

# Asia Submarine-cable Express (ASE) – Tseung Kwan O

## Baseline Water Quality Monitoring Report (Zone C)

1 October 2012

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Management**

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## Baseline Water Quality Monitoring Report (Zone C)

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Client:  NTT Com Asia Ltd		GMS No:  0171870			
Summary:  This report presents the monitoring requirements, methodologies and results of the baseline ambient marine water quality measurements at the monitoring locations near Tseung Kwan O in accordance with the EM&A Manual.		Date: 1 October 2012			
		Approved by:   Terence Fong Project Director			
0	Baseline Water Quality Monitoring Report (Zone C)	YL	GYANG	TFONG	1 Oct 12
Revision	Description	By	Checked	Approved	Date
<p>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.</p> <p>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.</p> <p>We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.</p> <p>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.</p>		<p>Distribution</p> <p><input checked="" type="checkbox"/> Internal</p> <p><input checked="" type="checkbox"/> Public</p> <p><input type="checkbox"/> Confidential</p> <div style="text-align: right;">      </div>			

**Asia Submarine-cable Express (ASE) – Tseung Kwan O**  
**Environmental Certification Sheet**  
**EP-433/2011**


**Reference Document/Plan**

Document/ <del>Plan</del> to be Certified/ Verified:	Baseline Water Quality Monitoring Report (Zone C)
Date of Report:	1 October 2012
Date prepared by ET:	ERM-Hong Kong Ltd
Date received by IEC:	Ecosystem Ltd


**Reference EM&A Manual/ EP Requirement**

EM&A Manual Requirement:	Section 2
Content:	<i>Water Quality Monitoring</i>
2.5	"The Baseline Monitoring Report shall be provided no later than two weeks before the cable laying work and report should be submitted to EPD for agreement on the Action/Limit Levels....."
2.6	"The Baseline Monitoring Report shall include the following details: brief project background information; drawings showing locations of the baseline monitoring station; an updated construction programme with milestones of environmental protection/ mitigation activities annotated..."
EP Condition:	Condition No. 2.4
Content:	<i>Baseline Monitoring Report on Water Quality</i>
(ii)(a)	To monitor the environmental impacts and timely implementation of the recommended mitigation measures, the Permit Holder shall submit to the Director four hard copies and one electronic copy of the baseline monitoring report on water quality no later than two weeks before the commencement of construction works, as defined in the approved EM&A Manual.

**ET Certification**

I hereby certify that the above referenced document/ <del>plan</del> complies with the above referenced condition of EP-433/2011.	
	
Terence Fong, Environmental Team Leader:	Date: 1 October 2012

**IEC Verification**

I hereby verify that the above referenced document/ <del>plan</del> complies with the above referenced condition of EP-433/2011.	
	
Vincent Lai, Independent Environmental Checker:	Date: 1 October 2012

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## EXECUTIVE SUMMARY

### Baseline Water Quality Monitoring

Baseline water quality monitoring has been conducted between 24 September 2012 and 28 September 2012 at 5 designated monitoring stations (including 2 Sensitive Receiver Stations, 2 Gradient Stations and 1 Control Station) established for the Project. *In situ* water quality measurements and water samples were taken at the monitoring stations on three occasions (days), at three depths (surface, middle and bottom) where practical. The intervals between two sets of monitoring were not less than 36 hours. The water quality sampling was undertaken within a 4 hour window of 2 hour before and 2 hour after mid-flood and mid-ebb tides. The tidal range selected for the baseline monitoring was at least 0.5 m for both flood and ebb tides as far as practicable.

No major activities influencing water quality were observed in the vicinity of the Project's marine works area during the baseline monitoring. Water quality monitoring results are, therefore, considered to be representative for the baseline conditions of the areas where marine works will be undertaken for the Project.

In accordance with the *EM&A Manual*, the baseline monitoring results were used to determine the Action and Limit Levels for Dissolved Oxygen (DO), Suspended Solids (SS) and Turbidity for the impact water quality monitoring which will be conducted during marine works of the Project. The Action and Limit Levels are summarized in *Table 1* below.

Table 1

*Action and Limit Levels for Water Quality (Zone C)*

Parameter	Action Level	Limit Level
SS in mgL <sup>-1</sup> (Depth-averaged) <sup>(a)</sup> <sup>(c)</sup>	95%-ile of baseline data (2.44 mg L <sup>-1</sup> ), or	99%-ile of baseline data (2.48 mg L <sup>-1</sup> ), and
	20% exceedance of value at any impact station compared with corresponding data from control station	30% exceedance of value at any impact station compared with corresponding data from control station
DO in mgL <sup>-1</sup> <sup>(b)</sup>	<u>Surface and Middle</u> <sup>(d)</sup>	<u>Surface and Middle</u> <sup>(d)</sup>
	5%-ile of baseline data for surface and middle layer (5.62 mg L <sup>-1</sup> )	5mg/L or 1%-ile of baseline data for surface and middle layer (5.58 mg L <sup>-1</sup> )
	<u>Bottom</u>	<u>Bottom</u>
	5%-ile of baseline data for bottom layers (5.46 mg L <sup>-1</sup> )	2mg/L or 1%-ile of baseline data for bottom layer (5.41 mg L <sup>-1</sup> )
Turbidity in NTU (Depth-averaged) <sup>(a)</sup> <sup>(c)</sup>	95%-ile of baseline data (1.44 NTU), or	99%-ile of baseline data (1.50 NTU), and
	20% exceedance of value at any impact station compared with corresponding data from control station	30% exceedance of value at any impact station compared with corresponding data from control station

**Notes:**

- e. "Depth-averaged" is calculated by taking the arithmetic means of reading of all sampled depths.
- f. For DO, non-compliance of the water quality limits occurs when the monitoring result is lower than the limits.
- g. For SS and turbidity, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.
- h. The Action and Limit Level for DO for surface and middle layer were calculated from the combined pool of baseline surface layer data and baseline middle layer data.

## 1.1

## BACKGROUND

NTT Com Asia (NTTCA) proposes to install a telecommunication cable (Asia Submarine-cable Express (ASE) cable) of approximately 7,200 km in length, connecting Japan and Singapore with branches to the Philippines, Hong Kong SAR (HKSAR) and Malaysia. NTTCA is responsible for securing the approval to land the ASE cable in Tseung Kwan O, Hong Kong SAR (HKSAR). The proposed landing site will be at a new Beach Manhole (BMH) and ultimately connect with a Data Centre in Tseung Kwan O (TKO) Industrial Estate which is scheduled for completion in 2012. It should be noted that Tseung Kwan O is currently the landing site for a number of submarine cables. From Tseung Kwan O, the cable will extend eastward approaching the Tathong Channel. Near to Cape Collinson, the cable is approximately parallel to the Tathong Channel until north of Waglan Island where the cable travels eastward to the boundary of HKSAR waters where it enters the South China Sea. The total length of cable in Hong Kong SAR waters is approximately 33.5 km. A map of the proposed cable route is presented in *Figure 1.1*.

A Project Profile (PP-452/2011) which includes an assessment of the potential environmental impacts associated with the installation of the submarine telecommunications cable system was prepared and submitted to the Environmental Protection Department (EPD) under section 5.(1)(b) and 5.(11) of the *Environmental Impact Assessment Ordinance (EIAO)* for the application for Permission to apply directly for Environmental Permit (EP). The Environmental Protection Department, subsequently issued an Environmental Permit (EP- 433/2011).

Pursuant to *Condition 2.4* of the EP, an environmental monitoring and audit (EM&A) programme as set out in the *Environmental Monitoring and Audit Manual (M&A Manual)* is required to be implemented. In accordance with the *EM&A Manual*, baseline monitoring of marine water quality should be undertaken for the Project. This *Water Quality Baseline Monitoring Report* ("the Report") is prepared by ERM-Hong Kong, Limited (ERM) on behalf of NTT Com Asia (NTTCA) to present the methodology and findings of the baseline marine water quality monitoring for the Project.

Given that the water sampling stations in Zone C are situated quite far away from those in Zones A and B, and the commencement dates of construction in each zone are also different, it is recommended to present the baseline data in separate reports (i.e. Part A for Zone A, Part B for Zone B and Part C for Zone C) and the corresponding Action and Limit Levels will be derived from the baseline data for each zone.

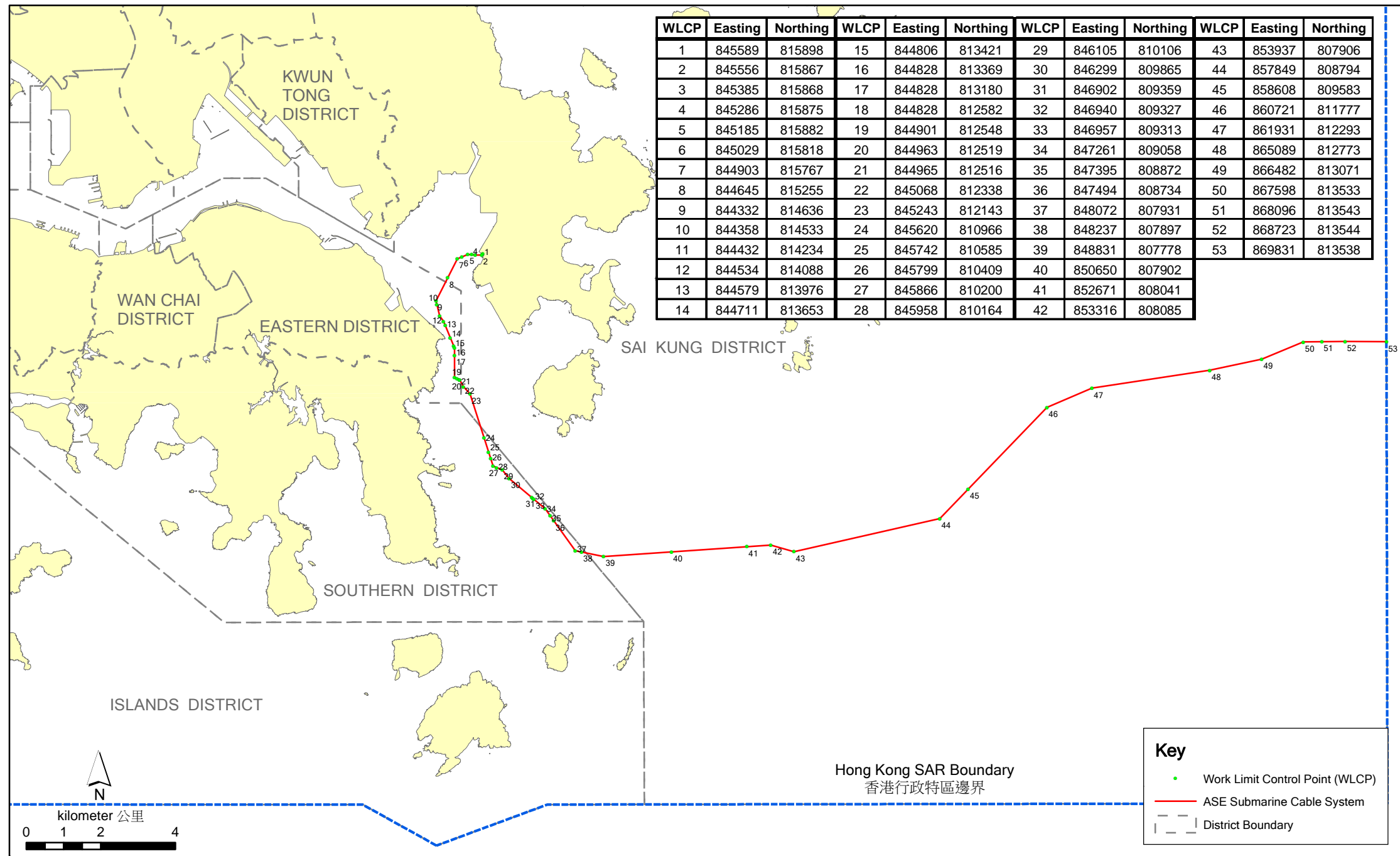



Figure 1.1 Proposed ASE Submarine Cable System (Layout Plan)

File: 0171870\_Landing\_Overview\_20110815.mxd  
Date: 17/09/2012

**Key**

- Work Limit Control Point (WLCP)
- ASE Submarine Cable System
- District Boundary

**Environmental Resources Management**





## 1.2 *PURPOSE OF THIS REPORT*

The purpose of this *Baseline Water Quality Monitoring Report (Part C)* is to determine the baseline marine water quality at the designated monitoring locations around the Project works area in Zone C prior to the commencement of the cable laying works of the Project. Such baseline conditions will be used as the basis for assessing water quality impacts, if any, and for compliance monitoring during the construction of the Project.

