

**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)**

**9th Monthly Progress Report for Contaminated
 Mud Pits to the South of The Brothers and at
 East Sha Chau – May 2013**

Revision 0

17 June 2013

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Client:		Project No:			
Civil Engineering and Development Department (CEDD)		0175086			
Summary:		Date:			
This document presents the ninth monthly progress report for Contaminated Mud Pits at the South of The Brothers and at East Sha Chau.		17 June 2013			
		Approved by:			
					
		Craig A. Reid Partner			
v0	9 th Monthly Progress Report for CMP V and SB CMPs	CL	JT	CAR	17/6/13
Revision	Description	By	Checked	Approved	Date
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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:	9 th Monthly Progress Report for Contaminated Mud Pits to the South of The Brothers and at East Sha Chau – May 2013
Date of Report:	17 June 2013
Date prepared by ET:	17 June 2013
Date received by IA:	17 June 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 non-compliance (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: 17/6/2013

IA Verification

I hereby verify that the above referenced document/ plan complies with the above referenced condition of EP-427/2011/A	
Dr Wang Wen Xiong, Independent Auditor:	 Date: 17/6/2013

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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

9TH MONTHLY PROGRESS REPORT FOR May 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 ⁽¹⁾ 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 May 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 2, 4, 6, 8, 10, 13, 15, 18, 20, 23, 25, 27, 29, 31 May 2013) in this reporting month in accordance with the EM&A Manual.

1.4 **DETAILS OF OUTSTANDING SAMPLING AND/OR ANALYSIS**

1.4.1 No outstanding sampling remained from May 2013. Laboratory analysis of Suspended Solids (SS) collected after 25 May 2013 was still in progress during the preparation of this monthly report. A summary of field activities conducted are presented in *Annex A*.

1.5 **BRIEF DISCUSSION OF THE MONITORING RESULTS FOR SB CMPs**

1.5.1 Monitoring data collected for SB CMPs from 26 April to 25 May 2013 are presented in this monthly report. Detailed discussion will be presented in the corresponding *Quarterly Report*.

(1) ERM (2012) Environmental Monitoring and Audit (EM&A) Manual. Final First Review. 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 November 2012.

1.5.2 **Impact Water Quality Monitoring during Dredging Operations of CMP 1 – April and May 2013**

1.5.3 *Impact Water Quality Monitoring during Dredging Operations of CMP 1* was conducted three times per week for a total of thirteen (13) sampling days from 26 April to 25 May 2013. On each 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*.

1.5.4 Monitoring results from 26 April to 25 May 2013 are presented in *Table B1 of Annex B*. It should be noted that sampling at station THB2 during mid-flood tide on 8 May 2013, during mid-ebb tide on 10 May 2013 and during both mid-flood and mid-ebb tides on 25 May 2013 were not carried out due to adverse weather. Levels of Dissolved Oxygen (DO), Turbidity and SS at most of the stations generally complied with the Action and Limit Levels (see *Table B2* for details) set in the Baseline Monitoring Report ⁽¹⁾, except for the following occasions of exceedances shown in *Table 1.1* below.

Table 1.1 Details of exceedances recorded at CMP 1 between 26 April and 25 May 2013

Date	Tide	Parameter	Station	Type
26 April 2013	Flood	Turbidity	DS4	Action
26 April 2013	Flood	Turbidity	DS5	Action
26 April 2013	Ebb	SS	WSR46	Action
26 April 2013	Flood	SS	DS3	Action
26 April 2013	Flood	SS	DS4	Limit
26 April 2013	Flood	SS	DS5	Action
29 April 2013	Ebb	SS	WSR46	Action
29 April 2013	Flood	SS	WSR46	Action
2 May 2013	Ebb	Turbidity	DS1	Action
2 May 2013	Ebb	SS	DS1	Action
2 May 2013	Flood	SS	DS2	Action
6 May 2013	Ebb	SS	DS1	Action
8 May 2013	Flood	SS	DS3	Action
8 May 2013	Flood	SS	DS4	Action
8 May 2013	Flood	SS	DS5	Action
10 May 2013	Ebb	SS	DS2	Action
10 May 2013	Flood	SS	DS2	Action
10 May 2013	Flood	SS	WSR45C	Action
10 May 2013	Flood	SS	WSR46	Action
13 May 2013	Ebb	SS	DS1	Action
15 May 2013	Flood	SS	WSR46	Action
23 May 2013	Flood	SS	WSR46	Action

(1) 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.

