



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)*

55th Monthly Progress Report for Contaminated Mud Pits to the South of The Brothers and at East Sha Chau – March 2017

Draft (Revision 0)

April 2017

Environmental Resources Management

16/F Berkshire House 25 Westlands Road Quarry Bay, Hong Kong Telephone (852) 2271 3000 Facsimile (852) 2723 5660 www.erm.com







Dredging, Management and Capping of Contaminated Sediment Disposal Facility at Sha Chau and to the South of The Brothers

Environmental Certification Sheet EP-312/2008/A & EP-427/2011/A

Reference Document/Plan

Document/Plan to be Certified/ Verified: 55th

55th Monthly Progress Report for Contaminated Mud Pits to

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

2017

Date of Report:

18 April 2017

Date prepared by ET:

18 April 2017

Date received by IA:

18 April 2017

Reference EP Condition

Environmental Permit Condition:

Condition 3.4 of EP-312/2008/A and Condition 4.4 of EP-427/2011/A:

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-312/2008/A and EP-427/2011/A

Craig A. Reid,

Environmental Team Leader:

Date:

18/4/2017

IA Verification

I hereby verify that the above referenced document/plan complies with the above referenced condition of EP-312/2008/A and EP-427/2011/A

Dr Wang Wen Xiong, Independent Auditor: Date:

18/4/2017

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

55th Monthly Progress Report for Contaminated Mud Pits to the South of The Brothers and at East Sha Chau – March 2017

Draft (Revision 0)

Document Code: 0175086 Monthly March 2017_v0.doc

Environmental Resources Management

16/F Berkshire House 25 Westlands Road Quarry Bay Hong Kong

Telephone: (852) 2271 3000 Facsimile: (852) 2723 5660 E-mail: post.hk@erm.com http://www.erm.com

Client:		Project N	0:		
Civil Eng	gineering and Development Department (CEDD)	017508	6		
Summary	:	Date:			
		18 April	2017		
		Approved	by:		
	ument presents the 55 th monthly progress report for nated Mud Pits at the South of The Brothers and at East u.	6			
ona ona		Craig A Partner	. Reid		
v0	55 th Monthly Progress Report for ESC CMPs and SB CMPs	RC	JT	CAR	18/04/17
Revision	Description	Ву	Checked	Approved	Date
'ERM Hong- Contract with	has been prepared by Environmental Resources Management the trading name of Kong, Limited', with all reasonable skill, care and diligence within the terms of the name the client, incorporating our General Terms and Conditions of Business and ant of the resources devoted to it by agreement with the client.	Distribution Inte	on ernal		18001:2007 No. OHS 515956
We disclaim scope of the	any responsibility to the client and others in respect of any matters outside the above.	⊠ Pul	olic	Constitute of	BSI
third parties	s confidential to the client and we accept no responsibility of whatsoever nature to to whom this report, or any part thereof, is made known. Any such party relies on their own risk.	☐ Co	nfidential	ISO 9 Certificate	001 : 2008 2 No. FS 32515



CONTENTS

ANNEX D

1.1	BACKGROU	ND	1
1.2	REPORTING	PERIOD	2
1.3	DETAILS OF	SAMPLING AND LABORATORY TESTING ACTIVITIES	2
1.4	DETAILS OF	OUTSTANDING SAMPLING AND/OR ANALYSIS	3
1.5	BRIEF DISCU	ISSION OF THE MONITORING RESULTS FOR ESC CMPS	3
1.6	ACTIVITIES S	SCHEDULED FOR THE NEXT MONTH	4
1.7	STUDY PRO	GRAMME	5
	ANNEXES		
	ANNEX A	SAMPLING SCHEDULE	
	ANNEX B	WATER QUALITY MONITORING RESULTS	
	ANNEX C	GRAPHICAL PRESENTATIONS	

STUDY PROGRAMME

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

55TH MONTHLY PROGRESS REPORT FOR MARCH 2017

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-427/2011/A) 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 ESC CMPs and SB CMPs is shown in *Figure 1.1.* In March 2017, the following works were being undertaken:
 - Disposal of contaminated mud at ESC CMP Vd.

Figure 1.1 Works Schedule for ESC CMPs and SB CMPs

Pit	Operation		20	12								20	13												2	01	4					T					_	20	15						T				_		20	16							20	17	Ī
FIL	Operation	s	0	N	D	J	F	- 1	1	A	М	J	J	Α	s	C	1	۱	b	J	F	М	Α	M	IJ	J	ı	1 5	3	1	1 [Ь,	J	F	М	Α	М	J	J	Α	s	O	N	1 0	Ы,	J	F	М	Α	М	J	J	Α	s	0	N	D	J	П	F	M
	Dredging						Γ												Ī													T	Ī									Г																			
ESC CMP	Backfilling																															Ι																													
	Capping						Ī									Г	Τ		I						П			Т	T	Т	Τ	Τ	T	Т								Г	П		T																
	Dredging																															Ι																													
SB CMP 1	Backfilling																																																												
	Capping																																																												
	Dredging																																																												
SB CMP 2	Backfilling																																																												
	Capping																																																												

1.2 REPORTING PERIOD

1.2.1 This 55th Monthly Progress Report covers the EM&A activities for the reporting month of March 2017.

1.3 DETAILS OF SAMPLING AND LABORATORY TESTING ACTIVITIES

- 1.3.1 The following monitoring activities have been undertaken for ESC CMPs in March 2017:
 - Water Column Profiling of ESC CMP Vd was undertaken on 16 March 2017; and
 - Pit Specific Sediment Chemistry of ESC CMP Vd was undertaken on 17 March 2017.

⁽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.

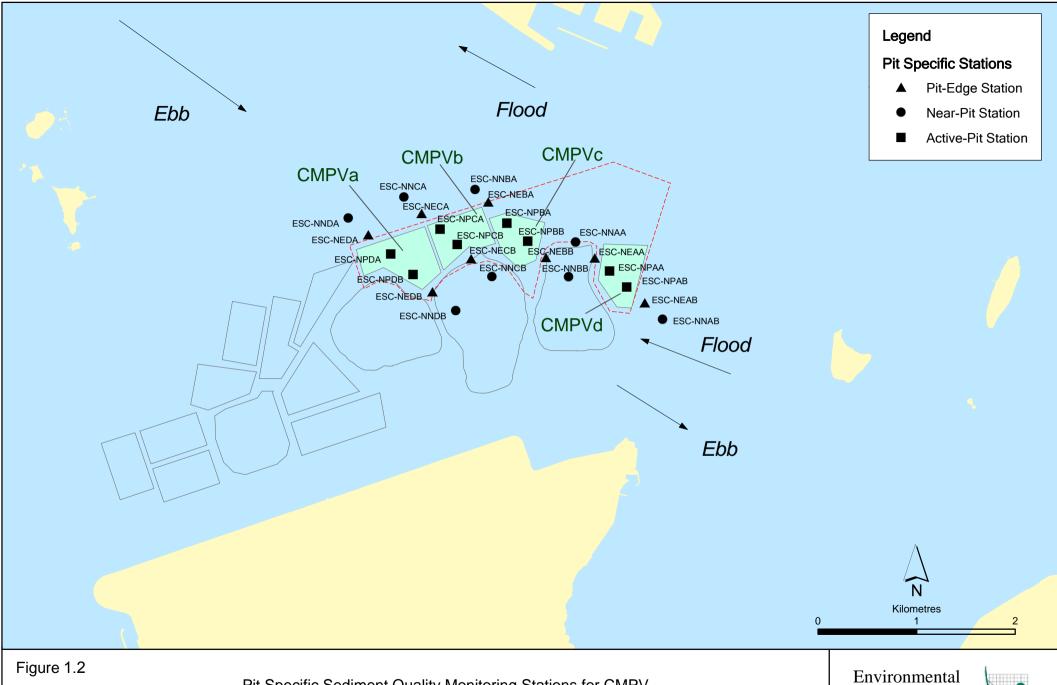
- 1.3.2 No monitoring activities were scheduled to be undertaken for SB CMPs in March 2017.
- 1.4 DETAILS OF OUTSTANDING SAMPLING AND/OR ANALYSIS
- 1.4.1 No outstanding sampling and analysis remained for March 2017.
- 1.5 Brief Discussion of the Monitoring Results for ESC CMPs
- 1.5.1 Brief discussion of the monitoring results of the following activities for ESC CMPs is presented in this 55th Monthly Progress Report:
 - Water Column Profiling of ESC CMP Vd in March 2017;
 - *Pit Specific Sediment Chemistry of ESC CMP Vd* in February and March 2017; and
 - Cumulative Impact Sediment Chemistry of ESC CMPs in February 2017.
- 1.5.2 Water Column Profiling of ESC CMP Vd March 2017
- 1.5.3 Water Column Profiling was undertaken at a total of two sampling stations (Upstream and Downstream stations) on 16 March 2017. 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 2006 2015 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 (Upstream) station 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).

In-situ Measurements

1.5.4 Analyses of results for March 2017 indicated that levels of DO and pH 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 (*Tables B1* and *B2* of *Annex B*).

Laboratory Measurements for Suspended Solids (SS)

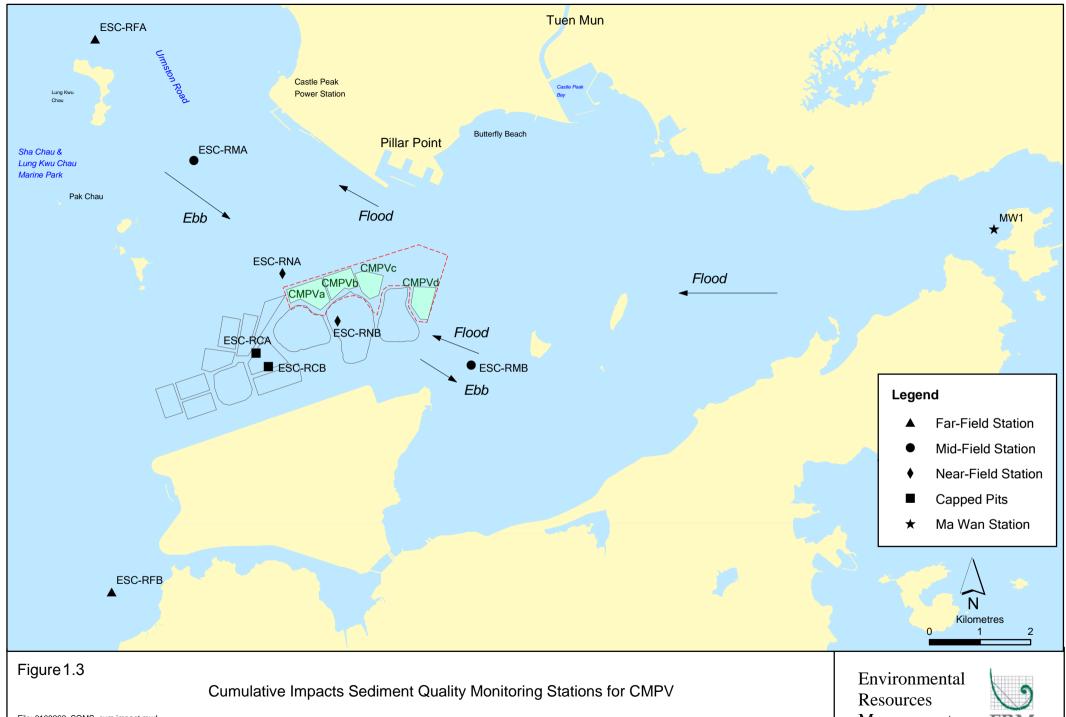
- 1.5.5 Analyses of results for March 2017 indicated that the SS levels complied with the WQO and the Action and Limit Levels at Downstream station (*Tables B1* and *B2* of *Annex B*). SS levels at Upstream station were higher than the WQO, however the SS levels at Upstream station complied with the Action and Limit Levels.
- 1.5.6 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.
- 1.5.7 Pit Specific Sediment Chemistry of ESC CMP Vd February and March 2017
- 1.5.8 Monitoring locations for *Pit Specific Sediment Chemistry for ESC CMP Vd* are shown in *Figure 1.2*. A total of six (6) monitoring stations were sampled in February and March 2017.
- 1.5.9 The concentrations of all inorganic contaminants were lower than the Lower Chemical Exceedance Level (LCEL) at all stations in February and March 2017 (*Figures 1, 2, 4* and *5* of *Annex C*).
- 1.5.10 For organic contaminants, the concentrations of Total Organic Carbon (TOC) were similar amongst the stations in February and March 2017 (*Figures 3* and 6 of *Annex C*). The concentrations of tributyltin (TBT) were similar amongst the stations in March 2017 (*Figure 7* of *Annex C*) whilst the concentrations of TBT were below the limit of reporting at all stations in February 2017. Low and High Molecular Weight Polycyclic Aromatic Hydrocarbons (PAHs), Total Polychlorinated Biphenyls (PCBs), Total dichloro-diphenyl-trichloroethane (DDT) and 4,4'-dichlorodiphenyldichloroethylene (DDE) concentrations were below the limit of reporting at all stations in February and March 2017.
- 1.5.11 Overall, there is no evidence indicating any unacceptable environmental impacts to sediment quality as a result of the contaminated mud disposal operations at ESC CMP Vd in February and March 2017. Statistical analysis will be undertaken and presented in the corresponding quarterly report to investigate whether there are any unacceptable impacts in the area caused by the contaminated mud disposal.
- 1.5.12 Cumulative Impact Sediment Chemistry of ESC CMPs February 2017
- 1.5.13 Monitoring locations for *Cumulative Impact Sediment Chemistry for ESC CMPs* are shown in *Figure 1.3*. A total of nine (9) monitoring stations were sampled in February 2017.
- 1.5.14 Analyses of results for the *Cumulative Impact Sediment Chemistry Monitoring* indicated that the concentrations of all inorganic contaminants were below the LCEL in February 2017 (*Figures 8* and 9 of *Annex C*).



