



**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)**

**6<sup>th</sup> Monthly Progress Report for Contaminated  
 Mud Pits to the South of The Brothers and at  
 East Sha Chau – February 2013**

Revision 0

14 March 2013

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




## 6<sup>th</sup> Monthly Progress Report for Contaminated Mud Pits to the South of The Brothers and at East Sha Chau – February 2013

### Revision 0

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### Environmental Resources Management

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| This document presents the sixth monthly progress report for Contaminated Mud Pits at the South of The Brothers and at East Sha Chau.  |   | 14 March 2013   |         |  |         |
|  |   | Approved by:  |         |  |         |
|  |   | <br>Craig A. Reid<br><i>Partner</i>                              |         |  |         |
|  |   |   |         |  |         |
| v0   | 6 <sup>th</sup> Monthly Progress Report for CMP V and SB CMPs | RC  | JT      | CAR  | 14/3/13 |
| Revision   | Description   | By  | Checked | Approved   | Date    |
| This report has been prepared by Environmental Resources Management the trading name of 'ERM Hong-Kong, Limited', with all reasonable skill, care and diligence within the terms of the Contract with the client, incorporating our General Terms and Conditions of Business and taking account of the resources devoted to it by agreement with the client.<br><br>We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.<br><br>This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk. |   | Distribution<br><input checked="" type="checkbox"/> Internal<br><input checked="" type="checkbox"/> Public<br><input type="checkbox"/> Confidential |         | <br><br> |         |

**Dredging, Management and Capping of Contaminated Sediment Disposal  
Facility to the South of The Brothers**

**Environmental Certification Sheet  
EP-427/2011/A**

**Reference Document/Plan**

|  |   |
|--|---|
| Document/ <del>Plan</del> to be Certified/ Verified: | 6 <sup>th</sup> Monthly Progress Report for Contaminated Mud Pits to the South of The Brothers and at East Sha Chau – February 2013 |
| Date of Report:                                      | 14 March 2013   |
| Date prepared by ET:                                 | 14 March 2013   |
| Date received by IA:                                 | 14 March 2013   |

**Reference EP Condition**

|                                 |                    |
|---------------------------------|--------------------|
| Environmental Permit Condition: | Condition No.: 4.4 |
|---------------------------------|--------------------|

4 hard copies and 1 electronic copy of monthly EM&A Report shall be submitted to the Director within 2 weeks after the end of the reporting month. The EM&A Reports shall include a summary of all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit Levels). The submissions shall be certified by the ET Leader and verified by the Independent Auditor. Additional copies of the submission shall be provided to the Director upon request by the Director.

**ET Certification**

I hereby certify that the above referenced document/~~plan~~ complies with the above referenced condition of EP-427/2011/A

Craig A. Reid,  
Environmental Team Leader:

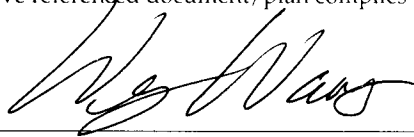


Date: 14/3/2013

**IA Verification**

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

Dr Wang Wen Xiong,  
Independent Auditor:



Date: 14/3/2013

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Agreement No. CE 23/2012 (EP)  
Environmental Monitoring and Audit  
for Contaminated Mud Pits at the South of The Brothers and at East Sha  
Chau (2012-2017) - Investigation

6<sup>TH</sup> MONTHLY PROGRESS REPORT FOR FEBRUARY 2013

**1.1 BACKGROUND**

1.1.1 Since early 1990s, contaminated sediment <sup>(1)</sup> arising from various construction works in Hong Kong has been disposed of at a series of seabed pits at East of Sha Chau (ESC). In late 2008, a review indicated that the existing and planned facilities at ESC would not be able to meet the disposal demand after 2012. In order to meet this demand, the Hong Kong Special Administrative Region Government (HKSARG) decided to implement a new contained aquatic disposal (CAD) <sup>(2)</sup> facility at the South of The Brothers (SB CMPs) (hereafter referred to as “the Project”) which had been under consideration for a number of years.

1.1.2 The environmental acceptability of the construction and operation of the Project had been confirmed by findings of the associated Environmental Impact Assessment (EIA) study completed in 2005 under *Agreement No. CE 12/2002(EP)* <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.
- (3) Detailed Site Selection Study for a Proposed Contaminated Mud Disposal Facility within the Airport East/ East of Sha Chau Area (*Agreement No. CE 12/2002(EP)*)
- (4) Under the CEDD study *Contaminated Sediment Disposal Facility to the South of The Brothers (Agreement No. FM 2/2009)*

1.1.4 An *Environmental Permit (EP-427/2011)* was issued by the Environmental Protection Department (EPD) to the CEDD, the Permit Holder, on 3 November 2011 and varied on 23 December 2011 (*EP-427/2011/A*). Under the requirements of *Condition 4* of the *EP (EP-427/2011/A)*, an Environmental Monitoring and Audit (EM&A) programme as set out in the EM&A Manual <sup>(1)</sup> is required to be implemented for the SB CMPs. The present EM&A programme undertaken under *Agreement No. CE 23/2012 (EP)* covers the dredging, disposal and capping operations of the SB CMPs.

