Appendix M

Transport
Roads & Maritime
NSW | Services

Ms Christina Halim
Project Specialist
Caltex Refineries (NSW) Pty Ltd
Level 24
2 Market Street
SYDNEY NSW 2000

W12/301
PTL#1547

Dear Ms Halim

Applicant(s) : URS Australia Pty Ltd for Caltex Refineries (NSW) Pty Ltd

Site Address : 2 Solander Street KURNELL

Proposal : Dredging, upgrade of fixed berth & sub berth infrastructure, increase fixed berth size, revetment and sheet pile works

I refer to the above proposal, dated 1 November 2012, a copy of which has been received by Roads and Maritime Services (RMS) for Land Owner's Consent to make a Development Application.

Your application has been assessed by reference to Roads and Maritime Services' (RMS) "*Obtaining Permission to Lodge Policy*". The DA must be in accordance with the attached plans prepared by Worley Parsons, numbered 148025/A to 148029/A, 148031/A to148033/A, dated 19 October 2012; 148271/A, 148272/A, 148228/A, dated 12 October 2012, 148010/C TO 148018/C, dated 17 October 2012 and stamped as approved by RMS.

A copy of this letter must be submitted with your DA to the relevant consent authority as evidence of land owner's consent – pursuant to clause 50 of the *Environmental Planning and Assessment Regulations 2000*.

This consent is valid for 12 months from the date of this letter. However, **should the nature, extent or specific location of your proposal change in this time, you must re-apply to RMS** in order to lodge the DA. This consent cannot be transferred to another applicant.

Please be aware that, in granting this consent, RMS is **not endorsing** the proposal **nor approving the development itself**. We are simply **giving permission for you to lodge a DA**. As such, the DA could still be refused, **even if RMS is the consent authority**.

You also need to note that this letter does not, in itself, authorise a person to enter RMS' land or act on any planning permission subsequently granted. Access to, and occupation of, RMS' land must be in accordance with an appropriate tenure arrangement. I would encourage you to contact Rory Gray (9563 8768) to discuss tenure arrangements as soon as possible as this will need to be established **before any construction can commence**.

If you have any questions about this letter, please contact RMS' Development Approvals Co-ordinator, Ms Myriam Mendez on 9563 8662.

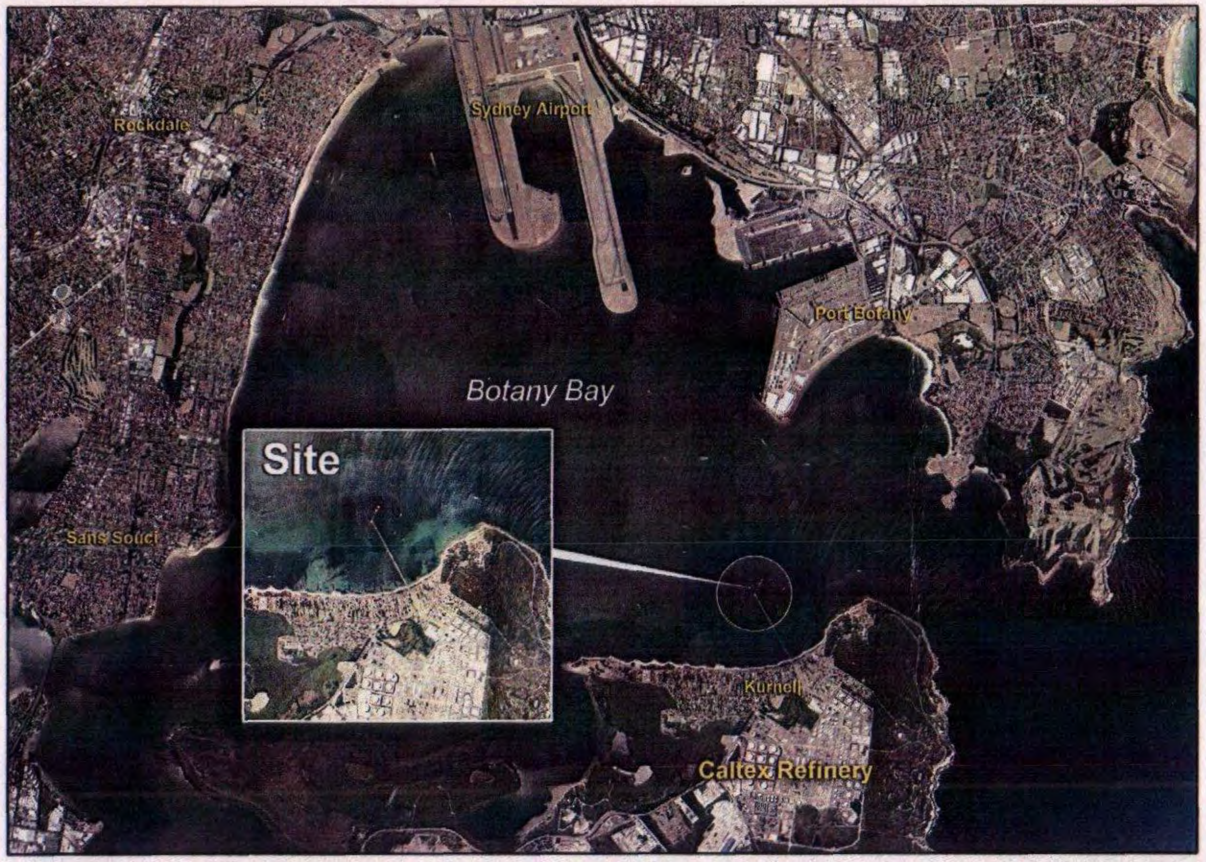
Yours sincerely

Michael Wright
General Manager
Maritime Property, Planning & Infrastructure
Cc: scott.mcinnes@urs.com

27.11.2012

CALTEX KURNELL PORT AND BERTHING PROJECT
REVETMENT AND SHEET PILE WORKS

NORTH



LOCALITY PLAN
NTS

DRAWING LIST

148025	TITLE SHEET, DRAWING LIST AND LOCALITY PLAN
148026	GENERAL NOTES AND SPECIFICATION
148027	GENERAL ARRANGEMENT
148028	REVETMENT PLAN
148029	REVETMENT TYPICAL SECTION
148030	REVETMENT TYPICAL DETAILS (NOT ISSUED)
148031	SHEET PILE WALL PLAN
148032	SHEET PILE WALL ELEVATION
148033	SHEET PILE WALL TYPICAL SECTIONS AND DETAILS

NSW GOVERNMENT | Transport Roads & Maritime Services

2 7 NOV 2012

This is the plan referred to in the Letter Dated Above

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WorleyParsons
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No.	DESCRIPTION	DATE	DRN	DRAFT CHK	DES	ENG CHK	APP'D	CLIENT
A	ISSUED FOR PRICING	19/10/12	PBC	ARG	DHL	AFN		

REFERENCE DRAWINGS — SPECIFICATIONS — REVISIONS — APPROVALS

PLANT 23 — KURNELL PORT AND BERTHING PROJECT

REVETMENT AND SHEET PILE WORKS
TITLE SHEET, DRAWING LIST AND
LOCALITY PLAN

RFC. No.	INDEX	SHT SIZE	DRAWING No.	SHT No.	REV.
X	A	A1	148025	0	A

PLOT DATE & TIME: 19/10/2012 4:08:27 PM USER NAME: philcornish LOCATION: S:\103167_CALTEX KURNELL JETTY UPGRADE\12.0 DRAWINGS\DRGS\CIVIL\REVETMENT\148025.DWG

GENERAL NOTES

1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS AND SPECIFICATIONS AND WITH SUCH OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE CONTRACT. ANY DISCREPANCY SHALL BE REFERRED TO THE PRINCIPALS REPRESENTATIVE BEFORE PROCEEDING WITH THE WORK.
2. DURING CONSTRUCTION THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE PROPOSED AND EXISTING STRUCTURES IN A STABLE CONDITION AND ENSURING NO PART IS OVERSTRESSED DURING CONSTRUCTION ACTIVITIES. TEMPORARY BRACING AND PROPS SHALL BE PROVIDED BY THE CONTRACTOR TO KEEP THE WORKS STABLE AT ALL TIMES.
3. ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE RELEVANT AND CURRENT AUSTRALIAN STANDARDS AND WITH THE BY-LAWS AND ORDINANCES OF THE RELEVANT BUILDING AUTHORITIES EXCEPT WHERE VARIED BY THESE DRAWINGS AND THE SPECIFICATION.
4. ALL CRITICAL ARRANGEMENTS AND DIMENSIONS SHOWN SHALL BE VERIFIED BY THE CONTRACTOR ON SITE BEFORE WORK COMMENCES. DRAWINGS SHALL NOT BE SCALED FOR DIMENSIONS.
5. BEFORE UNDERTAKING ANY WORK, ESTABLISH THE LOCATIONS OF ALL EXISTING SERVICES AFFECTED BY THE WORKS. ADVISE THE PRINCIPAL IF THERE ARE ANY UNKNOWN SERVICES THAT CAN POTENTIALLY BE AFFECTED BY THE WORKS.
6.
7. THE CONTRACTOR SHALL PROVIDE TEST CERTIFICATES FROM AN APPROVED BODY CERTIFYING THAT THE MATERIALS USED COMPLY WITH THE RELEVANT SPECIFICATIONS.
8. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.

DATUMS & TIDAL DATA

1. VERTICAL DATUM IS CALTEX REFINERY DATUM FOR ALL THE STRUCTURAL ELEMENTS AND CHART DATUM FOR ALL THE DREDGE DESIGN LEVELS. 29.6m CALTEX DATUM IS EQUAL TO 0m CHART DATUM (CD) WHICH IS APPROXIMATELY EQUAL TO ISLW AND IS 0.925m BELOW AUSTRALIAN HEIGHT DATUM (AHD).
2. HORIZONTAL DATUM IS THE MAP GRID OF AUSTRALIA (MGA94).

	CHART DATUM		CALTEX DATUM
+2.40 100 YEAR ARI HIGHEST RECORDED TIDE (MAY 1974)	Metres +2.4		
	+2.2		
	+2.0	+2.00 HAT	+31.60 HAT
	+1.8		
	+1.6	+1.56 MHWS	
	+1.4	+1.32 MHWN	
	+1.2		
+0.925 AHD	+1.0		
	+0.8	+0.89 MSL	+30.49 MSL
	+0.6		
0.925m	+0.4	+0.49 MLWN	
	+0.2	+0.24 MLWS	
	0.000	0.0 LAT	+29.60 LAT

ALL SEABED LEVELS ARE SPECIFIED TO CHART DATUM
ALL STRUCTURAL LEVELS ARE SPECIFIED TO CALTEX DATUM

STEEL SHEET PILES

1. SHEET PILES SHALL BE STEEL WITH MINIMUM 355MPa YIELD STRESS. PILE SECTIONS AND STEEL GRADE TO BE APPROVED IN WRITING BY THE PRINCIPAL'S REPRESENTATIVE PRIOR TO PROCUREMENT BY THE CONTRACTOR.
2. SHEET PILES SHALL BE TRANSPORTED, HANDLED AND STORED ON SITE IN SUCH A MANNER AND LOCATION SO AS TO PREVENT DAMAGE, DISTORTION OR CORROSION. HOLES OR OPENINGS SHALL NOT BE BURNT OR DRILLED IN THE FINISHED SECTION OF PILES FOR THE PURPOSE OF HANDLING. WHERE PILES HAVE BEEN DAMAGED DUE TO HANDLING, LIFTING AND/OR PITCHING, THE CONTRACTOR SHALL BE REQUIRED TO FIX AND/OR REPLACE SUCH PILES AT THEIR EXPENSE.
3. THE CONTRACTOR SHALL MAKE THEIR OWN ASSESSMENT OF THE PILING PLANT REQUIRED TO INSTALL THE PILES TO THE REQUIRED LEVELS CONSIDERING THE PARTICULAR PILE SECTION PROVIDED, GROUND CONDITIONS, NOISE RESTRICTIONS AND VIBRATION EFFECTS.
4. BEFORE COMMENCEMENT OF PILING, THE CONTRACTOR SHALL SUBMIT TO THE PRINCIPAL'S REPRESENTATIVE FULL DETAILS OF THE FOLLOWING:
   - NUMBER AND TYPES OF PILE GUIDE FRAMES;
   - PILE DRIVING RIG;
   - PILING TECHNIQUE;
   - HAMMERS AND/OR RAMS.
6. THE CONTRACTOR SHALL NOT REMOVE ANY EQUIPMENT OR PLANT FROM THE SITE PRIOR TO COMPLETION OF PILE DRIVING AND WITHOUT WRITTEN NOTIFICATION TO THE PRINCIPAL'S REPRESENTATIVE GIVING 7 DAYS PRIOR NOTICE.
7. IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE HAMMERS OF SUFFICIENT WEIGHT OR CAPACITY TO CONTROL THE LOAD IMPARTED TO THE PILES SO AS TO ENSURE THAT NO PILES ARE DAMAGED DURING PILING AND THAT THE PILES ARE INSTALLED TO THE REQUIRED PENETRATION DEPTH.
8. THE SHEET PILE SETOUT INCLUDING POSITION, LEVELS, DIMENSIONS AND ALIGNMENTS SHALL BE CARRIED OUT BY A REGISTERED SURVEYOR, AT THE CONTRACTOR'S EXPENSE BEFORE COMMENCEMENT OF THE PILING WORK AND DURING THE EXECUTION OF THE WORK.
9. PILES SHALL BE LIFTED AND PITCHED ACCURATELY IN THEIR POSITIONS AND ON APPROPRIATE LINES AND LEVELS.
10. PRIOR TO COMMENCEMENT OF PILE DRIVING, THE CONTRACTOR IS TO CONFIRM THE LOCATION OF ANY EXISTING PILES IN THE FILL THAT MAY AFFECT PROPOSED ALIGNMENT (EG. BENEATH EXISTING SERVICES TRENCHES TO BE DEMOLISHED AND REINSTATED).
11. THE CONTRACTOR SHALL KEEP COMPLETE AND ACCURATE PILING RECORDS DETAILING THE INFORMATION AS REQUIRED BY THE PILING CODE. RECORDS SHALL BE MADE AVAILABLE TO THE PRINCIPAL'S REPRESENTATIVE WITHIN ONE WEEK OF PILING BEING CARRIED OUT.
12. UNLESS PROPOSED OTHERWISE IN WRITING BY THE CONTRACTOR, SHEET PILES SHALL BE PITCHED TO FORM PANELS BEFORE DRIVING. THE PILES SHALL BE PREVENTED FROM LEANING AND/OR TILTING AND IN THIS RESPECT THE CONTRACTOR SHALL ALLOW FOR SUITABLE TEMPORARY GUIDE WALINGS, LEG GUIDES, BACK GUIDES, ETC., TO BE INSTALLED.
13. AS REQUIRED, THE HEADS OF PILES ARE TO BE PROTECTED BY AN APPROVED TYPE OF HELMET AND DOLLY DURING DRIVING.
14. PILES MAY BE VIBRATED INTO POSITION IN LIEU OF DRIVING, SUBJECT TO THERE BEING NO DAMAGE IMPARTED ONTO THE EXISTING JETTIES OR SURROUNDING STRUCTURES.
15. WHERE NECESSARY, THE INTERLOCK OF THE PILES SHALL BE LUBRICATED WITH AN APPROVED GREASE.
16. DURING INSTALLATION, ADJUSTMENTS ARE TO BE MADE TO COMPENSATE CENTRES OF SHEET PILING TO FIT INTO THE OVERALL LENGTH OF SHEET PILING PANELS.
17. CUTTING OFF PILE TOPS SHALL ONLY BE ALLOWED IF THE PRINCIPAL'S REPRESENTATIVE IS SATISFIED THAT THE PILES HAVE BEEN DRIVEN TO THE REQUIRED DEPTH. A RECORD SHALL BE KEPT OF PILES WHICH ARE CUT AND THE LENGTH CUT OFF.
18. TAPER PILES SHALL NOT BE INTRODUCED IN ORDER TO CORRECT PILES WHICH HAVE DEVELOPED A LEAN UNLESS APPROVAL OF THE PRINCIPAL'S REPRESENTATIVE IS FIRST OBTAINED.
19. ANY PILES WHICH SPREAD OR DO NOT PROPERLY INTERLOCK OR DO NOT REMAIN INTERLOCKED SHALL BE WITHDRAWN AND RE-INSTALLED AT NO ADDITIONAL COST TO THE PRINCIPAL.
20. THE MAXIMUM TOLERANCE IN CUT-OFF LEVEL SHALL BE 0mm ABOVE OR 100mm BELOW THE SPECIFIED LEVEL. THE MAXIMUM TOLERANCE IN ALIGNMENT SHALL BE 100mm EITHER SIDE OF THE SPECIFIED LINE. THE MAXIMUM TOLERANCE ON VERTICALITY SHALL BE 1 IN 50 IN PLANES PARALLEL AND PERPENDICULAR TO THE FACE OF THE PILING.
21. THE CONTRACTOR SHALL INSTALL THE PILES TO LESSER TOLERANCES IF REQUIRED TO ACCOMMODATE OTHER PARTS OF THE WORKS.

ROCK REVETMENT AND SCOUR PROTECTION - GEOTEXTILE

1. THE GEOTEXTILE FILTER FABRIC SHALL BE PLACED ON THE PREPARED PROFILE WHERE REQUIRED IN ACCORDANCE WITH THE DRAWINGS.
2. GEOTEXTILE TO BE LAID ON A CONTINUOUS BED FREE OF VOIDS AND FREE OF SHARP OBJECTS TO PREVENT TEARING.
3. GEOTEXTILE ELEMENTS MAY BE JOINED BY EITHER OVERLAPPING OR SEWING. OVERLAP WIDTHS TO BE NO LESS THAN 1000mm. FOR SEWING, 100mm OVERLAP IS SUFFICIENT USING A NON-BIODEGRADABLE THREAD.
4. GEOTEXTILE PLACED IN WATER WILL REQUIRE BALLAST TO SECURE IT IN POSITION. GEOTEXTILE SHALL BE SECURED AND STABILISED DURING CONSTRUCTION TO AVOID FLAPPING.

ROCK REVETMENT AND SCOUR PROTECTION - ROCK

1. INDIVIDUAL ROCKS SHALL BE HARD, DURABLE AND CLEAN AND SHOULD BE FREE FROM CRACKS, CLEAVAGE PLANES, JOINTS, SEAMS, CHEMICAL ALTERATION OR WEATHERING AND OTHER DEFECTS WHICH WOULD RESULT IN THE BREAKDOWN OF THE ROCK IN THE MARINE ENVIRONMENT.
2. ROCK SHALL BE IGNEOUS.
3. THE ARMOUR ROCK, UNDERLAYER, FILTER LAYER AND SCOUR PROTECTION SHALL BE PLACED SUCH THAT THE SPECIFIED REQUIREMENTS FOR MASS AND DIAMETER (MAXIMUM, MINIMUM AND 50% OR MEDIAN), FINISHED SIDE SLOPES, CREST AND TOE LEVELS, LAYER THICKNESSES AND DENSITY REQUIREMENTS, ARE SATISFIED. IN ADDITION ROCKS SHALL BE WEDGED AND LOCKED TOGETHER SUCH THAT THEY ARE NOT FREE TO MOVE.
4. IN ADDITION TO THE ABOVE, THE ROCK SHALL BE PLACED TO SATISFY THE FOLLOWING:
   - ROCK SHALL BE PLACED TO MINIMISE ITS BREAKDOWN ON HANDLING, PRODUCTION OF FINES AND WATER CONTAMINATION;
   - AVOID SEGREGATION DURING PLACEMENT; AND
   - THE FINISHED SLOPE SHALL BE NO STEEPER THAN THE SLOPE SPECIFIED IN THE DRAWINGS.

NSW GOVERNMENT Transport Roads & Maritime Services
27 NOV 2012
This is the plan referred to in the Letter Dated Above

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WorleyParsons
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REFERENCE DRAWINGS	SPECIFICATIONS	No.	DESCRIPTION	DATE	DRN	DRAFT CHK	DES	ENG CHK	APP'D	CLIENT
		A	ISSUED FOR PRICING	19/10/12	PBC	ARG	DHL	AFN		
			REVISIONS				APPROVALS			

PLANT 23 — KURNELL PORT AND BERTHING PROJECT
REVETMENT AND SHEET PILE WORKS
GENERAL NOTES AND SPECIFICATIONS

RFC. No.	INDEX	SHT SIZE	DRAWING No.	SHT No.	REV.
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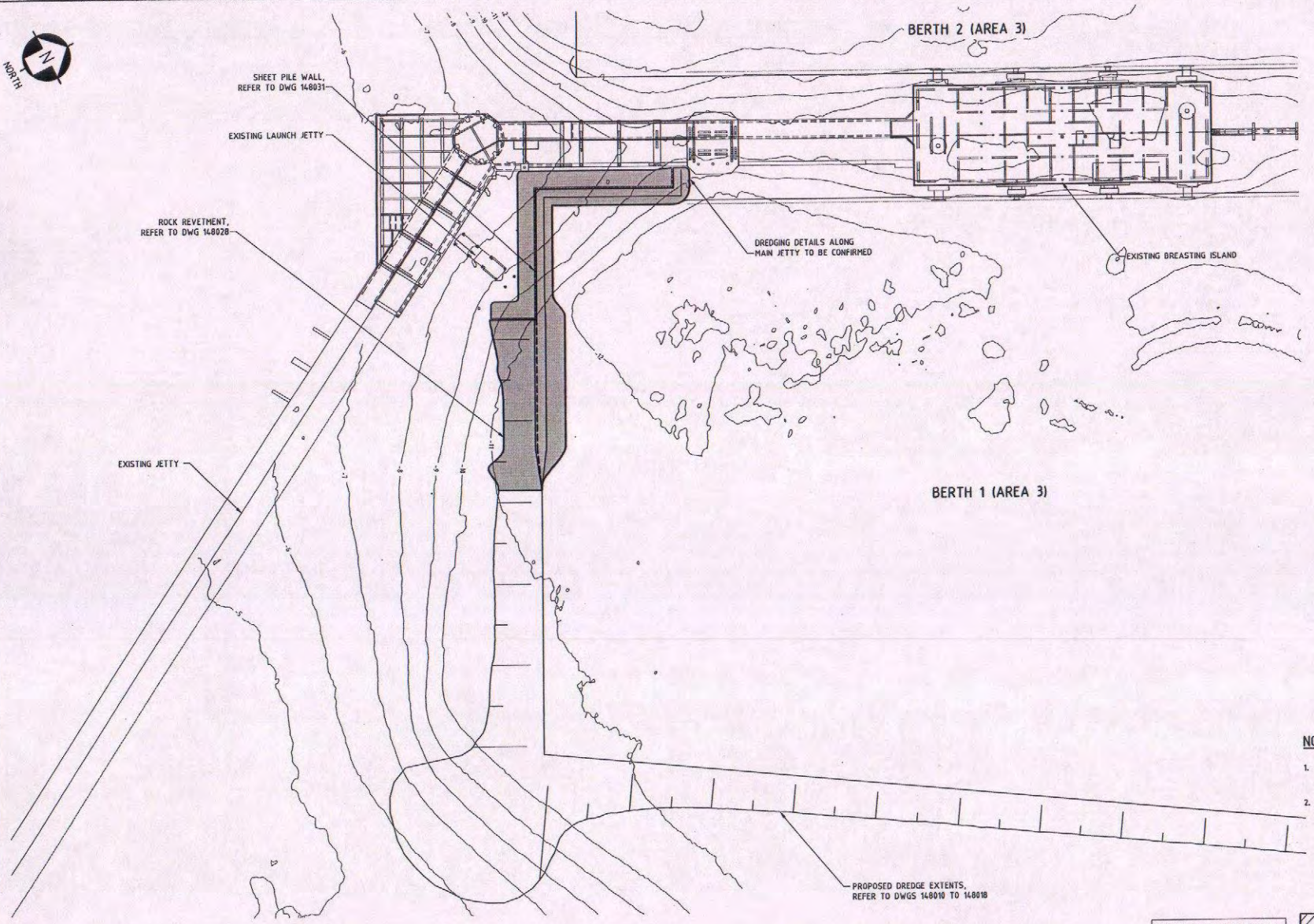

LEGEND

EXISTING CONTOURS, mCD (1m INTERVAL)

Transport Roads & Maritime Services
NSW GOVERNMENT

27 NOV 2012

This is the plan referred to in the Letter Dated Above

NOTES

1. EXISTING CONTOURS HAVE BEEN GENERATED BASED ON SYDNEY PORTS CORP JUNE 2010 & MAY 2012 SURVEY DATA
2. EXISTING JETTY IS BASED ON WATSON BUCHAN CONSULTING SURVEYORS WAE DRG A1-144221 SHT 0 REV 7 05.05.2012 AND SUBSTRUCTURE CAD DRG'S SUPPLIED BY CALTEX 1996. ALL DIMENSIONS AND LEVELS ARE TO BE CONFIRMED ON SITE PRIOR TO FABRICATION AND CONSTRUCTION.

