
- Asbestos.

16.0 Validation Strategy

This section outlines the proposed validation strategy and protocols required to demonstrate that the remedial action has achieved the remediation objectives.

16.1 Validation Principles

All soil materials to be retained on-site and/or beneficially reused in the Public Domain (South) must comply with the soil SSTCs and SSECs (as applicable), as discussed in **Section 5.3** and presented in **Table T1**.

Additionally groundwater concentrations within Area A, Area C and Area D must meet the groundwater SSTCs and SSECs presented in **Table T2**.

In particular, the ORWS HHERA Addendum (AECOM, 2011c) recommends that the median groundwater concentrations at the point of discharge to Darling Harbour should, on average, not exceed the relevant MWQC. The suite of analytes will include, but may not necessarily be limited to, the main contaminants of concern: arsenic, copper, lead, zinc, anthracene, phenanthrene, TPH C₆-C₉ and TPH C₁₀ to C₁₄. The ORWS HHERA Addendum further notes that marginal exceedances of the soil and/or groundwater SSECs would not be expected to adversely impact on ecological receptors within Darling Harbour, provided that median concentrations at the point of discharge to Darling Harbour and/or Southern Cove do not exceed both the MWQC and the SSEC-A (within the tidal prism) and SSTC-A derived by the ORWS HHERA Addendum (AECOM, 2011c).

The ORWS HHERA Addendum (AECOM, 2011c) has provided advice on the method for implementation of the soil and groundwater SSTCs and SSECs, including:

- A statistical approach to remedial validation with respect to large excavations; and
- The approach to isolated pockets of CIM.

The ORWS HHERA Addendum (AECOM, 2011c) recommends that soil validation data be assessed in accordance with the *National Environment Protection (Assessment of Site Contamination) Measure, National Environment Protection Council, 1999*. This will involve demonstrating that:

- the 95% Upper Confidence Limit (UCL) of the mean concentration is less than the adopted SSTCs and/or SSECs (as applicable, for all relevant CoPC);
- each individual sample concentration does not exceed the adopted SSTCs and/or SSECs (as applicable, by more than 2.5 times; and
- the standard deviation of the sample set, is not more than 50% of the adopted SSTCs and/or SSECs (as applicable).

Where required, the above criteria will be applied separately to the different Areas of the Site. This will apply to the fill materials remaining *in situ* within the basement groundwater retention system (Area C) as well as material located within the Site but outside the footprint of the basement groundwater retention wall system (Area A and Area D). This will also apply if different strata (i.e. fill materials, natural soils and bedrock) are observed to be present in the retained material. Consequently, the analytical data obtained from the validation of residual material retained on Site will be assessed separately as per the requirements of the *National Environment Protection (Assessment of Site Contamination) Measure, National Environment Protection Council (1999)*.

The NSW OEH Accredited Site Auditor will be invited to undertake regular site inspections during the excavation works.

The sampling and analysis program proposed to demonstrate compliance with the SSTCs and SSECs is described below.

16.2 Validation of Human Health and Ecological Risk Assessment Assumptions

An important element of the validation process will be confirmation that the key assumptions regarding the proposed development and on which the ORWS HHERA Addendum (AECOM, 2011c) was based (as described by **Appendix C** and **Section 20.9**) have been or will be implemented.

To this end, validation will include review of appropriate document confirming that the key assumptions either have been or will be constructed. Appropriate documentation may include:

- "Issue for Construction" Drawings that verify that the key elements of the proposed development relied on by the ORWS HHERA Addendum will be constructed; and/or
- "As Constructed" Drawings that document that the key elements of the proposed development relied on by the ORWS HHERA Addendum have been constructed.

This review will also assess any potential implications of changes to the design of the depth of basements and/or the final alignment of the basement groundwater retention wall system. Any significant changes to the final development plans will require confirmation that:

- The analytical data set and sampling density for the materials of potential concern (specifically Area A, Area B and Area D materials [as appropriate]) are adequate for assessing the suitability of the materials affected by the design changes;
- Any required additional site investigations are suitable to supplement the current analytical data set. If required, the scope of these works will be endorsed by the NSW OEH Accredited Site Auditor; and
- Confirmation that the assumptions of the ORWS HHERA Addendum are still valid (refer to **Section 5.3.3**).

The details of the above review will be included in the Site Validation Report (refer to **Section 16.8**).

As discussed previously, the basement and retention wall system are subject to ongoing refinement and development as part of the LLMP design process. Consequently, minor changes to the depth of basements and/or the final alignment of the basement groundwater retention wall system may be required. If the final development design is changed which affects the assumptions of the ORWS HHERA Addendum and this Amended RAP, the ORWS HHERA Addendum and this Amended RAP will be revised, as required, and submitted to the NSW OEH Accredited Site Auditor and the NSW OEH for approval (unless advised otherwise).

16.3 Soil Validation

Validation of soil will be undertaken at various stages prior to and during the Remediation Works to assess the soil against the SSTCs and SDESCs (as applicable, refer to **Table T1** and **Section 5.3**).

Materials that will require validation sampling will be as follows:

- Area A:
 - validation of any limited excavation areas (i.e. service trenches) if visual and olfactory field observations indicate that site conditions are significantly different to that observed during the ERM (2007), the ORWS DGI (AECOM 2010a) and *In situ* Soil and Fill Validation report (2011a) site investigations.
- Area B:
 - validation of treated or untreated materials removed during the basement bulk excavation works and designated for beneficial reuse within the Public Domain (South).
- Area C:
 - Validation of bedrock exposed in the base of the Deep Basement area.
- Area D:
 - Validation of materials to remain *in-situ* within Area D (refer to **Section 7.6**).
- Treatment and stockpiling areas will also be validated at the completion of the remediation works.

All validation sampling works will be conducted by a qualified environmental engineer/scientist with experience working on contaminated sites.

All validation soil samples detailed in the following Sections will be discrete soil samples only. I.e. composited soil samples will not be used for validation purposes.

16.3.1 Area A – Validation of Limited Excavation Areas

As an outcome of the ORWS *In Situ* Soil and Fill Validation works (AECOM 2011a) the groundwater and fill material to remain *in situ* within Area A is considered to have been adequately characterised and validated.

If excavation works in Area A (which are expected to be limited) encounter soils which, based on visual and olfactory observations, are significantly different to those observed during the ORWS *In Situ* Soil and Fill Validation works (AECOM 2011a, i.e. BH345 to BH356), validation soil sampling of the excavation base and walls above groundwater will be conducted to confirm that CoPC concentrations meet the soil SSTC-A and SDESC-A (as applicable).

If required, the Area A validation soil samples will be collected as follows:

- Wall validation samples will be collected at 10 m lineal metre intervals along the extent of wall in material identified to be the most impacted (either by visual observations of field screening of samples using a PID); and
- Base validation samples will be collected at 10 m lineal metres along the base of trenches or based on a 10 m sampling grid for wider excavation areas.

All excavations will be inspected by a qualified environmental engineer/scientist to confirm that the excavation walls and bases are free of bonded asbestos containing materials (BACMs). If BACM is encountered during these works, additional soil removal and validation works will be undertaken as per **Section 20.6**.

All soil samples will be analysed for the soil SSTC-A and SDESC-A (as applicable) CoPC detailed in **Table T1** and asbestos.

Validated limited excavations in Area A will be clearly marked and identified to ensure that cross contamination of surface areas with potential impacted material is mitigated.

16.3.2 Area B - Validation of Materials for Reuse or Off-site Disposal

Materials to be excavated as part of the bulk excavation works will be selectively excavated for potential beneficial reuse or offsite disposal based on excavation plans prepared as part of the RWP. The excavation plans will be based on:

- the findings of the DGI (AECOM 2010a) and ORWS *In Situ* Soil and Fill Validation works (AECOM 2011a);
- the soil SSTC-B and SDESC-B described by this RAP (refer to **Table T1**);
- the NSW DECC (2008) *Waste Classification Guidelines*; and
- field observations (visual and olfactory).

All Area B material excavated for beneficial reuse must be inspected by a qualified environmental engineer/scientist to confirm that the excavated material is free of any bonded asbestos containing materials (BACMs). If BACM is encountered during these works, soil removal and validation works will be undertaken as per **Section 20.6**.

Wherever possible, the excavated material will be taken directly to the Public Domain (South) or for off-site disposal. If field observations during the bulk excavation works indicate that the excavated material is significantly different from that anticipated by the available analytical data, the material will be stockpiled and additional discrete validation samples collected and analysed from each stockpile at a sampling frequency of 1 sample per 400 m³. All soil samples will be analysed for the SSTCs-B and SDESC-B CoPC detailed in **Table T1**, asbestos and in accordance with the NSW DECC (2008) *Waste Classification Guidelines*.

If the excavated material requires treatment to enable off-site disposal, validation samples will be collected from the treated material stockpiles to confirm its suitability. Samples will be collected at a frequency of 1 sample per 400 m³ of treated soil (or more frequently if required by the Immobilisation Approval). A less stringent sampling frequency may be adopted in consultation with the NSW OEH Accredited Site Auditor if the analytical results for the treated soil are confirmed to be statistically reliable.

Samples may also be submitted for unconfined compressive strength (UCS) tests if an ex-situ stabilisation treatment is used.

16.3.3 Area C - Validation of Materials to Remain In-situ Below the Shallow Basement

As an outcome of the ORWS *In Situ* Soil and Fill Validation works (AECOM 2011a) the groundwater and fill material to remain *in situ* within Area C is considered to have been adequately characterised and validated.

If tar or tar containing materials are identified at the base of the Shallow Basement area (where bedrock is not encountered) removal of the material shall be documented and validated through field notes, and photographs,

All Area C excavation walls and bases will be inspected by a qualified environmental engineer/scientist to confirm that the excavated material is free of BACMs. If BACM is encountered during these works, soil removal and validation works will be undertaken as per **Section 20.6**.

Where the Deep Basement area excavation is founded in rock, the excavation base will be validated visually. As described by **Section 5.3.3**, the standard of remediation in Area C is based on groundwater SSTC only. However, the ORWS HHERA, on which the SSTC area based, assumes that TCM will be removed from the immediate vicinity of the outer basement walls to the extent practicable. In consideration of this, visual validation will be based on observations that:

- the final surface is generally free of TCM, specifically:
 - any TCM present is contained within rock defects,
 - any TCM present is not mobile (that is it does not migrate out of the defects under normal weather conditions); and
 - the area of the TCM impacted defects is less than 5% of the exposed rock face); and/or,
- surface waters will be free of a sheen associated with contamination.

These observations will be confirmed via photographic documentation.

The above requirements are not met, the contingency measures detailed in **Section 20.11** will be considered.

16.3.4 Area D - Validation of Materials to Remain In-situ

Based on the current proposed basement plans and basement groundwater retention wall system alignment, Area D will remain unexcavated. Additional site investigation works will be required in this area to ensure the sampling density in this area complies with the NSW EPA (1995) *Sampling Design Guidelines*. As such, soil sampling will be conducted at an additional 4 boreholes to complement the existing analytical data obtained from BH094.

Soil samples will be collected from the boreholes at 1.5 m intervals each borehole will extend to at least 1.5 m into the natural underlying clays (present at approximately 6.5 m bgl based on the BH094 field observations) or refusal on bedrock. All soil samples will be analysed for the SSTCs-D CoPC detailed in **Table T1** and asbestos.

It is noted that no groundwater monitoring wells are currently located in Area D. Notwithstanding, groundwater concentrations at BH21/MW21 (which is adjacent to the proposed building location) were reported to be less than the groundwater SSTC-D.

If soil concentrations are reported by the validation program that exceed the SSTC-D and/or are significantly different to the current soil analytical data set in suggesting that groundwater concentration within Area D may be greater than those already reported, a groundwater investigation, to assess groundwater concentrations within Area D against the groundwater STC-D will be completed.

If required, two groundwater monitoring wells will be constructed within Area D. The groundwater monitoring wells, if required, will be evenly distributed across the area. The groundwater monitoring wells will be extended to and terminate on natural clay material (or at refusal on bedrock) and will be screened from approximately 1.0 m above the groundwater table to the base of the well. Groundwater samples will be collected from the two newly installed groundwater monitoring wells and the existing groundwater monitoring well (MW21) and analysed for the SSTCs-D CoPC detailed in **Table T1**.

Based on the discussed additional soil and groundwater results (if groundwater assessment is deemed warranted), an assessment of whether CIM is present within Area D will be undertaken and conclusions drawn

regarding remediation requirements in this area (if required). These works will be undertaken in consultation with the NSW OEH Accredited Site Auditor.

If any identified CIM is identified that requires remediation (as per **Section 5.3** and **Figure 11**), such works will be undertaken in parallel to the basement bulk excavation works.

16.3.5 Treatment Area and Stockpiling Areas

Activities within the RE, including the treatment and stockpiling works, will be undertaken on appropriately sealed hardstand areas in the ORWN, with diversion drains and bunding constructed around the perimeter of the area. Consequently, the soil beneath the hardstand is unlikely to be impacted by the stockpiling activities and subsequently, validation testing of these areas, once the hardstand is removed, is not proposed.

As a precautionary measure, before removal of hardstand is commenced, a careful inspection of these areas will be undertaken to identify the presence of contamination. If this inspection indicates the visual presence of any contamination relating to treatment operations, validation of the soil beneath the hardstand will be undertaken. These works will comprise the collection and analysis of validation samples on a 20 m sampling grid. Validation samples will be collected from the soil surface (0.0 to 0.15m depth) underlying the hardstand and analysed for all Area B CoPCs.

16.3.6 Validation Laboratory Analysis

All soil and groundwater validation samples will be analysed by National Association of Testing Authorities (NATA) accredited laboratories. The suite of analysis required for the various Areas at the Site will be as follows:

- Area A to D soils - determined by the relevant soil SSTCs and SSECs detailed in **Table T1**;
- Area A groundwater - determined by the relevant SSEC-A (within the tidal prism) and the SSTC-A as detailed in **Section 16.5**;
- If groundwater investigations are required in Area D (refer to **Section 16.3.4**), the Area D groundwater will be analysed for the groundwater SSTC-D CoPC; and
- Material proposed to be beneficially reused at:
 - Public Domain (South) – analysis as per the soil SSTC-B and SSEC-B CoPC.

If field observations during the bulk excavation works indicate that asbestos containing materials are present within the Site's fill materials, validation soil samples will also be analysed for asbestos in appropriate areas.

16.3.7 Analytical Methods

Two laboratories will analyse original, duplicate and triplicate soil samples using NATA registered methods. Both laboratories must undertake the required analytical testing in accordance with the requirements of the *National Environment Protection (Assessment of Site Contamination) Measure (NEPC, 1999a)*. Details regarding the analytical methods to be used will be discussed with the NSW OEH Accredited Site Auditor and the appropriate analytical laboratory engaged to undertake the works.

16.4 Soil Sampling Methodology

Soil sampling will be conducted in accordance with written standard operating procedures, copies of which will be maintained in a register on-site during the remedial works. This will ensure that representative samples of materials are collected and the sampling methodology remains consistent throughout the duration of the remedial works.

16.4.1 Sampling Methodology

Sample collection will be by:

- sampling trowel from excavation walls and bases (**only if it is safe to do so**);
- grab samples directly from the centre of an excavator bucket from the centre of stockpiles for validation of stockpiled or treated material;
- split spoon sampler (or equivalent) for validation of material to remain in-situ (i.e. in Area D, refer to **Section 16.3.4**); and

- grab samples directly from the centre of an excavator bucket from test pits excavated as part of the validation of fill materials (if required, refer to **Section 16.3.1**).

All validation sample points will be surveyed.

Materials will be described in accordance with the Unified Soil Classification System (USCS), with soil type, descriptive properties (colour, particle size, moisture content, sorting), as well as discolouration, staining, odours and other indications (if any) being noted. The information will be recorded on field logs completed for each location.

On-site screening of samples for volatile organic compounds (VOCs) in the field will be undertaken using a PID. The PID will be calibrated at least once daily (at the start of each sampling day) with a known concentration of isobutylene.

Soil samples will be placed into laboratory supplied glass jars as soon as practicable after collection. The jar size will be sufficient to meet the laboratory requirements for the requested analysis. All sample containers will be filled completely using a method such that the loss of volatile components is minimised. All sample containers will be clearly labelled with information such as sample number, sample location, depth, date collected and sampler's identification. After filling, sample containers will then be transferred to a chilled esky for sample preservation prior to and during shipment to the testing laboratory. The sample preservation requirements are listed in **Table 13**.

Table 10 Soil Sample Preservations and Storage

Analyte	Preservation	Storage
Inorganics		
Metals (General)	Unpreserved, glass jar with Teflon lined lid.	Store at <4°C, analysis within 6 months.
Metals (Chromium VI by alkali digestion)	Unpreserved, glass jar with Teflon lined lid.	Store at <4°C, extract within 28 days, analyse within 7 days.
Metals (inorganic Mercury)	Unpreserved, glass jar with Teflon lined lid.	Store at <4°C, analysis within 28 days.
Organics		
TPH C ₆ -C ₉	Unpreserved, glass jar with Teflon lined lid.	Store at <4°C, nil headspace, analysis within 14 days.
TPH C ₁₀ -C ₃₆	Unpreserved, glass jar with Teflon lined lid.	Store at <4°C, extraction within 14 days, analysis within 40 days.
BTEX	Unpreserved, glass jar with Teflon lined lid.	Store at <4°C, nil headspace, analysis within 14 days.
PAHs	Unpreserved, glass jar with Teflon lined lid.	Store at <4°C, extraction within 14 days, analysis within 40 days

A sample register will be updated daily to manage and track the validation process.

16.4.2 Sampling Equipment Decontamination

Equipment decontamination will be undertaken as described below. The following equipment will be needed for the detergent wash and water rinse decontamination process:

- laboratory (phosphate-free) detergent or Decon 90;
- tap water and deionised water;
- buckets or tubs (sufficient for size of equipment to be cleaned); and
- stiff brushes for cleaning.

Equipment that cannot be thoroughly decontaminated using the detergent wash and water rinse should be steam cleaned, or if a steam cleaner is not available, not used for further sampling (and marked clearly "not

decontaminated") or discarded. Equipment decontaminated using the high pressure steam cleaner will be further decontaminated as described above.

16.4.3 Quality Control samples

The following quality control (QC) samples will be collected as part of the field quality control procedures:

- Intra-Laboratory Duplicates – are identical to field samples, but both samples are sent anonymously to the primary laboratory. Blind duplicates provide an indication of the analytical precision of the main testing laboratory, but may also be affected by sampling techniques and inherent heterogeneity in the sample medium;
- Inter-Laboratory Duplicates – are identical to blind duplicates, but the duplicate sample is sent to the second (check) laboratory. Split duplicates provide an indication of the accuracy of the main testing laboratory;
- Equipment Blanks – are prepared in the field (at the sampling site) using empty bottles and the distilled water used during the final rinse of sampling equipment. After completion of the decontamination process fresh distilled water is poured over the sampling equipment and collected. The distilled water is exposed to the air for approximately the same time the sample would be exposed. The collected water is then transferred to an appropriate sample bottle and the proper preservative added, if required. Equipment blanks are a check on equipment decontamination procedures;
- Trip Blanks/Spikes – are samples of soil or water prepared by the laboratory with either zero or known analyte concentration. Trip blanks/spikes are a check on the sample contamination originating or lost from sample transport and handling, and shipping. One Trip Blank/Spike will be analysed per sample batch; and
- Field Blanks – are similar to trip blanks except the water is transferred to sample containers on-site. Field blanks are a check on sample contamination originating from sample transport, handling, shipping, site conditions or sample containers. One Field Blank will be analysed per water sample batch.

Procedures for duplicate sampling will be identical to those used for routine sampling and duplicate samples will be despatched for analysis for the same parameters using the same methods as the routine sample. Duplicate soil samples will be collected from directly adjacent to original samples. No homogenisation of samples will occur to reduce the loss of volatile compounds.

Duplicates and equipment blank samples will be collected as follows:

- Intra-Laboratory duplicate samples will be collected at a rate of approximately 1 in 10 soil samples and analysed for the full analyte suite. At least one blind duplicate sample will be included in each batch of samples;
- Inter-Laboratory duplicates samples will be collected at a rate of approximately 1 in 20 soil samples and analysed for the full analyte suite. At least one split duplicate sample will be included in each batch of samples; and
- One equipment blank of soil sampling equipment will be collected for every day of sampling and analysed for the full analyte suite. At least one equipment blank will be included in each batch of samples.

16.4.4 Laboratory QA/QC

The laboratories will undertake the analyses utilising their internal procedures and their test methods (for which they are NATA, or equivalent, registered) and in accordance with their quality assurance (QA) system which forms part of their registration.

Laboratory quality control procedures, which will be used during the project, will comprise the following:

- Laboratory Duplicate Samples – these are sub-samples taken from one sample submitted for analytical testing in a batch. A laboratory duplicate provides data on analytical precision. The rate of duplicate analysis will be according to the requirements of the laboratory's accreditation but will be at least one per batch;
- Matrix Spiked Samples – the purpose of the matrix spike is to monitor the performance of the analytical methods used, and to determine whether matrix interferences exist. A sample is spiked by adding an aliquot of known concentration of the target analyte(s) to the sample matrix prior to sample extraction and analysis. A spike documents the effect of the sample matrix on the extraction and analytical techniques. These will be analysed at a rate of approximately 5% of all analyses. At least one per batch will be reported;

- Laboratory Blank – this is usually an organic or aqueous solution that is as free of analyte as possible and contains all the reagents in the same volume as used in the processing of the samples. The reagent blank must be carried through the complete sample preparation procedure and contains the same reagent concentrations in the final solution as in the sample solution used for analysis. The reagent blank is used to correct for possible contamination resulting from the preparation or processing of the sample. Blanks will be analysed at a rate of once per process batch, and typically at a rate of 5% of all analyses;
- Laboratory Control Samples – these comprise either a standard reference material or a control matrix fortified with analytes representative of the analyte class. Recovery check portions should be fortified at concentrations that are easily quantified but within the range of concentrations expected for real samples. These will be analysed at a rate of one per process batch, and typically at a rate of 5% of analyses; and
- Surrogates – surrogate spikes are known additions to each sample, blank and matrix spike or reference sample analysis, of compounds which are similar to the analytes of interest in terms of:
 - extraction;
 - recovery through clean-up procedures; and
 - response to chromatography or other determination;
 - but which:
 - are not expected to be found in real samples;
 - will not interfere with quantification of any analyte of interest; and
 - may be separately and independently quantified by virtue of, for example, chromatographic separation or production of ions of different mass in a GC/MS analyser.

Surrogate spikes are added to the analysis before extraction. The purpose of surrogates is to provide a means of checking, for every analysis, that no gross errors have occurred at any stage of the procedure leading to significant analyte losses. Other internal laboratory quality control procedures, as required for NATA, or equivalent, registration, will also be performed.

Results of the QC analyses for both laboratories will be reported with each batch.

16.5 Groundwater Validation

As detailed in **Section 14.4.1**, a GMP will be prepared to detail groundwater monitoring requirements for the Site both during and following remediation. The groundwater monitoring will be undertaken to assess groundwater quality migrating from the Site against the MWQC and the SDESC-A (within the tidal prism) and SSTC-A derived by the ORWS HHERA Addendum (AECOM, 2011c). As per the ORWS HHERA Addendum recommendations (refer to **Section 3.4.14**), the groundwater monitoring will include the following Area A CoPC:

- Metals (arsenic, copper, lead, zinc);
- PAHs (anthracene and phenanthrene) and
- TPH (C₆-C₉ and TPH C₁₀ to C₁₄).

The ORWS HHERA Addendum defines the MWQC based on:

- ANZECC (2000) 95% species protection marine trigger values;
- ANZECC (2000) 99% species protection marine trigger values for potentially bioaccumulative contaminants; or
- other appropriate guideline values which provide a similar level of ecological protection to the ANZECC (2000) trigger values.

16.6 Groundwater Sampling Methodology

Groundwater sampling will be conducted in accordance with written standard operating procedures, copies of which will be maintained in a register on-site during the remedial works. This will ensure that representative groundwater samples are collected and the sampling methodology remains consistent throughout the duration of the remedial works.

A summary of the groundwater monitoring methodology is provided in **Table 11** following. Further details of the groundwater sampling methodology will be detailed in the Groundwater Monitoring Plan (refer to **Section 14.4.1**).

Table 11 Groundwater Sampling Methodology

Activity/Item	Details
Monitoring Parameters	Monitoring should include the following: - Groundwater depth (converted to m Australian Height Datum); and - Field parameters (including temperature, electrical conductivity, pH, dissolved oxygen and redox potential). Laboratory Analysis for the following: Area A – relevant Area A CoPC (as detailed in Section 16.5); and Area D (if required) - the SSTC-D detailed in Table T2.
Well Gauging	Monitoring wells should be gauged using a calibrated water level probe. The probe should be decontaminated between each measurement. Water levels should be gauged from the surveyed point on the casing. Details of the gauging dates and depths recorded are to be provided as part of reporting requirements.
Well Surveying	A licensed surveyor will be engaged to survey the location and elevation of the groundwater monitoring network to Australian Height Datum (m AHD).
Well Purging and Sampling Process	All groundwater monitoring wells should be purged using low flow (such as Micropurge) pumping prior to sampling, using new disposable low-density polyethylene (LDPE) bladders, in conjunction with flow cells as necessary and dedicated LDPE tubing. Measurement of field water parameters should be conducted continuously and purging continued until groundwater field quality parameters have stabilised. An appropriately experienced environmental consultant should be engaged to carry out these activities.
Decontamination Procedure	Monitoring and sampling equipment should be decontaminated according to the following procedure: - Wash with Decon 90 or similar decontaminant / water solution and rinse. - Triple wash with laboratory supplied clean deionised water.
Sample Method and Preservation	Following stabilisation of field parameters, samples should be placed into laboratory-supplied bottles containing appropriate preservatives for the selected analytical testing. Samples should be immediately chilled and stored at a temperature of 4°C or less prior to transit to the laboratory.
Disposal of Purged Groundwater	If required, purged groundwater should be disposed of at the on-site water treatment plant or off-site to a licensed waste receiving facility. Purged groundwater may be placed in drums for characterisation and disposed in accordance with the NSW DECC (2008) Waste Classification Guidelines or any subsequent revision. If required, a licensed contractor should be engaged to dispose of the water to an appropriately licensed facility.
Analytical Laboratories	Both a primary laboratory and secondary (QC) laboratory should be used. Both laboratories should be accredited by NATA for the analyses undertaken.
Quality Assurance / Quality Control (QA/QC)	QA/QC samples collected for quality control purposes during each round of groundwater sampling will be consistent with the requirements of Section 16.4.3 and 16.4.4. Discussion of the laboratory and field quality assurance/quality control and analytical data validation should be included in the reporting requirements.
Sample Nomenclature	Sample nomenclature will be consistent between sampling events.

16.7 Validation Data Quality Objectives

The Data Quality Objectives (DQO) process is a systematic, seven-step process that defines the criteria that an investigation should satisfy. DQOs for the validation works have been developed based on the iterative DQO process developed by the USEPA (2000) Guidance for the Data Quality Objectives Process – EPA QA/G-4 and adopted by NSW DEC (2006). The guidelines incorporate field quality control and laboratory analysis, methods and information on laboratory quality control data and have been used to validate the field and analytical data for the validation works.

The DQO approach follows the general guidance provided in Appendix IV of NSW DEC (2006) with respect to setting the DQOs and assessing their achievement by reference to the Data Quality Indicators (DQIs) set out in Appendix V of NSW DEC (2006). The approach has been modified to focus on setting appropriate objectives and ensuring the reliability of data from both field and laboratory procedures. The approach puts more emphasis on Step 5 (Developing the analytical approach to assessing data), which assesses the reliability of both the field and laboratory data and on demonstrating achievement of the objectives of the validation works. The approach assesses achievement of Step 6 (performance or acceptance criteria that data need to achieve) by reference to DQIs for both field and laboratory procedures.

The DQOs are detailed in the following Sections.

16.7.1 Step 1 – State the problem

The historic reclamation of the Site with fill materials (refer to **Section 3.3.1**) has caused metals, BTEX, PAH and TPH contamination in the soils and groundwater in some areas of the Site. The northeast corner of the Site may also have been impacted by the historic gas works located offsite to the north (refer to **Section 3.3.2**). The ORWS HHERA Addendum has concluded that some chemicals are present in the Site soils at concentrations which may pose a risk to human health or the environment in the context of the proposed land uses. Consequently, management of soils in some areas of the Site is required.

16.7.2 Step 2 – Identify the decisions

The decisions to be made relate to whether the validation program has demonstrated that the remedial works have achieved the objectives of the RAP which are:

- To ensure the remediated Site is protective of human health in the context of the intended future land use;
- To protect the environment (specifically groundwater and the adjacent Darling Harbour) by remediation of the Site to a standard that will minimise the risk of ongoing contamination;
- Comply with applicable legislative requirements including the appropriate requirements of the NSW DoP and NSW OEH; and
- To maximise the beneficial reuse of excavated material from the basement excavations within the Public Domain (South).

16.7.3 Step 3 - Identify the decision inputs

Inputs to the decision that need to be made with respect to whether the proposed remediation works at the Site have achieved the stated objectives are:

- The results of previous investigations (refer to **Section 3.4**);
- The use of appropriate remediation criteria (the SSTCs and SSECs, refer to **Section 5.0**) as described in the ORWS HHERA Addendum (AECOM, 2011c);
- The development and implementation of remedial options;
- The data to be obtained during soil sampling during the validation testing discussed in **Section 16.3**;
- The data to be obtained during groundwater sampling during the monitoring discussed in **Section 14.4** and **16.5**;
- The use of appropriate validation field methods, including sampling and preservation of soil and groundwater samples;

- The use of NATA registered methods for all analysis; and
- Confirmation that the DQIs have been achieved.

16.7.4 Step 4 – Definition of the boundaries of the remedial works

This is clearly defined by reference to the Site address and surveyed site areas (refer to **Section 3.1** and **Figure 2**). The proposed Shallow and Deep Basement plan is provided as **Figure 3** and the proposed land use is detailed in **Section 3.2** and **Figure 4**. The various Site areas are detailed in survey plans detailed in **Figure 5** to **Figure 10**.

16.7.5 Step 5 – Develop decision rules

The quality of data from field and laboratory procedures will be achieved by assessing data with reference to DQIs. The criteria will be as follows:

Table 12 Field and Laboratory Data Quality Indicators

Data	Data Quality Indicators
Field	
Field Personnel	Use appropriately trained field personnel.
Field data collection	Site conditions and sample locations properly described. All soil sample and groundwater monitoring well locations will be surveyed. Information to be recorded in field notes. Field notes are appropriately completed.
Sample handling (storage and transport)	Soil and water samples will be collected will be collected in accordance with Section 16.0 .
Field duplicates	As per the requirements of Section 16.4.3.
Field blanks	As per the requirements of Section 16.4.3.
Calibration of Field Equipment	On-site screening of samples for volatile organic compounds (VOCs) in the field will be undertaken using a portable photoionisation detector (PID). The PID will be calibrated at least once daily (at the start of each sampling day) with a known concentration of isobutylene. Water quality meters will be calibrated prior to the commencement of field activities with relevant solutions. The calibration will be in accordance with manufacturer's instructions or NATA publications <i>General Requirements for Registration: Supplementary Requirement: Chemical Testing (NATA 1993) and Technical Note NO. 19 (NATA 1994)</i> . Where satisfactory calibration cannot be achieved, the equipment will not be used. Calibration details will be recorded on field sheets, which will be included in the final report.
Laboratory	
Sample Analysis	All sample analyses to be conducted using National Association of Testing Authorities (NATA) certified laboratory using NEPM procedures. Use NATA certified check laboratory.
Holding times	Maximum acceptable sample holding time is 14 days for organic analyses and 6 months for metal analyses (28 days for mercury).
QA/QC samples	As per the requirements of Section 16.4.4.
Practical Quantitation Limits (PQLs)	All PQLs to be less than the remediation criteria.
Laboratory Relative Percentage Difference (RPD)	The RPDs of replicates will be determined and compared to the following criteria (from tender brief) for acceptability: Less than 20 percent for laboratory duplicates where the detection is greater than 20 times the PQL; Less than 50 percent for laboratory duplicates where the detection is greater than 10 times the PQL and less than 20 times the PQL; and No limit where concentration less than 10 times PQL

Data	Data Quality Indicators
Control Spike Duplicate RPDs	RPDs for Control Spike Duplicates will be compared to an acceptable limit of 20% and undertaken at 1 in 20 samples or a minimum of 1 per batch.
Matrix Spike Duplicates RPD	RPDs for Matrix Spike Duplicates will be compared to an acceptable limit of 20% and undertaken at a minimum of 1 in 20 samples.
Control Spike and Matrix Spike Recoveries	Percent recoveries of control spikes and matrix spikes will be compared to an acceptable range of 75–130 % and/or the laboratories internal DQI limits.

Corrective Actions

Analytical data that fails to meet the predetermined DQIs listed in **Table 12** will be managed using the following corrective actions on a case-by-case basis:

- Inspect samples to determine heterogeneity;
- Reanalyse suspect samples;
- Evaluate and amend sampling and/or analytical procedures;
- Re-sampling and re-analysis;
- Accept the data with an acknowledged level of bias and imprecision; and
- Discard the data.

In the event that data of questionable reliability are used, then it is essential that any restrictions and limitations associated with the use of such data are clearly identified. Failure to meet the DQIs will be reported and the implications to data quality will be assessed.

If the DQIs are considered to have been achieved satisfactorily then it will be concluded that the data is suitable for use for validation purposes. If the DQIs are not achieved, the significance of possible errors will be assessed to decide whether the data is useable.

16.7.6 Step 6 – Specification of the acceptable limits on decision errors

Specification of the acceptable limits on decision errors will be achieved by reference to the DQIs outlined below:

Precision

Precision measures the reproducibility of measurements under a given set of conditions. The precision of the laboratory data and sampling techniques will be assessed by calculating the Relative Percent Difference (RPD) of duplicate (laboratory and field) samples. The criteria to be used for the assessment of RPD will be based on guidelines given in AS4482.1 1997. These criteria listed in **Table 13**.

Table 13 RPD Assessment Criteria

Sample Type	Typical Acceptable RPD(a)
Intra-Laboratory Duplicate	30-50%(b)
Inter-Laboratory Duplicate	30-50%(b)

Notes: a) The significance of RPDs of results should be evaluated on the basis of sampling technique, sample variability, absolute concentration relative to criteria and laboratory performance.

b) This variation can be expected to be higher for organic analysis than for inorganics and for low concentrations of analytes which are close to the laboratory LOR.

If duplicate results are not within the acceptable RPD range, investigation into the cause will be initiated. The results of the investigations will be written up and filed, and followed up with the laboratories to achieve resolution. Thus the precision of the laboratory will be assessed by the acceptability of the RPD of laboratory duplicate samples, which should be within the acceptable RPD limits as established for intra-laboratory and inter-laboratory duplicates.

Accuracy

Accuracy measures the bias in measurement. Accuracy can be impacted by factors such as field contamination of samples, poor preservation of samples, poor sample preparation techniques and poor selection of analysis techniques by the analysing laboratory and improper analyses.

The accuracy of the laboratory data that will be generated during the project is a measure of the closeness of the analytical results obtained by a method to the 'true' value. For reference laboratory methods (e.g. USEPA methods), the following levels of accuracy should generally be achievable within $\pm 15\%$ of:

- the expected value of a certified reference material of similar matrix; or
- the value obtained by a separately validated and recognised quantitative method for the sample matrix.

Accuracy will be assessed by:

- reference to the analytical results of laboratory control samples;
- use of trip, equipment and field blanks to check the accuracy of sampling techniques; and
- evaluating the results of laboratory spikes and analyses against reference standards.

Analytical results of these should be sufficient to establish that accuracy has been achieved in the work of the sampling team.

Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represents a characteristic of a population or an environmental condition. Representativeness will be achieved by collecting samples on a grid basis from an adequate number of sample locations, to validate the subject area to the required accuracy and ensuring that an appropriate number of reliable analyses have been reported for each population or environmental condition, and that the concentrations of CoPC have been maintained in the samples during and after their collection. Consistent techniques and methods using written procedures will be utilised throughout the sampling program.

Completeness

Completeness is defined as the percentage of measurements made which are judged to be valid measurements. The completeness goal is set at there being a sufficient amount of valid data generated during the validation works. If there are insufficient valid data, as determined by the other DQIs, then additional data will be required to be collected.

Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. This will be achieved through maintaining a level of consistency in techniques used to collect samples, and ensuring the selected laboratories use consistent analytical techniques and reporting methods. Reporting of results will be done in consistent units and nomenclatures, and comparability will be achieved by ensuring that precision and accuracy objectives are met.

16.7.7 Step 7 – Optimisation of the design of the collection of data

This will be achieved by meeting the DQOs detailed in Steps 1 to 6 to confirm that the data generated from the remedial works is from appropriate locations, that analytical testing is undertaken for the identified CoPC, in appropriate quantities and of acceptable quality to confirm that the objectives of the remedial works have been achieved.

16.8 Validation Reporting

Following completion of the remediation and validation works, validation reports will be prepared. Depending on the final staging and development requirements, it is anticipated that separate validation reports will be required for each of the different development blocks and the Public Domain within the Remediation Works (South) Area.

It is assumed that reporting will be undertaken for the separate portions as follows:

- Block 1;
- Block 2;
- Block 3; and

- Public Domain.

The reporting requirements for the different areas will be confirmed with the various stakeholders including but not limited to the LLMP, the NSW OEH Accredited Site Auditor, OEH and the BDA.

The validation reports will be prepared in accordance with the requirements of the NSW EPA (1997) *Guidelines for Consultants Reporting on Contaminated Sites* and will include the following information:

- An overview of the remediation works carried out for each validation area;
- Confirmation that the final "Issue for Construction" Drawings (and/or final "As Constructed" Drawings) are consistent with the key assumptions of the ORWS HHERA Addendum (AECOM, 2011c) as detailed in **Appendix C** and as defined in Contingencies (refer to **Section 20.9**);
- A summary of the site history and basis for the remediation approach for the Site;
- Surveyed figures outlining the extent of the remediation works;
- The location of validation and characterisation samples;
- Descriptions of sampled materials (including visual and olfactory observations);
- Summary tables for soil and groundwater analytical results;
- Confirmation that the project DQO's and DQIs have been appropriately met;
- NATA registered laboratory analytical certificates;
- Summary of the tracking and fate of materials including materials excavated for on-site treatment, reuse on-site or off-site disposal;
- Landfill weighbridge dockets (if required);
- Conclusions as to the suitability of the Site for the proposed land uses; and
- Recommendations (if required) for further works.

17.0 Environment Management Plan – During Remediation

17.1 General

This section of the RAP describes the minimum standards to be adopted to protect the environment during the remediation works. The Remediation Contractor will develop and implement a suitable Environmental Management System in compliance with legislative and regulatory requirements. A site-specific Environmental Management Plan (EMP) will be developed prior to commencement of the remediation works. The EMP will detail the appropriate information and mitigation measures necessary to conduct the remediation works in a manner that will minimise the risk to the environment.

17.2 Water Management

The Environment Management Plan for the works will include procedures for the management of surface and groundwater during the works as outlined in **Section 13.0**.

17.3 Air Quality Management

An Air Quality Impact Assessment will be prepared in accordance with the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (DEC, 2005) to assess potential air and odour issues generated during the remediation works. This assessment will make reference to the following guidance documents:

- Assessment and Management of Odour from Stationary Sources in NSW: Technical Framework (DEC 2006); and
- Management of Odour from Stationary Sources in NSW: Technical Notes (DEC 2006).

17.3.1 Odours

Odour management is recognised as a critical aspect of site environmental management and will need to be given high priority in the planning of all excavation and stockpiling of contaminated soil at the Site. Odours are expected during the soil excavation, and consequently, management procedures will need to be developed within the EMP to address odour issues during the remediation works.

Primarily, odours at the Site will be associated with the excavation of hydrocarbon impacted materials. Odour generation at the Site will be influenced by weather conditions, the extent of open excavations stockpiles, and the quality of material exposed.

A detailed odour management system will be developed as part of the EMP incorporate the use of various management options as deemed appropriate for particular areas. The odour management system will include the following options:

- investigation as to the source of odours including odour monitoring;
- minimisation of the quantity or surface area of exposed odorous materials;
- implementation of odour management response procedures (as specified in the EMP);
- implementation of progressive contingency measures (as specified in the EMP);
- excavation within an EE (odorous soils), where practical;
- stockpiling in the RE (odorous soils);
- covering of exposed odorous materials progressively or at the completion of each work period;
- minimising exposed/excavation areas;
- apply odour suppressant sprays or foams to excavation surfaces; and
- undertake activities during favourable weather conditions.

The management of odours is recognised as a critical aspect of the environmental management of the proposed remediation works. Selection of the appropriate management and mitigation measures, including those summarised above, will be based on consideration of:

- the quantity of odorous materials that require remediation;
- the duration of the required remediation works and associated management of odorous materials;
- the proximity of the proposed remediation works to sensitive receptors;
- the prevailing and forecast weather conditions; and/or
- other activities being undertaken at the Site in parallel with the remediation work.

17.3.2 Dust

Care should be taken to manage wind-blown dust at the Site during excavation and earthworks activities. Dust can be generated through a range of means and activities:

- Wind action:
 - Exposed soil surfaces will generate dust during winds;
- Agitation and movement:
 - Excavation, mixing and placement of soil will generate dust;
 - Transfer of soil in uncovered trucks may result in dust generation;
- Vehicle Movements:
 - Vehicles' wheels on exposed soil surfaces (such as unsealed roadways) will generate dust.

Appropriate management of dust is required to ensure that it is minimised and/or prevented. Dust management will include the following:

- Excavation in the excavation enclosure for the contaminated areas;
- Covering surfaces;
- Minimising exposed/excavation areas;
- Wetting down; and
- Dust monitoring.

17.4 Noise and Vibration Management

An assessment of noise and vibration impacts potentially generated during the remediation works will be prepared in consultation with the NSW OEH. The assessment will be prepared in accordance with the *Interim Construction Noise Guideline* DECC (2009), *Industrial Noise Policy* (NSW EPA 2000) and *Application Notes, Environmental Criteria for Road Traffic Noise* (NSW EPA 1999) and *Assessing Vibration: A Technical Guide* (DEC 2006).

The potential for noise and vibration impacts from the remediation works will result from:

- Works associated with preparation of the Site;
- Movement of construction vehicles around the Site; and
- Operation of plant and activities on the Site.

17.5 Long Term Environmental Management Plan

It is anticipated that a Site Management Plan may be required to describe contingency management methods which may need to be applied by future land owners if they wish to re-develop their Barangaroo Stage 1 Development Area beyond the area affected by the Remediation and Development Works undertaken at the Site.

The Site Management Plan will be prepared as an outcome of the Soil Validation Program and in consultation with the NSW OEH Accredited Site Auditor.

On the basis that both the key assumptions and requirements of this Amended RAP and the ORWS HHERA Addendum (AECOM, 2011c) are successfully delivered and implemented during the execution of the works, and validated accordingly upon completion, no other form of Long Term Management Plan is envisaged as a requirement of this RAP.

18.0 Occupational Health and Safety – During Remediation

18.1 General

This section of the RAP describes the minimum standards to be adopted to protect the health and safety of all persons involved in the remediation works. The Remediation Contractor will develop and implement a suitable Health and Safety Management System in compliance with legislative and regulatory requirements. A site-specific Occupational Health and Safety Plan (OHSP) will be developed prior to commencement of the works. The OHSP will detail the appropriate health and safety information necessary to conduct the remediation works in a safe manner.

18.2 Occupational Health & Safety Plan

The purpose of the site-specific OHSP is to present all relevant health and safety information for the works. The information presented in the OHSP will include:

- Assignment of responsibilities for management personnel and workers;
- An outline of the existing Site conditions;
- Details of all work to be conducted;
- An evaluation of hazards and risks;
- Details of the proposed measures to be implemented to manage the identified hazards and risks;
- Establishment of personnel protection standards and mandatory safe work procedures;
- Establishment of OHS monitoring protocols;
- Training requirements for emergency team members;
- Communication protocols and training procedures;
- Evacuation procedures, emergency contacts and emergency drills to be implemented; and
- Provision for contingencies and changes in work practices.

18.2.1 Responsibilities

The responsibilities and duties of the Remediation Contractor in relation to OHS will include:

- Ensuring all work undertaken is performed in accordance with relevant legislation and regulations, and directions issued by regulatory authorities;
- Developing and documenting safe working practices for all employees and subcontractors;
- Ensuring workers are adequately trained to undertake their work tasks using the adopted work practices;
- Ensuring that work is performed in strict adherence to the adopted work practices;
- Appointing a suitably qualified and experienced Site Safety Officer (SSO) to supervise and control safety matters;
- Supplying and maintaining first aid kits, first aid facilities and ensuring first aid attendants are present in accordance with statutory requirements;
- Ensuring that all workers are inducted prior to their commencement of work. This will include site-specific training in regard to the site conditions, works procedures, emergency and evacuation procedures, first aid procedures, decontamination procedures and other relevant matters detailed in the OHSP;
- Ensuring that copies of the OHSP are readily available;
- Establishment and maintenance of a record of all hazardous substances on the Site including provision of Material Safety Data Sheets (MSDSs);
- Ensuring that all personnel who work with contaminated materials undergo a medical examination prior to and at the completion of their work on-site;

- Reporting all site incidents and accidents to the WorkCover Authority;
- Ensuring that the SSO is on-site during all site works to monitor compliance with the OHSP;
- Ensuring that regular documented OHS inspections are conducted, including the use of a documented follow-up system to monitor improvements and measures introduced to rectify any observations made;
- Supplying and maintaining the required personal protective equipment (PPE);
- Ensuring all workers are trained in the use of the PPE and correctly use PPE; and
- Ensuring that all electrical equipment, plant and tools comply with appropriate statutory requirements and are maintained in a good, serviceable and safe condition.

18.2.2 OH&S Legislation, Regulations and Standards

The remediation works will be conducted in compliance with applicable OH&S legislation, regulations and standards. In addition, the remediation works will comply with relevant industry codes of practice, guidelines and other publications that have been developed by the WorkCover Authority. These may include:

- The Occupational Health and Safety Act 2000 and Regulation 2001;
- The Dangerous Goods Act 1975 and General Regulation 1999;
- Guide for Riggers (November 1995);
- Electrical Practices for Construction Work (February 1992); and
- Exposure Standards for Atmospheric Contaminants in the Occupational Environment (May 1995).

A number of Australian Standards have been identified relating to OH&S issues for the works proposed at the Site. These standards include:

- AS 1319 -1994 Safety Signs for the Occupational Environment;
- AS 1336 -1997 Recommended Practices for Occupational Eye Protection;
- AS 1470 -1986 Health and Safety at Work - Principles and Practices;
- AS 1715 -1994 Selection, Use and Maintenance of Respiratory Protective Devices;
- AS 1716 -2003 Respiratory Protective Devices;
- AS 1801 -1997 Occupational Protective Helmets;
- AS 1885.1 -1990 Measurements of Occupational Health and Safety Performance - Describing and Reporting Occupational Injuries and Disease (known as the National Standard for Workplace Injury and Disease Recording);
- AS 2161 - 2000 Occupational Protective Gloves;
- AS 2210 - 2000 Occupational Protective Footwear;
- AS 2436 -1981 Guide to Noise Control on Construction, Maintenance and Demolition Sites;
- AS 2601 -2001 The Demolition of Structures;
- AS/NZS 2865-2001 Safe Working in a Confined Space;
- AS 2986 -1987 Workplace Atmospheres - Organic vapours - Sampling by Solid Adsorption Techniques;
- AS/NZS 3012 -1995 Electrical Installations – Construction and Demolition Sites;
- AS 3640 -1989 Workplace Atmospheres - Method for Sampling and Gravimetric Determination of Inhalable Dust; and
- AS/NZS 4576 -1995 Guidelines for Scaffolding.

18.3 Risk Assessment

A hazard analysis should be conducted prior to site establishment to identify the OHS hazards expected during the course of the remediation works. A Risk Management Plan will be developed to identify hazards associated

with the proposed remediation works, evaluate the associated risks and determine the necessary measures to reduce or mitigate those risks. This section of the RAP outlines some of the hazards expected over the course of the project. Hazard identification and risk assessment will be conducted and documented on an ongoing basis as the project works proceed.

18.3.1 Chemical Hazards

Based on the information provided in previous investigations at the Site, the presence of metals, TPH and PAHs has been confirmed within the Sites soils. The hazard posed by these materials will be evaluated and the associated risks assessed in the Risk Management Plan.

18.3.2 Atmospheric Exposure Limits and Recognition Qualities

The exposure limits and recognition qualities of the chemicals likely to be encountered in the remediation works will be taken from the following guidelines (listed in order of precedence) and detailed in the OHSP:

- NOHSC, Exposure Standards for Atmospheric Contaminants in the Occupational Environment, 1995. The most up-to-date Australian exposure standards are located on the Safe Work Australia Hazardous Substances Information System (<http://hsis.ascc.gov.au/SearchHS.aspx>); and
- National Institute for Occupational Safety and Health (NIOSH) 2007, Pocket Guide to Chemical Hazards. Also refer to <http://www.cdc.gov/niosh/npg/>.

18.3.3 Additional Hazards and Risks

The OHSP will identify and describe a range of other hazards anticipated during the remediation works. These hazards will include:

- Heat stress;
- Explosive atmospheres in areas dealing with contaminated materials;
- Oxygen deficient atmospheres and confined spaces (as defined under AS/NZS 2865 - 2001 Safe Working in a Confined Space);
- Underground utilities;
- Underground pipelines, pits, and other obstructions;
- Above ground electrical and utility hazards;
- Traffic hazards;
- Instability of excavation batters and stockpiled material;
- Hazards associated with the construction and decontamination of the RE and ECS;
- Hazards associated with operation of the treatment works;
- Hazards associated with the airlock and decontamination operations in the RE; and
- Physical hazards such as trip hazards and mobile plant.

Specific minimum standards for these hazards will be outlined within the Risk Management Plan.

18.4 Work Zones

The Site will be divided into a number of work zones, as follows:

- Exclusion Zones – the RE (as detailed in **Section 11.3.1**);
- Decontamination Zones – decontamination stations located in the Remediation Area; and
- Support Zones – the site office and site facilities areas within the Remediation Area.

Movement of personnel and equipment between these zones will be minimised and restricted to specific access control points and decontamination stations to prevent cross contamination to clean areas.

18.4.1 Decontamination Stations

The decontamination stations will be the only entry and exit points to Exclusion Zones. The stations will be located to minimise the transportation of contaminants between the various areas of the Site, and to ensure that the Support Zone does not become contaminated or affected by other site hazards.

As discussed in **Section 11.3.1**, clean and dirty zones will be established at all decontamination stations. All workers will be required to pass through the Decontamination Stations when entering and exiting the Exclusion Zones.

These stations will also house the PPE stock rooms and change rooms, so that when entering the Exclusion Zones workers are able to apply the necessary PPE.

18.4.2 Support Zone

The Support Zone refers to the site office and other support facilities involved in administering the remediation works. Site personnel may wear normal work clothes within this zone, leaving any potentially contaminated clothing, equipment and materials in the decontamination station until decontaminated or appropriately disposed of.

In the event of an emergency, support zone personnel are responsible for alerting the correct authorities. All emergency telephone numbers, evacuation route maps, vehicle keys and site safety information would be held within the Support Zone

19.0 Community Engagement

Community engagement prior to and during remediation is an integral component of successfully delivering remediation works. LLMP has developed a comprehensive Initial Community and Stakeholder Engagement Strategy (Lend Lease, August 2010) for the Barangaroo Stage 1 Development that will be implemented for delivery of the remediation works in the Site (refer to the summary presented in **Table 14** below). The strategy includes processes for communicating with the local community on the remediation works, discussing potential short term impacts and mitigation measures relating to the remediation.

Table 14 Summary of Lend Lease Communication Strategy

Communication Channel	Purpose
1300 Community Enquiry Line	A key channel for the community to raise issues, ask questions and speak directly to a member of the Community Relations team. A 24 hour after hours service will also be provided to ensure any issues occurring outside of business hours are addressed in a timely manner.
Barangaroo South Website (www.barangaroosouth.com.au)	This is the central portal for all information about the project. It is the one-stop-shop for everything the community and stakeholders will need to know about the development including electronic copies of all newsletters, notifications, press releases and links to the Department of Planning website and submissions.
Barangaroo South Blog (link on website)	An opportunity for open communication between the community, stakeholders and general public about the project.
Newsletters	To provide ongoing updates about the planning process and progress of works on site. This will be a key means of ensuring information transparently flows to the community and stakeholders about the development.
Community Information Sessions	Used to convey key messages to the local stakeholders and proactively work to address specific concerns.
Stakeholder one-on-one briefings	To discuss concerns raised by key stakeholders face-to-face and provide more detailed information and assurances about the project.
Public displays	To effectively raise greater awareness of the project and the progress, particularly during the design phase.
Notifications	To ensure all residents and businesses potentially impacted by Site works are informed in advance of key work commencing. Notifications will be used to inform the community of key issues such as the timing of noisy work, out of hours construction and traffic impacts.
Door knocking	To personally discuss concerns raised by the local business community (particularly the businesses along King Street Wharf and local cafes in the high rise commercial buildings) face-to-face on a one-on-one basis, proactively address any issues and provide assurances about the work.
Signage	To inform the community about who is responsible for the Site activities and the contact details for further information about the work.
Advertising	To provide regular updates to a large audience and direct them to the website for further information. To raise greater awareness about the project in the wider community.
Commercial Property Notice Boards	When appropriate, general information about the overall project will be included on the notice boards in commercial properties. This will also contain the contact details of the Lend Lease Barangaroo South Community Relations team should they require any further information about the work.
Hoardings	Hoardings will be used as a strategic communication tool to ensure the community and public are up to date with information regarding the construction and key marketing elements of the project (such as leasing enquiries). The relevant contact numbers (including the 24 hours Community Information Line) will be displayed on the hoarding at all times.

20.0 Contingency Planning

20.1 Approach

The purpose of the contingency plan is to outline procedures for the identification and management of unexpected issues or events that may occur during the works. The contingency plan will detail the following information:

- The assignment of responsibilities to nominated key personnel;
- The assessment of hazards associated with such situations, and the potential off-site impacts;
- Contingency responses; and
- Procedures for reporting relevant issues to regulatory authorities.

20.2 Potential Unexpected Events

The following unexpected events have been identified as having the potential to occur during the remediation works:

- Identification of greater amounts of CIM than presently anticipated;
- Identification of CIM at depths greater than presently anticipated (in particular below the depth of the proposed excavation works);
- Variation of contaminant characteristics or identification of unanticipated contaminants and materials;
- Bonded asbestos containing material (BACM) is encountered during the excavation works (either within Area A or Area B);
- Failure of the preferred treatment approach to achieve the soil SSTCs and SSECs (if required) or treatment standard required for off-site disposal of excavated material;
- Insufficient storage capacity to stockpile all required materials;
- Change of the basement design and associated basement groundwater retention wall system alignment;
- The groundwater program detailed in **Section 14.4** may report an increase in CoPC concentrations in the Area A groundwater rather than a decreasing trend;
- TCM and/or surface water sheens are encountered during visual validation of exposed rock in the Deep Basement area; and
- Operational issues during the remediation works including but not limited to:
 - Flooding of the site;
 - Generation of unacceptable levels of dust during excavation and reinstatement works;
 - Release of unacceptable levels of fugitive emissions during the excavation works;
 - Generation of unacceptable odours from the excavation works;
 - Generation of unacceptable noise levels during site works;
 - Generation of unacceptable vibration levels during excavation and reinstatement works; and
 - Spills and leaks of hazardous materials.

Contingency mitigations for these items are described in the following sections.

20.3 Increased Volumes of Contaminated Material

The remediation strategy is to undertake remediation works to the extent practicable such that the Site is suitable for its proposed land use. Soil SSTCs and SSECs have been used to define identified areas of CIM and associated remediation volumes as required by the Remediation Decision Making Process Flow Chart (refer to **Figure 11**).

The ORWS *In situ* soil and fill validation program (AECOM, 2011a) has been conducted to adequately characterise material within the Site and therefore minimise the risk of increased volumes of CIM requirement management during the remediation works.

Excavated and reused materials will be managed on-site using the Materials Tracking System described in **Section 12.7.2**. The quantities of materials excavated will be regularly compared to the estimated quantities.

In addition to unanticipated increased volumes of CIM, increased volumes of foreign materials in the form of steel reinforcement, scrap steel and pipe work may have the potential to adversely impact on the project. Depending on the magnitude of the changes of anticipated volumes of excavated materials, and the extent of contamination, changes to the depth of excavation and to the final reinstatement levels may be made during the project. These changes may require revision of the HHERA.

20.4 Variation of Contaminant Depth

Should CIM be identified at greater depths than can be practicably excavated, the following approach will be adopted:

- Review the identified CIM as required by the Remediation Decision Making Process Flow Chart (refer to **Figure 11**) to assess whether the subject material represents an unacceptable risk and thus requires remediation;
- Consider in-situ remediation techniques;
- Consider the principles of CUTEP and ESD to assess whether the material can be practically removed in the light of: for example, its depth below both ground surface and the water table; and proximity to existing structures and the Harbour;
- Additional or modified groundwater monitoring in Area A to assess potential impacts to the environment (as discussed in **Section 14.4**); and
- Review of the ORWS HHERA Addendum to quantify whether the identified CIM represents an unacceptable risk to human health or the environment.

20.5 Variation of Contaminant Characteristics

The range of contaminants analysed in the DGI and previous site investigations is considered to be appropriate for development of the soil SSTCs and SSECs. However, there is the potential for occurrence of as-yet unidentified contaminants, and for variation in the concentrations or distribution of known contaminants.

Should any significant changes to the nature or types of contaminants be identified during the works a variation to the ORWS HHERA Addendum and this RAP and the soil SSTCs and SSECs may be required. Variations will be submitted to the NSW OEH Accredited Site Auditor and the NSW OEH for approval (unless advised otherwise).

It is noted that LLMP is familiar with potential site conditions having excavated and remediated the adjacent Bond site. Notwithstanding this, it is considered that any different materials encountered can be adequately addressed by AECOM and Lend Lease following assessment and refinement of any required remediation design.

20.6 Management of Bonded Asbestos Containing Materials

In the event that BACM is encountered during the excavation works in Area A or Area B, the material will be collected and disposed of by a licensed Asbestos Removal Contractor (ARC) in accordance with the requirements of the NSW WorkCover the NSW Occupational Health & Safety Regulation Act (2001) and the requirements of the NSW Occupational Health and Safety Commission (NOHSC) Asbestos Code of Practice and Guidance Notes.

The BACM removal works would be undertaken as follows:

- The remediation contractor would establish appropriate barriers and signage around the area where BACM has been identified;
- The BACM will be suitably removed from the Site by an ARC;
- Airborne asbestos fibre monitoring will be undertaken around the working area during the works to confirm that the BACM is being removed in an appropriately controlled manner;

- Validation soil samples will be collected at 10 m lineal intervals along the walls and base of any identified BACM impacted excavation areas and analysed for asbestos. Should the soils beneath the BACM be impacted with asbestos fibres, the impacted soils will be excavated for appropriate off-site disposal; and
- An ARC will conduct a visual inspection of the affected area to confirm that it is free of all visible BACM fragments. A clearance certificate will be prepared to document these works.

If BACM is encountered and removed from Area A and B, any residual soils must not contain asbestos (bonded or otherwise) as determined by the following:

- A visual inspection of the remediated area to confirm the removal of all visible BACM fragments; and
- No detection of asbestos in samples collected from the residual soils and submitted for analysis.

20.7 Failure of the preferred treatment approach(es)

Two preferred ex-situ treatment approaches have been identified by this RAP. As described in **Section 8.0**, selection of the final treatment approach will be documented in the RWP.

Should the selected treatment approach prove to be unsuccessful:

- Consideration will be given to refinement of the treatment approach including use of different quantities of additives or different additives; and/or
- Implementation of the alternative ex-situ treatment will be considered.

The preferred treatment methodology for the Blocks 4 to 5 remediation works will also be considered based on the findings of remedial trials being conducted at those sites (if required).

20.8 Insufficient Storage Capacity for Stockpiles

The remediation strategy is to minimise the requirement for on-site stockpiling by direct transfer of material either for beneficial reuse or for off-site disposal. Further, the ORWS *In situ* soil and fill validation program (AECOM, 2011a) has been conducted to adequately characterise material within the Site and therefore minimise the requirement for interim stockpiling. Notwithstanding, variations in quantities or contaminant characteristics or delays in establishment of treatment infrastructure may result in the requirement for additional stockpiling.

If there is insufficient storage capacity for the stockpiling of material in the ORWN area the following options will be assessed:

- Explore alternative options for the immediate beneficial reuse of the material as part of the Barangaroo Stage 1 or Stage 2 developments (for example, as described in **Section 5.2.4.2**, there may be a potential to beneficially reuse material within the Headland Park or the Barangaroo Central Public Domain);
- Consider collection of additional *in-situ* samples to facilitate characterisation of material (where contaminant quantities or contaminant characteristics may be different from those expected) for either beneficial reuse or off-site disposal before it is excavated;
- Explore options for temporary stockpiling of material outside of Barangaroo South; and
- Off-site disposal of materials classified as Virgin Excavated Natural Material (VENM) for beneficial reuse on other sites outside Barangaroo. It is likely that VENM will be produced during the excavation of sandstone as required for the Deep Basement bulk excavation works.

20.9 Further Development of the Basement and Retention Wall System Designs

As discussed previously, the basement and retention wall system are subject to ongoing refinement and development as part of the LLMP design process. Consequently, minor changes to the depth of basements and/or the final alignment of the basement groundwater retention wall system may be required. If the design is changed and affects the assumptions in the ORWS HHERA Addendum and this Amended RAP, the ORWS HHERA Addendum and this Amended RAP will be revised, as required, and submitted to the NSW OEH Accredited Site Auditor and the NSW OEH for approval (unless advised otherwise).

Based on the currently available soil and groundwater analytical data as presented in this RAP contingency measures for each of the Areas within the Site are described following. In each instance, the Auditor would be consulted to confirm agreement with contingency measures to be adopted.

Area A

- CoPC concentrations in soil to the east of the proposed alignment of the retention wall system are similar to that reported within Area A. Consequently, minor lateral movement (i.e. by less than 5 m) of the retention wall system (i.e. to the east or west) will not affect the proposed management strategy of retaining the fill material in this Area and its suitability for the proposed landuse;
- If the alignment of the retention wall system moves laterally greater than 5 m, the Area A data set should be reassessed to confirm that it's sampling density suitably characterises the fill material. If this is not achieved, then additional sampling will be conducted in consultation with the NSW OEH Accredited Site Auditor.

Area B

- An increase/decrease in Area B fill material volumes as a result of any changes to the basement depth or retention wall system designs will not affect the proposed management strategy of beneficially reusing this material and the suitability of the Site for the proposed land uses;

Increasing the elevation of the final Public Domain (South) and therefore increasing the capacity of the Area for beneficial reuse will not impact on the remediation approach.

Area C

- CoPC concentrations in the proposed Area C fill materials are similar to that reported within the Area B fill materials and groundwater CoPC concentrations in Area C (following removal of the localised CIM in the MW08 area) will be significantly less than the groundwater SSTC-C. Consequently, minor vertical changes to the lowest basement level in the Shallow Basement area (i.e. by less than 5 m) will not affect the proposed management strategy of retaining the Area C fill material in this Area and the suitability of the Area for the proposed landuse.
- If the level of the lowest basement moves vertically greater than 5 m, the Area C data set should be reassessed to confirm that it's sampling density suitably characterises the underlying, residual fill material. If this is not achieved, then additional sampling will be conducted in consultation with the NSW OEH Accredited Site Auditor.
- If increased volumes of CIM are left below car park basements due to vertical changes in the level of the lowest basement, the extent and significance of these impacts, in the context of other material to remain below the car park basement, will be assessed to confirm whether they represent a significant risk to human health. This assessment will be conducted in consultation with the NSW OEH Accredited Site Auditor.

Area D

- The analytical data in the south-eastern Area D and at adjacent boreholes indicates that CoPC concentrations are generally non-detect and significantly less than the soil SSTC-D for Area D (refer to **Section 6.4**). It is noted that additional investigations will be undertaken in this Area as detailed in **Section 16.3.4**. Therefore, minor lateral movement of the retention wall system would not affect the suitability of this Area for the proposed land use.
- If the alignment of the retention wall system moves laterally greater than 5 m, the Area D data set should be reassessed to confirm that it's sampling density suitably characterises the fill material. If this is not achieved, then additional sampling will be conducted in consultation with the NSW OEH Accredited Site Auditor.

20.10 Area A Groundwater Quality

In the event that the groundwater monitoring program detailed in **Section 14.4** indicates that median groundwater concentrations at the point of discharge to Darling Harbour (the Area A Tidal Prism) are not statistically/significantly¹ decreasing towards achieving both the MWQC and the SDESC-A (within the tidal prism)

¹ Significance will be determined estimating confidence intervals for each of the CoPC using the existing dataset for the Site. Concentrations falling outside of the confidence interval by greater than 3x will be considered significant.

and SSTC-A for the identified CoPCs over 8 rounds of monitoring (2 years), contingency measures will be assessed to reduce impacts to the groundwater system. The following contingency actions will be considered:

- The GMP may be modified to include more detailed and frequent groundwater monitoring. Additional groundwater monitoring wells may be installed if more detailed groundwater assessment is considered to be warranted. If required, the GMP would be modified in consultation with the NSW OEH Accredited Site Auditor;
- A detailed area- and CoPC-specific human health risk assessment may be undertaken to assess the significance of specific exceedances of the groundwater SSTC-A;
- A quantitative ecological risk assessment may be undertaken to assess the significance of specific exceedances of the relevant MWQC and groundwater SDESC-A; and
- Active groundwater remediation works would be considered as an option.

20.11 Failure of Visual Validation (Tar Containing Material)

If TCM is encountered in rock exposed as part of the Deep Basement excavations as described by **Section 16.3.3**, the following contingency measures will be considered:

- 1) Engineering mitigation measures to prevent the ingress of TCM to the excavation, potentially including:
 - a) Local over-excavation of bedrock to remove TCM;
 - b) Grouting of the rock defect to seal the TCM within the rock matrix; or
 - c) Shotcreting (200 mm thick) of the rock surface to seal the TCM within the rock matrix.

20.12 Operational Contingencies

Flooding of the Site

The EMP for the remediation works will be developed to control the impact of site works in order to minimise and mitigate against any impacts to off-site waters (Darling Harbour). As outlined in **Section 14.0**, the implementation and maintenance of a variety of environmental control measures will be undertaken during the project to manage water encountered during the works. Measures such as the installation of drains to divert clean water from up gradient areas to on-site stormwater drains, recycling of water and off-site water treatment will be conducted to manage and control water.

In extreme situations such as flooding or heavy rainfall, the discharge of treated water may be permitted to the sewer system in accordance with the conditions of a Sydney Water licence. All water intended for discharge will be stored on-site and tested prior to discharge to confirm compliance.

Records of all discharges will be kept describing the estimated volume of water discharged, the time period over which the discharge occurred, and the water quality results of water samples collected prior to discharge.

These control measures will be monitored during significant rainfall events to confirm their integrity and suitability.

Control of Dust

Should unacceptable levels of dust be detected during the remediation works, an investigation will be conducted to determine the source of the dust, and evaluate the appropriate measures to be implemented.

These measures may include the following:

- Increased use of a water cart or water sprays to suppress dust in open areas;
- Installation of temporary sheeting to cover localised exposed areas and stockpiles;
- Installation of dust screens around the Remediation Area;
- Covering stockpiles of contaminated soil which will remain on the Site for more than 24 hours (where practical);

- Alteration of the works program to minimise the extent of disturbed open areas;
- Consolidation of material stockpiles;
- Use of chemical dust-suppressants provided the chemicals do not pose a contamination or OHS hazard;
- Use of alternative coverings such as hydromulch to stabilise the surface of open disturbed areas;
- Use of additional dust suppression features on items of dust generating plant and equipment;
- Securely covering all loads entering or exiting the Site; and
- Use of alternate work practices such as modified equipment to minimise dust generation.

Fugitive Emissions and Odours

Should unacceptable levels of fugitive emissions be detected at the Site boundaries or in the surrounding area during the project, an investigation will be conducted to determine the source of the emissions, and to evaluate the appropriate measures to be implemented.

These measures may include the following:

- Alteration in the works program to minimise in the extent of disturbed open areas;
- Prompt removal and treatment of heavily contaminated materials that have been exposed and are identified to have caused the emissions;
- Use of fine mist sprays around the Remediation Area;
- Conducting the work in more favourable weather conditions;
- Use of alternate work practices to minimise the period of impact of the emissions;
- Use of additional features to control emissions from plant and equipment;
- Use of alternate work practices such as using modified equipment;
- Relocation of offending plant and equipment to less sensitive on-site areas;
- Reducing the number of plant and equipment items on-site; and
- Use of a deodorant within water sprays at locations on-site and at Site boundaries provided the chemicals do not pose a contamination or OHS hazard.

Noise and Vibration

Should unacceptable noise and/or vibration levels be detected during the remediation works the following measures may be implemented:

- Modify the works program to minimise the impact of noisy or vibratory operations, including:
 - Modify the timing of the works to appropriate times of the day; and
 - Accelerate the works program to complete the works quickly and minimise the period of disturbance;
- Install additional noise suppression features on plant and equipment;
- Construct additional noise attenuation measures such as stockpile barriers, works area enclosures; and
- Use of different items of plant and equipment that generate less noise or vibration.

Spills and Leaks

A spill response plan will be developed and implemented as part of the Emergency Response Plan (ERP) detailing the procedures for responding to spills and leaks. The procedures outlined in the plan will be aimed at minimising the impact of any contaminant releases that may occur during the works.

The following actions will be taken in preparation for spills or leaks:

- Training of site personnel in appropriate spill response techniques;
- Allocation of spill response materials and equipment on-site (such as oil absorbent pads, booms and biodispersants);

- Containment of all storage tanks and drums inside bunded areas with a capacity of 110% of the largest container, or 25% of the total volume of all containers, whichever is greater;
- Initial assessment of the spill;
- Notification of the appropriate authorities if necessary;
- Following a spill or leak, an investigation to determine the root cause of the incident will be undertaken; and
- Corrective and preventative actions implemented to prevent future incidents.

Emergency Response Plan

An ERP will be prepared prior to the commencement of the site remediation works. The plan will outline the process for identifying possible emergency situations and detailing the procedures necessary to ensure the safety of both on-site and off-site personnel in the event of an emergency.

The plan should include the following general information:

- Assignment of responsibilities to nominated key personnel;
- Assessment of the potential on and off-site impacts of hazards;
- Emergency reporting procedures including on-site reporting and reporting to the appropriate authorities;
- Emergency response procedures including, but not limited to, the following:
 - On-site fires or explosions;
 - Chemical spills;
 - Rupture of buried services;
 - Hazardous gas releases and emissions;
 - Confined spaces situations;
 - Traffic accidents both involving the transportation of "Dangerous Goods";
 - First aid for injured personnel;
 - Evacuation of on-site personnel; and
 - Managing unknown/uncertain situations.
- Incident investigation procedures to determine the root cause of the incident, and to identify the appropriate corrective and preventative actions to prevent future incidents.

21.0 Key Personnel

The contractual framework of delivery of the remediation works has not yet been determined by LLMP. Potential contractual structures include:

- Turn key deliver of the remediation works by a remediation contractor;
- Supervision of the remediation works by a superintendant and validation team engaged separately for the remediation contractor; and
- A variation on the above.

Notwithstanding the contractual framework initially adopted by LLMP, the key roles and responsibilities associated with the remediation works are as discussed following and will be detailed in the RWP. Depending on the contract structure the various roles and responsibilities may be discharged by one or more entities.

21.1 Project Director

The Project Director is responsible for ensuring that the remedial works undertaken on-site are in accordance with this RAP, the EMP, the OHSP and other relevant documentation (including the RWP), and that the objectives stated within the RAP are ultimately met. The Project Director will generally also be responsible for ensuring that the project occurs within the timeframe nominated and within the financial budget allocated, and is completed safely. The Project Director assumes ultimate responsibility for the project.

21.2 Project Manager

The Project Manager is responsible for daily operations and directs the site operations to ensure effective planning, verification, documentation and management of operational and environmental and safety issues in accordance with this RAP. This includes maintaining a liaison with regulatory authorities to ensure that all necessary work is undertaken to satisfy the NSW OEH and NSW OEH Accredited Site Auditor that the remediation achieves the objectives of this RAP.

The Project Manager is responsible for the implementation of all Project Plans including the RAP, EMP, OHSP Plan, Quality Plan, the RWP and other relevant contractual documents associated with the remediation works. This includes responsibility for:

- any design that may be required during the work;
- implementation and scheduling of the remedial works in accordance with the abovementioned documents; and
- ensuring compliance with relevant legislation and regulations.

The Project Manager is also responsible for ensuring that human health and the environment are protected at all times, including the provision of training and site inductions to all appropriate subcontractors and workers.

The Project Manager will be a primary community contact and the first point of contact for sub-contractor issues.

21.3 Validation Team

A suitably qualified consultant will undertake the supervision and validation of the remedial works under the direction of a Validation Project Director (VPD). The VPD is responsible for ensuring that all required validation systems are fully functional, and that staff are trained in the requirements of the validation requirements as detailed in **Section 16.0** of this Amended RAP.

Daily validation management will be from an on-site project office. A site-based administrative system will be established to ensure that the project is fully documented. A daily fieldwork summary will be prepared and filed. All job-related incoming and outgoing communications will be logged in a register.

Decisions related to validation will be made in accordance with relevant guidelines endorsed by the NSW OEH and NSW OEH Accredited Site Auditor. Copies of relevant guidelines will be kept in the Site office. All fieldwork will be undertaken by qualified environmental engineer(s)/scientist(s) with experience working on contaminated sites.

A member of the Consultant's field team will be the Site Validation Manager (SVM) responsible for making all validation decisions and directing all routine site fieldwork. Prior to commencement of the project, the SVM will prepare a project manual containing all required procedures and forms. The manual will be updated, in conformance with the VP, on an as needed basis. It is the responsibility of the SVM to ensure that the validation requirements detailed in **Section 16.0** are followed.

Site meetings will be convened, as required, to discuss fieldwork procedures. At least one meeting per week will be held with the SVM and the Project Manager to plan work for the following week and to resolve outstanding issues.

Where, because of an unforeseen circumstance, the SVM considers that a departure from the validation requirements is required, this must be discussed with the VPD and NSW OEH Accredited Site Auditor before any other related action is taken. If the departure is approved it will be documented in site files. If urgent action is required, the VPD will be responsible for deciding the particular issue. The NSW OEH Accredited Site Auditor will be sent written confirmation as soon as practicable, but in any case within 5 working days of the reasons for making the changes to the validation procedures detailed in **Section 16.0** and feedback and endorsement of the changes will be requested in writing from the NSW OEH Accredited Site Auditor.

21.4 Site Foreman

The Site Foreman implements day-to-day operations as directed by the Project Manager.

21.5 Safety/Quality Officer and Environment

The Safety / Quality Officer is responsible for implementation of the quality and safety management systems. This person assists the Project Manager with day-to-day tasks that arise, reports activities undertaken, directs the subcontractors, maintains accurate records of works such as safety checklists, and maintains a photographic record of works undertaken. This will include review and update of the OH&S Plan and EMP plus health and safety manuals, rules and procedures.

The Safety / Quality Officer ensures personnel and visitors to the site are inducted and has responsibility for emergency response and training in accordance with the Emergency Plan. The Safety / Quality Officer has the authority and independence to require reasonable steps to be taken to avoid or minimise unintended or adverse work safety impacts, and can direct relevant actions to be ceased should any adverse impact on worker safety be likely to occur.

The Safety / Quality Officer ensures all H&S monitoring devices are operating in accordance with the RAP, EMP, OHSP and RWP and also keeps the incident and accident register up to date with notification given to Work Cover NSW as necessary.

The Safety / Quality Officer will provide advice and recommendations, when appropriate, with regards to:

- legal requirements;
- changes in legislation;
- dealings with Work Cover New South Wales
- prevention of injury or damage;
- accident and injury investigations and reports;
- work methods, equipment, or materials which could reduce risk; and
- selection, suitability and application of safety equipment.

The Safety/Quality Officer will be responsible for holding regular 'toolbox' safety meetings with all site personnel and will ensure meeting minutes are appropriately documented.

21.6 Subcontractors

All work, irrespective of who it is completed by will be undertaken, as specified by the Project Manager, and per the requirements stated within this RAP and the EMP, OHSP, RWP and relevant management plans.

Subcontractors will be advised of required work procedures through induction, training, and meetings provided by the Contractor. Maintenance of subcontractor equipment will be the responsibility of the subcontractors.

The Subcontractor is responsible for ensuring that all works executed by the subcontractor complies with relevant Work Cover NSW as necessary.

22.0 References

- AECOM, 2010a. Data Gap Investigation, Other Remediation Works (South) Area, Barangaroo. May.
- AECOM, 2010b. Remedial Action Plan (original version), Other Remediation Works (South) Area, Barangaroo. June.
- AECOM, 2010c. Groundwater Discharge Study, Stage 1 Barangaroo Development. 3 November.
- AECOM, 2011a. *In situ* Soil and Fill Validation. Other Remediation Works (South) Area. April.
- AECOM, 2011b. HHERA, Declaration Site Remediation Works Area. April.
- AECOM, 2011c. HHERA Addendum, Other Remediation Works (South) Area (Including Associated Public Domain Areas). April.
- ANZECC, 1992. Australian Water Quality Guidelines for Fresh and Marine Waters. Australian and New Zealand Environment and Conservation Council.
- ANZECC, 2000. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Environment and Conservation Council and Agriculture and Resourced Management Council of Australia and New Zealand.
- ANZECC/NHMRC, 1992. Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites. Australian and New Zealand Environment and Conservation Council and National Health and Medical Research Council.
- Broomham, R. 2007. Land at Millers Point Ownership and History. June 2007
- Coffey Environments. 2008. Preliminary Environmental Investigation, 30-38 Hickson Road, Millers Point, NSW 2000. 12 May.
- CCME, 2008b. Canadian Soil Quality Guidelines: Carcinogenic, Other Polycyclic Aromatic Hydrocarbons, Scientific Support Document, Environment Canada
- CRC, 2010. Draft Health Screening Levels for Petroleum Hydrocarbons in Soil and Groundwater, Summary for NEPC Consultation, E. Friebe and P Nadebaum, CRC for Contamination Assessment and Remediation of the Environment. June
- Davis, GB, Patterson, BM and Trefry, MG, 2009. Biodegradation of petroleum hydrocarbon vapours, CRC CARE Technical Report no. 12. CRC for Contamination Assessment and Remediation of the Environment, Adelaide, Australia.
- DEC, 2005. Approved Methods for the Modelling and Assessment of Air Pollutants in NSW
- DEC, 2006a. Guidelines for the NSW Site Auditor Scheme (2nd edition)
- DEC, 2006b. Assessing Vibration: A Technical Guide
- DEC, 2007. Guidelines for the Assessment and Management of Groundwater Contamination.
- DECC, 2008. Waste Classification Guidelines.
- DECC, 2009. Interim Construction Noise Guideline.
- DECCW, 15 March 2010. Request for Provision of Details for Key Issues and Assessment Requirements, Barangaroo, East Darling Harbour, Sydney & Barangaroo Concept Development Plan Modification.
- DoP, 23 March 2010. Director General's Requirements.
- DoP, 9 November 2010. Determination of Barangaroo – Bulk excavation and basement car parking (MP10_0023).
- EnviroPacific (2010). Ex-situ Stabilisation Trials - Barangaroo Stage 1 Development. 9 April.
- ERM, 2007. Environmental Site Assessment, East Darling Harbour, Sydney, NSW, Final Report, 21 June 2007
- ERM. 2007. Environmental Site Assessment, East Darling Harbour, Sydney, NSW, Final Report. 21 June.
- ERM. 2008a. Additional Investigation Works at Barangaroo, Hickson Road, Millers Point, NSW. July 2008.
P:\60153531_Barangaroo\30.RAP\5. Delivery\5.2 Reports Final\ORWS
RAP\60153531_RPT412_ORWS_ARAP_7July2011Unhighlig.doc
Revision 4 - 7 July 2011

- ERM. 2008b. Preliminary Sediment Screening Works at East Darling Harbour, Adjacent to Barangaroo, NSW, Draft, Rev 03. August.
- ERM. 2008c. Draft Stage 2 Remedial Action Plan for Barangaroo, Hickson Road, Sydney. September 2008.
- ERM. 2010. Overarching RAP for The Barangaroo Project Site, Sydney. 1 June (Final).
- Herbert C, 1983. Sydney 1:100 000 Geological Sheet 9130, 1st edition. Geological Survey of New South Wales, Sydney.
- Jeffery and Katauskas, 2006. Geotechnical Report development of Wharves 3-8 at East Darling Harbour. August 2006.
- Lend Lease Development supplied CD, 2010. BDA Supplied Historical Work As Executed Drawings for the Former Wharf Structures at Berths 3 to 8, Barangaroo. CD dated 21 January.
- Lend Lease Development supplied CD, 2010. Geotechnical Information - Barangaroo Area (including CBD Metro Geotechnical and Environmental Investigations, completed by Coffey). CD dated 21 January.
- Lend Lease Development Scheme CAD files provided to AECOM in December 2008.
- Lend Lease, August 2010. Barangaroo South, Initial Community and Stakeholder Engagement Strategy.
- NEHF, 1998. Health-Based Soil Investigation Levels. National Environmental Health Forum Monographs. Soil Series No 2. National Environmental Health Forum.
- NEPC, 1999. National Environment Protection (Assessment of Site Contamination) Measure (NEPM). National Environment Protection Council.
- NEPC, 1999a. Guideline on the Investigation Levels for Soil and Groundwater. Schedule B(1). National Environmental Protection Measure. National Environmental Protection Council.
- NEPC, 1999b. Guideline on Data Collection, Sample Design and Reporting. Schedule B(2). National Environmental Protection Measure. National Environmental Protection Council.
- NEPC 1999c. Guideline on Laboratory Analysis of Potentially Contaminated Soils. Schedule B(3). National Environmental Protection Measure. National Environmental Protection Council.
- NEPC, 1999d. Guideline on Health Risk Assessment Methodology. Schedule B(4). National Environmental Protection Measure. National Environmental Protection Council.
- NSW ASSMAC, 1998. Acid Sulfate Soils Assessment Guidelines. NSW Acid Sulfate Soil Management Advisory Committee
- NSW EPA, 1994. Guidelines for Assessing Service Station Sites.
- NSW EPA, 1995. Contaminated Sites: Sampling Design Guidelines.
- NSW EPA, 1997. Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites.
- NSW EPA, 1999. Environmental Criteria for Road Traffic Noise
- NSW EPA, 2000. Industrial Noise Policy and Application Notes
- Standards Australia, 2002. Australian Standard AS1668.2-02 - the use of ventilation and air conditioning in buildings - Ventilation design for indoor air contaminant control.
- USEPA, 1994. Air Emissions Models for Waste and Wastewater, EPA-453/R-94-080A.
- USEPA, 2004. User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings. United States Environmental Protection Agency, Office of Emergency and Remedial Response. Revised February 22.
- VeruTek (2010). Treatability Study Recommendations for the Implementation of an In Situ Remedy. 21 September.

Appendix A

Summary Analytical Tables

Appendix A Summary Analytical Tables

Table T1: Soil Remediation Criteria

Table T2: Groundwater Remediation Criteria

Table T3: Area A Soil Analytical Results

Table T4: Area A Asbestos Analytical Results

Table T5: Area A Groundwater Analytical Results (2010)

Table T6: Area A Historic Groundwater Analytical Results

Table T7: Area B Soil Analytical Results

Table T8: Area C Soil Analytical Results

Table T9: Area C Groundwater Analytical Results (2010)

Table T10: Area C Historic Groundwater Analytical Results

Table T11: Area D Soil Analytical Results

Table T12: 95% UCL for metals in all Area A fill material

Table T13: 95% UCL for metals in Area A fill material (unsaturated)

Table T14: 95% UCL for metals in Area A fill material (saturated)

Table T15: 95% UCL for TPH in Area A fill material (unsaturated)

Table T16: 95% UCL for TPH in Area A fill material (saturated)

Table T17: Terrestrial Soil Criteria

Table T18: Preliminary Technology Screening Matrix

TABLE T1
SUMMARY OF SSTCS & SSES CS
AMENDED RAP
BARANGAROO ORWS AREA
LEND LEASE

	SOIL SSTCS AND SSES CS													
CoPC	SSTC-A	Land Use Scenario	SSESC-A ^{Unsat}	Daf	SSESC-A ^{Sat}	Daf	SSTC-B	Land Use Scenario	SSESC-B	Daf	SSTC-C	Land Use Scenario	SSTC-D	Land Use Scenario
Site Area	Area A						Area B				Area C		Area D	
Relevant land use Scenario	Scenario 2, 4, 5, 6 & 7		Unsaturated soils		Saturated soils		Scenario 3 to 6		Unsaturated soils		NA		Scenario 2, 3, 4, 5, 6, 7 & 8	
	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
Arsenic, Inorganic	-	-	20	DAF x 4	5	DAF x 1	-	-	20	DAF x 4	-	NA	-	-
Acenaphthene	-	-	-	-	-	-	-	-	8	DAF x 4	-	NA	-	-
Acenaphthylene	-	-	-	-	-	-	-	-	5	DAF x 4	-	NA	-	-
Anthracene	-	-	-	-	-	-	-	-	5	DAF x 4	-	NA	-	-
Benz(a)anthracene	**	Scenario 6	-	-	-	-	**	Scenario 6	-	-	-	NA	**	Scenario 6
Benzene	15	Scenario 2	-	-	-	-	81	Scenario 5	-	-	-	NA	0.25	Scenario 8
Benzo(a)pyrene	**	Scenario 6	-	-	-	-	**	Scenario 6	-	-	-	NA	**	Scenario 6
Benzo(b)fluoranthene	**	Scenario 6	-	-	-	-	**	Scenario 6	-	-	-	NA	**	Scenario 6
Benzo(k)fluoranthene	**	Scenario 6	-	-	-	-	**	Scenario 6	-	-	-	NA	**	Scenario 6
Benzo(g,h,i)perylene	**	Scenario 6	-	-	-	-	**	Scenario 6	-	-	-	NA	**	Scenario 6
Cadmium	-	-	-	-	-	-	-	-	-	-	-	NA	-	-
Chromium(III), Insoluble Salts	180,000	Scenario 6	-	-	-	-	180,000	Scenario 6	-	-	-	NA	180,000	Scenario 6
Chromium(VI)	950	Scenario 6	-	-	-	-	950	Scenario 6	-	-	-	NA	950	Scenario 6
Chrysene	**	Scenario 6	-	-	-	-	**	Scenario 6	-	-	-	NA	**	Scenario 6
Cobalt	-	-	-	-	-	-	-	-	-	-	-	NA	-	-
Copper	-	-	170	DAF x 20	42	DAF x 5	-	-	170	DAF x 20	-	NA	-	-
Dibenz(a,h)anthracene	**	Scenario 6	-	-	-	-	**	Scenario 6	-	-	-	NA	**	Scenario 6
Ethylbenzene	600	Scenario 2	-	-	-	-	-	-	-	-	-	NA	64	Scenario 8
Fluoranthene	-	-	-	-	-	-	-	-	8	DAF x 4	-	NA	-	-
Fluorene	-	-	-	-	-	-	-	-	5	DAF x 4	-	NA	-	-
Indeno(1,2,3-cd)pyrene	**	Scenario 6	-	-	-	-	**	Scenario 6	-	-	-	NA	**	Scenario 6
Lead	15,000	Scenario 6	1800	DAF x 40	440	DAF x 10	15,000	Scenario 6	1,700	DAF x 40	-	NA	15,000	Scenario 6
Manganese	-	-	-	-	-	-	-	-	-	-	-	NA	-	-
Mercury	-	-	-	-	-	-	-	-	-	-	-	NA	-	-
Methylnaphthalene, 2-	1,100	Scenario 2	-	-	-	-	-	-	-	-	-	NA	18	Scenario 8
Methylphenol, 3&4	5,400	Scenario 6	-	-	-	-	5,400	Scenario 6	-	-	-	NA	140	Scenario 8
Naphthalene	41	Scenario 2	-	-	-	-	320	Scenario 5	21	DAF x 4	-	NA	0.67	Scenario 8
Nickel	-	-	-	-	-	-	-	-	-	-	-	NA	-	-
Phenanthrene	-	-	-	-	-	-	-	-	4	DAF x 4	-	NA	-	-
Toluene	-	-	-	-	-	-	-	-	-	-	-	NA	160	Scenario 8
TPH C06-C09 aliphatic	3,400	Scenario 6	40	DAF x 4	10	DAF x 1	-	-	39	DAF x 4	-	NA	55	Scenario 8
TPH C10-C14 aliphatic	13,000	Scenario 6	50	DAF x 4	50	DAF x 1	61,000	Scenario 5	50	DAF x 4	-	NA	210	Scenario 8
TPH C10-C14 aromatic														
TPH C15-C28 aliphatic	-	-	-	-	-	-	-	-	-	-	-	NA	-	-
TPH C15-C28 aromatic	-	-	-	-	-	-	-	-	-	-	-	NA	-	-
TPH C29-C36 aliphatic														
TPH C29-C36 aromatic														
TPH C10-C36 (Sum of Total)	-	-	-	-	-	-	-	-	-	-	-	NA	-	-
Total PAHs	-	-	-	-	-	-	-	-	-	-	-	NA	-	-
Trimethylbenzene, 1,2,4-	14	Scenario 2	-	-	-	-	110	Scenario 5	-	-	-	NA	0.23	Scenario 8
Vanadium	22,000	Scenario 6	-	-	-	-	22,000	Scenario 6	-	-	-	NA	-	-
Xylenes (total)	-	-	-	-	-	-	-	-	-	-	-	NA	14	Scenario 8
Zinc	-	-	220	DAF x 20	55	DAF x 5	-	-	220	DAF x 20	-	NA	-	-
CPAH**	67	Scenario 6	-	-	-	-	67	Scenario 6	-	-	-	NA	67	Scenario 6

Notes:
** CPAH = carcinogenic PAHs in top 2m of soil profile and includes: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h) anthracene and indeno (1,2,3-cd)pyrene.
NA = Not Applicable

Land Use Scenarios:
Scenario 2: Upper-most basement car park level (above water table);
Scenario 3: Unpaved Recreation, Public Domain (South) with no concrete/hardstand paving;
Scenario 4: Paved Recreation, Public Domain (South) with concrete/hardstand paving;
Scenario 5: Typical commercial slab on ground construction;
Scenario 6: Short term ground-intrusive maintenance;
Scenario 7: High density residential (above a car park basement); and
Scenario 8: Commercial slab on ground (with advection).

