

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

50TH MONTHLY PROGRESS REPORT FOR OCTOBER 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.

- (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.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)

- *Routine Water Quality Monitoring of ESC CMPs* was undertaken on 4 October 2016;
- *Pit Specific Sediment Chemistry of ESC CMP Vd* was undertaken on 6 October 2016.
- *Water Column Profiling of ESC CMP Vd* was undertaken on 12 October 2016;
- *Sediment Chemistry after a Major Storm of ESC CMPs* was undertaken on 27 October 2016; and

1.3.2 No monitoring activities were scheduled to be undertaken for SB CMPs in October 2016.

1.4 DETAILS OF OUTSTANDING SAMPLING AND/OR ANALYSIS

1.4.1 No outstanding sampling remained for October 2016.

1.4.2 The following laboratory analyses are in progress during the preparation of this monthly report and will be presented in the next monthly report once the data are available:

- Laboratory analyses of water samples collected for *Sediment Chemistry after a Major Storm of ESC CMPs* in October 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 50th *Monthly Progress Report*:

- *Water Quality Monitoring During Dredging of ESC CMP Vb* in October 2016;
- *Water Column Profiling of ESC CMP Vd* in October 2016;
- *Routine Water Quality Monitoring of ESC CMPs* in October 2016; and
- *Pit Specific Sediment Chemistry of ESC CMP Vd* in October 2016.

1.5.2 **Impact Water Quality Monitoring during Dredging Operations of ESC CMP Vb - October 2016**

1.5.3 Dredging activities were carried out on 7 - 31 October 2016 during this reporting period and monitoring was conducted three times per week on 3, 5, 7, 11, 13, 15, 17, 19, 24, 26, 28 and 31 October 2016. During the survey day, monitoring was conducted during both mid-ebb and mid-flood tides at two Reference (Upstream) stations and five Impact (Downstream) stations around the dredging operations at ESC CMP Vb. Monitoring was also conducted at one Sensitive Receiver station situated in Ma Wan. A total of eight (8) stations were monitored and locations of the sampling stations are shown in [Figure 1.2](#).

1.5.4 Monitoring results are presented in [Table B1 of Annex B](#). Daily dredging volume in October 2016 is reported in [Annex C](#). Levels of Dissolved Oxygen (DO), Turbidity and Suspended Solid (SS) complied with the Action and Limit Levels (see [Table B2 of Annex B](#) for details) set in the *Baseline Monitoring Report* ⁽¹⁾, except for the following occasion of exceedances discussed in [Table 1.1](#) below.

1.5.5 The results indicated that the dredging operations at ESC CMP Vb did not appear to cause any unacceptable deterioration in water quality during this reporting period. Therefore, no further action, except for those recommended in the Environmental Permit (*EP-312/2008/A*), are considered necessary for the dredging operations.

批注 [RC1]: we need to present the seven stations centered at CMP Vb. see the latest figure here.
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updated

批注 [RC2]: weekly dredging volume should be calculated from Sunday to Saturday, please revise

revised

(1) ERM (2009). Draft Second Review of the EM&A Manual. Under Agreement No. CE 4/2009 (EP) EM&A for Contaminated Mud Pit at Sha Chau (2009-2013) - Investigation

Table 1.1 *Details of Exceedances Recorded at ESC CMP Vb between 3 and 31 October 2016*

Date	Tide	Parameter	Station	Type	Remarks
19 October 2016	Mid-Flood	SS	DS4	Action	<p>The exceedance was not considered as indicating any unacceptable impacts from the dredging operations to WSRs outside the works area due to the following reason:</p> <ul style="list-style-type: none">• Stations DS4 is located further away from the works area of ESC CMP Vb when compared to station DS1, DS2 and DS3 at which the levels of SS did not exceed the Action and Limit Levels during the same tidal period.

1.5.6 ***Water Column Profiling of ESC CMP Vd – October 2016***

1.5.7 *Water Column Profiling* was undertaken at a total of two sampling stations (Upstream and Downstream stations) on 12 October 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 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 stations was used for the basis as the WQO. Levels of DO and Turbidity were also assessed for compliance with the Action and Limit Levels (see *Table B2 of Annex B* for details).

In-situ Measurements

1.5.8 Analyses of results for October 2016 indicated that levels of DO and pH complied with the WQOs at both Downstream and Upstream stations (*Table B3 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)

1.5.9 Analyses of results for October 2016 indicated that the SS levels at all stations complied with the WQOs (*Table B3 of Annex B*).

