

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ



Test Report ID **MAR00588**

Issue Version 1

Customer Swansea Council, Room 401, City & County of Swansea, The Guildhall, Swansea, SA1 4PE

Customer Reference Swansea Marine Sediment Testing

Date Sampled 02-03-Mar-20

Date Received 09-Mar-20

Date Reported 27-Mar-20

Condition of samples Frozen Satisfactory

Authorised by: Marya Hubbard

Position: Laboratory Manager

Any additional opinions or interpretations found in this report, are outside the scope of UKAS accreditation.

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		Units	% M/M	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	SOCOTEC Env Chem*	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
		Accreditation	UKAS/MMO	MMO	MMO	MMO	MMO	MMO
			Total Organic Carbon	45mm	31.5mm	22.4mm	16mm	11.2mm
Client Reference:	SOCOTEC Ref:	Matrix	-	-5.5	-5.0	-4.5	-4.0	-3.5
Site 3a	MAR00588.001	Sediment	7.30	0.52	1.04	0.69	2.61	0.70
Site 6a	MAR00588.003	Sediment	4.05	0.00	0.00	0.00	0.12	0.21
Site 9a	MAR00588.005	Sediment	14.1	0.00	0.00	0.00	0.19	0.37
Site 10a	MAR00588.006	Sediment	6.70	0.00	0.00	0.00	0.18	0.11

* See Report Notes

		Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
		Accreditation	MMO	MMO	MMO	MMO	MMO	MMO
			8mm	5.6mm	4mm	2.8mm	2mm	1.4mm
Client Reference:	SOCOTEC Ref:	Matrix	-3.0	-2.5	-2.0	-1.5	-1.0	-0.5
Site 3a	MAR00588.001	Sediment	1.01	0.67	0.65	0.52	0.50	0.55
Site 6a	MAR00588.003	Sediment	0.20	0.19	0.17	0.16	0.12	0.11
Site 9a	MAR00588.005	Sediment	0.99	1.18	1.84	2.34	2.45	2.44
Site 10a	MAR00588.006	Sediment	0.10	0.35	0.25	0.24	0.23	0.24

		Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
		Accreditation	MMO	MMO	MMO	MMO	MMO	MMO
			1mm	707µm	500µm	353.6µm	250µm	176.8µm
Client Reference:	SOCOTEC Ref:	Matrix	0.0	0.5	1.0	1.5	2.0	2.5
Site 3a	MAR00588.001	Sediment	0.44	1.80	0.47	3.38	3.43	5.80
Site 6a	MAR00588.003	Sediment	0.12	0.01	1.49	4.04	5.25	14.39
Site 9a	MAR00588.005	Sediment	1.85	6.20	7.18	7.63	8.10	10.33
Site 10a	MAR00588.006	Sediment	0.28	0.48	1.75	3.69	4.29	14.11

		Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
		Accreditation	MMO	MMO	MMO	MMO	MMO	MMO
			125µm	88.39µm	63µm	44.2µm	31.3µm	22.1µm
Client Reference:	SOCOTEC Ref:	Matrix	3.0	3.5	4.0	4.5	5.0	5.5
Site 3a	MAR00588.001	Sediment	8.92	8.44	9.60	9.38	8.09	7.00
Site 6a	MAR00588.003	Sediment	19.89	14.62	9.03	5.99	4.33	3.59
Site 9a	MAR00588.005	Sediment	9.88	6.75	4.97	4.23	3.83	3.65
Site 10a	MAR00588.006	Sediment	17.33	11.62	8.34	6.49	5.07	4.43