TABLE T2
SUMMARY OF GROUNDWATER SSTCS AND SSESCS
AMENDED RAP
BARANGAROO ORWS AREA
LEND LEASE

	GROUNDWATER SSTCS AND SSESCS									
CoPC	SSTC-A	Land Use Scenario	SSESC-A	Land Use Scenario	NA	Land Use Scenario	SSTC-C	Land Use Scenario	SSTC-D	Land Use Scenario
Site Area	Area A				Area B		Area C		Area D	
Relevant land use Scenario	Scenario 1, 2, 4, 5, 6 & 7				Scenario 3, 4, 5 & 6		Scenario 1		Scenario 1, 3, 4, 5, 6, 7 & 8	
	ug/L		ug/L		ug/L		ug/L		ug/L	
Acenaphthene	-	-	-	-	-	NA	-	-	-	-
Acenaphthylene	57,000	Scenario 6	-	-	-	NA	-	-	-	-
Ammonia	2,400,000	Scenario 1	-	-	-	NA	2,400,000	Scenario 1	1,500,000	Scenario 8
Aniline	980,000	Scenario 6	-	-	-	NA	-	-	-	-
Anthracene	-	-	1	Tidal Prism	-	NA	-	-	-	-
Arsenic, Inorganic	380,000	Scenario 6	2.3	Tidal Prism	-	NA	-	-	-	-
Barium	570,000	Scenario 6	-	-	-	NA	-	-	-	-
Benz(a)anthracene	-	-	-	-	-	NA	-	-	-	-
Benzene	3,400	Scenario 6	-	-	-	NA	21,000	Scenario 1	410	Scenario 8
Benzo(a)pyrene	-	-	-	-	-	NA	-	-	-	-
Benzo(b)fluoranthene	-	-	-	-	-	NA	-	-	-	-
Benzo(g,h,i)perylene	-	-	-	-	-	NA	-	-	-	-
Benzo(k)fluoranthene	-	-	-	-	-	NA	-	-	-	-
Cadmium	15,000	Scenario 6	-	-	-	NA	-	-	-	-
Chromium(III)	8,400,000	Scenario 6	-	-	-	NA	-	-	-	-
Chromium(VI)	7,600	Scenario 6	-	-	-	NA	-	-	-	-
Chrysene	-	-	-	-	-	NA	-	-	-	-
Cobalt	260,000	Scenario 6	-	-	-	NA	-	-	-	-
Copper	-	-	6.5	Tidal Prism	-	NA	-	-	-	-
Cyanide (WAD)	-	-	-	-	-	NA	-	-	-	-
Dibenz(a,h)anthracene	-	-	-	-	-	NA	-	-	-	-
Dibenzofuran	-	-	-	-	-	NA	-	-	-	-
Dimethylphenol, 2,4-	720,000	Scenario 6	-	-	-	NA	-	-	-	-
Ethylbenzene	210,000	Scenario 6	-	-	-	NA	-	-	49,000	Scenario 8
Fluoranthene	-	-	-	-	-	NA	-	-	-	-
Fluorene	-	-	-	-	-	NA	-	-	-	-
Indeno(1,2,3-cd)pyrene	-	-	-	-	-	NA	-	-	-	-
Lead	1,100,000	Scenario 6	44	Tidal Prism	-	NA	-	-	-	-
Manganese	2,400,000	Scenario 6	-	-	-	NA	-	-	-	-
Mercury	-	-	-	-	-	NA	-	-	-	-
Methylnaphthalene, 2-	38,000	Scenario 1/6	-	-	-	NA	38,000	Scenario 1	32,000	Scenario 8
Methylphenol, 2	4,900,000	Scenario 6	-	-	-	NA	-	-	-	-
Methylphenol, 3&4	270,000	Scenario 6	-	-	-	NA	1,000,000	Scenario 1	660,000	Scenario 8
Naphthalene	920	Scenario 1	-	-	-	NA	920	Scenario 1	1,700	Scenario 8
Nickel	350,000	Scenario 6	-	-	-	NA	-	-	-	-
Phenanthrene	-	-	1	Tidal Prism	-	NA	-	-	-	-
Phenol	23,000,000	Scenario 6	-	-	-	NA	310,000,000	Scenario 1	190,000,000	Scenario 8
Styrene	88,000	Scenario 6	-	-	-	NA	-	-	110,000	Scenario 8
Toluene	760,000	Scenario 6	-	-	-	NA	-	-	200,000	Scenario 8
TPH C06-C09 aliphatic	86,000	Scenario 5	110	Tidal Prism	-	NA	28,000,000	Scenario 1	1,600	Scenario 8
TPH C10-C14 aliphatic	7,700	Scenario 1	40	Tidal Prism	-	NA	7,700	Scenario 1	6,300	Scenario 8
TPH C10-C14 aromatic					-	NA			-	-
TPH C15-C28 aliphatic	220,000	Scenario 6	-	-	-	NA	-	-	-	-
TPH C15-C28 aromatic			-	-	-	NA	-	-	-	-
TPH C29-C36 aliphatic	250,000	Scenario 6	-	-	-	NA	-	-	-	-
TPH C29-C36 aromatic			-	-	-	NA	-	-	-	-
Trimethylbenzene, 1,2,4-	86,000	Scenario 5	-	-	-	NA	87,000	Scenario 1	1,500	Scenario 8
Vanadium	960,000	Scenario 6	-	-	-	NA	-	-	-	-
Xylenes (total)	-	-	-	-	-	NA	-	-	10,000	Scenario 8
Zinc	-	-	75	Tidal Prism	-	NA	-	-	-	-
CPAH	-	-	-	-	-	NA	-	-	-	-

Notes:
MWQC = Marine Water Quality Criteria
** CPAH = Carcinogenic PAHs as BaP TEF (benzo(a)anthracene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno (1,2,3-cd)pyrene (see main body report for details)
DAF = Dilution Attenuation Factors based on the MWQC values.
NA = Not Applicable
WAD - Weak Acid Dissociable



Table T3
Area A
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Lend Lease
Barangaroo

Field ID	BH01 0.3-0.4	BH01 1.0-1.2	BH01 10.0-10.2	BH01 12.0-12.1	BH01 17.65-17.75	BH01 17.65-17.75	BH01 2.0-2.2	BH01 20.5-20.6	BH01 25.0-25.1	BH01 4.0-4.1	BH01 7.0-7.1	BH01 9.0-9.1	BH049 0.3-0.5
Sample Depth	0.3-0.4	1-1.2	10-10.2	12-12.1	17.65-17.75	17.65-17.75	2-2.2	20.5-20.6	25-25.1	4-4.1	7-7.1	9-9.1	0.3-0.5
Location Code	AECOM BH01	AECOM BH01	AECOM BH01	AECOM BH01	AECOM BH01	AECOM BH01	AECOM BH01	AECOM BH01	AECOM BH01	AECOM BH01	AECOM BH01	AECOM BH01	BH049
Sampled Date	12/02/2009	12/02/2009	12/02/2009	12/02/2009	12/02/2009	12/03/2009	12/02/2009	12/03/2009	12/10/2009	12/02/2009	12/02/2009	12/02/2009	25/05/2006
Mon_Zone	L	L	L	L	L	L	L	L	L	L	L	L	L
Mon_Round	AECOM(Blocks 1-3)	AECOM(Blocks 1-3)	AECOM(Blocks 1-3)	AECOM(Blocks 1-3)	AECOM(Blocks 1-3)	AECOM(Blocks 1-3)	AECOM(Blocks 1-3)	AECOM(Blocks 1-3)	AECOM(Blocks 1-3)	AECOM(Blocks 1-3)	AECOM(Blocks 1-3)	AECOM(Blocks 1-3)	ERM
Comments	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A

ChemName	output unit	LOR	SSTC-A	SSESC-A ^{Unsat}	SSESC-A ^{Sat}												
Inorganics																	
WAD Cyanide	mg/kg	1															
Lead																	
Lead	mg/kg	2		1800	440	6	19	104	47	28	30	<5	13	16	132	74	6
Metals																	
Arsenic	mg/kg	1		20	5	<5	<5	6	<5	<5	<5	<5	27	<5	12	14	<5
Barium	mg/kg	5				20	40	60	40	10	70	<10	<10	40	40	60	
Beryllium	mg/kg	1				1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Cadmium	mg/kg	0.1				<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1
Chromium	mg/kg	1	950			2	7	7	7	31	18	3	37	10	7	5	3
Cobalt	mg/kg	1				12	3	2	2	<2	5	<2	<2	6	<2	2	
Copper	mg/kg	2		170	42	331	17	13	30	<5	44	<5	8	92	44	21	262
Manganese	mg/kg	5				725	152	159	132	<5	329	<5	5	355	160	147	
Mercury	mg/kg	0.05				<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1
Nickel	mg/kg	1				6	4	4	6	3	8	<2	<2	5	10	4	6
Vanadium	mg/kg	5	22,000			106	16	14	19	118	32	6	57	51	8	13	
Zinc	mg/kg	5		220	55	46	38	47	96	<5	2070	<5	10	42	115	47	54
PAH/Phenols																	
Acenaphthene	mg/kg	0.5								<0.5			<0.5	<0.5	<0.5		
Acenaphthylene	mg/kg	0.5								<0.5			<0.5	<0.5	<0.5		
Anthracene	mg/kg	0.5								<0.5			<0.5	1.5	0.8		
Benz(a)anthracene	mg/kg	0.5								<0.5			<0.5	1.9	1.8		
Benzo(a) pyrene	mg/kg	0.5								<0.5			<0.5	1.2	1.3		
Benzo(b)&(k)fluoranthene	mg/kg	1															
Benzo(b)fluoranthene	mg/kg	0.5								<0.5			<0.5	1.2	1.4		
Benzo(g,h,i)perylene	mg/kg	0.5								<0.5			<0.5	0.6	0.6		
Benzo(k)fluoranthene	mg/kg	0.5								<0.5			<0.5	0.7	<0.5		
Chrysene	mg/kg	0.5								<0.5			<0.5	1.4	1.5		
Dibenz(a,h)anthracene	mg/kg	0.5								<0.5			<0.5	<0.5	<0.5		
Fluoranthene	mg/kg	0.5								<0.5			<0.5	4.9	4.1		
Fluorene	mg/kg	0.5								<0.5			<0.5	<0.5	<0.5		
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5								<0.5			<0.5	0.5	<0.5		
Naphthalene	mg/kg	0.5								<0.5			<0.5	<0.5	<0.5		
Phenanthrene	mg/kg	0.5								<0.5			<0.5	5.3	2.3		
Pyrene	mg/kg	0.5								<0.5			<0.5	4.4	4.2		
CPAH (ESDAT)	mg/kg		67							<4.5			<4.5	9	7.4		
PAH (ESDAT TOTAL)	mg/kg									<8			<8	23.6	18		
SPOCAS																	
Chromium Reducible Sulfu	%	0.01															
TPH																	
TPH C6 - C9	mg/kg	2		40	10					<10			<10	<10	<10		<2
TPH C10 - C14	mg/kg	50		50	50					<50			<50	<50	<50		<50
TPH C15-C28	mg/kg	100								<100			<100	<100	<100		<100
TPH C15-C36	mg/kg									<200			<200	<200	<200		<200
TPH C29-C36	mg/kg	100								<100			<100	<100	<100		<100
TPH+C10 - C36 (Sum)	mg/kg	50								<50			<50	<50	<50		<250
BTEX																	
Benzene	mg/kg	0.2	15							<0.2			<0.2	<0.2	<0.2		<0.2
Ethylbenzene	mg/kg	0.2	600							<0.5			<0.5	<0.5	<0.5		<0.2
Toluene	mg/kg	0.2								<0.5			<0.5	<0.5	<0.5		<0.2
Xylene (m & p)	mg/kg	0.2								<0.5			<0.5	<0.5	<0.5		<0.2
Xylene (o)	mg/kg	0.2								<0.5			<0.5	<0.5	<0.5		<0.2
Xylene Total	mg/kg									nc			nc	nc	nc		nc

Notes:
mg/kq = milligrams per kilogram
Laboratory LOR = Limit of Reporting
< denotes less than LOR
nc - denotes not calculable as both results less than LOR
Shading = results exceeds soil SSTC-A
Bold with Shading = results exceeds soil SSESC-A^{Unsat} and are shallower than 2 m bgl
Shading = results exceeds soil SSESC-A^{Sat}
Refer to Table T1 for adopted SSTCs and DAFs

Table T3
Area A
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field_ID	BH049 3.0-3.45	BH345 0.1-0.2	BH345 1.5-1.9	BH345 10.5-10.9	BH345 12.0-12.3	BH345 13.5-13.8	BH345 15.0-15.4	BH345 16.5-16.9	BH345 18.0-18.4	BH345 3.0-3.4	BH345 4.5-4.9	BH345 6.0-6.4	BH345 7.5-7.9	BH345 9.0-9.4	BH346 0.1-0.2	BH346 1.5-1.8
Sample_Depth	3-3.45	0.1-0.2	1.5-1.9	10.5-10.9	12-12.3	13.5-13.8	15-15.4	16.5-16.9	18-18.4	3-3.4	4.5-4.9	6-6.4	7.5-7.9	9-9.4	0.1-0.2	1.5-1.8
Location_Cod	BH049	BH345	BH345	BH345	BH345	BH345	BH345	BH345	BH345	BH345	BH345	BH345	BH345	BH345	BH346	BH346
Sampled_Date	25/05/2006	21/07/2010	21/07/2010	21/07/2010	22/07/2010	22/07/2010	22/07/2010	22/07/2010	22/07/2010	21/07/2010	21/07/2010	21/07/2010	21/07/2010	21/07/2010	21/07/2010	21/07/2010
Mon_Zone	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
Mon_Round	ERM															
Comments	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A

ChemName	output unit	LOR	SSTC-A	SSESC-A ^{Unsat}	SSESC-A ^{Sat}																
Inorganics																					
WAD Cyanide	mg/kg	1					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Lead																					
Lead	mg/kg	2		1800	440	8	8	101	35	8	12	134	21	20	17	820	62	32	12	7	120
Metals																					
Arsenic	mg/kg	1		20	5	<5	<5	<5	<5	<5	<5	<5	<5	168	<5	<5	<5	<5	<5	<5	<5
Barium	mg/kg	5																			
Beryllium	mg/kg	1																			
Cadmium	mg/kg	0.1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	mg/kg	1	950			3	2	7	8	11	5	6	25	67	6	11	8	6	4	3	9
Cobalt	mg/kg	1																			
Copper	mg/kg	2		170	42	<5	288	11	8	<5	7	31	8	<5	<5	16	7	<5	<5	355	15
Manganese	mg/kg	5																			
Mercury	mg/kg	0.05				<0.1	<0.1	0.2	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	0.3	0.1	<0.1	<0.1	<0.1	0.2
Nickel	mg/kg	1				2	8	3	4	7	3	2	4	6	2	12	4	4	2	11	7
Vanadium	mg/kg	5	22,000																		
Zinc	mg/kg	5		220	55	10	55	84	55	9	9	59	7	15	22	132	36	25	13	71	177
PAH/Phenols																					
Acenaphthene	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	1.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2
Benzo(a) pyrene	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	1.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1
Benzo(b)&(k)fluoranthene	mg/kg	1																			
Benzo(b)fluoranthene	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	1.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.9
Benzo(g,h,i)perylene	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5
Chrysene	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	1.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2
Dibenz(a,h)anthracene	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg	0.5					<0.5	<0.5	<0.5	0.8	<0.5	3	<0.5	<0.5	<0.5	0.8	<0.5	<0.5	<0.5	<0.5	2.2
Fluorene	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	mg/kg	0.5					<0.5	<0.5	<0.5	0.6	<0.5	0.9	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	0.7
Pyrene	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	3.3	<0.5	<0.5	<0.5	0.8	<0.5	<0.5	<0.5	<0.5	2.9
CPAH (ESDAT)	mg/kg		67				<4.5	<4.5	<4.5	<4.5	<4.5	8.7	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	4.8
PAH (ESDAT TOTAL)	mg/kg						<8	<8	<8	3.4	<8	15.9	<8	<8	<8	2.1	<8	<8	<8	<8	10.6
SPOCAS																					
Chromium Reducible Sulfu	%	0.01											0.454								
TPH																					
TPH C6 - C9	mg/kg	2		40	10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
TPH C10 - C14	mg/kg	50		50	50		<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
TPH C15-C28	mg/kg	100					<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	100
TPH C15-C36	mg/kg						<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	100
TPH C29-C36	mg/kg	100					<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
TPH+C10 - C36 (Sum)	mg/kg	50					<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	100
BTEX																					
Benzene	mg/kg	0.2	15				<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	mg/kg	0.2	600				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	0.2					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (m & p)	mg/kg	0.2					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (o)	mg/kg	0.2					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene Total	mg/kg						nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc

Notes:
mg/kg = milligrams per kilogram
Laboratory LOR = Limit of Reporting
< denotes less than LOR
nc - denotes not calculable as both results less than LOR
Shading = results exceeds soil SSTC-A
Bold with Shading = results exceeds soil SSESC-A^{Unsat} and are shallower than 2 m bgl
Shading = results exceeds soil SSESC-A^{Sat}
Refer to Table T1 for adopted SSTCs and DAFs

Table T3
Area A
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field ID	BH346 10.5-10.9	BH346 12.0-12.4	BH346 13.5-13.9	BH346 15-15.4	BH346 16.5-16.9	BH346 17.0-17.4	BH346 3.0-3.4	BH346 6.0-6.4	BH346 7.5-7.9	BH346 9.0-9.4	BH347 0.1-0.2	BH347 1.5-1.6	BH347 10.5-10.9	BH347 12.0-12.4	BH347 13.5-13.9	BH347 15.1-15.4
Sample Depth	10.5-10.9	12-12.4	13.5-13.9	15-15.4	16.5-16.9	17-17.4	3-3.4	6-6.4	7.5-7.9	9-9.4	0.1-0.2	1.5-1.6	10.5-10.9	12-12.4	13.5-13.9	15.1-15.4
Location Code	BH346	BH346	BH346	BH346	BH346	BH346	BH346	BH346	BH346	BH346	BH347	BH347	BH347	BH347	BH347	BH347
Sampled Date	22/07/2010	22/07/2010	22/07/2010	22/07/2010	22/07/2010	22/07/2010	21/07/2010	21/07/2010	21/07/2010	21/07/2010	21/07/2010	22/07/2010	23/07/2010	23/07/2010	23/07/2010	23/07/2010
Mon_Zone	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
Mon_Round																
Comments	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A

ChemName	output unit	LOR	SSTC-A	SSESC-A ^{Unsat}	SSESC-A ^{Sat}																
Inorganics																					
WAD Cyanide	mg/kg	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Lead																					
Lead	mg/kg	2		1800	440	28	23	48	48	176	254	66	18	53	16	8	34	148	170	154	212
Metals																					
Arsenic	mg/kg	1		20	5	<5	<5	<5	<5	10	22	<5	<5	<5	<5	<5	<5	<5	6	<5	19
Barium	mg/kg	5																			
Beryllium	mg/kg	1																			
Cadmium	mg/kg	0.1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	mg/kg	1	950			12	5	13	5	15	33	12	9	7	10	3	6	4	8	9	28
Cobalt	mg/kg	1																			
Copper	mg/kg	2		170	42	27	<5	20	5	45	128	257	<5	10	<5	284	92	8	22	24	77
Manganese	mg/kg	5																			
Mercury	mg/kg	0.05				<0.1	<0.1	<0.1	<0.1	0.4	3.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.3	2.5
Nickel	mg/kg	1				8	2	6	5	4	11	7	4	5	4	7	10	<2	10	4	10
Vanadium	mg/kg	5	22,000																		
Zinc	mg/kg	5		220	55	49	18	50	14	144	312	87	30	39	25	59	52	72	173	105	261
PAH/Phenols																					
Acenaphthene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3.3	<0.5	<0.5
Acenaphthylene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	2	5.9	<0.5	<0.5	1.5	<0.5	<0.5	2	<0.5	29.7	0.8	1.5
Anthracene	mg/kg	0.5				0.6	<0.5	<0.5	<0.5	2.7	7	<0.5	<0.5	1.4	<0.5	<0.5	2.4	<0.5	52.3	1.7	1.4
Benz(a)anthracene	mg/kg	0.5				2.1	<0.5	0.8	<0.5	5.8	14.1	<0.5	<0.5	3.9	<0.5	<0.5	10.5	<0.5	81.3	3.5	4.3
Benzo(a) pyrene	mg/kg	0.5				2.1	<0.5	0.8	<0.5	4.6	10.7	<0.5	<0.5	2.5	<0.5	<0.5	9.5	<0.5	55.8	2.9	4.1
Benzo(b)&(k)fluoranthene	mg/kg	1																			
Benzo(b)fluoranthene	mg/kg	0.5				2.9	<0.5	0.8	<0.5	5.7	14.7	<0.5	<0.5	2.7	<0.5	<0.5	11.7	<0.5	78.1	3.6	5
Benzo(g,h,i)perylene	mg/kg	0.5				1.3	<0.5	0.5	<0.5	2.3	5.8	<0.5	<0.5	1.3	<0.5	<0.5	4.6	<0.5	28.3	1.6	2.2
Benzo(k)fluoranthene	mg/kg	0.5				1.8	<0.5	0.6	<0.5	2.1	6.5	<0.5	<0.5	1.8	<0.5	<0.5	4.4	<0.5	23.4	1.6	2.8
Chrysene	mg/kg	0.5				1.7	<0.5	<0.5	<0.5	4.3	11	<0.5	<0.5	2.6	<0.5	<0.5	8.8	<0.5	59.2	2.7	3.2
Dibenz(a,h)anthracene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	0.5	1.7	<0.5	<0.5	<0.5	<0.5	<0.5	1	<0.5	8.6	<0.5	0.6
Fluoranthene	mg/kg	0.5				9.4	<0.5	1.3	<0.5	12.5	29.3	0.7	<0.5	8.1	<0.5	<0.5	15.6	<0.5	172	6.8	6.8
Fluorene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	1	1.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	11.4	0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5				1	<0.5	<0.5	<0.5	2	5.3	<0.5	<0.5	1	<0.5	<0.5	3.7	<0.5	25.6	1.4	2
Naphthalene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	1.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3.7	0.5	0.6
Phenanthrene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	7	14.2	0.7	<0.5	1.9	<0.5	<0.5	3.5	<0.5	145	5.5	2.7
Pyrene	mg/kg	0.5				11.9	<0.5	1.8	<0.5	11.9	30.7	0.7	<0.5	9.3	<0.5	<0.5	23.2	<0.5	176	7.2	7.6
CPAH (ESDAT)	mg/kg		67			13.5	<4.5	3.5	<4.5	30	76.8	<4.5	<4.5	17.2	<4.5	<4.5	56.6	<4.5	412.6	19	25.6
PAH (ESDAT TOTAL)	mg/kg					34.8	<8	6.6	<8	64.4	161.3	2.1	<8	38	<8	<8	100.9	<8	953.7	40.3	44.8
SPOCAS																					
Chromium Reducible Sulfu	%	0.01								0.008											0.166
TPH																					
TPH C6 - C9	mg/kg	2		40	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
TPH C10 - C14	mg/kg	50		50	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	50	<50	<50
TPH C15-C28	mg/kg	100				330	<100	<100	<100	350	1110	<100	<100	220	<100	<100	510	<100	3700	150	470
TPH C15-C36	mg/kg					760	<200	<200	<200	560	1940	<200	<200	430	<200	<200	1390	<200	5680	280	870
TPH C29-C36	mg/kg	100				430	<100	<100	<100	210	830	<100	<100	210	<100	<100	880	<100	1980	130	400
TPH+C10 - C36 (Sum)	mg/kg	50				760	<50	<50	<50	560	1940	<50	<50	430	<50	<50	1390	<50	5730	280	870
BTEX																					
Benzene	mg/kg	0.2	15			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	mg/kg	0.2	600			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	0.2				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (m & p)	mg/kg	0.2				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (o)	mg/kg	0.2				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene Total	mg/kg					nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc

Notes:
mg/kq = milligrams per kilogram
Laboratory LOR = Limit of Reporting
< denotes less than LOR
nc - denotes not calculable as both results less than LOR
Shading = results exceeds soil SSTC-A
Bold with Shading = results exceeds soil SSESC-A^{Unsat} and are shallower than 2 m bql
Shading = results exceeds soil SSESC-A^{Sat}
Refer to Table T1 for adopted SSTCs and DAFs

Table T3
Area A
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field_ID	BH347_15-15.1	BH347_3.0-3.2	BH347_4.5-4.8	BH347_6.0-6.3	BH347_7.5-7.7	BH347_9.0-9.2	BH348_0.1-0.2	BH348_1.5-1.9	BH348_10.5-10.6	BH348_12-12.45	BH348_14.5-15.0	BH348_3.0-3.4	BH348_4.5-4.9	BH348_6.0-6.4	BH348_7.5-7.9	BH348_9.0-9.4	BH349_0.1-0.2
Sample_Depth	15-15.1	3-3.2	4.5-4.8	6-6.3	7.5-7.7	9-9.2	0.1-0.2	1.5-1.9	10.5-10.6	12-12.45	14.5-15	3-3.4	4.5-4.9	6-6.4	7.5-7.9	9-9.4	0.1-0.2
Location_Code	BH347	BH347	BH347	BH347	BH347	BH347	BH348	BH348	BH348	BH348	BH348	BH348	BH348	BH348	BH348	BH348	BH349
Sampled_Date	23/07/2010	22/07/2010	22/07/2010	22/07/2010	22/07/2010	22/07/2010	21/07/2010	23/07/2010	23/07/2010	26/07/2010	26/07/2010	23/07/2010	23/07/2010	23/07/2010	23/07/2010	23/07/2010	21/07/2010
Mon_Zone	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
Mon_Round																	
Comments	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A

ChemName	output unit	LOR	SSTC-A	SSESC-A ^{Unsat}	SSESC-A ^{Sat}																	
Inorganics																						
WAD Cyanide	mg/kg	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Lead																						
Lead	mg/kg	2		1800	440	67	176	15	19	104	80	8	266	56	591	27	301	400	185	142	98	9
Metals																						
Arsenic	mg/kg	1		20	5	11	<5	<5	<5	<5	6	<5	<5	6	<5	<5	<5	<5	<5	<5	<5	<5
Barium	mg/kg	5																				
Beryllium	mg/kg	1																				
Cadmium	mg/kg	0.1				<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	mg/kg	1	950			14	4	4	6	7	10	2	12	11	5	34	7	3	5	8	8	5
Cobalt	mg/kg	1																				
Copper	mg/kg	2		170	42	15	5	<5	59	12	16	274	22	12	6	<5	9	12	5	7	6	283
Manganese	mg/kg	5																				
Mercury	mg/kg	0.05				0.9	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	1				3	<2	<2	3	<2	5	9	7	7	2	3	3	2	2	2	<2	9
Vanadium	mg/kg	5	22,000																			
Zinc	mg/kg	5		220	55	67	100	7	10	97	242	62	120	52	202	13	131	48	220	36	26	68
PAH/Phenols																						
Acenaphthene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.5				1.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.9	<0.5	<0.5	<0.5	<0.5
Anthracene	mg/kg	0.5				1.6	<0.5	<0.5	<0.5	0.7	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.4	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	mg/kg	0.5				4.4	<0.5	<0.5	<0.5	0.9	2.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3	<0.5	<0.5	1.3	<0.5
Benzo(a) pyrene	mg/kg	0.5				3.9	<0.5	<0.5	<0.5	0.7	2.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.5	<0.5	<0.5	1.1	<0.5
Benzo(b)&(k)fluoranthene	mg/kg	1																				
Benzo(b)fluoranthene	mg/kg	0.5				5.1	<0.5	<0.5	<0.5	0.8	2.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.6	<0.5	<0.5	1.3	<0.5
Benzo(g,h,i)perylene	mg/kg	0.5				2.4	<0.5	<0.5	<0.5	<0.5	1.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	mg/kg	0.5				2.2	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1	<0.5	<0.5	0.8	<0.5
Chrysene	mg/kg	0.5				3.4	<0.5	<0.5	<0.5	0.7	1.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.3	<0.5	<0.5	1	<0.5
Dibenz(a,h)anthracene	mg/kg	0.5				0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg	0.5				7.8	<0.5	<0.5	<0.5	2	3.5	<0.5	0.5	0.6	<0.5	<0.5	<0.5	6.2	<0.5	<0.5	2.2	<0.5
Fluorene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5				2	<0.5	<0.5	<0.5	<0.5	1.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1	<0.5	<0.5	<0.5	<0.5
Naphthalene	mg/kg	0.5				0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	mg/kg	0.5				4.1	<0.5	<0.5	<0.5	1.7	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3.1	<0.5	<0.5	<0.5	<0.5
Pyrene	mg/kg	0.5				8.3	<0.5	0.6	<0.5	1.9	3.6	<0.5	0.6	0.7	0.5	<0.5	0.5	6.7	<0.5	0.5	2.3	<0.5
CPAH (ESDAT)	mg/kg		67			25.6	<4.5	<4.5	<4.5	3.8	13.2	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	14.8	<4.5	<4.5	5.5	<4.5
PAH (ESDAT TOTAL)	mg/kg					47.5	<8	0.6	<8	9.4	22.3	<8	1.1	1.3	0.5	<8	0.5	32.2	<8	0.5	10	<8
SPOCAS																						
Chromium Reducible Sulfu	%	0.01													<0.005							
TPH																						
TPH C6 - C9	mg/kg	2		40	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
TPH C10 - C14	mg/kg	50		50	50	<50	<50	<50	<50	<50	<50	<50	<50	70	<50	<50	<50	<50	<50	<50	<50	<50
TPH C15-C28	mg/kg	100				390	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	360	920	<100	<100	<100	<100
TPH C15-C36	mg/kg					680	<200	<200	<200	<200	100	<200	<200	<200	<200	<200	610	1860	<200	<200	<200	<200
TPH C29-C36	mg/kg	100				290	<100	<100	<100	<100	100	<100	<100	<100	<100	<100	250	940	<100	<100	<100	<100
TPH+C10 - C36 (Sum)	mg/kg	50				680	<50	<50	<50	<50	100	<50	<50	70	<50	<50	610	1860	<50	<50	<50	<50
BTEX																						
Benzene	mg/kg	0.2	15			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	mg/kg	0.2	600			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	0.2				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (m & p)	mg/kg	0.2				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (o)	mg/kg	0.2				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene Total	mg/kg					nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc

Notes:
mg/kq = milligrams per kilogram
Laboratory LOR = Limit of Reporting
< denotes less than LOR
nc - denotes not calculable as both results less than LOR
Shading = results exceeds soil SSTC-A
Bold with Shading = results exceeds soil SSESC-A^{Unsat} and are shallower than 2 m bgl
Shading = results exceeds soil SSESC-A^{Sat}
Refer to Table T1 for adopted SSTCs and DAFs

Table T3
Area A
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field_ID	BH349 1.5-1.9	BH349 10.5-10.9	BH349 12-12.25	BH349 13.6-13.9	BH349 3.0-3.4	BH349 4.5-4.9	BH349 6.0-6.4	BH349 7.5-7.9	BH349 9.0-9.4	BH350 0.1-0.2	BH350 1.5-1.95	BH350 10-10.45	BH350 11.5-11.95	BH350 14.5-14.95	BH350 16-16.45	BH350 2.5-2.95
Sample_Depth	1.5-1.9	10.5-10.9	12-12.25	13.6-13.9	3-3.4	4.5-4.9	6-6.4	7.5-7.9	9-9.4	0.1-0.2	1.5-1.95	10-10.45	11.5-11.95	14.5-14.95	16-16.45	2.5-2.95
Location_Cod	BH349	BH349	BH349	BH349	BH349	BH349	BH349	BH349	BH349	BH350	BH350	BH350	BH350	BH350	BH350	BH350
Sampled_Date	22/07/2010	23/07/2010	26/07/2010	26/07/2010	22/07/2010	22/07/2010	22/07/2010	23/07/2010	23/07/2010	21/07/2010	30/07/2010	30/07/2010	30/07/2010	30/07/2010	30/07/2010	30/07/2010
Mon_Zone	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
Mon_Round																
Comments	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A

ChemName	output unit	LOR	SSTC-A	SSESC-A ^{Unsat}	SSESC-A ^{Sat}																
Inorganics																					
WAD Cyanide	mg/kg	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Lead																					
Lead	mg/kg	2		1800	440	48	114	22	22	97	67	29	53	178	9	98	77	28	64	<5	205
Metals																					
Arsenic	mg/kg	1		20	5	8	<5	<5	<5	<5	<5	<5	<5	<5	<5	14	<5	<5	<5	<5	
Barium	mg/kg	5																			
Beryllium	mg/kg	1																			
Cadmium	mg/kg	0.1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Chromium	mg/kg	1	950		26	16	12	34	8	6	5	10	10	3	35	6	9	10	4	8	
Cobalt	mg/kg	1																			
Copper	mg/kg	2		170	42	24	20	35	6	12	12	<5	11	13	302	9	20	5	20	<5	137
Manganese	mg/kg	5																			
Mercury	mg/kg	0.05			0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.4	<0.1	
Nickel	mg/kg	1			15	6	6	4	3	<2	5	3	4	8	<2	3	4	2	<2	4	
Vanadium	mg/kg	5	22,000																		
Zinc	mg/kg	5		220	55	131	66	163	23	103	62	47	31	67	64	46	75	65	79	6	93
PAH/Phenols																					
Acenaphthene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Acenaphthylene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	0.6	0.8	<0.5	<0.5	1.9	<0.5	<0.5	1	<0.5	<0.5	<0.5	
Benz(a)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	1.2	1.5	0.8	1.2	4.5	<0.5	<0.5	1.4	1.2	<0.5	<0.5	
Benzo(a) pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	1.2	2.1	0.6	1.3	3.4	<0.5	0.7	1.1	1.4	<0.5	<0.5	
Benzo(b)&(k)fluoranthene	mg/kg	1																			
Benzo(b)fluoranthene	mg/kg	0.5			0.6	0.5	<0.5	<0.5	<0.5	1.2	2.6	0.7	1.9	4.6	<0.5	0.8	1.4	1.7	<0.5	<0.5	
Benzo(g,h,i)perylene	mg/kg	0.5			1	<0.5	<0.5	<0.5	<0.5	0.6	1.4	<0.5	0.8	1.7	<0.5	0.6	<0.5	0.7	<0.5	<0.5	
Benzo(k)fluoranthene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	0.9	1	<0.5	0.7	2.1	<0.5	<0.5	0.7	0.7	<0.5	<0.5	
Chrysene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	1.1	1.3	0.7	1.1	3.7	<0.5	<0.5	1.1	1.2	<0.5	<0.5	
Dibenz(a,h)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Fluoranthene	mg/kg	0.5			0.7	0.8	<0.5	<0.5	<0.5	2.5	2.6	1.8	2	8.6	<0.5	<0.5	3.9	2.7	<0.5	<0.5	
Fluorene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	0.5	1.2	<0.5	0.6	1.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	
Naphthalene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Phenanthrene	mg/kg	0.5			0.5	<0.5	<0.5	<0.5	<0.5	1.2	1.3	2	0.8	4.8	<0.5	<0.5	2.8	<0.5	<0.5	<0.5	
Pyrene	mg/kg	0.5			0.8	0.9	<0.5	<0.5	<0.5	2.8	3.4	1.9	2.5	9.2	<0.5	0.6	3.9	4.2	<0.5	<0.5	
CPAH (ESDAT)	mg/kg		67		1.6	0.5	<4.5	<4.5	7.3	11.9	2.8	7.6	23.4	<4.5	2.1	6.7	7.5	<4.5	<4.5	<4.5	
PAH (ESDAT TOTAL)	mg/kg				3.6	2.2	<8	<8	13.8	19.9	8.5	12.9	47.4	<8	2.7	17.3	14.4	<8	<8	0.5	
SPOCAS																					
Chromium Reducible Sulfu	%	0.01						<0.005													
TPH																					
TPH C6 - C9	mg/kg	2		40	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	
TPH C10 - C14	mg/kg	50		50	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	
TPH C15-C28	mg/kg	100				160	<100	<100	<100	<100	120	<100	<100	190	<100	<100	110	<100	<100	<100	
TPH C15-C36	mg/kg				510	<200	<200	<200	<200	150	340	<200	<200	330	<200	<200	110	<200	<200	<200	
TPH C29-C36	mg/kg	100			350	<100	<100	<100	<100	150	220	<100	<100	140	<100	<100	<100	<100	<100	<100	
TPH+C10 - C36 (Sum)	mg/kg	50			510	<50	<50	<50	<50	150	340	<50	<50	330	<50	<50	110	<50	<50	<50	
BTEX																					
Benzene	mg/kg	0.2	15		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Ethylbenzene	mg/kg	0.2	600		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Toluene	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Xylene (m & p)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Xylene (o)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Xylene Total	mg/kg				nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	

Notes:
mg/kg = milligrams per kilogram
Laboratory LOR = Limit of Reporting
< denotes less than LOR
nc - denotes not calculable as both results less than LOR
Shading = results exceeds soil SSTC-A
Bold with Shading = results exceeds soil SSESC-A^{Unsat} and are shallower than 2 m bgl
Shading = results exceeds soil SSESC-A^{Sat}
Refer to Table T1 for adopted SSTCs and DAFs

Table T3
Area A
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field ID	BH350 4-4.45	BH350 5.5-5.95	BH350 8.5-8.95	BH351 0.1-0.2	BH351 1.5-1.9	BH351 10.0-10.4	BH351 11.5-11.9	BH351 14.5-14.9	BH351 14.5-14.9	BH351 2.5-2.9	BH351 2.5-2.9	BH351 4.0-4.4	BH351 7.0-7.4	BH351 8.5-8.9	BH352 0.1-0.2	BH352 1.5-2.0	BH352 1.5-2.0
Sample Depth	4-4.45	5.5-5.95	8.5-8.95	0.1-0.2	1.5-1.9	10-10.4	11.5-11.9	14.5-14.9	14.5-14.9	2.5-2.9	2.5-2.9	4-4.4	7-7.4	8.5-8.9	0.1-0.2	1.5-2	1.5-2
Location Code	BH350	BH350	BH350	BH351	BH351	BH351	BH351	BH351	BH351	BH351	BH351	BH351	BH351	BH351	BH352	BH352	BH352
Sampled Date	30/07/2010	30/07/2010	30/07/2010	23/07/2010	27/07/2010	27/07/2010	27/07/2010	27/07/2010	28/07/2010	27/07/2010	28/07/2010	27/07/2010	27/07/2010	27/07/2010	23/07/2010	27/07/2010	28/07/2010
Mon_Zone	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
Mon_Round																	
Comments	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A

ChemName	output unit	LOR	SSTC-A	SSESC-A ^{Unsat}	SSESC-A ^{Sat}																
Inorganics																					
WAD Cyanide	mg/kg	1				<1	<1	<1	<1	<1	<1	<1		<1		<1	<1	<1	<1	<1	
Lead																					
Lead	mg/kg	2		1800	440	114	21	36	11	193	98	61	299		157		109	90	265	10	87
Metals																					
Arsenic	mg/kg	1		20	5	<5	<5	<5	<5	5	<5	6	9		<5		<5	<5	<5	<5	
Barium	mg/kg	5																			
Beryllium	mg/kg	1																			
Cadmium	mg/kg	0.1				<1	<1	<1	<1	<1	<1	<1	<1		<1		<1	<1	<1	<1	
Chromium	mg/kg	1	950			11	10	5	4	10	6	16	16		11		7	8	5	3	9
Cobalt	mg/kg	1																			
Copper	mg/kg	2		170	42	24	38	13	345	54	10	36	43		54		48	11	11	296	13
Manganese	mg/kg	5																			
Mercury	mg/kg	0.05				<0.1	<0.1	<0.1	<0.1	0.4	<0.1	<0.1	0.6		0.2		0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	1				10	2	4	8	9	<2	5	6		12		5	4	2	11	5
Vanadium	mg/kg	5	22,000																		
Zinc	mg/kg	5		220	55	69	31	26	62	143	58	171	225		136		108	60	121	67	54
PAH/Phenols																					
Acenaphthene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.5				<0.5	1.6	0.6	<0.5	0.9	<0.5	<0.5	<0.5		1.4		0.6	1	<0.5	<0.5	<0.5
Anthracene	mg/kg	0.5				<0.5	2.4	1	<0.5	1	<0.5	<0.5	0.5		2.5		0.8	1.9	<0.5	<0.5	0.5
Benz(a)anthracene	mg/kg	0.5				0.6	10	2.2	<0.5	2	0.9	<0.5	1.3		3.3		1.5	3.6	0.5	<0.5	0.7
Benzo(a) pyrene	mg/kg	0.5				0.6	5.2	2	<0.5	2.1	1.2	<0.5	1.6		3.4		2.1	3.6	<0.5	<0.5	<0.5
Benzo(b)&(k)fluoranthene	mg/kg	1																			
Benzo(b)fluoranthene	mg/kg	0.5				0.9	7.8	2.7	<0.5	1.5	1.2	<0.5	1.9		3.4		2.2	3.6	<0.5	<0.5	0.5
Benzo(g,h,i)perylene	mg/kg	0.5				<0.5	2.5	1	<0.5	2.1	<0.5	<0.5	0.6		3.6		1.4	2.1	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	mg/kg	0.5				<0.5	3.2	1.2	<0.5	0.6	<0.5	<0.5	0.8		1.2		0.8	1.4	<0.5	<0.5	<0.5
Chrysene	mg/kg	0.5				0.6	8.3	1.6	<0.5	1.9	<0.5	<0.5	1.4		3		1.4	2.8	<0.5	<0.5	0.5
Dibenz(a,h)anthracene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		0.6		<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg	0.5				1.4	2.6	3.9	<0.5	3.7	1.2	<0.5	2.3		7.3		1.6	7.8	0.8	<0.5	1.5
Fluorene	mg/kg	0.5				<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5				<0.5	2	0.8	<0.5	1.3	<0.5	<0.5	0.6		2.2		1	1.7	<0.5	<0.5	<0.5
Naphthalene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	<0.5	<0.5	<0.5	<0.5
Phenanthrene	mg/kg	0.5				1	0.7	2.1	<0.5	1.8	<0.5	<0.5	0.9		5.8		1.3	4.2	<0.5	<0.5	1.5
Pyrene	mg/kg	0.5				1.6	31.5	4.4	<0.5	3.7	2.2	<0.5	3.5		7.1		3.9	7.4	1	<0.5	1.3
CPAH (ESDAT)	mg/kg		67			2.7	41.4	12.5	<4.5	12.5	3.3	<4.5	8.7		23.2		11.2	20.7	0.5	<4.5	2.2
PAH (ESDAT TOTAL)	mg/kg					6.7	78.4	23.5	<8	22.6	6.7	<8	15.4		44.8		19.2	41.1	2.3	<8	6.5
SPOCAS																					
Chromium Reducible Sulfu	%	0.01											0.177		<0.005						0.083
TPH																					
TPH C6 - C9	mg/kg	2		40	10	<10	<10	<10	<10	<10	<10	<10	<10		<10		<10	<10	<10	<10	<10
TPH C10 - C14	mg/kg	50		50	50	<50	<50	<50	<50	<50	<50	<50	<50		<50		<50	<50	<50	<50	<50
TPH C15-C28	mg/kg	100				<100	1270	<100	<100	120	<100	<100	360		230		210	220	<100	<100	<100
TPH C15-C36	mg/kg					<200	2180	<200	<200	390	<200	<200	860		610		430	410	<200	<200	<200
TPH C29-C36	mg/kg	100				<100	910	<100	<100	270	<100	<100	500		380		220	190	<100	<100	<100
TPH+C10 - C36 (Sum)	mg/kg	50				<50	2180	<50	<50	390	<50	<50	860		610		430	410	<50	<50	<50
BTEX																					
Benzene	mg/kg	0.2	15			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		<0.2		<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	mg/kg	0.2	600			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	0.2				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (m & p)	mg/kg	0.2				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (o)	mg/kg	0.2				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5
Xylene Total	mg/kg					nc	nc	nc	nc	nc	nc	nc	nc		nc		nc	nc	nc	nc	nc

Notes:
mg/kq = milligrams per kilogram
Laboratory LOR = Limit of Reporting
< denotes less than LOR
nc - denotes not calculable as both results less than LOR
Shading = results exceeds soil SSTC-A
Bold with Shading = results exceeds soil SSESC-A^{Unsat} and are shallower than 2 m bdl
Shading = results exceeds soil SSESC-A^{Sat}
Refer to Table T1 for adopted SSTCs and DAFs

Table T3
Area A
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field_ID	BH352 10.5-11.0	BH352 12.0-12.5	BH352 13.5-14.0	BH352 13.5-14.0	BH352 3.0-3.35	BH352 4.5-5.0	BH352 6.0-6.5	BH352 7.5-8.0	BH352 9.0 9.5	BH353 0.1-0.2	BH353 1.5-1.9	BH353 10.5-10.9	BH353 11.7-12.15	BH353 13-13.45	BH353 3.0-3.4	BH353 4.0-4.65
Sample_Depth	10.5-11	12-12.5	13.5-14	13.5-14	3-3.35	4.5-5	6-6.5	7.5-8	9.5	0.1-0.2	1.5-1.9	10.5-10.9	11.7-12.15	13-13.45	3-3.4	4-4.65
Location_Cod	BH352	BH352	BH352	BH352	BH352	BH352	BH352	BH352	BH352	BH353	BH353	BH353	BH353	BH353	BH353	BH353
Sampled_Date	27/07/2010	27/07/2010	27/07/2010	28/07/2010	27/07/2010	27/07/2010	27/07/2010	27/07/2010	27/07/2010	23/07/2010	27/07/2010	28/07/2010	29/07/2010	29/07/2010	27/07/2010	27/07/2010
Mon_Zone	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
Mon_Round																
Comments	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A

ChemName	output unit	LOR	SSTC-A	SSESC-A ^{Unsat}	SSESC-A ^{Sat}																
Inorganics																					
WAD Cyanide	mg/kg	1			<1	<1	<1		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Lead																					
Lead	mg/kg	2		1800	440	33	88	290		37	56	13	98	20	10	88	2450	43	24	86	72
Metals																					
Arsenic	mg/kg	1		20	5	18	<5	7		6	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Barium	mg/kg	5																			
Beryllium	mg/kg	1																			
Cadmium	mg/kg	0.1				<1	<1	<1		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	mg/kg	1	950			29	9	15		8	5	6	13	8	3	6	7	4	22	3	5
Cobalt	mg/kg	1																			
Copper	mg/kg	2		170	42	61	18	40		14	24	<5	59	13	303	78	13	43	<5	<5	19
Manganese	mg/kg	5																			
Mercury	mg/kg	0.05				<0.1	<0.1	0.4		0.3	0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	1				10	8	6		3	7	5	3	6	8	6	3	3	3	<2	5
Vanadium	mg/kg	5	22,000																		
Zinc	mg/kg	5		220	55	53	65	238		196	29	9	61	74	66	51	41	69	5	37	53
PAH/Phenols																					
Acenaphthene	mg/kg	0.5				<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.6	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.5				0.5	<0.5	0.8		<0.5	0.7	<0.5	<0.5	<0.5	<0.5	4.9	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	mg/kg	0.5				1	1.4	1.5		<0.5	1.1	<0.5	<0.5	<0.5	<0.5	1.2	10.3	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	mg/kg	0.5				2.4	2.9	3.8		<0.5	3.5	<0.5	1.1	0.7	<0.5	1.6	14.6	0.6	<0.5	<0.5	0.6
Benzo(a) pyrene	mg/kg	0.5				3.7	3.6	4.9		<0.5	5	<0.5	2.5	1	<0.5	1.5	11.2	0.6	<0.5	<0.5	0.6
Benzo(b)&(k)fluoranthene	mg/kg	1																			
Benzo(b)fluoranthene	mg/kg	0.5				3.5	3.6	4.2		<0.5	6	<0.5	2.1	0.8	<0.5	1.6	15.8	0.7	<0.5	<0.5	0.7
Benzo(g,h,i)perylene	mg/kg	0.5				1.3	1.3	2		<0.5	1.8	<0.5	0.9	<0.5	<0.5	6.4	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	mg/kg	0.5				0.9	0.9	1.9		<0.5	1.8	<0.5	1	<0.5	<0.5	4.2	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	mg/kg	0.5				1.5	2.2	3.3		<0.5	2.8	<0.5	0.8	0.5	<0.5	1.4	10.8	<0.5	<0.5	<0.5	<0.5
Dibenz(a,h)anthracene	mg/kg	0.5				<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.3	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg	0.5				3.9	5.6	7.8		<0.5	6.9	<0.5	1.7	1.3	<0.5	3.5	38.4	1.1	<0.5	<0.5	0.9
Fluorene	mg/kg	0.5				<0.5	<0.5	0.6		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	5.6	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5				1.2	1.2	1.8		<0.5	1.7	<0.5	0.8	<0.5	<0.5	4.8	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	mg/kg	0.5				<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.1	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	mg/kg	0.5				2.5	2.6	3.3		<0.5	2	<0.5	0.7	0.8	<0.5	3	36.8	0.9	<0.5	<0.5	<0.5
Pyrene	mg/kg	0.5				8.4	8.9	8		<0.5	18.3	0.5	3.8	2.2	<0.5	3.4	41.1	1.9	<0.5	<0.5	1.1
CPAH (ESDAT)	mg/kg		67			15.5	17.1	23.4		<4.5	23.7	<4.5	9.2	3	<4.5	7.3	79.4	1.9	<4.5	<4.5	1.9
PAH (ESDAT TOTAL)	mg/kg					30.8	34.2	43.9		<8	51.6	0.5	15.4	7.3	<8	17.2	210.9	5.8	<8	<8	3.9
SPOCAS																					
Chromium Reducible Sulfu	%	0.01							0.087							0.075					
TPH																					
TPH C6 - C9	mg/kg	2		40	10	<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
TPH C10 - C14	mg/kg	50		50	50	<50	<50	<50		<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
TPH C15-C28	mg/kg	100				340	320	370		<100	510	<100	200	140	<100	600	990	<100	<100	<100	<100
TPH C15-C36	mg/kg					810	720	810		<200	1280	<200	540	290	<200	2050	1660	<200	<200	<200	210
TPH C29-C36	mg/kg	100				470	400	440		<100	770	<100	340	150	<100	1450	670	<100	<100	<100	210
TPH+C10 - C36 (Sum)	mg/kg	50				810	720	810		<50	1280	<50	540	290	<50	2050	1660	<50	<50	<50	210
BTEX																					
Benzene	mg/kg	0.2	15			<0.2	<0.2	<0.2		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	mg/kg	0.2	600			<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	0.2				<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (m & p)	mg/kg	0.2				<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (o)	mg/kg	0.2				<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene Total	mg/kg					nc	nc	nc		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc

Notes:
mg/kg = milligrams per kilogram
Laboratory LOR = Limit of Reporting
< denotes less than LOR
nc - denotes not calculable as both results less than LOR
Shading = results exceeds soil SSTC-A
Bold with Shading = results exceeds soil SSESC-A^{Unsat} and are shallower than 2 m bgl
Shading = results exceeds soil SSESC-A^{Sat}
Refer to Table T1 for adopted SSTCs and DAFs

Table T3
Area A
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field_ID	BH353 6.0-6.4	BH353 7.5-7.9	BH354 0.1-0.2	BH354 6.0-6.1	BH354 7.5-7.7	BH354-1.5-1.7	BH354-10.5-10.8	BH354-12.0-12.3	BH354-13.5-13.7	BH354-3.0-3.1	BH354-4.5-4.7	BH354-6.0-6.1	BH354-7.5-7.7	BH355 0-0.2	BH355 1.5-1.95	BH355 11.5-11.95	BH355 13-13.2
Sample_Depth	6-6.4	7.5-7.9	0.1-0.2	6-6.1	7.5-7.7	1.5-1.7	10.5-10.8	12-12.3	13.5-13.7	3-3.1	4.5-4.7	6-6.1	7.5-7.7	0-0.2	1.5-1.95	11.5-11.95	13-13.2
Location_Cod	BH353	BH353	BH354	BH354	BH354	BH354	BH354	BH354	BH354	BH354	BH354	BH354	BH354	BH355	BH355	BH355	BH355
Sampled_Date	28/07/2010	28/07/2010	23/07/2010	29/07/2010	29/07/2010	29/07/2010	29/07/2010	29/07/2010	29/07/2010	29/07/2010	29/07/2010	29/07/2010	29/07/2010	27/07/2010	29/07/2010	29/07/2010	30/07/2010
Mon_Zone	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
Mon_Round																	
Comments	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A

ChemName	output unit	LOR	SSTC-A	SSESC-A ^{Unsat}	SSESC-A ^{Sat}																
Inorganics																					
WAD Cyanide	mg/kg	1			<1	<1	<1		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Lead																					
Lead	mg/kg	2		1800	440	53	179	8	114	106	238	96	120	82	31	92	7	263	363	26	
Metals																					
Arsenic	mg/kg	1		20	5	<5	<5	<5	6	9	14	<5	<5	<5	6	<5	<5	<5	<5	6	<5
Barium	mg/kg	5																			
Beryllium	mg/kg	1																			
Cadmium	mg/kg	0.1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	mg/kg	1	950			8	9	2	9	9	11	11	6	8	15	10	3	9	15	4	
Cobalt	mg/kg	1																			
Copper	mg/kg	2		170	42	45	13	327	35	38	14	16	28	72	61	142	315	61	37	<5	
Manganese	mg/kg	5																			
Mercury	mg/kg	0.05				<0.1	<0.1	<0.1	1.7	0.2	0.1	<0.1	0.1	0.1	0.1	0.1	<0.1	2.4	<0.1	<0.1	
Nickel	mg/kg	1				9	6	8	15	9	2	4	14	11	8	11	8	5	13	<2	
Vanadium	mg/kg	5	22,000																		
Zinc	mg/kg	5		220	55	229	204	58	119	398	125	85	79	118	43	96	59	179	174	<5	
PAH/Phenols																					
Acenaphthene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	0.8	<0.5	<0.5	<0.5	0.6	0.7	<0.5	<0.5	4.5	<0.5	
Acenaphthylene	mg/kg	0.5				<0.5	<0.5	<0.5	0.6	0.8	<0.5	<0.5	<0.5	<0.5	1.8	0.8	<0.5	<0.5	1.7	<0.5	
Anthracene	mg/kg	0.5				<0.5	<0.5	<0.5	0.5	1.4	<0.5	<0.5	<0.5	0.5	3.8	1.5	<0.5	0.6	6.8	<0.5	
Benz(a)anthracene	mg/kg	0.5				0.7	0.6	<0.5	0.8	4.2	0.7	<0.5	<0.5	1	6.8	3.4	<0.5	2.6	6.7	<0.5	
Benzo(a) pyrene	mg/kg	0.5				1.2	0.8	<0.5	0.8	3.9	0.6	<0.5	<0.5	1.3	6.9	4.1	<0.5	2	4.9	<0.5	
Benzo(b)&(k)fluoranthene	mg/kg	1																			
Benzo(b)fluoranthene	mg/kg	0.5				1.2	0.8	<0.5	0.9	4.9	0.6	0.6	<0.5	1.3	9.3	4.7	<0.5	2.7	7.5	<0.5	
Benzo(g,h,i)perylene	mg/kg	0.5				0.6	0.5	<0.5	1.3	2.1	<0.5	<0.5	<0.5	0.7	2.6	2.2	<0.5	1.8	2.6	<0.5	
Benzo(k)fluoranthene	mg/kg	0.5				0.6	<0.5	<0.5	<0.5	1.7	<0.5	<0.5	<0.5	0.5	3.4	1.4	<0.5	1	3.2	<0.5	
Chrysene	mg/kg	0.5				0.6	0.5	<0.5	0.8	3.7	0.6	<0.5	<0.5	0.9	6	3	<0.5	2.5	5.3	<0.5	
Dibenz(a,h)anthracene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	
Fluoranthene	mg/kg	0.5				2.9	1.1	<0.5	2.3	8.8	2.1	1.2	<0.5	2.3	19.9	6.1	<0.5	5.8	19.9	<0.5	
Fluorene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.7	0.5	<0.5	<0.5	3.8	<0.5	
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5				<0.5	<0.5	<0.5	0.6	1.7	<0.5	<0.5	<0.5	0.5	2.7	1.7	<0.5	1.2	1.9	<0.5	
Naphthalene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.4	1.9	<0.5	<0.5	6.3	<0.5	
Phenanthrene	mg/kg	0.5				0.8	<0.5	<0.5	0.8	2.3	0.7	<0.5	<0.5	0.8	9.3	3.9	<0.5	1.2	21.9	<0.5	
Pyrene	mg/kg	0.5				4.5	2.5	<0.5	2.2	12	2.6	1.1	<0.5	3.8	20.5	8.6	<0.5	6.6	18	<0.5	
CPAH (ESDAT)	mg/kg		67			4.9	3.2	<4.5	5.7	23.6	2.5	0.6	<4.5	6.7	42.2	22	<4.5	14.4	38.9	<4.5	
PAH (ESDAT TOTAL)	mg/kg					13.1	6.8	<8	11.6	47.5	8.7	2.9	<8	14.2	96.4	44.5	<8	28	115	<8	
SPOCAS																					
Chromium Reducible Sulfu	%	0.01							0.091												
TPH																					
TPH C6 - C9	mg/kg	2		40	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
TPH C10 - C14	mg/kg	50		50	50	<50	<50	<50	<50	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
TPH C15-C28	mg/kg	100				130	<100	<100	200	520	500	<100	<100	280	500	400	<100	120	520	<100	
TPH C15-C36	mg/kg					230	<200	<200	480	960	880	<200	<200	690	880	820	<200	260	810	<200	
TPH C29-C36	mg/kg	100				100	<100	<100	280	440	380	<100	<100	410	380	420	<100	140	290	<100	
TPH+C10 - C36 (Sum)	mg/kg	50				230	<50	<50	480	1010	880	<50	<50	690	880	820	<50	260	810	<50	
BTEX																					
Benzene	mg/kg	0.2	15			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	mg/kg	0.2	600			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	0.2				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (m & p)	mg/kg	0.2				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (o)	mg/kg	0.2				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene Total	mg/kg					nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc

Notes:
mg/kg = milligrams per kilogram
Laboratory LOR = Limit of Reporting
< denotes less than LOR
nc - denotes not calculable as both results less than LOR
Shading = results exceeds soil SSTC-A
Bold with Shading = results exceeds soil SSESC-A^{Unsat} and are shallower than 2 m bbl
Shading = results exceeds soil SSESC-A^{Sat}
Refer to Table T1 for adopted SSTCs and DAFs

Table T3
Area A
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field ID	BH355 2.5-2.95	BH355 4.0-4.45	BH355 5.5-5.95	BH355 7-7.45	BH355 8.5-8.95	BH356 0.1-0.2	BH356 1.3-1.8	BH356 10.5-10.9	BH356 12-12.4	BH356 13.5-13.6	BH356 3.0-3.5	BH356 4.5-5.0	BH356 6.0-6.2	BH356 7.5-7.8	BH356 9.0-9.4
Sample Depth	2.5-2.95	4-4.45	5.5-5.95	7-7.45	8.5-8.95	0.1-0.2	1.3-1.8	10.5-10.9	12-12.4	13.5-13.6	3-3.5	4.5-5	6-6.2	7.5-7.8	9-9.4
Location Cod	BH355	BH355	BH355	BH355	BH355	BH356	BH356	BH356	BH356	BH356	BH356	BH356	BH356	BH356	BH356
Sampled Date	29/07/2010	29/07/2010	29/07/2010	29/07/2010	29/07/2010	27/07/2010	28/07/2010	29/07/2010	29/07/2010	29/07/2010	28/07/2010	28/07/2010	29/07/2010	29/07/2010	29/07/2010
Mon_Zone	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
Mon_Round															
Comments	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A	Area A

ChemName	output unit	LOR	SSTC-A	SSESC-A ^{Unsat}	SSESC-A ^{Sat}															
Inorganics																				
WAD Cyanide	mg/kg	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Lead																				
Lead	mg/kg	2		1800	440	215	50	41	217	33	7	102	30	29	22	273	291	49	83	142
Metals																				
Arsenic	mg/kg	1		20	5	<5	<5	<5	<5	6	<5	<5	<5	<5	<5	5	<5	12	6	<5
Barium	mg/kg	5																		
Beryllium	mg/kg	1																		
Cadmium	mg/kg	0.1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	mg/kg	1	950			6	9	9	3	5	2	6	8	8	19	10	5	16	10	9
Cobalt	mg/kg	1																		
Copper	mg/kg	2		170	42	83	10	16	<5	14	265	35	42	6	11	15	6	17	16	11
Manganese	mg/kg	5																		
Mercury	mg/kg	0.05				0.3	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.4	<0.1	<0.1	<0.1
Nickel	mg/kg	1				5	2	3	<2	6	8	4	4	<2	15	3	18	8	3	4
Vanadium	mg/kg	5	22,000																	
Zinc	mg/kg	5		220	55	92	35	56	70	46	62	41	40	15	117	117	264	37	26	186
PAH/Phenols																				
Acenaphthene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.5				1	<0.5	<0.5	<0.5	1.3	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	mg/kg	0.5				1.1	<0.5	0.6	<0.5	2.3	<0.5	0.7	1.9	<0.5	<0.5	<0.5	0.6	<0.5	0.6	<0.5
Benz(a)anthracene	mg/kg	0.5				2.7	0.7	1.2	<0.5	3.9	<0.5	2	2.8	1.3	<0.5	0.9	1.1	<0.5	1.3	0.8
Benzo(a) pyrene	mg/kg	0.5				4.6	1.2	0.9	0.6	2.9	<0.5	2.6	2.4	1.9	<0.5	0.9	0.9	<0.5	1	0.7
Benzo(b)&(k)fluoranthene	mg/kg	1																		
Benzo(b)fluoranthene	mg/kg	0.5				7.9	1.1	1.1	0.7	4.1	<0.5	3.1	2.4	1.8	<0.5	0.9	1	<0.5	1.5	0.9
Benzo(g,h,i)perylene	mg/kg	0.5				5.1	0.7	0.6	<0.5	1.8	<0.5	2	1	0.7	<0.5	<0.5	<0.5	<0.5	0.6	<0.5
Benzo(k)fluoranthene	mg/kg	0.5				2.8	0.5	0.5	<0.5	1.7	<0.5	1	1.1	0.9	<0.5	0.6	<0.5	<0.5	0.6	<0.5
Chrysene	mg/kg	0.5				2.6	<0.5	0.9	<0.5	3.3	<0.5	1.8	2.5	1	<0.5	0.8	0.9	<0.5	1.2	0.7
Dibenz(a,h)anthracene	mg/kg	0.5				0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg	0.5				3.8	1.3	2.4	<0.5	7.8	<0.5	4.5	6.9	2.4	<0.5	2.1	2.4	<0.5	2.6	1.5
Fluorene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5				3.4	<0.5	<0.5	<0.5	1.5	<0.5	1.5	0.9	0.6	<0.5	<0.5	<0.5	<0.5	0.5	<0.5
Naphthalene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	mg/kg	0.5				0.9	<0.5	1.8	<0.5	5.6	<0.5	1.4	6.4	0.6	<0.5	0.9	1.6	<0.5	1.6	0.9
Pyrene	mg/kg	0.5				6.7	3.2	2.7	1	7.1	<0.5	4.1	7.2	3.3	<0.5	2.7	2.3	<0.5	2.6	1.7
CPAH (ESDAT)	mg/kg		67			30.9	4.2	5.8	1.3	21.5	<4.5	14.7	15	8.2	<4.5	4.1	4.5	<4.5	7.3	3.1
PAH (ESDAT TOTAL)	mg/kg					43.3	8.7	12.7	2.3	43.3	<8	24.7	36.1	14.5	<8	9.8	10.8	<8	14.1	7.2
SPOCAS																				
Chromium Reducible Sulfu	%	0.01								0.122				0.018						
TPH																				
TPH C6 - C9	mg/kg	2		40	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
TPH C10 - C14	mg/kg	50		50	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
TPH C15-C28	mg/kg	100				500	220	<100	<100	360	<100	100	140	240	<100	<100	180	<100	140	<100
TPH C15-C36	mg/kg					1280	440	<200	<200	670	<200	240	270	510	<200	110	290	<200	140	<200
TPH C29-C36	mg/kg	100				780	220	<100	<100	310	<100	140	130	270	<100	110	110	<100	<100	<100
TPH+C10 - C36 (Sum)	mg/kg	50				1280	440	<50	<50	670	<50	240	270	510	<50	110	290	<50	140	<50
BTEX																				
Benzene	mg/kg	0.2	15			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	mg/kg	0.2	600			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	0.2				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (m & p)	mg/kg	0.2				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (o)	mg/kg	0.2				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene Total	mg/kg					nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc

Notes:
mg/kg = milligrams per kilogram
Laboratory LOR = Limit of Reporting
< denotes less than LOR
nc - denotes not calculable as both results less than LOR
Shading = results exceeds soil SSTC-A
Bold with Shading = results exceeds soil SSESC-A^{Unsat} and are shallower than 2 m bgl
Shading = results exceeds soil SSESC-A^{Sat}
Refer to Table T1 for adopted SSTCs and DAFs

Table T4
Area A
Asbestos Analytical results
Amended Remedial Action Plan,
Other Remediation Works (South) Area, Barangaroo

Borehole ID	Area	Sample ID	Sample Date	Result	Asbestos Type	Asbestos Fines	Fibrous Asbestos (g)	ACM (g)	Asbestos (g)
BH345	Area A	BH345_3.0-3.4	21/07/2010	ND	NA	-	-	-	-
BH346	Area A	BH346_1.5-1.8	21/07/2010	ND	NA	-	-	-	-
BH347	Area A	BH347_3.0-3.2	22/07/2010	ND	NA	-	-	-	-
BH348	Area A	BH348_12-12.45	26/07/2010	ND	NA	-	-	-	-
BH349	Area A	BH349_7.5-7.9	23/07/2010	ND	NA	-	-	-	-
BH349	Area A	BH349_12-12.25	26/07/2010	ND	NA	-	-	-	-
BH350	Area A	BH350_1.5-1.95	30/07/2010	ND	NA	-	-	-	-
BH351	Area A	BH351_8.5-8.9	27/07/2010	ND	NA	-	-	-	-
BH351	Area A	BH351_11.5-11.9	27/07/2010	ND	NA	-	-	-	-
BH352	Area A	BH352_1.5-2.0	27/07/2010	ND	NA	-	-	-	-
BH352	Area A	BH352_4.5-5.0	27/07/2010	Detected	Chrysotile ²	No	<0.01	<0.01	<0.01
BH353	Area A	BH353_1.5-1.9	27/07/2010	ND	NA	-	-	-	-
BH354	Area A	BH354-1.5-1.7	29/07/2010	Detected	Chrysotile ³	-	-	-	-
BH356	Area A	BH356_3.0-3.5	28/07/2010	Detected	Chrysotile ⁴	No	<0.01	0.04	<0.01
BH356	Area A	BH356_9.0-9.4	29/07/2010	Detected	Chrysotile ⁵	-	-	-	-

Notes

ND - Not detected

NA - Not Applicable

Shaded = Asbestos detected

(1) A pale red-brown granular soil with small brown red-brown and grey rocks. One very small fibre bundle.

(2) Grey fine-grained soil with large quantity small to medium sized grey black and white rocks and one small fibre

(3) A mixture of reddish-brown + white sandy clay soils with plenty of tar-like / sand agglomerates and some large & small shale and sandstone rocks. Trace of vegetation debris.

(4) Mixture of brown red-brown grey and black granular soil with some vegetation and several concrete pieces

(5) A mixture of reddish-brown + white + light grey coarse grain sandy soils with plenty of large sandstone & shale rocks and charcoal & malthiod-like material. Trace of vegetation debris.

Table T5
Area A
Groundwater Analytical Results (2010)
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field_ID	MW10	MW16	MW17	MW18	MW20
Monitoring_Zone	S	S	S	S	S
Location_Code	BH048	BH102	BH103	BH104	BH108
Well	MW10	MW16	MW17	MW18	MW20
Sampled_Date_Time	3/12/2010	15/03/2010	3/12/2010	3/12/2010	3/12/2010
SDG	ES1004714	ES1004783	ES1004714	ES1004714	ES1004714

ChemName	output unit	LOR	SSTC-A & SDESC-A					
CPAH (ESDAT)	µg/L			<0.85	<8.5	<0.85	<0.85	2.66
BTEX								
Benzene	µg/L	1	3400	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	2	210,000	<2	<2	<2	<2	<2
Toluene	µg/L	2	760,000	<5	<5	<5	<5	<5
Xylene (m & p)	µg/L	2		<2	<2	<2	<2	<2
Xylene (o)	µg/L	2		<2	<2	<2	<2	<2
Dissolved Hydrocarbon Gases								
Methane	µg/L	10		11	<10	185	12	109
Halogenated Phenols								
2,4,5-trichlorophenol	µg/L	1		<1	<1	<1	<1	<1
2,4,6-trichlorophenol	µg/L	1		<1	<1	<1	<1	<1
2,4-dichlorophenol	µg/L	1		<1	<1	<1	<1	<1
2,6-dichlorophenol	µg/L	1		<1	<1	<1	<1	<1
2-chlorophenol	µg/L	1		<1	<1	<1	<1	<1
Pentachlorophenol	µg/L	2		<2	<2	<2	<2	<2
Inorganics								
Alkalinity as CaCO3	mg/L	1		154	213	225	311	346
Ammonia as N	mg/L	0.01	2,400,000	<0.1	<0.1	<0.1	<0.1	<0.1
Anions Total	meq/L	0.01		612	568	598	667	628
Bicarbonate as CaCO3	mg/L	1		154	213	225	311	346
Carbonate	mg/L	1		<1	<1	<1	<1	<1
Cations Total	meq/L	0.01		664	563	657	662	651
Chloride	mg/L	0.5		19,700	19,100	19,300	21,300	20,100
Cyanide (Free)	mg/L	0.004		<0.004	<0.004	<0.004	<0.004	<0.004
Cyanide Total	mg/L	0.004		<0.004	<0.004	<0.004	<0.004	<0.004
Ferrous Iron	mg/L	0.05		<0.05	<0.05	1.14	0.2	2.96
Hydroxide Alkalinity as CaCO3	µg/L	1000		<1000	<1000	<1000	<1000	<1000
Ionic Balance	%	0.01		4.09	0.48	4.68	0.38	1.75
Nitrate (as N)	mg/L	0.01		0.18	0.06	0.04	0.1	0.03
Nitrite (as N)	mg/L	0.01		<0.01	<0.01	<0.01	<0.01	<0.01
Nitrogen (Total Oxidised)	mg/L	0.01		0.18	0.06	0.04	0.1	0.03
pH (Lab)	pH Units	0.01		7.31	6.15	7.22	6.2	7.03
Sulphate	mg/L	0.5		2550	1200	2350	2890	2580
TOC	mg/L	1		3	<1	3	1	3
Weak Acid Dissociable Cyanide	mg/L	0.004			<0.004			
Lead								
Lead (Filtered)	µg/L	0.2	44	0.2	12	0.2	2.1	<0.2
Metals								
Arsenic (Filtered)	µg/L	0.5	2.3	0.9	0.9	<0.5	1.1	<0.5
Cadmium (Filtered)	µg/L	0.2	0.7	25.2	23.5	<0.2	0.7	0.7
Calcium (Filtered)	mg/L	1		439	413	596	520	548
Chromium (Filtered)	µg/L	0.5	4.4	<0.5	<0.5	<0.5	<0.5	<0.5
Copper (Filtered)	µg/L	1	6.5	7	14	<1	79	<1
Magnesium (Filtered)	mg/L	1		1410	1110	1240	1360	1240
Mercury (Filtered)	µg/L	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel (Filtered)	µg/L	0.5	350,000	44.4	19.4	4.7	77	3
Potassium (Filtered)	mg/L	1		429	368	425	429	424
Sodium (Filtered)	mg/L	1		11,800	10,200	11,800	11,800	11,700
Zinc (Filtered)	µg/L	5	75	36	87	6	188	11
PAH								
7,12-dimethylbenz(a)anthracene	µg/L	0.1		<0.1		<0.1	<0.1	<0.1
PAH/Phenols								
PAH (ESDAT TOTAL)	µg/L			<1.55	<15.5	0.1	<1.55	4.16
2,4-dimethylphenol	µg/L	1	720,000	<1	<1	<1	<1	<1
2-methylnaphthalene	µg/L	0.1	38,000	<0.1		<0.1	<0.1	<0.1
2-methylphenol	µg/L	1	4,900,000	<1	<1	<1	<1	<1
2-nitrophenol	µg/L	1		<1	<1	<1	<1	<1
3-&4-methylphenol	µg/L	2		<2	<2	<2	<2	<2
3-methylcholanthrene	µg/L	0.1		<0.1		<0.1	<0.1	<0.1
4-chloro-3-methylphenol	µg/L	1		<1	<1	<1	<1	<1
Acenaphthene	µg/L	0.1		<0.1	<1	<0.1	<0.1	<0.1
Acenaphthylene	µg/L	0.1	57,000	<0.1	<1	<0.1	<0.1	<0.1
Anthracene	µg/L	0.1		<0.1	<1	<0.1	<0.1	0.1
Benz(a)anthracene	µg/L	0.1		<0.1	<1	<0.1	<0.1	0.3
Benzo(a) pyrene	µg/L	0.05		<0.05	<0.5	<0.05	<0.05	0.56
Benzo(b)fluoranthene	µg/L	0.1		<0.1	<1	<0.1	<0.1	0.3
Benzo(g,h,i)perylene	µg/L	0.1		<0.1	<1	<0.1	<0.1	0.3
Benzo(k)fluoranthene	µg/L	0.1		<0.1	<1	<0.1	<0.1	0.4
Chrysene	µg/L	0.1		<0.1	<1	<0.1	<0.1	0.3
Dibenz(a,h)anthracene	µg/L	0.1		<0.1	<1	<0.1	<0.1	0.1
Fluoranthene	µg/L	0.1		<0.1	<1	<0.1	<0.1	0.5
Fluorene	µg/L	0.1		<0.1	<1	<0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	0.1		<0.1	<1	<0.1	<0.1	0.3
Naphthalene	µg/L	0.1	920	<0.1	<1	<0.1	<0.1	<0.1
Phenanthrene	µg/L	0.1		<0.1	<1	<0.1	<0.1	0.2
Phenol	µg/L	1	23,000,000	<1	<1	<1	<1	<1
Pyrene	µg/L	0.1		<0.1	<1	0.1	<0.1	0.8
Pesticides								
Pesticides (total, NSW Waste 2008)	mg/L			<0.001	<0.001	<0.001	<0.001	<0.001
SVOCs								
2-(acetyl amino) fluorene	µg/L	0.1		<0.1		<0.1	<0.1	<0.1
Benzo(e)pyrene	µg/L	0.1		<0.1		<0.1	<0.1	0.3
Coronene	µg/L	0.1		<0.1		<0.1	<0.1	<0.1
Perylene	µg/L	0.1		<0.1		<0.1	<0.1	0.1
TPH								
TPH C15-C36	mg/L			<0.15	<0.15	<0.15	<0.15	<0.15
TPH C10 - C14	µg/L	50		<50	<50	<50	<50	<50
TPH C15-C28	µg/L	100	220,000	<100	<100	<100	<100	<100
TPH C29-C36	µg/L	50	250,000	<50	<50	<50	<50	<50
TPH C6 - C9	µg/L	20	110	<20	<20	<20	<20	<20
TPH+C10 - C36 (Sum of total)	µg/L	50		<50	<50	<50	<50	<50

Notes:
µg/L = micrograms per litre
mg/L = milligrams per litre
LOR = Laboratory Limit of Reporting
< Denotes less than LOR.
<0.1 Where LOR is greater than the adopted GRG values are shown in bold.
Shading = results exceeds groundwater remediation criteria
Refer to Table T2 for adopted SSTCs and DAFs

Table T6
Area A
Historic Groundwater Analytical Results
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field_ID	MW10	MW10	MW10	MW10	MW10	MW10	MW16	MW16	MW16	MW16	MW16	MW16	MW16	MW16	MW17	MW17	MW17	MW17	MW17	MW17	MW18
Monitoring_Zone	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Location_Code	BH048	BH048	BH048	BH048	BH048	BH048	BH102	BH102	BH102	BH102	BH102	BH102	BH102	BH102	BH103	BH103	BH103	BH103	BH103	BH103	BH104
Well	MW10	MW10	MW10	MW10	MW10	MW10	MW16	MW16	MW16	MW16	MW16	MW16	MW16	MW16	MW17	MW17	MW17	MW17	MW17	MW17	MW18
Sampled_Date	17/07/2006	17/07/2006	15/08/2007	8/05/2008	5/08/2008	3/12/2010	26/07/2006	26/07/2006	16/08/2007	9/05/2008	5/09/2008	15/03/2010	26/07/2006	26/07/2006	13/08/2007	9/05/2008	5/09/2008	3/12/2010	26/07/2006		

ChemName	output unit	LOR	SSTC-A & SSESC-A																		
CPAH (ESDAT)	µg/L			<8.5		<8.5		<8.5	<0.85	<8.5		<8.5		<8.5	<8.5	<8.5		<8.5		<8.5	<8.5
BTEX																					
Benzene	µg/L	1	3400	<1		<1		<1	<1	<1		<1		<1	<1	<1		<1		<1	<1
Ethylbenzene	µg/L	2	210,000	<2		<2		<2	<2	<2		<2		<2	<2	<2		<2		<2	<2
Toluene	µg/L	2	760,000	<2		<2		<5	<5	<2		<2		<5	<5	<2		<2		<5	<5
Xylene (m & p)	µg/L	2		<2		2		<2	<2	<2		<2		<2	<2	<2		<2		<2	<2
Xylene (o)	µg/L	2		<2		<2		<2	<2	<2		<2		<2	<2	<2		<2		<2	<2
Dissolved Hydrocarbon Gases																					
Methane	µg/L	10							11					<10						185	
Field																					
Dissolved Oxygen	mg/L					1						1.29						0.05			
pH (Field)	pH Units					7.11						7.2						7.46			
Redox	mV					39						156						-132			
Temperature	°C					21.9						21.9						22.8			
Halogenated Phenols																					
2,4,5-trichlorophenol	µg/L	1				<1		<1	<1			<1		<1	<1			<1		<1	<1
2,4,6-trichlorophenol	µg/L	1				<1		<1	<1			<1		<1	<1			<1		<1	<1
2,4-dichlorophenol	µg/L	1				<1		<1	<1			<1		<1	<1			<1		<1	<1
2,6-dichlorophenol	µg/L	1				<1		<1	<1			<1		<1	<1			<1		<1	<1
2-chlorophenol	µg/L	1				<1		<1	<1			<1		<1	<1			<1		<1	<1
Pentachlorophenol	µg/L	2				<2		<2	<2			<2		<2	<2			<2		<2	<2
Inorganic																					
Electrical conductivity *(lab)	uS/cm					48						44						-132			
Inorganics																					
Alkalinity as CaCO3	mg/L	1				157		168	154			264		208	213			204		214	225
Ammonia as N	mg/L	0.01	2,400,000			<0.1		<0.015	<0.1			<0.1		<0.015	<0.1			<0.5		0.463	<0.1
Anions Total	meg/L	0.01				614		664	612			547		568	568			563		598	598
Bicarbonate	mg/L	1				157		168				264		208				204		214	
Bicarbonate as CaCO3	mg/L	1							154						213						225
Carbonate	mg/L	1				<1		<1	<1			<1		<1	<1			<1		<1	<1
Cations Total	meg/L	0.01				672		611	664			603			563			554			657
Chloride	mg/L	0.5				19,400		19,900	19,700			17,200		14,800	19,100			18,100		14,900	19,300
Cyanide (Free)	mg/L	0.004				<0.004		<0.004	<0.004			<0.004		<0.004	<0.004			<0.004		<0.004	<0.004
Cyanide Total	mg/L	0.004		<0.005				<0.004	<0.004	<0.004				<0.004	<0.004	<0.004			<0.004	<0.004	<0.004
Ferrous Iron	mg/L	0.05						<0.05						<0.05							1.14
Hydroxide Alkalinity as CaCO3	µg/L	1000				<1000		<1000	<1000			<1000		<1000	<1000			<1000		<1000	<1000
Ionic Balance	%	0.01				4.48		4.17	4.09			4.78			0.48			0.85			4.68
Nitrate (as N)	mg/L	0.01							0.18						0.06						0.04
Nitrite (as N)	mg/L	0.01							<0.01						<0.01						<0.01
Nitrogen (Total Oxidised)	mg/L	0.01							0.18						0.06						0.04
pH (Lab)	pH Units	0.01							7.31						6.15						7.22
Sulphate	mg/L	0.5		2130		3040		4790	2550	1780		2740		2190	1200	1840		2300		2550	2350
Sulphate (Filtered)	mg/L	1																			1500
TOC	mg/L	1						3							<1						3
Weak Acid Dissociable Cyanide	mg/L	0.004												<0.004							
Lead																					
Lead (Filtered)	µg/L	0.2	44			0.2		<10		<0.2	0.2		3.1	144		7.2	12		1.2	<10	<0.2
Metals																					
Arsenic (Filtered)	µg/L	0.5	2.3	<10		<10		1.5	0.9	<10		12		0.9	0.9	<10		<10		1.1	<0.5
Cadmium (Filtered)	µg/L	0.1	0.7	<1		1.4		1.1	25.2	<1		15.6		0.2	23.5	<1		<1		<0.2	<0.2
Calcium	mg/L	1				480		415				417		419				449		490	
Calcium (Filtered)	mg/L	1							439						413						596
Chromium (Filtered)	µg/L	0.5	4.4	<10		<10		<0.5	<0.5	<10		<10		1.5	<0.5	<10		<10		1.2	<0.5
Copper (Filtered)	µg/L	1	6.5		<1	53		2	7		<1	34		2	14		2	<20		<1	<1
Magnesium	mg/L	1				1400		1230				1230		1160				1070		1110	
Magnesium (Filtered)	mg/L	1							1410						1110						1240
Mercury (Filtered)	µg/L	0.1	0.1	<0.1		<0.1		<0.1	<0.1	<0.1		<0.1		<0.1	<0.1	<0.1		<0.1		<0.1	<0.1
Nickel (Filtered)	µg/L	0.5	350,000	<10		22		54.8	44.4	<10		38		1.8	19.4	<10		15		0.9	4.7
Potassium	mg/L	1				452		424				387		400				401		402	
Potassium (Filtered)	mg/L	1						429							368						425
Sodium	mg/L	1				12,000		11,000				10,800		10,000				9960		9840	
Sodium (Filtered)	mg/L	1							11,800						10,200						11,800
Zinc (Filtered)	mg/L	0.005	0.075			0.015		0.085		0.038	0.036		0.115	0.233		0.074	0.087		0.078	0.096	<0.005

Table T6
Area A
Historic Groundwater Analytical Results
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field_ID	MW10	MW10	MW10	MW10	MW10	MW10	MW16	MW16	MW16	MW16	MW16	MW16	MW16	MW17	MW17	MW17	MW17	MW17	MW17	MW18
Monitoring_Zone	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Location_Code	BH048	BH048	BH048	BH048	BH048	BH048	BH102	BH102	BH102	BH102	BH102	BH102	BH102	BH103	BH103	BH103	BH103	BH103	BH103	BH104
Well	MW10	MW10	MW10	MW10	MW10	MW10	MW16	MW16	MW16	MW16	MW16	MW16	MW16	MW17	MW17	MW17	MW17	MW17	MW17	MW18
Sampled_Date	17/07/2006	17/07/2006	15/08/2007	8/05/2008	5/08/2008	3/12/2010	26/07/2006	26/07/2006	16/08/2007	9/05/2008	5/09/2008	15/03/2010	26/07/2006	26/07/2006	13/08/2007	9/05/2008	5/09/2008	3/12/2010	26/07/2006	