Under the requirement of *Condition 2.4* of the *EP*, the baseline monitoring report on water quality shall be prepared and submitted to the DEP no later than two weeks before the commencement of construction works of the Project.

## 1.3 *STRUCTURE OF THE REPORT*

The remainder of the report is structured as follows:

### ***Section 1: Introduction***

Provide details of the background, purpose and structure of the report.

### ***Section 2: Water Quality Monitoring***

Summarize the water quality monitoring locations and frequency, monitoring methodology and baseline monitoring results, and establishes the Action and Limit Levels in accordance with the *EM&A Manual*.

### ***Section 3: Conclusion***

Conclude the representativeness of the baseline monitoring results and observations for the Project.

## 2.1 MONITORING LOCATION

Baseline water quality monitoring in Zone C was conducted prior to the commencement of cable laying works at the monitoring stations listed in *Table 2.1* and shown in *Figure 2.1*.

- E4 is the Impact Station to monitor the impacts of cable installation works on the coral communities at the coast of Sung Kong;
- E5 is the Impact Station to monitor the impacts of cable installation works on the coral communities at the coast of Waglan Island;
- G5 is the Gradient Station between E4 and the alignment;
- G6 is the Gradient Station between E5 and the alignment; and
- C3 is a Control Station (approximately 3 km from the proposed cable alignment) for Zone C. It is not supposed to be influenced by the cable laying works due to its remoteness to the construction works.

**Table 2.1** Water Quality Monitoring Stations

Monitoring Station	Nature	Easting	Northing
E4	Impact Station (Coral Communities)	843210	816322
E5	Impact Station (Coral Communities)	844627	813609
G5	Gradient Station	847795	806678
G6	Gradient Station	849703	806636
C3	Control Station	848556	804750

## 2.2 SAMPLING AND TESTING METHODOLOGY

### 2.2.1 Monitoring Parameters

The parameters measured *in situ* were:

- Dissolved Oxygen (DO) (% saturation and mg L<sup>-1</sup>)
- Salinity (ppt)
- Temperature (°C)
- Turbidity (NTU)

The only parameter to be measured in the laboratory was:

- Suspended solids (SS) (mg L<sup>-1</sup>)

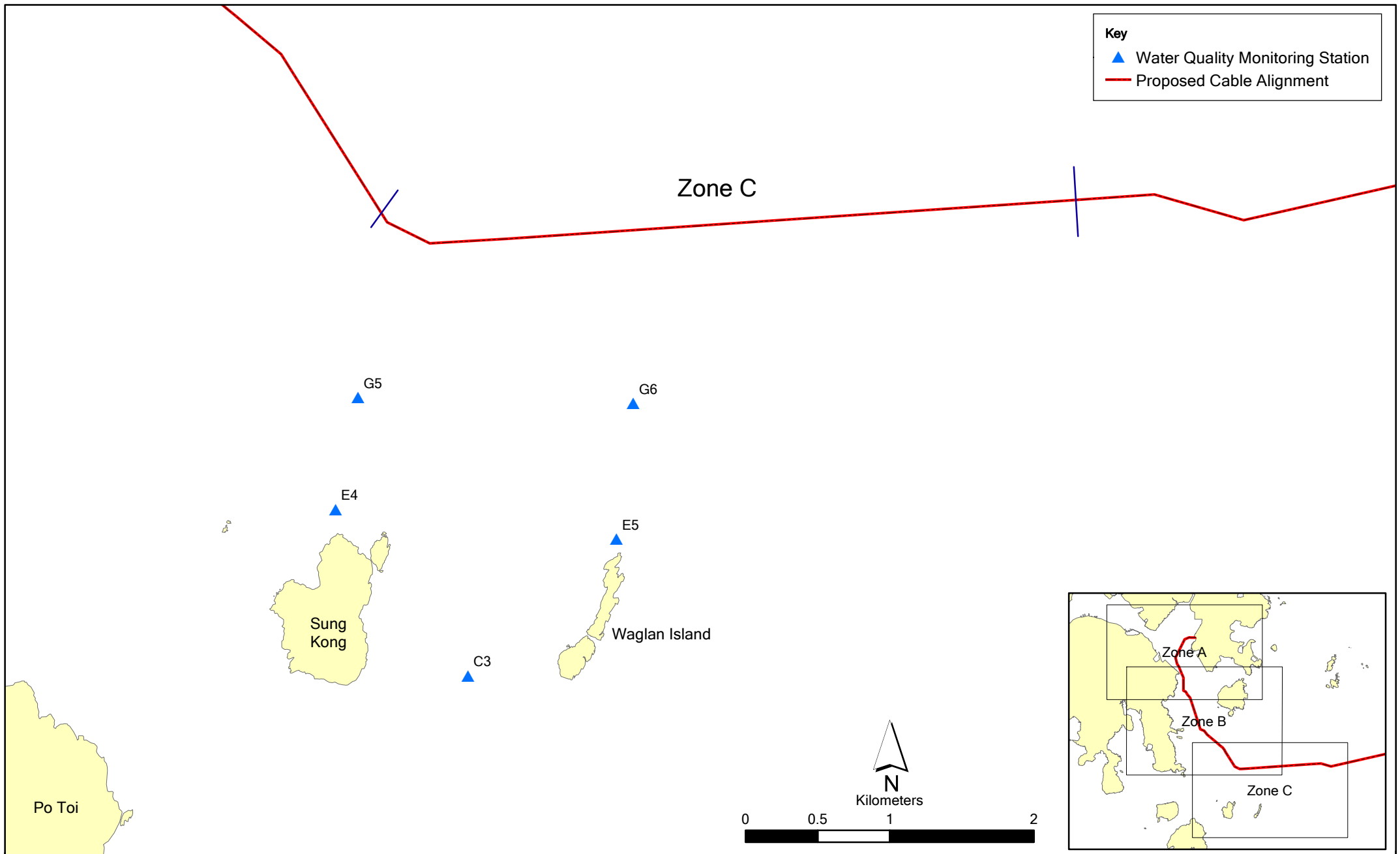


Figure 2.1

Water Quality Monitoring Station (Zone C)

File: 0171870\_Proposed\_WQMS\_ZoneC.mxd  
Date: 20/09/2012

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In addition to the water quality parameters, other relevant data were also measured and recorded in field logs, including the location of the sampling stations, water depth, time, weather conditions, sea conditions, tidal state, current direction and speed, special phenomena and work activities undertaken around the monitoring and works area that may influence the monitoring results.

## 2.2.2 *Monitoring Equipment*

Table 2.2 summaries the equipment used for the baseline water quality monitoring.

**Table 2.2** *Equipment used during the Baseline Water Quality Monitoring Programme*

<b>Equipment</b>	<b>Model</b>
Global Positioning Device	Garmin etrex 10
Water Depth Gauge	Speedtech Instrument SM-5A
Water Sampling Equipment	1510 Kemmerer Water Sampler
Salinity, DO, Temperature Measuring Meter	YSI Pro 2030
Current Velocity and Direction	Flow Probe FP11
Turbidity Meter	HACH Model 2100Q Turbid Meter

## 2.2.3 *Monitoring Frequency and Timing*

The water monitoring was carried out on three occasions (days) and the intervals between two sets of monitoring were not less than 36 hours. The water quality sampling was undertaken within a 4 hour window of 2 hour before and 2 hour after mid flood and mid-ebb tides. The tidal range selected for the baseline monitoring was at least 0.5 m for both flood and ebb tides as far as practicable.

Reference were made to the predicted tides at Tai Miu Wan, which is the tidal station nearest to the Project Site, published on the website of the Hong Kong Observatory <sup>(1)</sup>. Based on the predicted tidal levels at Tai Miu Wan, the baseline water quality monitoring was conducted between 24 September 2012 and 28 September 2012, following the schedule presented in *Annex A*. Schedule for baseline monitoring has been submitted to the Contractor, Independent Environmental Checker (IEC), Engineer Representative (ER) and Environmental Protection Department (EPD) one week prior to the commencement of the monitoring works.

## 2.2.4 *Sampling/ Testing Protocol*

All *in situ* monitoring instruments were checked, calibrated and certified by a laboratory accredited under HOKLAS or any other international accreditation scheme before use (see calibration reports in *Annex B*), and subsequently re-calibrated at-monthly intervals throughout all stages of the water quality monitoring. Responses of sensors and electrodes were checked with certified standard solutions before each use.

<sup>(1)</sup> Hong Kong Observatory (2012) <http://www.hko.gov.hk/tide/eQUBtide.htm> [Accessed in March 2012]

For the on-site calibration of field equipment, the *BS 1427: 1993, Guide to Field and On-Site Test Methods for the Analysis of Waters* was observed. Sufficient stocks of spare parts were maintained for replacements when necessary. Backup monitoring equipment was made available.

Water samples for SS measurements were collected in high density polythene bottles, packed in ice (cooled to 4° C without being frozen), and delivered to a HOKLAS laboratory as soon as possible after collection.

Two replicate samples were collected from each of the monitoring events for *in situ* measurement and lab analysis.

### 2.2.5 *Laboratory Analysis*

All laboratory work was carried out in a HOKLAS accredited laboratory. Water samples of about 1,000 mL were collected at the monitoring and control stations for carrying out the laboratory determinations. The determination work started within the next working day after collection of the water samples. The SS laboratory measurements were provided within 2 days of the sampling event (48 hours). The analyses followed the standard methods as described in APHA Standard Methods for the *Examination of Water and Wastewater*, 19th Edition, unless otherwise specified (APHA 2540D for SS).

The QA/QC details were in accordance with requirements of HOKLAS or another internationally accredited scheme (*Annex C*)

### 2.2.6 *Sampling Depths & Replication*

Each station was sampled and measurements/ water samples were taken at three depths, namely, 1 m below water surface, mid-depth and 1 m above sea bed, except where the water depth less than 6 m, the mid-depth station may be omitted. For stations that are less than 3 m in depth, only the mid-depth sample was taken.

For *in situ* measurements, duplicate readings were made at each water depth at each station. Duplicate water samples were collected at each water depth at each station.

## 2.3 *BASELINE MONITORING RESULTS*

The monitoring data and graphical presentations for baseline water quality monitoring are provided in *Annex D*. No marine construction activities were observed in the vicinity of the monitoring stations during the baseline monitoring. No other major activities influencing water quality were identified during the monitoring period, and weather conditions were generally calm during the baseline monitoring period.