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		Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
		Accreditation	MMO	MMO	MMO	MMO	MMO	MMO
			15.6µm	11µm	7.8µm	5.5µm	3.9µm	2.75µm
Client Reference:	SOCOTEC Ref:	Matrix	6.0	6.5	7.0	7.5	8.0	8.5
Site 3a	MAR00588.001	Sediment	5.75	4.89	3.89	2.93	1.98	1.25
Site 6a	MAR00588.003	Sediment	3.07	2.79	2.44	2.04	1.52	1.04
Site 9a	MAR00588.005	Sediment	3.25	2.79	2.24	1.72	1.17	0.72
Site 10a	MAR00588.006	Sediment	3.82	3.64	3.29	2.75	2.00	1.31

		Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
		Accreditation	MMO	MMO	MMO	MMO	MMO	MMO
			1.95µm	1.38µm	0.98µm	0.69µm	0.49µm	0.34µm
Client Reference:	SOCOTEC Ref:	Matrix	9.0	9.5	10.0	10.5	11.0	11.5
Site 3a	MAR00588.001	Sediment	0.75	0.50	0.39	0.33	0.29	0.24
Site 6a	MAR00588.003	Sediment	0.68	0.47	0.38	0.33	0.30	0.26
Site 9a	MAR00588.005	Sediment	0.42	0.27	0.21	0.18	0.16	0.14
Site 10a	MAR00588.006	Sediment	0.80	0.54	0.44	0.39	0.35	0.31

		Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
		Accreditation	MMO	MMO	MMO	MMO	MMO	MMO
			0.24µm	0.17µm	0.12µm	0.09µm	0.06µm	0.04µm
Client Reference:	SOCOTEC Ref:	Matrix	12.0	12.5	13.0	13.5	14.0	14.5
Site 3a	MAR00588.001	Sediment	0.20	0.15	0.11	0.07	0.03	0.00
Site 6a	MAR00588.003	Sediment	0.22	0.18	0.14	0.09	0.04	0.00
Site 9a	MAR00588.005	Sediment	0.11	0.08	0.06	0.04	0.02	0.00
Site 10a	MAR00588.006	Sediment	0.26	0.21	0.16	0.10	0.04	0.01

		Units	% (at 0.5phi intervals)
		Method No	*SUB_01
		Accreditation	MMO
			<0.04µm
Client Reference:	SOCOTEC Ref:	Matrix	>14.5
Site 3a	MAR00588.001	Sediment	0.00
Site 6a	MAR00588.003	Sediment	0.00
Site 9a	MAR00588.005	Sediment	0.00
Site 10a	MAR00588.006	Sediment	0.00

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		Units	mg/Kg (Dry Weight)							
		Method No	SOCOTEC Env Chem*							
		Limit of Detection	0.5	0.04	0.5	0.5	0.015	0.5	0.5	2
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	SOCOTEC Ref:	Matrix	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Copper (Cu)	Mercury (Hg)	Nickel (Ni)	Lead (Pb)	Zinc (Zn)
Site 3a	MAR00588.001	Sediment	23.1	1.97	27.0	53.5	0.10	86.6	56.0	385
Site 6a	MAR00588.003	Sediment	19.9	1.08	27.1	46.8	0.06	62.2	48.8	259
Site 9a	MAR00588.005	Sediment	13.3	1.08	38.2	31.7	0.04	40.5	26.7	208
Site 10a	MAR00588.006	Sediment	20.4	1.32	39.8	48.2	0.12	59.4	49.7	263
Certified Reference Material SETOC 774 (% Recovery)			106	99	92	107	101	101	99	107
QC Blank			<0.5	<0.04	<0.5	<0.5	<0.015	<0.5	<0.5	<2

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		Units	mg/Kg (Dry Weight)	
		Method No	ASC/SOP/301	
		Limit of Detection	0.001	0.001
		Accreditation	MMO	MMO
Client Reference:	SOCOTEC Ref:	Matrix	Dibutyltin (DBT)	Tributyltin (TBT)
Site 3a	MAR00588.001	Sediment	<0.005	<0.005
Site 6a	MAR00588.003	Sediment	<0.005	<0.005
Site 9a	MAR00588.005	Sediment	<0.005	<0.005
Site 10a	MAR00588.006	Sediment	<0.005	<0.005
Certified Reference Material BCR-646 (% Recovery)			117	99
QC Blank			<0.001	<0.001