ChemName	output unit	LOR	SSTC-A & SSEC-A																		
PAH																					
7,12-dimethylbenz(a)anthracene	µg/L	0.1							<0.1											<0.1	
PAH/Phenols																					
PAH (ESDAT TOTAL)	µg/L			<15.5		10.8		<15.5	<1.55	<15.5		4.9		<15.5	<15.5	<15.5		<15.5		<15.5	0.1
2,4-dimethylphenol	µg/L	1	720,000			<1		<1	<1			<1		<1	<1			<1		<1	<1
2-methylnaphthalene	µg/L	0.1	3800						<0.1											<0.1	
2-methylphenol	µg/L	1	4,900,000			<1		<1	<1			<1		<1	<1			<1		<1	<1
2-nitrophenol	µg/L	1				<1		<1	<1			<1		<1	<1			<1		<1	<1
3-&4-methylphenol	µg/L	2				<2		<2	<2			<2		<2	<2			<2		<2	<2
3-methylcholanthrene	µg/L	0.1							<0.1											<0.1	
4-chloro-3-methylphenol	µg/L	1				<1		<1	<1			<1		<1	<1			<1		<1	<1
Acenaphthene	µg/L	0.1		<1		<1		<1	<0.1	<1		<1		<1	<1	<1		<1		<0.1	<1
Acenaphthylene	µg/L	0.1	57,000	<1		<1		<1	<0.1	<1		<1		<1	<1	<1		<1		<0.1	<1
Anthracene	µg/L	0.1		<1		<1		<1	<0.1	<1		<1		<1	<1	<1		<1		<0.1	<1
Benz(a)anthracene	µg/L	0.1		<1		<1		<1	<0.1	<1		<1		<1	<1	<1		<1		<0.1	<1
Benzo(a) pyrene	µg/L	0.05		<0.5		<0.5		<0.5	<0.05	<0.5		<0.5		<0.5	<0.5	<0.5		<0.5		<0.05	<0.5
Benzo(b)fluoranthene	µg/L	0.1		<1		<1		<1	<0.1	<1		<1		<1	<1	<1		<1		<0.1	<1
Benzo(g,h,i)perylene	µg/L	0.1		<1		<1		<1	<0.1	<1		<1		<1	<1	<1		<1		<0.1	<1
Benzo(k)fluoranthene	µg/L	0.1		<1		<1		<1	<0.1	<1		<1		<1	<1	<1		<1		<0.1	<1
Chrysene	µg/L	0.1		<1		<1		<1	<0.1	<1		<1		<1	<1	<1		<1		<0.1	<1
Dibenz(a,h)anthracene	µg/L	0.1		<1		<1		<1	<0.1	<1		<1		<1	<1	<1		<1		<0.1	<1
Fluoranthene	µg/L	0.1		<1		<1		<1	<0.1	<1		<1		<1	<1	<1		<1		<0.1	<1
Fluorene	µg/L	0.1		<1		<1		<1	<0.1	<1		<1		<1	<1	<1		<1		<0.1	<1
Indeno(1,2,3-c,d)pyrene	µg/L	0.1		<1		<1		<1	<0.1	<1		<1		<1	<1	<1		<1		<0.1	<1
Naphthalene	µg/L	0.1	920	<1		10.8		<1	<0.1	<1		4.9		<1	<1	<1		<1		<0.1	1.4
Phenanthrene	µg/L	0.1		<1		<1		<1	<0.1	<1		<1		<1	<1	<1		<1		<0.1	<1
Phenol	µg/L	1	23,000,000			<1		<1	<1			<1		<1	<1			<1		<1	<1
Pyrene	µg/L	0.1		<1		<1		<1	<0.1	<1		<1		<1	<1	<1		<1		0.1	<1
Pesticides																					
Pesticides (total, NSW Waste 2008)	mg/L					<0.001		<0.001	<0.001			<0.001		<0.001	<0.001			<0.001		<0.001	<0.001
Demeton-S-methyl	µg/L	0.5																			
Fenamiphos	µg/L	0.5																			
Parathion	µg/L	2																			
Pirimphos-ethyl	µg/L	0.5																			
Polychlorinated Biphenyls																					
PCBs (Sum of total)	µg/L	1		<1		<1		<1		<1		<1		<1		<1		<1		<1	<1
SVOCs																					
2-(acetylamino) fluorene	µg/L	0.1							<0.1											<0.1	
Benzo(e)pyrene	µg/L	0.1							<0.1											<0.1	
Coronene	µg/L	0.1							<0.1											<0.1	
Perylene	µg/L	0.1							<0.1											<0.1	
TPH																					
TPH C15-C36	mg/L			<0.15		<0.15		<0.15	<0.15	<0.15		<0.15		<0.15	<0.15	<0.15		<0.15		<0.15	<0.15
TPH C10 - C14	µg/L	50	40	<50		<50		<50	<50	<50		<50		<50	<50	<50		<50		<50	<50
TPH C15-C28	µg/L	100	220,000	<100		<100		<100	<100	<100		<100		<100	<100	<100		<100		<100	<100
TPH C29-C36	µg/L	50	250,000	<50		<50		<50	<50	<50		<50		<50	<50	<50		<50		<50	<50
TPH C6 - C9	µg/L	20	110	<20		<20		<20	<20	<20		<20		<20	<20	<20		<20		<20	<20
TPH+C10 - C36 (Sum of total)	µg/L	50		<200		<200		<200	<50	<200		<200		<200	<50	<200		<200		<200	<200

Notes:
µg/L = micrograms per litre
mg/L = milligrams per litre
LOR = Laboratory Limit of Reporting
< Denotes less than LOR.
<0.1 Where LOR is greater than the adopted GRG values are shown in bold.
Shading = results exceeds groundwater remediation criteria
Refer to Table T2 for adopted SSTCs and DAFs

Table T6
Area A
Historic Groundwater Analytical Results
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field ID	MW18	MW18	MW18	MW18	MW18	MW20	MW20	MW20	MW20	MW20	MW20
Monitoring Zone	S	S	S	S	S	S	S	S	S	S	S
Location Code	BH104	BH104	BH104	BH104	BH104	BH108	BH108	BH108	BH108	BH108	BH108
Well	MW18	MW18	MW18	MW18	MW18	MW20	MW20	MW20	MW20	MW20	MW20
Sampled Date	26/07/2006	14/08/2007	9/05/2008	5/09/2008	3/12/2010	21/07/2006	21/07/2006	14/08/2007	9/05/2008	5/09/2008	3/12/2010

ChemName	output unit	LOR	SSTC-A & SSESC-A											
CPAH (ESDAT)	µg/L				<8.5		<0.85	<0.85			<8.5		0.05	2.66
BTEX														
Benzene	µg/L	1	3400		<1		<1	<1	<1		<1		<1	<1
Ethylbenzene	µg/L	2	210,000		<2		<2	<2	<2		<2		<2	<2
Toluene	µg/L	2	760,000		<2		<5	<5	<2		<2		<5	<5
Xylene (m & p)	µg/L	2			<2		<2	<2	<2		<2		<2	<2
Xylene (o)	µg/L	2			<2		<2	<2	<2		<2		<2	<2
Dissolved Hydrocarbon Gases														
Methane	µg/L	10					12							109
Field														
Dissolved Oxygen	mg/L					0.06					0.12			
pH (Field)	pH Units					7.13					7.18			
Redox	mV					-42					-121			
Temperature	°C					23.7					23.4			
Halogenated Phenols														
2,4,5-trichlorophenol	µg/L	1			<1		<1	<1			<1		<1	<1
2,4,6-trichlorophenol	µg/L	1			<1		<1	<1			<1		<1	<1
2,4-dichlorophenol	µg/L	1			<1		<1	<1			<1		<1	<1
2,6-dichlorophenol	µg/L	1			<1		<1	<1			<1		<1	<1
2-chlorophenol	µg/L	1			<1		<1	<1			<1		<1	<1
Pentachlorophenol	µg/L	2			<2		<2	<2			<2		<2	<2
Inorganic														
Electrical conductivity *(lab)	uS/cm					41.1					41.7			
Inorganics														
Alkalinity as CaCO3	mg/L	1			296		298	311			340		353	346
Ammonia as N	mg/L	0.01	2,400,000		0.76		<0.015	<0.1			5.83		0.183	<0.1
Anions Total	meq/L	0.01			525			667			472			628
Bicarbonate	mg/L	1			296		298				340		353	
Bicarbonate as CaCO3	mg/L	1						311						346
Carbonate	mg/L	1			<1		<1	<1			<1		<1	<1
Cations Total	meq/L	0.01			578			662			502			651
Chloride	mg/L	0.5			16,600		13,400	21,300			15,400		15,900	20,100
Cyanide (Free)	mg/L	0.004			<0.004			<0.004			<0.004			<0.004
Cyanide Total	mg/L	0.004					<0.004	<0.004	0.232				<0.004	<0.004
Ferrous Iron	mg/L	0.05						0.2						2.96
Hydroxide Alkalinity as CaCO3	µg/L	1000			<1000		<1000	<1000			<1000		<1000	<1000
Ionic Balance	%	0.01			4.74			0.38			2.98			1.75
Nitrate (as N)	mg/L	0.01						0.1						0.03
Nitrite (as N)	mg/L	0.01						<0.01						<0.01
Nitrogen (Total Oxidised)	mg/L	0.01						0.1						0.03
pH (Lab)	pH Units	0.01						6.2						7.03
Sulphate	mg/L	0.5			2400		2370	2890			1570		1980	2580
Sulphate (Filtered)	mg/L	1							1830					
TOC	mg/L	1						1						3
Weak Acid Dissociable Cyanide	mg/L	0.004												
Lead														
Lead (Filtered)	µg/L	0.2	44		1.1	<10		<0.2	2.1		0.3	<10		<0.2
Metals														
Arsenic (Filtered)	µg/L	0.5	2.3		<10		1.2	1.1	<1		<10		0.6	<0.5
Cadmium (Filtered)	µg/L	0.1	0.7		<1		<0.2	0.7	<0.1		3.2		<0.2	0.7
Calcium	mg/L	1			458		443				612		452	
Calcium (Filtered)	mg/L	1						520						548
Chromium (Filtered)	µg/L	0.5	4.4		<10		0.6	<0.5	2		<10		1.8	<0.5
Copper (Filtered)	µg/L	1	6.5	<1	32		<1	79		<1	<20		<1	<1
Magnesium	mg/L	1			1070		1110				847		1030	
Magnesium (Filtered)	mg/L	1						1360						1240
Mercury (Filtered)	µg/L	0.1	0.1		<0.1		<0.1	<0.1	<0.1		<0.1		<0.1	<0.1
Nickel (Filtered)	µg/L	0.5	350,000		25		<0.5	77	5		24		0.7	3
Potassium	mg/L	1			408		387				383		403	
Potassium (Filtered)	mg/L	1						429						424
Sodium	mg/L	1			10,500		9520				9000		9790	
Sodium (Filtered)	mg/L	1						11,800						11,700
Zinc (Filtered)	mg/L	0.005	0.075	0.06	0.07		0.019	0.188		0.028	<0.05		0.005	0.011

Table T6
Area A
Historic Groundwater Analytical Results
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field ID	MW18	MW18	MW18	MW18	MW18	MW20	MW20	MW20	MW20	MW20	MW20
Monitoring Zone	S	S	S	S	S	S	S	S	S	S	S
Location Code	BH104	BH104	BH104	BH104	BH104	BH108	BH108	BH108	BH108	BH108	BH108
Well	MW18	MW18	MW18	MW18	MW18	MW20	MW20	MW20	MW20	MW20	MW20
Sampled Date	26/07/2006	14/08/2007	9/05/2008	5/09/2008	3/12/2010	21/07/2006	21/07/2006	14/08/2007	9/05/2008	5/09/2008	3/12/2010

ChemName	output unit	LOR	SSTC-A & SDESC-A										
PAH													
7,12-dimethylbenz(a)anthracene	ug/L	0.1					<0.1	<0.1				<0.1	<0.1
PAH/Phenols													
PAH (ESDAT TOTAL)	ug/L				<15.5		<1.55	<1.55			<15.5	0.15	4.16
2,4-dimethylphenol	ug/L	1	720,000		<1		<1	<1			<1	<1	<1
2-methylnaphthalene	ug/L	0.1	3800				<0.1	<0.1				<0.1	<0.1
2-methylphenol	ug/L	1	4,900,000		<1		<1	<1			<1	<1	<1
2-nitrophenol	ug/L	1			<1		<1	<1			<1	<1	<1
3-&4-methylphenol	ug/L	2			<2		<2	<2			<2	<2	<2
3-methylcholanthrene	ug/L	0.1					<0.1	<0.1				<0.1	<0.1
4-chloro-3-methylphenol	ug/L	1			<1		<1	<1			<1	<1	<1
Acenaphthene	ug/L	0.1			<1		<0.1	<0.1			<1	<0.1	<0.1
Acenaphthylene	ug/L	0.1	57,000		<1		<0.1	<0.1			<1	<0.1	<0.1
Anthracene	ug/L	0.1			<1		<0.1	<0.1			<1	<0.1	0.1
Benz(a)anthracene	ug/L	0.1			<1		<0.1	<0.1			<1	<0.1	0.3
Benzo(a) pyrene	ug/L	0.05			<0.5		<0.05	<0.05			<0.5	0.05	0.56
Benzo(b)fluoranthene	ug/L	0.1			<1		<0.1	<0.1			<1	<0.1	0.3
Benzo(g,h,i)perylene	ug/L	0.1			<1		<0.1	<0.1			<1	<0.1	0.3
Benzo(k)fluoranthene	ug/L	0.1			<1		<0.1	<0.1			<1	<0.1	0.4
Chrysene	ug/L	0.1			<1		<0.1	<0.1			<1	<0.1	0.3
Dibenz(a,h)anthracene	ug/L	0.1			<1		<0.1	<0.1			<1	<0.1	0.1
Fluoranthene	ug/L	0.1			<1		<0.1	<0.1			<1	<0.1	0.5
Fluorene	ug/L	0.1			<1		<0.1	<0.1			<1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	ug/L	0.1			<1		<0.1	<0.1			<1	<0.1	0.3
Naphthalene	ug/L	0.1	920		<1		<0.1	<0.1			<1	<0.1	<0.1
Phenanthrene	ug/L	0.1			<1		<0.1	<0.1			<1	<0.1	0.2
Phenol	ug/L	1	23,000,000		<1		<1	<1			<1	<1	<1
Pyrene	ug/L	0.1			<1		<0.1	<0.1			<1	0.1	0.8
Pesticides													
Pesticides (total, NSW Waste 2008)	mg/L				<0.001		<0.001	<0.001	<0.005		<0.001	<0.001	<0.001
Demeton-S-methyl	ug/L	0.5							<0.5				
Fenamiphos	ug/L	0.5							<0.5				
Parathion	ug/L	2							<2				
Pirimphos-ethyl	ug/L	0.5							<0.5				
Polychlorinated Biphenyls													
PCBs (Sum of total)	ug/L	1			<1		<1		<1		<1	<1	
SVOCs													
2-(acetylamino) fluorene	ug/L	0.1					<0.1	<0.1				<0.1	<0.1
Benzo(e)pyrene	ug/L	0.1					<0.1	<0.1				<0.1	0.3
Coronene	ug/L	0.1					<0.1	<0.1				<0.1	<0.1
Perylene	ug/L	0.1					<0.1	<0.1				<0.1	0.1
TPH													
TPH C15-C36	mg/L				<0.15		<0.15	<0.15	2.45		1.25	0.1	<0.15
TPH C10 - C14	ug/L	50	40		<50		<50	<50	420		60	<50	<50
TPH C15-C28	ug/L	100	220,000		<100		<100	<100	2300		1000	100	<100
TPH C29-C36	ug/L	50	250,000		<50		<50	<50	150		250	<50	<50
TPH C6 - C9	ug/L	20	110		<20		<20	<20	<20		<20	<20	<20
TPH+C10 - C36 (Sum of total)	ug/L	50			<200		<200	<50	2870		1310	100	<50

Notes:
µg/L = micrograms per litre
mg/L = milligrams per litre
LOR = Laboratory Limit of Reporting
< Denotes less than LOR.
<0.1 Where LOR is greater than the adopted GRG values are shown in bold.
Shading = results exceeds groundwater remediation criteria
Refer to Table T2 for adopted SSTCs and DAFs

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field ID		BH018 0.3-0.5	BH018 1.5-1.8	BH018 3.0-3.45	BH02 3.0-3.1	BH02 5.0-5.1	BH02 7.0-7.1	BH03 3.0-3.2	BH035 0.3-0.5	BH035 1.5-1.95	BH035 4.0-4.5	BH04 1.0-1.1	BH04 8.0-8.1	BH047 0.3-0.5	BH047 1.5-1.95	BH048 1.5-1.95	BH048 3.0-3.45	BH05 0.25	BH05 1.7-1.8	BH05 4.1
Sample Depth		0-0.5	0.3-1.8	3-3.45	3-3.1	5-5.1	7-7.1	3-3.2	0.3-0.5	1.5-1.95	4-4.5	1-1.1	8-8.1	0.3-0.5	1.5-1.95	1.5-1.95	3-3.45	0.25	1.7-1.8	4.1
Location Code		BH018	BH018	BH018	AECOM BH02	AECOM BH02	AECOM BH02	AECOM BH03	BH035	BH035	BH035	AECOM BH04	AECOM BH04	BH047	BH047	BH048	BH048	AECOM BH05	AECOM BH05	AECOM BH05
Sampled Date		5/08/2006	5/08/2006	5/08/2006	12/04/2009	12/04/2009	12/04/2009	12/10/2009	18/05/2006	18/05/2006	18/05/2006	12/09/2009	12/09/2009	24/05/2006	24/05/2006	24/05/2006	24/05/2006	12/02/2009	12/02/2009	12/02/2009
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
CPAH (ESDAT)	mg/kg		67							<4.5								<4.5			<4.5		
1. CAHs																							
Tetrachloroethene	mg/kg	0.5																					
Trichloroethene	mg/kg	0.5																					
cis-1,2-dichloroethene	mg/kg	0.5																					
Vinyl chloride	mg/kg	5																					
BTEX																							
Benzene	mg/kg	0.2	81							<0.2		<0.2		<0.2			<0.2		<0.2		<0.2		
Ethylbenzene	mg/kg	0.2								<0.5		<0.2		<0.2			<0.2		<0.2		<0.5		
Toluene	mg/kg	0.2								<0.5		<0.2		<0.2			<0.2		<0.2		<0.5		
Xylene (m & p)	mg/kg	0.2								<0.5		<0.2		<0.2			<0.2		<0.2		<0.5		
Xylene (o)	mg/kg	0.2								<0.5		<0.2		<0.2			<0.2		<0.2		<0.5		
Xylene Total	mg/kg													<0.2			<0.2				<0.5		
Halogenated Phenols																							
2,3,4,6-tetrachlorophenol	mg/kg	0.5																					
2,4,5-trichlorophenol	mg/kg	0.5																			<0.5		
2,4,6-trichlorophenol	mg/kg	0.5																			<0.5		
2,4-dichlorophenol	mg/kg	0.5																			<0.5		
2,6-dichlorophenol	mg/kg	0.5																			<0.5		
2-chlorophenol	mg/kg	0.5																			<0.5		
Pentachlorophenol	mg/kg	1																			<2		
Inorganics																							
Cyanide (Free)	mg/kg	1																					
Cyanide Total	mg/kg	1																					
WAD Cyanide	mg/kg	1																					
MAH																							
1,2,4-trimethylbenzene	mg/kg	0.5	110																				
1,3,5-trimethylbenzene	mg/kg	0.5																					
Isopropylbenzene	mg/kg	0.5																					
n-butylbenzene	mg/kg	0.5																					
n-propylbenzene	mg/kg	0.5																					
p-isopropyltoluene	mg/kg	0.5																					
sec-butylbenzene	mg/kg	0.5																					
Styrene	mg/kg	0.5																					
tert-butylbenzene	mg/kg	0.5																					
Lead																							
Lead	mg/kg	2		1700	7	<5	54	22	23	13	8	7	20	18	13	10	15	23	18	<5	6	8	12
Metals																							
Arsenic	mg/kg	1		20	<5	<5	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	6	<5	7	<5	<5	<5	<5
Barium	mg/kg	5						10	<10	20	40				40	<10					20	20	30
Beryllium	mg/kg	1						<1	<1	<1	<1				<1	<1					<1	<1	<1
Cadmium	mg/kg	0.1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	mg/kg	1	180000		5	5	9	6	7	5	8	2	11	16	8	6	7	10	4	3	2	8	21
Chromium (hexavalent)	mg/kg	0.5	950																				
Cobalt	mg/kg	1						<2	<2	<2	4				3	2					13	3	5
Copper	mg/kg	2		170	192	<5	18	6	<5	9	<5	212	9	10	<5	<5	127	15	<5	<5	284	<5	20
Iron	mg/kg	10																					
Manganese	mg/kg	5						<5	<5	68	226				163	83					735	131	226
Mercury	mg/kg	0.01			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	1			7	<2	6	<2	<2	<2	5	6	5	33	4	2	8	7	<2	<2	6	3	7
Vanadium	mg/kg	5	22000					14	15	8	15				14	11					118	12	27
Zinc	mg/kg	2		220	50	<5	102	30	12	23	24	48	31	38	24	14	53	47	36	26	48	18	49
Nitroaromatics																							
2-Picoline	mg/kg	0.5																					
4-aminobiphenyl	mg/kg	0.5																					
Pentachloronitrobenzene	mg/kg	0.5																					



Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Lend Lease
Barangaroo

Field ID		BH018 0.3-0.5	BH018 1.5-1.8	BH018 3.0-3.45	BH02 3.0-3.1	BH02 5.0-5.1	BH02 7.0-7.1	BH03 3.0-3.2	BH035 0.3-0.5	BH035 1.5-1.95	BH035 4.0-4.5	BH04 1.0-1.1	BH04 8.0-8.1	BH047 0.3-0.5	BH047 1.5-1.95	BH048 1.5-1.95	BH048 3.0-3.45	BH05 0.25	BH05 1.7-1.8	BH05 4.1
Sample Depth		0-0.5	0.3-1.8	3-3.45	3-3.1	5-5.1	7-7.1	3-3.2	0.3-0.5	1.5-1.95	4-4.5	1-1.1	8-8.1	0.3-0.5	1.5-1.95	1.5-1.95	3-3.45	0.25	1.7-1.8	4.1
Location Code		BH018	BH018	BH018	AECOM BH02	AECOM BH02	AECOM BH02	AECOM BH03	BH035	BH035	BH035	AECOM BH04	AECOM BH04	BH047	BH047	BH048	BH048	AECOM BH05	AECOM BH05	AECOM BH05
Sampled Date		5/08/2006	5/08/2006	5/08/2006	12/04/2009	12/04/2009	12/04/2009	12/10/2009	18/05/2006	18/05/2006	18/05/2006	12/09/2009	12/09/2009	24/05/2006	24/05/2006	24/05/2006	24/05/2006	12/02/2009	12/02/2009	12/02/2009
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																		
PAH/Phenols																						
PAH (ESDAT TOTAL)	mg/kg								<8									<8			<8	
2,4-dimethylphenol	mg/kg	0.5																			<0.5	
2-chloronaphthalene	mg/kg	0.5																				
2-methylnaphthalene	mg/kg	0.5																				
2-methylphenol	mg/kg	0.5																			<0.5	
2-nitrophenol	mg/kg	0.5																			<0.5	
3-&4-methylphenol	mg/kg	0.5	5400																		<1	
3-methylcholanthrene	mg/kg	0.5																				
4-chloro-3-methylphenol	mg/kg	0.5																			<0.5	
Acenaphthene	mg/kg	0.5		8				<0.5								<0.5					<0.5	
Acenaphthylene	mg/kg	0.5		5				<0.5								<0.5					<0.5	
Acetophenone	mg/kg	0.5																				
Anthracene	mg/kg	0.5		5				<0.5								<0.5					<0.5	
Benz(a)anthracene	mg/kg	0.5						<0.5								<0.5					<0.5	
Benzo(a) pyrene	mg/kg	0.5						<0.5								<0.5					<0.5	
Benzo(b)&(k)fluoranthene	mg/kg	1																				
Benzo(b)fluoranthene	mg/kg	0.5						<0.5								<0.5					<0.5	
Benzo(g,h,i)perylene	mg/kg	0.5						<0.5								<0.5					<0.5	
Benzo(k)fluoranthene	mg/kg	0.5						<0.5								<0.5					<0.5	
Chrysene	mg/kg	0.5						<0.5								<0.5					<0.5	
Dibenz(a,h)anthracene	mg/kg	0.5						<0.5								<0.5					<0.5	
Fluoranthene	mg/kg	0.5		8				<0.5								<0.5					<0.5	
Fluorene	mg/kg	0.5		5				<0.5								<0.5					<0.5	
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5						<0.5								<0.5					<0.5	
Naphthalene	mg/kg	0.5		21				<0.5								<0.5					<0.5	
PAHs (Sum of total)	mg/kg	0.5																				
Phenanthrene	mg/kg	0.5		4				<0.5								<0.5					<0.5	
Phenol	mg/kg	0.5																			<0.5	
Phenolics Total	mg/kg																					
Pyrene	mg/kg	0.5						<0.5								<0.5					<0.5	
TPH																						
TPH C15-C36	mg/kg							<200		<200		<200			<200		<200			<200		
TPH C10 - C14	mg/kg	50	61,000	50				<50		<50		<50			<50		<50			<50		
TPH C15-C28	mg/kg	100						<100		<100		<100			<100		<100			<100		
TPH C29-C36	mg/kg	100						<100		<100		<100			<100		<100			<100		
TPH C6 - C9	mg/kg	2		39				<10		<2		<2			<2		<2			<10		
TPH+C10 - C36 (Sum)	mg/kg	50						<50		<250		<250			<250		<250			<50		

Notes:
mg/kg = milligrams per kilogram
LOR = Laboratory Limit of Reporting
Shading = results exceeds soil SSTC-B
Shading = results exceeds soil SSESC-B
Refer to Table T1 for adopted SSTCs and DAFs

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field ID		BH05 6.4	BH06 0.5-0.6	BH06 2.5-2.6	BH06 5.0-5.1	BH07 1.0-1.2	BH07 5.0-5.1	BH07 7.4-7.5	BH08 1.0-1.1	BH08 13.0-13.1	BH08 14.0-14.1	BH08 5.0-5.1	BH08 9.0-9.2	BH09 1.0-1.1	BH09 5.0-5.2	BH091 0.3 0.5	BH091 0.3-0.5	BH091 3.0-3.45	BH092 1.5-1.95	BH093 0.3 0.5
Sample Depth		6.4	0.5-0.6	2.5-2.6	5-5.1	1-1.2	5-5.1	7.4-7.5	1-1.1	13-13.1	14-14.1	5-5.1	9-9.2	1-1.1	5-5.2	0.3-0.5	0.3-0.5	3-3.45	1.5-1.95	0.3-0.5
Location Code		AECOM BH05	AECOM BH06	AECOM BH06	AECOM BH06	AECOM BH07	AECOM BH07	AECOM BH07	AECOM BH08	AECOM BH08	AECOM BH08	AECOM BH08	AECOM BH08	AECOM BH09	AECOM BH09	BH091	BH091	BH091	BH093	BH093
Sampled Date		12/02/2009	12/02/2009	12/02/2009	12/02/2009	12/08/2009	12/08/2009	12/08/2009	12/08/2009	12/08/2009	12/08/2009	12/08/2009	12/08/2009	12/07/2009	12/07/2009	13/06/2006	13/06/2006	13/06/2006	13/06/2006	13/06/2006
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
CPAH (ESDAT)	mg/kg		67				<4.5				56.2		6.5	<3.5				<4.5	<4.5				1.2
1. CAHs																							
Tetrachloroethene	mg/kg	0.5											<0.5	<0.5									
Trichloroethene	mg/kg	0.5											<0.5	<0.5									
cis-1,2-dichloroethene	mg/kg	0.5											<0.5	<0.5									
Vinyl chloride	mg/kg	5											<5	<5									
BTEx																							
Benzene	mg/kg	0.2	81				<0.2				<0.2		13.9	1.4				<0.2		<0.2		<0.2	
Ethylbenzene	mg/kg	0.2					<0.5				<0.5		5.6	<0.5				<0.5		<0.2		<0.2	
Toluene	mg/kg	0.2					<0.5				<0.5		42.1	3.5				<0.5		<0.2		<0.2	
Xylene (m & p)	mg/kg	0.2					0.5				<0.5		33	<1				<0.5		<0.2		<0.2	
Xylene (o)	mg/kg	0.2					<0.5				<0.5		13.5	<0.5				<0.5		<0.2		<0.2	
Xylene Total	mg/kg																						
Halogenated Phenols																							
2,3,4,6-tetrachlorophenol	mg/kg	0.5																					
2,4,5-trichlorophenol	mg/kg	0.5											<0.5	<0.5									
2,4,6-trichlorophenol	mg/kg	0.5											<0.5	<0.5									
2,4-dichlorophenol	mg/kg	0.5											<0.5	<0.5									
2,6-dichlorophenol	mg/kg	0.5											<0.5	<0.5									
2-chlorophenol	mg/kg	0.5											<0.5	<0.5									
Pentachlorophenol	mg/kg	1											<1	<1									
Inorganics																							
Cyanide (Free)	mg/kg	1												<1									
Cyanide Total	mg/kg	1												<1									
WAD Cyanide	mg/kg	1																					
MAH																							
1,2,4-trimethylbenzene	mg/kg	0.5	110										19	<0.5									
1,3,5-trimethylbenzene	mg/kg	0.5											4.4	<0.5									
Isopropylbenzene	mg/kg	0.5											<0.5	<0.5									
n-butylbenzene	mg/kg	0.5											<0.5	<0.5									
n-propylbenzene	mg/kg	0.5											<0.5	<0.5									
p-isopropyltoluene	mg/kg	0.5											<0.5	<0.5									
sec-butylbenzene	mg/kg	0.5											<0.5	<0.5									
Styrene	mg/kg	0.5											21.4	<0.5									
tert-butylbenzene	mg/kg	0.5											<0.5	<0.5									
Lead																							
Lead	mg/kg	2		1700	5	16	50	75	16	143	180	13	<5	9	22	<5	30	19		14	75	29	
Metals																							
Arsenic	mg/kg	1		20	<5	<5	13	8	5	<5	7	<5	<5	<5	10	<5	6	7		<5	<5	<5	
Barium	mg/kg	5			20	30	40	80	30	20	70	20	<10	30	60	<10	40	60					
Beryllium	mg/kg	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1					
Cadmium	mg/kg	0.1			<1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	<1	
Chromium	mg/kg	1	180000		6	6	10	14	12	14	16	10	13	4	16	11	12	11		2	7	8	
Chromium (hexavalent)	mg/kg	0.5	950																				
Cobalt	mg/kg	1			3	8	4	2	8	3	2	<2	<2	<2	<2	<2	5	8					
Copper	mg/kg	2		170	27	107	28	15	9	114	69	<5	<5	<5	15	<5	10	8		16	16	14	
Iron	mg/kg	10																					
Manganese	mg/kg	5			164	454	125	73	464	46	88	17	<5	<5	83	<5	244	448					
Mercury	mg/kg	0.01			<0.1	<0.1	<0.1	0.2	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1		<0.1	0.1	<0.1	
Nickel	mg/kg	1			3	7	10	4	11	4	5	<2	<2	<2	4	<2	8	12		6	2	7	
Vanadium	mg/kg	5	22000		20	70	12	22	24	9	23	9	36	6	25	26	22	18					
Zinc	mg/kg	2		220	18	44	121	172	60	691	221	28	<5	<5	51	<5	54	66		14	23	30	
Nitroaromatics																							
2-Picoline	mg/kg	0.5											<0.5	<0.5									
4-aminobiphenyl	mg/kg	0.5											<0.5	<0.5									
Pentachloronitrobenzene	mg/kg	0.5											<0.5	<0.5									

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field ID		BH05 6.4	BH06 0.5-0.6	BH06 2.5-2.6	BH06 5.0-5.1	BH07 1.0-1.2	BH07 5.0-5.1	BH07 7.4-7.5	BH08 1.0-1.1	BH08 13.0-13.1	BH08 14.0-14.1	BH08 5.0-5.1	BH08 9.0-9.2	BH09 1.0-1.1	BH09 5.0-5.2	BH091 0.3 0.5	BH091 0.3-0.5	BH091 3.0-3.45	BH092 1.5-1.95	BH093 0.3 0.5
Sample Depth		6.4	0.5-0.6	2.5-2.6	5-5.1	1-1.2	5-5.1	7.4-7.5	1-1.1	13-13.1	14-14.1	5-5.1	9-9.2	1-1.1	5-5.2	0.3-0.5	0.3-0.5	3-3.45	1.5-1.95	0.3-0.5
Location Code		AECOM BH05	AECOM BH06	AECOM BH06	AECOM BH06	AECOM BH07	AECOM BH07	AECOM BH07	AECOM BH08	AECOM BH08	AECOM BH08	AECOM BH08	AECOM BH08	AECOM BH09	AECOM BH09	BH091	BH091	BH091	BH093	BH093
Sampled Date		12/02/2009	12/02/2009	12/02/2009	12/02/2009	12/08/2009	12/08/2009	12/08/2009	12/08/2009	12/08/2009	12/08/2009	12/08/2009	12/08/2009	12/07/2009	12/07/2009	13/06/2006	13/06/2006	13/06/2006	13/06/2006	13/06/2006
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
PAH/Phenols																							
PAH (ESDAT TOTAL)	mg/kg						<8				251.3		60	3.3				<8	<8				5.4
2,4-dimethylphenol	mg/kg	0.5											<0.5	<0.5									
2-chloronaphthalene	mg/kg	0.5											<0.5	<0.5									
2-methylnaphthalene	mg/kg	0.5											15.7	0.9									
2-methylphenol	mg/kg	0.5											<0.5	<0.5									
2-nitrophenol	mg/kg	0.5											<0.5	<0.5									
3-&4-methylphenol	mg/kg	0.5	5400										<0.5	<0.5									
3-methylcholanthrene	mg/kg	0.5											<0.5	<0.5									
4-chloro-3-methylphenol	mg/kg	0.5											<0.5	<0.5									
Acenaphthene	mg/kg	0.5		8			<0.5			10.7			0.6	<0.5				<0.5	<0.5				<0.5
Acenaphthylene	mg/kg	0.5		5			<0.5			0.9			6	0.7				<0.5	<0.5				<0.5
Acetophenone	mg/kg	0.5											<0.5	<0.5									
Anthracene	mg/kg	0.5		5			<0.5			18.6			2.4	<0.5				<0.5	<0.5				<0.5
Benz(a)anthracene	mg/kg	0.5					<0.5			12.5			1.7	<0.5				<0.5	<0.5				0.6
Benzo(a) pyrene	mg/kg	0.5					<0.5			9.3			1	<0.5				<0.5	<0.5				<0.5
Benzo(b)&(k)fluoranthene	mg/kg	1											<1	<1									
Benzo(b)fluoranthene	mg/kg	0.5					<0.5			9.4								<0.5	<0.5				<0.5
Benzo(g,h,i)perylene	mg/kg	0.5					<0.5			4.4			<0.5	<0.5				<0.5	<0.5				<0.5
Benzo(k)fluoranthene	mg/kg	0.5					<0.5			5.5								<0.5	<0.5				<0.5
Chrysene	mg/kg	0.5					<0.5			10.8			1.4	<0.5				<0.5	<0.5				0.6
Dibenz(a,h)anthracene	mg/kg	0.5					<0.5			0.8			<0.5	<0.5				<0.5	<0.5				<0.5
Fluoranthene	mg/kg	0.5		8			<0.5			35.4			2.6	<0.5				<0.5	<0.5				1.5
Fluorene	mg/kg	0.5		5			<0.5			13			2.8	<0.5				<0.5	<0.5				<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5					<0.5			3.5			<0.5	<0.5				<0.5	<0.5				<0.5
Naphthalene	mg/kg	0.5		21			<0.5			13.6			29.1	0.9				<0.5	<0.5				<0.5
PAHs (Sum of total)	mg/kg	0.5																					
Phenanthrene	mg/kg	0.5		4			<0.5			64.6			8.4	1.2				<0.5	<0.5				1.2
Phenol	mg/kg	0.5											<0.5	<0.5									
Phenolics Total	mg/kg																						
Pyrene	mg/kg	0.5					<0.5			38.3			4	0.5				<0.5	<0.5				1.5
TPH																							
TPH C15-C36	mg/kg						<200			2540			200	<200				<200		<200		<200	
TPH C10 - C14	mg/kg	50	61,000	50			<50			80			100	<50				<50		<50		<50	
TPH C15-C28	mg/kg	100					<100			1290			200	<100				<100		<100		<100	
TPH C29-C36	mg/kg	100					<100			1250			<100	<100				<100		<100		<100	
TPH C6 - C9	mg/kg	2		39			<10			<10			170	<10				<10		<2		<2	
TPH+C10 - C36 (Sum)	mg/kg	50					<50			2620			300	<50				<50		<250		<250	

Notes:
mg/kg = milligrams per kilogram
LOR = Laboratory Limit of Reporting
Shading = results exceeds soil SSTC-B
Shading = results exceeds soil SSESC-B
Refer to Table T1 for adopted SSTCs and DAFs

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field ID		BH093 0.3-0.5	BH093 3.0-3.45	BH095 1.5-1.95	BH095 3.0-3.45	BH096 1.5 1.95	BH096 1.5-1.95	BH096 3.0-3.45	BH097 0.3-0.5	BH098 1.7-2.15	BH098 3.0-3.45	BH099 0.3 0.5	BH099 1.5 1.95	BH10 1.0-1.2	BH100 0.3 0.5	BH100 1.5 1.95	BH100 3.0 3.45	BH101 1.5 1.95	BH101 3.0 3.25	BH102 1.5 1.95
Sample Depth		0.3-0.5	3-3.45	1.5-1.95	3-3.45	1.5-1.95	1.5-1.95	3-3.45	0.3-0.5	1.7-2.15	3-3.45	0.3-0.5	1.5-1.95	1-1.2	0.3-0.5	1.5-1.95	3-3.45	1.5-1.95	3-3.25	1.5-1.95
Location Code		BH093	BH093	BH095	BH095	BH096	BH096	BH096	BH097	BH098	BH098	BH099	BH099	AECOM BH10	BH100	BH100	BH100	BH101	BH101	BH102
Sampled Date		13/06/2006	13/06/2006	13/06/2006	13/06/2006	13/06/2006	13/06/2006	13/06/2006	13/06/2006	13/06/2006	13/06/2006	15/06/2006	15/06/2006	12/11/2009	15/06/2006	15/06/2006	15/06/2006	15/06/2006	15/06/2006	16/06/2006
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																				
CPAH (ESDAT)	mg/kg		67						<4.5									4.1	24.4					
1. CAHs																								
Tetrachloroethene	mg/kg	0.5																						
Trichloroethene	mg/kg	0.5																						
cis-1,2-dichloroethene	mg/kg	0.5																						
Vinyl chloride	mg/kg	5																						
BTEX																								
Benzene	mg/kg	0.2	81		<0.2		<0.2			<0.2		<0.2	<0.2		<0.2			<0.2	<0.2	<0.2		<0.2		
Ethylbenzene	mg/kg	0.2			<0.2		<0.2			<0.2		<0.2	<0.2		<0.2			<0.2	<0.2	<0.2		<0.2		
Toluene	mg/kg	0.2			<0.2		<0.2			<0.2		<0.2	<0.2		<0.2			<0.2	<0.2	<0.2		<0.2		
Xylene (m & p)	mg/kg	0.2			<0.2		<0.2			<0.2		<0.2	<0.2		<0.2			<0.2	<0.2	<0.2		<0.2		
Xylene (o)	mg/kg	0.2			<0.2		<0.2			<0.2		<0.2	<0.2		<0.2			<0.2	<0.2	<0.2		<0.2		
Xylene Total	mg/kg																							
Halogenated Phenols																								
2,3,4,6-tetrachlorophenol	mg/kg	0.5																						
2,4,5-trichlorophenol	mg/kg	0.5																						
2,4,6-trichlorophenol	mg/kg	0.5																						
2,4-dichlorophenol	mg/kg	0.5																						
2,6-dichlorophenol	mg/kg	0.5																						
2-chlorophenol	mg/kg	0.5																						
Pentachlorophenol	mg/kg	1																						
Inorganics																								
Cyanide (Free)	mg/kg	1																						
Cyanide Total	mg/kg	1																						
WAD Cyanide	mg/kg	1																						
MAH																								
1,2,4-trimethylbenzene	mg/kg	0.5	110																					
1,3,5-trimethylbenzene	mg/kg	0.5																						
Isopropylbenzene	mg/kg	0.5																						
n-butylbenzene	mg/kg	0.5																						
n-propylbenzene	mg/kg	0.5																						
p-isopropyltoluene	mg/kg	0.5																						
sec-butylbenzene	mg/kg	0.5																						
Styrene	mg/kg	0.5																						
tert-butylbenzene	mg/kg	0.5																						
Lead																								
Lead	mg/kg	2		1700	10	146	20	32		9	18	78	593	354	112	61	26	113	34	<5	13	21	128	
Metals																								
Arsenic	mg/kg	1		20	<5	<5	<5	<5		<5	<5	<5	<5	5	<5		<5		<5	<5	<5		6	
Barium	mg/kg	5															30							
Beryllium	mg/kg	1															<1							
Cadmium	mg/kg	0.1			<1	<1	<1	<1		<1	<1	<1	<1	<1	<1		<1		<1	<1	<1		<1	
Chromium	mg/kg	1	180000		5	7	2	10		4	4	8	4	18	8		10		12	<2	9		7	
Chromium (hexavalent)	mg/kg	0.5	950																					
Cobalt	mg/kg	1															6							
Copper	mg/kg	2		170	57	19	5	7		30	<5	45	9	38	64		13		5	<5	<5		11	
Iron	mg/kg	10																						
Manganese	mg/kg	5																						
Mercury	mg/kg	0.01			<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	0.2	<0.1	0.2	<0.1		<0.1		0.2	<0.1	<0.1		<0.1	
Nickel	mg/kg	1			22	3	<2	<2		<2	<2	11	<2	7	22		8		<2	<2	<2		3	
Vanadium	mg/kg	5	22000														20							
Zinc	mg/kg	2		220	26	66	12	16		<5	<5	67	37	272	68		62		26	<5	12		78	
Nitroaromatics																								
2-Picoline	mg/kg	0.5																						
4-aminobiphenyl	mg/kg	0.5																						
Pentachloronitrobenzene	mg/kg	0.5																						

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field ID		BH093 0.3-0.5	BH093 3.0-3.45	BH095 1.5-1.95	BH095 3.0-3.45	BH096 1.5 1.95	BH096 1.5-1.95	BH096 3.0-3.45	BH097 0.3-0.5	BH098 1.7-2.15	BH098 3.0-3.45	BH099 0.3 0.5	BH099 1.5 1.95	BH10 1.0-1.2	BH100 0.3 0.5	BH100 1.5 1.95	BH100 3.0 3.45	BH101 1.5 1.95	BH101 3.0 3.25	BH102 1.5 1.95
Sample Depth		0.3-0.5	3-3.45	1.5-1.95	3-3.45	1.5-1.95	1.5-1.95	3-3.45	0.3-0.5	1.7-2.15	3-3.45	0.3-0.5	1.5-1.95	1-1.2	0.3-0.5	1.5-1.95	3-3.45	1.5-1.95	3-3.25	1.5-1.95
Location Code		BH093	BH093	BH095	BH095	BH096	BH096	BH096	BH097	BH098	BH098	BH099	BH099	AECOM BH10	BH100	BH100	BH100	BH101	BH101	BH102
Sampled Date		13/06/2006	13/06/2006	13/06/2006	13/06/2006	13/06/2006	13/06/2006	13/06/2006	13/06/2006	13/06/2006	13/06/2006	15/06/2006	15/06/2006	12/11/2009	15/06/2006	15/06/2006	15/06/2006	15/06/2006	15/06/2006	16/06/2006
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																	
PAH/Phenols																					
PAH (ESDAT TOTAL)	mg/kg								<8									10	45.1		
2,4-dimethylphenol	mg/kg	0.5																			
2-chloronaphthalene	mg/kg	0.5																			
2-methylnaphthalene	mg/kg	0.5																			
2-methylphenol	mg/kg	0.5																			
2-nitrophenol	mg/kg	0.5																			
3-&4-methylphenol	mg/kg	0.5	5400																		
3-methylcholanthrene	mg/kg	0.5																			
4-chloro-3-methylphenol	mg/kg	0.5																			
Acenaphthene	mg/kg	0.5		8				<0.5									<0.5	<0.5			
Acenaphthylene	mg/kg	0.5		5				<0.5									<0.5	2.1			
Acetophenone	mg/kg	0.5																			
Anthracene	mg/kg	0.5		5				<0.5									0.5	<0.5			
Benz(a)anthracene	mg/kg	0.5						<0.5									0.8	<0.5			
Benzo(a) pyrene	mg/kg	0.5						<0.5									0.8	6.2			
Benzo(b)&(k)fluoranthene	mg/kg	1																			
Benzo(b)fluoranthene	mg/kg	0.5						<0.5									0.6	5.7			
Benzo(g,h,i)perylene	mg/kg	0.5						<0.5									0.6	4.1			
Benzo(k)fluoranthene	mg/kg	0.5						<0.5									<0.5	4			
Chrysene	mg/kg	0.5						<0.5									0.8	<0.5			
Dibenz(a,h)anthracene	mg/kg	0.5						<0.5									<0.5	1.2			
Fluoranthene	mg/kg	0.5		8				<0.5									2	0.6			
Fluorene	mg/kg	0.5		5				<0.5									<0.5	<0.5			
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5						<0.5									<0.5	3.2			
Naphthalene	mg/kg	0.5		21				<0.5									<0.5	<0.5			
PAHs (Sum of total)	mg/kg	0.5																			
Phenanthrene	mg/kg	0.5		4				<0.5									1.8	<0.5			
Phenol	mg/kg	0.5																			
Phenolics Total	mg/kg																				
Pyrene	mg/kg	0.5						<0.5									2.1	18			
TPH																					
TPH C15-C36	mg/kg				<200		<200		<200		810	<200		270			<200	980	<200		210
TPH C10 - C14	mg/kg	50	61,000	50	<50		<50		<50		<50	<50		<50			<50	<50	<50		<50
TPH C15-C28	mg/kg	100			<100		<100		<100		380	<100		140			<100	470	<100		100
TPH C29-C36	mg/kg	100			<100		<100		<100		430	<100		130			<100	510	<100		110
TPH C6 - C9	mg/kg	2		39	<2		<2		<2		<2	<2		<2			<2	<2	<2		<2
TPH+C10 - C36 (Sum)	mg/kg	50			<250		<250		<250		810	<250		270			<250	980	<250		210

Notes:
mg/kg = milligrams per kilogram
LOR = Laboratory Limit of Reporting
Shading = results exceeds soil SSTC-B
Shading = results exceeds soil SSESC-B
Refer to Table T1 for adopted SSTCs and DAFs

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field_ID		BH102 3.0 3.45	BH103 1.5 1.95	BH103 3.0 3.45	BH103-1.5 1-95	BH103-3.0 3.5	BH104-0.3 0.5	BH104-3.0 3.45	BH108 1.5 1.95	BH108 3.0 3.45	BH11 1.4-1.5	BH11 1.6-1.8	BH11 2.6-2.7	BH11 3.2-3.3	BH110 0.3 0.5	BH110 1.5 1.95	BH110 3.0 3.2	BH111 1.5 1.95	BH111 3.0 3.45	BH112 1.5 1.95
Sample_Depth		3-3.45	1.5-1.95	3-3.45	1.5-1.95	3-3.5	0.3-0.5	3-3.45	1.5-1.95	3-3.45	1.4-1.5	1.6-1.8	2.6-2.7	3.2-3.3	0.3-0.5	1.5-1.95	3-3.2	1.5-1.95	3-3.45	1.5-1.95
Location_Code		BH102	BH103	BH103	BH103	BH103	BH104	BH104	BH108	BH108	AECOM BH11	AECOM BH11	AECOM BH11	AECOM BH11	BH110	BH110	BH110	BH111	BH111	BH112
Sampled_Date		16/06/2006	19/06/2006	19/06/2006	19/06/2006	19/06/2006	19/06/2006	19/06/2006	26/06/2006	27/06/2006	2/05/2010	2/05/2010	2/05/2010	2/05/2010	27/06/2006	27/06/2006	27/06/2006	27/06/2006	27/06/2006	27/06/2006
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
CPAH (ESDAT)	mg/kg		67			<4.5	1.5						12.7	<4.5						<4.5	<4.5	<4.5	
1. CAHs																							
Tetrachloroethene	mg/kg	0.5																					
Trichloroethene	mg/kg	0.5																					
cis-1,2-dichloroethene	mg/kg	0.5																					
Vinyl chloride	mg/kg	5																					
BTEX																							
Benzene	mg/kg	0.2	81		<0.2			<0.2	<0.2	<0.2		<0.2	<0.2	<0.2		<0.2	<0.2			<0.2	<0.2	<0.2	<0.2
Ethylbenzene	mg/kg	0.2			<0.2			<0.2	<0.2	<0.2		<0.2	<0.2	<0.5		<0.5	<0.5			<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	0.2			<0.2			<0.2	<0.2	<0.2		<0.2	<0.2	<0.5		<0.5	<0.5			<0.2	<0.2	<0.2	<0.2
Xylene (m & p)	mg/kg	0.2			<0.2			<0.2	<0.2	<0.2		<0.2	<0.2	<0.5		<0.5	<0.5			<0.2	<0.2	<0.2	<0.2
Xylene (o)	mg/kg	0.2			<0.2			<0.2	<0.2	<0.2		<0.2	<0.2	<0.5		<0.5	<0.5			<0.2	<0.2	<0.2	<0.2
Xylene Total	mg/kg																						
Halogenated Phenols																							
2,3,4,6-tetrachlorophenol	mg/kg	0.5																					
2,4,5-trichlorophenol	mg/kg	0.5											<0.5										
2,4,6-trichlorophenol	mg/kg	0.5											<0.5										
2,4-dichlorophenol	mg/kg	0.5											<0.5										
2,6-dichlorophenol	mg/kg	0.5											<0.5										
2-chlorophenol	mg/kg	0.5											<0.5										
Pentachlorophenol	mg/kg	1											<2										
Inorganics																							
Cyanide (Free)	mg/kg	1																					
Cyanide Total	mg/kg	1																		2.2	<1	<1	
WAD Cyanide	mg/kg	1																					
MAH																							
1,2,4-trimethylbenzene	mg/kg	0.5	110																				
1,3,5-trimethylbenzene	mg/kg	0.5																					
Isopropylbenzene	mg/kg	0.5																					
n-butylbenzene	mg/kg	0.5																					
n-propylbenzene	mg/kg	0.5																					
p-isopropyltoluene	mg/kg	0.5																					
sec-butylbenzene	mg/kg	0.5																					
Styrene	mg/kg	0.5																					
tert-butylbenzene	mg/kg	0.5																					
Lead																							
Lead	mg/kg	2		1700	878			1320	68	93	162	14	132	465	19	2050	261	14	22	17	15	17	10
Metals																							
Arsenic	mg/kg	1		20	<5			<5	7	5	<5	<5	<5	6	<5	8	<5	<5	<5	<5	<5	<5	<5
Barium	mg/kg	5												150	20	50	30						
Beryllium	mg/kg	1												<1	<1	<1	<1						
Cadmium	mg/kg	0.1			<1		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	mg/kg	1	180000		12		10	16	10	8	28	81	14	11	14	31	6	22	10	12	11	10	
Chromium (hexavalent)	mg/kg	0.5	950																				
Cobalt	mg/kg	1												5	<2	<2	12						
Copper	mg/kg	2		170	15		23	20	47	52	9	50	141	<5	425	34	228	38	8	6	6	<5	
Iron	mg/kg	10																					
Manganese	mg/kg	5												148	16	20	13						
Mercury	mg/kg	0.01			<0.1		0.3	<0.1	0.1	0.2	<0.1	<0.1	0.1	<0.1	0.5	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	1			4		4	3	3	5	6	7	7	<2	5	<2	6	6	4	2	9	5	
Vanadium	mg/kg	5	22000										30	23	23	11							
Zinc	mg/kg	2		220	749		402	46	35	124	31	85	18	6	26	5	50	60	33	19	52	26	
Nitroaromatics																							
2-Picoline	mg/kg	0.5																					
4-aminobiphenyl	mg/kg	0.5																					
Pentachloronitrobenzene	mg/kg	0.5																					



Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Lend Lease
Barangaroo

Field_ID		BH102 3.0 3.45	BH103 1.5 1.95	BH103 3.0 3.45	BH103-1.5 1-95	BH103-3.0 3.5	BH104-0.3 0.5	BH104-3.0 3.45	BH108 1.5 1.95	BH108 3.0 3.45	BH11 1.4-1.5	BH11 1.6-1.8	BH11 2.6-2.7	BH11 3.2-3.3	BH110 0.3 0.5	BH110 1.5 1.95	BH110 3.0 3.2	BH111 1.5 1.95	BH111 3.0 3.45	BH112 1.5 1.95
Sample_Depth		3-3.45	1.5-1.95	3-3.45	1.5-1.95	3-3.5	0.3-0.5	3-3.45	1.5-1.95	3-3.45	1.4-1.5	1.6-1.8	2.6-2.7	3.2-3.3	0.3-0.5	1.5-1.95	3-3.2	1.5-1.95	3-3.45	1.5-1.95
Location_Code		BH102	BH103	BH103	BH103	BH103	BH104	BH104	BH108	BH108	AECOM BH11	AECOM BH11	AECOM BH11	AECOM BH11	BH110	BH110	BH110	BH111	BH111	BH112
Sampled_Date		16/06/2006	19/06/2006	19/06/2006	19/06/2006	19/06/2006	19/06/2006	19/06/2006	26/06/2006	27/06/2006	2/05/2010	2/05/2010	2/05/2010	2/05/2010	27/06/2006	27/06/2006	27/06/2006	27/06/2006	27/06/2006	27/06/2006
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
PAH/Phenols																							
PAH (ESDAT TOTAL)	mg/kg					1.1	3.4						27.3	1.6						1.3	<8	<8	
2,4-dimethylphenol	mg/kg	0.5												<0.5									
2-chloronaphthalene	mg/kg	0.5																					
2-methylnaphthalene	mg/kg	0.5																					
2-methylphenol	mg/kg	0.5												<0.5									
2-nitrophenol	mg/kg	0.5												<0.5									
3-&4-methylphenol	mg/kg	0.5	5400											<1									
3-methylcholanthrene	mg/kg	0.5																					
4-chloro-3-methylphenol	mg/kg	0.5												<0.5									
Acenaphthene	mg/kg	0.5		8		<0.5	<0.5					0.5	<0.5						<0.5	<0.5	<0.5		
Acenaphthylene	mg/kg	0.5		5		<0.5	<0.5					<0.5	<0.5						<0.5	<0.5	<0.5		
Acetophenone	mg/kg	0.5																					
Anthracene	mg/kg	0.5		5		<0.5	<0.5					1.6	<0.5						<0.5	<0.5	<0.5		
Benz(a)anthracene	mg/kg	0.5				<0.5	0.5					2.1	<0.5						<0.5	<0.5	<0.5		
Benzo(a) pyrene	mg/kg	0.5				<0.5	0.5					1.8	<0.5						<0.5	<0.5	<0.5		
Benzo(b)&(k)fluoranthene	mg/kg	1																					
Benzo(b)fluoranthene	mg/kg	0.5				<0.5	<0.5					2.6	<0.5						<0.5	<0.5	<0.5		
Benzo(g,h,i)perylene	mg/kg	0.5				<0.5	<0.5					1.2	<0.5						<0.5	<0.5	<0.5		
Benzo(k)fluoranthene	mg/kg	0.5				<0.5	<0.5					0.7	<0.5						<0.5	<0.5	<0.5		
Chrysene	mg/kg	0.5				<0.5	0.5					1.8	<0.5						<0.5	<0.5	<0.5		
Dibenz(a,h)anthracene	mg/kg	0.5				<0.5	<0.5					<0.5	<0.5						<0.5	<0.5	<0.5		
Fluoranthene	mg/kg	0.5		8		0.5	0.9					4.5	0.5						0.7	<0.5	<0.5		
Fluorene	mg/kg	0.5		5		<0.5	<0.5					0.7	<0.5						<0.5	<0.5	<0.5		
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5				<0.5	<0.5					0.9	<0.5						<0.5	<0.5	<0.5		
Naphthalene	mg/kg	0.5		21		<0.5	<0.5					0.6	1.1						<0.5	<0.5	<0.5		
PAHs (Sum of total)	mg/kg	0.5																					
Phenanthrene	mg/kg	0.5		4		<0.5	<0.5					4.1	<0.5						<0.5	<0.5	<0.5		
Phenol	mg/kg	0.5											<0.5										
Phenolics Total	mg/kg																						
Pyrene	mg/kg	0.5				0.6	1					4.2	<0.5						0.6	<0.5	<0.5		
TPH																							
TPH C15-C36	mg/kg				<200			<200	<200	340		<200	530	470		9160	1440			<200	<200	<200	<200
TPH C10 - C14	mg/kg	50	61,000	50	<50			<50	<50	<50		<50	<50	210		4390	630			<50	<50	<50	<50
TPH C15-C28	mg/kg	100			<100			<100	<100	170		<100	260	470		9160	1440			<100	<100	<100	<100
TPH C29-C36	mg/kg	100			<100			<100	<100	170		<100	270	<100		<100	<100			<100	<100	<100	<100
TPH C6 - C9	mg/kg	2		39	<2			<2	<2	<2		<2	<2	<10		22	<10			<2	<2	<2	<2
TPH+C10 - C36 (Sum)	mg/kg	50			<250			<250	<250	340		<250	530	680		13,500 - 13,554	2070			<250	<250	<250	<250

Notes:
mg/kg = milligrams per kilogram
LOR = Laboratory Limit of Reporting
Shading = results exceeds soil SSTC-B
Shading = results exceeds soil SSESC-B
Refer to Table T1 for adopted SSTCs and DAFs

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field_ID		BH112 3.0 3.45	BH112 7.0 7.5	BH117 1.5 1.55	BH117 10 10.5	BH117 15 15.5	BH118 1.5 1.65	BH118 3.0 3.45	BH12 12.2-12.4	BH12 3.0-3.2	BH12 7.0-7.2	BH13 1.0-1.2	BH13 2.4-2.6	BH13 3.0-3.2	BH13 7.2-7.4	BH134-3.0-3.45	BH134-9.2-9.4	BH134A-0.4-0.6	BH14 2.5-2.7	BH14 7.0-7.2
Sample_Depth		3-3.45	7-7.5	1.5-1.55	10-10.5	15-15.5	1.5-1.65	3-3.45	12.2-12.4	3-3.2	7-7.2	1-1.2	2.4-2.6	3-3.2	7.2-7.4	3-3.45	9.2-9.4	0.4-0.6	2.5-2.7	7-7.2
Location_Code		BH112	BH112	BH117	BH117	BH117	BH118	BH118	AECOM BH12	AECOM BH12	AECOM BH12	AECOM BH13	AECOM BH13	AECOM BH13	AECOM BH13	BH134	BH134	BH134	AECOM BH14	AECOM BH14
Sampled_Date		27/06/2006	27/06/2006	29/06/2006	29/06/2006	29/06/2006	30/06/2006	30/06/2006	2/10/2010	2/10/2010	2/10/2010	2/05/2010	2/05/2010	2/05/2010	2/05/2010	7/11/2006	7/11/2006	7/11/2006	2/10/2010	2/10/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
CPAH (ESDAT)	mg/kg		67		<4.5	<4.5		6.2	66.2	<4.5	<4.5		109		2.7			17.5	<4.5	<4.5	<4.5	<4.5	<3.5
1. CAHs																							
Tetrachloroethene	mg/kg	0.5																					
Trichloroethene	mg/kg	0.5																					
cis-1,2-dichloroethene	mg/kg	0.5																					
Vinyl chloride	mg/kg	5																					
BTEX																							
Benzene	mg/kg	0.2	81		<0.2	<0.2	<0.2	<0.2	19.4	<0.2	<0.2		<0.2		<0.2	<0.2	<0.2	<0.2			<0.2		<0.2
Ethylbenzene	mg/kg	0.2			<0.2	<0.2	<0.2	0.5	10.5	<0.2	<0.2		<0.5		<0.5	<0.5	<0.5	<0.5			<0.2		<0.5
Toluene	mg/kg	0.2			<0.2	<0.2	<0.2	1.2	65.9	<0.2	<0.2		<0.5		<0.5	<0.5	<0.5	<0.5			<0.2		<0.5
Xylene (m & p)	mg/kg	0.2			<0.2	<0.2	<0.2	2.6	54.1	<0.2	<0.2		<0.5		<0.5	<0.5	<0.5	<0.5			<0.2		<0.5
Xylene (o)	mg/kg	0.2			<0.2	<0.2	<0.2	1.4	29.1	<0.2	<0.2		<0.5		<0.5	<0.5	<0.5	<0.5			<0.2		<0.5
Xylene Total	mg/kg																						
Halogenated Phenols																							
2,3,4,6-tetrachlorophenol	mg/kg	0.5																					<0.5
2,4,5-trichlorophenol	mg/kg	0.5								<0.5			<0.5		<0.5			<0.5				<0.5	<0.5
2,4,6-trichlorophenol	mg/kg	0.5								<0.5			<0.5		<0.5			<0.5				<0.5	<0.5
2,4-dichlorophenol	mg/kg	0.5								<0.5			<0.5		<0.5			<0.5				<0.5	<0.5
2,6-dichlorophenol	mg/kg	0.5								<0.5			<0.5		<0.5			<0.5				<0.5	<0.5
2-chlorophenol	mg/kg	0.5								<0.5			<0.5		<0.5			<0.5				<0.5	<0.5
Pentachlorophenol	mg/kg	1								<2			<2		<2			<2				<2	<1
Inorganics																							
Cyanide (Free)	mg/kg	1																					
Cyanide Total	mg/kg	1				1		<1	<1														
WAD Cyanide	mg/kg	1																					
MAH																							
1,2,4-trimethylbenzene	mg/kg	0.5	110																				
1,3,5-trimethylbenzene	mg/kg	0.5																					
Isopropylbenzene	mg/kg	0.5																					
n-butylbenzene	mg/kg	0.5																					
n-propylbenzene	mg/kg	0.5																					
p-isopropyltoluene	mg/kg	0.5																					
sec-butylbenzene	mg/kg	0.5																					
Styrene	mg/kg	0.5																					
tert-butylbenzene	mg/kg	0.5																					
Lead																							
Lead	mg/kg	2		1700	12	28	20	10	14	12	16	6	128	<5	74	792	714	370	8	11	7	14	19
Metals																							
Arsenic	mg/kg	1		20	<5	8	7	<5	<5	<5	<5	<5	<5	9	<5	6	<5	<5	<5	7	<5	15	<5
Barium	mg/kg	5										<10	40	<10	130	200	170	110			30	20	
Beryllium	mg/kg	1										<1	<1	<1	<1	<1	<1	<1			<1	<1	
Cadmium	mg/kg	0.1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	
Chromium	mg/kg	1	180000		19	24	17	14	13	10	9	21	13	5	12	14	7	7	6	22	3	11	3
Chromium (hexavalent)	mg/kg	0.5	950																				
Cobalt	mg/kg	1										<2	<2	<2	3	<2	<2	<2			<2	<2	
Copper	mg/kg	2		170	10	10	17	<5	<5	<5	9	<5	25	<5	36	79	14	7	<5	<5	212	10	<5
Iron	mg/kg	10																					
Manganese	mg/kg	5										<5	41	24	99	43	202	70			43	54	
Mercury	mg/kg	0.01			<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.8	<0.1	0.3	0.6	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	1			7	13	15	<2	<2	5	6	<2	2	<2	6	4	5	4	<2	3	5	2	<2
Vanadium	mg/kg	5	22000									48	19	14	20	21	9	11			26	5	
Zinc	mg/kg	2		220	42	87	42	6	8	22	48	<5	87	<5	86	272	863	150	7	6	57	27	15
Nitroaromatics																							
2-Picoline	mg/kg	0.5																					<0.5
4-aminobiphenyl	mg/kg	0.5																					<0.5
Pentachloronitrobenzene	mg/kg	0.5																					<0.5

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field_ID		BH112 3.0 3.45	BH112 7.0 7.5	BH117 1.5 1.55	BH117 10 10.5	BH117 15 15.5	BH118 1.5 1.65	BH118 3.0 3.45	BH12 12.2-12.4	BH12 3.0-3.2	BH12 7.0-7.2	BH13 1.0-1.2	BH13 2.4-2.6	BH13 3.0-3.2	BH13 7.2-7.4	BH134-3.0-3.45	BH134-9.2-9.4	BH134A-0.4-0.6	BH14 2.5-2.7	BH14 7.0-7.2
Sample_Depth		3-3.45	7-7.5	1.5-1.55	10-10.5	15-15.5	1.5-1.65	3-3.45	12.2-12.4	3-3.2	7-7.2	1-1.2	2.4-2.6	3-3.2	7.2-7.4	3-3.45	9.2-9.4	0.4-0.6	2.5-2.7	7-7.2
Location_Code		BH112	BH112	BH117	BH117	BH117	BH118	BH118	AECOM BH12	AECOM BH12	AECOM BH12	AECOM BH13	AECOM BH13	AECOM BH13	AECOM BH13	BH134	BH134	BH134	AECOM BH14	AECOM BH14
Sampled_Date		27/06/2006	27/06/2006	29/06/2006	29/06/2006	29/06/2006	30/06/2006	30/06/2006	2/10/2010	2/10/2010	2/10/2010	2/05/2010	2/05/2010	2/05/2010	2/05/2010	7/11/2006	7/11/2006	7/11/2006	2/10/2010	2/10/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
PAH/Phenols																							
PAH (ESDAT TOTAL)	mg/kg				2.7	<8		45	826.3	<8	<8		324.3		5.4			33.3	<8	<8	<8	1.2	<7
2,4-dimethylphenol	mg/kg	0.5								<0.5			<0.5		<0.5			<0.5				<0.5	<0.5
2-chloronaphthalene	mg/kg	0.5																					<0.5
2-methylnaphthalene	mg/kg	0.5																					<0.5
2-methylphenol	mg/kg	0.5								<0.5			<0.5		<0.5			<0.5				<0.5	<0.5
2-nitrophenol	mg/kg	0.5								<0.5			<0.5		<0.5			<0.5				<0.5	<0.5
3-&4-methylphenol	mg/kg	0.5	5400							<1			<1		<1			<1				<1	<0.5
3-methylcholanthrene	mg/kg	0.5																					<0.5
4-chloro-3-methylphenol	mg/kg	0.5								<0.5			<0.5		<0.5			<0.5				<0.5	<0.5
Acenaphthene	mg/kg	0.5		8	<0.5	<0.5		0.6	8.3	<0.5	<0.5		1.4		<0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.5		5	<0.5	<0.5		3.8	63.1	<0.5	<0.5		8.5		<0.5			0.9	<0.5	<0.5	<0.5	<0.5	<0.5
Acetophenone	mg/kg	0.5																					<0.5
Anthracene	mg/kg	0.5		5	<0.5	<0.5		1.9	25.6	<0.5	<0.5		17.9		<0.5			0.8	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	mg/kg	0.5			<0.5	<0.5		1.4	18.9	<0.5	<0.5		23.8		0.8			2.8	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a) pyrene	mg/kg	0.5			<0.5	<0.5		0.8	11.4	<0.5	<0.5		16		0.5			2.8	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b)&(k)fluoranthene	mg/kg	1																					<1
Benzo(b)fluoranthene	mg/kg	0.5			<0.5	<0.5		0.8	10	<0.5	<0.5		23.5		0.8			4.6	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g,h,i)perylene	mg/kg	0.5			<0.5	<0.5		<0.5	3.8	<0.5	<0.5		9.4		<0.5			1.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	mg/kg	0.5			<0.5	<0.5		<0.5	2.8	<0.5	<0.5		7.7		<0.5			2.1	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	mg/kg	0.5			<0.5	<0.5		1.3	15.4	<0.5	<0.5		18.9		0.6			1.8	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a,h)anthracene	mg/kg	0.5			<0.5	<0.5		<0.5	1.1	<0.5	<0.5		2.2		<0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg	0.5		8	1	<0.5		2.4	31.2	<0.5	<0.5		61.8		0.9			0.6	<0.5	<0.5	<0.5	0.6	<0.5
Fluorene	mg/kg	0.5		5	<0.5	<0.5		2.7	36.4	<0.5	<0.5		7.2		<0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5			<0.5	<0.5		<0.5	2.8	<0.5	<0.5		7.5		<0.5			1.1	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	mg/kg	0.5		21	<0.5	<0.5		19.3	462	<0.5	<0.5		2		<0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PAHs (Sum of total)	mg/kg	0.5																					
Phenanthrene	mg/kg	0.5		4	0.7	<0.5		6.3	86	<0.5	<0.5		55.1		0.8			0.6	<0.5	<0.5	<0.5	<0.5	<0.5
Phenol	mg/kg	0.5								<0.5			<0.5		<0.5			<0.5				<0.5	<0.5
Phenolics Total	mg/kg																						
Pyrene	mg/kg	0.5			1	<0.5		3.7	47.5	<0.5	<0.5		61.4		1			13.7	<0.5	<0.5	<0.5	0.6	<0.5
TPH																							
TPH C15-C36	mg/kg				<200	<200	<200	<200	2490	<200	<200		1510		340	<200	470	1430			<200		<200
TPH C10 - C14	mg/kg	50	61,000	50	<50	<50	<50	170	3090	<50	50		<50		<50	<50	<50	<50			<50		<50
TPH C15-C28	mg/kg	100			<100	<100	<100	<100	2180	<100	<100		1000		340	<100	290	660			<100		<100
TPH C29-C36	mg/kg	100			<100	<100	<100	<100	310	<100	<100		510		<100	<100	180	770			<100		<100
TPH C6 - C9	mg/kg	2		39	<2	<2	<2	10	244	<2	<2		<10		<10	<10	<10	<10			<2		<10
TPH+C10 - C36 (Sum)	mg/kg	50			<250	<250	<250	170	5580	<250	50		1510		340	<50	470	1430			<250		<50

Notes:
mg/kg = milligrams per kilogram
LOR = Laboratory Limit of Reporting
Shading = results exceeds soil SSTC-B
Shading = results exceeds soil SSESC-B
Refer to Table T1 for adopted SSTCs and DAFs

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field ID		BH15 2.0-2.2	BH15 5.0-5.2	BH16 1.0-1.2	BH16 4.2-4.4	BH17 10.0-10.2	BH17 4.0-4.2	BH18 14.0-14.2	BH18 2.5-2.7	BH18 7.0-7.2	BH19 1.0-1.2	BH19 11.5-11.7	BH19 6.9-7.0	BH192/3.0	BH192/7.4	BH193/2.5	BH194/0.5	BH194/1.5	BH194/3.6	BH195/5.45
Sample Depth		2-2.2	5-5.2	1-1.2	4.2-4.4	10-10.2	4-4.2	14-14.2	2.5-2.7	7-7.2	1-1.2	11.5-11.7	6.9-7	3	7.4	2.5	0.5	1.5	3.6	5.45
Location Code		AECOM BH15	AECOM BH15	AECOM BH16	AECOM BH16	AECOM BH17	AECOM BH17	AECOM BH18	AECOM BH18	AECOM BH18	AECOM BH19	AECOM BH19	AECOM BH19	BH192	BH192	BH193	BH194	BH194	BH194	BH195
Sampled Date		2/09/2010	2/09/2010	2/09/2010	2/09/2010	2/10/2010	2/09/2010	2/10/2010	2/10/2010	2/10/2010	2/09/2010	2/09/2010	2/09/2010	19/03/2008	19/03/2008	20/03/2008	19/03/2008	20/03/2008	20/03/2008	25/03/2008
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
CPAH (ESDAT)	mg/kg		67		9.4			<4.5	<4.5	<4.5		<4.5		5.5		23	<4.5	5.2	<4.5	<4.5	14.5	<4.5	<4.5
1. CAHs																							
Tetrachloroethene	mg/kg	0.5																					
Trichloroethene	mg/kg	0.5																					
cis-1,2-dichloroethene	mg/kg	0.5																					
Vinyl chloride	mg/kg	5																					
BTEx																							
Benzene	mg/kg	0.2	81		<0.2	<0.2		<0.2	<0.2	<0.2		<0.2				<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	mg/kg	0.2			<0.5	<0.5		<0.5	<0.5	<0.5		<0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	0.2			<0.5	<0.5		<0.5	<0.5	<0.5		<0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (m & p)	mg/kg	0.2			<0.5	<0.5		<0.5	<0.5	<0.5		<0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (o)	mg/kg	0.2			<0.5	<0.5		<0.5	<0.5	<0.5		<0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene Total	mg/kg																						
Halogenated Phenols																							
2,3,4,6-tetrachlorophenol	mg/kg	0.5																					
2,4,5-trichlorophenol	mg/kg	0.5			<0.5				<0.5	<0.5		<0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4,6-trichlorophenol	mg/kg	0.5			<0.5				<0.5	<0.5		<0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-dichlorophenol	mg/kg	0.5			<0.5				<0.5	<0.5		<0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,6-dichlorophenol	mg/kg	0.5			<0.5				<0.5	<0.5		<0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-chlorophenol	mg/kg	0.5			<0.5				<0.5	<0.5		<0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol	mg/kg	1			<2				<2	<2		<2					<2	<2	<2	<2	<2	<2	<2
Inorganics																							
Cyanide (Free)	mg/kg	1																					
Cyanide Total	mg/kg	1															<1	<1	<1	<1	<1	<1	<1
WAD Cyanide	mg/kg	1																					
MAH																							
1,2,4-trimethylbenzene	mg/kg	0.5	110																				
1,3,5-trimethylbenzene	mg/kg	0.5																					
Isopropylbenzene	mg/kg	0.5																					
n-butylbenzene	mg/kg	0.5																					
n-propylbenzene	mg/kg	0.5																					
p-isopropyltoluene	mg/kg	0.5																					
sec-butylbenzene	mg/kg	0.5																					
Styrene	mg/kg	0.5																					
tert-butylbenzene	mg/kg	0.5																					
Lead																							
Lead	mg/kg	2		1700	1630	<5	95	22	<5	25	20	117	<5	35	<5	180	184	30	36	18	142	<5	55
Metals																							
Arsenic	mg/kg	1		20	20	16	5	<5	6	20	<5	<5	7	<5	<5	12	<5	<5	<5	<5	<5	<5	11
Barium	mg/kg	5			390	<10	40	20	<10	<10	20	80	<10	20	10	70							
Beryllium	mg/kg	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1							
Cadmium	mg/kg	0.1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2
Chromium	mg/kg	1	180000		11	10	11	8	11	21	43	9	12	5	7	10	8	10	8	5	14	3	65
Chromium (hexavalent)	mg/kg	0.5	950																				
Cobalt	mg/kg	1			19	<2	4	5	<2	<2	4	9	<2	<2	<2	<2							
Copper	mg/kg	2		170	233	<5	69	34	<5	9	7	32	<5	14	<5	38	14	11	17	12	59	<5	42
Iron	mg/kg	10																					
Manganese	mg/kg	5			278	29	133	214	<5	11	728	80	6	47	<5	109							
Mercury	mg/kg	0.01			2	<0.1	0.4	<0.1	<0.1	<0.1	<0.1	1	<0.1	<0.1	<0.1	0.1	0.1	0.1	0.3	<0.1	0.4	<0.1	0.4
Nickel	mg/kg	1			40	3	5	4	<2	<2	4	15	<2	<2	<2	4	2	6	<2	6	21	<2	21
Vanadium	mg/kg	5	22000		19	19	34	14	25	62	125	19	29	9	17	12							
Zinc	mg/kg	2		220	224	6	82	78	<5	23	12	53	<5	57	<5	99	127	77	12	16	161	<5	450
Nitroaromatics																							
2-Picoline	mg/kg	0.5																					
4-aminobiphenyl	mg/kg	0.5																					
Pentachloronitrobenzene	mg/kg	0.5																					

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field ID		BH15 2.0-2.2	BH15 5.0-5.2	BH16 1.0-1.2	BH16 4.2-4.4	BH17 10.0-10.2	BH17 4.0-4.2	BH18 14.0-14.2	BH18 2.5-2.7	BH18 7.0-7.2	BH19 1.0-1.2	BH19 11.5-11.7	BH19 6.9-7.0	BH192/3.0	BH192/7.4	BH193/2.5	BH194/0.5	BH194/1.5	BH194/3.6	BH195/5.45
Sample Depth		2-2.2	5-5.2	1-1.2	4.2-4.4	10-10.2	4-4.2	14-14.2	2.5-2.7	7-7.2	1-1.2	11.5-11.7	6.9-7	3	7.4	2.5	0.5	1.5	3.6	5.45
Location Code		AECOM BH15	AECOM BH15	AECOM BH16	AECOM BH16	AECOM BH17	AECOM BH17	AECOM BH18	AECOM BH18	AECOM BH18	AECOM BH19	AECOM BH19	AECOM BH19	BH192	BH192	BH193	BH194	BH194	BH194	BH195
Sampled Date		2/09/2010	2/09/2010	2/09/2010	2/09/2010	2/10/2010	2/09/2010	2/10/2010	2/10/2010	2/10/2010	2/09/2010	2/09/2010	2/09/2010	19/03/2008	19/03/2008	20/03/2008	19/03/2008	20/03/2008	20/03/2008	25/03/2008
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
PAH/Phenols																							
PAH (ESDAT TOTAL)	mg/kg				14			<8	<8	1.5		<8		8.1		47.6	0.6	11.1	1.6	<8	28.1	<8	<8
2,4-dimethylphenol	mg/kg	0.5			<0.5				<0.5	<0.5		<0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-chloronaphthalene	mg/kg	0.5																					
2-methylnaphthalene	mg/kg	0.5					<0.5							<0.5		<0.5							
2-methylphenol	mg/kg	0.5			<0.5				<0.5	<0.5		<0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-nitrophenol	mg/kg	0.5			<0.5				<0.5	<0.5		<0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
3-&4-methylphenol	mg/kg	0.5	5400		<1				<1	<1		<1					<1	<1	<1	<1	<1	<1	<1
3-methylcholanthrene	mg/kg	0.5															<1	<1	<1	<1	<1	<1	<1
4-chloro-3-methylphenol	mg/kg	0.5			<0.5				<0.5	<0.5		<0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	mg/kg	0.5		8	<0.5			<0.5	<0.5	<0.5		<0.5		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.5		5	<0.5			<0.5	<0.5	<0.5		<0.5		<0.5		1.1	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5
Acetophenone	mg/kg	0.5																					
Anthracene	mg/kg	0.5		5	<0.5			<0.5	<0.5	<0.5		<0.5		<0.5		2.4	<0.5	0.5	<0.5	<0.5	<0.5	0.8	<0.5
Benz(a)anthracene	mg/kg	0.5			1			<0.5	<0.5	<0.5		<0.5		0.7		3.6	<0.5	1.1	<0.5	<0.5	<0.5	2.3	<0.5
Benzo(a) pyrene	mg/kg	0.5			1.3			<0.5	<0.5	<0.5		<0.5		1.2		4.2	<0.5	1.1	<0.5	<0.5	<0.5	2.6	<0.5
Benzo(b)&(k)fluoranthene	mg/kg	1																					
Benzo(b)fluoranthene	mg/kg	0.5			1.6			<0.5	<0.5	<0.5		<0.5		0.8		3.5	<0.5	1.1	<0.5	<0.5	<0.5	2.5	<0.5
Benzo(g,h,i)perylene	mg/kg	0.5			2.2			<0.5	<0.5	<0.5		<0.5		1.3		2.2	<0.5	0.5	<0.5	<0.5	<0.5	1.5	<0.5
Benzo(k)fluoranthene	mg/kg	0.5			0.7			<0.5	<0.5	<0.5		<0.5		<0.5		1.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.4	<0.5
Chrysene	mg/kg	0.5			0.9			<0.5	<0.5	<0.5		<0.5		0.6		3	<0.5	0.9	<0.5	<0.5	<0.5	2.1	<0.5
Dibenz(a,h)anthracene	mg/kg	0.5			<0.5			<0.5	<0.5	<0.5		<0.5		<0.5		0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg	0.5		8	1.6			<0.5	<0.5	0.7		<0.5		1.2		7.9	<0.5	2.2	0.8	<0.5	<0.5	5.4	<0.5
Fluorene	mg/kg	0.5		5	<0.5			<0.5	<0.5	<0.5		<0.5		<0.5		0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5			1.7			<0.5	<0.5	<0.5		<0.5		0.9		2	<0.5	<0.5	<0.5	<0.5	<0.5	1.3	<0.5
Naphthalene	mg/kg	0.5		21	<0.5			<0.5	<0.5	<0.5		<0.5		<0.5		1.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PAHs (Sum of total)	mg/kg	0.5						<0.5						8.1		47.6							
Phenanthrene	mg/kg	0.5		4	1.5			<0.5	<0.5	<0.5		<0.5		<0.5		5.4	<0.5	1.4	<0.5	<0.5	<0.5	2.4	<0.5
Phenol	mg/kg	0.5			<0.5				<0.5	<0.5		<0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenolics Total	mg/kg																						
Pyrene	mg/kg	0.5			1.5			<0.5	<0.5	0.8		<0.5		1.4		8.1	0.6	2.3	0.8	<0.5	5.2	<0.5	<0.5
TPH																							
TPH C15-C36	mg/kg				440	<200		<200	<200	<200		100				180	<200	<200	<200	<200	<200	<200	<200
TPH C10 - C14	mg/kg	50	61,000	50	50	<50		<50	<50	<50		<50				<50	<50	<50	<50	<50	<50	<50	<50
TPH C15-C28	mg/kg	100			440	<100		<100	<100	<100		100				180	<100	<100	<100	<100	<100	<100	<100
TPH C29-C36	mg/kg	100			<100	<100		<100	<100	<100		<100				<100	<100	<100	<100	<100	<100	<100	<100
TPH C6 - C9	mg/kg	2		39	<10	<10		<10	<10	<10		<10				<10	<10	<10	<10	<10	<10	<10	<10
TPH+C10 - C36 (Sum)	mg/kg	50			490	<50		<50	<50	<50		100				180	<250	<250	<250	<250	<250	<250	<250

Notes:
mg/kg = milligrams per kilogram
LOR = Laboratory Limit of Reporting
Shading = results exceeds soil SSTC-B
Shading = results exceeds soil SSESC-B
Refer to Table T1 for adopted SSTCs and DAFs

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field ID		BH196/1.0	BH196/6.4	BH20 1.0-1.2	BH20 4.0-4.2	BH21 1.0-1.2	BH21 4.0-4.2	BH22 4.0-4.2	BH22 8.0-8.2	BH23 1.6-1.8	BH23 4.7-4.9	BH23 7.8-8.0	BH24 0.75-0.85	BH24 5.0-5.2	BH25 1.0-1.2	BH25 5.2-5.4	BH25 7.2-7.4	BH26 4.0-4.2	BH27 0.2-0.3	BH27 7.0-7.2
Sample Depth		1	6.4	1-1.2	4-4.2	1-1.2	4-4.2	4-4.2	8-8.2	1.6-1.8	4.7-4.9	7.8-8	0.75-0.85	5-5.2	1-1.2	5.2-5.4	7.2-7.4	4-4.2	0.2-0.3	7-7.2
Location Code		BH196	BH196	AECOM BH20	AECOM BH20	AECOM BH21	AECOM BH21	AECOM BH22	AECOM BH22	AECOM BH23	AECOM BH23	AECOM BH23	AECOM BH24	AECOM BH24	AECOM BH25	AECOM BH25	AECOM BH25	AECOM BH26	AECOM BH27	AECOM BH27
Sampled Date		19/03/2008	19/03/2008	2/11/2010	2/11/2010	2/11/2010	2/11/2010	2/10/2010	2/10/2010	2/05/2010	2/05/2010	2/05/2010	2/12/2010	2/12/2010	19/02/2010	19/02/2010	19/02/2010	2/11/2010	15/02/2010	15/02/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
CPAH (ESDAT)	mg/kg		67		8.2	1.8	111.8	<4.5		6	<4.5	<3.5		116.1		<4.5		12.4	12.4	9.3	10.2		<3.5
1. CAHs																							
Tetrachloroethene	mg/kg	0.5																		<0.5			
Trichloroethene	mg/kg	0.5																		<0.5			
cis-1,2-dichloroethene	mg/kg	0.5																		<0.5			
Vinyl chloride	mg/kg	5																		<5			
BTEx																							
Benzene	mg/kg	0.2	81		<0.2	<0.2		<0.2		<0.2	<0.2	<0.2		<0.2	<0.2					<0.2	<0.2		<0.2
Ethylbenzene	mg/kg	0.2			<0.5	<0.5		<0.5		<0.5	<0.5	<0.5		<0.5	<0.5					<0.5	<0.5		<0.5
Toluene	mg/kg	0.2			<0.5	<0.5		<0.5		<0.5	<0.5	<0.5		<0.5	<0.5					<0.5	<0.5		<0.5
Xylene (m & p)	mg/kg	0.2			<0.5	<0.5		<0.5		<0.5	<0.5	<0.5		<0.5	<0.5					<0.5	<0.5		<0.5
Xylene (o)	mg/kg	0.2			<0.5	<0.5		<0.5		<0.5	<0.5	<0.5		<0.5	<0.5					<0.5	<0.5		<0.5
Xylene Total	mg/kg																						
Halogenated Phenols																							
2,3,4,6-tetrachlorophenol	mg/kg	0.5										<0.5											<0.5
2,4,5-trichlorophenol	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5		<2				<0.5			<0.5		<0.5
2,4,6-trichlorophenol	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5		<2				<0.5			<0.5		<0.5
2,4-dichlorophenol	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5		<2				<0.5			<0.5		<0.5
2,6-dichlorophenol	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5		<2				<0.5			<0.5		<0.5
2-chlorophenol	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5		<2				<0.5			<0.5		<0.5
Pentachlorophenol	mg/kg	1			<2	<2	<2	<2		<2	<2	<1		<4				<2			<2		<1
Inorganics																							
Cyanide (Free)	mg/kg	1																		<1			
Cyanide Total	mg/kg	1			<1	<1														<1			
WAD Cyanide	mg/kg	1																					
MAH																							
1,2,4-trimethylbenzene	mg/kg	0.5	110																	<0.5			
1,3,5-trimethylbenzene	mg/kg	0.5																		<0.5			
Isopropylbenzene	mg/kg	0.5																		<0.5			
n-butylbenzene	mg/kg	0.5																		<0.5			
n-propylbenzene	mg/kg	0.5																		<0.5			
p-isopropyltoluene	mg/kg	0.5																		<0.5			
sec-butylbenzene	mg/kg	0.5																		<0.5			
Styrene	mg/kg	0.5																		<0.5			
tert-butylbenzene	mg/kg	0.5																		<0.5			
Lead																							
Lead	mg/kg	2		1700	514	198	489	10	50	77	61	26	414	39	56	27	38	27	221	52	559	6	45
Metals																							
Arsenic	mg/kg	1		20	16	<5	<5	<5	<5	<5	<5	6	<5	<5	<5	<5	<5	<5	18	<5	<5	<5	<5
Barium	mg/kg	5					120	<10	30	10	20	<10	80	40	50	30	20			240	10	10	
Beryllium	mg/kg	1					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1			<1	<1	<1	
Cadmium	mg/kg	0.1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Chromium	mg/kg	1	180000		16	6	6	4	12	6	6	7	8	8	8	5	9	7	8	10	5	2	9
Chromium (hexavalent)	mg/kg	0.5	950																				
Cobalt	mg/kg	1					4	<2	<2	<2	<2	<2	2	8	2	8	<2			<2	11	<2	
Copper	mg/kg	2		170	209	24	40	<5	27	8	30	6	14	35	18	90	<5	20	19	8	7	219	8
Iron	mg/kg	10																					
Manganese	mg/kg	5					119	<5	82	10	8	10	67	246	116	304	48			88	608	53	
Mercury	mg/kg	0.01			5.9	0.6	<0.1	<0.1	0.2	<0.1	0.2	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Nickel	mg/kg	1			17	2	6	<2	5	<2	<2	<2	3	20	6	12	3	4	3	<2	<2	8	2
Vanadium	mg/kg	5	22000				20	5	28	17	14	11	18	24	15	52	20			11	88	16	
Zinc	mg/kg	2		220	710	199	158	<5	51	14	20	16	137	40	42	43	16	25	38	74	398	41	30
Nitroaromatics																							
2-Picoline	mg/kg	0.5										<0.5											<0.5
4-aminobiphenyl	mg/kg	0.5										<0.5											<0.5
Pentachloronitrobenzene	mg/kg	0.5										<0.5											<0.5

