

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

Baseline Water Quality Monitoring Update Report (Zone A)

5 December 2013

Environmental Resources Management

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NTT Com Asia Ltd

Asia Submarine-cable Express (ASE) –
Tseung Kwan O
亞洲快線海底光纜系統 - 將軍澳

December 2013

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For and on behalf of
ERM-Hong Kong, Limited
香港環境資源管理顧問有限公司

Approved by 批核: Terence Fong



Signed by 簽署: Terence Fong

Position 職位: Partner

Date 日期: December 2013

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


Reference Document/Plan

Document/ Plan -to be-Certified/ Verified:	Baseline Water Quality Monitoring Update Report (Zone A)
Date of Report:	
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	"A Baseline Monitoring Report shall be provided no later than two weeks before the start of Project marine installation work and should be submitted to EPD for agreement on the Action/Limit Levels....."
2.6	"A Baseline Monitoring Report shall include the following details: brief project background information; drawings showing locations of the baseline monitoring station; an updated Project marine installation works programme with milestones of environmental protection/ mitigation activities annotated; monitoring results together with the information including monitoring; methodology, parameters monitored, monitoring locations (and depth), monitoring date, time, frequency and duration; details on influencing factors, including major activities, if any, being carried out on the Site during the period, weather conditions during the period and other factors which might affect the results; determination of the Action and Limit Levels (AL levels) for each monitoring parameter and statistical analysis of the baseline data, the analysis shall conclude if there is any significant difference between control and impact stations for the parameters monitored; and comments and conclusions."
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/ plan complies with the above referenced condition of EP-433/2011.	
Terence Fong, Environmental Team Leader:	
	Date: <i>Dec 2013</i>

IEC Verification

I hereby verify that the above referenced document/ plan complies with the above referenced condition of EP-433/2011.	
Vincent Lai, Independent Environmental Checker:	
	Date: <i>December 2013</i>

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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 landing site is at a new Beach Manhole (BMH) and ultimately is connected with a Data Centre in Tseung Kwan O (TKO) Industrial Estate which was completed 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 extends westward 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 and enters the South China Sea. The total length of cable in Hong Kong SAR waters is approximately 33.5 km. A map of the 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). EPD 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 (EM&A Manual)* is required for this Project. Baseline data were collected prior to the start of cable installation works in 2012 and EM&A was conducted throughout the cable installation and after its completion in early 2013 as required in the *EM&A Manual*.

Upon inspection in October 2013 the ASE cable was found to be damaged and a section within Zone A (see *Figure 2.1*) requires re-installation. The EM&A programme is therefore required to resume for the cable installation works in Hong Kong Waters (the "Project").

In accordance with the *EM&A Manual*, baseline monitoring of marine water quality should be undertaken for the Project. The baseline water quality monitoring was conducted prior to the cable installation works in 2012. An update to the baseline water quality has now been conducted to reflect the current baseline water quality conditions prior to the cable re-installation works. This *Baseline Water Quality Monitoring Update Report (Zone A)* ("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 update monitoring for the Project.

1.2 ***ACTION AND LIMIT LEVELS HAVE BEEN DERIVED FROM THE BASELINE WATER QUALITY UPDATE MONITORING DATA FOR ZONE A. PURPOSE OF THIS REPORT***

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

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

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 Update Monitoring

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

Section 3: Conclusion

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

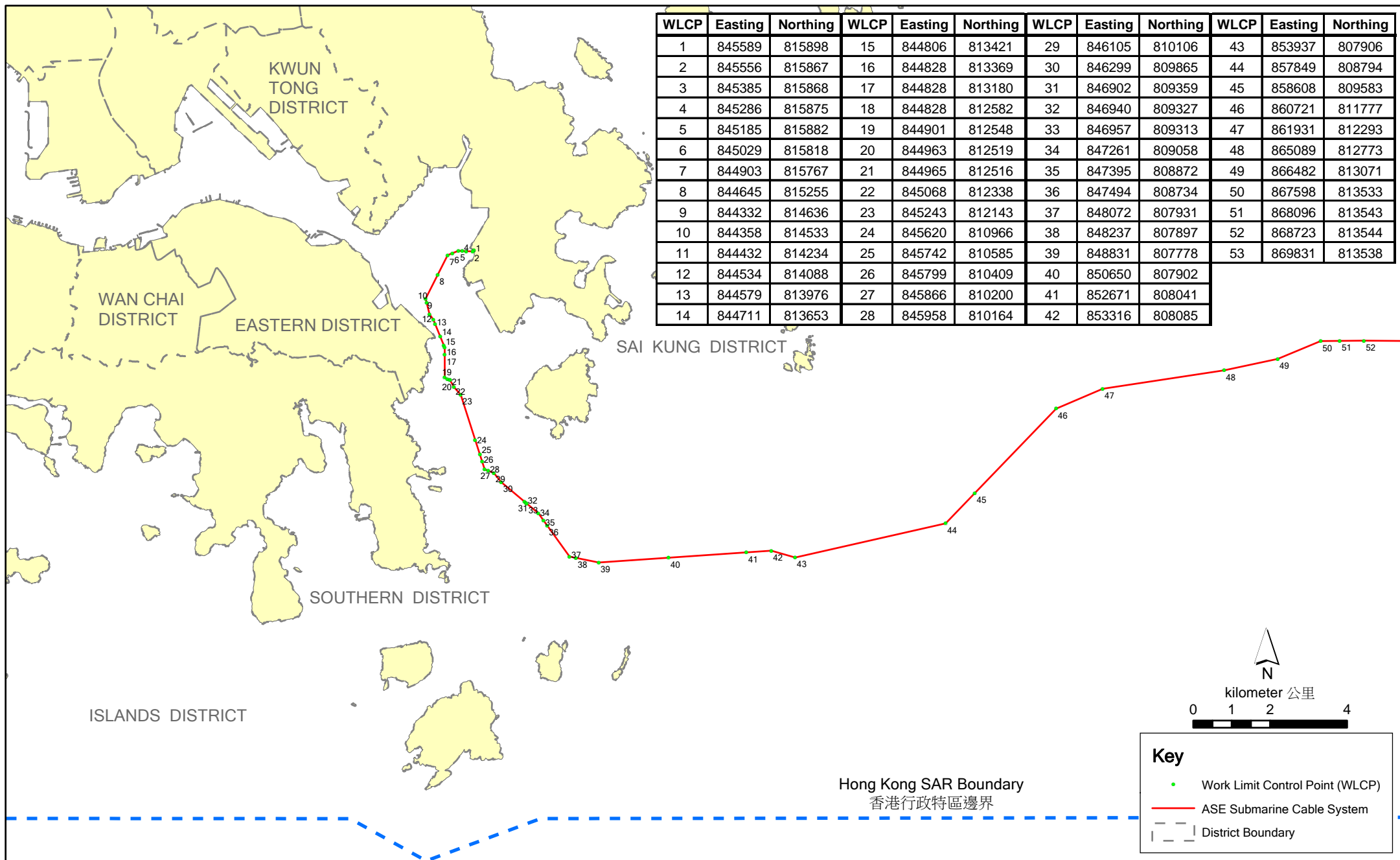


Figure 1.1

ASE Submarine Cable System (Layout Plan)

2.1 MONITORING LOCATION

Baseline water quality update monitoring in Zone A was conducted prior to the commencement of Project marine installation works at the monitoring stations listed in *Table 2.1* and shown in *Figure 2.1*.

- 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 Project marine installation 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 Project marine installation 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 Project marine installation works due to its remoteness from the works.

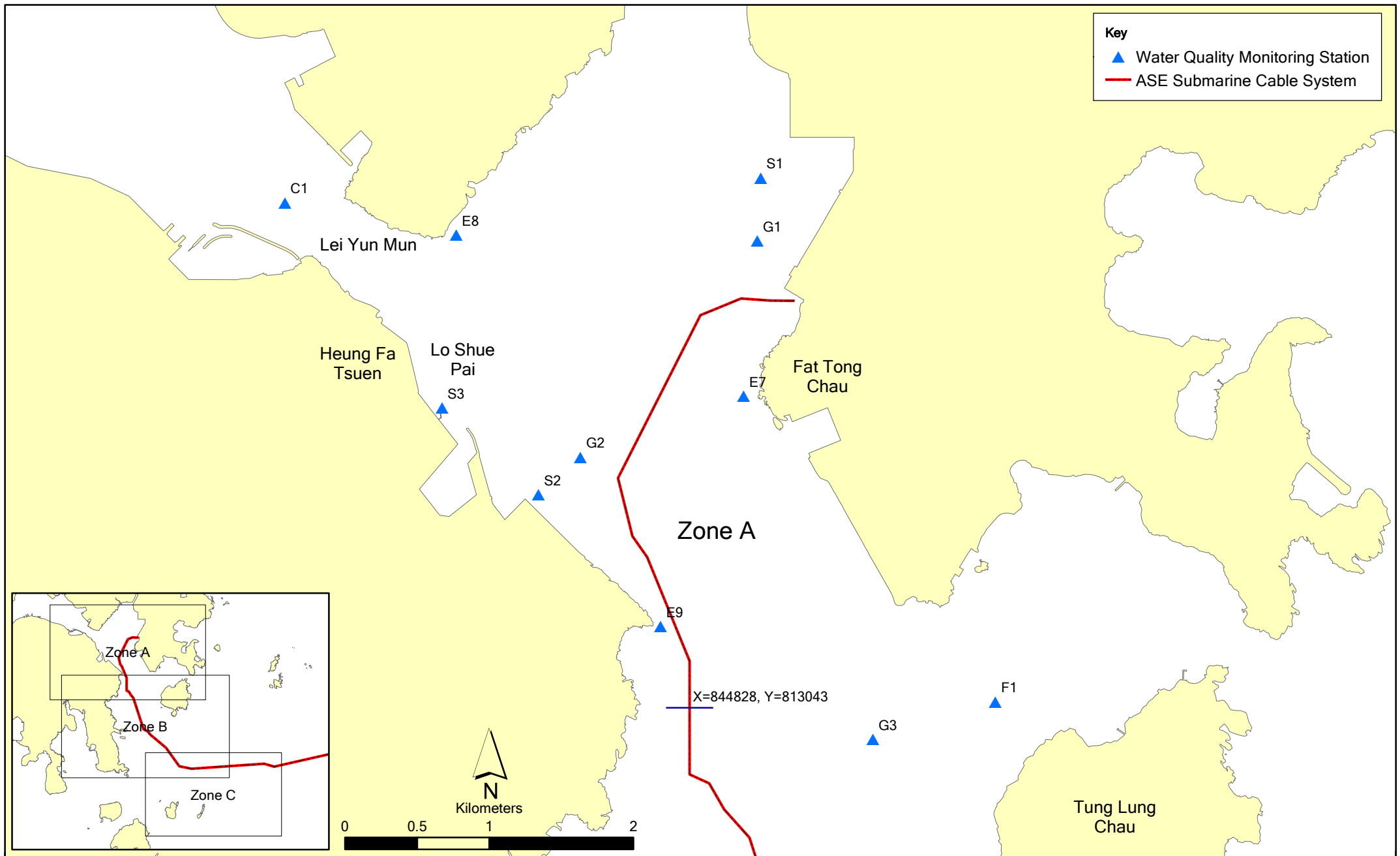


Figure 2.1

Water Quality Monitoring Station (Zone A)

Table 2.1 *Water Quality Update Monitoring Stations*

Monitoring Station	Nature	Easting	Northing
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

2.2 *SAMPLING AND TESTING METHODOLOGY*

2.2.1 *Monitoring Parameters*

The parameters measured *in situ* were:

- Dissolved Oxygen (DO) (% saturation and mg L⁻¹)
- Salinity (ppt)
- Temperature (°C)
- Turbidity (NTU)

The only parameter to be measured in the laboratory was:

- Suspended solids (SS) (mg L⁻¹)

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 update monitoring.

Table 2.2 *Equipment used during Baseline Water Quality Update Monitoring*

Equipment	Model
Global Positioning Device	Garmin eTrex 10
Water Depth Gauge	Speedtech Instrument SM-5
Water Sampling Equipment	1520 Kemmerer Water Sampler

Equipment	Model
Salinity, DO, Temperature Measuring Meter	YSI Pro 2030
Current Velocity and Direction	Flow Probe FP111
Turbidity Meter	HACH Model 2100Q Turbid Meter

2.2.3 *Monitoring Frequency and Timing*

The water quality update 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 hours before and 2 hours after mid flood and mid-ebb tides. The tidal range selected for the baseline update 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 ⁽¹⁾. Based on the predicted tidal levels at Tai Miu Wan, the baseline water quality update monitoring was conducted between 5 November and 9 November 2013, following the schedule presented in *Annex A*. Schedule for baseline update 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 will be 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.

