



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)*

43rd Monthly Progress Report for Contaminated Mud Pits to the South of The Brothers and at East Sha Chau – March 2016

Draft (Revision 0)

14 April 2016

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Client:		Project N	0:		
Civil Enç	gineering and Development Department (CEDD)	017508	6		
	ument presents the 43 rd monthly progress report for nated Mud Pits at the South of The Brothers and at East	Date: 14 April Approved Craig A	by:		
		Partitier			
v0	43 rd Monthly Progress Report for ESC CMPs and SB CMPs	RC	JT	CAR	14/4/16
Revision	Description	Ву	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:

43rd Monthly Progress Report for Contaminated Mud Pits

to the South of The Brothers and at East Sha Chau - March

2016

Date of Report:

14 April 2016

Date prepared by ET:

14 April 2016

Date received by IA:

14 April 2016

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/ $\frac{plan}{plan}$ complies with the above referenced condition of EP-427/2011/A

Craig A. Reid,

Environmental Team Leader:

Date:

14/4/2016

IA Verification

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

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EP-427/2011/A

Dr Wang Wen Xiong, Independent Auditor: Date:

14/4/2016

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Agreement No. CE 23/2012 (EP) Environmental Monitoring and Audit

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

43RD MONTHLY PROGRESS REPORT FOR MARCH 2016

1.1 BACKGROUND

- 1.1.1 Since early 1990s, contaminated sediment (1) arising from various construction works (e.g. dredging and reclamation projects) 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) 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.

- 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.7
- (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 Environmental Permits (EPs) (EP-312/2008/A and EP-427/2011A) were issued by the Environmental Protection Department (EPD) to the CEDD, the Permit Holder, on 28 November 2008 for ESC CMP V and on 23 December 2011 for SB CMPs, respectively. Under the requirements of the EPs, an Environmental Monitoring and Audit (EM&A) programme as set out in the EM&A Manuals (1) (2) is required to be implemented for the CMPs.
- 1.1.5 The present EM&A programme under *Agreement No. CE 23/2012 (EP)* covers the dredging, disposal and capping operations of the SB CMPs as well as ESC CMPs. Detailed works schedule for both CMPs is shown in *Figure 1.1*. In March 2016, the following works were being undertaken at the CMPs:
 - Disposal of contaminated mud at SB CMP 2 up to 21 March 2016;
 - Capping operation at ESC CMP Va up to 21 March 2016;
 - Disposal of contaminated mud at ESC CMP Vd since 22 March 2016; and
 - Capping operation at SB CMP 2 since 22 March 2016.

Figure 1.1 Works Schedule for ESC CMPs and SB CMPs

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1.2 REPORTING PERIOD

1.2.1 This 43rd Monthly Progress Report covers the EM&A activities for the reporting month of March 2016.

1.3 DETAILS OF SAMPLING AND LABORATORY TESTING ACTIVITIES

- 1.3.1 The following monitoring activities have been undertaken for ESC CMPs in March 2016:
 - Water Column Profiling of ESC CMP Vd was undertaken on 22 March 2016;
 and
 - (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.
 - (2) ERM (2010) Environmental Monitoring and Audit (EM&A) Manual. Final Second Review. Environmental Monitoring and Audit for Contaminated Mud Pit at Sha Chau (2009-2013) Investigation. Agreement No. CE 4/2009(EP). Submitted to EPD in November 2010.