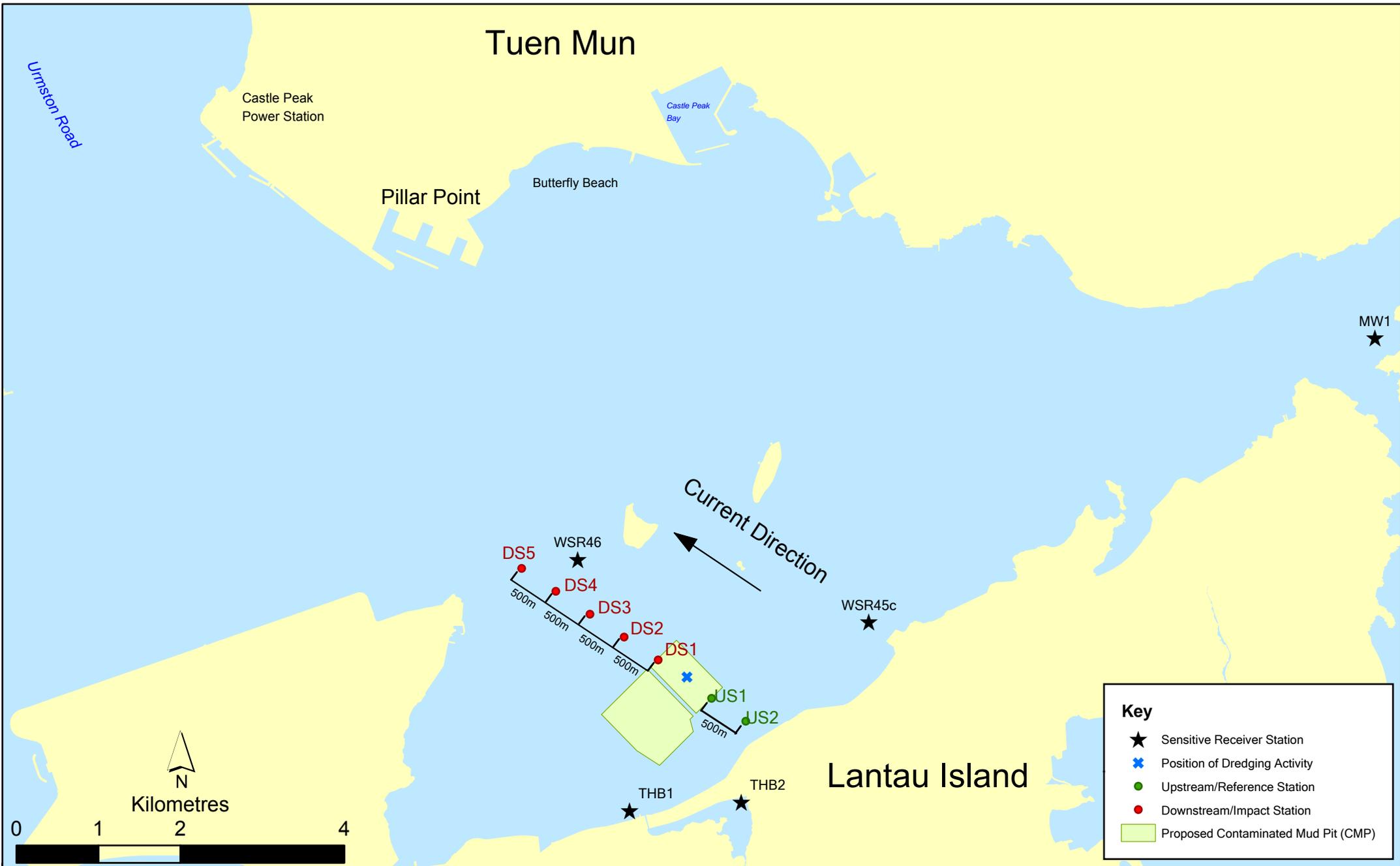


Figure 1.1

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

- 1.5.5 Action Level exceedances of Turbidity and SS were recorded at Impact station DS1 during mid-ebb tide on 2 and 6 May 2013. Station DS1 is located in close proximity to the works area of CMP 1 (ie within 500m from the works area). Since the exceedances were recorded at station DS1 and during one tidal period only, it is considered that the sediment plume, if any, was transient in nature and limited to the close vicinity of the works area as predicted in the EIA review of the Project ⁽¹⁾. Hence, the dredging works did not appear to cause any unacceptable deterioration in water quality.
- 1.5.6 Exceedances were recorded at stations DS2, DS3, DS4, DS5, WSR45C and WSR46 on other occasions. These stations are located further away from the works area of CMP 1 when compared to station DS1 at which the levels of SS and Turbidity did not exceed the Action and Limit Levels. As such, the exceedances at these stations (ie DS3, DS4, DS5, WSR45C and WSR46) are not likely to be caused by the dredging works at CMP 1. It should be noted that high levels of Turbidity and SS were occasionally recorded during baseline monitoring which are considered to be sporadic events and characteristic of water quality in this area of Hong Kong. Therefore, the Action and Limit Level exceedances may be caused by natural background variation in water quality of the area.
- 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 June 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*.

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

Annex A

Sampling Schedule

Annex B

Results of Impact