10 0 10 20 30 40 50m
1:500 (A1) 1:1000 (A3)

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No.	DESCRIPTION	DATE	DRN	PBC DRAFT CHK	ARG DES	DHL ENG CHK	AFN APP'D CLIENT
A	ISSUED FOR PRICING	19/10/12					

REVISIONS APPROVALS

REFERENCE DRAWINGS | SPECIFICATIONS

PRELIMINARY

PLANT 23 KURNELL PORT AND BERTHING PROJECT

REVETMENT AND SHEET PILE WORKS

GENERAL ARRANGEMENT

RFC. No.	INDEX	SHT SIZE	DRAWING No.	SHT No.	REV.
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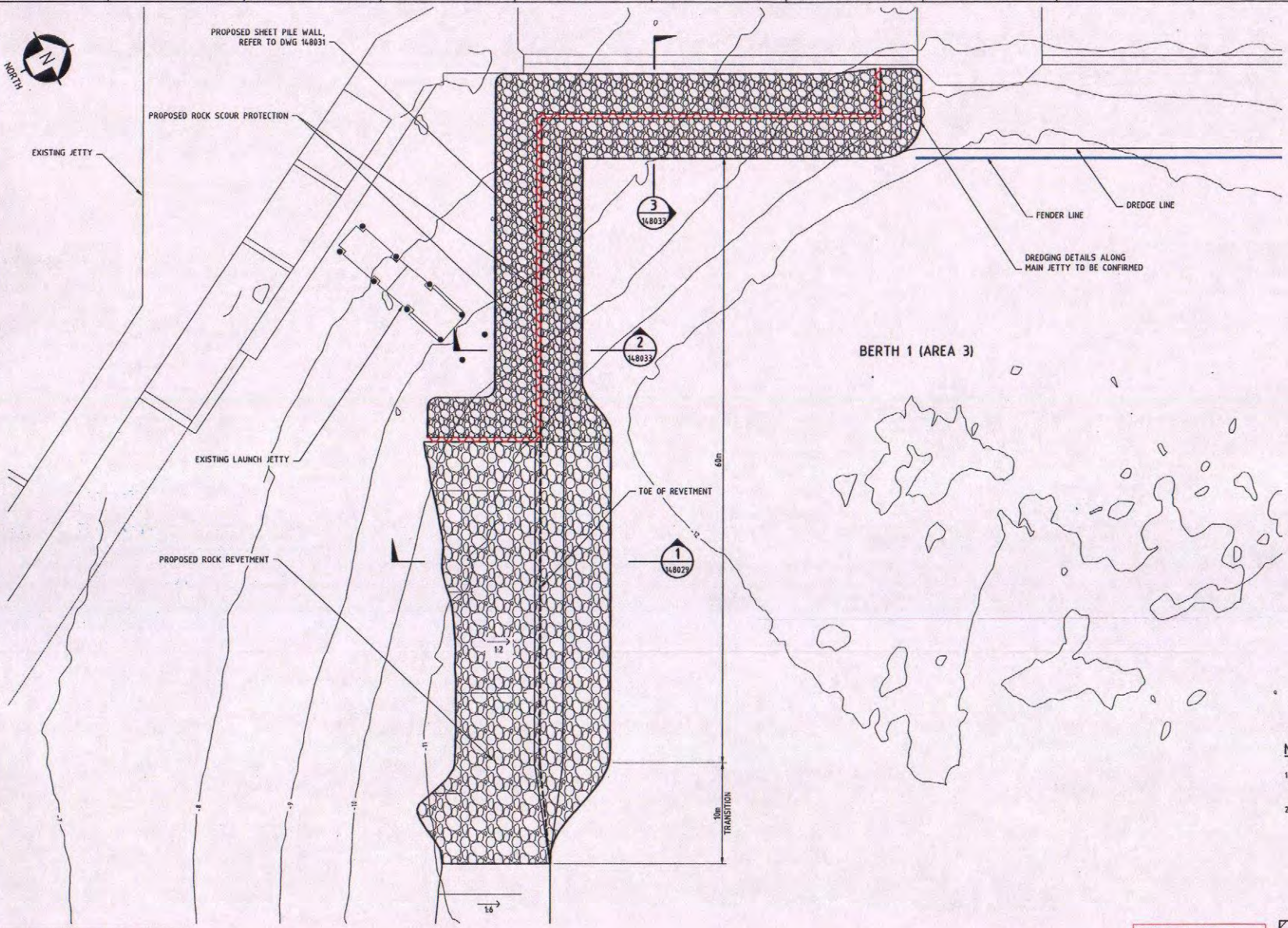

LEGEND

-10- EXISTING CONTOURS, mCD (1m INTERVAL)

NSW GOVERNMENT Transport Roads & Maritime Services

27 NOV 2012

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NOTES

1. EXISTING CONTOURS HAVE BEEN GENERATED BASED ON SYDNEY PORTS CORP JUNE 2010 & MAY 2012 SURVEY DATA
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4 0 4 8 12 16 20m

1:200 (A1) 1:400 (A3)

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PLANT 23 KURNELL PORT AND BERTHING PROJECT

REVETMENT AND SHEET PILE WORKS

REVETMENT PLAN

RFC. No.	INDEX	SHT SIZE	DRAWING No.	SHT No.	REV.
X	A	A1	148028	0	A

No.	DESCRIPTION	DATE	DRN	DRAFT CHK	DES	ENG CHK	APP'D CLIENT
A	ISSUED FOR PRICING	19/10/12	PBC	ARG	DHL	AFN	

REFERENCE DRAWINGS

SPECIFICATIONS

REVISIONS

APPROVALS

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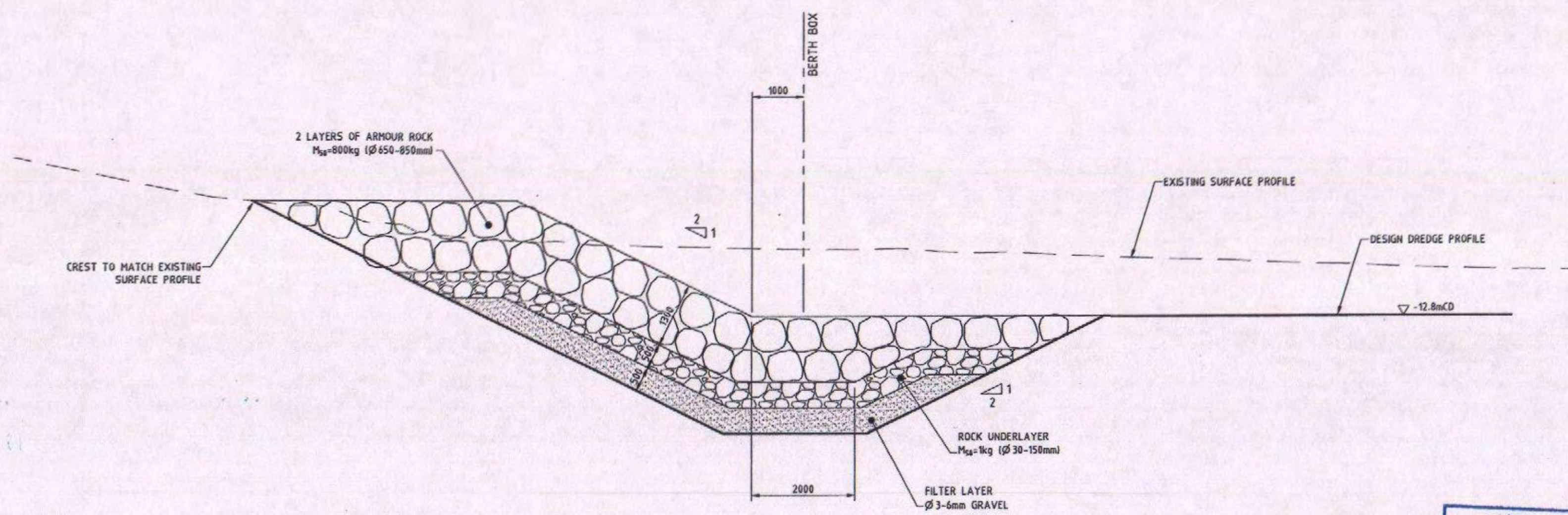

SECTION 1 (148028)
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1:50 (A1) 1:100 (A3)

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Transport Roads & Maritime Services — NSW Government
27 NOV 2012
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No.	DESCRIPTION	DATE	DRN	DRAFT CHK	DES	ENG CHK	APP'D	CLIENT
A	ISSUED FOR PRICING	19/10/12	PBC	ARG	DHL	AFN		

REFERENCE DRAWINGS — SPECIFICATIONS — REVISIONS — APPROVALS

PRELIMINARY

PLANT 23 — KURNELL PORT AND BERTHING PROJECT
REVETMENT AND SHEET PILE WORKS
REVETMENT TYPICAL SECTION

EFC. No.	INDEX	SHT SIZE	DRAWING No.	SHT No.	REV.
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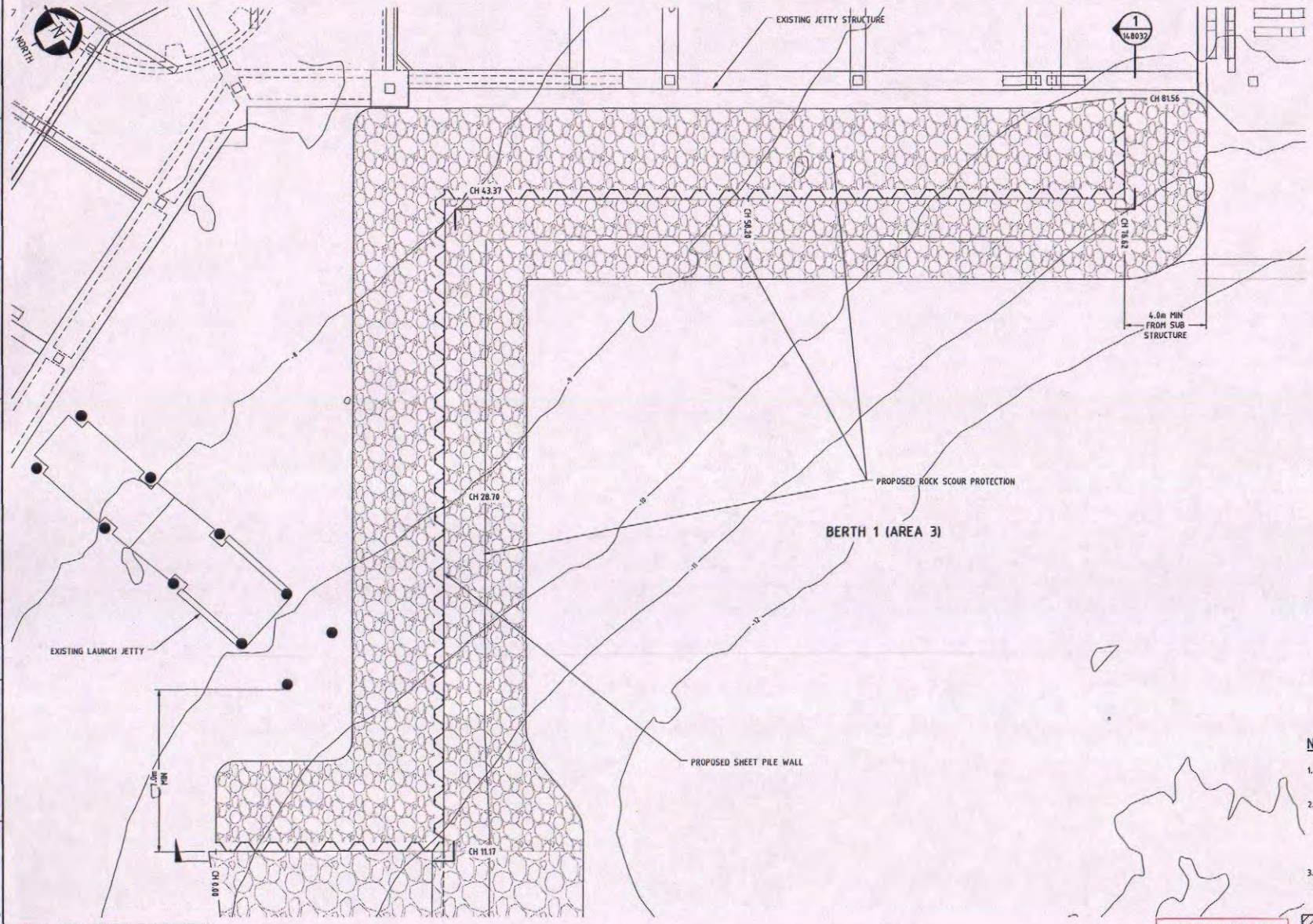

LEGEND

-10- EXISTING CONTOURS, mCD (1m INTERVAL)

NSW GOVERNMENT Transport Roads & Maritime Services

27 NOV 2012

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NOTES

1. EXISTING CONTOURS HAVE BEEN GENERATED BASED ON SYDNEY PORTS CORP JUNE 2010 & MAY 2012 SURVEY DATA
2. EXISTING JETTY IS BASED ON WATSON BUCHAN CONSULTING SURVEYORS WAE DRG A1-144221 SHT 0 REV 7 05.05.2012 AND SUBSTRUCTURE CAD DRG'S SUPPLIED BY CALTEX 1996. ALL DIMENSIONS AND LEVELS ARE TO BE CONFIRMED ON SITE PRIOR TO FABRICATION AND CONSTRUCTION.
3. CHAINAGE LABELS ON SHEET PILE WALL ARE BASED ON A SINGLE SHEET PILE WIDTH OF 700mm.

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2 0 2 4 6 8 10m

1:100 (A1) 1:200 (A3)

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PLANT 23 KURNELL PORT AND BERTHING PROJECT

REVETMENT AND SHEET PILE WORKS

SHEET PILE WALL PLAN

REFERENCE DRAWINGS	SPECIFICATIONS

No.	DESCRIPTION	DATE	DRN	ARG CHK	DES	DHL ENG CHK	AFN APP'D CLIENT
A	ISSUED FOR PRICING	19/10/12	PBC				

REVISIONS APPROVALS

DFC. No.	INDEX	SHT SIZE	DRAWING No.	SHT No.	REV.
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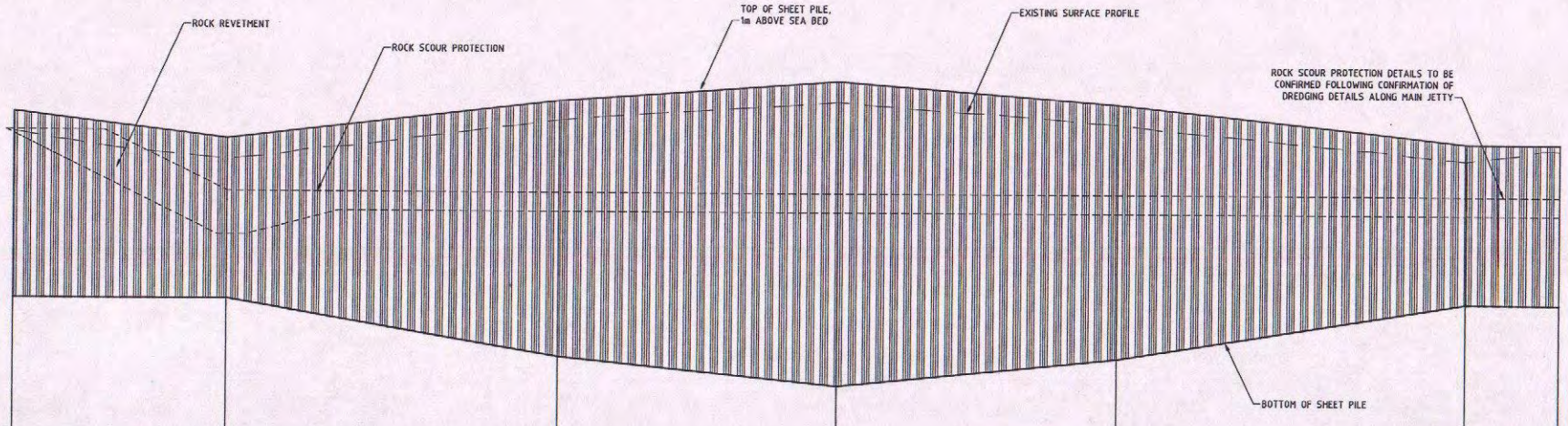

DATUM RL -26.0

TOP OF SHEET PILE	-8.60	-10.00	-7.90	-6.80	-8.00	-10.00	-10.00
BOTTOM OF SHEET PILE	-18.50	-18.50	-21.50	-23.00	-21.50	-18.59	-18.58
EXISTING SURFACE PROFILE	-9.67	-11.09	-8.94	-7.91	-9.06	-10.99	-10.31
CHAINAGE	0.00	11.71	28.70	43.37	58.20	76.62	81.56

ELEVATION 1 (148031)
SCALE 1:125

NOTES:

1. STEEL SHEET PILE TO BE AZ36-700N OR BETTER
2. MINIMUM SHEET PILE SECTION DETAILS (UNO):
   - CROSS SECTION AREA: 215cm²/m OF WALL MIN
   - SECTION MODULUS: 3590cm³/m OF WALL MIN
   - YIELD STRESS: 355 MPa MIN
3. ALL LEVELS REDUCED TO CHART DATUM
4. CHAINAGE LABELS ARE BASED ON A SINGLE SHEET PILE WIDTH OF 700mm

NSW GOVERNMENT Transport Roads & Maritime Services
27 NOV 2012
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2500 0 2500 5000 7500 10000 12500mm
1:125 (A1) 1:250 (A3)

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PRELIMINARY

PLANT 23 KURNELL PORT AND BERTHING PROJECT
REVETMENT AND SHEET PILE WORKS
SHEET PILE WALL ELEVATION

RFC No.	INDEX	SHT SIZE	DRAWING No.	SHT No.	REV.
X	A	A1	148032	0	A

No.	DESCRIPTION	DATE	DRN	DRAFT CHK	DES	ENG CHK	APP'D CLIENT
A	ISSUED FOR PRICING	19/10/12	PBC	ARG	DHL	AFN	

REVISIONS APPROVALS

REFERENCE DRAWINGS SPECIFICATIONS

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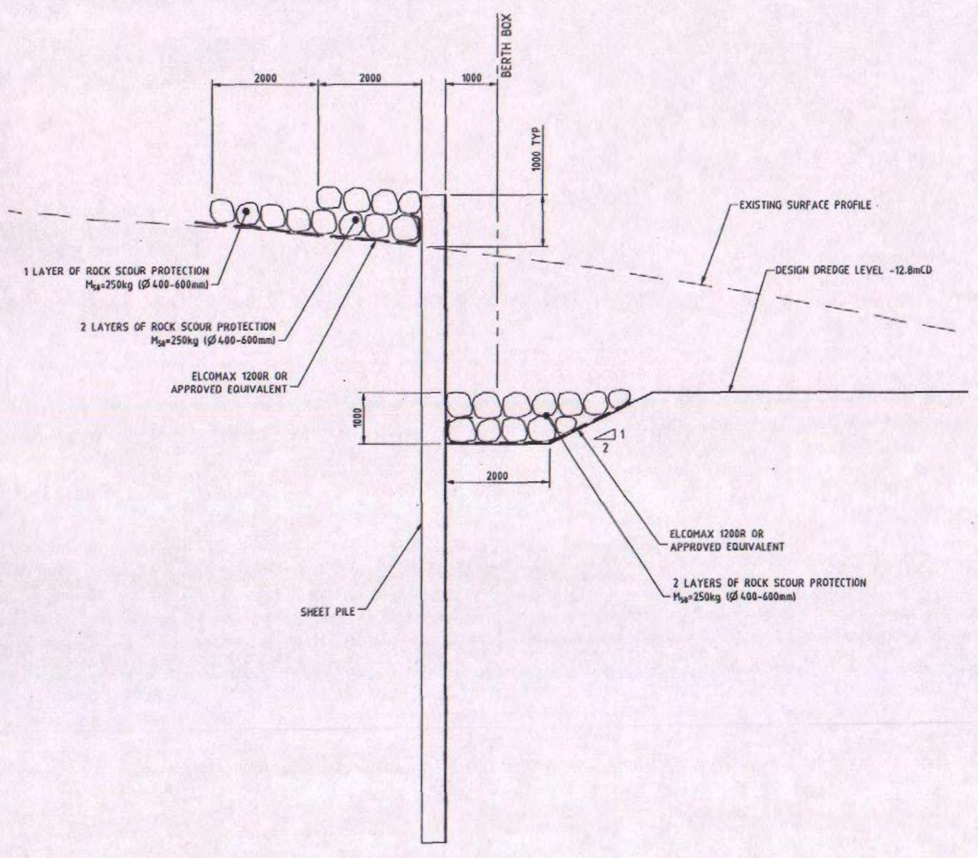

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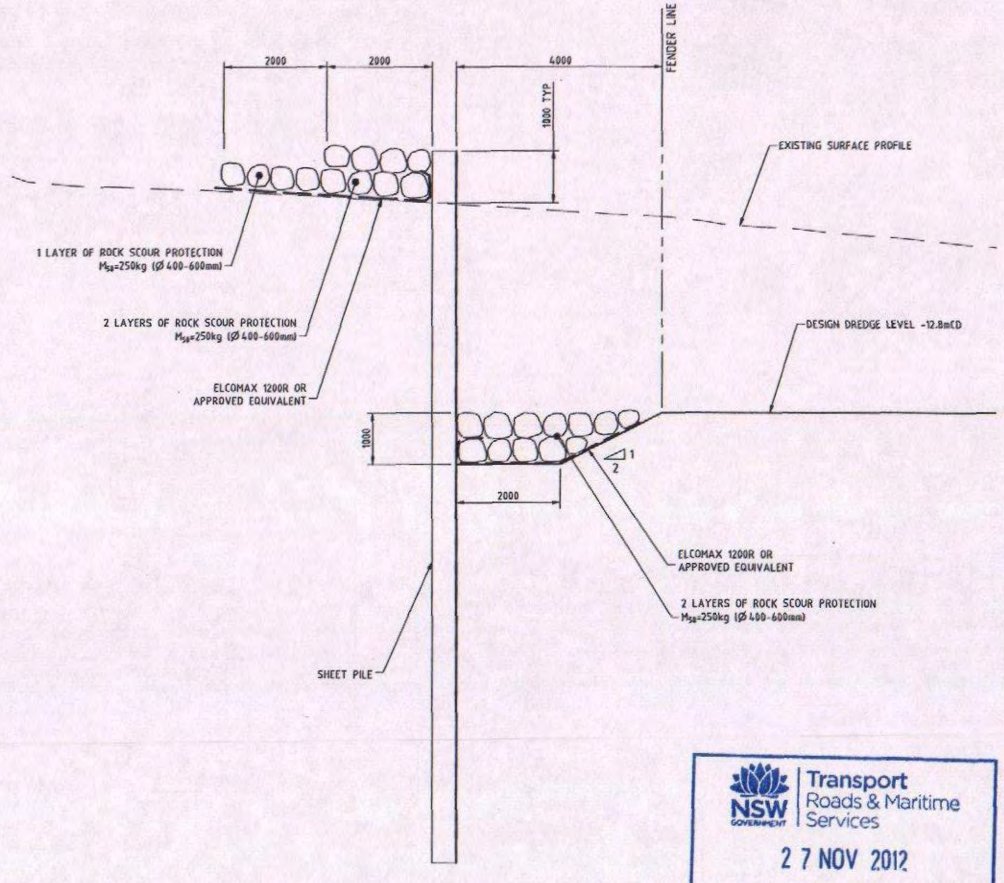