File: CMPV\0103262_SQMS_pit specific.mxd Date: 29/10/2009

Pit Specific Sediment Quality Monitoring Stations for CMPV





File: 0103262_SQMS_cum impact.mxd Date: 29/10/2009

Management



- 1.5.15 For organic contaminants, concentrations of TOC were observed to be similar amongst all stations (*Figure 10* of *Annex C*). Concentrations of TBT were recorded to be higher at Ma Wan station (*Figure 11* of *Annex C*). Low and High Molecular Weight PAHs, PCBs, DDT and DDE concentrations were recorded below the limit of reporting at all stations.
- 1.5.16 Overall, there is no evidence indicating any unacceptable environmental impacts to sediment quality as a result of the contaminated mud disposal operations at ESC CMP Vd in February 2017. Statistical analysis will be undertaken and presented in the corresponding quarterly report to investigate whether there are any unacceptable impacts in the area caused by the contaminated mud disposal.

1.6 ACTIVITIES SCHEDULED FOR THE NEXT MONTH

- 1.6.1 The following monitoring activities will be conducted in the next monthly period of April 2017 for ESC CMPs (see *Annex A* for the sampling schedule):
 - Water Column Profiling of ESC CMP Vd;
 - Routine Water Quality Monitoring of ESC CMPs; and
 - *Pit Specific Sediment Chemistry of ESC CMP Vd.*
- 1.6.2 No monitoring activities are scheduled in the next monthly period of April 2017 for SB CMPs.
- 1.6.3 The monitoring activities starting in April 2017 will be reported under a new consultancy *Agreement No. CE 63/2016 (EP) Environmental Monitoring and Audit for Disposal Facility to the East of Sha Chau (2017-2020) Investigation.*

1.7 STUDY PROGRAMME

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

Annex A

Sampling Schedule

WCP2

Annex A1 - Environmental Monitor	rıng ana Audıt Sa	mpling			jor E	ast of	sna C	Cnau	(Sept			- Apri	ıı 2017)							04.4											04.5											24.4					_		
			2012							201	.3									2	014											015										20	016							2017
it Specific Sediment Chemistry	Code	S	0	N I)	J F	M	[A	M	J	J .	A S	$S \mid O$	N	D	J]	F N	1 A	M	J	J	Α	S	О	N	D	J	F I	M A	M	J	J	A	S	O	N D	J	F	M	A	M	J	J	A	S	0	N	D	J	F M
Active-Pit																																												<u> </u>		\sqcup	\perp			
	ESC-NPDA	*	*	*	*	* *	*	*	*	*	*	*																											*	*	*	*	*	*	*	*	*	*	*	* *
	ESC-NPDB	*	*	*	*	* *	*	*	*	*	*	*																											*	*	*	*	*	*	*	*	*	*	*	* *
Pit-Edge																																											ī —							
	ESC-NEDA	*	*	*	*	* *	*	*	*	*	*	*																											*	*	*	*	*	*	*	*	*	*	*	* *
	ESC-NEDB	*	*	* :	*	* *	*	*	*	*	*	*																		1									*	*	*	*	*	*	*	*	*	*	*	* *
Near-Pit	LOC IVEDD	\vdash							+	+ +			-				-	+		+								-		+						+			 					+-	 	+	-+	\dashv		_
inear-rit	ECC NINIDA	*	*	* ,	*	* *	*	*	*	*	*	*	-	+	\vdash	_		+	+	+		\vdash		-	-+	-+	_	+	+	+	+	\vdash	-+	_	-	+	+		*	*	*	*	*	*	*	*	*	*	*	* *
	ESC-NNDA	*	_			* *						*	_				_	_		+		\vdash				-	_	_		-	+	\vdash				_			*	*	*	*			*	+				
	ESC-NNDB	*	*	*	*	* *	*	*	*	*	*	*																											*	*	*	*	*	*	*	*	*	*	*	* *
Cumulative Impact Sediment Cher	mistry	S	O	N I)	J F	M	[A	. M	J	J	A S	\circ	N	D	J]	F N	$A \qquad A$	M	J	J	A	S	О	N	D	J	F I	$\mathbf{M} \mid A$	M	J	J	A	\mathbf{S}		N D	J	F	M	A	M	J	J	A	S	О	N	D	J	F M
Near-field Stations																																											·							
	ESC-RNA			,	*	*				*		*																														*	i —	*				*		*
	ESC-RNB			,	*	*				*		*																														*		*		\Box	-	*		*
Mid-field Stations	Loc In to	\vdash			+					+ +										+						-				+						+								+-	 	+	-+	\dashv		
wha-nera stations	ECC DMA	H	+	٠,	*	*	+	+	+	*	+	*	+	+	\vdash	+	+	+	+	+	1	$\vdash\vdash\vdash$	\vdash	+	-+	+	+	+	+	+	+	\vdash	-+	_	+	+	+	-	+	-	\vdash	*		*	+	+	+	*	+	*
	ESC-RMA	\vdash	+				-	+	+					+	\vdash		-	+	+	+	1	$\vdash \vdash \vdash$	\vdash		-+			+	+	+-	+	\vdash	-+		_	+	+	-	┼	 	-				 	+	\rightarrow			
	ESC-RMB	\square	\perp		*	*				*		*								4		\sqcup						\perp			_								<u> </u>	<u> </u>		*		*	 	\coprod	\longrightarrow	*		*
Capped Pit Stations				\perp				\perp																																					<u> </u>	$\perp \perp \perp$				
	ESC-RCA		[,	*	*		\perp		*	[*											<u> </u>		[\perp		[L^-		L_{-}		*		*		\perp \uparrow	[*	[*
	ESC-RCB			,	*	*				*		*	\top							T																\top						*		*				*		*
Far-Field Stations										1 1										1																	1							\top		\Box	-	\neg		
	ESC-RFA	\vdash	\dashv	,	*	*		+-	+	*	\dashv	*	-		 	-	-	+	+	+		\vdash		+	$\overline{}$	-+	-+	+	-	+		 				+	+		\vdash			*		*	+-	+	+	*	+	*
		\vdash	+		*	*	+	+-	+-	*	+	*	+	+	\vdash	+	+	+	+	+		$\vdash\vdash$	\vdash	\rightarrow	\dashv	+	\dashv	+	+	+	+	\vdash	-+	-+	+	+	+	\vdash	\vdash		\vdash	*		*		+-+	\rightarrow	*		*
N. 147 Co. 11	ESC-RFB	\vdash	+	- 		^	+	+	+	$+$ $^{"}+$	\dashv		+	+	$\vdash \vdash$	+	+	+	+	+-	-	$\vdash\vdash\vdash$	$\vdash \vdash \vdash$		-+	+	\dashv	+	$-\!\!\!\!+\!\!\!\!\!-$	_	+	$\vdash \vdash$	-+	_	+	+	+	 	├	-	-			<u> </u>		+	\rightarrow		$-\!\!\!\!+$	
Ma Wan Station		\vdash			_					+																_				_														—	<u> </u>	\longrightarrow	—	—		
	MW1			,	*	*				*		*																														*		*	<u></u> '			*		*
Sediment Toxicity Tests		S	0	N I)	J F	M	[A	. M	J	J	A S	s o	N	D	J]	F N	$\mathbf{A} \mid A$	M	J	J	Α	S	О	N	D	J :	F	$\mathbf{M} \mid A$	M	J	J	A	S		N D	J	F	M	Α	M	J	J	A	S	О	N	D	J	F M
Near-Field Stations		П			T																				\neg			\neg															$\overline{}$	\top	$\overline{}$		\neg	\neg		
	ESC-TDA	\Box			\top	*			+			*						\top		+						\neg		\neg	\vdash	+						+								*	\vdash	\vdash	-+	\dashv		*
	ESC-TDB	\vdash		-	+	*	+	+	+	+		*	_	+	\vdash		_	+	+	+				_		-+		+	+	+	+		_			+	+		+					*	+	+	-+	\rightarrow		*
The Court	ESC-1DD	\vdash	_	_	+			_	+	+			_	+			_	+	_	+					-	-+	_	-			+	\vdash				_	+		-					+	+	+	\longrightarrow	\longrightarrow		
Reference Stations		\vdash		_	_		_	_	_	+-+		_	_	_	\vdash		_	_		+						_	_	_			_	\vdash		_	_		_							₩	 	++	\longrightarrow	\rightarrow		
	ESC-TRA					*				\perp		*																				\sqcup											<u> </u>	*	<u> </u>	\sqcup		—		*
	ESC-TRB					*						*																																*						*
Ma Wan Station																																											i							
	MW1					*						*																															·	*						*
									_		I		I			I	I													-		<u> </u>																		<u> </u>
Tissue/ Whole Body Sampling		S	O :	N I)	J F	M	[A	M	J	J	A S	s o	N	D	J]	F N	1 A	M	J	J	Α	S	О	N	D	J :	F I	M A	M	J	J	Α	S	O N	N D	J	F	M	Α	M	J	J	A	S	О	N	D	J	F M
Impact Stations		$\overline{}$		$\overline{}$	\top					1								_		 					\neg	\neg		$\overline{}$						_			Ť					_	~~	$\overline{}$	$\overline{}$	$\overline{}$	$\overline{}$	\neg		
impact stations	ESC-INA	\vdash		+	+	*		+	+	+		*	_	+		_	_	+	_	+				_		-+	_	+	+	-	+	+	+		_	+	+		+					*	+	+	-+	\rightarrow		*
		\vdash		_	-	*			+	+		4			\vdash		_	_		+						-+		_		_		\vdash				_	+		-					*	+	+-+	-+	\rightarrow		*
	ESC-INB	\vdash		_	_	^				+-+		^	_	_			_			+						_		_			_	\vdash					+							<u> </u>	 	\longrightarrow	\longrightarrow	\longrightarrow		
Reference		\sqcup	\perp	\perp						$\bot \bot$	\perp				igspace							\sqcup	$\sqcup \sqcup$					\perp	\bot			$\sqcup \bot$							 			igsquare	<u> </u>	1		\coprod	\longrightarrow	—		
	ESC-TNA					*		\perp				*																																*						*
	ESC-TNB					*				<u> </u>		*											LT		T	T						\Box T											 L_	*		\bot \top				*
			\neg		\top						\neg																																				\neg	\neg		
	ESC-TSA		$\neg +$	\dashv	十	*		1	1	+	$\neg +$	*	\dashv			$\neg \vdash$	\neg	\top	\neg	1		М			-+	-	$\neg \vdash$	\dashv	$\neg \vdash$							\dashv	1		1					*		\Box	$\overline{}$	\dashv	\top	*
	ESC-TSB	\vdash	\dashv	\dashv	十	*		+	_	+	\dashv	*	+	+		\dashv	\dashv	+	+	+		$\vdash \vdash$		+	-+	-+	\dashv	\dashv	\dashv	+		 				\dashv	1					\vdash		*	+-	+	$\overline{}$	\rightarrow	$\overline{}$	*
	100-100							1	<u> </u>												1										1							<u> </u>	1					<u>—</u>	Щ_	Щ				
2 12 1						. I		. 1			-				-											-		- I				I - I		6				I		1				_			3.7		-	T .
Demersal Trawling		S	0	N I)	JF	M	l A	M	J	J	A S	5 O	N	D	J]	F N	1 A	M	J	J	A	S	0	N	D	J :	F I	M A	M	J	J	A	S) N	1 D	J	F	M	A	M	J	J	A	S	О	N	D	J	F M
Impact Stations																																						<u> </u>		<u> </u>	<u> </u>									
	ESC-INA		$_{\perp}$ \top			* *				\prod	*	*											L T																				*	*		⊥ T			*	*
	ESC-INB			\neg		* *					*	*	\top																							\top							*	*			\top	\neg	*	*
Reference Stations			$\neg +$	\top	十	\neg		\top	1	+	$\neg +$		\neg				\neg	\top	\neg	1		П			-+			\dashv	$\neg \vdash$							\dashv	1		1					\top	\vdash	\Box	$\overline{}$	\dashv	$\neg +$	$\neg \vdash$
	ESC-TNA	\vdash	\dashv	+	+	* *	+	+	+	+	*	*	\dashv		 	\dashv	-	+	+	+		$\vdash \vdash \vdash$	 	+	-+	-+	\dashv	+	-	+		 				+	+		 			\vdash	*	*	+	+	+	+	*	*
		\vdash	+	+	_	* *	+	+	+	+		*	_		\vdash	_	_	+	+	+		\vdash	\vdash					+	_	+	+	\vdash		_		+	+		+	-			*	_	+	+	+		*	
	ESC-TNB	\vdash	\perp	+	_	. *		+	+	++	<u> </u>	<u> </u>		1	\vdash				\perp	+		$\vdash \vdash \vdash$						\perp			1	\vdash				+	_	<u> </u>	 	-		$\vdash \vdash \vdash$		+ *		+	\longrightarrow	—	<u> </u>	<u> </u>
		\sqcup	\perp	\perp						$\downarrow \downarrow \downarrow$	\perp	\perp			igspace				\bot			\sqcup	$\sqcup \sqcup$				\bot		\bot			$\sqcup \bot$	\perp						 			\sqcup	<u> </u>	1	<u> </u>	\coprod	\longrightarrow		\bot	
	ESC-TSA					* *		\perp			*	*																															*	*		$\perp \perp$			*	
	ESC-TSB	1 1	$_{-}\top$			* *					*	*											\Box \top		T				_ _			$oxedsymbol{oxed}T$											*	*		\perp \top			*	*
																	_	_																																
Water Column Profiling		S	0	NI		I F	M	[A	M	Ţ	Ţ	AS	$s \mid o$	N	D	I I	F N	1 L A	M	T	I	Α	S	0	N	D	T .	F	M L	M	I	Ţ	Α	$\mathbf{S} \mid 0$		N D	Ţ	F	M	Α	M	I	I	Α	S	0	N	D	Ţ	F M
Water Column Profiling Plume Stations	WCP1	S *	_	_	_	J F *	_	_	_	J	_	A S	SO	N	D	J 1	F N	1 A	M	J	J	A	S	О	N	D	J :	F I	M A	M	J	J	A	S	O	N D	J	F	M	A *	M		J	_		O *		_	J	