Monitoring during
Dredging Operations of
CMP 1 in April and May
2013

Table B1 *Summary Table of DO, Turbidity and SS Levels Recorded in April and May 2013*

Sampling Date	Tidal Period	Station	Average DO Levels (mg/L)		Average Turbidity Level (NTU)	Average SS Level (mg/L)	
			Bottom	Surface and Mid Depth			
2013/4/26	Mid-Ebb	DS1	6.33	6.38	12.13	16.44	
		DS2	6.39	6.52	9.10	10.50	
		DS3	6.34	6.40	11.01	17.56	
		DS4	6.36	6.35	10.93	16.89	
		DS5	6.41	6.36	12.92	18.50	
		US1	6.44	6.52	9.88	10.33	
		US2	6.41	6.44	10.00	13.17	
		MW1	6.47	6.57	5.66	10.78	
		THB1	6.39	6.40	14.40	21.00	
		THB2	-	6.13	5.53	7.33	
		WSR45C	6.37	6.49	12.26	17.67	
		WSR46	6.60	6.57	24.10	37.78	
		Mid-Flood	DS1	6.63	6.62	8.53	11.33
			DS2	6.62	6.59	11.22	12.83
	DS3		6.66	6.58	18.60	24.50	
	DS4		6.61	6.61	44.00	58.50	
	DS5		6.49	6.48	29.99	37.78	
	US1		6.42	6.43	14.78	21.33	
	US2		6.39	6.40	11.57	14.56	
	MW1		6.39	6.39	14.44	15.33	
	THB1		6.41	6.38	24.60	23.83	
	THB2		-	6.46	8.53	14.33	
	WSR45C		6.38	6.41	15.41	18.89	
	WSR46		6.44	6.49	22.17	19.56	
	2013/4/29	Mid-Ebb	DS1	6.48	6.54	12.37	18.17
			DS2	6.58	6.61	11.52	17.83
DS3			6.42	6.62	13.27	17.56	
DS4			6.66	6.72	8.48	12.33	
DS5			6.65	6.64	9.62	13.83	
US1			6.53	6.56	13.93	20.50	
US2			6.70	6.71	12.50	18.83	
MW1			6.47	6.56	7.07	8.22	
THB1			6.71	6.96	9.02	11.33	
THB2			-	7.05	3.81	7.33	
WSR45C			6.37	6.56	17.65	18.00	
WSR46			6.31	6.44	20.65	23.22	
Mid-Flood			DS1	6.49	6.51	20.32	27.33
			DS2	6.58	6.56	8.60	11.67
		DS3	6.64	6.63	6.97	8.50	
		DS4	6.67	6.71	8.08	10.17	
		DS5	6.69	6.69	13.28	17.22	
		US1	6.50	6.62	12.67	14.89	
		US2	6.42	6.54	14.72	20.67	
		MW1	6.27	6.36	8.96	10.78	
		THB1	6.69	6.77	9.64	13.00	
		THB2	-	6.36	6.87	12.33	
		WSR45C	6.31	6.57	16.13	18.11	