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field ID		BH196/1.0	BH196/6.4	BH20 1.0-1.2	BH20 4.0-4.2	BH21 1.0-1.2	BH21 4.0-4.2	BH22 4.0-4.2	BH22 8.0-8.2	BH23 1.6-1.8	BH23 4.7-4.9	BH23 7.8-8.0	BH24 0.75-0.85	BH24 5.0-5.2	BH25 1.0-1.2	BH25 5.2-5.4	BH25 7.2-7.4	BH26 4.0-4.2	BH27 0.2-0.3	BH27 7.0-7.2
Sample Depth		1	6.4	1-1.2	4-4.2	1-1.2	4-4.2	4-4.2	8-8.2	1.6-1.8	4.7-4.9	7.8-8	0.75-0.85	5-5.2	1-1.2	5.2-5.4	7.2-7.4	4-4.2	0.2-0.3	7-7.2
Location Code		BH196	BH196	AECOM BH20	AECOM BH20	AECOM BH21	AECOM BH21	AECOM BH22	AECOM BH22	AECOM BH23	AECOM BH23	AECOM BH23	AECOM BH24	AECOM BH24	AECOM BH25	AECOM BH25	AECOM BH25	AECOM BH26	AECOM BH27	AECOM BH27
Sampled Date		19/03/2008	19/03/2008	2/11/2010	2/11/2010	2/11/2010	2/11/2010	2/10/2010	2/10/2010	2/05/2010	2/05/2010	2/05/2010	2/12/2010	2/12/2010	19/02/2010	19/02/2010	19/02/2010	2/11/2010	15/02/2010	15/02/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
PAH/Phenols																							
PAH (ESDAT TOTAL)	mg/kg				23.1	5	300.7	<8		16.3	<8	<7		277.2		0.5		21.4	16.5	17.4	24.4		1.1
2,4-dimethylphenol	mg/kg	0.5			<0.5	<0.5	0.9	<0.5		<0.5	<0.5	<0.5		<2				<0.5			<0.5		<0.5
2-chloronaphthalene	mg/kg	0.5										<0.5											<0.5
2-methylnaphthalene	mg/kg	0.5						<0.5		<0.5		<0.5											<0.5
2-methylphenol	mg/kg	0.5			<0.5	<0.5	0.9	<0.5		<0.5	<0.5	<0.5		<2				<0.5			<0.5		<0.5
2-nitrophenol	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5		<2				<0.5			<0.5		<0.5
3-&4-methylphenol	mg/kg	0.5	5400		<1	<1	2	<1		<1	<1	<0.5		<4				<1			<1		<0.5
3-methylcholanthrene	mg/kg	0.5										<0.5											<0.5
4-chloro-3-methylphenol	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5		<2				<0.5			<0.5		<0.5
Acenaphthene	mg/kg	0.5		8	2.4	<0.5	4.4	<0.5		<0.5	<0.5	<0.5		<2		<0.5		<0.5	<0.5	<0.5	<0.5		<0.5
Acenaphthylene	mg/kg	0.5		5	<0.5	<0.5	7.5	<0.5		0.6	<0.5	<0.5		4.1		<0.5		<0.5	<0.5	<0.5	<0.5		<0.5
Acetophenone	mg/kg	0.5										<0.5											<0.5
Anthracene	mg/kg	0.5		5	1.4	<0.5	15.1	<0.5		<0.5	<0.5	<0.5		5.5		<0.5		0.7	<0.5	<0.5	1.2		<0.5
Benz(a)anthracene	mg/kg	0.5			1.6	0.6	21	<0.5		<0.5	<0.5	<0.5		31.7		<0.5		2.3	0.9	1.7	1.9		<0.5
Benzo(a) pyrene	mg/kg	0.5			1.2	0.6	18.1	<0.5		1.6	<0.5	<0.5		17.2		<0.5		1.9	2.6	1.6	1.4		<0.5
Benzo(b)&(k)fluoranthene	mg/kg	1										<1											<1
Benzo(b)fluoranthene	mg/kg	0.5			1.5	0.6	21.8	<0.5		2	<0.5			26.7		<0.5		2.8	4.1	2.3	1.8		
Benzo(g,h,i)perylene	mg/kg	0.5			0.6	<0.5	10.6	<0.5		0.8	<0.5	<0.5		8.7		<0.5		1	1.4	0.9	0.8		<0.5
Benzo(k)fluoranthene	mg/kg	0.5			<0.5	<0.5	10.3	<0.5		1	<0.5			7.3		<0.5		0.9	1.4	0.7	0.9		
Chrysene	mg/kg	0.5			1.3	<0.5	19	<0.5		<0.5	<0.5	<0.5		17.7		<0.5		2	0.8	1.4	1.5		<0.5
Dibenz(a,h)anthracene	mg/kg	0.5			<0.5	<0.5	2.4	<0.5		<0.5	<0.5	<0.5		<2		<0.5		<0.5	<0.5	<0.5	<0.5		<0.5
Fluoranthene	mg/kg	0.5		8	4.6	1.1	49.3	<0.5		0.7	<0.5	<0.5		44.7		<0.5		3.4	1	3.1	4.8		0.5
Fluorene	mg/kg	0.5		5	<0.5	<0.5	7.1	<0.5		<0.5	<0.5	<0.5		<2		<0.5		<0.5	<0.5	<0.5	0.7		<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5			0.6	<0.5	8.6	<0.5		0.6	<0.5	<0.5		6.8		<0.5		0.8	1.2	0.7	0.7		<0.5
Naphthalene	mg/kg	0.5		21	<0.5	<0.5	4.7	<0.5		<0.5	<0.5	<0.5		<2		<0.5		<0.5	<0.5	<0.5	<0.5		<0.5
PAHs (Sum of total)	mg/kg	0.5						<0.5		16.3													
Phenanthrene	mg/kg	0.5		4	3.7	1	46	<0.5		<0.5	<0.5	<0.5		4.8		<0.5		1.7	<0.5	1.8	4.2		<0.5
Phenol	mg/kg	0.5			<0.5	<0.5	1	<0.5		<0.5	<0.5	<0.5		<2				<0.5			<0.5		<0.5
Phenolics Total	mg/kg																						
Pyrene	mg/kg	0.5			4.2	1.1	54.8	<0.5		9	<0.5	<0.5		102		0.5		3.9	3.1	3.2	4.5		0.6
TPH																							
TPH C15-C36	mg/kg				190	<200		<200		330	<200	<200		7160	450						250		<200
TPH C10 - C14	mg/kg	50	61,000	50	<50	<50		<50		<50	<50	<50		180	<50						<50		<50
TPH C15-C28	mg/kg	100			190	<100		<100		170	<100	<100		4990	240						140		<100
TPH C29-C36	mg/kg	100			<100	<100		<100		160	<100	<100		2170	210						110		<100
TPH C6 - C9	mg/kg	2		39	<10	<10		<10		<10	<10	<10		<10	<10						<10		<10
TPH+C10 - C36 (Sum)	mg/kg	50			190	<250		<50		330	<50	<50		7340	440 - 450						250		<50

Notes:
mg/kg = milligrams per kilogram
LOR = Laboratory Limit of Reporting
Shading = results exceeds soil SSTC-B
Shading = results exceeds soil SSESC-B
Refer to Table T1 for adopted SSTCs and DAFs

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field ID		BH28 0.5-0.6	BH29 2.5-2.6	BH29 7.0-7.2	BH30 1.0-1.2	BH30 7.0-7.1	BH300 0.14-0.2	BH300 1.0-1.2	BH300 2.0-2.2	BH300 3.0-3.2	BH300 4.0-4.2	BH300 5.0-5.2	BH300 5.4-5.8	BH300 6.2-6.8	BH301 1.3-1.5	BH302 0.1-0.2	BH302 1.2-1.4	BH302 2.0-2.2	BH302 3.0-3.2	BH302 4.0-4.2
Sample Depth		0.5-0.6	2.5-2.6	7-7.2	1-1.2	7-7.1	0.14-0.2	1-1.2	2-2.2	3-3.2	4-4.2	5-5.2	5.4-5.8	6.2-6.8	1.3-1.5	0.1-0.2	1.2-1.4	2-2.2	3-3.2	4-4.2
Location Code		AECOM BH28	AECOM BH29	AECOM BH29	AECOM BH30	AECOM BH30	BH300	BH300	BH300	BH300	BH300	BH300	BH300	BH300	BH301	BH302	BH302	BH302	BH302	BH302
Sampled Date		15/02/2010	16/02/2010	16/02/2010	15/02/2010	16/02/2010	8/11/2010	8/11/2010	8/11/2010	8/11/2010	8/11/2010	8/11/2010	8/11/2010	8/11/2010	10/01/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
CPAH (ESDAT)	mg/kg		67		6.5		<4.5	39.4	<4.5	<4.5	26.3	11.8	<4.5	<4.5	<4.5	2.4	<4.5	<4.5	<4.5	15.9	30.4	<4.5	<4.5
1. CAHs																							
Tetrachloroethene	mg/kg	0.5																					
Trichloroethene	mg/kg	0.5																					
cis-1,2-dichloroethene	mg/kg	0.5																					
Vinyl chloride	mg/kg	5																					
BTEX																							
Benzene	mg/kg	0.2	81				<0.2		<0.2	3.1	0.9	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	mg/kg	0.2					<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	0.2					<0.5		<0.5	2.1	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (m & p)	mg/kg	0.2					<0.5		<0.5	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (o)	mg/kg	0.2					<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene Total	mg/kg																						
Halogenated Phenols																							
2,3,4,6-tetrachlorophenol	mg/kg	0.5					<0.5																
2,4,5-trichlorophenol	mg/kg	0.5					<0.5																
2,4,6-trichlorophenol	mg/kg	0.5					<0.5																
2,4-dichlorophenol	mg/kg	0.5					<0.5																
2,6-dichlorophenol	mg/kg	0.5					<0.5																
2-chlorophenol	mg/kg	0.5					<0.5																
Pentachlorophenol	mg/kg	1					<1																
Inorganics																							
Cyanide (Free)	mg/kg	1																					
Cyanide Total	mg/kg	1																					
WAD Cyanide	mg/kg	1							<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
MAH																							
1,2,4-trimethylbenzene	mg/kg	0.5	110																				
1,3,5-trimethylbenzene	mg/kg	0.5																					
Isopropylbenzene	mg/kg	0.5																					
n-butylbenzene	mg/kg	0.5																					
n-propylbenzene	mg/kg	0.5																					
p-isopropyltoluene	mg/kg	0.5																					
sec-butylbenzene	mg/kg	0.5																					
Styrene	mg/kg	0.5																					
tert-butylbenzene	mg/kg	0.5																					
Lead																							
Lead	mg/kg	2		1700	80	69	32	102	50	<5	459	723	10	7	6	6	6	<5	7	88	244	8	9
Metals																							
Arsenic	mg/kg	1		20	<5	<5	<5	<5	50	<5	6	8	<5	<5	16	8	<5	<5	<5	<5	<5	<5	<5
Barium	mg/kg	5			40	20	20	40	50														
Beryllium	mg/kg	1			<1	<1	<1	<1	<1														
Cadmium	mg/kg	0.1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	mg/kg	1	180000		8	18	7	8	20	<2	14	16	8	12	13	7	<2	2	3	8	10	12	8
Chromium (hexavalent)	mg/kg	0.5	950																				
Cobalt	mg/kg	1			8	<2	<2	2	14														
Copper	mg/kg	2		170	33	9	8	24	420	7	40	48	8	<5	<5	<5	<5	<5	266	34	206	<5	<5
Iron	mg/kg	10																					
Manganese	mg/kg	5			214	58	26	168	146														
Mercury	mg/kg	0.01			0.1	<0.1	<0.1	<0.1	0.2	<0.1	0.3	0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.2	<0.1	<0.1
Nickel	mg/kg	1			17	2	4	5	34	<2	12	12	<2	2	4	<2	<2	<2	9	10	5	<2	<2
Vanadium	mg/kg	5	22000		23	36	12	19	18														
Zinc	mg/kg	2		220	97	58	29	63	342	8	192	276	14	10	8	7	<5	<5	62	57	201	19	21
Nitroaromatics																							
2-Picoline	mg/kg	0.5					<0.5																
4-aminobiphenyl	mg/kg	0.5					<0.5																
Pentachloronitrobenzene	mg/kg	0.5					<0.5																



Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Lend Lease
Barangaroo

Field ID		BH28 0.5-0.6	BH29 2.5-2.6	BH29 7.0-7.2	BH30 1.0-1.2	BH30 7.0-7.1	BH300 0.14-0.2	BH300 1.0-1.2	BH300 2.0-2.2	BH300 3.0-3.2	BH300 4.0-4.2	BH300 5.0-5.2	BH300 5.4-5.8	BH300 6.2-6.8	BH301 1.3-1.5	BH302 0.1-0.2	BH302 1.2-1.4	BH302 2.0-2.2	BH302 3.0-3.2	BH302 4.0-4.2
Sample Depth		0.5-0.6	2.5-2.6	7-7.2	1-1.2	7-7.1	0.14-0.2	1-1.2	2-2.2	3-3.2	4-4.2	5-5.2	5.4-5.8	6.2-6.8	1.3-1.5	0.1-0.2	1.2-1.4	2-2.2	3-3.2	4-4.2
Location Code		AECOM BH28	AECOM BH29	AECOM BH29	AECOM BH30	AECOM BH30	BH300	BH300	BH300	BH300	BH300	BH300	BH300	BH300	BH301	BH302	BH302	BH302	BH302	BH302
Sampled Date		15/02/2010	16/02/2010	16/02/2010	15/02/2010	16/02/2010	8/11/2010	8/11/2010	8/11/2010	8/11/2010	8/11/2010	8/11/2010	8/11/2010	8/11/2010	10/01/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
PAH/Phenols																							
PAH (ESDAT TOTAL)	mg/kg				14.9		1.2	98.9	0.8	<8	45.3	22.5	<8	<8	<8	10.4	<8	<8	<8	31.6	51.3	<8	1.1
2,4-dimethylphenol	mg/kg	0.5						<0.5															
2-chloronaphthalene	mg/kg	0.5						<0.5															
2-methylnaphthalene	mg/kg	0.5						<0.5															
2-methylphenol	mg/kg	0.5						<0.5															
2-nitrophenol	mg/kg	0.5						<0.5															
3-&4-methylphenol	mg/kg	0.5	5400					<0.5															
3-methylcholanthrene	mg/kg	0.5						<0.5															
4-chloro-3-methylphenol	mg/kg	0.5						<0.5															
Acenaphthene	mg/kg	0.5		8	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.5		5	<0.5		<0.5	1.8	<0.5	<0.5	1.8	0.5	<0.5	<0.5	<0.5	1.1	<0.5	<0.5	<0.5	0.6	1	<0.5	<0.5
Acetophenone	mg/kg	0.5						<0.5															
Anthracene	mg/kg	0.5		5	0.8		<0.5	4.5	<0.5	<0.5	1.9	0.8	<0.5	<0.5	<0.5	0.9	<0.5	<0.5	<0.5	1.4	1.4	<0.5	<0.5
Benz(a)anthracene	mg/kg	0.5			1.5		<0.5	10.3	<0.5	<0.5	3.8	2.1	<0.5	<0.5	<0.5	0.9	<0.5	<0.5	<0.5	3.4	4.9	<0.5	<0.5
Benzo(a) pyrene	mg/kg	0.5			0.9		<0.5	8.7	<0.5	<0.5	4.8	2.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.7	6	<0.5	<0.5
Benzo(b)&(k)fluoranthene	mg/kg	1						11															
Benzo(b)fluoranthene	mg/kg	0.5			1.6		<0.5		<0.5	<0.5	5.4	2.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3	6	<0.5	<0.5
Benzo(g,h,i)perylene	mg/kg	0.5			0.5		<0.5	3.4	<0.5	<0.5	2.8	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1	2.8	<0.5	<0.5
Benzo(k)fluoranthene	mg/kg	0.5			<0.5		<0.5		<0.5	<0.5	2.1	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.1	2.4	<0.5	<0.5
Chrysene	mg/kg	0.5			1.2		<0.5	8.3	<0.5	<0.5	3.2	1.8	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	2.4	4	<0.5	<0.5
Dibenz(a,h)anthracene	mg/kg	0.5			<0.5		<0.5	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5
Fluoranthene	mg/kg	0.5		8	3		0.6	19.3	<0.5	<0.5	6.2	3.7	<0.5	<0.5	<0.5	1.2	<0.5	<0.5	<0.5	6.2	8.2	<0.5	0.6
Fluorene	mg/kg	0.5		5	<0.5		<0.5	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5			<0.5		<0.5	3.2	<0.5	<0.5	2.3	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.9	2.4	<0.5	<0.5
Naphthalene	mg/kg	0.5		21	<0.5		<0.5	<0.5	<0.5	<0.5	0.8	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PAHs (Sum of total)	mg/kg	0.5																					
Phenanthrene	mg/kg	0.5		4	2.8		<0.5	17.8	<0.5	<0.5	3.5	2.4	<0.5	<0.5	<0.5	3.2	<0.5	<0.5	<0.5	3	2.7	<0.5	<0.5
Phenol	mg/kg	0.5						<0.5															
Phenolics Total	mg/kg																						
Pyrene	mg/kg	0.5			2.6		0.6	19.9	0.8	<0.5	6.7	3.6	<0.5	<0.5	<0.5	1.8	<0.5	<0.5	<0.5	5.9	9	<0.5	0.5
TPH																							
TPH C15-C36	mg/kg							640		<200	630	130	<200	<200	<200	<200	<200	<200	<200	260	440	<200	<200
TPH C10 - C14	mg/kg	50	61,000	50				<50		<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
TPH C15-C28	mg/kg	100						360		<100	300	130	<100	<100	<100	<100	<100	<100	<100	150	210	<100	<100
TPH C29-C36	mg/kg	100						280		<100	330	<100	<100	<100	<100	<100	<100	<100	<100	110	230	<100	<100
TPH C6 - C9	mg/kg	2		39				<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
TPH+C10 - C36 (Sum)	mg/kg	50						640		<50	630	130	<50	<50	<50	<50	<50	<50	<50	260	440	<50	<50

Notes:
mg/kg = milligrams per kilogram
LOR = Laboratory Limit of Reporting
Shading = results exceeds soil SSTC-B
Shading = results exceeds soil SSESC-B
Refer to Table T1 for adopted SSTCs and DAFs

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field_ID		BH302_5.0-5.2	BH302_6.0-6.2	BH303_0.08-0.18	BH303_1.0-1.5	BH303_2.2-3.2	BH303_3.9-4.2	BH303_4.9-5.2	BH303_5.8-6.2	BH303_6.9-7.15	BH304_0.1-0.2	BH304_10-10.5	BH304_1-1.5	BH304_2-2.5	BH304_3-3.5	BH304_4-4.5	BH304_5-5.5	BH304_6-6.5	BH304_7-7.5	BH304_8-8.5
Sample_Depth		5-5.2	6-6.2	0.08-0.18	1-1.5	2.2-3.2	3.9-4.2	4.9-5.2	5.8-6.2	6.9-7.15	0.1-0.2	10-10.5	1-1.5	2-2.5	3-3.5	4-4.5	5-5.5	6-6.5	7-7.5	8-8.5
Location_Code		BH302	BH302	BH303	BH303	BH303	BH303	BH303	BH303	BH303	BH304	BH304	BH304	BH304	BH304	BH304	BH304	BH304	BH304	BH304
Sampled_Date		8/04/2010	8/04/2010	8/05/2010	8/11/2010	8/11/2010	8/11/2010	8/11/2010	8/11/2010	8/11/2010	8/04/2010	8/05/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/05/2010	8/05/2010	8/05/2010	8/05/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
CPAH (ESDAT)	mg/kg		67		<4.5	<4.5	<4.5	23	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	1.1	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	
1. CAHs																							
Tetrachloroethene	mg/kg	0.5																					
Trichloroethene	mg/kg	0.5																					
cis-1,2-dichloroethene	mg/kg	0.5																					
Vinyl chloride	mg/kg	5																					
BTEX																							
Benzene	mg/kg	0.2	81		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Ethylbenzene	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Toluene	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Xylene (m & p)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Xylene (o)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Xylene Total	mg/kg																						
Halogenated Phenols																							
2,3,4,6-tetrachlorophenol	mg/kg	0.5																					
2,4,5-trichlorophenol	mg/kg	0.5																					
2,4,6-trichlorophenol	mg/kg	0.5																					
2,4-dichlorophenol	mg/kg	0.5																					
2,6-dichlorophenol	mg/kg	0.5																					
2-chlorophenol	mg/kg	0.5																					
Pentachlorophenol	mg/kg	1																					
Inorganics																							
Cyanide (Free)	mg/kg	1																					
Cyanide Total	mg/kg	1																					
WAD Cyanide	mg/kg	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
MAH																							
1,2,4-trimethylbenzene	mg/kg	0.5	110																				
1,3,5-trimethylbenzene	mg/kg	0.5																					
Isopropylbenzene	mg/kg	0.5																					
n-butylbenzene	mg/kg	0.5																					
n-propylbenzene	mg/kg	0.5																					
p-isopropyltoluene	mg/kg	0.5																					
sec-butylbenzene	mg/kg	0.5																					
Styrene	mg/kg	0.5																					
tert-butylbenzene	mg/kg	0.5																					
Lead																							
Lead	mg/kg	2		1700	8	<5	7	520	50	16	5	7	<5	8	<5	317	232	86	33	28	<5	8	9
Metals																							
Arsenic	mg/kg	1		20	<5	13	<5	10	<5	<5	20	8	<5	<5	<5	<5	6	<5	<5	12	10	18	<5
Barium	mg/kg	5																					
Beryllium	mg/kg	1																					
Cadmium	mg/kg	0.1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Chromium	mg/kg	1	180000		6	11	2	16	10	9	10	9	10	3	17	7	11	10	7	9	6	13	16
Chromium (hexavalent)	mg/kg	0.5	950																				
Cobalt	mg/kg	1																					
Copper	mg/kg	2		170	<5	<5	262	56	14	10	<5	<5	<5	221	<5	312	61	76	5	15	<5	<5	<5
Iron	mg/kg	10																					
Manganese	mg/kg	5																					
Mercury	mg/kg	0.01			<0.1	<0.1	<0.1	0.5	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.3	0.2	<0.1	<0.1	<0.1	<0.1	
Nickel	mg/kg	1			<2	4	7	9	4	<2	3	2	4	10	<2	10	6	7	<2	3	<2	3	2
Vanadium	mg/kg	5	22000																				
Zinc	mg/kg	2		220	<5	7	54	327	36	12	8	7	<5	56	7	31	39	24	19	10	<5	6	<5
Nitroaromatics																							
2-Picoline	mg/kg	0.5																					
4-aminobiphenyl	mg/kg	0.5																					
Pentachloronitrobenzene	mg/kg	0.5																					



Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Lend Lease
Barangaroo

Field_ID		BH302_5.0-5.2	BH302_6.0-6.2	BH303_0.08-0.18	BH303_1.0-1.5	BH303_2.2-3.2	BH303_3.9-4.2	BH303_4.9-5.2	BH303_5.8-6.2	BH303_6.9-7.15	BH304_0.1-0.2	BH304_10-10.5	BH304_1-1.5	BH304_2-2.5	BH304_3-3.5	BH304_4-4.5	BH304_5-5.5	BH304_6-6.5	BH304_7-7.5	BH304_8-8.5
Sample_Depth		5-5.2	6-6.2	0.08-0.18	1-1.5	2.2-3.2	3.9-4.2	4.9-5.2	5.8-6.2	6.9-7.15	0.1-0.2	10-10.5	1-1.5	2-2.5	3-3.5	4-4.5	5-5.5	6-6.5	7-7.5	8-8.5
Location_Code		BH302	BH302	BH303	BH303	BH303	BH303	BH303	BH303	BH303	BH304	BH304	BH304	BH304	BH304	BH304	BH304	BH304	BH304	BH304
Sampled_Date		8/04/2010	8/04/2010	8/05/2010	8/11/2010	8/11/2010	8/11/2010	8/11/2010	8/11/2010	8/11/2010	8/04/2010	8/05/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/05/2010	8/05/2010	8/05/2010	8/05/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																		
PAH/Phenols																						
PAH (ESDAT TOTAL)	mg/kg				<8	<8	<8	40.7	<8	<8	<8	<8	<8	<8	<8	2.8	<8	<8	<8	<8	<8	<8
2,4-dimethylphenol	mg/kg	0.5																				
2-chloronaphthalene	mg/kg	0.5																				
2-methylnaphthalene	mg/kg	0.5																				
2-methylphenol	mg/kg	0.5																				
2-nitrophenol	mg/kg	0.5																				
3-&4-methylphenol	mg/kg	0.5	5400																			
3-methylcholanthrene	mg/kg	0.5																				
4-chloro-3-methylphenol	mg/kg	0.5																				
Acenaphthene	mg/kg	0.5		8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.5		5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acetophenone	mg/kg	0.5																				
Anthracene	mg/kg	0.5		5	<0.5	<0.5	<0.5	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	3.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a) pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	4.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b)&(k)fluoranthene	mg/kg	1																				
Benzo(b)fluoranthene	mg/kg	0.5			<0.5	<0.5	<0.5	4.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g,h,i)perylene	mg/kg	0.5			<0.5	<0.5	<0.5	1.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	mg/kg	0.5			<0.5	<0.5	<0.5	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	mg/kg	0.5			<0.5	<0.5	<0.5	3.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a,h)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg	0.5		8	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	1.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	mg/kg	0.5		21	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PAHs (Sum of total)	mg/kg	0.5																				
Phenanthrene	mg/kg	0.5		4	<0.5	<0.5	<0.5	2.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenol	mg/kg	0.5																				
Phenolics Total	mg/kg																					
Pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	7.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.9	<0.5	<0.5	<0.5	<0.5	<0.5
TPH																						
TPH C15-C36	mg/kg				<200	<200	<200	120	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200
TPH C10 - C14	mg/kg	50	61,000	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
TPH C15-C28	mg/kg	100			<100	<100	<100	120	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
TPH C29-C36	mg/kg	100			<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
TPH C6 - C9	mg/kg	2		39	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
TPH+C10 - C36 (Sum)	mg/kg	50			<50	<50	<50	120	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50

Notes:
mg/kg = milligrams per kilogram
LOR = Laboratory Limit of Reporting
Shading = results exceeds soil SSTC-B
Shading = results exceeds soil SSESC-B
Refer to Table T1 for adopted SSTCs and DAFs

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field ID		BH304 9-9.5	BH305 0.1-0.2	BH305 1.2-1.7	BH305 10.0-10.5	BH305 11.0-11.5	BH305 2.0-2.2	BH305 3-3.2	BH305 4-4.2	BH305 5.0-5.2	BH305 6-6.2	BH305 7-7.2	BH305 8.0-8.5	BH305 9.0-9.5	BH306 0.1-0.2	BH306 0.5-1.2	BH306 10.0-10.5	BH306 11.0-11.5	BH306 12.0-12.5	BH306 13.4-13.6
Sample Depth		9-9.5	0.1-0.2	1.2-1.7	10-10.5	11-11.5	2-2.2	3-3.2	4-4.2	5-5.2	6-6.2	7-7.2	8-8.5	9-9.5	0.1-0.2	0.5-1.2	10-10.2	11-11.2	12-12.2	13.4-13.6
Location Code		BH304	BH305	BH305	BH305	BH305	BH305	BH305	BH305	BH305	BH305	BH305	BH305	BH305	BH306	BH306	BH306	BH306	BH306	BH306
Sampled Date		8/05/2010	8/04/2010	8/04/2010	8/10/2010	8/11/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/10/2010	8/10/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
CPAH (ESDAT)	mg/kg		67		<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	10.8	<4.5	<4.5	<4.5	<4.5	
1. CAHs																							
Tetrachloroethene	mg/kg	0.5																					
Trichloroethene	mg/kg	0.5																					
cis-1,2-dichloroethene	mg/kg	0.5																					
Vinyl chloride	mg/kg	5																					
BTEX																							
Benzene	mg/kg	0.2	81		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Ethylbenzene	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Toluene	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Xylene (m & p)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Xylene (o)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Xylene Total	mg/kg																						
Halogenated Phenols																							
2,3,4,6-tetrachlorophenol	mg/kg	0.5																					
2,4,5-trichlorophenol	mg/kg	0.5																					
2,4,6-trichlorophenol	mg/kg	0.5																					
2,4-dichlorophenol	mg/kg	0.5																					
2,6-dichlorophenol	mg/kg	0.5																					
2-chlorophenol	mg/kg	0.5																					
Pentachlorophenol	mg/kg	1																					
Inorganics																							
Cyanide (Free)	mg/kg	1																					
Cyanide Total	mg/kg	1																					
WAD Cyanide	mg/kg	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
MAH																							
1,2,4-trimethylbenzene	mg/kg	0.5	110																				
1,3,5-trimethylbenzene	mg/kg	0.5																					
Isopropylbenzene	mg/kg	0.5																					
n-butylbenzene	mg/kg	0.5																					
n-propylbenzene	mg/kg	0.5																					
p-isopropyltoluene	mg/kg	0.5																					
sec-butylbenzene	mg/kg	0.5																					
Styrene	mg/kg	0.5																					
tert-butylbenzene	mg/kg	0.5																					
Lead																							
Lead	mg/kg	2		1700	<5	8	1210	<5	<5	947	107	31	14	14	14	<5	10	5	606	5	13	5	<5
Metals																							
Arsenic	mg/kg	1		20	<5	<5	5	<5	<5	<5	<5	<5	19	30	21	6	6	<5	14	<5	<5	5	<5
Barium	mg/kg	5																					
Beryllium	mg/kg	1																					
Cadmium	mg/kg	0.1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	
Chromium	mg/kg	1	180000		12	3	8	13	19	8	10	8	18	38	38	19	31	9	16	20	9	10	20
Chromium (hexavalent)	mg/kg	0.5	950																				
Cobalt	mg/kg	1																					
Copper	mg/kg	2		170	<5	240	472	<5	<5	69	18	10	6	7	6	<5	<5	190	160	<5	<5	<5	<5
Iron	mg/kg	10																					
Manganese	mg/kg	5																					
Mercury	mg/kg	0.01			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.9	<0.1	<0.1	<0.1	<0.1	
Nickel	mg/kg	1			<2	11	12	<2	<2	13	4	3	6	12	12	<2	3	45	14	<2	<2	<2	<2
Vanadium	mg/kg	5	22000																				
Zinc	mg/kg	2		220	7	57	46	<5	<5	47	54	10	14	30	30	<5	5	50	1340	<5	12	<5	<5
Nitroaromatics																							
2-Picoline	mg/kg	0.5																					
4-aminobiphenyl	mg/kg	0.5																					
Pentachloronitrobenzene	mg/kg	0.5																					



Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Lend Lease
Barangaroo

Field ID		BH304 9-9.5	BH305 0.1-0.2	BH305 1.2-1.7	BH305 10.0-10.5	BH305 11.0-11.5	BH305 2.0-2.2	BH305 3-3.2	BH305 4-4.2	BH305 5.0-5.2	BH305 6-6.2	BH305 7-7.2	BH305 8.0-8.5	BH305 9.0-9.5	BH306 0.1-0.2	BH306 0.5-1.2	BH306 10.0-10.5	BH306 11.0-11.5	BH306 12.0-12.5	BH306 13.4-13.6
Sample Depth		9-9.5	0.1-0.2	1.2-1.7	10-10.5	11-11.5	2-2.2	3-3.2	4-4.2	5-5.2	6-6.2	7-7.2	8-8.5	9-9.5	0.1-0.2	0.5-1.2	10-10.2	11-11.2	12-12.2	13.4-13.6
Location Code		BH304	BH305	BH305	BH305	BH305	BH305	BH305	BH305	BH305	BH305	BH305	BH305	BH305	BH306	BH306	BH306	BH306	BH306	BH306
Sampled Date		8/05/2010	8/04/2010	8/04/2010	8/10/2010	8/11/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/10/2010	8/10/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
PAH/Phenols																							
PAH (ESDAT TOTAL)	mg/kg				<8	<8	<8	<8	<8	<8	0.6	<8	<8	<8	0.6	<8	<8	<8	25.8	<8	<8	<8	<8
2,4-dimethylphenol	mg/kg	0.5																					
2-chloronaphthalene	mg/kg	0.5																					
2-methylnaphthalene	mg/kg	0.5																					
2-methylphenol	mg/kg	0.5																					
2-nitrophenol	mg/kg	0.5																					
3-&4-methylphenol	mg/kg	0.5	5400																				
3-methylcholanthrene	mg/kg	0.5																					
4-chloro-3-methylphenol	mg/kg	0.5																					
Acenaphthene	mg/kg	0.5		8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5
Acetophenone	mg/kg	0.5																					
Anthracene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	4.1	<0.5	<0.5	<0.5	<0.5
Benzo(a) pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3.5	<0.5	<0.5	<0.5	<0.5
Benzo(b)&(k)fluoranthene	mg/kg	1																					
Benzo(b)fluoranthene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g,h,i)perylene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3.2	<0.5	<0.5	<0.5	<0.5
Dibenz(a,h)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg	0.5		8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	7.2	<0.5	<0.5	<0.5	<0.5
Fluorene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	mg/kg	0.5		21	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PAHs (Sum of total)	mg/kg	0.5																					
Phenanthrene	mg/kg	0.5		4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenol	mg/kg	0.5																					
Phenolics Total	mg/kg																						
Pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	7.3	<0.5	<0.5	<0.5	<0.5
TPH																							
TPH C15-C36	mg/kg				<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	600	<200	<200	<200	<200
TPH C10 - C14	mg/kg	50	61,000	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
TPH C15-C28	mg/kg	100			<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	280	<100	<100	<100	<100
TPH C29-C36	mg/kg	100			<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	320	<100	<100	<100	<100
TPH C6 - C9	mg/kg	2		39	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
TPH+C10 - C36 (Sum)	mg/kg	50			<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	600	<50	<50	<50	<50

Notes:
mg/kg = milligrams per kilogram
LOR = Laboratory Limit of Reporting
Shading = results exceeds soil SSTC-B
Shading = results exceeds soil SSESC-B
Refer to Table T1 for adopted SSTCs and DAFs

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field ID		BH306_2.0-2.2	BH306_3.0-3.2	BH306_4.0-4.2	BH306_5.0-5.2	BH306_6.0-6.2	BH306_7.0-7.2	BH306_8.0-8.2	BH307_0.1-0.2	BH307_1.5-1.6	BH307_10.0-10.4	BH307_11-11.5	BH307_12.0-12.4	BH307_13.0-13.4	BH307_2.0-2.5	BH307_3.0-3.5	BH307_4.0-4.5	BH307_5.0-5.5	BH307_6.0-6.5	BH307_7.0-7.5
Sample Depth		2-2.2	3-3.2	4-4.2	5-5.2	6-6.2	7-7.2	8-8.2	0.1-0.2	1.5-1.6	10-10.5	11-11.5	12-12.5	13-13.4	2-2.5	3-3.5	4-4.5	5-5.5	6-6.5	7-7.5
Location Code		BH306	BH306	BH306	BH306	BH306	BH306	BH306	BH307	BH307	BH307	BH307	BH307	BH307	BH307	BH307	BH307	BH307	BH307	BH307
Sampled Date		8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	13/08/2010	13/08/2010	13/08/2010	13/08/2010	8/09/2010	8/09/2010	8/09/2010	8/09/2010	8/09/2010	13/08/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
CPAH (ESDAT)	mg/kg		67		<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	3	50.9	32.4	8.4	<4.5	<4.5	<4.5	<4.5	<4.5	26.2
1. CAHs																							
Tetrachloroethene	mg/kg	0.5																					
Trichloroethene	mg/kg	0.5																					
cis-1,2-dichloroethene	mg/kg	0.5																					
Vinyl chloride	mg/kg	5																					
BTEX																							
Benzene	mg/kg	0.2	81		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	4	6.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	9.1	5.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	4.8	3.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (m & p)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.4	29.4	20.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (o)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.5	23.6	15.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene Total	mg/kg																						
Halogenated Phenols																							
2,3,4,6-tetrachlorophenol	mg/kg	0.5																					
2,4,5-trichlorophenol	mg/kg	0.5																					
2,4,6-trichlorophenol	mg/kg	0.5																					
2,4-dichlorophenol	mg/kg	0.5																					
2,6-dichlorophenol	mg/kg	0.5																					
2-chlorophenol	mg/kg	0.5																					
Pentachlorophenol	mg/kg	1																					
Inorganics																							
Cyanide (Free)	mg/kg	1																					
Cyanide Total	mg/kg	1																					
WAD Cyanide	mg/kg	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
MAH																							
1,2,4-trimethylbenzene	mg/kg	0.5	110																				
1,3,5-trimethylbenzene	mg/kg	0.5																					
Isopropylbenzene	mg/kg	0.5																					
n-butylbenzene	mg/kg	0.5																					
n-propylbenzene	mg/kg	0.5																					
p-isopropyltoluene	mg/kg	0.5																					
sec-butylbenzene	mg/kg	0.5																					
Styrene	mg/kg	0.5																					
tert-butylbenzene	mg/kg	0.5																					
Lead																							
Lead	mg/kg	2		1700	110	110	122	46	23	<5	<5	8	28	<5	<5	6	11	19	8	18	<5	<5	228
Metals																							
Arsenic	mg/kg	1		20	<5	<5	<5	<5	<5	8	9	<5	<5	11	<5	<5	<5	<5	<5	<5	<5	<5	8
Barium	mg/kg	5																					
Beryllium	mg/kg	1																					
Cadmium	mg/kg	0.1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	mg/kg	1	180000		10	10	11	11	6	12	8	3	20	20	4	20	14	14	7	9	5	8	15
Chromium (hexavalent)	mg/kg	0.5	950																				
Cobalt	mg/kg	1																					
Copper	mg/kg	2		170	5	14	23	11	5	<5	<5	239	12	<5	<5	<5	<5	8	<5	<5	<5	<5	180
Iron	mg/kg	10																					
Manganese	mg/kg	5																					
Mercury	mg/kg	0.01			<0.1	0.2	0.3	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.5
Nickel	mg/kg	1			<2	3	4	<2	<2	3	<2	9	4	2	<2	<2	3	7	4	<2	<2	3	10
Vanadium	mg/kg	5	22000																				
Zinc	mg/kg	2		220	19	73	91	37	19	8	<5	64	82	5	<5	<5	8	43	74	11	6	20	168
Nitroaromatics																							
2-Picoline	mg/kg	0.5																					
4-aminobiphenyl	mg/kg	0.5																					
Pentachloronitrobenzene	mg/kg	0.5																					

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field ID		BH306_2.0-2.2	BH306_3.0-3.2	BH306_4.0-4.2	BH306_5.0-5.2	BH306_6.0-6.2	BH306_7.0-7.2	BH306_8.0-8.2	BH307_0.1-0.2	BH307_1.5-1.6	BH307_10.0-10.4	BH307_11-11.5	BH307_12.0-12.4	BH307_13.0-13.4	BH307_2.0-2.5	BH307_3.0-3.5	BH307_4.0-4.5	BH307_5.0-5.5	BH307_6.0-6.5	BH307_7.0-7.5
Sample Depth		2-2.2	3-3.2	4-4.2	5-5.2	6-6.2	7-7.2	8-8.2	0.1-0.2	1.5-1.6	10-10.5	11-11.5	12-12.5	13-13.4	2-2.5	3-3.5	4-4.5	5-5.5	6-6.5	7-7.5
Location Code		BH306	BH306	BH306	BH306	BH306	BH306	BH306	BH307	BH307	BH307	BH307	BH307	BH307	BH307	BH307	BH307	BH307	BH307	BH307
Sampled Date		8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	13/08/2010	13/08/2010	13/08/2010	13/08/2010	8/09/2010	8/09/2010	8/09/2010	8/09/2010	8/09/2010	13/08/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
PAH/Phenols																							
PAH (ESDAT TOTAL)	mg/kg				<8	<8	<8	<8	<8	<8	<8	<8	<8	21.8	478.2	226.9	58.1	<8	<8	<8	<8	<8	51.8
2,4-dimethylphenol	mg/kg	0.5																					
2-chloronaphthalene	mg/kg	0.5																					
2-methylnaphthalene	mg/kg	0.5																					
2-methylphenol	mg/kg	0.5																					
2-nitrophenol	mg/kg	0.5																					
3-&4-methylphenol	mg/kg	0.5	5400																				
3-methylcholanthrene	mg/kg	0.5																					
4-chloro-3-methylphenol	mg/kg	0.5																					
Acenaphthene	mg/kg	0.5		8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	6.2	3	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.2	30.8	19.5	5.9	<0.5	<0.5	<0.5	<0.5	<0.5	1.2
Acetophenone	mg/kg	0.5																					
Anthracene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.5	18.8	9.2	2.8	<0.5	<0.5	<0.5	<0.5	<0.5	1.8
Benz(a)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.9	14.4	7.2	2	<0.5	<0.5	<0.5	<0.5	<0.5	4.9
Benzo(a) pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8.7	4	1.1	<0.5	<0.5	<0.5	<0.5	<0.5	4.3
Benzo(b)&(k)fluoranthene	mg/kg	1																					
Benzo(b)fluoranthene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	6.7	3.2	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	4.9
Benzo(g,h,i)perylene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.9	1.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.9
Benzo(k)fluoranthene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3.1	1.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3
Chrysene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	11.9	5	1.6	<0.5	<0.5	<0.5	<0.5	<0.5	3.7
Dibenz(a,h)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg	0.5		8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.6	21.3	10.2	3.1	<0.5	<0.5	<0.5	<0.5	<0.5	9.6
Fluorene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.6	23.7	12.5	3.6	<0.5	<0.5	<0.5	<0.5	<0.5	0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.4	1.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.7
Naphthalene	mg/kg	0.5		21	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	7.7	241	105	22.8	<0.5	<0.5	<0.5	<0.5	0.6
PAHs (Sum of total)	mg/kg	0.5																					
Phenanthrene	mg/kg	0.5		4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3.4	55.6	29.1	8.9	<0.5	<0.5	<0.5	<0.5	<0.5	3.9
Phenol	mg/kg	0.5																					
Phenolics Total	mg/kg																						
Pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.3	29.9	15.2	4.5	<0.5	<0.5	<0.5	<0.5	<0.5	9.8
TPH																							
TPH C15-C36	mg/kg				<200	<200	<200	<200	<200	<200	<200	<200	<200	160	1910	890	200	<200	<200	<200	<200	<200	600
TPH C10 - C14	mg/kg	50	61,000	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	70	1220	570	90	<50	<50	<50	<50	<50	<50
TPH C15-C28	mg/kg	100			<100	<100	<100	<100	<100	<100	<100	<100	<100	160	1620	780	200	<100	<100	<100	<100	<100	320
TPH C29-C36	mg/kg	100			<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	290	110	<100	<100	<100	<100	<100	<100	280
TPH C6 - C9	mg/kg	2		39	<10	<10	<10	<10	<10	<10	<10	<10	<10	14	164	113	<10	<10	<10	<10	<10	<10	<10
TPH+C10 - C36 (Sum)	mg/kg	50			<50	<50	<50	<50	<50	<50	<50	<50	<50	230	3130	1460	290	<50	<50	<50	<50	<50	600

Notes:
mg/kg = milligrams per kilogram
LOR = Laboratory Limit of Reporting
Shading = results exceeds soil SSTC-B
Shading = results exceeds soil SSESC-B
Refer to Table T1 for adopted SSTCs and DAFs

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field ID		BH307 9.0-9.5	BH308 0.1-0.2	BH308 10.0-10.5	BH308 11.0-11.5	BH308 1-1.5	BH308 12.0-12.5	BH308 13-13.5	BH308 14-14.5	BH308 2.0-2.5	BH308 3.0-3.5	BH308 4.0-4.5	BH308 5.0-5.3	BH308 6.0-6.5	BH308 7.0-7.5	BH308 8.0-8.5	BH308 9.0-9.5	BH309 0.1-0.2	BH309 1.5-1.8	BH309 10.5-10.9
Sample Depth		9-9.5	0.1-0.2	10-10.5	11-11.5	1-1.5	12-12.5	13-13.5	14-14.12	2-2.5	3-3.5	4-4.5	5-5.3	6-6.5	7-7.5	8-8.5	9-9.5	0.1-0.2	1.5-1.8	10.5-10.9
Location Code		BH307	BH308	BH308	BH308	BH308	BH308	BH308	BH308	BH308	BH308	BH308	BH308	BH308	BH308	BH308	BH308	BH309	BH309	BH309
Sampled Date		13/08/2010	8/06/2010	13/08/2010	13/08/2010	8/12/2010	13/08/2010	13/08/2010	13/08/2010	8/12/2010	8/12/2010	8/12/2010	13/08/2010	13/08/2010	13/08/2010	13/08/2010	13/08/2010	30/07/2010	8/04/2010	8/04/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
CPAH (ESDAT)	mg/kg		67		26.8	<4.5	<4.5	<4.5	18.1	<4.5	<4.5	<4.5	16	189.4	83.4	22.9	11.6	<4.5	<4.5	<4.5	<4.5	5.9	<4.5
1. CAHs																							
Tetrachloroethene	mg/kg	0.5																					
Trichloroethene	mg/kg	0.5																					
cis-1,2-dichloroethene	mg/kg	0.5																					
Vinyl chloride	mg/kg	5																					
BTEX																							
Benzene	mg/kg	0.2	81		1.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	mg/kg	0.2			9.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	0.2			3.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (m & p)	mg/kg	0.2			9.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (o)	mg/kg	0.2			11.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene Total	mg/kg																						
Halogenated Phenols																							
2,3,4,6-tetrachlorophenol	mg/kg	0.5																					
2,4,5-trichlorophenol	mg/kg	0.5																					
2,4,6-trichlorophenol	mg/kg	0.5																					
2,4-dichlorophenol	mg/kg	0.5																					
2,6-dichlorophenol	mg/kg	0.5																					
2-chlorophenol	mg/kg	0.5																					
Pentachlorophenol	mg/kg	1																					
Inorganics																							
Cyanide (Free)	mg/kg	1																					
Cyanide Total	mg/kg	1																					
WAD Cyanide	mg/kg	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
MAH																							
1,2,4-trimethylbenzene	mg/kg	0.5	110																				
1,3,5-trimethylbenzene	mg/kg	0.5																					
Isopropylbenzene	mg/kg	0.5																					
n-butylbenzene	mg/kg	0.5																					
n-propylbenzene	mg/kg	0.5																					
p-isopropyltoluene	mg/kg	0.5																					
sec-butylbenzene	mg/kg	0.5																					
Styrene	mg/kg	0.5																					
tert-butylbenzene	mg/kg	0.5																					
Lead																							
Lead	mg/kg	2		1700	9	6	10	<5	122	<5	<5	9	160	86	934	934	152	9	<5	<5	8	60	<5
Metals																							
Arsenic	mg/kg	1		20	10	<5	<5	<5	<5	<5	<5	<5	<5	9	18	13	22	16	20	<5	<5	<5	6
Barium	mg/kg	5																					
Beryllium	mg/kg	1																					
Cadmium	mg/kg	0.1			<1	<1	<1	<1	1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	mg/kg	1	180000		33	4	22	7	24	16	19	12	23	9	47	29	31	18	11	12	3	9	8
Chromium (hexavalent)	mg/kg	0.5	950																				
Cobalt	mg/kg	1																					
Copper	mg/kg	2		170	<5	215	<5	<5	53	<5	<5	<5	58	40	188	138	30	<5	<5	<5	287	54	<5
Iron	mg/kg	10																					
Manganese	mg/kg	5																					
Mercury	mg/kg	0.01			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.3	3.2	4.3	0.2	<0.1	<0.1	<0.1	<0.1	0.2	<0.1
Nickel	mg/kg	1			3	19	3	<2	16	<2	<2	4	12	8	46	23	11	5	3	<2	9	6	<2
Vanadium	mg/kg	5	22000																				
Zinc	mg/kg	2		220	7	51	<5	<5	113	<5	<5	16	83	105	920	690	64	13	5	<5	64	82	<5
Nitroaromatics																							
2-Picoline	mg/kg	0.5																					
4-aminobiphenyl	mg/kg	0.5																					
Pentachloronitrobenzene	mg/kg	0.5																					



Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Lend Lease
Barangaroo

Field_ID		BH307_9.0-9.5	BH308_0.1-0.2	BH308_10.0-10.5	BH308_11.0-11.5	BH308_1-1.5	BH308_12.0-12.5	BH308_13-13.5	BH308_14-14.5	BH308_2.0-2.5	BH308_3.0-3.5	BH308_4.0-4.5	BH308_5.0-5.3	BH308_6.0-6.5	BH308_7.0-7.5	BH308_8.0-8.5	BH308_9.0-9.5	BH309_0.1-0.2	BH309_1.5-1.8	BH309_10.5-10.9
Sample_Depth		9-9.5	0.1-0.2	10-10.5	11-11.5	1-1.5	12-12.5	13-13.5	14-14.12	2-2.5	3-3.5	4-4.5	5-5.3	6-6.5	7-7.5	8-8.5	9-9.5	0.1-0.2	1.5-1.8	10.5-10.9
Location_Code		BH307	BH308	BH308	BH308	BH308	BH308	BH308	BH308	BH308	BH308	BH308	BH308	BH308	BH308	BH308	BH308	BH309	BH309	BH309
Sampled_Date		13/08/2010	8/06/2010	13/08/2010	13/08/2010	8/12/2010	13/08/2010	13/08/2010	13/08/2010	8/12/2010	8/12/2010	8/12/2010	13/08/2010	13/08/2010	13/08/2010	13/08/2010	13/08/2010	30/07/2010	8/04/2010	8/04/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
PAH/Phenols																							
PAH (ESDAT TOTAL)	mg/kg				170.8	<8	<8	<8	42.5	<8	<8	<8	31.6	621.2	199.6	43.8	22.4	<8	<8	<8	<8	9.2	<8
2,4-dimethylphenol	mg/kg	0.5																					
2-chloronaphthalene	mg/kg	0.5																					
2-methylnaphthalene	mg/kg	0.5																					
2-methylphenol	mg/kg	0.5																					
2-nitrophenol	mg/kg	0.5																					
3-&4-methylphenol	mg/kg	0.5	5400																				
3-methylcholanthrene	mg/kg	0.5																					
4-chloro-3-methylphenol	mg/kg	0.5																					
Acenaphthene	mg/kg	0.5		8	2.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	4.9	1.5	<0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.5		5	15.2	<0.5	<0.5	<0.5	1.2	<0.5	<0.5	<0.5	1.2	25.8	4.5	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acetophenone	mg/kg	0.5																					
Anthracene	mg/kg	0.5		5	7.3	<0.5	<0.5	<0.5	2.1	<0.5	<0.5	<0.5	1.1	44.3	9.1	1.9	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	mg/kg	0.5			5.9	<0.5	<0.5	<0.5	3.4	<0.5	<0.5	<0.5	2.8	46.8	18.9	4.4	2.3	<0.5	<0.5	<0.5	<0.5	1.1	<0.5
Benzo(a) pyrene	mg/kg	0.5			3.4	<0.5	<0.5	<0.5	2.9	<0.5	<0.5	<0.5	2.8	32.9	15.4	3.7	1.8	<0.5	<0.5	<0.5	<0.5	1.2	<0.5
Benzo(b)&(k)fluoranthene	mg/kg	1																					
Benzo(b)fluoranthene	mg/kg	0.5			2.6	<0.5	<0.5	<0.5	3.1	<0.5	<0.5	<0.5	3	33.6	16	4.1	1.9	<0.5	<0.5	<0.5	<0.5	1.4	<0.5
Benzo(g,h,i)perylene	mg/kg	0.5			1.1	<0.5	<0.5	<0.5	1.4	<0.5	<0.5	<0.5	1.7	11.7	5.6	2.2	1	<0.5	<0.5	<0.5	<0.5	0.7	<0.5
Benzo(k)fluoranthene	mg/kg	0.5			1.2	<0.5	<0.5	<0.5	1.3	<0.5	<0.5	<0.5	1.1	15.9	7	1.7	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	mg/kg	0.5			4.5	<0.5	<0.5	<0.5	2.7	<0.5	<0.5	<0.5	2.2	34.4	14	3.2	1.7	<0.5	<0.5	<0.5	<0.5	1	<0.5
Dibenz(a,h)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3	1.3	<0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg	0.5		8	8.8	<0.5	<0.5	<0.5	8.3	<0.5	<0.5	<0.5	6.3	107	43	8.3	4.4	<0.5	<0.5	<0.5	<0.5	1.6	<0.5
Fluorene	mg/kg	0.5		5	10.2	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	25.5	2.6	<0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5			0.8	<0.5	<0.5	<0.5	1.2	<0.5	<0.5	<0.5	1.3	11.1	5.2	1.7	0.8	<0.5	<0.5	<0.5	<0.5	0.5	<0.5
Naphthalene	mg/kg	0.5		21	69.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	14.8	1.8	<0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PAHs (Sum of total)	mg/kg	0.5																					
Phenanthrene	mg/kg	0.5		4	24.1	<0.5	<0.5	<0.5	6.5	<0.5	<0.5	<0.5	1.8	110	12.5	2.8	2.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenol	mg/kg	0.5																					
Phenolics Total	mg/kg																						
Pyrene	mg/kg	0.5			13.6	<0.5	<0.5	<0.5	7.8	<0.5	<0.5	<0.5	6.3	99.5	41.2	9	4.1	<0.5	<0.5	<0.5	<0.5	1.7	<0.5
TPH																							
TPH C15-C36	mg/kg				650	<200	<200	<200	160	<200	<200	<200	250	3600	4000	1010	<200	<200	<200	<200	<200	<200	<200
TPH C10 - C14	mg/kg	50	61,000	50	470	<50	<50	<50	<50	<50	<50	<50	<50	130	80	<50	<50	<50	<50	<50	<50	<50	<50
TPH C15-C28	mg/kg	100			650	<100	<100	<100	160	<100	<100	<100	130	2560	2940	710	<100	<100	<100	<100	<100	<100	<100
TPH C29-C36	mg/kg	100			<100	<100	<100	<100	<100	<100	<100	<100	120	1040	1060	300	<100	<100	<100	<100	<100	<100	<100
TPH C6 - C9	mg/kg	2		39	88	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
TPH+C10 - C36 (Sum)	mg/kg	50			1120	<50	<50	<50	160	<50	<50	<50	250	3730	4080	1010	<50	<50	<50	<50	<50	<50	<50

Notes:
mg/kg = milligrams per kilogram
LOR = Laboratory Limit of Reporting
Shading = results exceeds soil SSTC-B
Shading = results exceeds soil SSESC-B
Refer to Table T1 for adopted SSTCs and DAFs

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field ID		BH309 11.5-11.8	BH309 12.5-12.9	BH309 2.5-2.7	BH309 4.5-4.9	BH309 5.5-5.7	BH309 6.5-7.0	BH309 7.5-7.9	BH309 8.5-8.9	BH309 9.5-9.9	BH31 0.2-0.3	BH31 2.5-2.7	BH31 7.0-7.2	BH310 0.1-0.2	BH310 1.0-1.5	BH310 10-10.5	BH310 11-11.5	BH310 12-12.14	BH310 13-13.5	BH310 14-14.5
Sample Depth		11.5-11.8	12.5-12.9	2.5-2.7	4.5-4.9	5.5-5.7	6.5-7	7.5-7.9	8.5-8.9	9.5-9.9	0.2-0.3	2.5-2.7	7-7.2	0.1-0.2	1-1.5	10-10.5	11-11.5	12-12.14	13-13.5	14-14.5
Location Code		BH309	BH309	BH309	BH309	BH309	BH309	BH309	BH309	BH309	AECOM BH31	AECOM BH31	AECOM BH31	BH310	BH310	BH310	BH310	BH310	BH310	BH310
Sampled Date		8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	16/02/2010	16/02/2010	16/02/2010	30/07/2010	8/12/2010	8/12/2010	8/12/2010	8/12/2010	8/12/2010	8/12/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
CPAH (ESDAT)	mg/kg		67		<4.5	<4.5	<4.5	<4.5	12.7	167.8	<4.5	<4.5	<4.5	0	<4.5	<3.5	<4.5	<4.5	<4.5	<4.5	5.5	<4.5	<4.5
1. CAHs																							
Tetrachloroethene	mg/kg	0.5																					
Trichloroethene	mg/kg	0.5																					
cis-1,2-dichloroethene	mg/kg	0.5																					
Vinyl chloride	mg/kg	5																					
BTEX																							
Benzene	mg/kg	0.2	81		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		<0.2		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (m & p)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (o)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene Total	mg/kg														<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Halogenated Phenols																							
2,3,4,6-tetrachlorophenol	mg/kg	0.5														<0.5							
2,4,5-trichlorophenol	mg/kg	0.5													<0.5	<0.5							
2,4,6-trichlorophenol	mg/kg	0.5													<0.5	<0.5							
2,4-dichlorophenol	mg/kg	0.5													<0.5	<0.5							
2,6-dichlorophenol	mg/kg	0.5													<0.5	<0.5							
2-chlorophenol	mg/kg	0.5													<0.5	<0.5							
Pentachlorophenol	mg/kg	1													<2	<1							
Inorganics																							
Cyanide (Free)	mg/kg	1																					
Cyanide Total	mg/kg	1																					
WAD Cyanide	mg/kg	1			<1	<1	<1	<1	<1	<1	<1	<1	<1				<1	<1	<1	<1	<1	<1	<1
MAH																							
1,2,4-trimethylbenzene	mg/kg	0.5	110																				
1,3,5-trimethylbenzene	mg/kg	0.5																					
Isopropylbenzene	mg/kg	0.5																					
n-butylbenzene	mg/kg	0.5																					
n-propylbenzene	mg/kg	0.5																					
p-isopropyltoluene	mg/kg	0.5																					
sec-butylbenzene	mg/kg	0.5																					
Styrene	mg/kg	0.5																					
tert-butylbenzene	mg/kg	0.5																					
Lead																							
Lead	mg/kg	2		1700	<5	<5	68	39	808	909	23	<5	9	5	14	12	8	191	6	341	400	<5	<5
Metals																							
Arsenic	mg/kg	1		20	<5	<5	<5	<5	7	19	24	10	16	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Barium	mg/kg	5												20	70	30							
Beryllium	mg/kg	1												<1	<1	<1							
Cadmium	mg/kg	0.1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	mg/kg	1	180000		7	13	8	12	15	27	11	7	16	2	6	2	4	14	<2	6	8	10	3
Chromium (hexavalent)	mg/kg	0.5	950																				
Cobalt	mg/kg	1												10	3	<2							
Copper	mg/kg	2		170	<5	<5	14	10	105	218	<5	<5	<5	221	<5	12	289	40	<5	8	30	<5	<5
Iron	mg/kg	10																					
Manganese	mg/kg	5												729	126	6							
Mercury	mg/kg	0.01			<0.1	<0.1	<0.1	0.3	3.1	0.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.3	<0.1	<0.1	0.3	<0.1	<0.1
Nickel	mg/kg	1			<2	<2	5	2	10	10	3	<2	<2	6	5	<2	11	5	<2	<2	4	<2	<2
Vanadium	mg/kg	5	22000											88	11	5							
Zinc	mg/kg	2		220	<5	<5	67	13	308	43	7	<5	<5	42	21	19	59	135	<5	72	238	<5	<5
Nitroaromatics																							
2-Picoline	mg/kg	0.5														<0.5							
4-aminobiphenyl	mg/kg	0.5														<0.5							
Pentachloronitrobenzene	mg/kg	0.5														<0.5							



Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Lend Lease
Barangaroo

Field ID		BH309 11.5-11.8	BH309 12.5-12.9	BH309 2.5-2.7	BH309 4.5-4.9	BH309 5.5-5.7	BH309 6.5-7.0	BH309 7.5-7.9	BH309 8.5-8.9	BH309 9.5-9.9	BH31 0.2-0.3	BH31 2.5-2.7	BH31 7.0-7.2	BH310 0.1-0.2	BH310 1.0-1.5	BH310 10-10.5	BH310 11-11.5	BH310 12-12.14	BH310 13-13.5	BH310 14-14.5
Sample Depth		11.5-11.8	12.5-12.9	2.5-2.7	4.5-4.9	5.5-5.7	6.5-7	7.5-7.9	8.5-8.9	9.5-9.9	0.2-0.3	2.5-2.7	7-7.2	0.1-0.2	1-1.5	10-10.5	11-11.5	12-12.14	13-13.5	14-14.5
Location Code		BH309	BH309	BH309	BH309	BH309	BH309	BH309	BH309	BH309	AECOM BH31	AECOM BH31	AECOM BH31	BH310	BH310	BH310	BH310	BH310	BH310	BH310
Sampled Date		8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	16/02/2010	16/02/2010	16/02/2010	30/07/2010	8/12/2010	8/12/2010	8/12/2010	8/12/2010	8/12/2010	8/12/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
PAH/Phenols																							
PAH (ESDAT TOTAL)	mg/kg				<8	<8	<8	<8	21.8	424.3	<8	<8	<8		<8	<7	<8	2.4	<8	<8	10.1	<8	<8
2,4-dimethylphenol	mg/kg	0.5													<0.5	<0.5							
2-chloronaphthalene	mg/kg	0.5														<0.5							
2-methylnaphthalene	mg/kg	0.5														<0.5							
2-methylphenol	mg/kg	0.5													<0.5	<0.5							
2-nitrophenol	mg/kg	0.5													<0.5	<0.5							
3-&4-methylphenol	mg/kg	0.5	5400												<1	<0.5							
3-methylcholanthrene	mg/kg	0.5														<0.5							
4-chloro-3-methylphenol	mg/kg	0.5														<0.5	<0.5						
Acenaphthene	mg/kg	0.5		8	<0.5	<0.5	<0.5	<0.5	<0.5	8.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acetophenone	mg/kg	0.5														<0.5							
Anthracene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	0.7	24.8	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	2.3	40.2	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1	<0.5	<0.5
Benzo(a) pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	2.2	27.3	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	<0.5
Benzo(b)&(k)fluoranthene	mg/kg	1														<1							
Benzo(b)fluoranthene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	2.7	30	<0.5	<0.5	<0.5		<0.5		<0.5	<0.5	<0.5	<0.5	1.2	<0.5	<0.5
Benzo(g,h,i)perylene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	1	8.6	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	<0.5
Benzo(k)fluoranthene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	1	16.7	<0.5	<0.5	<0.5		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	1.9	33.1	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	<0.5	<0.5
Dibenz(a,h)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	2.9	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg	0.5		8	<0.5	<0.5	<0.5	<0.5	4.1	79.3	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	0.9	<0.5	<0.5	1.8	<0.5	<0.5
Fluorene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	<0.5	10.9	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	0.9	9	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5
Naphthalene	mg/kg	0.5		21	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PAHs (Sum of total)	mg/kg	0.5																					
Phenanthrene	mg/kg	0.5		4	<0.5	<0.5	<0.5	<0.5	1.2	69	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	0.6	<0.5	<0.5	0.7	<0.5	<0.5
Phenol	mg/kg	0.5													<0.5	<0.5							
Phenolics Total	mg/kg																						
Pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	3.8	62	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	0.9	<0.5	<0.5	2.1	<0.5	<0.5
TPH																							
TPH C15-C36	mg/kg				<200	<200	<200	<200	330	1930	<200	<200	<200		<200		<200	<200	<200	<200	<200	<200	<200
TPH C10 - C14	mg/kg	50	61,000	50	<50	<50	<50	<50	<50	<50	<50	<50	<50		<50		<50	<50	<50	<50	<50	<50	<50
TPH C15-C28	mg/kg	100			<100	<100	<100	<100	210	1310	<100	<100	<100		<100		<100	<100	<100	<100	<100	<100	<100
TPH C29-C36	mg/kg	100			<100	<100	<100	<100	120	620	<100	<100	<100		<100		<100	<100	<100	<100	<100	<100	<100
TPH C6 - C9	mg/kg	2		39	<10	<10	<10	<10	<10	<10	<10	<10	<10		<10		<10	<10	<10	<10	<10	<10	<10
TPH+C10 - C36 (Sum)	mg/kg	50			<50	<50	<50	<50	330	1930	<50	<50	<50		<50		<50	<50	<50	<50	<50	<50	<50

Notes:
mg/kg = milligrams per kilogram
LOR = Laboratory Limit of Reporting
Shading = results exceeds soil SSTC-B
Shading = results exceeds soil SSESC-B
Refer to Table T1 for adopted SSTCs and DAFs

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
CPAH (ESDAT)	mg/kg		67		<4.5	<4.5	<4.5	<4.5	<4.5	2.5	<4.5	<4.5	3.4	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	9.6	3	
1. CAHs																							
Tetrachloroethene	mg/kg	0.5																					
Trichloroethene	mg/kg	0.5																					
cis-1,2-dichloroethene	mg/kg	0.5																					
Vinyl chloride	mg/kg	5																					
BTEx																							
Benzene	mg/kg	0.2	81		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Ethylbenzene	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Toluene	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Xylene (m & p)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Xylene (o)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Xylene Total	mg/kg																						
Halogenated Phenols																							
2,3,4,6-tetrachlorophenol	mg/kg	0.5																					
2,4,5-trichlorophenol	mg/kg	0.5																					
2,4,6-trichlorophenol	mg/kg	0.5																					
2,4-dichlorophenol	mg/kg	0.5																					
2,6-dichlorophenol	mg/kg	0.5																					
2-chlorophenol	mg/kg	0.5																					
Pentachlorophenol	mg/kg	1																					
Inorganics																							
Cyanide (Free)	mg/kg	1																					
Cyanide Total	mg/kg	1																					
WAD Cyanide	mg/kg	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
MAH																							
1,2,4-trimethylbenzene	mg/kg	0.5	110																				
1,3,5-trimethylbenzene	mg/kg	0.5																					
Isopropylbenzene	mg/kg	0.5																					
n-butylbenzene	mg/kg	0.5																					
n-propylbenzene	mg/kg	0.5																					
p-isopropyltoluene	mg/kg	0.5																					
sec-butylbenzene	mg/kg	0.5																					
Styrene	mg/kg	0.5																					
tert-butylbenzene	mg/kg	0.5																					
Lead																							
Lead	mg/kg	2		1700	<5	20	12	15	54	163	24	<5	46	250	22	103	102	<5	20	62	474	82	26
Metals																							
Arsenic	mg/kg	1	20		<5	<5	<5	<5	<5	<5	<5	<5	<5	9	<5	<5	12	<5	<5	<5	18	15	<5
Barium	mg/kg	5																					
Beryllium	mg/kg	1																					
Cadmium	mg/kg	0.1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	mg/kg	1	180000		7	16	11	12	7	7	5	29	14	17	12	6	13	4	8	6	17	8	5
Chromium (hexavalent)	mg/kg	0.5	950																				
Cobalt	mg/kg	1																					
Copper	mg/kg	2		170	<5	<5	<5	16	11	38	8	101	9	100	8	46	23	<5	6	13	35	8	<5
Iron	mg/kg	10																					
Manganese	mg/kg	5																					
Mercury	mg/kg	0.01			<0.1	<0.1	<0.1	0.1	0.2	<0.1	<0.1	<0.1	0.1	0.5	0.2	<0.1	<0.1	<0.1	<0.1	0.1	0.2	0.1	<0.1
Nickel	mg/kg	1			2	6	14	4	2	3	3	104	2	6	<2	2	<2	<2	<2	3	11	5	<2
Vanadium	mg/kg	5	22000																				
Zinc	mg/kg	2		220	<5	18	23	16	31	50	24	69	30	202	9	32	26	<5	9	35	132	58	17
Nitroaromatics																							
2-Picoline	mg/kg	0.5																					
4-aminobiphenyl	mg/kg	0.5																					
Pentachloronitrobenzene	mg/kg	0.5																					



Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Lend Lease
Barangaroo

Field ID		BH310 15-15.5	BH310 16-16.23	BH310 2.0-2.5	BH310 3.0-3.5	BH310 5.0-5.5	BH310 6.0-6.5	BH310 9.0-9.5	BH311 0.1-0.2	BH311 0.9-1.2	BH311 10-10.2	BH311 11-11.2	BH311 12-12.2	BH311 13-13.2	BH311 14-14.2	BH311 15-15.2	BH311 2.0-2.2	BH311 3.0-3.2	BH311 4.0-4.2	BH311 5.0-5.2
Sample Depth		15-15.5	16-16.23	2-2.5	3-3.5	5-5.5	6-6.5	9-9.5	0.1-0.2	0.9-1.2	10-10.2	11-11.2	12-12.2	13-13.2	14-14.2	15-15.2	2-2.2	3-3.2	4-4.2	5-5.2
Location Code		BH310	BH310	BH310	BH310	BH310	BH310	BH310	BH311	BH311	BH311	BH311	BH311	BH311	BH311	BH311	BH311	BH311	BH311	BH311
Sampled Date		8/12/2010	8/12/2010	8/12/2010	8/12/2010	8/12/2010	8/12/2010	8/12/2010	30/07/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
PAH/Phenols																							
PAH (ESDAT TOTAL)	mg/kg				<8	<8	<8	1.2	0.5	6.4	1.2	<8	8.1	<8	<8	<8	<8	1.2	<8	1.1	12.8	20	
2,4-dimethylphenol	mg/kg	0.5																					
2-chloronaphthalene	mg/kg	0.5																					
2-methylnaphthalene	mg/kg	0.5																					
2-methylphenol	mg/kg	0.5																					
2-nitrophenol	mg/kg	0.5																					
3-&4-methylphenol	mg/kg	0.5	5400																				
3-methylcholanthrene	mg/kg	0.5																					
4-chloro-3-methylphenol	mg/kg	0.5																					
Acenaphthene	mg/kg	0.5		8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.7	
Acenaphthylene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Acetophenone	mg/kg	0.5																					
Anthracene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.6	
Benz(a)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	<0.5	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.4	0.8	
Benzo(a) pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.2	<0.5	
Benzo(b)&(k)fluoranthene	mg/kg	1																					
Benzo(b)fluoranthene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.5	<0.5	
Benzo(g,h,i)perylene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.4	<0.5	
Benzo(k)fluoranthene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	<0.5	
Chrysene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.3	0.6	
Dibenz(a,h)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Fluoranthene	mg/kg	0.5		8	<0.5	<0.5	<0.5	0.6	<0.5	1.2	0.6	<0.5	1.7	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	0.5	1.1	4.6	
Fluorene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1	<0.5	
Naphthalene	mg/kg	0.5		21	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.9	
PAHs (Sum of total)	mg/kg	0.5																					
Phenanthrene	mg/kg	0.5		4	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	<0.5	1.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.7	4.6	
Phenol	mg/kg	0.5																					
Phenolics Total	mg/kg																						
Pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	0.6	0.5	1.5	0.6	<0.5	1.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	0.6	4
TPH																							
TPH C15-C36	mg/kg				<200	<200	<200	<200	<200	160	<200	<200	<200	890	<200	<200	<200	<200	<200	<200	<200	<200	
TPH C10 - C14	mg/kg	50	61,000	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	80	<50	<50	<50	<50	<50	<50	<50	<50	
TPH C15-C28	mg/kg	100			<100	<100	<100	<100	<100	<100	<100	<100	<100	530	<100	<100	<100	<100	<100	<100	<100	<100	
TPH C29-C36	mg/kg	100			<100	<100	<100	<100	<100	160	<100	<100	<100	360	<100	<100	<100	<100	<100	<100	<100	<100	
TPH C6 - C9	mg/kg	2		39	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	
TPH+C10 - C36 (Sum)	mg/kg	50			<50	<50	<50	<50	<50	160	<50	<50	<50	970	<50	<50	<50	<50	<50	<50	<50	<50	

Notes:
mg/kg = milligrams per kilogram
LOR = Laboratory Limit of Reporting
Shading = results exceeds soil SSTC-B
Shading = results exceeds soil SSESC-B
Refer to Table T1 for adopted SSTCs and DAFs

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field_ID		BH311_5.8-6.2	BH311_7.0-7.2	BH311_8.0-8.2	BH311_9.0-9.2	BH312_0.1-0.2	BH312_10.0-10.5	BH312_1-1.2	BH312_11-11.5	BH312_12.0-12.5	BH312_13.0-13.5	BH312_14.0-14.5	BH312_15.0-15.5	BH312_16-16.7	BH312_2.0-2.2	BH312_2.8-3.2	BH312_3.2-3.6	BH312_4.0-4.5	BH312_5.0-5.5	BH312_6.0-6.5
Sample_Depth		5.8-6.2	7-7.2	8-8.2	9-9.2	0.1-0.2	10-10.5	1-1.2	11-11.5	12-12.5	13-13.5	14-14.5	15-15.5	16-16.7	2-2.2	2.8-3.2	3.2-3.6	4-4.5	5-5.5	6-6.5
Location_Code		BH311	BH311	BH311	BH311	BH312	BH312	BH312	BH312	BH312	BH312	BH312	BH312	BH312	BH312	BH312	BH312	BH312	BH312	BH312
Sampled_Date		8/02/2010	8/02/2010	8/02/2010	8/02/2010	30/07/2010	8/11/2010	8/02/2010	8/11/2010	8/11/2010	8/11/2010	8/11/2010	8/11/2010	8/11/2010	8/02/2010	8/02/2010	8/02/2010	8/11/2010	8/11/2010	8/11/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
CPAH (ESDAT)	mg/kg		67		26.4	<4.5	<4.5	<4.5	<4.5	<4.5	27.4	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	61.4	17		191.5	<4.5	<4.5
1. CAHs																							
Tetrachloroethene	mg/kg	0.5																					
Trichloroethene	mg/kg	0.5																					
cis-1,2-dichloroethene	mg/kg	0.5																					
Vinyl chloride	mg/kg	5																					
BTEX																							
Benzene	mg/kg	0.2	81		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		<0.2	<0.2	<0.2
Ethylbenzene	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5
Toluene	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5
Xylene (m & p)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5
Xylene (o)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5
Xylene Total	mg/kg																						
Halogenated Phenols																							
2,3,4,6-tetrachlorophenol	mg/kg	0.5																					
2,4,5-trichlorophenol	mg/kg	0.5																					
2,4,6-trichlorophenol	mg/kg	0.5																					
2,4-dichlorophenol	mg/kg	0.5																					
2,6-dichlorophenol	mg/kg	0.5																					
2-chlorophenol	mg/kg	0.5																					
Pentachlorophenol	mg/kg	1																					
Inorganics																							
Cyanide (Free)	mg/kg	1																					
Cyanide Total	mg/kg	1																					
WAD Cyanide	mg/kg	1			<1	<1	<1	<1	<1	<1		<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	<1
MAH																							
1,2,4-trimethylbenzene	mg/kg	0.5	110																				
1,3,5-trimethylbenzene	mg/kg	0.5																					
Isopropylbenzene	mg/kg	0.5																					
n-butylbenzene	mg/kg	0.5																					
n-propylbenzene	mg/kg	0.5																					
p-isopropyltoluene	mg/kg	0.5																					
sec-butylbenzene	mg/kg	0.5																					
Styrene	mg/kg	0.5																					
tert-butylbenzene	mg/kg	0.5																					
Lead																							
Lead	mg/kg	2		1700	108	19	33	38	<5	34	225	10	<5	6	<5	<5	6	324	256		115	243	<5
Metals																							
Arsenic	mg/kg	1		20	<5	<5	<5	<5	<5	<5	<5	14	<5	<5	<5	<5	<5	<5	<5		<5	8	<5
Barium	mg/kg	5																					
Beryllium	mg/kg	1																					
Cadmium	mg/kg	0.1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	<1
Chromium	mg/kg	1	180000		5	4	9	5	13	9	10	14	6	6	3	<2	8	14	16		9	14	7
Chromium (hexavalent)	mg/kg	0.5	950																				
Cobalt	mg/kg	1																					
Copper	mg/kg	2		170	12	<5	<5	<5	93	<5	30	<5	<5	<5	<5	<5	<5	80	52		48	51	<5
Iron	mg/kg	10																					
Manganese	mg/kg	5																					
Mercury	mg/kg	0.01			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.6	0.5		0.1	0.4	0.1
Nickel	mg/kg	1			2	<2	<2	<2	72	<2	4	<2	<2	<2	<2	<2	7	5	5		6	8	2
Vanadium	mg/kg	5	22000																				
Zinc	mg/kg	2		220	44	11	29	19	66	<5	158	<5	<5	<5	<5	<5	22	304	121		82	78	<5
Nitroaromatics																							
2-Picoline	mg/kg	0.5																					
4-aminobiphenyl	mg/kg	0.5																					
Pentachloronitrobenzene	mg/kg	0.5																					



Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Lend Lease
Barangaroo

Field ID		BH311 5.8-6.2	BH311 7.0-7.2	BH311 8.0-8.2	BH311 9.0-9.2	BH312 0.1-0.2	BH312 10.0-10.5	BH312 1-1.2	BH312 11-11.5	BH312 12.0-12.5	BH312 13.0-13.5	BH312 14.0-14.5	BH312 15.0-15.5	BH312 16-16.7	BH312 2.0-2.2	BH312 2.8-3.2	BH312 3.2-3.6	BH312 4.0-4.5	BH312 5.0-5.5	BH312 6.0-6.5
Sample Depth		5.8-6.2	7-7.2	8-8.2	9-9.2	0.1-0.2	10-10.5	1-1.2	11-11.5	12-12.5	13-13.5	14-14.5	15-15.5	16-16.7	2-2.2	2.8-3.2	3.2-3.6	4-4.5	5-5.5	6-6.5
Location Code		BH311	BH311	BH311	BH311	BH312	BH312	BH312	BH312	BH312	BH312	BH312	BH312	BH312	BH312	BH312	BH312	BH312	BH312	BH312
Sampled Date		8/02/2010	8/02/2010	8/02/2010	8/02/2010	30/07/2010	8/11/2010	8/02/2010	8/11/2010	8/11/2010	8/11/2010	8/11/2010	8/11/2010	8/11/2010	8/02/2010	8/02/2010	8/02/2010	8/11/2010	8/11/2010	8/11/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
PAH/Phenols																							
PAH (ESDAT TOTAL)	mg/kg				49.8	<8	<8	<8	<8	<8	53.7	<8	<8	<8	<8	<8	<8	102.3	29.8		475.2	1.2	<8
2,4-dimethylphenol	mg/kg	0.5																					
2-chloronaphthalene	mg/kg	0.5																					
2-methylnaphthalene	mg/kg	0.5																					
2-methylphenol	mg/kg	0.5																					
2-nitrophenol	mg/kg	0.5																					
3-&4-methylphenol	mg/kg	0.5	5400																				
3-methylcholanthrene	mg/kg	0.5																					
4-chloro-3-methylphenol	mg/kg	0.5																					
Acenaphthene	mg/kg	0.5		8	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		1.3	<0.5	<0.5
Acenaphthylene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.5	1.2		9.2	<0.5	<0.5
Acetophenone	mg/kg	0.5																					
Anthracene	mg/kg	0.5		5	1.9	<0.5	<0.5	<0.5	<0.5	<0.5	2.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	4.2	1.1		24	<0.5	<0.5
Benz(a)anthracene	mg/kg	0.5			4.6	<0.5	<0.5	<0.5	<0.5	<0.5	5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	10.8	3.2		41.9	<0.5	<0.5
Benzo(a) pyrene	mg/kg	0.5			4.2	<0.5	<0.5	<0.5	<0.5	<0.5	4.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	9.4	3		32.6	<0.5	<0.5
Benzo(b)&(k)fluoranthene	mg/kg	1																					
Benzo(b)fluoranthene	mg/kg	0.5			6.1	<0.5	<0.5	<0.5	<0.5	<0.5	5.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	11.5	3.1		43.3	<0.5	<0.5
Benzo(g,h,i)perylene	mg/kg	0.5			1.4	<0.5	<0.5	<0.5	<0.5	<0.5	2.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	4.6	1.4		14.7	<0.5	<0.5
Benzo(k)fluoranthene	mg/kg	0.5			2.9	<0.5	<0.5	<0.5	<0.5	<0.5	2.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	5.6	1.1		13.1	<0.5	<0.5
Chrysene	mg/kg	0.5			4.1	<0.5	<0.5	<0.5	<0.5	<0.5	4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	9.9	2.9		29.3	<0.5	<0.5
Dibenz(a,h)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5		3	<0.5	<0.5
Fluoranthene	mg/kg	0.5		8	7	<0.5	<0.5	<0.5	<0.5	<0.5	9.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	16.1	4.8		96.1	0.6	<0.5
Fluorene	mg/kg	0.5		5	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		6.8	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5			1.2	<0.5	<0.5	<0.5	<0.5	<0.5	1.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	4.2	1.2		13.6	<0.5	<0.5
Naphthalene	mg/kg	0.5		21	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5		2.7	<0.5	<0.5
PAHs (Sum of total)	mg/kg	0.5																					
Phenanthrene	mg/kg	0.5		4	7.8	<0.5	<0.5	<0.5	<0.5	<0.5	4.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	6	1.7		53.2	<0.5	<0.5
Phenol	mg/kg	0.5																					
Phenolics Total	mg/kg																						
Pyrene	mg/kg	0.5			6.3	<0.5	<0.5	<0.5	<0.5	<0.5	10.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	15.7	5.1		90.4	0.6	<0.5
TPH																							
TPH C15-C36	mg/kg				<200	<200	<200	<200	<200	<200	1570	<200	<200	<200	<200	<200	<200	690	470		1840	<200	<200
TPH C10 - C14	mg/kg	50	61,000	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50		<50	<50	<50
TPH C15-C28	mg/kg	100			<100	<100	<100	<100	<100	<100	380	<100	<100	<100	<100	<100	<100	240	<100		1250	<100	<100
TPH C29-C36	mg/kg	100			<100	<100	<100	<100	<100	<100	1190	<100	<100	<100	<100	<100	<100	450	470		590	<100	<100
TPH C6 - C9	mg/kg	2		39	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		<10	<10	<10
TPH+C10 - C36 (Sum)	mg/kg	50			<50	<50	<50	<50	<50	<50	1570	<50	<50	<50	<50	<50	<50	690	470		1840	<50	<50

Notes:
mg/kg = milligrams per kilogram
LOR = Laboratory Limit of Reporting
Shading = results exceeds soil SSTC-B
Shading = results exceeds soil SSESC-B
Refer to Table T1 for adopted SSTCs and DAFs

[illegible]

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field_ID		BH312 8.0-8.5	BH312 9.0-9.5	BH313 0.1-0.2	BH313 1.0-1.5	BH313 2.0-2.5	BH313 3.0-3.3	BH313 4.0-4.5	BH313 5.0-5.5	BH313 6.0-6.5	BH313 7.0-7.5	BH313 8.0-8.5	BH314 0.1-0.3	BH314 1.0-1.5	BH314 2.0-2.5	BH314 3.0-3.2	BH314 4.0-4.5	BH314 5.0-5.5	BH314 7.0-7.5	BH314 8.0-8.5
Sample_Depth		8-8.5	9-9.5	0.1-0.2	1-1.5	2-2.5	3-3.5	4-4.5	5-5.5	6-6.5	7-7.5	8-8.5	0.1-0.3	1-1.5	2-2.5	3-3.2	4-4.5	5-5.5	7-7.5	8-8.5
Location_Code		BH312	BH312	BH313	BH313	BH313	BH313	BH313	BH313	BH313	BH313	BH313	BH314	BH314	BH314	BH314	BH314	BH314	BH314	BH314
Sampled_Date		8/11/2010	8/11/2010	8/04/2010	8/09/2010	8/09/2010	8/09/2010	8/09/2010	8/09/2010	8/09/2010	8/09/2010	8/09/2010	30/09/2010	30/09/2010	30/09/2010	30/09/2010	30/09/2010	30/09/2010	30/09/2010	30/09/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																		
PAH/Phenols																						
PAH (ESDAT TOTAL)	mg/kg				<8	<8	<8	<8	<8	<8	4.4	<8	<8	<8	<8	110.3	<8	<8	15.6	<8	<8	<8
2,4-dimethylphenol	mg/kg	0.5																				
2-chloronaphthalene	mg/kg	0.5																				
2-methylnaphthalene	mg/kg	0.5																				
2-methylphenol	mg/kg	0.5																				
2-nitrophenol	mg/kg	0.5																				
3-&4-methylphenol	mg/kg	0.5	5400																			
3-methylcholanthrene	mg/kg	0.5																				
4-chloro-3-methylphenol	mg/kg	0.5																				
Acenaphthene	mg/kg	0.5		8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acetophenone	mg/kg	0.5																				
Anthracene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	4.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	10.8	<0.5	<0.5	1.4	<0.5	<0.5	<0.5
Benzo(a) pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	8.9	<0.5	<0.5	2.2	<0.5	<0.5	<0.5
Benzo(b)&(k)fluoranthene	mg/kg	1																				
Benzo(b)fluoranthene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	9.4	<0.5	<0.5	2.2	<0.5	<0.5	<0.5
Benzo(g,h,i)perylene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	4.2	<0.5	<0.5	0.9	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	4	<0.5	<0.5	0.8	<0.5	<0.5	<0.5
Chrysene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	7.9	<0.5	<0.5	1	<0.5	<0.5	<0.5
Dibenz(a,h)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg	0.5		8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	<0.5	<0.5	<0.5	19.9	<0.5	<0.5	1.9	<0.5	<0.5	<0.5
Fluorene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3.7	<0.5	<0.5	0.7	<0.5	<0.5	<0.5
Naphthalene	mg/kg	0.5		21	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PAHs (Sum of total)	mg/kg	0.5																				
Phenanthrene	mg/kg	0.5		4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	11.1	<0.5	<0.5	0.9	<0.5	<0.5	<0.5
Phenol	mg/kg	0.5																				
Phenolics Total	mg/kg																					
Pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.4	<0.5	<0.5	<0.5	<0.5	18.9	<0.5	<0.5	3.6	<0.5	<0.5	<0.5
TPH																						
TPH C15-C36	mg/kg				<200	<200	<200	<200	270	560	<200	<200	<200	<200	<200	510	<200	<200	700	<200	<200	<200
TPH C10 - C14	mg/kg	50	61,000	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
TPH C15-C28	mg/kg	100			<100	<100	<100	<100	100	310	<100	<100	<100	<100	<100	290	<100	<100	360	<100	<100	<100
TPH C29-C36	mg/kg	100			<100	<100	<100	<100	170	250	<100	<100	<100	<100	<100	220	<100	<100	340	<100	<100	<100
TPH C6 - C9	mg/kg	2		39	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
TPH+C10 - C36 (Sum)	mg/kg	50			<50	<50	<50	<50	270	560	<50	<50	<50	<50	<50	510	<50	<50	700	<50	<50	<50

Notes:
mg/kg = milligrams per kilogram
LOR = Laboratory Limit of Reporting
Shading = results exceeds soil SSTC-B
Shading = results exceeds soil SSESC-B
Refer to Table T1 for adopted SSTCs and DAFs