Annex A1 - Environmental Monito	oring and Audit S	ampling Sche	edule	for E	ast of	Sha Cl	hau (Sep	tember .	2012 -	April 2	2017)																																
		201	12					201	3								2	2014									2015									201	6					201	7
Benthic Recolonisation Studies		S O	N	D]	J F	M	A N	ı J	J A	S	0	N	D J	F	M	A N	м Ј	J	A	S	0	N	D	J F	M A	M	J J	A	SC	N	D	J	M	A	M	J	J A	S	O	l D	J	F	M A
Capped Contaminated Mud Pits IV	Va-c																						T																				
	ESC-CPA			*					*				*						*				*					*			*						*			*			
	ESC-CPB			*					*				*						*				*					*			*						*	1		*			
	ESC-CPC			*					*				*						*				*	1 1		1		*			*						*			*	\vdash		
Reference Stations	Esc er e															<u> </u>							-	++		1		1 1			1 1							1 1			+		-
Reference Stations	ESC-RBA		-	*				+ +	*	+	+	_	*				+	+	*		-		*	+	+	+ +	+	*	_		*		+				*	+		*	\vdash		
	ESC-RBB			*				+ +	*			_	*					+	*				*	+++				*			*						*	+		*	\vdash		
	ESC-RBC		-	*				+ +	*				*					+	*	+			*	+	-	+ +		*			*						*	+ -		*	\vdash		
	ESC-NDC																																										/
In a st Manitain - Car Dondain			NT .	n l	T E	1 3/1	A 3.	7 7	T A	C		NT .	D I	Г	M	A 3	A T	т	Ι .			N.T.	D.	T T	3.4 A	M -	т т	T . T		N.T.	Б	T T		A	M	T	T A	C		ı I D	7	т	34 A
Impact Monitoring for Dredging		SO	N	D .	J F	IVI	A IV	ı J	J A	. 5	О	IN	υj	Г	M	A N	M J	J	A		О	N	D	J F	M A	M]	<u> </u>	A	S C	N	D	J I	M	A	M	J	J A	. 5	O	1 D	J	F	M A
Upstream/Reference Stations	1104	4 4			st. st.		* *		_	+	\vdash	-+	-	+	\vdash			+	+	-	_		+	-		+ +		+ +	* *	*	*	* *	.	+			_	+	*	* *	+		 !
	US1					+		+			\vdash		_							\vdash			_	\perp								* *						\perp			\longrightarrow		
	US2	* *	*	* :	* *	*	* *				\vdash	_	_		\vdash			+	+	\vdash			\dashv						* *	*	*	* *						+	*	* *	\longrightarrow		
Downstream/Impact Stations											\sqcup						_			$\sqcup \bot$			_	\perp			_	\bot			\vdash									_	\sqcup		
	DS1	* *		*		+	* *																	\bot				\bot		*		* *								* *	\coprod		'
	DS2	* *												4	$\sqcup \bot$				↓	$\sqcup \bot$				\bot		\bot		\bot		*		* *				_				* *	\coprod		'
	DS3	* *			* *	\perp	* *																	$\bot\bot$				\bot	* *	*	*	* *	·						*	* *	\coprod		'
	DS4	* *			* *		* *																						* *	*	*	* *							*	* *			
	DS5	* *	*	*	* *	*	* *																						* *	*	*	* *							*	*			
Ma Wan Station																																											
	MW1	* *	*	* :	* *	*	* *																						* *	*	*	* *							*	*			
			•	•	'	'	'		'	'	•	•	•	'		•	•		•		•	•			•		'		'		•		•	•	•	•	•	'	•	•			
Capping		S O	N	D]	J F	M	A N	ı J	J A	\mathbf{s}	О	N	D J	F	M	A N	M J	J	A	S	О	N	D	J F	M A	M]	J J	A	S C	N	D	J I	M	A	M	J	J A	S	O	l D	J	F	M A
Ebb Tide																																											
Impact Station																																											
	ESC-IPE1												*	*			*		*				*	*		,	*	*			*	*	,										
	ESC-IPE2												*	*			*	1	*				*	*		,	*	*			*	*									\Box		
	ESC-IPE3												*	*			*		*				*	*		† † ,	*	*			*	*									\vdash		
	ESC-IPE4		-						_	+	\vdash	-	*	*			*	+	*		-+		*	*		,	*	*			*	*						+ +			\vdash	-+	-
	ESC-IPE5		-+								\vdash		*	*			*	+	*				*	*		 	*	*			*	*						+			\vdash	-+	
Intermediate Station	Loc-II Lo		-+	-	+	+			+	+	\vdash	-+	+	+				+	+		-+	_	\dashv	+				+ +			+	+						+			\vdash		
intermediate Station	ESC-INE1		-+	-		+ +		+ +		+	+	_	*	*			*	+	*				*	*		+ + ;	*	*			*	*						+		_	\vdash		
			-+	-	-	+		+	-	+	\vdash	-+	*	*	\vdash		*		*	\vdash	-+	-	*	*	-			*	_		*	,					_	+		_	\vdash		
	ESC-INE2		_					+	_	+	\vdash	-	*	*			*		*	\vdash	-		*	*	_		*	*	_		*	-					_	+		_	+		 '
	ESC-INE3									+	\vdash	_	4	*			*		*	\vdash			*	*			*	*			*							+		_	\vdash		 -'
	ESC-INE4			_				+					*	*			*		*	\vdash			*				*	+	_		*						_	+		_	+		
	ESC-INE5							+			\vdash		*	*			*		*	\vdash			*	*		+ + '	*	*			*	*						\perp		_	\longrightarrow		
Reference Station		\square		_													_		_	$\sqcup \sqcup$			_	\perp		\bot		\bot			+							\perp			igoplus		
	ESC-RFE1										\sqcup		*	*			*		*				*	*			*	*			*	*	<u> </u>								\sqcup		
	ESC-RFE2												*	*			*		*				*	*			*	*			*	*	· .					\perp			\coprod		
	ESC-RFE3			[_				\perp					*	*			*		*				*	*			*	*			*	*									\coprod		'
	ESC-RFE4				\perp			$\perp \perp$					*	*			*		*				*	*		,	*	*			*	*	•								\coprod		'
	ESC-RFE5												*	*			*		*				*	*		,	*	*			*	*											
Ma Wan Station																				$oxed{L}$											$oxed{\Box}$												
	MW1												*	*			*		*				*	*		,	*	*			*	*											
Flood Tide																																											
Impact Station		L		_ [_										_ [1		
	ESC-IPF1												*	*			*		*				*	*		,	*	*			*	*											
	ESC-IPF2		$\neg \uparrow$	\top	\dashv			$\uparrow \uparrow$	\neg		\Box		*	*			*		*			$\neg \uparrow$	*	*	$\neg \vdash$,	*	*			*	*		T							\Box	\top	
	ESC-IPF3		-	\top	\top	+ +		++		+		-	*	*			*		*			$\overline{}$	*	*		 ,	*	*	\neg	1	*	*		1 1						+	\Box	\top	
Intermediate Station			-+	\top	\top	+ +		+	\dashv	1		-+	\top	+			\dashv		†			-+	\dashv	++	$\neg \vdash$	+ +	\dashv	\dagger	\neg	\top	 	\top	\top	† †				\dagger			\vdash	+	
	ESC-INF1		-+	-	\dashv			++			+		*	*			*		*	+		-+	*	*	 	 	*	*	\dashv	+	*	*			-+	$\overline{}$	-			+	+	+	-+-
	ESC-INF2		-+	-	+	+ +		++	_		+ +	_	*	*	 		*		*	 			*	*	-+	+ + ,	*	*	-	+-	*	*	,	+ +		$\overline{}$					+	+	-
	ESC-INF2 ESC-INF3		-+	-	+	+ +		++			+ +		*	*	+ +		*		*	+ +			*	*	$\overline{}$		*	*		+	*	*		+ +		- 					+		-+-'
Potovona Chatian	ESC-INF3		-+	+	+	+		++	_	+	\vdash		+	+ -				+	+ -			-+	+	++		+ + -	_	+ - +	_		+ +		-	+ +				+		+	+		 '
Reference Station	ECC PEE		$-\!\!\!\!+$	+	+	+		++	-		+		*	.3-	\vdash		.1.	-	*	\vdash	_	-+	*		-	+ + -		J.	-	+-	4	,		+		-+	_			+	+		——
	ESC-RFF1				+	+		++		_	\vdash			*			*			\vdash			_	*		'		*		+	*			 				\perp			\longrightarrow		<u> </u>
	ESC-RFF2							+		_			*	*	\sqcup		*		*	\sqcup			*	*			*	*			*	*						4			\longrightarrow		
	ESC-RFF3					1 1		\perp					*	*			*		*				*	*		'	*	*			*	*	·					4		_	\coprod		'
Ma Wan Station					\perp	\perp		$\perp \perp$			\sqcup		\perp		\sqcup					\sqcup				\bot		\bot					\perp							\perp			\Box		
	MW1												*	*			*		*				*	*			*	*			*	*											

