



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

## Third Weekly Impact Water Quality Monitoring Report

24 December 2012

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## 3<sup>rd</sup> Weekly Impact Water Quality Monitoring Report

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Summary:  This report presents the monitoring requirements, methodologies and results of the impact marine water quality measurements at the monitoring locations near Tseung Kwan O in accordance with the EM&A Manual.		Date: 24 December 2012			
		Approved by: 			
		Terence Fong Project Director			
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## ***EXECUTIVE SUMMARY***

The submarine cable installation works for the Asia Submarine-cable Express (ASE) cable system were commenced on 8 October 2012. This is the **Third Weekly Impact Water Quality Monitoring Report** presenting the impact water quality monitoring conducted during the period from **10 December 2012 to 16 December 2012** in accordance with the *Monitoring and Audit Manual (EM&A Manual)*.

### Summary of Construction Works Undertaken during the Reporting Period

During the reporting period, submarine cable post-installation works, which involved diver jetting burial, were conducted in Zone A and Zone B.

### Water Quality Monitoring

Two monitoring events were scheduled in the reporting period, with each one conducted in Zone A and Zone B respectively. Monitoring events at designated monitoring stations in Zone A and Zone B were performed on schedule.

### Environmental Non-conformance

Exceedances of Action and Limit Levels were recorded during the reporting week. However, the exceedances were considered to reflect natural background fluctuation rather than impact caused by the Project.

No complaint and summons/prosecution was received during the reporting week.

### Future Key Issues

In the week of 24 December 2012, there are protection works to be conducted at the crossing point of Drainage Services Department (DSD) sewage pipe and the submarine cable in Zone A. Impact water quality monitoring will be carried out in parallel with the diver jetting for the projection works in the week.

ERM-Hong Kong, Limited (ERM) was appointed by NTT Com Asia (NTTCA) as the Environmental Team (ET) to implement the Environmental Monitoring and Audit (EM&A) programme for the installation of a telecommunication cable (Asia-Submarine-cable Express (ASE)) of approximately 7,200 km in length, connecting Japan and Singapore with branches to the Philippines, Hong Kong SAR (HKSAR) and Malaysia (thereinafter called the Project).

### **1.1 PURPOSE OF THE REPORT**

This is the **Third Weekly Impact Water Quality Monitoring Report**, which summarises the results of impact water quality monitoring as part of the EM&A programme during the reporting period from **10 December 2012 to 16 December 2012**.

### **1.2 STRUCTURE OF THE REPORT**

The structure of the Report is as follows:

*Section 1 : Introduction*

Provides details of the background, purpose and report structure.

*Section 2 : Project Information*

Summarises background and scope of the project, the construction works undertaken and the status of Environmental Permits/Licenses during the reporting period.

*Section 3 : Water Quality Monitoring Requirements*

Summarises the monitoring parameters, monitoring programmes, monitoring methodologies, monitoring frequency, monitoring locations, Action and Limit Levels, and Event Action Plan.

*Section 4 : Monitoring Results*

Summarises the water quality monitoring results obtained in the reporting period.

*Section 5 : Environmental Non-conformance*

Summarises any monitoring exceedance, environmental complaints and environmental summons within the reporting period.

*Section 6 : Future Key Issues*

Summarises the monitoring schedule for the next reporting period.

*Section 7 : Conclusions*

Presents the key findings of the impact monitoring results.

## 2.1 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. 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 2.1*.

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 programme as set out in the *Environmental Monitoring and Audit Manual (EM&A Manual)* is required to be implemented. In accordance with Section 2 of the *EM&A Manual*, impact monitoring of marine water quality should be undertaken when the cable installation barge works in Zone A, Zone B and Zone C.

Impact monitoring started on 8 October 2012 in parallel with the submarine cable laying works in Zone A and Zone B, and temporarily ceased after 16 October 2012 as the cable installation barge moved outside Zone C. During this reporting week, the post-installation works that involved hand jetting were conducted in Zone A and Zone B. This Report therefore presents the monitoring results from the monitoring stations within Zone A and Zone B.

## 2.2 MARINE CONSTRUCTION WORKS UNDERTAKEN DURING REPORTING WEEK

During the reporting period from 10 December 2012 to 16 December 2012, post-installation works that involved hand jetting by diver were conducted in Zone A and Zone B.

## 2.3

## STATUS OF ENVIRONMENTAL APPROVAL DOCUMENTS

A summary of the relevant permits, licences and reports on marine water quality for this Project is presented in *Table 2.1*.

**Table 2.1** *Summary of Environmental Licensing, Notification, Permit and Reporting Status*

Permit / Licence / Notification / Report	Reference	Validity Period	Remarks
Environmental Permit	EP 433/2011	Throughout the construction and operation stages	Granted on 20 December 2011
EM&A Manual	-	Throughout the construction stage	Revised EM&A Manual submitted on 18 September 2012
Baseline Water Quality Monitoring Report (Zone A)	-	Throughout the construction period for Zone A	Submitted on 19 September 2012
Baseline Water Quality Monitoring Report (Zone B)	-	Throughout the construction period for Zone B	Submitted on 25 September 2012
Baseline Water Quality Monitoring Report (Zone C)	-	Throughout the construction period for Zone C	Submitted on 1 October 2012
First Weekly Impact Water Quality Monitoring Report	-	Throughout the construction stage	Submitted on 19 October 2012
Second Weekly Impact Water Quality Monitoring Report	-	Throughout the construction stage	Submitted on 24 October 2012



### 3.1 MONITORING LOCATIONS

In accordance with the *EM&A Manual*, water quality samplings were collected at the stations situated around the cable laying works in Zone A and Zone B when post-installation works involving hand jetting were conducted in these zones. The locations of the sampling stations within Zone A are shown in *Figure 3.1*.

- E7 is the Impact Station located at Fat Tong Chau to monitor the impacts of cable installation works on the coral communities in the proximity;
- E8 is an Impact Station to monitor the impacts of cable installation works on the coral communities along Junk Bay – South West;
- E9 is an Impact Station to monitor the impacts of cable installation works on the coral communities at Cape Collison (the Gradient Station is not set due to the short distance of this Impact Station to nearby proposed cable works which may affect the cable laying works);
- F1 is an Impact Station to monitor the impacts of cable installation works on the Tung Lung Chau Fish Culture Zone;
- S1 is an Impact Station situated at the WSD Seawater Intake Point in Junk Bay. It is located within 500 m north of the cable alignment at Junk Bay and set up to monitor the effect of cable laying works in the area;
- S2 is an Impact Station to monitor the impacts of cable installation works on the WSD Seawater Intake at Siu Sai Wan;
- S3 is an Impact Station to monitor the impacts of cable installation works on the Pamela Youde Nethersole Eastern Hospital Cooling Water Intake at Heng Fa Chuen;
- G1 is a Gradient Station between S1 and the cable alignment;
- G2 is a Gradient Station between S2 and the cable alignment;
- G3 is a Gradient Station between F1 and the cable alignment; and
- C1 is a Control Station (approximately 3 km from the proposed cable alignment) for Zone A. It is not supposed to be influenced by the cable laying works due to its remoteness to the construction works.

The co-ordinates of the above monitoring stations in Zone A are listed in *Table 3.1*.

**Table 3.1** *Co-ordinates of Water Quality Impact Monitoring Stations in Zone A*

<b>Monitoring Station</b>	<b>Nature</b>	<b>Easting</b>	<b>Northing</b>
E7	Impact Station (Coral Community)	843779	814520
E8	Impact Station (Coral Community)	843111	815126
E9	Impact Station (Coral Community)	843557	811853
F1	Impact Station (Fish Culture Zone)	847196	811056
S1	Impact Station (Seawater Intakes)	847639	805900
S2	Impact Station (Seawater Intakes)	849587	805696
S3	Impact Station (Seawater Intakes)	845474	810605
G1	Gradient Station	845297	816282
G2	Gradient Station	844071	814784
G3	Gradient Station	846099	812826
C1	Control Station	842022	816547

The locations of the sampling stations within Zone B are shown in *Figure 3.2*.

- B1 is an Impact Station to monitor the impacts of cable installation works on the Big Wave Bay Beach;
- B2 is an Impact Station to monitor the impacts of cable installation works on the Rocky Bay Beach;
- B3 is an Impact Station to monitor the impacts of cable installation works on the Shek O Beach;
- E1 is an Impact Station to monitor impacts of cable installation works on Cape d’Aguilar Marine Reserve;
- E2 is an Impact Station to monitor the impacts of cable installation works on the coral communities at Tung Lung Chau;
- E6 is an Impact Station to monitor the impacts of cable installation works on the coral communities at Tai Long Pai (the Gradient Station is not set due to the short distance of this Impact Station to nearby proposed cable works which may affect the cable laying works);
- E9 is an Impact Station to monitor the impacts of cable installation works on the coral communities at Cape Collison (the Gradient Station is not set due to the short distance of this Impact Station to nearby proposed cable works which may affect the cable laying works);
- F1 is an Impact Station to monitor the impacts of cable installation works on the Tung Lung Chau Fish Culture Zone;
- G3 is a Gradient Station between F1 and the cable alignment;
- G4 is a Gradient Station between E2 and the cable alignment;
- G7 is a Gradient Station between E1 and the cable alignment; and

- C2 is a Control Station (approximately 3.4 km from the proposed cable alignment) for Zone B. It is not supposed to be influenced by the cable laying works due to its remoteness to the construction works.

The co-ordinates of the above monitoring stations in Zone B are listed in *Table 3.2*.

**Table 3.2** *Co-ordinates of Water Quality Impact Monitoring Stations in Zone B*

Monitoring Station	Nature	Easting	Northing
B1	Impact Station (Beach)	843557	811853
B2	Impact Station (Beach)	844062	810369
B3	Impact Station (Beach)	843988	809902
E1	Impact Station (Marine Reserve)	845474	810605
E2	Impact Station (Coral Communities)	845203	815205
E6	Impact Station (Coral Communities)	845321	816718
E9	Impact Station (Coral Communities)	843557	811853
F1	Impact Station (Fish Culture Zone)	847196	811056
G3	Gradient Station	846099	812826
G4	Gradient Station	846583	810809
G7	Gradient Station	845946	808583
C2	Control Station	849603	811528

### 3.2 MONITORING PARAMETERS

The impact water quality monitoring was conducted in accordance with the requirements stated in the *EM&A Manual*. Monitoring parameters are presented as below.

Parameters measured *in situ* were:

- dissolved oxygen (DO) (% saturation and mg L<sup>-1</sup>);
- temperature (°C);
- turbidity (NTU); and
- salinity (‰).

The only parameter measured in the laboratory was:

- suspended solids (SS) (mgL<sup>-1</sup>).

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

### 3.3 MONITORING EQUIPMENT AND METHODOLOGY

#### 3.3.1 Monitoring Equipment

Table 3.3 summaries the equipment used for the impact water quality monitoring.

**Table 3.3** *Equipment Used during the Impact Water Quality Monitoring*

<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

#### 3.3.2 Monitoring Methodology

##### *Timing & Frequency*

In-situ data and SS data were collected during the diver jetting works from 7:00 to 23:00 on a daily basis. The impact monitoring schedule for the reporting period is presented in *Annex A*.

Impact monitoring at E7, E8, E9, F1, S1, S2, S3, G1, G2, G3 and C1 commenced when the diver jetting for cable post-installation works was undertaken in Zone A. The daily sampling works ceased once the diver jetting works in Zone A were completed.

Similarly, impact monitoring at C2, G3, G4, G7, B1, B2, B3, E1, E2, E6, E9 and F1 commenced when the diver jetting for cable post-installation works was undertaken in Zone B. The daily sampling works ceased once the diver jetting works in Zone B were completed.

Due to the weather conditions and travelling time between stations, *in-situ* and SS measurements were taken at the impact monitoring stations with an approximately four-hour interval in Zone A and Zone B. The monitoring frequency and parameters for Impact Monitoring are summarised in *Table 3.4*.

**Table 3.4** *Monitoring Frequency and Parameters for Impact Monitoring in Zone A and Zone B*

Zone	Station Type	Monitoring Station	Monitoring Frequency	Monitoring Parameter
A	Control	C1	Daily at a 4-hour interval while cable installation works were being undertaken in Zone A	Temperature, Turbidity, Salinity, DO and SS
	Gradient	G1, G2, G3		
	Impact	E7, E8, E9, F1, S1, S2, S3,		
B	Control	C2	Daily at a 4-hour interval while cable installation works were being undertaken in Zone B	Temperature, Turbidity, Salinity, DO and SS
	Gradient	G3, G4, G7		
	Impact	B1, B2, B3, E1, E2, E6, E9, F1		

Duplicate samples were collected from each of the monitoring events for in situ measurements and laboratory analysis. *Depths*

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.

#### *Sampling/ Testing Protocols*

All *in situ* monitoring instruments were checked, calibrated and certified by a laboratory accredited under HOKLAS or any other international accreditation scheme before use, 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.

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.

### 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 B*)

### 3.3.3 Action and Limit Levels

The Action and Limit levels for Zones A, which were established based on the results of *Baseline Environmental Monitoring (Zone A)*, are presented in *Table 3.5*.

**Table 3.5** *Action and Limit Levels of Water Quality for Zone A*

Parameter	Action Level	Limit Level
SS in mgL <sup>-1</sup> (Depth-averaged) <sup>(a) (c)</sup>	95%-ile of baseline data (6.27 mg L <sup>-1</sup> ), or	99%-ile of baseline data (6.40 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 (4.36 mg L <sup>-1</sup> )	5mg/L or 1%-ile of baseline for surface and middle layer (4.25 mg L <sup>-1</sup> )
	<u>Bottom</u>	<u>Bottom</u>
	5%-ile of baseline data for bottom layers (4.39 mg L <sup>-1</sup> )	2mg/L or 1%-ile of baseline data for bottom layer (4.33 mg L <sup>-1</sup> )
Turbidity in NTU (Depth-averaged) <sup>(a) (c)</sup>	95%-ile of baseline data (4.38 NTU), or	99%-ile of baseline data (4.43 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:**

- “Depth-averaged” is calculated by taking the arithmetic means of reading of all sampled depths.
- For DO, non-compliance of the water quality limits occurs when the monitoring result is lower than the limits.
- For SS and turbidity, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.
- 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.

The Action and Limit levels for Zones B, which were established based on the results of *Baseline Environmental Monitoring (Zone B)*, are presented in Table 3.6.

**Table 3.6** *Action and Limit Levels of Water Quality for Zone B*

<b>Parameter</b>	<b>Action Level</b>	<b>Limit Level</b>
SS in mgL <sup>-1</sup> (Depth-averaged) <sup>(a) (c)</sup>	95%-ile of baseline data (4.09 mg L <sup>-1</sup> ), or	99%-ile of baseline data (4.60 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 (4.72 mg L <sup>-1</sup> )	5mg/L or 1%-ile of baseline for surface and middle layer (4.57 mg L <sup>-1</sup> )
	<u>Bottom</u>	<u>Bottom</u>
	5%-ile of baseline data for bottom layers (4.52 mg L <sup>-1</sup> )	2mg/L or 1%-ile of baseline data for bottom layer (4.44 mg L <sup>-1</sup> )
Turbidity in NTU (Depth-averaged) <sup>(a) (c)</sup>	95%-ile of baseline data (3.01 NTU), or	99%-ile of baseline data (3.13 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
<b>Notes:</b>		
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.	

### 3.3.4 *Event and Action Plan*

The Event and Action Plan for water quality monitoring which was stipulated in *EM&A Manual* is presented in *Table 3.7*.

**Table 3.7** *Event Action Plan for Water Quality*

<b>Event</b>	<b>Contractor</b>
Action Level	<b>Step 1</b> - repeat sampling event.
Exceedance	<p><b>Step 2</b> - identify source(s) of impact and confirm whether exceedance was due to the construction works;</p> <p><b>Step 3</b> - inform EPD, AFCD and LCSD and confirm notification of the non-compliance in writing;</p> <p><b>Step 4</b> - discuss with cable installation contractor the most appropriate method of reducing suspended solids during cable installation (e.g. reduce cable laying speed/volume of water used during installation).</p> <p><b>Step 5</b> - repeat measurements after implementation of mitigation for confirmation of compliance.</p> <p><b>Step 6</b> - if non compliance continues - increase measures in Step 4 and repeat measurements in Step 5. If non compliance occurs a third time, suspend cable laying operations.</p>
Limit Level	Undertake <b>Steps 1-5</b> immediately, if further non compliance
Exceedance	continues at the Limit Level, suspend cable laying operations until an effective solution is identified.



A total of two monitoring events were scheduled in the reporting period between 10 December 2012 and 15 December 2012 (*Annex A*). Monitoring events at all designated monitoring stations within Zone A and Zone B were performed on schedule. No major activities influencing the water quality were identified during the reporting period.

