



Environmental Monitoring and Audit for Contaminated Mud Pits to the South of The Brothers and at East Sha Chau (2012-2017) – Investigation *Agreement No. CE 23/2012(EP)*

5th Monthly Progress Report for Contaminated Mud Pits to the South of The Brothers and at East Sha Chau – January 2013

Revision 0

27 February 2013

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name of 'EF terms of the Business ar	has been prepared by Environmental Resources Management the trading RM Hong-Kong, Limited', with all reasonable skill, care and diligence within the Contract with the client, incorporating our General Terms and Conditions of ad taking account of the resources devoted to it by agreement with the client.	Distr	ibutic	^{on} ernal		351 ™ 518001:2007 No. OHS 515956
This report in nature to this	any responsibility to the client and others in respect of any matters outside f the above. s confidential to the client and we accept no responsibility of whatsoever rd parties to whom this report, or any part thereof, is made known. Any such on the report at their own risk.		Puk Cor	olic nfidential	ISO 9	001 : 2008 2 No. FS 32515
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Dredging, Management and Capping of Contaminated Sediment Disposal Facility to the South of The Brothers

Environmental Certification Sheet EP-427/2011/A

Reference Document/Plan

Document/Plan to be Certified / Verified:

5th Monthly Progress Report for Contaminated Mud Pits to

the South of The Brothers and at East Sha Chau - January

Date of Report:

21 February 2013

Date prepared by ET:

21 February 2013

Date received by IA:

21 February 2013

Reference EP Condition

Environmental Permit Condition:

Condition No.: 4.4

4 hard copies and 1 electronic copy of monthly EM&A Report shall be submitted to the Director within 2 weeks after the end of the reporting month. The EM&A Reports shall include a summary of all noncompliance (exceedances) of the environmental quality performance limits (Action and Limit Levels). The submissions shall be certified by the ET Leader and verified by the Independent Auditor. Additional copies of the submission shall be provided to the Director upon request by the Director.

ET Certification

I hereby certify that the above referenced document/plan complies with the above referenced condition of EP-427/2011/A

Craig A. Reid,

Environmental Team Leader:

Date:

21/2/2013

IA Verification

I hereby verify that the above referenced document/plan complies with the above referenced condition of

West Vars

EP-427/2011/A

Dr Wang Wen Xiong, Independent Auditor:

Date: 22/2/2013

CONTENTS

BACKGROUND	1
REPORTING PERIOD	2
DETAILS OF SAMPLING AND LABORATORY TESTING ACTIVITIES	2
DETAILS OF OUTSTANDING SAMPLING AND/OR ANALYSIS	2
BRIEF DISCUSSION OF THE MONITORING RESULTS FOR SB CMPS	2
ACTIVITIES SCHEDULED FOR THE NEXT MONTH	3
STUDY PROGRAMME	3
ANNEXES	
	REPORTING PERIOD DETAILS OF SAMPLING AND LABORATORY TESTING ACTIVITIES DETAILS OF OUTSTANDING SAMPLING AND/OR ANALYSIS BRIEF DISCUSSION OF THE MONITORING RESULTS FOR SB CMPS ACTIVITIES SCHEDULED FOR THE NEXT MONTH STUDY PROGRAMME

Annex A	Sampling Schedule
Annex B	Results of Impact Monitoring during Dredging Operations of
	CMP 1 in January 2013
Annex C	Study Programme

Agreement No. CE 23/2012 (EP)

Environmental Monitoring and Audit

for Contaminated Mud Pits at the South of The Brothers and at East Sha Chau (2012-2017) - Investigation

5th MONTHLY PROGRESS REPORT FOR JANUARY 2013

1.1 BACKGROUND

- 1.1.1 Since early 1990s, contaminated sediment (1) arising from various construction works in Hong Kong has been disposed of at a series of seabed pits at East of Sha Chau (ESC). In late 2008, a review indicated that the existing and planned facilities at ESC would not be able to meet the disposal demand after 2012. In order to meet this demand, the Hong Kong Special Administrative Region Government (HKSARG) decided to implement a new contained aquatic disposal (CAD) (2) facility at the South of The Brothers (SB CMPs) (hereafter referred to as "the Project") which had been under consideration for a number of years.
- 1.1.2 The environmental acceptability of the construction and operation of the Project had been confirmed by findings of the associated Environmental Impact Assessment (EIA) study completed in 2005 under *Agreement No. CE* 12/2002(EP) (3). The Director of Environmental Protection (DEP) approved this EIA report under the *Environmental Impact Assessment Ordinance* (Cap. 499) (EIAO) in September 2005 (EIA Register No.: AEIAR-089/2005).
- 1.1.3 In accordance with the EIA recommendation, prior to commencement of construction works for the SB CMPs, the Civil Engineering and Development Department (CEDD) undertook a detailed review and update of the EIA findings for the SB site (4). Findings of the EIA review undertaken in 2009/2010 confirmed that the construction and operation of the SB site had been predicted to be environmentally acceptable.