2 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

(1) Hong Kong Observatory (2013) <http://www.hko.gov.hk/tide/eQUBtide.htm> [Accessed in November 2013]

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 UPDATE MONITORING RESULTS*

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

The observations from the update monitoring results are as following:

- For all monitoring stations, water quality was variable throughout the baseline update monitoring period and this represented natural fluctuation in water quality ;
- Dissolved Oxygen (DO) levels were recorded to stay at a similar level across all the monitoring stations within the baseline update monitoring period;
- DO levels at all depths were generally high for all samples; DO levels smaller than 4 mg L⁻¹ were not recorded;
- Minor variations of Turbidity and SS levels were observed within the baseline update monitoring period whilst Turbidity and SS levels moved to a similar level across all the monitoring stations in the last day of monitoring;
- On 5 November 2013, relatively higher levels of Turbidity were recorded at Control Station C1, Gradient Station G2, Impact Station S2 and S3 at

mid-ebb tidal stage and were observed at Impact Station E7 and F1 at mid-flood tidal stage;

- On 5 November 2013, relatively higher levels of SS were detected at Control Station C1 at mid-ebb tidal stage and were also recorded at Impact Station E7 at mid-flood tidal stage; and,
- The above sporadic patterns of relatively high levels of Turbidity and SS in 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*

Parameter	Action Level	Limit Level ^(d)
SS in mgL ⁻¹ (Depth-averaged) ^{(a) (c)}	95%-ile of baseline data or	99%-ile of baseline data, 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 ⁻¹ ^(b)	<u>Surface and Middle</u> 5%-ile of baseline data for surface and middle layer	<u>Surface and Middle</u> 5mg/L or 1%-ile of baseline for surface and middle layer
	<u>Bottom</u> 5%-ile of baseline data for bottom layers	<u>Bottom</u> 2mg/L or 1%-ile of baseline data for bottom layer
Turbidity in NTU (Depth-averaged) ^{(a) (c)}	95%-ile of baseline data, or	99%-ile of baseline data, 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.
- 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.

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

Table 2.4 Action and Limit Levels for Water Quality

Parameter	Action Level	Limit Level
SS in mgL ⁻¹ (Depth-averaged) ^(a) ^(c)	95%-ile of baseline data (7.01 mg L ⁻¹), or	99%-ile of baseline data (7.15 mg L ⁻¹), 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 ⁻¹ ^(b)	<u>Surface and Middle</u> ^(d)	<u>Surface and Middle</u> ^(d)
	5%-ile of baseline data for surface and middle layer (5.91 mg L ⁻¹)	5mg/L or 1%-ile of baseline data for surface and middle layer (5.85 mg L ⁻¹)
	<u>Bottom</u>	<u>Bottom</u>
	5%-ile of baseline data for bottom layers (5.72 mg L ⁻¹)	2mg/L or 1%-ile of baseline data for bottom layer (5.62 mg L ⁻¹)
Turbidity in NTU (Depth-averaged) ^(a) ^(c)	95%-ile of baseline data (5.09 NTU), or	99%-ile of baseline data (5.25 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.

Baseline water quality update monitoring in Zone A was conducted between 5 November and 9 November 2013 at 11 designated monitoring stations (including 7 Sensitive Receiver Stations, 3 Gradient Stations and 1 Control Station). The update monitoring was carried out over 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 update monitoring results are, therefore, considered to be representative of the current baseline conditions of the areas where marine installation works will be undertaken for the Project.

The baseline update 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 A throughout the Project marine installation works.

EXECUTIVE SUMMARY

Baseline Water Quality Update Monitoring

Baseline water quality update monitoring was conducted between 5 November and 9 November 2013 at 11 designated monitoring stations (7 Sensitive Receiver Stations, 3 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 hours before and 2 hours after mid flood and mid-ebb tides. The tidal range selected for the baseline update 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 update monitoring. Water quality update monitoring results are, therefore, considered to be representative for the baseline conditions of the areas where Project marine installation works will be undertaken.

In accordance with the *EM&A Manual*, the baseline update 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 Project marine installation works. The Action and Limit Levels are summarized in *Table 1* below.

Table 1

Action and Limit Levels for Water Quality

Parameter	Action Level	Limit Level
SS in mgL ⁻¹ (Depth-averaged) ^{(a) (c)}	95%-ile of baseline data (7.01 mg L ⁻¹), or	99%-ile of baseline data (7.15 mg L ⁻¹), 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 ⁻¹ ^(b)	<u>Surface and Middle</u> ^(d)	<u>Surface and Middle</u> ^(d)
	5%-ile of baseline data for surface and middle layer (5.91 mg L ⁻¹)	5mg/L or 1%-ile of baseline data for surface and middle layer (5.85 mg L ⁻¹)
	<u>Bottom</u>	<u>Bottom</u>
	5%-ile of baseline data for bottom layers (5.72 mg L ⁻¹)	2mg/L or 1%-ile of baseline data for bottom layer (5.62 mg L ⁻¹)
Turbidity in NTU (Depth-averaged) ^{(a) (c)}	95%-ile of baseline data (5.09 NTU), or	99%-ile of baseline data (5.25 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.

Annex A

Baseline Water Quality Update Monitoring Schedule (Zone A)

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

Time Schedule for Baseline Water Quality Update Monitoring

5 to 9 November 2013

Sun	Mon	Tue	Wed	Thu	Fri	Sat
3	4	5 <u>Zone A</u> Food Tide (07:00-11:00) Ebb Tide (11:30-15:30)	6	7 <u>Zone A</u> Food Tide (08:00-12:00) Ebb Tide (13:10-16:40)	8	9 <u>Zone A</u> Food Tide (10:30-14:30) Ebb Tide (15:30-18:20)
10	11	12	13	14	15	16

Annex B

Calibration Reports of Multi-parameter Sensor



Performance Check of Turbidity Meter

Equipment Ref. No. : ET/0505/010 Manufacturer : HACH

Model No. : 2100Q Serial No. : 11110 C 014260

Date of Calibration : 08/102013 Due Date : 07/01/2014

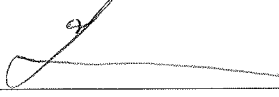
Gelex Vial Std	Theoretical Value (NTU)	Measured Value (NTU)	Difference %
0-10 NTU	5	5.23	4.50
10-100 NTU	50	52.1	4.11
100-1000 NTU	550	566	2.87

Acceptance Criteria

Difference : -5 % to 5%

The turbidity 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 : 



Internal Calibration Report of Dissolved Oxygen Meter

Equipment Ref. No. : <u>ET/EW/008/006</u>	Manufacturer : <u>YSI</u>
Model No. : <u>Pro 2030</u>	Serial No. : <u>12A 100554</u>
Date of Calibration : <u>19/09/2013</u>	Calibration Due Date : <u>18/12/2013</u>

Temperature Verification

Ref. No. of Reference Thermometer : ET/0521/008

Ref. No. of Water Bath : ---

		Temperature (°C)		
Reference Thermometer reading	Measured	20.1	Corrected	19.8
DO Meter reading	Measured	19.6	Difference	0.2

Standardization of sodium thiosulphate (Na₂S₂O₃) solution

Reagent No. of Na ₂ S ₂ O ₃ titrant	CPE/012/4.5/001/7	Reagent No. of 0.025N K ₂ Cr ₂ O ₇	CPE/012/4.4/001/1921
		Trial 1	Trial 2
Initial Vol. of Na ₂ S ₂ O ₃ (ml)		0.50	15.00
Final Vol. of Na ₂ S ₂ O ₃ (ml)		10.95	25.50
Vol. of Na ₂ S ₂ O ₃ used (ml)		10.45	10.50
Normality of Na ₂ S ₂ O ₃ solution (N)		0.02392	0.02381
Average Normality (N) of Na ₂ S ₂ O ₃ solution (N)		0.02387	
Acceptance criteria, Deviation		Less than ± 0.001N	

Calculation: Normality of Na₂S₂O₃, N = 0.25 / ml Na₂S₂O₃ 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 ₂ S ₂ O ₃ (ml)	0.00	11.20	22.50	0.00	8.10	12.90
Final Vol. of Na ₂ S ₂ O ₃ (ml)	11.20	22.50	30.40	8.10	12.90	17.80
Vol. (V) of Na ₂ S ₂ O ₃ used (ml)	11.20	11.30	7.90	8.10	4.80	4.90
Dissolved Oxygen (DO), mg/L	7.18	7.24	5.06	5.19	3.08	3.14
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	7.10	7.30	7.20	7.18	7.24	7.21	0.14
5	5.13	5.52	5.33	5.06	5.19	5.13	3.82
10	3.09	3.31	3.20	3.08	3.14	3.11	2.85
Linear regression coefficient				0.9979			



Internal Calibration Report of Dissolved Oxygen Meter

Zero Point Checking

DO meter reading, mg/L	0.00
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Salinity Checking

Reagent No. of NaCl (10ppt)	CPE/012/4.7/002/09	Reagent No. of NaCl (30ppt)	CPE/012/4.8/002/09
-----------------------------	--------------------	-----------------------------	--------------------

Determination of dissolved oxygen content by Winkler Titration **

Salinity (ppt)	10		30	
Trial	1	2	1	2
Initial Vol. of Na ₂ S ₂ O ₃ (ml)	0.00	11.80	24.00	35.10
Final Vol. of Na ₂ S ₂ O ₃ (ml)	11.80	24.00	35.10	46.40
Vol. (V) of Na ₂ S ₂ O ₃ used (ml)	11.80	12.20	11.10	11.30
Dissolved Oxygen (DO), mg/L	7.56	7.82	7.11	7.24
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	7.65	7.88	7.77	7.56	7.82	7.69	1.03
30	7.03	7.15	7.09	7.11	7.24	7.18	1.26

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/008/006 Manufacturer : YSI
Model No. : Pro 2030 Serial No. : 12A 100554
Date of Calibration : 19/09/2012 Due Date : 18/12/2013

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

S/001/5


Salinity Standard (ppt)	Measured Salinity (ppt)	Difference %
30.0	31.8	5.83

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 : 

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 @
11/5/2013	99.4	FC1S-1	3.17	FS1S-2	100.0
	102.8	FS1S-3	0.00	FE7M-1	97.9
	99.2	FE7M-2	2.67	FG3M-3	103.8
	102.4	FG3B-1	2.60	FS2B-2	101.9
	98.3	FS2B-3	2.82	FS3B-3	108.3
	105.7	EC1S-1	0.00	ES1S-2	94.2
	93.3	ES1S-3	3.17	EE7M-1	98.1
	105.8	EE7M-2	2.90	EG3M-3	96.0
	97.0	EG3B-1	0.00	ES2B-2	103.8
	106.6	ES2B-3	0.00	ES3B-3	91.8

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 @
11/7/2013	94.8	FC1S-1	3.28	FG1S-2	100.0
	102.3	FG1M-1	2.99	FG3M-2	100.0
	106.5	FG3B1	2.74	FG2B-2	104.1
	95.9	FS3S-1	0.00	ES1S-2	98.1
	92.6	ES1M-1	0.00	EE1M-2	94.1
	106.5	EF1B1	2.67	ES2B-2	101.9
		100.2	EG2S1	0.00	ES3B-2