The observations from the monitoring results are as following:

- For all monitoring stations, water quality was variable throughout the baseline monitoring period and this represented natural fluctuation in water quality ;
- Fluctuation of Dissolved Oxygen (DO) was observed during mid-ebb and mid-flood, whilst DO levels fluctuated within a limited range. Hence, it is considered that DO levels between Sensitive Receivers and Control Stations are similar in average although fluctuation exists;
- DO levels at all depths were generally high for all samples, DO levels <4 mg L<sup>-1</sup> were not recorded;
- The levels of turbidity at all the stations in Zone C were observed to be close;
- The levels of suspended solid were recorded similar through all the stations in Zone C;
- The above sporadic patterns of turbidity and SS at the water monitoring stations are considered to be a characteristic of water quality in this area of Hong Kong.

## 2.4

### *ACTION AND LIMIT LEVELS*

The Action and Limit Levels were set in the *EM&A Manual* and the proposed Action and Limit Levels were determined as shown in *Table 2.3*.

**Table 2.3** *Determination of Action and Limit Levels for Water Quality*

<b>Parameter</b>	<b>Action Level</b>	<b>Limit Level<sup>(d)</sup></b>
SS in mgL <sup>-1</sup> (Depth-averaged) <sup>(a) (c)</sup>	95%-ile of baseline data or 20% exceedance of value at any impact station compared with corresponding data from control station	99%-ile of baseline data, and 30% exceedance of value at any impact station compared with corresponding data from control station
DO in mgL <sup>-1</sup> <sup>(b)</sup>	<u>Surface and Middle</u> 5%-ile of baseline data for surface and middle layer <u>Bottom</u> 5%-ile of baseline data for bottom layers	<u>Surface and Middle</u> 5mg/L or 1%-ile of baseline for surface and middle layer <u>Bottom</u> 2mg/L or 1%-ile of baseline data for bottom layer
Turbidity in NTU (Depth-averaged) <sup>(a) (c)</sup>	95%-ile of baseline data, or 20% exceedance of value at any impact station compared with corresponding data from control station	99%-ile of baseline data, and 30% exceedance of value at any impact station compared with corresponding data from control station

Parameter	Action Level	Limit Level <sup>(d)</sup>
<b>Notes:</b>		
a.	"Depth-averaged" is calculated by taking the arithmetic means of reading of all sampled depths.	
b.	For DO, non-compliance of the water quality limits occurs when the monitoring result is lower than the limits.	
c.	For SS and turbidity, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.	
d.	Limit level for DO was derived from the Water Quality Objectives (WQO) for Junk Bay, Eastern Buffer, and Mirs Bay Water Control Zones under the Water Pollution Control Ordinance (WPCO) Chapters 358L, 358Y, and 358I respectively.	

The Action and Limit Levels have been determined based on baseline water quality monitoring data for all monitoring stations in Zone C. The results are presented in *Table 2.4*. Please note that the results are used to determine the Action and Limit Levels for the cable laying works to be undertaken in Zone C.

**Table 2.4 Action and Limit Levels for Water Quality (Zone C)**

<b>Parameter</b>	<b>Action Level</b>	<b>Limit Level</b>
SS in mgL <sup>-1</sup> (Depth-averaged) <sup>(a)</sup> <sup>(c)</sup>	95%-ile of baseline data (2.44 mg L <sup>-1</sup> ), or	99%-ile of baseline data (2.48 mg L <sup>-1</sup> ), and
	20% exceedance of value at any impact station compared with corresponding data from control station	30% exceedance of value at any impact station compared with corresponding data from control station
DO in mgL <sup>-1</sup> <sup>(b)</sup>	<u>Surface and Middle</u> <sup>(d)</sup>	<u>Surface and Middle</u> <sup>(d)</sup>
	5%-ile of baseline data for surface and middle layer (5.62 mg L <sup>-1</sup> )	5mg/L or 1%-ile of baseline data for surface and middle layer (5.58 mg L <sup>-1</sup> )
	<u>Bottom</u>	<u>Bottom</u>
	5%-ile of baseline data for bottom layers (5.46 mg L <sup>-1</sup> )	2mg/L or 1%-ile of baseline data for bottom layer (5.41 mg L <sup>-1</sup> )
Turbidity in NTU (Depth-averaged) <sup>(a)</sup> <sup>(c)</sup>	95%-ile of baseline data (1.44 NTU), or	99%-ile of baseline data (1.50 NTU), and
	20% exceedance of value at any impact station compared with corresponding data from control station	30% exceedance of value at any impact station compared with corresponding data from control station

**Notes:**

- a. "Depth-averaged" is calculated by taking the arithmetic means of reading of all sampled depths.
- b. For DO, non-compliance of the water quality limits occurs when the monitoring result is lower than the limits.
- c. For SS and turbidity, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.
- d. The Action and Limit Level for DO for surface and middle layer were calculated from the combined pool of baseline surface layer data and baseline middle layer data.



## CONCLUSION

Baseline water quality monitoring in Zone C has been conducted between 24 September 2012 and 28 September 2012 at 5 designated monitoring stations (including 2 Sensitive Receiver Stations, 2 Gradient Stations and 1 Control Station). The monitoring was conducted in 3 days, at mid-flood and mid-ebb tides, at three depths (surface, middle and bottom). The intervals between two sets of monitoring were not less than 36 hours. During the monitoring period, no major activities influencing water quality were observed in the vicinity of the Project's marine works area. Water quality monitoring results are, therefore, considered to be representative of the baseline conditions of the areas where marine works will be undertaken for the Project.

The baseline monitoring results were used to determine the Action and Limit Levels for the DO, SS and turbidity for impact monitoring to be conducted at Zone C throughout the construction phase of the Project.

Annex A

## Baseline Water Quality Monitoring Schedule for Zone C

**ASE Submarine Cable System - Tseung Kwan O**  
**Tentative Water Quality Baseline Monitoring Schedule - September 2012**

Reference Tidal Station: Tai Miu Wan (source: HK Observatory Department)

as of 13 September 2012

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						01-Sep
02-Sep	03-Sep	04-Sep	05-Sep	06-Sep	07-Sep	08-Sep
09-Sep	10-Sep	11-Sep	12-Sep	13-Sep	14-Sep	15-Sep
16-Sep	17-Sep	18-Sep	19-Sep	20-Sep	21-Sep	22-Sep
23-Sep	24-Sep	25-Sep	26-Sep	27-Sep	28-Sep	
	Mid-Flood: 13:30 - 16:00 Mid-Ebb: 18:00 - 20:30 <b>(Zone C, 5 stations )</b> <i>Baseline Monitoring</i>		Mid-Ebb: 08:30 - 11:00 Mid-Flood: 15:00 - 17:30 <b>(Zone C, 5 stations )</b> <i>Baseline Monitoring</i>		Mid-Ebb: 09:30 - 12:00 Mid-Flood: 16:00 - 18:30 <b>(Zone C, 5 stations )</b> <i>Baseline Monitoring</i>	

The schedule is subject to agreement from the EPD and AFCD on the monitoring times. The schedule will be revised after reviewing the progress of the construction works or due

Annex B

## Calibration Reports of Multi-parameter Sensor



### Internal Calibration Report of Dissolved Oxygen Meter

Equipment Ref. No. : <u>ET/EW/008/005</u>	Manufacturer : <u>YSI</u>
Model No. : <u>Pro 2030</u>	Serial No. : <u>12A 100353</u>
Date of Calibration : <u>25/08/2012</u>	Calibration Due Date : <u>24/11/2012</u>

**Temperature Verification**

Ref. No. of Reference Thermometer : ET/0521/001  
 Ref. No. of Water Bath : ---

		Temperature (°C)		
Reference Thermometer reading	Measured	20.2	Corrected	19.8
DO Meter reading	Measured	19.7	Difference	0.1

**Standardization of sodium thiosulphate (Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>) solution**

Reagent No. of Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> titrant	CPE/012/4.5/001/5	Reagent No. of 0.025N K <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub>	CPE/012/4.4/001/12
		Trial 1	Trial 2
Initial Vol. of Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> (ml)		0.00	0.00
Final Vol. of Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> (ml)		40.10	40.05
Vol. of Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> used (ml)		40.10	40.05
Normality of Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> solution (N)		0.02494	0.02497
Average Normality (N) of Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> solution (N)		0.02496	
Acceptance criteria, Deviation		Less than ± 0.001N	

Calculation: Normality of Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>, N = 1 / ml Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> used

**Linearity Checking**

**Determination of dissolved oxygen content by Winkler Titration \***

Purging Time (min)	2		5		10	
	1	2	1	2	1	2
Initial Vol. of Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> (ml)	0.00	11.20	22.20	0.00	7.60	12.30
Final Vol. of Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> (ml)	11.20	22.20	29.90	7.60	12.30	17.20
Vol. (V) of Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> used (ml)	11.20	11.00	7.70	7.60	4.70	4.90
Dissolved Oxygen (DO), mg/L	7.50	7.37	5.16	5.09	3.15	3.28
Acceptance criteria, Deviation	Less than + 0.3mg/L		Less than + 0.3mg/L		Less than + 0.3mg/L	

Calculation: DO (mg/L) = V x N x 8000/298

Purging time, min	DO meter reading, mg/L			Winkler Titration result *, mg/L			Difference (%) of DO Content
	1	2	Average	1	2	Average	
2	7.51	7.60	7.56	7.50	7.37	7.44	1.60
5	5.21	5.20	5.21	5.16	5.09	5.13	1.55
10	3.19	3.25	3.22	3.15	3.28	3.22	0.00
Linear regression coefficient				0.99990			



## Internal Calibration Report of Dissolved Oxygen Meter

### *Zero Point Checking*

DO meter reading, mg/L	0.00
------------------------	------

### *Salinity Checking*

Reagent No. of NaCl (10ppt)	CPE/012/4.7/001/28	Reagent No. of NaCl (30ppt)	CPE/012/4.8/001/28
-----------------------------	--------------------	-----------------------------	--------------------

### *Determination of dissolved oxygen content by Winkler Titration \*\**

Salinity (ppt)	10		30	
	1	2	1	2
Trial				
Initial Vol. of Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> (ml)	0.00	11.50	23.20	33.90
Final Vol. of Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> (ml)	11.50	23.20	33.90	44.40
Vol. (V) of Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> used (ml)	11.50	11.70	10.70	10.50
Dissolved Oxygen (DO), mg/L	7.71	7.84	7.17	7.04
Acceptance criteria, Deviation	Less than + 0.3mg/L		Less than + 0.3mg/L	

Calculation:  $DO (mg/L) = V \times N \times 8000/298$

Salinity (ppt)	DO meter reading, mg/L			Winkler Titration result**, mg/L			Difference (%) of DO Content
	1	2	Average	1	2	Average	
10	7.7	7.65	7.68	7.71	7.84	7.78	1.29
30	7.13	7.05	7.09	7.17	7.04	7.11	0.28

### *Acceptance Criteria*

- (1) Difference between temperature readings from temperature sensor of DO probe and reference thermometer : < 0.5 °C
- (2) Linear regression coefficient : >0.99
- (3) Zero checking: 0.0mg/L
- (4) Difference (%) of DO content from the meter reading and by winkler titration : within ± 5%

The equipment complies # / does not comply # with the specified requirements and is deemed acceptable # / unacceptable # for use.