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

			2012						2013									2014										20	015										2016	6						201	7
Routine Water Quality Monito	oring	S C) N	D	J]	F M	A	M	JJ	A	S) N	D	J F	FN	и А	M			A S	0	N	D	J	F	МА	M		J	A	S	0	N D	J	F	M	A	M			A S	О	N	D	J	F	M A
Ebb Tide							$\overline{}$																		\neg					\neg		\neg							\top		\neg			\neg			
Impact Station																																							\top								
	ESC-IPE1	k	* *		*	*	*	*	*	*																										,	*	*	\top	*	*	*	*		*	*	*
	ESC-IPE2	k	* *		*	*	*	*	*	*																										,	*	*	\top	*	*	*	*		*	*	*
	ESC-IPE3	k	* *		*	*	*	*	*	*																										,	*	*	\top	*	*	*	*		*	*	*
	ESC-IPE4	k	* *		*	*	*	*	*	*									\top															1		,	*	*	\top	*	*	*	*		*	*	*
	ESC-IPE5	k	* *		*	*	*	*	*	*											1															,	*	*	\top	*	*	*	*		*	*	*
Intermediate Station																					1																		\top								
	ESC-INE1	k	* *		*	*	*	*	*	*									\top															1		,	*	*	\top	*	*	*	*		*	*	*
	ESC-INE2	k	* *	1	*	*	*	*	*	*									\top	1	1															,	*	*	\top	*	*	*	*		*	*	*
	ESC-INE3	*	* *		*	*	*	*	*	*																										,	*	*	+	*	*	*	*		*	*	*
	ESC-INE4	*	* *		*	*	*	*	*	*									\neg																	,	*	*	\top	*	*	*	*		*	*	*
	ESC-INE5	*	* *		*	*	*	*	*	*									\neg																	,	*	*	+	*	*	*	*		*	*	*
Reference Station							1 1								\top				\top																				+								
	ESC-RFE1	*	* *		*	*	*	*	*	*					\top				\neg																	,	*	*	+	*	*	*	*		*	*	*
	ESC-RFE2	*	* *		*	*	*	*	*	*									\dashv																	,	*	*	+	*	*	*	*		*	*	*
	ESC-RFE3	*	* *		*	*	*	*	*	*			1 1		+				\dashv		1															,	*	*	+	*	*	*	*		*	*	*
	ESC-RFE4	*	* *		*	*	*	*	*	*			1 1						\dashv																	,	*	*	+	*	*	*	*		*	*	*
	ESC-RFE5	*	* *		*	*	*	*	*	*									\dashv																	,	*	*	+	*	*	*	*		*	*	*
Ma Wan Station							1 1												\dashv																				+								
	MW1	,	* *		*	*	*	*	*	*									\neg																	,	*	*	+	*	*	*	*		*	*	*
Flood Tide											<u> </u>		 					<u> </u>		l			l	 				<u> </u>																			
Impact Station																																															
	ESC-IPF1	k	* *	Т	*	*	*	*	*	*			1 									Т														,	*	*	$\overline{}$	*	*	*	*		*	*	*
	ESC-IPF2	k	* *		*	*	*	*	*	*			+ +		_				-									1								,	*	*	+	*	*	*	*		*	*	*
	ESC-IPF3	k	* *		*	*	*	*	*	*			+ +		_	_			-									+								,	*	*	+	*	*	*	*		*	*	*
Intermediate Station	Loc HTo						+ +			+			+ +		_	+			-									+									-	_	+								
	ESC-INF1	,	k *	+	*	*	*	*	*	*			+ +		+				+	-	+															,	*	*	+	*	*	*	*		*	*	*
	ESC-INF2	*	k *	+	*	*	*	*	*	*			+ +		+				\dashv																	,	*	*	+	*	*	*	*		*	*	*
	ESC-INF3	,	k *	+	*	*	*	*	*	*			+ +		+				+		+															,	*	*	+	*	*	*	*		*	*	*
Reference Station	Loc-IIVI			+			+						+ +		+				\dashv																		-		+								
Reference Station	ESC-RFF1	k	k *	+	*	*	*	*	*	*		_	+		+	_			+		+													+		,	*	*	+	*	*	*	*		*	*	*
	ESC-RFF1 ESC-RFF2	*	k *		*	*	*	*		*		+	+		+				-			+-		\vdash								-+	_					*	+		*	*	\perp			*	*
	ESC-RFF3	k	* *	+	*	*	+	*		*		+	+	_	+	-			\dashv	-	+	+-		\vdash	-+			+	\vdash		\vdash			+			_	*		*		*	_			*	*
Ma Wan Station	ESC-RFF3		+	+		+	+			_		+	+	_	+	-			\dashv	-	+	+-		\vdash	-+			1	 		\vdash			+			+		+				+			_	-
ivia vvaii Statioli	MW1	*	k *	+	*	*	*	*	*	*		+-	+	_	+	-			\dashv	-		+-		\vdash	-+			+	\vdash		\vdash			+		,	*	*	+	*	*	*	*		*	*	*
	14144 T																								1_																						

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

					2012							2013										20)14										2015										2016							201
Baseline Monitoring Prior to Dredging	Code	Frequency	Ţ		2012 0	N	D	J F	M	Α	M	7016 J	J A	S	0	N	D	J	F M	I A	. M		J.e.	A	S	0 N	N D) I	F	M	A	мІІ	4015 I	A	S	O N	D	I	F	M	A	M	Z016	J A	A S	0	N	D	Ţ	F
ar Field Stations	3333		+++	+				, -				,	, ,									,						,				,	1				1	,			$\overline{}$	-	' '	+	+	+			,	
	SB-WFA	3 days per week for 4 weeks	*	*	1 1		\dashv		+	-		\dashv	+		T		\dashv		+	+	1			\Box	\dashv	\top		+	+			\top	+	\Box	\dashv	+	+			$\neg \uparrow$		一	+	+	+	+	+			
	SB-WFB	3 days per week for 4 weeks	* *	*					+				\top		1	\vdash	_																							$\neg \uparrow$	$\neg \uparrow$	\dashv	+	+	+	+	+			
Mid Field Stations		o mayo per meen en a meen	\vdash	+	+ +		\dashv		+		$\overline{}$	-	+	+	+	+	\dashv	_		+	+			\vdash			+	+			_	-	+	\vdash		+	+	+		\dashv	\rightarrow	+	+	+	+	+	+		-	
	SB-WMA	3 days per week for 4 weeks	* *	*	+ +	_	\dashv	+	+		+	\dashv	+	+	+	+	\dashv	_	+	+	+			 			+	+	+ +		-	-	+	\vdash		+	+	1	Н	\rightarrow	\rightarrow	+	+	+	+	+	+		_	-
	SB-WMB	3 days per week for 4 weeks	\vdash	*	+	-+	+	-	+		\dashv	+	+	+	+	\vdash	\dashv	-+	+	+	+	+	\vdash	\vdash	-+	-	+	+	+		-+	+	+	\vdash	-+	+	+	+	Н	\rightarrow	\rightarrow	+	+	+	+	+	+		\dashv	\dashv
Near Field Stations	30-771710	3 days per week for 4 weeks	\vdash	+	+	-+	+	-	+		\dashv	+	+	+	+	\vdash	+	-+	+	+	+-		\vdash	\vdash	-	_	+	+	+		-	-	+	\vdash	_	+	+	+	\vdash	\rightarrow	\rightarrow	+	+	+	+	+	+-		\dashv	\dashv
Near Field Stations	CD MINIA A	2 days man yearly for 4 yearly	* >	*	+		-		+		-+	-	+	_	+	+	+	_	_		-	+		\vdash		_	+	+	+		_	_	+	\vdash		+	+	-		\rightarrow	\rightarrow	+	+	+	+	+-	+'		-	
		3 days per week for 4 weeks	* *	- 1	+	-+	+	_	+	-	\dashv	+	+	+-	+-	\vdash	+	_	+	+	+	+	\vdash	\vdash	-+	+	+	+	+	-+	-	+	+	$\vdash\vdash$	-+	+	+	₩	\vdash			+	+	+	+	+	+'		\dashv	\dashv
		3 days per week for 4 weeks	\vdash		+		-	_	+		_	-	_		 	\vdash	+	_	_		_	_		\vdash		_	+	+	+		_	_	+-	\vdash		+	+	-					+	+	+	+-	<i></i> /		_	_
	SB-WNBA		\perp	*	+	_	+		+		_	-	+		 	\vdash	\dashv		_	_	+			\vdash		_	_	+	+		_			\vdash		_	+	-	\vdash			\rightarrow	+	+	$+\!\!-$	$+\!\!-\!\!\!-$	 -'		_	_
- 4	SB-WNBB	3 days per week for 4 weeks	* '	*	\perp		_		\bot						_	\sqcup	_							\sqcup				_	\bot					\sqcup				_				\rightarrow	\rightarrow	+	—		 '			
Reference Stations				——	\perp		_		\bot			_	_		<u> </u>	\sqcup	_				_			\sqcup				_	\perp					Ш				_	Ш			\rightarrow	\bot	—	—	—	 -'			
	NM1	3 days per week for 4 weeks	\perp	*			_		\perp						<u> </u>	$oxed{oxed}$							Ш	Ш				\perp										_									<u> </u>			
	NM2	3 days per week for 4 weeks	* *	*													\perp																														<u> </u>			
	NM3	3 days per week for 4 weeks		*																																										Ш.	<u> </u>			
	NM5	3 days per week for 4 weeks	* >	*																																														
	NM6	3 days per week for 4 weeks	* *	*																																														
Sensitive Receiver Stations				\top		\neg					\neg	\neg	\top						\top	\top				П	\neg							\top	\top		\neg		T			\Box	\Box					T				
	MW1	3 days per week for 4 weeks	*	*									\top																				1				1	Ī		\Box	\Box		\top	\top	\top	\top				
	THB1	3 days per week for 4 weeks	* *	*	1 1	\neg	\neg	\neg	1 1		\neg	$\neg \vdash$	$\neg \vdash$		1		\neg		$\neg \vdash$						$\neg \uparrow$			1	1 1				\top		$\neg \uparrow$		\top			\Box	, —	\top	\top	\top	\top	\top	\Box			
	THB2	3 days per week for 4 weeks	* >	*	\top		\neg		\top		一十	\neg	十	\top	1	\Box	一							\Box				\top					\top	П		\top	\top			\neg	一十	\neg	\top	\top	\top	\top	\top		\neg	
