

**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**

**46<sup>TH</sup> MONTHLY PROGRESS REPORT FOR JUNE 2016**

**1.1 BACKGROUND**

1.1.1 Since early 1990s, contaminated sediment <sup>(1)</sup> 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) <sup>(2)</sup> 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)* <sup>(3)</sup>. 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 <sup>(4)</sup>. Findings of the EIA review undertaken in 2009/2010 confirmed that the construction and operation of the SB site had been predicted to be environmentally acceptable.

(1) According to the Management Framework of Dredged/ Excavated Sediment of ETWB TC(W) No. 34/2002, contaminated sediment in general shall mean those sediment requiring Type 2 – Confined Marine Disposal as determined according to this TC(W).

(2) CAD options may involve use of excavated borrow pits, or may involve purpose-built excavated pits. CAD sites are those which involve filling a seabed pit with contaminated mud and capping it with uncontaminated material such that the original seabed level is restored and the contaminated material is isolated from the surrounding marine environment.<sup>7</sup>

(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 <sup>(1)</sup> <sup>(2)</sup> 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 June 2016, the following works were being undertaken at the CMPs:

- Disposal of contaminated mud at ESC CMP Vd; and
- Capping operation at SB CMP 2.

**Figure 1.1 Works Schedule for ESC CMPs and SB CMPs**

Pit	Operation	2012			2013					2014					2015					2016					2017					
		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
ESC CMP	Dredging																													
	Backfilling																													
	Capping																													
SB CMP 1	Dredging																													
	Backfilling																													
	Capping																													
SB CMP 2	Dredging																													
	Backfilling																													
	Capping																													

**1.2 REPORTING PERIOD**

1.2.1 This 46<sup>th</sup> Monthly Progress Report covers the EM&A activities for the reporting month of June 2016.

**1.3 DETAILS OF SAMPLING AND LABORATORY TESTING ACTIVITIES**

1.3.1 The following monitoring activities have been undertaken for ESC CMPs in June 2016:

- *Water Column Profiling of ESC CMP Vd* was undertaken on 6 June 2016;
- *Pit Specific Sediment Chemistry of ESC CMP Vd* was undertaken on 7 June 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.

- *Cumulative Impact Sediment Chemistry* of ESC CMP Vd was undertaken on 8 June 2016;

1.3.2 The following monitoring activities have been undertaken for SB CMPs in June 2016:

- *Water Quality Monitoring during Capping Operations of SB CMP 2* was undertaken on 2 June 2016;

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

1.4.1 No outstanding sampling and analysis remained for June 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 46<sup>th</sup> *Monthly Progress Report*:

- *Pit Specific Sediment Chemistry of ESC CMP Vd* in June 2016; and
- *Cumulative Impact Sediment Chemistry of ESC CMP Vd* in June 2016; and
- *Water Column Profiling of ESC CMP Vd* in June 2016.

1.5.2 ***Pit Specific Sediment Chemistry of ESC CMP Vd – June 2016***

1.5.3 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 June 2016.

1.5.4 The concentrations of all inorganic contaminants were lower than the Lower Chemical Exceedance Level (LCEL) at all stations, except Copper (*Figures 1 and 2 of Annex B*). In June 2016, Copper exceeded the LCEL at Active Pit station ESC-NPAA (*Figure 1 of Annex B*).

1.5.5 For organic contaminants, the concentrations of Total Organic Carbon (TOC) were similar amongst most stations in June 2016 (*Figure 3 of Annex B*). In June 2016, Tributyltin (TBT) concentrations were higher at Active Pit station ESC-NPAA (*Figure 4 of Annex B*). Low and High Molecular Weight Polycyclic Aromatic Hydrocarbons (PAHs), Total Polychlorinated Biphenyls (PCBs), Total dichlorodiphenyltrichloroethane (DDT) and 4,4'-dichlorodiphenyldichloroethylene (DDE) concentrations were below the limit of reporting at all stations in June 2016.

1.5.6 Higher Copper concentrations were recorded within the Active Pit station only which were receiving contaminated mud during the reporting month. Therefore, there is no evidence indicating any dispersal of contaminants from the Active Pit due to the disposal activities.

1.5.7 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 June 2016. Statistical analysis will be undertaken and presented in the quarterly report to investigate whether there are any unacceptable impacts in the area caused by the contaminated mud disposal.

1.5.8 ***Cumulative Impact Sediment Chemistry of ESC CMP Vd – June 2016***

1.5.9 Monitoring locations for *Cumulative Impact Sediment Chemistry for ESC CMP Vd* are shown in *Figure 1.3*. A total of nine (9) monitoring stations were sampled in June 2016.

1.5.10 Analyses of results for the *Cumulative Impact Sediment Chemistry Monitoring* indicated that the concentrations of all inorganic contaminants were below the LCEL in June 2016 (*Figures 5 and 6 of Annex B*).

1.5.11 For organic contaminants, concentrations of TOC were observed to be similar among all stations (*Figure 7 of Annex B*). Concentrations of TBTs were recorded to be higher at Ma Wan station (*Figure 8 of Annex B*). Total DDT, 4,4'-DDE, Total PCBs as well as Low and High Molecular Weight PAHs were recorded below the limit of reporting at all stations.

1.5.12 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 June 2016. Statistical analysis will be undertaken and presented in the quarterly report to investigate whether there are any unacceptable impacts in the area caused by the contaminated mud disposal.