#### 4.1 DATA COLLECTED DURING REPORTING PERIOD

Continuous water sampling was taken at the impact monitoring stations in Zone A and Zone B at approximately 4-hour intervals (subject to the weather conditions and travelling time between stations) on a daily basis. In general, the water quality of Zone A and Zone B was stable throughout each sampling day though natural fluctuation existed. Neither sudden drop in dissolved oxygen concentrations nor sharp increase in turbidity levels and suspended solid levels were observed on each monitoring day. The results of the impact monitoring and their graphical presentations were included in *Annex C*.

Despite relatively stable water quality, exceedances of the Action and Limit Levels were recorded during the reporting week. A summary of stations where exceedances were recorded is presented in *Error! Reference source not found.*. Exceedances with detailed information of location and time were presented in *Annex C*.

**Table 4.1** Summary of Exceedances Occurring during the Reporting Week

Date	Surface DO		Middle DO		Bottom DO		Depth-averaged Turbidity		Depth-averaged SS	
	Exceedances									
	Action Level	Limit Level	Action Level	Limit Level	Action Level	Limit Level	Action Level	Limit Level	Action Level	Limit Level
10/12									E7, E8, E9, F1, S1, S2, S3	
15/12									E9	E9

#### 4.2 EXCEEDANCES DURING REPORTING PERIOD

##### 4.2.1 Exceedances on 10 December 2012

Exceedances of the Action Level in depth-averaged SS were recorded at Impact Station E7, E8, E9, F1, S1, S2 and S3 in the 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> sampling rounds on 10 December 2012 (*Table 4.2*).

According to the daily barge operation report, there was preparation and equipment maintenance works carried out by the Contractor before the burial operation by diver (ie hand jetting works) resumed at 13:00. All marine

works stopped at approximately 19:30 in the evening. The actual time of hand jetting works on 10 Dec 2012 was between 13:00 to 19:30. This period overlapped with the marine water quality monitoring.

Hand jetting works for the Project did not start when the exceedances were recorded at all monitoring stations (i.e. C1, G1, G2, G3, E8, S1, E7, F1, E9, S2 and S3) in the 1st round (07:00 – 10:50) of marine water quality monitoring. Therefore, the exceedances of the Action Level at in the 1st sampling round are considered as representing natural background fluctuations rather than a result of the cable installation (hand jetting) works.

For the exceedances in the 2nd and 3rd rounds of water quality sampling, considering the generally elevated Depth-averaged SS levels compared with the baseline data at all monitoring stations including the Control Station C1 to the east of Lei Yun Mun, it is unlikely that the localised and small scaled diver burial activities (hand jetting only) can cause SS elevation of such scale. Attention should also be given to the fact that such exceedances at all sampling stations occurred at the 1st round of water quality sampling before the hand jetting works started. It is hence considered that the Depth-averaged SS exceedances at the 2nd and 3rd rounds of sampling may represent a natural and sporadic phenomenon, which is not related to the diver burial operation of the Project.

Given the discussion as above, the exceedances of the Action Level at all impact stations in the 4th round of sampling (19:34 – 23:06) when the burial works ended at 19:30 are unlikely to be caused by the Project either. Rather, the exceedances are considered to be a continuum of the performance of the natural background conditions for the day.

**Table 4.2** *Exceedances of Action Level on 10 December 2012*

<b>Date</b>	10 December 2012 (Measured) 11 December 2012 ( <i>In situ</i> results received by ERM) 13 December 2012 (Laboratory results received by ERM)	
<b>Monitoring Station</b>	E8, S1, E7, F1, E9, S2 and S3	
<b>Parameter(s) with Exceedance(s)</b>	Depth-averaged SS (mg/L)	
<b>Action Levels</b>	6.27 mg/L, or 20% exceedance of value at any impact station compared with corresponding data from control station	
<b>Limit Levels</b>	6.40 mg/L, and 30% exceedance of value at any impact station compared with corresponding data from control station	
<b>Measured Levels at Impact Stations Where Exceedances Were Recorded</b>	1st Round	SS: E8=6.95 mg/L; S1=7.25 mg/L; E7=7.00 mg/L, F1=7.98 mg/L; E9=7.30 mg/L; S2= 6.70 mg/L; and S3=7.33 mg/L
	2nd Round	SS: E8=7.07 mg/L; S1=7.15 mg/L; E7=7.05 mg/L, F1=7.77 mg/L; E9=7.30 mg/L; S2= 6.90 mg/L; and S3=7.30 mg/L
	3rd Round	SS: E8=7.00 mg/L; S1=7.20 mg/L; E7=6.98 mg/L, F1=7.57 mg/L; E9=7.52 mg/L; S2= 6.67 mg/L; and S3=7.12 mg/L

	4 <sup>th</sup> Round	SS: E8=6.87 mg/L; S1=7.17 mg/L; E7=7.15 mg/L, F1=7.63 mg/L; E9=7.15 mg/L; S2= 6.78 mg/L; and S3=7.43 mg/L
<b>Exceedances</b>	1 <sup>st</sup> Round	Exceedance of Action Level in SS: E8, S1, E7, F1, E9, S2 and S3.
	2 <sup>nd</sup> Round	Exceedance of Action Level in SS: E8, S1, E7, F1, E9, S2 and S3.
	3 <sup>rd</sup> Round	Exceedance of Action Level in SS: E8, S1, E7, F1, E9, S2 and S3.
	4 <sup>th</sup> Round	Exceedance of Action Level in SS: E8, S1, E7, F1, E9, S2 and S3.

#### 4.2.2 *Exceedances on 15 December 2012*

Exceedances of Action and Limit Levels in depth-averaged Turbidity and depth-averaged SS were recorded at Stations E9 in all four sampling rounds on 15 December 2012 (Table 4.3).

According to the daily barge operation report, there were some maintenance works carried out by the Contractor before burial operation. The burial operation (ie jetting works) was conducted between 13:00 and 17:00 on 15 December 2012 and this period overlapped with the marine water quality monitoring.

Hand jetting works for the Project did not start when the exceedances in depth-averaged Turbidity and depth-averaged SS were recorded at E9 in the 1<sup>st</sup> round (07:00 – 11:02) of marine water quality monitoring. Therefore, the exceedances of the Action and Limit Levels at in the 1<sup>st</sup> sampling round are considered as representing natural background fluctuations rather than a result of the cable installation (hand jetting) works.

For the exceedances in depth-averaged Turbidity and depth-averaged SS in the 2<sup>nd</sup> and 3<sup>rd</sup> sampling rounds, Impact Station E9 is located in the north, far away from the cable installation barge. Between this station and the cable installation barge, there were several gradient stations (ie G3 and G4) and impact stations (ie E6, B1 and E2), which are located in the middle and therefore more susceptible to the impact of the project. But exceedances of Action or Limit Levels in all water quality parameters were recorded at none of these stations. The fact demonstrates the exceedances in depth-averaged Turbidity and depth-averaged SS at E9 in these two sampling rounds, as well as later in the 4<sup>th</sup> (19:02 – 22:53) round of marine water quality monitoring when hand jetting works ceased for the day, were unlikely to be caused by the jetting works but should be considered as representing natural background levels during the time of monitoring.

**Table 4.3 Exceedances of Action and Limit Levels on 15 December 2012**

<b>Date</b>	15 December 2012 (Measured) 17 December 2012 (In situ results received by ERM) 19 December 2012 (Laboratory results received by ERM) 20 December 2012 (Records of Contractor's activities on monitoring day received by ERM)	
<b>Monitoring Station</b>	B1, B2, B3, E1, E2, E6, E9, and F1	
<b>Parameter(s) with Exceedance(s)</b>	Depth-averaged Turbidity (NTU)	Depth-averaged SS (mg/L)
<b>Action Levels</b>	3.01 NTU or 20% exceedance of data at control station	4.09 (mg/L) or 20% exceedance of data at control station
<b>Limit Levels</b>	3.13 NTU and 30% exceedance of data at control station	4.60 (mg/L) and 30% exceedance of data at control station
<b>Measured Levels at Impact Stations Where Exceedances Were Recorded</b>	1 <sup>st</sup> Round	Turbidity: E9=3.44 NTU. SS: E9=4.00 mg/L.
	2 <sup>nd</sup> Round	Turbidity: E9=2.88 NTU. SS: E9=3.35 mg/L.
	3 <sup>rd</sup> Round	Turbidity: E9=3.47 NTU. SS: E9=3.92 mg/L.
	4 <sup>th</sup> Round	Turbidity: E9=3.42 NTU. SS: E9=3.90 mg/L.
<b>Exceedances</b>	1 <sup>st</sup> Round	Exceedance of Action and Limit Levels in Turbidity: E9; Exceedance of Action Level in SS: E9.
	2 <sup>nd</sup> Round	Exceedance of Action Level in Turbidity: E9; Exceedance of Action Level in SS: E9.
	3 <sup>rd</sup> Round	Exceedance of Action and Limit Levels in Turbidity: E9; Exceedance of Action Level in SS: E9.
	4 <sup>th</sup> Round	Exceedance of Action and Limit Levels in Turbidity: E9; Exceedance of Action Level in SS: E9.

## 5 ENVIRONMENTAL NON-CONFORMANCES

### 5.1 SUMMARY OF ENVIRONMENTAL EXCEEDANCE

Exceedances of the Action and Limit Levels were recorded during the reporting period. The Event and Action Plan for the identified exceedances were implemented and followed the procedures as stipulated in the *EM&A Manual* and *Table 3.7*. It was concluded that the exceedances were considered to reflect natural background fluctuation rather than the impact caused by the Project (See *Section 4.2* for details).

### 5.2 SUMMARY OF ENVIRONMENTAL NON-COMPLIANCE

No non-compliance events were recorded during the reporting period.

### 5.3 SUMMARY OF ENVIRONMENTAL COMPLAINT

No complaints were received during the reporting period.

### 5.4 SUMMARY OF ENVIRONMENTAL SUMMONS AND PROSECUTION

No summons or prosecution on environmental matters were received during the reporting period.

## 6 *FUTURE KEY ISSUES*

### 6.1 *KEY ISSUES FOR THE COMING REPORTING PERIOD*

In the week of 24 December 2012, there are protection works to be conducted at the crossing point of Drainage Services Department (DSD) sewage pipe and the submarine cable in Zone A.

### 6.2 *MONITORING SCHEDULE FOR THE COMING REPORTING PERIOD*

Impact water quality monitoring will be carried out in parallel with the diver jetting for the projection works at the crossing point of DSD sewage pipe and the submarine cable in Zone A in the week of 24 December 2012.

This Weekly Impact Monitoring Report presents the results of impact water quality monitoring undertaken in Zone A and Zone B during the period from **10 December 2012** to **16 December 2012** in accordance with the *EM&A Manual* and the requirements under Environmental Permit (EP - 433/2011).

Water quality in Zone A and Zone B was generally stable throughout the sampling period. Neither sudden drop in dissolved oxygen concentrations nor sharp increase in turbidity levels and suspended solid levels were observed. Exceedances of Action and Limit Levels were recorded during the reporting week, but they are considered to reflect natural background fluctuation rather than impact caused by the Project.

It is concluded that no deterioration of water quality was observed and hence the impact of the Project on water quality is considered to be negligible.

Annex A

## Impact Water Quality Monitoring Schedule



**ASE Submarine Cable System - Tseung Kwan O  
Impact Water Quality Monitoring Schedule - Third Week**

as of 10 December 2012

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1-Dec
2-Dec	3-Dec	4-Dec	5-Dec	6-Dec	7-Dec	8-Dec
9-Dec	10-Dec	11-Dec	12-Dec	13-Dec	14-Dec	15-Dec
	07:00 -23:00 <b>(Zone A, 11 stations )</b> <i>Impact Monitoring</i>					07:00 -23:00 <b>(Zone B, 12 stations )</b> <i>Impact Monitoring</i>
16-Dec	17-Dec	18-Dec	19-Dec	20-Dec	21-Dec	22-Dec
23-Dec	24-Dec	25-Dec	26-Dec	27-Dec	28-Dec	29-Dec

Annex B

## QA/QC Results for Suspended Solids Testing

**Annex B1 QA/QC Results of Laboratory Analysis of Total Suspended Solids (Zone A)**

Sampling Date	QC Sample	Sample Duplicate		Sample Spike	
	% Recovery *	Sample ID	% Error #	Sample ID	% Recovery @
12/10/2012	92.1	C1-S1(0700)	2.99	G1-S2 (0700)	100.0
	104.3	G1-M1(0700)	2.90	G3-M2 (0700)	102.1
	96.8	G3-B1 (0700)	0.00	G2-B2(0700)	98.0
	96.9	S3-S1 (0700)	2.67	S3-B2 (0700)	98.0
	103.5	C1-S1(1100)	2.90	G1-S2 (1100)	97.9
	102.5	G1-M1(1100)	2.82	G3-M2 (1100)	92.5
	95.2	G3-B1 (1100)	0.00	G2-B2 (1100)	100.0
	92.8	S3-S1 (1100)	5.56	S3-B2 (1100)	108.3
	99.8	C1-S1(1500)	3.08	G1-S2 (1500)	100.0
	98.2	G1-M1(1500)	2.90	G3-M2 (1500)	94.0
	104.8	G3-B1 (1500)	2.82	G2-B2 (1500)	102.1
	98.7	S3-S1 (1500)	0.00	S3-B2 (1500)	102.1
	95.2	C1-S1(1900)	2.90	G1-S2 (1900)	98.0
	95.7	G1-M1(1900)	2.74	G3-M2 (1900)	92.2
	105.9	G3-B1 (1900)	2.82	G2-B2 (1900)	105.9
	104.2	S3-S1 (1900)	2.74	S3-B2 (1900)	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 MDL.

**Annex B2 QA/QC Results of Laboratory Analysis of Total Suspended Solids (Zone B)**

Sampling Date	QC Sample	Sample Duplicate		Sample Spike	
	% Recovery *	Sample ID	% Error #	Sample ID	% Recovery ®
12/15/2012	96.5	E1-S1 (0700)	0.00	B2-S2 (0700)	102.1
	101.4	B2-M1 (0700)	7.41	G4-M2 (0700)	100.0
	101.2	G4-B1 (0700)	6.90	G3-B2 (0700)	102.1
	97.0	G3-S1 (0700)	0.00	E9-B2 (0700)	100.0
	103.3	E1-S1 (1100)	0.00	B2-S2 (1100)	100.0
	96.8	B2-M1 (1100)	6.45	G4-M2 (1100)	92.0
	96.0	G4-B1 (1100)	0.00	G3-B2 (1100)	104.2
	100.2	G3-S1 (1100)	6.90	E9-B2 (1100)	91.8
	100.8	E1-S1 (1500)	8.00	B2-S2 (1500)	96.2
	104.7	B2-M1 (1500)	6.90	G4-M2 (1500)	105.9
	104.2	G4-B1 (1500)	0.00	G3-B2 (1500)	103.8
	105.0	G3-S1 (1500)	6.06	E9-B2 (1500)	94.0
	97.1	E1-S1 (1900)	0.00	B2-S2 (1900)	105.8
	100.4	B2-M1 (1900)	7.41	G4-M2 (1900)	91.8
	97.5	G4-B1 (1900)	6.45	G3-B2 (1900)	98.0
103.8	G3-S1 (1900)	0.00	E9-B2 (1900)	102.0	

- 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 MDL.