* See report notes

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		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	SOCOTEC Ref:	Matrix	ACENAPTH	ACENAPHY	ANTHRACN	BAA	BAP	BBF
Site 3a	MAR00588.001	Sediment	94.9	28.8	138	548	578	677
Site 6a	MAR00588.003	Sediment	29.1	19.0	55.3	267	318	331
Site 9a	MAR00588.005	Sediment	100	17.4	146	638	594	665
Site 10a	MAR00588.006	Sediment	54.4	18.7	72.6	290	340	411
Certified Reference Material CRM180013 1941b (% Recovery)			76	87	66	65	60	88
QC Blank			<1	<1	<1	<1	<1	<1

~ Indicates result is for an In-house Reference Material as
no Certified Reference Materials are available.
For full analyte name see method summaries

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	MMO	MMO	MMO
Client Reference:	SOCOTEC Ref:	Matrix	BENZGHPH	BEP	BKF	C1N	C1PHEN	C2N
Site 3a	MAR00588.001	Sediment	378	502	309	147	314	137
Site 6a	MAR00588.003	Sediment	202	251	148	56.2	148	48.4
Site 9a	MAR00588.005	Sediment	373	516	293	115	355	112
Site 10a	MAR00588.006	Sediment	255	312	178	80.0	162	66.8
Certified Reference Material CRM180013 1941b (% Recovery)			60	84	87	78	81	100
QC Blank			<1	<1	<1	<1	<1	<1

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	MMO	MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	SOCOTEC Ref:	Matrix	C3N	CHRYSENE	DBENZAH	FLUORANT	FLUORENE	INDPYR
Site 3a	MAR00588.001	Sediment	104	631	104	1140	92.4	407
Site 6a	MAR00588.003	Sediment	61.6	279	52.9	447	33.4	223
Site 9a	MAR00588.005	Sediment	87.1	907	94.0	1460	96.0	385
Site 10a	MAR00588.006	Sediment	48.3	364	70.6	556	47.5	273
Certified Reference Material CRM180013 1941b (% Recovery)			100	84	97	80	51	66
QC Blank			<1	<1	<1	<1	<1	<1

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	mg/Kg
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/305
		Limit of Detection	1	1	1	1	1
		Accreditation	UKAS/MMO	MMO	UKAS/MMO	UKAS/MMO	MMO
Client Reference:	SOCOTEC Ref:	Matrix	NAPTH	PERYLENE	PHENANT	PYRENE	THC
Site 3a	MAR00588.001	Sediment	105	203	658	893	392
Site 6a	MAR00588.003	Sediment	56.7	106	224	374	286
Site 9a	MAR00588.005	Sediment	96.9	231	784	1200	438
Site 10a	MAR00588.006	Sediment	58.4	114	324	448	262
Certified Reference Material CRM180013 1941b (% Recovery)			62	61	77	71	111~
QC Blank			<1	<1	<1	<1	<1

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REPORT NOTES

Method Code	Sample ID	The following information should be taken into consideration when using the data contained within this report
*SUB_01	MAR00588.001-008	Analysis was conducted by an approved subcontracted laboratory.
SOCOTEC Env Chem*	MAR00588.001-008	Analysis was conducted by an internal SOCOTEC laboratory. UKAS accredited analysis by this laboratory is under UKAS number 1252.
ASC/SOP/301	MAR00588.001-008	The matrix of this sample has been found to interfere with the result for this test. The sample has therefore been diluted, but in doing so, the detection limit for this test has been elevated.
ASC/SOP/303/304	MAR00588.001-008	Chrysene is known to coelute with Triphenylene and these peaks can not be resolved in the PAHSED UKAS accredited method. Chrysene and Triphenylene are resolved for MMO but this is currently not UKAS accredited therefore Chrysene is reported without this accreditation.