## 1.2 **REPORTING PERIOD**

1.2.1 This Monthly Progress Report covers the EM&A activities for the reporting month of February 2013.

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

1.3.1 *Impact Water Quality Monitoring during Dredging Operations of CMP 1* was conducted three times per week (ie 2, 4, 6, 8, 14, 16, 19, 21, 23, 26 and 28 February 2013) in this reporting month in accordance with the EM&A Manual. No sampling was conducted between 10 to 12 February 2013 since there were no dredging works during that period.

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

1.4.1 No outstanding sampling remained from February 2013. Laboratory analysis of Suspended Solids (SS) collected after 23 February 2013 was still in progress during the preparation of this monthly report. A summary of field activities conducted are presented in *Annex A*.

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

1.5.1 Monitoring data collected for SB CMPs from 2 February to 23 February 2013 are presented in this monthly report. Detailed discussion will be presented in the corresponding *Quarterly Report*.

(1) ERM (2012) Environmental Monitoring and Audit (EM&A) Manual. Final First Review. Environmental Monitoring and Audit for Contaminated Mud Pits to the South of the Brothers and at East Sha Chau (2012-2017) – Investigation. Agreement No. CE 23/2012(EP). Submitted to EPD in November 2012.

- 1.5.2 ***Impact Water Quality Monitoring during Dredging Operations of CMP 1 – February 2013***
- 1.5.3 *Impact Water Quality Monitoring during Dredging Operations of CMP 1* was conducted three times per week with a total of eleven (11) sampling days in February 2013. On each survey day, sampling was conducted during both mid-ebb and mid-flood tides at two Reference (Upstream) stations upstream and five Impact (Downstream) stations downstream of the dredging operations at CMP 1. Monitoring was also conducted at five Sensitive Receiver Stations (Ma Wan, Shum Shui Kok, Tai Mo To and Tai Ho Bay). A total of twelve stations were monitored and locations of the sampling stations are shown in *Figure 1.1*.
- 1.5.4 Monitoring results from 2 February 2013 to 23 February 2013 are presented in *Table B1 of Annex B*. Levels of Dissolved Oxygen (DO), Turbidity and SS generally complied with the Action and Limit Levels (see *Table B2* for details) set in the Baseline Monitoring Report <sup>(1)</sup>, except during mid-flood tide on 2, 19 and 23 February 2013.
- 1.5.5 On 2 February 2013, levels of Turbidity exceeded the Action Level at Impact Stations DS1 and DS2 and levels of SS exceeded the Limit Level at Impact Stations DS1 and DS2 during mid-flood tide.
- 1.5.6 On 19 and 23 February 2013, levels of SS exceeded the Action Level at Impact Station DS1 during mid-flood tide.
- 1.5.7 Stations DS1 and DS2 are located in close proximity to the works area of CMP 1 (ie within 500m from the works area). Since the exceedances were recorded at stations DS1 and DS2 and during one tidal period only, it is considered that the sediment plume was transient in nature and limited to the close vicinity of the works area as predicted in the EIA review of the Project <sup>(2)</sup>. Hence, the dredging works did not appear to cause any unacceptable deterioration in water quality. It should also be noted that high levels of SS and Turbidity were occasionally recorded during baseline monitoring which are considered to be sporadic events and characteristic of water quality in this area of Hong Kong. As such, the exceedances recorded may also be caused by natural background variation in water quality of the area.
- 1.5.8 Exceedance of Action and Limit Level was not recorded at any Sensitive Receiver stations. As such, the dredging works did not appear to cause any unacceptable water quality impacts at the Sensitive Receivers.

(1) ERM (2012) Baseline Monitoring Report. Environmental Monitoring and Audit for Contaminated Mud Pits to the South of the Brothers and at East Sha Chau (2012-2017) – Investigation. Agreement No. CE 23/2012(EP). Submitted to EPD in October 2012.