Sampling Date	Tidal Period	Station	Average DO Levels (mg/L)		Average Turbidity Level (NTU)	Average SS Level (mg/L)
			Bottom	Surface and Mid Depth		
		WSR46	6.37	6.55	24.07	28.22
2013/5/2	Mid-Ebb	DS1	6.82	6.90	27.70	37.67
		DS2	6.87	6.87	8.35	11.00
		DS3	6.25	6.69	10.48	15.89
		DS4	6.82	6.68	7.02	11.17
		DS5	6.47	6.48	8.98	12.33
		US1	6.54	6.95	8.98	8.83
		US2	6.74	6.97	12.15	12.00
		MW1	6.50	6.70	4.45	8.67
		THB1	6.71	6.79	6.77	11.17
		THB2	-	6.15	6.07	7.33
	WSR45C	6.16	6.48	8.49	17.00	
	Mid-Flood	WSR46	6.43	6.59	6.48	8.78
		DS1	6.72	6.81	8.68	8.50
		DS2	6.71	6.85	19.65	22.50
		DS3	6.63	6.90	12.87	14.33
		DS4	6.88	6.91	7.97	7.67
		DS5	6.90	6.91	8.48	7.17
		US1	6.46	6.64	5.73	6.00
		US2	6.41	6.62	5.81	6.44
		MW1	6.28	6.38	3.43	4.44
THB1		6.70	6.69	6.29	7.00	
THB2	-	6.11	6.01	4.00		
WSR45C	6.39	6.49	6.64	8.11		
WSR46	6.45	6.90	6.34	6.89		
2013/5/4	Mid-Ebb	DS1	6.36	6.42	8.87	12.33
		DS2	6.49	6.50	4.47	8.33
		DS3	6.16	6.28	5.64	9.33
		DS4	6.27	6.33	5.47	8.67
		DS5	6.28	6.28	6.53	10.67
		US1	6.71	6.70	6.28	6.50
		US2	6.71	6.68	6.68	9.33
		MW1	6.29	6.39	3.61	6.44
		THB1	6.27	6.65	9.29	16.50
		THB2	-	6.22	3.51	3.67
	WSR45C	6.19	6.66	4.83	5.89	
	Mid-Flood	WSR46	6.30	6.54	7.76	12.00
		DS1	6.72	6.78	19.92	15.83
		DS2	6.77	6.78	5.50	10.17
		DS3	6.90	6.87	5.62	9.17
		DS4	7.03	6.98	4.97	7.50
		DS5	6.49	6.99	7.24	11.89
		US1	6.46	6.64	6.11	9.89
		US2	6.41	6.69	6.04	9.56
		MW1	6.28	6.35	4.40	7.22
THB1		6.86	6.96	6.22	6.67	
THB2	-	6.69	6.87	6.67		
WSR45C	6.20	6.47	8.15	13.33		
WSR46	6.18	6.59	7.33	10.44		
2013/5/6	Mid-Ebb	DS1	6.40	6.48	14.07	26.11