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field_ID		BH315 0.1-0.3	BH315 1.0-1.5	BH315 2.0-2.5	BH315 3.0-3.5	BH315 4.0-4.5	BH315 5.0-5.5	BH315 6.0-6.5	BH315 8.0-8.5	BH316 0.1-0.2	BH316 1.0-1.5	BH316 2.0-2.5	BH316 3.0-3.5	BH316 4-4.21	BH316 6.0-6.5	BH316 7-7.5	BH317 0.1-0.2	BH317 1.0-1.5	BH317 2.0-2.5	BH317 4.0-4.5
Sample_Depth		0.1-0.3	1-1.5	2-2.5	3-3.5	4-4.5	5-5.5	6-6.5	8-8.5	0.1-0.2	1-1.5	2-2.5	3-3.5	4-4.21	6-6.5	7-7.5	0.1-0.2	1-1.5	2-2.5	4-4.5
Location_Code		BH315	BH315	BH315	BH315	BH315	BH315	BH315	BH315	BH316	BH316	BH316	BH316	BH316	BH316	BH316	BH317	BH317	BH317	BH317
Sampled_Date		30/09/2010	30/09/2010	30/09/2010	30/09/2010	30/09/2010	30/09/2010	30/09/2010	30/09/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/06/2010	8/06/2010	8/06/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
CPAH (ESDAT)	mg/kg		67		<4.5	<4.5	<4.5	0.5	49	74.8	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	6.6	1.1	<4.5	6.4	9.8	13.6	
1. CAHs																							
Tetrachloroethene	mg/kg	0.5																					
Trichloroethene	mg/kg	0.5																					
cis-1,2-dichloroethene	mg/kg	0.5																					
Vinyl chloride	mg/kg	5																					
BTEX																							
Benzene	mg/kg	0.2	81		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Ethylbenzene	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Toluene	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Xylene (m & p)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Xylene (o)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Xylene Total	mg/kg																						
Halogenated Phenols																							
2,3,4,6-tetrachlorophenol	mg/kg	0.5																					
2,4,5-trichlorophenol	mg/kg	0.5																					
2,4,6-trichlorophenol	mg/kg	0.5																					
2,4-dichlorophenol	mg/kg	0.5																					
2,6-dichlorophenol	mg/kg	0.5																					
2-chlorophenol	mg/kg	0.5																					
Pentachlorophenol	mg/kg	1																					
Inorganics																							
Cyanide (Free)	mg/kg	1																					
Cyanide Total	mg/kg	1																					
WAD Cyanide	mg/kg	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
MAH																							
1,2,4-trimethylbenzene	mg/kg	0.5	110																				
1,3,5-trimethylbenzene	mg/kg	0.5																					
Isopropylbenzene	mg/kg	0.5																					
n-butylbenzene	mg/kg	0.5																					
n-propylbenzene	mg/kg	0.5																					
p-isopropyltoluene	mg/kg	0.5																					
sec-butylbenzene	mg/kg	0.5																					
Styrene	mg/kg	0.5																					
tert-butylbenzene	mg/kg	0.5																					
Lead																							
Lead	mg/kg	2		1700	8	8	41	79	143	113	35	35	<5	27	22	8	32	23	25	9	92	59	71
Metals																							
Arsenic	mg/kg	1		20	<5	<5	6	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	
Barium	mg/kg	5																					
Beryllium	mg/kg	1																					
Cadmium	mg/kg	0.1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Chromium	mg/kg	1	180000		145	141	11	14	10	6	7	5	9	5	5	3	6	7	5	4	7	6	11
Chromium (hexavalent)	mg/kg	0.5	950																				
Cobalt	mg/kg	1																					
Copper	mg/kg	2		170	38	42	28	21	27	50	31	<5	120	11	8	<5	48	16	8	213	17	9	12
Iron	mg/kg	10																					
Manganese	mg/kg	5																					
Mercury	mg/kg	0.01			<0.1	<0.1	<0.1	<0.1	0.2	0.3	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1
Nickel	mg/kg	1			122	113	4	6	6	3	4	<2	46	2	<2	<2	4	2	3	16	4	3	4
Vanadium	mg/kg	5	22000																				
Zinc	mg/kg	2		220	60	65	71	50	82	81	33	41	50	20	19	15	38	19	35	52	60	70	31
Nitroaromatics																							
2-Picoline	mg/kg	0.5																					
4-aminobiphenyl	mg/kg	0.5																					
Pentachloronitrobenzene	mg/kg	0.5																					



Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Lend Lease
Barangaroo

Field_ID		BH315_0.1-0.3	BH315_1.0-1.5	BH315_2.0-2.5	BH315_3.0-3.5	BH315_4.0-4.5	BH315_5.0-5.5	BH315_6.0-6.5	BH315_8.0-8.5	BH316_0.1-0.2	BH316_1.0-1.5	BH316_2.0-2.5	BH316_3.0-3.5	BH316_4-4.21	BH316_6.0-6.5	BH316_7-7.5	BH317_0.1-0.2	BH317_1.0-1.5	BH317_2.0-2.5	BH317_4.0-4.5
Sample_Depth		0.1-0.3	1-1.5	2-2.5	3-3.5	4-4.5	5-5.5	6-6.5	8-8.5	0.1-0.2	1-1.5	2-2.5	3-3.5	4-4.21	6-6.5	7-7.5	0.1-0.2	1-1.5	2-2.5	4-4.5
Location_Code		BH315	BH315	BH315	BH315	BH315	BH315	BH315	BH315	BH316	BH316	BH316	BH316	BH316	BH316	BH316	BH317	BH317	BH317	BH317
Sampled_Date		30/09/2010	30/09/2010	30/09/2010	30/09/2010	30/09/2010	30/09/2010	30/09/2010	30/09/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/06/2010	8/06/2010	8/06/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
PAH/Phenols																							
PAH (ESDAT TOTAL)	mg/kg				<8	<8	1.3	3.4	168.4	214	1.7	<8	<8	<8	<8	<8	0.6	15.2	3.1	<8	11.1	19.2	29.5
2,4-dimethylphenol	mg/kg	0.5																					
2-chloronaphthalene	mg/kg	0.5																					
2-methylnaphthalene	mg/kg	0.5																					
2-methylphenol	mg/kg	0.5																					
2-nitrophenol	mg/kg	0.5																					
3-&4-methylphenol	mg/kg	0.5	5400																				
3-methylcholanthrene	mg/kg	0.5																					
4-chloro-3-methylphenol	mg/kg	0.5																					
Acenaphthene	mg/kg	0.5		8	<0.5	<0.5	<0.5	<0.5	6.7	3.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	1.9	3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8
Acetophenone	mg/kg	0.5																					
Anthracene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	9.5	13	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	0.7	1.4
Benz(a)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	0.5	11.1	19.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1	0.5	<0.5	1	1.8	2.2
Benzo(a) pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	9	13.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.5	0.6	<0.5	1.3	1.6	2.3
Benzo(b)&(k)fluoranthene	mg/kg	1																					
Benzo(b)fluoranthene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	8.4	12.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	<0.5	1.6	2.1	2.6
Benzo(g,h,i)perylene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	2.7	3.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	0.9	0.8	1.3
Benzo(k)fluoranthene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	4.9	4.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	0.5	0.9
Chrysene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	9.8	16	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	<0.5	<0.5	0.9	1.6	1.8
Dibenz(a,h)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	0.5	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg	0.5		8	<0.5	<0.5	0.6	1.1	31	38	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.6	0.9	<0.5	1.8	4	5.1
Fluorene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	6.1	6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	2.6	3.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	0.7	0.7	1.1
Naphthalene	mg/kg	0.5		21	<0.5	<0.5	<0.5	<0.5	6.1	3.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PAHs (Sum of total)	mg/kg	0.5																					
Phenanthrene	mg/kg	0.5		4	<0.5	<0.5	<0.5	0.6	31.8	33.2	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	0.9	1.5	4.9
Phenol	mg/kg	0.5																					
Phenolics Total	mg/kg																						
Pyrene	mg/kg	0.5			<0.5	<0.5	0.7	1.2	26.3	39	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	6	1.1	<0.5	2	3.9	5.1
TPH																							
TPH C15-C36	mg/kg				<200	<200	200	<200	910	990	<200	<200	<200	<200	<200	<200	<200	340	<200	<200	<200	240	110
TPH C10 - C14	mg/kg	50	61,000	50	<50	<50	<50	<50	70	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	
TPH C15-C28	mg/kg	100			<100	<100	<100	<100	560	500	<100	<100	<100	<100	<100	<100	<100	170	<100	<100	<100	<100	<100
TPH C29-C36	mg/kg	100			<100	<100	200	<100	350	490	<100	<100	<100	<100	<100	<100	<100	170	<100	<100	<100	240	110
TPH C6 - C9	mg/kg	2		39	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
TPH+C10 - C36 (Sum)	mg/kg	50			<50	<50	200	<50	980	990	<50	<50	<50	<50	<50	<50	<50	340	<50	<50	<50	240	110

Notes:
mg/kg = milligrams per kilogram
LOR = Laboratory Limit of Reporting
Shading = results exceeds soil SSTC-B
Shading = results exceeds soil SSESC-B
Refer to Table T1 for adopted SSTCs and DAFs

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field_ID		BH317_5.0-5.5	BH317_6.0-6.5	BH317_7.0-7.5	BH317_8.0-8.5	BH318_0.1-0.3	BH318_1.0-1.5	BH318_2.0-2.5	BH318_3.0-3.5	BH318_4.0-4.5	BH318_5.0-5.5	BH318_7.0-7.5	BH318_8.0-8.5	BH319_0.1-0.3	BH319_1.0-1.5	BH319_2.0-2.5	BH319_3.0-3.5	BH319_4.0-4.1	BH319_5.0-5.5	BH319_6.0-6.5
Sample_Depth		5-5.5	6-6.5	7-7.5	8-8.5	0.1-0.3	1-1.5	2-2.5	3-3.5	4-4.5	5-5.5	7-7.5	8-8.5	0.1-0.3	1-1.5	2-2.5	3-3.5	4-4.1	5-5.5	6-6.5
Location_Code		BH317	BH317	BH317	BH317	BH318	BH318	BH318	BH318	BH318	BH318	BH318	BH318	BH319	BH319	BH319	BH319	BH319	BH319	BH319
Sampled_Date		8/06/2010	8/06/2010	8/06/2010	8/06/2010	29/09/2010	29/09/2010	29/09/2010	29/09/2010	29/09/2010	29/09/2010	29/09/2010	29/09/2010	29/09/2010	29/09/2010	29/09/2010	29/09/2010	29/09/2010	29/09/2010	29/09/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
CPAH (ESDAT)	mg/kg		67		<4.5	<4.5	<4.5	<4.5	15.8	2.8	20.7	64.8	<4.5	<4.5	12.7	<4.5	11.4	4.8	<4.5	1.7	<4.5	22.2	0.6
1. CAHs																							
Tetrachloroethene	mg/kg	0.5																					
Trichloroethene	mg/kg	0.5																					
cis-1,2-dichloroethene	mg/kg	0.5																					
Vinyl chloride	mg/kg	5																					
BTEX																							
Benzene	mg/kg	0.2	81		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (m & p)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (o)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene Total	mg/kg																						
Halogenated Phenols																							
2,3,4,6-tetrachlorophenol	mg/kg	0.5																					
2,4,5-trichlorophenol	mg/kg	0.5																					
2,4,6-trichlorophenol	mg/kg	0.5																					
2,4-dichlorophenol	mg/kg	0.5																					
2,6-dichlorophenol	mg/kg	0.5																					
2-chlorophenol	mg/kg	0.5																					
Pentachlorophenol	mg/kg	1																					
Inorganics																							
Cyanide (Free)	mg/kg	1																					
Cyanide Total	mg/kg	1																					
WAD Cyanide	mg/kg	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
MAH																							
1,2,4-trimethylbenzene	mg/kg	0.5	110																				
1,3,5-trimethylbenzene	mg/kg	0.5																					
Isopropylbenzene	mg/kg	0.5																					
n-butylbenzene	mg/kg	0.5																					
n-propylbenzene	mg/kg	0.5																					
p-isopropyltoluene	mg/kg	0.5																					
sec-butylbenzene	mg/kg	0.5																					
Styrene	mg/kg	0.5																					
tert-butylbenzene	mg/kg	0.5																					
Lead																							
Lead	mg/kg	2		1700	98	31	20	<5	164	302	901	32	11	103	6	10	78	230	17	42	140	166	40
Metals																							
Arsenic	mg/kg	1		20	<5	<5	<5	<5	<5	24	<5	<5	<5	<5	<5	<5	5	<5	<5	<5	<5	<5	<5
Barium	mg/kg	5																					
Beryllium	mg/kg	1																					
Cadmium	mg/kg	0.1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	3	<1	<1	<1	<1
Chromium	mg/kg	1	180000		6	5	4	9	11	14	25	9	7	6	4	6	35	9	8	9	11	5	9
Chromium (hexavalent)	mg/kg	0.5	950																				
Cobalt	mg/kg	1																					
Copper	mg/kg	2		170	<5	<5	<5	13	44	64	12	19	7	75	<5	6	61	24	6	26	13	7	13
Iron	mg/kg	10																					
Manganese	mg/kg	5																					
Mercury	mg/kg	0.01			0.4	0.1	<0.1	<0.1	<0.1	0.2	0.3	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	0.2	4.3	0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	1			<2	2	<2	<2	17	9	3	3	<2	6	<2	2	35	4	2	6	5	<2	4
Vanadium	mg/kg	5	22000																				
Zinc	mg/kg	2		220	58	32	8	9	102	118	329	48	6	55	8	11	101	60	23	46	106	42	28
Nitroaromatics																							
2-Picoline	mg/kg	0.5																					
4-aminobiphenyl	mg/kg	0.5																					
Pentachloronitrobenzene	mg/kg	0.5																					

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field_ID		BH317 5.0-5.5	BH317 6.0-6.5	BH317 7.0-7.5	BH317 8.0-8.5	BH318 0.1-0.3	BH318 1.0-1.5	BH318 2.0-2.5	BH318 3.0-3.5	BH318 4.0-4.5	BH318 5.0-5.5	BH318 7.0-7.5	BH318 8.0-8.5	BH319 0.1-0.3	BH319 1.0-1.5	BH319 2.0-2.5	BH319 3.0-3.5	BH319 4.0-4.1	BH319 5.0-5.5	BH319 6.0-6.5
Sample_Depth		5-5.5	6-6.5	7-7.5	8-8.5	0.1-0.3	1-1.5	2-2.5	3-3.5	4-4.5	5-5.5	7-7.5	8-8.5	0.1-0.3	1-1.5	2-2.5	3-3.5	4-4.1	5-5.5	6-6.5
Location_Code		BH317	BH317	BH317	BH317	BH318	BH318	BH318	BH318	BH318	BH318	BH318	BH318	BH319	BH319	BH319	BH319	BH319	BH319	BH319
Sampled_Date		8/06/2010	8/06/2010	8/06/2010	8/06/2010	29/09/2010	29/09/2010	29/09/2010	29/09/2010	29/09/2010	29/09/2010	29/09/2010	29/09/2010	29/09/2010	29/09/2010	29/09/2010	29/09/2010	29/09/2010	29/09/2010	29/09/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
PAH/Phenols																							
PAH (ESDAT TOTAL)	mg/kg				<8	0.5	<8	<8	29.2	5.2	35.6	175.2	<8	<8	29.5	<8	26.3	10.1	0.5	4.6	<8	51.3	1.7
2,4-dimethylphenol	mg/kg	0.5																					
2-chloronaphthalene	mg/kg	0.5																					
2-methylnaphthalene	mg/kg	0.5																					
2-methylphenol	mg/kg	0.5																					
2-nitrophenol	mg/kg	0.5																					
3-&4-methylphenol	mg/kg	0.5	5400																				
3-methylcholanthrene	mg/kg	0.5																					
4-chloro-3-methylphenol	mg/kg	0.5																					
Acenaphthene	mg/kg	0.5		8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	0.6	<0.5	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	4.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1	<0.5
Acetophenone	mg/kg	0.5																					
Anthracene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	0.9	<0.5	<0.5	5.5	<0.5	<0.5	0.7	<0.5	1.3	<0.5	<0.5	<0.5	<0.5	1.9	<0.5
Benz(a)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	2.8	0.7	3.4	9	<0.5	<0.5	2.5	<0.5	2	1	<0.5	0.6	<0.5	4.6	<0.5
Benzo(a) pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	2.8	0.7	4.7	15.4	<0.5	<0.5	2.2	<0.5	1.8	1.1	<0.5	0.5	<0.5	3.4	<0.5
Benzo(b)&(k)fluoranthene	mg/kg	1																					
Benzo(b)fluoranthene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	3	0.8	4.4	15.9	<0.5	<0.5	2.5	<0.5	2	1.2	<0.5	0.6	<0.5	4	0.6
Benzo(g,h,i)perylene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	1.3	<0.5	1.9	4.7	<0.5	<0.5	0.9	<0.5	1	0.6	<0.5	<0.5	<0.5	1.4	<0.5
Benzo(k)fluoranthene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	1.5	<0.5	1.7	6.3	<0.5	<0.5	0.9	<0.5	0.8	<0.5	<0.5	<0.5	<0.5	1.7	<0.5
Chrysene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	2.4	0.6	3	8.1	<0.5	<0.5	2.2	<0.5	1.7	0.9	<0.5	<0.5	<0.5	3.9	<0.5
Dibenz(a,h)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg	0.5		8	<0.5	<0.5	<0.5	<0.5	5.3	1.2	3.9	20.8	<0.5	<0.5	6	<0.5	4.8	1.8	<0.5	1.1	<0.5	11.7	0.5
Fluorene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	1.1	<0.5	1.6	4.5	<0.5	<0.5	0.8	<0.5	0.8	<0.5	<0.5	<0.5	<0.5	1.3	<0.5
Naphthalene	mg/kg	0.5		21	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	0.6	0.6	<0.5	<0.5	<0.5	<0.5	<0.5
PAHs (Sum of total)	mg/kg	0.5																					
Phenanthrene	mg/kg	0.5		4	<0.5	<0.5	<0.5	<0.5	2.4	<0.5	0.7	15.7	<0.5	<0.5	4.3	<0.5	4	1	<0.5	0.6	<0.5	5.3	<0.5
Phenol	mg/kg	0.5																					
Phenolics Total	mg/kg																						
Pyrene	mg/kg	0.5			<0.5	0.5	<0.5	<0.5	5.7	1.2	9.7	61.9	<0.5	<0.5	5.2	<0.5	4.7	1.9	0.5	1.2	<0.5	11.1	0.6
TPH																							
TPH C15-C36	mg/kg				<200	<200	<200	<200	420	<200	350	2310	<200	<200	<200	<200	380	<200	<200	<200	<200	200	<200
TPH C10 - C14	mg/kg	50	61,000	50	<50	<50	<50	<50	<50	<50	<50	70	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
TPH C15-C28	mg/kg	100			<100	<100	<100	<100	210	<100	170	1420	<100	<100	<100	<100	200	<100	<100	<100	<100	200	<100
TPH C29-C36	mg/kg	100			<100	<100	<100	<100	210	<100	180	890	<100	<100	<100	<100	180	<100	<100	<100	<100	<100	<100
TPH C6 - C9	mg/kg	2		39	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
TPH+C10 - C36 (Sum)	mg/kg	50			<50	<50	<50	<50	420	<50	350	2380	<50	<50	<50	<50	380	<50	<50	<50	<50	200	<50

Notes:
mg/kg = milligrams per kilogram
LOR = Laboratory Limit of Reporting
Shading = results exceeds soil SSTC-B
Shading = results exceeds soil SSESC-B
Refer to Table T1 for adopted SSTCs and DAFs

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field_ID		BH319 7.0-7.5	BH319 8.0-8.5	BH32 7.0-7.2	BH320 0.1-0.3	BH320 1.0-1.5	BH320 2.0-2.5	BH320 3.0-3.5	BH320 5.0-5.5	BH320 6.0-6.5	BH320 7.0-7.5	BH320 8.0-8.5	BH321 0.23-0.39	BH321 1.0-1.5	BH321 2.0-2.5	BH321 3.0-3.5	BH321 4.0-4.5	BH321 5.0-5.5	BH321 6.0-6.5	BH321 7.0-7.5
Sample_Depth		7-7.5	8-8.5	7-7.2	0.1-0.3	1-1.5	2-2.5	3-3.5	5-5.5	6-6.5	7-7.5	8-8.5	0.23-0.39	1-1.5	2-2.5	3-3.5	4-4.5	5-5.5	6-6.5	7-7.5
Location_Code		BH319	BH319	AECOM BH32	BH320	BH320	BH320	BH320	BH320	BH320	BH320	BH320	BH321	BH321	BH321	BH321	BH321	BH321	BH321	BH321
Sampled_Date		29/09/2010	29/09/2010	2/12/2010	28/09/2010	28/09/2010	28/09/2010	28/09/2010	28/09/2010	28/09/2010	28/09/2010	28/09/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
CPAH (ESDAT)	mg/kg		67		<4.5	<4.5	13.6	12.7	17	6.6	<4.5	<4.5	951.1	<4.5	3.5	<4.5	9.7	<4.5	<4.5	<4.5	<4.5	<4.5	
1. CAHs																							
Tetrachloroethene	mg/kg	0.5																					
Trichloroethene	mg/kg	0.5																					
cis-1,2-dichloroethene	mg/kg	0.5																					
Vinyl chloride	mg/kg	5																					
BTEX																							
Benzene	mg/kg	0.2	81		<0.2	<0.2		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Ethylbenzene	mg/kg	0.2			<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Toluene	mg/kg	0.2			<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Xylene (m & p)	mg/kg	0.2			<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Xylene (o)	mg/kg	0.2			<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Xylene Total	mg/kg																						
Halogenated Phenols																							
2,3,4,6-tetrachlorophenol	mg/kg	0.5																					
2,4,5-trichlorophenol	mg/kg	0.5																					
2,4,6-trichlorophenol	mg/kg	0.5																					
2,4-dichlorophenol	mg/kg	0.5																					
2,6-dichlorophenol	mg/kg	0.5																					
2-chlorophenol	mg/kg	0.5																					
Pentachlorophenol	mg/kg	1																					
Inorganics																							
Cyanide (Free)	mg/kg	1																					
Cyanide Total	mg/kg	1																					
WAD Cyanide	mg/kg	1			<1	<1		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
MAH																							
1,2,4-trimethylbenzene	mg/kg	0.5	110																				
1,3,5-trimethylbenzene	mg/kg	0.5																					
Isopropylbenzene	mg/kg	0.5																					
n-butylbenzene	mg/kg	0.5																					
n-propylbenzene	mg/kg	0.5																					
p-isopropyltoluene	mg/kg	0.5																					
sec-butylbenzene	mg/kg	0.5																					
Styrene	mg/kg	0.5																					
tert-butylbenzene	mg/kg	0.5																					
Lead																							
Lead	mg/kg	2		1700	41	54	63	268	17	32	54	698	65	30	26	7	38	40	8	32	98	40	15
Metals																							
Arsenic	mg/kg	1		20	5	<5	<5	7	<5	6	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	
Barium	mg/kg	5					40																
Beryllium	mg/kg	1					<1																
Cadmium	mg/kg	0.1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Chromium	mg/kg	1	180000		8	7	11	20	23	20	17	13	4	14	5	2	7	7	7	16	8	9	13
Chromium (hexavalent)	mg/kg	0.5	950																				
Cobalt	mg/kg	1					<2																
Copper	mg/kg	2		170	41	81	10	56	<5	48	18	18	121	<5	5	257	44	8	<5	6	<5	6	<5
Iron	mg/kg	10																					
Manganese	mg/kg	5					25																
Mercury	mg/kg	0.01			<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Nickel	mg/kg	1			6	6	<2	14	<2	18	4	7	6	7	<2	7	4	<2	<2	3	<2	5	<2
Vanadium	mg/kg	5	22000				21																
Zinc	mg/kg	2		220	46	51	49	400	10	19	62	115	56	33	12	54	26	29	<5	26	30	18	12
Nitroaromatics																							
2-Picoline	mg/kg	0.5																					
4-aminobiphenyl	mg/kg	0.5																					
Pentachloronitrobenzene	mg/kg	0.5																					

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field ID		BH319 7.0-7.5	BH319 8.0-8.5	BH32 7.0-7.2	BH320 0.1-0.3	BH320 1.0-1.5	BH320 2.0-2.5	BH320 3.0-3.5	BH320 5.0-5.5	BH320 6.0-6.5	BH320 7.0-7.5	BH320 8.0-8.5	BH321 0.23-0.39	BH321 1.0-1.5	BH321 2.0-2.5	BH321 3.0-3.5	BH321 4.0-4.5	BH321 5.0-5.5	BH321 6.0-6.5	BH321 7.0-7.5
Sample Depth		7-7.5	8-8.5	7-7.2	0.1-0.3	1-1.5	2-2.5	3-3.5	5-5.5	6-6.5	7-7.5	8-8.5	0.23-0.39	1-1.5	2-2.5	3-3.5	4-4.5	5-5.5	6-6.5	7-7.5
Location Code		BH319	BH319	AECOM BH32	BH320	BH320	BH320	BH320	BH320	BH320	BH320	BH320	BH321	BH321	BH321	BH321	BH321	BH321	BH321	BH321
Sampled Date		29/09/2010	29/09/2010	2/12/2010	28/09/2010	28/09/2010	28/09/2010	28/09/2010	28/09/2010	28/09/2010	28/09/2010	28/09/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																		
PAH/Phenols																						
PAH (ESDAT TOTAL)	mg/kg				<8	1.1	35	25.6	55.7	11.3	2.6	5.4	2561.3	2.4	11.6	<8	26.7	<8	<8	<8	<8	<8
2,4-dimethylphenol	mg/kg	0.5																				
2-chloronaphthalene	mg/kg	0.5																				
2-methylnaphthalene	mg/kg	0.5																				
2-methylphenol	mg/kg	0.5																				
2-nitrophenol	mg/kg	0.5																				
3-&4-methylphenol	mg/kg	0.5	5400																			
3-methylcholanthrene	mg/kg	0.5																				
4-chloro-3-methylphenol	mg/kg	0.5																				
Acenaphthene	mg/kg	0.5		8	<0.5	<0.5	<0.5	<0.5	2.4	<0.5	<0.5	0.6	18.1	<0.5	<0.5	<0.5	1	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.5		5	<0.5	<0.5	1	<0.5	0.5	<0.5	<0.5	<0.5	118	<0.5	<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	<0.5
Acetophenone	mg/kg	0.5																				
Anthracene	mg/kg	0.5		5	<0.5	<0.5	1.9	1.2	3	<0.5	<0.5	<0.5	146	<0.5	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	mg/kg	0.5			<0.5	<0.5	2.7	1.9	3.4	0.9	<0.5	<0.5	182	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a) pyrene	mg/kg	0.5			<0.5	<0.5	1.6	1.7	1.8	<0.5	<0.5	<0.5	155	<0.5	<0.5	<0.5	2.7	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b)&(k)fluoranthene	mg/kg	1																				
Benzo(b)fluoranthene	mg/kg	0.5			<0.5	<0.5	2.4	1.8	2.1	1	<0.5	<0.5	144	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g,h,i)perylene	mg/kg	0.5			<0.5	<0.5	0.9	1.4	1.3	1.3	<0.5	<0.5	108	<0.5	<0.5	<0.5	1.1	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	mg/kg	0.5			<0.5	<0.5	1.2	2.1	2.1	1.2	<0.5	<0.5	89.8	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	mg/kg	0.5			<0.5	<0.5	2.2	1.5	2.3	1.2	<0.5	<0.5	166	<0.5	0.8	<0.5	2.3	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a,h)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	25.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg	0.5		8	<0.5	0.5	7.2	4.8	12.2	2.2	0.9	1.6	353	0.8	2.8	<0.5	6.1	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	mg/kg	0.5		5	<0.5	<0.5	1	<0.5	1.4	<0.5	<0.5	<0.5	131	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5			<0.5	<0.5	0.7	1.1	1	1	<0.5	<0.5	80.7	<0.5	<0.5	<0.5	0.9	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	mg/kg	0.5		21	<0.5	<0.5	<0.5	<0.5	2.7	<0.5	<0.5	<0.5	28.1	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PAHs (Sum of total)	mg/kg	0.5																				
Phenanthrene	mg/kg	0.5		4	<0.5	<0.5	5.4	2.7	8	<0.5	0.7	1.5	455	0.6	2.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenol	mg/kg	0.5																				
Phenolics Total	mg/kg																					
Pyrene	mg/kg	0.5			<0.5	0.6	6.8	5.4	11.5	2.5	1	1.7	361	1	3	<0.5	8.1	<0.5	<0.5	<0.5	<0.5	<0.5
TPH																						
TPH C15-C36	mg/kg				<200	<200		850	820	<200	<200	<200	860	<200	<200	<200	990	<200	<200	<200	<200	<200
TPH C10 - C14	mg/kg	50	61,000	50	<50	<50		<50	70	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
TPH C15-C28	mg/kg	100			<100	<100		340	590	<100	<100	<100	570	<100	<100	<100	430	<100	<100	<100	<100	<100
TPH C29-C36	mg/kg	100			<100	<100		510	230	<100	<100	<100	290	<100	<100	<100	560	<100	<100	<100	<100	<100
TPH C6 - C9	mg/kg	2		39	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
TPH+C10 - C36 (Sum)	mg/kg	50			<50	<50		850	890	<50	<50	<50	860	<50	<50	<50	990	<50	<50	<50	<50	<50

Notes:
mg/kg = milligrams per kilogram
LOR = Laboratory Limit of Reporting
Shading = results exceeds soil SSTC-B
Shading = results exceeds soil SSESC-B
Refer to Table T1 for adopted SSTCs and DAFs

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field_ID		BH321_8.0-8.5	BH322_0.1-0.2	BH322_1.0-1.2	BH322_2.0-2.2	BH322_3.0-3.2	BH322_4.0-4.2	BH322_5.0-5.2	BH322_5.8-6.2	BH322_7.0-7.2	BH323_0.1-0.2	BH323_1.5-1.7	BH323_2.5-2.6	BH323_3.5-3.6	BH323_4.5-4.6	BH323_5.5-5.6	BH323_6.5-6.6	BH323_7.5-7.6	BH324_2-2.5	BH324_3-3.5
Sample_Depth		8-8.5	0.1-0.2	1-1.2	2-2.2	3-3.2	4-4.2	5-5.2	5.8-6.2	7-7.2	0.1-0.2	1.5-1.7	2.5-2.6	3.5-3.6	4.5-4.6	5.5-5.6	6.5-6.6	7.5-7.6	2-2.5	3-3.5
Location_Code		BH321	BH322	BH322	BH322	BH322	BH322	BH322	BH322	BH322	BH323	BH323	BH323	BH323	BH323	BH323	BH323	BH323	BH324	BH324
Sampled_Date		8/04/2010	23/07/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/05/2010	8/05/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
CPAH (ESDAT)	mg/kg		67		0.5	<4.5	<4.5	<4.5	2.7	<4.5	<4.5	<4.5	17.6	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	2.3	6.3	
1. CAHs																							
Tetrachloroethene	mg/kg	0.5																					
Trichloroethene	mg/kg	0.5																					
cis-1,2-dichloroethene	mg/kg	0.5																					
Vinyl chloride	mg/kg	5																					
BTEX																							
Benzene	mg/kg	0.2	81		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Ethylbenzene	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Toluene	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Xylene (m & p)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Xylene (o)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Xylene Total	mg/kg																						
Halogenated Phenols																							
2,3,4,6-tetrachlorophenol	mg/kg	0.5																					
2,4,5-trichlorophenol	mg/kg	0.5																					
2,4,6-trichlorophenol	mg/kg	0.5																					
2,4-dichlorophenol	mg/kg	0.5																					
2,6-dichlorophenol	mg/kg	0.5																					
2-chlorophenol	mg/kg	0.5																					
Pentachlorophenol	mg/kg	1																					
Inorganics																							
Cyanide (Free)	mg/kg	1																					
Cyanide Total	mg/kg	1																					
WAD Cyanide	mg/kg	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
MAH																							
1,2,4-trimethylbenzene	mg/kg	0.5	110																				
1,3,5-trimethylbenzene	mg/kg	0.5																					
Isopropylbenzene	mg/kg	0.5																					
n-butylbenzene	mg/kg	0.5																					
n-propylbenzene	mg/kg	0.5																					
p-isopropyltoluene	mg/kg	0.5																					
sec-butylbenzene	mg/kg	0.5																					
Styrene	mg/kg	0.5																					
tert-butylbenzene	mg/kg	0.5																					
Lead																							
Lead	mg/kg	2		1700	54	25	35	47	206	32	24	9	459	7	11	11	14	9	14	11	12	200	67
Metals																							
Arsenic	mg/kg	1		20	<5	<5	<5	<5	<5	<5	<5	<5	22	<5	<5	<5	<5	<5	<5	<5	7	7	
Barium	mg/kg	5																					
Beryllium	mg/kg	1																					
Cadmium	mg/kg	0.1			<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	2	<1	
Chromium	mg/kg	1	180000		7	8	8	4	3	4	7	3	43	4	10	18	8	7	8	7	9	16	16
Chromium (hexavalent)	mg/kg	0.5	950																				
Cobalt	mg/kg	1																					
Copper	mg/kg	2		170	9	155	11	6	<5	<5	<5	7	202	318	<5	<5	<5	8	6	<5	6	24	26
Iron	mg/kg	10																					
Manganese	mg/kg	5																					
Mercury	mg/kg	0.01			<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	3.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	
Nickel	mg/kg	1			3	28	2	3	<2	2	<2	<2	14	7	5	5	8	5	7	7	7	25	7
Vanadium	mg/kg	5	22000																				
Zinc	mg/kg	2		220	33	74	50	50	67	11	12	<5	626	60	23	21	32	20	41	38	26	178	66
Nitroaromatics																							
2-Picoline	mg/kg	0.5																					
4-aminobiphenyl	mg/kg	0.5																					
Pentachloronitrobenzene	mg/kg	0.5																					



Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Lend Lease
Barangaroo

Field_ID		BH321_8.0-8.5	BH322_0.1-0.2	BH322_1.0-1.2	BH322_2.0-2.2	BH322_3.0-3.2	BH322_4.0-4.2	BH322_5.0-5.2	BH322_5.8-6.2	BH322_7.0-7.2	BH323_0.1-0.2	BH323_1.5-1.7	BH323_2.5-2.6	BH323_3.5-3.6	BH323_4.5-4.6	BH323_5.5-5.6	BH323_6.5-6.6	BH323_7.5-7.6	BH324_2-2.5	BH324_3-3.5
Sample_Depth		8-8.5	0.1-0.2	1-1.2	2-2.2	3-3.2	4-4.2	5-5.2	5.8-6.2	7-7.2	0.1-0.2	1.5-1.7	2.5-2.6	3.5-3.6	4.5-4.6	5.5-5.6	6.5-6.6	7.5-7.6	2-2.5	3-3.5
Location_Code		BH321	BH322	BH322	BH322	BH322	BH322	BH322	BH322	BH322	BH323	BH323	BH323	BH323	BH323	BH323	BH323	BH323	BH324	BH324
Sampled_Date		8/04/2010	23/07/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/05/2010	8/05/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																		
PAH/Phenols																						
PAH (ESDAT TOTAL)	mg/kg				3.2	<8	<8	<8	5.1	<8	<8	<8	32.4	<8	<8	<8	<8	<8	<8	<8	5.9	9.7
2,4-dimethylphenol	mg/kg	0.5																				
2-chloronaphthalene	mg/kg	0.5																				
2-methylnaphthalene	mg/kg	0.5																				
2-methylphenol	mg/kg	0.5																				
2-nitrophenol	mg/kg	0.5																				
3-&4-methylphenol	mg/kg	0.5	5400																			
3-methylcholanthrene	mg/kg	0.5																				
4-chloro-3-methylphenol	mg/kg	0.5																				
Acenaphthene	mg/kg	0.5		8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acetophenone	mg/kg	0.5																				
Anthracene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	mg/kg	0.5			0.5	<0.5	<0.5	<0.5	0.9	<0.5	<0.5	<0.5	2.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1
Benzo(a) pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	2.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.4
Benzo(b)&(k)fluoranthene	mg/kg	1																				
Benzo(b)fluoranthene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	4.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.1
Benzo(g,h,i)perylene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.9
Benzo(k)fluoranthene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5
Chrysene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	0.8
Dibenz(a,h)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg	0.5		8	1.3	<0.5	<0.5	<0.5	1.1	<0.5	<0.5	<0.5	5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.4	1.5
Fluorene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6
Naphthalene	mg/kg	0.5		21	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PAHs (Sum of total)	mg/kg	0.5																				
Phenanthrene	mg/kg	0.5		4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	<0.5
Phenol	mg/kg	0.5																				
Phenolics Total	mg/kg																					
Pyrene	mg/kg	0.5			1.4	<0.5	<0.5	<0.5	1.3	<0.5	<0.5	<0.5	6.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.4	1.9
TPH																						
TPH C15-C36	mg/kg				<200	<200	<200	<200	<200	<200	<200	<200	4250	<200	<200	<200	<200	<200	<200	<200	<200	130
TPH C10 - C14	mg/kg	50	61,000	50	<50	<50	<50	<50	<50	<50	<50	<50	50	<50	<50	<50	<50	<50	<50	<50	<50	<50
TPH C15-C28	mg/kg	100			<100	<100	<100	<100	<100	<100	<100	<100	1920	<100	<100	<100	<100	<100	<100	<100	<100	<100
TPH C29-C36	mg/kg	100			<100	<100	<100	<100	<100	<100	<100	<100	2330	<100	<100	<100	<100	<100	<100	<100	<100	130
TPH C6 - C9	mg/kg	2		39	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
TPH+C10 - C36 (Sum)	mg/kg	50			<50	<50	<50	<50	<50	<50	<50	<50	4300	<50	<50	<50	<50	<50	<50	<50	<50	130

Notes:
mg/kg = milligrams per kilogram
LOR = Laboratory Limit of Reporting
Shading = results exceeds soil SSTC-B
Shading = results exceeds soil SSESC-B
Refer to Table T1 for adopted SSTCs and DAFs

[illegible][illegible]



Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Lend Lease
Barangaroo

Field_ID		BH324_4-4.5	BH324_5-5.5	BH324_6-6.5	BH324_7-7.5	BH324_8-8.5	BH325_0.1-0.2	BH325_1.5-1.8	BH325_2.5-2.7	BH325_3.5-3.8	BH325_4.5-4.6	BH325_5.5-5.8	BH325_6.5-6.6	BH325_7.5-7.7	BH326_0.1-0.2	BH326_1.0-1.5	BH326_2.0-2.5	BH326_3.0-3.5	BH326_4.0-4.5	BH326_5.0-5.5
Sample_Depth		4-4.5	5-5.5	6-6.5	7-7.5	8-8.5	0.1-0.2	1.5-1.8	2.5-2.7	3.5-3.8	4.5-4.6	5.5-5.8	6.5-6.6	7.5-7.7	0.1-0.2	1-1.5	2-2.5	3-3.5	4-4.5	5-5.5
Location_Code		BH324	BH324	BH324	BH324	BH324	BH325	BH325	BH325	BH325	BH325	BH325	BH325	BH325	BH326	BH326	BH326	BH326	BH326	BH326
Sampled_Date		8/05/2010	8/05/2010	8/05/2010	8/05/2010	8/05/2010	8/05/2010	8/05/2010	8/05/2010	8/05/2010	8/05/2010	8/05/2010	8/05/2010	8/05/2010	8/05/2010	8/06/2010	8/06/2010	8/06/2010	8/06/2010	8/06/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
PAH/Phenols																							
PAH (ESDAT TOTAL)	mg/kg				2.6	54	<8	128.5	6.7	<8	4.1	<8	<8	97	<8	<8	<8	<8	4.1	<8	<8	<8	<8
2,4-dimethylphenol	mg/kg	0.5																					
2-chloronaphthalene	mg/kg	0.5																					
2-methylnaphthalene	mg/kg	0.5																					
2-methylphenol	mg/kg	0.5																					
2-nitrophenol	mg/kg	0.5																					
3-&4-methylphenol	mg/kg	0.5	5400																				
3-methylcholanthrene	mg/kg	0.5																					
4-chloro-3-methylphenol	mg/kg	0.5																					
Acenaphthene	mg/kg	0.5		8	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.5		5	<0.5	0.8	<0.5	2.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acetophenone	mg/kg	0.5																					
Anthracene	mg/kg	0.5		5	<0.5	0.8	<0.5	6.5	<0.5	<0.5	<0.5	<0.5	<0.5	4.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	mg/kg	0.5			<0.5	5.8	<0.5	13.4	0.8	<0.5	0.6	<0.5	<0.5	8.1	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a) pyrene	mg/kg	0.5			<0.5	3.7	<0.5	7.6	0.6	<0.5	0.6	<0.5	<0.5	8.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b)&(k)fluoranthene	mg/kg	1																					
Benzo(b)fluoranthene	mg/kg	0.5			<0.5	5	<0.5	12.7	0.8	<0.5	0.6	<0.5	<0.5	8.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5
Benzo(g,h,i)perylene	mg/kg	0.5			<0.5	1.6	<0.5	2.6	<0.5	<0.5	<0.5	<0.5	<0.5	3.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	mg/kg	0.5			<0.5	1.3	<0.5	3.3	<0.5	<0.5	<0.5	<0.5	<0.5	4.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	mg/kg	0.5			<0.5	2.9	<0.5	10	0.6	<0.5	<0.5	<0.5	<0.5	6.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a,h)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	1	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg	0.5		8	0.9	10.5	<0.5	27.8	1.6	<0.5	1.1	<0.5	<0.5	23.7	<0.5	<0.5	<0.5	<0.5	1	<0.5	<0.5	<0.5	<0.5
Fluorene	mg/kg	0.5		5	<0.5	<0.5	<0.5	1.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5			<0.5	1.4	<0.5	2.7	<0.5	<0.5	<0.5	<0.5	<0.5	3.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	mg/kg	0.5		21	<0.5	<0.5	<0.5	1.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PAHs (Sum of total)	mg/kg	0.5																					
Phenanthrene	mg/kg	0.5		4	0.7	1	<0.5	14	0.9	<0.5	<0.5	<0.5	<0.5	1.7	<0.5	<0.5	<0.5	<0.5	0.9	<0.5	<0.5	<0.5	<0.5
Phenol	mg/kg	0.5																					
Phenolics Total	mg/kg																						
Pyrene	mg/kg	0.5			1	19.2	<0.5	21.2	1.4	<0.5	1.2	<0.5	<0.5	23.2	<0.5	<0.5	<0.5	<0.5	1.1	<0.5	<0.5	<0.5	<0.5
TPH																							
TPH C15-C36	mg/kg				<200	560	<200	600	<200	<200	<200	<200	<200	1040	<200	<200	<200	<200	<200	<200	<200	<200	<200
TPH C10 - C14	mg/kg	50	61,000	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
TPH C15-C28	mg/kg	100			<100	290	<100	360	<100	<100	<100	<100	<100	420	<100	<100	<100	<100	<100	<100	<100	<100	<100
TPH C29-C36	mg/kg	100			<100	270	<100	240	<100	<100	<100	<100	<100	620	<100	<100	<100	<100	<100	<100	<100	<100	<100
TPH C6 - C9	mg/kg	2		39	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
TPH+C10 - C36 (Sum)	mg/kg	50			<50	560	<50	600	<50	<50	<50	<50	<50	1040	<50	<50	<50	<50	<50	<50	<50	<50	<50

Notes:
mg/kg = milligrams per kilogram
LOR = Laboratory Limit of Reporting
Shading = results exceeds soil SSTC-B
Shading = results exceeds soil SSESC-B
Refer to Table T1 for adopted SSTCs and DAFs

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field_ID		BH326 6.0-6.5	BH326 7.0-7.5	BH326 8.0-8.5	BH327 0.1-0.2	BH327 1-1.5	BH327 2-2.5	BH327 3-3.5	BH327 4-4.5	BH327 5-5.5	BH327 6-6.5	BH327 7-7.5	BH328 0.3-0.5	BH328 1.0-1.5	BH328 2.0-2.5	BH328 3.0-3.5	BH328 4.0-4.31	BH328 5.0-5.5	BH328 6.0-6.5	BH328 7.0-7.5
Sample_Depth		6-6.5	7-7.5	8-8.5	0.1-0.2	1-1.5	2-2.5	3-3.5	4-4.5	5-5.5	6-6.5	7-7.5	0.3-0.5	1-1.5	2-2.5	3-3.5	4-4.31	5-5.5	6-6.5	7-7.5
Location_Code		BH326	BH326	BH326	BH327	BH327	BH327	BH327	BH327	BH327	BH327	BH327	BH328	BH328	BH328	BH328	BH328	BH328	BH328	BH328
Sampled_Date		8/09/2010	8/09/2010	8/09/2010	8/05/2010	8/05/2010	8/05/2010	8/05/2010	8/05/2010	8/05/2010	8/05/2010	8/05/2010	28/09/2010	28/09/2010	28/09/2010	28/09/2010	28/09/2010	28/09/2010	28/09/2010	28/09/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
CPAH (ESDAT)	mg/kg		67		<4.5	<4.5	<4.5	<4.5	5.7	<4.5	2.7	<4.5	<4.5	0	8.5	2.5	<4.5	<4.5	<4.5	2.8	1.2	12.4	<4.5
1. CAHs																							
Tetrachloroethene	mg/kg	0.5																					
Trichloroethene	mg/kg	0.5																					
cis-1,2-dichloroethene	mg/kg	0.5																					
Vinyl chloride	mg/kg	5																					
BTEX																							
Benzene	mg/kg	0.2	81		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (m & p)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (o)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene Total	mg/kg														<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Halogenated Phenols																							
2,3,4,6-tetrachlorophenol	mg/kg	0.5																					
2,4,5-trichlorophenol	mg/kg	0.5																					
2,4,6-trichlorophenol	mg/kg	0.5																					
2,4-dichlorophenol	mg/kg	0.5																					
2,6-dichlorophenol	mg/kg	0.5																					
2-chlorophenol	mg/kg	0.5																					
Pentachlorophenol	mg/kg	1																					
Inorganics																							
Cyanide (Free)	mg/kg	1																					
Cyanide Total	mg/kg	1																					
WAD Cyanide	mg/kg	1			<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	<1	<1	<1	<1	<1	<1	<1
MAH																							
1,2,4-trimethylbenzene	mg/kg	0.5	110																				
1,3,5-trimethylbenzene	mg/kg	0.5																					
Isopropylbenzene	mg/kg	0.5																					
n-butylbenzene	mg/kg	0.5																					
n-propylbenzene	mg/kg	0.5																					
p-isopropyltoluene	mg/kg	0.5																					
sec-butylbenzene	mg/kg	0.5																					
Styrene	mg/kg	0.5																					
tert-butylbenzene	mg/kg	0.5																					
Lead																							
Lead	mg/kg	2		1700	66	8	24	8	177	222	292	7	26		126	120	45	80	65	302	417	69	30
Metals																							
Arsenic	mg/kg	1		20	<5	<5	<5	<5	<5	<5	<5	<5	<5		<5	<5	<5	<5	<5	<5	<5	<5	<5
Barium	mg/kg	5													<5	<5	<5	<5	<5	<5	<5	<5	<5
Beryllium	mg/kg	1																					
Cadmium	mg/kg	0.1			<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	mg/kg	1	180000		15	8	8	3	4	6	7	5	5		8	10	13	8	13	7	6	16	7
Chromium (hexavalent)	mg/kg	0.5	950																				
Cobalt	mg/kg	1																					
Copper	mg/kg	2		170	<5	<5	6	222	381	8	13	6	19		28	36	90	66	45	18	11	11	34
Iron	mg/kg	10																					
Manganese	mg/kg	5																					
Mercury	mg/kg	0.01			0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1		0.3	<0.1	<0.1	0.1	0.1	0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	1			2	<2	4	18	<2	2	5	<2	<2		4	19	58	10	6	2	<2	9	6
Vanadium	mg/kg	5	22000																				
Zinc	mg/kg	2		220	26	6	39	47	664	34	183	18	32		68	82	86	46	36	81	140	70	48
Nitroaromatics																							
2-Picoline	mg/kg	0.5																					
4-aminobiphenyl	mg/kg	0.5																					
Pentachloronitrobenzene	mg/kg	0.5																					



Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Lend Lease
Barangaroo

Field_ID		BH326 6.0-6.5	BH326 7.0-7.5	BH326 8.0-8.5	BH327 0.1-0.2	BH327 1-1.5	BH327 2-2.5	BH327 3-3.5	BH327 4-4.5	BH327 5-5.5	BH327 6-6.5	BH327 7-7.5	BH328 0.3-0.5	BH328 1.0-1.5	BH328 2.0-2.5	BH328 3.0-3.5	BH328 4.0-4.31	BH328 5.0-5.5	BH328 6.0-6.5	BH328 7.0-7.5
Sample_Depth		6-6.5	7-7.5	8-8.5	0.1-0.2	1-1.5	2-2.5	3-3.5	4-4.5	5-5.5	6-6.5	7-7.5	0.3-0.5	1-1.5	2-2.5	3-3.5	4-4.31	5-5.5	6-6.5	7-7.5
Location_Code		BH326	BH326	BH326	BH327	BH327	BH327	BH327	BH327	BH327	BH327	BH327	BH328	BH328	BH328	BH328	BH328	BH328	BH328	BH328
Sampled_Date		8/09/2010	8/09/2010	8/09/2010	8/05/2010	8/05/2010	8/05/2010	8/05/2010	8/05/2010	8/05/2010	8/05/2010	8/05/2010	28/09/2010	28/09/2010	28/09/2010	28/09/2010	28/09/2010	28/09/2010	28/09/2010	28/09/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
PAH/Phenols																							
PAH (ESDAT TOTAL)	mg/kg				1.3	<8	<8	<8	6.4	<8	4.6	<8	<8		21.6	5.2	<8	<8	2.7	6.2	3.5	21	<8
2,4-dimethylphenol	mg/kg	0.5																					
2-chloronaphthalene	mg/kg	0.5																					
2-methylnaphthalene	mg/kg	0.5																					
2-methylphenol	mg/kg	0.5																					
2-nitrophenol	mg/kg	0.5																					
3-&4-methylphenol	mg/kg	0.5	5400																				
3-methylcholanthrene	mg/kg	0.5																					
4-chloro-3-methylphenol	mg/kg	0.5																					
Acenaphthene	mg/kg	0.5		8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acetophenone	mg/kg	0.5																					
Anthracene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.4	<0.5
Benz(a)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	0.5	<0.5	0.6	<0.5	<0.5		1.4	0.7	<0.5	<0.5	<0.5	0.7	<0.5	1.6	<0.5
Benzo(a) pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	1.3	<0.5	0.7	<0.5	<0.5		1.4	0.6	<0.5	<0.5	<0.5	0.8	0.6	1.5	<0.5
Benzo(b)&(k)fluoranthene	mg/kg	1																					
Benzo(b)fluoranthene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	1	<0.5	0.9	<0.5	<0.5		1.7	0.7	<0.5	<0.5	<0.5	0.8	0.6	2.3	<0.5
Benzo(g,h,i)perylene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	1.4	<0.5	<0.5	<0.5	<0.5		0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.7	<0.5
Benzo(k)fluoranthene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.7	<0.5
Chrysene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	0.5	<0.5	0.5	<0.5	<0.5		1.2	0.5	<0.5	<0.5	<0.5	0.5	<0.5	1.6	<0.5
Dibenz(a,h)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg	0.5		8	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	0.9	<0.5	<0.5		3.1	1.1	<0.5	<0.5	0.9	1	0.8	3.6	<0.5
Fluorene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	1	<0.5	<0.5	<0.5	<0.5		0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5
Naphthalene	mg/kg	0.5		21	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		2.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PAHs (Sum of total)	mg/kg	0.5																					
Phenanthrene	mg/kg	0.5		4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		3	0.5	<0.5	<0.5	0.8	0.6	0.6	1.4	<0.5
Phenol	mg/kg	0.5																					
Phenolics Total	mg/kg																						
Pyrene	mg/kg	0.5			0.7	<0.5	<0.5	<0.5	0.7	<0.5	1	<0.5	<0.5		3.2	1.1	<0.5	<0.5	1	1.8	0.9	3.6	<0.5
TPH																							
TPH C15-C36	mg/kg				<200	<200	<200	<200	250	310	<200	<200	<200		830	<200	<200	<200	<200	<200	<200	<200	<200
TPH C10 - C14	mg/kg	50	61,000	50	<50	<50	<50	<50	<50	<50	<50	<50	<50		<50	<50	<50	<50	<50	<50	<50	<50	<50
TPH C15-C28	mg/kg	100			<100	<100	<100	<100	120	170	<100	<100	<100		350	<100	<100	<100	<100	<100	<100	<100	<100
TPH C29-C36	mg/kg	100			<100	<100	<100	<100	130	140	<100	<100	<100		480	<100	<100	<100	<100	<100	<100	<100	<100
TPH C6 - C9	mg/kg	2		39	<10	<10	<10	<10	<10	<10	<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10
TPH+C10 - C36 (Sum)	mg/kg	50			<50	<50	<50	<50	250	310	<50	<50	<50		830	<50	<50	<50	<50	<50	<50	<50	<50

Notes:
mg/kg = milligrams per kilogram
LOR = Laboratory Limit of Reporting
Shading = results exceeds soil SSTC-B
Shading = results exceeds soil SSESC-B
Refer to Table T1 for adopted SSTCs and DAFs

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field_ID		BH328 8.0-8.5	BH329 0.1-0.2	BH329 1.0-1.5	BH329 2.0-2.5	BH329 3.0-3.5	BH329 4.0-4.5	BH329 5.0-5.5	BH329 6.0-6.5	BH329 7.0-7.5	BH329 8.0-8.5	BH33 0.75-0.85	BH33 5.0-5.2	BH33 8.0-8.2	BH330 0.1-0.2	BH330 1-1.5	BH330 2-2.5	BH330 3-3.5	BH330 4-4.5	BH330 5-5.5
Sample_Depth		8-8.5	0.1-0.2	1-1.5	2-2.5	3-3.5	4-4.5	5-5.5	6-6.5	7-7.5	8-8.5	0.75-0.85	5-5.2	8-8.2	0.1-0.2	1-1.5	2-2.5	3-3.5	4-4.5	5-5.5
Location_Code		BH328	BH329	BH329	BH329	BH329	BH329	BH329	BH329	BH329	BH329	AECOM BH33	AECOM BH33	AECOM BH33	BH330	BH330	BH330	BH330	BH330	BH330
Sampled_Date		28/09/2010	27/07/2010	27/09/2010	27/09/2010	27/09/2010	27/09/2010	27/09/2010	27/09/2010	27/09/2010	27/09/2010	2/12/2010	2/12/2010	2/12/2010	23/07/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
CPAH (ESDAT)	mg/kg		67		<4.5	<4.5	<4.5	<4.5	2	13.3	6.2	<4.5	5.5	<4.5	0	<4.5	0	<4.5	1	2.1	0.5	1.8	<4.5
1. CAHs																							
Tetrachloroethene	mg/kg	0.5																					
Trichloroethene	mg/kg	0.5																					
cis-1,2-dichloroethene	mg/kg	0.5																					
Vinyl chloride	mg/kg	5																					
BTEX																							
Benzene	mg/kg	0.2	81		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (m & p)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (o)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene Total	mg/kg																						
Halogenated Phenols																							
2,3,4,6-tetrachlorophenol	mg/kg	0.5																					
2,4,5-trichlorophenol	mg/kg	0.5														<0.5							
2,4,6-trichlorophenol	mg/kg	0.5														<0.5							
2,4-dichlorophenol	mg/kg	0.5														<0.5							
2,6-dichlorophenol	mg/kg	0.5														<0.5							
2-chlorophenol	mg/kg	0.5														<0.5							
Pentachlorophenol	mg/kg	1														<2							
Inorganics																							
Cyanide (Free)	mg/kg	1														<1							
Cyanide Total	mg/kg	1																					
WAD Cyanide	mg/kg	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		<1		<1	<1	<1	<1	<1	<1
MAH																							
1,2,4-trimethylbenzene	mg/kg	0.5	110																				
1,3,5-trimethylbenzene	mg/kg	0.5																					
Isopropylbenzene	mg/kg	0.5																					
n-butylbenzene	mg/kg	0.5																					
n-propylbenzene	mg/kg	0.5																					
p-isopropyltoluene	mg/kg	0.5																					
sec-butylbenzene	mg/kg	0.5																					
Styrene	mg/kg	0.5																					
tert-butylbenzene	mg/kg	0.5																					
Lead																							
Lead	mg/kg	2		1700	<5	9	20	43	1810	90	87	521	811	20	6	36	37	54	43	84	187	45	18
Metals																							
Arsenic	mg/kg	1		20	<5	<5	12	<5	<5	<5	<5	<5	8	<5	<5	6	<5	<5	<5	<5	<5	<5	<5
Barium	mg/kg	5																					
Beryllium	mg/kg	1																					
Cadmium	mg/kg	0.1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	mg/kg	1	180000		4	3	24	6	11	7	6	5	19	3	8	10	9	4	7	7	10	13	19
Chromium (hexavalent)	mg/kg	0.5	950																				
Cobalt	mg/kg	1																					
Copper	mg/kg	2		170	<5	276	54	8	21	34	39	6	35	<5	264	12	10	208	61	23	27	6	<5
Iron	mg/kg	10																					
Manganese	mg/kg	5																					
Mercury	mg/kg	0.01			<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	1			2	10	56	3	2	3	9	<2	<2	<2	10	12	7	9	30	15	12	<2	<2
Vanadium	mg/kg	5	22000																				
Zinc	mg/kg	2		220	<5	59	48	36	214	103	60	45	99	8	50	77	40	62	52	48	114	16	10
Nitroaromatics																							
2-Picoline	mg/kg	0.5																					
4-aminobiphenyl	mg/kg	0.5																					
Pentachloronitrobenzene	mg/kg	0.5																					



Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Lend Lease
Barangaroo

Field_ID		BH328 8.0-8.5	BH329 0.1-0.2	BH329 1.0-1.5	BH329 2.0-2.5	BH329 3.0-3.5	BH329 4.0-4.5	BH329 5.0-5.5	BH329 6.0-6.5	BH329 7.0-7.5	BH329 8.0-8.5	BH33 0.75-0.85	BH33 5.0-5.2	BH33 8.0-8.2	BH330 0.1-0.2	BH330 1-1.5	BH330 2-2.5	BH330 3-3.5	BH330 4-4.5	BH330 5-5.5
Sample_Depth		8-8.5	0.1-0.2	1-1.5	2-2.5	3-3.5	4-4.5	5-5.5	6-6.5	7-7.5	8-8.5	0.75-0.85	5-5.2	8-8.2	0.1-0.2	1-1.5	2-2.5	3-3.5	4-4.5	5-5.5
Location_Code		BH328	BH329	BH329	BH329	BH329	BH329	BH329	BH329	BH329	BH329	AECOM BH33	AECOM BH33	AECOM BH33	BH330	BH330	BH330	BH330	BH330	BH330
Sampled_Date		28/09/2010	27/07/2010	27/09/2010	27/09/2010	27/09/2010	27/09/2010	27/09/2010	27/09/2010	27/09/2010	27/09/2010	2/12/2010	2/12/2010	2/12/2010	23/07/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
PAH/Phenols																							
PAH (ESDAT TOTAL)	mg/kg				<8	<8	<8	<8	4.2	53.5	49	1.5	11.5	<8		<8		1	2.1	4.9	1.9	4.2	<8
2,4-dimethylphenol	mg/kg	0.5														<0.5							
2-chloronaphthalene	mg/kg	0.5																					
2-methylnaphthalene	mg/kg	0.5																					
2-methylphenol	mg/kg	0.5														<0.5							
2-nitrophenol	mg/kg	0.5														<0.5							
3-&4-methylphenol	mg/kg	0.5	5400													<1							
3-methylcholanthrene	mg/kg	0.5																					
4-chloro-3-methylphenol	mg/kg	0.5														<0.5							
Acenaphthene	mg/kg	0.5		8	<0.5	<0.5	<0.5	<0.5	<0.5	3	5.8	<0.5	<0.5	<0.5		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acetophenone	mg/kg	0.5																					
Anthracene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	<0.5	4.6	2.6	<0.5	<0.5	<0.5		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	0.6	1.9	1.1	<0.5	1.2	<0.5		<0.5		<0.5	<0.5	0.5	<0.5	0.6	<0.5
Benzo(a) pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	0.6	1.5	0.7	<0.5	1.1	<0.5		<0.5		<0.5	0.5	0.6	<0.5	0.6	<0.5
Benzo(b)&(k)fluoranthene	mg/kg	1																					
Benzo(b)fluoranthene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	0.8	1.8	0.9	<0.5	1.1	<0.5		<0.5		<0.5	0.5	0.5	0.5	0.6	<0.5
Benzo(g,h,i)perylene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	0.8	<0.5	<0.5	0.6	<0.5		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	0.5	<0.5		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	1.6	0.9	<0.5	1	<0.5		<0.5		<0.5	<0.5	0.5	<0.5	<0.5	<0.5
Dibenz(a,h)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg	0.5		8	<0.5	<0.5	<0.5	<0.5	1	7.3	4.6	0.5	2.4	<0.5		<0.5		0.5	0.5	1.1	0.6	1.2	<0.5
Fluorene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	<0.5	4.8	3.2	<0.5	<0.5	<0.5		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	mg/kg	0.5		21	<0.5	<0.5	<0.5	<0.5	<0.5	1.5	15.7	<0.5	<0.5	<0.5		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PAHs (Sum of total)	mg/kg	0.5																					
Phenanthrene	mg/kg	0.5		4	<0.5	<0.5	<0.5	<0.5	<0.5	17.6	9.6	0.5	1.1	<0.5		<0.5		<0.5	<0.5	0.5	<0.5	<0.5	<0.5
Phenol	mg/kg	0.5														<0.5							
Phenolics Total	mg/kg																						
Pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	1.2	6	3.9	0.5	2.5	<0.5		<0.5		0.5	0.6	1.2	0.8	1.2	<0.5
TPH																							
TPH C15-C36	mg/kg				290	<200	<200	120	340	1210	890	<200	240	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200
TPH C10 - C14	mg/kg	50	61,000	50	<50	<50	<50	<50	<50	<50	70	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
TPH C15-C28	mg/kg	100			290	<100	<100	<100	160	400	390	<100	110	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
TPH C29-C36	mg/kg	100			<100	<100	<100	120	180	810	500	<100	130	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
TPH C6 - C9	mg/kg	2		39	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
TPH+C10 - C36 (Sum)	mg/kg	50			290	<50	<50	120	340	1210	960	<50	240	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50

Notes:
mg/kg = milligrams per kilogram
LOR = Laboratory Limit of Reporting
Shading = results exceeds soil SSTC-B
Shading = results exceeds soil SSESC-B
Refer to Table T1 for adopted SSTCs and DAFs

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field_ID		BH330 6-6.5	BH330 7-7.5	BH331 0.1-0.2	BH331 1.0-1.5	BH331 2.0-2.5	BH331 3.0-3.5	BH331 4.0-4.5	BH331 5.0-5.5	BH331 6.0-6.5	BH331 7.0-7.5	BH331 8.0-8.5	BH332 0.1-0.2	BH332 1.0-1.5	BH332 2.0-2.5	BH332 3.0-3.5	BH332 5.0-5.5	BH332 6.0-6.5	BH332 7.0-7.5	BH333 0.1-0.2
Sample_Depth		6-6.5	7-7.5	0.1-0.2	1-1.5	2-2.5	3-3.5	4-4.5	5-5.5	6-6.5	7-7.5	8-8.5	0.1-0.2	1-1.5	2-2.5	3-3.5	5-5.5	6-6.5	7-7.5	0.1-0.2
Location_Code		BH330	BH330	BH331	BH331	BH331	BH331	BH331	BH331	BH331	BH331	BH331	BH332	BH332	BH332	BH332	BH332	BH332	BH332	BH333
Sampled_Date		8/04/2010	8/04/2010	23/07/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/04/2010	8/04/2010	8/04/2010	8/05/2010	8/05/2010	8/05/2010	8/05/2010	8/05/2010	8/05/2010	8/05/2010	27/07/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
CPAH (ESDAT)	mg/kg		67		<4.5	<4.5	<4.5	<4.5	16	<4.5	1.2	<4.5	<4.5	<4.5	<4.5	<4.5	7.9	0.6	<4.5	<4.5	<4.5	<4.5	<4.5
1. CAHs																							
Tetrachloroethene	mg/kg	0.5																					
Trichloroethene	mg/kg	0.5																					
cis-1,2-dichloroethene	mg/kg	0.5																					
Vinyl chloride	mg/kg	5																					
BTEX																							
Benzene	mg/kg	0.2	81		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (m & p)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (o)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene Total	mg/kg																						
Halogenated Phenols																							
2,3,4,6-tetrachlorophenol	mg/kg	0.5																					
2,4,5-trichlorophenol	mg/kg	0.5																					
2,4,6-trichlorophenol	mg/kg	0.5																					
2,4-dichlorophenol	mg/kg	0.5																					
2,6-dichlorophenol	mg/kg	0.5																					
2-chlorophenol	mg/kg	0.5																					
Pentachlorophenol	mg/kg	1																					
Inorganics																							
Cyanide (Free)	mg/kg	1																					
Cyanide Total	mg/kg	1																					
WAD Cyanide	mg/kg	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
MAH																							
1,2,4-trimethylbenzene	mg/kg	0.5	110																				
1,3,5-trimethylbenzene	mg/kg	0.5																					
Isopropylbenzene	mg/kg	0.5																					
n-butylbenzene	mg/kg	0.5																					
n-propylbenzene	mg/kg	0.5																					
p-isopropyltoluene	mg/kg	0.5																					
sec-butylbenzene	mg/kg	0.5																					
Styrene	mg/kg	0.5																					
tert-butylbenzene	mg/kg	0.5																					
Lead																							
Lead	mg/kg	2		1700	6	16	6	64	30	23	24	24	45	21	34	6	167	59	8	13	18	45	8
Metals																							
Arsenic	mg/kg	1		20	<5	<5	<5	<5	<5	6	6	<5	<5	8	<5	<5	<5	<5	<5	<5	<5	<5	<5
Barium	mg/kg	5																					
Beryllium	mg/kg	1																					
Cadmium	mg/kg	0.1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	mg/kg	1	180000		7	8	3	14	8	10	10	9	8	12	6	3	8	7	4	7	6	7	2
Chromium (hexavalent)	mg/kg	0.5	950																				
Cobalt	mg/kg	1																					
Copper	mg/kg	2		170	<5	<5	220	40	110	10	28	7	8	11	<5	286	10	12	<5	<5	6	<5	316
Iron	mg/kg	10																					
Manganese	mg/kg	5																					
Mercury	mg/kg	0.01			<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	1			<2	4	11	22	19	<2	8	3	4	<2	<2	7	2	5	<2	3	6	3	8
Vanadium	mg/kg	5	22000																				
Zinc	mg/kg	2		220	8	48	55	64	101	9	26	18	28	35	18	48	56	41	6	23	62	33	57
Nitroaromatics																							
2-Picoline	mg/kg	0.5																					
4-aminobiphenyl	mg/kg	0.5																					
Pentachloronitrobenzene	mg/kg	0.5																					



Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Lend Lease
Barangaroo

Field ID		BH330 6-6.5	BH330 7-7.5	BH331 0.1-0.2	BH331 1.0-1.5	BH331 2.0-2.5	BH331 3.0-3.5	BH331 4.0-4.5	BH331 5.0-5.5	BH331 6.0-6.5	BH331 7.0-7.5	BH331 8.0-8.5	BH332 0.1-0.2	BH332 1.0-1.5	BH332 2.0-2.5	BH332 3.0-3.5	BH332 5.0-5.5	BH332 6.0-6.5	BH332 7.0-7.5	BH333 0.1-0.2
Sample Depth		6-6.5	7-7.5	0.1-0.2	1-1.5	2-2.5	3-3.5	4-4.5	5-5.5	6-6.5	7-7.5	8-8.5	0.1-0.2	1-1.5	2-2.5	3-3.5	5-5.5	6-6.5	7-7.5	0.1-0.2
Location Code		BH330	BH330	BH331	BH331	BH331	BH331	BH331	BH331	BH331	BH331	BH331	BH332	BH332	BH332	BH332	BH332	BH332	BH332	BH333
Sampled Date		8/04/2010	8/04/2010	23/07/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/04/2010	8/04/2010	8/04/2010	8/05/2010	8/05/2010	8/05/2010	8/05/2010	8/05/2010	8/05/2010	8/05/2010	27/07/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
PAH/Phenols																							
PAH (ESDAT TOTAL)	mg/kg				<8	<8	<8	2.1	34.8	<8	4.4	<8	<8	<8	1.3	<8	12.9	2.2	<8	<8	<8	0.5	<8
2,4-dimethylphenol	mg/kg	0.5																					
2-chloronaphthalene	mg/kg	0.5																					
2-methylnaphthalene	mg/kg	0.5																					
2-methylphenol	mg/kg	0.5																					
2-nitrophenol	mg/kg	0.5																					
3-&4-methylphenol	mg/kg	0.5	5400																				
3-methylcholanthrene	mg/kg	0.5																					
4-chloro-3-methylphenol	mg/kg	0.5																					
Acenaphthene	mg/kg	0.5		8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	1.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acetophenone	mg/kg	0.5																					
Anthracene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	2.4	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a) pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	2.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b)&(k)fluoranthene	mg/kg	1																					
Benzo(b)fluoranthene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	2.7	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	1.7	0.6	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g,h,i)perylene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	1.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	1.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a,h)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg	0.5		8	<0.5	<0.5	<0.5	0.9	7.4	<0.5	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	1.9	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	1.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	mg/kg	0.5		21	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PAHs (Sum of total)	mg/kg	0.5																					
Phenanthrene	mg/kg	0.5		4	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenol	mg/kg	0.5																					
Phenolics Total	mg/kg																						
Pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	1.2	8.7	<0.5	1.4	<0.5	<0.5	<0.5	<0.5	<0.5	2.5	1.1	<0.5	<0.5	<0.5	<0.5	<0.5
TPH																							
TPH C15-C36	mg/kg				<200	<200	<200	<200	740	<200	<200	<200	<200	<200	1730	<200	<200	<200	<200	<200	<200	<200	<200
TPH C10 - C14	mg/kg	50	61,000	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
TPH C15-C28	mg/kg	100			<100	<100	<100	<100	360	<100	<100	<100	<100	<100	770	<100	<100	<100	<100	<100	<100	<100	<100
TPH C29-C36	mg/kg	100			<100	<100	<100	<100	380	<100	<100	<100	<100	<100	960	<100	<100	<100	<100	<100	<100	<100	<100
TPH C6 - C9	mg/kg	2		39	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
TPH+C10 - C36 (Sum)	mg/kg	50			<50	<50	<50	<50	740	<50	<50	<50	<50	<50	1730	<50	<50	<50	<50	<50	<50	<50	<50

Notes:
mg/kg = milligrams per kilogram
LOR = Laboratory Limit of Reporting
Shading = results exceeds soil SSTC-B
Shading = results exceeds soil SSESC-B
Refer to Table T1 for adopted SSTCs and DAFs

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field_ID		BH333_1.0-1.5	BH333_2.0-2.5	BH333_3.0-3.5	BH333_4.0-4.5	BH333_5.0-5.5	BH333_6.0-6.5	BH333_7.0-7.5	BH333_8.0-8.5	BH334_0.1-0.2	BH334_1.0-1.5	BH334_2.0-2.5	BH334_4.0-4.5	BH334_6.0-6.5	BH334_7.0-7.5	BH334_8.0-8.3	BH335_0.1-0.2	BH335_1.0-1.5	BH335_3.0-3.5	BH335_5.0-5.5
Sample_Depth		1-1.5	2-2.5	3-3.5	4-4.5	5-5.5	6-6.5	7-7.5	8-8.5	0.1-0.2	1-1.5	2-2.5	4-4.5	6-6.5	7-7.5	8-8.3	0.1-0.2	1-1.5	3-3.5	5-5.5
Location_Code		BH333	BH333	BH333	BH333	BH333	BH333	BH333	BH333	BH334	BH334	BH334	BH334	BH334	BH334	BH334	BH335	BH335	BH335	BH335
Sampled_Date		8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	27/07/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	27/07/2010	8/05/2010	8/05/2010	8/05/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
CPAH (ESDAT)	mg/kg		67		34.5	14.4	4.2	9.7	18.9	<4.5	2.3	<4.5	<4.5	34.3	5.9	<4.5	7.2	<4.5	<4.5	<4.5	39.4	<4.5	<4.5
1. CAHs																							
Tetrachloroethene	mg/kg	0.5																					
Trichloroethene	mg/kg	0.5																					
cis-1,2-dichloroethene	mg/kg	0.5																					
Vinyl chloride	mg/kg	5																					
BTEx																							
Benzene	mg/kg	0.2	81		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (m & p)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (o)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene Total	mg/kg																						
Halogenated Phenols																							
2,3,4,6-tetrachlorophenol	mg/kg	0.5																					
2,4,5-trichlorophenol	mg/kg	0.5																					
2,4,6-trichlorophenol	mg/kg	0.5																					
2,4-dichlorophenol	mg/kg	0.5																					
2,6-dichlorophenol	mg/kg	0.5																					
2-chlorophenol	mg/kg	0.5																					
Pentachlorophenol	mg/kg	1																					
Inorganics																							
Cyanide (Free)	mg/kg	1																					
Cyanide Total	mg/kg	1																					
WAD Cyanide	mg/kg	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
MAH																							
1,2,4-trimethylbenzene	mg/kg	0.5	110																				
1,3,5-trimethylbenzene	mg/kg	0.5																					
Isopropylbenzene	mg/kg	0.5																					
n-butylbenzene	mg/kg	0.5																					
n-propylbenzene	mg/kg	0.5																					
p-isopropyltoluene	mg/kg	0.5																					
sec-butylbenzene	mg/kg	0.5																					
Styrene	mg/kg	0.5																					
tert-butylbenzene	mg/kg	0.5																					
Lead																							
Lead	mg/kg	2		1700	67	466	352	77	104	18	35	6	6	58	388	121	798	72	26	8	206	28	21
Metals																							
Arsenic	mg/kg	1		20	<5	<5	<5	<5	6	<5	<5	<5	<5	<5	<5	6	6	<5	<5	<5	<5	<5	<5
Barium	mg/kg	5																					
Beryllium	mg/kg	1																					
Cadmium	mg/kg	0.1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	mg/kg	1	180000		10	8	7	7	10	7	8	5	4	8	9	6	9	10	6	3	9	4	10
Chromium (hexavalent)	mg/kg	0.5	950																				
Cobalt	mg/kg	1																					
Copper	mg/kg	2		170	12	20	22	20	25	<5	10	<5	246	39	18	21	100	25	<5	226	30	<5	7
Iron	mg/kg	10																					
Manganese	mg/kg	5																					
Mercury	mg/kg	0.01			0.2	0.3	0.2	<0.1	0.2	<0.1	0.1	<0.1	<0.1	0.6	0.3	0.1	0.6	0.1	<0.1	<0.1	0.2	<0.1	<0.1
Nickel	mg/kg	1			3	4	4	3	4	<2	<2	<2	8	17	3	4	5	4	<2	12	4	<2	2
Vanadium	mg/kg	5	22000																				
Zinc	mg/kg	2		220	28	133	84	386	85	30	44	<5	56	38	282	248	176	87	32	48	105	18	28
Nitroaromatics																							
2-Picoline	mg/kg	0.5																					
4-aminobiphenyl	mg/kg	0.5																					
Pentachloronitrobenzene	mg/kg	0.5																					



Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Lend Lease
Barangaroo

Field_ID		BH333_1.0-1.5	BH333_2.0-2.5	BH333_3.0-3.5	BH333_4.0-4.5	BH333_5.0-5.5	BH333_6.0-6.5	BH333_7.0-7.5	BH333_8.0-8.5	BH334_0.1-0.2	BH334_1.0-1.5	BH334_2.0-2.5	BH334_4.0-4.5	BH334_6.0-6.5	BH334_7.0-7.5	BH334_8.0-8.3	BH335_0.1-0.2	BH335_1.0-1.5	BH335_3.0-3.5	BH335_5.0-5.5
Sample_Depth		1-1.5	2-2.5	3-3.5	4-4.5	5-5.5	6-6.5	7-7.5	8-8.5	0.1-0.2	1-1.5	2-2.5	4-4.5	6-6.5	7-7.5	8-8.3	0.1-0.2	1-1.5	3-3.5	5-5.5
Location_Code		BH333	BH333	BH333	BH333	BH333	BH333	BH333	BH333	BH334	BH334	BH334	BH334	BH334	BH334	BH334	BH335	BH335	BH335	BH335
Sampled_Date		8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	27/07/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	27/07/2010	8/05/2010	8/05/2010	8/05/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
PAH/Phenols																							
PAH (ESDAT TOTAL)	mg/kg				59.2	26.7	8.7	24.4	37.6	<8	5	<8	<8	62.1	11.8	<8	13.6	<8	<8	<8	77.9	1.5	0.6
2,4-dimethylphenol	mg/kg	0.5																					
2-chloronaphthalene	mg/kg	0.5																					
2-methylnaphthalene	mg/kg	0.5																					
2-methylphenol	mg/kg	0.5																					
2-nitrophenol	mg/kg	0.5																					
3-&4-methylphenol	mg/kg	0.5	5400																				
3-methylcholanthrene	mg/kg	0.5																					
4-chloro-3-methylphenol	mg/kg	0.5																					
Acenaphthene	mg/kg	0.5		8	<0.5	<0.5	<0.5	1.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.5		5	1.9	0.6	<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.3	<0.5
Acetophenone	mg/kg	0.5																					
Anthracene	mg/kg	0.5		5	2.1	1	<0.5	1.4	1.1	<0.5	<0.5	<0.5	<0.5	2.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.3	<0.5	<0.5
Benz(a)anthracene	mg/kg	0.5			5.9	2.5	0.9	1.6	3.3	<0.5	0.5	<0.5	<0.5	6.3	1.4	<0.5	1.8	<0.5	<0.5	<0.5	6.5	<0.5	<0.5
Benzo(a) pyrene	mg/kg	0.5			5.7	2.3	0.9	1.5	3.1	<0.5	0.8	<0.5	<0.5	5.8	1.2	<0.5	1.7	<0.5	<0.5	<0.5	6.1	<0.5	<0.5
Benzo(b)&(k)fluoranthene	mg/kg	1																					
Benzo(b)fluoranthene	mg/kg	0.5			7.1	3.1	1	1.7	3.4	<0.5	1	<0.5	<0.5	6	0.9	<0.5	1.5	<0.5	<0.5	<0.5	7	<0.5	<0.5
Benzo(g,h,i)perylene	mg/kg	0.5			3.3	1.5	0.6	0.8	2.1	<0.5	<0.5	<0.5	<0.5	2.6	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	4.1	<0.5	<0.5
Benzo(k)fluoranthene	mg/kg	0.5			2.4	0.9	<0.5	0.9	1.7	<0.5	<0.5	<0.5	<0.5	2.7	<0.5	<0.5	0.7	<0.5	<0.5	<0.5	2.8	<0.5	<0.5
Chrysene	mg/kg	0.5			4.7	2.1	0.8	1.2	2.4	<0.5	<0.5	<0.5	<0.5	6.1	1.2	<0.5	1.5	<0.5	<0.5	<0.5	6.6	<0.5	<0.5
Dibenz(a,h)anthracene	mg/kg	0.5			0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	<0.5	<0.5
Fluoranthene	mg/kg	0.5		8	9.1	4.4	1.7	4	6.9	<0.5	0.9	<0.5	<0.5	11	2.4	<0.5	2.7	<0.5	<0.5	<0.5	13.4	0.7	<0.5
Fluorene	mg/kg	0.5		5	<0.5	<0.5	<0.5	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5			2.5	1	<0.5	0.6	1.8	<0.5	<0.5	<0.5	<0.5	2.2	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3.2	<0.5	<0.5
Naphthalene	mg/kg	0.5		21	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PAHs (Sum of total)	mg/kg	0.5																					
Phenanthrene	mg/kg	0.5		4	3.4	2.4	0.9	4.8	3.4	<0.5	0.8	<0.5	<0.5	4.2	1.2	<0.5	1.2	<0.5	<0.5	<0.5	9.3	<0.5	<0.5
Phenol	mg/kg	0.5																					
Phenolics Total	mg/kg																						
Pyrene	mg/kg	0.5			10.3	4.9	1.9	4	7.7	<0.5	1	<0.5	<0.5	12	2.3	<0.5	2.5	<0.5	<0.5	<0.5	14.5	0.8	0.6
TPH																							
TPH C15-C36	mg/kg				490	500	<200	530	500	<200	1740	<200	<200	340	<200	<200	<200	<200	<200	<200	200	<200	<200
TPH C10 - C14	mg/kg	50	61,000	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
TPH C15-C28	mg/kg	100			200	180	<100	190	180	<100	1420	<100	<100	180	<100	<100	<100	<100	<100	<100	200	<100	<100
TPH C29-C36	mg/kg	100			290	320	<100	340	320	<100	320	<100	<100	160	<100	<100	<100	<100	<100	<100	<100	<100	<100
TPH C6 - C9	mg/kg	2		39	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
TPH+C10 - C36 (Sum)	mg/kg	50			490	500	<50	530	500	<50	1740	<50	<50	340	<50	<50	<50	<50	<50	<50	200	<50	<50

Notes:
mg/kg = milligrams per kilogram
LOR = Laboratory Limit of Reporting
Shading = results exceeds soil SSTC-B
Shading = results exceeds soil SSESC-B
Refer to Table T1 for adopted SSTCs and DAFs

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field_ID		BH335_6.0-6.5	BH335_7.0-7.5	BH335_8.0-8.26	BH336_0.1-0.2	BH336_1.0-1.5	BH336_2.0-2.5	BH336_3.0-3.5	BH336_4.0-4.2	BH336_5.0-5.5	BH336_6.0-6.5	BH336_7.0-7.5	BH336_8.0-8.3	BH337_0.1-0.2	BH337_1.0-1.5	BH337_2.0-2.5	BH337_3.0-3.5	BH337_4.0-4.5	BH337_5.0-5.5	BH337_6.0-6.5
Sample_Depth		6-6.5	7-7.5	8-8.26	0.1-0.2	1-1.5	2-2.5	3-3.5	4-4.2	5-5.5	6-6.5	7-7.5	8-8.3	0.1-0.2	1-1.5	2-2.5	3-3.5	4-4.5	5-5.5	6-6.5
Location_Code		BH335	BH335	BH335	BH336	BH336	BH336	BH336	BH336	BH336	BH336	BH336	BH336	BH337	BH337	BH337	BH337	BH337	BH337	BH337
Sampled_Date		8/05/2010	8/05/2010	8/05/2010	22/07/2010	30/07/2010	30/07/2010	30/07/2010	30/07/2010	30/07/2010	30/07/2010	30/07/2010	30/07/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/05/2010	8/05/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
CPAH (ESDAT)	mg/kg		67		<4.5	11.2	<4.5	<4.5	24.5	<4.5	0.6	<4.5	25.1	17.7	117.9	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	
1. CAHs																							
Tetrachloroethene	mg/kg	0.5																					
Trichloroethene	mg/kg	0.5																					
cis-1,2-dichloroethene	mg/kg	0.5																					
Vinyl chloride	mg/kg	5																					
BTEX																							
Benzene	mg/kg	0.2	81		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Ethylbenzene	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Toluene	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Xylene (m & p)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Xylene (o)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Xylene Total	mg/kg																						
Halogenated Phenols																							
2,3,4,6-tetrachlorophenol	mg/kg	0.5																					
2,4,5-trichlorophenol	mg/kg	0.5																					
2,4,6-trichlorophenol	mg/kg	0.5																					
2,4-dichlorophenol	mg/kg	0.5																					
2,6-dichlorophenol	mg/kg	0.5																					
2-chlorophenol	mg/kg	0.5																					
Pentachlorophenol	mg/kg	1																					
Inorganics																							
Cyanide (Free)	mg/kg	1																					
Cyanide Total	mg/kg	1																					
WAD Cyanide	mg/kg	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
MAH																							
1,2,4-trimethylbenzene	mg/kg	0.5	110																				
1,3,5-trimethylbenzene	mg/kg	0.5																					
Isopropylbenzene	mg/kg	0.5																					
n-butylbenzene	mg/kg	0.5																					
n-propylbenzene	mg/kg	0.5																					
p-isopropyltoluene	mg/kg	0.5																					
sec-butylbenzene	mg/kg	0.5																					
Styrene	mg/kg	0.5																					
tert-butylbenzene	mg/kg	0.5																					
Lead																							
Lead	mg/kg	2		1700	56	44	77	7	144	48	262	7	135	48	560	46	5	43	148	10	11	23	11
Metals																							
Arsenic	mg/kg	1		20	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	7	<5	6	6	<5	<5	6	<5
Barium	mg/kg	5																					
Beryllium	mg/kg	1																					
Cadmium	mg/kg	0.1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2	<1	<1	<1	<1
Chromium	mg/kg	1	180000		9	5	10	3	10	16	10	8	15	6	10	18	2	20	18	7	4	6	8
Chromium (hexavalent)	mg/kg	0.5	950																				
Cobalt	mg/kg	1																					
Copper	mg/kg	2		170	5	<5	11	239	25	36	7	6	48	5	14	11	217	16	32	<5	7	12	10
Iron	mg/kg	10																					
Manganese	mg/kg	5																					
Mercury	mg/kg	0.01			<0.1	<0.1	<0.1	<0.1	0.2	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	1			4	2	5	9	5	2	4	3	11	<2	4	<2	8	13	12	<2	<2	<2	<2
Vanadium	mg/kg	5	22000																				
Zinc	mg/kg	2		220	37	26	57	55	96	39	104	13	232	109	170	24	50	45	268	<5	<5	<5	<5
Nitroaromatics																							
2-Picoline	mg/kg	0.5																					
4-aminobiphenyl	mg/kg	0.5																					
Pentachloronitrobenzene	mg/kg	0.5																					



Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Lend Lease
Barangaroo

Field_ID		BH335_6.0-6.5	BH335_7.0-7.5	BH335_8.0-8.26	BH336_0.1-0.2	BH336_1.0-1.5	BH336_2.0-2.5	BH336_3.0-3.5	BH336_4.0-4.2	BH336_5.0-5.5	BH336_6.0-6.5	BH336_7.0-7.5	BH336_8.0-8.3	BH337_0.1-0.2	BH337_1.0-1.5	BH337_2.0-2.5	BH337_3.0-3.5	BH337_4.0-4.5	BH337_5.0-5.5	BH337_6.0-6.5
Sample_Depth		6-6.5	7-7.5	8-8.26	0.1-0.2	1-1.5	2-2.5	3-3.5	4-4.2	5-5.5	6-6.5	7-7.5	8-8.3	0.1-0.2	1-1.5	2-2.5	3-3.5	4-4.5	5-5.5	6-6.5
Location_Code		BH335	BH335	BH335	BH336	BH336	BH336	BH336	BH336	BH336	BH336	BH336	BH336	BH337	BH337	BH337	BH337	BH337	BH337	BH337
Sampled_Date		8/05/2010	8/05/2010	8/05/2010	22/07/2010	30/07/2010	30/07/2010	30/07/2010	30/07/2010	30/07/2010	30/07/2010	30/07/2010	30/07/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/05/2010	8/05/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
PAH/Phenols																							
PAH (ESDAT TOTAL)	mg/kg				1.5	21.2	1.1	<8	61.8	1.2	1.8	<8	57.3	34.3	237.1	4.7	<8	2.6	2.1	<8	<8	<8	1
2,4-dimethylphenol	mg/kg	0.5																					
2-chloronaphthalene	mg/kg	0.5																					
2-methylnaphthalene	mg/kg	0.5																					
2-methylphenol	mg/kg	0.5																					
2-nitrophenol	mg/kg	0.5																					
3-&4-methylphenol	mg/kg	0.5	5400																				
3-methylcholanthrene	mg/kg	0.5																					
4-chloro-3-methylphenol	mg/kg	0.5																					
Acenaphthene	mg/kg	0.5		8	<0.5	<0.5	<0.5	<0.5	1.6	<0.5	<0.5	<0.5	<0.5	<0.5	2.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.1	<0.5	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acetophenone	mg/kg	0.5																					
Anthracene	mg/kg	0.5		5	<0.5	0.5	<0.5	<0.5	3.8	<0.5	<0.5	<0.5	2.7	1.8	8.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	mg/kg	0.5			<0.5	2	<0.5	<0.5	4.7	<0.5	<0.5	<0.5	5.2	3.3	20.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a) pyrene	mg/kg	0.5			<0.5	1.9	<0.5	<0.5	3.2	<0.5	<0.5	<0.5	3.5	2.7	18.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b)&(k)fluoranthene	mg/kg	1																					
Benzo(b)fluoranthene	mg/kg	0.5			<0.5	2.2	<0.5	<0.5	4.5	<0.5	0.6	<0.5	4.4	3.1	34.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g,h,i)perylene	mg/kg	0.5			<0.5	1	<0.5	<0.5	1.8	<0.5	<0.5	<0.5	1.5	1.2	6.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	mg/kg	0.5			<0.5	0.8	<0.5	<0.5	1.5	<0.5	<0.5	<0.5	2.4	1.7	11.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	mg/kg	0.5			<0.5	2	<0.5	<0.5	3.5	<0.5	<0.5	<0.5	4.1	2.9	17.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a,h)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg	0.5		8	0.7	3.9	0.5	<0.5	11.1	0.6	0.5	<0.5	10.9	5	33.8	1.6	<0.5	1.2	1	<0.5	<0.5	<0.5	0.5
Fluorene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	<0.5	<0.5	0.6	0.6	3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5			<0.5	0.8	<0.5	<0.5	1.5	<0.5	<0.5	<0.5	1.3	1	7.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	mg/kg	0.5		21	<0.5	<0.5	<0.5	<0.5	1	<0.5	<0.5	<0.5	0.5	0.6	3.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PAHs (Sum of total)	mg/kg	0.5																					
Phenanthrene	mg/kg	0.5		4	<0.5	1.8	<0.5	<0.5	12.6	<0.5	<0.5	<0.5	6.2	5.2	23	1.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenol	mg/kg	0.5																					
Phenolics Total	mg/kg																						
Pyrene	mg/kg	0.5			0.8	4.3	0.6	<0.5	9.8	0.6	0.7	<0.5	12.9	5.2	44.2	1.6	<0.5	1.4	1.1	<0.5	<0.5	<0.5	0.5
TPH																							
TPH C15-C36	mg/kg				<200	<200	<200	<200	410	<200	<200	<200	340	120	1470	<200	<200	<200	2140	<200	<200	<200	<200
TPH C10 - C14	mg/kg	50	61,000	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	290	<50	<50	<50	<50
TPH C15-C28	mg/kg	100			<100	<100	<100	<100	180	<100	<100	<100	160	<100	870	<100	<100	<100	1520	<100	<100	<100	<100
TPH C29-C36	mg/kg	100			<100	<100	<100	<100	230	<100	<100	<100	180	120	600	<100	<100	<100	620	<100	<100	<100	<100
TPH C6 - C9	mg/kg	2		39	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
TPH+C10 - C36 (Sum)	mg/kg	50			<50	<50	<50	<50	410	<50	<50	<50	340	120	1470	<50	<50	<50	2430	<50	<50	<50	<50