# Delete as appropriate

Calibrated by

:

Approved by :



## Performance Check of Salinity Meter

Equipment Ref. No. : ET/EW/008/005                      Manufacturer : YSI  
Model No. : Pro 2030                                      Serial No. : 12A 100353  
Date of Calibration : 25/08/2012                      Due Date : 24/11/2012

Ref. No. of Salinity Standard used (30ppt)

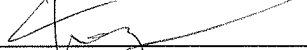
S/001/3


Salinity Standard (ppt)	Measured Salinity (ppt)	Difference %
30.0	30.2	0.66

Acceptance Criteria

Difference : <10 %

The salinity meter complies \* / ~~does not comply~~ \* with the specified requirements and is deemed acceptable \* / ~~unacceptable~~ \* for use. Measurements are traceable to national standards.

Checked by : 

Approved by : 



## Performance Check of Turbidimeter

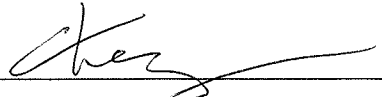
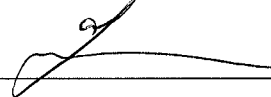
Equipment Ref. No. : ET/0505/008                      Manufacturer : HACH  
Model No. : 2100Q                                      Serial No. : 10030 C 001191  
Date of Calibration : 02/08/2012                      Due Date : 01/11/2012

Gelex Vial Std	Theoretical Value (NTU)	Measured Value (NTU)	Difference %
0-10 NTU	5.70	5.62	1.41
10-100 NTU	52.1	52.7	1.15
100-1000 NTU	547	539	1.47

Acceptance Criteria

Difference : <5 %

The salinity meter complies \* / ~~does not comply~~ \* with the specified requirements and is deemed acceptable \* / ~~unacceptable~~ \* for use. Measurements are traceable to national standards.

Checked by :                       Approved by : 



Annex C

## QA/QC Results for Suspended Solids Testing

## QA/QC Results of Laboratory Analysis of Total Suspended Solids

Sampling Date	QC Sample	Sample Duplicate		Sample Spike	
	% Recovery *	Sample ID	% Error #	Sample ID	% Recovery @
9/24/2012	104.7	FE4S-1	11.76**	FG6 S-2	93.9
	103.0	FG6 M-1	8.70	FG5 B-2	100.0
	93.9	EE4S-1	0.00	EG6 S-2	94.3
	105.7	EG6 M-1	8.00	EG5 B-2	98.1

Note: (\*) % Recovery of QC sample should be between 80% to 120%.  
 (#) % Error of Sample Duplicate should be between 0% to 10%.  
 (@) % Recovery of Sample Spike should be between 80% to 120%.  
 (\*\*) % Error of Sample Duplicate >10% but invalid due to sample results less than ML

Sampling Date	QC Sample	Sample Duplicate		Sample Spike	
	% Recovery *	Sample ID	% Error #	Sample ID	% Recovery @
9/26/2012	106.5	FE4S-1	0.00	FG6 S-2	103.9
	92.1	FG6 M-1	8.70	FG5 B-2	106.1
	99.6	EE4S-1	8.70	EG6 S-2	93.9
	100.2	EG6 M-1	9.52	EG5 B-2	96.0

Note: (\*) % Recovery of QC sample should be between 80% to 120%.  
 (#) % Error of Sample Duplicate should be between 0% to 10%.  
 (@) % Recovery of Sample Spike should be between 80% to 120%.  
 (\*\*) % Error of Sample Duplicate >10% but invalid due to sample results less than ML

Sampling Date	QC Sample	Sample Duplicate		Sample Spike	
	% Recovery *	Sample ID	% Error #	Sample ID	% Recovery @
9/28/2012	103.6	FE4S-1	0.00	FG6 S-2	93.8
	94.4	FG6 M-1	0.00	FG5 B-2	91.7
	107.6	EE4S-1	0.00	EG6 S-2	98.1
	100.8	EG6 M-1	0.00	EG5 B-2	98.0

Note: (\*) % Recovery of QC sample should be between 80% to 120%.  
 (#) % Error of Sample Duplicate should be between 0% to 10%.  
 (@) % Recovery of Sample Spike should be between 80% to 120%.  
 (\*\*) % Error of Sample Duplicate >10% but invalid due to sample results less than ML

Annex D

## Baseline Water Quality Monitoring Results for Zone C

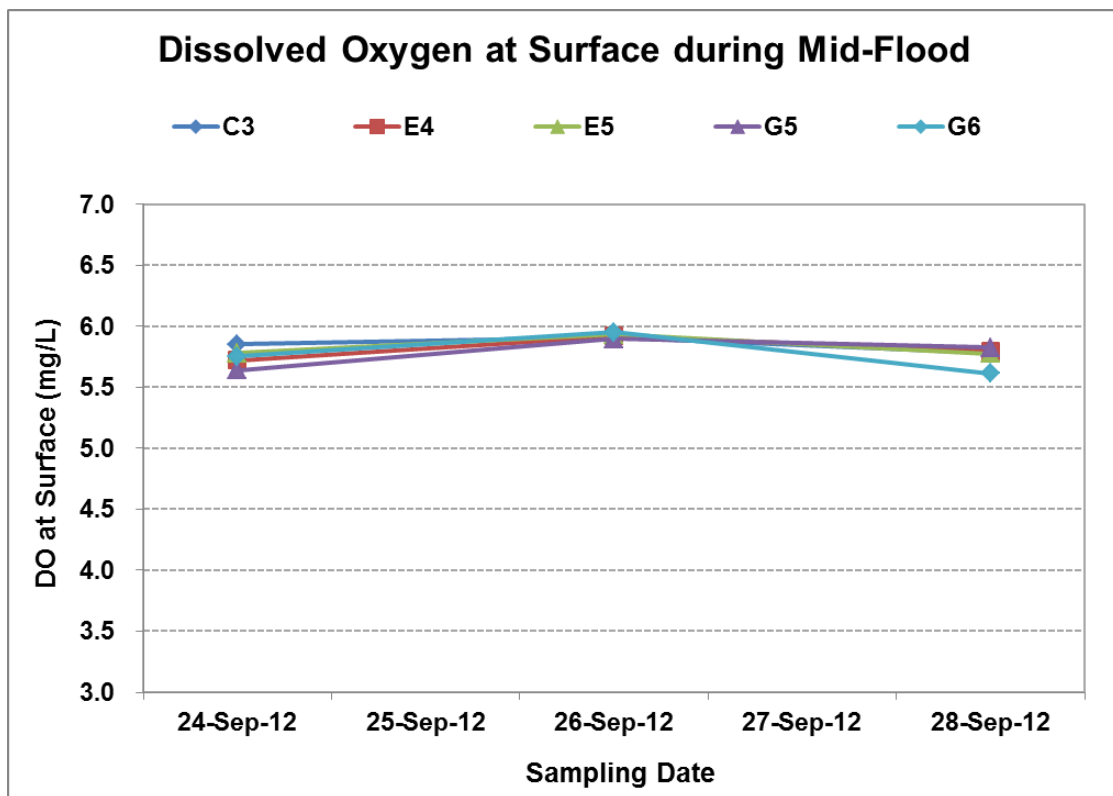
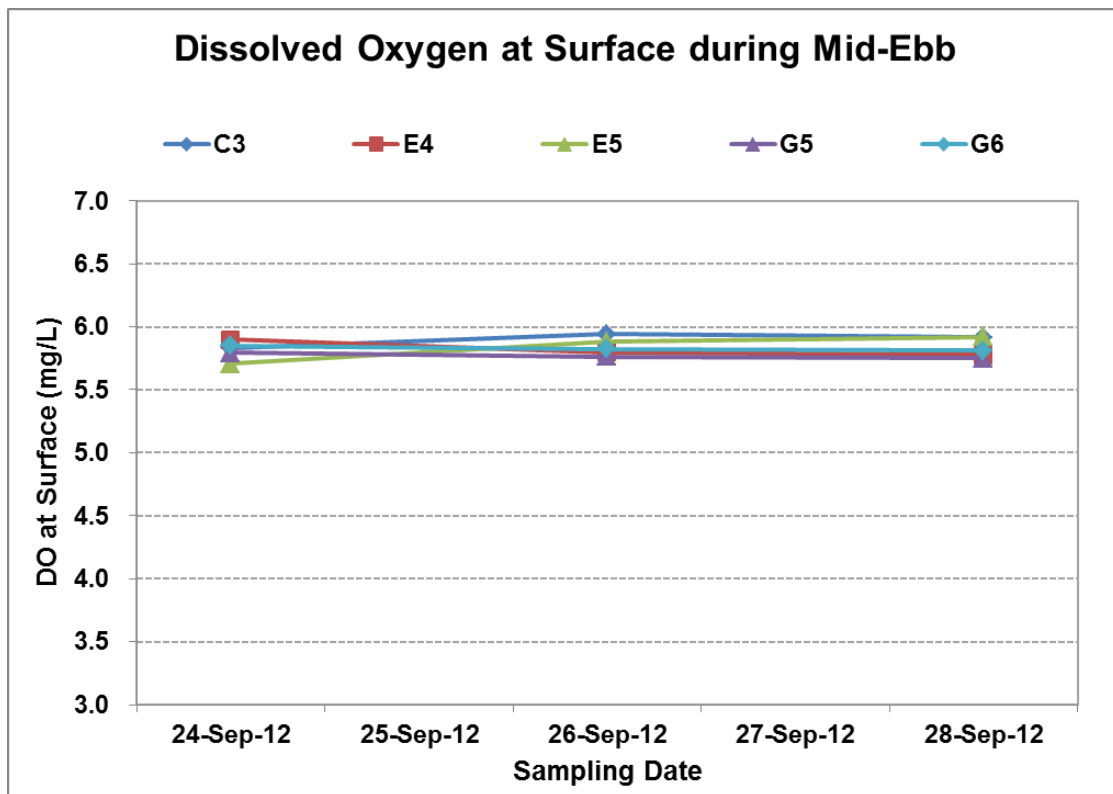


Figure D1 Dissolved oxygen (mg/L) at surface of water column measured during the baseline monitoring period from 24 September to 28 September for Zone C