- Pit Specific Sediment Chemistry of ESC CMP Vd was undertaken on 23 March 2016.
- 1.3.2 The following monitoring activities have been undertaken for SB CMPs in March 2016:
 - Water Column Profiling of CMP 2 was undertaken on 2 March 2016; and
 - *Pit Specific Sediment Chemistry of CMP* 2 was undertaken on 3 March 2016.
- 1.4 DETAILS OF OUTSTANDING SAMPLING AND/OR ANALYSIS
- 1.4.1 No outstanding sampling remained for March 2016.
- 1.4.2 A summary of field activities conducted are presented in *Annex A*. The following laboratory analyses were still in progress during the preparation of this monthly report and hence are not presented in this monthly report:
 - Laboratory analyses of sediment samples collected for *Pit Specific Sediment Chemistry of SB CMP* 2 in March 2016; and
 - Laboratory analyses of sediment samples collected for *Pit Specific Sediment Chemistry of ESC CMP Vd* in March 2016.
- 1.5 Brief Discussion of the Monitoring Results for ESC CMPs
- 1.5.1 Brief discussion of the monitoring results of the following activities for ESC CMPs is presented in this 43rd Monthly Progress Report:
 - Water Column Profiling of ESC CMP Vd in March 2016
- 1.5.2 Water Column Profiling of ESC CMP Vd March 2016
- 1.5.3 Water Column Profiling was undertaken at a total of two sampling stations (Upstream and Downstream stations) on 22 March 2016. The monitoring results have been assessed for compliance with the Water Quality Objectives (WQOs) set by Environmental Protection Department (EPD). This consists of a review of the EPD routine water quality monitoring data for the dry season period (November to March) of 2005 2014 from stations in the Northwestern Water Control Zone (WCZ), where the ESC CMPs are located (1). For Salinity, the averaged value obtained from the Reference stations was used for the basis as the WQO. Levels of Dissolved Oxygen (DO) and Turbidity were also assessed for compliance with the Action and Limit Levels (see Table B1 of Annex B for details).
 - (1) http://epic.epd.gov.hk/EPICRIVER/marine/?lang=en

In-situ Measurements

1.5.4 Analyses of results for March 2016 indicated that levels of Salinity, DO and pH generally complied with the WQOs at both Downstream and Upstream stations (*Table B2* of *Annex B*). In addition, DO and Turbidity at all stations complied with the Action and Limit Levels (*Table B2* of *Annex B*).

Laboratory Measurements for Suspended Solids (SS)

1.5.5 Analyses of results for March 2016 indicated that the SS levels complied with the WQO at Downstream stations. Both Upstream and Downstream stations complied with the Action and Limit Levels (*Table B2* of *Annex B*).

Overall, the monitoring results indicated that the mud disposal operation at ESC CMP Vd did not appear to cause any deterioration in water quality during this reporting period.

1.6 Brief Discussion of the Monitoring Results for SB CMPs

- 1.6.1 Brief discussion of the monitoring results of the following activities for SB CMPs is presented in this 43rd Monthly Progress Report:
 - Water Column Profiling of CMP 2 in 2 March 2016

1.6.2 Water Column Profiling of CMP 2 - March 2016

1.6.3 Water Column Profiling was undertaken at a total of two sampling stations (Upstream and Downstream stations) on 2 March 2016. The monitoring results have been assessed for compliance with the WQOs (see Section 1.5.3 for details). Levels of DO and Turbidity were also assessed for compliance with the Action and Limit Levels (see Table B3 of Annex B for details).

In-situ Measurements

1.6.4 Analyses of results for March 2016 indicated that levels of Salinity, DO and pH complied with the WQOs at both Downstream and Upstream stations (*Table B4* of *Annex B*). In addition, DO and Turbidity at all stations complied with the Action and Limit Levels (*Table B4* of *Annex B*).

Laboratory Measurements for SS

- 1.6.5 Analyses of results for March 2016 indicated that the SS levels complied with the WQO at Downstream stations. Both Upstream and Downstream stations complied with the Action and Limit Levels (*Table B4* of *Annex B*).
- 1.6.6 Overall, the monitoring results indicated that the mud disposal operation at CMP 2 did not appear to cause any deterioration in water quality during this reporting period.

- 1.7 ACTIVITIES SCHEDULED FOR THE NEXT MONTH
- 1.7.1 No monitoring activities will be scheduled in the next monthly period of April 2016 for SB CMPs.
- 1.7.2 The following monitoring activities will be conducted in the next monthly period of April 2016 for ESC CMPs:
 - Routine Water Quality Monitoring of ESC CMP Vd;
 - Pit Specific Sediment Chemistry of ESC CMP Vd; and
 - Water Column Profiling of ESC CMP Vd.
- 1.7.3 The sampling schedule is presented in *Annex A*.
- 1.8 STUDY PROGRAMME
- 1.8.1 A summary of the Study programme is presented in *Annex C*.