SECTION 3 (148028)
SCALE 1:50

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1:50 (A1) 1:100 (A3)

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WorleyParsons
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REFERENCE DRAWINGS — SPECIFICATIONS — REVISIONS — APPROVALS

PLANT 23 — KURNELL PORT AND BERTHING PROJECT
REVETMENT AND SHEET PILE WORKS
SHEET PILE WALL TYPICAL SECTIONS AND DETAILS

RFC No.	INDEX	SHT SIZE	DRAWING No.	SHT No.	REV.
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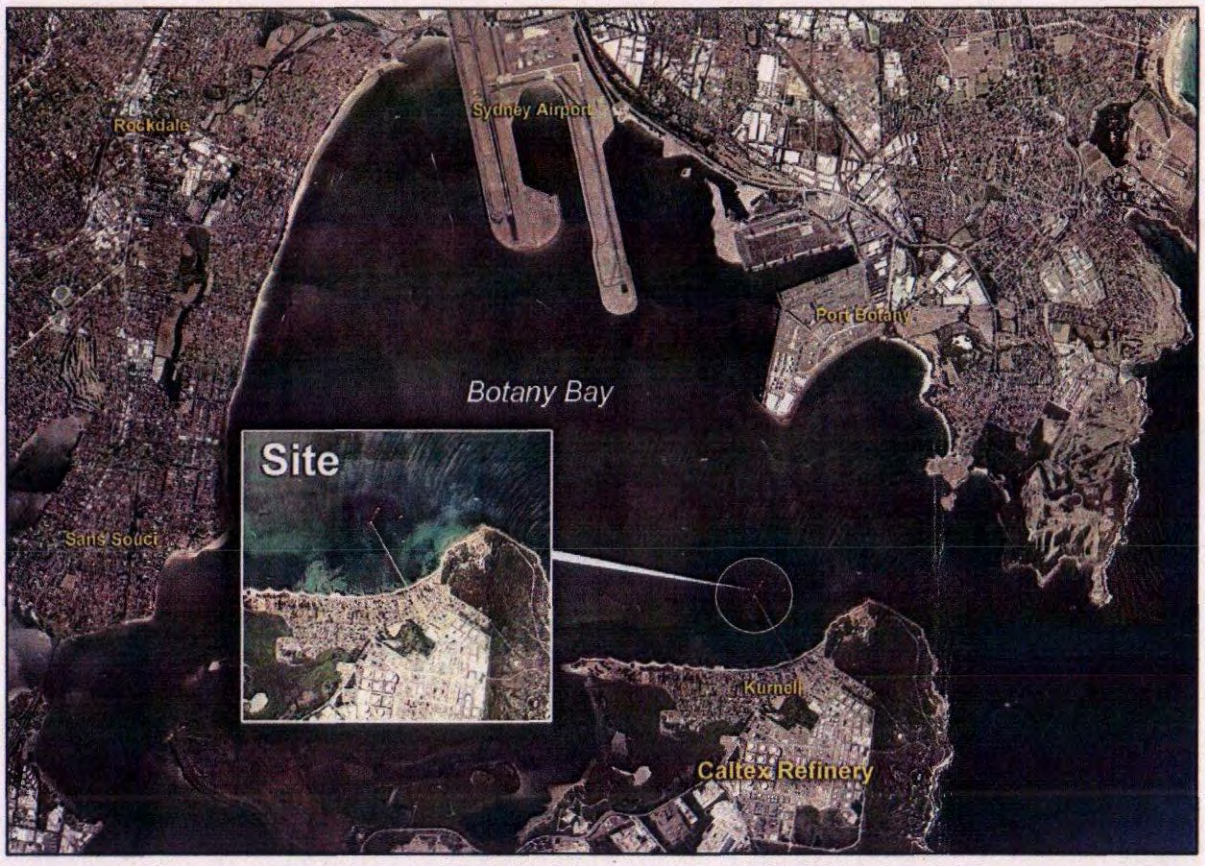
PLOT DATE & TIME: 19/10/2012 4:48:29 PM USER NAME: pbl.cornish LOCATION: W:_INFRASTRUCTURE\PROJECTS\301015\03647_CALTEX KURNELL JETTY UPGRADE\12.0 DRAWINGS\DRGS\CIVIL\REVETMENT\148033.DWG

CALTEX KURNELL PORT AND BERTHING PROJECT
DREDGING WORKS



LOCALITY PLAN
NTS

DRAWING LIST

148010	TITLE SHEET, DRAWING LIST AND LOCALITY PLAN
148011	GENERAL NOTES AND SPECIFICATION
148012	GENERAL ARRANGEMENT
148013	SUB-BERTH PLAN (AREA 2)
148014	BERTH 1 AND 2 PLAN (AREA 3)
148015	PROPOSED SPOIL GROUND
148016	DREDGING SECTIONS - SHEET 1
148017	DREDGING SECTIONS - SHEET 2
148018	DREDGING SECTIONS - SHEET 3

NSW GOVERNMENT Transport Roads & Maritime Services
27 NOV 2012
This is the plan referred to in the Letter Dated Above

INFORMATION ONLY NOT TO BE USED FOR CONSTRUCTION

WorleyParsons resources & energy

No.	DESCRIPTION	DATE	DRN	DRAFT CHK	DES	ENG CHK	APP'D CLIENT
C	ISSUED FOR TENDER	17/10/12	PBC	ARG	DHL	DGA	DPJ
B	ISSUED FOR CLIENT REVIEW	12/10/12	PBC	ARG	DHL	DGA	
A	ISSUED FOR INTERNAL REVIEW	09/10/12	PBC	ARG	DHL	DGA	

REFERENCE DRAWINGS | SPECIFICATIONS | REVISIONS | APPROVALS

PRELIMINARY

PLANT 23 KURNELL PORT AND BERTHING PROJECT
DREDGING WORKS
TITLE SHEET, DRAWING LIST AND LOCALITY PLAN

RFC No.	INDEX	SHT SIZE	DRAWING No.	SHT No.	REV.
X	A	A1	148010	0	C

PLOT DATE & TIME: 16/10/2012 1:57:17 PM USER NAME: pkcornish LOCATION: S:\93367_CALTEX KURNELL JETTY UPGRADE\12.2 DRAWINGS\DRGS\CIVIL\DREDGING\148010.DWG

GENERAL NOTES

1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS AND SPECIFICATIONS AND WITH SUCH OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE CONTRACT. ANY DISCREPANCY SHALL BE REFERRED TO THE PRINCIPALS REPRESENTATIVE BEFORE PROCEEDING WITH THE WORK.
2. DURING CONSTRUCTION THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE PROPOSED AND EXISTING STRUCTURES IN A STABLE CONDITION AND ENSURING NO PART IS OVERSTRESSED DURING CONSTRUCTION ACTIVITIES. TEMPORARY BRACING AND PROPS SHALL BE PROVIDED BY THE CONTRACTOR TO KEEP THE WORKS STABLE AT ALL TIMES.
3. ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE RELEVANT AND CURRENT AUSTRALIAN STANDARDS AND WITH THE BY-LAWS AND ORDINANCES OF THE RELEVANT BUILDING AUTHORITIES EXCEPT WHERE VARIED BY THESE DRAWINGS AND THE SPECIFICATION.
4. ALL CRITICAL ARRANGEMENTS AND DIMENSIONS SHOWN SHALL BE VERIFIED BY THE CONTRACTOR ON SITE BEFORE WORK COMMENCES. DRAWINGS SHALL NOT BE SCALED FOR DIMENSIONS.
5. BEFORE UNDERTAKING ANY WORK, ESTABLISH THE LOCATIONS OF ALL EXISTING SERVICES AFFECTED BY THE WORKS. ADVISE THE PRINCIPAL IF THERE ARE ANY UNKNOWN SERVICES THAT CAN POTENTIALLY BE AFFECTED BY THE WORKS.
6. THE CONTRACTOR SHALL PROVIDE TEST CERTIFICATES FROM AN APPROVED BODY CERTIFYING THAT THE MATERIALS USED COMPLY WITH THE RELEVANT SPECIFICATIONS.
7. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.

DATUMS & TIDAL DATA

1. VERTICAL DATUM IS CHART DATUM FOR ALL THE DREDGING AND REVETMENT WORKS. CHART DATUM (CD) IS APPROXIMATELY EQUAL TO ISLW AND IS 0.925m BELOW AUSTRALIAN HEIGHT DATUM (AHD).
2. NOTE, THE VERTICAL DATUM FOR STRUCTURAL ELEMENTS (EXCLUDING THOSE IN NOTE 1) ARE IN CALTEX REFINERY DATUM, 29.6m CALTEX DATUM IS EQUAL TO 0m CHART DATUM (CD).
3. HORIZONTAL DATUM IS THE MAP GRID OF AUSTRALIA (MGA94).

	CHART DATUM		CALTEX DATUM
+2.40 100 YEAR ARI HIGHEST RECORDED TIDE (MAY 1974)	Metres +2.4		
	+2.2		
	+2.0	+2.00 HAT	+31.60 HAT
	+1.8		
	+1.6	+1.56 MHWS	
	+1.4	+1.32 MHWN	
	+1.2		
+0.925 AHD	+1.0	+0.89 MSL	+30.49 MSL
	+0.8		
	+0.6	+0.49 MLWN	
	+0.4		
0.925m	+0.2	+0.24 MLWS	
	0.000	0.0 LAT	+29.68 LAT

ALL SEABED LEVELS ARE SPECIFIED TO CHART DATUM
ALL STRUCTURAL LEVELS ARE SPECIFIED TO CALTEX DATUM

DREDGING

1. THE EXTENT OF THE DREDGING WORK IS INDICATED ON THE DRAWINGS.
2. THE DREDGING SHALL BE CARRIED OUT IN THE LOCATIONS SHOWN AND TO THE LEVELS, WIDTHS AND SIDE SLOPES INDICATED ON THE DRAWINGS.
3. AN INDICATION OF THE MATERIAL TO BE REMOVED DURING DREDGING IS INDICATED IN THE GEOTECHNICAL INVESTIGATIONS THAT HAVE BEEN COMPLETED AT THE SITE.
4. ALL MATERIAL DREDGED SHALL BE DISPOSED OFFSHORE AT A DESIGNATED SPOIL GROUND AREA OR WHERE SUITABLE, USED TO COVER PIPELINES OR FILL DEEPENED AREA AS SPECIFIED ON THE DRAWINGS AND IN THE SPECIFICATION. AREA 3 AND AREA 1 HIGHLY CONTAMINATED MATERIAL SHALL BE DREDGED WITH NO OVERFLOW ALLOWED FROM LOADING BARGES.

NSW GOVERNMENT Transport Roads & Maritime Services
27 NOV 2012
This is the plan referred to in the Letter Dated Above

WorleyParsons
resources & energy

INFORMATION ONLY NOT TO BE USED FOR CONSTRUCTION

PRELIMINARY

REFERENCE DRAWINGS	SPECIFICATIONS

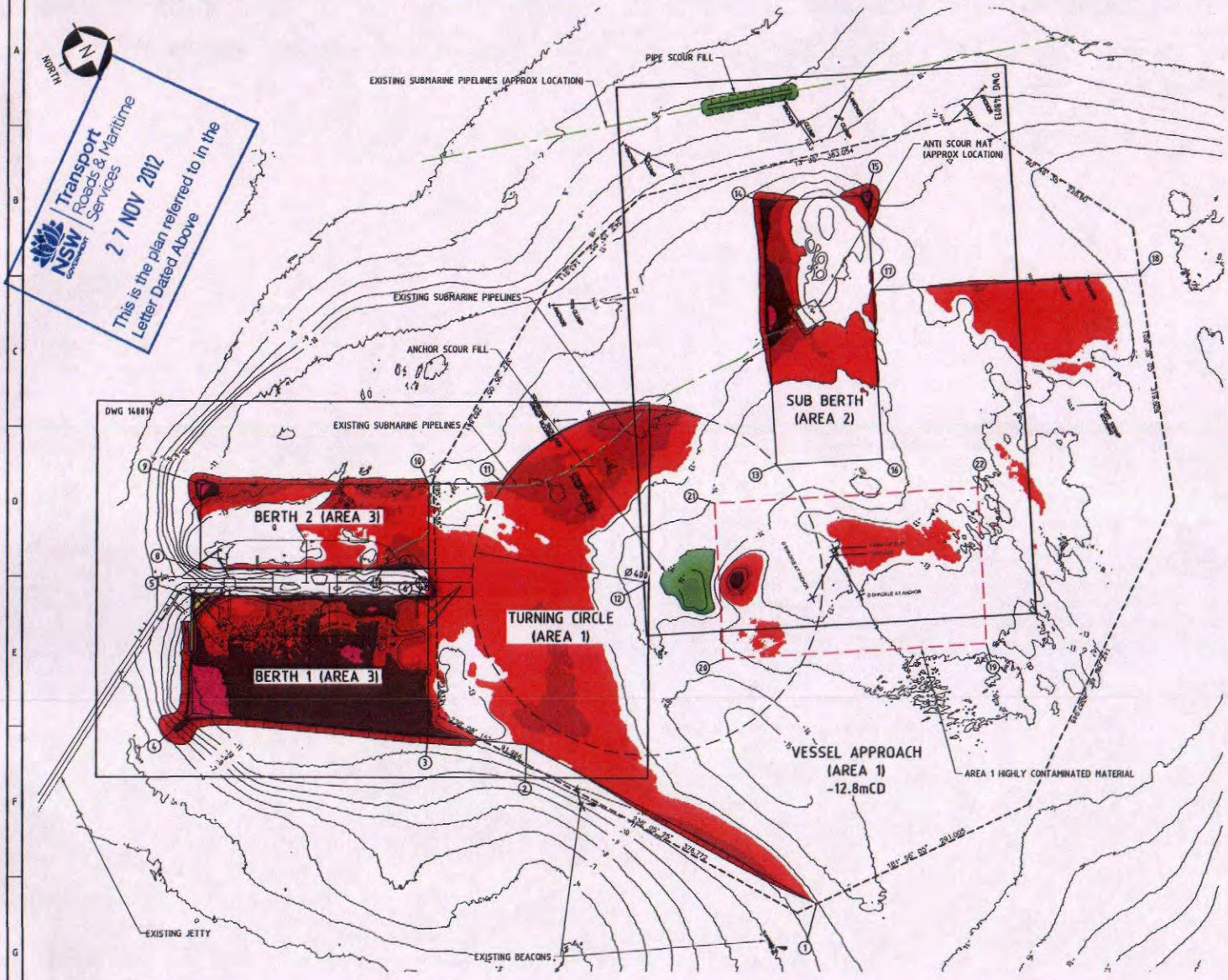
No.	DESCRIPTION	DATE	DRN	DRAFT CHK	DES	ENG CHK	APP'D CLIENT
C	ISSUED FOR TENDER	17/10/12	PBC	ARG	DHL	DGA	DPJ
B	ISSUED FOR CLIENT REVIEW	12/10/12	PBC	ARG	DHL	DGA	
A	ISSUED FOR INTERNAL REVIEW	09/10/12	PBC	ARG	DHL	DGA	

REVISIONS APPROVALS

PLANT 23 KURNELL PORT AND BERTHING PROJECT
DREDGING WORKS
GENERAL NOTES AND SPECIFICATIONS

RFC No.	INDEX	SHT SIZE	DRAWING No.	SHT No.	REV.
X	A	A1	148011	1	C

LOCATION: S:\148011_CALTEX KURNELL JETTY UPGRADE\12.0 DRAWINGS\DRGS\DWG\148011GA01.DWG USER NAME: phil.cornish PLOT DATE & TIME: 16/10/2012 3:40:36 PM



LEGEND

EXISTING CONTOURS, mCD (1m INTERVAL)

BUOYS, ANCHORS & MOORINGS

APPROACH & MANOEUVRING AREAS UNDER AUSTRALIAN OIL REFINING AGREEMENT RATIFICATION ACT 1954 NO. 34 SCHEDULE 10. WITH BEARING & LENGTH

DREDGING DEPTH

- DREDGING 0.0m TO 0.5m
- DREDGING 0.5m TO 1.0m
- DREDGING 1.0m TO 1.5m
- DREDGING 1.5m TO 2.0m
- DREDGING 2.0m TO 2.5m
- DREDGING 2.5m TO 3.0m
- DREDGING 3.0m TO 3.5m
- DREDGING 3.5m TO 4.0m
- DREDGING 4.0m TO 4.5m

FILL DEPTH

- FILL 0.0m TO 0.5m
- FILL 0.5m TO 1.0m
- FILL 1.0m TO 1.5m
- FILL 1.0m TO 1.5m

DREDGE SETOUT

POINT	EASTING	NORTHING
1	335275.256	6236757.725
2	334968.889	6236546.338
3	334899.478	6236458.766
4	334753.348	6236223.181
5	334632.413	6236285.331
6	334755.638	6236524.783
7	334728.565	6236538.715
8	334609.442	6236307.233
9	334521.859	6236352.385
10	334640.982	6236583.786
11	334680.178	6236659.937
12	334856.578	6236754.187
13	334803.396	6236946.989
14	334524.747	6237078.510
15	334573.387	6237180.844
16	334852.037	6237057.323
17	334673.561	6237136.439
18	334797.890	6237416.912
19	335096.159	6237665.698
20	334975.142	6236791.189
21	334810.437	6236863.800
22	334931.454	6237138.308

NOTES

1. VERTICAL DATUM IS CHART DATUM FOR ALL THE DREDGING AND REVETMENT WORKS. CHART DATUM (CD) IS APPROXIMATELY EQUAL TO ISLW AND IS 0.925m BELOW AUSTRALIAN HEIGHT DATUM (AHD).
2. EXISTING CONTOURS HAVE BEEN GENERATED BASED ON SYDNEY PORTS CORP JUNE 2010 & MAY 2012 SURVEY DATA
3. ALL PROPOSED BATTER SLOPES 1 IN 6 MAX
4. EXISTING JETTY, BUOYS, ANCHORS & MOORINGS IS BASED ON WATSON BUCHAN CONSULTING SURVEYORS WAE DRG A1-144221 SHT 0 REV 7 05.05.2012 AND SUBSTRUCTURE CAD DRG'S SUPPLIED BY CALTEX 1996. ALL DIMENSIONS AND LEVELS ARE TO BE CONFIRMED ON SITE PRIOR TO DREDGING AND FILLING.
5. CHAINS ATTACHED TO ANCHOR ARE NOT SHOWN ON DRAWING. ALL CHAINS MAY BE MOVED SUBJECT TO APPROVAL OF THE PRINCIPAL'S REPRESENTATIVE. ANCHORS CANNOT BE DISTURBED. CONTRACTOR TO CONFIRM LOCATION, LEVEL AND DETAILS PRIOR TO DREDGING.
6. THE HORIZONTAL AND VERTICAL LOCATION OF THE SUB-BERTH PIPELINES HAVE BEEN PLOTTED FROM THE CO-ORDINATES AND LEVELS SUPPLIED BY CALTEX
7. THE LOCATION AND LEVEL OF THE SUB-BERTH PIPELINES START POINT (CHAINAGE -21.84) SUPPLIED BY CALTEX:
   334696E, 6236452N, RL -18.82m
8. LOCATION, LEVEL AND DETAILS OF PIPELINES TO BE PROVIDED. CONTRACTOR SHALL CONFIRM LOCATION, LEVEL AND DETAIL PRIOR TO DREDGING
9. LOCATION OF ANTI SCOUR MAT TAKEN FROM 'BKSB 808-A_1-SUB BERTH ANTI-SCOUR MATS (4).pdf'. LOCATION TO BE PROVIDED AND CONTRACTOR SHALL CONFIRM LOCATION PRIOR TO DREDGING

INFORMATION ONLY NOT TO BE USED FOR CONSTRUCTION

50 0 50 100 150 200 250m
1:2500 (A1) 1:5000 (A3)

WorleyParsons resources & energy

No.	DESCRIPTION	DATE	ORN	DRAFT CHK	DES	ENG CHK	APP'D CLIENT
C	ISSUED FOR TENDER	17/10/12	PBC	ARG	DHL	DGA	DPJ
B	ISSUED FOR CLIENT REVIEW	12/10/12	PBC	ARG	DHL	DGA	
A	ISSUED FOR INTERNAL REVIEW	09/10/12	PBC	ARG	DHL	DGA	

REVISIONS APPROVALS

REFERENCE DRAWINGS SPECIFICATIONS

PRELIMINARY

PLANT 23 KURNELL PORT AND BERTHING PROJECT

DREDGING WORKS

GENERAL ARRANGEMENT

RFC No.	INDEX	SHT SIZE	DRAWING No.	SHT No.	REV.
X	A	A1	148012	0	C

LOCATION: S:\148MJ_CALTEX KURNELL JETTY UPGRADE\12.0 DRAWINGS\DRGS\CIVIL\DREDGING\148012.DWG
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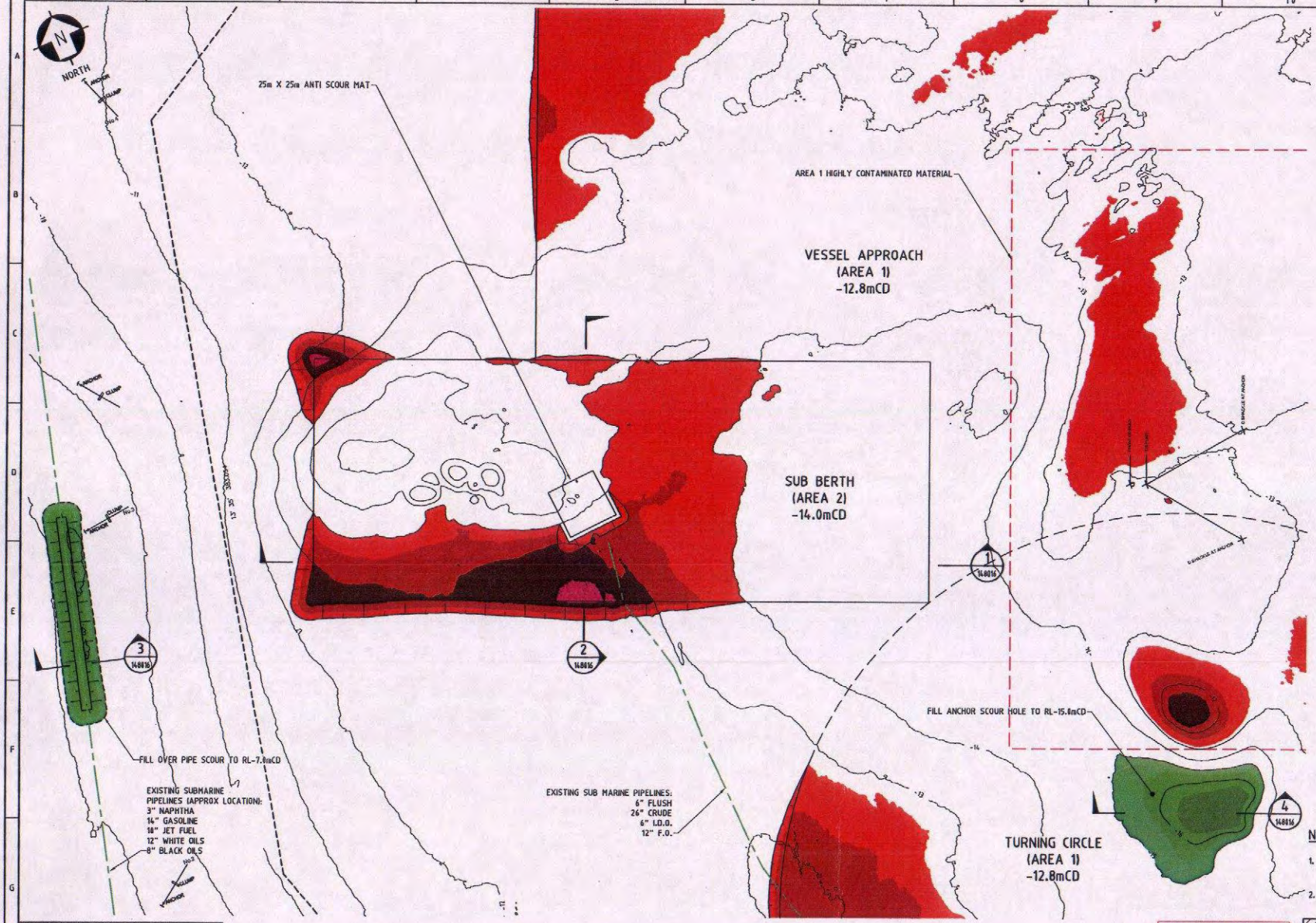
PLOT DATE & TIME: 16/10/2012 3:10:13 PM