- (1) According to the Management Framework of Dredged/ Excavated Sediment of ETWB TC(W) No. 34/2002, contaminated sediment in general shall mean those sediment requiring Type 2 Confined Marine Disposal as determined according to this TC(W).
- (2) CAD options may involve use of excavated borrow pits, or may involve purpose-built excavated pits. CAD sites are those which involve filling a seabed pit with contaminated mud and capping it with uncontaminated material such that the original seabed level is restored and the contaminated material is isolated from the surrounding marine environment.
- (3) Detailed Site Selection Study for a Proposed Contaminated Mud Disposal Facility within the Airport East / East of Sha Chau Area (Agreement No. CE 12/2002(EP))
- (4) Under the CEDD study Contaminated Sediment Disposal Facility to the South of The Brothers (Agreement No. FM 2/2009)

1.1.4 An *Environmental Permit* (*EP-427/2011*) was issued by the Environmental Protection Department (*EPD*) to the CEDD, the Permit Holder, on 3 November 2011 and varied on 23 December 2011 (*EP-427/2011/A*). Under the requirements of *Condition 4* of the *EP* (*EP-427/2011/A*), an Environmental Monitoring and Audit (EM&A) programme as set out in the EM&A Manual is required to be implemented for the SB CMPs. The present EM&A programme undertaken under *Agreement No. CE 23/2012 (EP)* covers the dredging, disposal and capping operations of the SB CMPs.

1.2 REPORTING PERIOD

1.2.1 This Monthly Progress Report covers the EM&A activities for the reporting month of January 2013.

1.3 DETAILS OF SAMPLING AND LABORATORY TESTING ACTIVITIES

1.3.1 Impact Water Quality Monitoring during Dredging Operations of CMP 1 was conducted three times per week (ie 3, 5, 8, 10, 12, 15, 17, 19, 21, 24, 26, 29 and 31 January 2013) in this reporting month.

1.4 DETAILS OF OUTSTANDING SAMPLING AND/OR ANALYSIS

1.4.1 No outstanding sampling and laboratory analysis remained from January 2013. A summary of field activities are presented in *Annex A*.

1.5 Brief Discussion of the Monitoring Results for SB CMPs

1.5.1 All monitoring data collected for SB CMPs in January 2013 will be presented in this monthly report. Detailed discussion will be presented in the corresponding *Quarterly Report*.

1.5.2 Impact Water Quality Monitoring during Dredging Operations of CMP 1 – January 2013

1.5.3 Impact Water Quality Monitoring during Dredging Operations of CMP 1 was conducted three times per week in a total of thirteen sampling days in January 2013. On the survey day, sampling was conducted during both mid-ebb and mid-flood tides at two Reference (Upstream) stations upstream and five Impact (Downstream) stations downstream of the dredging operations at CMP 1. Monitoring was also conducted at five Sensitive Receiver Stations (Ma Wan, Shum Shui Kok, Tai Mo To and Tai Ho Bay). A total of twelve stations were monitored and locations of the sampling stations are shown in Figure 1.1.

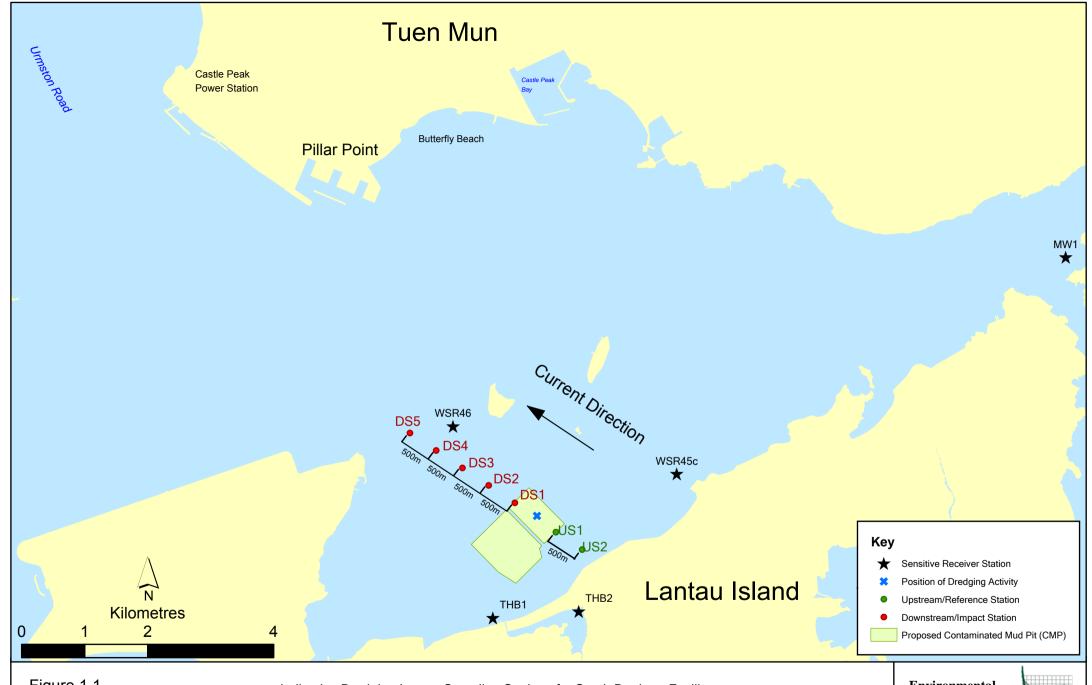


Figure 1.1

Indicative Dredging Impact Sampling Stations for South Brothers Facility

Note: The locations of sampling stations will be determined on site based on current direction and position of dredging activities