1.5.10 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>

1.5.11 ***Routine Water Quality Monitoring of ESC CMPs – October 2016***

1.5.12 *Routine Water Quality Monitoring of ESC CMPs* was undertaken on 4 October 2016. The monitoring results have been assessed for compliance with the WQOs (see *Section 1.5.7* for details). The monitoring results are shown in *Tables B4 and B5 of Annex B* and *Figures 1 - 10 of Annex D*. A total of sixteen (16) monitoring stations were sampled in October 2016 as shown in *Figure 1.3*.

In-situ Measurements

1.5.13 Graphical presentation of the monitoring results (Temperature, DO, pH, Salinity and Turbidity) is shown in *Figures 1 - 6 of Annex D*. Analyses of results for October 2016 indicated that the levels of pH, Salinity and DO complied with the WQOs at all stations (Impact, Intermediate, Reference and Ma Wan stations) in October 2016 (*Table B4 of Annex B; Figures 1, 3 and 5 of Annex D*).

1.5.14 The levels of DO and Turbidity complied with the Action and Limit Levels at all stations (*Table B4 of Annex B; Figures 3 and 6 of Annex D*).

1.5.15 Overall, *in-situ* measurement results of the *Routine Water Quality Monitoring* indicated that the disposal operation at ESC CMP Vd did not appear to cause any unacceptable impacts in water quality in October 2016.

Laboratory Measurements

1.5.16 Laboratory analysis of October 2016 results indicated that concentrations of Cadmium, Silver and Mercury were below their limit of reporting at all stations. Arsenic, Lead, Chromium, Nickel, Copper and Zinc were detected in October 2016 samples and the concentrations of these metals and metalloids were similar amongst stations (*Table B5 of Annex B; Figure 7 of Annex D*).

1.5.17 For nutrients, concentrations of Total Inorganic Nitrogen (TIN) at all stations except Intermediate station in October 2016 were higher than the WQO (0.5 mg/L) (*Table B5 of Annex B; Figure 8 of Annex D*). It should be noted that due to the effect of Pearl River, the North Western WCZ has historically experienced higher levels of TIN⁽¹⁾. 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 ESC CMP Vd. Concentrations of Ammonia Nitrogen (NH₃-N) were relatively similar amongst all stations (*Table B5 of Annex B; Figure 8 of Annex D*). Levels of 5-day Biochemical Oxygen Demand (BOD₅) appear to be higher at Impact stations in October 2016 (*Table B5 of Annex B; Figure 9 of Annex D*).

1.5.18 Analyses of results for October 2016 indicated that the SS levels at all stations were higher than the WQO (11.0 mg/L for wet season), however SS levels at all stations complied with the Action and Limit Levels (*Table B5 of Annex B; Figure 10 of Annex D*).

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

- 1.5.19 Overall, results of the *Routine Water Quality Monitoring* indicated that the disposal operation at ESC CMP Vd did not appear to cause any unacceptable deterioration in water quality in October 2016. Detailed statistical analysis will be presented in the Quarterly Report to investigate any spatial and temporal trends of potential concern.
- 1.5.20 ***Pit Specific Sediment Chemistry of ESC CMP Vd – October 2016***
- 1.5.21 Monitoring locations for *Pit Specific Sediment Chemistry for ESC CMP Vd* are shown in *Figure 1.4*. A total of six (6) monitoring stations were sampled in October 2016.
- 1.5.22 The concentrations of all inorganic contaminants were lower than the Lower Chemical Exceedance Level (LCEL) at all stations in October 2016 (*Figures 11 and 12 of Annex D*).
- 1.5.23 For organic contaminants, the concentrations of Total Organic Carbon (TOC) were similar amongst the stations in October 2016 (*Figure 13 of Annex D*). In October 2016, Tributyltin (TBT) concentrations were higher at Active Pit station ESC-NPAB in October 2016 (*Figure 14 of Annex D*). 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 October 2016.
- 1.5.24 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 October 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.

1.6 ACTIVITIES SCHEDULED FOR THE NEXT MONTH

- 1.6.1 The following monitoring activities will be conducted in the next monthly period of November 2016 for ESC CMPs:
- *Water Column Profiling of ESC CMP Vd;*
 - *Routine Water Quality Monitoring of ESC CMP Vd;*
 - *Water Quality Monitoring During Dredging of ESC CMP Vb; and*
 - *Pit Specific Sediment Chemistry of ESC CMP Vd.*

1.6.2 No monitoring activities will be scheduled in the next monthly period of November 2016 for SB CMPs.

1.6.3 The sampling schedule is presented in *Annex A*.

1.7 *STUDY PROGRAMME*

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

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