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

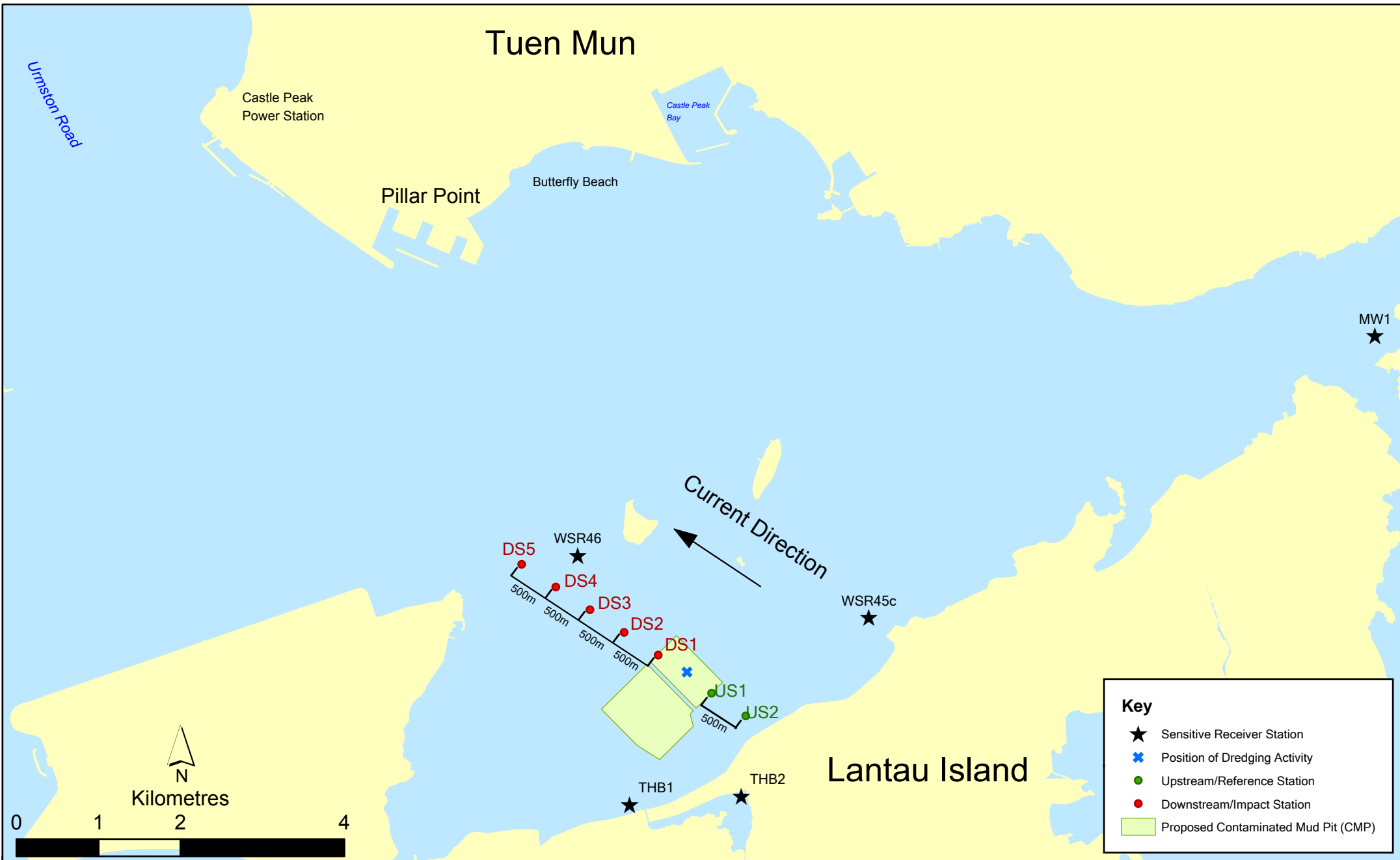


Figure 1.1

Indicative Dredging Impact Sampling Stations for South Brothers Facility

Note: The locations of sampling stations will be determined on site based on current direction and position of dredging activities



1.5.9 Overall, the results indicated that the dredging operations at CMP 1 of SB did not appear to cause any unacceptable deterioration in water quality during this reporting period. Therefore, no further mitigation measures, except for those recommended in the Environmental Permit (EP-427/2011/A), are considered necessary for the dredging operations.

**1.6** *ACTIVITIES SCHEDULED FOR THE NEXT MONTH*

1.6.1 *Impact Water Quality Monitoring during Dredging Operations for CMP 1* will be conducted three times per week in the next monthly period of March 2013. The sampling schedule is presented in *Annex A*.

**1.7** *STUDY PROGRAMME*

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

Annex A

## Sampling Schedule









Annex B

Results of Impact  
Monitoring during  
Dredging Operations of  
CMP 1 in February 2013