	WSR45C	3 days per week for 4 weeks	* >	*	+ +	\top	\dashv	\neg	+ +	-	\dashv	\dashv	\dashv		†		\dashv	$\neg \vdash$	\dashv		1		\Box	\Box	\dashv	\dashv	\top	\top	+	\vdash		\dashv	\top	\Box	\dashv	\top	1				,—+	\dashv	+	+	+	+	\Box			
	WSR46	3 days per week for 4 weeks	* >	*	+	\dashv	\dashv	\dashv	+	\dashv	\dashv	\dashv	+	\top	T	\vdash	\dashv	\dashv	\dashv	+	\top		\Box	$\vdash \vdash$	\dashv	\top	\top	\top	\dagger	\vdash	\dashv	\top	\top	\dagger	\dashv	\top	\top	T	\Box			+	+	+	+	+	\top		\dashv	\dashv
		V 1		—																									1					1					_	—			<u> </u>	—	—					
mpact Monitoring for Dredging			J A	A S	0	N	D	J F	M	A	M	J	J A	S	0	N	D	J	F M	I A	M	J	J	A	S	O N	N D) I	F	M	A l	M I	J	A	S	O N	D	J	F	M	Α	M	J	JA	S	О	N	D	J	F
Jpstream Stations			+ +	$\overline{}$	_		_		_		_	_				П	\neg		_	_	_	,					_									_	_	,		$\overline{}$	\neg	$\overline{}$	+	\top	$\overline{}$	$\overline{}$	\vdash		,	_
	US1	3 days per week	\vdash	+	+ +	*	*	* *	*	*	*	*	* *	*	*	*	*	*	* *	*	*	*	*	*	*	* *	*	+	+		_	\dashv	+			+	+			\rightarrow	\rightarrow	+	+	+	+	+-	+		_	
	US2	3 days per week	\vdash	+	+	*	*	* *	*	*	*	*	* *	*	*	*	*	*	* *	*	*	*	*	*	*	* *	*	+	+		-	+	+	\vdash		+	+			\rightarrow	\rightarrow	+	+	+	+	+-	+		\dashv	$\overline{}$
Downstream Stations	002	o days per week	\vdash	+	+ +		\dashv		+		$\overline{}$	\dashv	+	+	+	+	\dashv	-			+	1		\vdash			+	+	+			\dashv	+			+	+	+		\rightarrow	\rightarrow	+	+	+	+	+-	+		\dashv	
	DS1	3 days per week	\vdash	+	+ +	*	*	* *	*	*	*	*	* *	*	*	*	*	*	* *	*	*	*	*	*	*	* *	*	+	+		_	\dashv	+	\vdash		+	+			\rightarrow	\rightarrow	+	+	+	+	+	+		\dashv	
	DS2	3 days per week	\vdash	+	+	*	*	* *	*	*	*	*	* *	*	*	*	*	*	* *	*	*	*	*	*	*	* *	*	+	+		-	+	+	\vdash	-+	+	+	+	\vdash	\rightarrow	\dashv	+	+	+	+	+	+		\dashv	\dashv
	DS3	3 days per week	\vdash	+	+	*	*	* *	*	-		*	* *	*	*	$oldsymbol{oldsymbol{\sqcup}}$	*			*	*	*	*	*	*	* *	*	+	+		_	+	+	\vdash	_	+	+	+		\rightarrow	\rightarrow	+	+	+	+	+	+		\dashv	\dashv
	DS4	3 days per week	\vdash	+	+	*	*	* *	*	*	*	*	* *	*	*	*	*	*	* *	*	*	*	*	*	*	* *	*	+	+		-	+	+	\vdash		+	+	+		\rightarrow	\rightarrow	+	+	+	+	+	+-		\dashv	\dashv
	DS5		\vdash	+	+	*	_		*	-	*			*		*	_			*		-	*	*	-	* *	*	+	+		-+	+	+	\vdash	_	+	+	\vdash	\vdash	\rightarrow	\rightarrow	+	+	+	+	+-	+-		+	+
Sensitive Receiver Stations	D55	3 days per week	\vdash	+	+		_		+				+	+	+	+ +	+			+	+	+		+			+	+	+	_	+	+	+	\vdash	_	+	+	╁	\vdash	\rightarrow	\dashv	+	+	+	+	+	+-		\dashv	\dashv
Sensitive Receiver Stations	N 43A71	2 days par week	\vdash	+	+	*	*	* *	*	*	*	*	* *	*	*	*	*	*	* *	*	*	*	*	*	*	* *	*	+	+	_	-	-	+	\vdash	-+	+	+	╁	\vdash	\rightarrow	\rightarrow	+	+	+	+	+	+-		\dashv	\dashv
	MW1	3 days per week	\vdash	+	+	*	· ·		*	-	_	-	_	*	_	*	_	_		*		\perp	*	*		-	*	+	+		_	_	+	\vdash		+	+	-		\longrightarrow	\rightarrow	\dashv	+	+	+	+-	+		-	_
	THB1	3 days per week	\vdash	+	+	*	_		*		*			*		*	_	_		*		\perp	*	*	_		*	+	+		_	_	+	\vdash		+	+	+		\rightarrow		-+	+	+	+	+-	+-		-+	_
	THB2 WSR45C	3 days per week 3 days per week	\vdash	+	+	*	*		*		*			*		*	_			*		\perp	*	*			*	+	+	_	-	-	+	\vdash	-+	+	+	╁	\vdash	\rightarrow	\rightarrow	+	+	+	+	+	+		\dashv	\dashv
	WSR46	3 days per week	\vdash	+	+	*	*		+		*								* *				*			_	*	+	+		-	+	+	\vdash	_	+	+	₩		\rightarrow	\rightarrow	+	+	+	+	+	+		\dashv	\dashv
	VV3IX40	3 days per week													<u> </u>																									—	—	<u> </u>	<u> </u>	—	—	—	لــــــــــــــــــــــــــــــــــــــ			
Pit Specific Sediment Chemistry			J A	AS	0	N	рI	I F	М	A	М	ī	ı I A		0	N	D	ī	FIM	1 A	М	Ī	ī	A	s	$0 \mid N$	v I D) I (F	М	A 1	мΙι	Ιī	A	$\mathbf{s} \mid \mathbf{c}$	O N	l D	T	F	м	Α	М	T	I A	Als	О	N	D	T	F
6B CMP 1 Active			+++	+		- 1		, ,	112		112	,	,			- 1		,	1112		112	,	,					,	1	112		,,	,			1		,	_				, , ,	+	+	+	1		,	-
Near-Pit			 	+	+	+	+	+	+	+	\dashv	+	+	+	+	+	+	+	+	+	+	+	\vdash	\vdash	+	+	+	+	+	\vdash	\dashv	+	+	+	\dashv	+	+	+	\vdash			+	+	+	+	+	+	$\vdash \vdash \vdash$	\dashv	+
· · · · · · · · · · · · · · · · · · ·	SB-NNAA	Monthly	 	+	+	+	+	\dashv	+	+	\dashv	+	11) 12	12	12	12	12 1	12 12) 12	12	12	12	12	12	12 1	2	+	+	\vdash	-+	+	+	+	+	+	+	+	\vdash	\rightarrow		+	+	+	+	+	+	\vdash	+	+
	SB-NNAB		 	+	++	+	+	-	+	-+	+	+							12 12									+	+	\vdash	-+	+	+-	+	+	+	+-	+	\vdash	\rightarrow	\rightarrow	+	+	+	+	+	+-	┝	-+	-+
Pit-Edge	SD ININID	Monuny	 	+	+	+	+	\dashv	+	\vdash	+	+	14	12	12	14	14	14 .	14 14	- 12	- 12	12	14	14	14	12 1.		+	+	\vdash	-+	+	+-	+	+	+	+-	+	\vdash			+	+	+	+	+	+	┝	-+	-+
In Euge	SB-NEAA	Monthly	 	+	+	+	+	\dashv	+	+	\dashv	\dashv	11) 12	12	12	12	12	12 12) 12	12	12	12	12	12	12 1	2	+	+	\vdash	\dashv	+	+-	+	\dashv	+	+	+	\vdash	\rightarrow		+	+	+	+	+	+-	$\vdash \vdash \vdash$	+	+
	SB-NEAA SB-NEAB	Monthly	-	+	+	+	\dashv	+	+	+	\dashv	+							12 12 12 12									+	+	\vdash	\dashv	+	+-	+	+	+	+	+	$\vdash \vdash$	\rightarrow		+	+	+	+	+	+-	\vdash	+	+
Active-Pit	5D-NEAB	Montruy	 	+	+	+	+	+	+		\dashv	+	12	2 12	12	12	12	12	12 12	2 12	12	12	12	12	12	12 1	- 4	+	+	\vdash	-+	+	+	+	+	+	+	+	\vdash			+	+	+	+	+	+	\vdash	+	+
V(11 C-1 1)	CD NID 4 4	Monthl	-	+	+	+	+	-	+		\dashv	+	11	112	10	10	12	12 -	12 12) 12	10	10	10	10	12	10 1	2	+	+	\vdash	-+	+	+	+	-+	+	+	+	\vdash			+	+	+	+	+	+/	\vdash	_	
	SB-NPAA	-	 	+	+	+	+	-	+		\dashv	+		2 12 2 12					12 12 12 12							12 1: 12 1:		+	+	\vdash	-+	+	+-	\vdash	-+	+	+-	\vdash	$\vdash \vdash$			+	+	+	+	+	+'			
R CMP 2 Active	SB-NPAB	Monuny	+-+	+	+	\dashv	+	-	+	_	\dashv	$-\!\!\!+$	12	2 12	12	12	14	14 .	12 12	4 12	. 12	12	12	12	14	12 1		+	+	\vdash	-+	+	+-	\vdash	$-\!\!\!+$	+	+-	\vdash	\vdash			+	+	—	+	+	+/		\dashv	\dashv
GB CMP 2 Active			\vdash	+	+	\perp	+	-	+		\dashv	$-\!\!\!\!+$	+	+	+-	\vdash			+	+	+	1	\vdash	$\vdash \vdash$		+	+	+	+	\vdash		+	+	\vdash	$-\!\!\!\!\!+$	+	+	-	$\vdash \vdash$			—	+	—	—	+-	 '			
	CD ATATS 4	N. 41	\vdash	+	+	\dashv	\dashv	-	+	\vdash	\dashv	\dashv	+	+	₩	\vdash	\dashv	-	+	+	+	1	\vdash	$\vdash \vdash$	\dashv	+	+		1,-		15		1		12	_	1					\rightarrow	+	+		+	 '	igwdown		
Near-Fit	SB-NNBA	3	\vdash	+	+	\perp	\dashv	-	+		\dashv	+	+	+	+-	\vdash	\dashv		+	+	+	1	\vdash	$\vdash \vdash$		+		2 12														—	+	—	—	+	 '			
Near-Pit		Monthly	\vdash	+	+	\dashv	\dashv	-	+	\vdash	\dashv	\dashv	+	+	₩	$\vdash \vdash$		-	+	+	+	1	$\vdash \vdash$	$\vdash \vdash$	\dashv	\perp	12	2 12	12	12	12 1	12 12	12	12	12 1	2 12	12	12	12	12		\rightarrow	+	+	—	+	 '	igwdown		
	SB-NNBB	•		- 1	1 1	1	- 1		1 1		- 1	- 1	- 1	1							\perp		\sqcup	\sqcup			\perp				- 1	- 1	1				1		I	, 1	. 1		- 1	1	1	1	' '	. 1		
		•	\vdash	\rightarrow	+	-+	_	-	$\overline{}$	_	$\overline{}$		$\overline{}$	_													1 40				-	-	_	_		-	_		-	ightarrow	lacksquare	-	\rightarrow	+	+	+-	+	Ļ	-	
	SB-NEBA	Monthly	世	士							\Box		丰					_					\sqcup	\sqcup											12 1		_					士	士	\pm	#	士	\Box			
Pit-Edge		Monthly Monthly		土														\pm	\pm	\pm						士		2 122 12									_					丰	主	土	士	\pm				\perp
Near-Pit Pit-Edge Active-Pit	SB-NEBA SB-NEBB	Monthly		\pm																							12	2 12	12	12	12 1	12 12	2 12	12	12 1	2 12	12	12	12	12		$\frac{1}{2}$	<u> </u>	\pm	\pm					
Pit-Edge	SB-NEBA	Monthly																									12		12	12	12 1 12 1	12 12	2 12	12	12 1	2 12	12	12	12	12		<u></u>	<u>+</u>	‡ ‡						