LEGEND

EXISTING CONTOURS, mCD (1m INTERVAL)

BUOYS, ANCHORS & MOORINGS

APPROACH & MANOEUVRING AREAS UNDER AUSTRALIAN OIL REFINING AGREEMENT RATIFICATION ACT 1954 NO. 34 SCHEDULE 10. WITH BEARING & LENGTH

DREDGING DEPTH

- DREDGING 0.0m TO 0.5m
- DREDGING 0.5m TO 1.0m
- DREDGING 1.0m TO 1.5m
- DREDGING 1.5m TO 2.0m
- DREDGING 2.0m TO 2.5m
- DREDGING 2.5m TO 3.0m
- DREDGING 3.0m TO 3.5m
- DREDGING 3.5m TO 4.0m
- DREDGING 4.0m TO 4.5m

FILL DEPTH

- FILL 0.0m TO 0.5m
- FILL 0.5m TO 1.0m
- FILL 1.0m TO 1.5m
- FILL 1.0m TO 1.5m

NSW GOVERNMENT Transport Roads & Maritime Services

2 7 NOV 2012

This is the plan referred to in the Letter Dated Above

NOTES

1. EXISTING CONTOURS HAVE BEEN GENERATED BASED ON SYDNEY PORTS CORP JUNE 2010 & MAY 2012 SURVEY DATA
2. ALL PROPOSED BATTER SLOPES 1 IN 6 MAX

20 0 20 40 60 80 100m

1:1000 (A1) 1:2000 (A3)

INFORMATION ONLY NOT TO BE USED FOR CONSTRUCTION

WorleyParsons resources & energy

No.	DESCRIPTION	DATE	ORN	DRAFT CHK	DES	ENG CHK	APP'D CLIENT
C	ISSUED FOR TENDER	17/10/12	PBC	ARG	OHL	DGA	DPJ
B	ISSUED FOR CLIENT REVIEW	12/10/12	PBC	ARG	DHL	DGA	
A	ISSUED FOR INTERNAL REVIEW	09/10/12	PBC	ARG	DHL	DGA	

REVISIONS APPROVALS

REFERENCE DRAWINGS

SPECIFICATIONS

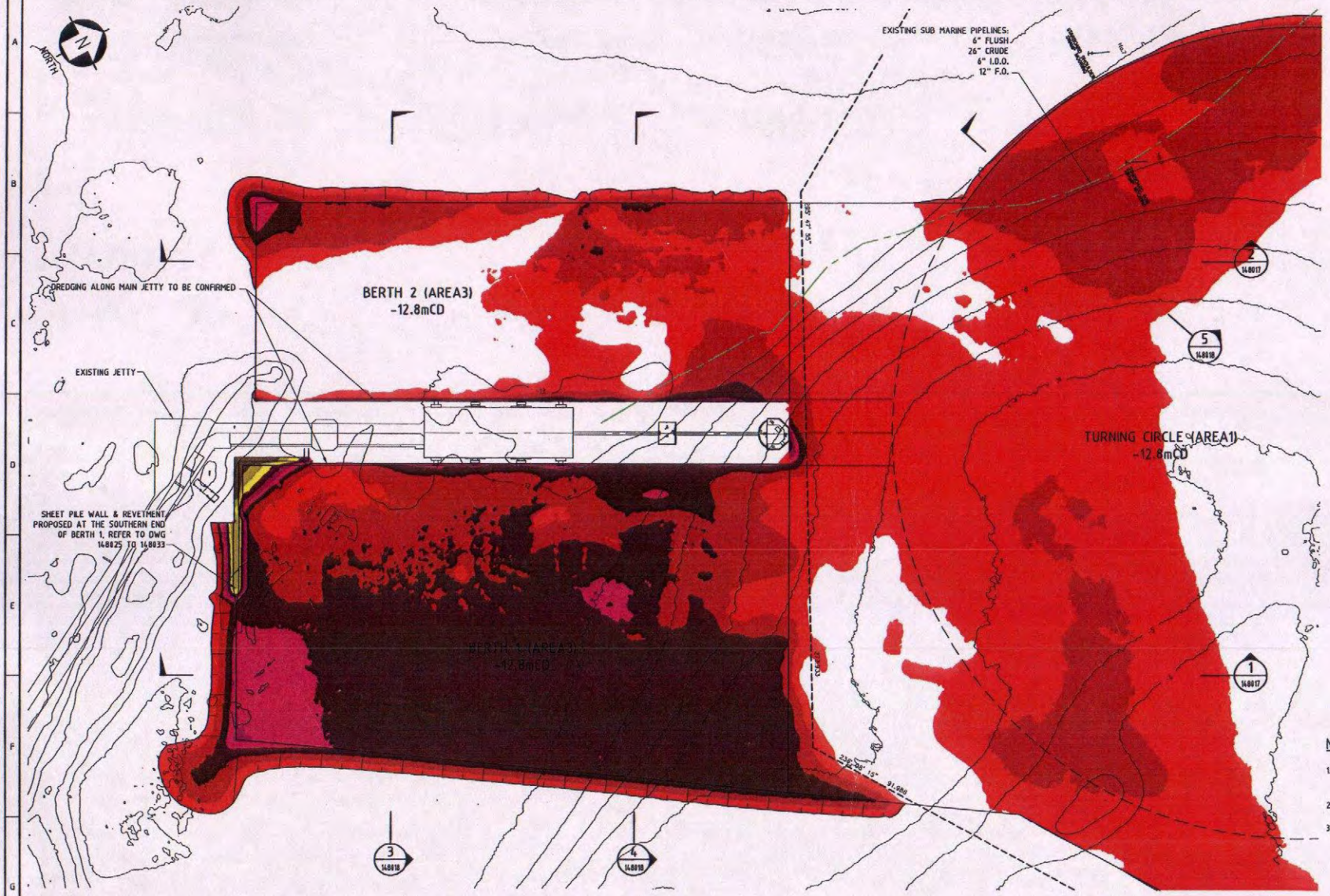
PRELIMINARY

PLANT 23 KURNELL PORT AND BERTHING PROJECT

DREDGING WORKS
SUB-BERTH PLAN
(AREA 2)

RFC No.	INDEX	SHT SIZE	DRAWING No.	SHT No.	REV.
X	A	A1	148013	0	C

PLOT DATE & TIME: 16/10/2012 3:16:24 PM USER NAME: phil.cornish LOCATION: S:\93957_CALTEX KURNELL JETTY UPGRADE\12.0 DRAWINGS\DRGS\CIVIL\DREDGING\148013.DWG



LEGEND

- EXISTING CONTOURS, mCD (1m INTERVAL)
- BUOYS, ANCHORS & MOORINGS
- APPROACH & MANOEUVRING AREAS UNDER AUSTRALIAN OIL REFINING AGREEMENT RATIFICATION ACT 1954 NO. 34 SCHEDULE 10, WITH BEARING & LENGTH

DREDGING DEPTH

- DREDGING 0.0m TO 0.5m
- DREDGING 0.5m TO 1.0m
- DREDGING 1.0m TO 1.5m
- DREDGING 1.5m TO 2.0m
- DREDGING 2.0m TO 2.5m
- DREDGING 2.5m TO 3.0m
- DREDGING 3.0m TO 3.5m
- DREDGING 3.5m TO 4.0m
- DREDGING 4.0m TO 4.5m

NSW GOVERNMENT Transport Roads & Maritime Services

27 NOV 2012

This is the plan referred to in the Letter Dated Above

NOTES

1. EXISTING CONTOURS HAVE BEEN GENERATED BASED ON SYDNEY PORTS CORP JUNE 2010 & MAY 2012 SURVEY DATA
2. ALL PROPOSED BATTER SLOPES 1 IN 6 MAX
3. EXISTING JETTY, BUOYS, ANCHORS & MOORINGS IS BASED ON WATSON BUCHAN CONSULTING SURVEYORS WAE DRG A1-144221 SHT 8 REV 7 05.05.2012 AND SUBSTRUCTURE CAD DRG'S SUPPLIED BY CALTEX 1996. ALL DIMENSIONS AND LEVELS ARE TO BE CONFIRMED ON SITE PRIOR TO DREDGING AND FILLING

WorleyParsons resources & energy

20 0 20 40 60 80 100m

1:1000 (A1) 1:2000 (A3)

INFORMATION ONLY NOT TO BE USED FOR CONSTRUCTION

PRELIMINARY

PLANT 23 KURNELL PORT AND BERTHING PROJECT

DREDGING WORKS
BERTH 1 AND 2 PLAN
(AREA 3)

No.	DESCRIPTION	DATE	DRN	DRAFT CHK	DES	ENG CHK	APP'D CLIENT
C	ISSUED FOR TENDER	17/10/12	PBC	ARG	DHL	DGA	DPJ
B	ISSUED FOR CLIENT REVIEW	12/10/12	PBC	ARG	DHL	DGA	
A	ISSUED FOR INTERNAL REVIEW	09/10/12	PBC	ARG	DHL	DGA	

REVISIONS APPROVALS

REFERENCE DRAWINGS SPECIFICATIONS

RFC No.	INDEX	SHT SIZE	DRAWING No.	SHT No.	REV.
X	A	A1	148014	0	C

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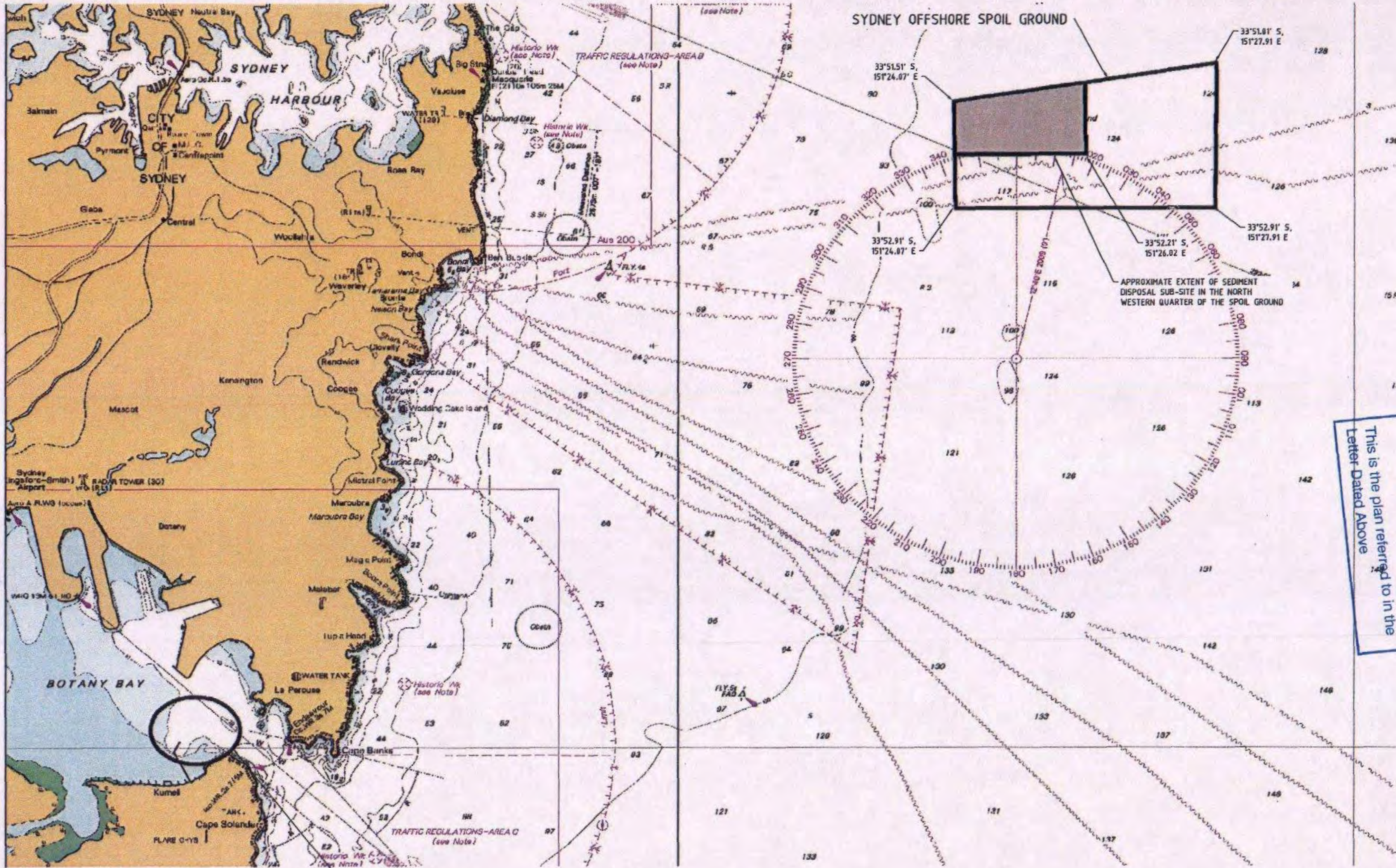

IMAGE SOURCE:
AUSTRALIAN HYDROGRAPHIC SERVICE, WOLLONGONG, NSW, 2001.
APPROACHES TO PORT JACKSON, PORT HACKING TO THE SKILLION; AUS 197.

Transport Roads & Maritime Services — NSW Government
27 NOV 2012
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INFORMATION ONLY
NOT TO BE USED
FOR CONSTRUCTION

1000 0 1000 2000 3000 4000 5000m
1:50,000 (A1) 1:100,000 (A3)

WorleyParsons
resources & energy

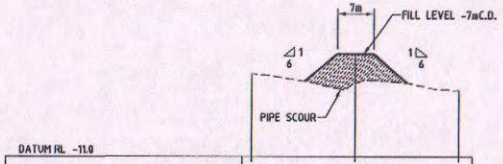
PRELIMINARY

PLANT 23 — KURNELL PORT AND BERTHING PROJECT
DREDGING WORKS
PROPOSED SPOIL GROUND

No.	DESCRIPTION	DATE	DRN	DRAFT CHK	DES	ENG CHK	APP'D	CLIENT
C	ISSUED FOR TENDER	17/10/12	PBC	ARG	DHL	DGA	DPJ	
B	ISSUED FOR CLIENT REVIEW	12/10/12	PBC	ARG	DHL	DGA		
A	ISSUED FOR INTERNAL REVIEW	09/10/12	PBC	ARG	DHL	DGA		

REVISIONS — APPROVALS — REFERENCE DRAWINGS — SPECIFICATIONS

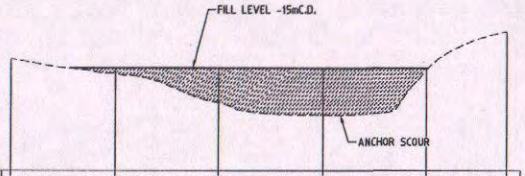
RFC No.	INDEX	SHT SIZE	DRAWING No.	SHT No.	REV.
X	A	A1	148015	0	C



DATUM RL -11.0

DESIGN FILL PROFILE		-7.00	
EXISTING SURFACE PROFILE	-7.76	-8.14	-8.40
CHAINAGE	0.00	20.00	40.00

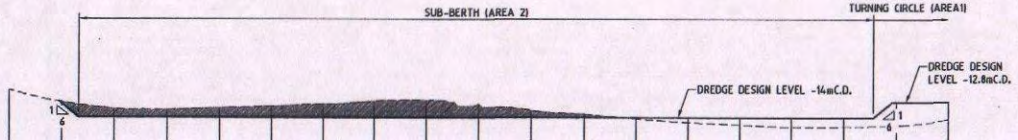
SECTION 3 (14.8013)
SCALE HORIZONTAL 1:500
SCALE VERTICAL 1:100



DATUM RL -19.0

DESIGN FILL PROFILE		-15.00	-15.00	-15.00	-15.00	
EXISTING SURFACE PROFILE	-14.65	-15.18	-16.34	-16.82	-15.08	-13.60
CHAINAGE	0.00	20.00	40.00	60.00	80.00	95.53

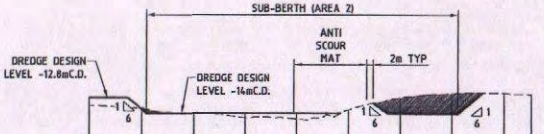
SECTION 4 (14.8013)
SCALE HORIZONTAL 1:500
SCALE VERTICAL 1:100



DATUM RL -19.0

DESIGN DREDGE PROFILE		-12.93	-14.00	-14.00	-14.00	-14.00	-14.00	-14.00	-14.00	-14.00	-14.00	-14.00	-14.00	-14.00	-14.00	-14.00	-14.00	-12.80	-12.80	
EXISTING SURFACE PROFILE	-11.84	-12.79	-13.32	-13.40	-13.26	-13.13	-12.97	-12.72	-12.68	-12.97	-13.43	-13.72	-14.10	-14.38	-14.55	-14.72	-14.70	-14.61	-14.13	
CHAINAGE	0.00	20.00	40.00	60.00	80.00	100.00	120.00	140.00	160.00	180.00	200.00	220.00	240.00	260.00	280.00	300.00	320.00	340.00	359.07	

SECTION 1 (14.8013)
SCALE HORIZONTAL 1:1000
SCALE VERTICAL 1:200



DATUM RL -19.0

DESIGN DREDGE PROFILE	-12.80	-13.70	-14.00	-14.00	-14.00	-11.94	-14.00	-14.00	
EXISTING SURFACE PROFILE	-13.39	-13.60	-13.97	-14.34	-14.47	-13.72	-12.79	-12.45	-12.39	-12.48
CHAINAGE	0.00	20.00	40.00	60.00	80.00	100.00	120.00	140.00	160.00	170.44

SECTION 2 (14.8013)
SCALE HORIZONTAL 1:1000
SCALE VERTICAL 1:200

LEGEND

MATERIAL TO BE DREDGED

MATERIAL TO BE FILLED

NOTES

1. VERTICAL DATUM IS CHART DATUM FOR ALL THE DREDGING AND REVETMENT WORKS. CHART DATUM (CD) IS APPROXIMATELY EQUAL TO ISLW AND IS 0.925m BELOW AUSTRALIAN HEIGHT DATUM (AHD).
2. OFFSET OF VERTICAL BOX CUT FROM FENDER LINE TO BE CONFIRMED

10 0 10 20 30 40 50m
HORIZONTAL 1:500 (A1) 1:1000 (A3)
2 0 2 4 6 8 10m
VERTICAL 1:100 (A1) 1:200 (A3)

20 0 20 40 60 80 100m
HORIZONTAL 1:1000 (A1) 1:2000 (A3)
4 0 4 8 12 16 20m
VERTICAL 1:200 (A1) 1:400 (A3)

INFORMATION ONLY NOT TO BE USED FOR CONSTRUCTION

PRELIMINARY

WorleyParsons
resources & energy

No.	DESCRIPTION	DATE	DRN	DRAFT CHK	DES	ENG CHK	APP'D CLIENT
C	ISSUED FOR TENDER	17/10/12	PBC	ARG	DHL	DGA	DPJ
B	ISSUED FOR CLIENT REVIEW	12/10/12	PBC	ARG	DHL	DGA	
A	ISSUED FOR INTERNAL REVIEW	09/10/12	PBC	ARG	DHL	DGA	

REVISIONS APPROVALS

REFERENCE DRAWINGS | SPECIFICATIONS

Transport Roads & Maritime Services
NSW GOVERNMENT

2 7 NOV 2012

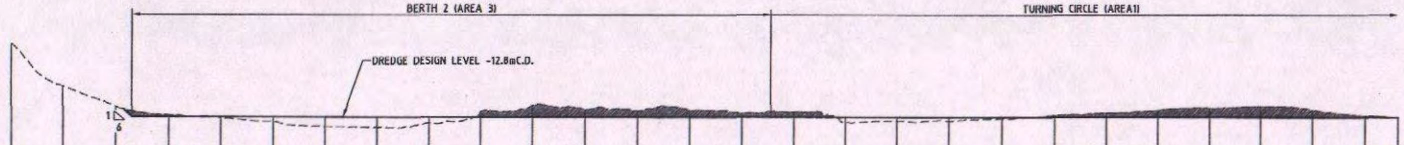
This is the plan referred to in the Letter Dated Above

PLANT 23 KURNELL PORT AND BERTHING PROJECT

DREDGING WORKS
DREDGING SECTIONS
SHEET 1

APC. No.	INDEX	SHT SIZE	DRAWING No.	SHT No.	REV.
X	A	A1	148016	0	C

PLOT DATE & TIME: 16/10/2012 3:39:25 PM USER NAME: phil.cornish LOCATION: S:\43867_CALTEX KURNELL JETTY UPGRADE\129 DRAWINGS\DRGS\CIVIL\DREDGING\148016.DWG



DATUM RL -18.0

CHAINAGE	EXISTING SURFACE PROFILE	DESIGN DREDGE PROFILE
0.00	-7.20	
20.00	-10.46	
40.00	-12.05	
60.00	-12.68	-12.80
80.00	-12.89	-12.80
100.00	-13.16	-12.80
120.00	-13.56	-12.80
140.00	-13.64	-12.80
160.00	-13.28	-12.80
180.00	-12.39	-12.80
200.00	-11.95	-12.80
220.00	-12.23	-12.80
240.00	-12.34	-12.80
260.00	-12.27	-12.80
280.00	-12.51	-12.80
300.00	-12.41	-12.80
320.00	-13.23	-12.80
340.00	-13.12	-12.80
360.00	-13.12	-12.80
380.00	-12.93	-12.80
400.00	-12.68	-12.80
420.00	-12.48	-12.80
440.00	-12.26	-12.80
460.00	-12.10	-12.80
480.00	-11.96	-12.80
500.00	-12.24	-12.80
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SECTION (2) 148014
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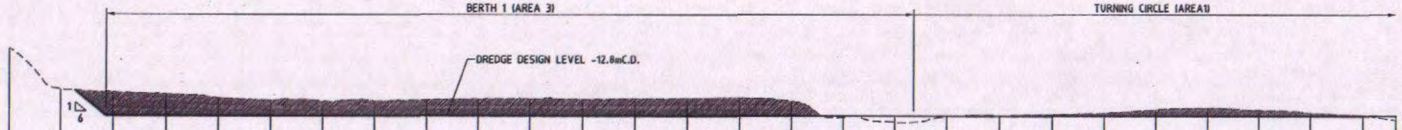
SCALE VERTICAL 1:200



DATUM RL -18.0

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260.00	-11.43	-12.80
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340.00	-13.28	-12.80
360.00	-12.85	-12.80
380.00	-12.78	-12.80
400.00	-12.68	-12.80
420.00	-12.59	-12.80
440.00	-12.33	-12.80
460.00	-12.20	-12.80
480.00	-12.35	-12.80
500.00	-12.55	-12.80
520.00	-12.73	-12.80
532.37	-13.13	-12.80

SECTION (1) 148014
SCALE HORIZONTAL 1:1000
SCALE VERTICAL 1:200

LEGEND

MATERIAL TO BE DREDGED

NOTES

1. VERTICAL DATUM IS CHART DATUM FOR ALL THE DREDGING AND REVETMENT WORKS. CHART DATUM (CD) IS APPROXIMATELY EQUAL TO ISLW AND IS 0.925m BELOW AUSTRALIAN HEIGHT DATUM (AHD).
2. OFFSET OF VERTICAL BOX CUT FROM FENDER LINE TO BE CONFIRMED