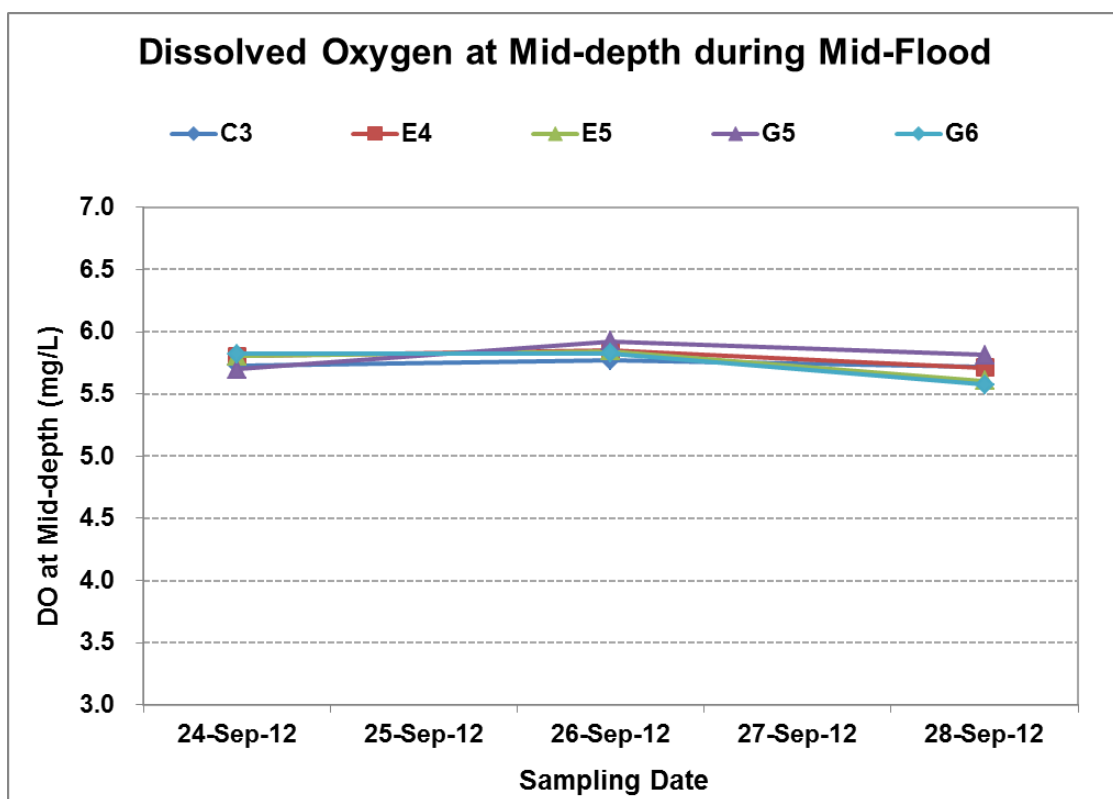
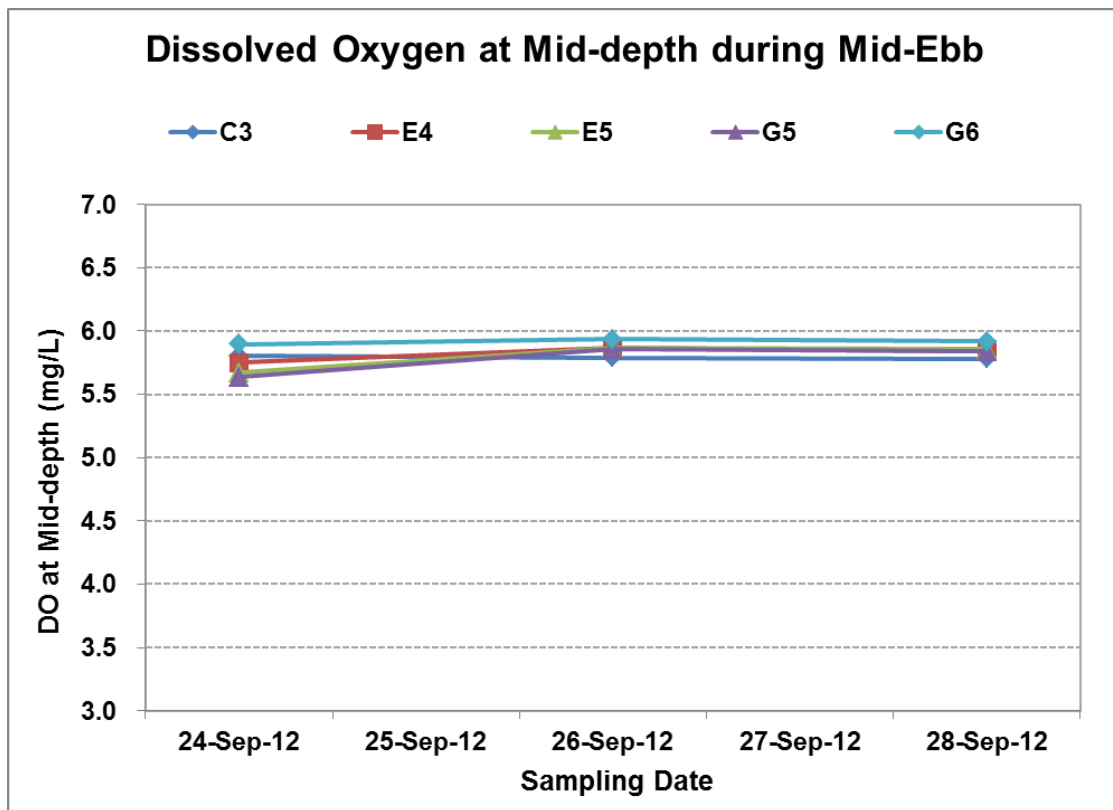


Figure D2 Dissolved oxygen (mg/L) at mid-depth of water column measured during the baseline monitoring period from 24 September to 28 September for Zone C



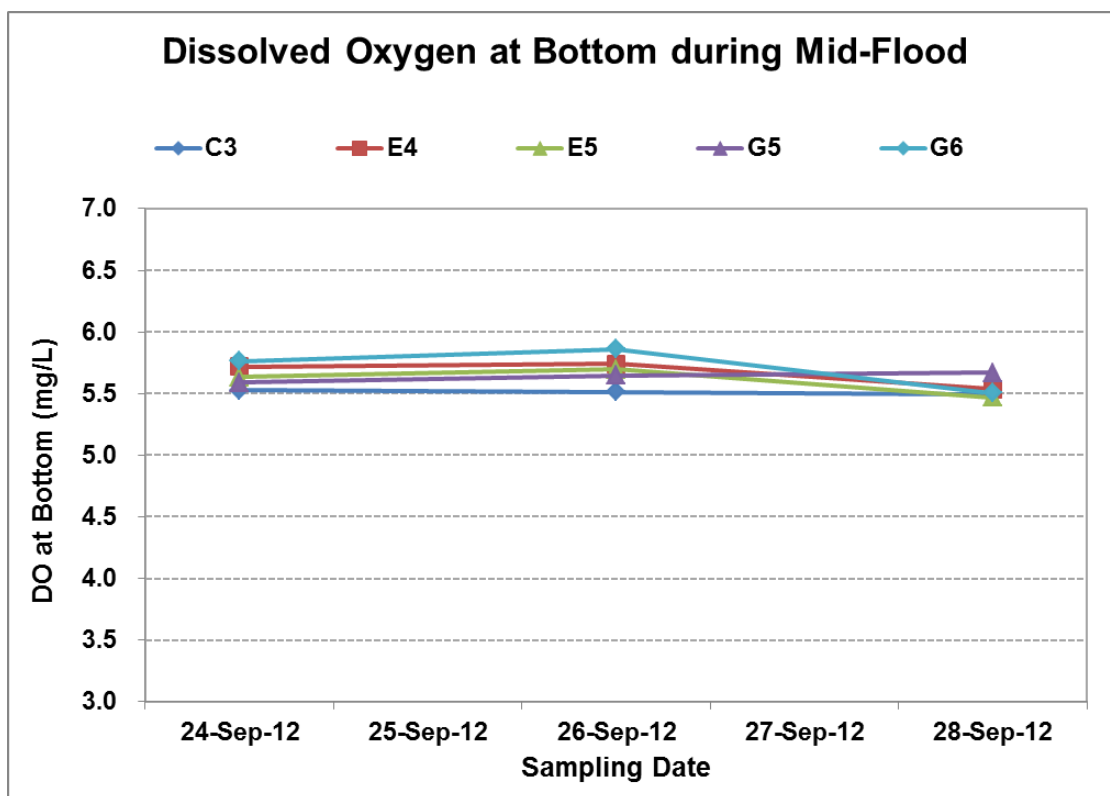
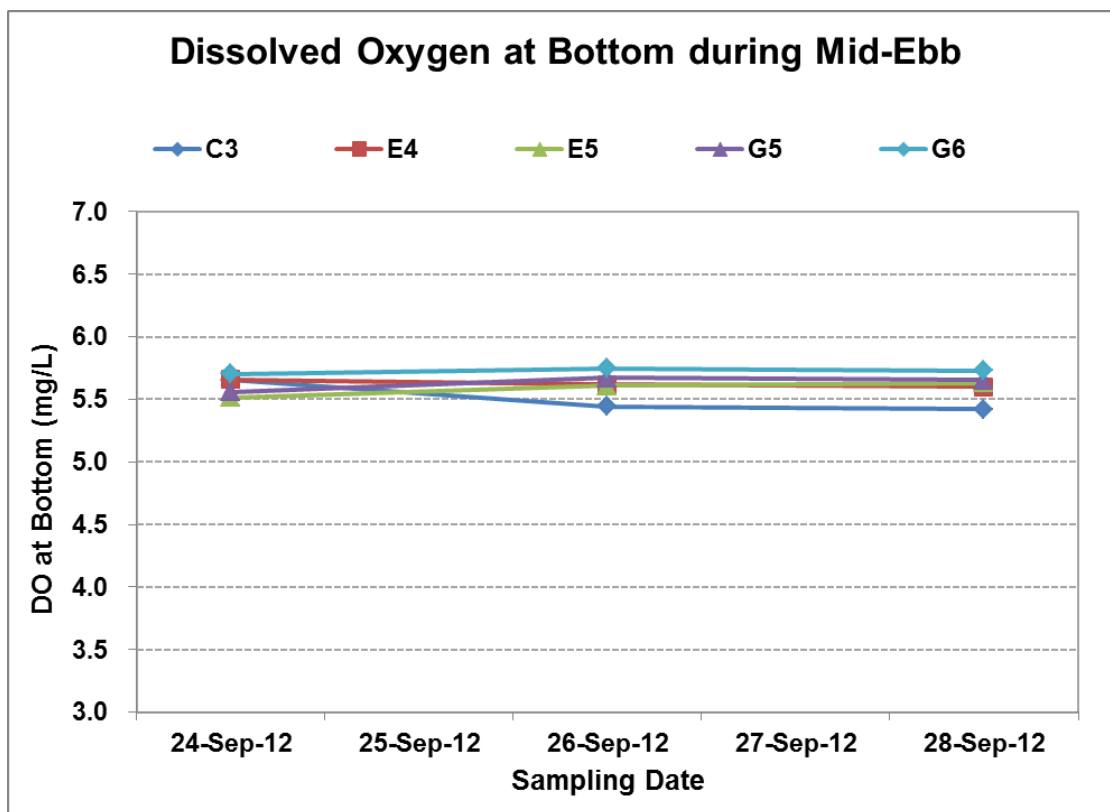


Figure D3 Dissolved oxygen (mg/L) at bottom of water column measured during the baseline monitoring period from 24 September to 28 September for Zone C