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

				20	012					20	13						201	14					2015							2	016				201	7
Cumulative Impact Sediment Chemi	stry		J	A S	0 1	N D	J	F M	1 A N	И Ј	J A	S	O N	D J	J F	M A	M J	J	A S	O N D	J	F M	AMJJ	A	S	N	D	J F	M	A M J	J	A S	0	N D J	F	M A
Near-field Stations																																				
	SB-RNA	4 times per year									1	2		12	12		12	1	2	12	1	2	12	12			12	12	2							
	SB-RNB	4 times per year									1	2		12	12		12	1	2	12	1	2	12	12			12	12	2							
Mid-field Stations												\perp																					\perp			
	SB-RMA	4 times per year			\perp				\bot	\perp	1			12	12		12		2	12	1	2	12	12			12	12					$\perp \perp \downarrow$			
	SB-RMB	4 times per year	\vdash		\vdash		\bot		++	\perp	1	2	\perp	12	12		12	1	2	12	1	2	12	12	\vdash	\perp	12	12	2		\bot		+		+	
Far-Field Stations			\vdash		\vdash	_	+	_	+	\perp							 	_	_			_		-		\perp		4					+		\perp	
	SB-RFA	4 times per year	\vdash		+		+		++	\perp	1		-	12	12		12		2	12		2	12	12		+	12	12		\square	+		++		+	
Conned Dit Stations	SB-RFB	4 times per year			++		+	_	+	+	1	2		12	12		12	- 1	2	12		2	12	12	\vdash	+	12	12	2				+++		+	
Capped Pit Stations	SB-RCA	A time on man years	\vdash		+	_	+		+	+	1	+		12	12	_	12	1	2	12	1	2	12	12	\vdash	+	12	12	,		+ +		+		+	_
	SB-RCB	4 times per year 4 times per year			+	_	+		+ +	+	1			12	12		12	_	2	12		2	12	12		+	12	12		 			++		+	
Sensitive Receiver Stations	3D-RCD	4 times per year	\vdash		+ +	-	+	-	+	+	+		++	12	12	_	12	++		12	 1		12	12		+	12	+ 1	_		+ +		++		+	
Sensitive Receiver Stations	MW1	4 times per year			 				+	+	1	2		12	12		12	1	2	12	1	2	12	12		+	12	12	,				++		+	
	THB1	4 times per year			 				+ +		1		\rightarrow	12	12		12	_	2	12		2	12	12		+	12	12					++		+ +	
	THB2	4 times per year				\vdash	t	\dashv		+	1		-	12	12		12	_	2	12		2	12	12		+	12	12	_	 			++		+ +	
		r to y to	- 1												1 1		1 1 1				•		1 1 1 1								<u> </u>			<u> </u>		
Sediment Toxicity Tests			Ţ	A S	OI	N D	J	F M	1 A N	и Г	I A	S	O N	D J	J F	M A	M J	J	A S	O N D	I I	F M	AMJJ	A	S	N	D	J F	M	A M J	J	A S	0	N D]	F	M A
SB CMP 1 Active			1																				 												1	
Reference			\vdash		+ +	\dashv	\dagger	_	+ +	+	\vdash	++	++	\dashv	+		+ + +	\dashv	+	 		+	 	+	\vdash	+	\dashv	+	+	 	++	+	+++	+	+	
	SB-TRA	2 times per year							+ +	\top	5	;	++	\dashv	\dashv	5	 		5	 			 	\top		+		\dashv	\top		+		+		+ +	
	SB-TRB	2 times per year				\neg			 	\top	5	-	1 1	$\neg \vdash$	\dashv	5	1 1 1	- 5	5				 	\top		\top	十	\dashv	\top		\dagger		+	\dashv	11	
Near-Field		- /				\neg	1	\neg	 	\top		+	1	$\neg \vdash$	$\dashv \dashv$			$\neg \vdash$	\neg		\sqcap		 	\top		\top	\dashv	$\neg \vdash$	\top		\dagger	\top	\Box	 	\dashv	
	SB-TAA	2 times per year									5	5				5			5																	
	SB-TAB	2 times per year										5				5		Ę	5																	
Sensitive Receiver Stations																																				
	MW1	2 times per year									5	5				5		Ę	5																	
	THB1	2 times per year									ш)	5				5		Ę	5																	
	THB2	2 times per year									5	5				5		Ę	5																	
SB CMP 2 Active																																				
Reference																																				
	SB-TRA	2 times per year										\perp									į	5		5				5					\bot			
	SB-TRB	2 times per year			$\perp \perp$		\bot		$\bot\bot$	\perp	\perp	$\bot\bot$	\perp		\perp		\bot			oxdot	į	5		5		\perp	_	5					+		\perp	
Near-Field					\perp		\bot		\bot	\perp	\perp	\bot								\Box						\perp							+			
	SB-TBA	2 times per year	\vdash		\vdash		\bot		+	\perp		++	\perp		\perp		+			\square	į	5		5	\vdash	\perp	_	5	_				+		+	
	SB-TBB	2 times per year	\vdash		+		\bot	_	++	\perp		++	\perp	_	\perp		+			\square		5		5	\vdash	\perp	_	5					+		+	
Sensitive Receiver Stations	2.474				\vdash		+		++	+	\vdash	++	\perp	_			+	_	_	\vdash	L .	_	+	+-	\vdash	+	_	+-		\vdash	+		++		+	
	MW1 THB1	2 times per year	\vdash		+	_	+	_	+	+	\vdash	++	+	_	+		+	-	_	+	į			5	\vdash	+	+	5	_	++-	1	_	+		+	
	THB1	2 times per year			+		+		+	+		++			-			_	_		;	5		5	\vdash	+	_	5	_				+		+	
	11102	2 times per year																			,	5		5				٥								
Tissue/ Whole Body Sampling			T	A S		N I D	ΙτΙ	F M	1 A N	лТ	т /	S	O N	DI	г г	M A	MII	т /	A S	OND	T 1	F M	AMJJ	ΙΛ	s	NI	D	тІт	M	AMJ	T	\ C		N D]	т	M A
Near-Pit Stations			,	A 3		N D	,	I IV.	IAIN	ı j	J	3	O N	D)	, 1	W A	IVI J	J	1 3	O N D	, ,	I IVI	AWIJ	Α	3 (1	Ъ	, ,	IVI	A WI J	J Z	1 3	+++	N D J	1	WI A
rvear-1 it Stations	SB-INA	2 times per year	\vdash		++	+	+	+	+	+	\vdash	++	+	\dashv	*		+ + +	 ,	*	 	,	*	 	*	\vdash	+	+	*	+	 	++	+	+-+	++	++	
	SB-INB	2 times per year	\vdash	_	++	+	+	+	++	+	$\vdash \vdash$	++	++	\dashv	*		+ + +	 ,	*		 	*	 	*	\vdash	+	\dashv	*	+-	 	+ +	+	++	++	+	
Reference North	02 1110	- mice per jem			++	\dashv	\dagger	\dashv	++	+	$\vdash \vdash$	++	++	\dashv	\dashv	-	+ + +	\dashv	\top		\vdash	\dashv	 	+	\vdash	+	\dashv	+	+	 	++	+	++	++	+	
			\vdash						 			+			*		1 1 1	,	*	 	1 1	*		*				*					+		+	
	TNA	2 times per year				_	+ +		1 1			+			*		1 1 1	,	*		,	*		*				*					+			
	TNA TNB	2 times per year 2 times per year	H														+ + +	-	$\overline{}$			_	 	-											-	_
Reference South	TNA TNB	2 times per year 2 times per year					+										1 1 1	- 1	- 1		I I															
Reference South															*			,	*		,	*		*		+	+	*					$\overline{+}$			
Reference South	TNB	2 times per year													*				*			*		*				*					$\overline{+}$			
Reference South	TNB TSA	2 times per year 2 times per year													\rightarrow									*				*								
	TNB TSA	2 times per year 2 times per year	J	A S	0 1	N D	J	F M	1 A M	м ј	J A	A S	O N	D J	*	M A	M J	5	*	O N D		*	A M J J	* * A	S) N	D		M	A M J	J	A S	0	N D J	T F	M A
Demersal Trawling	TNB TSA	2 times per year 2 times per year	J	A S	O 1	N D	J	F M	1 A N	и ј	J A	A S	O N	D J	*	M A	M J	5	*	O N D		*	A M J J		S) N	D			A M J	J A	A S	0	N D j	Γ F	M A
Demersal Trawling	TNB TSA TSB SB-INA 1-	2 times per year 2 times per year 2 times per year 5 4 times per year	J	A S	0 1	N D	J	F M	1 A N	и ј	J A		O N		*	M A	M J	5	*	O N D	J	*			S) N	D	J F	M	A M J	J A	A S	0	N D j	J F	M A
Demersal Trawling Impact	TNB TSA TSB SB-INA 1-	2 times per year 2 times per year 2 times per year	J	A S	0 1	N D	J	F M	1 A N	ИЈ		5	O N	5	* J F	M A	M J	5	*	O N D	J	* M	5	A	S	O N		J F	M	A M J	J A	A S	0	N D	J F	M A
Demersal Trawling Impact	TNB TSA TSB SB-INA 1-SB-INB 1-5	2 times per year 2 times per year 2 times per year 5 4 times per year 5 4 times per year	J	A S	0 1	N D	J	F M	1 A N	и ј	5	5	O N	5	* F 5 5 5 5 5	M A	M J	5	*	O N D	J 1	* M	5	A 5	S	D N		J F 5 5 5 5	M	A M J	J A	A S	0	N D J	J F	M A
Demersal Trawling Impact	TNB TSA TSB SB-INA 1-5 SB-INB 1-5	2 times per year 2 times per year 2 times per year 5 4 times per year 4 times per year	J	A S	ON	N D	J	F M	1 A N	и ј		5	O N	5	* F 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	M A	M J	5	*	O N D	J 1 5 5 5 5 5 5 5 5 5	* F M 5 5	5 5	A 5 5 5	S) N		J F 5 5 5 5 5 5 5 5	M	A M J	J A	A S	0	N D j	F	M A
Reference South Demersal Trawling Impact Reference North	TNB TSA TSB SB-INA 1-SB-INB 1-5	2 times per year 2 times per year 2 times per year 5 4 times per year 5 4 times per year	J	A S	0 1	N D	J	F M	1 A M	м ј	5	5	O N	5	* F 5 5 5 5 5	M A	M J	5	*	O N D	J 5 5 5 5 5 5 5 5	* F M 5 5	5 5	A 5	S	O N		J F 5 5 5 5	M	A M J	J A	A S	0	N D j	T F	M A
Demersal Trawling Impact	TNB TSA TSB SB-INA 1- SB-INB 1-5 TNA 1-5 TNB 1-5	2 times per year 2 times per year 2 times per year 5 4 times per year 4 times per year 4 times per year 4 times per year	J	A S	O 1	N D	J	F M	1 A N	И Ј	E 5	5	O N	5 5	* F 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	M A	M J	5	*	O N D	J 1 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	* F M 5 5	5 5 5	5 5 5	S C	D N		J F 5 5 5 5 5 5 5 5 5	M	A M J	J A	A S	0	N D j	f F	M A
Demersal Trawling Impact Reference North	TNB TSA TSB SB-INA 1-5 SB-INB 1-5	2 times per year 2 times per year 2 times per year 5 4 times per year 4 times per year	J	A S	O 1	N D	J	F M	1 A M	M J		5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	O N	5 5 5 6 5	* F 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	M A	M J	5	*	O N D	J 5 5 5 5 5 5 5 5	* F M 5 5	5 5 5	A 5 5 5	S	O N		J F 5 5 5 5 5 5 5 5	M	A M J	J A	A S	0	N D j	J F	M A

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

Doubing Motor Osselite Menitories			т.		012 O N	ı D	т ,	F M	A		2013	A	C	O N	D	т	г ,	M .	М	2014	, ,		0	N D	т	F I	v	M	2015		C		N D		F	M	Α ,		2016 J	Α.	C	O N	D		2017
Routine Water Quality Monitoring			J	A S	O N	I D	J .	F M	A	M))	A	5	O N	D	J	F I	M A	M	J	J A	1 5	0	N D	J	F .	M A	M	J .	J A	. 5	0	N L	,)	F	M	AN	VI J	J	Α	5 (N	D		F
Ebb Tide								_	+	-	+	+-	\vdash		+	\square					_	_	\vdash		+			+	_			_		_	\vdash	igoplus	\leftarrow	+			+	+	$+\!-\!1$	\longrightarrow	\rightarrow
Impact Stations Downcurrent	CD IDE1							_	++	_	+		\vdash		_						0 0			0		0							0		0	igwdapprox	\leftarrow	+			+	+	+	\vdash	\rightarrow
	SB-IPE1	8 times per year						_	++	-	+	8	\vdash	8 8	_	8	8	8	+ -		8 8	3	8	8	8	8	8	8		8 8	_	8	8	8	8	igwdapprox	\leftarrow	+			+	+	+	\vdash	\rightarrow
	SB-IPE2	8 times per year							+	-	+	8	$\vdash \vdash$	8 8	_	8		8	+ -	_	8 8	3	8	8	8	8	8	0		8 8	+	Ü	8	8	8	igwdapprox	\leftarrow	+			+	+	$+\!-\!1$	\vdash	\rightarrow
	SB-IPE3	8 times per year			+			_	+	_	+	8	\vdash	8 8	_	8		8	_		8 8	3	8	8	- ŭ	8	8			8 8	_	8	8	8	8	igwdapprox	\vdash	+			+	+	+	\vdash	+
	SB-IPE4	8 times per year					\vdash	_	++		+	8	\vdash	8 8	_	8		8			8 8	3	8	8	8	8	8	8		8 8	_	8	8	8	8	igwdapprox	\vdash	+			+	$+\!\!-$	+	\vdash	\rightarrow
	SB-IPE5	8 times per year						_	+	_	+	8	\vdash	8 8	+	8	8	8	8		8 8	3	8	8	8	8	8	8		8 8		8	8	8	8	igoplus	\vdash	+			+	+	$+\!-\!-\!-$	\vdash	\rightarrow
Intermediate Stations Downcurrent	CD INIT								++	-	+		\vdash		_						0 0			0		0							0		0	igoplus	\leftarrow	+			+	+	$+\!-\!-\!+$	\vdash	\rightarrow
	SB-INE1	8 times per year				_		_	+	-	+	8	\vdash	8 8	+	8	8	8	+ -		8 8	3	8	8	8	8	8			8 8	_	0	8	8	8	ш	\vdash	+	_	\vdash	+	+	igspace	\longrightarrow	\rightarrow
	SB-INE2	8 times per year				_		_	+	-	+	8	\vdash	8 8	_	8	_	8	+ -	_	8 8	3	8	8	8	8	8	8	_	8 8	_	8	8	8	8	ш	\leftarrow	+	_	\vdash	+	+	igspace	\longrightarrow	\rightarrow
	SB-INE3	8 times per year				_	\vdash	_	+	_	+	8	\sqcup	8 8		8		8	+ -		8 8	3	8	8	8	8	8	8		8 8	+	8	8	8	8	igspace	\leftarrow	+	_	\vdash	+	+	$\perp \!\!\!\! \perp \!\!\!\! \perp$	\vdash	\rightarrow
	SB-INE4	8 times per year				_	\vdash		+	_	+	8	\sqcup	8 8		8	_	8		-	8 8	3	 	8	8	8	8	_ <u> </u>		8 8	-	Ŭ	8	8	8	igspace	\leftarrow	+	_	\vdash	+	+	$\perp \!\!\!\! \perp \!\!\!\! \perp$	\vdash	\rightarrow
	SB-INE5	8 times per year		_			$\vdash \vdash$	-	+	$-\!\!\!\!+$	+	8	\longmapsto	8 8	+-	8	8	8	8	\dashv	8 8	3	8	8	8	8	8	8		8 8	+	8	8	8	8	igspace	\vdash	+	4	$\vdash \vdash$	+	+	$+\!\!-\!\!\!\!-$	\vdash	\dashv
Reference Stations Upcurrent	on need			_			$\vdash \vdash$	\perp	+	$-\!\!\!\!\!+$	_	+-	\sqcup		_			$-\!$	\bot	\perp	\perp		\vdash		+			+		_	\perp		_	\bot		igspace	\vdash	\bot		$\sqcup \bot$	+	+	$\downarrow \downarrow \downarrow$	igwdap	\bot
	SB-RFE1	8 times per year		_		4	$\vdash \vdash$		+	$-\!\!\!\!+$	+	8	\sqcup	8 8	_	8		8		-	8 8	3	8	8	8	8	8	- 0		8 8	_	-	8	8	, i	igspace	\vdash	+	4	$\vdash \vdash$	+	—	$\downarrow \downarrow \downarrow$	\vdash	\bot
	SB-RFE2	8 times per year		_		4	$\vdash \vdash$		+	$-\!\!\!\!+$	+	8	\sqcup	8 8		8		_	8	_	8 8	3	8	8	<u> </u>	Ŭ	8			8 8	_	8		8	, i	igspace	\vdash	+	4	$\vdash \vdash$	+	—	$\downarrow \downarrow \downarrow$	\vdash	\bot
	SB-RFE3	8 times per year		_	\bot		\vdash		+	\perp	\bot	8	\sqcup	8 8	_	Ŭ		8	 		8 8	3	8	8	8	8	8	8		8 8	+	8	8	8	8	ш	\vdash	\rightarrow			\rightarrow	—	igspace	\longrightarrow	\rightarrow
	SB-RFE4	8 times per year		_			\vdash		+			8	\sqcup	8 8	_	8		8			8 8	3	8	8	8	8	8	8		8 8	_	8	8	8	8	ш	\vdash	—			\rightarrow	—	igspace	\longrightarrow	\rightarrow
	SB-RFE5	8 times per year		_					+		_	8	\sqcup	8 8		8	8	8	8		8 8	3	8	8	8	8	8	8		8 8	\perp	8	8	8	8	ш	\leftarrow	—			\rightarrow		Ш	\longrightarrow	\rightarrow
Sensitive Receiver Stations									\bot		_	_	\sqcup		_	\sqcup			\bot				\sqcup		lacksquare	\perp		\bot							Ш	ш	\vdash	—			\dashv	—	Ш	igspace	\rightarrow
	MW1	8 times per year							\bot		_	8	\sqcup	8 8		8	8	8			8 8	3	8	8	8	8	8	8		8 8		8	8	8	8	ш	\vdash	—			\rightarrow	—	Ш	\longrightarrow	\rightarrow
	THB1	8 times per year							\bot		_	8	\sqcup	8 8		8	_	8	8		8 8	3	8	8	8	8	8	8		8 8	_	8	8	8	8	ш	\vdash	—			\dashv	Щ	Ш	\longrightarrow	\rightarrow
	THB2	8 times per year							\bot		_	8	\sqcup	8 8	_	8		8	-		8 8	3	8	8	8	8	8	Ŭ	_	8 8	_		8	8	8	ш	\vdash	—			\dashv	Щ	Ш	\longrightarrow	\rightarrow
	WSR45C	8 times per year							$\perp \perp$			8	\sqcup	8 8		8	8	8	8		8 8	3	8	8	8	8	8	8		8 8		8	8	8	8	ш	igspace	<u></u>			\bot		Ш	igspace	\rightarrow
	WSR46	8 times per year										8		8 8		8	8	8	8		8 8	3	8	8	8	8	8	8		8 8		8	8	8	8	Ш	igspace				\rightarrow		$oxed{oxed}$	\sqcup	
Flood Tide											\perp																									Ш	\Box				\bot		Ш	\Box	
Impact Stations Downcurrent											\perp																									Ш	\Box				\bot		Ш	\Box	
	SB-IPF1	8 times per year										8		8 8		8	8	8			8 8	3	8	8	8	8	8	8		8 8		Ü	8	8	8	Ш	$oldsymbol{oldsymbol{\sqcup}}$				\perp		Ш	\Box	\perp
	SB-IPF2	8 times per year										8		8 8		8	Ü	8	8		8 8	3	8	8	8	8	8	8		8 8		8	8	8	0	-					\perp		$oxed{oxed}$	\Box	\perp
	SB-IPF3	8 times per year										8		8 8		8	8	8	8		8 8	3	8	8	8	8	8	8		8 8		8	8	8	8	Ш					\perp		$oxed{oxed}$	\Box	\perp
Intermediate Stations Downcurrent																																				Ш					\perp		Ш	\Box	\perp
	SB-INF1	8 times per year										8		8 8		8		8	8		8 8	3	8	8	8	8	8	8		8 8		8	8	8	8										
	SB-INF2	8 times per year										8		8 8		8		8	8		8 8	3	8	8	8	8	8	8		8 8		8	8	8	8										
	SB-INF3	8 times per year										8		8 8		8	8	8	8		8 8	3	8	8	8	8	8	8		8 8		8	8	8	8	$oxed{oxed}$							$oxed{oxed}$	Ш	
Reference Stations Upcurrent																																													
	SB-RFF1	8 times per year							\prod			8		8 8		8		8	8		8 8	3	8	8	8	8	8	8		8 8		8	8	8	8										
	SB-RFF2	8 times per year										8		8 8		8		8	8		8 8	3	8	8	8	8	8	8		8 8		8	8	8	8										
	SB-RFF3	8 times per year										8		8 8		8	8	8	8		8 8	3	8	8	8	8	8	8		8 8		8	8	8	8										
Sensitive Receiver Stations									\prod																																				
	MW1	8 times per year							\prod			8		8 8		8		8	8		8 8	3	8	8	8	8	8	8		8 8		8	8	8	8										
	THB1	8 times per year										8		8 8		8		8	8		8 8	3	8	8	8	8	8	8		8 8		8	8	8		$oldsymbol{ol}}}}}}}}}}}}}}}}}}$									
	THB2	8 times per year										8		8 8		8	8	8	8		8 8	3	8	8	8	8	8	8		8 8		8	8	8	8										
	WSR45C	8 times per year										8		8 8		8	8	8	8		8 8	3	8	8	8	8	8	8		8 8		8	8	8	8										
	WSR46	8 times per year										8		8 8		8	8	8	8		8 8	3	8	8	8	8	8	8		8 8		8	8	8	8										
Vater Column Profiling			J	A S	O N	l D	J	F M	A	M J	J	A	S	O N	D	J	F	M A	M	J	J A	S	0	N D	J	F 1	M A	M	J	JA	S	0	N I	J	F	M		M J	J	A	$S \mid C$	O N	D	J	F
Plume Stations	WCP1	Monthly			1	1	1 T		1 —							. T	4		- i - T				i . T			4		4		4 4						· . –				ı T		1 -		∡ T	1