HORIZONTAL 1:1000 (A1) 1:2000 (A3): 20 0 20 40 60 80 100m
VERTICAL 1:200 (A1) 1:400 (A3): 4 0 4 8 12 16 20m

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No.	DESCRIPTION	DATE	DRN	DRAFT CHK	DES	ENG CHK	APP'D	CLIENT
C	ISSUED FOR TENDER	17/10/12	PBC	ARG	DHL	DGA	DPJ	
B	ISSUED FOR CLIENT REVIEW	12/10/12	PBC	ARG	DHL	DGA		
A	ISSUED FOR INTERNAL REVIEW	09/10/12	PBC	ARG	DHL	DGA		

REFERENCE DRAWINGS | SPECIFICATIONS | REVISIONS | APPROVALS

PLANT 23
KURNELL PORT AND BERTHING PROJECT
DREDGING WORKS
DREDGING SECTIONS
SHEET 2

RFC No.	INDEX	SHT SIZE	DRAWING No.	SHT No.	REV.
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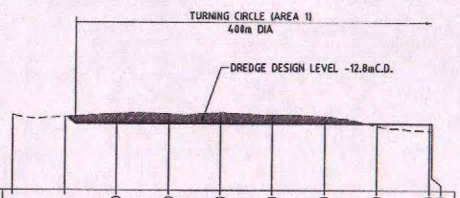
TURNING CIRCLE (AREA 1)
400m DIA



DATUM RL -18.0

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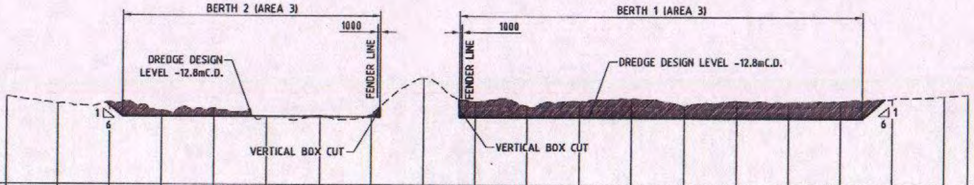
SECTION (5 / 148014)
SCALE HORIZONTAL 1:1000
SCALE VERTICAL 1:200

BERTH 2 (AREA 3) BERTH 1 (AREA 3)

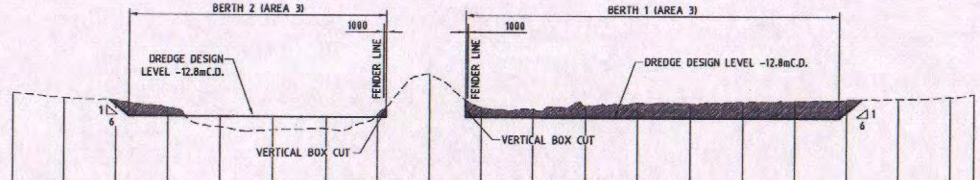


DATUM RL -18.0

DESIGN DREDGE PROFILE			-11.99	-12.80	-12.80	-12.80	-12.80	-12.80		-12.80	-12.80	-12.80	-12.80	-12.80	-12.80	-12.80	-12.80			
EXISTING SURFACE PROFILE	-11.30	-11.85	-11.72	-12.36	-12.15	-12.79	-12.72	-12.59	-9.19	-11.57	-11.94	-11.52	-11.33	-11.89	-11.46	-11.56	-11.47	-11.29	-11.07	-10.90
CHAINAGE	0.00	20.00	40.00	60.00	80.00	100.00	120.00	140.00	160.00	180.00	200.00	220.00	240.00	260.00	280.00	300.00	320.00	340.00	360.00	369.17

SECTION (4 / 148014)
SCALE HORIZONTAL 1:1000
SCALE VERTICAL 1:200

BERTH 2 (AREA 3) BERTH 1 (AREA 3)



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EXISTING SURFACE PROFILE	-11.07	-11.42	-11.63	-12.15	-13.63	-13.85	-13.75	-12.63	-9.48	-12.02	-12.14	-11.89	-11.65	-11.69	-11.57	-11.47	-11.35	-11.27	-11.12	-10.87
CHAINAGE	0.00	20.00	40.00	60.00	80.00	100.00	120.00	140.00	160.00	180.00	200.00	220.00	240.00	260.00	280.00	300.00	320.00	340.00	360.00	369.17

SECTION (3 / 148014)
SCALE HORIZONTAL 1:1000
SCALE VERTICAL 1:200

LEGEND

MATERIAL TO BE DREDGED

NOTES

1. VERTICAL DATUM IS CHART DATUM FOR ALL THE DREDGING AND REVETMENT WORKS. CHART DATUM (CD) IS APPROXIMATELY EQUAL TO ISLW AND IS 0.925m BELOW AUSTRALIAN HEIGHT DATUM (AHD).
2. OFFSET OF VERTICAL BOX CUT FROM FENDER LINE TO BE CONFIRMED

HORIZONTAL 20 0 20 40 60 80 100m — 1:1000 (A1) 1:2000 (A3)
VERTICAL 4 0 4 8 12 16 20m — 1:200 (A1) 1:400 (A3)

INFORMATION ONLY
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PRELIMINARY

WorleyParsons
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No.	DESCRIPTION	DATE	DRN	DRAFT CHK	DES	ENG CHK	APP'D	CLIENT
C	ISSUED FOR TENDER	17/10/12	PBC	ARG	DHL	DGA	DPJ	
B	ISSUED FOR CLIENT REVIEW	12/10/12	PBC	ARG	DHL	DGA		
A	ISSUED FOR INTERNAL REVIEW	09/10/12	PBC	ARG	DHL	DGA		

REFERENCE DRAWINGS — SPECIFICATIONS — REVISIONS — APPROVALS

PLANT 23 — KURNELL PORT AND BERTHING PROJECT
DREDGING WORKS
DREDGING SECTIONS
SHEET 3

RFC No.	INDEX	SHT SIZE	DRAWING No.	SHT No.	REV.
X	A	A1	148018	0	C

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Appendix N

Design Standards

WorleyParsons
resources & energy

EcoNomics

CALTEX

MEMORANDUM

DATE	10/12/12
TO	Mr. Khaled Elomar
FROM	WorleyParsons
PROJECT	301015-03067
SUBJECT	**Responses to EPA questions received from Caltex on 06/12/12**
DOC NO	301015-03067-MA-MEM-007
FILE LOC	

EPA Question 5

No	ISSUES	Raised by	Comments/Issues to be resolved	Suggested solutions/Requested information
5	General	DP&I	EIS must demonstrate that any building works will be capable of meeting relevant Building Code of Australia Standards	Provide the list of Standards used for the designs of various upgrade works. If Standards are not followed, why not

WP Response to Question 5

In WorleyParsons Scope of Work to date, there has been no building design as such.

The below is a list of Standards and Specifications that WorleyParsons has referred to in their Coastal, Marine & Fire design.

CALTEX SPECIFICATIONS

- Caltex Refineries Kurnell Construction Safety Management Plan
- Chevron CIV-EN-900__Wharves and Moorings
- Chevron CMP200__Corrosive Environments
- Chevron FPM-EN-600__Fighting the Fire
- STD 40.06.CES.CIV.LA.850-L Plain and Reinforced Concrete
- STD 40.06.CES.CIV-DC-5009-H Structural Design Criteria
- STD 40.06.SPEC-M01 Structural Steel Design
- STD 40.06.SPEC-M02 Structural Steel Supply, Fabrication and Erection - Refining

MARINE / STRUCTURES

Australian Standards

- AS1141 Methods for sampling and testing aggregates
- AS1170.0 Structural design actions – general principles
- AS1170.1 Structural design actions – permanent, imposed and other actions
- AS1170.2 Structural design actions – wind actions
- AS1170.4 Structural design actions – minimum design loads on structures – earthquake loads
- AS1269 Occupational Noise Management
- AS1470 Health and Safety at Work Principles and Practices
- AS1523 Elastomeric bearing for use in structures
- AS1554 Structural steel welding (SAA Structural Steel Welding Code)
- AS1627.4 Metal finishing – Preparation and pre-treatment of surfaces
- AS1657 Fixed platforms, walkways, stairs and ladders – design construction and installation
- AS1726 Geotechnical site investigations
- AS1885.1 Measurement of Occupational Health and Safety Performance
- AS1949 Acoustics Measurement of Airborne Noise Emitted by Vessels in Waterways, Ports and Harbours
- AS2159 Piling – Design and installation
- AS2207 Non-destructive testing - Ultrasonic testing of fusion welded joints in carbon and low alloy steel
- AS2312 Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings

- AS2758.6 Aggregates and rock for engineering purposes – Guidelines for the specification of armourstone
- AS2815 Training and certification of occupational divers
- AS2832.3 Cathodic protection of metals: Fixed immersed structures
- AS/NZS 2980 Qualification of welders for fusion welding of steels
- AS3600 Concrete structures
- AS3610 Formwork for concrete
- AS/NZS 3678 Structural steel - Hot-rolled plates, floor plates and slabs
- AS/NZS 3679 Structural steel – Hot-rolled bars and sections
- AS3735 Concrete Structures for retaining liquids
- AS4100 Steel structures
- AS4133 Methods of Testing Rocks for Engineering Purposes
- AS/NZS 4671 Steel reinforcing materials
- AS4678 Earth – Retaining Structures
- AS4775 Emergency eyewash and shower equipment
- AS/NZS 4856 Welding consumables - Covered electrodes for manual metal arc welding of creep-resisting steels - Classification
- AS/NZS 4857 Welding consumables - Covered electrodes for manual metal arc welding of high-strength steels - Classification
- AS4997 Guidelines for the design of maritime structures
- AS5100 Bridge Design

British Standards

- BS6349 Marine Structure Part 1: Code of Practice for General Criteria
- BS6349 Marine Structure Part 2: Code of Practice for Design of Quay Walls, Jetties and Dolphins
- BS6349 Marine Structure Part 4: Code of Practice for Design of Fendering and Mooring Systems
- BS6349 Marine Structures – Part – 5 (1991) Code of Practice for Dredging and Land Reclamation
- BS8081 Code of Practice for Ground Anchors

European Norm Standards

- EN 10320 Geotextiles and geotextile-related products – Identification on site
- EN 13253 Geotextiles and geotextile-related products – Characteristics required for use in erosion control works
- EN 13383 Armourstone

Other Guidelines, Manual and References

- CEM Coastal Engineering Manual
- CIRIA Rock Manual
- DNV Classification Notes No 30.5: Environmental Conditions and Environmental Loads
- Hamill, G.A., Johnston H.T. and Stewart, D.P.J. (1996) Estimating the velocities in a ship's propeller wash, PIANC Bulletin No. 89, pp. 46-53
- International Hydrographic Organisation-Users Handbook on Datum Transformation involving WGS84 3rd Edition July 2003 (latest correction August 2008) Special Publication No 60.
- International Hydrographic Organisation-Standards for Hydrographic Surveys 5th Edition February 2008 Special Publication No.44.
- IMO A.481 (XII) Principles of Safe Manning
- IMO ISM Code International Maritime Organisation (IMO) – International Safety Management Code
- ISGOTT International Safety Guide for Oil Tankers and Terminals- 5th Edition
- ISRM International Society for Rock Mechanics
- OCIMF-MEG3 Mooring Equipment Guidelines 3
- PIANC Guidelines for the Design of Fender Systems: 2002
- Permanent International Association of Navigation Congresses [PIANC] (1997) Guidelines for the design of armoured slopes under open piled quay wall, PTC II, report of Working Group 22, Supplement to Bulletin no. 96
- Römisch, H.K. and Hering, W. (2002) Input Data of Propeller Induced Velocities for Dimensioning of Bed Protection Near Quay Walls, PIANC Bulletin No. 109, pp. 5-11
- SOLAS 74 International Convention for the Safety of Lives at Sea (as amended)
- STWC International Convention on Standards of Training Certification and Watch Keeping for Seafarers, 1995
- Sydney Ports Corporation Port Procedures Guide for Sydney and Port Botany April 2009

FIRE

Australian Standards

- AS 1670 series Fire detection, control and intercom systems
- AS 2419.1 Fire Hydrant Installations It is proposed to comply with this standard and a requirement to operate 3 attack hydrants simultaneously.
- AS 2941 Fixed Fire protection Installations – Pump set systems
- AS 3846 The handling and transport of dangerous cargoes in port areas
- AS 4775 Emergency eyewash and shower equipment

OTHER GUIDELINES, MANUALS AND REFERENCES

- ISGOTT International Safety Guide for Oil Tankers and Terminals - 5th Edition
- NFPA 15 Water deluge systems (manifold and below breasting island areas)
- NFPA 20 Fire Pumps - to be used where necessary to enhance the requirements of AS 2941
- NFPA30 2012 Flammable & Combustible Liquids Code
- GPS-S3 3/95 Fire Protection & Safety Systems
- Chevron FPM-EN-3300 Marine Terminals and Marine Transport

EPA Question 6

No	ISSUES	Raised by	Comments/Issues to be resolved	Suggested solutions/Requested information
6	General	Fisheries	Location of the two breasting dolphins and bow mooring dolphin are not depicted in the draft EIS.	Provide drawings which shows the new breasting dolphins and bow mooring dolphin

WP Response to Question 6

Please find attached latest drawings depicting the new berthing dolphins per your request.

301015-03067-MA-DWG-148215-B.pdf
301015-03067-MA-DWG-148229-B.pdf
301015-03067-MA-DWG-148228-B.pdf
301015-03067-MA-DWG-148230-B.pdf

EPA Question 7

No	ISSUES	Raised by	Comments/Issues to be resolved	Suggested solutions/Requested information
7	General	NSW Office of Waters	Draft EIS makes reference to bore hole records. It is recommended that the bore hole records are included in EIS as an appendix to provide details on the subsurface conditions and justify the hydrogeology/groundwater comments	It would be good to include copy of the latest bore hole drawings. When would this be available?

WP Responses to Question 7

Please find attached latest updated drawing depicting the boreholes per your request.

148233 BOREHOLE GA_B.pdf

END OF MEMO

Appendix O

Remediation Action Plan

REMEDIATION ACTION PLAN
CALTEX REFINERIES (NSW) PTY LTD
DREDGING IN BOTANY BAY

Prepared by

Caltex Refineries (NSW) Pty Ltd

February 2013

Table of Contents

Executive summary 1
1 Introduction 2
1.1 Project Overview 2
1.2 Objectives 4
1.3 Extent of Dredging Works 4
1.4 Site Identification 6
2 Site History 7
3 Site Conditions and Surrounding Environment 8
3.1 Submarine Utilities and Infrastructure 8
3.2 Recreation 9
3.3 Areas of Ecological Significance 9
3.4 Sensitive Receptors 10
4 Sub-soil Environments 11
4.1 Regional Geology and Stratigraphy 11
4.2 Acid Sulfate Soils 11
5 Assessment Criteria 13
5.1 Basis for Assessment Criteria 13
5.2 Acceptance Criteria 15
6 Existing Sediment Data 16
6.1 Previous Investigations 16
6.2 Sediment Characteristics 17
6.3 Chemical Characteristics 20
6.3.1 Tributyltin 20
6.3.2 Acid Sulfate Soils 21
7 Remediation Options Appraisal 22
7.1 Overview of Issues and Objectives 22
7.2 Onshore Disposal 22
7.3 Onshore Disposal after Treatment 22
7.4 Onshore Reuse 22
7.5 Partial Offshore Reuse 22
7.6 Partial Offshore Disposal 23
8 Preferred Remediation Approach 24

8.1 Overview of Preferred Remediation Options 24
8.2 Works Overview 24
8.2.1 Dredging Works 24
8.2.2 Proposed Dredging Method 25
8.2.3 Sediment Reuse 26
8.2.4 Sediment Disposal 29
9 Environmental Management 30
9.1 Dredge and Spoil Disposal Management Plan (DSDMP) 30
9.2 Use of Zero Overflow Dredging Methodology 31
9.3 Physico-Chemical Monitoring and Stop-Work Triggers 33
9.4 Management of Acid Sulfate Soils 33
9.5 Mitigation and Management Measures 33
9.6 Validation 38
10 Concluding Remarks 38

Tables

Table 5-1 Screening Levels 14
Table 5-2 Sediment Quality High Values 15
Table 6-2 Summary of the Geochemical Analysis Results for TBT in Sediments 20
Table 6-3 Elutriate Testing Results 21
Table 8-1 Proposed Dredging Area, Depth and Volume 25
Table 9-1 Mitigation and Management Measures 34

Figures

Figure 1-1 Location of Port and Berthing Facility 3
Figure 1-2 Area of Proposed Dredging Activities 5
Figure 6-1 Sampling Locations (2009-2011) 18
Figure 6-2 Sampling Locations (2012) 19
Figure 8-1 Sediment re-use locations 28
Figure 9-1 Distribution of Tributyltin across the Project Site 32

Executive summary

Caltex Refineries (NSW) Pty Ltd (Caltex) (ABN: 1 900 0108 725) maintains and operates an oil refinery (the Kurnell Refinery) located on the Kurnell Peninsula in New South Wales. Part of the refinery operation includes a Port and Berthing Facility for receiving crude oil and exporting intermediates and final products. The facility includes a 1 km wharf; two fixed berths located either side of the wharf's breasting island, a submarine (sub) berth, and an associated turning circle and approaches. This facility has been operational since 1956.

Caltex proposes to upgrade the Kurnell Port and Berthing Facility to extend its operational life by improving the shipping capability. The proposed works will include both infrastructure works and dredging activities. The overall works are a State Significant Development, which requires the preparation of an Environmental Impact Statement (EIS). This Remediation Action Plan (RAP) has been prepared in conjunction with an Environmental Impact Statement (EIS) under the provisions of State Environmental Planning Policy 55 (SEPP N^{o}55) on the Remediation of Land.

The dredging work will involve the excavation of sediments, some of which contain elevated contaminant concentrations. The objective of this RAP is to establish the management protocols for the excavation, transport and disposal of the dredged sediments, in order to complete the works in an environmentally acceptable manner.

The activities which are the subject of this RAP include dredging the two fixed berths adjacent to the Wharf, the sub berth, the turning circle and approaches. There will be selected reuse of some dredged material to cover two exposed sections of the submarine fuel pipelines and to backfill a former anchor point at the approach to the sub berth. However, the majority of the sediment will be disposed offshore at the Sydney Offshore Spoil Ground, a process that is subject to a Sea Dumping Permit under the *Commonwealth Environmental (Sea Dumping) Act 1981*.

The proposed dredging is being conducted to allow for safe shipping access. Dredging will be restricted to specific areas and to nominated depths with the extent and depth of dredging controlled by GPS management.

The dredging is being conducted in accordance with an EIS that has been prepared to obtain planning consent for the proposed works. The EIS establishes the environmental conditions in the areas to be dredged and the mitigation and management measure that are required to reduce any adverse impacts of the proposed works. This RAP has been prepared to document the handling and disposal activities associated with the dredging.

1 Introduction

1.1 Project Overview

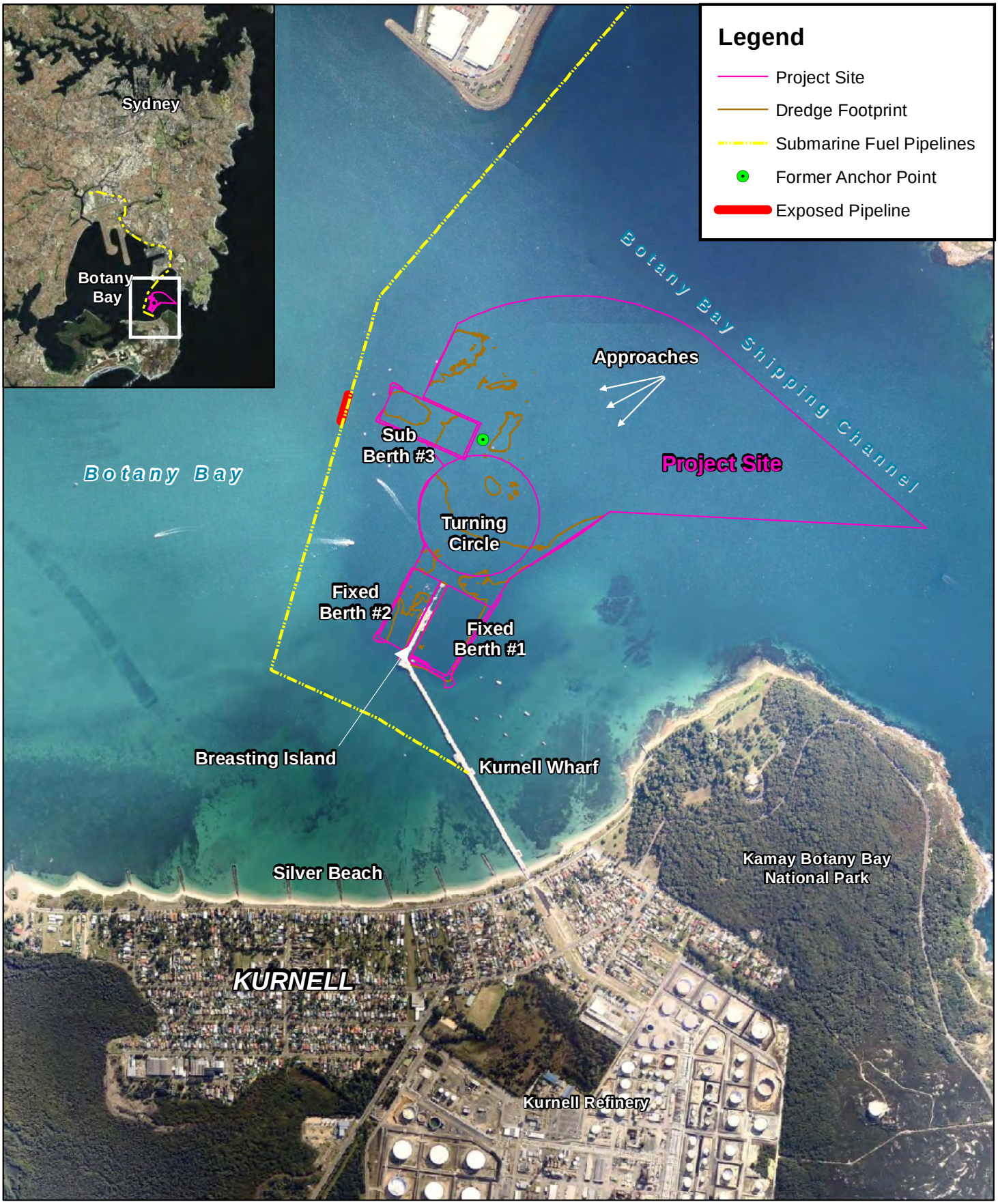
Caltex Refineries (NSW) Pty Ltd (Caltex) maintains and operates an oil refinery (the Kurnell Refinery) located on the Kurnell Peninsula in New South Wales. The Kurnell Refinery facilities include a jetty structure known as the Kurnell Wharf, which along with the associated shipping berths form the Kurnell Port and Berthing Facility.

The location of the Port and Berthing Facility is shown on **Figure 1-1**. The Figure shows the Wharf and the areas around the Wharf that form the berths, approaches and turning circle, which are leased from the State Government. This area is used exclusively by Caltex for accessing and berthing ships to allow loading and unloading to take place.

The Kurnell Port and Berthing Facility has been in service since 1956 and is limited in the draft and size of ships that can be received, both through design and the natural environmental changes that have occurred in the area over time. The deposition of sediment, which has occurred since the berths were previously dredged 40 years ago, now restricts safe access.

Caltex proposes to undertake works on the Facility to improve the shipping capability. This will include both upgrade work to the berthing infrastructure and dredging activities. The overall works are classed as State Significant Development, which requires the preparation of an Environmental Impact Statement (EIS) to support the development application for the proposed works. In addition to the EIS, the proposed dredging requires the preparation of a Remediation Action Plan (RAP) under the provisions of State Environmental Planning Policy 55 (SEPP N^{o}55) on the Remediation of Land as the proposed works would involve the *removal and dispersal of land that is contaminated'* they constitute 'remediation'..