Annex A

Sampling Schedule

Annex A1 - Environmental Monitoring and Audit Sampling Schedule for East of Sha Chau (September 2012 - February 2017) 2012 2013 2014 2015 2016 2017 Pit Specific Sediment Chemistry Code 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 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 Active-Pit ESC-NPDA ESC-NPDB Pit-Edge ESC-NEDA **ESC-NEDB** Near-Pit ESC-NNDA ESC-NNDB **Cumulative Impact Sediment Chemistry** SONDJFMAMJJASONDJFMAAMJJJASONDJFMAAMJJJASONDJFFMAAMJJJASONDJFMAAMJJJASONDJFFMAAAMJJJASONDJF Near-field Stations ESC-RNA ESC-RNB Mid-field Stations ESC-RMA ESC-RMB Capped Pit Stations ESC-RCA ESC-RCB Far-Field Stations ESC-RFA ESC-RFB Ma Wan Station MW1 **Sediment Toxicity Tests** Near-Field Stations ESC-TDA ESC-TDB Reference Stations ESC-TRA ESC-TRB Ma Wan Station MW1 Tissue/Whole Body Sampling Impact Stations ESC-INA ESC-INB Reference ESC-TNA ESC-TNB ESC-TSA ESC-TSB

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Annex A1 - Environmental Monitoring and Audit Sampling Schedule for East of Sha Chau (September 2012 - February 2017)

Annex All - Luononmentui Mo	8		012	,	J	` /		013		J	,					20)14								2015							2	016					2017
Routine Water Quality Monit	toring	S O	N D	J	F M	I A M	J	J	A S	0	NI) J	F M	[A	. M	J	JA	S	ON	D	J	F	M A	M	J J	A	$S \mid O$	N D	J	F N	I A M	J	J	A 5	5 O	N	D]	F
Ebb Tide																																			$\neg \neg$			$\neg \neg$
Impact Station																																			\Box			
	ESC-IPE1	*	*	*	*	* *		*	*																						* *		* *	r	*	*	*	* *
	ESC-IPE2	*	*	*	*	* *		*	*																						* *		* *	٠	*	*	*	* *
	ESC-IPE3	*	*	*	*	* *		*	*																						* *		* *	٠	*	*		* *
	ESC-IPE4	*	*	*	*	* *		*	*																						* *		* *	٠	*	*	*	* *
	ESC-IPE5	*	*	*	*	* *		*	*																						* *		* *	*	*	*	*	* *
Intermediate Station																																						
	ESC-INE1	*	*	*	*	* *		*	*																						* *		* *	٠	*	*	*	* *
	ESC-INE2	*	*	*	*	* *		*	*																						* *		* *	•	*	*		* *
	ESC-INE3	*	*	*	*	* *		*	*																						* *		* *	•	*	*		* *
	ESC-INE4	*	*	*	*	* *		*	*																						* *		* *	f	*	*		* *
	ESC-INE5	*	*	*	*	* *		*	*																						* *		* *	f	*	*	*	* *
Reference Station																																						
	ESC-RFE1	*	*	*		* *		*	*																						* *		* *	f	*	*		*
	ESC-RFE2	*	*	*	*	* *		*	*																						* *		* *	f	*	*		* *
	ESC-RFE3	*	*	*	*	* *		*	*																						* *		* *	f	*	*		*
	ESC-RFE4	*	*	*	*	* *		*	*																						* *		* *	f	*	*		* *
	ESC-RFE5	*	*	*	*	* *		*	*																						* *		* *	f	*	*	*	* *
Ma Wan Station																																						
	MW1	*	*	*	*	* *		*	*																						* *		* *	*	*	*	*	* *
Flood Tide																																						
Impact Station																																						
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Intermediate Station																																	$\perp \perp$		\bot			
	ESC-INF1	*	*	*		* *			*																						* *		* *	<i>:</i>	*	*		* *
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Annex A2 - Environmental Monitoring and Audit Sampling Schedule for South of The Brothers (July 2012 - February 2017)