1.5.13 ***Water Column Profiling of ESC CMP Vd - June 2016***

1.5.14 *Water Column Profiling* was undertaken on 6 June 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 wet season period (April to October) of 2005 - 2014 from stations in the Northwestern Water Control Zone (WCZ), where the ESC CMPs are located <sup>(1)</sup>. 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 C1 of Annex C* for details).

*In-situ Measurements*

1.5.15 Analyses of results for June 2016 indicated that levels of Salinity, DO and pH complied with the WQOs at both Downstream and Upstream stations (*Table C2 of Annex C*). In addition, DO and Turbidity at all stations complied with the Action and Limit Levels (*Table C2 of Annex C*).

*Laboratory Measurements for Suspended Solids (SS)*

1.5.16 Analyses of results for June 2016 indicated that the SS levels were higher than the WQO at Downstream station. Both Upstream and Downstream stations complied with the Action and Limit Levels (*Table C2 of Annex C*).

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) <http://epic.epd.gov.hk/EPICRIVER/marine/?lang=en>

## 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 46<sup>th</sup> *Monthly Progress Report*:

- *Water Quality Monitoring during Capping Operations of SB CMP 2 in June 2016.*

### 1.6.2 ***Water Quality Monitoring during Capping of SB CMP 2 - June 2016***

1.6.3 The monitoring results obtained during June 2016 sampling in the wet season have been assessed for compliance with the WQOs (see *Section 1.5.13* for details). Levels of DO and Turbidity were also assessed for compliance with the Action and Limit Levels (see *Table C3 of Annex C* for details). A total of fourteen (14) monitoring stations were sampled in June 2016 as shown in *Figure 1.4*. Graphical presentation of the monitoring results is provided in *Annex B*.

#### *In-situ Measurements*

1.6.4 Graphical presentation of the monitoring results (Temperature, DO, pH, Salinity and Turbidity) is shown in *Figures 9-14 of Annex B*. Levels of pH at all stations in June 2016 complied with the WQO (*Table C3 of Annex C; Figure 9 of Annex B*). The levels of Turbidity at all stations complied with the Action and Limit levels in June 2016 (*Table C3 of Annex C; Figure 10 of Annex B*). DO at all stations also complied with the WQO and the Action and Limit levels in June 2016 (*Table C3 of Annex C; Figure 12 of Annex B*).

Levels of Salinity at most stations exceeded with the WQO except at Impact stations. The lower Salinities recorded at Tai Ho Bay 1 and Tai Ho Bay 2 are likely due to the close proximity of the nearby streams, which release large amount of freshwater runoff in the area during flooding. The Salinities at other stations were higher or above the WQO as they were located further away from the Tai Ho Bay and Reference stations which experienced less freshwater runoff from the nearby streams and Pearl River mouth.

## *Laboratory Measurement*

- 1.6.5 Concentrations of SS were recorded higher than the WQO (11.1 mg/L for wet season) at Tai Mo To, Tai Ho Bay 1 and Tai Ho Bay 2 stations in June 2016 (*Table C4 of Annex C; Figure 15 of Annex B*). Levels of SS at all stations generally complied with the Action and Limit Levels in June 2016, except the exceedance in Tai Mo To station. Since Tai Mo To station is located further away from the works area of CMP 2 when compared to all other monitoring stations at which the levels of SS did not exceed the Action and Limits Levels during the same tidal period, the exceedance were not considered as indicating any unacceptable impacts from the capping operations to cause any deterioration in water quality during this reporting period. (*Table C3 of Annex C*).
- 1.6.6 For nutrients, concentrations of NH<sub>3</sub> were relatively similar amongst all stations (*Table C4 of Annex C; Figure 16 of Annex B*). ***TIN at most stations exceeded the WQO of 0.5 mg/L, except Ma Wan station in June 2016 (Table C4 of Annex C; Figure 17 of Annex B). It should be noted that due to effect of Pearl River, the North Western WCZ has historically experienced higher levels of TIN<sup>(1)</sup>. Since TIN concentrations were recorded to be similar*** amongst all stations, the exceedances of TIN WQO at all stations are unlikely to be caused by the disposal operation at CMP 2. Levels of BOD<sub>5</sub> appeared to be higher at Tai Ho Bay 2 station in June 2016. (*Table C4 of Annex C; Figure 18 of Annex B*).
- 1.6.7 Overall, the monitoring results indicated that the capping operation at CMP 2 did not appear to cause any unacceptable deterioration in water quality in June 2016. Statistical analysis will be undertaken and presented in the quarterly report to investigate whether the capping operations at CMP 2 is causing any unacceptable impacts in water quality of the area.

## **1.7 ACTIVITIES SCHEDULED FOR THE NEXT MONTH**

1.7.1 The following monitoring activities will be conducted in the next monthly period of July 2016 for ESC CMPs:

- *Water Column Profiling of ESC CMP Vd;*
- *Routine Water Quality Monitoring of ESC CMP Vd;*
- *Pit Specific Sediment Chemistry of ESC CMP Vd; and*
- *Demersal Trawling of ESC CMP Vd.*

(1) [http://www.epd.gov.hk/epd/misc/marine\\_quality/1986-2005/textonly/eng/index.htm](http://www.epd.gov.hk/epd/misc/marine_quality/1986-2005/textonly/eng/index.htm)

- 1.7.2 No monitoring activities will be scheduled in the next monthly period of July 2016 for SB CMPs.
- 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 D*.



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