DEVIATING SAMPLE STATEMENT

Deviation Code	Deviation Definition	Sample ID	Deviation Details. The following information should be taken into consideration when using the data contained within this report
D1	Holding Time Exceeded	N/A	N/A
D2	Handling Time Exceeded	N/A	N/A
D3	Sample Contaminated through Damaged Packaging	N/A	N/A
D4	Sample Contaminated through Sampling	N/A	N/A
D5	Inappropriate Container/Packaging	N/A	N/A
D6	Damaged in Transit	N/A	N/A
D7	Insufficient Quantity of Sample	N/A	N/A
D8	Inappropriate Headspace	N/A	N/A
D9	Retained at Incorrect Temperature	N/A	N/A
D10	Lack of Date & Time of Sampling	N/A	N/A
D11	Insufficient Sample Details	N/A	N/A
D12	Sample integrity compromised or not suitable for analysis	N/A	N/A

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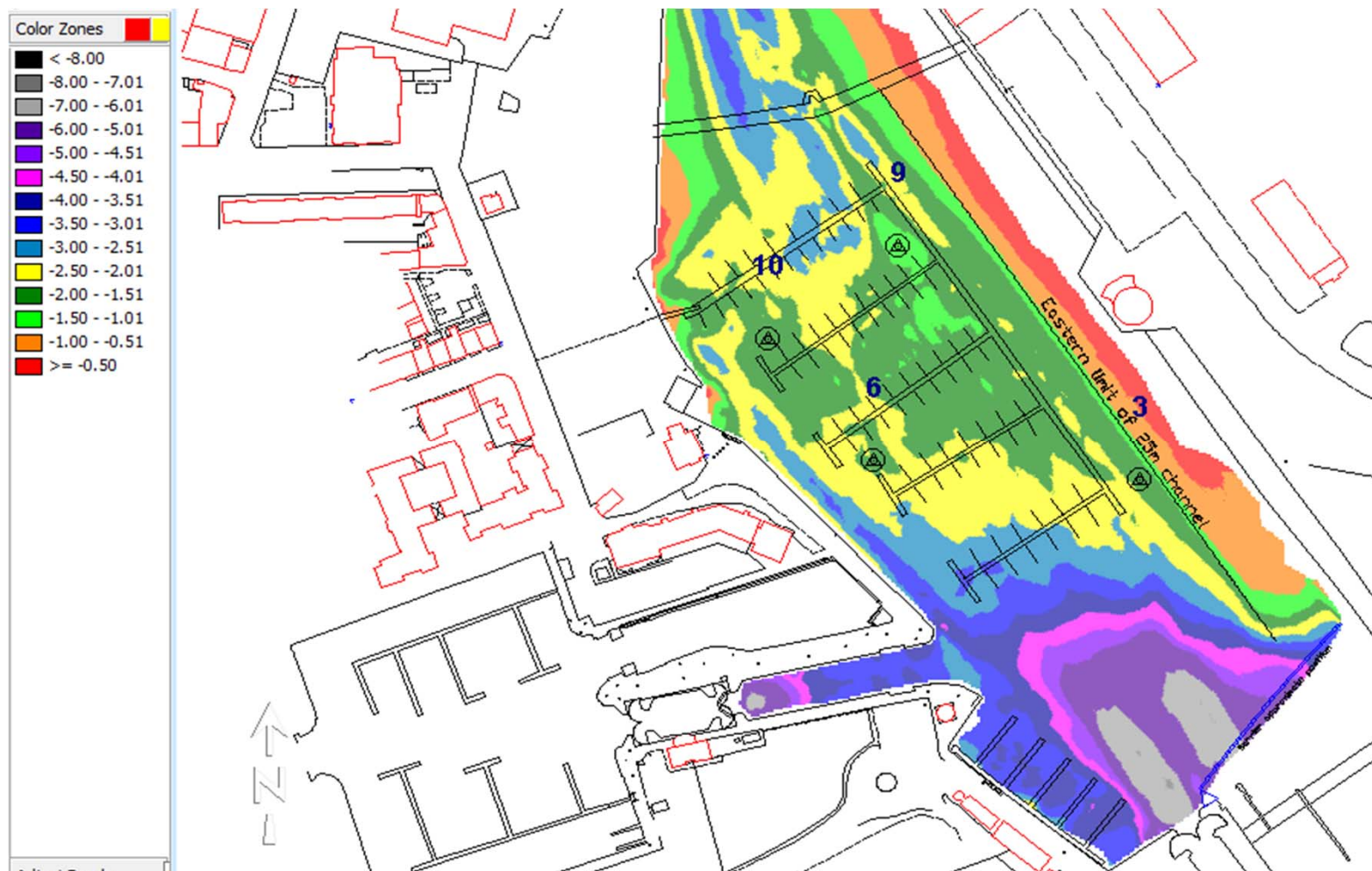
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Method	Sample and Fraction Size	Method Summary
Particle Size Analysis	Wet Sediment	Wet and dry sieving followed by laser diffraction analysis.
Total Organic Carbon (TOC)	Air dried	Carbonate removal and sulphurous acid/combustion at 1600°C/NDIR.
Metals	Air dried	Aqua-regia extraction followed by ICP analysis.
Organotins	Wet Sediment	Solvent extraction and derivatisation followed by GC-MS analysis.
Polyaromatic Hydrocarbons (PAH)	Wet Sediment	Solvent extraction and clean up followed by GC-MS analysis.
Total Hydrocarbon Content (THC)	Wet Sediment	Ultra-violet fluorescence spectroscopy