Sampling Date	Tidal Period	Station	Average DO Levels (mg/L)		Average Turbidity Level (NTU)	Average SS Level (mg/L)
			Bottom	Surface and Mid Depth		
		DS2	6.47	6.53	9.22	19.44
		DS3	6.37	6.41	6.30	8.89
		DS4	6.27	6.31	7.12	10.22
		DS5	6.27	6.26	7.08	11.00
		US1	6.44	6.47	11.65	20.33
		US2	6.47	6.50	15.82	20.00
		MW1	6.33	6.42	3.99	7.11
		THB1	6.53	6.75	5.82	5.67
		THB2	-	6.21	7.12	9.33
		WSR45C	6.28	6.51	7.45	10.11
		WSR46	6.52	6.83	17.03	20.78
	Mid-Flood	DS1	6.95	7.02	6.48	11.00
		DS2	7.00	7.10	5.87	8.50
		DS3	6.96	7.10	6.13	8.33
		DS4	6.71	6.90	7.75	11.67
		DS5	6.58	6.85	8.69	11.89
		US1	6.50	6.85	8.69	11.89
		US2	6.42	6.62	6.87	11.11
		MW1	6.32	6.44	5.67	11.33
		THB1	6.39	6.66	9.00	12.33
		THB2	-	7.27	4.13	11.33
		WSR45C	6.40	6.77	8.43	15.00
		WSR46	6.47	6.75	8.80	13.33
2013/5/8	Mid-Ebb	DS1	6.61	6.61	7.47	9.44
		DS2	6.61	6.61	7.20	9.11
		DS3	6.50	6.56	6.66	8.44
		DS4	6.50	6.48	6.72	10.00
		DS5	6.44	6.45	7.15	11.67
		US1	6.67	6.66	11.27	19.00
		US2	6.57	6.56	14.67	18.33
		MW1	6.29	6.35	4.57	7.00
		THB1	6.81	6.83	10.57	15.33
		THB2	-	6.60	4.46	7.33
		WSR45C	6.39	6.68	10.10	14.33
		WSR46	6.49	6.73	24.39	21.56
	Mid-Flood	DS1	6.75	6.75	7.33	8.33
		DS2	6.79	6.76	10.30	11.83
		DS3	6.76	6.77	16.72	22.50
		DS4	6.85	6.85	23.38	35.00
		DS5	6.78	6.79	20.31	26.33
		US1	6.29	6.50	12.21	14.33
		US2	6.37	6.51	9.57	11.22
		MW1	6.43	6.49	9.71	10.78
		THB1	6.61	6.62	16.75	21.50
		THB2	-	-	-	-
		WSR45C	6.47	6.64	11.39	13.78
		WSR46	6.57	6.63	11.86	11.00
2013/5/10	Mid-Ebb	DS1	6.44	6.41	9.24	13.11
		DS2	6.39	6.46	17.14	27.56
		DS3	6.57	6.59	6.49	7.78

Sampling Date	Tidal Period	Station	Average DO Levels (mg/L)		Average Turbidity Level (NTU)	Average SS Level (mg/L)
			Bottom	Surface and Mid Depth		
		DS4	6.40	6.50	10.06	13.00
		DS5	6.49	6.48	8.73	12.17
		US1	6.42	6.43	6.32	8.17
		US2	6.42	6.40	8.32	11.00
		MW1	6.29	6.48	6.32	8.17
		THB1	6.37	6.68	6.54	5.83
		THB2	-	-	-	-
		WSR45C	6.27	6.35	12.78	16.56
		WSR46	6.20	6.17	11.34	10.00
	Mid-Flood	DS1	6.31	6.32	12.50	13.17
		DS2	6.34	6.36	15.18	23.17
		DS3	6.31	6.31	16.72	20.83
		DS4	6.35	6.35	14.15	18.33
		DS5	6.34	6.35	13.67	20.44
		US1	6.28	6.36	9.76	11.22
		US2	6.23	6.29	11.32	13.11
		MW1	6.10	6.16	9.53	15.56
		THB1	6.34	6.43	11.24	16.33
		THB2	-	6.11	11.32	13.33
		WSR45C	6.11	6.24	12.90	25.00
		WSR46	6.14	6.22	16.74	24.56
2013/5/13	Mid-Ebb	DS1	6.07	6.30	12.39	26.78
		DS2	6.14	6.41	9.39	15.33
		DS3	6.17	6.34	7.86	13.00
		DS4	6.22	6.31	5.92	8.89
		DS5	6.36	6.41	5.23	7.67
		US1	6.55	6.70	6.10	9.33
		US2	6.59	6.65	5.53	7.33
		MW1	6.23	6.37	5.34	7.44
		THB1	6.19	6.64	6.04	5.00
		THB2	-	5.89	6.18	7.33
		WSR45C	6.17	6.46	7.00	7.44
		WSR46	6.02	6.38	6.74	6.11
	Mid-Flood	DS1	6.12	6.04	7.45	8.50
		DS2	5.99	5.97	5.68	5.67
		DS3	6.12	6.10	5.57	5.17
		DS4	6.16	6.13	5.05	5.33
		DS5	6.04	6.14	5.77	6.89
		US1	5.96	6.12	10.20	11.33
		US2	5.97	6.13	12.24	18.44
		MW1	6.12	6.36	4.77	6.89
		THB1	6.14	6.23	5.82	6.17
		THB2	-	5.54	5.46	3.67
		WSR45C	6.14	6.28	7.78	10.89
		WSR46	5.97	6.02	15.46	21.00
2013/5/15	Mid-Ebb	DS1	6.43	6.61	7.55	18.00
		DS2	6.44	6.61	5.36	11.67
		DS3	6.49	6.70	4.29	11.78
		DS4	6.56	6.81	2.84	8.00
		DS5	6.25	6.24	5.27	12.33