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

| Sampling Date | Tidal Period | Station   | Average DO Levels (mg/L) |                       | Average Turbidity Level (NTU) | Average SS Level (mg/L) |       |
|---------------|--------------|-----------|--------------------------|-----------------------|-------------------------------|-------------------------|-------|
|               |              |           | Bottom                   | Surface and Mid Depth |                               |                         |       |
| 2013/2/2      | Mid-Ebb      | DS1       | 7.82                     | 7.91                  | 7.11                          | 12.17                   |       |
|               |              | DS2       | 7.88                     | 7.88                  | 5.82                          | 9.07                    |       |
|               |              | DS3       | 7.64                     | 7.93                  | 3.16                          | 5.40                    |       |
|               |              | DS4       | 7.70                     | 7.91                  | 3.36                          | 5.97                    |       |
|               |              | DS5       | 7.59                     | 7.65                  | 3.49                          | 6.55                    |       |
|               |              | US1       | 7.66                     | 7.66                  | 7.66                          | 27.93                   |       |
|               |              | US2       | 7.62                     | 7.59                  | 11.40                         | 15.65                   |       |
|               |              | MW1       | 7.10                     | 7.16                  | 2.10                          | 4.81                    |       |
|               |              | THB1      | 7.59                     | 7.61                  | 3.15                          | 6.55                    |       |
|               |              | THB2      | -                        | 7.79                  | 4.52                          | 8.67                    |       |
|               |              | WSR45C    | 6.90                     | 7.26                  | 2.79                          | 4.91                    |       |
|               |              | WSR46     | 6.89                     | 7.06                  | 4.28                          | 7.89                    |       |
|               |              | Mid-Flood | DS1                      | 7.65                  | 7.67                          | 27.96                   | 40.67 |
|               |              |           | DS2                      | 7.66                  | 7.69                          | 32.08                   | 49.63 |
|               | DS3          |           | 7.74                     | 7.74                  | 5.11                          | 8.42                    |       |
|               | DS4          |           | 7.80                     | 7.80                  | 4.97                          | 7.77                    |       |
|               | DS5          |           | 7.91                     | 7.88                  | 4.83                          | 9.66                    |       |
|               | US1          |           | 7.66                     | 7.73                  | 5.15                          | 7.76                    |       |
|               | US2          |           | 7.55                     | 7.72                  | 4.98                          | 6.66                    |       |
|               | MW1          |           | 7.04                     | 7.16                  | 2.60                          | 5.79                    |       |
|               | THB1         |           | 7.41                     | 7.45                  | 3.03                          | 6.33                    |       |
|               | THB2         |           | -                        | 6.73                  | 6.86                          | 6.97                    |       |
|               | 2013/2/4     | Mid-Ebb   | WSR45C                   | 7.09                  | 7.24                          | 4.75                    | 8.53  |
|               |              |           | WSR46                    | 7.22                  | 7.27                          | 7.90                    | 12.13 |
| DS1           |              |           | 7.52                     | 7.82                  | 14.46                         | 12.39                   |       |
| DS2           |              |           | 7.71                     | 7.87                  | 3.52                          | 6.69                    |       |
| DS3           |              |           | 7.75                     | 7.99                  | 3.06                          | 5.04                    |       |
| DS4           |              |           | 7.57                     | 7.82                  | 2.86                          | 5.13                    |       |
| DS5           |              |           | 7.81                     | 7.97                  | 2.45                          | 4.57                    |       |
| US1           |              |           | 7.77                     | 7.75                  | 6.13                          | 8.58                    |       |
| US2           |              |           | 7.74                     | 7.73                  | 6.87                          | 11.02                   |       |
| MW1           |              |           | 6.94                     | 7.03                  | 1.41                          | 5.30                    |       |
| THB1          |              |           | 7.50                     | 7.67                  | 3.57                          | 7.53                    |       |
| THB2          |              |           | -                        | 7.84                  | 3.57                          | 6.10                    |       |
| WSR45C        |              |           | 7.29                     | 7.45                  | 3.53                          | 7.39                    |       |
| WSR46         |              |           | 6.90                     | 7.24                  | 2.76                          | 6.47                    |       |
| Mid-Flood     |              | DS1       | 7.50                     | 7.63                  | 3.36                          | 7.25                    |       |
|               |              | DS2       | 7.50                     | 7.66                  | 4.51                          | 7.92                    |       |
|               |              | DS3       | 7.66                     | 7.69                  | 3.44                          | 6.23                    |       |
|               |              | DS4       | 7.70                     | 7.73                  | 2.98                          | 6.78                    |       |
|               |              | DS5       | 7.54                     | 7.70                  | 3.69                          | 6.39                    |       |
|               |              | US1       | 7.38                     | 7.58                  | 3.27                          | 5.27                    |       |
|               |              | US2       | 7.33                     | 7.51                  | 2.68                          | 4.84                    |       |
|               |              | MW1       | 6.75                     | 6.94                  | 1.63                          | 5.92                    |       |
|               |              | THB1      | 7.47                     | 7.62                  | 2.58                          | 5.85                    |       |
|               |              | THB2      | -                        | 6.73                  | 14.18                         | 10.23                   |       |
| WSR45C        | 7.09         | 7.37      | 2.19                     | 4.62                  |                               |                         |       |
| WSR46         | 7.10         | 7.42      | 2.94                     | 6.11                  |                               |                         |       |