Annex C

## Impact Water Quality Monitoring Results

**Annex C1 Impact Water Quality Monitoring Results during First Round Monitoring on 10 December 2012**

Date: 10-Dec-12  
 Weather: Cloudy  
 Sea Conditions: Great Wave  
 Zone: A

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.**
C1	0700-0718	34.8	E	1.4	Surface	20.6	20.6	20.6	27.4	27.4	27.4	6.5	6.4	6.5	84.7	84.2	84.5	3.8	3.7	3.7		6.6	6.7	6.7	
					Middle	20.7	20.7	20.7	27.6	27.5	27.6	6.3	6.3	6.3	82.7	82.4	82.6	3.5	3.5	3.5	3.7	7.1	7.2	7.2	7.1
					Bottom	20.8	20.8	20.8	27.8	27.9	27.9	6.2	6.3	6.2	81.2	81.7	81.5	3.8	3.9	3.8		7.4	7.5	7.5	
E8	0724-0740	20.2	E	1.3	Surface	20.7	20.6	20.7	27.4	27.3	27.4	6.3	6.3	6.3	82.6	82.1	82.4	3.6	3.7	3.6		6.2	6.4	6.3	
					Middle	20.7	20.7	20.7	27.5	27.5	27.5	6.2	6.2	6.2	80.7	81.0	80.9	3.5	3.5	3.5	3.7	7.5	7.4	7.5	7.0
					Bottom	20.8	20.7	20.8	27.7	27.8	27.8	6.1	6.1	6.1	79.9	79.4	79.7	3.8	3.8	3.8		7.0	7.2	7.1	
S1	0748-0802	9.0	E	1.3	Surface	20.6	20.7	20.7	27.4	27.4	27.4	6.2	6.2	6.2	81.4	80.9	81.2	3.5	3.6	3.6		7.2	7.3	7.3	
					Middle	20.6	20.7	20.7	27.4	27.5	27.5	6.1	6.1	6.1	80.0	79.5	79.8	3.8	3.8	3.8	3.8	7.1	7.3	7.2	7.3
					Bottom	20.8	20.7	20.8	27.5	27.6	27.6	6.0	6.1	6.0	78.9	79.2	79.1	3.9	3.9	3.9		7.4	7.2	7.3	
G1	0806-0820	11.4	E	1.2	Surface	20.6	20.7	20.7	27.4	27.5	27.5	6.3	6.2	6.3	82.0	81.6	81.8	3.7	3.7	3.7		7.0	7.2	7.1	
					Middle	20.7	20.6	20.7	27.5	27.5	27.5	6.2	6.1	6.1	80.5	80.1	80.3	3.6	3.6	3.6	3.7	7.0	6.8	6.9	7.0
					Bottom	20.7	20.8	20.8	27.6	27.7	27.7	6.1	6.1	6.1	79.1	79.7	79.4	3.9	3.8	3.8		6.9	7.1	7.0	
E7	0824-0840	12.8	E	1.2	Surface	20.6	20.6	20.6	27.4	27.5	27.5	6.3	6.3	6.3	82.3	82.0	82.2	3.6	3.6	3.6		6.8	6.8	6.8	
					Middle	20.6	20.7	20.7	27.5	27.6	27.6	6.1	6.1	6.1	80.3	79.8	80.1	3.5	3.5	3.5	3.6	6.7	6.9	6.8	7.0
					Bottom	20.8	20.8	20.8	27.7	27.6	27.7	6.0	6.1	6.1	79.0	79.4	79.2	3.7	3.7	3.7		7.3	7.5	7.4	
F1	0848-0903	11.2	E	1.0	Surface	20.6	20.7	20.7	27.5	27.5	27.5	6.4	6.5	6.4	83.8	84.3	84.1	3.2	3.2	3.2		7.2	7.4	7.3	
					Middle	20.6	20.7	20.7	27.6	27.6	27.6	6.4	6.3	6.3	83.1	82.8	83.0	3.0	3.1	3.0	3.2	7.7	7.6	7.7	8.0
					Bottom	20.7	20.8	20.8	27.7	27.7	27.7	6.2	6.2	6.2	81.3	80.8	81.1	3.3	3.4	3.3		9.1	8.9	9.0	
G3	0909-0925	14.6	E	1.1	Surface	20.6	20.7	20.7	27.5	27.5	27.5	6.5	6.4	6.4	84.5	84.1	84.3	3.2	3.2	3.2		6.6	6.5	6.6	
					Middle	20.7	20.7	20.7	27.6	27.7	27.7	6.3	6.3	6.3	82.5	82.0	82.3	3.3	3.3	3.3	3.3	6.7	6.8	6.8	6.7
					Bottom	20.8	20.7	20.8	27.8	27.8	27.8	6.1	6.1	6.1	80.2	79.8	80.0	3.4	3.4	3.4		6.8	7.0	6.9	
E9	0932-0949	18.6	E	1.2	Surface	20.7	20.6	20.7	27.5	27.4	27.5	6.4	6.3	6.3	83.3	82.5	82.9	3.5	3.6	3.6		7.0	6.9	7.0	
					Middle	20.7	20.8	20.8	27.6	27.7	27.7	6.2	6.2	6.2	81.6	80.9	81.3	3.7	3.8	3.7	3.7	7.1	7.3	7.2	7.3
					Bottom	20.9	20.8	20.9	27.8	27.9	27.9	6.1	6.1	6.1	79.9	79.3	79.6	3.9	3.9	3.9		7.9	7.6	7.8	
S2	0954-1008	10.4	E	1.1	Surface	20.7	20.6	20.7	27.5	27.5	27.5	6.2	6.2	6.2	81.2	80.5	80.9	3.9	3.9	3.9		6.1	6.3	6.2	
					Middle	20.6	20.7	20.7	27.5	27.6	27.6	6.1	6.1	6.1	80.0	79.6	79.8	4.0	4.0	4.0	4.0	7.1	7.4	7.3	6.7
					Bottom	20.7	20.8	20.8	27.7	27.7	27.7	6.0	6.0	6.0	79.0	78.6	78.8	4.1	4.1	4.1		6.8	6.5	6.7	
G2	1012-1030	12.6	E	1.1	Surface	20.7	20.7	20.7	27.4	27.5	27.5	6.2	6.2	6.2	81.0	80.4	80.7	3.9	4.0	4.0		7.6	7.8	7.7	
					Middle	20.7	20.7	20.7	27.6	27.6	27.6	6.1	6.1	6.1	79.4	80.2	79.8	4.1	4.0	4.0	4.0	6.9	6.8	6.9	7.3
					Bottom	20.7	20.8	20.8	27.7	27.8	27.8	6.0	6.0	6.0	78.7	78.3	78.5	4.1	4.2	4.1		7.5	7.4	7.5	
S3	1034-1050	10.0	E	1.1	Surface	20.7	20.7	20.7	27.4	27.5	27.5	6.1	6.2	6.1	79.9	80.6	80.3	3.9	4.0	3.9		7.4	7.5	7.5	
					Middle	20.7	20.7	20.7	27.5	27.5	27.5	6.0	6.0	6.0	78.8	78.2	78.5	4.1	4.1	4.1	4.1	7.8	7.6	7.7	7.3
					Bottom	20.8	20.7	20.8	27.7	27.6	27.7	5.9	6.0	5.9	77.3	77.8	77.6	4.2	4.2	4.2		6.9	6.8	6.9	

Remark or Observation:

Note: \* Average \*\* Depth Average

**Annex C2 Impact Water Quality Monitoring Results during Second Round Monitoring on 10 December 2012**

Date: 10-Dec-12  
 Weather: Cloudy  
 Sea Conditions: Great Wave  
 Zone: A

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.**
C1	1110-1125	35.0	E	1.5	Surface	20.6	20.7	20.7	27.4	27.4	27.4	6.4	6.4	6.4	83.7	84.1	83.9	3.6	3.6	3.6		6.8	6.8	6.8	
					Middle	20.7	20.8	20.8	27.5	27.5	27.5	6.3	6.3	6.3	82.7	82.1	82.4	3.5	3.4	3.4	3.6	6.9	6.5	6.7	7.0
					Bottom	20.8	20.8	20.8	27.8	27.8	27.8	6.2	6.2	6.2	81.1	80.6	80.9	3.8	3.8	3.8		7.3	7.5	7.4	
E8	1132-1149	20.4	E	1.4	Surface	20.6	20.6	20.6	27.4	27.3	27.4	6.3	6.3	6.3	82.5	82.0	82.3	3.6	3.6	3.6		6.6	6.4	6.5	
					Middle	20.7	20.7	20.7	27.5	27.5	27.5	6.2	6.2	6.2	81.1	80.7	80.9	3.5	3.5	3.5	3.6	7.2	7.2	7.2	7.1
					Bottom	20.8	20.9	20.9	27.7	27.8	27.8	6.1	6.1	6.1	79.8	79.3	79.6	3.8	3.8	3.8		7.6	7.4	7.5	
S1	1157-1214	9.5	E	1.3	Surface	20.7	20.6	20.7	27.4	27.4	27.4	6.2	6.2	6.2	81.1	80.6	80.9	3.6	3.7	3.6		6.9	7.0	7.0	
					Middle	20.7	20.7	20.7	27.4	27.5	27.5	6.1	6.1	6.1	79.5	79.1	79.3	3.7	3.8	3.7	3.8	7.3	7.2	7.3	7.2
					Bottom	20.8	20.9	20.9	27.6	27.6	27.6	6.0	5.9	6.0	78.1	77.7	77.9	3.9	3.9	3.9		7.1	7.4	7.3	
G1	1221-1238	11.6	E	1.1	Surface	20.6	20.7	20.7	27.4	27.3	27.4	6.3	6.3	6.3	81.8	82.4	82.1	3.7	3.7	3.7		6.9	6.8	6.9	
					Middle	20.7	20.7	20.7	27.5	27.5	27.5	6.1	6.1	6.1	80.0	79.7	79.9	3.8	3.8	3.8	3.8	7.0	7.2	7.1	7.1
					Bottom	20.8	20.8	20.8	27.6	27.7	27.7	6.0	6.0	6.0	78.2	77.8	78.0	3.9	3.9	3.9		7.2	7.4	7.3	
E7	1244-1301	13.0	E	1.2	Surface	20.6	20.6	20.6	27.4	27.5	27.5	6.3	6.3	6.3	82.1	82.5	82.3	3.6	3.6	3.6		7.0	6.8	6.9	
					Middle	20.7	20.7	20.7	27.5	27.6	27.6	6.2	6.2	6.2	81.0	80.4	80.7	3.5	3.4	3.4	3.6	6.6	6.6	6.6	7.1
					Bottom	20.8	20.8	20.8	27.6	27.6	27.6	6.1	6.0	6.0	79.1	78.6	78.9	3.7	3.7	3.7		7.7	7.6	7.7	
F1	1309-1326	11.2	E	1.2	Surface	20.7	20.6	20.7	27.5	27.5	27.5	6.4	6.4	6.4	83.3	83.1	83.2	3.3	3.4	3.3		7.0	7.2	7.1	
					Middle	20.7	20.7	20.7	27.6	27.6	27.6	6.3	6.2	6.2	81.9	81.4	81.7	3.4	3.4	3.4	3.4	7.4	7.6	7.5	7.8
					Bottom	20.8	20.8	20.8	27.7	27.7	27.7	6.1	6.1	6.1	80.0	79.5	79.8	3.4	3.4	3.4		8.8	8.6	8.7	
G3	1332-1349	14.8	E	1.3	Surface	20.6	20.6	20.6	27.5	27.6	27.6	6.3	6.3	6.3	82.9	82.5	82.7	3.2	3.2	3.2		6.9	6.7	6.8	
					Middle	20.7	20.6	20.7	27.6	27.6	27.6	6.2	6.1	6.1	80.4	79.8	80.1	3.3	3.3	3.3	3.3	7.0	7.0	7.0	6.8
					Bottom	20.7	20.8	20.8	27.8	27.8	27.8	6.0	6.0	6.0	78.3	77.8	78.1	3.4	3.4	3.4		6.8	6.5	6.7	
E9	1353-1409	19.0	E	1.2	Surface	20.7	20.7	20.7	27.5	27.4	27.5	6.3	6.3	6.3	82.5	82.1	82.3	3.5	3.6	3.5		6.9	6.8	6.9	
					Middle	20.8	20.8	20.8	27.6	27.6	27.6	6.2	6.2	6.2	81.4	81.0	81.2	3.7	3.7	3.7	3.7	7.3	7.3	7.3	7.3
					Bottom	20.9	21.0	21.0	27.8	27.9	27.9	6.1	6.1	6.1	79.8	79.4	79.6	3.8	3.9	3.8		7.8	7.7	7.8	
S2	1414-1430	10.8	E	1.0	Surface	20.7	20.6	20.7	27.5	27.5	27.5	6.2	6.2	6.2	81.5	81.1	81.3	3.8	3.9	3.8		6.3	6.5	6.4	
					Middle	20.7	20.7	20.7	27.6	27.6	27.6	6.1	6.1	6.1	80.0	79.5	79.8	4.0	4.0	4.0	4.0	7.3	7.6	7.5	6.9
					Bottom	20.8	20.8	20.8	27.7	27.8	27.8	6.0	6.0	6.0	78.3	77.8	78.1	4.1	4.1	4.1		6.9	6.8	6.9	
G2	1435-1450	12.8	E	1.1	Surface	20.7	20.7	20.7	27.4	27.5	27.5	6.1	6.2	6.2	80.3	80.8	80.6	3.9	3.9	3.9		7.4	7.6	7.5	
					Middle	20.8	20.8	20.8	27.6	27.6	27.6	6.1	6.0	6.0	79.1	78.6	78.9	4.0	4.0	4.0	4.0	7.1	7.2	7.2	7.3
					Bottom	20.9	20.9	20.9	27.7	27.8	27.8	5.9	5.9	5.9	77.7	77.4	77.6	4.1	4.1	4.1		7.4	7.2	7.3	
S3	1456-1506	10.2	E	1.2	Surface	20.7	20.8	20.8	27.4	27.5	27.5	6.2	6.1	6.1	80.6	80.0	80.3	3.9	4.0	3.9		7.4	7.3	7.4	
					Middle	20.8	20.8	20.8	27.6	27.6	27.6	6.0	6.0	6.0	78.9	78.3	78.6	4.0	4.1	4.1	4.0	7.4	7.4	7.4	7.3
					Bottom	20.9	20.9	20.9	27.7	27.7	27.7	5.9	5.9	5.9	77.6	77.0	77.3	4.1	4.2	4.2		7.1	7.2	7.2	

Remark or Observation:

Note: \* Average \*\* Depth Average

**Annex C3 Impact Water Quality Monitoring Results during Third Round Monitoring on 10 December 2012**

Date: 10-Dec-12  
 Weather: Cloudy  
 Sea Conditions: Great Wave  
 Zone: A

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.**
C1	1505-1522	36.8	W	0.5	Surface	27.6	27.5	27.6	26.3	26.4	26.4	5.1	5.1	5.1	75.0	74.7	74.9	4.0	4.0	4.0		6.6	6.6	6.6	
					Middle	27.5	27.4	27.5	26.5	26.6	26.6	4.9	5.0	4.9	72.5	72.9	72.7	3.5	3.5	3.5	3.7	6.8	6.6	6.7	6.8
					Bottom	27.4	27.3	27.4	26.7	26.8	26.8	4.9	4.9	4.9	72.4	72.5	72.5	3.7	3.7	3.7		7.0	7.2	7.1	
E8	1526-1543	20.4	W	0.3	Surface	27.5	27.6	27.6	26.4	26.5	26.5	5.2	5.2	5.2	76.4	76.8	76.6	3.8	3.8	3.8		6.0	6.3	6.2	
					Middle	27.5	27.5	27.5	26.6	26.7	26.7	5.1	5.1	5.1	74.7	75.1	74.9	3.9	3.9	3.9	4.0	7.3	7.4	7.4	7.0
					Bottom	27.5	27.4	27.5	26.9	27.0	27.0	4.7	4.8	4.8	69.9	70.2	70.1	4.3	4.3	4.3		7.4	7.6	7.5	
S1	1552-1609	9.6	W	0.4	Surface	27.5	27.6	27.6	26.3	26.4	26.4	5.4	5.3	5.4	78.5	78.2	78.4	3.7	3.7	3.7		7.2	7.0	7.1	
					Middle	27.5	27.4	27.5	26.5	26.6	26.6	5.0	5.1	5.0	73.9	74.2	74.1	3.5	3.5	3.5	3.6	7.3	7.2	7.3	7.2
					Bottom	27.3	27.3	27.3	27.1	27.2	27.2	4.5	4.6	4.6	66.8	67.7	67.3	3.6	3.6	3.6		7.1	7.4	7.3	
G1	1613-1629	12.0	W	0.3	Surface	27.5	27.5	27.5	26.3	26.4	26.4	5.4	5.4	5.4	78.7	79.0	78.9	3.4	3.3	3.3		6.8	7.0	6.9	
					Middle	27.4	27.3	27.4	26.6	26.7	26.7	4.9	4.9	4.9	72.2	71.4	71.8	3.6	3.6	3.6	3.6	6.8	6.6	6.7	6.8
					Bottom	27.3	27.2	27.3	26.8	26.9	26.9	4.5	4.6	4.5	66.6	67.1	66.9	3.9	3.9	3.9		7.0	6.8	6.9	
E7	1634-1650	12.6	W	0.2	Surface	27.6	27.5	27.6	26.3	26.4	26.4	5.3	5.3	5.3	77.9	77.8	77.9	3.5	3.5	3.5		6.8	6.6	6.7	
					Middle	27.4	27.4	27.4	26.7	26.6	26.7	5.1	5.1	5.1	75.3	75.0	75.2	3.8	3.8	3.8	3.8	7.1	7.0	7.1	7.0
					Bottom	27.3	27.2	27.3	26.9	27.0	27.0	4.7	4.8	4.8	69.7	70.5	70.1	4.2	4.2	4.2		7.0	7.4	7.2	
F1	1658-1715	11.8	W	0.3	Surface	27.6	27.6	27.6	26.4	26.3	26.4	5.1	5.1	5.1	74.4	74.9	74.7	3.5	3.6	3.5		6.9	6.8	6.9	
					Middle	27.5	27.4	27.5	26.6	26.5	26.6	5.0	4.9	5.0	73.4	72.6	73.0	3.4	3.4	3.4	3.6	7.4	7.2	7.3	7.6
					Bottom	27.3	27.3	27.3	27.0	27.1	27.1	4.5	4.4	4.4	65.7	65.3	65.5	3.9	3.9	3.9		8.5	8.6	8.6	
G3	1719-1737	15.4	W	0.4	Surface	27.6	27.5	27.6	26.5	26.5	26.5	5.3	5.3	5.3	77.2	77.8	77.5	3.9	3.9	3.9		6.8	6.9	6.9	
					Middle	27.5	27.4	27.5	26.7	26.8	26.8	4.9	5.0	5.0	72.3	73.4	72.9	3.6	3.5	3.5	3.8	7.0	7.2	7.1	7.0
					Bottom	27.4	27.3	27.4	26.9	27.0	27.0	4.5	4.5	4.5	66.8	66.3	66.6	3.9	3.9	3.9		7.0	7.0	7.0	
E9	1741-1758	19.2	W	0.3	Surface	27.6	27.6	27.6	26.7	26.8	26.8	5.3	5.3	5.3	77.1	77.5	77.3	4.0	4.0	4.0		7.3	7.2	7.3	
					Middle	27.5	27.4	27.5	26.9	27.0	27.0	5.0	5.0	5.0	73.2	73.8	73.5	3.9	3.8	3.8	4.0	7.4	7.3	7.4	7.5
					Bottom	27.3	27.2	27.3	27.4	27.4	27.4	4.5	4.4	4.4	65.6	65.2	65.4	4.1	4.2	4.1		8.1	7.8	8.0	
S2	1805-1821	10.8	W	0.4	Surface	27.6	27.5	27.6	26.7	26.8	26.8	5.2	5.2	5.2	75.7	75.6	75.7	3.7	3.7	3.7		6.4	6.5	6.5	
					Middle	27.5	27.5	27.5	26.8	26.9	26.9	5.0	4.9	4.9	72.8	72.2	72.5	4.1	4.0	4.0	3.9	7.0	6.9	7.0	6.7
					Bottom	27.3	27.3	27.3	26.9	26.9	26.9	4.7	4.7	4.7	69.4	69.6	69.5	4.1	4.1	4.1		6.7	6.5	6.6	
G2	1829-1845	14.2	W	0.2	Surface	27.6	27.6	27.6	26.6	26.5	26.6	5.0	5.0	5.0	73.1	72.7	72.9	3.7	3.7	3.7		7.5	7.3	7.4	
					Middle	27.5	27.4	27.5	26.7	26.8	26.8	4.9	4.9	4.9	71.3	71.6	71.5	4.0	4.0	4.0	4.0	7.1	7.0	7.1	7.3
					Bottom	27.3	27.2	27.3	27.0	27.1	27.1	4.8	4.8	4.8	70.0	70.8	70.4	4.3	4.2	4.3		7.3	7.4	7.4	
S3	1849-1903	11.4	W	0.3	Surface	27.6	27.5	27.6	26.4	26.5	26.5	4.8	4.9	4.8	70.6	71.1	70.9	4.0	4.0	4.0		7.2	7.0	7.1	
					Middle	27.4	27.4	27.4	26.7	26.8	26.8	4.6	4.5	4.6	67.5	66.7	67.1	4.2	4.2	4.2	4.2	7.3	7.3	7.3	7.1
					Bottom	27.2	27.3	27.3	26.9	27.0	27.0	4.4	4.4	4.4	64.7	64.1	64.4	4.3	4.4	4.3		6.9	7.0	7.0	

Remark or Observation:

Note: \* Average \*\* Depth Average



**Annex C4 Impact Water Quality Monitoring Results during Forth Round Monitoring on 10 December 2012**

Date: 10-Dec-12  
 Weather: Cloudy  
 Sea Conditions: Great Wave  
 Zone: A

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.**
C1	1910-1927	34.8	W	1.2	Surface	20.6	20.6	20.6	27.4	27.4	27.4	6.3	6.3	6.3	82.4	82.0	82.2	3.3	3.3	3.3		7.0	6.9	7.0	
					Middle	20.7	20.6	20.7	27.5	27.6	27.6	6.2	6.3	6.2	80.7	81.6	81.2	3.4	3.5	3.4	3.4	6.8	6.9	6.9	7.1
					Bottom	20.8	20.7	20.8	27.8	27.7	27.8	6.1	6.1	6.1	79.2	78.7	79.0	3.6	3.6	3.6		7.3	7.5	7.4	
E8	1934-1949	20.8	W	1.3	Surface	20.5	20.6	20.6	27.3	27.4	27.4	6.3	6.4	6.3	81.9	82.9	82.4	3.5	3.5	3.5		6.4	6.4	6.4	
					Middle	20.7	20.7	20.7	27.4	27.5	27.5	6.2	6.2	6.2	81.1	80.3	80.7	3.6	3.7	3.7	3.6	6.8	7.0	6.9	6.9
					Bottom	20.7	20.8	20.8	27.7	27.8	27.8	6.1	6.2	6.1	79.7	79.9	79.8	3.7	3.7	3.7		7.4	7.2	7.3	6.9
S1	1959-2016	9.8	W	1.3	Surface	20.6	20.5	20.6	27.4	27.5	27.5	6.3	6.2	6.3	81.6	81.1	81.4	3.4	3.4	3.4		6.9	7.1	7.0	
					Middle	20.6	20.7	20.7	27.5	27.6	27.6	6.1	6.2	6.1	79.6	79.9	79.8	3.5	3.5	3.5	3.5	7.4	7.2	7.3	7.2
					Bottom	20.8	20.8	20.8	27.8	27.8	27.8	6.0	6.0	6.0	78.1	78.4	78.3	3.6	3.6	3.6		7.1	7.3	7.2	
G1	2023-2040	12.2	W	1.1	Surface	20.6	20.5	20.6	27.4	27.5	27.5	6.3	6.4	6.3	82.2	82.7	82.5	3.5	3.5	3.5		7.2	7.4	7.3	
					Middle	20.7	20.6	20.7	27.5	27.5	27.5	6.2	6.2	6.2	80.7	81.1	80.9	3.6	3.7	3.7	3.7	7.4	7.2	7.3	7.2
					Bottom	20.8	20.8	20.8	27.7	27.8	27.8	6.1	6.1	6.1	79.0	78.7	78.9	3.8	3.8	3.8		7.1	7.1	7.1	
E7	2046-2057	13.4	W	1.2	Surface	20.6	20.5	20.6	27.5	27.6	27.6	6.3	6.2	6.3	81.8	81.1	81.5	3.3	3.3	3.3		7.1	7.2	7.2	
					Middle	20.7	20.7	20.7	27.6	27.7	27.7	6.2	6.1	6.2	80.6	79.7	80.2	3.6	3.5	3.5	3.5	7.0	7.2	7.1	7.2
					Bottom	20.8	20.7	20.8	27.8	27.7	27.8	6.1	6.1	6.1	79.8	79.4	79.6	3.6	3.5	3.6		7.1	7.3	7.2	
F1	2104-2121	12.0	W	1.3	Surface	20.7	20.6	20.7	27.5	27.6	27.6	6.4	6.4	6.4	83.1	82.7	82.9	3.2	3.2	3.2		6.9	7.1	7.0	
					Middle	20.7	20.7	20.7	27.7	27.7	27.7	6.2	6.2	6.2	80.5	79.9	80.2	3.5	3.5	3.5	3.4	7.5	7.4	7.5	7.6
					Bottom	20.7	20.8	20.8	27.9	27.8	27.9	6.0	6.1	6.0	78.5	78.7	78.6	3.5	3.5	3.5		8.5	8.4	8.5	
G3	2128-2145	15.2	W	1.4	Surface	20.7	20.6	20.7	27.4	27.5	27.5	6.4	6.4	6.4	82.7	83.2	83.0	3.3	3.3	3.3		6.8	6.7	6.8	
					Middle	20.7	20.6	20.7	27.6	27.7	27.7	6.3	6.2	6.3	81.5	80.9	81.2	3.5	3.6	3.5	3.5	6.8	6.8	6.8	6.9
					Bottom	20.7	20.8	20.8	27.7	27.8	27.8	6.1	6.2	6.1	79.6	79.9	79.8	3.6	3.6	3.6		7.0	7.1	7.1	
E9	2152-2209	19.2	W	1.2	Surface	20.7	20.6	20.7	27.5	27.4	27.5	6.3	6.2	6.3	81.5	81.1	81.3	3.3	3.4	3.3		6.6	6.8	6.7	
					Middle	20.7	20.7	20.7	27.6	27.7	27.7	6.1	6.1	6.1	79.3	79.0	79.2	3.4	3.4	3.4	3.5	6.9	7.1	7.0	7.2
					Bottom	20.9	20.8	20.9	27.8	27.9	27.9	6.0	6.0	6.0	78.3	78.5	78.4	3.7	3.7	3.7		7.6	7.9	7.8	
S2	2216-2223	11.0	W	1.1	Surface	20.6	20.5	20.6	27.5	27.4	27.5	6.3	6.2	6.3	81.8	81.1	81.5	3.6	3.6	3.6		6.3	6.5	6.4	
					Middle	20.7	20.8	20.8	27.7	27.8	27.8	6.1	6.1	6.1	79.6	79.3	79.5	3.6	3.7	3.6	3.7	7.0	7.2	7.1	6.8
					Bottom	20.8	20.8	20.8	27.9	27.8	27.9	6.0	6.1	6.0	79.3	78.7	79.0	3.8	3.7	3.8		6.9	6.8	6.9	
G2	2229-2246	13.0	W	1.1	Surface	20.6	20.6	20.6	27.6	27.7	27.7	6.3	6.3	6.3	82.3	81.9	82.1	3.5	3.5	3.5		7.4	7.6	7.5	
					Middle	20.7	20.8	20.8	27.8	27.8	27.8	6.2	6.1	6.2	80.3	79.8	80.1	3.7	3.7	3.7	3.7	7.1	7.2	7.2	7.3
					Bottom	20.8	20.7	20.8	27.8	27.8	27.8	6.0	6.1	6.1	78.5	79.0	78.8	3.9	3.9	3.9		7.3	7.4	7.4	
S3	2250-2306	10.8	W	1.2	Surface	20.7	20.6	20.7	27.5	27.4	27.5	6.2	6.2	6.2	80.6	79.9	80.3	3.6	3.6	3.6		7.2	7.6	7.4	
					Middle	20.7	20.7	20.7	27.6	27.7	27.7	6.1	6.1	6.1	79.0	79.2	79.1	3.7	3.8	3.8	3.7	7.9	7.8	7.9	7.4
					Bottom	20.8	20.8	20.8	27.8	27.9	27.9	5.9	6.0	6.0	77.2	77.9	77.6	3.8	3.9	3.9		7.1	7.0	7.1	

Remark or Observation:

Note: \* Average \*\* Depth Average

## Annex C5 Summary of Compliance with Action and Limit Level for Zone A

Compliance with Action Level and Limit Level for Zone A - Round 1 (07:00), 10 December						
Station	Limits	Surface DO (mg/L)	Middle DO (mg/L)	Bottom DO (mg/L)	* DA Turbidity (NTU)	*DA SS (mg/L)
	Action Level (Baseline)	4.36	4.36	4.39	4.38	6.27
	Or Action Level (C1*1.2)	N.A.	N.A.	N.A.	4.32	8.36
	Limit Level (Baseline)	4.25	4.25	4.33	4.43	6.40
	And Limit Level (C1*1.3)	N.A.	N.A.	N.A.	4.68	9.06
E7	Exceedance of Action Level	N	N	N	N	Y
	Exceedance of Limit Level	N	N	N	N	N
E8	Exceedance of Action Level	N	N	N	N	Y
	Exceedance of Limit Level	N	N	N	N	N
E9	Exceedance of Action Level	N	N	N	N	Y
	Exceedance of Limit Level	N	N	N	N	N
F1	Exceedance of Action Level	N	N	N	N	Y
	Exceedance of Limit Level	N	N	N	N	N
S1	Exceedance of Action Level	N	N	N	N	Y
	Exceedance of Limit Level	N	N	N	N	N
S2	Exceedance of Action Level	N	N	N	N	Y
	Exceedance of Limit Level	N	N	N	N	N
S3	Exceedance of Action Level	N	N	N	N	Y
	Exceedance of Limit Level	N	N	N	N	N

\*DA: Depth-averaged

Compliance with Action Level and Limit Level for Zone A - Round 2 (11:00), 10 December						
Station	Limits	DO (Surface)	DO (Middle)	DO (Bottom)	Turbidity (*DA)	SS (*DA)
	Action Level (Baseline)	4.36	4.36	4.39	4.38	6.27
	Or Action Level (C1*1.2)	N.A.	N.A.	N.A.	4.32	8.36
	Limit Level (Baseline)	4.25	4.25	4.33	4.43	6.40
	And Limit Level (C1*1.3)	N.A.	N.A.	N.A.	4.68	9.06
E7	Exceedance of Action Level	N	N	N	N	Y
	Exceedance of Limit Level	N	N	N	N	N
E8	Exceedance of Action Level	N	N	N	N	Y
	Exceedance of Limit Level	N	N	N	N	N
E9	Exceedance of Action Level	N	N	N	N	Y
	Exceedance of Limit Level	N	N	N	N	N
F1	Exceedance of Action Level	N	N	N	N	Y
	Exceedance of Limit Level	N	N	N	N	N
S1	Exceedance of Action Level	N	N	N	N	Y
	Exceedance of Limit Level	N	N	N	N	N
S2	Exceedance of Action Level	N	N	N	N	Y
	Exceedance of Limit Level	N	N	N	N	N
S3	Exceedance of Action Level	N	N	N	N	Y
	Exceedance of Limit Level	N	N	N	N	N

\*DA: Depth-averaged

## Annex C6 Summary of Compliance with Action and Limit Level for Zone A

Compliance with Action Level and Limit Level for Zone A - Round 3 (15:00), 10 December						
Station	Limits	DO (Surface)	DO (Middle)	DO (Bottom)	Turbidity (*DA)	SS (*DA)
	Action Level (Baseline)	4.36	4.36	4.39	4.38	6.27
	Or Action Level (C1*1.2)	N.A.	N.A.	N.A.	4.32	8.36
	Limit Level (Baseline)	4.25	4.25	4.33	4.43	6.40
	And Limit Level (C1*1.3)	N.A.	N.A.	N.A.	4.68	9.06
E7	Exceedance of Action Level	N	N	N	N	Y
	Exceedance of Limit Level	N	N	N	N	N
E8	Exceedance of Action Level	N	N	N	N	Y
	Exceedance of Limit Level	N	N	N	N	N
E9	Exceedance of Action Level	N	N	N	N	Y
	Exceedance of Limit Level	N	N	N	N	N
F1	Exceedance of Action Level	N	N	N	N	Y
	Exceedance of Limit Level	N	N	N	N	N
S1	Exceedance of Action Level	N	N	N	N	Y
	Exceedance of Limit Level	N	N	N	N	N
S2	Exceedance of Action Level	N	N	N	N	Y
	Exceedance of Limit Level	N	N	N	N	N
S3	Exceedance of Action Level	N	N	N	N	Y
	Exceedance of Limit Level	N	N	N	N	N

\*DA: Depth-averaged

Compliance with Action Level and Limit Level for Zone A - Round 4 (19:00), 10 December						
Station	Limits	DO (Surface)	DO (Middle)	DO (Bottom)	Turbidity (*DA)	SS (*DA)
	Action Level (Baseline)	4.36	4.36	4.39	4.38	6.27
	Or Action Level (C1*1.2)	N.A.	N.A.	N.A.	4.32	8.36
	Limit Level (Baseline)	4.25	4.25	4.33	4.43	6.40
	And Limit Level (C1*1.3)	N.A.	N.A.	N.A.	4.68	9.06
E7	Exceedance of Action Level	N	N	N	N	Y
	Exceedance of Limit Level	N	N	N	N	N
E8	Exceedance of Action Level	N	N	N	N	Y
	Exceedance of Limit Level	N	N	N	N	N
E9	Exceedance of Action Level	N	N	N	N	Y
	Exceedance of Limit Level	N	N	N	N	N
F1	Exceedance of Action Level	N	N	N	N	Y
	Exceedance of Limit Level	N	N	N	N	N
S1	Exceedance of Action Level	N	N	N	N	Y
	Exceedance of Limit Level	N	N	N	N	N
S2	Exceedance of Action Level	N	N	N	N	Y
	Exceedance of Limit Level	N	N	N	N	N
S3	Exceedance of Action Level	N	N	N	N	Y
	Exceedance of Limit Level	N	N	N	N	N