Sampling Date	Tidal Period	Station	Average DO Levels (mg/L)		Average Turbidity Level (NTU)	Average SS Level (mg/L)
			Bottom	Surface and Mid Depth		
		US1	6.61	6.69	5.04	13.17
		US2	6.70	6.76	3.51	14.50
		MW1	6.79	7.16	2.82	7.67
		THB1	6.42	6.48	4.87	7.33
		THB2	-	5.70	4.56	5.33
		WSR45C	6.58	6.91	5.38	8.89
		WSR46	5.84	6.49	4.26	8.44
	Mid-Flood	DS1	6.00	6.17	5.34	14.00
		DS2	6.06	6.18	4.86	11.67
		DS3	6.20	6.18	3.14	10.17
		DS4	6.18	6.26	3.01	10.00
		DS5	5.91	6.27	4.94	11.78
		US1	6.90	6.10	4.04	9.89
		US2	6.02	6.09	3.25	9.89
		MW1	6.53	6.82	2.47	8.33
		THB1	6.98	7.01	5.67	7.17
		THB2	-	5.83	3.46	10.33
		WSR45C	6.57	6.77	4.91	10.89
		WSR46	6.62	6.82	14.22	23.89
2013/5/18	Mid-Ebb	DS1	6.49	6.78	3.73	6.33
		DS2	6.20	6.60	2.77	5.00
		DS3	6.56	6.71	1.71	3.33
		DS4	6.90	6.79	2.09	3.50
		DS5	6.68	6.67	2.23	4.17
		US1	6.35	6.29	3.68	5.00
		US2	6.21	6.30	2.76	4.67
		MW1	6.32	6.82	2.57	5.22
		THB1	7.00	7.82	2.61	4.17
		THB2	-	6.45	3.49	5.00
		WSR45C	6.43	6.76	4.60	3.78
		WSR46	6.07	6.65	3.67	2.78
	Mid-Flood	DS1	6.08	6.39	10.65	21.17
		DS2	6.41	6.88	3.24	4.50
		DS3	6.73	6.81	2.09	4.83
		DS4	5.57	6.37	4.14	9.11
		DS5	5.38	6.28	4.84	7.11
		US1	5.88	6.23	2.11	4.22
		US2	5.99	6.47	2.55	4.56
		MW1	6.12	7.10	2.22	5.11
		THB1	6.12	7.29	2.21	2.50
		THB2	-	6.36	3.49	5.67
		WSR45C	6.03	6.66	3.07	5.67
		WSR46	5.92	6.43	3.10	3.78
2013/5/20	Mid-Ebb	DS1	6.87	7.31	3.30	7.67
		DS2	7.29	7.43	4.58	6.89
		DS3	7.36	7.58	3.53	6.11
		DS4	7.45	7.60	3.05	7.56
		DS5	7.62	7.63	3.18	4.33
		US1	7.40	7.44	2.79	5.17
		US2	6.82	7.34	5.46	10.83