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

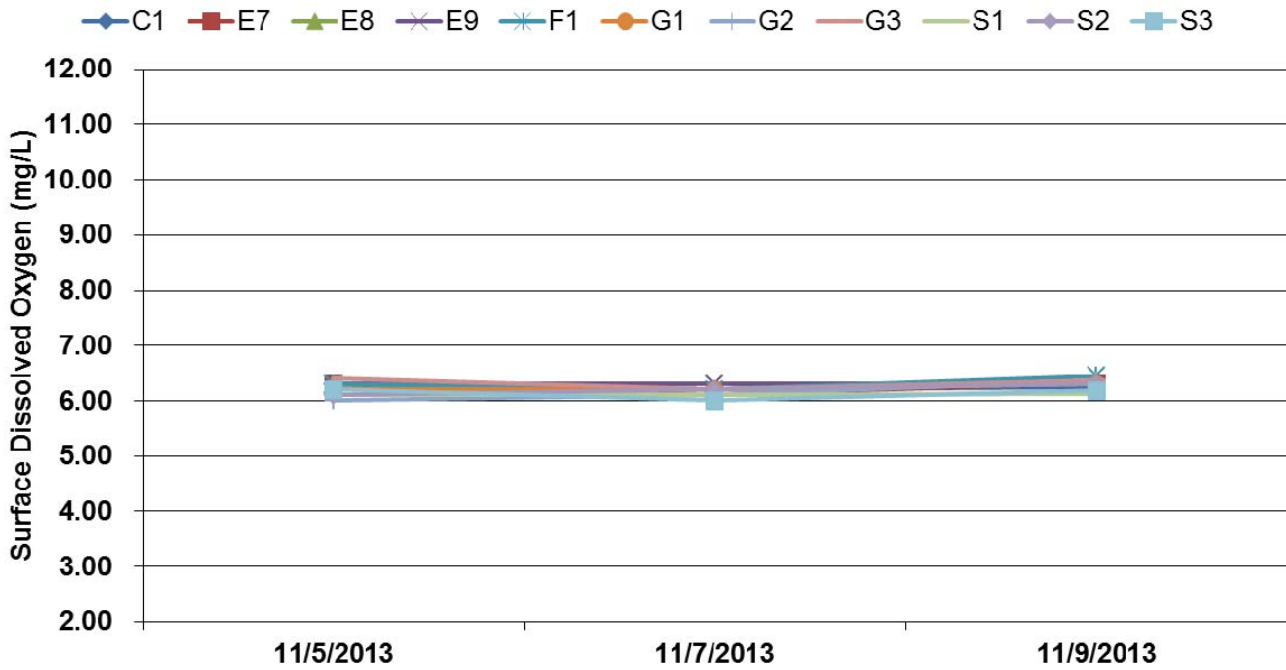
Sampling Date	QC Sample	Sample Duplicate		Sample Spike	
	% Recovery *	Sample ID	% Error #	Sample ID	% Recovery @
11/9/2013	106.8	FC1S-1	2.90	FG1S-2	105.9
	106.0	FG1M-1	2.99	FG3M-2	100.0
	94.9	FG3B1	0.00	FG2B-2	106.0
	92.3	FS3S-1	2.99	ES1S-2	103.8
	105.7	ES1M-1	0.00	EE1M-2	93.9
	94.3	EF1B1	2.82	ES2B-2	103.8
		93.0	EG2S1	3.17	ES3B-2

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 Update Monitoring Results (Zone A)

Mid-ebb Dissolved Oxygen (Surface)



Mid-flood Dissolved Oxygen (Surface)

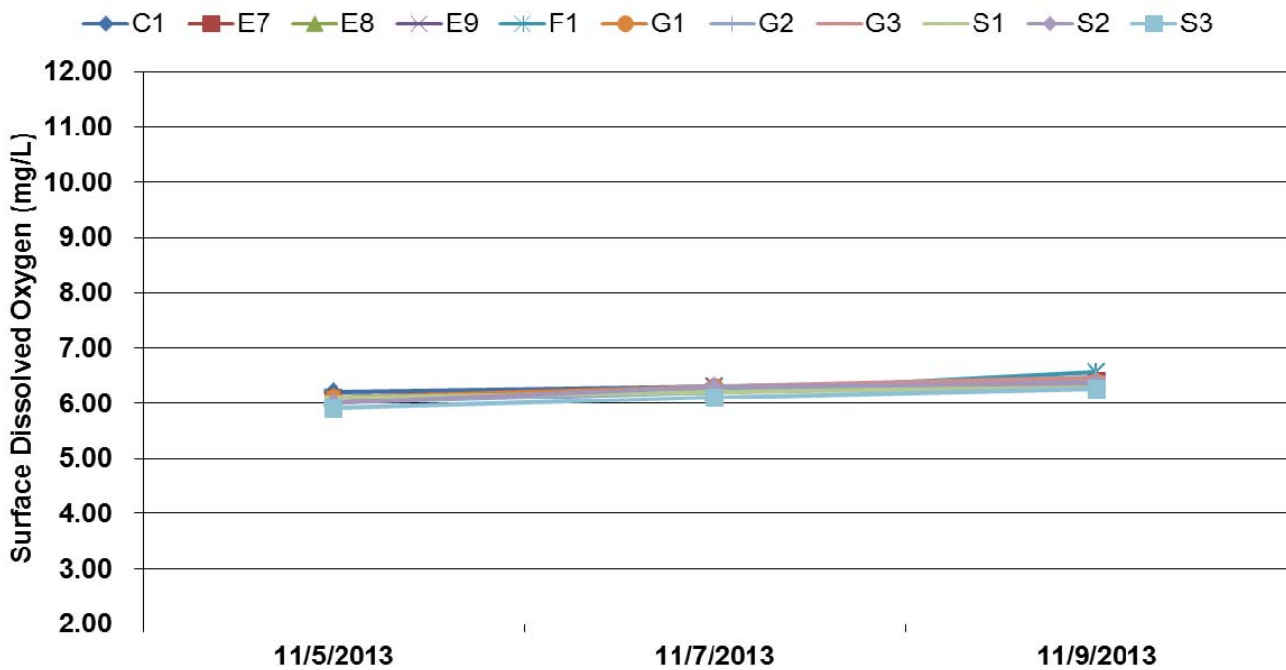
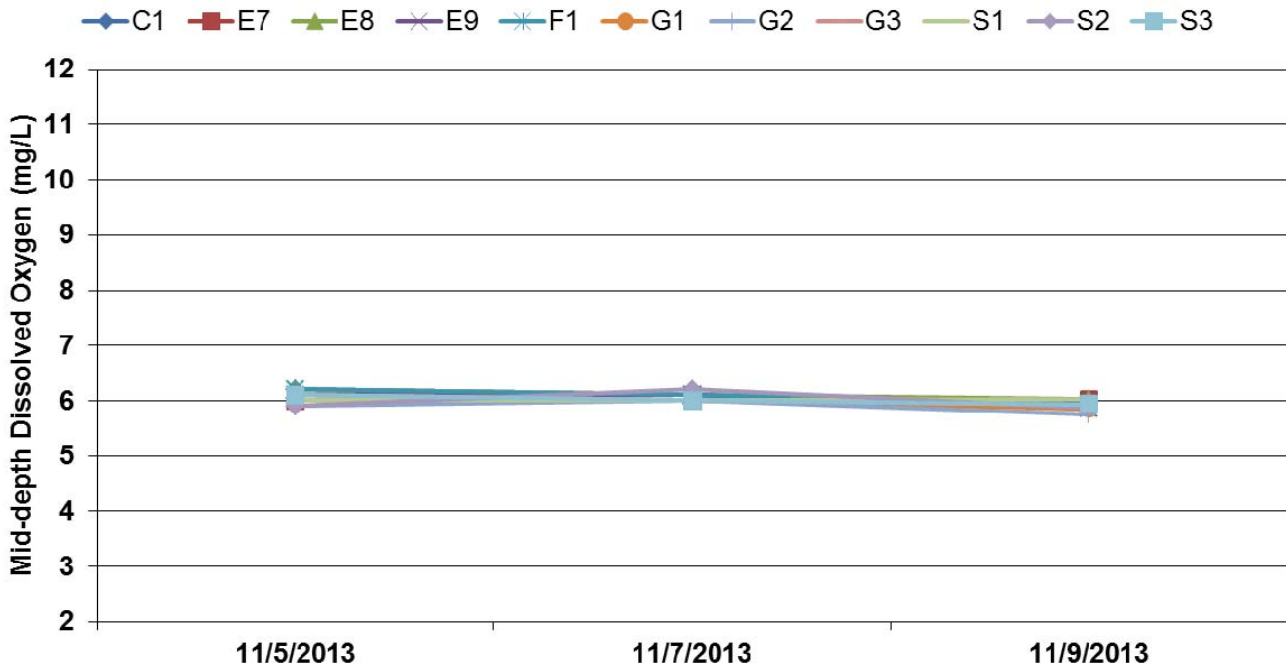


Figure D1 Dissolved oxygen (mg/L) at surface of water column measured during the baseline update monitoring period from 5 November to 9 November 2013 for Zone A



Mid-ebb Dissolved Oxygen (Mid-depth)



Mid-flood Dissolved Oxygen (Mid-depth)

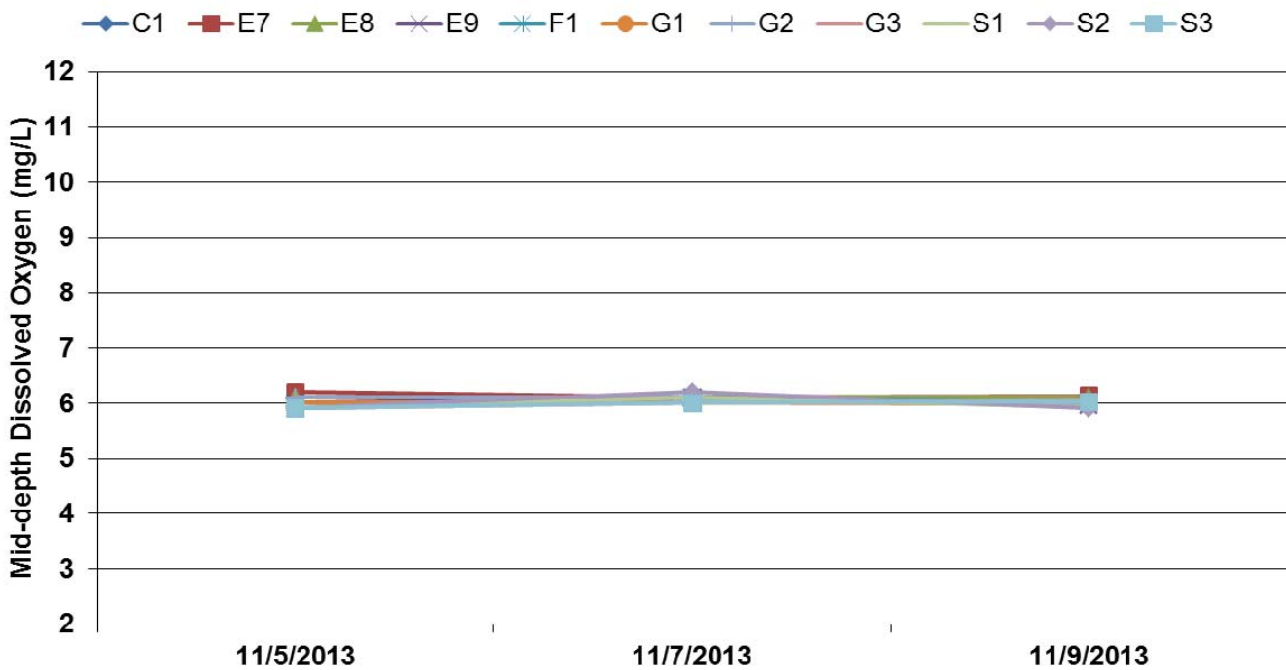
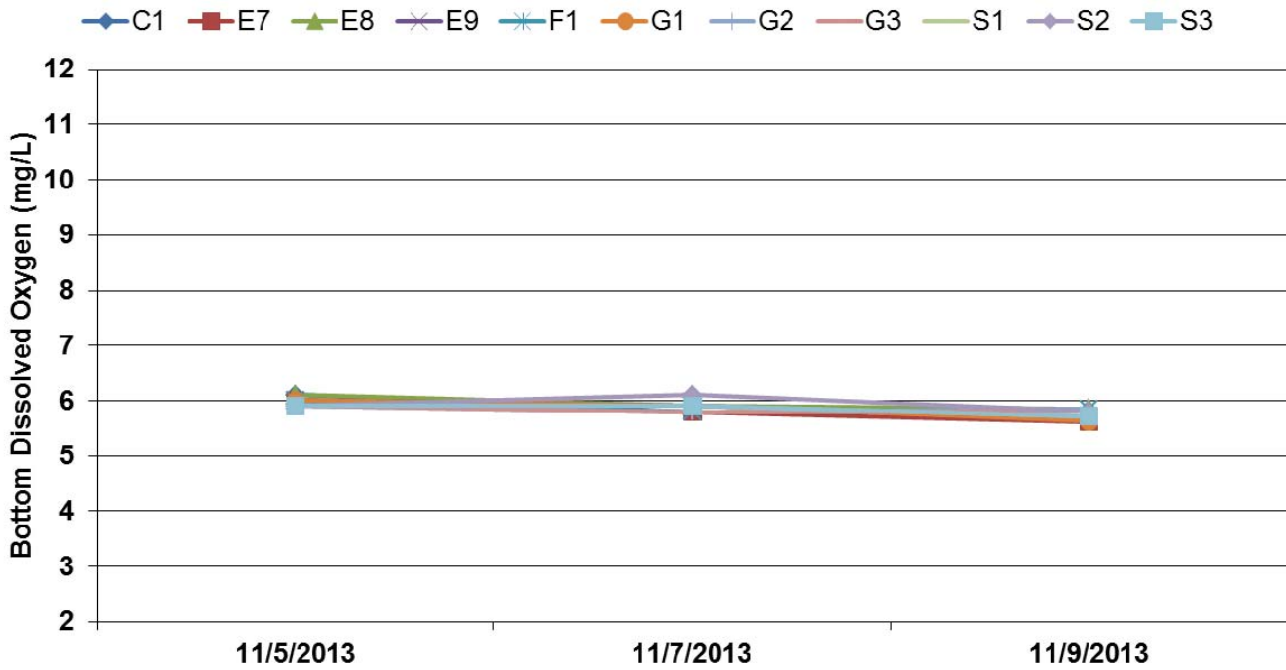