This RAP has been prepared in conjunction with the EIS, both documents addressing potential impacts resulting from the proposed works. The RAP has been prepared in accordance with the *Guidelines for Consultants Reporting on Contaminated Sites (NSW Environment Protection Authority (EPA), 1997*).



N
W E
S

0 100 200 400 600 800 Meters

Datum: GDA94
Grid: MGA Zone 56

Source: Aerial Imagery from Bing Maps © 2010 Microsoft Corporation and its data suppliers and Nearmap Hypertiles 2012.

CALTEX
Caltex Australia

KURNELL PORT AND BERTHING PROJECT

LOCATION OF PORT AND BERTHING FACILITY

URS

BOTANY BAY, NSW

File No: 43177771.073.mxd Drawn: STB Approved: CF Date: 19/02/2013

Figure: 1-1

Rev. A A4

1.2 Objectives

The dredging work will involve the excavation of sediments, some of which contain elevated concentrations of contaminants, specifically lead, zinc mercury and tributlytin (TBT).

The objective of this RAP is to establish the management protocols for the excavation, transport and disposal of the dredged sediments so as to minimise potential adverse impacts to recreational users of the bay and marine ecosystems. This RAP has been developed to satisfy a scope of work item, as presented in the EIS, which is submitted under a separate cover.

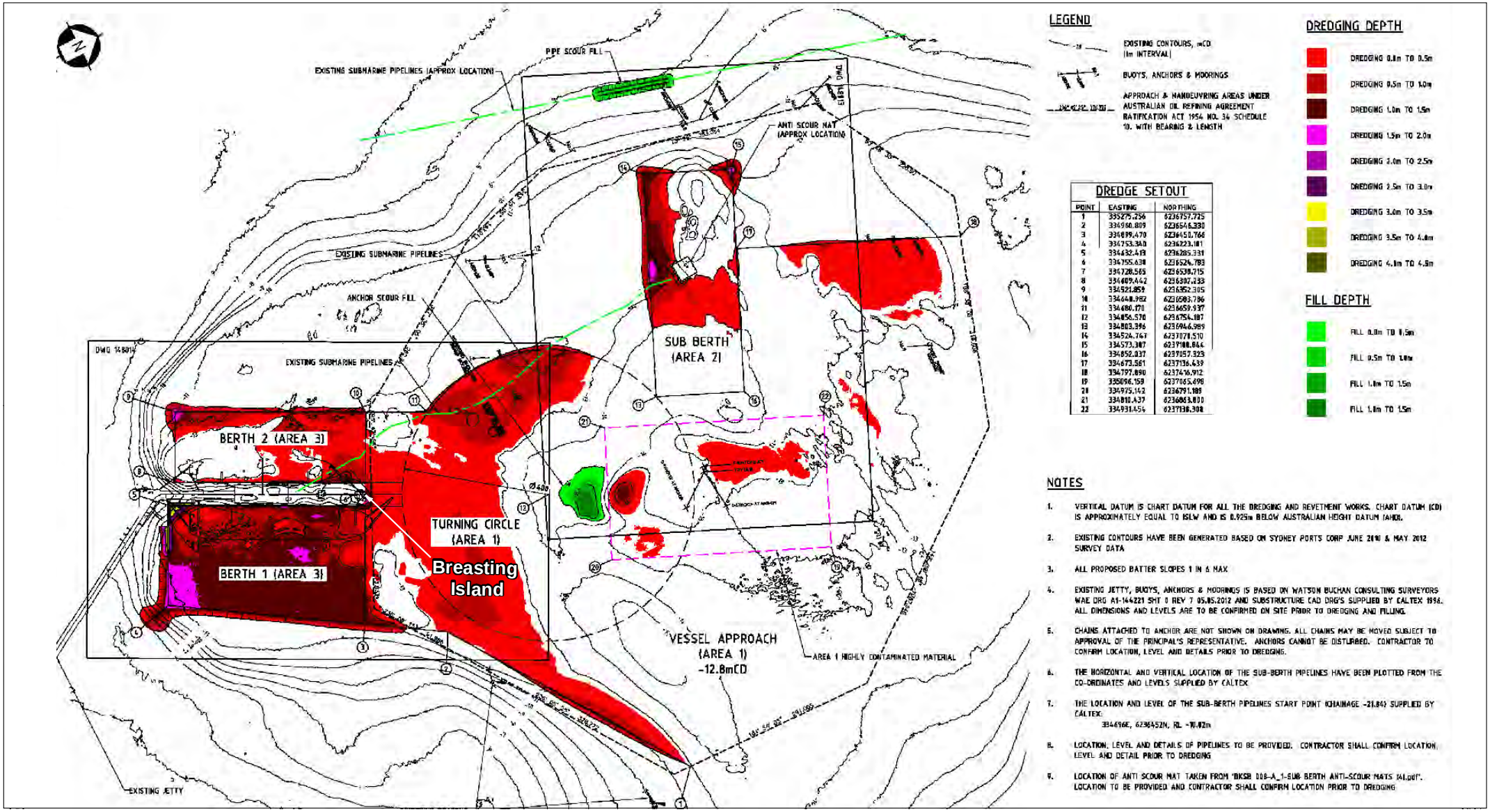
1.3 Extent of Dredging Works

The proposed works aim to extend the operational life of the Kurnell Port and Berthing Facility and to improve the current shipping capability to meet existing and future transport fuels demands in both New South Wales (NSW) and the Australian Capital Territory (ACT).

To achieve this, Caltex is proposing upgrading of the berthing infrastructure and targeted dredging associated with the port and berthing facility, within Botany Bay. The dredging activities that are the subject of this RAP include:

- dredging within the two fixed berths adjacent to the Wharf, within the sub berth and within the turning circle and approaches;
- selective reuse of some dredged material to cover two exposed sections of the submarine fuel pipelines and to backfill a former anchor point at the approach to the sub berth; and
- disposal of the dredged material offshore, which is subject to a Sea Dumping Permit.

The volume of material that will be excavated during the dredging activities is approximately 150,000 m^3. The area of the proposed dredging activities is presented on **Figure 1-2**, which shows the position of the three berths along with the associated approaches and turning circle that provide access to and from the berths.



DREDGE SETOUT

POINT	EASTING	NORTHING
1	335275.256	6236757.725
2	334960.809	6236546.330
3	334689.470	6236451.766
4	334753.340	6236223.181
5	334432.419	6236285.331
6	334755.638	6236524.783
7	334728.565	6236538.715
8	334609.442	6236307.233
9	334521.859	6236352.305
10	334648.982	6236598.786
11	334680.170	6236659.937
12	334856.570	6236754.187
13	334803.396	6236946.989
14	334524.767	6237078.510
15	334573.387	6237188.846
16	334852.037	6237057.329
17	334673.581	6237136.439
18	334797.890	6237446.912
19	335096.159	6237065.498
20	334975.142	6236791.189
21	334810.437	6236863.800
22	334931.454	6237136.308

NOTES

1. VERTICAL DATUM IS CHART DATUM FOR ALL THE DREDGING AND REVETMENT WORKS. CHART DATUM (CD) IS APPROXIMATELY EQUAL TO ISLW AND IS 0.925m BELOW AUSTRALIAN HEIGHT DATUM (AHD).
2. EXISTING CONTOURS HAVE BEEN GENERATED BASED ON SYDNEY PORTS CORP JUNE 2010 & MAY 2012 SURVEY DATA
3. ALL PROPOSED BATTER SLOPES 1 IN 6 MAX
4. EXISTING JETTY, BUOYS, ANCHORS & MOORINGS IS BASED ON WATSON BUCHAN CONSULTING SURVEYORS WAE DRG A1-144221 SHT 0 REV 7 05.05.2012 AND SUBSTRUCTURE CAD DRG'S SUPPLIED BY CALTEX 1956. ALL DIMENSIONS AND LEVELS ARE TO BE CONFIRMED ON SITE PRIOR TO DREDGING AND FILLING.
5. CHAINS ATTACHED TO ANCHOR ARE NOT SHOWN ON DRAWING. ALL CHAINS MAY BE MOVED SUBJECT TO APPROVAL OF THE PRINCIPAL'S REPRESENTATIVE. ANCHORS CANNOT BE DISTURBED. CONTRACTOR TO CONFIRM LOCATION, LEVEL AND DETAILS PRIOR TO DREDGING.
6. THE HORIZONTAL AND VERTICAL LOCATION OF THE SUB-BERTH PIPELINES HAVE BEEN PLOTTED FROM THE CO-ORDINATES AND LEVELS SUPPLIED BY CALTEX.
7. THE LOCATION AND LEVEL OF THE SUB-BERTH PIPELINES START POINT (CHAINAGE -21.84) SUPPLIED BY CALTEX:
   334696E, 6236452N, RL -10.62m
8. LOCATION, LEVEL AND DETAILS OF PIPELINES TO BE PROVIDED. CONTRACTOR SHALL CONFIRM LOCATION, LEVEL AND DETAIL PRIOR TO DREDGING
9. LOCATION OF ANTI SCOUR MAT TAKEN FROM "BKSB 008-A_1-SUB BERTH ANTI-SCOUR MATS (4).pdf". LOCATION TO BE PROVIDED AND CONTRACTOR SHALL CONFIRM LOCATION PRIOR TO DREDGING

Source:
Image supplied by Worley Parsons: 301015-03067-MA-DWG-148012-C.pdf

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KURNELL PORT AND BERTHING PROJECT

AREA OF PROPOSED DREDGING ACTIVITIES

URS

BOTANY BAY, NSW.

Figure: 1-2

File No: 43177815.074.mxd Drawn: STB Approved: SM Date: 19/02/2013

Rev. A A4

1.4 Site Identification

The Kurnell Refinery is located on the southern shore of Botany Bay, south of the Sydney's Central Business District (CBD) (**Figure 1-1**). The Wharf extends approximately 800 m into Botany Bay to the west of Sutherland Point. Fixed Berths 1 and 2 are located either side of the Wharf, beyond which are the approaches (including a turning circle) and the sub-berth.

The Port and Berthing Facility occupies land leased form the NSW State Government. The schedule within this lease describes the location of the land as being:

> *"within the Parish of Sutherland, County of Cumberland, Sutherland Shire comprising Portion 995 being of 10 acres, 2 roods and 22 perches shown on plan C. 7000-2030 Department of Lands."*

2 Site History

Botany Bay has strong Aboriginal and historic heritage associations. Today, the Bay has a diverse and mixed use. It is one of Sydney's major commercial, industrial and port areas as well as being home to the international airport. The waters of the Bay are recreationally fished and licensed for aquaculture use. There are also a number of pipelines, cables and submarine structures that traverse the seabed.

The majority of the project site falls within 'unincorporated land', which means that it does not fall under the jurisdiction of any local authorities in NSW. A small part of the project site to the south falls within Sutherland Shire Local Government Area (LGA), however the zoning for this part of the LGA is controlled by the State Environmental Planning Policy for the Kurnell Peninsula and is not covered under the Sutherland Shire Local Environment Plan (LEP).

Caltex operates and maintains the project site within Botany Bay under an agreement made under of the *Australian Oil Refinery Limited Agreement Ratification Act 1954*. This allows Caltex to use Botany Bay as a Port and Berthing Facility.

The location of the proposed dredging works is wholly within Botany Bay, in an area that has only formally been occupied by Caltex; however, there are other significant commercial facilities around Botany Bay including:

- Port Botany, north of the project site which is one of NSW's major three ports;
- Sydney (Kingsford-Smith) Airport's main and parallel runways, which extend into the Bay on a reclaimed peninsula; and
- The Kurnell Refinery and the Sydney (Kurnell) Desalination Plant, which are located on the Kurnell Peninsula south and south west of the project site, respectively.

The other major land use in the area is an aquaculture lease, which occupies 4 ha adjacent to the Kurnell Wharf. Although this lease is active, the site is not currently being farmed.

3 Site Conditions and Surrounding Environment

Botany Bay covers an area of approximately 4,600 hectares located 10 km south of the Sydney's CBD. The Bay is located within the Sydney Metropolitan Catchment Management Area (SMCMA) and is designated a Special Port Area (Sydney Ports, 2012).

Botany Bay is a wide, shallow estuary exposed to winds from all directions and waves from the adjacent high-energy coastal zone. Waves and currents determine the sediment erosion, deposition and transport patterns of the Bay and therefore the ultimate fate of sediments. Previous developments, most notably within northern Botany Bay, have modified the foreshores and substantially changed the local hydrodynamics. Any future changes to the Bay's bathymetry (depth) and shoreline could further affect hydrodynamic conditions and the transport of sediment, potentially impacting the stability of the beaches and infrastructure.

Currents within Botany Bay are predominantly tide, wind and river generated. Current velocities are generally exceptionally low (< 2 centimetres per second) and are influenced by:

- the tidal flow to and from the Georges River in high rainfall periods;
- long-period waves originating offshore in storm surges; and
- wind action (which depends on the strength, fetch and duration of the wind). Botany Bay is exposed to winds over large stretches of open water (fetches) and wind-driven currents assist in the exchange and mixing of the estuarine waters in the Bay.

Maximum tidal velocities are likely to only cause a localised re-suspension of the sandy sub-benthic substrate that is predominant throughout sediments in the Bay.

A large extent of Botany Bay is relatively shallow (0 to 4 m below Chart Datum (CD)). The exception is around the entrance from the Pacific Ocean, where the main channel depth increases to around 18 to 20 m below CD. This is partially natural and partially as a result of active dredging that has taken place to form the main shipping channel, the approaches and berths for the Kurnell Wharf.

3.1 Submarine Utilities and Infrastructure

No submarine utilities or infrastructure are known to cross the dredge footprint, with the exception of a crude oil submarine pipeline that connects the Refinery's tanks to the sub berth and the two fixed berths. The next nearest major submarine infrastructure are the existing, Refinery submarine fuel pipelines that run west of the project site departing west from the Kurnell Wharf immediately south of the fixed berths. The Sydney (Kurnell) Desalination Plant includes a water supply pipeline, which crosses the Bay between Silver Beach and Kyeemagh, also west of the project site. *Energy Australia's* 132 kV submarine power cable runs to the east of the project site.

3.2 Recreation

Recreational fishing is permissible in much of the Bay including the waters adjacent to the project site. No recreational fishing is permitted within the project site due to a 100 m Marine Security Zone around the berths and wharf. There are nominally 10 amateur fishing and angling groups that launch from close to the project site and use the Bay.

3.3 Areas of Ecological Significance

Botany Bay is considered to be the largest estuarine wetland in Sydney. It supports extensive aquatic marine and freshwater coastal habitat.

There are several key areas of ecological importance within the Bay. The key areas of note in close proximity to the proposed works include: Towra Point Nature Reserve; Towra Point Aquatic Reserve; Cape Banks Aquatic Reserve; Bare Island; Taren and Dolls Point; areas of Seagrass Beds; and Kamay Botany Bay National Park.

- *Towra Point Nature Reserve* is a Ramsar-listed site managed by NSW Office of Environment and Heritage (OEH). The Ramsar Convention was held in 1971 with the purpose of identifying areas of international importance for coastal wetlands. The Towra Point Nature Reserve is located to the west of Kurnell Peninsula and is the largest wetland of its type in the Sydney Basin. The reserve contains vegetation types that are now rare in the area and includes a variety of habitats such as seagrass beds, mangroves, saltmarshes, dune woodlands, she-oak *Casuarina spp* forest, littoral rainforest, sand dune grasslands and migratory wading bird habitats (DECCW, 2010).
- *Towra Point Aquatic Reserve* is managed by NSW Department of Primary Industries (DPI) (Fisheries) and includes both an area zoned as an '*aquatic wildlife refuge zone*' and a '*sanctuary zone*'. The *aquatic wildlife refuge zone* extends around Towra Point Nature Reserve and extends into the Bay area, while the *sanctuary zone* occurs within the estuary. The reserve is considered to support high levels of aquatic biodiversity. More than 230 species of fish have been recorded within the reserve (NSW OEH National Parks and Wildlife Services (NPWS), 2012).
- *Seagrass Beds in Botany Bay*: There is a higher coverage of seagrass about 3 km back from the estuary entrance close to the project site. The seagrass forms nursery grounds for many commercial fish and crustacean species and provides key habitat for a number of protected marine species including seahorses, pipefish and weedy sea-dragons. Research has determined that 257 ha (58%) of the seagrass beds in the Bay have been destroyed as a result of erosion, coastal works, elevated nutrients and sea urchin grazing. The most significant seagrass beds that are relevant to the dredge footprint are those containing strapweed *Posidonia australis*. This species was listed as an endangered population in 2010 under the NSW *Fisheries Management* (FM) *Act 1994*. This species was found to be located within the seagrass beds south of the dredge footprint.
- *Kamay Botany Bay National Park* is located on northern and southern headlands of the Kurnell Peninsula. The Park is managed by NSW OEH NPWS and contains rich diverse ecosystems including cliffs and rock platforms, dunes, freshwater streams and swamps

and wet forest. These provide habitat for a number of threatened species (Sutherland Shire Environment Centre (SSEC), 2008). It also includes the area of Bare Island located off the northern headland of the National Park.

- *Cape Banks Aquatic Reserve* was established as a marine research site in the 1940s and includes rock platforms, crevices, rock pools, boulder and cobble shorelines. Some recreational fishing is permitted in the reserve.
- *Dolls Point and Taren Point* are located where the Georges River enters the Bay. They are both key habitat within the Bay area and contain a diverse assemblage and population of shorebirds.

3.4 Sensitive Receptors

A number of native and Commonwealth and State-listed threatened biota have been recorded in and around the Botany Bay area. The notable native and threatened marine species in the area include:

- a number of vulnerable, endangered and critically endangered birds (including Osprey, Little Penguin, Little Tern, Grey Tattler, Petrels, Shearwaters, Pied and Sooty Oystercatcher etc.);
- the Australian and New Zealand fur seal;
- a range of seagrass species;
- a number of marine fish species (including 1 ray-finned fish);
- a number of common marine invertebrates;
- marine turtles (including the Green Turtle, Loggerhead Turtle and Leatherback Turtle);
- Dugong;
- Grey Nurse Shark; and
- a number of cetaceans (i.e. whales (including the Humpback and Southern Right Whales) and dolphins).

4 Sub-soil Environments

4.1 Regional Geology and Stratigraphy

Botany Bay is located in the Sydney Basin, which is a Palaeozoic to Mesozoic, trending trough located between the New England Fold Belt to the north east and the Lachlan Fold Belt to the west.

The Botany Basin forms a specific sub unit of the Sydney Basin and is bounded by Centennial Park to the north, Randwick and Matraville to the east, Alexandria and Rockdale to the west, and the Kurnell Peninsula and part of Sutherland Shire to the south.

The regional geology across the Botany Basin comprises Triassic age Hawkesbury Sandstone overlain by drift Quaternary deposits (Sydney 1:100,000 Geological Sheet). The sandstone comprises cross-bedded, medium-to-coarse quartz sand, with minor shale and laminate beds. The Quaternary deposits are up to 160 m in thickness and comprise sand, silty-sand, clayey-sand and clay with lenses of peat.

The upper sediment layer of the Bay (to depths of approximately 7 m) comprise of loose estuarine sand and silty sand. Occasional stiff clay lenses, peat deposits and shelly sand beds appear within these sediments. This layer is overlying dense coarse sand and silty-sand (up to 30 m in thickness).

There is some variability in the geology and sedimentology across Botany Bay. At the mouth and central portions, the sediments comprise a mixture of modern and relict sand and biogenic material. The sediments are largely derived from the weathered Hawkesbury Sandstone. In low-energy areas, including the embayments on the southern shoreline close to the project site, the sediments are characterised by silty deposits and occasional lenses of peat.

Previous sampling undertaken at the project site indicates the sedimentology and stratigraphy is typical and representative of the characteristics of the wider Bay area. Borehole sampling recorded that the upper sand layers are underlain by fissured clays and residual soils, with bedrock (sandstone) occurring between 25 -35 m.

4.2 Acid Sulfate Soils

The inundation of iron-rich soil by saline waters containing sulphates can lead to the formation of pyrite (iron sulphides). These sulphides are present across the Bay and are typical of the silty deposits and peat encountered around its periphery.

Materials containing sulphides that remain undisturbed, submerged, or buried in the absence of oxygen (anoxic), do not pose a threat to the environment and are known as Potential Acid Sulfate Soil (PASS). However, if PASS are disturbed and exposed to oxygen, the sulphides may oxidise and produce sulphuric acid and iron-rich leachate. At this point they become Actual ASS (AASS). The resulting low pH conditions in the soil and local groundwater can subsequently leach metals from soils and cause adverse environmental effects in nearby surface waters.

A review of the Acid Sulfate Soil Risk Map: Botany Bay indicates that land below the mean high water mark is at a high risk of containing PASS. The presence of PASS within the project site was confirmed through laboratory analysis, with the presence of AASS confirmed within the fixed berths.

5 Assessment Criteria

5.1 Basis for Assessment Criteria

The criteria used to assess the sediments within the project site were adopted from the *National Assessment Guidelines for Dredging* (NAGD, the Guidelines) (Department of the Environment, Water, Heritage and the Arts, 2009). Through the Sea Dumping Act, the Australian Government assesses proposals to load, transport and dispose of wastes and other matter at sea. The Sea Dumping Act also permits acceptable activities and places conditions of approval to mitigate and manage environmental impacts.

The NAGD sets out the framework for the environmental impact assessment and permitting of the ocean disposal of dredged material. The framework includes:

- evaluating alternatives to ocean disposal;
- assessing loading and disposal sites;
- assessing potential impacts on the marine environment and other users; and
- determining management and monitoring requirements.

The NAGD are intended to provide greater certainty about the assessment and permitting process, as well as providing guidance on opportunities for longer-term strategic planning. The Guidelines provide a decision-tree approach for assessing potential contaminants, that comprises of five phases.

- Phase I involves reviewing existing information on the material proposed for sea disposal to determine which contaminants need investigation and to assess whether the existing information sufficiently characterises the sediments without further testing.
- Phase II involves identifying and investigating the contaminants that could be present in the sediments within the proposed dredge area. A Sampling and Analysis Plan (SAP) is prepared and once approved by the Determining Authority it is enacted. Results from the investigation are then evaluated by comparison to the Screening Levels contained in the NAGD (presented in **Table 5-1**). The results are also compared against ambient baseline levels for sediments of comparable grainsize in the vicinity of the disposal site.
- Phase III consists of elutriate and bioavailability testing and is undertaken when results of testing undertaken in Phase II exceed the Screening Levels. Elutriate testing assesses impacts to water quality. Test results are normally compared to the relevant ANZECC/ARMCANZ (2000) marine water quality trigger values for 95 per cent protection of species. Bioavailability testing is conducted to assess the potential risk to marine organisms from contaminant intake based on the identified sediment quality. There are a variety of methods available to investigate contaminant bioavailability. If tests indicate that the bioavailability of the relevant contaminants would produce adjusted exposure concentrations that are below the specified criteria, the dredged material is chemically acceptable for ocean disposal. If the bioavailability results indicate adjusted exposure concentrations that are above the criteria, the sediment is potentially toxic and the assessment proceeds to Phase IV.

- Phase IV involves acute and chronic toxicity testing when results from Phase III indicate that the sediment is potentially toxic. It employs a minimum of three sensitive test organisms, representing the main contaminant exposure routes. If all tests are passed, the sediment is not considered toxic and is deemed chemically acceptable for ocean disposal.
- Phase V is a weight-of-evidence assessment where there are no appropriate toxicity tests for particular contaminants or where scattered toxicity has been found throughout a dredge area and it is not associated with any hot spot.

Bioaccumulation testing is undertaken when the sediment contains bio-accumulating substances, such as mercury, dioxins or organochlorine pesticides at levels exceeding the ANZECC/ARMCANZ 2000 *Sediment Quality Guidelines* (SQG), which provide High value thresholds, as detailed in **Table 5-2**. On this basis, it should be noted that bioaccumulation may be a concern even where toxicity has not been identified.