Sampling Date	Tidal Period	Station	Average DO Levels (mg/L)		Average Turbidity Level (NTU)	Average SS Level (mg/L)
			Bottom	Surface and Mid Depth		
		MW1	5.57	6.58	3.62	4.78
		THB1	7.98	8.70	4.08	2.67
		THB2	-	7.27	3.46	4.00
		WSR45C	5.72	6.42	4.34	5.44
		WSR46	5.66	6.73	4.28	4.00
	Mid-Flood	DS1	6.63	9.09	4.23	6.17
		DS2	6.47	9.68	5.17	7.50
		DS3	7.25	10.58	4.27	5.00
		DS4	7.00	9.93	3.79	5.50
		DS5	6.28	8.46	7.15	9.22
		US1	6.56	7.86	2.69	3.33
		US2	6.05	7.80	2.51	4.44
		MW1	5.39	7.73	3.40	6.78
		THB1	7.84	10.21	4.27	4.50
		THB2	-	9.27	2.79	5.33
		WSR45C	5.71	7.65	5.69	9.56
		WSR46	5.60	7.95	4.89	5.11
2013/5/23	Mid-Ebb	DS1	6.24	6.31	4.37	9.11
		DS2	6.39	6.29	5.64	8.56
		DS3	6.68	6.42	3.99	7.67
		DS4	6.94	6.86	2.76	5.67
		DS5	6.95	6.82	3.34	7.33
		US1	6.29	6.47	4.74	10.33
		US2	6.76	7.29	2.93	7.83
		MW1	5.14	5.55	2.63	6.11
		THB1	6.17	6.96	3.84	10.67
		THB2	-	5.77	3.53	10.33
		WSR45C	5.52	5.98	4.89	8.56
		WSR46	5.08	5.73	16.91	23.00
	Mid-Flood	DS1	5.93	6.23	7.84	16.67
		DS2	5.99	6.49	6.31	7.67
		DS3	6.40	6.78	3.48	5.00
		DS4	6.24	6.80	5.36	7.67
		DS5	6.40	6.69	5.92	9.67
		US1	5.66	6.27	4.92	8.78
		US2	5.54	5.84	6.95	14.11
		MW1	5.13	5.93	7.33	10.67
		THB1	6.75	7.09	11.50	14.67
		THB2	-	6.41	4.99	9.00
		WSR45C	5.22	5.95	9.43	12.33
		WSR46	5.34	6.03	11.71	8.78
2013/5/25	Mid-Ebb	DS1	5.42	5.60	5.22	7.33
		DS2	5.51	5.70	7.95	14.00
		DS3	5.52	5.72	5.24	6.56
		DS4	5.45	5.72	3.08	3.89
		DS5	5.88	5.91	6.45	8.67
		US1	5.77	5.94	4.41	6.17
		US2	5.53	6.02	3.83	6.17
		MW1	4.78	5.18	5.95	6.33
		THB1	6.04	6.46	4.76	3.33

Sampling Date	Tidal Period	Station	Average DO Levels (mg/L)		Average Turbidity Level (NTU)	Average SS Level (mg/L)
			Bottom	Surface and Mid Depth		
		THB2	-	-	-	-
		WSR45C	5.22	6.06	7.89	6.22
		WSR46	5.01	5.21	7.96	5.56
	Mid-Flood	DS1	5.20	5.62	4.66	5.00
		DS2	5.45	5.63	4.49	4.33
		DS3	5.36	5.62	5.19	5.50
		DS4	5.32	5.48	6.73	7.00
		DS5	5.34	5.50	5.57	5.00
		US1	5.39	5.56	6.59	6.56
		US2	5.44	5.62	4.94	5.67
		MW1	4.86	5.26	4.20	4.78
		THB1	5.27	5.58	6.48	6.00
		THB2	-	-	-	-
		WSR45C	5.01	5.30	18.55	13.89
		WSR46	5.01	5.16	15.28	20.44

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. 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.
5. Sampling at Station THB2 during mid-flood tide of 8 May 2013, sampling during mid-ebb tide of 10 May 2013 and all sampling of 25 May 2013 were not carried out due to adverse weather.

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

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