Environmental Resources Management



- 1.5.4 Monitoring results are presented in *Table B1* of *Annex B*. Levels of Dissolved Oxygen (DO), Turbidity and Suspended Solids (SS) generally complied with the Action and Limit Levels set in the Baseline Monitoring Report ⁽¹⁾, except on 29 January 2013 during the mid-flood tide.
- 1.5.5 On 29 January 2013, levels of SS exceeded the Action Levels at Impact Stations DS1 and DS2 during mid-flood tide.
- 1.5.6 Stations DS1 and DS2 are located in close proximity to the works area of CMP

 1. Since Action Level Exceedances of SS were recorded at stations DS1 and
 DS2 and during one tidal period amongst the 13 monitoring events only, it is
 considered that the sediment plume was transient and limited to the close
 vicinity of the works area as predicted in the EIA review of the Project (2).
 Hence, the dredging works did not appear to cause any unacceptable
 deterioration in water quality.
- 1.5.7 Overall, the results indicated that the dredging operations at CMP 1 of SB did not appear to cause any unacceptable deterioration in water quality during this reporting period. Therefore, no further mitigation measures, except for those recommended in the Environmental Permit (EP-427/2011/A), are considered necessary for the dredging operations.

1.6 ACTIVITIES SCHEDULED FOR THE NEXT MONTH

1.6.1 Impact Water Quality Monitoring during Dredging Operations for CMP 1 will be conducted three times per week in the next monthly period of February 2013. The sampling schedule is presented in Annex A.

1.7 STUDY PROGRAMME

1.7.1 A summary of the Study programme is presented in *Annex C*.

ERM (2012) Baseline Monitoring Report. Environmental Monitoring and Audit for Contaminated Mud Pits to the South of the Brothers and at East Sha Chau (2012-2017) – Investigation. Agreement No. CE 23/2012(EP).
 Submitted to EPD in October 2012.

⁽²⁾ Under the CEDD study Contaminated Sediment Disposal Facility to the South of The Brothers (Agreement No. FM 2/2009)

Annex A

Sampling Schedule

 $Annex\ A-Environmental\ Monitoring\ and\ Audit\ Sampling\ Schedule\ for\ South\ of\ The\ Brothers\ (September\ 2012-December\ 2017)$

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 $Annex\ A-Environmental\ Monitoring\ and\ Audit\ Sampling\ Schedule\ for\ South\ of\ The\ Brothers\ (September\ 2012-December\ 2017)$

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Near-Field		- mico per yem	 	++	++	++	+++	+++	+++	-		\dashv	\neg		+	++		 	+++	+		++	++	 	\dashv	 	\dashv	++	++	++	\vdash	+++	++
	SB-TAA	2 times per year									5			5																		Ш	
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	THB1	2 times per year 2 times per year			++-	1 1		+++	+ + +		5			5					+++			++	1 1	1 1 1			+ +	++	++	++	\leftarrow	+++	++
	THB2	2 times per year									5			5															+	\Box	\Box		
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	SB-TBA	2 times per year														5			5		5							\neg	11	H^{\dagger}	\cap	+	
	SB-TBB	2 times per year														5			5		5										ш		
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Reference South	TSA	2 times per year	 	++	++	++	+	+++	+++	+	*	\dashv	+	*	++	*	\vdash	+++	*	+	*	++	++	+++	+	+++	+	++	++	++	++	+++	++
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Annex A - Environmental Monitoring and Audit Sampling Schedule for South of The Brothers (September 2012 - December 2017)

						2012							2013						2014						2015					2016							2017		
outine Water Quality Monitoring			J	F M	A M	J	J A S	s o	N D	J F	M A	M J	J A	s c) N I) ј	F M	A M	4 J J	A S	S O N	D J	F	M A M	JЈ	A S	O N D	J F M	1 A N	1 J	J A S	s o	N D	J F	M A	A M	JЈ	A S	s c
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	WSR45C	8 times per year			 	+		-					8 8			9	9	0 0	2 9	9	0 0	8	9	8 8	9	8	8 8		+ +	+				+	+	+++		+	+
	WSR46	8 times per year				+							8 8		8 8	8	9	0 0	2 9	9	0 0	8	9	8 8	9	9	8 8			+			+		+			+	+
ood Tide	VV3K40	o times per year	-+		 	+	+	+	-++	+			0 0		, 0	0	0	0 0	, 0	0	0 0	0	0	0 0	0	0	0 0	+	++	+	+	+	+	$-\!\!\!\!+\!\!\!\!-$	+	+++	+	+	+
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pact Stations Downcurrent	SB-IPF1	0.0	-		 	+		-					0 0			-		0 0			0 0			0 0		0			+	+			\rightarrow		+			$-\!\!\!+\!\!\!\!-$	-
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	SB-RFF3	8 times per year			\vdash	++	+	+	\dashv	\rightarrow	\rightarrow		8 8	1 8	8	8	δ	8 8	5 8	8	8 8	8	8	8 8	- 8	8	8 8	++	+	++	+	++	\dashv	+	++		+	+	+
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	WSR45C	8 times per year		_		1 1							8 8			8		8 8	8	8	8 8	8		8 8	8	8	8 8				+	+	-	$-\!$	1	44		$-\!$	+
	WSR46	8 times per year											8 8	8	8	8	8	8 8	8	8	8 8	8	8	8 8	8	8	8 8												
ter Column Profiling			J 1	F M	A M	J	J A S	SO	N D	J F	M A																O N D		1 A N	I J	J A S	SO	N D	J F	M A	A M	JJ	A S	5 C
ume Stations	WCP1	Monthly	1		1 1			1 7					4 4	4 4	4 4	1 4 T	4 4	4 4	1 4 4	4 4	4 4 4	4 4	4	4 4 4	4 4	4 4	4 4 4	1 1		1 1	1	1 T				1 T	17	1 -	- 1