Notes:
mg/kg = milligrams per kilogram
LOR = Laboratory Limit of Reporting
Shading = results exceeds soil SSTC-B
Shading = results exceeds soil SSESC-B
Refer to Table T1 for adopted SSTCs and DAFs

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field_ID		BH337 7.0-7.5	BH337 8.0-8.5	BH338 0-0.2	BH338 1.0-1.5	BH338 3.0-3.5	BH338 4.0-4.5	BH338 5.0-5.5	BH338 6.0-6.5	BH338 7.0-7.5	BH338 8.0-8.5	BH339 0.1-0.2	BH339 1.0-1.2	BH339 2.0-2.4	BH339 3.0-3.1	BH339 4.0-4.1	BH339 5.0-5.2	BH339 6.0-6.2	BH339 7.0-7.2	BH339 8.0-8.4
Sample_Depth		7-7.5	8-8.5	0-0.2	1-1.5	3-3.5	4-4.5	5-5.5	6-6.5	7-7.5	8-8.5	0.1-0.2	1-1.2	2-2.4	3-3.1	4-4.1	5-5.2	6-6.2	7-7.2	8-8.4
Location_Code		BH337	BH337	BH338	BH338	BH338	BH338	BH338	BH338	BH338	BH338	BH339	BH339	BH339	BH339	BH339	BH339	BH339	BH339	BH339
Sampled_Date		8/05/2010	8/05/2010	27/07/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	22/07/2010	30/07/2010	30/07/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
CPAH (ESDAT)	mg/kg		67		<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	7.3	<4.5	237.6	3.8	<4.5	22.2	<4.5	<4.5	<4.5	37
1. CAHs																							
Tetrachloroethene	mg/kg	0.5																					
Trichloroethene	mg/kg	0.5																					
cis-1,2-dichloroethene	mg/kg	0.5																					
Vinyl chloride	mg/kg	5																					
BTEx																							
Benzene	mg/kg	0.2	81		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (m & p)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (o)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene Total	mg/kg																						
Halogenated Phenols																							
2,3,4,6-tetrachlorophenol	mg/kg	0.5																					
2,4,5-trichlorophenol	mg/kg	0.5																					
2,4,6-trichlorophenol	mg/kg	0.5																					
2,4-dichlorophenol	mg/kg	0.5																					
2,6-dichlorophenol	mg/kg	0.5																					
2-chlorophenol	mg/kg	0.5																					
Pentachlorophenol	mg/kg	1																					
Inorganics																							
Cyanide (Free)	mg/kg	1																					
Cyanide Total	mg/kg	1																					
WAD Cyanide	mg/kg	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
MAH																							
1,2,4-trimethylbenzene	mg/kg	0.5	110																				
1,3,5-trimethylbenzene	mg/kg	0.5																					
Isopropylbenzene	mg/kg	0.5																					
n-butylbenzene	mg/kg	0.5																					
n-propylbenzene	mg/kg	0.5																					
p-isopropyltoluene	mg/kg	0.5																					
sec-butylbenzene	mg/kg	0.5																					
Styrene	mg/kg	0.5																					
tert-butylbenzene	mg/kg	0.5																					
Lead																							
Lead	mg/kg	2		1700	120	12	24	105	12	12	21	16	14	330	10	115	341	23	55	22	30	11	14
Metals																							
Arsenic	mg/kg	1		20	<5	<5	<5	<5	<5	<5	<5	6	<5	11	<5	<5	<5	<5	<5	<5	<5	<5	<5
Barium	mg/kg	5																					
Beryllium	mg/kg	1																					
Cadmium	mg/kg	0.1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	mg/kg	1	180000		7	3	16	8	8	9	8	26	5	23	3	11	11	7	12	10	23	3	9
Chromium (hexavalent)	mg/kg	0.5	950																				
Cobalt	mg/kg	1																					
Copper	mg/kg	2		170	<5	<5	21	16	<5	<5	10	6	<5	64	298	28	13	6	14	9	12	<5	15
Iron	mg/kg	10																					
Manganese	mg/kg	5																					
Mercury	mg/kg	0.01			<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.1	<0.1	<0.1	0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	1			<2	<2	8	6	3	<2	<2	<2	<2	6	8	5	4	<2	6	8	14	4	7
Vanadium	mg/kg	5	22000																				
Zinc	mg/kg	2		220	36	7	53	63	<5	6	12	<5	<5	278	62	66	49	<5	109	30	166	15	18
Nitroaromatics																							
2-Picoline	mg/kg	0.5																					
4-aminobiphenyl	mg/kg	0.5																					
Pentachloronitrobenzene	mg/kg	0.5																					

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field_ID		BH337 7.0-7.5	BH337 8.0-8.5	BH338 0-0.2	BH338 1.0-1.5	BH338 3.0-3.5	BH338 4.0-4.5	BH338 5.0-5.5	BH338 6.0-6.5	BH338 7.0-7.5	BH338 8.0-8.5	BH339 0.1-0.2	BH339 1.0-1.2	BH339 2.0-2.4	BH339 3.0-3.1	BH339 4.0-4.1	BH339 5.0-5.2	BH339 6.0-6.2	BH339 7.0-7.2	BH339 8.0-8.4
Sample_Depth		7-7.5	8-8.5	0-0.2	1-1.5	3-3.5	4-4.5	5-5.5	6-6.5	7-7.5	8-8.5	0.1-0.2	1-1.2	2-2.4	3-3.1	4-4.1	5-5.2	6-6.2	7-7.2	8-8.4
Location_Code		BH337	BH337	BH338	BH338	BH338	BH338	BH338	BH338	BH338	BH338	BH339	BH339	BH339	BH339	BH339	BH339	BH339	BH339	BH339
Sampled_Date		8/05/2010	8/05/2010	27/07/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	22/07/2010	30/07/2010	30/07/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
PAH/Phenols																							
PAH (ESDAT TOTAL)	mg/kg				<8	<8	2.8	<8	<8	<8	<8	<8	<8	13.4	<8	504.9	6.4	<8	46.4	<8	<8	<8	75.5
2,4-dimethylphenol	mg/kg	0.5																					
2-chloronaphthalene	mg/kg	0.5																					
2-methylnaphthalene	mg/kg	0.5																					
2-methylphenol	mg/kg	0.5																					
2-nitrophenol	mg/kg	0.5																					
3-&4-methylphenol	mg/kg	0.5	5400																				
3-methylcholanthrene	mg/kg	0.5																					
4-chloro-3-methylphenol	mg/kg	0.5																					
Acenaphthene	mg/kg	0.5		8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	12	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.7
Acetophenone	mg/kg	0.5																					
Anthracene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	21.3	<0.5	<0.5	1.5	<0.5	<0.5	<0.5	2.7
Benz(a)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.3	<0.5	50.6	0.8	<0.5	4.1	<0.5	<0.5	<0.5	6.2
Benzo(a) pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.6	<0.5	41.6	0.9	<0.5	3.9	<0.5	<0.5	<0.5	6.3
Benzo(b)&(k)fluoranthene	mg/kg	1																					
Benzo(b)fluoranthene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.4	<0.5	50.2	0.9	<0.5	3.7	<0.5	<0.5	<0.5	6.8
Benzo(g,h,i)perylene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	<0.5	17.8	0.5	<0.5	1.8	<0.5	<0.5	<0.5	2.8
Benzo(k)fluoranthene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	16	<0.5	<0.5	1.8	<0.5	<0.5	<0.5	3.4
Chrysene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.1	<0.5	39.9	0.7	<0.5	3.9	<0.5	<0.5	<0.5	5.6
Dibenz(a,h)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	4.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6
Fluoranthene	mg/kg	0.5		8	<0.5	<0.5	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.4	<0.5	94.2	1.2	<0.5	9.2	<0.5	<0.5	<0.5	11.4
Fluorene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	16.7	<0.5	<0.5	1.5	<0.5	<0.5	<0.5	2.6
Naphthalene	mg/kg	0.5		21	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.4
PAHs (Sum of total)	mg/kg	0.5																					
Phenanthrene	mg/kg	0.5		4	<0.5	<0.5	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	<0.5	34.8	<0.5	<0.5	4.7	<0.5	<0.5	<0.5	6.8
Phenol	mg/kg	0.5																					
Phenolics Total	mg/kg																						
Pyrene	mg/kg	0.5			<0.5	<0.5	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.9	<0.5	99	1.4	<0.5	10.3	<0.5	<0.5	<0.5	18.2
TPH																							
TPH C15-C36	mg/kg				<200	<200	250	<200	<200	<200	<200	<200	<200	600	<200	2720	<200	<200	240	<200	<200	<200	290
TPH C10 - C14	mg/kg	50	61,000	50	<50	<50	<50	<50	<50	<50	80	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	160
TPH C15-C28	mg/kg	100			<100	<100	100	<100	<100	<100	<100	<100	<100	320	<100	1330	<100	<100	130	<100	<100	<100	140
TPH C29-C36	mg/kg	100			<100	<100	150	<100	<100	<100	<100	<100	<100	280	<100	1390	<100	<100	110	<100	<100	<100	150
TPH C6 - C9	mg/kg	2		39	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	69	<10	<10	<10	<10	<10	<10	<10
TPH+C10 - C36 (Sum)	mg/kg	50			<50	<50	250	<50	<50	<50	80	<50	<50	600	<50	2720	<50	<50	240	<50	<50	<50	450

Notes:
mg/kg = milligrams per kilogram
LOR = Laboratory Limit of Reporting
Shading = results exceeds soil SSTC-B
Shading = results exceeds soil SSESC-B
Refer to Table T1 for adopted SSTCs and DAFs

[illegible]

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field_ID		BH340_0.1-0.2	BH340_1.0-1.1	BH340_3.0-3.2	BH340_4.0-4.1	BH340_6.0-6.1	BH340_7.0-7.2	BH340_8.0-8.1	BH341_0.1-0.2	BH341_1.5-1.9	BH341_2.5-2.9	BH341_3.5-3.8	BH341_4.5-4.9	BH341_5.5-5.9	BH341_6.5-6.9	BH341_7.5-7.9	BH342_0.1-0.2	BH342_1.0-1.5	BH342_2.0-2.4	BH342_3.0-3.4
Sample_Depth		0.1-0.2	1-1.1	3-3.2	4-4.1	6-6.1	7-7.2	8-8.1	0.1-0.2	1.5-1.9	2.5-2.9	3.5-3.8	4.5-4.9	5.5-5.9	6.5-6.9	7.5-7.9	0.1-0.2	1-1.5	2-2.4	3-3.4
Location_Code		BH340	BH340	BH340	BH340	BH340	BH340	BH340	BH341	BH341	BH341	BH341	BH341	BH341	BH341	BH341	BH342	BH342	BH342	BH342
Sampled_Date		21/07/2010	30/07/2010	30/07/2010	30/07/2010	30/07/2010	30/07/2010	30/07/2010	22/07/2010	29/07/2010	29/07/2010	29/07/2010	29/07/2010	29/07/2010	29/07/2010	29/07/2010	22/07/2010	30/07/2010	30/07/2010	30/07/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																				
PAH/Phenols																								
PAH (ESDAT TOTAL)	mg/kg				<8	1.9	73.2	2.5	6.6	11.7	21.9	<8	<8	10.8	<8	9.8	<8	6.3	<8	<8	26.1	114.5	<8	
2,4-dimethylphenol	mg/kg	0.5																						
2-chloronaphthalene	mg/kg	0.5																						
2-methylnaphthalene	mg/kg	0.5																						
2-methylphenol	mg/kg	0.5																						
2-nitrophenol	mg/kg	0.5																						
3-&4-methylphenol	mg/kg	0.5	5400																					
3-methylcholanthrene	mg/kg	0.5																						
4-chloro-3-methylphenol	mg/kg	0.5																						
Acenaphthene	mg/kg	0.5		8	<0.5	<0.5	1.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.7	<0.5	
Acenaphthylene	mg/kg	0.5		5	<0.5	<0.5	1.2	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	0.8	<0.5
Acetophenone	mg/kg	0.5																						
Anthracene	mg/kg	0.5		5	<0.5	<0.5	4.4	<0.5	<0.5	<0.5	1.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.3	6.2	<0.5
Benz(a)anthracene	mg/kg	0.5			<0.5	<0.5	5.2	<0.5	0.7	1.3	1.8	<0.5	<0.5	0.9	<0.5	1.1	<0.5	0.6	<0.5	<0.5	<0.5	2.3	8.6	<0.5
Benzo(a) pyrene	mg/kg	0.5			<0.5	<0.5	4.5	0.5	0.9	1.3	1.9	<0.5	<0.5	1.2	<0.5	1	<0.5	0.6	<0.5	<0.5	<0.5	2.5	7.7	<0.5
Benzo(b)&(k)fluoranthene	mg/kg	1																						
Benzo(b)fluoranthene	mg/kg	0.5			<0.5	<0.5	3.6	<0.5	0.8	1.1	1.6	<0.5	<0.5	1.2	<0.5	1	<0.5	0.7	<0.5	<0.5	<0.5	2.7	7.9	<0.5
Benzo(g,h,i)perylene	mg/kg	0.5			<0.5	<0.5	2.1	0.5	0.7	0.7	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	1.2	2.8	<0.5
Benzo(k)fluoranthene	mg/kg	0.5			<0.5	<0.5	1.2	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	0.6	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	1	3.8	<0.5
Chrysene	mg/kg	0.5			<0.5	<0.5	4.1	<0.5	0.6	1.1	1.5	<0.5	<0.5	1	<0.5	0.9	<0.5	0.5	<0.5	<0.5	<0.5	1.9	7.2	<0.5
Dibenz(a,h)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5
Fluoranthene	mg/kg	0.5		8	<0.5	1	15.5	0.7	1.1	1.6	3.8	<0.5	<0.5	1.7	<0.5	2	<0.5	1.3	<0.5	<0.5	<0.5	3.7	21.7	<0.5
Fluorene	mg/kg	0.5		5	<0.5	<0.5	1.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.9	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5			<0.5	<0.5	1.8	<0.5	0.6	0.6	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1	2.8	<0.5
Naphthalene	mg/kg	0.5		21	<0.5	<0.5	2.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PAHs (Sum of total)	mg/kg	0.5																						
Phenanthrene	mg/kg	0.5		4	<0.5	<0.5	9.8	<0.5	<0.5	0.5	2.3	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	0.7	<0.5	<0.5	<0.5	2.8	18.2	<0.5
Phenol	mg/kg	0.5																						
Phenolics Total	mg/kg																							
Pyrene	mg/kg	0.5			<0.5	0.9	14.2	0.8	1.2	3.5	5.1	<0.5	<0.5	4.2	<0.5	2.5	<0.5	1.3	<0.5	<0.5	<0.5	5.1	22.6	<0.5
TPH																								
TPH C15-C36	mg/kg				<200	<200	400	<200	<200	<200	100	<200	<200	580	<200	230	<200	<200	<200	<200	<200	410	1130	<200
TPH C10 - C14	mg/kg	50	61,000	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
TPH C15-C28	mg/kg	100			<100	<100	240	<100	<100	<100	<100	<100	<100	190	<100	120	<100	<100	<100	<100	<100	140	470	<100
TPH C29-C36	mg/kg	100			<100	<100	160	<100	<100	<100	100	<100	<100	390	<100	110	<100	<100	<100	<100	<100	270	660	<100
TPH C6 - C9	mg/kg	2		39	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
TPH+C10 - C36 (Sum)	mg/kg	50			<50	<50	400	<50	<50	<50	100	<50	<50	580	<50	230	<50	<50	<50	<50	<50	410	1130	<50

Notes:
mg/kg = milligrams per kilogram
LOR = Laboratory Limit of Reporting
Shading = results exceeds soil SSTC-B
Shading = results exceeds soil SSESC-B
Refer to Table T1 for adopted SSTCs and DAFs

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field_ID		BH342_5.0-5.5	BH342_6.0-6.4	BH342_7.0-7.5	BH342_8.0-8.5	BH343_0.1-0.2	BH343_1.0-1.5	BH343_2.0-2.5	BH343_3.0-3.5	BH343_4.0-4.5	BH343_5.0-5.5	BH343_6.0-6.5	BH343_7.0-7.5	BH343_8.0-8.5	BH344_0.1-0.2	BH344_0.8-1.2	BH344_1.8-2.0	BH344_3.0-3.2	BH344_4.0-4.2	BH344_5.0-5.2
Sample_Depth		5-5.5	6-6.4	7-7.5	8-8.5	0.1-0.2	1-1.5	2-2.5	3-3.5	4-4.5	5-5.5	6-6.5	7-7.5	8-8.5	0.1-0.2	0.8-1.2	1.8-2	3-3.2	4-4.2	5-5.2
Location_Code		BH342	BH342	BH342	BH342	BH343	BH343	BH343	BH343	BH343	BH343	BH343	BH343	BH343	BH344	BH344	BH344	BH344	BH344	BH344
Sampled_Date		30/07/2010	30/07/2010	30/07/2010	30/07/2010	22/07/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	22/07/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
CPAH (ESDAT)	mg/kg		67		<4.5	<4.5	<4.5	<4.5	<4.5	19.4	8	6.2	3.9	5.6	<4.5	5.4	<4.5	<4.5	130.5	575.8	5.4	17.1	2.6
1. CAHs																							
Tetrachloroethene	mg/kg	0.5																					
Trichloroethene	mg/kg	0.5																					
cis-1,2-dichloroethene	mg/kg	0.5																					
Vinyl chloride	mg/kg	5																					
BTEX																							
Benzene	mg/kg	0.2	81		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Ethylbenzene	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Toluene	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Xylene (m & p)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Xylene (o)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Xylene Total	mg/kg																						
Halogenated Phenols																							
2,3,4,6-tetrachlorophenol	mg/kg	0.5																					
2,4,5-trichlorophenol	mg/kg	0.5																					
2,4,6-trichlorophenol	mg/kg	0.5																					
2,4-dichlorophenol	mg/kg	0.5																					
2,6-dichlorophenol	mg/kg	0.5																					
2-chlorophenol	mg/kg	0.5																					
Pentachlorophenol	mg/kg	1																					
Inorganics																							
Cyanide (Free)	mg/kg	1																					
Cyanide Total	mg/kg	1																					
WAD Cyanide	mg/kg	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
MAH																							
1,2,4-trimethylbenzene	mg/kg	0.5	110																				
1,3,5-trimethylbenzene	mg/kg	0.5																					
Isopropylbenzene	mg/kg	0.5																					
n-butylbenzene	mg/kg	0.5																					
n-propylbenzene	mg/kg	0.5																					
p-isopropyltoluene	mg/kg	0.5																					
sec-butylbenzene	mg/kg	0.5																					
Styrene	mg/kg	0.5																					
tert-butylbenzene	mg/kg	0.5																					
Lead																							
Lead	mg/kg	2		1700	7	28	21	39	7	67	72	53	101	81	20	199	46	9	115	104	605	130	501
Metals																							
Arsenic	mg/kg	1	20		<5	6	<5	<5	<5	<5	<5	<5	<5	<5	<5	35	<5	<5	6	19	<5	<5	<5
Barium	mg/kg	5																					
Beryllium	mg/kg	1																					
Cadmium	mg/kg	0.1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Chromium	mg/kg	1	180000		7	7	5	14	6	10	11	18	6	22	4	15	8	5	28	10	8	9	5
Chromium (hexavalent)	mg/kg	0.5	950																				
Cobalt	mg/kg	1																					
Copper	mg/kg	2		170	<5	6	<5	5	256	15	30	34	16	9	6	91	6	261	16	100	16	26	25
Iron	mg/kg	10																					
Manganese	mg/kg	5																					
Mercury	mg/kg	0.01			<0.1	<0.1	<0.1	<0.1	<0.1	0.3	0.3	0.1	0.2	<0.1	<0.1	0.1	<0.1	<0.1	0.2	0.2	1.7	0.2	0.1
Nickel	mg/kg	1			2	<2	<2	<2	10	3	7	9	7	21	4	13	2	10	4	4	3	6	<2
Vanadium	mg/kg	5	22000																				
Zinc	mg/kg	2		220	8	34	6	15	61	66	72	261	88	57	39	259	49	64	73	78	259	111	54
Nitroaromatics																							
2-Picoline	mg/kg	0.5																					
4-aminobiphenyl	mg/kg	0.5																					
Pentachloronitrobenzene	mg/kg	0.5																					



Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Lend Lease
Barangaroo

Field_ID		BH342_5.0-5.5	BH342_6.0-6.4	BH342_7.0-7.5	BH342_8.0-8.5	BH343_0.1-0.2	BH343_1.0-1.5	BH343_2.0-2.5	BH343_3.0-3.5	BH343_4.0-4.5	BH343_5.0-5.5	BH343_6.0-6.5	BH343_7.0-7.5	BH343_8.0-8.5	BH344_0.1-0.2	BH344_0.8-1.2	BH344_1.8-2.0	BH344_3.0-3.2	BH344_4.0-4.2	BH344_5.0-5.2
Sample_Depth		5-5.5	6-6.4	7-7.5	8-8.5	0.1-0.2	1-1.5	2-2.5	3-3.5	4-4.5	5-5.5	6-6.5	7-7.5	8-8.5	0.1-0.2	0.8-1.2	1.8-2	3-3.2	4-4.2	5-5.2
Location_Code		BH342	BH342	BH342	BH342	BH343	BH343	BH343	BH343	BH343	BH343	BH343	BH343	BH343	BH344	BH344	BH344	BH344	BH344	BH344
Sampled_Date		30/07/2010	30/07/2010	30/07/2010	30/07/2010	22/07/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	8/04/2010	22/07/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010	8/02/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)																			
PAH/Phenols																							
PAH (ESDAT TOTAL)	mg/kg				<8	<8	<8	<8	<8	52.1	22.4	16.1	10.1	26.8	1.9	18.6	<8	<8	335.8	1594.1	16.5	31.1	6.7
2,4-dimethylphenol	mg/kg	0.5																					
2-chloronaphthalene	mg/kg	0.5																					
2-methylnaphthalene	mg/kg	0.5																					
2-methylphenol	mg/kg	0.5																					
2-nitrophenol	mg/kg	0.5																					
3-&4-methylphenol	mg/kg	0.5	5400																				
3-methylcholanthrene	mg/kg	0.5																					
4-chloro-3-methylphenol	mg/kg	0.5																					
Acenaphthene	mg/kg	0.5		8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3	<0.5	0.7	<0.5	<0.5	1.4	17.4	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	<0.5	1.8	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3.2	20.9	0.6	1.1	<0.5
Acetophenone	mg/kg	0.5																					
Anthracene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	16.2	86.1	1.1	1	<0.5
Benz(a)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	8.1	3.3	2.2	1.2	2.3	<0.5	2.1	<0.5	<0.5	31.6	123	1	2	0.7
Benzo(a) pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	5.4	2.3	2.4	1.9	1.6	<0.5	1.4	<0.5	<0.5	23.2	97.2	1.2	3.8	0.6
Benzo(b)&(k)fluoranthene	mg/kg	1																					
Benzo(b)fluoranthene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	21.9	95	1.3	4.8	0.7
Benzo(g,h,i)perylene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	6.8	52.7	<0.5	1.4	<0.5
Benzo(k)fluoranthene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	11	46.3	<0.5	1.5	<0.5
Chrysene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	5.9	2.4	1.6	0.8	1.7	<0.5	1.9	<0.5	<0.5	27.3	109	0.8	1.4	0.6
Dibenz(a,h)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.9	11.1	<0.5	<0.5	<0.5
Fluoranthene	mg/kg	0.5		8	<0.5	<0.5	<0.5	<0.5	<0.5	15.2	6.6	3.7	1.8	7.5	0.9	5.5	<0.5	<0.5	62.2	269	3.1	3	1.5
Fluorene	mg/kg	0.5		5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	0.6	<0.5	<0.5	2.2	<0.5	0.6	<0.5	<0.5	3.7	40.6	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	6.8	41.5	<0.5	1.2	<0.5
Naphthalene	mg/kg	0.5		21	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.6	<0.5	0.7	<0.5	<0.5	0.7	12.3	<0.5	1	<0.5
PAHs (Sum of total)	mg/kg	0.5																					
Phenanthrene	mg/kg	0.5		4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	49.9	292	2.4	1.3	1
Phenol	mg/kg	0.5																					
Phenolics Total	mg/kg																						
Pyrene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	15.2	6.5	6.2	4.4	6.9	1	5.7	<0.5	<0.5	68	280	5	7.6	1.6
TPH																							
TPH C15-C36	mg/kg				<200	<200	<200	<200	<200	470	1470	500	100	850	<200	1220	<200	<200	1900	7360	140	660	<200
TPH C10 - C14	mg/kg	50	61,000	50	<50	<50	<50	<50	<50	<50	190	<50	<50	<50	<50	120	<50	<50	<50	140	<50	<50	<50
TPH C15-C28	mg/kg	100			<100	<100	<100	<100	<100	230	1090	180	100	360	<100	560	<100	<100	1010	4380	<100	250	<100
TPH C29-C36	mg/kg	100			<100	<100	<100	<100	<100	240	380	320	<100	490	<100	660	<100	<100	890	2980	140	410	<100
TPH C6 - C9	mg/kg	2		39	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
TPH+C10 - C36 (Sum)	mg/kg	50			<50	<50	<50	<50	<50	470	1660	500	100	850	<50	1340	<50	<50	1900	7500	140	660	<50

Notes:
mg/kg = milligrams per kilogram
LOR = Laboratory Limit of Reporting
Shading = results exceeds soil SSTC-B
Shading = results exceeds soil SSESC-B
Refer to Table T1 for adopted SSTCs and DAFs

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field ID		BH344 5.8-6.2	BH344 7.0-7.2	BH344 8.0-8.2	BH36 1.0-1.2	BH36 4.0-4.4	BH36-0.07-0.1	BH37 0.06-0.1	BH37 2.5-2.7	BH37 5.5-5.7	BH37 8.3-8.5
Sample Depth		5.8-6.2	7-7.2	8-8.2	1-1.2	4-4.4	0.7-0.1	0.06-0.1	2.5-2.7	5.5-5.7	8.3-8.5
Location Code		BH344	BH344	BH344	AECOM BH36	AECOM BH36	AECOM BH36	AECOM BH37	AECOM BH37	AECOM BH37	AECOM BH37
Sampled Date		8/02/2010	8/02/2010	8/02/2010	3/03/2010	3/03/2010	19/02/2010	17/02/2010	17/02/2010	18/02/2010	18/02/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)										
CPAH (ESDAT)	mg/kg		67		<4.5	44	<4.5	<4.5	<3.5				<4.5	<4.5
1. CAHs														
Tetrachloroethene	mg/kg	0.5							<0.5					
Trichloroethene	mg/kg	0.5							<0.5					
cis-1,2-dichloroethene	mg/kg	0.5							<0.5					
Vinyl chloride	mg/kg	5							<5					
BTEX														
Benzene	mg/kg	0.2	81		<0.2	<0.2	<0.2	<0.2	<0.2				<0.2	<0.2
Ethylbenzene	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5				<0.5	<0.5
Toluene	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5				<0.5	<0.5
Xylene (m & p)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5				<0.5	<0.5
Xylene (o)	mg/kg	0.2			<0.5	<0.5	<0.5	<0.5	<0.5				<0.5	<0.5
Xylene Total	mg/kg													
Halogenated Phenols														
2,3,4,6-tetrachlorophenol	mg/kg	0.5							<0.5					
2,4,5-trichlorophenol	mg/kg	0.5						<0.5	<0.5				<0.5	<0.5
2,4,6-trichlorophenol	mg/kg	0.5						<0.5	<0.5				<0.5	<0.5
2,4-dichlorophenol	mg/kg	0.5						<0.5	<0.5				<0.5	<0.5
2,6-dichlorophenol	mg/kg	0.5						<0.5	<0.5				<0.5	<0.5
2-chlorophenol	mg/kg	0.5						<0.5	<0.5				<0.5	<0.5
Pentachlorophenol	mg/kg	1						<2	<1				<2	<2
Inorganics														
Cyanide (Free)	mg/kg	1												
Cyanide Total	mg/kg	1							<1				<1	
WAD Cyanide	mg/kg	1			<1	<1	<1		<1					
MAH														
1,2,4-trimethylbenzene	mg/kg	0.5	110						<0.5					
1,3,5-trimethylbenzene	mg/kg	0.5							<0.5					
Isopropylbenzene	mg/kg	0.5							<0.5					
n-butylbenzene	mg/kg	0.5							<0.5					
n-propylbenzene	mg/kg	0.5							<0.5					
p-isopropyltoluene	mg/kg	0.5							<0.5					
sec-butylbenzene	mg/kg	0.5							<0.5					
Styrene	mg/kg	0.5							<0.5					
tert-butylbenzene	mg/kg	0.5							<0.5					
Lead														
Lead	mg/kg	2		1700	157	220	67	17	9	6	6	9	20	11
Metals														
Arsenic	mg/kg	1		20	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Barium	mg/kg	5						10	30	20	20	<10	30	80
Beryllium	mg/kg	1						<1	<1	<1	<1	<1	<1	<1
Cadmium	mg/kg	0.1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	mg/kg	1	180000		6	9	8	8	7	2	2	5	8	10
Chromium (hexavalent)	mg/kg	0.5	950										<0.5	
Cobalt	mg/kg	1						<2	<2	12	12	<2	3	6
Copper	mg/kg	2		170	5	16	10	<5	<5	256	225	23	<5	<5
Iron	mg/kg	10											8730	
Manganese	mg/kg	5						43	73	753	768	9	125	329
Mercury	mg/kg	0.01			<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	1			<2	6	4	<2	2	7	7	<2	5	9
Vanadium	mg/kg	5	22000					12	12	119	125	8	15	16
Zinc	mg/kg	2		220	43	238	34	14	17	51	47	11	28	46
Nitroaromatics														
2-Picoline	mg/kg	0.5							<0.5					
4-aminobiphenyl	mg/kg	0.5							<0.5					
Pentachloronitrobenzene	mg/kg	0.5							<0.5					

Table T7
Area B
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field ID		BH344 5.8-6.2	BH344 7.0-7.2	BH344 8.0-8.2	BH36 1.0-1.2	BH36 4.0-4.4	BH36-0.07-0.1	BH37 0.06-0.1	BH37 2.5-2.7	BH37 5.5-5.7	BH37 8.3-8.5
Sample Depth		5.8-6.2	7-7.2	8-8.2	1-1.2	4-4.4	0.7-0.1	0.06-0.1	2.5-2.7	5.5-5.7	8.3-8.5
Location Code		BH344	BH344	BH344	AECOM BH36	AECOM BH36	AECOM BH36	AECOM BH37	AECOM BH37	AECOM BH37	AECOM BH37
Sampled Date		8/02/2010	8/02/2010	8/02/2010	3/03/2010	3/03/2010	19/02/2010	17/02/2010	17/02/2010	18/02/2010	18/02/2010
Area		Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B	Area B

ChemName	output unit	LOR	SSTC-B	SSESC-B (unsaturated)										
PAH/Phenols														
PAH (ESDAT TOTAL)	mg/kg				1.6	103.5	1.1	<8	<7				<8	<8
2,4-dimethylphenol	mg/kg	0.5						<0.5	<0.5				<0.5	<0.5
2-chloronaphthalene	mg/kg	0.5							<0.5					
2-methylnaphthalene	mg/kg	0.5						<0.5	<0.5					
2-methylphenol	mg/kg	0.5						<0.5	<0.5				<0.5	<0.5
2-nitrophenol	mg/kg	0.5						<0.5	<0.5				<0.5	<0.5
3-&4-methylphenol	mg/kg	0.5	5400					<1	<0.5				<1	<1
3-methylcholanthrene	mg/kg	0.5							<0.5					
4-chloro-3-methylphenol	mg/kg	0.5						<0.5	<0.5				<0.5	<0.5
Acenaphthene	mg/kg	0.5		8	<0.5	<0.5	<0.5	<0.5	<0.5				<0.5	<0.5
Acenaphthylene	mg/kg	0.5		5	<0.5	2.8	<0.5	<0.5	<0.5				<0.5	<0.5
Acetophenone	mg/kg	0.5							<0.5					
Anthracene	mg/kg	0.5		5	<0.5	4.8	<0.5	<0.5	<0.5				<0.5	<0.5
Benz(a)anthracene	mg/kg	0.5			<0.5	8.4	<0.5	<0.5	<0.5				<0.5	<0.5
Benzo(a) pyrene	mg/kg	0.5			<0.5	8	<0.5	<0.5	<0.5				<0.5	<0.5
Benzo(b)&(k)fluoranthene	mg/kg	1							<1					
Benzo(b)fluoranthene	mg/kg	0.5			<0.5	9.4	<0.5	<0.5					<0.5	<0.5
Benzo(g,h,i)perylene	mg/kg	0.5			<0.5	2.4	<0.5	<0.5	<0.5				<0.5	<0.5
Benzo(k)fluoranthene	mg/kg	0.5			<0.5	2.9	<0.5	<0.5					<0.5	<0.5
Chrysene	mg/kg	0.5			<0.5	5.2	<0.5	<0.5	<0.5				<0.5	<0.5
Dibenz(a,h)anthracene	mg/kg	0.5			<0.5	0.6	<0.5	<0.5	<0.5				<0.5	<0.5
Fluoranthene	mg/kg	0.5		8	<0.5	17.8	0.5	<0.5	<0.5				<0.5	<0.5
Fluorene	mg/kg	0.5		5	<0.5	1.7	<0.5	<0.5	<0.5				<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5			<0.5	2.3	<0.5	<0.5	<0.5				<0.5	<0.5
Naphthalene	mg/kg	0.5		21	<0.5	0.6	<0.5	<0.5	<0.5				<0.5	<0.5
PAHs (Sum of total)	mg/kg	0.5						<0.5						
Phenanthrene	mg/kg	0.5		4	<0.5	9.6	<0.5	<0.5	<0.5				<0.5	<0.5
Phenol	mg/kg	0.5						<0.5	<0.5				<0.5	<0.5
Phenolics Total	mg/kg													
Pyrene	mg/kg	0.5			0.9	27	0.6	<0.5	<0.5				<0.5	<0.5
TPH														
TPH C15-C36	mg/kg				<200	1730	<200	<200	<200				<200	<200
TPH C10 - C14	mg/kg	50	61,000	50	<50	<50	<50	<50	<50				<50	<50
TPH C15-C28	mg/kg	100			<100	710	<100	<100	<100				<100	<100
TPH C29-C36	mg/kg	100			<100	1020	<100	<100	<100				<100	<100
TPH C6 - C9	mg/kg	2		39	<10	<10	<10	<10	<10				<10	<10
TPH+C10 - C36 (Sum)	mg/kg	50			<50	1730	<50	<50	<50				<50	<50

Notes:
mg/kg = milligrams per kilogram
LOR = Laboratory Limit of Reporting
Shading = results exceeds soil SSTC-B
Shading = results exceeds soil SSESC-B
Refer to Table T1 for adopted SSTCs and DAFs

[illegible]

ChemName		output unit	LOR																																
	CPAH (ESDAT)	mg/kg		6.2		<4.5				18.9	2.7									2.4		<4.5	6.1	<4.5	3.6	<4.5	34.2	<4.5	10.4	10.9	<3.5	<3.5			
1. CAHs	Tetrachloroethene	mg/kg	0.5								<0.5																								
	Trichloroethene	mg/kg	0.5								<0.5																								
	cis-1,2-dichloroethene	mg/kg	0.5								<0.5																								
	Vinyl chloride	mg/kg	5								<5																								
BTEX	Benzene	mg/kg	0.2		<0.2					5.6	9.7	8								7.8	<0.2	<0.2		<0.2		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		
	Ethylbenzene	mg/kg	0.2		<0.5					2.9	4.1	1.3								2.2	<0.2	<0.2		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			
	Toluene	mg/kg	0.2		<0.5					15	34.1	8.1								14.1	<0.2	<0.2		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			
	Xylene (m & p)	mg/kg	0.2		<0.5					15.2	20.1	6.7								11.5	<0.2	<0.2		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			
	Xylene (o)	mg/kg	0.2		<0.5					8.4	10.6	3.6								6	<0.2	<0.2		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			
	Xylene Total	mg/kg																																	
Chlorinated Hydrocarbons	1,1-dichloropropane	mg/kg	0.5								<0.5																								
	1,2-dibromo-3-chloropropane	mg/kg	0.5								<0.5																								
	1,2-dichloropropane	mg/kg	0.5								<0.5																								
	1,3-dichloropropane	mg/kg	0.5								<0.5																								
	2,2-dichloropropane	mg/kg	0.5								<0.5																								
	Chloromethane	mg/kg	5								<5																								
Halogenated Benzenes	2-chlorotoluene	mg/kg	0.5								<0.5																								
	4-chlorotoluene	mg/kg	0.5								<0.5																								
	Bromobenzene	mg/kg	0.5								<0.5																								
Halogenated Hydrocarbons	Bromomethane	mg/kg	5								<5																								
	Dichlorodifluoromethane	mg/kg	5								<5																								
Halogenated Phenols	2,3,4,6-tetrachlorophenol	mg/kg	0.5																																
	2,4,5-trichlorophenol	mg/kg	0.5								<0.5	<0.5									<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			
	2,4,6-trichlorophenol	mg/kg	0.5								<0.5	<0.5									<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			
	2,4-dichlorophenol	mg/kg	0.5								<0.5	<0.5									<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			
	2,6-dichlorophenol	mg/kg	0.5								<0.5	<0.5									<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			
	2-chlorophenol	mg/kg	0.5								<0.5	<0.5									<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			
	Pentachlorophenol	mg/kg	1								<1	<2									<2		<2	<2	<2	<2	<2	<2	<2	<2	<1	<1	<1		
Herbicides	Diallate	mg/kg	0.5																																
	Proxamide	mg/kg	0.5								<0.5																				<0.5	<0.5	<0.5		
Inorganics	Cyanide (Free)	mg/kg	1								<1																								
	Cyanide Total	mg/kg	1								<1																								
	Sulphate	mg/kg	10																																
	TOC	%	0.02								0.11																								
	WAD Cyanide	mg/kg	1																																
Lead	Lead	mg/kg	2	6	100		<5	<5	17	6	6	9	<5	20	27	12	16	28	15	24	9	11	28		<5	214	<5	19	28	382	24	130	1070	183	338
MAH	1,2,4-trimethylbenzene	mg/kg	0.5								12.7																								
	1,3,5-trimethylbenzene	mg/kg	0.5								3.7																								
	Isopropylbenzene	mg/kg	0.5								<0.5																								
	n-butylbenzene	mg/kg	0.5								<0.5																								
	n-propylbenzene	mg/kg	0.5								0.6																								
	p-isopropyltoluene	mg/kg	0.5								<0.5																								
	sec-butylbenzene	mg/kg	0.5								<0.5																								
	Styrene	mg/kg	0.5								13.6																								
	tert-butylbenzene	mg/kg	0.5								<0.5																								
	Metals	Arsenic	mg/kg	1	<5	<5		<5	<5	<5	<5	<5	<5		<5	<5	6	<5	<5	<5	<5	<5	<5		<5	9	<5	<5	<5	<5	12	<5	7	15	11
Barium		mg/kg	5	<10	30		<10	10	50	10	<10	10		<10	40						<10	20									200	80	80		
Beryllium		mg/kg	1	<1	<1		<1	<1	<1	<1	<1	<1		<1	<1					<1	<1									<1	<1	4			
Cadmium		mg/kg	0.1	<1	<1		<1	<1	<1	<1	<1	<1		<1	<1	<1	<1	<1	<1	<1	<1			<1	<1	<1	<1	<1	<1	2	<1	<1			
Chromium		mg/kg	1	7	8		6	2	12	8	4	4	2	10	6	12	15	27	14	12	3	16		10	23	3	4	6	17	8	9	32	16	<1	22
Chromium (hexavalent)		mg/kg	0.5																																
Cobalt		mg/kg	1	<2	2		<2	<2	<2	<2	<2	<2		4						<2	<2									5	<2	2			
Copper		mg/kg	2	<5	20		<5	<5	<5	<5	<5	<5		6	<5	<5	<5	<5	<5	<5	<5	139		<5	60	<5	9	<5	108	<5	19	391	52	18	
Iron		mg/kg	50																																
Manganese		mg/kg	5	18	99		<5	<5	26	<5	<5	<5		246							<5	96									110	44	54		
Mercury		mg/kg	0.05	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1		<0.1	1.6	0.2	<0.1	<0.1	<0.1	3.1	<0.1	0.1	3.4	1.1	<0.1	
Nickel		mg/kg	1	<2	6		<2	<2	3	<2	<2	<2		5	<2	<2	4		<2	4	<2	<2		<2	6	<2	<2	<2	10	<2	13	26	4	30	
Vanadium		mg/kg	5	<5	15		9	6	22	8	<5	7		21						<5	32										73	24	18		
Zinc		mg/kg	2	15	44		<5	<5	19	<5	<5	<5	<5	40	6	8	10	32	49	24	6	33		<5	201	<5	25	14	437	<5	1890	702	200	118	
Nitroaromatics		1,4-dinitrobenzene	mg/kg	0.5																													<0.5	<0.5	<0.5
		2-Picoline	mg/kg	0.5																													<0.5	<0.5	<0.5
		4-aminobiphenyl	mg/kg	0.5																													<0.5	<0.5	<0.5
	Pentachloronitrobenzene	mg/kg	0.5																													<0.5	<0.5	<0.5	
PAH	7,12-dimethylbenz(a)anthracene	mg/kg	0.5								<0.5																					<0.5	<0.5	<0.5	
PAH/Phenols	PAH (ESDAT TOTAL)	mg/kg		12.6		<8					151	27.8									6.4		<8	11	<8	8.8	<8	58.2	<8	23.9	24.8	1.3	<7		
	2,4-dimethylphenol	mg/kg	0.5								<0.5	<0.5																							

[illegible][illegible]

Notes:
 mg/kg = milligrams per kilogram
 Laboratory LOR = Limit of Reporting
 < denotes less than LOR
 Refer to Table T1 - remediation criteria are not applicable to Area C

[illegible]

[illegible][illegible]

Notes:
 mg/kg = milligrams per kilogram
 Laboratory LOR = Limit of Reporting
 < denotes less than LOR
 Refer to Table T1 - remediation criteria are not applicable to Area C

Data Entry: KM
Data Review: AL
AECOM

[illegible][illegible]

Notes:
 mg/kg = milligrams per kilogram
 Laboratory LOR = Limit of Reporting
 < denotes less than LOR
 Refer to Table T1 - remediation criteria are not applicable to Area C

6/07/2011
Page 7 of 8

[illegible][illegible]

Notes:
 mg/kg = milligrams per kilogram
 Laboratory LOR = Limit of Reporting
 < denotes less than LOR
 Refer to Table T1 - remediation criteria are not applicable to Area C

Table T9
Area C
Groundwater Analytical Results (2010)
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field ID	MW08	MW09	MW09	MW16	MW17	MW17	MW17	MW18	MW19	MW19	MW20	MW21	MW21	MW21	MW26	MW26
Monitoring Zone	D	S	S	S	D	D	S	S	D	D	S	S	S	S	S	S
Location Code	AECOM BH08	AECOM BH09	BH047	BH102	AECOM BH17	AECOM BH17	BH103	BH104	AECOM BH19	AECOM BH19	BH108	AECOM BH21	AECOM BH21	BH110	AECOM BH26	AECOM BH26
Well	MW08	MW09	MW09	MW16	MW17	MW17	MW17	MW18	MW19	MW19	MW20	MW21	MW21	MW21	MW26	MW26
Sampled Date	27/02/2010	27/02/2010	15/03/2010	15/03/2010	25/02/2010	27/02/2010	3/12/2010	3/12/2010	25/02/2010	27/02/2010	3/12/2010	25/02/2010	27/02/2010	15/03/2010	25/02/2010	27/02/2010
SDG	ES1003746	ES1003746	ES1004783	ES1004783	ES1003658	ES1003746	ES1004714	ES1004714	ES1003658	ES1003746	ES1004714	ES1003658	ES1003746	ES1004783	ES1003658	ES1003746

ChemName	output unit	LOR	SSTC-C																
CPAH (ESDAT)	µg/L			54.4	<8.5	<8.5	<8.5	<8.5		<0.85	<0.85	0.7		2.66	<8.5		2.1	<8.5	
BTEX																			
Benzene	µg/L	1	21,000	4410	<1	<1	<1	<1		<1	<1	<1		<1	<1		<1	<1	
Ethylbenzene	µg/L	1		683	<2	<2	<2	<2		<2	<2	<2		<2	<2		<2	<2	
Toluene	µg/L	1		1600	<5	<5	<5	<5		<5	<5	<5		<5	<5		<5	<5	
Xylene (m & p)	µg/L	2		1160	<2	<2	<2	<2		<2	<2	<2		<2	<2		<2	<2	
Xylene (o)	µg/L	1		1130	<2	<2	<2	<2		<2	<2	<2		<2	<2		<2	<2	
Xylene Total	µg/L																		
Cyanides																			
Cyanide (WAD)	mg/L	0.01																	
Dissolved Hydrocarbon Gases																			
Methane	µg/L	10		386	81	12	<10	1370		185	12	38		109	142		59	61	
Field																			
pH (Field)	pH Units	0.1																	
Halogenated Phenols																			
2,4,5-trichlorophenol	µg/L	1				<1	<1			<1	<1			<1			<1		
2,4,6-trichlorophenol	µg/L	1				<1	<1			<1	<1			<1			<1		
2,4-dichlorophenol	µg/L	1				<1	<1			<1	<1			<1			<1		
2,6-dichlorophenol	µg/L	1				<1	<1			<1	<1			<1			<1		
2-chlorophenol	µg/L	1				<1	<1			<1	<1			<1			<1		
Pentachlorophenol	µg/L	2				<2	<2			<2	<2			<2			<2		
Inorganic																			
Alkalinity	mg/L	5																	
Inorganics																			
Alkalinity as CaCO3	mg/L	1		933	137	160	213	295		225	311	317		346	184		142	227	
Ammonia	mg/L	0.01	2400																
Ammonia as N	mg/L	0.01		5.32	<0.1	<0.1	<0.1	2.23		<0.1	<0.1	<0.1		<0.1	5.16		<0.1	<0.1	
Anions Total	meq/L	0.01		569	509	574	568	528		598	667	537		628	428		598	588	
Bicarbonate as CaCO3	mg/L	1		933	137	160	213	295		225	311	317		346	184		142	227	
Carbonate	mg/L	1		<1	<1	<1	<1	<1		<1	<1	<1		<1	<1		<1	<1	
Cations Total	meq/L	0.01		590	513	544	563	576		657	662	535		651	389		570	544	
Chloride	mg/L	0.5		19,200	16,200	19,600	19,100	16,200		19,300	21,300	17,100		20,100	13,900		20,200	18,900	
Cyanide (Free)	mg/L	0		<0.004	<0.004	<0.004	<0.004	<0.004		<0.004	<0.004	<0.004		<0.004	<0.004		<0.004	<0.004	
Cyanide Total	mg/L	0								<0.004	<0.004			<0.004					
Ferrous Iron	mg/L	0.05		6.08	10.9	24.3	<0.05	8.39		1.14	0.2	6.22		2.96	56		29.3	1.18	
Fluoride	mg/L	0.1																	
Hydroxide Alkalinity as CaCO3	µg/L	1000		<1000	<1000	<1000	<1000	<1000		<1000	<1000	<1000		<1000	<1000		<1000	<1000	
Ionic Balance	%	0.01		1.8	0.38	2.72	0.48	4.34		4.68	0.38	0.18		1.75	4.86		2.4	3.86	
Nitrate (as N)	mg/L	0.01		0.02	0.03	0.03	0.06	<0.01		0.04	0.1	0.04		0.03	2.76		<0.01	0.05	
Nitrite (as N)	mg/L	0.01		<0.01	<0.01	<0.01	<0.01	0.05		<0.01	<0.01	<0.01		<0.01	<0.01		0.01	0.01	
Nitrogen (Total Oxidised)	mg/L	0.01		0.02	0.03	0.03	0.06	0.04		0.04	0.1	0.04		0.03	2.76		0.02	0.07	
pH (Lab)	pH Units	0.01		6.82	6.71	5.49	6.15	5.98		7.22	6.2	5.67		7.03	6.36		6.42	7.36	
Sulphate	mg/L	0.5		472	2450	850	1200	3190		2350	2890	2350		2580	1590		1210	2400	
TOC	mg/L	1		16	1	<1	<1	<1		3	1	<1		3	1		3	4	
Weak Acid Dissociable Cyanide	mg/L	0		<0.004	<0.004	<0.004	<0.004	<0.004				<0.004			<0.004		<0.004	<0.004	
Lead																			
Lead (Filtered)	µg/L	0.1		<0.2	<0.2	1.4	12		<0.2	0.2	2.1		<0.2	<0.2		0.8	0.5		<0.2
Metals																			
Arsenic (Filtered)	µg/L	0.2		1.2	8.6	1.5	0.9		1.2	<0.5	1.1		0.7	<0.5		3.1	4.7		0.6
Cadmium (Filtered)	µg/L	0.05		47.8	<0.2	108	23.5		<0.2	<0.2	0.7		<0.2	0.7		0.16	0.4		<0.2
Calcium	mg/L	0.1																	
Calcium (Filtered)	mg/L	1		173	573	440	413	437		596	520	405		548	706		435	442	
Chromium (Filtered)	µg/L	0.2		<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5		<0.5	<0.5		<0.2	<0.5		<0.5
Copper (Filtered)	µg/L	0.5		<1	<1	55	14		<1	<1	79		<1	<1		<0.5	<1		<1
Magnesium	mg/L	0.1																	
Magnesium (Filtered)	mg/L	1		1110	991	1080	1110	1140		1240	1360	1050		1240	631		1170	1060	
Mercury (Filtered)	µg/L	0.1		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1		<0.1	<0.1		<0.1	<0.1		<0.1
Nickel (Filtered)	µg/L	0.5		47.2	27.1	72.1	19.4		87.1	4.7	77		57.7	3		94.7	50.9		8.8
Potassium	mg/L	0.1																	
Potassium (Filtered)	mg/L	1		378	236	314	368	385		425	429	362		424	167		356	370	
Sodium	mg/L	0.1																	
Sodium (Filtered)	mg/L	1		11,000	9130	9760	10,200	10,400		11,800	11,800	9640		11,700	6840		10,200	9780	
Zinc (Filtered)	mg/L	0		0.011	0.019	0.13	0.087		0.018	0.006	0.188		0.009	0.011		0.059	0.074		<0.005

Table T9
Area C
Groundwater Analytical Results (2010)
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field ID	MW08	MW09	MW09	MW16	MW17	MW17	MW17	MW18	MW19	MW19	MW20	MW21	MW21	MW21	MW26	MW26
Monitoring Zone	D	S	S	S	D	D	S	S	D	D	S	S	S	S	S	S
Location Code	AECOM BH08	AECOM BH09	BH047	BH102	AECOM BH17	AECOM BH17	BH103	BH104	AECOM BH19	AECOM BH19	BH108	AECOM BH21	AECOM BH21	BH110	AECOM BH26	AECOM BH26
Well	MW08	MW09	MW09	MW16	MW17	MW17	MW17	MW18	MW19	MW19	MW20	MW21	MW21	MW21	MW26	MW26
Sampled Date	27/02/2010	27/02/2010	15/03/2010	15/03/2010	25/02/2010	27/02/2010	3/12/2010	3/12/2010	25/02/2010	27/02/2010	3/12/2010	25/02/2010	27/02/2010	15/03/2010	25/02/2010	27/02/2010
SDG	ES1003746	ES1003746	ES1004783	ES1004783	ES1003658	ES1003746	ES1004714	ES1004714	ES1003658	ES1003746	ES1004714	ES1003658	ES1003746	ES1004783	ES1003658	ES1003746

ChemName	output unit	LOR	SSTC-C														
PAH																	
7,12-dimethylbenz(a)anthracene	µg/L	0.1							<0.1	<0.1			<0.1				
PAH/Phenols																	
PAH (ESDAT TOTAL)	µg/L			4841.5	<15.5	<15.5	<15.5	2.2		0.1	<1.55	0.7		4.16	1.4		5.4
2,4-dimethylphenol	µg/L	1				<1	<1			<1	<1			<1			<15.5
2-methylnaphthalene	µg/L	0.1	38,000							<0.1	<0.1			<0.1			
2-methylphenol	µg/L	1				<1	<1			<1	<1			<1			<1
2-nitrophenol	µg/L	1				<1	<1			<1	<1			<1			<1
3-&4-methylphenol	µg/L	2	1,000,000			<2	<2			<2	<2			<2			<2
3-methylcholanthrene	µg/L	0.1								<0.1	<0.1			<0.1			
4-chloro-3-methylphenol	µg/L	1				<1	<1			<1	<1			<1			<1
Acenaphthene	µg/L	0.1		19	<1	<1	<1	<1		<0.1	<0.1	<1		<0.1	<1	<1	<1
Acenaphthylene	µg/L	0.1		168	<1	<1	<1	<1		<0.1	<0.1	<1		<0.1	<1	1.7	<1
Anthracene	µg/L	0.1		20.4	<1	<1	<1	<1		<0.1	<0.1	<1		0.1	<1	<1	<1
Benz(a)anthracene	µg/L	0.1		11.9	<1	<1	<1	<1		<0.1	<0.1	<1		0.3	<1	<1	<1
Benzo(a) pyrene	µg/L	0.05		7.7	<0.5	<0.5	<0.5	<0.5		<0.05	<0.05	0.7		0.56	<0.5	1.1	<0.5
Benzo(b)&(k)fluoranthene	µg/L	2															
Benzo(b)fluoranthene	µg/L	0.1		6	<1	<1	<1	<1		<0.1	<0.1	<1		0.3	<1	1	<1
Benzo(g,h,i)perylene	µg/L	0.1		<3.7	<1	<1	<1	<1		<0.1	<0.1	<1		0.3	<1	<1	<1
Benzo(k)fluoranthene	µg/L	0.1		<3.7	<1	<1	<1	<1		<0.1	<0.1	<1		0.4	<1	<1	<1
Chrysene	µg/L	0.1		8.4	<1	<1	<1	<1		<0.1	<0.1	<1		0.3	<1	<1	<1
Dibenz(a,h)anthracene	µg/L	0.1		<3.7	<1	<1	<1	<1		<0.1	<0.1	<1		0.1	<1	<1	<1
Fluoranthene	µg/L	0.1		18.5	<1	<1	<1	1.2		<0.1	<0.1	<1		0.5	<1	<1	<1
Fluorene	µg/L	0.1		47.5	<1	<1	<1	<1		<0.1	<0.1	<1		<0.1	<1	<1	<1
Indeno(1,2,3-c,d)pyrene	µg/L	0.1		<3.7	<1	<1	<1	<1		<0.1	<0.1	<1		0.3	<1	<1	<1
Naphthalene	µg/L	0.1	920	4440	<1	<1	<1	<1		<0.1	<0.1	<1		<0.1	1.4	<1	<1
PAHs (Sum of total)	µg/L																
Phenanthrene	µg/L	0.1		66	<1	<1	<1	<1		<0.1	<0.1	<1		0.2	<1	<1	<1
Phenol	µg/L	1	310,000,000			<1	<1			<1	<1			<1		<1	<1
Pyrene	µg/L	0.1		28.1	<1	<1	<1	1		0.1	<0.1	<1		0.8	<1	1.6	<1
Pesticides																	
Pesticides (total, NSW Waste 2008)	mg/L					<0.001	<0.001			<0.001	<0.001			<0.001		<0.001	
SVOCs																	
2-(acetyl)amino) fluorene	µg/L	0.1								<0.1	<0.1			<0.1			
Benzo(e)pyrene	µg/L	0.1								<0.1	<0.1			0.3			
Coronene	µg/L	0.1								<0.1	<0.1			<0.1			
Perylene	µg/L	0.1								<0.1	<0.1			0.1			
TPH																	
TPH C15-C36	mg/L			3.52	<0.15	<0.15	<0.15	<0.15		<0.15	<0.15	<0.15		<0.15	<0.15		<0.15
TPH C10 - C14	µg/L	50	7700	5860	<50	<50	<50	<50		<50	<50	<50		<50	<50		<50
TPH C15-C28	µg/L	100		3420	<100	<100	<100	<100		<100	<100	<100		<100	<100		<100
TPH C29-C36	µg/L	50		100	<50	<50	<50	<50		<50	<50	<50		<50	<50		<50
TPH C6 - C9	µg/L	20	28,000,000	13,200	<20	<20	<20	<20		<20	<20	<20		<20	<20		<20
TPH+C10 - C36 (Sum of total)	µg/L	50		9380	<50	<50	<50	<50		<50	<50	<50		<50	<50		<50

Notes:
LOR = Limit of Reporting
< denotes less than LOR
µg/L - micrograms per litre
mg/L = milligrams per litre
Shading = result exceeds groundwater SSTC-C
Refer to Table T2 for adopted SSTCs and DAFs

Table T10
Area C
Historic Groundwater Analytical Results
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field ID	MW08	MW09	MW09	MW09	MW09	MW09	MW09	MW09	MW09	MW16	MW16	MW16	MW16	MW16	MW16	MW17	MW17	MW17	MW17
Monitoring_Zone	D	S	S	S	S	S	S	S	S	S	S	S	S	S	S	D	D	S	S
Location Code	AECOM BH08	AECOM BH09	BH047	BH047	BH047	BH047	BH047	BH047	BH047	BH102	BH102	BH102	BH102	BH102	BH102	AECOM BH17	AECOM BH17	BH103	BH103
Well	MW08	MW09	MW09	MW09	MW09	MW09	MW09	MW09	MW09	MW16	MW16	MW16	MW16	MW16	MW16	MW17	MW17	MW17	MW17
Sampled Date	27/02/2010	27/02/2010	19/07/2006	19/07/2006	15/08/2007	9/05/2008	5/09/2008	15/03/2010	26/07/2006	26/07/2006	16/08/2007	9/05/2008	5/09/2008	15/03/2010	25/02/2010	27/02/2010	26/07/2006	26/07/2006	

ChemName	output unit	LOR	SSTC-C																	
CPAH (ESDAT)	µg/L			54.4	<8.5	<8.5		<8.5		<8.5	<8.5	<8.5		<8.5		<8.5	<8.5		<8.5	
BTEX																				
Benzene	µg/L	1	21,000	4410	<1	<1		1		<1	<1	<1		<1		<1	<1		<1	
Ethylbenzene	µg/L	1		683	<2	<2		<2		<2	<2	<2		<2		<2	<2		<2	
Toluene	µg/L	1		1600	<5	<2		<2		<5	<5	<2		<2		<5	<5		<2	
Xylene (m & p)	µg/L	2		1160	<2	<2		2		<2	<2	<2		<2		<2	<2		<2	
Xylene (o)	µg/L	1		1130	<2	<2		<2		<2	<2	<2		<2		<2	<2		<2	
Xylene Total	µg/L																			
Cyanides																				
Cyanide (WAD)	mg/L	0.01																		
Dissolved Hydrocarbon Gases																				
Methane	µg/L	10		386	81					12						<10	1370			
Field																				
Dissolved Oxygen	mg/L							0.05						1.29						
pH (Field)	pH Units	0.1						6.02						7.2						
Redox	mV							11						156						
Temperature	°C							23						21.9						
Halogenated Phenols																				
2,4,5-trichlorophenol	µg/L	1						<1		<1	<1			<1		<1	<1			
2,4,6-trichlorophenol	µg/L	1						<1		<1	<1			<1		<1	<1			
2,4-dichlorophenol	µg/L	1						<1		<1	<1			<1		<1	<1			
2,6-dichlorophenol	µg/L	1						<1		<1	<1			<1		<1	<1			
2-chlorophenol	µg/L	1						<1		<1	<1			<1		<1	<1			
Pentachlorophenol	µg/L	2						<2		<2	<2			<2		<2	<2			
Inorganic																				
Alkalinity	mg/L	5																		
Electrical conductivity *(lab)	uS/cm							44.5						44						
Inorganics																				
Alkalinity as CaCO3	mg/L	1		933	137			143		152	160			264		208	213	295		
Ammonia	mg/L	0.01	2400																	
Ammonia as N	mg/L	0.01		5.32	<0.1			<0.1		0.237	<0.1			<0.1		<0.015	<0.1	2.23		
Anions Total	meq/L	0.01		569	509			554		574				547			568	528		
Bicarbonate	mg/L	1						143		152				264		208				
Bicarbonate as CaCO3	mg/L	1		933	137						160						213	295		
Carbonate	mg/L	1		<1	<1			<1		<1	<1			<1		<1	<1	<1		
Cations Total	meq/L	0.01		590	513			588			544			603			563	576		
Chloride	mg/L	0.5		19,200	16,200			17,600		16,300	19,600			17,200		14,800	19,100	16,200		
Cyanide (Free)	mg/L	0.004		<0.004	<0.004			<0.004		<0.004	<0.004			<0.004		<0.004	<0.004	<0.004		
Cyanide Total	mg/L	0.004				0.005				<0.004	<0.004					<0.004			<0.004	
Ferrous Iron	mg/L	0.05		6.08	10.9					24.3						<0.004	<0.05	8.39		
Fluoride	mg/L	0.1																		
Hydroxide Alkalinity as CaCO3	µg/L	1000		<1000	<1000			<1000		<1000	<1000			<1000		<1000	<1000	<1000		
Ionic Balance	%	0.01		1.8	0.38			2.96			2.72			4.78			0.48	4.34		
Nitrate (as N)	mg/L	0.01		0.02	0.03						0.03						0.06	<0.01		
Nitrite (as N)	mg/L	0.01		<0.01	<0.01						<0.01						<0.01	0.05		
Nitrogen (Total Oxidised)	mg/L	0.01		0.02	0.03						0.03						0.06	0.04		
pH (Lab)	pH Units	0.01		6.82	6.71						5.49						6.15	5.98		
Sulphate	mg/L	0.5		472	2450			2580		3000	850	1780		2740		2190	1200	3190		1840
Sulphate (Filtered)	mg/L	1				2700														
TOC	mg/L	1		16	1						<1						<1	<1		
Weak Acid Dissociable Cyanide	mg/L	0.004		<0.004	<0.004					<0.004						<0.004	<0.004			
Lead																				
Lead (Filtered)	µg/L	0.1		<0.2	<0.2		0.9	<10		<0.2	1.4		3.1	144		7.2	12		<0.2	1.2
Metals																				
Arsenic (Filtered)	µg/L	0.2		1.2	8.6	<10		<10		1.4	1.5	<10		12		0.9	0.9		1.2	<10
Cadmium (Filtered)	µg/L	0.05		47.8	<0.2	1.3		<1		<0.2	108	<1		15.6		0.2	23.5		<0.2	<1
Calcium	mg/L	0.1						509		485				417		419				
Calcium (Filtered)	mg/L	1		173	573						440						413	437		
Chromium (Filtered)	µg/L	0.2		<0.5	<0.5	<10		<10		0.6	<0.5	<10		<10		1.5	<0.5	<0.5	<0.5	<10
Copper (Filtered)	µg/L	0.5		<1	<1		<1	63		8	55		<1	34		2	14		<1	2
Magnesium	mg/L	0.1						1190		1130				1230		1160				
Magnesium (Filtered)	mg/L	1		1110	991						1080						1110	1140		
Mercury (Filtered)	µg/L	0.1		<0.1	<0.1	<0.1		<0.1		<0.1	<0.1	<0.1		<0.1		<0.1	<0.1		<0.1	<0.1
Nickel (Filtered)	µg/L	0.5		47.2	27.1	22		34		40	72.1	<10		38		1.8	19.4		87.1	<10
Potassium	mg/L	0.1						384		340				387		400				
Potassium (Filtered)	mg/L	1		378	236						314						368	385		
Sodium	mg/L	0.1						10,500		9350				10,800		10,000				
Sodium (Filtered)	mg/L	1		11,000	9130						9760						10,200	10,400		
Zinc (Filtered)	mg/L	0.001		0.011	0.019		0.128	<0.05		0.046	0.13		0.115	0.233		0.074	0.087		0.018	0.078
PAH																				
7,12-dimethylbenz(a)anthracene	µg/L	0.1																		

Table T10
Area C
Historic Groundwater Analytical Results
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field ID	MW08	MW09	MW09	MW09	MW09	MW09	MW09	MW09	MW09	MW16	MW16	MW16	MW16	MW16	MW16	MW17	MW17	MW17	MW17
Monitoring Zone	D	S	S	S	S	S	S	S	S	S	S	S	S	S	S	D	D	S	S
Location Code	AECOM BH08	AECOM BH09	BH047	BH047	BH047	BH047	BH047	BH047	BH047	BH102	BH102	BH102	BH102	BH102	BH102	AECOM BH17	AECOM BH17	BH103	BH103
Well	MW08	MW09	MW09	MW09	MW09	MW09	MW09	MW09	MW09	MW16	MW16	MW16	MW16	MW16	MW16	MW17	MW17	MW17	MW17
Sampled Date	27/02/2010	27/02/2010	19/07/2006	19/07/2006	15/08/2007	9/05/2008	5/09/2008	15/03/2010	26/07/2006	26/07/2006	16/08/2007	9/05/2008	5/09/2008	15/03/2010	25/02/2010	27/02/2010	26/07/2006	26/07/2006	

ChemName	output unit	LOR	SSTC-C																
PAH/Phenols																			
PAH (ESDAT TOTAL)	µg/L			4841.5	<15.5	<15.5		16.4		<15.5	<15.5	<15.5		4.9		<15.5	<15.5	2.2	<15.5
2,4-dimethylphenol	µg/L	1						<1		<1	<1			<1		<1	<1		
2-methylnaphthalene	µg/L	0.1	38000																
2-methylphenol	µg/L	1						<1		<1	<1			<1		<1	<1		
2-nitrophenol	µg/L	1						<1		<1	<1			<1		<1	<1		
3-&4-methylphenol	µg/L	2	1,000,000					<2		<2	<2			<2		<2	<2		
3-methylcholanthrene	µg/L	0.1																	
4-chloro-3-methylphenol	µg/L	1						<1		<1	<1			<1		<1	<1		
Acenaphthene	µg/L	0.1		19	<1	<1		<1		<1	<1	<1		<1		<1	<1	<1	
Acenaphthylene	µg/L	0.1		168	<1	<1		<1		<1	<1	<1		<1		<1	<1	<1	
Anthracene	µg/L	0.1		20.4	<1	<1		<1		<1	<1	<1		<1		<1	<1	<1	
Benz(a)anthracene	µg/L	0.1		11.9	<1	<1		<1		<1	<1	<1		<1		<1	<1	<1	
Benzo(a) pyrene	µg/L	0.05		7.7	<0.5	<0.5		<0.5		<0.5	<0.5	<0.5		<0.5		<0.5	<0.5	<0.5	
Benzo(b)&(k)fluoranthene	µg/L	2																	
Benzo(b)fluoranthene	µg/L	0.1		6	<1	<1		<1		<1	<1	<1		<1		<1	<1	<1	
Benzo(g,h,i)perylene	µg/L	0.1		<3.7	<1	<1		<1		<1	<1	<1		<1		<1	<1	<1	
Benzo(k)fluoranthene	µg/L	0.1		<3.7	<1	<1		<1		<1	<1	<1		<1		<1	<1	<1	
Chrysene	µg/L	0.1		8.4	<1	<1		<1		<1	<1	<1		<1		<1	<1	<1	
Dibenz(a,h)anthracene	µg/L	0.1		<3.7	<1	<1		<1		<1	<1	<1		<1		<1	<1	<1	
Fluoranthene	µg/L	0.1		18.5	<1	<1		<1		<1	<1	<1		<1		<1	<1	1.2	<1
Fluorene	µg/L	0.1		47.5	<1	<1		<1		<1	<1	<1		<1		<1	<1	<1	
Indeno(1,2,3-c,d)pyrene	µg/L	0.1		<3.7	<1	<1		<1		<1	<1	<1		<1		<1	<1	<1	
Naphthalene	µg/L	0.1	920	4440	<1	<1		16.4		<1	<1	<1		4.9		<1	<1	<1	<1
PAHs (Sum of total)	µg/L																		
Phenanthrene	µg/L	0.1		66	<1	<1		<1		<1	<1	<1		<1		<1	<1	<1	
Phenol	µg/L	1	310,000,000					<1		<1	<1			<1		<1	<1		
Pyrene	µg/L	0.1		28.1	<1	<1		<1		<1	<1	<1		<1		<1	<1	1	<1
Pesticides																			
Demeton-S-methyl	µg/L	0.5																	
Fenamiphos	µg/L	0.5																	
Parathion	µg/L	2																	
Pirimphos-ethyl	µg/L	0.5																	
Polychlorinated Biphenyls																			
PCBs (Sum of total)	µg/L	1				<1		<1		<1		<1		<1		<1			<1
SVOCs																			
2-(acetyl amino) fluorene	µg/L	0.1																	
Benzo(e)pyrene	µg/L	0.1																	
Coronene	µg/L	0.1																	
Perylene	µg/L	0.1																	
TPH																			
TPH C15-C36	mg/L			3.52	<0.15	0.96		<0.15		<0.15	<0.15	<0.15		<0.15		<0.15	<0.15	<0.15	<0.15
TPH C10 - C14	µg/L	50	7700	5860	<50	<50		<50		<50	<50	<50		<50		<50	<50	<50	<50
TPH C15-C28	µg/L	100		3420	<100	500		<100		<100	<100	<100		<100		<100	<100	<100	<100
TPH C29-C36	µg/L	50		100	<50	460		<50		<50	<50	<50		<50		<50	<50	<50	<50
TPH C6 - C9	µg/L	20	28,000,000	13,200	<20	<20		<20		<20	<20	<20		<20		<20	<20	<20	<20
TPH+C10 - C36 (Sum of total)	µg/L	50		9380	<50	960		<200		<200	<50	<200		<200		<200	<50	<50	<200

Notes:
LOR = Limit of Reporting
< denotes less than LOR
µg/L - micrograms per litre
mg/L = milligrams per litre
Shading = result exceeds groundwater SSTC-C
Refer to Table T2 for adopted SSTCs

Table T10
Area C
Historic Groundwater Analytical Results
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field ID	MW17	MW17	MW17	MW17	MW18	MW18	MW18	MW18	MW18	MW18	MW18	MW19	MW19	MW20	MW20	MW20	MW20	MW20	MW20
Monitoring_Zone	S	S	S	S	S	S	S	S	S	S	S	D	D	S	S	S	S	S	S
Location Code	BH103	BH103	BH103	BH103	BH104	BH104	BH104	BH104	BH104	BH104	BH104	AECOM BH19	AECOM BH19	BH108	BH108	BH108	BH108	BH108	BH108
Well	MW17	MW17	MW17	MW17	MW18	MW18	MW18	MW18	MW18	MW18	MW18	MW19	MW19	MW20	MW20	MW20	MW20	MW20	MW20
Sampled_Date	13/08/2007	9/05/2008	5/09/2008	3/12/2010	26/07/2006	26/07/2006	14/08/2007	9/05/2008	5/09/2008	3/12/2010	25/02/2010	27/02/2010	27/02/2010	21/07/2006	21/07/2006	14/08/2007	9/05/2008	5/09/2008	3/12/2010

ChemName	output unit	LOR	SSTC-C																		
CPAH (ESDAT)	µg/L			<8.5		<8.5	<0.85	<8.5		<8.5		<0.85	<0.85	0.7				<8.5		0.05	2.66
BTEX																					
Benzene	µg/L	1	21,000	<1		<1	<1	<1		<1		<1	<1	<1		<1		<1		<1	<1
Ethylbenzene	µg/L	1		<2		<2	<2	<2		<2		<2	<2	<2		<2		<2		<2	<2
Toluene	µg/L	1		<2		<5	<5	<2		<2		<5	<5	<5		<2		<2		<5	<5
Xylene (m & p)	µg/L	2		<2		<2	<2	<2		<2		<2	<2	<2		<2		<2		<2	<2
Xylene (o)	µg/L	1		<2		<2	<2	<2		<2		<2	<2	<2		<2		<2		<2	<2
Xylene Total	µg/L																				
Cyanides																					
Cyanide (WAD)	mg/L	0.01																			
Dissolved Hydrocarbon Gases																					
Methane	µg/L	10					185						12	38							109
Field																					
Dissolved Oxygen	mg/L				0.05						0.06								0.12		
pH (Field)	pH Units	0.1			7.46						7.13								7.18		
Redox	mV				-132						-42								-121		
Temperature	°C				22.8						23.7								23.4		
Halogenated Phenols																					
2,4,5-trichlorophenol	µg/L	1		<1		<1	<1			<1		<1	<1					<1		<1	<1
2,4,6-trichlorophenol	µg/L	1		<1		<1	<1			<1		<1	<1					<1		<1	<1
2,4-dichlorophenol	µg/L	1		<1		<1	<1			<1		<1	<1					<1		<1	<1
2,6-dichlorophenol	µg/L	1		<1		<1	<1			<1		<1	<1					<1		<1	<1
2-chlorophenol	µg/L	1		<1		<1	<1			<1		<1	<1					<1		<1	<1
Pentachlorophenol	µg/L	2		<2		<2	<2			<2		<2	<2					<2		<2	<2
Inorganic																					
Alkalinity	mg/L	5																			
Electrical conductivity *(lab)	uS/cm				-132						41.1								41.7		
Inorganics																					
Alkalinity as CaCO3	mg/L	1		204		214	225			296		298	311	317				340		353	346
Ammonia	mg/L	0.01	2400																		
Ammonia as N	mg/L	0.01		<0.5		0.463	<0.1			0.76		<0.015	<0.1	<0.1				5.83		0.183	<0.1
Anions Total	meq/L	0.01		563			598			525			667	537				472			628
Bicarbonate	mg/L	1		204		214				296		298						340		353	
Bicarbonate as CaCO3	mg/L	1					225						311	317							346
Carbonate	mg/L	1		<1		<1	<1			<1		<1	<1	<1				<1		<1	<1
Cations Total	meq/L	0.01		554			657			578			662	535				502			651
Chloride	mg/L	0.5		18,100		14,900	19,300			16,600		13,400	21,300	17,100				15,400		15,900	20,100
Cyanide (Free)	mg/L	0.004		<0.004			<0.004			<0.004			<0.004	<0.004				<0.004			<0.004
Cyanide Total	mg/L	0.004				<0.004	<0.004	<0.004				<0.004	<0.004			0.232			<0.004	<0.004	
Ferrous Iron	mg/L	0.05					1.14						0.2	6.22						2.96	
Fluoride	mg/L	0.1																			
Hydroxide Alkalinity as CaCO3	µg/L	1000		<1000		<1000	<1000			<1000		<1000	<1000	<1000				<1000		<1000	<1000
Ionic Balance	%	0.01		0.85			4.68			4.74			0.38	0.18				2.98			1.75
Nitrate (as N)	mg/L	0.01					0.04						0.1	0.04							0.03
Nitrite (as N)	mg/L	0.01					<0.01						<0.01	<0.01							<0.01
Nitrogen (Total Oxidised)	mg/L	0.01					0.04						0.1	0.04							0.03
pH (Lab)	pH Units	0.01					7.22						6.2	5.67							7.03
Sulphate	mg/L	0.5		2300		2550	2350	1500		2400		2370	2890	2350			1830		1570		1980
Sulphate (Filtered)	mg/L	1																			2580
TOC	mg/L	1					3						1	<1							3
Weak Acid Dissociable Cyanide	mg/L	0.004											<0.004								
Lead																					
Lead (Filtered)	µg/L	0.1		<10		<0.2	0.2		1.1	<10		<0.2	2.1		<0.2		0.3	<10		<0.2	<0.2
Metals																					
Arsenic (Filtered)	µg/L	0.2		<10		1.1	<0.5	<10		<10		1.2	1.1		0.7	<1		<10		0.6	<0.5
Cadmium (Filtered)	µg/L	0.05		<1		<0.2	<0.2	<1		<1		<0.2	0.7		<0.2	<0.1		3.2		<0.2	0.7
Calcium	mg/L	0.1		449		490				458		443						612		452	
Calcium (Filtered)	mg/L	1					596						520	405							548
Chromium (Filtered)	µg/L	0.2		<10		1.2	<0.5	<10		<10		0.6	<0.5		<0.5	2		<10		1.8	<0.5
Copper (Filtered)	µg/L	0.5		<20		<1	<1		<1	32		<1	79		<1		<1	<20		<1	<1
Magnesium	mg/L	0.1		1070		1110				1070		1110						847		1030	
Magnesium (Filtered)	mg/L	1					1240						1360	1050							1240
Mercury (Filtered)	µg/L	0.1		<0.1		<0.1	<0.1	<0.1		<0.1		<0.1	<0.1		<0.1	<0.1		<0.1		<0.1	<0.1
Nickel (Filtered)	µg/L	0.5		15		0.9	4.7	<10		25		<0.5	77		57.7	5		24		0.7	3
Potassium	mg/L	0.1		401		402				408		387						383		403	
Potassium (Filtered)	mg/L	1					425						429	362							424
Sodium	mg/L	0.1		9960		9840				10,500		9520						9000		9790	
Sodium (Filtered)	mg/L	1					11,800						11,800	9640							11,700
Zinc (Filtered)	mg/L	0.001		0.096		<0.005	0.006		0.06	0.07		0.019	0.188		0.009		0.028	<0.05		0.005	0.011
PAH																					
7,12-dimethylbenz(a)anthracene	µg/L	0.1					<0.1					<0.1	<0.1							<0.1	<0.1

Table T10
Area C
Historic Groundwater Analytical Results
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field ID	MW17	MW17	MW17	MW17	MW18	MW18	MW18	MW18	MW18	MW18	MW18	MW19	MW19	MW20	MW20	MW20	MW20	MW20	MW20
Monitoring_Zone	S	S	S	S	S	S	S	S	S	S	S	D	D	S	S	S	S	S	S
Location Code	BH103	BH103	BH103	BH103	BH104	BH104	BH104	BH104	BH104	BH104	BH104	AECOM BH19	AECOM BH19	BH108	BH108	BH108	BH108	BH108	BH108
Well	MW17	MW17	MW17	MW17	MW18	MW18	MW18	MW18	MW18	MW18	MW19	MW19	MW19	MW20	MW20	MW20	MW20	MW20	MW20
Sampled_Date	13/08/2007	9/05/2008	5/09/2008	3/12/2010	26/07/2006	26/07/2006	14/08/2007	9/05/2008	5/09/2008	3/12/2010	25/02/2010	27/02/2010	27/02/2010	21/07/2006	21/07/2006	14/08/2007	9/05/2008	5/09/2008	3/12/2010

ChemName	output unit	LOR	SSTC-C																		
PAH/Phenols																					
PAH (ESDAT TOTAL)	µg/L			<15.5		<15.5	0.1	1.4		<15.5		<1.55	<1.55	0.7				<15.5		0.15	4.16
2,4-dimethylphenol	µg/L	1		<1		<1	<1			<1		<1	<1					<1		<1	<1
2-methylnaphthalene	µg/L	0.1	38000				<0.1					<0.1	<0.1							<0.1	<0.1
2-methylphenol	µg/L	1		<1		<1	<1			<1		<1	<1					<1		<1	<1
2-nitrophenol	µg/L	1		<1		<1	<1			<1		<1	<1					<1		<1	<1
3-&4-methylphenol	µg/L	2	1,000,000	<2		<2	<2			<2		<2	<2					<2		<2	<2
3-methylcholanthrene	µg/L	0.1					<0.1					<0.1	<0.1							<0.1	<0.1
4-chloro-3-methylphenol	µg/L	1		<1		<1	<1			<1		<1	<1					<1		<1	<1
Acenaphthene	µg/L	0.1		<1		<1	<0.1	<1		<1		<0.1	<0.1	<1				<1		<0.1	<0.1
Acenaphthylene	µg/L	0.1		<1		<1	<0.1	<1		<1		<0.1	<0.1	<1				<1		<0.1	<0.1
Anthracene	µg/L	0.1		<1		<1	<0.1	<1		<1		<0.1	<0.1	<1				<1		<0.1	0.1
Benz(a)anthracene	µg/L	0.1		<1		<1	<0.1	<1		<1		<0.1	<0.1	<1				<1		<0.1	0.3
Benzo(a) pyrene	µg/L	0.05		<0.5		<0.5	<0.05	<0.5		<0.5		<0.05	<0.05	0.7				<0.5		0.05	0.56
Benzo(b)&(k)fluoranthene	µg/L	2																			
Benzo(b)fluoranthene	µg/L	0.1		<1		<1	<0.1	<1		<1		<0.1	<0.1	<1				<1		<0.1	0.3
Benzo(g,h,i)perylene	µg/L	0.1		<1		<1	<0.1	<1		<1		<0.1	<0.1	<1				<1		<0.1	0.3
Benzo(k)fluoranthene	µg/L	0.1		<1		<1	<0.1	<1		<1		<0.1	<0.1	<1				<1		<0.1	0.4
Chrysene	µg/L	0.1		<1		<1	<0.1	<1		<1		<0.1	<0.1	<1				<1		<0.1	0.3
Dibenz(a,h)anthracene	µg/L	0.1		<1		<1	<0.1	<1		<1		<0.1	<0.1	<1				<1		<0.1	0.1
Fluoranthene	µg/L	0.1		<1		<1	<0.1	<1		<1		<0.1	<0.1	<1				<1		<0.1	0.5
Fluorene	µg/L	0.1		<1		<1	<0.1	<1		<1		<0.1	<0.1	<1				<1		<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	0.1		<1		<1	<0.1	<1		<1		<0.1	<0.1	<1				<1		<0.1	0.3
Naphthalene	µg/L	0.1	920	<1		<1	<0.1	1.4		<1		<0.1	<0.1	<1				<1		<0.1	<0.1
PAHs (Sum of total)	µg/L																				
Phenanthrene	µg/L	0.1		<1		<1	<0.1	<1		<1		<0.1	<0.1	<1				<1		<0.1	0.2
Phenol	µg/L	1	310,000,000	<1		<1	<1			<1		<1	<1					<1		<1	<1
Pyrene	µg/L	0.1		<1		<1	0.1	<1		<1		<0.1	<0.1	<1				<1		0.1	0.8
Pesticides																					
Demeton-S-methyl	µg/L	0.5																<0.5			
Fenamiphos	µg/L	0.5																<0.5			
Parathion	µg/L	2																<2			
Pirimphos-ethyl	µg/L	0.5																<0.5			
Polychlorinated Biphenyls																					
PCBs (Sum of total)	µg/L	1		<1		<1		<1		<1		<1						<1		<1	
SVOCs																					
2-(acetyl amino) fluorene	µg/L	0.1					<0.1					<0.1	<0.1							<0.1	<0.1
Benzo(e)pyrene	µg/L	0.1					<0.1					<0.1	<0.1							<0.1	0.3
Coronene	µg/L	0.1					<0.1					<0.1	<0.1							<0.1	<0.1
Perylene	µg/L	0.1					<0.1					<0.1	<0.1							<0.1	0.1
TPH																					
TPH C15-C36	mg/L			<0.15		<0.15	<0.15	<0.15		<0.15		<0.15	<0.15	<0.15				2.45	1.25	0.1	<0.15
TPH C10 - C14	µg/L	50	7700	<50		<50	<50	<50		<50		<50	<50	<50				420	60	<50	<50
TPH C15-C28	µg/L	100		<100		<100	<100	<100		<100		<100	<100	<100				2300	1000	100	<100
TPH C29-C36	µg/L	50		<50		<50	<50	<50		<50		<50	<50	<50				150	250	<50	<50
TPH C6 - C9	µg/L	20	28,000,000	<20		<20	<20	<20		<20		<20	<20	<20				<20	<20	<20	<20
TPH+C10 - C36 (Sum of total)	µg/L	50		<200		<200	<50	<200		<200		<200	<50	<50				2870	1310	100	<50

Notes:
LOR = Limit of Reporting
< denotes less than LOR
µg/L - micrograms per litre
mg/L = milligrams per litre
Shading = result exceeds groundwater SSTC-C
Refer to Table T2 for adopted SSTCs

Table T10
Area C
Historic Groundwater Analytical Results
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field ID	MW21	MW21	MW21	MW21	MW21	MW21	MW21	MW21	MW21	MW21	MW22	MW26	MW26
Monitoring Zone	S	S	S	S	S	S	S	S	S	S	S	S	S
Location Code	AECOM BH21	AECOM BH21	BH110	BH110	BH110	BH110	BH110	BH110	BH110	BH110	BH110	AECOM BH26	AECOM BH26
Well	MW21	MW21	MW21	MW21	MW21	MW21	MW21	MW21	MW21	MW21	MW21	MW26	MW26
Sampled Date	25/02/2010	27/02/2010	14/07/2006	14/07/2006	19/07/2006	15/08/2007	8/05/2008	5/08/2008	15/03/2010	15/08/2007		25/02/2010	27/02/2010