\*DA: Depth-averaged

### Annex C7 Impact Water Quality Monitoring Results during First Round Monitoring on 15 December 2012

Date: 15-Dec-12  
 Weather: Fine  
 Sea Conditions: Small Wave  
 Zone: B

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.**				
E1	0700-0715	46.7	E	0.6	Surface	20.7	20.7	20.7	26.4	26.4	26.4	6.3	6.2	6.3	81.2	80.8	81.0	1.5	1.5	1.5	1.9	2.0	2.1	2.1	2.4	
					Middle	20.5	20.5	20.5	26.6	26.7	26.7	6.1	6.1	6.1	78.9	79.3	79.1	1.9	2.0	2.0	1.9	2.3	2.4	2.4	2.4	
					Bottom	20.3	20.2	20.3	26.9	26.9	26.9	5.9	6.0	5.9	76.8	77.2	77.0	2.4	2.4	2.4		2.6	2.8	2.7		
G7	0719-0734	32.5	E	0.7	Surface	20.6	20.7	20.7	26.4	26.4	26.4	6.2	6.3	6.2	80.3	80.9	80.6	2.0	2.1	2.0	2.2	2.5	2.5	2.5	2.6	
					Middle	20.5	20.4	20.5	26.5	26.6	26.6	6.1	6.1	6.1	79.1	78.6	78.9	2.1	2.2	2.1	2.2	2.6	2.6	2.6	2.6	
					Bottom	20.3	20.2	20.3	20.8	20.9	20.9	5.9	5.9	5.9	76.3	75.8	76.1	2.4	2.4	2.4		2.8	2.8	2.8		
B3	0740-0755	13.4	E	0.6	Surface	20.6	20.6	20.6	26.4	26.5	26.5	6.2	6.2	6.2	79.6	80.0	79.8	1.9	1.9	1.9	2.1	2.3	2.4	2.4	2.6	
					Middle	20.4	20.5	20.5	26.6	26.6	26.6	6.0	6.0	6.0	78.2	77.7	78.0	2.0	2.1	2.1	2.1	2.5	2.5	2.5	2.6	
					Bottom	20.3	20.2	20.3	26.8	26.8	26.8	5.9	5.9	5.9	76.8	76.3	76.6	2.3	2.4	2.3		2.9	2.8	2.9		
B2	0803-0818	15.6	E	0.5	Surface	20.6	20.6	20.6	26.4	26.5	26.5	6.1	6.2	6.1	79.4	79.8	79.6	2.1	2.1	2.1	2.3	2.6	2.6	2.6	2.8	
					Middle	20.4	20.5	20.5	26.6	26.6	26.6	6.2	6.3	6.2	80.7	80.9	80.8	2.3	2.4	2.4	2.3	2.8	2.9	2.9	2.8	
					Bottom	20.3	20.2	20.3	26.9	26.8	26.9	6.0	6.0	6.0	78.2	77.7	78.0	2.5	2.5	2.5		2.8	2.9	2.9		
B1	0823-0838	10.9	E	0.6	Surface	20.6	20.5	20.6	26.6	26.5	26.6	6.1	6.0	6.1	78.6	78.2	78.4	1.9	1.9	1.9	2.2	2.4	2.6	2.5	2.7	
					Middle	20.4	20.4	20.4	26.8	26.7	26.8	5.9	5.9	5.9	76.8	76.4	76.6	2.2	2.3	2.3	2.2	2.7	2.8	2.8	2.7	
					Bottom	20.3	20.2	20.3	26.9	26.9	26.9	5.8	5.8	5.8	75.6	75.1	75.4	2.4	2.4	2.4		2.9	3.0	3.0		
E6	0842-0857	27.0	E	0.7	Surface	20.6	20.6	20.6	26.5	26.6	26.6	6.1	6.1	6.1	79.0	79.5	79.3	2.0	2.1	2.0	2.3	2.5	2.6	2.6	2.8	
					Middle	20.4	20.4	20.4	26.8	26.8	26.8	6.0	5.9	6.0	77.3	76.9	77.1	2.4	2.5	2.4	2.3	2.9	3.0	3.0	2.8	
					Bottom	20.2	20.1	20.2	27.0	27.0	27.0	5.9	5.8	5.8	75.8	75.2	75.5	2.4	2.4	2.4		2.8	2.9	2.9		
G4	0902-0917	25.4	E	0.6	Surface	20.6	20.6	20.6	26.4	26.4	26.4	6.1	6.1	6.1	78.5	79.0	78.8	2.3	2.4	2.3	2.5	2.8	2.8	2.8	2.8	
					Middle	20.4	20.5	20.5	26.5	26.6	26.6	6.0	5.9	5.9	77.1	76.5	76.8	2.4	2.5	2.4	2.5	2.7	2.8	2.8	2.8	
					Bottom	20.3	20.2	20.3	26.8	26.9	26.9	5.9	5.8	5.8	75.8	75.4	75.6	2.6	2.6	2.6		3.0	2.8	2.9		
E2	0921-0936	10.1	E	0.6	Surface	20.5	20.5	20.5	26.4	26.5	26.5	6.0	6.0	6.0	78.1	77.4	77.8	2.4	2.4	2.4	2.6	2.9	2.9	2.9	3.0	
					Middle	20.4	20.4	20.4	26.7	26.7	26.7	5.9	5.9	5.9	76.7	76.3	76.5	2.6	2.6	2.6	2.6	2.8	3.0	2.9	3.0	
					Bottom	20.2	20.2	20.2	26.9	26.9	26.9	5.8	5.8	5.8	75.1	74.7	74.9	2.7	2.7	2.7		3.2	3.3	3.3		
C2	0941-0956	30.4	E	0.7	Surface	20.6	20.7	20.7	26.4	26.3	26.4	6.1	6.2	6.1	79.3	79.8	79.6	2.2	2.2	2.2	2.4	2.9	2.8	2.9	3.1	
					Middle	20.5	20.5	20.5	26.6	26.6	26.6	6.0	6.0	6.0	77.8	77.4	77.6	2.4	2.4	2.4	2.4	3.1	3.2	3.2	3.1	
					Bottom	20.4	20.3	20.4	26.8	26.9	26.9	5.9	5.8	5.8	75.8	75.1	75.5	2.5	2.5	2.5		3.1	3.3	3.2		
F1	1003-1018	9.0	E	0.5	Surface	20.5	20.6	20.6	26.4	26.4	26.4	6.1	6.0	6.1	78.6	78.2	78.4	2.4	2.4	2.4	2.6	2.8	2.9	2.9	3.2	
					Middle	20.4	20.4	20.4	26.6	26.5	26.6	6.0	5.9	5.9	77.2	76.8	77.0	2.6	2.6	2.6	2.6	3.2	3.3	3.3	3.2	
					Bottom	20.2	20.2	20.2	26.8	26.8	26.8	5.6	5.5	5.5	71.9	71.4	71.7	2.8	2.8	2.8		3.4	3.6	3.5		
G3	1023-1038	13.2	E	0.6	Surface	20.6	20.7	20.7	26.6	26.5	26.6	6.0	5.9	6.0	77.4	76.9	77.2	2.5	2.6	2.6	3.0	3.0	3.1	3.1	3.3	
					Middle	20.4	20.5	20.5	26.7	26.8	26.8	5.9	5.8	5.9	76.0	75.6	75.8	3.0	3.1	3.1	3.0	3.3	3.2	3.3	3.3	
					Bottom	20.3	20.2	20.3	27.0	27.0	27.0	5.7	5.7	5.7	74.3	73.8	74.1	3.3	3.3	3.3		3.6	3.5	3.6		
E9	1045-1102	19.6	E	0.6	Surface	20.7	20.7	20.7	26.6	26.7	26.7	5.8	5.8	5.8	75.1	75.6	75.4	2.8	2.8	2.8	3.4	3.3	3.5	3.4	4.0	
					Middle	20.5	20.5	20.5	26.9	26.9	26.9	5.9	5.9	5.9	76.5	76.9	76.7	3.5	3.5	3.5	3.4	4.0	4.1	4.1	4.0	
					Bottom	20.3	20.3	20.3	27.1	27.1	27.1	5.8	5.7	5.8	74.6	74.3	74.5	4.0	4.1	4.1		4.5	4.6	4.6		

Remark or Observation:

Note: \* Average \*\* Depth Average

**Annex C8 Impact Water Quality Monitoring Results during Second Round Monitoring on 15 December 2012**

Date: 15-Dec-12  
 Weather: Fine  
 Sea Conditions: Small Wave  
 Zone: B

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.**				
E1	1110-1125	46.4	E	0.8	Surface	20.6	20.6	20.6	26.4	26.4	26.4	6.2	6.1	6.2	79.9	79.1	79.5	1.6	1.6	1.6		2.0	2.1	2.1		
					Middle	20.6	20.5	20.6	26.7	26.8	26.8	6.1	6.2	6.2	79.2	80.1	79.7	2.0	2.0	2.0	1.9	2.3	2.4	2.4	2.4	
					Bottom	20.5	20.4	20.5	27.0	27.1	27.1	6.0	6.0	6.0	77.3	77.0	77.2	2.2	2.2	2.2		2.8	2.9	2.9		
G7	1129-1144	32.2	E	0.7	Surface	20.5	20.6	20.6	26.5	26.4	26.5	6.1	6.2	6.1	79.1	79.5	79.3	1.9	2.0	1.9		2.3	2.4	2.4		
					Middle	20.4	20.5	20.5	26.6	26.7	26.7	6.1	6.1	6.1	78.6	78.9	78.8	2.2	2.2	2.2	2.2	2.8	2.6	2.7	2.7	
					Bottom	20.3	20.4	20.4	20.8	20.9	20.9	5.9	6.0	5.9	76.4	76.8	76.6	2.3	2.4	2.4		2.9	3.0	3.0		
B3	1150-1205	13.2	E	0.7	Surface	20.6	20.6	20.6	26.5	26.6	26.6	6.1	6.2	6.1	78.7	79.6	79.2	1.7	1.8	1.7		2.2	2.3	2.3		
					Middle	20.5	20.6	20.6	26.6	26.6	26.6	6.0	5.9	6.0	77.0	76.5	76.8	1.9	2.0	2.0	2.0	2.6	2.5	2.6	2.5	
					Bottom	20.4	20.4	20.4	26.7	26.8	26.8	6.0	6.0	6.0	76.8	76.9	76.9	2.3	2.3	2.3		2.7	2.7	2.7		
B2	1212-1227	16.0	E	0.6	Surface	20.6	20.5	20.6	26.5	26.6	26.6	6.3	6.3	6.3	80.8	81.3	81.1	2.2	2.2	2.2		2.8	2.8	2.8		
					Middle	20.5	20.4	20.5	26.6	26.5	26.6	6.3	6.4	6.3	81.5	82.0	81.8	2.6	2.6	2.6	2.5	3.0	2.9	3.0	2.9	
					Bottom	20.3	20.2	20.3	27.0	27.0	27.0	6.1	6.2	6.1	78.9	79.5	79.2	2.7	2.7	2.7		2.8	2.9	2.9		
B1	1231-1245	11.2	E	0.7	Surface	20.5	20.4	20.5	26.6	26.7	26.7	6.1	6.2	6.1	78.9	79.5	79.2	2.0	2.1	2.1		2.5	2.6	2.6		
					Middle	20.4	20.3	20.4	26.7	26.8	26.8	6.1	6.1	6.1	78.0	78.6	78.3	2.4	2.4	2.4	2.4	2.8	2.8	2.8	2.8	
					Bottom	20.3	20.3	20.3	26.9	27.0	27.0	6.0	5.9	6.0	77.3	76.4	76.9	2.6	2.6	2.6		3.0	3.0	3.0		
E6	1250-1305	27.2	E	0.7	Surface	20.5	20.5	20.5	26.6	26.7	26.7	6.2	6.1	6.2	79.9	79.2	79.6	2.2	2.2	2.2		2.6	2.7	2.7		
					Middle	20.4	20.4	20.4	26.7	26.8	26.8	6.1	6.1	6.1	78.6	78.2	78.4	2.3	2.4	2.3	2.3	2.8	2.8	2.8	2.8	
					Bottom	20.3	20.4	20.4	27.0	27.1	27.1	6.0	6.0	6.0	77.5	77.8	77.7	2.4	2.5	2.4		3.0	3.1	3.1		
G4	1312-1327	25.6	E	0.9	Surface	20.7	20.6	20.7	26.5	26.6	26.6	6.2	6.2	6.2	79.9	80.5	80.2	2.2	2.3	2.3		2.8	2.8	2.8		
					Middle	20.6	20.5	20.6	26.7	26.7	26.7	6.2	6.2	6.2	79.9	79.3	79.6	2.4	2.4	2.4	2.4	2.5	2.6	2.6	2.8	
					Bottom	20.4	20.5	20.5	27.0	27.0	27.0	6.0	6.0	6.0	77.9	77.7	77.8	2.6	2.7	2.7		3.0	2.8	2.9		
E2	1331-1346	10.4	E	0.7	Surface	20.6	20.7	20.7	26.6	26.5	26.6	6.1	6.1	6.1	79.2	78.7	79.0	2.0	2.1	2.1		2.5	2.5	2.5		
					Middle	20.5	20.6	20.6	26.7	26.8	26.8	6.1	6.0	6.0	78.0	77.5	77.8	2.2	2.2	2.2	2.3	2.7	2.7	2.7	2.7	
					Bottom	20.3	20.4	20.4	26.8	26.9	26.9	5.9	6.0	5.9	76.2	76.8	76.5	2.5	2.6	2.5		3.0	3.0	3.0		
C2	1351-1406	30.6	E	0.8	Surface	20.7	20.6	20.7	26.5	26.5	26.5	6.1	6.1	6.1	78.3	78.0	78.2	1.9	2.0	2.0		2.6	2.6	2.6		
					Middle	20.5	20.5	20.5	26.7	26.6	26.7	5.9	6.0	5.9	76.4	76.8	76.6	2.3	2.3	2.3	2.2	2.8	2.7	2.8	2.7	
					Bottom	20.3	20.4	20.4	27.0	27.1	27.1	5.9	5.9	5.9	75.8	76.1	76.0	2.4	2.4	2.4		2.8	2.8	2.8		
F1	1413-1428	9.2	E	0.6	Surface	20.7	20.6	20.7	26.6	26.5	26.6	6.3	6.3	6.3	81.5	81.3	81.4	2.4	2.4	2.4		2.9	3.0	3.0		
					Middle	20.5	20.5	20.5	26.7	26.6	26.7	6.0	6.0	6.0	77.5	77.8	77.7	2.8	2.8	2.8	2.7	3.1	3.2	3.2	3.1	
					Bottom	20.3	20.3	20.3	26.7	26.8	26.8	5.9	6.0	5.9	76.4	77.0	76.7	2.8	2.9	2.9		3.1	3.2	3.2		
G3	1433-1445	13.4	E	0.6	Surface	20.6	20.5	20.6	26.5	26.4	26.5	6.1	6.2	6.1	78.7	79.7	79.2	2.4	2.4	2.4		3.0	2.8	2.9		
					Middle	20.4	20.5	20.5	26.7	26.6	26.7	6.1	6.1	6.1	78.2	78.7	78.5	3.1	3.1	3.1	2.9	3.5	3.3	3.4	3.3	
					Bottom	20.4	20.4	20.4	27.0	27.1	27.1	6.0	6.0	6.0	77.1	77.7	77.4	3.2	3.2	3.2		3.8	3.6	3.7		
E9	1450-1505	19.8	E	0.7	Surface	20.6	20.6	20.6	26.6	26.6	26.6	6.0	6.1	6.1	77.7	78.4	78.1	2.6	2.6	2.6		3.1	3.1	3.1		
					Middle	20.5	20.5	20.5	26.8	26.7	26.8	5.9	6.0	5.9	76.4	76.9	76.7	2.9	3.0	3.0	2.9	3.3	3.4	3.4	3.4	
					Bottom	20.3	20.2	20.3	27.1	27.0	27.1	5.9	5.9	5.9	75.7	76.1	75.9	3.1	3.2	3.1		3.6	3.6	3.6		

Remark or Observation:

Note: \* Average \*\* Depth Average

### Annex C9 Impact Water Quality Monitoring Results during Third Round Monitoring on 15 December 2012

Date: 15-Dec-12  
 Weather: Fine  
 Sea Conditions: Small Wave  
 Zone: B

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.**				
E1	1500-1518	47.8	W	0.8	Surface	20.7	20.8	20.8	26.3	26.3	26.3	6.4	6.4	6.4	83.0	83.4	83.2	1.9	1.8	1.9		2.4	2.4	2.4		
					Middle	20.5	20.4	20.5	26.6	26.5	26.6	6.2	6.2	6.2	80.7	80.3	80.5	2.0	2.0	2.0	2.1	2.3	2.4	2.4	2.6	
					Bottom	20.2	20.2	20.2	26.8	26.9	26.9	6.1	6.1	6.1	79.1	78.6	78.9	2.6	2.5	2.5		3.0	2.9	3.0		
G7	1522-1538	33.8	W	0.8	Surface	20.7	20.8	20.8	26.3	26.4	26.4	6.4	6.3	6.3	82.4	81.8	82.1	2.3	2.3	2.3		2.8	2.8	2.8		
					Middle	20.5	20.5	20.5	26.6	26.6	26.6	6.2	6.2	6.2	80.8	80.4	80.6	2.5	2.5	2.5	2.5	2.8	2.9	2.9	2.9	
					Bottom	20.3	20.2	20.3	26.8	2.7	14.8	6.0	6.1	6.0	78.2	78.4	78.3	2.7	2.7	2.7		3.0	3.1	3.1		
B3	1543-1558	14.2	W	0.9	Surface	20.8	20.8	20.8	26.4	26.3	26.4	6.4	6.4	6.4	82.4	83.1	82.8	2.1	2.1	2.1		2.4	2.5	2.5		
					Middle	20.6	20.5	20.6	26.5	26.6	26.6	6.3	6.2	6.2	80.9	80.2	80.6	2.4	2.3	2.3	2.3	2.8	2.8	2.8	2.7	
					Bottom	20.4	20.3	20.4	26.7	26.7	26.7	6.0	6.0	6.0	77.9	78.3	78.1	2.5	2.5	2.5		2.8	3.0	2.9		
B2	1605-1620	16.8	W	0.7	Surface	20.8	20.7	20.8	26.4	26.3	26.4	6.3	6.3	6.3	81.4	82.1	81.8	2.2	2.2	2.2		2.8	2.8	2.8		
					Middle	20.6	20.5	20.6	26.5	26.6	26.6	6.2	6.2	6.2	80.6	80.2	80.4	2.5	2.5	2.5	2.5	3.0	2.9	3.0	2.8	
					Bottom	20.4	20.4	20.4	26.8	26.8	26.8	6.1	6.1	6.1	79.3	78.8	79.1	2.6	2.7	2.7		2.7	2.6	2.7		
B1	1625-1639	11.8	W	0.7	Surface	20.7	20.7	20.7	26.5	26.5	26.5	6.2	6.2	6.2	80.0	79.6	79.8	2.1	2.1	2.1		2.5	2.6	2.6		
					Middle	20.6	20.6	20.6	26.6	26.7	26.7	6.1	6.1	6.1	78.5	79.1	78.8	2.4	2.4	2.4	2.3	2.8	2.9	2.9	2.8	
					Bottom	20.5	20.6	20.6	26.8	26.8	26.8	6.0	6.0	6.0	77.2	77.6	77.4	2.5	2.6	2.5		2.8	2.9	2.9		
E6	1643-1659	28.0	W	0.8	Surface	20.7	20.6	20.7	26.5	26.4	26.5	6.3	6.3	6.3	81.0	81.5	81.3	2.2	2.3	2.3		2.7	2.8	2.8		
					Middle	20.5	20.4	20.5	26.6	26.7	26.7	6.2	6.1	6.2	80.0	79.4	79.7	2.6	2.6	2.6	2.4	2.9	2.9	2.9	2.9	
					Bottom	20.2	20.1	20.2	26.9	26.8	26.9	6.0	6.1	6.0	78.0	78.4	78.2	2.4	2.5	2.5		2.9	3.0	3.0		
G4	1703-1718	26.2	W	0.7	Surface	20.7	20.7	20.7	26.3	26.3	26.3	6.2	6.3	6.2	80.6	81.1	80.9	2.4	2.5	2.5		2.9	2.9	2.9		
					Middle	20.5	20.4	20.5	26.7	26.6	26.7	6.1	6.1	6.1	79.5	79.1	79.3	2.6	2.6	2.6	2.6	2.9	3.0	3.0	3.0	
					Bottom	20.2	20.3	20.3	26.8	26.9	26.9	6.0	6.0	6.0	78.3	77.7	78.0	2.7	2.8	2.8		3.0	3.2	3.1		
E2	1722-1736	11.4	W	0.8	Surface	20.7	20.6	20.7	26.4	26.3	26.4	6.2	6.2	6.2	80.4	80.1	80.3	2.6	2.7	2.6		3.1	3.2	3.2		
					Middle	20.5	20.5	20.5	26.5	26.5	26.5	6.1	6.1	6.1	79.2	78.9	79.1	2.8	2.8	2.8	2.8	3.3	3.2	3.3	3.3	
					Bottom	20.4	20.4	20.4	26.7	26.7	26.7	5.9	5.9	5.9	76.8	76.4	76.6	2.9	2.9	2.9		3.3	3.5	3.4		
C2	1741-1756	31.6	W	0.8	Surface	20.7	20.8	20.8	26.3	26.4	26.4	6.3	6.3	6.3	81.8	81.2	81.5	2.4	2.4	2.4		2.9	2.8	2.9		
					Middle	20.5	20.4	20.5	26.6	26.5	26.6	6.3	6.2	6.2	81.0	80.6	80.8	2.5	2.5	2.5	2.5	2.9	2.9	2.9	2.9	
					Bottom	20.2	20.2	20.2	26.8	26.7	26.8	6.1	6.1	6.1	78.3	78.8	78.6	2.6	2.7	2.6		3.0	3.1	3.1		
F1	1804-1817	9.8	W	0.6	Surface	20.7	20.7	20.7	26.5	26.5	26.5	6.2	6.2	6.2	79.6	80.0	79.8	2.6	2.6	2.6		3.1	3.1	3.1		
					Middle	20.6	20.7	20.7	26.6	26.7	26.7	6.1	6.0	6.0	78.4	77.9	78.2	2.8	2.8	2.8	2.8	3.2	3.1	3.2	3.2	
					Bottom	20.5	20.4	20.5	26.8	26.8	26.8	5.8	5.9	5.9	75.7	76.4	76.1	2.9	2.9	2.9		3.3	3.2	3.3		
G3	1820-1833	14.2	W	0.8	Surface	20.6	20.7	20.7	26.6	26.6	26.6	6.1	6.2	6.1	79.2	79.7	79.5	2.7	2.7	2.7		3.4	3.3	3.4		
					Middle	20.5	20.4	20.5	26.7	26.8	26.8	6.0	6.0	6.0	77.8	78.2	78.0	3.1	3.2	3.1	3.1	3.6	3.7	3.7	3.6	
					Bottom	20.3	20.3	20.3	26.9	27.0	27.0	5.9	5.9	5.9	76.7	76.2	76.5	3.4	3.5	3.5		3.8	3.8	3.8		
E9	1839-1954	20.8	W	0.7	Surface	20.7	20.6	20.7	26.6	26.6	26.6	6.1	6.0	6.1	78.5	78.1	78.3	2.9	2.9	2.9		3.4	3.5	3.5		
					Middle	20.4	20.4	20.4	26.8	26.9	26.9	5.9	6.0	6.0	76.9	77.4	77.2	3.6	3.5	3.5	3.5	4.0	4.1	4.1	3.9	
					Bottom	20.3	20.2	20.3	27.0	27.1	27.1	5.9	5.9	5.9	76.0	76.6	76.3	4.0	4.0	4.0		4.3	4.2	4.3		

Remark or Observation:

Note: \* Average \*\* Depth Average

### Annex C10 Impact Water Quality Monitoring Results during Forth Round Monitoring on 15 December 2012

Date: 15-Dec-12  
 Weather: Fine  
 Sea Conditions: Small Wave  
 Zone: B

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.**	1	2	Ave.*	D.A.**
E1	1902-1919	47.6	W	0.8	Surface	20.7	20.7	20.7	26.3	26.2	26.3	6.4	6.4	6.4	83.2	82.7	83.0	1.9	1.9	1.9		2.4	2.3	2.4		
					Middle	20.4	20.3	20.4	26.5	26.5	26.5	6.3	6.2	6.3	81.2	80.7	81.0	2.1	2.1	2.1	2.2	2.4	2.4	2.4	2.6	
					Bottom	20.2	20.1	20.2	26.8	26.8	26.8	6.1	6.1	6.1	79.3	79.0	79.2	2.5	2.5	2.5		2.9	3.0	3.0		
G7	1923-1939	34.0	W	0.9	Surface	20.7	20.7	20.7	26.3	26.3	26.3	6.3	6.4	6.4	82.0	82.5	82.3	2.3	2.2	2.2		2.7	2.7	2.7		
					Middle	20.5	20.4	20.5	26.5	26.6	26.6	6.2	6.3	6.2	80.3	81.0	80.7	2.5	2.6	2.6	2.5	2.9	3.0	3.0	2.9	
					Bottom	20.2	20.2	20.2	26.8	26.8	26.8	6.0	6.0	6.0	78.3	77.7	78.0	2.7	2.7	2.7		3.0	2.8	2.9		
B3	1943-1957	14.6	W	0.8	Surface	20.8	20.7	20.8	26.3	26.4	26.4	6.4	6.3	6.4	82.8	82.1	82.5	2.1	2.2	2.1		2.5	2.6	2.6		
					Middle	20.5	20.6	20.6	26.6	26.5	26.6	6.2	6.3	6.3	80.8	81.3	81.1	2.3	2.3	2.3	2.3	2.7	2.6	2.7	2.7	
					Bottom	20.4	20.3	20.4	26.7	26.7	26.7	6.0	6.0	6.0	77.8	77.3	77.6	2.5	2.5	2.5		2.9	3.0	3.0		
B2	2004-2018	17.2	W	0.8	Surface	20.7	20.7	20.7	26.3	26.3	26.3	6.3	6.4	6.3	81.7	82.3	82.0	2.1	2.1	2.1		2.5	2.6	2.6		
					Middle	20.6	20.6	20.6	26.5	26.4	26.5	6.2	6.2	6.2	80.3	80.0	80.2	2.4	2.4	2.4	2.4	2.6	2.5	2.6	2.7	
					Bottom	20.5	20.4	20.5	26.8	26.7	26.8	6.1	6.1	6.1	78.5	79.0	78.8	2.6	2.6	2.6		2.9	2.9	2.9		
B1	2023-2036	12.0	W	0.8	Surface	20.6	20.7	20.7	26.5	26.4	26.5	6.2	6.2	6.2	80.7	80.2	80.5	2.1	2.0	2.1		2.5	2.4	2.5		
					Middle	20.5	20.5	20.5	26.6	26.6	26.6	6.1	6.2	6.1	79.2	79.7	79.5	2.3	2.3	2.3	2.3	2.7	2.8	2.8	2.7	
					Bottom	20.4	20.3	20.4	26.8	26.7	26.8	6.0	6.0	6.0	78.0	77.5	77.8	2.5	2.5	2.5		2.8	2.9	2.9		
E6	2040-2056	28.4	W	0.7	Surface	20.7	20.6	20.7	26.4	26.5	26.5	6.3	6.3	6.3	82.0	81.6	81.8	2.3	2.3	2.3		2.8	2.8	2.8		
					Middle	20.4	20.4	20.4	26.7	26.7	26.7	6.2	6.1	6.2	80.1	79.5	79.8	2.6	2.5	2.5	2.5	3.1	3.0	3.1	2.9	
					Bottom	20.2	20.1	20.2	26.9	27.0	27.0	6.1	6.0	6.1	78.6	78.2	78.4	2.6	2.7	2.6		2.9	3.0	3.0		
G4	2100-2115	26.4	W	0.7	Surface	20.6	20.7	20.7	26.3	26.3	26.3	6.3	6.3	6.3	80.9	81.4	81.2	2.4	2.4	2.4		2.8	2.9	2.9		
					Middle	20.4	20.4	20.4	26.6	26.6	26.6	6.1	6.1	6.1	79.4	79.0	79.2	2.5	2.6	2.6	2.6	3.0	3.2	3.1	3.0	
					Bottom	20.2	20.2	20.2	26.8	26.8	26.8	6.0	6.0	6.0	77.9	77.4	77.7	2.7	2.7	2.7		3.0	3.2	3.1		
E2	2119-2132	11.8	W	0.7	Surface	20.6	20.7	20.7	26.3	26.4	26.4	6.2	6.3	6.2	80.5	81.0	80.8	2.6	2.6	2.6		3.1	3.2	3.2		
					Middle	20.6	20.5	20.6	26.4	26.5	26.5	6.2	6.1	6.2	80.1	79.6	79.9	2.8	2.8	2.8	2.7	3.3	3.4	3.4	3.3	
					Bottom	20.4	20.3	20.4	26.7	26.6	26.7	6.0	6.0	6.0	77.1	77.7	77.4	2.9	2.8	2.8		3.2	3.3	3.3		
C2	2137-2152	32.2	W	0.8	Surface	20.6	20.6	20.6	26.3	26.3	26.3	6.3	6.2	6.3	81.1	80.6	80.9	2.4	2.4	2.4		2.8	2.7	2.8		
					Middle	20.4	20.3	20.4	26.5	26.6	26.6	6.2	6.2	6.2	80.3	79.9	80.1	2.5	2.6	2.5	2.5	3.0	2.9	3.0	2.9	
					Bottom	20.2	20.1	20.2	26.8	26.8	26.8	6.0	6.1	6.0	78.1	78.5	78.3	2.7	2.7	2.7		2.9	2.9	2.9		
F1	2200-2214	9.6	W	0.7	Surface	20.6	20.7	20.7	26.5	26.4	26.5	6.2	6.2	6.2	79.9	80.4	80.2	2.6	2.5	2.5		3.1	3.2	3.2		
					Middle	20.6	20.6	20.6	26.5	26.6	26.6	6.0	6.1	6.1	78.1	78.5	78.3	2.8	2.7	2.7	2.7	3.1	3.3	3.2	3.3	
					Bottom	20.5	20.5	20.5	26.8	26.7	26.8	5.9	5.9	5.9	76.7	76.1	76.4	2.9	2.9	2.9		3.4	3.6	3.5		
G3	2218-2232	14.4	W	0.7	Surface	20.6	20.7	20.7	26.6	26.5	26.6	6.1	6.1	6.1	79.5	78.9	79.2	2.6	2.6	2.6		3.4	3.4	3.4		
					Middle	20.5	20.4	20.5	26.7	26.8	26.8	6.1	6.0	6.0	78.3	77.6	78.0	3.1	3.1	3.1	3.0	3.7	3.6	3.7	3.6	
					Bottom	20.3	20.2	20.3	26.9	27.0	27.0	5.9	5.9	5.9	75.9	76.3	76.1	3.4	3.4	3.4		3.8	3.7	3.8		
E9	2238-2253	20.6	W	0.8	Surface	20.6	20.6	20.6	26.6	26.5	26.6	6.1	6.1	6.1	79.2	78.7	79.0	2.8	2.8	2.8		3.3	3.2	3.3		
					Middle	20.4	20.3	20.4	26.8	26.8	26.8	6.0	6.1	6.0	77.9	78.4	78.2	3.5	3.5	3.5	3.4	4.1	4.2	4.2	3.9	
					Bottom	20.2	20.2	20.2	27.0	27.1	27.1	6.0	5.9	5.9	77.2	76.8	77.0	4.0	4.0	4.0		4.4	4.2	4.3		

Remark or Observation:

Note: \* Average \*\* Depth Average

## Annex C11 Summary of Compliance with Action and Limit Level for Zone B

Compliance with Action Level and Limit Level for Zone B - Round 1 (07:00), 14 October						
Station	Limits	Surface DO (mg/L)	Middle DO (mg/L)	Bottom DO (mg/L)	* DA Turbidity (NTU)	*DA SS (mg/L)
	Action Level (Baseline)	4.72	4.72	4.52	3.01	4.09
	Or Action Level (C2*1.2)	N.A.	N.A.	N.A.	3.02	3.44
	Limit Level (Baseline)	4.57	4.57	4.44	3.13	4.60
	And Limit Level (C2*1.3)	N.A.	N.A.	N.A.	3.29	3.73
B1	Exceedance of Action Level	N	N	N	N	N
	Exceedance of Limit Level	N	N	N	N	N
B2	Exceedance of Action Level	N	N	N	N	N
	Exceedance of Limit Level	N	N	N	N	N
B3	Exceedance of Action Level	N	N	N	N	N
	Exceedance of Limit Level	N	N	N	N	N
E1	Exceedance of Action Level	N	N	N	N	N
	Exceedance of Limit Level	N	N	N	N	N
E2	Exceedance of Action Level	N	N	N	N	N
	Exceedance of Limit Level	N	N	N	N	N
E6	Exceedance of Action Level	N	N	N	N	N
	Exceedance of Limit Level	N	N	N	N	N
E9	Exceedance of Action Level	N	N	N	Y	Y
	Exceedance of Limit Level	N	N	N	Y	N
F1	Exceedance of Action Level	N	N	N	N	N
	Exceedance of Limit Level	N	N	N	N	N