Water Column Profiling			J	F M A	M	J J	A S	O N	I D J	F N	1 A M	1 J	J A	S	O N	D]	J F	M A	M	J J	A	s o	N D	J	F M	A N	1 J	J A	S	O N	D J	F	M A	M J	J	A S	6 0	N D	J	F M	A M	J J	A S	6 0	N D
Plume Stations	WCP1	Monthly											4 4	4	4 4	4 4	4 4	4 4	4	4 4	4	4 4	4 4	4	4 4	4	1 4	4 4	4	4 4	4														
	WCP2	Monthly											4 4	4	4 4	4 4	4 4	4 4	4	4 4	4	4 4	4 4	4	4 4	4	1 4	4 4	4	4 4	4														

 $Annex\ A-Environmental\ Monitoring\ and\ Audit\ Sampling\ Schedule\ for\ South\ of\ The\ Brothers\ (September\ 2012-December\ 2017)$

					20	12				2	013				20	014					2015					20	016					20	17		
Capping Water Quality Monitoring			J F	M A	МІ	I A	s o	N D	J F M	A M I	J A S	O N	DI	F M A	MI	I A	s o	N D	J F	M A	мііі	A 9	6 O N	DIF	F M	A M I	I A	s o	N D	ī	F M A	M I	I A	S O N	D
Ebb Tide			, ,		,	,		., 2	,	,	,		,		,	,	5 0 .	., 2	, ,	111))		7 0 11	, ,		,	,		., 2	,		,	,	5 0 1	Ë
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	SB-IPE1	8 times per year																		1 1 1		1 1		3 3	3	3 3	3 3	3	3	1 1					+
	SB-IPE2	8 times per year																		1 1 1				3 3			3 3		3	1 1					\top
	SB-IPE3	8 times per year																						3 3	3	3 3	3 3	3	3						
	SB-IPE4	8 times per year																						3 3	3	3 3	3 3	3	3						
	SB-IPE5	8 times per year																						3 3	3	3 3	3 3	3	3						
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	SB-INE1	8 times per year																						3 3	3	3 3	3 3	3	3						
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	SB-INE5	8 times per year																						3 3	3	3 3	3 3	3	3						
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	SB-RFE2	8 times per year																						3 3			3 3		3						
	SB-RFE3	8 times per year																						3 3	3	3 3	3 3		3						
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	SB-RFE5	8 times per year																						3 3	3	3 3	3 3	3	3						
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	WSR45C	8 times per year																						3 3	3	3 3	3 3		3						$oxed{oxed}$
	WSR46	8 times per year																						3 3	3	3 3	3 3	3	3						
Flood Tide																																			
Impact Stations Downcurrent																																			
	SB-IPF1	8 times per year																						3 3	3	3 3	3 3	3	3						
	SB-IPF2	8 times per year																						3 3	3	3 3	3 3	3	3						
	SB-IPF3	8 times per year																						3 3	3	3 3	3 3	3	3						
Intermediate Stations Downcurrent																																			
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	SB-INF2	8 times per year																						3 3	3	3 3	3 3	3	3						
	SB-INF3	8 times per year																						3 3	3	3 3	3 3	3	3						
Reference Stations Upcurrent																																			
	SB-RFF1	8 times per year																						3 3	3	3 3	3 3	3	3						
	SB-RFF2	8 times per year																						3 3			3 3		3						
	SB-RFF3	8 times per year																						3 3	3	3 3	3 3	3	3						
Sensitive Receiver Stations																																			
	MW1	8 times per year																						3 3	3	3 3	3 3	3	3						
	THB1	8 times per year																																	
	THB2	8 times per year																																	
	WSR45C	8 times per year																						3 3				3							
	WSR46	8 times per year																						3 3	3	3 3	3 3	3	3						
Benthic Recolonisation Studies			J F	M A	M J	J A	S O	N D]	J F M	A M J	J A S	O N	D J	F M A	M J	J A	S O	N D	J F	M A	M J J	A S	S O N	D J I	F M	A M J	J A	SO	N D	J	F M A	M J	J A	S O N	D
Capped Contaminated Mud Pits																																			
	SB-CPA	2 times per year																									12		12	2			12		12
	SB-CPB	2 times per year																									12		12	2			12		12
																											12		12	2			12		12
Reference Stations																																			
	RBA	2 times per year																									12		12	2			12		12
	RBB	2 times per year																									12		12	,			12		12
	RBC																										12								12

Notes:
"" = Number of replicates depends on parameters
Naming of stations are tentative only and will be subjected to changes