| Sampling Date | Tidal Period | Station | Average DO Levels (mg/L) |                       | Average Turbidity Level (NTU) | Average SS Level (mg/L) |
|---------------|--------------|---------|--------------------------|-----------------------|-------------------------------|-------------------------|
|               |              |         | Bottom                   | Surface and Mid Depth |                               |                         |
| 2013/2/6      | Mid-Ebb      | DS1     | 7.38                     | 7.50                  | 3.70                          | 6.38                    |
|               |              | DS2     | 7.39                     | 7.55                  | 1.84                          | 4.20                    |
|               |              | DS3     | 7.29                     | 7.37                  | 2.05                          | 4.30                    |
|               |              | DS4     | 7.31                     | 7.38                  | 2.20                          | 4.56                    |
|               |              | DS5     | 7.37                     | 7.39                  | 2.90                          | 5.40                    |
|               |              | US1     | 7.67                     | 7.83                  | 2.11                          | 4.50                    |
|               |              | US2     | 7.66                     | 7.73                  | 4.16                          | 6.42                    |
|               |              | MW1     | 6.75                     | 6.78                  | 1.45                          | 5.78                    |
|               |              | THB1    | 7.44                     | 7.55                  | 1.93                          | 6.98                    |
|               |              | THB2    | -                        | 7.23                  | 4.14                          | 11.97                   |
|               |              | WSR45C  | 6.77                     | 6.99                  | 1.50                          | 4.42                    |
|               |              | WSR46   | 6.91                     | 7.23                  | 2.25                          | 4.39                    |
|               | Mid-Flood    | DS1     | 7.85                     | 7.93                  | 6.33                          | 12.80                   |
|               |              | DS2     | 7.89                     | 8.22                  | 3.53                          | 6.52                    |
|               |              | DS3     | 7.68                     | 8.02                  | 4.00                          | 6.60                    |
|               |              | DS4     | 7.82                     | 7.90                  | 4.44                          | 6.93                    |
|               |              | DS5     | 7.82                     | 8.25                  | 3.41                          | 6.17                    |
|               |              | US1     | 7.42                     | 8.01                  | 2.55                          | 5.12                    |
|               |              | US2     | 7.24                     | 8.04                  | 2.38                          | 5.00                    |
|               |              | MW1     | 6.53                     | 6.60                  | 1.83                          | 4.11                    |
|               |              | THB1    | 7.12                     | 7.39                  | 2.69                          | 5.48                    |
|               |              | THB2    | -                        | 8.62                  | 4.74                          | 7.70                    |
|               |              | WSR45C  | 6.75                     | 7.34                  | 1.97                          | 5.58                    |
|               |              | WSR46   | 6.51                     | 7.20                  | 2.17                          | 4.98                    |
| 2013/2/8      | Mid-Ebb      | DS1     | 7.36                     | 7.36                  | 2.56                          | 5.04                    |
|               |              | DS2     | 7.38                     | 7.38                  | 2.49                          | 5.17                    |
|               |              | DS3     | 7.30                     | 7.33                  | 2.36                          | 5.44                    |
|               |              | DS4     | 7.29                     | 7.29                  | 2.33                          | 4.77                    |
|               |              | DS5     | 7.28                     | 7.30                  | 2.51                          | 5.63                    |
|               |              | US1     | 7.39                     | 7.39                  | 2.93                          | 5.75                    |
|               |              | US2     | 7.42                     | 7.43                  | 6.66                          | 9.95                    |
|               |              | MW1     | 7.16                     | 7.12                  | 2.33                          | 6.03                    |
|               |              | THB1    | 7.69                     | 7.73                  | 3.13                          | 8.13                    |
|               |              | THB2    | -                        | 7.98                  | 6.95                          | 12.67                   |
|               |              | WSR45C  | 7.31                     | 7.37                  | 2.06                          | 5.41                    |
|               |              | WSR46   | 7.54                     | 7.77                  | 3.68                          | 6.79                    |
|               | Mid-Flood    | DS1     | 7.64                     | 7.62                  | 5.31                          | 10.62                   |
|               |              | DS2     | 7.66                     | 7.70                  | 9.35                          | 14.67                   |
|               |              | DS3     | 7.57                     | 7.69                  | 4.79                          | 8.42                    |
|               |              | DS4     | 7.63                     | 7.66                  | 3.81                          | 7.27                    |
|               |              | DS5     | 7.73                     | 7.76                  | 3.13                          | 5.57                    |
|               |              | US1     | 7.35                     | 7.44                  | 2.26                          | 5.41                    |
|               |              | US2     | 7.28                     | 7.44                  | 2.52                          | 4.93                    |
|               |              | MW1     | 7.26                     | 7.25                  | 2.18                          | 4.92                    |
|               |              | THB1    | 7.79                     | 7.77                  | 2.96                          | 6.55                    |
|               |              | THB2    | -                        | 8.71                  | 5.13                          | 9.23                    |
|               |              | WSR45C  | 7.28                     | 7.43                  | 2.18                          | 5.90                    |
|               |              | WSR46   | 7.50                     | 7.76                  | 3.08                          | 6.34                    |
| 2013/2/14     | Mid-Ebb      | DS1     | 7.83                     | 7.89                  | 5.05                          | 8.51                    |
|               |              | DS2     | 7.87                     | 7.99                  | 3.20                          | 6.32                    |
|               |              | DS3     | 7.73                     | 8.01                  | 2.74                          | 5.66                    |