				2012							2013									203	14									2015										20	016					
Baseline Monitoring Prior to Dredging	Code	Frequency	I A	S 0		D	J F	M	Α				S	0 1	N D	J	F	M A	M			A	$\mathbf{S} \mid \mathbf{O}$	O N	D	J	FIN	и А	M		A	S	0	N	D	Ţ	FIN	Л А	M		010 J	A	$\mathbf{s} \mid \mathbf{o}$	N	D	
ar Field Stations	2000		, ,				-				, ,									,	,					, -				, .						,				+	+	—	+	+-	_	一
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	SB-WFB	3 days per week for 4 weeks	* *																																				\top	+	\vdash	-	\top	+		十
Mid Field Stations		T T T T T T T T T T T T T T T T T T T											t																1 1			1							+	+	+	-	+	+	+	十
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	SB-WMB	3 days per week for 4 weeks	* *	+ +				+			+		t														_					+					_		+	+	+	-	$\overline{}$	+	+	十
Near Field Stations	OD WIND	5 days per week for 1 weeks		+ +	+			1	\vdash		+		+		+		-+	-	+			-	+	+	+		-					╁	1	\vdash			-	-	+	+-	+	-	+	+	+	十
vear rela stations	SR_W/NI A A	3 days per week for 4 weeks	* *	+ +				-			+		\vdash		\dashv		-+	-	+			-	+				+		1 1	-		╁	<u> </u>	\vdash			+	-	+	+-	+	-+	+	+	+	+
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	SB-WNBA	3 days per week for 4 weeks	* *						\vdash		-		+		+		-		+				-	+	+							+	<u> </u>	\vdash				-	+	+	+	-+	+	+	+	+
		3 days per week for 4 weeks	* *		+	\vdash					-		\vdash			-	-					-	_	+	+		-					-		\vdash			-	-	+	+	+	-	+	+	+	+
Reference Stations	3D-WINDD	3 days per week for 4 weeks	\vdash	+	+						-		\vdash			-	-					-	_	+	+		-					+		\vdash			-	-	+	+	+	-+	+	+	+	+
Reference Stations	NM1	2 dans non man le fan 4 marilia	* *		-						-					-	-						-		1		-					1							+	+-	+	-+	+	$+\!\!-$	+	+
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	NM2	3 days per week for 4 weeks	* *								_		\vdash									_		-	-		_		1			<u> </u>					_		+	—	+	-	+	$+\!\!-$	—	+
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	NM6	3 days per week for 4 weeks	* *	\bot	1	$oxed{oldsymbol{eta}}$		1	\sqcup				\sqcup			$\downarrow \downarrow \downarrow$			1						$oxed{igspace}$		\perp		+			<u> </u>	1				\perp		4		+		\bot		4	
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	MW1	3 days per week for 4 weeks	* *						$\coprod J$				ШĬ												$oldsymbol{ol}}}}}}}}}}}}}}}}$									ШĬ							$oxed{oxed}$					
	THB1	3 days per week for 4 weeks	* *																																											
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	THB1	3 days per week			*	*	* *	*	*	*	* *	*	*	*	* *	*	*	* *	*	*	*	* :	* *	* *															\top	\top	1			\top	\top	十
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Annex A2 - Environmental Monitoring and Audit Sampling Schedule for South of The Brothers (July 2012 - February 2017)