Annex B

Results of Impact Monitoring during Dredging Operations of CMP 1 in January 2013

Table B1 Summary Table of DO, Turbidity and SS Levels Recorded in January 2013

Sampling Date	Tidal Period	Station		DO Levels ng/L)	Average Turbidity	Average S Level
			Bottom	Surface and	Level	(mg/L)
				Mid Depth	(NTU)	
2013/1/3	Mid-Ebb	DS1	7.13	7.14	3.29	4.88
		DS2	7.10	7.08	2.92	4.77
		DS3	7.11	7.15	2.80	5.10
		DS4	7.00	7.01	2.67	4.39
		DS5	7.09	7.10	2.56	4.29
		US1	7.62	7.62	4.02	7.99
		US2	7.66	7.66	6.90	8.32
		MW1	7.13	7.11	2.57	5.43
		THB1	7.83	7.84	2.96	5.22
		THB2	-	7.59	9.64	11.53
		WSR45C	7.09	7.08	1.98	4.88
		WSR46	7.18	7.15	3.35	5.74
	Mid-Flood	DS1	7.40	7.40	9.54	11.57
		DS2	7.43	7.42	8.24	9.63
		DS3	7.45	7.47	5.78	7.61
		DS4	7.47	7.50	5.14	6.32
		DS5	_	7.53	5.24	6.53
		US1	7.25	7.27	6.27	8.10
		US2	7.13	7.16	9.40	9.62
		MW1	6.89	6.86	4.12	6.59
		THB1	7.64	7.65	4.55	7.87
		THB2	_	7.07	8.95	7.23
		WSR45C	7.21	7.20	5.67	8.31
		WSR46	7.40	7.41	5.85	9.92
2013/1/5	Mid-Ebb	DS1	7.09	7.07	11.20	14.71
, ., .		DS2	7.04	7.06	10.58	14.37
		DS3	7.05	7.07	6.72	11.64
		DS4	7.07	7.08	3.82	7.09
		DS5	7.13	7.11	3.57	6.48
		US1	7.38	7.35	8.43	12.08
		US2	7.28	7.27	6.55	9.71
		MW1	7.31	7.28	1.33	4.76
		THB1	7.59	7.57	5.25	6.80
		THB2	-	7.62	6.12	10.47
		WSR45C	7.32	7.24	1.92	5.26
		WSR46	7.15	7.24	1.90	6.40
	Mid-Flood	DS1	7.09	7.05	3.12	4.89
	1111a 1100a	DS2	7.09	7.08	3.14	6.14
		DS3	7.13	7.12	2.89	5.48
		DS4	7.13	7.12	4.07	5.92
		DS5	7.46	7.43	4.07	8.18
		US1	6.88	6.91	3.11	6.00
		US2	6.89	6.91	3.05	5.82
		MW1	7.24	7.23	2.71	6.01
		THB1	7.2 4 7.59	7.23 7.60	2.71	5.87
		THB1				
			- 7.20	7.60	4.78	6.60
		WSR45C	7.28	7.28	2.98	6.24

Sampling Date	Tidal Period	Station		e DO Levels ng/L)	Average Turbidity	Average SS Level
			Bottom	Surface and Mid Depth	Level (NTU)	(mg/L)
2013/1/8	Mid-Ebb	DS1	7.10	7.11	2.29	4.30
		DS2	7.09	7.09	1.97	4.18
		DS3	7.06	7.08	1.86	4.98
		DS4	7.08	7.08	1.71	4.34
		DS5	7.10	7.12	1.66	4.29
		US1	7.53	7.52	2.59	5.53
		US2	7.64	7.65	6.18	8.65
		MW1	7.21	7.21	1.71	4.31
		THB1	7.88	7.83	1.72	5.25
		THB2	-	7.62	5.30	6.03
		WSR45C	7.30	7.25	1.52	4.58
		WSR46	7.40	7.39	1.67	4.52
	Mid-Flood	DS1	7.44	7.43	2.32	5.61
		DS2	7.86	7.68	2.31	6.56
		DS3	8.33	8.04	2.83	6.12
		DS4	8.92	8.80	3.24	6.18
		DS5	-	8.63	2.63	5.83
		US1	7.33	7.36	1.98	4.53
		US2	7.36	7.41	1.59	5.27
		MW1	7.24	7.22	1.64	5.53
		THB1	8.32	8.32	1.87	5.43
		THB2	-	8.65	7.12	7.67
		WSR45C	7.22	7.29	1.21	3.93
		WSR46	7.22	7.40	1.78	5.09
2013/1/10	Mid-Ebb	DS1	7.04	7.06	2.93	5.92
		DS2	7.07	7.09	2.64	4.76
		DS3	7.11	7.13	2.43	3.86
		DS4	7.12	7.15	2.41	4.03
		DS5	7.27	7.25	2.35	4.16
		US1	7.81	7.83	3.95	5.66
		US2	7.89	7.88	5.08	7.22
		MW1	7.16	7.12	3.30	4.89
		THB1	8.48	8.43	2.66	7.85
		THB2	-	8.51	6.31	8.57
		WSR45C	7.28	7.28	1.90	4.69
		WSR46	7.98	7.70	4.13	6.59
	Mid-Flood	DS1	7.81	7.79	3.46	5.87
		DS2	7.99	7.94	3.02	5.31
		DS3	8.62	8.48	2.99	5.72
		DS4	8.73	8.77	4.16	7.03
		DS5	_	8.78	4.96	7.43
		US1	7.34	7.32	3.29	4.71
		US2	7.33	7.35	3.52	5.07
		MW1	7.63	7.59	2.81	4.71
		THB1	9.13	9.25	2.42	5.55
		THB2	-	9.60	5.81	4.27
		WSR45C	7.72	7.68	2.11	4.70
		WSR46	7.89	7.72	2.85	4.43
2013/1/12	Mid-Ebb	DS1	7.51	7.56	3.58	6.34
	200	DS2	7.51	7.57	3.52	6.81
		DS3	7.50	7.64	3.33	5.86