| Sampling Date | Tidal Period | Station | Average DO Levels (mg/L) |                       | Average Turbidity Level (NTU) | Average SS Level (mg/L) |
|---------------|--------------|---------|--------------------------|-----------------------|-------------------------------|-------------------------|
|               |              |         | Bottom                   | Surface and Mid Depth |                               |                         |
| 2013/2/16     | Mid-Flood    | DS4     | 7.83                     | 7.97                  | 3.04                          | 6.17                    |
|               |              | DS5     | 7.72                     | 7.83                  | 2.90                          | 5.90                    |
|               |              | US1     | 8.10                     | 8.19                  | 3.14                          | 5.38                    |
|               |              | US2     | 8.22                     | 8.23                  | 5.43                          | 9.85                    |
|               |              | MW1     | 7.09                     | 7.23                  | 1.75                          | 4.59                    |
|               |              | THB1    | 8.02                     | 8.01                  | 3.71                          | 7.25                    |
|               |              | THB2    | -                        | 8.02                  | 4.20                          | 9.37                    |
|               |              | WSR45C  | 7.05                     | 7.38                  | 3.37                          | 7.03                    |
|               |              | WSR46   | 7.56                     | 7.63                  | 2.99                          | 6.57                    |
|               |              | DS1     | 7.65                     | 7.65                  | 3.74                          | 6.78                    |
|               |              | DS2     | 7.68                     | 7.67                  | 4.80                          | 9.25                    |
|               |              | DS3     | 7.66                     | 7.68                  | 3.29                          | 6.22                    |
|               |              | DS4     | 7.65                     | 7.64                  | 3.75                          | 6.75                    |
|               |              | DS5     | 7.70                     | 7.72                  | 2.78                          | 5.91                    |
|               |              | US1     | 7.66                     | 7.64                  | 3.13                          | 6.04                    |
|               |              | US2     | 7.42                     | 7.52                  | 3.88                          | 6.66                    |
|               | MW1          | 7.27    | 7.33                     | 2.13                  | 4.74                          |                         |
|               | THB1         | 7.56    | 7.60                     | 3.06                  | 7.60                          |                         |
|               | THB2         | -       | 7.32                     | 3.07                  | 6.63                          |                         |
|               | WSR45C       | 7.35    | 7.46                     | 3.67                  | 7.03                          |                         |
|               | WSR46        | 7.47    | 7.43                     | 3.44                  | 6.61                          |                         |
|               | Mid-Ebb      | DS1     | 7.80                     | 8.07                  | 2.95                          | 4.63                    |
|               | DS2          | 7.64    | 8.11                     | 3.75                  | 5.37                          |                         |
|               | DS3          | 7.69    | 8.07                     | 3.57                  | 6.16                          |                         |
|               | DS4          | 7.66    | 7.99                     | 1.87                  | 3.72                          |                         |
|               | DS5          | 7.87    | 8.02                     | 2.02                  | 3.53                          |                         |
|               | US1          | 8.33    | 8.46                     | 4.03                  | 6.40                          |                         |
|               | US2          | 8.39    | 8.54                     | 4.60                  | 6.37                          |                         |
|               | MW1          | 7.55    | 7.64                     | 1.22                  | 2.14                          |                         |
|               | THB1         | 8.83    | 8.89                     | 2.49                  | 4.38                          |                         |
|               | THB2         | -       | 8.46                     | 3.30                  | 5.17                          |                         |
|               | WSR45C       | 7.42    | 7.72                     | 1.65                  | 3.68                          |                         |
| WSR46         | 7.71         | 8.24    | 2.66                     | 6.60                  |                               |                         |
| Mid-Flood     | DS1          | 7.99    | 8.04                     | 4.76                  | 6.93                          |                         |
| DS2           | 8.00         | 8.04    | 5.46                     | 9.83                  |                               |                         |
| DS3           | 8.06         | 8.07    | 3.73                     | 6.80                  |                               |                         |
| DS4           | 8.10         | 8.11    | 2.69                     | 4.33                  |                               |                         |
| DS5           | 8.16         | 8.19    | 2.68                     | 3.68                  |                               |                         |
| US1           | 7.61         | 7.78    | 2.31                     | 4.17                  |                               |                         |
| US2           | 7.56         | 7.73    | 2.91                     | 4.38                  |                               |                         |
| MW1           | 7.42         | 7.47    | 1.60                     | 5.52                  |                               |                         |
| THB1          | 8.07         | 8.10    | 2.62                     | 5.12                  |                               |                         |
| THB2          | -            | 7.52    | 6.29                     | 5.63                  |                               |                         |
| WSR45C        | 7.62         | 7.83    | 2.56                     | 4.72                  |                               |                         |
| WSR46         | 7.69         | 8.01    | 2.35                     | 5.06                  |                               |                         |
| 2013/2/19     | Mid-Ebb      | DS1     | 9.74                     | 9.77                  | 6.09                          | 5.11                    |
| DS2           | 9.93         | 9.86    | 2.58                     | 5.89                  |                               |                         |
| DS3           | 10.07        | 10.31   | 2.81                     | 6.11                  |                               |                         |
| DS4           | 10.15        | 10.30   | 1.84                     | 3.33                  |                               |                         |
| DS5           | 10.27        | 10.28   | 2.21                     | 4.00                  |                               |                         |
| US1           | 9.87         | 10.18   | 2.76                     | 4.67                  |                               |                         |

