



CONTRACT NO: HK/2009/05

**WANCHAI DEVELOPMENT PHASE II AND CENTRAL
WANCHAI BYPASS
SAMPLING, FIELD MEASUREMENT AND TESTING
WORK (STAGE 1)**

**SUPPLEMENTARY BASELINE MONITORING REPORT –
DISSOLVED OXYGEN AT**

**CAUSEWAY BAY TYPHOON SHELTER AND
EX-WANCHAI PUBLIC CARGO WORKING AREA**

- MAY-JUNE 2010 -

CLIENTS:

**Civil Engineering and Development
Department**

and

Highways Department

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Raymond Dai
Environmental Team Leader

DATE:

26 July 2010

Ref.: AACWBIECEM00_0_0369L.10

28 July 2010

Lam Geotechnics Limited
11/F Centre Point
181-185 Gloucester Road
Wan Chai, Hong Kong

By Post and Fax (2882 3331)

Attention: Mr. Raymond Dai

Dear Sir,

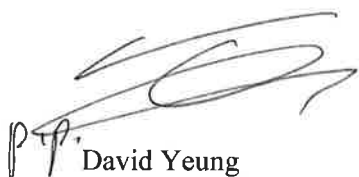
**Re: Contract No. HK/2009/05
Wan Chai Development Phase II and Central-Wan Chai Bypass –
Sampling, Field Measurement and Testing Work (Stage 1)
Supplementary Baseline Monitoring Report – Dissolved Oxygen at Causeway
Bay Typhoon Shelter and Ex-Wanchai Public Cargo Working Area**

Reference is made to your submission of the Supplementary Baseline Monitoring Report for the captioned dated 26 July 2010 by E-mail for our review and comment.

Please be informed that we have no adverse comments on the captioned submission. We write to verify the captioned report in accordance with the requirement in the Environmental Permit No. EP-356/2009.

Thank you for your kind attention.

Yours sincerely,



David Yeung
Independent Environmental Checker

c.c.	CEDD	Mr. Patrick Keung	by fax: 2577 5040
	HyD	Mr. Jones Lai	by fax: 2714 5289
	AECOM	Mr. Frankie Fan	by fax: 2587 1877
	AECOM	Mr. Kelvin Cheng	by fax: 2691 2649

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EXECUTIVE SUMMARY

- i. This is the Supplementary Baseline Monitoring Report under Condition 2.5(b) under Environmental Permit No. EP-356/2009. This report presents the supplementary baseline dissolved oxygen (DO) monitoring during the period 14 May to 12 June 2010 at the existing site at the two seawater intakes C6 and C7 in Causeway Bay Typhoon Shelter and ex-Wan Chai Public Cargo Working Area.

Project Background

- ii. In order to monitoring of possible deterioration and avoid aggravation of odour nuisance from seawater arising from temporary reclamation in the ex-Wan Chai Public Cargo Working Area and the Causeway Bay Typhoon Shelter during temporary reclamation, an enhanced water quality monitoring and audit programme are required as stipulated in Condition 2.5(b) under EP-356/2009 and Section 4.6.3 of updated EM&A Manual.

Enhanced Water Quality Monitoring

- iii. The supplementary baseline monitoring in term of dissolved oxygen was carried out 14 days at two seawater intakes C6 and C7 in Causeway Bay Typhoon Shelter and ex-Wan Chai Public Cargo Working Area. Other parameter, Temperature, pH and salinity were also recorded in the baseline monitoring. No marine construction activity was observed in the vicinity of the monitoring stations during the period of baseline water quality monitoring.

1. INTRODUCTION

1.1 Scope of the Report

1.1.1. Lam Geotechnics Limited (LGL) has been appointed to work as the Environmental Team (ET) for Contractor No. HK/2009/05 Wan Chai Development Phase II and Central –Wan Chai Bypass – Sampling, Field Measurement and Testing Work (Stage 1) to implement the Environmental Monitoring and Audit (EM&A) programme as stipulated in the EM&A Manual of the approved Environmental Impact Assessment (EIA) Report for Wan Chai Development phase II and Central-Wan Chai Bypass (Register No.: AEIAR-125/2008) and in the EM&A Manual of the approved EIA Report for Central-Wan Chai Bypass and Island Eastern Corridor Link (Register No. AEIAR-014/2001).

1.1.2. This report presents the environmental monitoring data and information recorded from monitoring work carried during the supplementary baseline dissolved oxygen monitoring period from 14 May to 12 June 2010 at the two seawater intakes C6 and C7 in Causeway Bay Typhoon Shelter and the south-eastern and south-western corners at ex-Wan Cah Public Cargo Working Area.

1.2 Structure of the Report

Section 1 ***Introduction*** – details the scope and structure of the report.

Section 2 ***Project Background*** –summarizes background and scope of the project, site description, project organization and contact details of key personnel, construction programme and works undertaken during the baseline monitoring period.

Section 3 ***Methodology for Water Quality Monitoring*** – summarizes all the requirements for water quality monitoring including monitoring location, parameters, methodology and equipment, and monitoring frequency.

Section 4 ***Monitoring Results*** – summarizes the monitoring results obtained in the reporting period.