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

					2012					201	3						20	14						201	5						20:	16			20)17
Comming Water Overlite Manifester						N D	, .		1				N D	т	E				C		NI D	I F	M A				N	т ,	E 34	, ,				J D		
Capping Water Quality Monitoring Ebb Tide			J	A S		N D	JF	M	A M	J	J A	, 0	N D	J	F M	A	M J	J A	5	0	N D	J F I	VI A	IVI J	J A	5 () N D	J J J	г М	A N	vi J	JA	5 U N	שוא	JF	MA
Impact Stations Downcurrent			\vdash		+		\vdash		\vdash	+	++	+	_	+	+				+	-+	_		++	++		\vdash		++		\vdash	+	++				\longrightarrow
impact Stations Downcurrent	SB-IPE1	4 times per year			+					+	-	+ +		+					+	-+	3	3	+	3	3	+	3		3		3	3		3		$\overline{}$
	SB-IPE2	4 times per year		-	+	_				+ +	+	+ +		+ +					╫	-+	3	3	+	3	3	+	3	 	3		3	3		3		\Box
	SB-IPE3	4 times per year			+					+		+ +		1 1	+				+	-	3	3		3	3	 	3	1 3	3		3	3		3		$\overline{}$
	SB-IPE4	4 times per year			1			1		+		+ +		1					\Box	\dashv	3	3	+++	3	3		3		3		3	3		3		$\overline{}$
	SB-IPE5	4 times per year			1 1					+	\dashv	1 1		1					1 1	\neg	3	3	+	3	3		3		3		3	3		3		$\overline{}$
Intermediate Stations Downcurrent		- market per year								1 1				1					1 1	\neg	Ť		+		+		1 1	 								\Box
	SB-INE1	4 times per year			1 1					1 1				1 1					\Box		3	3	\dashv	3	3		3	3	3		3	3		3		\Box
	SB-INE2	4 times per year			1 1					\top	\neg			1					\Box	\neg	3	3	\dashv	3	3		3	3	3		3	3		3		\Box
	SB-INE3	4 times per year			1 1					\top				1					\Box	\neg	3	3		3	3		3	3	3		3	3		3		
	SB-INE4	4 times per year			1 1					\top				1					\Box	\neg	3	3		3	3		3	3	3		3	3		3		
	SB-INE5	4 times per year			1 1					\top				1					\Box	\neg	3	3	\perp	3	3		3	3	3		3	3		3		
Reference Stations Upcurrent		. ,								\top									\Box																	
•	SB-RFE1	4 times per year																			3	3		3	3		3	3	3		3	3		3		
	SB-RFE2	4 times per year			1 1					1 1		1 1		1							3	3	\dashv	3	3	$\uparrow \uparrow \uparrow$	3	3	3		3	3		3		\Box
	SB-RFE3	4 times per year								\top									\Box	\neg	3	3		3	3		3	3	3		3	3		3		
	SB-RFE4	4 times per year																			3	3		3	3		3	3	3		3	3		3		\Box
	SB-RFE5	4 times per year																	\Box		3	3		3	3		3	3	3		3	3		3		
Sensitive Receiver Stations		• •								\top									\Box																	
	MW1	4 times per year																			3	3		3	3		3	3	3		3	3		3		\Box
	THB1	4 times per year																			3	3		3	3		3	3	3		3	3		3		
	THB2	4 times per year								\top									\Box		3	3		3	3		3	3	3		3	3		3		
	WSR45C	4 times per year			1 1					\top				1					\Box	\neg	3	3		3	3		3	3	3		3	3		3		
	WSR46	4 times per year								\top									\Box		3	3		3	3		3	3	3		3	3		3		
Flood Tide		•								1 1				1					\Box	\neg																\Box
Impact Stations Downcurrent					1 1					1 1	\dashv	\top		1					+		\dashv		\dashv	\dashv		+		+ +			\dashv	\dashv				\Box
	SB-IPF1	4 times per year			1 1					+	\dashv	\top		1 1					\Box	-	3	3	+	3	3		3	3	3		3	3		3		
	SB-IPF2	4 times per year			1 1					+	\dashv	+							\Box	-	3	3	+	3	3	+	3		3		3	3		3		
	SB-IPF3	4 times per year			1 1					+	\rightarrow	1		1					+	\neg	3	3	+	3	3		3		3		3	3		3		$\overline{}$
Intermediate Stations Downcurrent		- territor protection			1 1					+	\dashv	\top		1 1					\Box	-	<u> </u>		+			+		11								
	SB-INF1	4 times per year			1 1					+	\dashv	\top		1 1					\Box	-	3	3	+	3	3	+	3	3	3		3	3		3		
	SB-INF2	4 times per year			1 1					+	\dashv	\top		1 1					\Box	-	3	3	+	3	3	+	3		3		3	3		3		
	SB-INF3	4 times per year			1 1					+				1					+	\neg	3	3	+	3	3		3		3		3	3		3		
Reference Stations Upcurrent		I miles per year								+				1					+	\neg	+		+++					 								
	SB-RFF1	4 times per year			1 1					+	\dashv	+		1					\Box	-	3	3	+	3	3	+	3	1 3	3		3	3		3		
	SB-RFF2	4 times per year			1 1			+		+				T					+	\neg	3	3	+	3	3		3		3		3	3		3		
	SB-RFF3	4 times per year	\vdash	$\neg \vdash$	+					+	- - 	+	$\neg \vdash$	1	\dashv	\top			+	\dashv	3	3	+	3	3	+	3		3	\vdash	3	3		3		
Sensitive Receiver Stations		x - y	\Box		+	\neg				+	- - 	+		1 1	$\neg \vdash$				+	-+	+		\dashv		1	+	1 1	 	\top	\vdash	1	- - - - - - - - - - 				
1	MW1	4 times per year	\Box	$\neg \vdash$	+					+	- - 	+	$\neg \vdash$	1	\dashv	\top			+	\dashv	3	3	+	3	3	+	3	3	3		3	3		3		
	THB1	4 times per year	\vdash		+ +	_		\top		+	++	+ +	\neg	1 1	\dashv	\top			+	\dashv	3	3	+	3	3	 	3		3		3	3		3		
	THB2	4 times per year	\vdash	$\neg \vdash$	+					+	+	+	$\neg \vdash$	1	\dashv	\top			+	\dashv	3	3	+	3	3	+	3		3	\vdash	3	3		3		
	WSR45C	4 times per year	\vdash		+ +	_		\top		+ +	++	+ +	\neg	1 1	\dashv				+	\dashv	3	3	+	3	3	 	3		3		3	3		3		,
	WSR46	4 times per year	\vdash	\dashv	+					+	+	+	\dashv	\dagger	\dashv	+			+	\dashv	3	3	+	3	3	++	3	 	3	\vdash	3	3		3		
		<u>r</u> <i>y</i>					<u> </u>							1 1												<u> </u>	<u> </u>						1 1	J		
Benthic Recolonisation Studies			J	A S	0	N D	JF	M	A M	J	J A	6 0	N D	J	F M	[A	M J	J A	S	0	N D	J F I	M A	M J	J A	S) N D	JI	F M	AN	м ј	J A	S O N	N D	J F	M A
Capped Contaminated Mud Pits																																				
	SB-CPA	2 times per year	\Box	\neg	\top					+	\neg	77	$\neg \vdash$	1	\neg				\Box	$\neg \vdash$	\top		\dashv	\dashv	12	T^{\dagger}	12	+		\vdash	$\dashv \dashv$	12		12		\Box
	SB-CPB	2 times per year			\top		 			† †	\neg	11		1	\neg					$\neg \dagger$	\dashv		\dashv	\dashv	12		12				$\dashv \dashv$	12		12		\Box
		. ,			\top		 			† †	\neg	11		1	\neg					$\neg \dagger$	\dashv		\dashv	\dashv			1 1	+			$\dashv \dashv$	- - 				\Box
Reference Stations			\Box		+	\neg				+ +	- 	+		1 1	\neg				+	-+	\top		\dashv	\dashv		+	 	++		\vdash	+	- - 	\dashv	1 1		
	RBA	2 times per year	\Box		+	\neg				+ +	- - 	+		1 1	$\neg \vdash$				+	-+	\top		\dashv	\dashv	12	 	12	++		\vdash	+	12	 	12		
	RBB	2 times per year	\Box		+					+ +	\dashv	+ +	$\neg \neg$	1 1	\neg	\top			\dagger	-	\top		\dashv	\dashv	12	\dagger	12				+	12	\dashv	12		\Box
	RBC	2 times per year	\Box		+			1		+	\dashv	+	$\neg \neg$	1 1	\neg	\top			\Box	-+	\top		\dashv	\dashv	12	T^{\dagger}	12				+	12	\dashv	12		$\overline{}$
<u> </u>		1 J																											1							