Sampling Date	Tidal Period	Station		DO Levels ng/L)	Average Turbidity	Average S Level
			Bottom	Surface and Mid Depth	Level (NTU)	(mg/L)
		DS4	7.58	7.67	3.47	6.14
		DS5	7.89	7.88	3.46	5.64
		US1	7.94	7.97	4.60	7.43
		US2	7.87	7.90	14.14	13.67
		MW1	7.35	7.29	3.65	5.74
		THB1	8.39	8.39	3.12	7.15
		THB2	_	9.03	4.86	7.87
		WSR45C	7.55	7.56	2.59	5.46
		WSR46	7.60	7.66	4.09	7.03
	Mid-Flood	DS1	7.62	7.64	9.55	13.33
		DS2	7.67	7.68	9.38	11.22
		DS3	7.72	7.68	8.36	10.16
		DS4	8.04	8.07	5.48	7.67
		DS5	_	7.86	4.79	6.83
		US1	7.54	7.54	7.87	9.52
		US2	7.45	7.48	11.23	14.07
		MW1	7.82	7.76	5.68	7.98
		THB1	8.41	8.42	3.75	7.37
		THB2	-	8.01	4.83	6.23
		WSR45C	7.85	7.82	10.37	10.56
		WSR46	7.76	7.73	8.14	9.68
2013/1/15	Mid-Ebb	DS1	7.70	7.71	4.35	6.97
2010/1/10	Wild Ecc	DS2	7.65	7.72	4.31	6.09
		DS3	7.66	7.73	4.35	6.47
		DS4	7.82	7.88	3.86	5.23
		DS5	8.15	8.22	3.87	5.81
		US1	8.06	8.09	6.69	8.41
		US2	8.14	8.16	8.31	10.63
		MW1	7.51	7.53	3.57	5.62
		THB1	8.94	8.99	3.06	5.63
		THB2	-	9.06	6.23	7.93
		WSR45C	7.80	7.94	3.40	5.66
		WSR45C WSR46	7.76	7.94	3.74	5.66
	Mid-Flood	DS1	7.78	7.79	9.19	9.91
	W11d-1100d	DS2	7.78			
		DS2 DS3	7.84 7.87	7.85 7.88	9.66 7.74	12.72 9.18
		DS4				
		DS5	7.84 -	7.86 7.92	8.01 6.27	9.86 8.73
		US1	7.85	7.92	8.28	10.60
		US2				
		MW1	7.75 7.66	7.77	7.28	9.39
		THB1	7.66 8.83	7.65	9.99 4.03	11.28 7.50
		THB1	8.83	8.88	4.03	7.50
			7 00	8.21	4.21	8.97
		WSR45C	7.89	7.91	8.79	11.44
2012 /1 /17	M; J 171-1-	WSR46	7.92	7.95	10.88	11.60
2013/1/17	Mid-Ebb	DS1	8.01	8.21	9.94	13.43
		DS2	7.70	8.21	4.25	6.10
		DS3	7.79	8.22	4.27	6.76
		DS4	7.66	8.30	3.44	5.70
		DS5	8.26	8.34	3.45	5.86
		US1	8.50	8.50	5.29	7.40

Sampling Date	Tidal Period	Station		e DO Levels ng/L)	Average Turbidity	Average S Level
			Bottom	Surface and Mid Depth	Level (NTU)	(mg/L)
		US2	8.48	8.51	4.41	6.87
		MW1	7.42	7.46	2.57	5.16
		THB1	9.12	9.04	2.79	6.48
		THB2	-	9.40	3.27	8.30
		WSR45C	7.34	7.85	2.89	5.16
		WSR46	7.68	7.89	3.87	6.22
	Mid-Flood	DS1	7.90	7.90	4.37	6.43
		DS2	7.96	7.96	4.06	5.58
		DS3	8.09	8.09	4.39	6.48
		DS4	8.27	8.28	4.09	6.31
		DS5	8.73	8.62	4.19	6.60
		US1	7.84	7.90	4.35	7.24
		US2	7.62	7.68	5.30	7.90
		MW1	7.27	7.28	4.08	7.28
		THB1	7.96	7.97	3.09	6.18
		THB2	-	8.82	6.19	8.07
		WSR45C	7.55	7.54	5.63	8.08
		WSR46	7.63	7.60	6.78	9.78
2013/1/19	Mid-Ebb	DS1	7.95	8.28	15.94	18.57
		DS2	8.09	8.37	8.41	11.00
		DS3	7.97	8.48	4.25	6.28
		DS4	7.93	8.53	2.96	5.11
		DS5	8.60	8.85	3.21	5.62
		US1	8.91	8.92	4.65	7.82
		US2	8.84	8.94	4.68	6.12
		MW1	7.60	7.59	1.33	4.12
		THB1	9.54	9.62	3.10	6.43
		THB2	-	9.23	4.55	7.63
		WSR45C	7.79	8.35	1.82	4.62
		WSR46	8.35	8.36	4.00	6.60
	Mid-Flood	DS1	8.10	8.13	5.44	7.92
		DS2	8.25	8.34	4.71	5.96
		DS3	8.37	8.45	4.45	6.59
		DS4	8.74	8.87	4.00	5.67
		DS5	9.41	9.47	3.58	6.27
		US1	7.64	7.95	3.08	4.98
		US2	7.59	8.14	3.01	4.42
		MW1	7.27	7.29	1.90	3.90
		THB1	9.10	9.18	2.33	6.02
		THB2	-	8.76	7.47	7.43
		WSR45C	7.86	8.19	2.29	5.37
		WSR46	7.87	8.25	2.45	5.29
2013/1/21	Mid-Ebb	DS1	8.88	9.09	3.57	6.01
		DS2	8.54	8.91	2.45	4.97
		DS3	8.21	8.56	2.02	4.61
		DS4	8.02	8.61	1.88	4.11
		DS5	8.23	8.51	2.38	6.34
		US1	8.84	9.08	7.19	9.02
		US2	8.97	9.15	5.77	8.71
		MW1	6.86	7.04	0.82	4.34
		THB1	8.80	8.98	2.55	5.77