| Sampling Date | Tidal Period | Station | Average DO Levels (mg/L) |                       | Average Turbidity Level (NTU) | Average SS Level (mg/L) |
|---------------|--------------|---------|--------------------------|-----------------------|-------------------------------|-------------------------|
|               |              |         | Bottom                   | Surface and Mid Depth |                               |                         |
| 2013/2/21     | Mid-Flood    | US2     | 9.63                     | 9.64                  | 4.07                          | 6.67                    |
|               |              | MW1     | 7.44                     | 7.85                  | 0.57                          | 4.89                    |
|               |              | THB1    | 10.60                    | 10.52                 | 2.54                          | 6.00                    |
|               |              | THB2    | -                        | 9.78                  | 2.91                          | 5.67                    |
|               |              | WSR45C  | 8.56                     | 9.90                  | 1.54                          | 5.11                    |
|               |              | WSR46   | 8.07                     | 9.34                  | 1.34                          | 5.11                    |
|               |              | DS1     | 8.27                     | 8.42                  | 20.44                         | 37.50                   |
|               |              | DS2     | 8.41                     | 8.75                  | 4.63                          | 9.67                    |
|               |              | DS3     | 9.06                     | 9.11                  | 3.43                          | 6.50                    |
|               |              | DS4     | 9.07                     | 9.13                  | 3.83                          | 5.67                    |
|               |              | DS5     | 8.99                     | 9.06                  | 2.58                          | 4.11                    |
|               |              | US1     | 8.57                     | 8.77                  | 1.82                          | 5.00                    |
|               |              | US2     | 8.01                     | 8.24                  | 1.89                          | 5.67                    |
|               |              | MW1     | 7.41                     | 7.53                  | 1.00                          | 5.00                    |
|               |              | THB1    | 9.21                     | 9.25                  | 2.54                          | 5.17                    |
|               |              | THB2    | -                        | 7.65                  | 7.94                          | 10.00                   |
|               | WSR45C       | 7.43    | 8.21                     | 1.28                  | 6.67                          |                         |
|               | WSR46        | 7.80    | 8.63                     | 2.18                  | 7.11                          |                         |
|               | DS1          | 9.02    | 9.86                     | 1.92                  | 5.00                          |                         |
|               | DS2          | 9.58    | 9.93                     | 13.34                 | 8.44                          |                         |
|               | DS3          | 8.58    | 9.73                     | 2.96                  | 3.11                          |                         |
|               | DS4          | 8.97    | 10.04                    | 1.76                  | 4.44                          |                         |
|               | DS5          | 9.64    | 9.75                     | 1.38                  | 1.00                          |                         |
|               | US1          | 8.79    | 8.90                     | 3.60                  | 5.33                          |                         |
|               | US2          | 8.40    | 8.55                     | 5.23                  | 6.17                          |                         |
|               | MW1          | 8.53    | 8.90                     | 1.04                  | 2.22                          |                         |
|               | THB1         | 9.85    | 10.39                    | 2.22                  | 3.00                          |                         |
|               | THB2         | -       | 9.42                     | 4.01                  | 3.33                          |                         |
|               | WSR45C       | 8.59    | 9.22                     | 2.48                  | 3.00                          |                         |
|               | WSR46        | 7.84    | 9.28                     | 3.23                  | 2.22                          |                         |
|               | DS1          | 9.00    | 9.38                     | 1.30                  | 2.17                          |                         |
|               | DS2          | 9.47    | 9.90                     | 1.37                  | 2.67                          |                         |
| DS3           | 9.25         | 9.94    | 2.40                     | 3.17                  |                               |                         |
| DS4           | 9.42         | 10.01   | 2.00                     | 5.00                  |                               |                         |
| DS5           | 8.78         | 9.37    | 2.72                     | 3.11                  |                               |                         |
| US1           | 8.37         | 9.33    | 1.09                     | 2.44                  |                               |                         |
| US2           | 8.12         | 8.95    | 1.03                     | 3.56                  |                               |                         |
| MW1           | 7.30         | 7.50    | 0.81                     | 2.33                  |                               |                         |
| THB1          | 9.10         | 9.82    | 1.43                     | 4.67                  |                               |                         |
| THB2          | -            | 9.46    | 2.04                     | 5.33                  |                               |                         |
| WSR45C        | 7.60         | 8.21    | 0.95                     | 2.22                  |                               |                         |
| WSR46         | 7.85         | 8.72    | 0.95                     | 3.56                  |                               |                         |
| DS1           | 9.03         | 9.20    | 1.22                     | 6.17                  |                               |                         |
| DS2           | 8.75         | 8.81    | 1.21                     | 6.22                  |                               |                         |
| DS3           | 8.15         | 8.99    | 1.21                     | 6.00                  |                               |                         |
| DS4           | 8.44         | 9.08    | 1.48                     | 4.44                  |                               |                         |
| DS5           | 9.04         | 9.29    | 1.92                     | 7.00                  |                               |                         |
| US1           | 9.74         | 10.52   | 3.50                     | 9.33                  |                               |                         |
| US2           | 9.96         | 10.24   | 3.60                     | 9.83                  |                               |                         |
| MW1           | 7.36         | 7.56    | 1.34                     | 6.78                  |                               |                         |
| THB1          | 10.21        | 10.54   | 1.79                     | 7.00                  |                               |                         |