Analyte Definitions					
Analyte Abbreviation	Full Analyte name	Analyte Abbreviation	Full Analyte name	Analyte Abbreviation	Full Analyte name
ACENAPTH	Acenaphthene	C2N	C2-naphthalenes	THC	Total Hydrocarbon Content
ACENAPHY	Acenaphthylene	C3N	C3-naphthalenes	AHCH	alpha-Hexachlorocyclohexane
ANTHRACN	Anthracene	CHRYSENE	Chrysene	BHCH	beta-Hexachlorocyclohexane
BAA	Benzo[a]anthracene	DBENZAH	Diben[ah]anthracene	GHCH	gamma-Hexachlorocyclohexane
BAP	Benzo[a]pyrene	FLUORANT	Fluoranthene	DIELDRIN	Dieldrin
BBF	Benzo[b]fluoranthene	FLUORENE	Fluorene	HCB	Hexachlorobenzene
BEP	Benzo[e]pyrene	INDPYR	Indeno[1,2,3-cd]pyrene	PPDDE	p,p'-Dichlorodiphenyldichloroethylene
BENZGHIP	Benzo[ghi]perylene	NAPTH	Naphthalene	PPDDT	p,p'-Dichlorodiphenyltrichloroethane
BKF	Benzo[k]fluoranthene	PERYLENE	Perylene	PPTDE	p,p'-Dichlorodiphenyldichloroethane
C1N	C1-naphthalenes	PHENANT	Phenanthrene		
C1PHEN	C1-phenanthrene	PYRENE	Pyrene		

Name	OS East	OS North	WGS84 Lat	WGS84 Long
3	266412.9	192758.1	51 37 2.2976 N	003 55 47.1332 W
6	266297.9	192766.7	51 37 2.4766 N	003 55 53.1223 W
9	266308.2	192863.7	51 37 5.6227 N	003 55 52.7164 W
10	266252.3	192821.7	51 37 4.2178 N	003 55 55.5654 W



Depth colours shown are relative to the Primary Weir Crest of the barrage. Target dredge depth is -2.50mPWC so yellow and green areas need to be dredged