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Near-field Stations	·																																
	SB-RNA	4 times per year									12		12	2	12			12	12	12	12			12	12		1	2 12					
	SB-RNB	4 times per year									12		12		12			12	12	12	12			12	12		1	2 12					
Mid-field Stations																																	
	SB-RMA	4 times per year									12		12		12			12	12	12	12			12	12		1						
	SB-RMB	4 times per year									12		12	2	12			12	12	12	12			12	12		1	2 12					
Far-Field Stations																																	
	SB-RFA	4 times per year									12		12		12			12	12	12	12			12	12		1						
	SB-RFB	4 times per year									12		12	2	12			12	12	12	12			12	12		1	2 12					
Capped Pit Stations																																	
	SB-RCA	4 times per year									12		12		12			12	12	12	12			12	12			2 12					
	SB-RCB	4 times per year									12		12	2	12			12	12	12	12			12	12		1	2 12					
Sensitive Receiver Stations																																	
	MW1	4 times per year									12		12		12			12	12	12	12			12	12		1						
	THB1	4 times per year									12		12		12		_	12	12	12	12		_	12	12		1						
	THB2	4 times per year									12		12	-	12			12	12	12	12			12	12		1	2 12					
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	SB-TRA	2 times per year			+ +			 		+ + +	5	+ +		1 1		5			5	- 		 	+ +		+ +	_		 	++				
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	SB-TAA	2 times per year		\dashv	\dagger	-		+		 	5	+ +	\dashv	+		5			5	 		 	+		+ +			1 1 1 1	++		\vdash		
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Sensitive Receiver Stations		2 times per year								1 1 1									+ -				1					 					
Seriora to receive a survivorio	MW1	2 times per year								1 1 1	5					5			5									 					
	THB1	2 times per year			+ +			 		+ + +	5	+ +				5	\vdash		5	- 		 	+ +		+ +	_		 	++				
	THB2	2 times per year									5	+ +		+ +		5			5				+ +										
SB CMP 2 Active		j		_	+	\dashv		\vdash	_	+ + +	+ - + -	+ +	\dashv	+	\dashv	-	\vdash	_	+ + + +			 	+	-	+ +	_			++	1	\vdash	+	
Reference				\dashv	\dagger	-		+		 	+ +	+ +	\dashv	+	-				+	 		 	+		+ +			1 1 1 1	++		\vdash		
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Annex A2 - Environmental Monitoring and Audit Sampling Schedule for South of The Brothers (July 2012 - February 2017)

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Annex A2 - Environmental Monitoring and Audit Sampling Schedule for South of The Brothers (July 2012 - February 2017)

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Sensitive Receiver Stations																																					
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	SB-RFF2	4 times per year																			3	3			3	3			3	3		3	3			3	
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Notes:

[&]quot;*" = Number of replicates depends on parameters

Naming of stations are tentative only and will be subjected to changes

Annex B

Water Quality Monitoring Results

Table B1 Action and Limit Levels of Water Quality for Dredging, Backfilling and Capping Activities at ESC CMPs

Parameter	Action Level	Limit Level			
Dissolved Oxygen (DO) (1)	Surface and Mid-depth (2)	Surface and Mid-depth (2)			
	5%-ile of baseline data for surface and	1%-ile of baseline data for surface and			
	middle layer = 3.76 mg L ⁻¹	middle layer = 3.11 mg L^{-1} (3)			
	and	and			
	Significantly less than the reference	Significantly less than the reference			
	stations mean DO (at the same tide of	stations mean DO (at the same tide of			
	the same day)	the same day)			
	Bottom	Bottom			
	5%-ile of baseline data for bottom	The average of the impact station			
	layers = 2.96 mg L -1	readings are <2 mg/L-1			
	and	and			
	Significantly less than the reference	Significantly less than the reference			
	stations mean DO (at the same tide of the same day)	stations mean DO (at the same tide of the same day)			
Depth-averaged Suspended	95%-ile of baseline data for depth	99%-ile of baseline data for depth			
Solids (SS) (4) (5)	average = 37.88 mg L-1	average = 61.92 mg L-1			
	and				
		and			
	120% of control station's SS at the same	130% of control station's SS at the same			
	tide of the same day	tide of the same day			
Depth-averaged Turbidity (Tby) (4) (5)	95%-ile of baseline data = 28.14 NTU	99%-ile of baseline data = 38.32 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) Given the Action Level for DO for Surface & Middle layers has already been lower than 4 mg L-1, it is proposed to set the Limit Level at 3.11 mg L-1 which is the first percentile of the baseline data.
- (4) "Depth-averaged" is calculated by taking the arithmetic means of reading of all three depths.
- (5) For turbidity and SS, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.