Figure D2 Dissolved oxygen (mg/L) at mid-depth of water column measured during the baseline update monitoring period from 5 November to 9 November 2013 for Zone A



Mid-ebb Dissolved Oxygen (Bottom)



Mid-flood Dissolved Oxygen (Bottom)

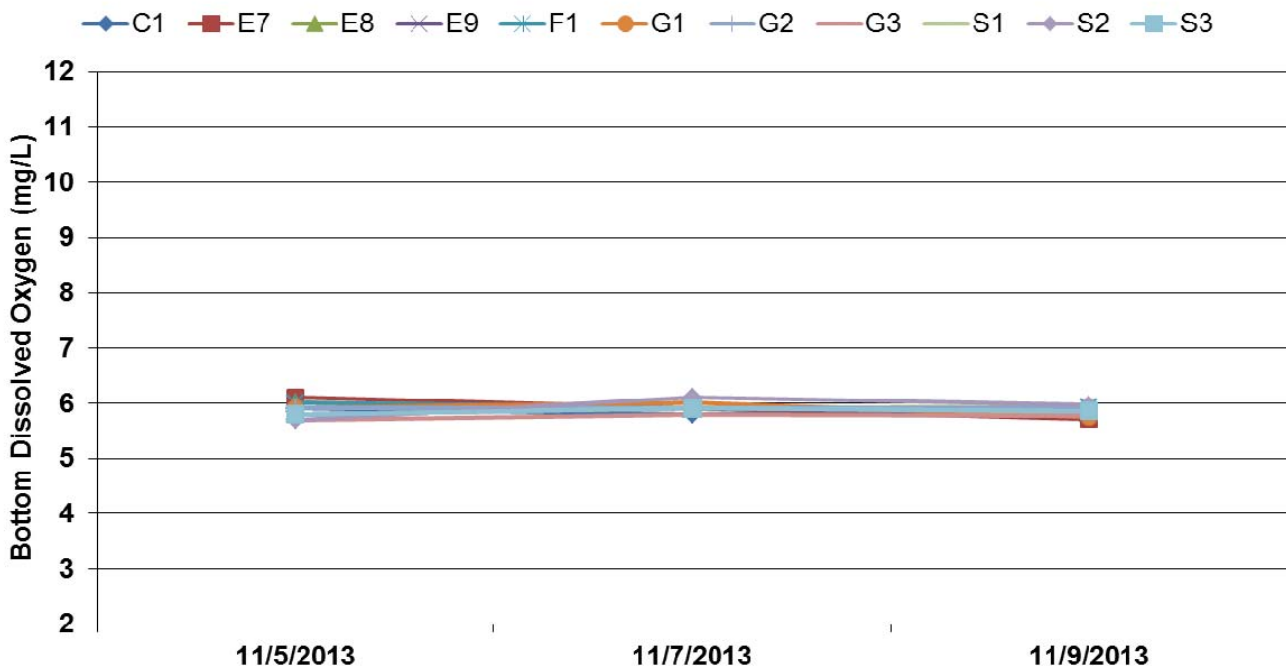
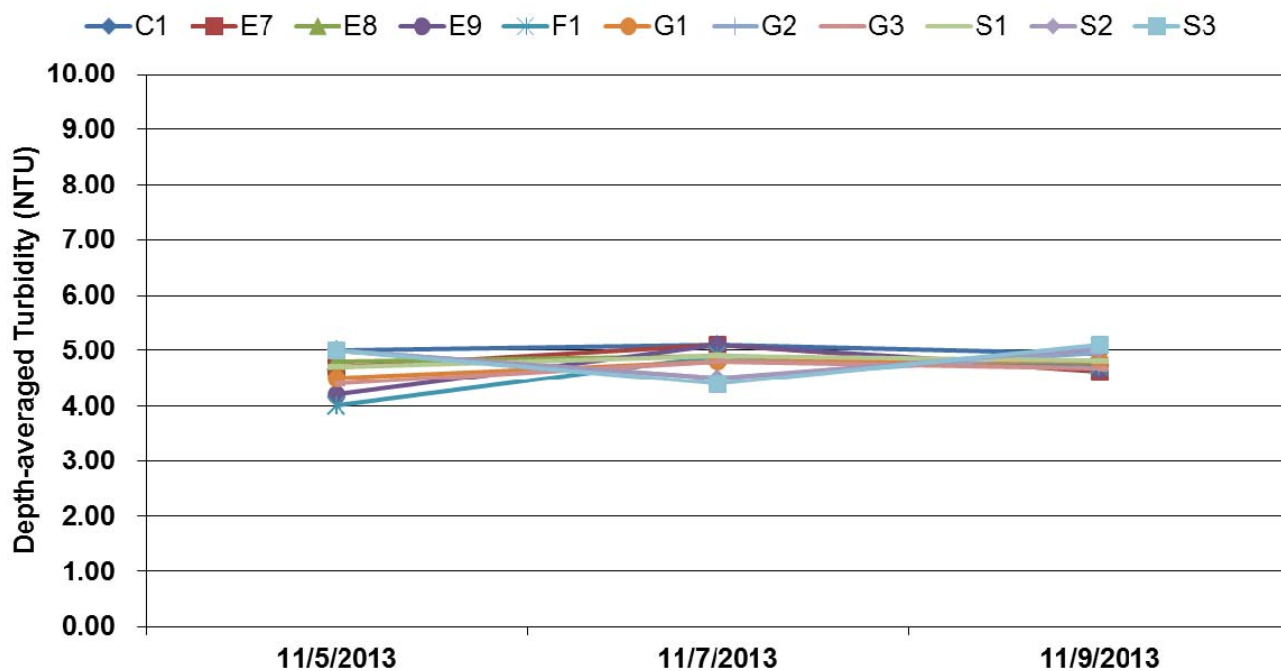


Figure D3 Dissolved oxygen (mg/L) at bottom of water column measured during the baseline update monitoring period from 5 November to 9 November 2013 for Zone A



Mid-ebb Turbidity (Depth-averaged)



Mid-flood Turbidity (Depth-averaged)

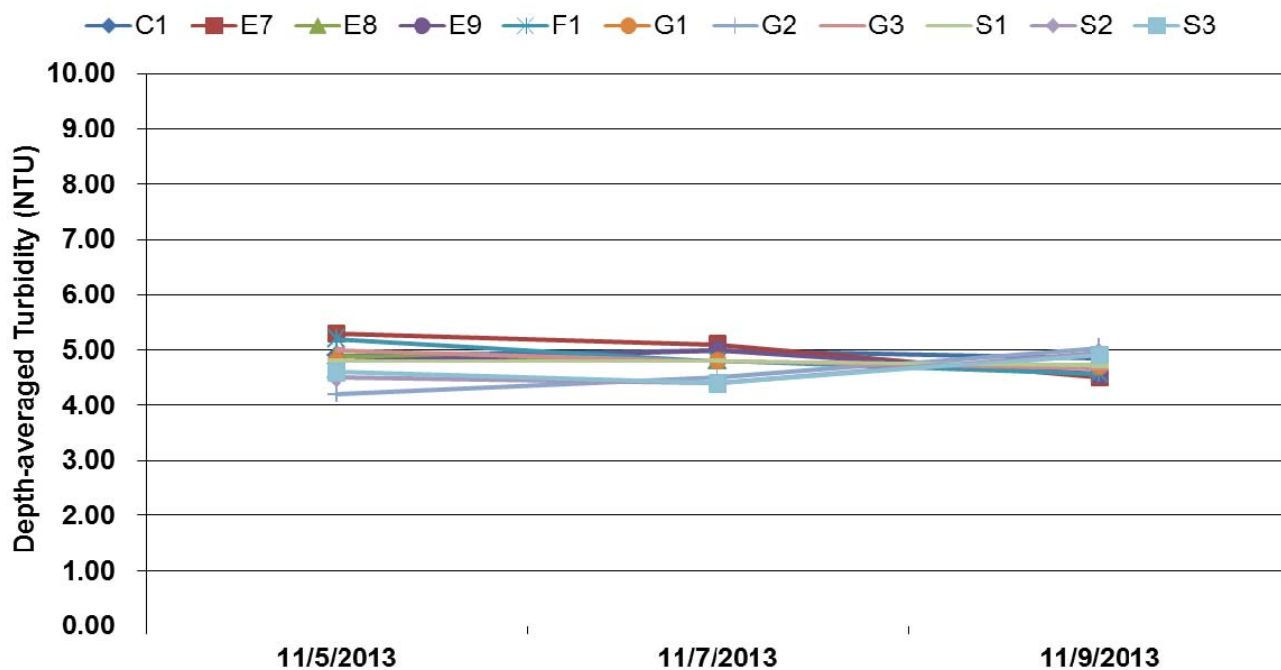
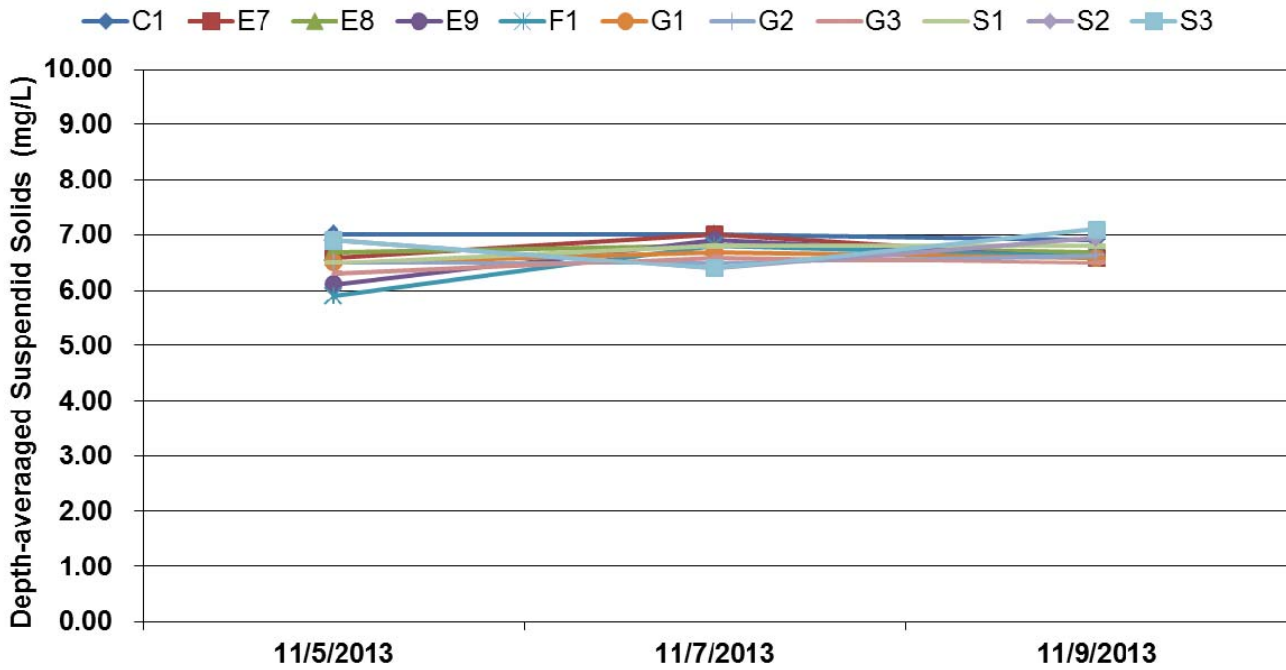


Figure D4 Depth-averaged turbidity (NTU) of water column measured during the baseline update monitoring period from 5 November to 9 November 2013 for Zone A



Mid-ebb Suspended Solids (Depth-averaged)



Mid-flood Suspended Solids (Depth-averaged)