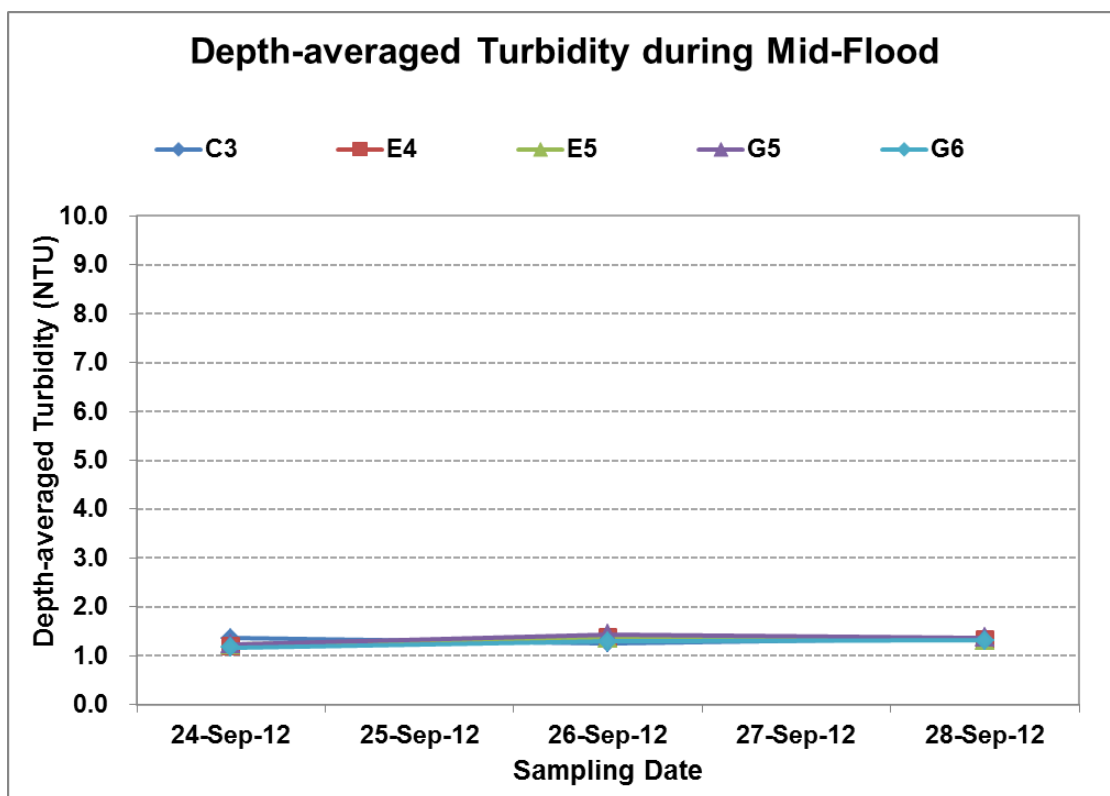
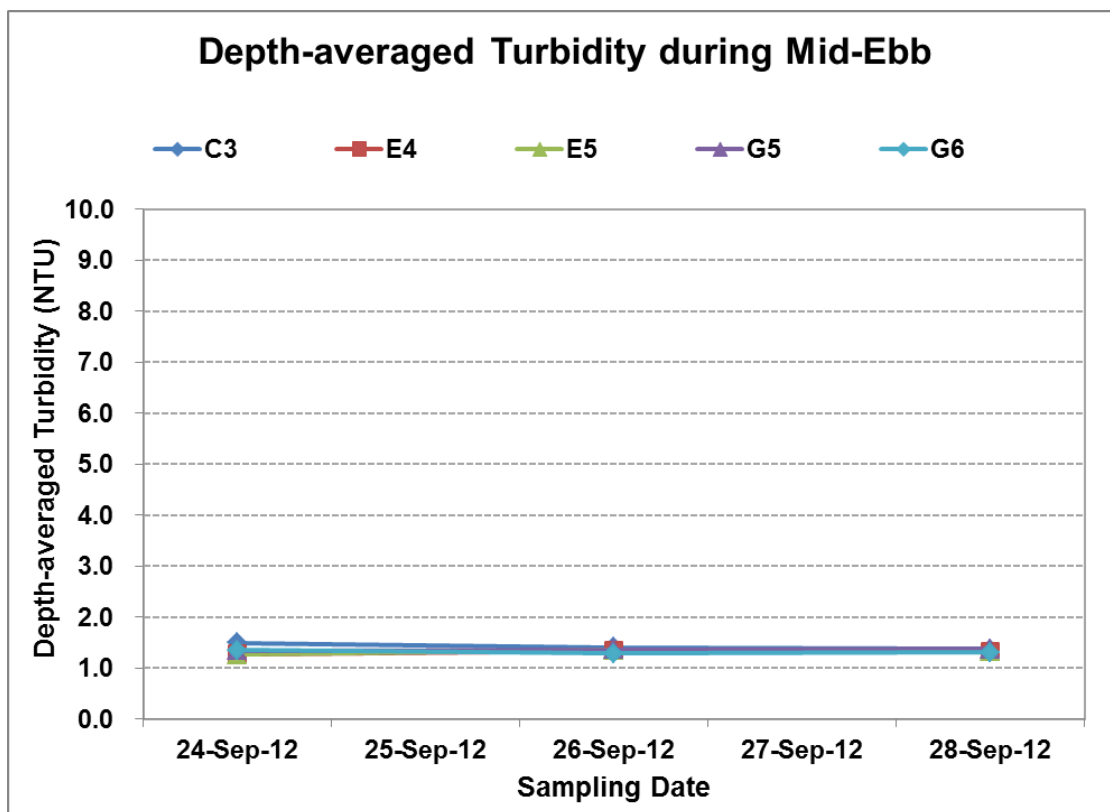


Figure D4 Depth-averaged turbidity (NTU) of water column measured during the baseline monitoring period from 24 September to 28 September for Zone C



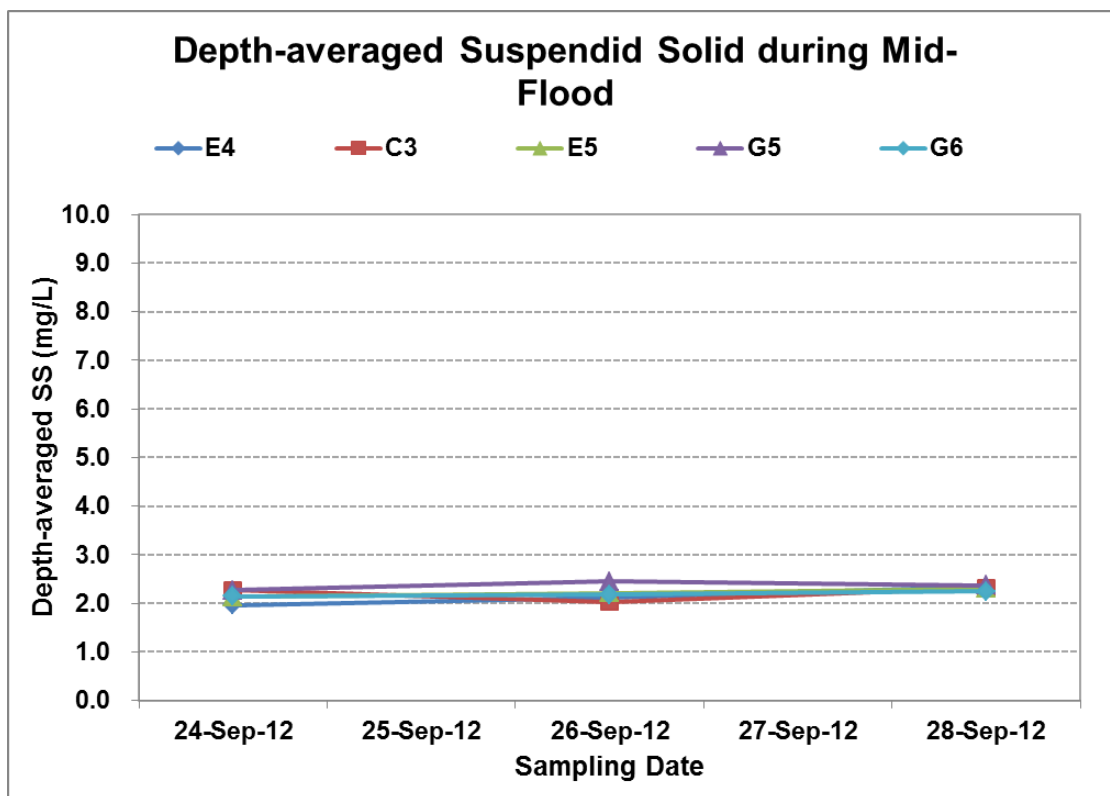
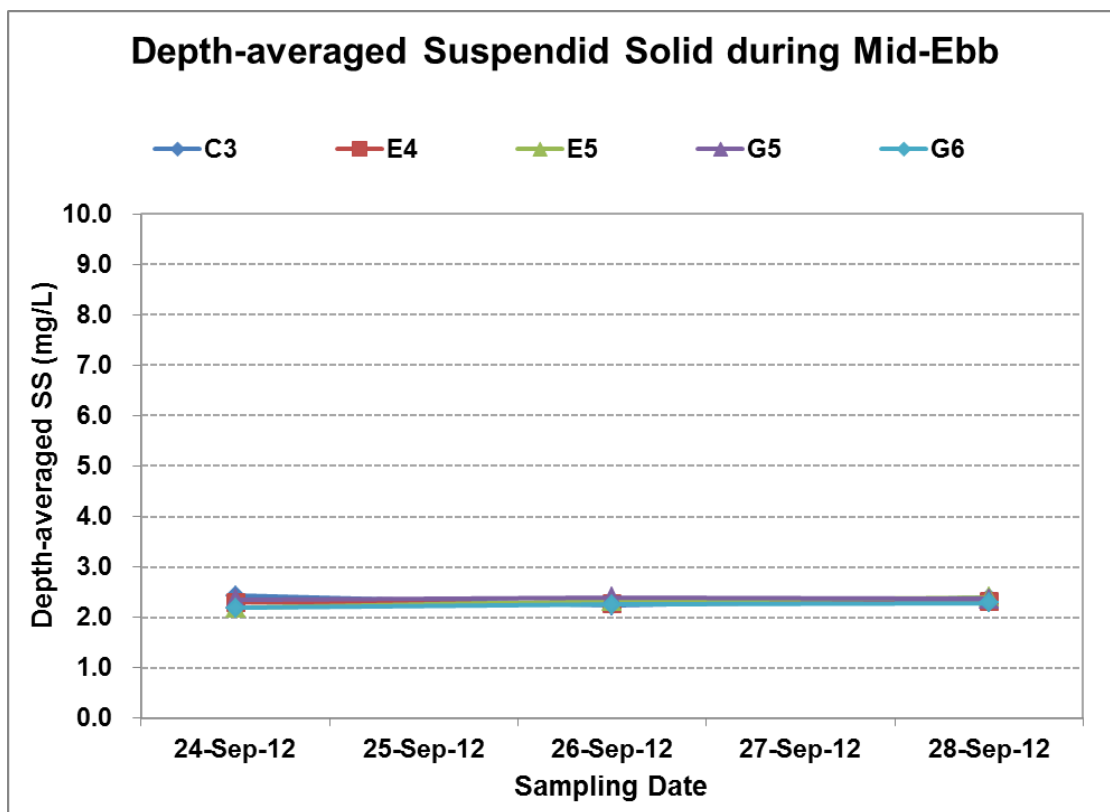


Figure D5 Depth-averaged suspended solid (mg/L) of water column measured during the baseline monitoring period from 24 September to 28 September for Zone C





### Annex D1 Baseline Water Quality Monitoring Results during Mid-Flood Tide for 24 September 2012

Date: 24-Sep-12  
 Tide: Mid-Flood  
 Weather: Rainy  
 Sea Conditions: Small Wave  
 Zone: C