Table 5-1 Screening Levels

Analytical Parameter	Screening Level (ISQG Trigger Value)
METALS & METALLOIDS	*(mg/kg)*
Antimony	2
Arsenic	20
Cadmium	1.5
Chromium	80
Copper	65
Lead	50
Mercury	0.15
Nickel	21
Silver	1.0
Zinc	200
*ORGANICS**	*(µg/kg)*
Total PCBs	23
Pesticides DDD	2
DDE	2.2
Total DDT	1.6
Dieldrin	280
Chlordane	0.5
Lindane	0.32
Endrin	10
Total polycyclic aromatic hydrocarbons (PAHs)	10 000
Total petroleum hydrocarbons	550 mg/kg
Tributyltin (as Sn)	9 µg Sn/kg
RADIONUCLIDES** (sum gross alpha and gross beta)	35 Bq/g

* Normalised to 1 per cent total organic carbon. Normalisation is only appropriate over the TOC range 0.2–10 per cent.

** Maximum (Bq/g is becquerels per gram).

Table 5-2 Sediment Quality High Values

Contaminant	SQG High Value Thresholds
METALS & METALLOIDS	**(mg/kg)**
Antimony	25
Cadmium	10
Chromium	370
Copper	270
Lead	220
Mercury	1
Nickel	52
Silver	3.7
Zinc	410
Arsenic	70
ORGANOMETALLICS	**(µg/kg)**
Tributyltin (TBT)	70
ORGANICS	**(µg/kg)**
Total PAHs	50 000 (45 000)
Total DDT	46
p.p'-DDE	27
o,p'- + p,p'-DDD	20
Chlordane	6
Dieldrin	270 e / 620
Endrin	120 e / 220
Lindane	1.0
Total PCBs	–
Total petroleum hydrocarbons (TPHs)	NA

5.2 Acceptance Criteria

For the purposes of the sediment management works, sediments with contaminant concentrations below the SQG screening levels are deemed to be 'clean' and not to requiring any special management measures.

6 Existing Sediment Data

6.1 Previous Investigations

Three recent sediment investigations were undertaken by Worley Parsons (WP) in November 2009, March 2010 and November 2011 to determine the suitability of the proposed dredge material for unconfined sea disposal. A further investigation was undertaken by WP in 2012 to:

- characterise the chemical properties of sediment from within the expanded areas of the dredge footprint; and
- assess the bioavailability and toxicity of TBT with depth across the dredge footprint.

The testing was undertaken in accordance with the NAGD in three separate Dredge Areas, as follows:

- Dredge Area 1 - Approaches and Turning Circle (to be dredged to 12.8 m below CD);
- Dredge Area 2: Sub-berth (to be dredged to 14.0 m below CD); and
- Dredge Area 3: Fixed Berths 1 and 2 (to be dredged to 12.8 m below CD).

WP undertook a preliminary investigation in November 2009 to characterise the physical properties and the types, concentrations and bioavailability of chemicals present in the proposed dredge material. The dredging requirements were determined from the Sydney Ports Corporation (SPC) (2007) hydrographic survey. This was the most recent hydrographic survey available at the time of sampling.

The results of the preliminary investigation indicated that:

- elevated concentrations of lead and zinc were present at concentrations exceeding the NAGD-low thresholds at location SS3A; and
- elevated concentrations of tributyltin (TBT) and mercury were present at concentrations exceeding the NAGD-low thresholds at location SS3B.

Further review of the hydrographic survey and subsequent discussions with the SPC pilots indicated that the dredge footprint was larger than the footprint investigated in the preliminary investigation. Additional sediment sampling was therefore undertaken in March 2010 in accordance with an approved sampling and analytical plan (SAP). The analytical results indicated that whilst elevated concentrations of TBT were observed in elutriates, dilution modelling for material from the combined Dredge Areas 1, 2 and 3 determined that the concentrations of TBT in the dredge material would not be of concern to water quality during disposal at the Sydney Offshore Spoil Ground. In addition, toxicity was not observed by whole sediment or elutriate toxicity testing.

Following the second sediment sampling program by WP in 2010 the need for additional sampling and testing was identified due to the proposed expansion of the dredge footprint. This additional, third investigation was undertaken to:

- meet the required minimum number of samples specified in the guidelines due to the increase in dredge footprint since the previous sediment investigation; and
- provide a better spatial and vertical coverage of the three proposed Dredge Areas.

The third sediment sampling and analysis investigation was completed in November 2011.

6.2 Sediment Characteristics

The upper sediment layer across the project site has been subject to sediment characterisation by particle size distribution (PSD) analysis. A total of 38 sediment samples have been collected to the depth of the proposed dredging (14m below CD). The sampling locations are shown on **Figure 6-1** (2009-2011) and **Figure 6-2** (2012).

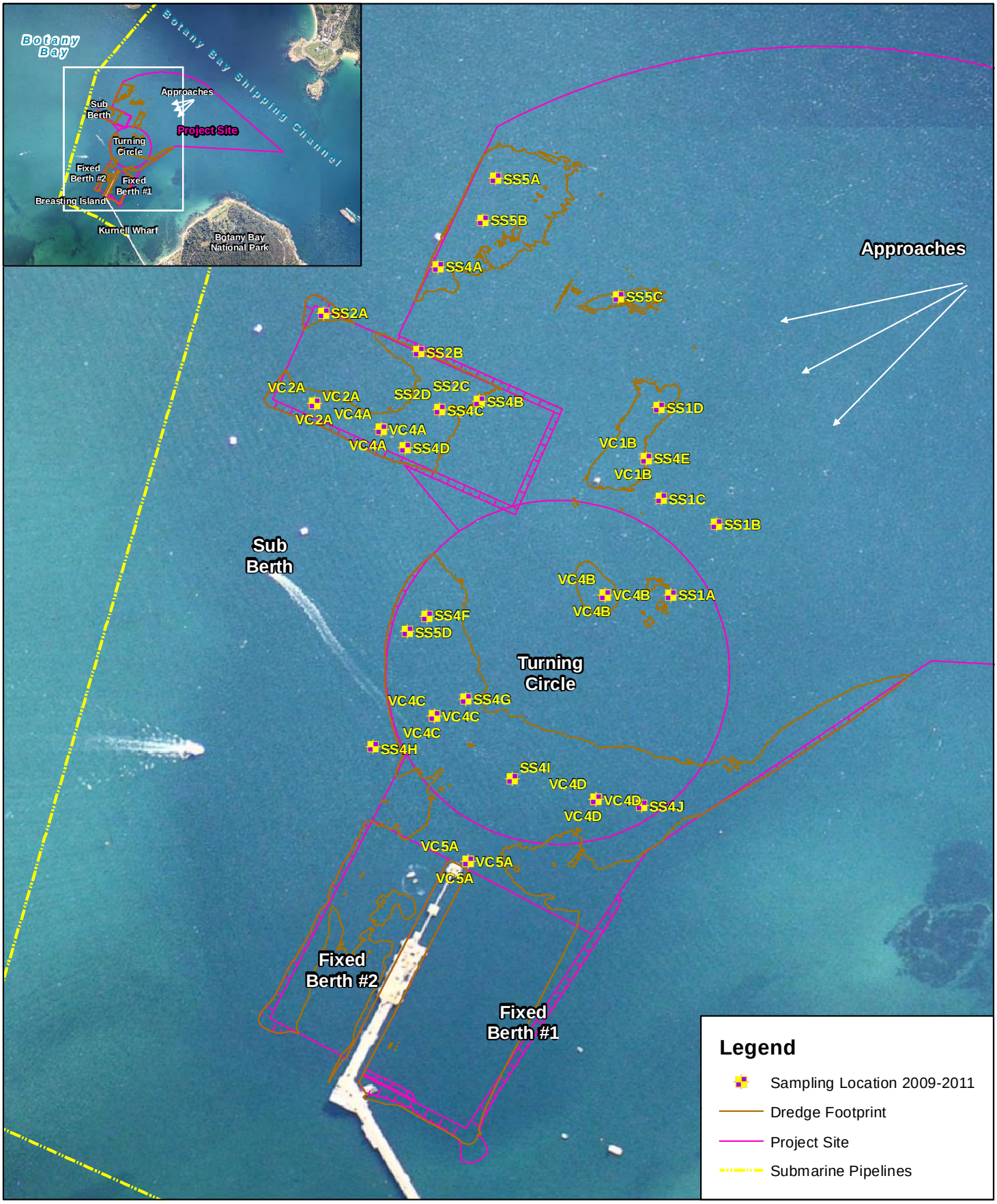
The results of the PSD sampling determined the following:

- The approaches, turning circle and sub berth predominantly comprise sand with a low distribution of fine particle sizes (less than 70 µm).
- Sand with some gravel and fines are predominantly found within the fixed berths. The gravel comprises rock and shell fragments and the fines (found closer to the shoreline) comprise silt deposits (see **Table 6-1**).
- Peat deposits (found at depths of between 0.6 – 1.5 m below the surface) were encountered at the southern end of fixed berth #1. These, along with the silt, remain buried and anoxic giving rise to PASS.

Table 6-1 Summary of the Mean Particle Size Analyses

	Clay (<2µm) (%)	Silt (2-60µm) (%)	Fines (61-70 µm) (%)	Sand (71µm – 2 mm) (%)	Gravel (>2mm) (%)	Cobbles (>6cm) (%)
All Dredge Areas	5	2.3	10.2	86.1	4.9	<1
Approaches and Turning Circle	2	0.8	7.5	89.3	3.6	<1
Sub Berth	6	2	8	93	<1	<1
Fixed Berths	7	4	15	76	10	<1
Fixed Berth #1	8	6	17	70	13	<1
Fixed Berth #2	6	1	8	91	2	<1

The variance of PSD between all the collected samples within each area is relatively low, denoting that the sediments characteristics across much of the project site are fairly uniform. The only notable exception is the greater proportion of gravel in sediments collected from the southern end of fixed berth #1.



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SAMPLING LOCATIONS (2009-2011)

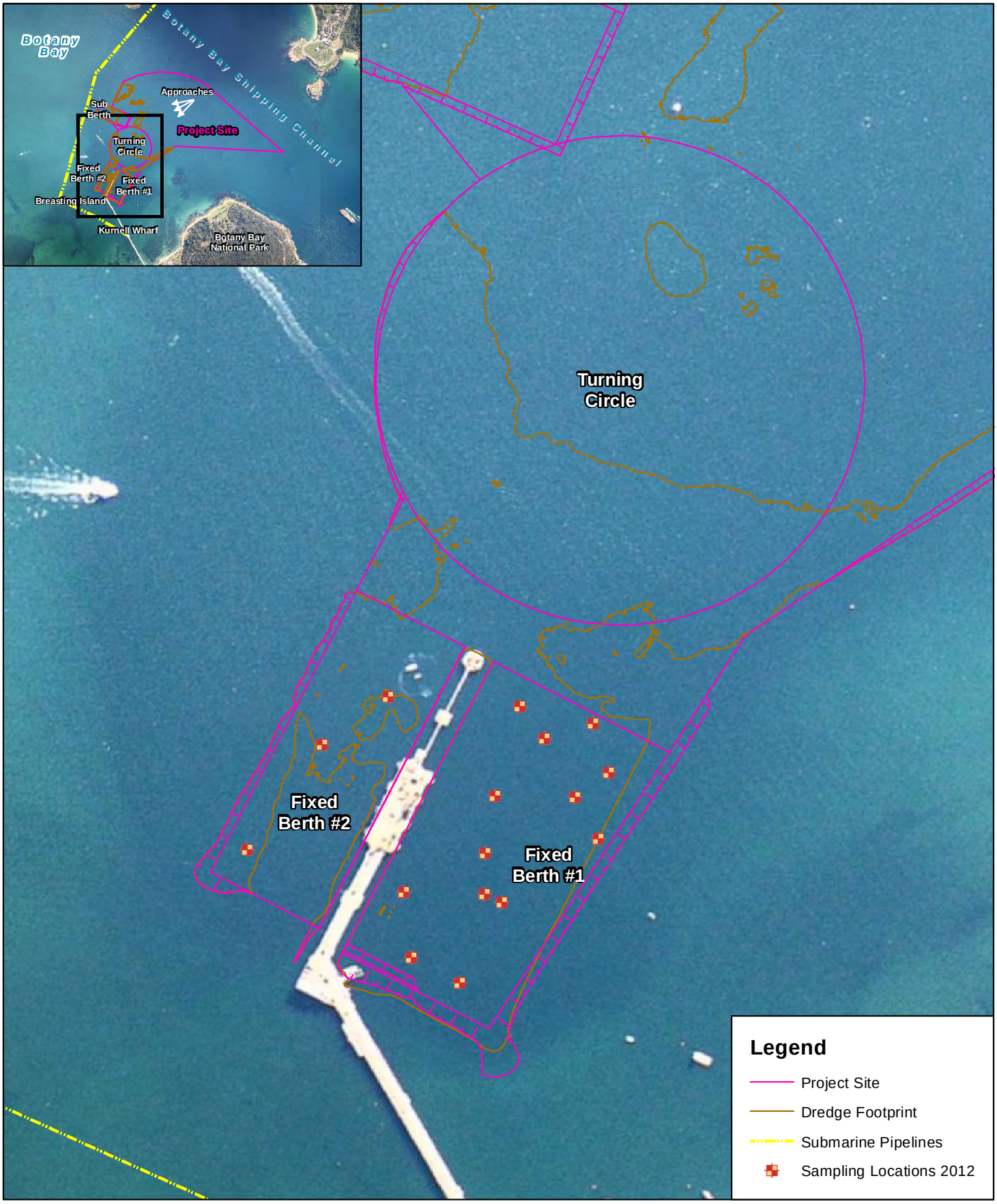
URS

BOTANY BAY, NSW

Figure: **6-1**

File No: 43177771.075.mxd Drawn: STB Approved: CF Date: 19/02/2013

Rev. **A** A4



N
W E
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0 25 50 100 150 200
Meters

Datum: GDA94
Grid: MGA Zone 56

Source: Aerial Imagery - Nearmap Hypertiles 2012.

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SAMPLING LOCATIONS (2012)

URS

BOTANY BAY, NSW

Figure: **6-2**

File No: 43177771.076.mxd Drawn: STB Approved: CF Date: 19/02/2013

Rev. **A** A4

6.3 Chemical Characteristics

Geochemical testing has included a number of physical, chemical and toxicity tests on the collected sediments. The analytical suite of chemicals selected for testing is based on the NAGD recommendations. These chemicals consist of a number of heavy metals, hydrocarbons (and their derivatives), pesticides, polychlorinated biphenyls (PCBs) and TBT (see below). Samples collected next to the Wharf have also been tested for volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs).

Concentrations of BTEX[1] pesticides, PCBs and volatile compounds were below the analytical limits of reporting (LOR) in all samples collected within the project site. Hydrocarbons (and their derivatives) and heavy metals were detected within sediment samples from the project site; however, the 95% UCL of each area and across the project site was below the guideline limits set for waste classification, site contamination and toxicity for all but one analyte, TBT.

6.3.1 Tributyltin

Tributyltin (TBT) forms a group of tin-derivative compounds that were used extensively in antifouling paint in the shipping industry, until an international ban in 2003 prevented further use. This was followed by a ban in 2008. The sediment investigations have shown that TBT occurs extensively across the project site; exceeding the guidance limits for site contamination and toxicity. The mean concentration of TBT found in each of the main areas of the dredge footprint is summarised in **Table 6-2**.

Table 6-2 Summary of the Geochemical Analysis Results for TBT in Sediments

Criteria		Threshold Limit (µgSn/kg)
Aquatic Ecology Threshold Limit	ISQG-low	*5**
	ISQG-high	**70**
Area	Results	TBT normalised (µgSn/kg)
All Dredged Areas	Mean	**151**
	Standard Deviation	**504**
	95% UCL of the Mean	**255**
Approaches and Turning Circle	Mean	**226**
	Standard Deviation	**695**
	95% UCL of the Mean	**408**
Sub Berth	Mean	**175**
	Standard Deviation	**307**
	95% UCL of the Mean	**315**
Fixed Berths	Mean	*12*
	Standard Deviation	*50*
	95% UCL of the Mean	*25*

[1] Benzene, toluene, ethyl benzene and xylene. Volatile organic compounds found in petroleum derivatives.

* The NAGD includes a revised screening criterion of 9 µgSnkg^{-1}, which has been used for assessment for the purpose of offshore disposal

Whilst the above data show the mean TBT concentrations found across the three key areas of the project site, notable variations have been found within each area. The depth at which TBT occurs also varies considerably within the sampled sediments.

In samples collected from the northern end of the approaches and the eastern side of the turning circle, concentrations of TBT have been shown to only be slightly elevated (or in some instances not even present at detectable concentrations). Conversely, in the southern parts of the fixed berths, the central portion of the sub berth, the northern end of the turning circle, and the southern part of the approach channel, sediment has been shown to contain highly elevated concentrations of TBT.

Elutriate testing of the sediments within the project area has also been completed. Elutriate testing indicates whether disturbing the sediments during dredging activities would release contaminants into the water column. The results of this testing can be compared against water quality limits set for the protection of aquaculture and aquatic ecosystems. A summary of elutriate test results is provided in **Table 6-3**. The testing has been undertaken on representative samples across the dredge footprint including those with the highest contamination of TBT.

Table 6-3 Elutriate Testing Results

Criteria	Standard	Threshold Limit (µg/l)
	Aquatic Ecology Threshold Limit	*0.006*
	Aquaculture Protection	0.01
Area	Results	TBT (µg/l)
Approaches and Turning Circle	Mean	0.941
	95% UCL of the Mean	1.884
Sub Berth	Mean	0.015
	95% UCL of the Mean	0.038
Fixed Berths	Mean	*0.006*
	95% UCL of the Mean	0.016

6.3.2 Acid Sulfate Soils

Initial laboratory analysis conducted on dredged sediments has confirmed PASS to be present across the project site. Further detailed laboratory analysis has indicated the presence of AASS in the fixed berths. The results of the tests have also reported a potential sulfidic acidity greater than the '*action criteria*' specified in the *Manual* and *Assessment Guidelines* confirming an ASSMP would be required where sediments are brought ashore for treatment and disposal.

7 Remediation Options Appraisal

7.1 Overview of Issues and Objectives

The objective of the dredging work is to provide safe access to ships and this RAP was developed to provide protocols for the management of contaminated material to be displaced by the proposed dredging. Thus remediation is restricted to the management of the dredged sediments.

The chemistry of the dredged sediments has been compared against marine fauna toxicity risks, human health risks and waste classification criteria to determine if it would be suitable for onshore or offshore disposal, or for reuse within Botany Bay. These issues are discussed in more detail in the following sections, which form an appraisal of various sediment management options.

7.2 Onshore Disposal

Analysis has determined that the proposed dredged materials would be suitable for disposal onshore as *general solid waste* when compared against the NSW *Waste Classification Guidelines 2009*. Due to the elevated TBT concentrations however, it has been considered that there may be restrictions if these materials were to be disposed at a licenced landfill. Onshore disposal to waste landfill is therefore, not considered to be a viable disposal option for the proposed dredged sediments.

7.3 Onshore Disposal after Treatment

Onshore treatment of dredged sediments using commercially-available technologies, prior to landfill disposal was also considered and found not to be a viable option, as treatment costs are prohibitive and the approach presents additional handling, transport and social issues.

7.4 Onshore Reuse

The viability of reusing the sediments onshore has been discussed with NSW Department of Primary Industry (DPI) (Fisheries) and NSW Environment Protection Authority (EPA). Both agencies have confirmed that despite meeting the screening levels established in the NEPM, the presence of TBT and its potential impacts on human health would preclude this as an option. Whilst there are commercially-available options available for treating TBT enriched sediments their costs are prohibitive.

7.5 Partial Offshore Reuse

Analysis has differentiated areas in the turning circle and approaches where the TBT concentration within sediments is below NAGD-low Screening levels for TBT (9 µgSn/kg). Sediments from these areas are reusable within Botany Bay. As such, it is proposed to reuse 6,000 m^3 of dredged material to cover two exposed sections of the subsea fuels pipelines behind the sub berth and a former anchor point. The particle size distribution of the dredged sediments is likely to broadly ‘match’ the PSD identified at the two, proposed reuse locations, given the uniformity observed across the area.

Whilst the assessment of ASS confirms both their potential and existence within the Bay sediments, the likelihood of generating acid conditions during the proposed works for partial offshore reuse would be unlikely, as the sediments would be reused below the water surface and would remain saturated during transport, thus preventing their oxidation.

7.6 Partial Offshore Disposal

The majority of the dredged sediments are suitable to be disposed at the Sydney Offshore Disposal Ground. This site has been used for the disposal of spoil from dredging operations around the Sydney area since 1984, following the passing of the *Environment Protection (Sea Dumping) Act 1981*. Caltex is in the process of securing a sea dumping permit application from the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (SEWPaC).

Similar to the partial offshore reuse option, the likelihood of generating acid conditions during the proposed works for partial offshore disposal would be unlikely, as the sediments would be disposed below the water surface and would remain saturated during transport, thus preventing their oxidation.

8 Preferred Remediation Approach

8.1 Overview of Preferred Remediation Options

Following evaluation of the benefits, limitations and uncertainties associated with each remediation option, a combination of Partial Offshore Reuse (in Botany Bay) and Partial Offshore Disposal (at the Sydney Offshore Spoil Ground) are considered to provide the preferred approach for the management of the contaminated sediments located within the project area. The detail and scope of the remedial approach will be finalised following further evaluation and input from the nominated Works' Contractor. This will allow innovative solutions from the Works' Contractor to be considered.

The preferred remedial approach involves removal of the contaminated soft sediments within the impacted areas of Botany Bay to create the required bathymetry for berth and port shipping requirements.

In consideration of the various site specific issues, a series of remediation tasks have been defined, taking into account possible handling and transport logistic constraints. The detailed scope of each task, in particular handling, treatment and transport logistics may change with work method variations proposed by the nominated Works' Contractor.

The broad overview of the contaminated sediment management tasks is as follows.

- Installation of environmental controls to mitigate and manage potentially unacceptable impacts on the local environment arising from the works.
- Removal of contaminated sediments via water based dredge/excavator positioned on working barge.
- Transfer of excavated sediments from working barge to transport barge.
- Transport off-site by transport barge to disposal location.

8.2 Works Overview

The proposed works would comprise the following principal components:

- dredging the seabed in the vicinity of the berths, turning circle and approaches;
- the reuse of a proportion of the dredged material to cover two exposed sections of the submarine fuel pipelines behind the sub berth and a former anchor point at the approach to the sub berth; and
- disposal of the remaining dredged material offshore.

8.2.1 Dredging Works

The proposed works would be to 'spot-dredge' locations within the turning circle, approaches and berths to leave a broadly flat, uniform area across the base of the footprint. The perimeter of the dredge footprint would be profiled to create side 'batter' slopes. These would be at least to a 1-in-4 profile to the existing seabed. The exception is at the back of

fixed berth #1 where a rock revetment would be constructed. The areas that require dredging are shown in **Figure 1-2**.

In total, approximately 153,000 m^3 of material would be dredged to achieve the desired navigation depth across the footprint. The result of the dredging would be to return the turning circle and approaches to the design depth of 12.8 m below CD, whilst the sub berth would be returned to the design depth of 14 m below CD. The fixed berths would be dredged to increase the size of the berth boxes and their overall effective depth (12.8 m below CD).

Table 8-1 provides a summary of the proposed dredging works, showing the area, depth and volume of material that would be removed. Included in the table are the required dredge volumes and an over-dredging allowance. Associated with any dredging project is an accepted additional allowance beyond the required minimum dredge volume that accounts for the inaccuracies that come in achieving the final dredge profile and the issues of future settlement. This accepted allowance is referred to as over-dredging.

Table 8-1 Proposed Dredging Area, Depth and Volume

Location	Required Dredge Depth to CD* (excluding over dredging)	Design Area (m^2)	Required Dredge Volume (m^3)	Additional Dredge Volume to allow for over dredging (m^3)	Total Volume (including over dredging (m^3)
Approaches & Turning Circle	-12.8	98,750	30,500	29,750	60,250
Sub Berth	-14	16,750	7,750	5,000	12,750
Fixed Berths	-12.8	62,500	61,250	18,750	80,000
Total	-	178,000	99,500	53,500	153,000
*Note: Depth to seabed and not ships keel.					