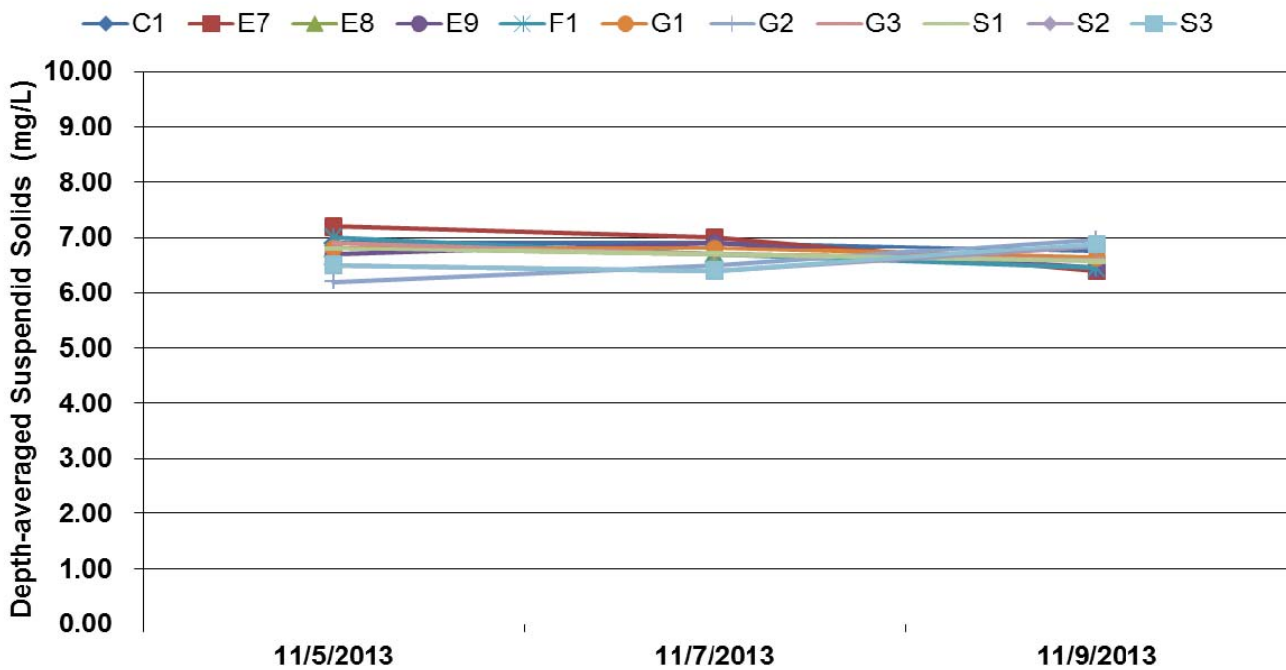


Figure D5 Depth-averaged suspended solid (mg/L) of water column measured during the baseline update monitoring period from 5 November to 9 November 2013 for Zone A



Date: 5-Nov-13
Tide: Mid-Flood
Weather: Cloudy
Sea Conditions: Small Wave
Zone A

Location	Sampling Time	Water Depth (m)	Current direction	Current speed (ms ⁻¹)	Monitoring Depth	Temperature (°C)				Salinity (ppt)				DO (mg/l)				DO Saturation (%)				Turbidity (NTU)					Suspended Solids (mg/l)				
						1	2	3	Ave.*	1	2	3	Ave.*	1	2	3	Ave.*	1	2	3	Ave.*	1	2	3	Ave.*	D.A.**	1	2	3	Ave.*	D.A.**
C1	0735-0750	34.0	W	0.8	Surface	25.0	25.0	24.9	25.0	29.1	29.1	29.1	29.1	6.2	6.1	6.2	6.2	88.4	87.6	88.2	88.1	4.2	4.2	4.3	4.2		6.2	6.3	6.4	6.3	
					Middle	24.9	25.0	25.0	25.0	29.1	29.1	29.1	29.1	6.0	6.1	6.1	6.1	85.9	86.3	86.9	86.4	5.1	5.1	5.2	5.1	4.9	6.9	7.2	7.1	7.1	6.9
					Bottom	25.1	25.1	25.0	25.1	29.2	29.3	29.3	29.3	5.9	5.9	5.9	5.9	84.6	84.5	84.2	84.4	5.2	5.3	5.3	5.3		7.4	7.2	7.5	7.4	
E8	0754-0809	19.0	W	0.7	Surface	24.9	24.9	24.8	24.9	29.2	29.1	29.1	29.1	6.2	6.1	6.2	6.1	88.2	87.2	87.7	87.7	4.1	4.2	4.1	4.1		6.0	6.2	6.1	6.1	
					Middle	25.0	25.0	25.0	25.0	29.2	29.2	29.2	29.2	6.1	6.1	6.1	6.1	87.0	87.6	87.1	87.2	5.1	5.1	5.0	5.1	4.9	7.2	7.0	7.0	7.1	6.8
					Bottom	25.1	25.1	25.1	25.1	29.3	29.3	29.2	29.3	6.0	6.0	5.9	6.0	85.2	85.3	84.5	85.0	5.3	5.4	5.4	5.4		7.4	7.3	7.3	7.3	
S1	0813-0827	9.4	W	0.6	Surface	24.9	24.9	24.9	24.9	29.2	29.2	29.1	29.2	6.1	6.0	6.1	6.1	86.9	86.0	85.6	86.2	4.4	4.4	4.4	4.4		6.5	6.4	6.4	6.4	
					Middle	25.0	25.0	25.0	25.0	29.2	29.1	29.1	29.1	5.9	6.0	5.9	5.9	84.5	85.2	84.3	84.7	4.9	5.0	5.0	5.0	4.8	6.8	6.9	6.9	6.9	6.8
					Bottom	25.1	25.1	25.1	25.1	29.2	29.3	29.3	29.3	5.9	5.8	5.8	5.8	83.6	83.3	83.0	83.3	5.1	5.2	5.1	5.1		7.2	7.0	7.1	7.1	
G1	0831-0846	12.0	W	0.6	Surface	24.9	24.9	24.9	24.9	29.1	29.1	29.1	29.1	6.1	6.1	6.1	6.1	87.5	87.0	86.7	87.1	4.6	4.7	4.7	4.7		6.6	6.6	6.7	6.6	
					Middle	25.0	25.0	25.0	25.0	29.1	29.2	29.2	29.2	6.0	5.9	6.0	6.0	85.3	84.5	85.0	84.9	4.7	4.7	4.6	4.7	4.8	6.5	6.9	6.4	6.6	6.8
					Bottom	25.1	25.1	25.0	25.1	29.3	29.3	29.2	29.3	5.9	5.9	5.9	5.9	84.7	84.5	84.6	84.6	5.0	5.0	5.0	5.0		6.9	7.2	7.1	7.1	
E7	0850-0905	12.8	W	0.5	Surface	24.9	25.0	25.0	25.0	29.1	29.2	29.2	29.2	6.1	6.1	6.1	6.1	86.6	87.3	87.6	87.2	4.8	4.7	4.8	4.8		6.8	6.4	6.7	6.6	
					Middle	25.0	25.0	25.0	25.0	29.1	29.1	29.1	29.1	6.1	6.2	6.2	6.2	87.2	87.7	88.3	87.7	5.5	5.4	5.4	5.4	5.3	7.4	7.4	7.2	7.3	7.2
					Bottom	25.1	25.1	25.1	25.1	29.2	29.2	29.2	29.2	6.1	6.0	6.1	6.1	86.5	85.8	86.7	86.3	5.9	5.8	5.7	5.8		7.9	7.6	7.7	7.7	
F1	0910-0925	12.4	W	0.6	Surface	24.9	24.9	24.9	24.9	29.1	29.1	29.2	29.1	6.1	6.0	6.0	6.1	87.0	85.9	86.2	86.4	4.2	4.2	4.2	4.2		6.1	6.2	6.2	6.2	
					Middle	25.0	25.0	25.1	25.0	29.2	29.2	29.2	29.2	5.9	6.0	5.9	5.9	84.7	85.5	84.3	84.8	5.6	5.7	5.7	5.7	5.2	7.4	7.4	7.6	7.5	7.0
					Bottom	25.0	25.0	25.0	25.0	29.3	29.3	29.3	29.3	5.9	5.9	6.0	6.0	84.2	84.7	85.7	84.9	5.7	5.8	5.8	5.8		7.5	7.6	7.4	7.5	
G3	0929-0943	14.0	W	0.6	Surface	24.9	24.9	25.0	24.9	29.2	29.1	29.1	29.1	6.0	6.0	6.0	6.0	85.9	86.0	85.6	85.8	4.4	4.4	4.5	4.4		6.3	6.6	6.4	6.4	
					Middle	25.0	25.0	25.0	25.0	29.3	29.2	29.3	29.3	5.9	5.8	5.9	5.9	83.9	83.0	84.2	83.7	4.7	4.7	4.7	4.7	5.0	6.5	6.6	6.8	6.6	6.9
					Bottom	25.1	25.1	25.1	25.1	29.3	29.2	29.3	29.3	5.8	5.7	5.7	5.7	82.3	81.9	81.6	81.9	5.8	5.7	5.8	5.8		7.8	7.6	7.7	7.7	
E9	0948-1003	19.0	W	0.5	Surface	24.9	24.9	24.9	24.9	29.0	29.0	29.1	29.0	6.1	6.1	6.2	6.1	87.6	87.2	88.0	87.6	4.6	4.7	4.7	4.7		6.4	6.5	6.7	6.5	
					Middle	24.9	24.9	25.0	24.9	29.3	29.2	29.2	29.2	6.0	6.0	6.0	6.0	85.7	86.0	86.2	86.0	4.9	4.9	5.0	4.9	4.8	6.8	6.9	7.1	6.9	6.7
					Bottom	25.2	25.1	25.1	25.1	29.3	29.3	29.3	29.3	5.8	5.9	5.8	5.8	83.0	83.6	82.9	83.2	4.8	4.9	4.9	4.9		6.6	6.8	6.9	6.8	
S2	1007-1021	11.4	W	0.6	Surface	24.9	24.9	25.0	24.9	29.1	29.1	29.1	29.1	6.0	6.0	5.9	6.0	85.0	85.5	84.6	85.0	4.2	4.1	4.1	4.1		6.1	6.0	6.0	6.0	
					Middle	25.0	25.0	25.0	25.0	29.2	29.2	29.3	29.2	6.0	5.9	5.9	5.9	85.0	84.5	84.2	84.6	4.3	4.4	4.4	4.3	4.5	6.2	6.4	6.4	6.3	6.5
					Bottom	25.1	25.1	25.1	25.1	29.3	29.3	29.3	29.3	5.7	5.7	5.7	5.7	81.6	81.0	81.9	81.5	5.0	5.1	4.9	5.0		6.8	7.0	7.2	7.0	
G2	1024-1038	14.0	W	0.8	Surface	25.0	25.0	25.0	25.0	29.1	29.0	29.0	29.0	5.9	6.0	6.0	6.0	84.6	85.9	85.7	85.4	4.1	4.0	4.0	4.0		6.0	6.2	6.0	6.1	
					Middle	25.0	25.1	25.1	25.1	29.2	29.1	29.2	29.2	6.1	6.1	6.1	6.1	86.9	87.6	87.2	87.2	4.1	4.2	4.2	4.2	4.2	6.2	6.0	6.3	6.2	6.2
					Bottom	25.0	25.1	25.1	25.1	29.2	29.3	29.3	29.3	5.9	5.9	5.9	5.9	84.6	84.5	84.3	84.5	4.4	4.4	4.4	4.4		6.4	6.4	6.3	6.4	
S3	1042-1100	10.2	W	0.7	Surface	24.9	24.9	24.9	24.9	29.0	29.0	29.0	29.0	5.9	5.9	5.9	5.9	83.9	84.2	84.7	84.3	4.3	4.3	4.2	4.3		6.2	6.3	6.1	6.2	
					Middle	25.0	25.0	25.0	25.0	29.2	29.2	29.2	29.2	5.9	5.8	5.9	5.9	83.6	82.9	84.0	83.5	4.5	4.5	4.6	4.5	4.6	6.4	6.6	6.5	6.5	6.5
					Bottom	25.1	25.0	25.1	25.1	29.3	29.2	29.3	29.3	5.8	5.9	5.8	5.8	83.3	83.7	82.9	83.3	5.0	5.1	5.1	5.1		6.9	7.0	6.8	6.9	

Remark or Observation:

Note: * Average

** Depth Average

Date: 5-Nov-13
Tide: Mid-Ebb
Weather: Drizzle
Sea Conditions: Small Wave
Zone A

Location	Sampling Time	Water Depth (m)	Current direction	Current speed (ms ⁻¹)	Monitoring Depth	Temperature (°C)				Salinity (ppt)				DO (mg/l)				DO Saturation (%)				Turbidity (NTU)					Suspended Solids (mg/l)				
						1	2	3	Ave.*	1	2	3	Ave.*	1	2	3	Ave.*	1	2	3	Ave.*	1	2	3	Ave.*	D.A.**	1	2	3	Ave.*	D.A.**
C1	1130-1148	35.4	E	0.8	Surface	24.8	24.8	24.8	24.8	29.0	29.0	29.0	29.0	6.3	6.3	6.3	6.3	89.2	89.6	89.1	89.3	4.8	4.9	4.8	4.8		6.8	6.6	6.7	6.7	
					Middle	25.0	25.0	25.0	25.0	29.1	29.1	29.1	29.1	6.2	6.2	6.2	6.2	88.3	87.9	88.1	88.1	4.7	4.7	4.8	4.8	5.0	6.7	6.6	6.9	6.7	7.0
					Bottom	25.1	25.1	25.2	25.1	29.2	29.2	29.2	29.2	6.0	6.1	6.0	6.1	86.2	86.6	86.3	86.4	5.5	5.5	5.6	5.5		7.4	7.5	7.6	7.5	
E8	1155-1212	19.2	E	0.4	Surface	24.9	24.9	24.9	24.9	29.0	29.0	29.0	29.0	6.4	6.3	6.3	6.3	90.8	90.4	90.2	90.5	4.6	4.6	4.6	4.6		6.4	6.3	6.6	6.4	
					Middle	25.0	25.0	25.0	25.0	29.1	29.2	29.2	29.2	6.2	6.2	6.1	6.2	88.8	88.2	87.6	88.2	4.8	4.8	4.8	4.8	4.8	6.8	6.7	6.6	6.7	6.7
					Bottom	25.1	25.1	25.2	25.1	29.2	29.2	29.2	29.2	6.1	6.1	6.1	6.1	87.1	86.5	87.5	87.0	5.0	5.0	5.0	5.0		6.9	7.0	7.0	7.0	
S1	1217-1232	8.8	E	0.4	Surface	24.9	24.9	24.9	24.9	29.0	29.0	29.0	29.0	6.1	6.2	6.1	6.1	87.6	88.0	87.3	87.6	4.3	4.3	4.4	4.3		6.2	6.0	6.4	6.2	
					Middle	25.0	25.0	25.0	25.0	29.1	29.1	29.1	29.1	6.0	5.9	5.9	6.0	85.3	84.8	84.7	84.9	4.7	4.8	4.8	4.8	4.7	6.4	6.3	6.5	6.4	6.5
					Bottom	25.1	25.2	25.2	25.2	29.2	29.2	29.3	29.2	5.9	5.9	6.0	5.9	84.2	84.8	85.2	84.7	5.1	5.1	5.1	5.1		6.8	7.1	7.0	7.0	
G1	1240-1256	10.8	E	0.3	Surface	24.9	24.8	24.8	24.8	29.1	29.1	29.1	29.1	6.2	6.2	6.2	6.2	88.6	89.0	88.3	88.6	4.4	4.4	4.4	4.4		6.2	6.4	6.2	6.3	
					Middle	25.0	25.0	25.0	25.0	29.2	29.2	29.1	29.2	6.0	6.1	6.0	6.1	86.2	86.8	86.2	86.4	4.5	4.4	4.5	4.5	4.5	6.4	6.3	6.5	6.4	6.5
					Bottom	25.1	25.1	25.2	25.1	29.2	29.2	29.2	29.2	6.0	6.0	5.9	6.0	85.2	85.5	84.6	85.1	4.8	4.7	4.8	4.8		6.8	6.6	6.7	6.7	
E7	1303-1319	11.8	E	0.4	Surface	24.9	24.9	24.8	24.9	29.1	29.1	29.1	29.1	6.3	6.3	6.3	6.3	89.9	89.2	89.6	89.6	4.6	4.5	4.5	4.5		6.4	6.5	6.5	6.5	
					Middle	25.1	25.1	25.1	25.1	29.2	29.2	29.2	29.2	6.1	6.0	6.0	6.0	86.6	86.2	85.9	86.2	4.8	4.9	5.0	4.9	4.7	6.4	6.8	6.9	6.7	6.6
					Bottom	25.2	25.2	25.2	25.2	29.2	29.2	29.2	29.2	6.0	5.9	5.9	6.0	85.3	84.8	84.6	84.9	4.7	4.8	4.8	4.8		6.6	6.7	6.7	6.7	
F1	1329-1344	11.2	E	0.3	Surface	24.9	25.0	25.0	25.0	29.1	29.0	29.1	29.1	6.3	6.3	6.2	6.3	89.1	89.6	89.0	89.2	4.0	3.9	4.0	4.0		6.0	5.8	6.0	5.9	
					Middle	25.1	25.2	25.2	25.2	29.2	29.1	29.1	29.1	6.1	6.2	6.2	6.2	87.5	87.9	88.3	87.9	3.8	3.8	3.9	3.8	4.0	5.6	5.8	5.9	5.8	5.9
					Bottom	25.1	25.2	25.2	25.2	29.3	29.2	29.2	29.2	6.0	6.1	6.0	6.0	85.9	86.3	85.5	85.9	4.0	4.1	4.1	4.1		6.0	6.3	6.1	6.1	
G3	1349-1405	13.8	E	0.5	Surface	25.0	25.0	25.1	25.0	29.1	29.1	29.0	29.1	6.4	6.4	6.3	6.4	90.8	91.1	90.4	90.8	4.0	4.1	4.1	4.1		6.0	6.1	6.0	6.0	
					Middle	25.2	25.2	25.2	25.2	29.2	29.2	29.1	29.2	6.1	6.1	6.0	6.1	86.9	86.3	85.8	86.3	4.6	4.5	4.6	4.5	4.4	6.6	6.4	6.4	6.5	6.3
					Bottom	25.2	25.2	25.2	25.2	29.3	29.3	29.2	29.3	6.0	5.9	5.9	5.9	84.9	84.3	84.6	84.6	4.6	4.7	4.6	4.6		6.2	6.4	6.5	6.4	
E9	1415-1431	18.2	E	0.3	Surface	24.9	25.0	25.0	25.0	29.1	29.1	29.1	29.1	6.3	6.3	6.3	6.3	90.0	89.4	89.7	89.7	4.1	4.1	4.2	4.1		6.2	6.0	6.0	6.1	
					Middle	25.1	25.2	25.2	25.2	29.2	29.2	29.2	29.2	6.1	6.1	6.1	6.1	87.0	86.6	87.3	87.0	4.1	4.1	4.1	4.1	4.2	5.8	5.9	6.2	6.0	6.1
					Bottom	25.2	25.1	25.2	25.2	29.3	29.3	29.3	29.3	6.0	6.0	6.0	6.0	85.8	86.1	85.5	85.8	4.3	4.4	4.4	4.4		6.2	6.4	6.4	6.3	
S2	1437-1452	9.8	E	0.3	Surface	25.0	25.0	25.0	25.0	29.1	29.1	29.1	29.1	6.1	6.1	6.1	6.1	87.1	86.7	87.6	87.1	4.7	4.7	4.8	4.7		6.8	6.6	6.5	6.6	
					Middle	25.2	25.1	25.1	25.1	29.2	29.2	29.2	29.2	5.9	5.9	6.0	5.9	84.5	84.3	85.3	84.7	5.1	5.1	5.1	5.1	5.0	7.0	6.9	7.0	7.0	6.9
					Bottom	25.2	25.2	25.1	25.2	29.2	29.3	29.3	29.3	6.0	5.9	5.9	5.9	85.2	84.8	84.5	84.8	5.1	5.2	5.1	5.1		7.1	7.2	7.0	7.1	
G2	1457-1511	12.6	E	0.4	Surface	25.0	24.9	25.0	25.0	29.1	29.0	29.1	29.1	6.0	6.0	6.1	6.0	86.1	85.8	86.7	86.2	4.5	4.6	4.7	4.6		6.4	6.3	6.5	6.4	
					Middle	25.2	25.2	25.1	25.2	29.2	29.1	29.2	29.2	6.0	5.9	5.9	5.9	85.3	84.8	84.5	84.9	5.2	5.2	5.2	5.2	5.0	6.0	6.2	6.3	6.2	6.5
					Bottom	25.2	25.1	25.2	25.2	29.3	29.3	29.2	29.3	5.9	5.9	6.0	5.9	84.2	84.8	85.3	84.8	5.2	5.1	5.1	5.1		7.1	6.9	6.8	6.9	
S3	1516-1530	9.8	E	0.3	Surface	25.0	25.0	24.9	25.0	29.1	29.1	29.1	29.1	6.2	6.2	6.1	6.2	87.7	88.1	87.3	87.7	4.6	4.7	4.7	4.7		6.6	6.5	6.3	6.5	
					Middle	25.2	25.1	25.2	25.2	29.2	29.2	29.1	29.2	6.0	6.1	6.1	6.1	85.9	86.3	86.9	86.4	5.0	5.0	4.9	5.0	5.0	6.9	6.7	7.0	6.9	6.9
					Bottom	25.2	25.2	25.2	25.2	29.3	29.4	29.4	29.4	5.9	5.9	5.9	5.9	84.1	83.7	84.2	84.0	5.3	5.3	5.3	5.3		7.2	7.3	7.2	7.2	

Remark or Observation:

Note: * Aver

** Depth Average

Date: 7-Nov-13
Tide: Mid-Flood
Weather: Cloudy
Sea Conditions: Small Wave
Zone A

Location	Sampling Time	Water Depth (m)	Current direction	Current speed (ms ⁻¹)	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	0800-0816	33.8	W	0.7	Surface	24.8	24.8	24.8	28.8	28.9	28.9	6.3	6.3	6.3	89.3	89.7	89.5	4.4	4.4	4.4	5.0	6.2	6.4	6.3	6.9
					Middle	24.8	24.7	24.8	29.1	29.2	29.2	6.1	6.2	6.1	87.2	87.5	87.4	5.2	5.2	5.2		7.0	7.2	7.1	
					Bottom	24.9	24.9	24.9	29.4	29.4	29.4	5.8	5.8	5.8	82.0	82.4	82.2	5.6	5.5	5.5		7.4	7.3	7.4	
E8	0821-0837	19.2	W	0.5	Surface	24.8	24.8	24.8	28.9	28.9	28.9	6.2	6.2	6.2	88.4	88.7	88.6	4.1	4.1	4.1	4.8	6.0	6.2	6.1	6.7
					Middle	24.9	24.8	24.9	29.1	29.1	29.1	6.2	6.1	6.1	87.6	87.1	87.4	5.1	5.1	5.1		6.9	6.8	6.9	
					Bottom	24.9	25.0	25.0	29.3	29.2	29.3	5.9	5.9	5.9	83.8	84.1	84.0	5.3	5.3	5.3		7.0	7.3	7.2	
S1	0841-0857	9.2	W	0.4	Surface	24.8	24.8	24.8	29.0	28.9	29.0	6.2	6.2	6.2	87.9	87.7	87.8	4.5	4.5	4.5	4.8	6.4	6.3	6.4	6.7
					Middle	24.7	24.8	24.8	29.0	29.0	29.0	6.1	6.1	6.1	86.8	86.4	86.6	4.9	4.9	4.9		6.7	6.9	6.8	
					Bottom	24.9	24.9	24.9	29.2	29.2	29.2	5.9	5.9	5.9	84.4	84.0	84.2	5.1	5.1	5.1		7.0	7.1	7.1	
G1	0904-0920	11.4	W	0.4	Surface	24.8	24.8	24.8	29.0	29.0	29.0	6.3	6.3	6.3	88.9	89.2	89.1	4.6	4.6	4.6	4.8	6.5	6.6	6.6	6.8
					Middle	24.8	24.9	24.9	29.0	29.1	29.1	6.1	6.0	6.0	86.2	85.8	86.0	4.7	4.8	4.7		6.8	6.7	6.8	
					Bottom	24.9	24.8	24.9	29.1	29.2	29.2	6.0	6.0	6.0	85.1	84.7	84.9	5.0	5.0	5.0		7.0	6.9	7.0	
E7	0927-0944	12.6	W	0.4	Surface	24.8	24.9	24.9	28.9	28.9	28.9	6.2	6.2	6.2	87.7	88.0	87.9	4.6	4.7	4.6	5.1	6.4	6.5	6.5	7.0
					Middle	24.8	24.8	24.8	29.0	29.0	29.0	6.1	6.1	6.1	86.9	86.4	86.7	5.0	5.1	5.0		6.8	7.0	6.9	
					Bottom	24.7	24.7	24.7	29.1	29.2	29.2	5.9	5.9	5.9	84.5	84.2	84.4	5.5	5.6	5.6		7.6	7.5	7.6	
F1	0954-1010	11.8	W	0.6	Surface	24.9	24.9	24.9	28.9	29.0	29.0	6.2	6.2	6.2	88.7	88.4	88.6	4.3	4.3	4.3	4.8	6.0	6.2	6.1	6.7
					Middle	24.9	24.8	24.9	29.0	29.1	29.1	6.1	6.1	6.1	86.7	87.4	87.1	4.7	4.6	4.7		6.5	6.4	6.5	
					Bottom	24.8	24.7	24.8	29.1	29.2	29.2	5.9	5.9	5.9	83.7	84.1	83.9	5.5	5.5	5.5		7.4	7.5	7.5	
G3	1014-1030	13.6	W	0.6	Surface	24.8	24.9	24.9	28.7	28.8	28.8	6.3	6.3	6.3	89.4	89.9	89.2	4.2	4.3	4.2	4.8	6.2	6.3	6.3	6.7
					Middle	24.8	24.8	24.8	28.9	29.0	29.0	6.0	6.0	6.0	85.5	85.8	85.7	4.6	4.6	4.6		6.5	6.4	6.5	
					Bottom	24.8	24.9	24.9	29.1	29.2	29.2	5.8	5.8	5.8	83.1	82.8	83.0	5.4	5.5	5.5		7.2	7.3	7.3	
E9	1038-1055	18.4	W	0.5	Surface	24.8	24.9	24.9	28.9	29.0	29.0	6.3	6.3	6.3	89.5	89.8	89.7	4.6	4.5	4.6	5.0	6.4	6.5	6.5	6.9
					Middle	24.8	24.7	24.8	29.2	29.3	29.3	6.1	6.1	6.1	86.8	87.4	87.1	5.0	5.1	5.0		7.0	6.9	7.0	
					Bottom	24.8	24.7	24.8	29.4	29.3	29.4	5.9	5.9	5.9	84.4	83.8	84.1	5.4	5.4	5.4		7.1	7.2	7.2	
S2	1102-1118	10.6	W	0.5	Surface	24.8	24.8	24.8	28.9	29.0	29.0	6.2	6.3	6.3	88.8	89.2	89.0	4.3	4.3	4.3	4.4	6.2	6.3	6.3	6.4
					Middle	24.8	24.8	24.8	29.0	29.1	29.1	6.2	6.2	6.2	88.2	88.5	88.4	4.2	4.2	4.2		6.0	6.2	6.1	
					Bottom	24.8	24.8	24.8	29.1	29.2	29.2	6.1	6.1	6.1	87.2	86.8	87.0	4.8	4.9	4.8		6.8	6.7	6.8	
G2	1123-1140	12.4	W	0.5	Surface	24.9	24.8	24.9	29.0	28.9	29.0	6.2	6.2	6.2	88.4	87.9	88.2	4.2	4.2	4.2	4.5	6.2	6.0	6.1	6.5
					Middle	24.9	24.8	24.9	29.1	29.1	29.1	6.1	6.0	6.1	86.2	85.9	86.1	4.4	4.5	4.4		6.4	6.5	6.5	
					Bottom	24.8	24.8	24.8	29.1	29.2	29.2	5.9	5.9	5.9	83.5	84.0	83.8	4.7	4.8	4.7		6.9	6.8	6.9	
S3	1145-1200	9.6	W	0.4	Surface	24.9	24.8	24.9	28.8	28.8	28.8	6.1	6.1	6.1	86.1	86.5	86.3	4.3	4.3	4.3	4.4	6.2	6.3	6.3	6.4
					Middle	24.8	24.8	24.8	29.0	29.0	29.0	6.0	6.0	6.0	85.5	85.4	85.5	4.1	4.1	4.1		6.0	6.2	6.1	
					Bottom	24.8	24.7	24.8	29.2	29.2	29.2	5.9	5.9	5.9	84.1	83.9	84.0	4.7	4.7	4.7		6.8	6.7	6.8	