| Sampling Date | Tidal Period | Station | Average DO Levels (mg/L) |                       | Average Turbidity Level (NTU) | Average SS Level (mg/L) |
|---------------|--------------|---------|--------------------------|-----------------------|-------------------------------|-------------------------|
|               |              |         | Bottom                   | Surface and Mid Depth |                               |                         |
|               |              | THB2    | -                        | 10.07                 | 9.61                          | 8.67                    |
|               |              | WSR45C  | 7.82                     | 8.85                  | 1.05                          | 4.89                    |
|               |              | WSR46   | 8.37                     | 9.78                  | 3.15                          | 6.56                    |
|               | Mid-Flood    | DS1     | 10.20                    | 10.42                 | 17.90                         | 23.33                   |
|               |              | DS2     | 10.65                    | 10.89                 | 2.98                          | 6.67                    |
|               |              | DS3     | 11.03                    | 11.08                 | 3.17                          | 4.83                    |
|               |              | DS4     | 11.03                    | 11.07                 | 2.68                          | 5.17                    |
|               |              | DS5     | 11.16                    | 11.19                 | 3.14                          | 5.89                    |
|               |              | US1     | 10.37                    | 10.68                 | 1.88                          | 6.22                    |
|               |              | US2     | 8.73                     | 10.43                 | 1.57                          | 6.22                    |
|               |              | MW1     | 7.95                     | 8.09                  | 0.88                          | 4.11                    |
|               |              | THB1    | 11.30                    | 11.40                 | 1.49                          | 4.50                    |
|               |              | THB2    | -                        | 10.44                 | 3.11                          | 5.00                    |
|               |              | WSR45C  | 8.67                     | 10.27                 | 1.66                          | 5.11                    |
|               |              | WSR46   | 8.68                     | 10.46                 | 2.46                          | 6.22                    |

Notes:

1. Please refer to Table B2 below for the Action and Limit Levels for dredging activities.
2. Cell shaded yellow indicated value exceeding the Action Level criteria.
3. Cell shaded red indicated value exceeding the Limit Level criteria.
4. Only mid-depth water was sampled at Station THB2 because water depth was less than 3m.

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

| <b>Parameter</b>   | <b>Action Level</b>  | <b>Limit Level</b>   |
|--|--|--|
| Dissolved Oxygen (DO) <sup>(1)</sup>   | <u>Surface and Mid-depth</u> <sup>(2)</sup><br>The average of the impact, WSR 45C and WSR 46 station readings are < 5%-ile of baseline data for surface and middle layer = <b>4.32 mg L<sup>-1</sup></b> | <u>Surface and Mid-depth</u> <sup>(2)</sup><br>The average of the impact, WSR 45C and WSR 46 station readings are < <b>4 mg L<sup>-1</sup></b>   |
|  | and  | and  |
|  | Significantly less than the reference stations mean DO (at the same tide of the same day)  | Significantly less than the reference stations mean DO (at the same tide of the same day)  |
|  | <u>Bottom</u><br>The average of the impact, WSR 45C and WSR 46 station readings are < 5%-ile of baseline data for bottom layers = <b>3.12 mg L<sup>-1</sup></b>  | <u>Bottom</u><br>The average of the impact station, WSR 45C and WSR 46 readings are < <b>2 mg L<sup>-1</sup></b>                                 |
|  | and  | and  |
|  | Significantly less than the reference stations mean DO (at the same tide of the same day)  | Significantly less than the reference stations mean DO (at the same tide of the same day)  |
| Depth-averaged Suspended Solids (SS) <sup>(3)(4)</sup>   | The average of the impact, WSR 45C and WSR 46 station readings are > 95%-ile of baseline data for depth average = <b>21.60 mg L<sup>-1</sup></b>   | The average of the impact, WSR 45C and WSR 46 station readings are > 99%-ile of baseline data for depth average = <b>40.10 mg L<sup>-1</sup></b> |
|  | and  | and  |
|  | 120% of control station's SS at the same tide of the same day  | 130% of control station's SS at the same tide of the same day  |
| Depth-averaged Turbidity (Tby) <sup>(3)(4)</sup>   | The average of the impact, WSR 45C and WSR 46 station readings are > 95%-ile of baseline data = <b>25.04 NTU</b>   | The average of the impact, WSR 45C and WSR 46 station readings are > 99%-ile of baseline data = <b>56.30 NTU</b>                                 |
|  | 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   |
| <b>Notes:</b>  |  |  |
| (1) For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.   |  |  |
| (2) The Action and Limit Levels for DO for Surface & Middle layers were calculated from the combined pool of baseline surface layer data and baseline middle layer data. |  |  |
| (3) "Depth-averaged" is calculated by taking the arithmetic means of reading of all three depths.  |  |  |
| (4) For turbidity and SS, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.  |  |  |

Annex C

## Study Programme