Location	Sampling Time	Water Depth (m)	Current direction	Current speed (ms <sup>-1</sup> )	Monitoring Depth	Temperrature (°C)			Salinity (ppt)			DO (mg/l)			DO Saturation (%)			Turbidity (NTU)				Suspended Solids (mg/l)			
						1	2	Ave.*	1	2	Ave.*	1	2	Ave.*	1	2	Ave.*	1	2	Ave.*	D.A.**	1	2	Ave.*	D.A.**
E4	1330-1348	22.4	E	0.3	Surface	27.9	27.0	27.5	26.8	26.7	26.8	5.7	5.7	5.7	84.9	85.5	85.2	1.1	1.2	1.1		1.8	2.0	1.9	
					Middle	27.9	27.8	27.9	26.8	26.8	26.8	5.8	5.8	5.8	86.7	86.3	86.5	1.0	1.1	1.1	1.2	1.6	1.8	1.7	2.0
					Bottom	27.8	27.7	27.8	27.0	27.0	27.0	5.8	5.7	5.7	85.8	84.6	85.2	1.4	1.4	1.4		2.2	2.4	2.3	
C3	1400-1418	31.4	E	0.4	Surface	27.9	28.0	28.0	27.0	26.9	27.0	5.8	5.9	5.9	87.0	87.5	87.3	1.2	1.2	1.2		2.0	2.3	2.2	
					Middle	27.8	27.8	27.8	27.2	27.2	27.2	5.8	5.7	5.7	85.7	85.0	85.4	1.3	1.3	1.3	1.4	2.3	2.5	2.4	2.3
					Bottom	27.7	27.7	27.7	27.3	27.3	27.3	5.5	5.5	5.5	82.1	82.5	82.3	1.5	1.6	1.6		2.1	2.4	2.3	
E5	1428-1445	32.8	E	0.4	Surface	28.0	28.0	28.0	27.1	27.1	27.1	5.8	5.8	5.8	86.4	85.8	86.1	1.2	1.1	1.2		1.9	1.8	1.9	
					Middle	28.0	27.9	28.0	27.2	27.3	27.3	5.8	5.8	5.8	86.7	86.1	86.4	1.2	1.2	1.2	1.2	2.3	2.1	2.2	2.1
					Bottom	27.8	27.8	27.8	27.3	27.4	27.4	5.7	5.6	5.6	84.3	83.6	84.0	1.3	1.3	1.3		2.3	2.4	2.4	
G6	1452-1510	32.6	E	0.4	Surface	28.0	28.0	28.0	27.1	27.0	27.1	5.8	5.7	5.8	86.3	85.5	85.9	1.1	1.2	1.1		1.9	2.0	2.0	
					Middle	27.9	27.9	27.9	27.2	27.3	27.3	5.8	5.8	5.8	86.4	87.1	86.8	1.2	1.1	1.1	1.2	2.2	2.1	2.2	2.2
					Bottom	27.7	27.8	27.8	27.1	27.1	27.1	5.8	5.7	5.8	86.3	85.5	85.9	1.2	1.3	1.2		2.2	2.5	2.4	
G5	1523-1545	29.2	E	0.4	Surface	28.0	28.1	28.1	26.8	26.9	26.9	5.7	5.6	5.6	84.3	83.7	84.0	1.0	1.1	1.1		2.0	1.9	2.0	
					Middle	28.0	27.9	28.0	26.9	26.9	26.9	5.7	5.7	5.7	85.2	84.6	84.9	1.2	1.2	1.2	1.2	2.2	2.5	2.4	2.3
					Bottom	27.8	27.8	27.8	27.0	27.1	27.1	5.6	5.6	5.6	82.9	83.6	83.3	1.4	1.5	1.5		2.4	2.6	2.5	

Remark or Observation:

Note: \* Average \*\* Depth Average

## Annex D2 Baseline Water Quality Monitoring Results during Mid-Ebb Tide for 24 September 2012

Date: 24-Sep-12  
 Tide: Mid-Ebb  
 Weather: Rainy  
 Sea Conditions: Small Wave  
 Zone: C

Location	Sampling Time	Water Depth (m)	Current direction	Current speed (ms <sup>-1</sup> )	Monitoring Depth	Temperature (°C)			Salinity (ppt)			DO (mg/l)			DO Saturation (%)			Turbidity (NTU)				Suspended Solids (mg/l)			
						1	2	Ave.*	1	2	Ave.*	1	2	Ave.*	1	2	Ave.*	1	2	Ave.*	D.A.**	1	2	Ave.*	D.A.**
E4	1800-1818	22.0	E	0.5	Surface	28.0	28.0	28.0	26.7	26.7	26.7	5.9	5.9	5.9	87.6	87.0	87.3	1.2	1.3	1.3		2.0	2.1	2.1	
					Middle	27.9	27.8	27.9	26.8	26.7	26.8	5.7	5.8	5.8	84.9	85.2	85.1	1.2	1.1	1.1	1.3	2.3	2.4	2.4	2.3
					Bottom	27.7	27.6	27.7	27.0	26.9	27.0	5.7	5.7	5.7	83.9	83.6	83.8	1.5	1.4	1.4		2.5	2.5	2.5	
C3	1830-1847	30.8	E	0.6	Surface	28.0	28.1	28.1	26.9	26.8	26.9	5.9	5.8	5.8	86.6	86.1	86.4	1.3	1.3	1.3		2.1	2.3	2.2	
					Middle	27.8	27.9	27.9	27.0	27.1	27.1	5.8	5.8	5.8	85.8	85.9	85.9	1.5	1.6	1.5	1.5	2.5	2.5	2.5	2.4
					Bottom	27.6	27.6	27.6	27.2	27.3	27.3	5.6	5.7	5.7	83.5	83.9	83.7	1.7	1.6	1.7		2.5	2.7	2.6	
E5	1858-1916	40.2	E	0.5	Surface	28.1	28.0	28.1	26.9	26.8	26.9	5.7	5.7	5.7	84.2	86.7	85.5	1.1	1.1	1.1		1.9	2.1	2.0	
					Middle	27.9	27.9	27.9	27.2	27.3	27.3	5.7	5.7	5.7	83.6	83.6	83.6	1.2	1.3	1.3	1.3	2.3	2.2	2.3	2.2
					Bottom	27.5	27.6	27.6	27.1	27.2	27.2	5.5	5.5	5.5	81.8	81.4	81.6	1.5	1.5	1.5		2.4	2.2	2.3	
G6	1920-1938	31.8	E	0.5	Surface	28.1	28.0	28.1	26.7	26.8	26.8	5.8	5.9	5.9	86.1	87.0	86.6	1.3	1.4	1.4		2.0	1.8	1.9	
					Middle	27.8	27.9	27.9	27.1	27.2	27.2	5.9	5.9	5.9	87.3	87.2	87.3	1.3	1.3	1.3	1.4	2.3	2.2	2.3	2.2
					Bottom	27.6	27.7	27.7	27.3	27.3	27.3	5.7	5.7	5.7	84.7	84.2	84.5	1.4	1.4	1.4		2.5	2.3	2.4	
G5	1951-2010	28.8	E	0.5	Surface	28.1	28.2	28.2	26.8	26.7	26.8	5.8	5.8	5.8	85.4	86.1	85.8	1.2	1.1	1.2		2.2	2.1	2.2	
					Middle	27.9	27.8	27.9	27.1	27.1	27.1	5.7	5.6	5.6	83.6	83.2	83.4	1.3	1.4	1.4	1.3	2.3	2.5	2.4	2.4
					Bottom	27.7	27.7	27.7	27.2	27.3	27.3	5.6	5.5	5.6	82.7	81.8	82.3	1.5	1.6	1.5		2.4	2.6	2.5	

Remark or Observation:

Note: \* Average \*\* Depth Average

### Annex D3 Baseline Water Quality Monitoring Results during Mid-Flood Tide for 26 September 2012

Date: 26-Sep-12  
 Tide: Mid-Flood  
 Weather: Cloudy  
 Sea Conditions: Great Wave  
 Zone: C

Location	Sampling Time	Water Depth (m)	Current direction	Current speed (ms <sup>-1</sup> )	Monitoring Depth	Temperature (°C)			Salinity (ppt)			DO (mg/l)			DO Saturation (%)			Turbidity (NTU)				Suspended Solids (mg/l)			
						1	2	Ave.*	1	2	Ave.*	1	2	Ave.*	1	2	Ave.*	D.A.**	1	2	Ave.*	D.A.**			
E4	1500-1520	21.6	W	0.8	Surface	27.8	27.8	27.8	26.6	26.7	26.7	5.9	5.9	5.9	87.3	86.7	87.0	1.4	1.4	1.4		2.0	2.1	2.1	
					Middle	27.6	27.7	27.7	26.7	26.8	26.8	5.8	5.9	5.9	85.6	86.4	86.0	1.2	1.3	1.3	1.4	1.9	2.0	2.0	2.1
					Bottom	27.5	27.6	27.6	26.8	26.9	26.9	5.7	5.8	5.7	83.9	84.8	84.4	1.4	1.5	1.5		2.3	2.4	2.4	
C3	1528-1546	31.4	W	0.8	Surface	27.7	27.8	27.8	26.7	26.7	26.7	5.9	5.9	5.9	86.6	87.0	86.8	1.2	1.2	1.2		1.9	2.0	2.0	
					Middle	27.6	27.7	27.7	27.0	27.0	27.0	5.8	5.8	5.8	84.5	85.1	84.8	1.2	1.3	1.2	1.3	2.0	2.2	2.1	2.0
					Bottom	27.6	27.6	27.6	27.1	27.2	27.2	5.5	5.5	5.5	81.3	80.9	81.1	1.4	1.4	1.4		2.0	2.1	2.1	
E5	1555-1615	32.8	W	0.7	Surface	27.8	27.9	27.9	26.6	26.7	26.7	5.9	6.0	5.9	87.0	87.5	87.3	1.3	1.3	1.3		2.0	1.9	2.0	
					Middle	27.6	27.6	27.6	27.0	27.1	27.1	5.8	5.9	5.8	85.6	86.3	86.0	1.3	1.3	1.3	1.4	2.2	2.1	2.2	2.2
					Bottom	27.5	27.6	27.6	27.2	27.3	27.3	5.7	5.7	5.7	83.5	83.0	83.3	1.5	1.5	1.5		2.6	2.5	2.6	
G6	1620-1640	32.8	W	0.8	Surface	27.8	27.9	27.9	26.7	26.7	26.7	6.0	5.9	6.0	87.6	87.3	87.5	1.2	1.3	1.2		1.9	2.0	2.0	
					Middle	27.7	27.6	27.7	27.0	27.0	27.0	5.8	5.8	5.8	85.8	85.4	85.6	1.3	1.2	1.3	1.3	2.2	2.0	2.1	2.2
					Bottom	27.6	27.5	27.6	27.2	27.1	27.2	5.8	5.9	5.9	85.6	86.7	86.2	1.4	1.4	1.4		2.4	2.6	2.5	
G5	1647-1710	30.6	W	0.8	Surface	27.8	27.8	27.8	26.8	26.7	26.8	5.9	5.9	5.9	86.3	87.0	86.7	1.4	1.4	1.4		2.5	2.4	2.5	
					Middle	27.6	27.7	27.7	27.0	26.9	27.0	5.9	5.9	5.9	87.1	87.4	87.3	1.4	1.4	1.4	1.4	2.3	2.4	2.4	2.5
					Bottom	27.6	27.0	27.3	27.0	27.1	27.1	5.6	5.7	5.6	82.8	83.2	83.0	1.6	1.5	1.6		2.5	2.6	2.6	

Remark or Observation:

Note: \* Average \*\* Depth Average

### Annex D4 Baseline Water Quality Monitoring Results during Mid-Ebb Tide for 26 September 2012

Date: 26-Sep-12  
 Tide: Mid-Ebb  
 Weather: Cloudy  
 Sea Conditions: Great Wave  
 Zone: C