Table B2 Water Column Profiling Results for ESC CMP Vd in March 2016

Stations	Temp	Salinity	Turbidity	Dissolved Oxygen pH		pН	Suspended Solids
	(°C)	(ppt)	(NTU)	(%)	(mg L-1)	(mg L-1)	(mg L-1)
WCP1	17.7	27.4	8.0	91.7	7.4	8.1	8.2
(Downstream)							
WCP 2	17.8	24.1	4.6	93.0	7.7	8.0	5.1
(Upstream)							
WQO (Dry season)	N/A	26.51 - 23.15#	N/A	N/A	>4	6.5-8.5	13.5

Note:

[#]Not exceeding 10% of natural ambient level which is the result obtained from the Reference Station.

Cell shaded yellow / red indicate value exceeding the Action/Limit levels.

Cell shaded grey indicate value exceeding the WQO.

Table B3 Action and Limit Levels of Water Quality for Dredging, Backfilling and Capping Activities for SB CMPs

and WSR 46 station readings are < 5%- ile of baseline data for surface and middle layer = 4.32 mg L-1 and Significantly less than the reference stations mean DO (at the same tide of the same day) Bottom 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 and and Significantly less ts stations mean DO (the same tide of the same day) Depth-averaged Suspended Solids (SS) (3) (4) Depth-averaged Suspended Turbidity 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 and 120% of control station's SS at the same tide of the same day The average of the impact, WSR 45C and WSR 46 station readings are > 130% of control station of the same day The average of the impact, WSR 45C and WSR 46 station readings are > 130% of control station of the same day The average of the impact, WSR 45C and WSR 46 station readings are > 130% of control station of the same day The average of the impact, WSR 45C and WSR 46 station readings are > 130% of control station of the same day The average of the impact, WSR 45C and WSR 46 station readings are > 130% of control station of the same day The average of the impact, WSR 45C and WSR 46 station readings are > 130% of control station of the same day The average of the impact, WSR 45C and WSR 46 station readings are > 130% of control station of the same day			
Significantly less than the reference stations mean DO (at the same tide of the same day) Bottom	depth ⁽²⁾ te impact, WSR 45C on readings are < 4		
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 and 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 and 120% 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 average of the impact, WSR 45C and WSR 46 station readings are > 95%-ile of baseline data = 25.04 NTU	than the reference O (at the same tide of		
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 and and 120% 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 Significantly less to stations mean DO the stations mean DO the same day The average of the impact, WSR 45C and WSR 46 station readings are > 99%-ile of baseline data = 25.04 NTU Significantly less to stations mean DO the same day)	ne impact station, SR 46 readings are < 2		
Solids (SS) (3) (4) and WSR 46 station readings are > 95%-ile of baseline data for depth average = 21.60 mg L-1 and and 120% 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 > 99%-ile of baseline data = 25.04 NTU The average of baseline data = 25.04 NTU	Significantly less than the reference stations mean DO (at the same tide of		
120% of control station's SS at the same tide of the same day tide of the same day The average of the impact, WSR 45C and WSR 46 station readings are > and WSR 46 station 95%-ile of baseline data = 25.04 NTU 99%-ile of baseline	ne data for depth		
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(Tby) (3) (4) and WSR 46 station readings are > and WSR 46 station 95%-ile of baseline data = 25.04 NTU 99%-ile of baseline			
and and	The average of the impact, WSR 45C and WSR 46 station readings are > 99%-ile of baseline data = 32.68 NTU		
· · · · · · · · · · · · · · · · · · ·	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.

Table B4 Water Column Profiling Results for SB CMP 2 in March 2016

Stations	Temp	Salinity	Turbidity	Dissolved Oxygen		pН	Suspended Solids
	(°C)	(ppt)	(NTU)	(%)	(mg L-1)	(mg L-1)	(mg L-1)
WCP1	16.6	29.6	3.2	103.6	8.4	8.1	4.1
(Downstream) WCP 2 (Upstream)	16.6	29.6	4.9	105.2	8.6	8.1	6.2
WQO (Dry season)	N/A	26.61 - 32.51#	N/A	N/A	>4	6.5-8.5	13.5

Note:

[#]Not exceeding 10% of natural ambient level which is the result obtained from the Reference Station.

Cell shaded yellow / red indicate value exceeding the Action/Limit levels.

Cell shaded grey indicate value exceeding the WQO.

Annex C

Study Programme