\*DA: Depth-averaged

Compliance with Action Level and Limit Level for Zone B - Round 2 (11:00), 14 October						
Station	Limits	Surface DO (mg/L)	Middle DO (mg/L)	Bottom DO (mg/L)	* DA Turbidity (NTU)	*DA SS (mg/L)
	Action Level (Baseline)	4.72	4.72	4.52	3.01	4.09
	Or Action Level (C2*1.2)	N.A.	N.A.	N.A.	3.02	3.44
	Limit Level (Baseline)	4.57	4.57	4.44	3.13	4.60
	And Limit Level (C2*1.3)	N.A.	N.A.	N.A.	3.29	3.73
B1	Exceedance of Action Level	N	N	N	N	N
	Exceedance of Limit Level	N	N	N	N	N
B2	Exceedance of Action Level	N	N	N	N	N
	Exceedance of Limit Level	N	N	N	N	N
B3	Exceedance of Action Level	N	N	N	N	N
	Exceedance of Limit Level	N	N	N	N	N
E1	Exceedance of Action Level	N	N	N	N	N
	Exceedance of Limit Level	N	N	N	N	N
E2	Exceedance of Action Level	N	N	N	N	N
	Exceedance of Limit Level	N	N	N	N	N
E6	Exceedance of Action Level	N	N	N	N	N
	Exceedance of Limit Level	N	N	N	N	N
E9	Exceedance of Action Level	N	N	N	Y	Y
	Exceedance of Limit Level	N	N	N	N	N
F1	Exceedance of Action Level	N	N	N	N	N
	Exceedance of Limit Level	N	N	N	N	N

\*DA: Depth-averaged



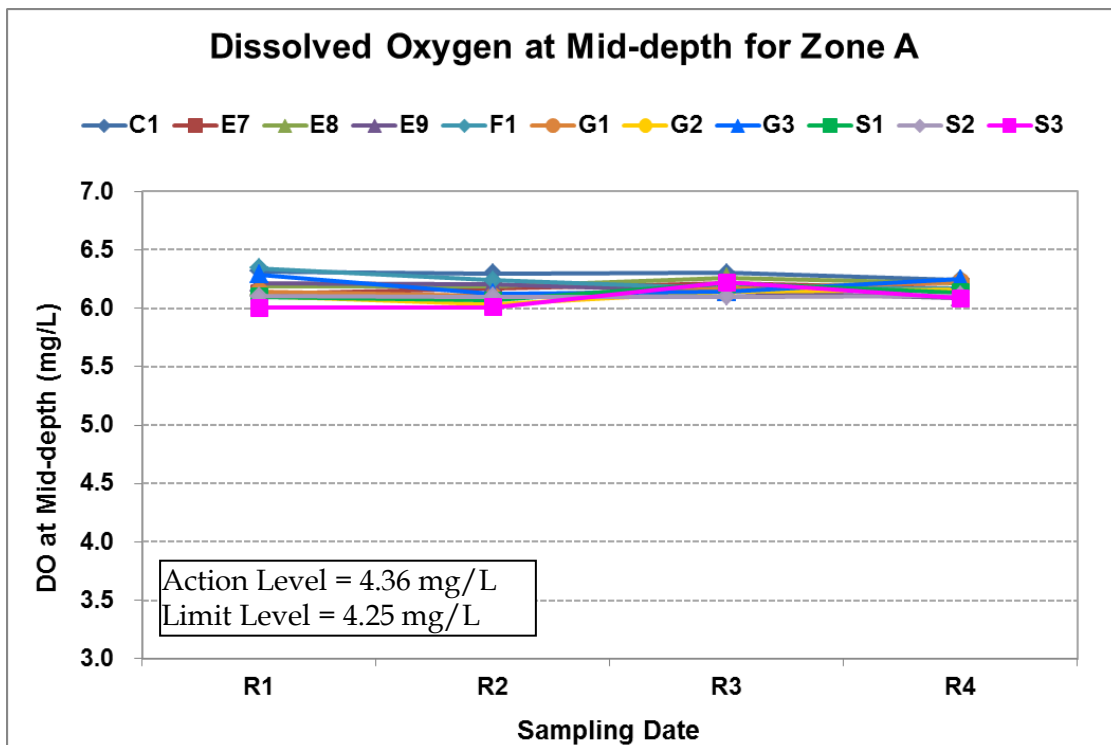
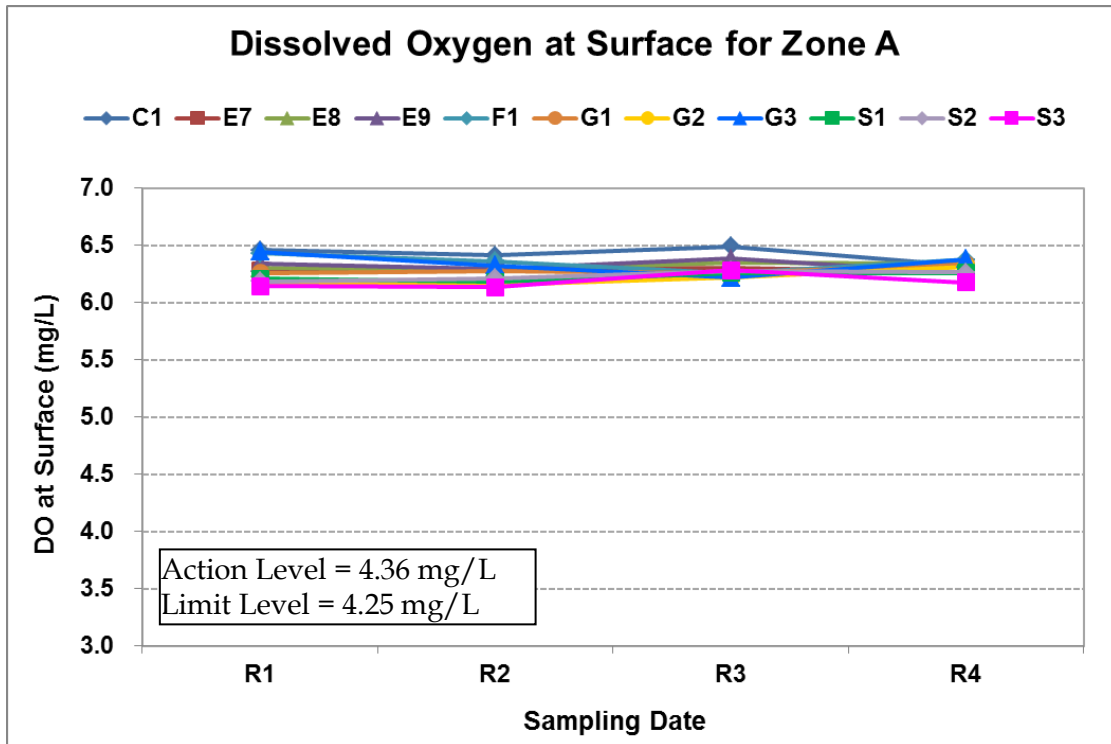
## Annex C12 Summary of Compliance with Action and Limit Level for Zone B

Compliance with Action Level and Limit Level for Zone B - Round 3 (15:00), 14 October						
Station	Limits	Surface DO (mg/L)	Middle DO (mg/L)	Bottom DO (mg/L)	* DA Turbidity (NTU)	*DA SS (mg/L)
	Action Level (Baseline)	4.72	4.72	4.52	3.01	4.09
	Or Action Level (C2*1.2)	N.A.	N.A.	N.A.	3.02	3.44
	Limit Level (Baseline)	4.57	4.57	4.44	3.13	4.60
	And Limit Level (C2*1.3)	N.A.	N.A.	N.A.	3.29	3.73
B1	Exceedance of Action Level	N	N	N	N	N
	Exceedance of Limit Level	N	N	N	N	N
B2	Exceedance of Action Level	N	N	N	N	N
	Exceedance of Limit Level	N	N	N	N	N
B3	Exceedance of Action Level	N	N	N	N	N
	Exceedance of Limit Level	N	N	N	N	N
E1	Exceedance of Action Level	N	N	N	N	N
	Exceedance of Limit Level	N	N	N	N	N
E2	Exceedance of Action Level	N	N	N	N	N
	Exceedance of Limit Level	N	N	N	N	N
E6	Exceedance of Action Level	N	N	N	N	N
	Exceedance of Limit Level	N	N	N	N	N
E9	Exceedance of Action Level	N	N	N	Y	Y
	Exceedance of Limit Level	N	N	N	Y	N
F1	Exceedance of Action Level	N	N	N	N	N
	Exceedance of Limit Level	N	N	N	N	N

\*DA: Depth-averaged

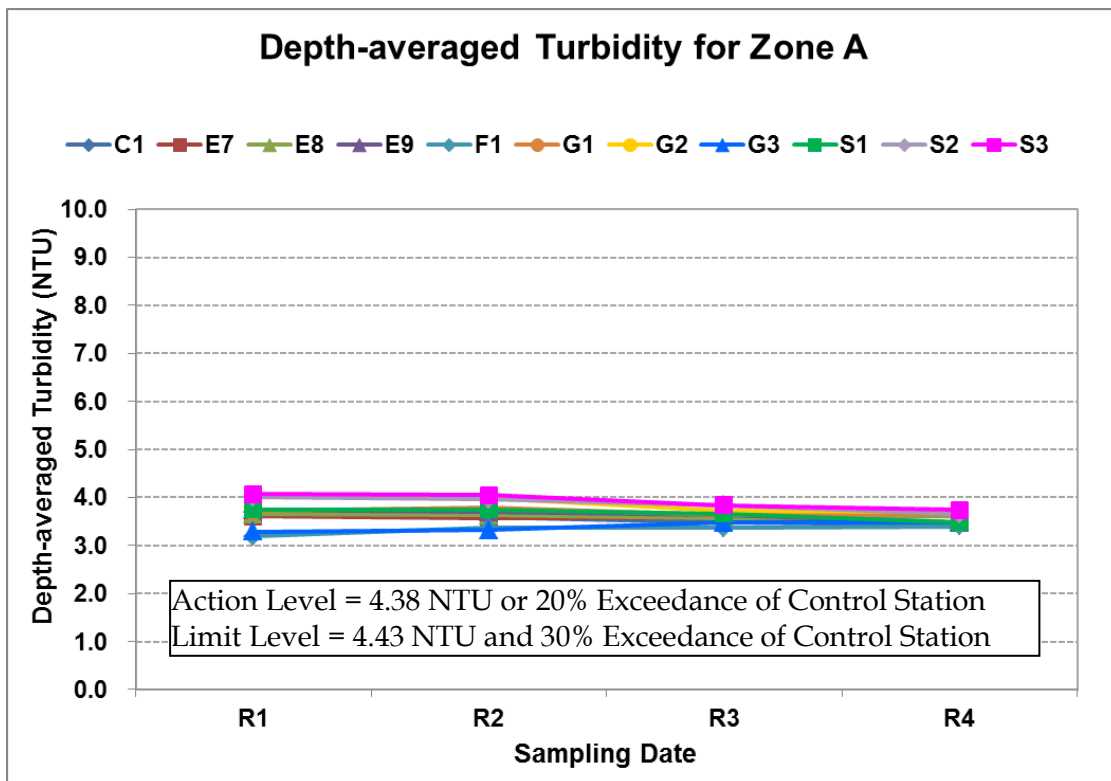
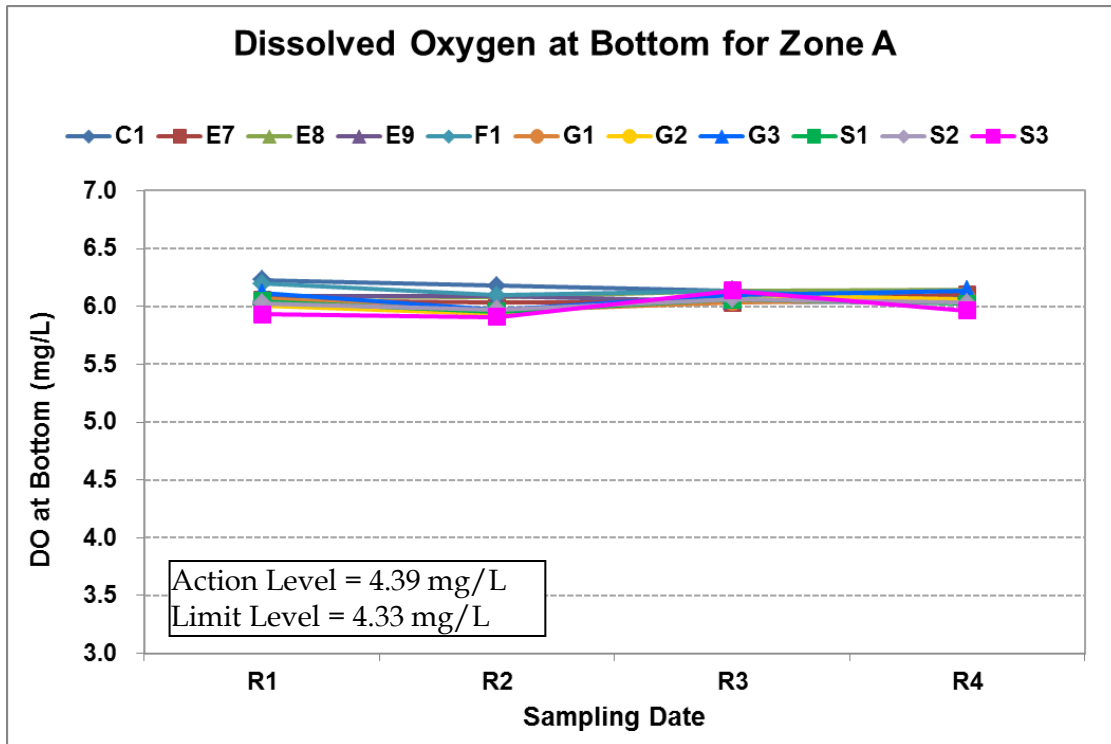
Compliance with Action Level and Limit Level for Zone B - Round 4 (19:00), 14 October						
Station	Limits	Surface DO (mg/L)	Middle DO (mg/L)	Bottom DO (mg/L)	* DA Turbidity (NTU)	*DA SS (mg/L)
	Action Level (Baseline)	4.72	4.72	4.52	3.01	4.09
	Or Action Level (C2*1.2)	N.A.	N.A.	N.A.	3.02	3.44
	Limit Level (Baseline)	4.57	4.57	4.44	3.13	4.60
	And Limit Level (C2*1.3)	N.A.	N.A.	N.A.	3.29	3.73
B1	Exceedance of Action Level	N	N	N	N	N
	Exceedance of Limit Level	N	N	N	N	N
B2	Exceedance of Action Level	N	N	N	N	N
	Exceedance of Limit Level	N	N	N	N	N
B3	Exceedance of Action Level	N	N	N	N	N
	Exceedance of Limit Level	N	N	N	N	N
E1	Exceedance of Action Level	N	N	N	N	N
	Exceedance of Limit Level	N	N	N	N	N
E2	Exceedance of Action Level	N	N	N	N	N
	Exceedance of Limit Level	N	N	N	N	N
E6	Exceedance of Action Level	N	N	N	N	N
	Exceedance of Limit Level	N	N	N	N	N
E9	Exceedance of Action Level	N	N	N	Y	Y
	Exceedance of Limit Level	N	N	N	Y	N
F1	Exceedance of Action Level	N	N	N	N	N
	Exceedance of Limit Level	N	N	N	N	N