8.2.2 Proposed Dredging Method

The proposed dredging works would be undertaken using a mechanical dredging technique. This would involve using a backhoe dredger (BHD) to load the dredged materials onto split hopper barges. The BHD method is comparable to a normal land based excavator where the materials would be dredged from the seabed through mechanical digging. Following loading, the materials would be transported to the disposal/reuse areas where they would be unloaded from the bottom of the split hopper barge.

This method of dredging has the benefit of allowing controlled and more accurate dredging to take place around structures and is therefore appropriate for dredging next to the Kurnell Wharf. As the hopper barge is separate to dredger it allows continuous dredging because a replacement hopper can moor alongside the dredger as the full hopper is transported to the disposal/reuse areas.

Whilst split hoppers vary in size, barges with a capacity to hold 500 m^3 have been identified as suitable for these proposed works. Barges of this size have sufficient manoeuvrability and draft to access the shallow waters close to the fixed berths.

To minimise the duration of the works, it is anticipated that four hopper barges (and supporting tugboats) would be used on a rotational basis. One would be in the process of being loaded, with one moored alongside the BHD. The remaining two would be either in transit to, or from, the disposal ground.

It is anticipated that on average, approximately:

- 2,000 m^3 of material would be dredged from the approaches, turning circle and sub berth per day; and
- 850 - 1,000 m^3 of material would be dredged from the fixed berths per day.

At these rates, it would take approximately 20 - 23 weeks to complete the proposed dredging works.

The BHD would remove dredged material from the seabed in a bucket, lifting it through the water column before slewing (transferring) it over and releasing it into an adjacent split hopper.

The dredged material would also include a volume of surplus water. The volume of surplus water depends on the composition of what is being dredged and can be considerable, especially in areas of softer sandier sediment as are present within the majority of the dredge footprint.

In order to reduce the duration of works it is common practice to allow the majority of the excess water to overflow from the side of the split hopper barge prior to the materials being transported elsewhere. This process is known as overflow dredging and would take place in the approaches, sub berth and the turning circle. Overflow dredging would not be permitted within the fixed berth and in front of the submarine berth due to the presence of contaminated sediments. The rate of overflow dredging depends on the size and type of hopper barge used. Under the working assumption of using 500 m3 capacity hoppers it is anticipated that approximately 15-20 m3 of water would overflow every minute. The overflow would also contain a quantity of finer sediment, which would not be instantly settled out in the hopper. The corresponding 'spill rate' of this sediment is anticipated to be approximately 10-15 kg per second. Validation sampling, monitoring and various environmental controls are proposed to manage the BHD works.

8.2.3 Sediment Reuse

Approximately 6,000 m^3 of clean dredged sediment taken either from the area north of the sub berth or the area on the southeast side of the turning circle would be reused.

The majority of reclaimed sediments (up to approximately 4,500 m^3) would be used to fill in a former anchoring hole located within centre of the turning circle (3348.90E, 62367.95N), with the remaining 1,500 m^3 used to cover two exposed sections of the submarine fuel supply pipelines located behind the sub-berth (northern end: 334425.91E, 6237067.74N; southern end: 334400.38N, 6237067.74E). The reuse locations are shown on **Figure 8-1**.

The submarine fuel pipelines have become exposed over the past three years from regular hydrographic surveying of the area. This has resulted in damage to their outer casing most likely due to recreational ships dropping anchor over the pipelines. Therefore the proposal

would cover the two 100 m long exposed sections of the pipelines to a width of 7 m and an approximate average depth of 0.7 m.

The clean dredged materials would be placed over the submarine fuel pipelines and anchor point by positioning split hopper barges over the relevant locations and releasing the materials from the bottom of the hopper.

N
W E
S

0 30 60 120 180 240
Meters

Datum: GDA94
Grid: MGA Zone 56

Source: Aerial Photography - Bing Maps © 2010 Microsoft Corporation and its data suppliers

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SEDIMENT RE-USE LOCATIONS

URS

BOTANY BAY, NSW.

Figure: **8-1**

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Rev. **A** A4

8.2.4 Sediment Disposal

The dredged material identified as not suitable for reuse (approximately 147,000 m^3) will be disposed of at the Sydney Offshore Disposal Ground. The disposal ground is located approximately 25 km from the dredge footprint 10 km east-southeast off Sydney Heads in water depths approximately 100 to 130 m below CD. The offshore disposal grounds cover an area of approximately 23 km^2.

The disposal of the materials is subject to permit approval from the Commonwealth Government under the terms of the *Environment Protection (Sea Dumping) Act* 1981.

9 Environmental Management

9.1 Dredge and Spoil Disposal Management Plan (DSDMP)

The Sydney Offshore Disposal Ground has been specifically selected for sea dumping as it is both deep and unaffected by strong currents and the effects of wave action. However, there would be a requirement to manage the transport and disposal process to reduce the risk of impacts upon the receiving environment of the offshore disposal ground. The works would be managed under a Dredge and Spoil Disposal Management Plan (DSDMP).

The DSDMP would cover the mitigation and management measures required to control the impacts of dredging in Botany Bay along with the impacts of loading, transport and disposal permitted under the Commonwealth *Environmental Protection (Sea Dumping) Act 1981*.

Providing a framework for the environmental management and execution of the dredging and disposal activities the DSDMP would be prepared using a performance-based approach structured to allow the management of potential environmental impacts to levels consistent with the mitigation and management measures included in this EIS (relating to dredging) and the conditions included in the Sea Dumping Permit with regard to disposal.

The DSDMP would present the measures including the objectives, actions and associated key performance indicators that would be implemented throughout dredging program. The DSDMP also presents the proposed monitoring and inspection programs required to check performance.

The appointed EMR (or potentially a separate dredging EMR) would regularly audit the dredging activities to ensure that all mitigation and management measures were being effectively applied and that the proposed works were being carried out in accordance with the DSDMP, associated approvals and permit conditions. The DSDMP would also be subject to review by the EMR prior to commencement of the dredging works and ongoing review as the works progressed.

The DSDMP will include the following:

- outline the proposed dredging and spoil disposal program;
- describe any overarching strategy that forms the design basis for the DSDMP;
- describe the procedures that would be implemented to minimise and manage potential on water and sediment quality, noise, ecology and heritage impacts;
- outline the environmental monitoring and inspection programs that would be implemented;
- outline the contingency measures that would be implemented in the event that a specific threshold limit (as set out in this EIS) is exceeded;
- describe the measures that would be implemented to manage environmental issues relating to marine quarantine, the use and handling of hydrocarbons, waste management, noise management, and shipping operations; and

- outline how the environmental management strategies would be implemented, including the definition of clear and accountable roles and responsibilities, coordination and communication, auditing and reporting requirements.

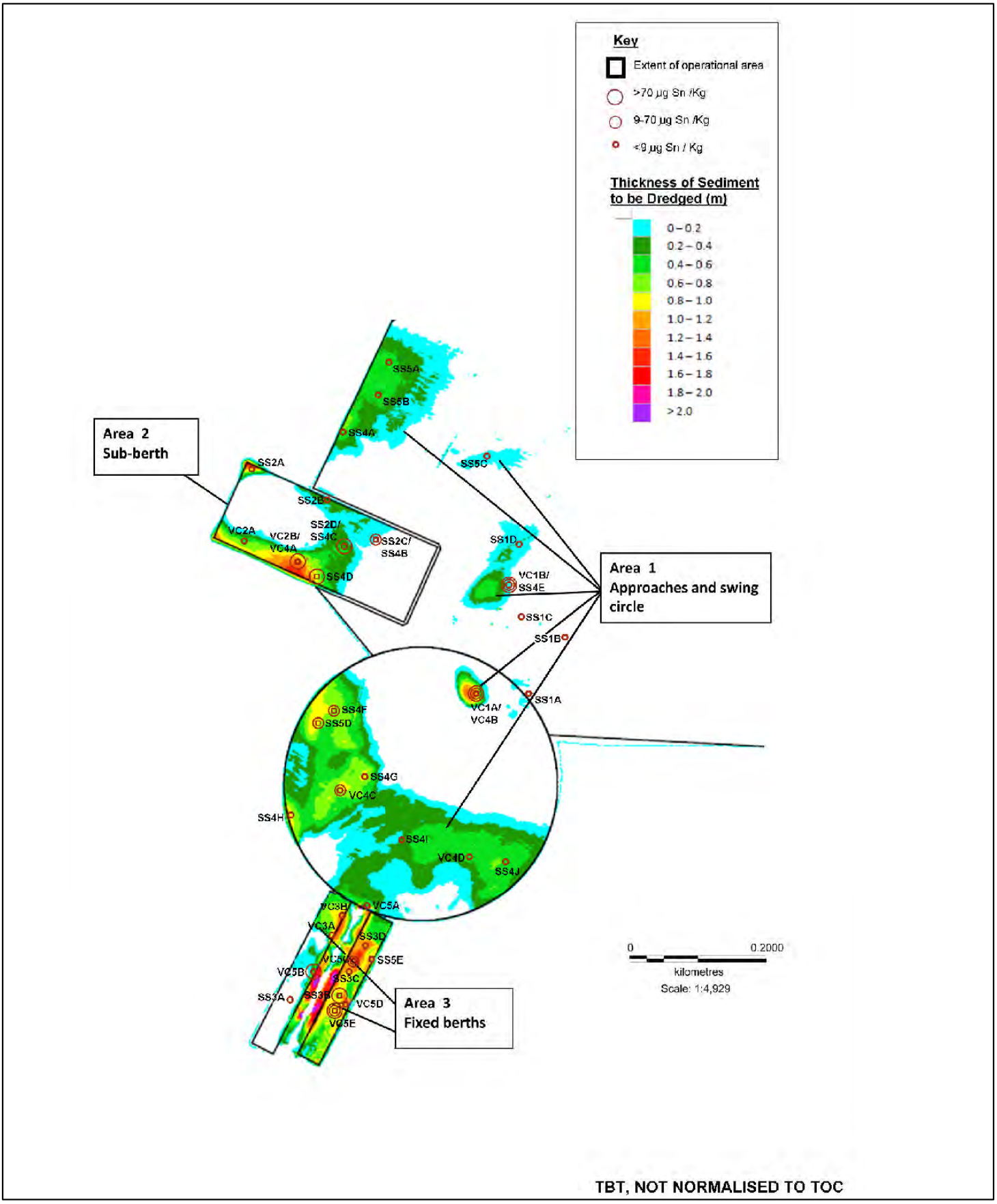
Various sub-plans would be formed under the DSDMP that would include:

- a spill control plan;
- a sediment and water quality monitoring program;
- flora management;
- fauna management;
- a port operating procedure and marine works management plan; and
- a waste and resource management plan.

In particular the DSDMP would incorporate of the following contamination management activities.

9.2 Use of Zero Overflow Dredging Methodology

Highly contaminated areas would be dredged using no-overflow operations (the process of removing surplus water removed with the dredged sediments) to limit the dispersion of TBT contaminated sediments within Botany Bay. This would focus on the areas at the northern end of the turning circle and the southern part of the approach channel shown in **Figure 9-1**. Additionally, no overflow dredging would be permitted within the fixed berths.



TBT, NOT NORMALISED TO TOC

Source:
Figure provided by Worley Parsons: SAP (May 2011) - Figure 5, 301015-02448_Fig5_TBT Not Normalised to TDC.jpg

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KURNELL PORT AND BERTHING PROJECT

DISTRIBUTION OF TRIBUTYLTIN ACROSS THE PROJECT SITE

URS

BOTANY BAY, NSW

Figure: 9-1

File No: 43177771.078.mxd Drawn: STB Approved: CF Date: 19/02/2013

Rev. A A4

9.3 Physico-Chemical Monitoring and Stop-Work Triggers

Live turbidity monitoring would be undertaken during the works to meet the following criteria:

- a limit of 50 mg/L (under normal dry weather conditions) at the outer limit of the project site; and
- a limit of 10 mg/L (under normal dry weather) at the aquaculture lease site and seagrass bed locations.

Additional physico-chemical stressor monitoring would be undertaken on the sediment and water quality compared against the *Water Quality Guidelines for Fresh and Marine Waters 2000.*

Persistent exceedances of the above parameters would result in the dredging works being temporarily stopped and one of two measures being introduced. Either the spill rate would be reduced (i.e. the rate of overflow dredging), or in extreme cases (i.e. where more than three exceedances were detected in a 24-hour period), overflow dredging would be halted temporarily in favour of removing excess water to the Sydney Offshore Spoil Ground.

9.4 Management of Acid Sulfate Soils

The overflow dredging would involve deposition of material below the water level under stable non-oxidising conditions. Given that AASS or PASS materials would remain submerged throughout the process, the overall risk of adverse ecological effects from PASS is considered to be low. As such, the need to prepare an acid sulphate soils management plan (ASSMP) in accordance with ASSMAC guidance is not deemed necessary for the proposed works.

Measures would be included to monitor the sediments in transit (either to the offshore disposal ground or reuse locations within Botany Bay) to ensure they would not dry out (particularly during the summer months or if there was a delay in moving the hopper offshore). Where required, the sediments would be sprayed with sea water and kept moist during transit to prevent drying. These provisions would be carried through to the contractor specifications and included under the provisions of the Construction Environmental Management Plan (CEMP), also prepared to support the infrastructure component of the proposed works, and the DSDMP.

9.5 Mitigation and Management Measures

The adoption of the mitigation and management measures is an important component of the proposed works and reinforces Caltex's commitment to controlling its impact on the environment. **Table 9-1** presents these measures and sets out the timeframe for their implementation.

Table 9-1 Mitigation and Management Measures

Mitigation and Management Measures	Implementation of mitigation measures		
	Design	Implementation	Operation
Caltex would carry out the proposed works in accordance with the EIS and the approval conditions.	✓	✓	✓
Caltex would implement reasonable and practicable measures to avoid, or minimise impacts to the environment that may arise as a result of the proposed works.	✓	✓	✓
Caltex would ensure that the works' contractor prepares and implements a *Construction Environmental Management Plan* (CEMP) and a *Dredging and Spoil Disposal Management Plan* (DSDMP) to manage the proposed works. This would be reviewed and approved by a Caltex Environmental Management Representative (EMR).		✓	
Caltex would appoint an EMR to monitor the implementation of all required environmental mitigation and management measures. The EMR would ensure that all measures were being effectively applied during the proposed works and that the work would be carried out in accordance with the CEMP, DSDMP, all environmental approvals and legislative conditions.		✓	
Caltex and the various works' contractor personnel would undergo training in accordance with the CEMP, DSDMP and currently implemented environmental and safety measures agreed as part of the proposed works' approval.		✓	
Overflow dredging would not be permitted within the fixed berths during the dredging works.		✓	
The DSDMP would contain controls and measures to ensure that no overflow dredging operations were to take place at the contaminated area in the approach to the sub berth and in the fixed berths. Further restrictions would be placed on overflow dredging operations if required to further limit sediment dispersion. The DSDMP would also include measures to ensure the sediments would be lifted and loaded so as to prevent any excessive disturbance and agitation, whilst preventing excessive spillage. This would include a need for the following measures. • The dredger would make use of a closed bucket to minimise sediment spill when lifting the backhoe through the water column and when undertaking slewing. • Accurate positioning systems (e.g. GPS) would be used on the dredgers to ensure direct impacts are restricted to the approved dredging area and to ensure the over-dredging limit is minimised. • Hopper doors would be kept in good condition to minimise loss of sediment during transport. • Dredging activities would be restricted to locations shown on the dredging plan(s). Dredging activities would be conducted using equipment that is regularly serviced and registered, and which complies with the conditions of relevant approvals.	✓	✓	
With regard to the management of acid sulphate soils, the dredged sediments would be monitored during transit to ensure they would not dry out (particularly during the summer months or when there was any delay is moving the hopper offshore). Spraying the sediments with sea water would be undertaken if there was evidence of drying. These measures would be included in the CEMP and DSDMP specifications.		✓	

Mitigation and Management Measures	Implementation of mitigation measures		
	Design	Implementation	Operation
A *Sediment and Water Quality Monitoring Program* (SWQMP) would be developed and implemented prior to, and during, the proposed dredging works. This would form part of the DSDMP.		✓	
The SWQMP would include that turbidity monitoring be undertaken for the duration of the dredging works. This would be undertaken at the limit of the project site, within the aquaculture site and at a number of locations within the limit of the seagrass beds. The sampling would include: • obtaining background concentrations during dry weather conditions prior to dredging to confirm the limit of 5 mgl^{-1} as being representative of the baseline; and • live monitoring during the dredging works to ensure limits of 50 mgl^{-1} were achieved at the outer limit of the project site and 10 mgl^{-1} at the aquaculture lease site and seagrass bed locations.		✓	
The SWQMP would include a monitoring program for pH and dissolved oxygen at the limit of the project site, to be undertaken for the duration of the dredging works. These parameters would be compared against the limits set by the *Water Quality Guidelines for Fresh and Marine Waters 2000*. The sampling would include: • obtaining background concentrations prior to dredging; and • live monitoring during the dredging works to ensure the above limits were achieved.		✓	
Should any of the monitored parameters persistently exceed the threshold limits within the *Water Quality Guidelines for Fresh and Marine Waters 2000,* works would temporarily stop and either the spill rate would be reduced, or in extreme cases (i.e. where more than three exceedances were detected in a 24-hour period), overflow dredging would be halted temporarily in favour of removing excess water to the Sydney Offshore Spoil Ground.		✓	
A licence would be obtained under Section 120 of the POEO Act prior to commencing the works.		✓	
Further structural investigations would be conducted during the detailed design phase of the project to confirm the design specifications of the Wharf, whilst highlighting the need for any additional strengthening and stability requirements.		✓	
A *Spill Control Plan* (SCP) would form part of the DSDMP and CEMP. It would include controls currently in place at the port and berthing facility to manage spill risks. The SCP would include: • the requirement for staff to understand the limitations, controls, and methods to manage and prevent spills; • the protocol for reporting spills and the consequential actions to cease works immediately; • the need for regular inspections by the works' contractor to ensure the adoption of the relevant spill-management controls; • the need to plan for regular equipment maintenance; and • the requirement for spill containment provisions to be available to support the proposed works.		✓	
The proposed works would be integrated into existing resource efficiency, waste management and handling, emergency response and preparedness plans for the port and	✓	✓	

Mitigation and Management Measures	Implementation of mitigation measures		
	Design	Implementation	Operation
berthing facility.			
All operations would conform to the Marpol Convention to prevent marine pollution in addition to the requirements of Section 120 of the POEO Act.		✓	

The following general provisions would be included in both the CEMP and DSDMP to ensure that impacts are effectively managed.

- Mapping would be provided to clearly demark the locations where overflow dredging would take place and where it would be restricted.

- The contractor would be made aware of the continuous turbidity monitoring requirement, locations for monitoring and the monitoring limits. The contractor would also be made aware of the potential requirement to further limit spill rates or overflow dredging operations in additional areas as the works progress. The basis of management would be to include provisions to ensure the contractor immediately cease overflow dredging operations should an exceedance be detected to then work with the EMR to identify how the spill rates or overflow dredging operations would progress moving forward.

- There would be a requirement for the dredger to make use of a closed bucket to minimise sediment spill when lifting the backhoe through the water column and when undertaking slewing.

- There would be a requirement for an accurate geographic positioning system (GPS) to be used on the dredgers to ensure direct impacts are restricted to the approved dredging area and to ensure the over-dredging limit is minimised.

- There would be a requirement for the hopper doors to be kept in good condition to minimise loss of sediment during transport.

- There would be a requirement for dredging activities to be conducted using equipment that is in survey and registered, and which complies with the conditions of relevant approvals.

- Caltex's current operational management procedures would be included in the management plans for the works' contractor to adopt. This would ensure there would be no discharges to the marine environment, backed by specifications on managing solid and liquid wastes.

- The works' contractor would be required to monitoring the dredged materials to ensure there was no visible drying occurring whilst loading or in transit to the disposal ground so as to prevent ASS risks. This would be backed by a requirement to dampen the sediments if required.

- Specifications on the location, type and frequency of turbidity and physico-chemical monitoring along with reporting and auditing provisions. These provisions would be included as part of the Sediment and Water Quality Management Plan (SWQMP). The SWQMP would also include provisions to:

  - manage any exceedances, which would include temporarily stopping overflow operations; and

  - implementing further restrictions where required.

- A subsection of the SWQMP would be the Spill Control Plan (SCP). This would set out the management and containment provisions should there be an accidental or emergency release, backed by the necessary reporting mechanisms, auditing provisions and the need for regular maintenance on the part of the contractor.

- Specifications for the works' contractor to monitor the works as they progress to ensure any identified heritage items would be reported under the provisions and requirements set out under the *Heritage Act 1977*.

- A clear works schedule in the management plans. It would set out activities that would be limited or prohibited outside of the standard working hours. It would also specify the noise monitoring requirements to be undertaken during the proposed dredging and piling works along with the controls to be put in place should noise limits be exceeded. It would also include the reporting and auditing requirements that the contractor would be required to adopt.

- For the piling works, slow start up specifications in the management plans.

- Provisions to monitor for noise-sensitive marine fauna within 420 m of the working dredger or piling rig would be included, with the additional requirement for the contractor to cease work for 30 minutes if any such fauna come within 150 m.

- A requirement for the works' contractor to implement a process of odour screening to identify anomalous odours would be included in the management plans. This would require a notification process of instances of where odour was recorded and in exceptional circumstances the need to undertake odour monitoring or limit the rate of dredging.

- Waste management provisions contained as a separate WRMP. The WRMP would provide clear direction on waste and resource handling, storage, stockpiling, use and reuse management measures (consistent with current management practices relating to Caltex's operations). The WRMP would be backed by specifying the responsibilities of the works' contractor and their relationship with the EMR.

- The contractor would be bound by the requirements of the POP and MWMP, which would provide detail on managing ship movement and working arrangements to ensure navigational safety.

- As specification to ensure that all activities associated with dredging and reclamation would be carried out to avoid spreading *Caulerpa taxifolia* consistent with the current management plan for that species issued by the NSW Department of Primary Industries. This would be underpinned by the need to provide written certification to SPC that any ships coming from outside Botany Bay were free from fouling organisms and sediment.

- A requirement to comply with the requirements of all relevant authorities for the import of vessels, including the Department of Agriculture, Fisheries and Forestry (DAFF).

- A requirement to immediately cease dredging operations in the case of accidental or unintended pipe breaks, overflows or spillages. Works would not be allowed to recommence until repairs were complete or relevant work methods modified.

- Specifications on the required training needed prior to and during the proposed works would be included. This would focus on:

  - waste disposal, segregation and management;

  - pollution prevention;

  - the reporting of spills;

  - with EMR to specifically brief the site management and dredge manager; and

  - provide toolbox talks on the use of oil spill equipment, marine mammal identification and heritage identification.

9.6 Validation

The proposed dredging is being conducted to allow for safe shipping access. The works would result in dredging specified areas to nominated depths. The extent and depth of dredging will be controlled by GPS management.

As the objective of the proposed works is not to remediate sediments there is no requirement for validation sampling or testing to verify the quality of remaining sediments. A validation report will be prepared at the completion of the works however, to document the implementation of contaminated sediment management measures, in accordance with this RAP and the DSDMP. As a minimum the validation report would include the following:

- Details of the dredging works conducted and all mitigation measures implemented to control the spread of contamination;
- Documentation of water quality observations and monitoring data undertaken during dredging and sediment transfer to the identified disposal and reuse areas; and
- Description of any contingency actions undertaken to appropriately manage contaminated sediments and/or control the spread of impacted materials.

There will be no ongoing monitoring required following the completion of dredging.

10 Concluding Remarks

The proposed dredging activities will result in the excavation of approximately 150,000 m^3 of sediment. This material will predominantly be transported to the off-shore waste disposal area although some material will be used as backfill.

The dredging is being conducted in accordance with an EIS that has been prepared to obtain planning consent for the proposed works. The EIS establishes the existing environmental conditions in the areas to be dredged and the mitigation and management measure that are required to control the impact of the proposed works. This RAP has been prepared to document the handling and disposal activities associated with the dredging.


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