Notes

"*" = 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 2017

Stations	Temp	Salinity	Turbidity		solved ygen	pН	Suspended Solids
	(°C)	(ppt)	(NTU)	(%)	(mg L-1)	(mg L-1)	(mg L-1)
WCP 1							
(Downstream) WCP 2	18.48	29.54	7.42	91.02	7.15	7.94	7.38
(Upstream)	18.47	29.23	17.97	92.40	7.28	7.98	16.40
WQO (Dry season)	N/A	26.31 - 32.16#	N/A	N/A	>4	6.5-8.5	13.2

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

Graphical Presentations

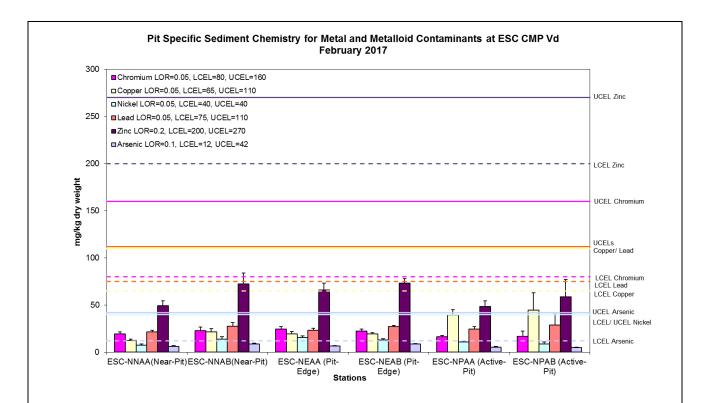


Figure 1: Concentration of Metals and Metalloid (Cr, Cu, Ni, Pb, Zn, As; mg/kg dry weight; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vd in February 2017.

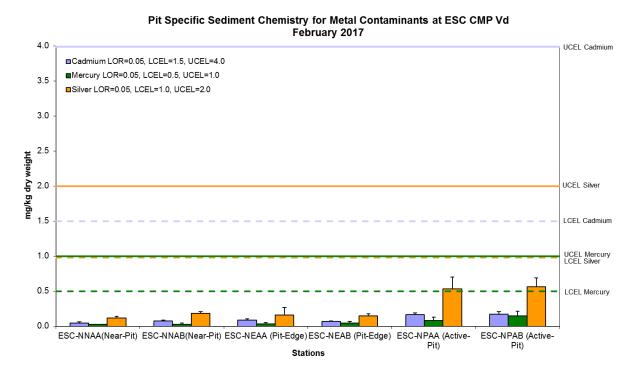


Figure 2: Concentration of Metals (Cd, Hg, Ag; mg/kg dry weight; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vd in February 2017.

 $Source: H:\ Team\ EM\ GMS\ Projects\ 0175086\ CEDD\ EM\&A\ for\ South\ Brothers\ 02\\ Deliverable\ 07\ CMP\ Monthly\ Report\ 55th\ (March\ 2017)$

Date: April 2017



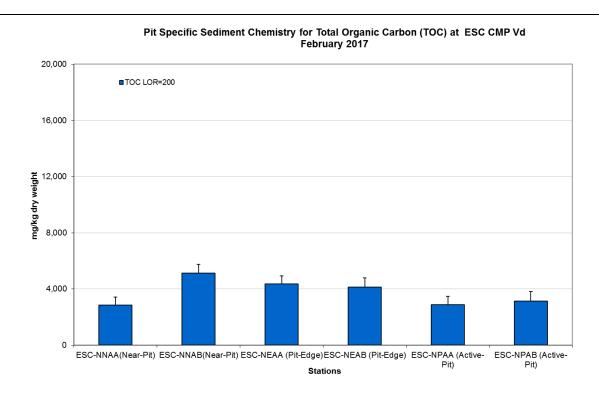


Figure 3: Concentration of Total Organic Carbon (TOC) (mg/kg dry weight; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vd in February 2017.

 $Source: H:\ Team\ EM\ GMS\ Projects\ 0175086\ CEDD\ EM\&A\ for\ South\ Brothers\ 02\\ Deliverable\ 07\ CMP\ Monthly\ Report\ 55th\ (March\ 2017)$

Date: April 2017



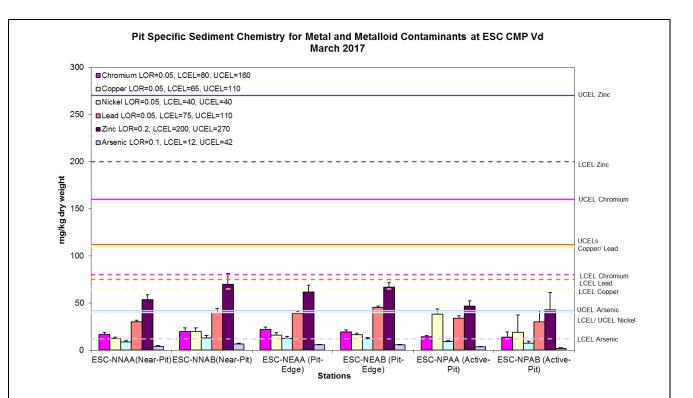


Figure 4: Concentration of Metals and Metalloid (Cr, Cu, Ni, Pb, Zn, As; mg/kg dry weight; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vd in March 2017.

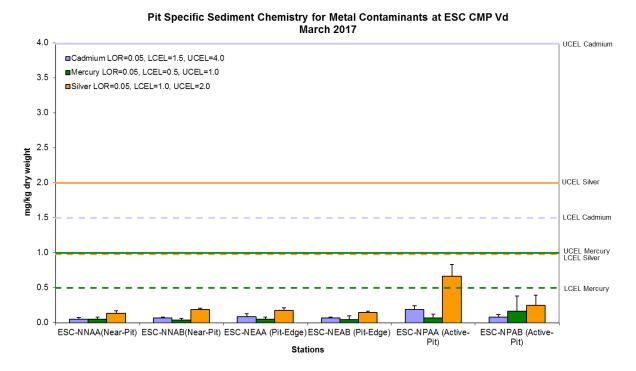


Figure 5: Concentration of Metals (Cd, Hg, Ag; mg/kg dry weight; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vd in March 2017.

Source: H:\Team\EM\GMS Projects\0175086 CEDD EM&A for South Brothers\02 Deliverable\07 CMP Monthly Report\55th (March 2017)

Date: April 2017



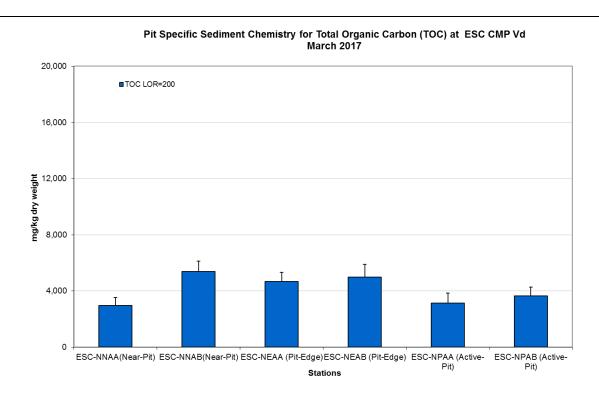


Figure 6: Concentration of Total Organic Carbon (TOC) (mg/kg dry weight; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vd in March 2017.

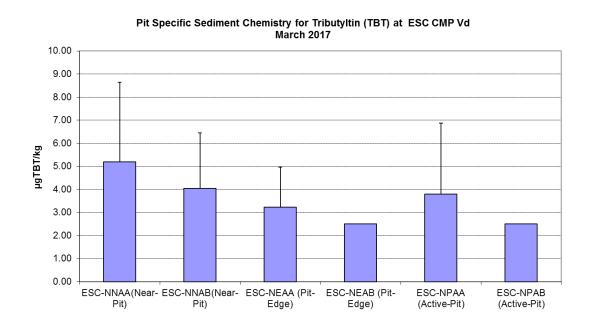


Figure 7: Concentration of Tributyltin (TBT) (μg TBT/kg; mean +SD) in sediment samples collected from Pit Specific Sediment Chemistry Monitoring for ESC CMP Vd in March 2017.

 $Source: H:\ Team\ EM\ GMS\ Projects\ 0175086\ CEDD\ EM\&A\ for\ South\ Brothers\ 02\\ Deliverable\ 07\ CMP\ Monthly\ Report\ 55th\ (March\ 2017)$

Date: April 2017



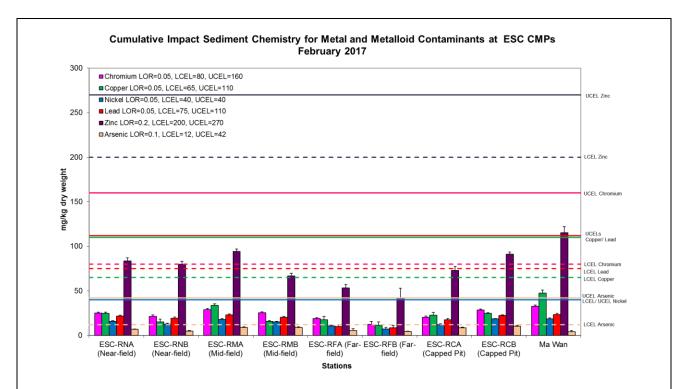


Figure 8: Concentration of Metals and Metalloid (Cr, Cu, Ni, Pb, Zn, As; mean +SD) in sediment samples collected from Cumulative Impact Sediment Chemistry Monitoring for ESC CMPs in February 2017.

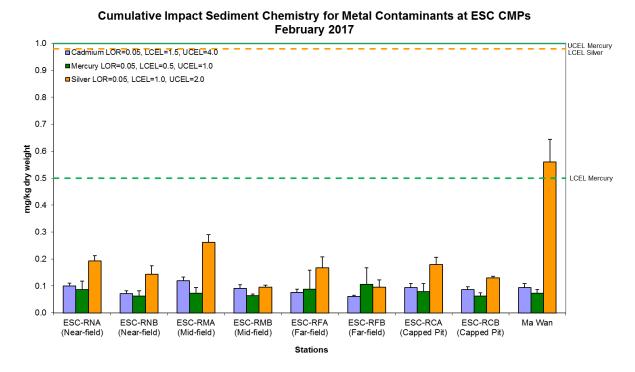


Figure 9: Concentration of Metals (Cd, Hg, Ag; mean +SD) in sediment samples collected from Cumulative Impact Sediment Chemistry Monitoring for ESC CMPs in February 2017.

Source: H:\Team\EM\GMS Projects\0175086 CEDD EM&A for South Brothers\02 Deliverable\07 CMP Monthly Report\55th (March 2017)

Date: April 2017



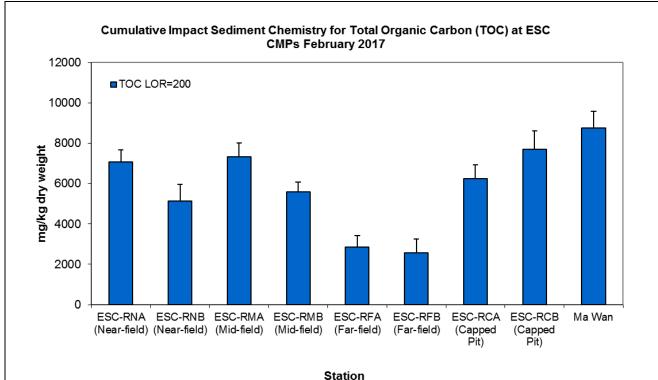


Figure 10: Concentration of Total Organic Carbon (TOC) (mg/kg dry weight; mean +SD) in sediment samples collected from Cumulative Impact Sediment Chemistry Monitoring for ESC CMPs in February 2017.

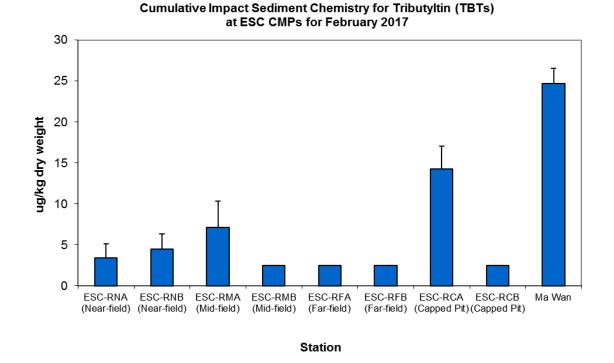


Figure 11: Concentration of Tributyltin (μg TBT/kg; mean +SD) in sediment samples collected from Cumulative Impact Sediment Chemistry Monitoring for ESC CMPs in February 2017.

Source: H:\Team\EM\GMS Projects\0175086 CEDD EM&A for South Brothers\02 Deliverable\07 CMP Monthly Report\55th (March 2017)

Date: April 2017



Annex D

Study Programme