\*DA: Depth-averaged



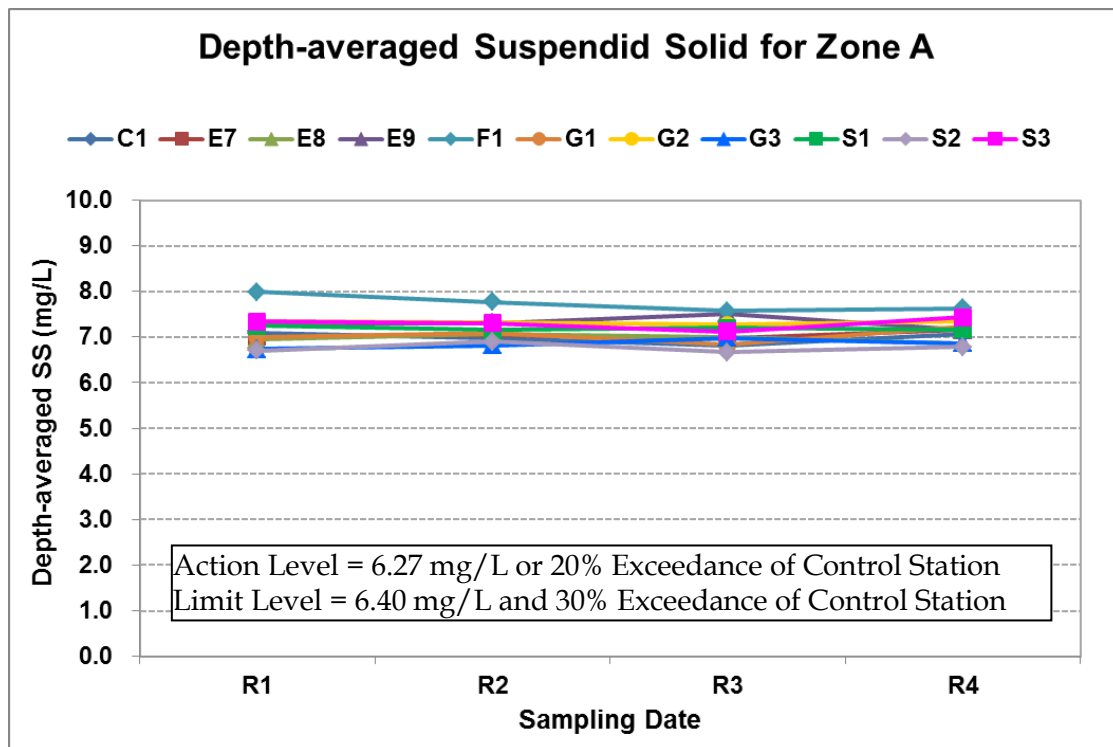
**Figure C1** Dissolved oxygen (mg/L) at surface and mid-depth of water column measured during the impact monitoring on 10 December 2012 for Zone A





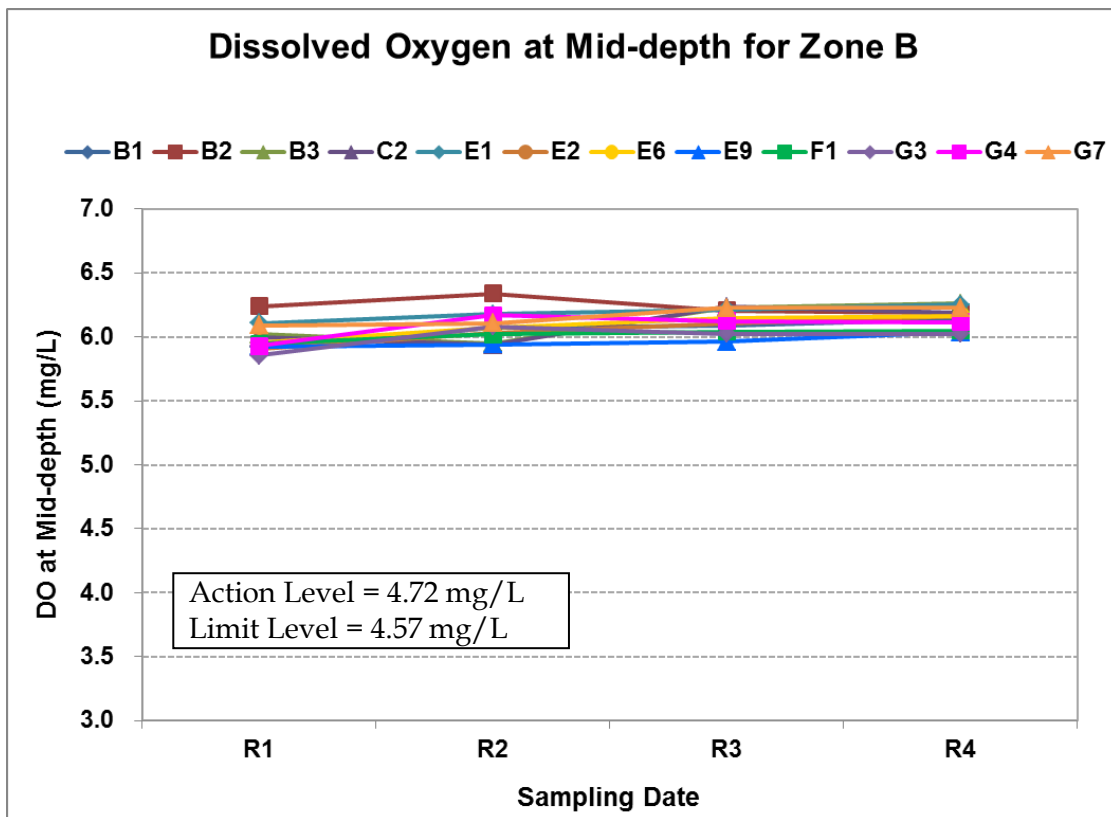
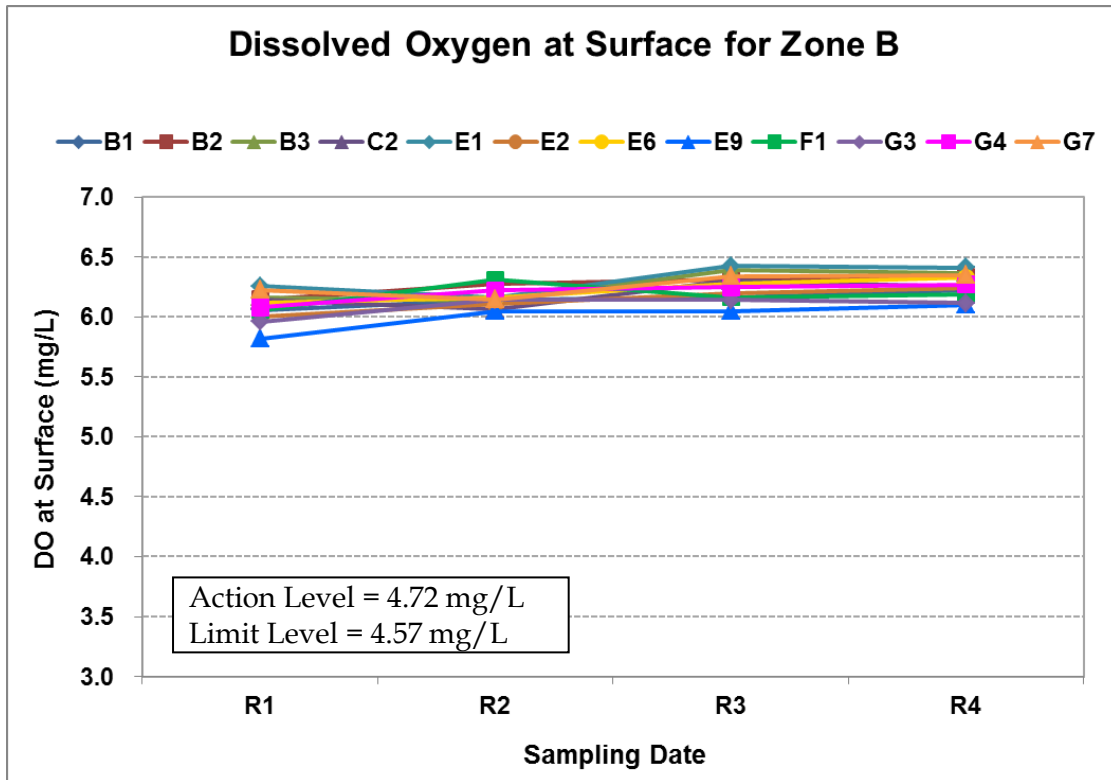
**Figure C2** Dissolved oxygen (mg/L) at bottom of water column and depth-averaged Turbidity (NTU) measured during the impact monitoring on 10 December 2012 for Zone A





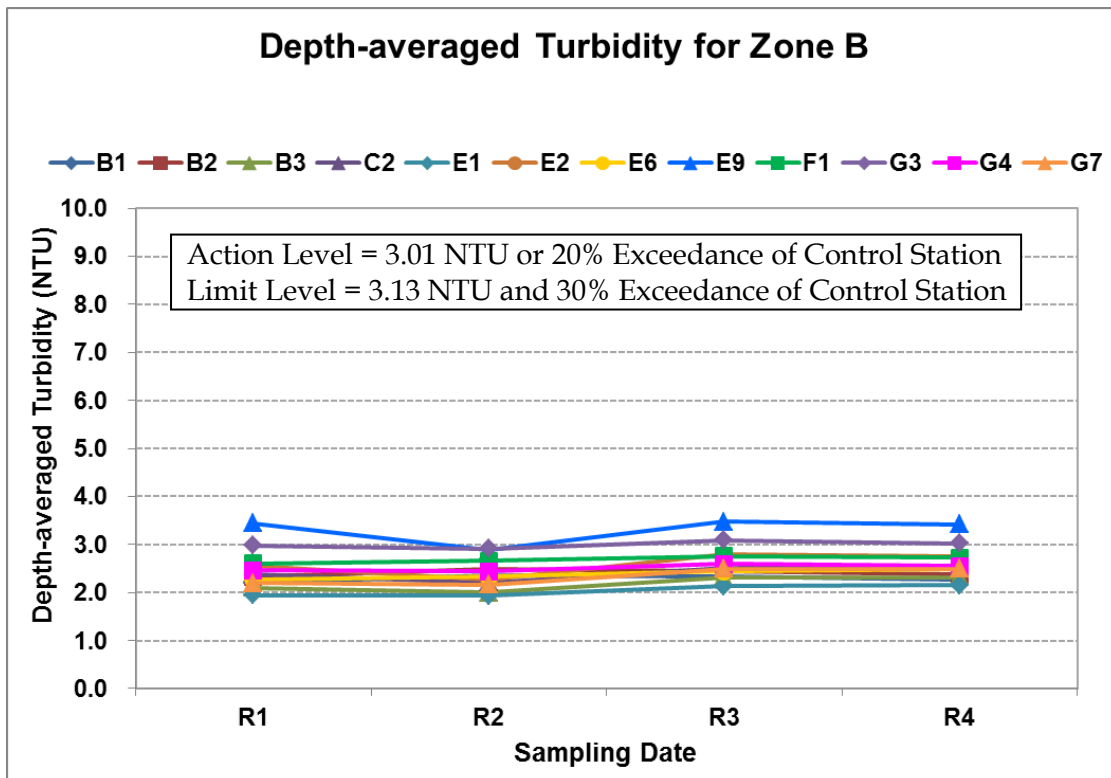
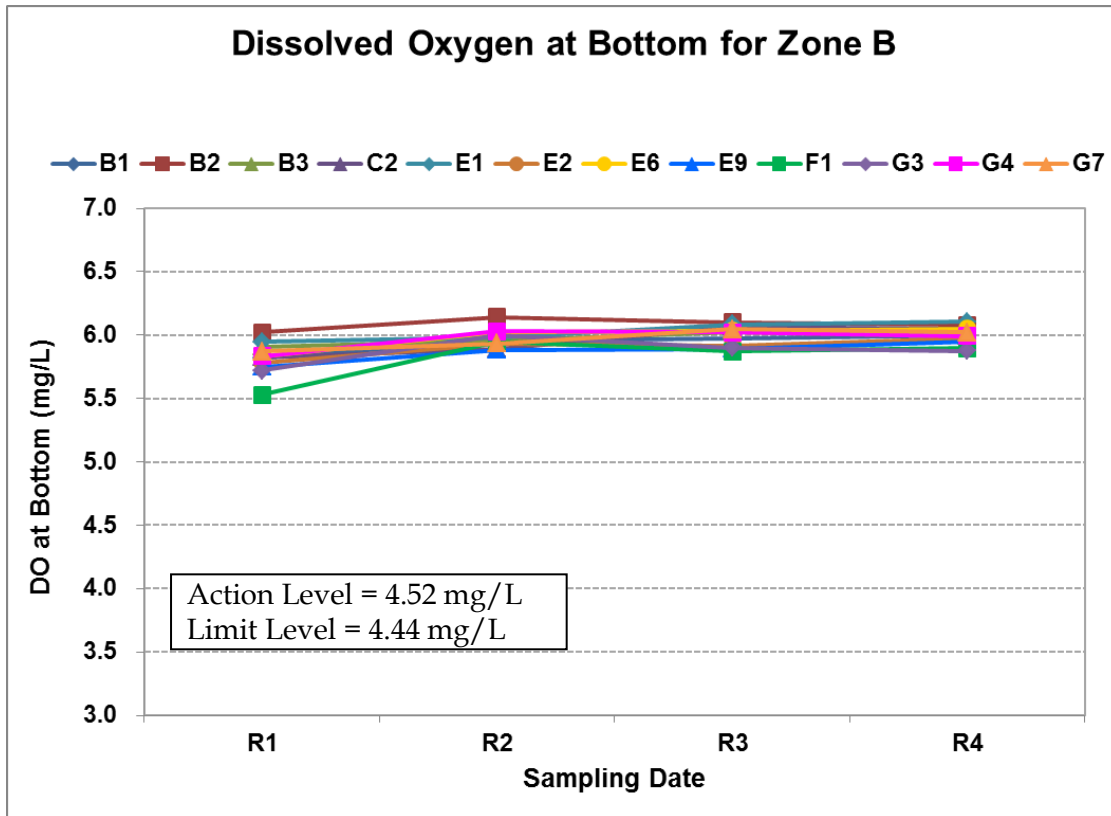
**Figure C3** Depth-averaged suspended solid (mg/L) during the impact monitoring on 10 December 2012 for Zone A





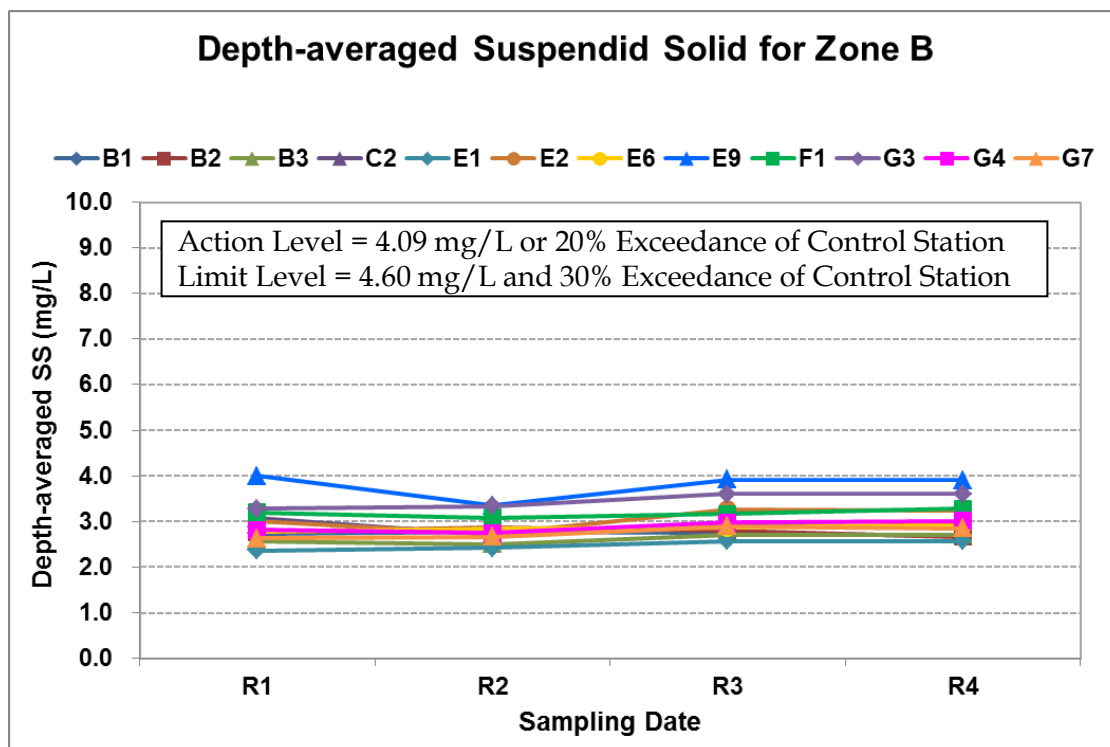
**Figure C4** Dissolved oxygen (mg/L) at surface and mid-depth of water column measured during the impact monitoring on 15 December 2012 for Zone B





**Figure C5** Dissolved oxygen (mg/L) at bottom of water column and depth-averaged Turbidity (NTU) measured during the impact monitoring on 15 December 2012 for Zone B





**Figure C6** Depth-averaged suspended solid (mg/L) during the impact monitoring on 15 December 2012 for Zone B



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