Remark or Observation:

Note: * Average

** Depth Average

Date: 7-Nov-13
Tide: Mid-Ebb
Weather: Cloudy
Sea Conditions: Small Wave
Zone A

Location	Sampling Time	Water Depth (m)	Current direction	Current speed (ms ⁻¹)	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	1310-1314	33.4	E	0.7	Surface	24.9	24.9	24.9	28.8	28.9	28.9	6.2	6.3	6.2	88.5	89.0	88.8	4.4	4.5	4.5		6.4	6.2	6.3	
					Middle	24.8	24.8	24.8	29.1	29.2	29.2	6.1	6.1	6.1	86.4	86.7	86.6	5.3	5.2	5.3	5.1	7.0	7.2	7.1	7.0
					Bottom	24.9	25.0	25.0	29.4	29.4	29.4	5.8	5.8	5.8	82.2	82.5	82.4	5.5	5.4	5.5		7.5	7.4	7.5	
E8	1319-1333	18.6	E	0.4	Surface	24.9	25.0	25.0	28.9	29.0	29.0	6.2	6.2	6.2	87.5	87.9	87.7	4.1	4.2	4.2		6.2	6.1	6.2	
					Middle	25.0	24.9	25.0	29.1	29.0	29.1	6.1	6.1	6.1	86.9	86.3	86.6	5.2	5.1	5.2	4.9	6.9	7.1	7.0	6.8
					Bottom	25.1	25.1	25.1	29.2	29.2	29.2	5.8	5.9	5.9	83.1	83.4	83.3	5.3	5.3	5.3		7.3	7.0	7.2	
S1	1338-1352	8.8	E	0.3	Surface	24.9	24.9	24.9	29.1	29.0	29.1	6.1	6.1	6.1	87.2	86.9	87.1	4.6	4.5	4.6		6.3	6.6	6.5	
					Middle	24.9	25.0	25.0	29.1	29.0	29.1	6.1	6.0	6.0	86.2	85.5	85.9	4.9	5.0	4.9	4.9	7.0	6.9	7.0	6.8
					Bottom	25.0	25.0	25.0	29.3	29.2	29.3	5.9	5.8	5.9	83.5	83.1	83.3	5.1	5.2	5.1		7.0	7.2	7.1	
G1	1357-1411	11.2	E	0.3	Surface	25.0	24.9	25.0	29.1	29.0	29.1	6.2	6.2	6.2	88.2	88.4	88.3	4.6	4.7	4.7		6.4	6.6	6.5	
					Middle	25.0	25.1	25.1	29.2	29.2	29.2	6.0	6.0	6.0	85.4	85.0	85.2	4.8	4.8	4.8	4.8	6.7	6.8	6.8	6.7
					Bottom	25.0	24.9	25.0	29.3	29.3	29.3	5.9	5.9	5.9	84.3	84.0	84.2	5.0	5.1	5.1		6.9	6.8	6.9	
E7	1416-1430	12.2	E	0.3	Surface	24.9	24.9	24.9	28.9	28.9	28.9	6.1	6.1	6.1	87.0	87.3	87.2	4.7	4.7	4.7		6.6	6.7	6.7	
					Middle	24.8	24.9	24.9	28.9	29.0	29.0	6.1	6.0	6.0	86.2	85.5	85.9	5.0	5.1	5.1	5.1	7.0	6.9	7.0	7.0
					Bottom	24.8	24.8	24.8	29.2	29.1	29.2	5.8	5.8	5.8	82.4	82.1	82.3	5.6	5.7	5.6		7.4	7.5	7.5	
F1	1435-1449	11.4	E	0.5	Surface	25.0	25.0	25.0	28.8	28.9	28.9	6.2	6.2	6.2	87.9	87.5	87.7	4.3	4.4	4.4		6.2	6.2	6.2	
					Middle	24.9	25.0	25.0	28.9	29.0	29.0	6.0	6.1	6.1	85.6	86.0	85.8	4.8	4.7	4.7	4.9	6.6	6.8	6.7	6.8
					Bottom	24.8	24.8	24.8	29.1	29.2	29.2	5.8	5.9	5.8	82.9	83.4	83.2	5.5	5.6	5.6		7.4	7.5	7.5	
G3	1455-1509	13.2	E	0.5	Surface	24.9	24.9	24.9	28.9	28.9	28.9	6.2	6.2	6.2	88.5	88.1	88.3	4.3	4.3	4.3		6.2	6.2	6.2	
					Middle	24.8	24.8	24.8	29.0	29.1	29.1	6.0	6.0	6.0	84.8	85.1	85.0	4.7	4.6	4.6	4.8	6.4	6.3	6.4	6.6
					Bottom	24.7	24.8	24.8	29.2	29.3	29.3	5.8	5.8	5.8	82.8	82.2	82.5	5.5	5.6	5.5		7.2	7.3	7.3	
E9	1514-1528	17.8	E	0.4	Surface	24.9	24.8	24.9	28.9	28.8	28.9	6.2	6.3	6.3	88.8	89.0	88.9	4.6	4.6	4.6		6.5	6.6	6.6	
					Middle	24.8	24.8	24.8	28.9	29.0	29.0	6.1	6.1	6.1	86.1	86.7	86.4	5.1	5.1	5.1	5.1	6.9	6.9	6.9	6.9
					Bottom	24.7	24.7	24.7	29.1	29.1	29.1	5.8	5.9	5.9	83.2	83.7	83.5	5.4	5.5	5.5		7.2	7.5	7.4	
S2	1533-1547	10.4	E	0.5	Surface	24.9	24.8	24.9	29.0	29.0	29.0	6.2	6.2	6.2	88.0	88.2	88.1	4.4	4.4	4.4		6.4	6.2	6.3	
					Middle	24.7	24.8	24.8	29.0	29.0	29.0	6.2	6.2	6.2	87.5	87.8	87.7	4.2	4.3	4.2	4.5	6.0	6.1	6.1	6.4
					Bottom	24.8	24.8	24.8	29.1	29.2	29.2	6.1	6.1	6.1	86.6	86.2	86.4	4.8	4.9	4.9		6.7	6.8	6.8	
G2	1552-1606	11.8	E	0.4	Surface	24.9	24.9	24.9	29.0	28.9	29.0	6.2	6.1	6.1	87.6	87.2	87.4	4.3	4.3	4.3		6.0	6.2	6.1	
					Middle	24.8	24.7	24.8	29.0	29.0	29.0	6.0	6.1	6.0	85.3	86.7	86.0	4.5	4.5	4.5	4.5	6.4	6.6	6.5	6.5
					Bottom	24.7	24.7	24.7	29.1	29.1	29.1	5.8	5.9	5.8	82.8	83.3	83.1	4.8	5.0	4.9		6.7	6.9	6.8	
S3	1620-1640	9.4	E	0.3	Surface	24.9	24.8	24.9	28.9	28.8	28.9	6.0	6.0	6.0	85.4	85.8	85.6	4.4	4.4	4.4		6.2	6.4	6.3	
					Middle	24.8	24.8	24.8	29.0	29.0	29.0	6.0	6.0	6.0	84.8	84.6	84.7	4.1	4.2	4.2	4.4	6.0	6.2	6.1	6.4
					Bottom	24.8	24.7	24.8	29.2	29.2	29.2	5.9	5.9	5.9	83.4	83.3	83.4	4.8	4.8	4.8		6.7	6.8	6.8	

Remark or Observation:

Note: * Average

** Depth Average

Date: 9-Nov-13
Tide: Mid-Flood
Weather: Fine
Sea Conditions: Small Wave
Zone A

Location	Sampling Time	Water Depth (m)	Current direction	Current speed (ms ⁻¹)	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	1030-1050	36.8	W	0.5	Surface	25.4	25.3	25.4	26.3	26.3	26.3	6.3	6.3	6.3	90.2	89.7	90.0	5.1	5.0	5.0		7.0	6.9	7.0	
					Middle	25.2	25.2	25.2	26.9	26.8	26.9	6.1	6.0	6.1	86.5	86.1	86.3	4.8	4.9	4.9	4.9	6.7	6.6	6.7	6.8
					Bottom	25.2	25.1	25.2	27.0	27.1	27.1	5.9	5.9	5.9	84.7	84.1	84.4	4.7	4.6	4.7		6.5	6.8	6.7	
E8	1058-1115	19.8	W	0.6	Surface	25.3	25.3	25.3	26.4	26.3	26.4	6.5	6.5	6.5	91.8	92.1	92.0	4.4	4.4	4.4		6.2	6.4	6.3	
					Middle	25.2	25.2	25.2	26.9	26.9	26.9	6.1	6.1	6.1	87.2	86.6	86.9	4.9	4.9	4.9	4.7	6.9	6.7	6.8	6.6
					Bottom	25.1	25.1	25.1	27.0	27.0	27.0	5.9	6.0	5.9	84.3	84.7	84.5	4.8	4.7	4.7		6.8	6.6	6.7	
S1	1121-1137	10.2	W	0.3	Surface	25.4	25.4	25.4	26.4	26.4	26.4	6.3	6.3	6.3	89.5	90.1	89.8	4.5	4.6	4.6		6.4	6.3	6.4	
					Middle	25.3	25.2	25.3	26.9	26.8	26.9	5.9	5.9	5.9	84.6	84.0	84.3	4.7	4.7	4.7	4.7	6.5	6.6	6.6	6.6
					Bottom	25.2	25.2	25.2	27.1	27.1	27.1	5.9	5.8	5.9	83.8	83.2	83.5	4.8	4.9	4.9		6.8	6.8	6.8	
G1	1143-1158	11.4	W	0.4	Surface	25.4	25.4	25.4	26.4	26.3	26.4	6.4	6.4	6.4	90.8	90.4	90.6	4.6	4.6	4.6		6.5	6.4	6.5	
					Middle	25.3	25.3	25.3	26.9	26.9	26.9	6.0	6.0	6.0	85.0	85.3	85.2	4.8	4.7	4.8	4.7	6.8	6.7	6.8	6.6
					Bottom	25.2	25.2	25.2	27.0	27.1	27.1	5.7	5.8	5.8	81.7	82.3	82.0	4.8	4.8	4.8		6.8	6.6	6.7	
E7	1206-1222	12.6	W	0.3	Surface	25.4	25.4	25.4	26.4	26.5	26.5	6.4	6.4	6.4	91.2	90.9	91.1	4.2	4.1	4.1		6.0	6.2	6.1	
					Middle	25.3	25.3	25.3	26.8	26.9	26.9	6.1	6.2	6.1	87.1	87.5	87.3	4.6	4.6	4.6	4.5	6.4	6.5	6.5	6.4
					Bottom	25.2	25.2	25.2	27.1	27.0	27.1	5.7	5.7	5.7	81.8	81.2	81.5	4.8	4.8	4.8		6.6	6.7	6.7	
F1	1227-1242	11.8	W	0.4	Surface	25.4	25.3	25.4	26.5	26.5	26.5	6.6	6.5	6.6	93.5	93.1	93.3	4.4	4.4	4.4		6.3	6.2	6.3	
					Middle	25.3	25.2	25.3	27.0	27.0	27.0	6.0	6.0	6.0	86.0	85.6	85.8	4.4	4.5	4.5	4.6	6.4	6.4	6.4	6.5
					Bottom	25.2	25.1	25.2	27.1	27.1	27.1	5.9	5.9	5.9	84.5	84.1	84.3	4.8	4.9	4.8		6.8	6.6	6.7	
G3	1249-1304	15.2	W	0.4	Surface	25.4	25.4	25.4	26.5	26.4	26.5	6.5	6.4	6.5	92.2	91.7	92.0	4.5	4.5	4.5		6.4	6.3	6.4	
					Middle	25.2	25.2	25.2	27.0	27.0	27.0	6.1	6.1	6.1	86.7	86.2	86.5	4.8	4.8	4.8	4.7	6.7	6.8	6.8	6.6
					Bottom	25.1	25.1	25.1	27.1	27.2	27.2	5.8	5.8	5.8	82.7	82.0	82.4	4.7	4.7	4.7		6.6	6.8	6.7	
E9	1310-1325	18.8	W	0.5	Surface	25.4	25.4	25.4	26.5	26.5	26.5	6.4	6.3	6.4	90.7	90.4	90.6	4.5	4.6	4.5		6.3	6.4	6.4	
					Middle	25.3	25.2	25.3	27.0	26.9	27.0	6.0	6.0	6.0	85.2	84.7	85.0	4.6	4.6	4.6	4.6	6.6	6.5	6.6	6.5
					Bottom	25.2	25.1	25.2	27.2	27.2	27.2	5.8	5.8	5.8	82.8	82.4	82.6	4.5	4.6	4.5		6.4	6.5	6.5	
S2	1330-1345	10.6	W	0.4	Surface	25.4	25.4	25.4	26.5	26.5	26.5	6.4	6.3	6.4	90.8	90.2	90.5	4.8	4.9	4.8		6.8	6.7	6.8	
					Middle	25.3	25.2	25.3	27.0	27.0	27.0	5.9	5.9	5.9	84.4	83.9	84.2	5.0	5.1	5.1	5.0	6.9	6.8	6.9	6.8
					Bottom	25.1	25.2	25.2	27.1	27.1	27.1	6.0	6.0	6.0	84.8	85.2	85.0	5.0	4.9	5.0		7.0	6.8	6.9	
G2	1350-1406	13.2	W	0.4	Surface	25.4	25.4	25.4	26.5	26.4	26.5	6.4	6.4	6.4	91.2	91.7	91.5	4.9	5.0	5.0		6.9	7.1	7.0	
					Middle	25.2	25.2	25.2	26.9	27.0	27.0	6.0	5.9	6.0	85.2	84.6	84.9	5.1	5.1	5.1	5.0	7.1	6.9	7.0	7.0
					Bottom	25.2	25.2	25.2	27.2	27.1	27.2	5.9	5.9	5.9	84.1	84.5	84.3	5.0	5.1	5.1		6.8	7.0	6.9	
S3	1413-1430	10.8	W	0.3	Surface	25.4	25.4	25.4	26.5	26.5	26.5	6.3	6.2	6.3	89.2	88.8	89.0	4.8	4.8	4.8		6.8	6.7	6.8	
					Middle	25.2	25.2	25.2	27.0	27.0	27.0	6.0	6.0	6.0	85.7	86.0	85.9	4.9	4.9	4.9	4.9	6.9	6.8	6.9	6.9
					Bottom	25.1	25.1	25.1	27.2	27.2	27.2	5.8	5.9	5.9	83.2	83.7	83.5	5.1	5.0	5.0		7.0	7.1	7.1	

Remark or Observation:

Note: * Average

** Depth Average

Date: 9-Nov-13
Tide: Mid-Ebb
Weather: Fine
Sea Conditions: Small Wave
Zone A

Location	Sampling Time	Water Depth (m)	Current direction	Current speed (ms ⁻¹)	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	1530-1542	36.5	W	0.5	Surface	25.4	25.5	25.5	26.4	26.4	26.4	6.3	6.2	6.2	88.9	88.0	88.5	5.1	5.1	5.1		7.0	7.2	7.1	
					Middle	25.4	25.4	25.4	26.8	26.9	26.9	6.0	6.0	6.0	84.9	85.2	85.1	4.9	4.9	4.9	4.9	6.9	6.9	6.9	6.9
					Bottom	25.2	25.3	25.3	27.0	27.1	27.1	5.8	5.8	5.8	83.2	82.9	83.1	4.8	4.8	4.8		6.7	6.8	6.8	
E8	1540-1558	19.6	W	0.4	Surface	25.5	25.5	25.5	26.4	26.5	26.5	6.3	6.3	6.3	89.9	90.2	90.1	4.5	4.5	4.5		6.4	6.2	6.3	
					Middle	25.4	25.3	25.4	26.9	26.8	26.9	6.0	6.0	6.0	86.1	85.6	85.9	5.0	5.0	5.0	4.8	6.9	7.0	7.0	6.7
					Bottom	25.2	25.1	25.2	27.0	27.0	27.0	5.9	5.9	5.9	83.6	83.3	83.5	4.8	4.8	4.8		6.8	6.8	6.8	
S1	1602-1614	10.0	W	0.4	Surface	25.6	25.5	25.6	26.3	26.4	26.4	6.1	6.1	6.1	86.9	87.3	87.1	4.6	4.6	4.6		6.4	6.6	6.5	
					Middle	25.4	25.4	25.4	26.8	26.8	26.8	6.0	6.1	6.0	85.4	86.4	85.9	4.8	4.8	4.8	4.8	6.8	6.9	6.9	6.8
					Bottom	25.1	25.2	25.2	27.1	27.0	27.1	5.7	5.7	5.7	81.6	81.2	81.4	5.0	5.0	5.0		7.0	7.1	7.1	
G1	1618-1630	11.1	W	0.3	Surface	25.5	25.4	25.5	26.4	26.5	26.5	6.3	6.3	6.3	89.4	89.7	89.6	4.8	4.8	4.8		6.4	6.5	6.5	
					Middle	25.3	25.4	25.4	26.8	26.9	26.9	5.8	5.9	5.9	83.2	83.6	83.4	4.8	4.9	4.8	4.8	6.8	6.7	6.8	6.6
					Bottom	25.2	25.2	25.2	27.1	27.1	27.1	5.6	5.6	5.6	80.0	80.3	80.2	4.8	4.8	4.8		6.6	6.5	6.6	
E7	1634-1646	12.3	W	0.3	Surface	25.5	25.4	25.5	26.5	26.5	26.5	6.3	6.3	6.3	89.7	89.8	89.8	4.3	4.3	4.3		6.2	6.1	6.2	
					Middle	25.4	25.3	25.4	26.8	26.9	26.9	6.0	6.0	6.0	85.0	85.9	85.5	4.7	4.7	4.7	4.6	6.8	6.7	6.8	6.6
					Bottom	25.2	25.2	25.2	27.0	27.1	27.1	5.6	5.6	5.6	80.2	79.7	80.0	4.8	4.9	4.8		6.8	6.9	6.9	
F1	1650-1702	11.6	W	0.4	Surface	25.4	25.4	25.4	26.4	26.5	26.5	6.5	6.4	6.5	91.9	91.6	91.8	4.5	4.5	4.5		6.3	6.4	6.4	
					Middle	25.3	25.4	25.4	26.9	26.9	26.9	5.9	5.9	5.9	84.6	84.4	84.5	4.6	4.6	4.6	4.7	6.5	6.6	6.6	6.6
					Bottom	25.2	25.1	25.2	27.1	27.0	27.1	5.8	5.9	5.9	83.2	83.4	83.3	5.0	5.0	5.0		7.0	6.9	7.0	
G3	1706-1718	15.0	W	0.4	Surface	25.3	25.4	25.4	26.5	26.4	26.5	6.4	6.4	6.4	90.6	90.3	90.5	4.5	4.6	4.5		6.2	6.3	6.3	
					Middle	25.3	25.3	25.3	27.0	26.9	27.0	5.9	5.9	5.9	84.8	84.2	84.5	4.6	4.6	4.6	4.7	6.5	6.6	6.6	6.5
					Bottom	25.2	25.1	25.2	27.1	27.1	27.1	5.8	5.8	5.8	82.7	82.5	82.6	4.8	4.9	4.9		6.7	6.7	6.7	
E9	1722-1734	18.5	W	0.5	Surface	25.4	25.3	25.4	26.4	26.5	26.5	6.3	6.3	6.3	89.0	89.4	89.2	4.7	4.7	4.7		6.6	6.4	6.5	
					Middle	25.3	25.2	25.3	26.9	26.8	26.9	5.9	5.9	5.9	83.6	83.4	83.5	4.7	4.7	4.7	4.7	6.5	6.8	6.7	6.6
					Bottom	25.1	25.2	25.2	27.0	27.1	27.1	5.7	5.7	5.7	81.6	81.1	81.4	4.6	4.7	4.7		6.7	6.5	6.6	
S2	1738-1750	10.3	W	0.4	Surface	25.4	25.4	25.4	26.4	26.5	26.5	6.3	6.3	6.3	89.4	89.7	89.6	4.9	5.0	4.9		6.9	6.9	6.9	
					Middle	25.3	25.2	25.3	26.8	26.8	26.8	5.9	5.9	5.9	83.9	83.6	83.8	5.1	5.1	5.1	5.0	7.0	7.2	7.1	7.0
					Bottom	25.1	25.1	25.1	27.0	27.1	27.1	5.8	5.8	5.8	82.9	82.4	82.7	5.0	5.0	5.0		6.9	6.8	6.9	
G2	1754-1806	12.9	W	0.3	Surface	25.5	25.4	25.5	26.5	26.4	26.5	6.4	6.4	6.4	90.6	90.3	90.5	4.5	4.6	4.5		6.4	6.2	6.3	
					Middle	25.3	25.3	25.3	26.8	26.9	26.9	5.7	5.8	5.7	81.7	82.0	81.9	5.2	5.2	5.2	5.0	6.5	6.3	6.4	6.6
					Bottom	25.2	25.1	25.2	27.0	27.0	27.0	5.9	5.9	5.9	83.6	83.3	83.5	5.1	5.1	5.1		7.1	7.3	7.2	
S3	1810-1820	10.6	W	0.4	Surface	25.4	25.5	25.5	26.5	26.5	26.5	6.2	6.2	6.2	87.7	88.0	87.9	4.9	5.0	5.0		6.9	6.8	6.9	
					Middle	25.3	25.2	25.3	26.9	26.8	26.9	5.9	6.0	5.9	84.4	84.8	84.6	5.1	5.1	5.1	5.1	7.2	7.0	7.1	7.1
					Bottom	25.1	25.1	25.1	27.1	27.0	27.1	5.7	5.7	5.7	81.6	81.2	81.4	5.2	5.3	5.3		7.3	7.4	7.4	

Remark or Observation:

Note: * Average

** Depth Average

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