ChemName	output unit	LOR	SSTC-C													
CPAH (ESDAT)	µg/L			<8.5		4			8.7		<8.5	2.1	<8.5	<8.5		
BTEX																
Benzene	µg/L	1	21,000	<1		3			<1		<1	<1	4	<1		
Ethylbenzene	µg/L	1		<2		2			<2		<2	<2	4	<2		
Toluene	µg/L	1		<5		8			<2		<5	<5	5	<5		
Xylene (m & p)	µg/L	2		<2		12			<2		<2	<2	6	<2		
Xylene (o)	µg/L	1		<2		9			<2		<2	<2	4	<2		
Xylene Total	µg/L															
Cyanides																
Cyanide (WAD)	mg/L	0.01														
Dissolved Hydrocarbon Gases																
Methane	µg/L	10		142								59		61		
Field																
Dissolved Oxygen	mg/L									-0.11						
pH (Field)	pH Units	0.1								6.4						
Redox	mV									-77						
Temperature	°C									24.3						
Halogenated Phenols																
2,4,5-trichlorophenol	µg/L	1							<1		<1	<1	<1			
2,4,6-trichlorophenol	µg/L	1							<1		<1	<1	<1			
2,4-dichlorophenol	µg/L	1							<1		<1	<1	<1			
2,6-dichlorophenol	µg/L	1							<1		<1	<1	<1			
2-chlorophenol	µg/L	1							<1		<1	<1	<1			
Pentachlorophenol	µg/L	2							<2		<2	<2	<2			
Inorganic																
Alkalinity	mg/L	5														
Electrical conductivity *(lab)	uS/cm									44						
Inorganics																
Alkalinity as CaCO3	mg/L	1		184					158		154	142	314	227		
Ammonia	mg/L	0.01	2400													
Ammonia as N	mg/L	0.01		5.16					<0.1		0.1	<0.1	0.047	<0.1		
Anions Total	meq/L	0.01		428					505		584	598	182	588		
Bicarbonate	mg/L	1							158		154		314			
Bicarbonate as CaCO3	mg/L	1		184								142		227		
Carbonate	mg/L	1		<1					<1		<1	<1	<1	<1		
Cations Total	meq/L	0.01		389					522		550	570	165	544		
Chloride	mg/L	0.5		13,900					16,000		17,400	20,200	5930	18,900		
Cyanide (Free)	mg/L	0.004		<0.004					<0.004			<0.004	<0.004	<0.004		
Cyanide Total	mg/L	0.004					0.007				<0.004					
Ferrous Iron	mg/L	0.05		56								29.3		1.18		
Fluoride	mg/L	0.1														
Hydroxide Alkalinity as CaCO3	µg/L	1000		<1000					<1000		<1000	<1000	<1000	<1000		
Ionic Balance	%	0.01		4.86					1.68		3.03	2.4	4.82	3.86		
Nitrate (as N)	mg/L	0.01		2.76								<0.01		0.05		
Nitrite (as N)	mg/L	0.01		<0.01								0.01		0.01		
Nitrogen (Total Oxidised)	mg/L	0.01		2.76								0.02		0.07		
pH (Lab)	pH Units	0.01		6.36								6.42		7.36		
Sulphate	mg/L	0.5		1590					2460		4340	1210	402	2400		
Sulphate (Filtered)	mg/L	1						2370								
TOC	mg/L	1		1								3		4		
Weak Acid Dissociable Cyanide	mg/L	0.004		<0.004								<0.004		<0.004		
Lead																
Lead (Filtered)	µg/L	0.1			0.8		0.9		15		<0.2	0.5	1		<0.2	
Metals																
Arsenic (Filtered)	µg/L	0.2			3.1	<10			14		6	4.7	3		0.6	
Cadmium (Filtered)	µg/L	0.05			0.16	<1			7.4		2.6	0.4	2.8		<0.2	
Calcium	mg/L	0.1							395		400		267			
Calcium (Filtered)	mg/L	1		706								435		442		
Chromium (Filtered)	µg/L	0.2			<0.2	<10			<10		<0.5	<0.5	<5		<0.5	
Copper (Filtered)	µg/L	0.5			<0.5		<1		<20		<1	<1	4		<1	
Magnesium	mg/L	0.1							1110		1120		407			
Magnesium (Filtered)	mg/L	1		631								1170		1060		
Mercury (Filtered)	µg/L	0.1			<0.1	<0.1			<0.1		<0.1	<0.1	<0.1		<0.1	
Nickel (Filtered)	µg/L	0.5			94.7	24			46		102	50.9	51		8.8	
Potassium	mg/L	0.1							398		380		52			
Potassium (Filtered)	mg/L	1		167								356		370		
Sodium	mg/L	0.1							9860		9840		2690			
Sodium (Filtered)	mg/L	1		6840								10,200		9780		
Zinc (Filtered)	mg/L	0.001			0.059		0.018		0.359		0.026	0.074	0.08		<0.005	
PAH																
7,12-dimethylbenz(a)anthracene	µg/L	0.1														

Table T10
Area C
Historic Groundwater Analytical Results
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field ID	MW21	MW21	MW21	MW21	MW21	MW21	MW21	MW21	MW21	MW21	MW22	MW26	MW26
Monitoring Zone	S	S	S	S	S	S	S	S	S	S	S	S	S
Location Code	AECOM BH21	AECOM BH21	BH110	BH110	BH110	BH110	BH110	BH110	BH110	BH110	AECOM BH26	AECOM BH26	AECOM BH26
Well	MW21	MW21	MW21	MW21	MW21	MW21	MW21	MW21	MW21	MW21	MW26	MW26	MW26
Sampled Date	25/02/2010	27/02/2010	14/07/2006	14/07/2006	19/07/2006	15/08/2007	8/05/2008	5/08/2008	15/03/2010	15/08/2007	25/02/2010	27/02/2010	27/02/2010

ChemName	output unit	LOR	SSTC-C											
PAH/Phenols														
PAH (ESDAT TOTAL)	µg/L			1.4		21.6			29.5		<15.5	5.4	30.6	<15.5
2,4-dimethylphenol	µg/L	1							<1		<1	<1	<1	
2-methylnaphthalene	µg/L	0.1	38000											
2-methylphenol	µg/L	1							<1		<1	<1	<1	
2-nitrophenol	µg/L	1							<1		<1	<1	<1	
3-&4-methylphenol	µg/L	2	1,000,000						<2		<2	<2	<2	
3-methylcholanthrene	µg/L	0.1												
4-chloro-3-methylphenol	µg/L	1							<1		<1	<1	<1	
Acenaphthene	µg/L	0.1		<1		1.6			<1		<1	<1	<1	<1
Acenaphthylene	µg/L	0.1		<1		5.3			2.4		<1	1.7	1	<1
Anthracene	µg/L	0.1		<1		2.1			<1		<1	<1	<1	<1
Benz(a)anthracene	µg/L	0.1		<1		1.2			2.3		<1	<1	<1	<1
Benzo(a) pyrene	µg/L	0.05		<0.5		0.7			2.4		<0.5	1.1	<0.5	<0.5
Benzo(b)&(k)fluoranthene	µg/L	2												
Benzo(b)fluoranthene	µg/L	0.1		<1		<1			1.8		<1	1	<1	<1
Benzo(g,h,i)perylene	µg/L	0.1		<1		<1			<1		<1	<1	<1	<1
Benzo(k)fluoranthene	µg/L	0.1		<1		<1			<1		<1	<1	<1	<1
Chrysene	µg/L	0.1		<1		<1			2.2		<1	<1	<1	<1
Dibenz(a,h)anthracene	µg/L	0.1		<1		<1			<1		<1	<1	<1	<1
Fluoranthene	µg/L	0.1		<1		3			2		<1	<1	<1	<1
Fluorene	µg/L	0.1		<1		3.8			<1		<1	<1	<1	<1
Indeno(1,2,3-c,d)pyrene	µg/L	0.1		<1		<1			<1		<1	<1	<1	<1
Naphthalene	µg/L	0.1	920	1.4		<1			12.3		<1	<1	29.6	<1
PAHs (Sum of total)	µg/L													
Phenanthrene	µg/L	0.1		<1		2.6			1.1		<1	<1	<1	<1
Phenol	µg/L	1	310,000,000						<1		<1	<1	<1	
Pyrene	µg/L	0.1		<1		1.3			3		<1	1.6	<1	<1
Pesticides														
Demeton-S-methyl	µg/L	0.5												
Fenamiphos	µg/L	0.5												
Parathion	µg/L	2												
Pirimphos-ethyl	µg/L	0.5												
Polychlorinated Biphenyls														
PCBs (Sum of total)	µg/L	1				<1			<1		<1		<1	
SVOCs														
2-(acetylamino) fluorene	µg/L	0.1												
Benzo(e)pyrene	µg/L	0.1												
Coronene	µg/L	0.1												
Perylene	µg/L	0.1												
TPH														
TPH C15-C36	mg/L			<0.15		0.2			1.52		<0.15	<0.15	2.62	<0.15
TPH C10 - C14	µg/L	50	7700	<50		160			<50		<50	<50	280	<50
TPH C15-C28	µg/L	100		<100		200			900		<100	<100	2100	<100
TPH C29-C36	µg/L	50		<50		<50			620		<50	<50	520	<50
TPH C6 - C9	µg/L	20	28,000,000	<20		60			<20		<20	<20	40	<20
TPH+C10 - C36 (Sum of total)	µg/L	50		<50		360			1520		<200	<50	2900	<50

Notes:
LOR = Limit of Reporting
< denotes less than LOR
µg/L - micrograms per litre
mg/L = milligrams per litre
Shading = result exceeds groundwater SSTC-C
Refer to Table T2 for adopted SSTCs

Table T11
Area D
Soil Analytical Results,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Field ID	BH094 1.5-1.95	BH094 3.0-3.45
Sample Depth Range	1.5-1.95	3-3.45
Location Code	BH094	BH094
Sampled Date Time	13/06/2006	13/06/2006
Monitoring Zone	D	D
Monitoring Round	ERM	ERM
SampleComments	Area D	Area D

ChemName	output unit	LOR	SSTC-D		
BTEX					
Benzene	mg/kg	0.2	0.25	<0.2	
Ethylbenzene	mg/kg	0.2	64	<0.2	
Toluene	mg/kg	0.2	160	<0.2	
Xylene (m & p)	mg/kg	0.2	14	<0.2	
Xylene (o)	mg/kg	0.2		<0.2	
Lead					
Lead	mg/kg	5		274	153
Metals					
Arsenic	mg/kg	5		<5	<5
Cadmium	mg/kg	1		<1	<1
Chromium	mg/kg	2		11	11
Copper	mg/kg	5		143	44
Mercury	mg/kg	0.1		3.3	0.6
Nickel	mg/kg	2		13	3
Zinc	mg/kg	5		132	62
TPH					
TPH C15-C36	mg/kg			<200	
TPH C10 - C14	mg/kg	50	210	<50	
TPH C15-C28	mg/kg	100		<100	
TPH C29-C36	mg/kg	100		<100	
TPH C6 - C9	mg/kg	2	55	<2	
TPH+C10 - C36 (Sum of total)	mg/kg			<250	

Notes:

mg/kg = milligrams per kilogram

Laboratory LOR = Limit of Reporting

< denotes less than LOR

Shading = results exceeds soil SSTC-D

Refer to Table T1 for adopted SSTCs

Table T12 - Metals 95% UCL for all Area A fill material (excluding natural materials)

Amended ORWS RAP, Barangaroo

Lend Lease

	Lead	Arsenic	Copper	Zinc	Arsenic
BH01_0.3-0.4	6	2.5	331	46	Raw Statistics
BH01_1.0-1.2	19	2.5	17	38	Minimum 2.5
BH01_10.0-10.2	104	6	13	47	Maximum 18
BH01_12.0-12.1	47	2.5	30	96	Mean 3.671
BH01_2.0-2.2	30	2.5	44	2070	Median 2.5
BH01_4.0-4.1	16	2.5	92	42	SD 2.901
BH01_7.0-7.1	132	12	44	115	Coefficient of Variation 0.79
BH01_9.0-9.1	74	14	21	47	Skewness 2.896
BH049_0.3-0.5	6	2.5	262	54	Use 95% Student's-t UCL 4.11
BH049_3.0-3.45	8	2.5	2.5	10	or 95% Modified-t UCL 4.121
BH345_0.1-0.2	8	2.5	288	55	Copper
BH345_1.5-1.9	101	2.5	11	84	Minimum 2.5
BH345_10.5-10.9	35	2.5	8	55	Maximum 355
BH345_12.0-12.3	8	2.5	2.5	9	Mean 59.16
BH345_13.5-13.8	12	2.5	7	9	Median 17
BH345_15.0-15.4	134	2.5	31	59	SD 94.9
BH345_3.0-3.4	17	2.5	2.5	22	Coefficient of Variation 1.604
BH345_4.5-4.9	820	2.5	16	132	Skewness 2.092
BH345_6.0-6.4	62	2.5	7	36	95% Chebyshev(Mean, Sd) UCL 96.93
BH345_7.5-7.9	32	2.5	2.5	25	Lead
BH345_9.0-9.4	12	2.5	2.5	13	Minimum 6
BH346_0.1-0.2	7	2.5	355	71	Maximum 2450
BH346_1.5-1.8	120	2.5	15	177	Mean 116.7
BH346_10.5-10.9	28	2.5	27	49	Median 66.5
BH346_12.0-12.4	23	2.5	2.5	18	SD 243.4
BH346_13.5-13.9	48	2.5	20	50	Coefficient of Variation 2.086
BH346_15-15.4	48	2.5	5	14	Skewness 7.806
BH346_16.5-16.9	176	10	45	144	Use 95% H-UCL 149
BH346_3.0-3.4	66	2.5	257	87	Zinc
BH346_6.0-6.4	18	2.5	2.5	30	Minimum 7
BH346_7.5-7.9	53	2.5	10	39	Maximum 2070
BH346_9.0-9.4	16	2.5	2.5	25	Mean 97.44
BH347_0.1-0.2	8	2.5	284	59	Median 62
BH347_1.5-1.6	34	2.5	92	52	SD 192
BH347_10.5-10.9	148	2.5	8	72	Coefficient of Variation 1.97
BH347_12.0-12.4	170	6	22	173	Skewness 9.307
BH347_13.5-13.9	154	2.5	24	105	Use 95% Chebyshev (Mean, Sd) UCL 173.8
BH347_15-15.1	67	11	15	67	
BH347_3.0-3.2	176	2.5	5	100	
BH347_4.5-4.8	15	2.5	2.5	7	
BH347_6.0-6.3	19	2.5	59	10	
BH347_7.5-7.7	104	2.5	12	97	
BH347_9.0-9.2	80	6	16	242	
BH348_0.1-0.2	8	2.5	274	62	
BH348_1.5-1.9	266	2.5	22	120	
BH348_10.5-10.6	56	6	12	52	
BH348_12-12.45	591	2.5	6	202	
BH348_3.0-3.4	301	2.5	9	131	
BH348_4.5-4.9	400	2.5	12	48	
BH348_6.0-6.4	185	2.5	5	220	
BH348_7.5-7.9	142	2.5	7	36	
BH348_9.0-9.4	98	2.5	6	26	
BH349_0.1-0.2	9	2.5	283	68	
BH349_1.5-1.9	48	8	24	131	
BH349_10.5-10.9	114	2.5	20	66	
BH349_12-12.25	22	2.5	35	163	
BH349_3.0-3.4	97	2.5	12	103	
BH349_4.5-4.9	67	2.5	12	62	
BH349_6.0-6.4	29	2.5	2.5	47	
BH349_7.5-7.9	53	2.5	11	31	
BH349_9.0-9.4	178	2.5	13	67	
BH350_0.1-0.2	9	2.5	302	64	
BH350_1.5-1.95	98	14	9	46	

Table T12 - Metals 95% UCL for all Area A fill material (excluding natural materials)

Amended ORWS RAP, Barangaroo

Lend Lease

BH350	10-10.45	77	2.5	20	75
BH350	11.5-11.95	28	2.5	5	65
BH350	2.5-2.95	205	2.5	137	93
BH350	4-4.45	114	2.5	24	69
BH350	5.5-5.95	21	2.5	38	31
BH350	8.5-8.95	36	2.5	13	26
BH351	0.1-0.2	11	2.5	345	62
BH351	1.5-1.9	193	5	54	143
BH351	10.0-10.4	98	2.5	10	58
BH351	11.5-11.9	61	6	36	171
BH351	2.5-2.9	157	2.5	54	136
BH351	4.0-4.4	109	2.5	48	108
BH351	7.0-7.4	90	2.5	11	60
BH351	8.5-8.9	265	2.5	11	121
BH352	0.1-0.2	10	2.5	296	67
BH352	1.5-2.0	87	2.5	13	54
BH352	10.5-11.0	33	18	61	53
BH352	12.0-12.5	88	2.5	18	65
BH352	3.0-3.35	37	6	14	196
BH352	4.5-5.0	56	2.5	24	29
BH352	6.0-6.5	13	2.5	2.5	9
BH352	7.5-8.0	98	2.5	59	61
BH352	9.0-9.5	20	2.5	13	74
BH353	0.1-0.2	10	2.5	303	66
BH353	1.5-1.9	88	2.5	78	51
BH353	10.5-10.9	2450	2.5	13	41
BH353	11.7-12.15	43	2.5	43	69
BH353	3.0-3.4	86	2.5	2.5	37
BH353	4.0-4.65	72	2.5	19	53
BH353	6.0-6.4	53	2.5	45	229
BH353	7.5-7.9	179	2.5	13	204
BH354	0.1-0.2	8	2.5	327	58
BH354	1.5-1.7	114	6	35	119
BH354	10.5-10.8	106	9	38	398
BH354	12.0-12.3	238	14	14	125
BH354	13.5-13.7	96	2.5	16	85
BH354	3.0-3.1	120	2.5	28	79
BH354	4.5-4.7	82	2.5	72	118
BH354	6.0-6.1	31	6	61	43
BH354	7.5-7.7	92	2.5	142	96
BH355	0-0.2	7	2.5	315	59
BH355	1.5-1.95	263	2.5	61	179
BH355	11.5-11.95	363	6	37	174
BH355	2.5-2.95	215	2.5	83	92
BH355	4.0-4.45	50	2.5	10	35
BH355	5.5-5.95	41	2.5	16	56
BH355	7-7.45	217	2.5	2.5	70
BH355	8.5-8.95	33	6	14	46
BH356	0.1-0.2	7	2.5	265	62
BH356	1.3-1.8	102	2.5	35	41
BH356	10.5-10.9	30	2.5	42	40
BH356	12-12.4	29	2.5	6	15
BH356	3.0-3.5	273	5	15	117
BH356	4.5-5.0	291	2.5	6	264
BH356	6.0-6.2	49	12	17	37
BH356	7.5-7.8	83	6	16	26
BH356	9.0-9.4	142	2.5	11	186

Table T13 - Metals 95% UCL for all Area A fill material above groundwater
Amended ORWS RAP, Barangaroo
Lend Lease

	Lead	Arsenic	Copper	Zinc			
BH01 0.3-0.4	6	<5	331	46	Arsenic		
BH01 1.0-1.2	19	<5	17	38	Minimum of Detected	5	
BH049 0.3-0.5	6	<5	262	54	Maximum of Detected	14	
BH345 0.1-0.2	8	<5	288	55	Mean of Detected	8.25	
BH345 1.5-1.9	101	<5	11	84	SD of Detected	4.031	
BH346 0.1-0.2	7	<5	355	71	95% KM (t) UCL	6.153	
BH346 1.5-1.8	120	<5	15	177	95% KM (Percentile Bootstrap) UCL	8.444	20
BH347 0.1-0.2	8	<5	284	59	Copper		
BH347 1.5-1.6	34	<5	92	52	Minimum	9	
BH348 0.1-0.2	8	<5	274	62	Maximum	355	
BH348 1.5-1.9	266	<5	22	120	Mean	173.9	
BH349 0.1-0.2	9	<5	283	68	Median	262	
BH349 1.5-1.9	48	8	24	131	SD	138.4	
BH350 0.1-0.2	9	<5	302	64	Coefficient of Variation	0.796	
BH350 1.5-1.95	98	14	9	46	Skewness	-0.0604	
BH351 0.1-0.2	11	<5	345	62	95% Chebyshev(Mean, Sd) UCL	290	170
BH351 1.5-1.9	193	5	54	143	Lead		
BH352 0.1-0.2	10	<5	296	67	Minimum	6	
BH352 1.5-2.0	87	<5	13	54	Maximum	266	
BH353 0.1-0.2	10	<5	303	66	Mean	61	
BH353 1.5-1.9	88	<5	78	51	Median	11	
BH354 0.1-0.2	8	<5	327	58	SD	77.06	
BH354-1.5-1.7	114	6	35	119	Coefficient of Variation	1.263	
BH355_0-0.2	7	<5	315	59	Skewness	1.594	
BH355 1.5-1.95	263	<5	61	179	95% Chebyshev(Mean, Sd) UCL	208.6	1700
BH356 0.1-0.2	7	<5	265	62	Zinc		
BH356 1.3-1.8	102	<5	35	41	Minimum	38	
					Maximum	179	
					Mean	77.33	
					Median	62	
					SD	39.76	
					Coefficient of Variation	0.514	
					Skewness	1.553	
					Use 95% Student's-t UCL	90.39	
					or 95% Modified-t UCL	90.77	220

Table T14 - Metals 95% UCL for all Area A fill material below groundwater (excluding natural materials)

Amended ORWS RAP, Barangaroo
Lend Lease

SSESC

	Lead	Arsenic	Copper	Zinc	Arsenic				
BH01 10.0-10.2	104	6	13	47	Minimum of Detected	5			
BH01 12.0-12.1	47	<5	30	96	Maximum of Detected	18			
BH01 2.0-2.2	30	<5	44	2070	Mean of Detected	8.684			
BH01 4.0-4.1	16	<5	92	42	SD of Detected	3.787			
BH01 7.0-7.1	132	12	44	115	95% KM (t) UCL	6.148			
BH01 9.0-9.1	74	14	21	47	95% KM (Percentile Bootstrap) UCL	6.785	5		
BH049 3.0-3.45	8	<5	<5	10	Copper				
BH345 10.5-10.9	35	<5	8	55	Minimum of Detected	5			
BH345 12.0-12.3	8	<5	<5	9	Maximum of Detected	257			
BH345 13.5-13.8	12	<5	7	9	Mean of Detected	29.64			
BH345 15.0-15.4	134	<5	31	59	SD of Detected	36.77			
BH345 3.0-3.4	17	<5	<5	22	95% KM (BCA) UCL	32.62	42		
BH345 4.5-4.9	820	<5	16	132	Lead				
BH345 6.0-6.4	62	<5	7	36	Minimum	8			
BH345 7.5-7.9	32	<5	<5	25	Maximum	2450			
BH345 9.0-9.4	12	<5	<5	13	Mean	132.8			
BH346 10.5-10.9	28	<5	27	49	Median	74			
BH346 12.0-12.4	23	<5	<5	18	SD	271.7			
BH346 13.5-13.9	48	<5	20	50	Coefficient of Variation	2.045			
BH346 15-15.4	48	<5	5	14	Skewness	7.125			
BH346 16.5-16.9	176	10	45	144	95% H-UCL	154.9	440		
BH346 3.0-3.4	66	<5	257	87	Zinc				
BH346 6.0-6.4	18	<5	<5	30	Minimum	7			
BH346 7.5-7.9	53	<5	10	39	Maximum	2070			
BH346 9.0-9.4	16	<5	<5	25	Mean	103.3			
BH347 10.5-10.9	148	<5	8	72	Median	62			
BH347 12.0-12.4	170	6	22	173	SD	217			
BH347 13.5-13.9	154	<5	24	105	Coefficient of Variation	2.101			
BH347 15-15.1	67	11	15	67	Skewness	8.299			
BH347 3.0-3.2	176	<5	5	100	95% H-UCL	116.9	55		
BH347 4.5-4.8	15	<5	<5	7					
BH347 6.0-6.3	19	<5	59	10	BH352 3.0-3.35	37	6	14	196
BH347 7.5-7.7	104	<5	12	97	BH352 4.5-5.0	56	<5	24	29
BH347 9.0-9.2	80	6	16	242	BH352 6.0-6.5	13	<5	<5	9
BH348 10.5-10.6	56	6	12	52	BH352 7.5-8.0	98	<5	59	61
BH348 12-12.45	591	<5	6	202	BH352 9.0 9.5	20	<5	13	74
BH348 3.0-3.4	301	<5	9	131	BH353 10.5-10.9	2450	<5	13	41
BH348 4.5-4.9	400	<5	12	48	BH353 11.7-12.15	43	<5	43	69
BH348 6.0-6.4	185	<5	5	220	BH353 3.0-3.4	86	<5	<5	37
BH348 7.5-7.9	142	<5	7	36	BH353 4.0-4.65	72	<5	19	53
BH348 9.0-9.4	98	<5	6	26	BH353 6.0-6.4	53	<5	45	229
BH349 10.5-10.9	114	<5	20	66	BH353 7.5-7.9	179	<5	13	204
BH349 12-12.25	22	<5	35	163	BH354-10.5-10.8	106	9	38	398
BH349 3.0-3.4	97	<5	12	103	BH354-12.0-12.3	238	14	14	125
BH349 4.5-4.9	67	<5	12	62	BH354-13.5-13.7	96	<5	16	85
BH349 6.0-6.4	29	<5	<5	47	BH354-3.0-3.1	120	<5	28	79
BH349 7.5-7.9	53	<5	11	31	BH354-4.5-4.7	82	<5	72	118
BH349 9.0-9.4	178	<5	13	67	BH354-6.0-6.1	31	6	61	43
BH350 10-10.45	77	<5	20	75	BH354-7.5-7.7	92	<5	142	96
BH350 11.5-11.95	28	<5	5	65	BH355 11.5-11.95	363	6	37	174
BH350 2.5-2.95	205	<5	137	93	BH355 2.5-2.95	215	<5	83	92
BH350 4-4.45	114	<5	24	69	BH355 4.0-4.45	50	<5	10	35
BH350 5.5-5.95	21	<5	38	31	BH355 5.5-5.95	41	<5	16	56
BH350 8.5-8.95	36	<5	13	26	BH355 7-7.45	217	<5	<5	70
BH351 10.0-10.4	98	<5	10	58	BH355 8.5-8.95	33	6	14	46
BH351 11.5-11.9	61	6	36	171	BH356 10.5-10.9	30	<5	42	40
BH351 2.5-2.9	157	<5	54	136	BH356 12-12.4	29	<5	6	15
BH351 4.0-4.4	109	<5	48	108	BH356 3.0-3.5	273	5	15	117
BH351 7.0-7.4	90	<5	11	60	BH356 4.5-5.0	291	<5	6	264
BH351 8.5-8.9	265	<5	11	121	BH356 6.0-6.2	49	12	17	37
BH352 10.5-11.0	33	18	61	53	BH356 7.5-7.8	83	6	16	26
BH352 12.0-12.5	88	<5	18	65	BH356 9.0-9.4	142	<5	11	186

Table T15 - TPH 95% UCL for all Area A fill material above groundwater

Amended ORWS RAP, Barangaroo

Lend Lease

	TPH C6-C9	TPH C10-C14	TPH C6-C9
BH049 0.3-0.5	<2	<50	All non-detects. 95% UCLs not calculated.
BH345 0.1-0.2	<10	<50	
BH345 1.5-1.9	<10	<50	
BH346 0.1-0.2	<10	<50	TPH C10-C14 All non-detects. 95% UCLs not calculated.
BH346 1.5-1.8	<10	<50	
BH347 0.1-0.2	<10	<50	
BH347 1.5-1.6	<10	<50	
BH348 0.1-0.2	<10	<50	
BH348 1.5-1.9	<10	<50	
BH349 0.1-0.2	<10	<50	
BH349 1.5-1.9	<10	<50	
BH350 0.1-0.2	<10	<50	
BH350 1.5-1.95	<10	<50	
BH351 0.1-0.2	<10	<50	
BH351 1.5-1.9	<10	<50	
BH352 0.1-0.2	<10	<50	
BH352 1.5-2.0	<10	<50	
BH353 0.1-0.2	<10	<50	
BH353 1.5-1.9	<10	<50	
BH354 0.1-0.2	<10	<50	
BH354-1.5-1.7	<10	<50	
BH355 0-0.2	<10	<50	
BH355 1.5-1.95	<10	<50	
BH356 0.1-0.2	<10	<50	
BH356 1.3-1.8	<10	<50	

Table T16 - TPH 95% UCL for all Area A fill material below groundwater (excluding natural materials)
Amended ORWS RAP, Barangaroo
Lend Lease

	TPH C6-C9	TPH C10-C14	TPH C6-C9		
BH01 4.0-4.1	<10	<50	All non-detects		
BH01 7.0-7.1	<10	<50			
BH049 0.3-0.5	<2	<50	TPH C10-C14 Minimum 50 Maximum 70 Mean of Detected 56.67 SD 11.55 95% KM (t) UCL 50.69 95% KM (% Bootstrap) UCL N/A		
BH345 10.5-10.9	<10	<50			
BH345 12.0-12.3	<10	<50			
BH345 13.5-13.8	<10	<50			
BH345 15.0-15.4	<10	<50			
BH345 3.0-3.4	<10	<50			
BH345 4.5-4.9	<10	<50			
BH345 6.0-6.4	<10	<50			
BH345 7.5-7.9	<10	<50			
BH345 9.0-9.4	<10	<50			
BH346 10.5-10.9	<10	<50	BH352 9.0 9.5	<10	<50
BH346 12.0-12.4	<10	<50	BH353 10.5-10.9	<10	<50
BH346 13.5-13.9	<10	<50	BH353 11.7-12.15	<10	<50
BH346 15-15.4	<10	<50	BH353 3.0-3.4	<10	<50
BH346 16.5-16.9	<10	<50	BH353 4.0-4.65	<10	<50
BH346 3.0-3.4	<10	<50	BH353 6.0-6.4	<10	<50
BH346 6.0-6.4	<10	<50	BH353 7.5-7.9	<10	<50
BH346 7.5-7.9	<10	<50	BH354-10.5-10.8	<10	50
BH346 9.0-9.4	<10	<50	BH354-12.0-12.3	<10	<50
BH347 10.5-10.9	<10	<50	BH354-13.5-13.7	<10	<50
BH347 12.0-12.4	<10	50	BH354-3.0-3.1	<10	<50
BH347 13.5-13.9	<10	<50	BH354-4.5-4.7	<10	<50
BH347 15-15.1	<10	<50	BH354-6.0-6.1	<10	<50
BH347 3.0-3.2	<10	<50	BH354-7.5-7.7	<10	<50
BH347 4.5-4.8	<10	<50	BH355 11.5-11.95	<10	<50
BH347 6.0-6.3	<10	<50	BH355 2.5-2.95	<10	<50
BH347 7.5-7.7	<10	<50	BH355 4.0-4.45	<10	<50
BH347 9.0-9.2	<10	<50	BH355 5.5-5.95	<10	<50
BH348 10.5-10.6	<10	70	BH355 7-7.45	<10	<50
BH348 12-12.45	<10	<50	BH355 8.5-8.95	<10	<50
BH348 3.0-3.4	<10	<50	BH356 10.5-10.9	<10	<50
BH348 4.5-4.9	<10	<50	BH356 12-12.4	<10	<50
BH348 6.0-6.4	<10	<50	BH356 3.0-3.5	<10	<50
BH348 7.5-7.9	<10	<50	BH356 4.5-5.0	<10	<50
BH348 9.0-9.4	<10	<50	BH356 6.0-6.2	<10	<50
BH349 10.5-10.9	<10	<50	BH356 7.5-7.8	<10	<50
BH349 12-12.25	<10	<50	BH356 9.0-9.4	<10	<50
BH349 3.0-3.4	<10	<50			
BH349 4.5-4.9	<10	<50			
BH349 6.0-6.4	<10	<50			
BH349 7.5-7.9	<10	<50			
BH349 9.0-9.4	<10	<50			
BH350 10-10.45	<10	<50			
BH350 11.5-11.95	<10	<50			
BH350 2.5-2.95	<10	<50			
BH350 4-4.45	<10	<50			
BH350 5.5-5.95	<10	<50			
BH350 8.5-8.95	<10	<50			
BH351 10.0-10.4	<10	<50			
BH351 11.5-11.9	<10	<50			
BH351 2.5-2.9	<10	<50			
BH351 4.0-4.4	<10	<50			
BH351 7.0-7.4	<10	<50			
BH351 8.5-8.9	<10	<50			
BH352 10.5-11.0	<10	<50			
BH352 12.0-12.5	<10	<50			
BH352 3.0-3.35	<10	<50			
BH352 4.5-5.0	<10	<50			
BH352 6.0-6.5	<10	<50			
BH352 7.5-8.0	<10	<50			

Table T17
Terrestrial Soil Criteria,
Amended Remedial Action Plan,
ORWS Area, Barangaroo

Key Chemical	Criteria for Protection of Plants and Soil (mg/kg)	Grouped Criteria (mg/kg)	Data Sources/Notes
Metals and inorganics			
Arsenic ¹	20		NEPM (1999) - Interim Urban
Cadmium	3		NEPM (1999) - Interim Urban
Chromium	190		NEPM (draft, 2010) EILs - Public open space - aged
Copper ¹	60		NEPM (draft, 2010) EILs - Public open space - aged
Lead ¹	1100		NEPM (draft, 2010) EILs - Public open space - aged
Mercury	1		NEPM (1999) - Interim Urban
Nickel	30		NEPM (draft, 2010) EILs - Public open space - aged
Zinca	200		NEPM (1999) - Interim Urban
Cyanide (if free)	8		CCME (1999a) coarse soil
Ammonia			Calculate based on irrigation guideline of 5 mg/L as N (based on protection of plants)
Petroleum Hydrocarbons			
TPH C6 - C9a	210		CCME (2008b) coarse soil
TPH C10 - C14a	150		CCME (2008b) coarse soil
TPH C15 - C28	-	300	CCME (2008b) coarse soil
TPH C29 - C36	-		
Benzene	1		NSW EPA (1994)
Toluene	1.4		NSW EPA (1994)
Ethylbenzene	3.1		NSW EPA (1994)
Xylenes	14		NSW EPA (1994)
Low MWT PAHs			
Acenaphthene ¹		sum - 50b	a: CCME (1999b)
Acenaphthylene ¹			b: Total PAHs (excluding carcinogenic PAHs), from USEPA Eco SSLs of 48mg/kg rounded to 50mg/kg
Anthracene			
Fluorene ¹			
Phenanthrene			
Naphthalene ¹	22a		
High MWT PAHs			
Benzo[a]anthracene	40 c		c: Criteria derived from 4 for benzo(a)pyrene and applied using the following TEFs from CCME
Benzo[a]pyrene	4 c		- benzo[a]anthracene, 0.1
Benzo[b]fluoranthene	40 c		- benzo[a]pyrene, 1
Benzo[k]fluoranthene	40 c		- benzo[b]fluoranthene, 0.1
Benzo[ghi]perylene	400 c		- benzo[k]fluoranthene, 0.1
Chrysene	400 c		- benzo[ghi]perylene, 0.01
Dibenz[ah]anthracene	4 c		- chrysene, 0.01
Fluoranthene	- c		- dibenz[ah]anthracene, 1
Indeno[123cd]pyrene	40 c		- indeno[123cd]pyrene, 0.1
Pyrene	- c		TEFs for fluoranthene and pyrene not used by CCME (2008b)
Phenols			
Phenol	3.8		CCME (1999c) coarse soil
2,4dimethylphenol	3.8		CCME (1999c) coarse soil
2-methylphenol	3.8		CCME (1999c) coarse soil
3&4-methylphenol	3.8		CCME (1999c) coarse soil

Note:

¹ Where the TSC are greater than the derived leachability based soil SSEC (refer to Section 5.7.3.3, ORWS HHERA Addendum) the relevant soil SSEC will be adopted.

Data Entry: AS
Data Review: AR

Remediation Technology	Technology Description	Feasibility				Sustainability						Comments	Total Score
		Technical 30%	Financial 15%	Logistical 10%	Timing 10%	RU 6%	WG 6%	MR 6%	CO2 6%	CI 6%	OGM 5%		
Ex Situ Stabilisation or Solidification (on or off site)	Encapsulation of contaminant by ex situ blending with chemical binders to immobilise and solidify contaminants of concern.	5	4	5	5	4	5	5	3	3	3	Immobilises contaminants and neutralises soil. Has been used for treatment of source zone soils at a number of MGP sites in North America and Australia. Treated material could potentially be re-used on-site or require off-site disposal. Off-site disposal would likely require disposal to landfill - which depending on quantities may present difficulties with existing landfill licence conditions. Excavation of soil can create significant odour issues thereby requiring negative pressure shed and air emissions control.	4.45
Surfactant-enhanced Ex Situ Chemical Oxidation (S-ESCO)	Strong oxidants such as hydrogen peroxide, permanganate or persulphate are applied to excavated materials (typically using a pugmill) to degrade a wide range of organic contaminants.	4	5	4	4	5	5	5	4	4	3	Efficacy dependent on soil oxidant demand and contaminant type. Use of pugmill improves effectiveness of technology. Has been applied at several former MGP sites in North America with good effectiveness. Surfactant enhancement can be used to overcome some difficulties associated with tar contamination from former MGP sites.	4.28
In Situ Stabilisation or Solidification (on site)	Encapsulation of contaminant by in situ blending with chemical binders to immobilise contaminants of concern.	4	4	4	4	4	5	5	3	4	3	Immobilises contaminants and neutralises soil. Has been used for treatment of source zone soils at a number of MGP sites in North America. Effective in situ mixing may be difficult in fine grained soils or where large obstructions are present as would be expected in areas of significant fill.	4.01
Ex situ Chemical Oxidation (on site)	Ex-situ treatment of excavation soils using strong oxidants, such as hydrogen peroxide, permanganate or persulphate to degrade a wide range of organic contaminants.	3	5	4	4	4	5	5	3	3	4	As for ISCO, efficacy is dependent on soil oxidant demand and contaminant type. Chemical dosing of the soil is accomplished in parallel with physical mixing using specially designed injection equipment. Relatively novel technology that has not been widely demonstrated, however ISCO is known to be effective on former MGP sites in North America. The ex-situ nature of the technology and the ability to physically amend the material should improve the treatment efficacy.	3.85
Excavation and Ex Situ Thermal Desorption (likely off site)	Desorption and/or destruction of organic contaminants in excavated soil by heating, usually by direct heating thermal unit.	4	3	4	4	2	5	5	1	1	4	Demonstrated PAH and organic contaminant reduction and has been widely used for the remediation of MGP residues at many sites in both North America and Australia. Based on understanding of SHFA requirements, treatment would need to be as an off site location - which would need to be appropriately licenced by the DECC. Logistically and timing likely to be preferable where volumes are large (>20,000 m³) may be financially more viable. Air emissions control required. Excavation of soil can create significant odour issues thereby requiring negative pressure shed. Public perception of thermal treatment and regulatory licencing requirements would make establishment of a thermal treatment plant difficult and time consuming.	3.49
Thermal Conductive Heating (TCH)	Soil heating via in-well heaters or thermal blankets in the case of very shallow soil to vaporise/volatile fluids and contaminants. Temperatures can be raised to above 450°C to remove 4 and 5 ring PAHs and other recalcitrant compounds.	4	1	4	3	2	5	5	1	4	3	Works well under wide range of soil types including clay. Removes contaminants under existing structures. Has been used for in situ remediation at former MGP sites including staged heating for removal of volatile components only. Requires closely spaced wells (<5 m) and has high electrical consumption.	3.22
Physical Containment	Containment or capping of contaminated soil to prevent or significantly reduce contaminant migration and to prevent human and environmental exposure.	2	3	3	3	4	5	4	4	4	1	Does not remove contamination sources and would require long term management and deed restriction. Will not satisfy regulatory requirements.	2.96
Excavation & Co-burning	Combustion of MGP residues with coal in utility boilers and cement kilns.	4	3	1	2	1	3	4	1	1	4	Technology has been used for remediation of several MGP sites in North America. Significantly lower cost than on-site thermal treatment. Requires the removal and transport to a large coal fired boiler. Coordination with co-burners can be problematic. Daily throughput can be very low, making storage and staging of excavated materials difficult to manage leading to increased costs. Handling and transportation of coal tar, including associated odour could be a logistical problem. Technology has never been used in Australia and may not be acceptable to community and regulators.	2.75
Excavation & Cold or Hot-Mix Asphalt Batching	Encapsulation of contaminant by blending residues, wet aggregate and asphalt emulsion at ambient or high temperatures.	2	4	3	3	2	3	4	2	1	4	Viable treatment technology for coal tars. Immobilises PAHs and reuses materials. Not suitable for fine-grained materials (e.g., clays) and would require addition of high grade aggregate. Physical properties of final product not always appropriate for traffic reuse. May be suitable for zones where extensive tar is present.	2.72
In Situ Steam Stripping	Injection of steam into subsurface contaminants to volatilise and mobilise contaminants.	1	1	3	3	2	2	2	2	3	2	Technology works best in sandy permeable soils and generally not suitable for very shallow unsaturated zone soils. Temperature is limited to 100 °C and therefore suitable for removal of volatile component only. Very high initial capital cost.	1.81
Monitored Natural Attenuation (MNA)	Natural subsurface processes—such as dilution, volatilization, biodegradation, adsorption, and chemical reactions with subsurface materials—are allowed to reduce contaminant concentrations to acceptable levels.											Not effective as first approach in source areas. Will not satisfy regulatory requirements. Retain for future option post-remediation	0.00
Soil Vapour Extraction System (SVE)	Soil vapour extraction (SVE) is an in situ unsaturated (vadose) zone soil remediation technology in which a vacuum is applied to the soil to induce the controlled flow of air and remove volatile and some semi volatile contaminants from the soil. The extracted vapour requires treatment to recover or destroy the contaminants.											Well established proven technology will remove volatile component and reduce risks to future users of site. Has additional benefit of removing contaminants from areas where excavation is not feasible (e.g. easements). However, will not remove the higher chain TPH fraction and may not be as effective in fine grained soils. Will also promote in situ biodegradation through increased oxygen in unsaturated zone. Technology may not be suitable for use over large source zone but may be used in conjunction with other technologies for targeted source removal.	0.00

Remediation Technology	Technology Description	Feasibility				Sustainability						Comments	Total Score
		Technical 30%	Financial 15%	Logistical 10%	Timing 10%	RU 6%	WG 6%	MR 6%	CO2 6%	CI 6%	OGM 5%		
In Situ Enhanced Bioremediation (ISEB)	Destruction of organic compounds in subsurface contaminated soil by microorganisms.											Timeframe for reduction of contaminants, in particular coal tar may be very long. Treatment uniformity uncertain because of subsurface variables. Verification of destruction is sometimes difficult. Not effective for higher molecular-weight hydrocarbons. Whilst technology has been highly successful for the treatment of hydrocarbons and lower molecular weight PAHs at many sites, it has not been demonstrated for treatment of MGP coal tar.	0.00
Ex Situ Bioremediation (Landfarming/Biopiles/Bioreactor)	Destruction of organic compounds in contaminated soil by microorganisms. Treatment occurs through soil amendment and stockpiling or enclosed reactor vessel.											Shorter treatment period than in situ bioremediation alternative. However, not effective for higher molecular weight hydrocarbons and will be significantly slower than alternative treatment technologies. May be suitable for impacted soil but unlikely to be feasible for residual coal tar. Requires a large amount of space and VOC and odour emissions likely to be a significant constraint in urban setting.	0.00
Phytoremediation	Phytoremediation is a process that uses plants to remove, transfer, stabilize, and destroy contaminants in soil and sediment. Contaminants may be either organic or inorganic.											Technology requires long timeframe for removal of contaminants which renders site unusable for other purposes. Has not been demonstrated for use at MGP sites.	0.00
Electrical Resistive Heating	Similar to TCH, however electrodes are used instead of heater wells. Temperature cannot exceed 100 °C since process requires transmission of heat via pore water											Technology is suitable for most soil types and in particular low permeability clays. Technology can not exceed temperatures of 100°C and is suitable for removal of volatile compounds only. Technology requires moisture in the soil for conduction of heat between electrodes and may not be suitable for unsaturated zone soils. Requires closely spaced electrodes (<5 m) and has high electrical consumption.	0.00
Soil Washing	Physical/chemical process for scrubbing soils ex situ to remove contaminants.											High degree of certainty regarding treatment performance. Material handling possibly expensive. Effectiveness limited by complex waste mixtures and high humic content. Generally not suitable for fine grained soil.	0.00
In Situ Vitrification (ISV)	In situ vitrification (ISV) is another in situ S/S process which uses an electric current to melt soil or other earthen materials at extremely high temperatures (1,600 to 2,000 °C) and thereby immobilise most inorganics and destroy organic pollutants by pyrolysis.											Method designed for sandy soils. Prohibitively expensive.	0.00
Surfactant and/or Co-solvent injection	Surfactant/Alcohol generally used in combination to lower interfacial tension, decrease density and increase solubility leading to removal of free phase and residual tar.											Requires detailed knowledge of DNAPL composition to determine correct flushing fluid composition. Not effective in removing tar from low permeability material. Not very effective treatment for sorbed or diffused contaminants. Requires significant above ground treatment infrastructure for the recovery/re-use of surfactant and treatment of contaminants. Technology has not been used for treatment of MGP residues.	0.00
Permeable Reactive Barrier (PRB)	A permeable reaction wall is installed across the flow path of a contaminant plume, allowing the water portion of the plume to passively move through the wall. The contaminants will either be degraded or retained in a concentrated form by the barrier material.											Technology not suitable for unsaturated zone soils.	0.00
Supercritical water oxidation	Supercritical Water Oxidation (SCWO) is a high-efficiency, thermal oxidation process capable of treating a wide variety of hazardous and non-hazardous wastes.											Technology is not suitable for treatment of soils. Typically used to treat small quantities of hazardous liquid waste/slurries in commercial reactors.	0.00
Electrokinetics	Electrokinetic remediation uses electrochemical and electrokinetic processes to desorb, and then remove, metals and polar organics											Not applicable for the contaminants of concern.	0.00

RU Resource Use
WG Waste Generation
MR Material Reusability
CO2 CO2 Generation
CI Community Impact
OGM Ongoing Management and Risk

Appendix B

Figures

Appendix B Figures

Figure 1: Site Location

Figure 2: Site Layout and Surrounding Area Figure

Figure 3: Proposed Shallow and Deep Basement Plan

Figure 4: Proposed Land Use

Figure 5: Site Plan and Sampling Locations

Figure 6: Area A Soil SSTC-A and SDESC-A Exceedances - Metals, PAHs and TPH

Figure 7: Area A Groundwater SDESC-A Exceedances

Figure 8: Area B Soil SDESC-B Exceedances - Metals

Figure 9: Area B Soil SSTC-B and SDESC-B Exceedances - PAHs and TPH

Figure 10: Area C SSTC-C Exceedance Naphthalene

Figure 11: Remediation Decision Making Process Flow Chart



PROJECT ID: S4150030
 CREATED BY: TO
 LAST MODIFIED: TO 15 02 2011
 www.aecom.com

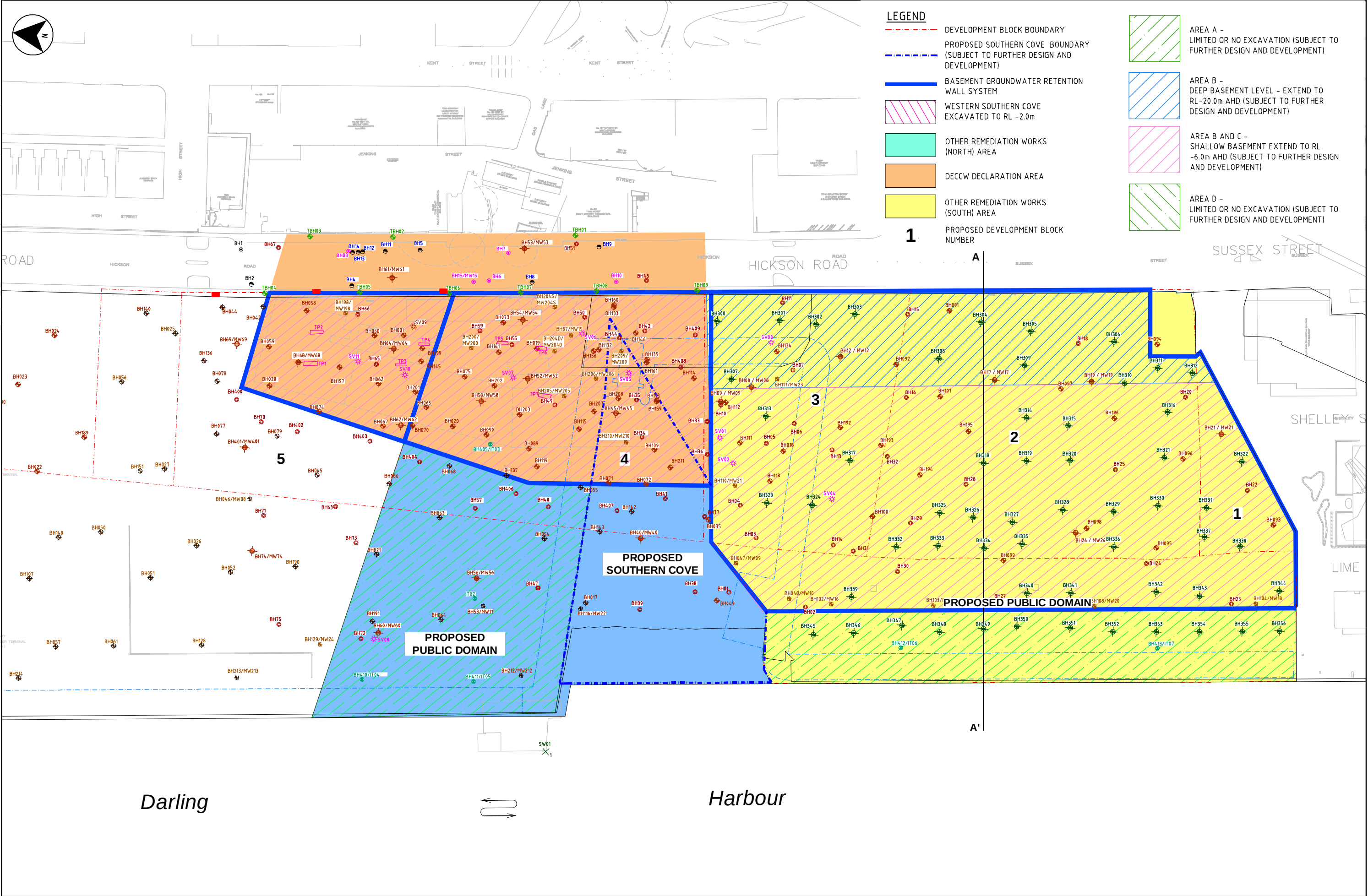


Site Location

Lend Lease Development
 Amended Remedial Action Plan
 Barangaroo Other Remediation Works
 (South) Area
 Hickson Road, Millers Point NSW

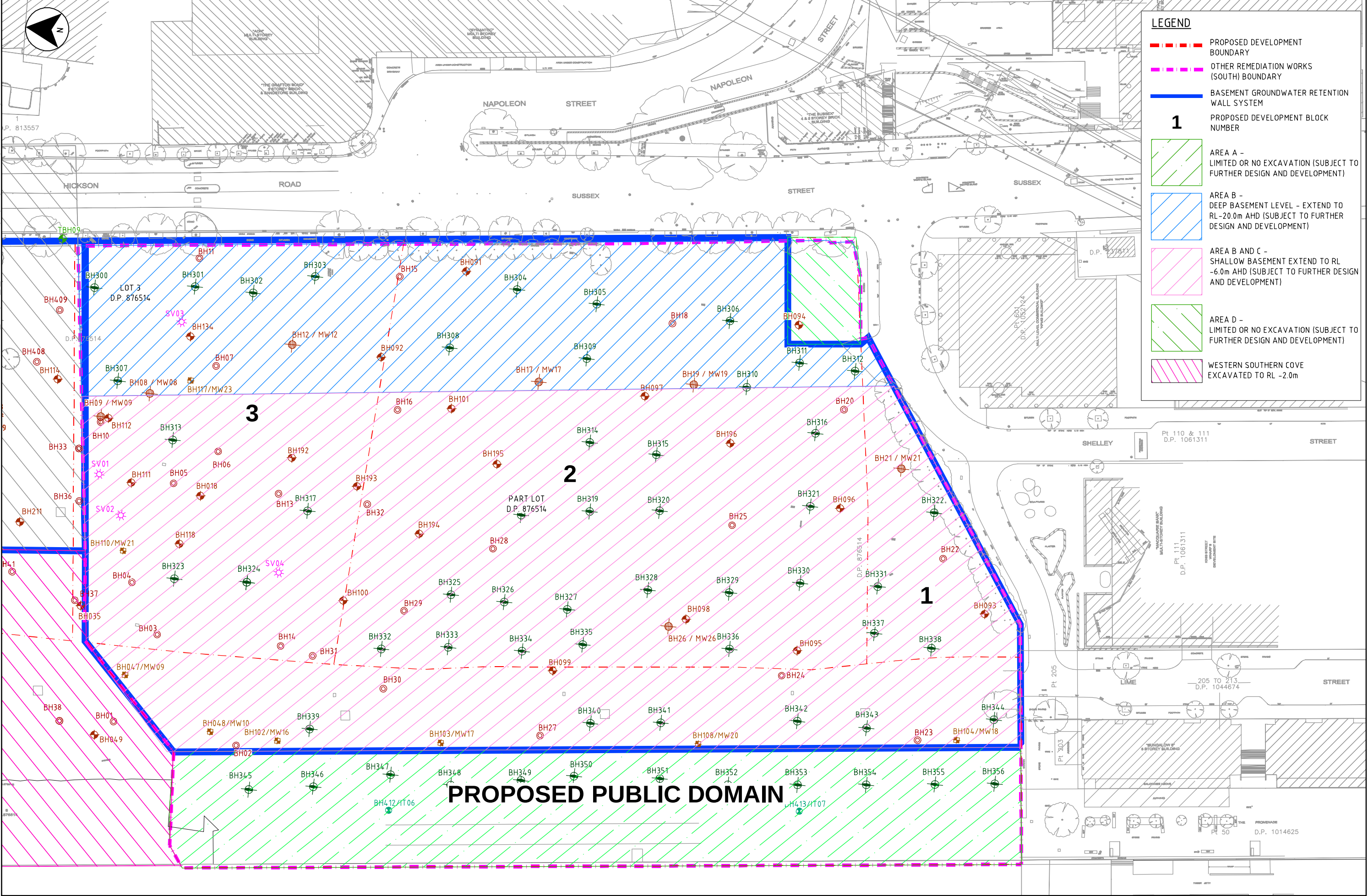
Figure
1

Car ref: P:\0153531_Barramoor_S_CIS_CADD\53 Working\Dr\Design\0153531-drg-10-ASRAP-F2.dwg
Last modified: 06 Jul 11 - 16:02



This drawing is confidential and shall only be used for the purposes of this project.					THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM TO ISO 9001-2000				DESIGNER:		ORWS AMENDED RAP		
REVISIONS					SCALE 1:750	DESIGNED	AR/DFM	CHECKED	AR/DFM		FIGURE 2 SITE LAYOUT AND BASEMENT GROUNDWATER RETENTION WALL SYSTEM		
						DRAWN	SS	CHECKED	JA				
						APPROVED	DFM	DATE					
01	SS									AECOM Australia Pty Ltd A.B.N. 20 093 846 925	STATUS: FINAL	DRAWING NO: 60153531-DRG-10-ASRAP-F2	REV: 01
No.	BY	DATE		DESCRIPTION	APPD								

Car ref: P:\0153531 - Barangaroo - S - CUS - CAD\0153 Working\Dr\Design\0153531-drg-10-ASRAP-F3.dwg
Last modified: 06 Jul 11 - 16:09



This drawing is confidential and shall only be used for the purposes of this project.				
REVISIONS				
01	SS			DFM
No.	BY	DATE	DESCRIPTION	APPD

THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM TO ISO 9001:2000			
DESIGNED	AR/DFM	CHECKED	AR/DFM
DRAWN	SS	CHECKED	JA
APPROVED	DFM	DATE	

THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM TO ISO 9001:2000			
DESIGNED	AR/DFM	CHECKED	AR/DFM
DRAWN	SS	CHECKED	JA
APPROVED	DFM	DATE	

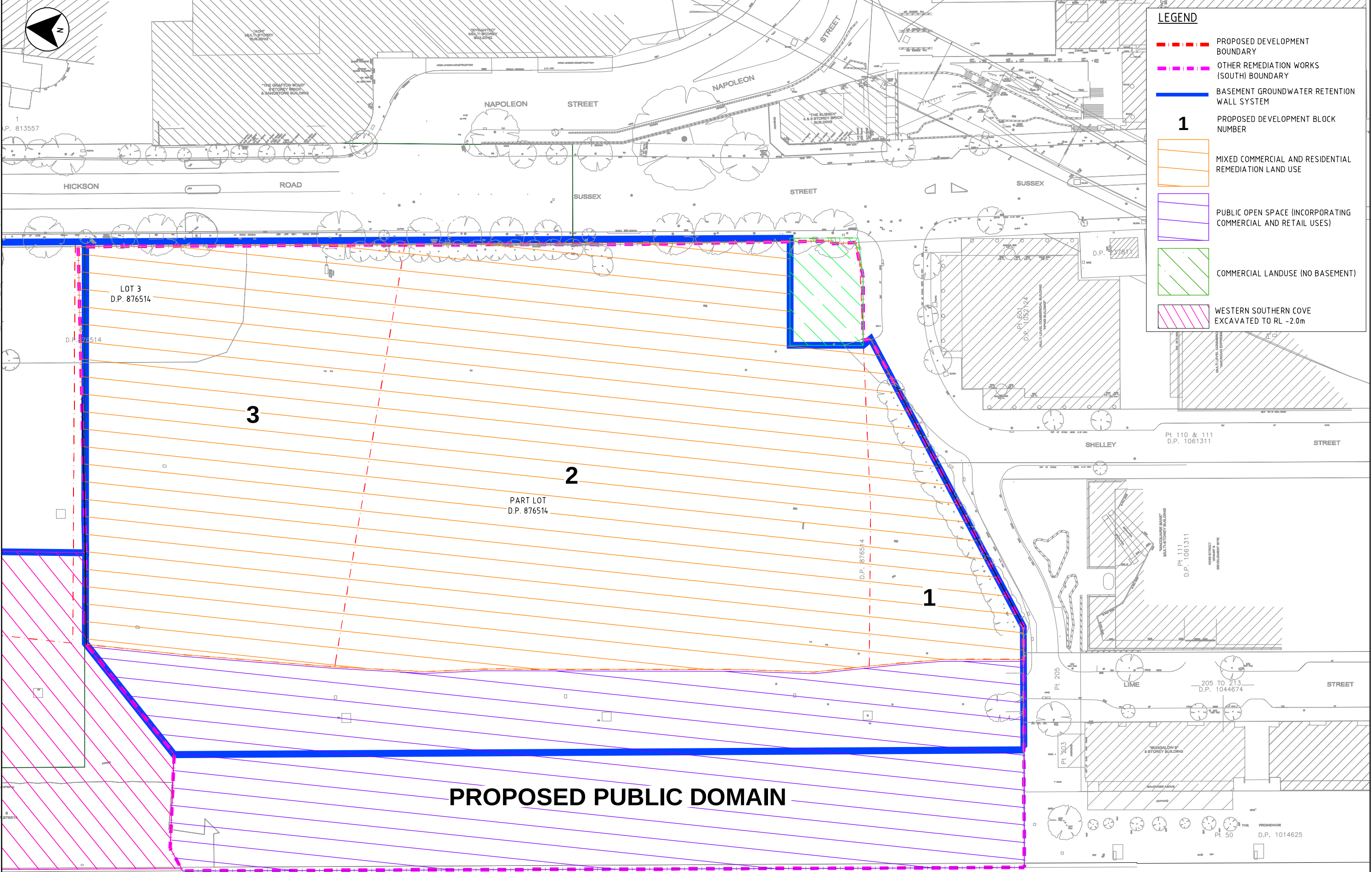
THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM TO ISO 9001:2000			
DESIGNED	AR/DFM	CHECKED	AR/DFM
DRAWN	SS	CHECKED	JA
APPROVED	DFM	DATE	

DESIGNER:	
AECOM	
AECOM Australia Pty Ltd A.B.N. 20 093 846 925	

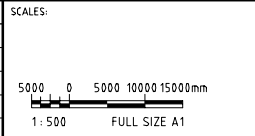
DESIGNER:	
AECOM	
AECOM Australia Pty Ltd A.B.N. 20 093 846 925	

ORWS AMENDED RAP			
FIGURE 3 PROPOSED SHALLOW AND DEEP BASEMENT PLAN			
STATUS:		DRAWING NO:	
FINAL		60153531-DRG-10-ASRAP-F3	
REV:			01

Cad ref: P:\0153531_Berangaroo_S_ICIS_CADD\53 Working\Dr\Design\0153531-drg-10-ASRAP-F4.dwg
Last modified: 06 Jul 11 - 16:09



This drawing is confidential and shall only be used for the purposes of this project.					
REVISIONS					
01	SS				DFM
No.	BY	DATE	DESCRIPTION		APPD



THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM TO ISO 9001-2000			
DESIGNED	AR/DFM	CHECKED	AR/DFM
DRAWN	SS	CHECKED	JA
APPROVED	DFM	DATE	

DESIGNER:

AECOM

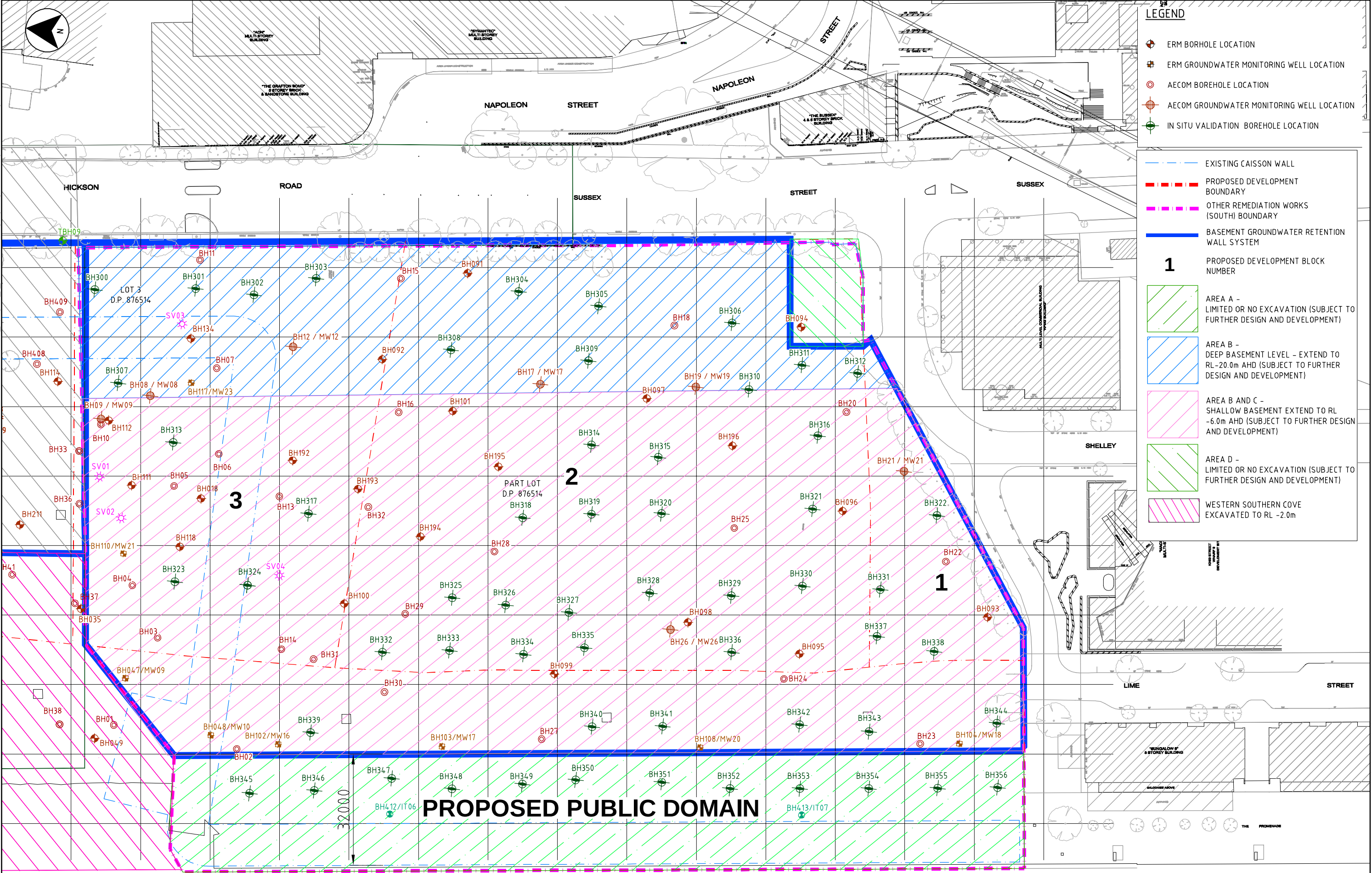
AECOM Australia Pty Ltd A.B.N. 20 093 846 925

ORWS AMENDED RAP

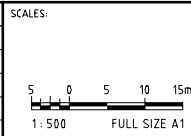
FIGURE 4
PROPOSED LAND USE

STATUS:	FINAL	DRAWING NO:	60153531-DRG-10-ASRAP-F4	REV:	01
---------	-------	-------------	--------------------------	------	----

60153531-DRG-10-ASRAP-F5.dwg
Last modified: 06 Jul 11 - 16:03
C:\S\CAD\US3 Working\Dr\Design\60153531-DRG-10-ASRAP-F5.dwg
C:\S\CAD\US3 Working\Dr\Design\60153531-DRG-10-ASRAP-F5.dwg



This drawing is confidential and shall only be used for the purposes of this project.				
REVISIONS	No.	BY	DATE	DESCRIPTION
	01	SS		DFM
				APPD



THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM TO ISO 9001:2000			
DESIGNED	AR/DFM	CHECKED	AR/DFM
DRAWN	SS	CHECKED	JA
APPROVED	DFM	DATE	

DESIGNER:

AECOM

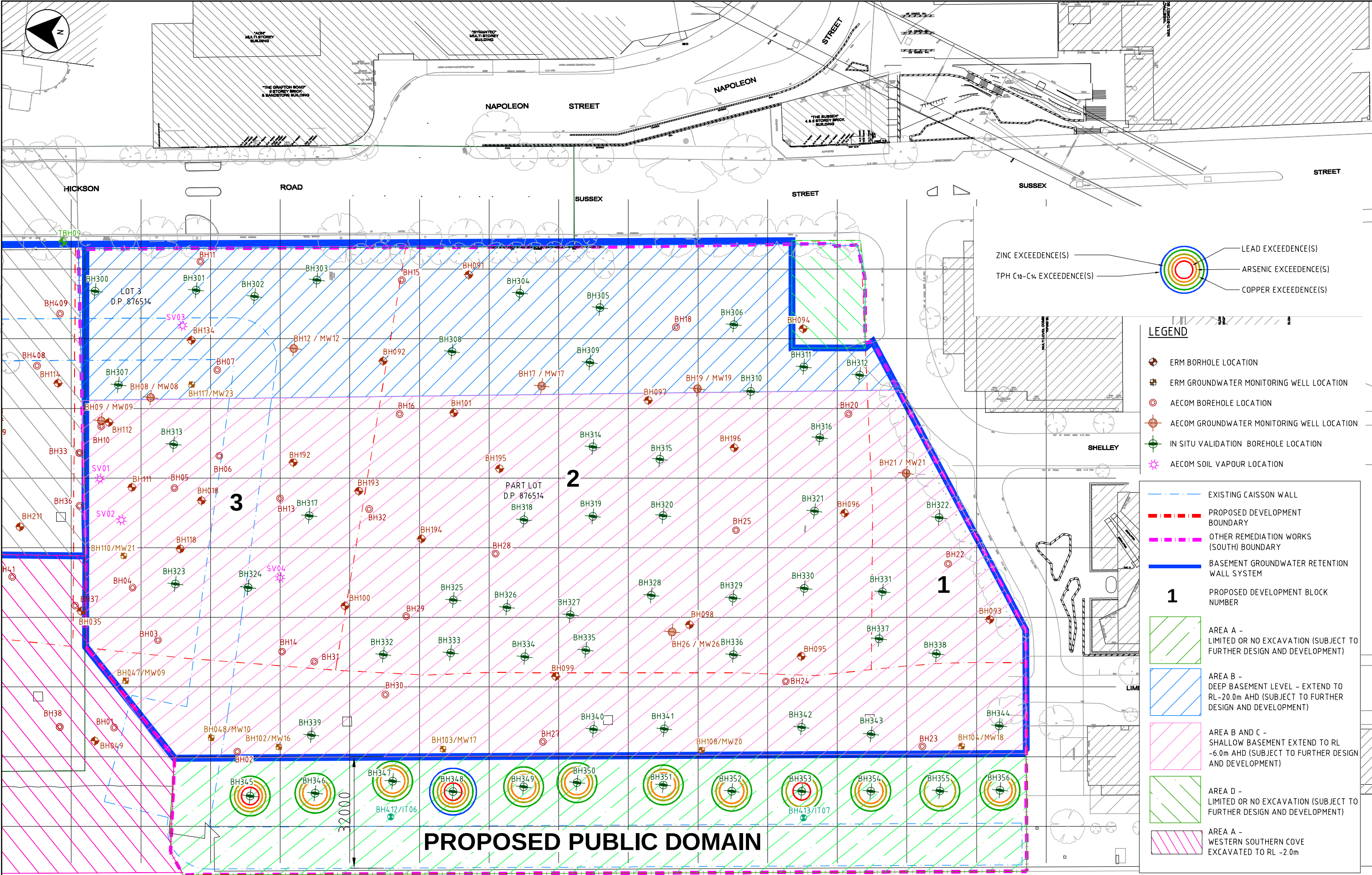
AECOM Australia Pty Ltd A.B.N. 20 093 846 925

ORWS AMENDED RAP

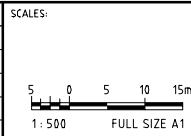
FIGURE 5
SITE PLAN AND SAMPLING LOCATIONS

STATUS:	FINAL	DRAWING NO:	60153531-DRG-10-ASRAP-F5	REV:	01
---------	-------	-------------	--------------------------	------	----

Car ref: P\A0153531_Burangaroo_S_CUS_CADD\US3 Working\Dr\Design\A0153531-dwg-10-ASRAP-F6.dwg
Last modified: 06 Jul 11 - 16:03



This drawing is confidential and shall only be used for the purposes of this project.				
REVISIONS	No.	BY	DATE	DESCRIPTION
	01	SS		DFM
				APPD



THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM TO ISO 9001-2000			
DESIGNED	AR/DFM	CHECKED	AR/DFM
DRAWN	SS	CHECKED	JA
APPROVED	DFM	DATE	

DESIGNER:

AECOM

AECOM Australia Pty Ltd A.B.N. 20 093 846 925

ORWS AMENDED RAP

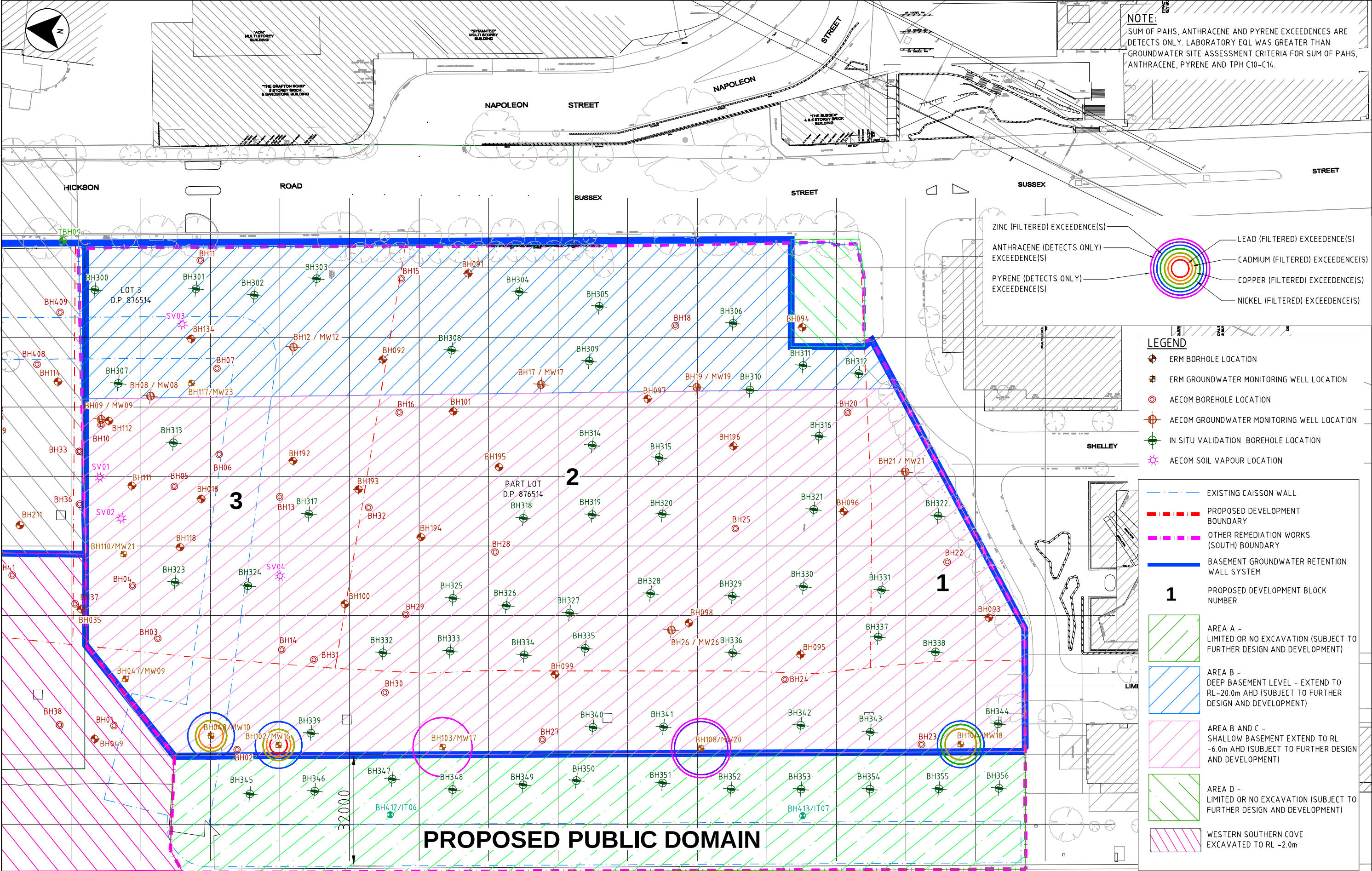
FIGURE 6:
AREA A SOIL SSTC-A AND SSEC-A EXCEEDENCES
METALS, PAHs AND TPH

STATUS: FINAL

DRAWING NO: 60153531-DRG-10-ASRAP-F6

REV: 01

Cell ref: P\60153531_Brangaroo_S_K15_CADD\53 Working\Dr\Design\60153531-drg-10-ASRAP-F7.dwg
Last modified: 06 Jul 11 - 16:03



This drawing is confidential and shall only be used for the purposes of this project.				
REVISIONS	No.	BY	DATE	DESCRIPTION
	01	SS		DFM
				APPD

SCALES:	
1:500	FULL SIZE A1

THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM TO ISO 9001:2000			
DESIGNED	AR/DFM	CHECKED	AR/DFM
DRAWN	SS	CHECKED	JA
APPROVED	DFM	DATE	

DESIGNER:

AECOM

AECOM Australia Pty Ltd A.B.N. 20 093 846 925

ORWS AMENDED RAP

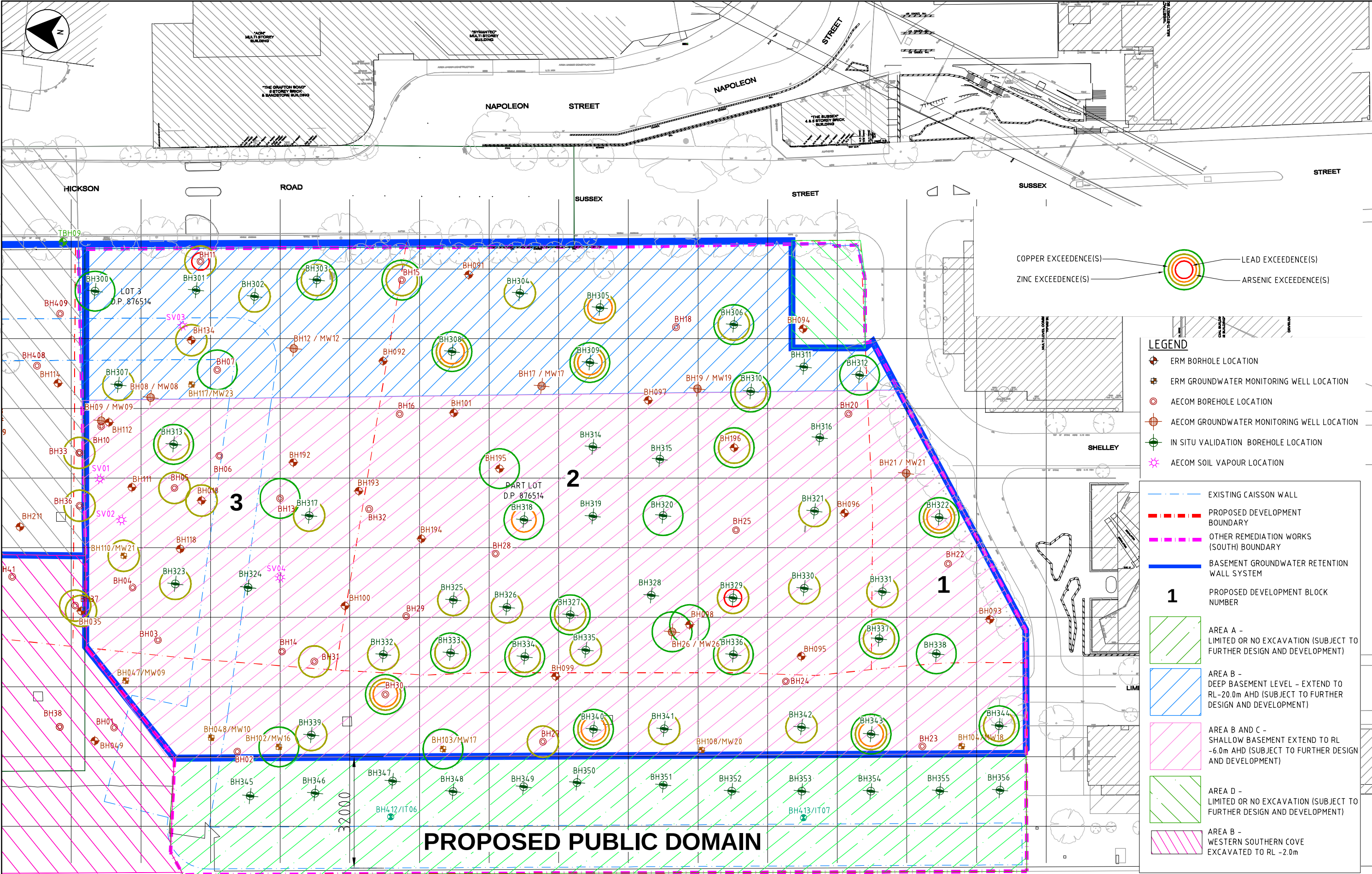
FIGURE 7:
AREA A GROUNDWATER SSEC-A EXCEEDENCES

STATUS: FINAL

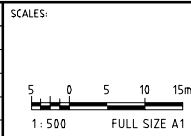
DRAWING NO: 60153531-DRG-10-ASRAP-F7

REV: 01

Cell ref: P:\0153531 - Barangaroo - S - CUS - CAD\0153 Working\Drwg\Design\0153531-dwg-10-ASRAP-F8.dwg
Last modified: 06 Jul 11 - 16:04



This drawing is confidential and shall only be used for the purposes of this project.				
REVISIONS	No.	BY	DATE	DESCRIPTION
	01	SS		DFM APPD



THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM TO ISO 9001-2000			
DESIGNED	AR/DFM	CHECKED	AR/DFM
DRAWN	SS	CHECKED	JA
APPROVED	DFM	DATE	

DESIGNER:

AECOM

AECOM Australia Pty Ltd A.B.N. 20 093 846 925

ORWS AMENDED RAP

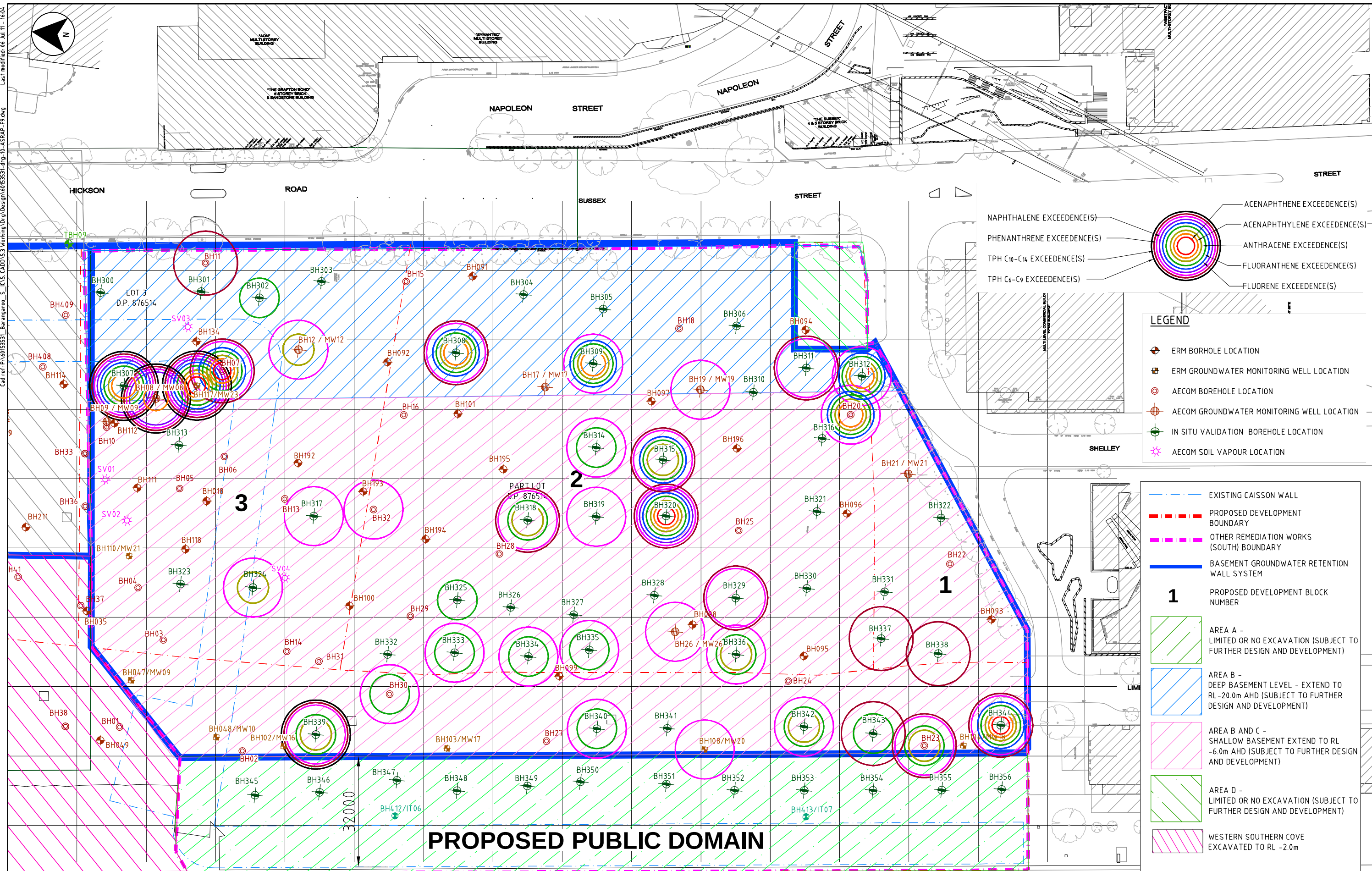
FIGURE 8: AREA B SOIL SSEC-B EXCEEDENCES METALS

STATUS: FINAL

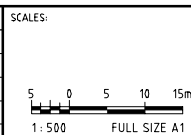
DRAWING NO: 60153531-DRG-10-ASRAP-F8

REV: 01

Car ref: P\0153531 - Barangaroo - S - CUS CAD\0153 Working\Dr\Design\0153531-dwg-10-ASRAP-F9.dwg
Last modified: 06 Jul 11 - 16:04



This drawing is confidential and shall only be used for the purposes of this project.				
REVISIONS	No.	BY	DATE	DESCRIPTION
	01	SS		DFM
				APPD



THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM TO ISO 9001:2000			
DESIGNED	AR/DFM	CHECKED	AR/DFM
DRAWN	SS	CHECKED	JA
APPROVED	DFM	DATE	

DESIGNER:

AECOM

AECOM Australia Pty Ltd A.B.N. 20 093 846 925

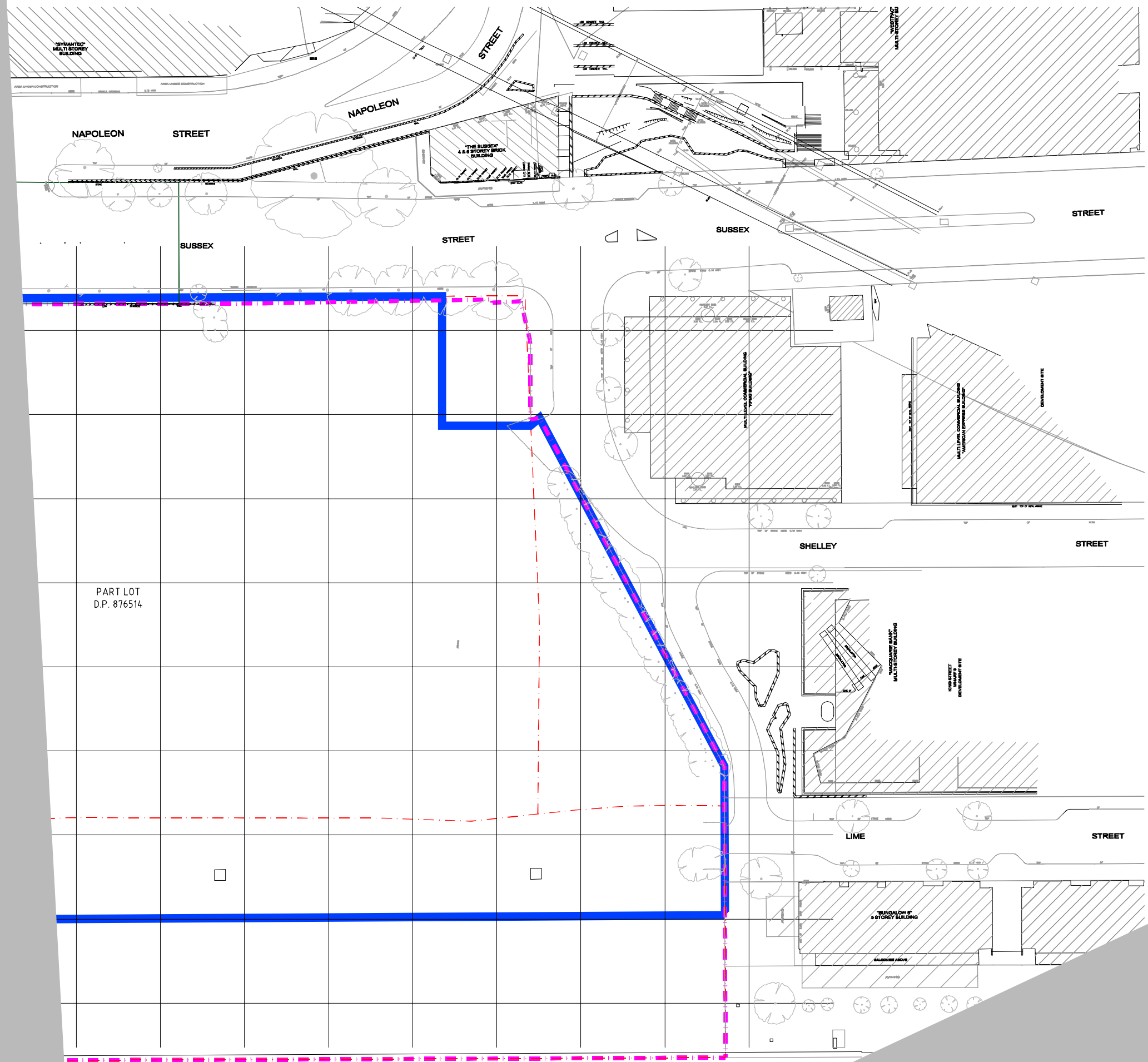
ORWS AMENDED RAP

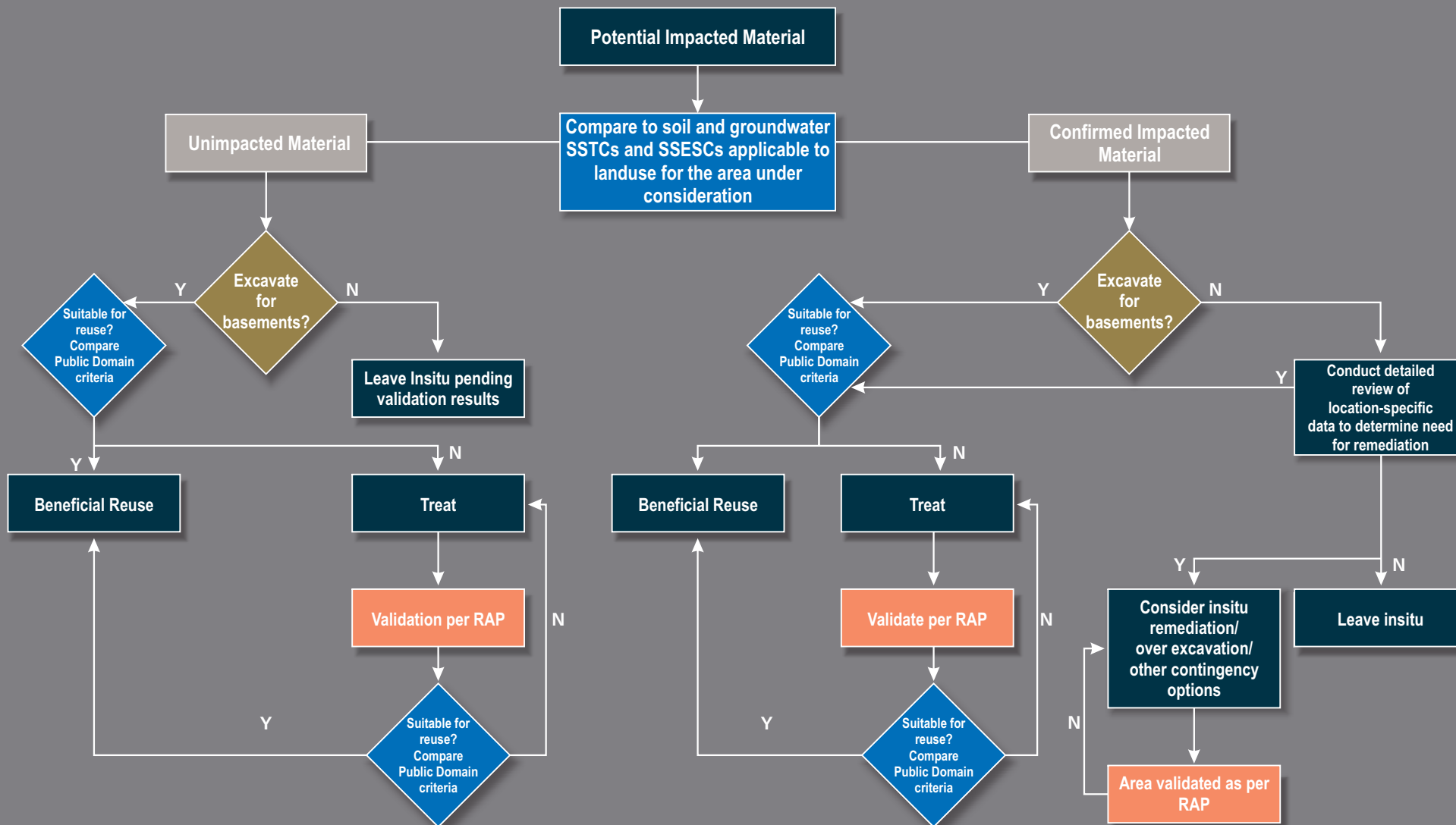
FIGURE 9:
AREA B SSTC-B AND SSEC-B EXCEEDENCES
PAHs AND TPH

STATUS: FINAL

DRAWING NO: 60153531-DRG-10-ASRAP-F9

REV: 01





PROJECT ID: S4150030
 CREATED BY: TO
 LAST MODIFIED: TO 30 06 2011
 www.aecom.com



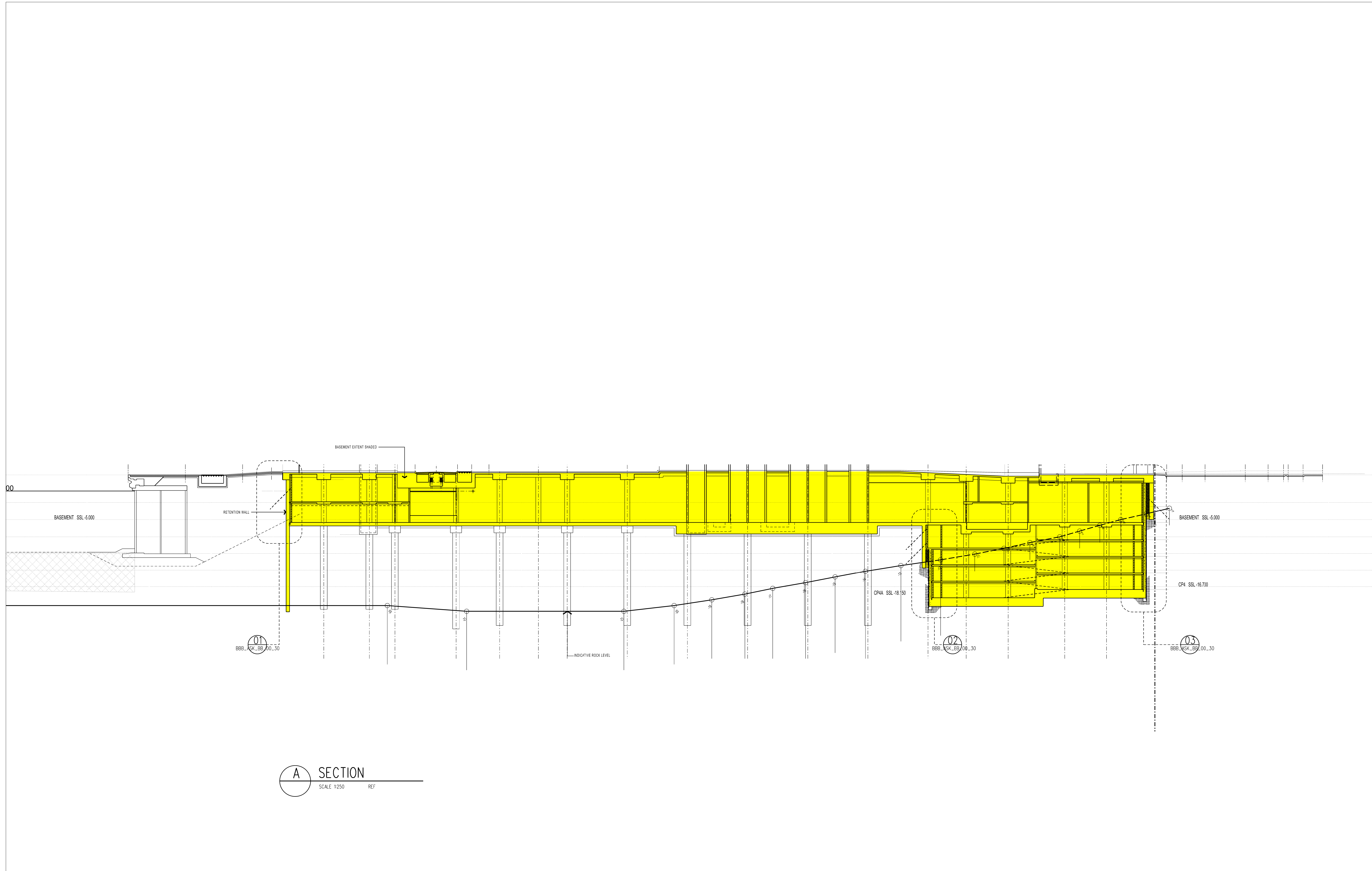
Remediation Decision Making Process Flow Chart

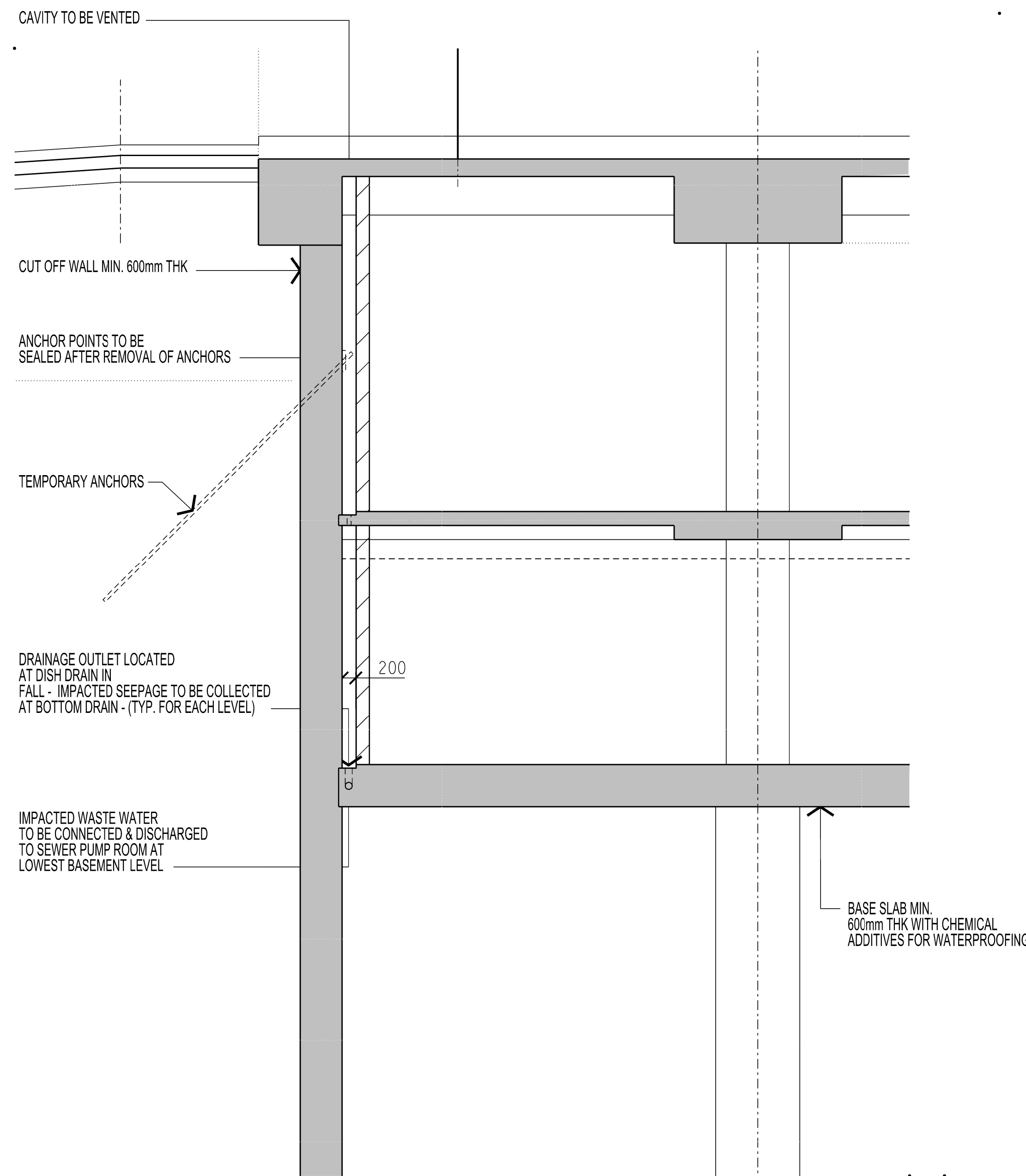
Lend Lease Development
 Amended Remedial Action Plan
 Barangaroo Other Remediation Works
 (South) Area
 Hickson Road, Millers Point NSW

**Figure
11**

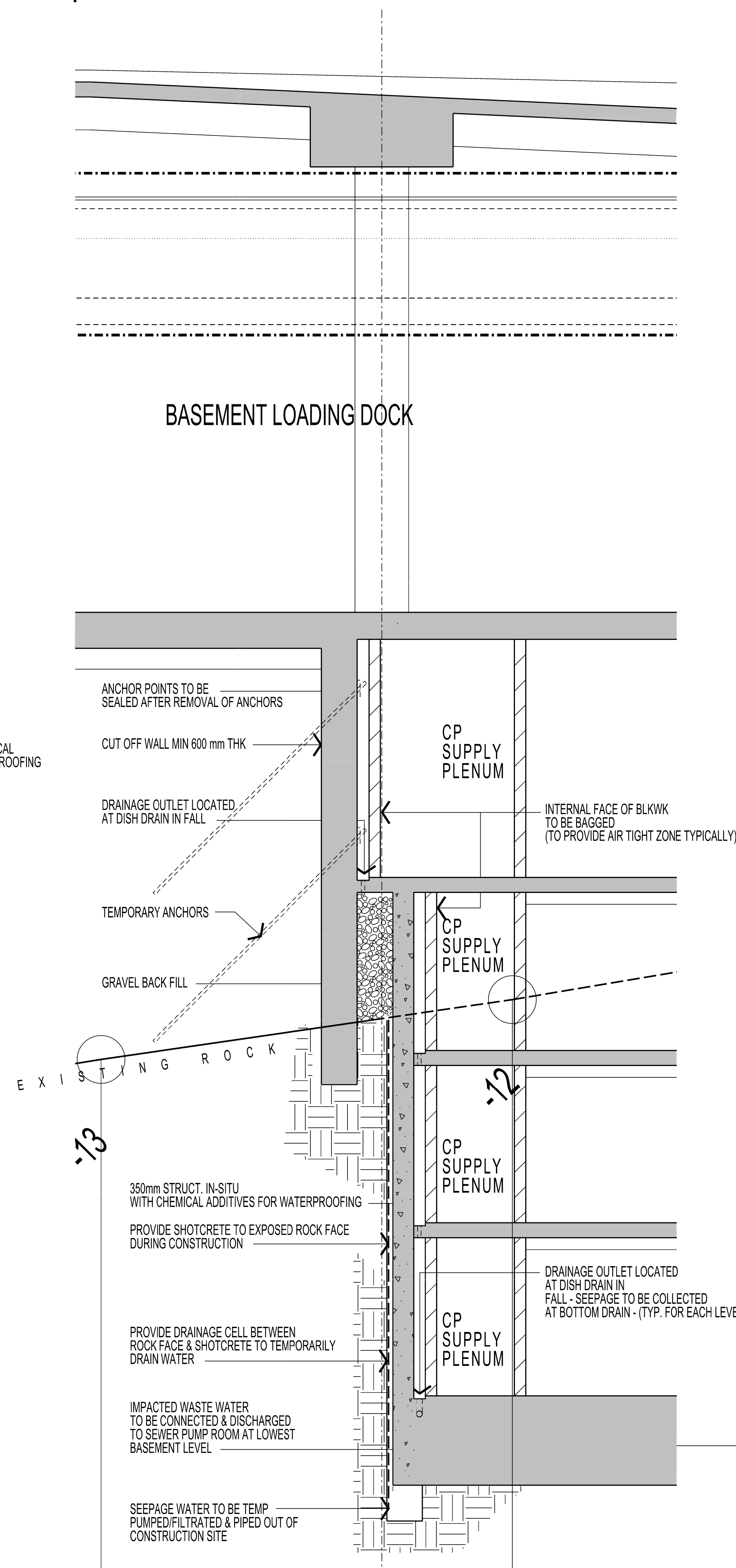
Appendix C

Lend Lease Development Plans

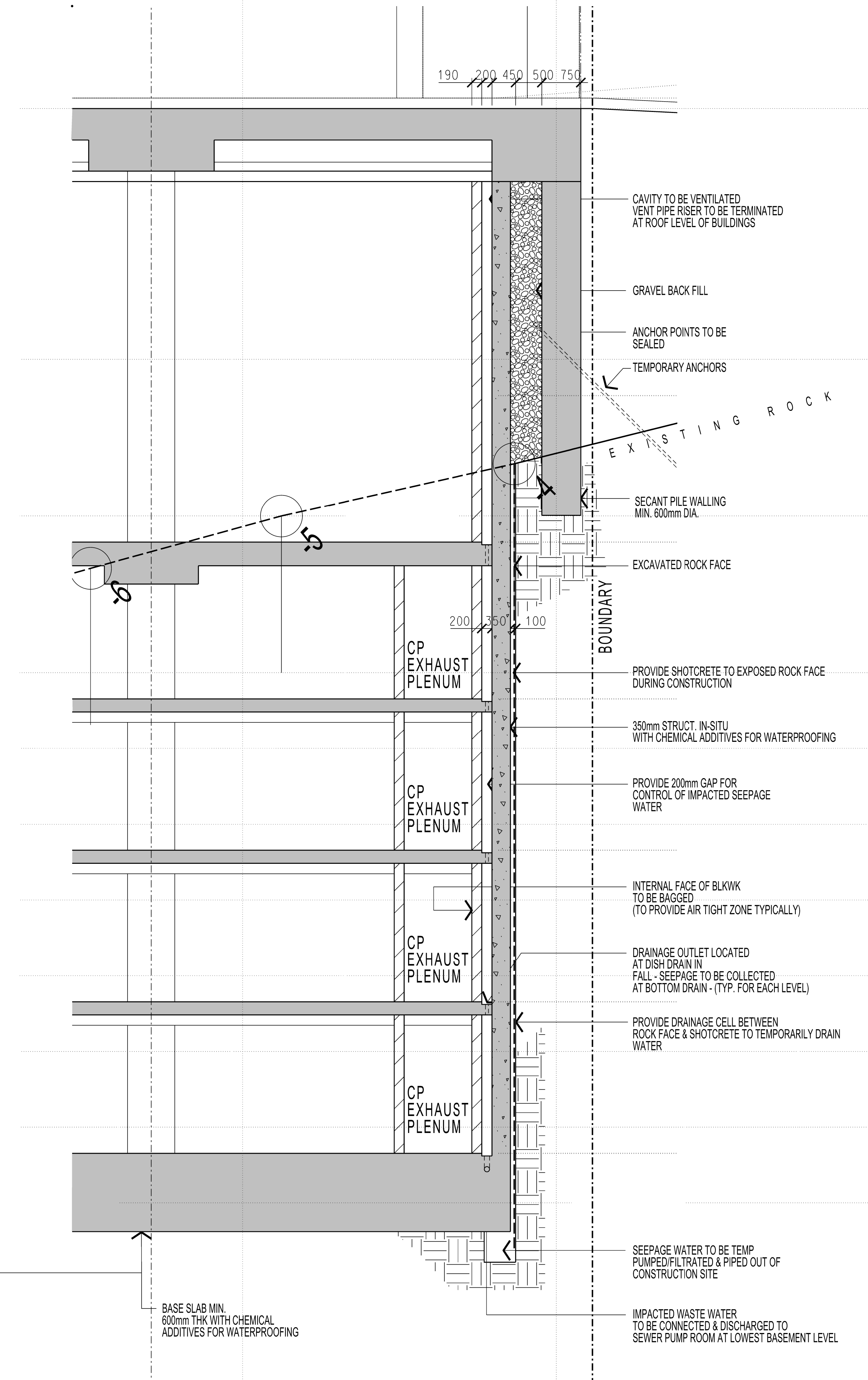




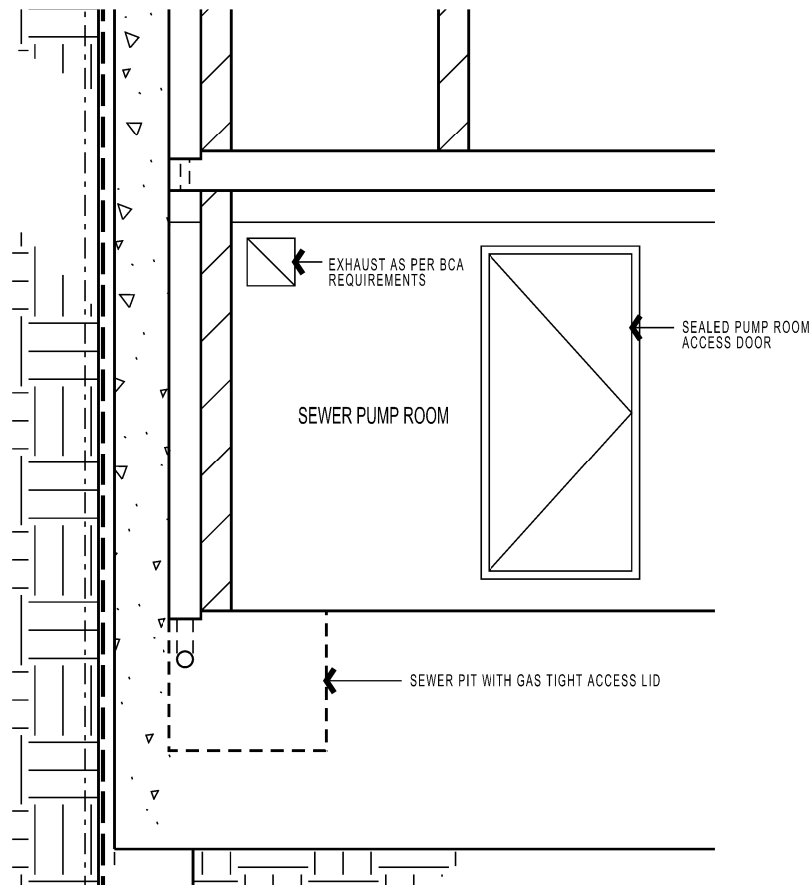
01 SECTION
SCALE 1:50 REF



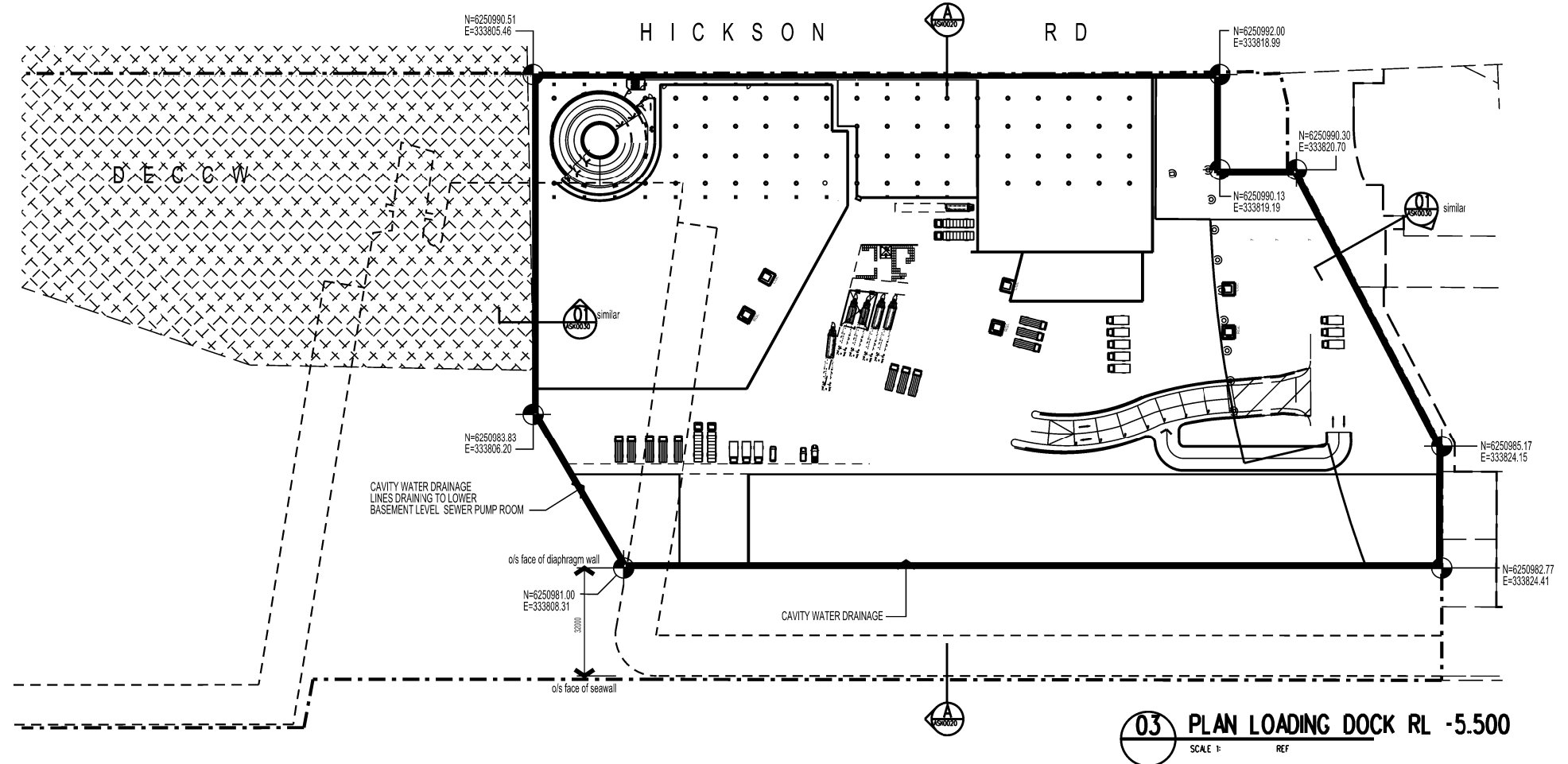
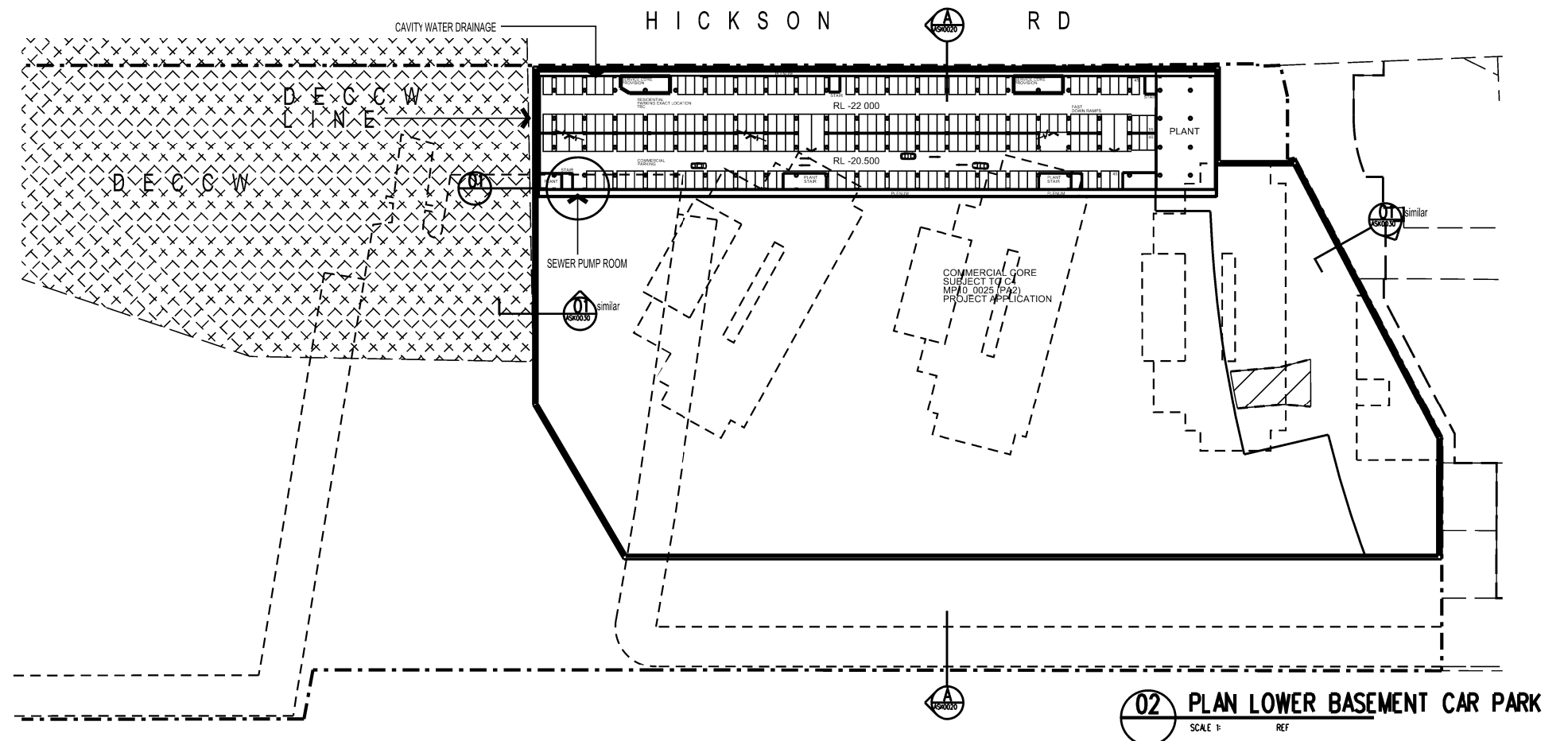
02 SECTION
SCALE 1:50 REF



03 SECTION
SCALE 1:50 REF



01 PART SECTION SEWER PUMP ROOM
SCALE 1: REF



BARANGAROO SOUTH.



Bulk Excavation and Basement Car Parking Section 75W Application MP10_0023

ARCHITECTURAL DRAWINGS:

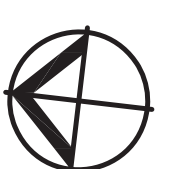
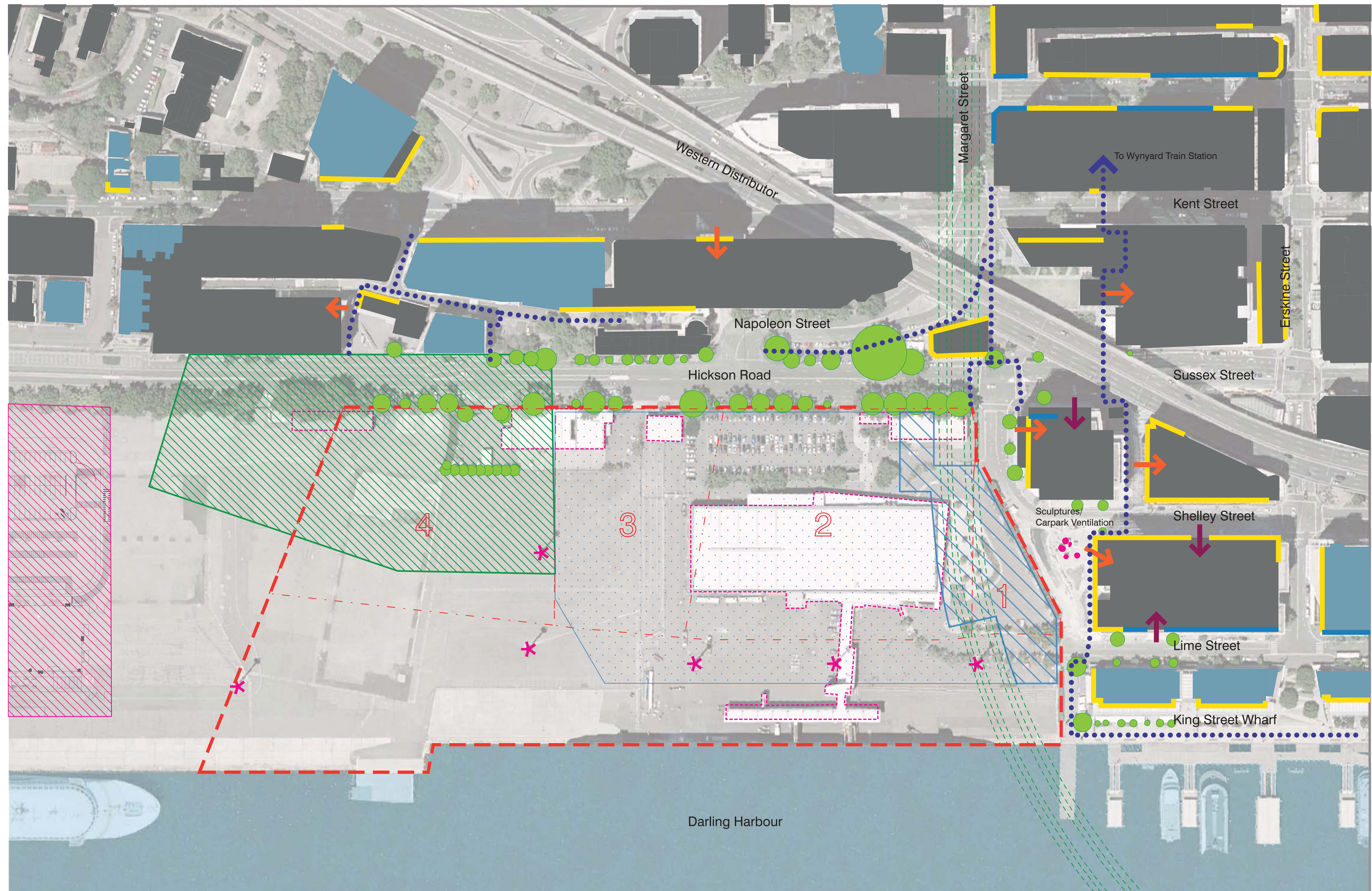
- BB1_PA1_S75W1_A000 - TITLE SHEET
- BB1_PA1_S75W1_A001 - AERIAL LOCATION PLAN
- BB1_PA1_S75W1_A002 - SITE ANALYSIS
- BB1_PA1_S75W1_A003 - SURVEY PLAN
- BB1_PA1_S75W1_A004 - DEMOLITION
- BB1_PA1_S75W1_A005 - GROUND PLAN
- BB1_PA1_S75W1_A006 - BASEMENT PLAN LEVEL B1A
- BB1_PA1_S75W1_A007 - BASEMENT PLAN LEVEL B1
- BB1_PA1_S75W1_A008 - BASEMENT PLAN LEVEL CP1
- BB1_PA1_S75W1_A009 - BASEMENT PLAN LEVEL CP2
- BB1_PA1_S75W1_A010 - BASEMENT PLAN LEVEL CP3
- BB1_PA1_S75W1_A011 - BASEMENT PLAN LEVEL CP4
- BB1_PA1_S75W1_A012 - BASEMENT PLAN LEVEL CP5
- BB1_PA1_S75W1_A014 - CROSS SECTION 1-1
- BB1_PA1_S75W1_A015 - LONGITUDINAL SECTION

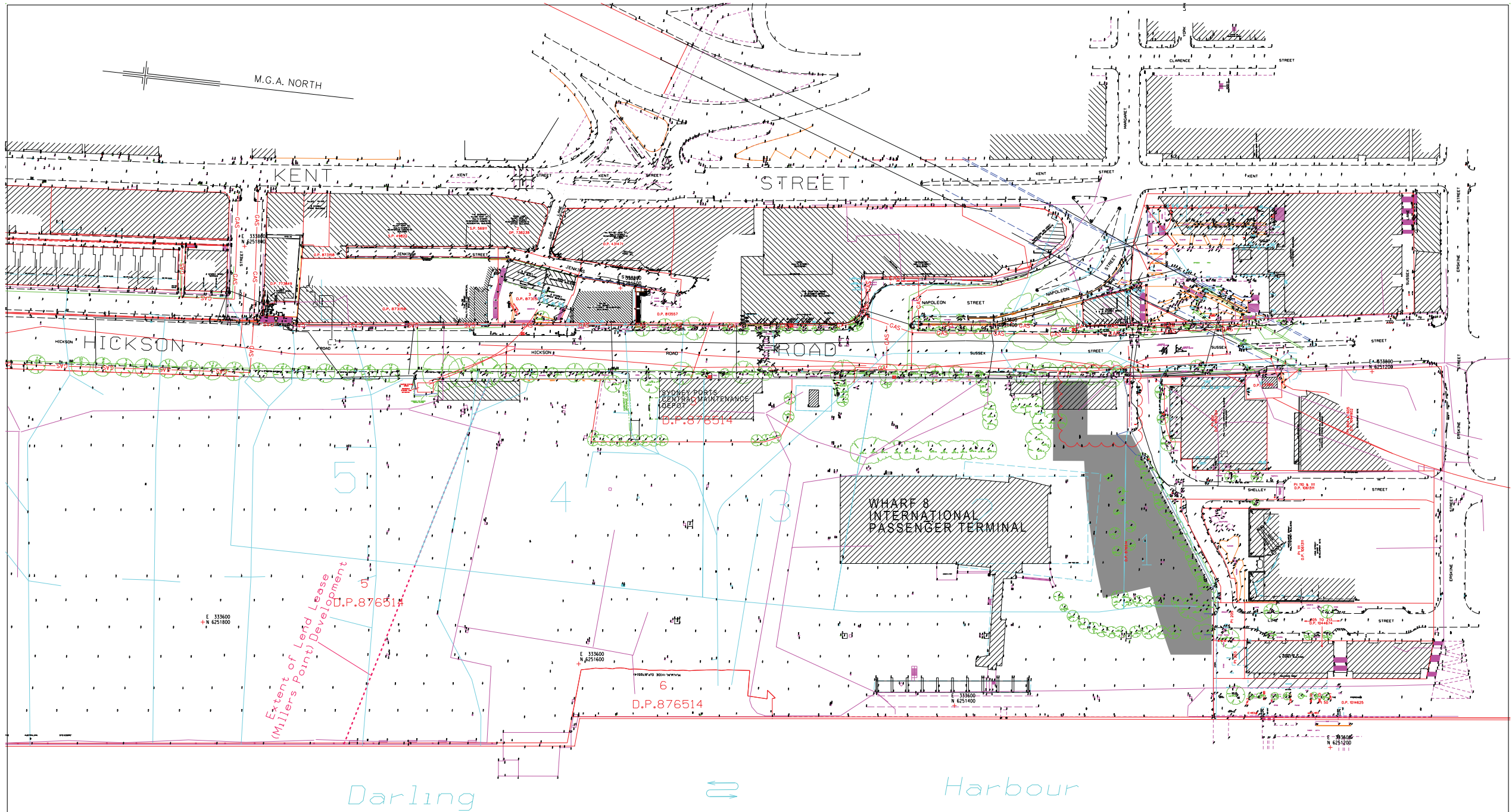
LANDSCAPE DRAWINGS:

- BB1_PA1_S75W1_L001 - LANDSCAPE PLAN

INDICATIVE LAYOUT ONLY







NOTES:

POSITION OF UNDERGROUND SERVICES PLOTTED FROM INFORMATION SUPPLIED BY THE RELEVANT AUTHORITIES AND MAY BE APPROXIMATE ONLY.

SYMBOLS REPRESENTING SERVICE PITS, POLES AND STREET FURNITURE ARE NOT TO SCALE.

SERVICE LINES SHOWN ARE DIAGRAMMATIC ONLY AND DO NOT REPRESENT THE WIDTH AND NUMBER OF CABLES OR PIPES IN THE GROUND.

PIT SIZE IS SHOWN AT GROUND LEVEL. PITS MAY BE LARGER BELOW THE SURFACE.

THIS PLAN HAS BEEN CREATED AT A SCALE OF 1:1000 AND MAY NOT BE SATISFACTORY FOR OTHER PURPOSES. THE ACCURACY OF ANY ENLARGEMENT OR OTHER REPRODUCTION MAY BE LESS THAN THAT OF THE ORIGINAL.

TREE SPREADS & TRUNK DIAMETERS SHOWN ARE DIAGRAMMATIC ONLY AND TREE HEIGHTS ARE ESTIMATED. IF ANY OF THESE ELEMENTS ARE CRITICAL TO DESIGN (IN PARTICULAR DRIP LINES) MORE SPECIFIC DETAILS SHOULD BE REQUESTED FOR ACCURATE LOCATION.

LIMITED BOUNDARY SURVEY MADE. IF ANY CONSTRUCTION IS INTENDED IN THE PROXIMITY OF THE BOUNDARIES IT IS RECOMMENDED THAT A FURTHER SURVEY BE REQUESTED FOR THE MARKING OF THE RELEVANT BOUNDARIES.

ORIGIN OF CO-ORDINATES: SSM 46693 IN HICKSON ROAD, E 333,712.559, N 6,252,045.086. AZIMUTH IS ON M.G.A. NORTH. DISTANCES ARE PLANE DISTANCES CENTRED ABOUT SSM 46693.

M.G.A. CO-ORDINATES OF OTHER P.M.'S & S.S.M.'S MUST BE ADJUSTED ABOUT SSM 46693 BEFORE BEING USED FOR CONTROL.

IT IS THE RESPONSIBILITY OF EACH CONTRACTOR AND/OR CONSULTANT TO CONTACT THE RELEVANT AUTHORITY AND/OR "Dig Before You Dig" (Phone 100 Fax 1300 652 077) BEFORE COMMENCING ANY EXCAVATION.

NOTE:

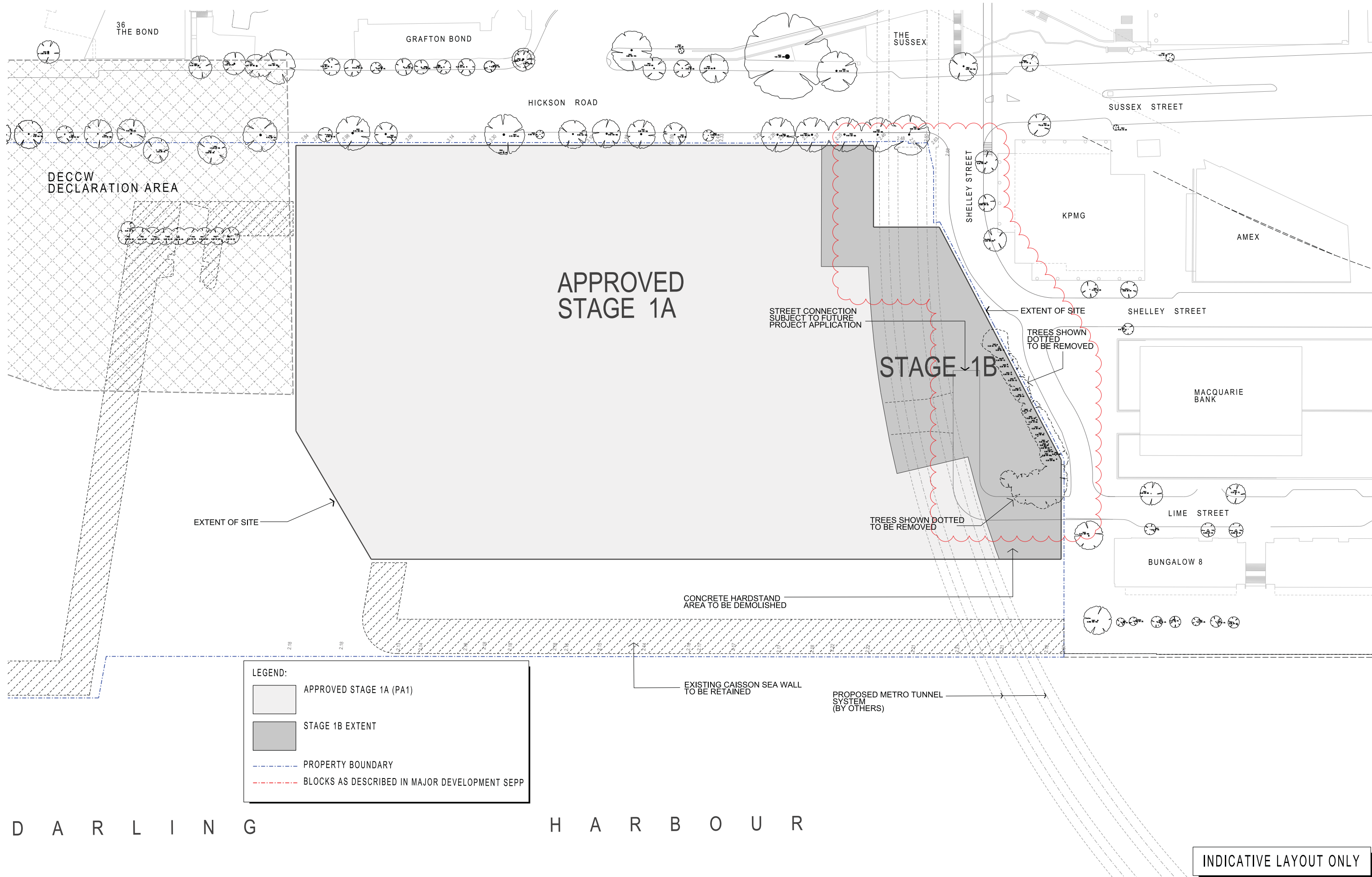
DETAIL INFORMATION SHOWN HAS BEEN COMPILED FROM SURVEY PLANS 72085 (DATED 29/6/2006) AND 74122 (DATED 25/3/2010)

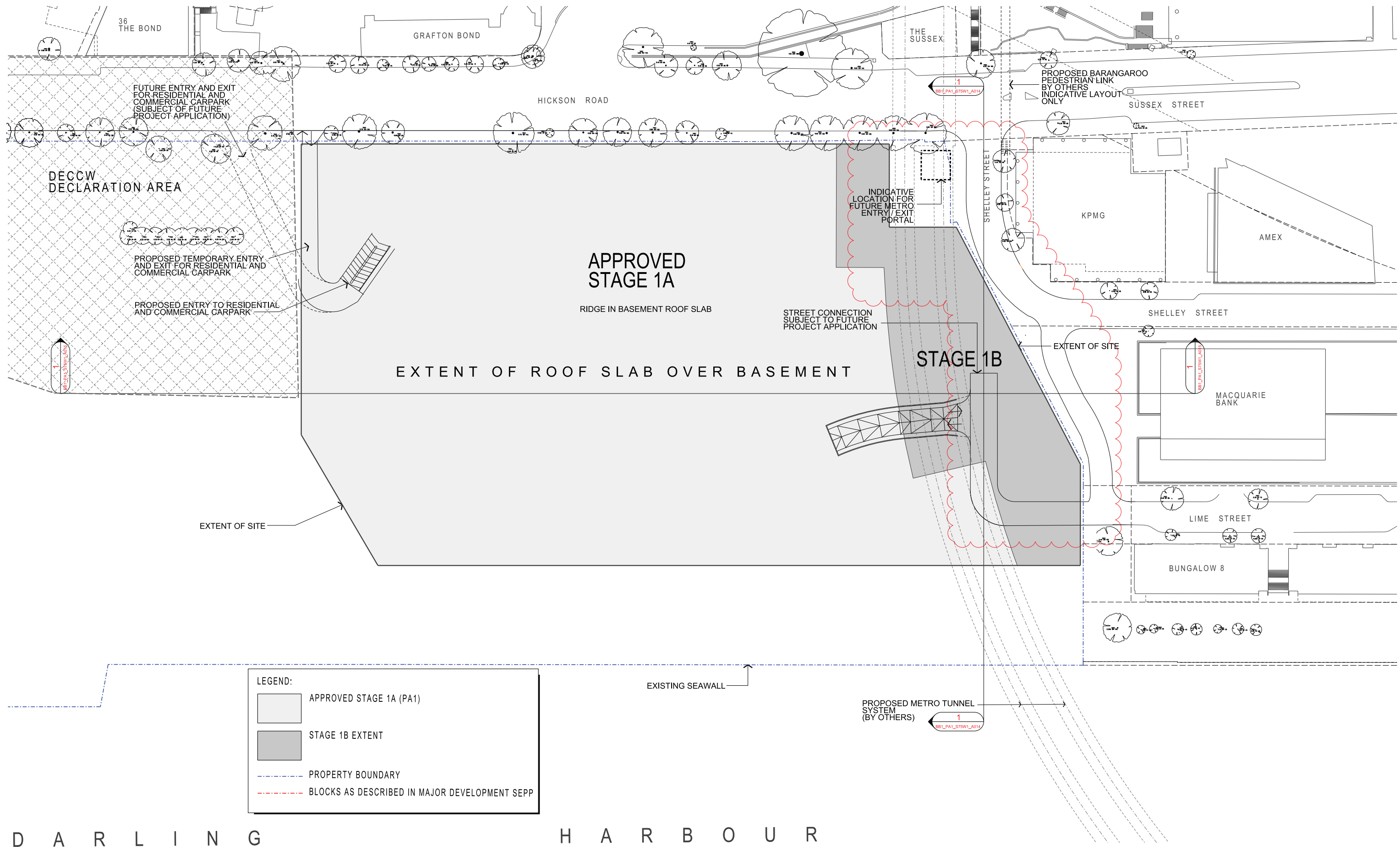
LEGEND

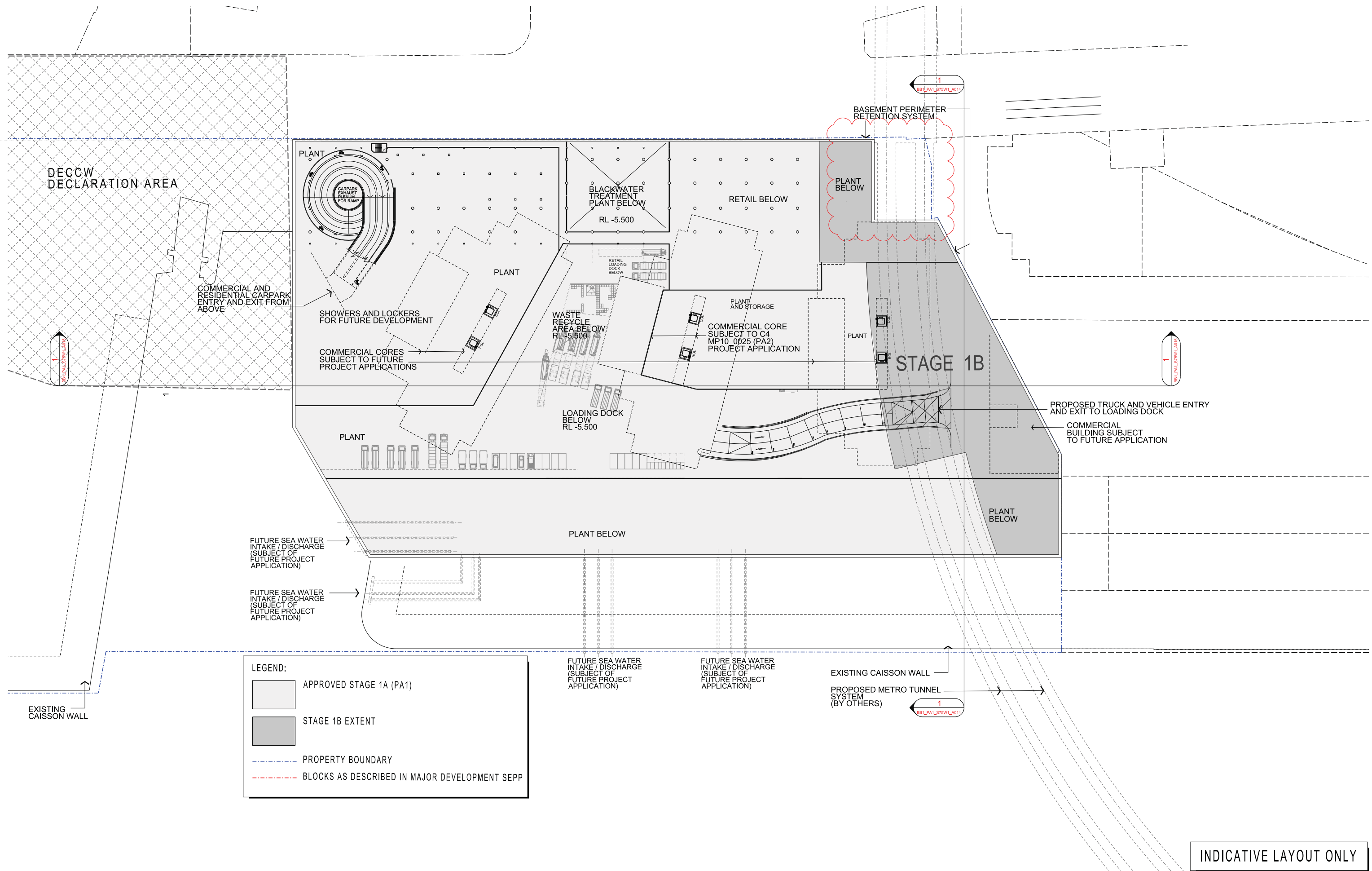
⬢ ELECTRICITY PIT	— E — UNDERGROUND ELECTRICITY	⬢ WATER METER
⬢ ELEC POLE WITH LIGHT	— O — OVERHEAD POWER LINES	⬢ WATER VALVE
⬢ ELECTRICITY POLE	— G — UNDERGROUND GAS	⬢ STOP VALVE
⬢ LIGHT POLE	— S — UNDERGROUND SEWER	⬢ HYDRANT
⬢ TRAFFIC SIGNAL	— SW — UNDERGROUND STORMWATER PIPE	⬢ STORMWATER GRATE
⬢ GAS METER	— W — UNDERGROUND STORMWATER	⬢ STORMWATER MANHOLE
⬢ GAS VALVE	— T — UNDERGROUND WATER SUPPLY	⬢ STORMWATER PIT
⬢ POLE (UNSPECIFIED)	— T — TELECOMMUNICATIONS	⬢ SEWER PIT
⬢ PIT (UNSPECIFIED)		⬢ SEWER MANHOLE
⬢ MANHOLE (UNSPECIFIED)		⬢ SEWER MANHOLE
⬢ TELECOM PIT		⬢ BOLLARD
⬢ TELECOM PILLAR		⬢ SIGN

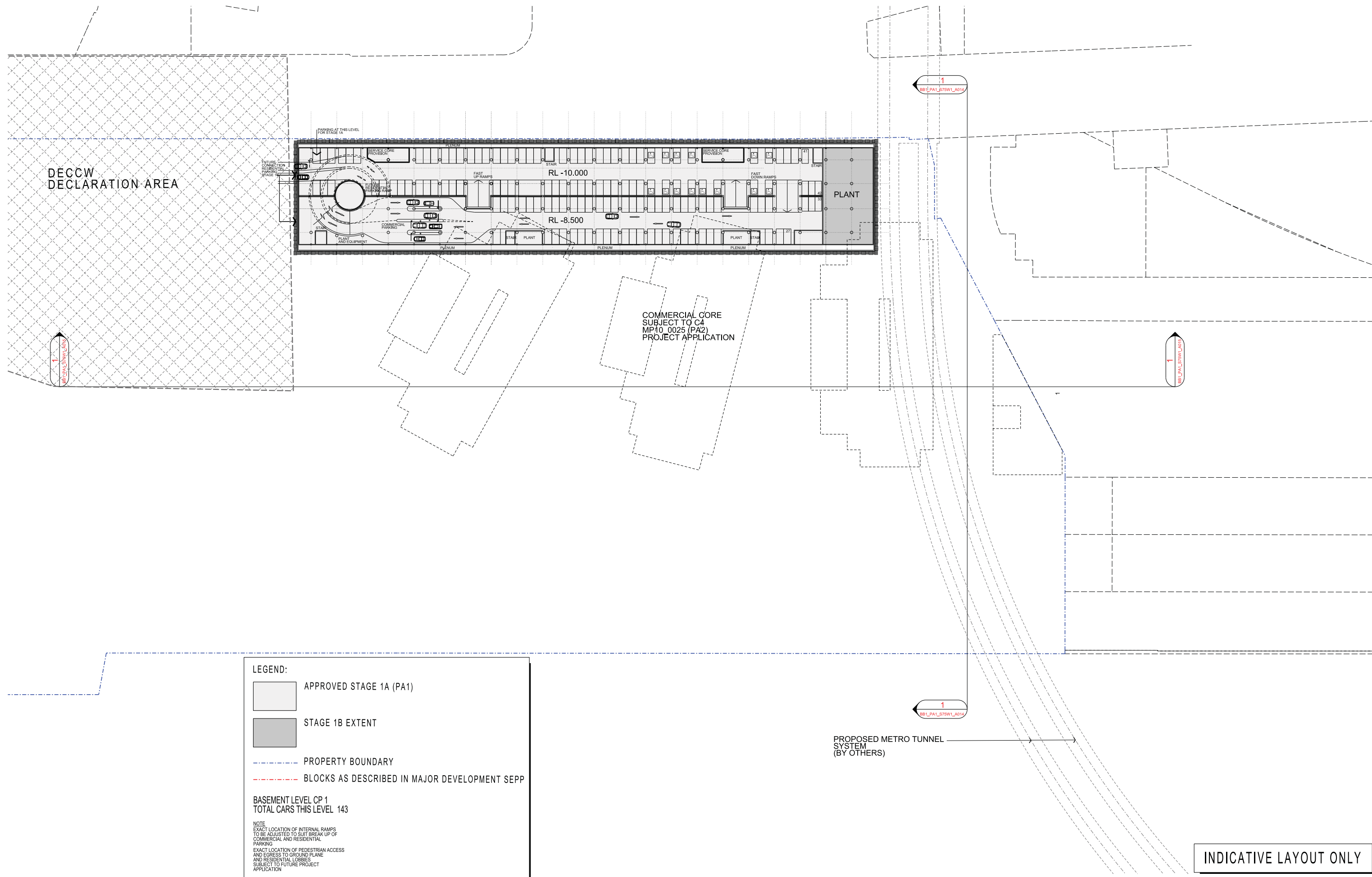
		COPYRIGHT © RYGATE & COMPANY PTY. LIMITED 2010. NO PART OF THIS PLAN MAY BE REPRODUCED, COMMUNICATED, STORED IN A RETRIEVAL SYSTEM OR TRANSMITTED IN ANY FORM WITHOUT THE WRITTEN PERMISSION OF THE COPYRIGHT OWNER EXCEPT AS PERMITTED BY THE COPYRIGHT ACT 1968. ANY PERMITTED DOWNLOADING, ELECTRONIC STORAGE, DISPLAY, PRINT, COPY, REPRODUCTION OR COMMUNICATION OF THIS SURVEY SHOULD CONTAIN NO ALTERATION OR ADDITION TO THE ORIGINAL SURVEY.		 REDUCTION RATIO 1:1000		 RYGATE & COMPANY PTY. LIMITED REGISTERED LAND SURVEYORS 81 YORK STREET, SYDNEY 2000 MEMBER OF ASSOCIATION OF CONSULTING SURVEYORS PHONE 9262 6800 FAX 9262 6843 GIVEN 61001 204897 www.rygate.com.au Email: surveyors@rygate.com.au		CLIENT LEND LEASE (Millers Point) PTY. LTD.		PLAN SHOWING DETAIL, LEVELS & SERVICES			
DATUM : AUSTRALIAN HEIGHT DATUM CONTOUR INTERVAL : N/A ORIGIN OF LEVELS : P.M. 46693 R.L. 2.454 A.H.D.		SURVEYOR DRAWN GO		LOCALITY BARANGAROO SYDNEY		REFERENCE No. 74216-36-REV		PLAN No. A		DATE 14/5/2010		SHEET No. OF SHEETS	
A REV. DATE 14/05/2010 SEPP BLOCKS ADDED AMENDMENTS													

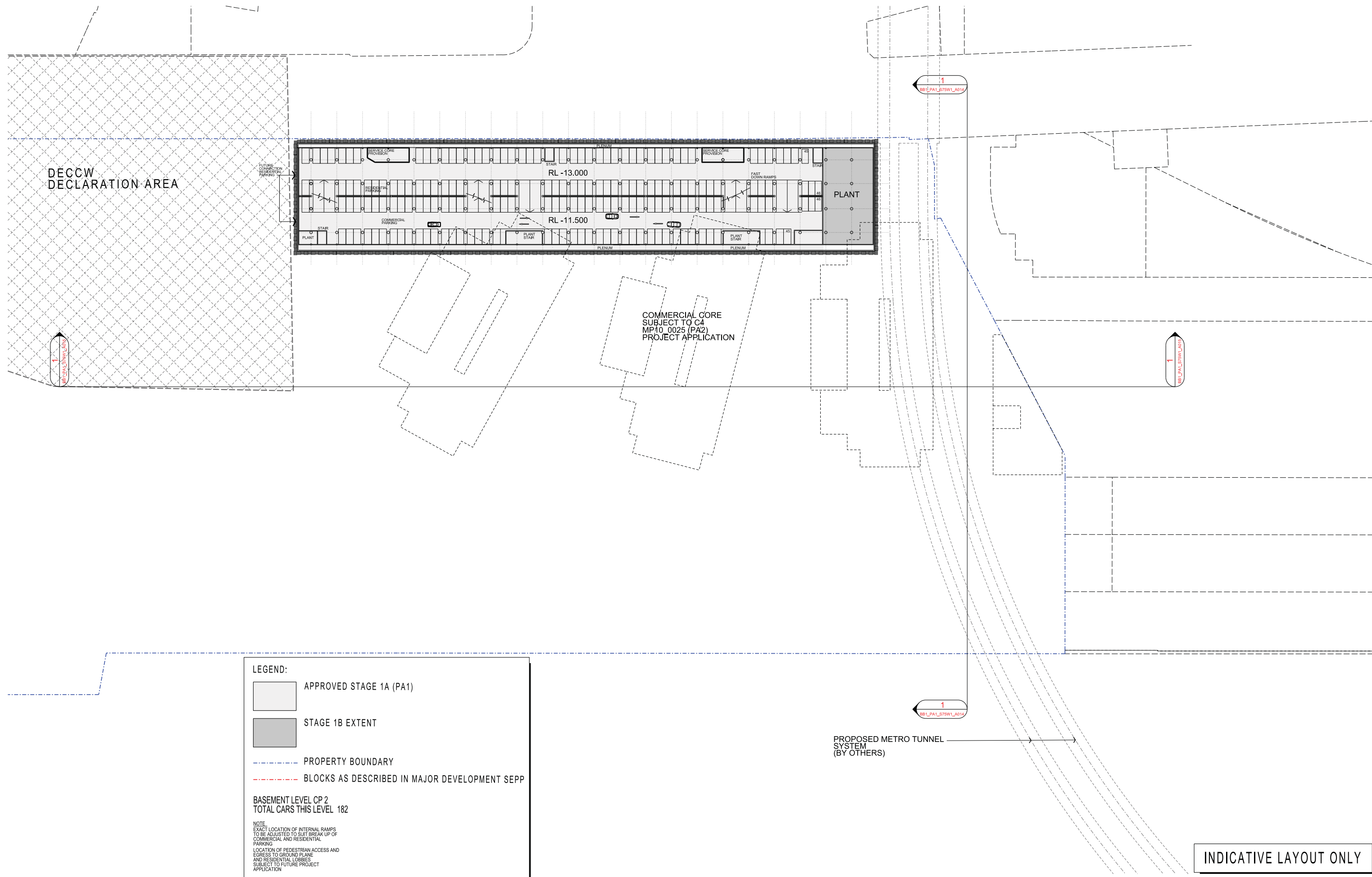
INDICATIVE LAYOUT ONLY

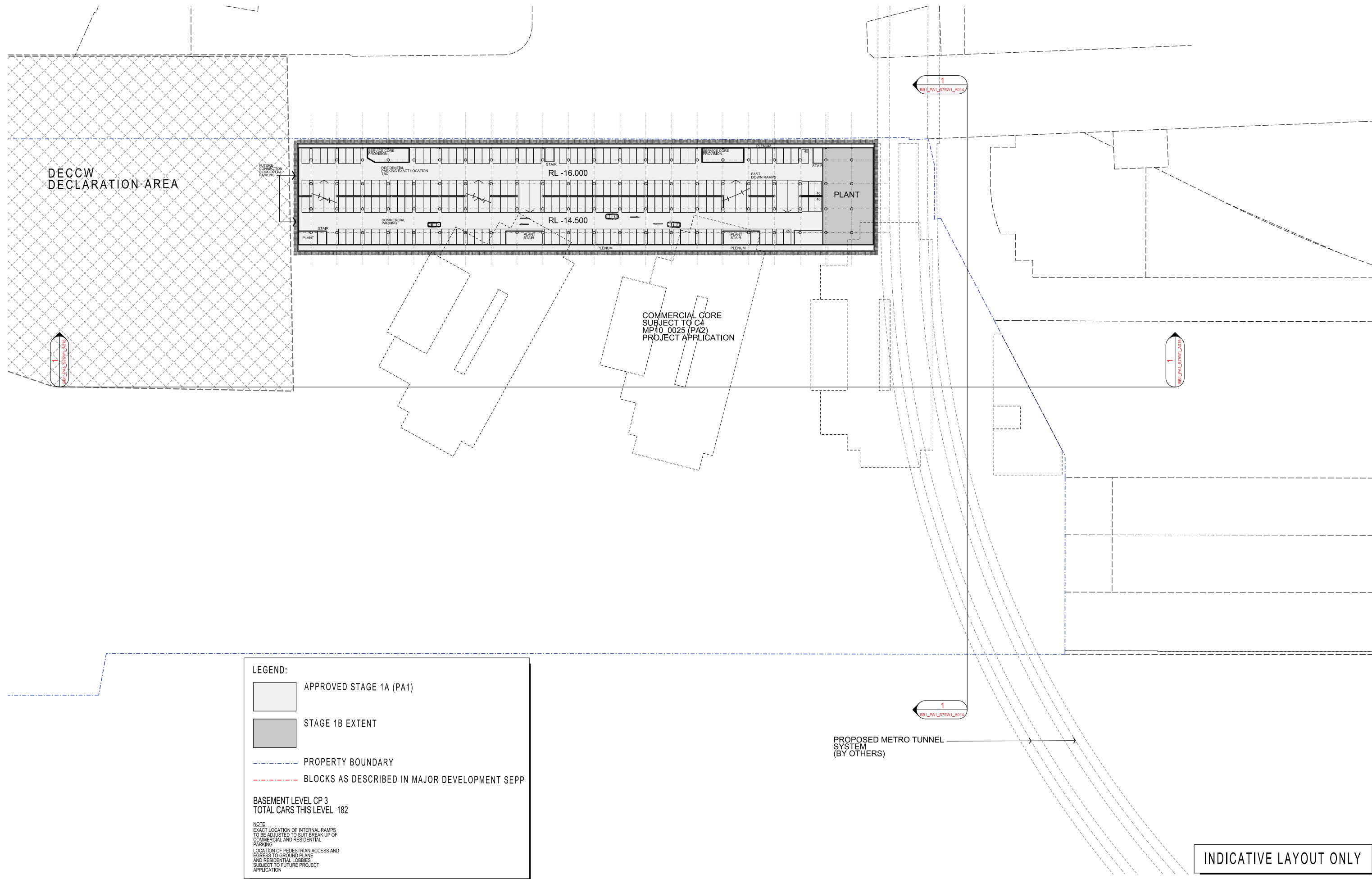


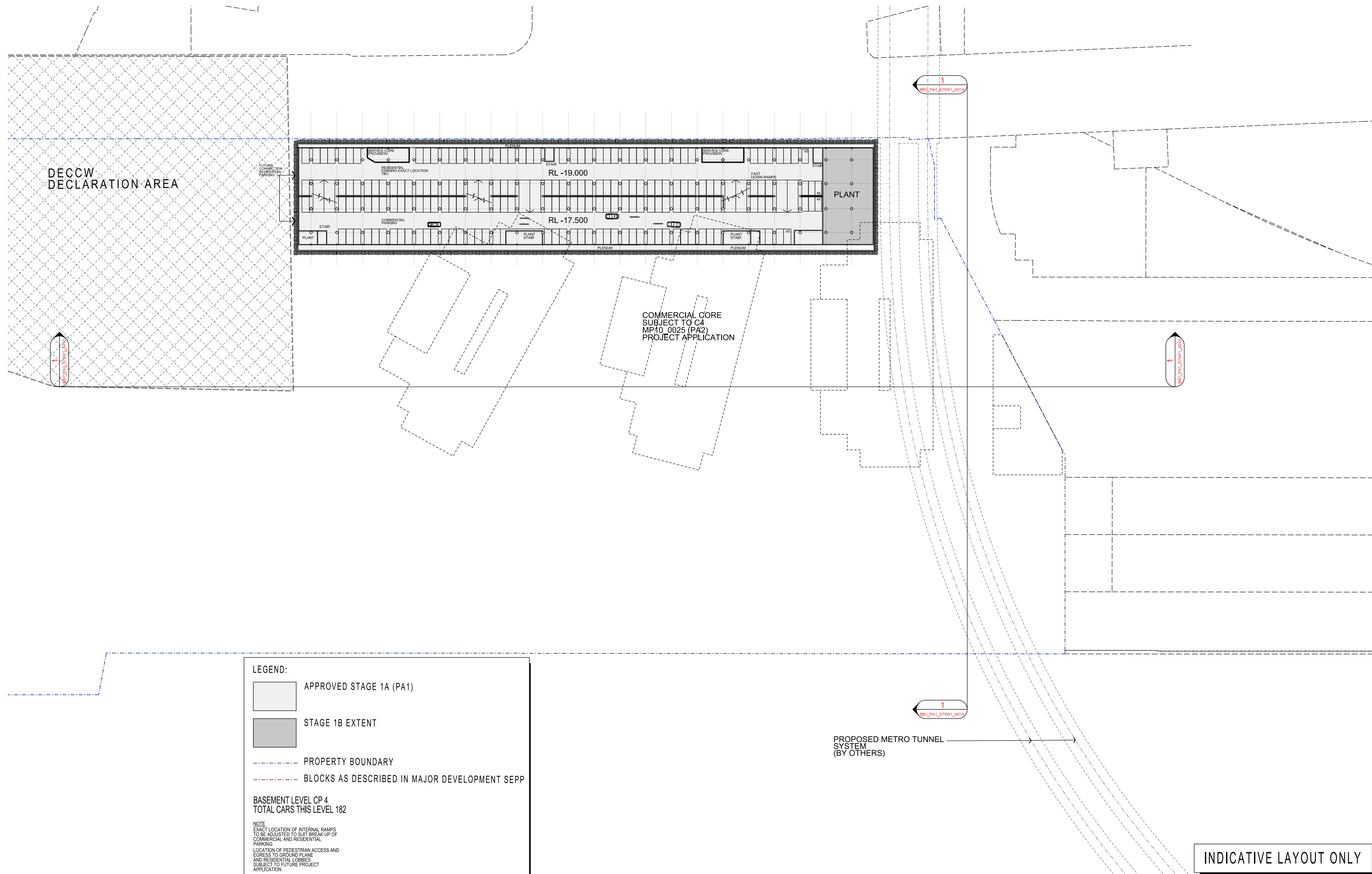


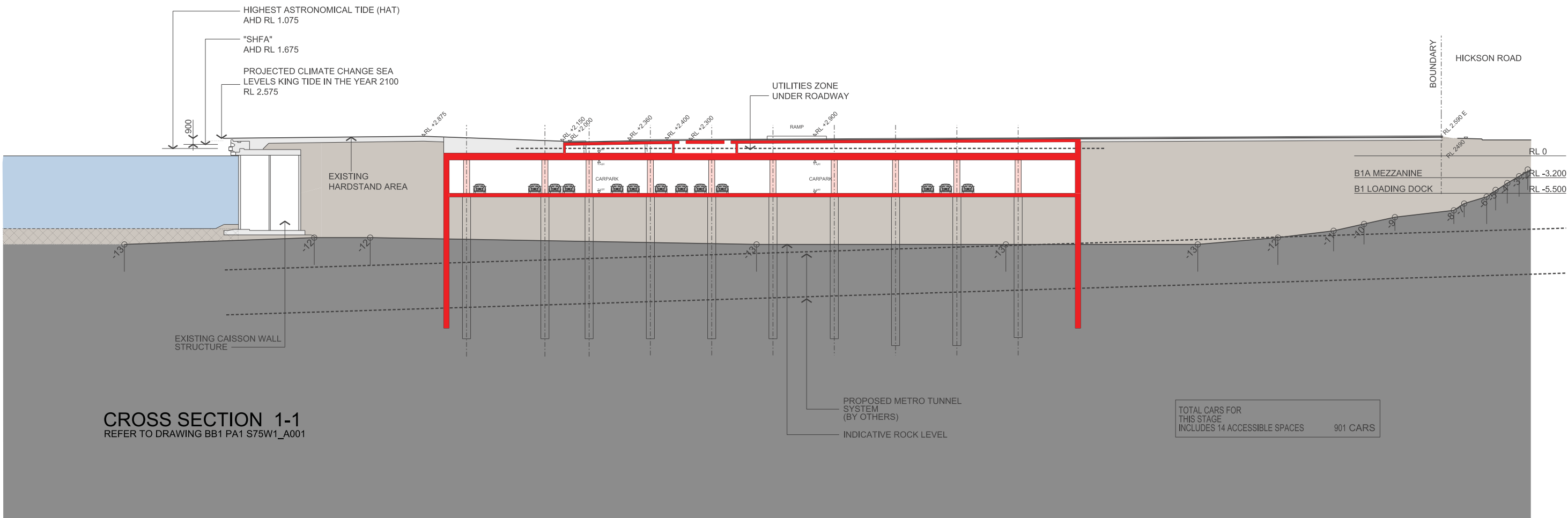








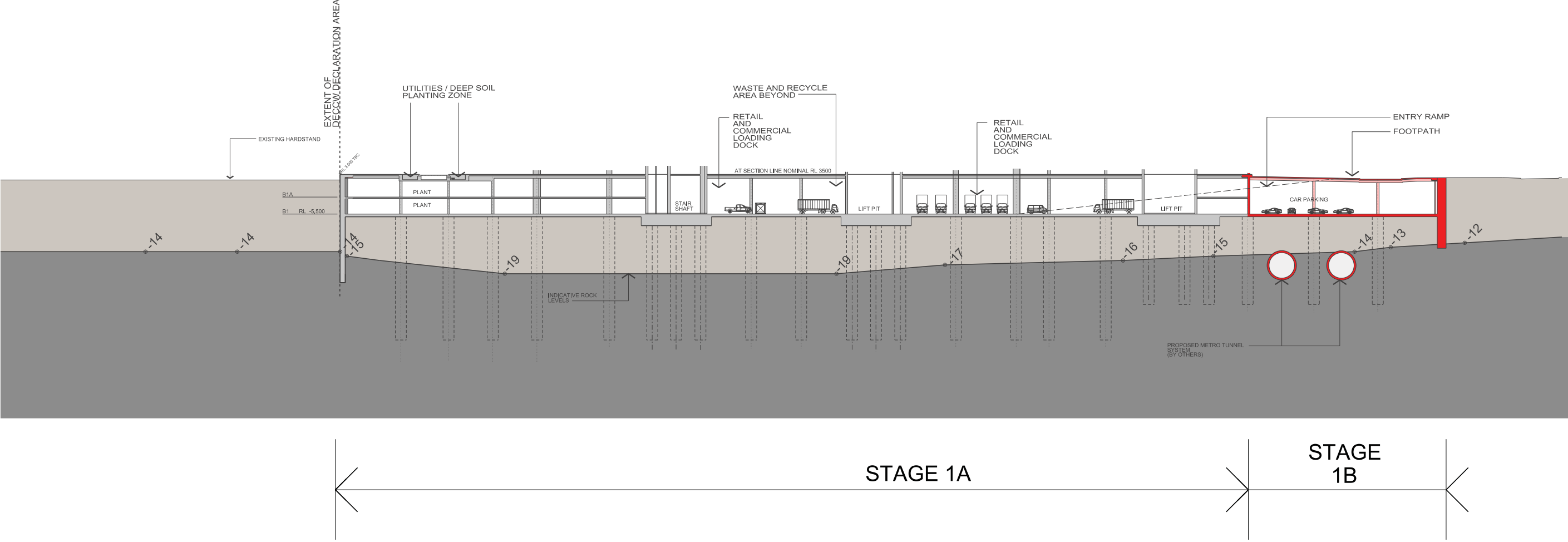




CROSS SECTION 1-1
REFER TO DRAWING BB1 PA1 S75W1_A001

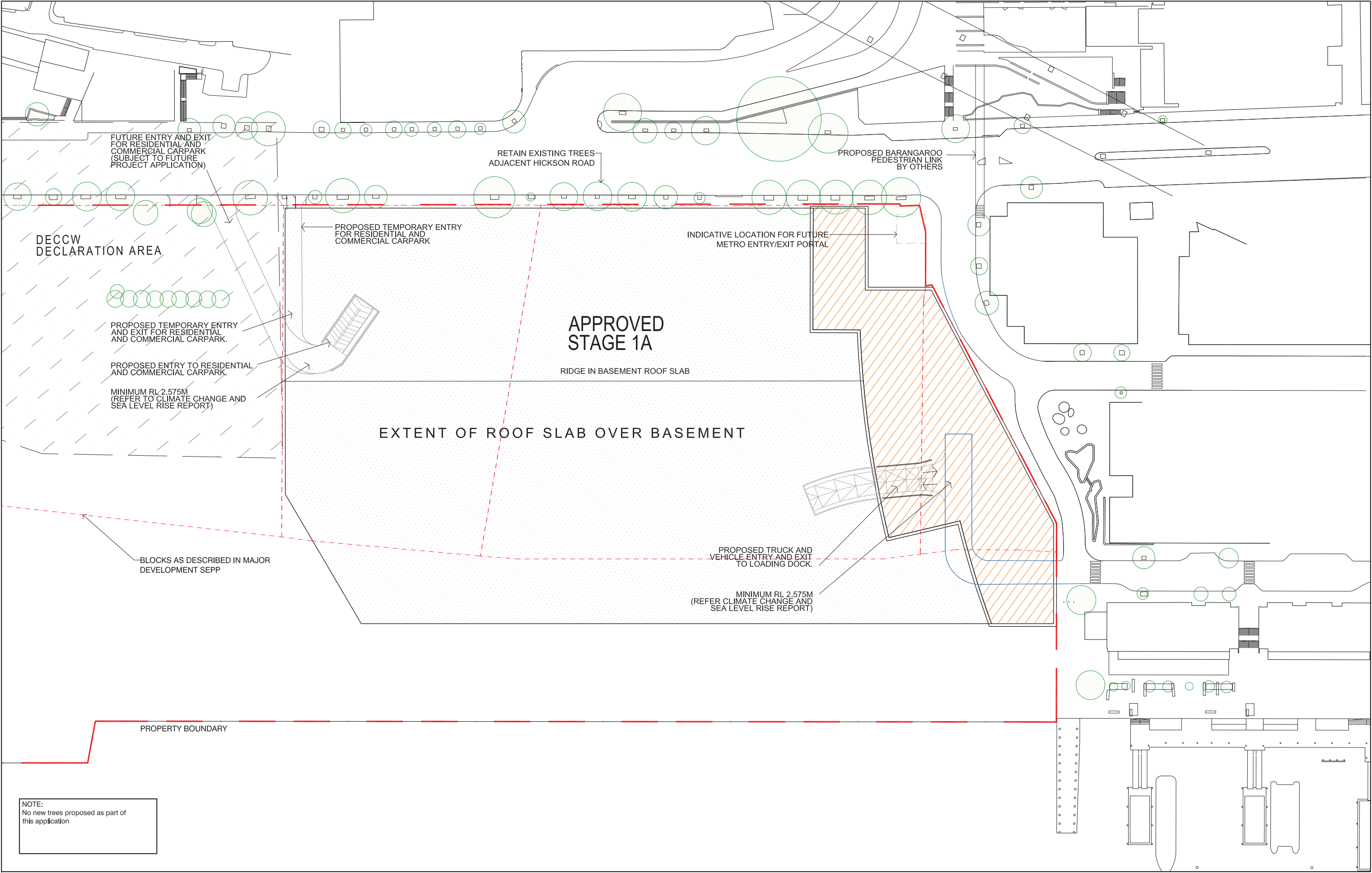
ALL SURFACE LEVELS SHOWN ARE INDICATIVE ONLY
AND ARE SUBJECT TO FINAL GROUND PLANE DESIGN
DEVELOPMENT.
THE FINAL LEVELS WILL BE SUBJECT OF FUTURE
PROJECT APPLICATIONS.

INDICATIVE LAYOUT ONLY



ALL SURFACE LEVELS SHOWN ARE INDICATIVE ONLY AND ARE SUBJECT TO FINAL GROUND PLANE DESIGN DEVELOPMENT. THE FINAL LEVELS WILL BE SUBJECT OF FUTURE PROJECT APPLICATIONS.

INDICATIVE LAYOUT ONLY



Appendix D

Relevant ORWS HHERA Addendum Tables

Summary Table of Groundwater SSECs
Area A

	Units	MWQC	MWQC x4	MWQC x5	MWQC x10	MWQC x 20	MWQC x 40	Tidal Prism		Upgradient of Tidal Prism	
								Unsaturated Zone to Harbour	Saturated Zone to Harbour	Unsaturated Zone to Harbour	Saturated Zone to Harbour
Arsenic	µg/L	2.3	9.2	11.5	23	46	92	9.2	2.3	9.2	2.3
Copper	µg/L	1.3	5.2	6.5	13	26	52	26	6.5	26	6.5
Lead	µg/L	4.4	17.6	22	44	88	176	176	44	176	44
Zinc	mg/L	0.015	0.06	0.075	0.15	0.3	0.6	0.3	0.075	0.3	0.075
Anthracene	µg/L	1*	4*	5*	10*	20*	40*	4*	1*	20*	5*
Phenanthrene	µg/L	1*	4*	5*	10*	20*	40*	4*	1*	20*	5*
TPH C10 - C14	µg/L	40	160	200	400	800	1600	160	40	800	200
TPH C6 - C9	µg/L	110	440	550	1100	2200	4400	440	110	2200	550

Notes:

MWQC

Marine Water Quality Criteria

ANZECC (2000) 95% Marine Water Trigger Value

ANZECC (2000) 95% Marine Water Trigger Value - low reliability

ANZECC (2000) 99% Marine Water Trigger Value

CCME (1999) Freshwater Guideline

CCME (2008) benchmark

Adopted criteria from Acenaphthene as surrogate

* = SSEC adopted is the standard LOR where the MWQC is less than the standard LOR

¹= SSEC was developed based on Analyte Specific Dafs which are based on Site data both inside and outside the tidal prism. Therefore where a analyte speciifc Daf is available, the derived SSEC is the same within the outside the tidal prism.

Summary Table of Groundwater SSECs
Area B

	Units	MWQC	MWQC x4	MWQC x5	MWQC x10	MWQC x20	MWQC x 40	Tidal Prism		Upgradient of Tidal Prism	
								Unsaturated Zone to Harbour	Saturated Zone to Harbour	Unsaturated Zone to Harbour	Saturated Zone to Harbour
Arsenic	µg/L	2.3	9.2	11.5	23	46	92	9.2	2.3	9.2	2.3
Copper	µg/L	1.3	5.2	6.5	13	26	52	26	6.5	26	6.5
Lead	µg/L	4.4	17.6	22	44	88	176	176	44	176	44
Zinc	mg/L	0.015	0.06	0.075	0.15	0.3	0.6	0.3	0.075	0.3	0.075
Acenaphthene	µg/L	5.8	23.2	29	58	116	232	23.2	5.8	116	29
Acenaphthylene	µg/L	5.8	23.2	29	58	116	232	23.2	5.8	116	29
Anthracene	µg/L	1*	4*	5*	10*	20*	40*	4*	1*	20*	5*
Fluoranthene	µg/L	1	4	5	10	20	40	4	1	20	5
Fluorene	µg/L	3	12	15	30	60	120	12	3	60	15
Naphthalene	µg/L	70	280	350	700	1400	2800	280	70	1400	350
Phenanthrene	µg/L	1*	4*	5*	10*	20*	40*	4*	1*	20*	5*
TPH C10 - C14	µg/L	40	160	200	400	800	1600	160	40	800	200
TPH C6 - C9	µg/L	110	440	550	1100	2200	4400	440	110	2200	550
								4 x (1, 5, 10 x Daf)	1, 5, 10 x Daf	4 x (1, 5, 10 x Daf)	1, 5, 10 x DAF

Notes:

MWQC	Marine Water Quality Criteria
	ANZECC (2000) 95% Marine Water Trigger Value
	ANZECC (2000) 95% Fresh Water Trigger Value
	ANZECC (2000) 99% Marine Water Trigger Value
	CCME (1999) Freshwater Guideline
	CCME (2008) benchmark

* = SSEC adopted is the standard LOR where the MWQC is less than the standard LOR

	calculated EIL (refer to Appendix D for source of 1 x Daf)						Tidal Prism		Upgradient of Tidal Prism	
	1 x Daf	4 x Daf	5 x Daf	10 Daf	20 Daf	40 Daf	Unsaturated Zone to the Harbour	Saturated Zone to the Harbour	Unsaturated Zone to the Harbour	Saturated Zone to the Harbour
Metals and Inorganics										
Arsenic	5.06	20.24	25.30	50.60	101.20	202.40	20	5.1	20	5.1
Copper	8.45	33.80	42.25	84.50	169.00	338.00	169	42.3	169	42
Lead	43.60	174.40	217.99	435.99	871.98	1743.96	1744	436	1744	436
Zinc	11.05	44.21	55.27	110.53	221.06	442.12	221	55	221	55
Anthracene*	1.19	4.76	5.95	11.90	23.80	47.60	5	1	24	6
Phenanthrene*	0.97	3.88	4.85	9.70	19.40	38.80	4	1	19	5
C6-C9	9.63	38.53	48.16	96.32	192.64	385.27	39	10	193	48
C10-C14	3.19	12.77	15.97	31.93	63.86	127.72	13	3	64	16
							4 x (1, 5, 10 x Daf)	1, 5, 10 x Daf	4 x (1, 5, 10) Daf	1, 5, 10 x Daf

Notes:

All criteria are mg/kg unless otherwise indicated

* SSEC calculated based on the standard LOR where the MWQC is less than the standard LOR

Shaded cells are analyte specific Dafs that are applicable to the Saturated Zone of the fill upgradient of the Tidal Prism

	Calculated EIL (refer to Appendix D for source of 1 x Daf)						Tidal Prism	Upgradient of Tidal
	1 x Daf	4 x Daf	5 x Daf	10 Daf	20 Daf	40 Daf	Unsaturated Zone to the Harbour	Unsaturated Zone to Harbour
Metals and Inorganics								
Arsenic	5.06	20.24	25.30	50.60	101.20	202.40	20	20
Copper	8.45	33.80	42.25	84.50	169.00	338.00	169	169
Lead	43.60	174.40	217.99	435.99	871.98	1743.96	1744	1744
Zinc	11.05	44.21	55.27	110.53	221.06	442.12	221	221
Acenaphthene	2.08	8.32	10.41	20.81	41.62	83.24	8	42
Acenaphthylene	1.29	5.16	6.45	12.90	25.79	51.59	5	26
Anthracene*	1.19	4.76	5.95	11.90	23.80	47.60	5	24
Fluoranthene	1.88	7.53	9.41	18.82	37.65	75.29	8	38
Fluorene	1.22	4.87	6.09	12.18	24.36	48.72	5	24
Naphthalene	5.34	21.34	26.68	53.36	106.72	213.44	21	107
Phenanthrene*	0.97	3.88	4.85	9.70	19.40	38.80	4	19
C6-C9	9.63	38.53	48.16	96.32	192.64	385.27	39	193
C10-C14	3.19	12.77	15.97	31.93	63.86	127.72	13	64
							4 x (1, 5, 10 x Daf)	4 x (1, 5, 10 x Daf)

Notes:

All criteria are mg/kg unless otherwise indicated

* SSEC calculated based on the standard LOR where the MWQC is less than the standard LOR

Yellow shaded cells are analyte specific Dafs that are applicable to the Saturated Zone upgradient of the Tidal Prism