Location	Sampling Time	Water Depth (m)	Current direction	Current speed (ms <sup>-1</sup> )	Monitoring Depth	Temperature (°C)			Salinity (ppt)			DO (mg/l)			DO Saturation (%)			Turbidity (NTU)				Suspended Solids (mg/l)			
						1	2	Ave.*	1	2	Ave.*	1	2	Ave.*	1	2	Ave.*	D.A.**	1	2	Ave.*	D.A.**			
E4	0830-0850	22.2	E	0.7	Surface	27.6	27.7	27.7	26.5	26.5	26.5	5.8	5.8	5.8	86.1	85.5	85.8	1.4	1.4	1.4		2.4	2.2	2.3	
					Middle	27.6	27.6	27.6	26.6	26.7	26.7	5.9	5.9	5.9	87.0	86.6	86.8	1.2	1.2	1.2	1.3	2.0	2.1	2.1	2.3
					Bottom	27.6	27.5	27.6	26.8	26.8	26.8	5.6	5.6	5.6	82.9	83.5	83.2	1.4	1.5	1.4		2.5	2.4	2.5	
C3	0858-0916	31.0	E	0.9	Surface	27.7	27.7	27.7	26.6	26.7	26.7	5.9	6.0	5.9	87.6	89.2	88.4	1.3	1.3	1.3		2.1	2.1	2.1	
					Middle	27.5	27.6	27.6	27.1	27.0	27.1	5.8	5.8	5.8	86.1	85.2	85.7	1.3	1.3	1.3	1.4	2.1	2.3	2.2	2.2
					Bottom	27.5	27.5	27.5	27.2	27.3	27.3	5.4	5.5	5.4	80.2	81.0	80.6	1.6	1.7	1.6		2.3	2.5	2.4	
E5	0925-0945	32.0	E	0.8	Surface	27.7	27.8	27.8	26.7	26.7	26.7	5.9	5.9	5.9	86.7	87.3	87.0	1.4	1.3	1.3		2.4	2.2	2.3	
					Middle	27.7	27.6	27.7	27.1	27.1	27.1	5.9	5.8	5.9	87.2	86.4	86.8	1.2	1.3	1.2	1.4	2.0	2.2	2.1	2.3
					Bottom	27.6	27.6	27.6	27.2	27.2	27.2	5.6	5.6	5.6	82.7	83.3	83.0	1.5	1.5	1.5		2.6	2.5	2.6	
G6	0950-1010	32.4	E	0.8	Surface	27.7	27.7	27.7	26.8	26.8	26.8	5.8	5.9	5.8	85.8	86.6	86.2	1.4	1.2	1.3		2.1	2.0	2.1	
					Middle	27.7	27.6	27.7	26.9	27.0	27.0	5.9	6.0	5.9	87.5	88.2	87.9	1.1	1.2	1.2	1.3	2.2	2.0	2.1	2.3
					Bottom	27.5	27.5	27.5	27.1	27.1	27.1	5.8	5.7	5.8	85.5	84.7	85.1	1.4	1.5	1.4		2.5	2.7	2.6	
G5	1017-1040	30.0	E	0.9	Surface	27.8	27.8	27.8	26.7	26.8	26.8	5.7	5.8	5.8	85.0	85.7	85.4	1.3	1.4	1.3		2.4	2.5	2.5	
					Middle	27.7	27.7	27.7	26.9	26.9	26.9	5.8	5.9	5.9	86.3	87.0	86.7	1.2	1.3	1.3	1.4	2.2	2.3	2.3	2.4
					Bottom	27.6	27.6	27.6	26.9	27.0	27.0	5.7	5.7	5.7	84.2	83.6	83.9	1.5	1.5	1.5		2.4	2.6	2.5	

Remark or Observation:

Note: \* Average \*\* Depth Average

### Annex D5 Baseline Water Quality Monitoring Results during Mid-Flood Tide for 28 September 2012

Date: 28-Sep-12  
 Tide: Mid-Flood  
 Weather: Fine  
 Sea Conditions: Great Wave  
 Zone: C

Location	Sampling Time	Water Depth (m)	Current direction	Current speed (ms <sup>-1</sup> )	Monitoring Depth	Temperature (°C)			Salinity (ppt)			DO (mg/l)			DO Saturation (%)			Turbidity (NTU)				Suspended Solids (mg/l)			
						1	2	Ave.*	1	2	Ave.*	1	2	Ave.*	1	2	Ave.*	1	2	Ave.*	D.A.**	1	2	Ave.*	D.A.**
E4	16:00-16:22	24.3	W	1.0	Surface	27.9	27.9	27.9	26.5	26.5	26.5	5.9	5.7	5.8	87.0	84.6	85.8	1.3	1.3	1.3		2.4	2.2	2.3	
					Middle	27.7	27.7	27.7	26.6	26.7	26.7	5.7	5.7	5.7	84.8	84.2	84.5	1.3	1.4	1.4	1.3	2.3	2.4	2.4	2.3
					Bottom	27.5	27.5	27.5	26.9	27.0	27.0	5.6	5.5	5.5	82.2	81.5	81.9	1.4	1.4	1.4		2.4	2.3	2.4	
C3	16:30-16:51	32.7	W	1.0	Surface	28.0	27.9	28.0	26.6	26.5	26.6	5.8	5.8	5.8	85.7	85.5	85.6	1.4	1.4	1.4		2.2	2.4	2.3	
					Middle	27.7	27.7	27.7	26.7	26.7	26.7	5.7	5.7	5.7	84.5	84.8	84.7	1.3	1.3	1.3	1.4	2.2	2.3	2.3	2.3
					Bottom	27.5	27.6	27.6	27.0	26.9	27.0	5.5	5.5	5.5	81.1	81.4	81.3	1.4	1.4	1.4		2.4	2.4	2.4	
E5	17:00-17:21	33.6	W	1.0	Surface	28.0	28.0	28.0	26.6	26.6	26.6	5.8	5.8	5.8	85.7	85.2	85.5	1.3	1.4	1.3		2.2	2.3	2.3	
					Middle	27.7	27.7	27.7	26.8	26.8	26.8	5.6	5.6	5.6	83.2	82.7	83.0	1.3	1.2	1.3	1.3	2.2	2.2	2.2	2.3
					Bottom	27.6	27.5	27.6	27.0	27.0	27.0	5.5	5.5	5.5	81.1	70.8	76.0	1.4	1.4	1.4		2.4	2.5	2.5	
G6	17:25-17:45	34.1	W	1.0	Surface	28.0	28.0	28.0	26.8	26.8	26.8	5.6	5.6	5.6	83.3	82.9	83.1	1.3	1.4	1.4		2.2	2.4	2.3	
					Middle	27.9	27.8	27.9	26.9	27.0	27.0	5.6	5.6	5.6	82.6	82.4	82.5	1.2	1.1	1.2	1.3	2.0	2.1	2.1	2.3
					Bottom	27.7	27.7	27.7	27.2	27.2	27.2	5.5	5.5	5.5	81.7	81.3	81.5	1.4	1.4	1.4		2.4	2.4	2.4	
G5	17:52-18:12	32.3	W	1.1	Surface	28.0	27.9	28.0	26.9	26.8	26.9	5.9	5.8	5.8	86.7	85.7	86.2	1.3	1.3	1.3		2.2	2.2	2.2	
					Middle	27.8	27.8	27.8	26.9	26.9	26.9	5.8	5.8	5.8	85.9	86.1	86.0	1.3	1.4	1.3	1.4	2.3	2.4	2.4	2.4
					Bottom	27.6	27.6	27.6	27.2	27.1	27.2	5.7	5.7	5.7	84.1	83.8	84.0	1.5	1.5	1.5		2.5	2.6	2.6	

Remark or Observation:

Note: \* Average \*\* Depth Average

### Annex D6 Baseline Water Quality Monitoring Results during Mid-Ebb Tide for 28 September 2012

Date: 28-Sep-12  
 Tide: Mid-Ebb  
 Weather: Fine  
 Sea Conditions: Great Wave  
 Zone: C

Location	Sampling Time	Water Depth (m)	Current direction	Current speed (ms <sup>-1</sup> )	Monitoring Depth	Temperature (°C)			Salinity (ppt)			DO (mg/l)			DO Saturation (%)			Turbidity (NTU)				Suspended Solids (mg/l)			
						1	2	Ave.*	1	2	Ave.*	1	2	Ave.*	1	2	Ave.*	1	2	Ave.*	D.A.**	1	2	Ave.*	D.A.**
E4	09:30-09:50	22.1	E	0.7	Surface	27.7	27.6	27.7	26.5	26.6	26.6	5.8	5.8	5.8	85.7	85.2	85.5	1.4	1.3	1.4		2.4	2.3	2.4	
					Middle	27.6	27.5	27.6	26.7	26.8	26.8	5.9	5.8	5.8	86.5	86.3	86.4	1.2	1.2	1.2	1.3	2.1	2.2	2.2	2.3
					Bottom	27.5	27.5	27.5	26.8	26.9	26.9	5.6	5.6	5.6	82.6	83.2	82.9	1.4	1.5	1.4		2.4	2.5	2.5	
C3	09:58-10:16	30.8	E	0.9	Surface	27.7	27.6	27.7	26.6	26.7	26.7	5.9	5.9	5.9	87.2	87.9	87.6	1.3	1.3	1.3		2.2	2.3	2.3	
					Middle	27.5	27.5	27.5	26.8	26.9	26.9	5.8	5.8	5.8	86.0	85.1	85.6	1.3	1.3	1.3	1.4	2.2	2.4	2.3	2.4
					Bottom	27.6	27.4	27.5	27.1	27.2	27.2	5.4	5.4	5.4	80.0	80.5	80.3	1.5	1.6	1.6		2.6	2.6	2.6	
E5	10:25-10:45	31.8	E	0.8	Surface	27.8	27.7	27.8	26.7	26.8	26.8	5.9	5.9	5.9	87.5	87.8	87.7	1.3	1.3	1.3		2.4	2.3	2.4	
					Middle	27.6	27.5	27.6	26.9	27.0	27.0	5.9	5.8	5.9	87.0	86.3	86.7	1.2	1.3	1.2	1.3	2.2	2.4	2.3	2.4
					Bottom	27.5	27.5	27.5	27.2	27.3	27.3	5.6	5.6	5.6	83.2	83.5	83.4	1.5	1.5	1.5		2.5	2.6	2.6	
G6	10:50-11:10	32.2	E	0.8	Surface	27.8	27.8	27.8	26.8	26.8	26.8	5.8	5.8	5.8	85.5	86.4	86.0	1.3	1.3	1.3		2.2	2.4	2.3	
					Middle	27.7	27.6	27.7	26.9	27.0	27.0	5.9	5.9	5.9	87.3	87.9	87.6	1.2	1.2	1.2	1.3	2.0	2.2	2.1	2.3
					Bottom	27.5	27.5	27.5	27.1	27.2	27.2	5.8	5.7	5.7	85.1	84.5	84.8	1.4	1.5	1.4		2.4	2.5	2.5	
G5	11:17-11:40	30.0	E	0.9	Surface	27.8	27.7	27.8	26.8	26.7	26.8	5.7	5.8	5.8	84.8	85.4	85.1	1.3	1.4	1.3		2.4	2.3	2.4	
					Middle	27.6	27.6	27.6	26.9	26.9	26.9	5.8	5.9	5.8	86.0	86.9	86.5	1.3	1.3	1.3	1.4	2.2	2.3	2.3	2.4
					Bottom	27.6	27.5	27.6	27.0	27.1	27.1	5.7	5.6	5.7	84.1	83.3	83.7	1.5	1.6	1.5		2.4	2.6	2.5	

Remark or Observation:

Note: \* Average \*\* Depth Average

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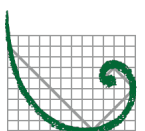
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