Sampling Date	Tidal Period	Station		Average DO Levels (mg/L)		Average SS Level
			Bottom	Surface and Mid Depth	Turbidity Level (NTU)	(mg/L)
		THB2	-	11.06	3.61	5.67
		WSR45C	7.33	7.99	1.34	4.14
		WSR46	7.72	8.22	1.71	4.46
	Mid-Flood	DS1	9.06	9.12	4.40	6.78
		DS2	9.65	9.73	5.67	8.50
		DS3	10.00	10.08	8.25	10.99
		DS4	10.11	10.17	14.23	16.97
		DS5	-	10.53	3.68	7.87
		US1	8.94	8.96	5.49	8.66
		US2	8.75	8.84	6.34	8.78
		MW1	7.23	7.22	1.51	4.89
		THB1	9.54	9.63	2.78	6.75
		THB2	-	10.84	5.08	7.83
		WSR45C	7.80	8.49	1.69	6.40
		WSR46	8.11	8.64	2.08	6.20
2013/1/24	Mid-Ebb	DS1	8.67	9.16	2.74	4.69
		DS2	8.41	8.83	2.58	5.08
		DS3	8.25	8.80	2.62	4.94
		DS4	8.25	8.84	2.69	5.20
		DS5	9.19	9.35	2.71	5.70
		US1	9.25	9.56	4.98	7.54
		US2	9.38	9.53	5.59	8.98
		MW1	7.36	7.57	1.62	4.42
		THB1	9.70	9.86	2.80	6.85
		THB2	-	9.40	3.78	7.63
		WSR45C	8.08	8.75	2.03	4.48
		WSR46	9.08	9.37	2.96	6.08
	Mid-Flood	DS1	9.80	10.03	6.97	10.28
		DS2	10.27	10.64	4.56	8.18
		DS3	10.24	10.32	6.61	8.99
		DS4	10.26	10.31	10.51	13.48
		DS5	10.26	10.96	5.82	9.10
		US1	10.44	10.36	3.25	6.66
		US2	9.53	9.94	3.62	5.64
		MW1	7.61	7.64	2.33	5.31
		THB1	10.45	10.80	3.07	7.05
		THB2	-	12.53	6.14	11.27
		WSR45C	9.64	10.10	2.50	6.52
		WSR46	8.90	9.49	2.39	7.17
2013/1/26	Mid-Ebb	DS1	8.52	9.08	2.59	5.98
		DS2	8.61	9.56	2.56	5.56
		DS3	8.44	9.05	2.67	5.47
		DS4	8.47	9.07	2.72	5.89
		DS5	9.00	9.11	3.30	6.23
		US1	9.61	9.81	5.83	9.23
		US2	9.54	9.74	7.76	11.04
		MW1	7.17	7.28	2.13	6.52
		THB1	10.09	10.21	4.07	8.97
		THB2	-	8.92	7.46	11.07
			7.00	8.40	2.00	4.98
		WSR45C	7.80	A 4U	/ [][]	4 95

Sampling Date	Tidal Period	Station		Average DO Levels (mg/L)		Average SS Level
			Bottom	Surface and Mid Depth	Level (NTU)	(mg/L)
	Mid-Flood	DS1	9.57	9.71	6.02	9.58
		DS2	9.66	10.15	5.72	9.00
		DS3	9.48	9.84	6.72	9.61
		DS4	9.67	9.67	6.99	10.67
		DS5	10.26	10.30	5.53	9.60
		US1	8.62	9.14	7.40	8.18
		US2	8.06	8.63	6.33	7.52
		MW1	7.75	7.89	2.19	4.68
		THB1	10.22	10.27	3.22	8.07
		THB2	-	9.80	12.56	9.90
		WSR45C	8.50	9.50	2.63	5.64
		WSR46	8.96	9.34	3.04	6.94
2013/1/29	Mid-Ebb	DS1	8.23	8.35	4.50	7.57
		DS2	8.17	8.38	3.76	6.14
		DS3	8.25	8.42	4.10	5.48
		DS4	8.33	8.48	4.67	5.73
		DS5	8.58	8.63	4.70	8.47
		US1	8.43	8.45	12.81	14.51
		US2	8.34	8.40	13.33	17.26
		MW1	7.45	7.56	2.05	4.62
		THB1	8.71	8.93	3.34	8.57
		THB2	-	9.32	5.21	8.30
		WSR45C	7.47	7.99	2.66	5.01
		WSR46	7.77	7.90	2.85	6.46
	Mid-Flood	DS1	8.08	8.09	24.71	34.95
		DS2	8.06	8.12	13.00	22.30
		DS3	7.99	8.02	6.92	9.37
		DS4	8.11	8.19	4.65	6.41
		DS5	8.55	8.77	4.25	6.12
		US1	7.91	7.99	5.11	7.31
		US2	7.77	7.81	4.72	7.36
		MW1	7.80	7.90	3.39	9.23
		THB1	8.39	8.45	4.73	9.33
		THB2	-	8.07	4.97	5.57
		WSR45C	8.26	8.23	5.31	6.62
		WSR46	8.16	8.16	7.69	10.09
2013/1/31	Mid-Ebb	DS1	7.94	8.00	7.60	12.37
		DS2	7.79	7.99	5.98	9.69
		DS3	7.81	8.11	3.42	6.03
		DS4	7.80	8.01	3.27	6.09
		DS5	8.01	8.14	3.78	6.42
		US1	8.21	8.17	7.99	12.25
		US2	8.13	8.12	8.07	11.83
		MW1	6.98	7.01	2.37	6.64
		THB1	7.75	7.76	2.84	7.10
		THB2	-	8.79	5.15	8.47
		WSR45C	6.97	7.27	2.97	6.29
		WSR46	7.20	7.30	5.39	9.00
	Mid-Flood	DS1	8.03	8.16	14.08	19.35
		DS2	7.79	7.80	8.32	18.72
		DS3	7.81	7.81	5.97	9.91

Sampling Date	Tidal Period	Station	Average DO Levels (mg/L)		Average Turbidity	Average SS Level
			Bottom	Surface and Mid Depth	Level (NTU)	(mg/L)
		DS4	7.80	7.81	4.65	7.57
		DS5	7.95	7.91	4.38	7.63
		US1	7.76	7.76	6.54	9.79
		US2	7.65	7.67	7.43	11.52
		MW1	7.41	7.46	2.83	6.93
		THB1	7.62	7.61	3.87	6.50
		THB2	-	7.67	5.38	14.37
		WSR45C	7.52	7.55	7.46	11.31
		WSR46	7.48	7.50	6.90	11.46

Notes:

- 1. Please refer to Table B2 below for the Action and Limit Levels for dredging activities.
- 2. Cell shaded yellow indicated value exceeding the Action Level criteria.
- $3. \quad \text{Cell shaded red indicated value exceeding the Limit Level criteria.} \\$
- 4. Only mid-depth water was sampled at Station THB2 because water depth was less than 3m.

Table B2 Action and Limit Levels of Water Quality for Dredging, Backfilling and Capping Activities

Parameter	Action Level	Limit Level		
Dissolved Oxygen (DO) (1)	Surface and Mid-depth (2)	Surface and Mid-depth (2)		
Dibberved Oxygen (DO)	The average of the impact, WSR	The average of the impact, WSR		
	45C and WSR 46 station readings	45C and WSR 46 station readings		
	are < 5%-ile of baseline data for	are < 4 mg L ⁻¹		
	surface and middle layer = 4.32 mg			
	L-1	and		
	2	uru		
	and	Significantly less than the reference		
		stations mean DO (at the same tide		
	Significantly less than the reference	of the same day)		
	stations mean DO (at the same tide	3,		
	of the same day)			
	,			
	Bottom	<u>Bottom</u>		
	The average of the impact, WSR	The average of the impact station,		
	45C and WSR 46 station readings	WSR 45C and WSR 46 readings are		
	are < 5%-ile of baseline data for	< 2 mg L ⁻¹		
	bottom layers = 3.12 mg L^{-1}			
		and		
	and			
		Significantly less than the reference		
	Significantly less than the reference	stations mean DO (at the same tide		
	stations mean DO (at the same tide	of the same day)		
	of the same day)			
Depth-averaged	The average of the impact, WSR	The average of the impact, WSR		
Suspended Solids (SS) (3) (4)	45C and WSR 46 station readings	45C and WSR 46 station readings		
	are > 95%-ile of baseline data for	are > 99%-ile of baseline data for		
	depth average = 21.60 mg L ⁻¹	depth average = 40.10 mg L ⁻¹		
	J			
	and	and		
	120% of control station's SS at the	130% of control station's SS at the		
	same tide of the same day	same tide of the same day		
Depth-averaged Turbidity	The average of the impact, WSR	The average of the impact, WSR		
(Tby) (3) (4)	45C and WSR 46 station readings	45C and WSR 46 station readings		
` ',	are > 95%-ile of baseline data =	are > 99%-ile of baseline data =		
	25.04 NTU	56.30 NTU		
	and	and		
	120% of control station's Tby at the	130% of control station's Tby at the		
	same tide of the same day	same tide of the same day		
	,	,		

Notes:

- (1) For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.
- (2) The Action and Limit Levels for DO for Surface & Middle layers were calculated from the combined pool of baseline surface layer data and baseline middle layer data.
- 3) "Depth-averaged" is calculated by taking the arithmetic means of reading of all three depths.
- (4) For turbidity and SS, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.

Annex C

Study Programme