Section 5 ***Conclusion***

2. PROJECT BACKGROUND

2.1 Background

2.1.1. “Wan Chai Development phase II and Central-Wan Chai Bypass” and “Central-Wan Chai Bypass and Island Eastern Corridor Link” (hereafter called “the Project”) are Designed Project (DP) under the Environmental Impact Assessment Ordinance (Cap. 499) (EIAO). The Environmental Impact Assessment (EIA) Reports for Central-Wan Chai Bypass and Island Eastern Corridor Link (Register No. AEIAR-041/2001) and Wan Chai Development phase II and Central-Wan Chai Bypass (Register No.: AEIAR-125/2008) have been approved on 31 August 2001 and 11 December 2008 respectively.

2.1.2. The key purpose of Wan Chai Development Phase II (WDII) is to provide land at Wan Chai North and North Point for construction of the Central-Wan Chai Bypass and Island Eastern Corridor Link (CWB). Land formed under the project will be developed as a world-class waterfront promenade joining that at the new Central waterfront for public enjoyment.

2.1.3. There is a compelling and present need for the CWB to provide relief to the very congested east-west Connaught Road Central/Harcourt Road / Gloucester Road Corridor (the Corridor) which is currently operating beyond its capacity. The CWB will provide relief to the existing congestion along the Corridor and cater for the anticipated growth of traffic on Hong Kong Island. Without the CWB and its access roads, there will not be sufficient capacity to serve the heavy traffic demands at both strategic and local levels.

2.2 Scope of the Project and Site Description

2.2.1. The Project is located mainly in Wan Chai North, Causeway Bay and North Point, and is demarcated by Gloucester Road and Victoria Park Road to the south, Fenwick Pier Street to the west and Tong Shui Road Interchange to the east.

2.2.2. The study area encompasses existing developments along the Wan Chai, Causeway Bay and North Point shorelines. Major land uses include the Hong Kong Convention & Exhibition Centre (HKCEC) Extension, the Wan Chai Ferry Pier, the ex-Wan Chai Public Cargo Working Area (ex-WPCWA), the Royal Hong Kong Yacht Club (RHKYC), the Police Officers' Club, the Causeway Bay Typhoon Shelter (CBTS) and commercial and residential developments.

3. METHODOLOGY FOR WATER QUALITY MONITORING

3.0.1. In accordance with the Section 4.6.3 of Updated Environmental Monitoring and Audit (EM&A) Manual for EP-356/2009, enhanced water quality monitoring and audit programme should be implemented to provide a monitoring mechanism for the avoid aggravation of odour nuisance from seawater arising from temporary reclamation at the ex-Wan Chai Public Cargo Working Area and the Causeway Bay Typhoon Shelter.

3.1 Water Quality Monitoring Stations

3.1.1. Monitoring of dissolved oxygen (DO) was carried out at the two seawater intakes C6 and C7 in Causeway Bay Typhoon Shelter and south-eastern and south-western corners of ex-Wan Chai Public Cargo Working Area.

3.1.2. The locations of water monitoring stations are listed and presented in **Table 3.1** and **Figure 3.1**.

Table 3.1 Water Quality Monitoring Station

Station ID	Location	Coordinate	
		Easting	Northing
C6	Cooling water intake of the Proposed Exhibition Station / World Trade Centre	837010	815999
C7	Cooling water intake of the Windsor House	837194	816150
Ex-WPCWA SE	South-eastern corners of ex-Wanchai Public Cargo Works Area	836775	816031
Ex-WPCWA SW	South-western corners of ex-Wanchai Public Cargo Works Area	836621	815968

3.2 Monitoring Methodology and Parameters

3.2.1. Dissolved oxygen measurements were taken under two tidal conditions (mid-flood and mid-ebb) at 3 water depths, namely 1m below the water surface, mid-depth and 1m above the seabed, except where the water depth is less than 6m, the mid-depth sample may be omitted. If the water depth is less than 3m, only the mid-depth will be monitored.

3.2.2. Duplicate in-situ measurements and samples were collected at each monitoring station for all parameters to ensure a robust statistical interpretable dataset.

3.2.3. In association with the water quality parameters, some relevant data was also be measured, such as monitoring location/position, time, water depth, water temperature, pH, salinity, weather conditions, sea conditions, tidal stage, and any special phenomena and work underway at the construction site etc.

3.3 Sampling Procedures and Monitoring Equipment

3.2.1. Water samples shall be measured directly for the in-situ parameters using the equipment in accordance with **Table 3.2**

Table 3.2 Equipment for In-situ Water Quality Monitoring

Parameter	Equipment Name	Model	Range / Resolution	Accuracy
Salinity	YSL	600XL-BCR-M	0 – 70 ppt / 0.01 ppt	+/- 1.0% or 0.1 ppt, whichever greater
Temperature			-5° – 45°C / 0.01°C	+/- 0.15°C
Dissolved Oxygen (DO)			0 - 50.00 mg/l / 0.01 mg/L (calculated from % air saturation, temp & salinity)	0-20 mg/L: +/- 2% or 0.2 mg/L, whichever greater 20-50 mg/L: +/- 6%
pH			0.00 – 14.00 / 0.01	+/- 0.2

Calibration and Accuracy of Equipment

3.2.2. All in-situ monitoring equipment was checked, calibrated and certified by a laboratory accredited under HOKLAS or equivalent before use, and subsequently re-calibrated at 3 monthly intervals throughout all stages of the water quality monitoring. Responses of sensors and electrodes should be checked with certified standard solutions before each use. Wet bulb calibration for a DO meter shall be carried out before measurement at each monitoring location. Current calibration certificates are presented in [Appendix 3.1](#).

3.2.3. For the on site calibration of field equipment, the BS 127:1993, "Guide to Field and on-site test methods for the analysis of waters" should be observed.

3.2.4. Sufficient stocks of spare parts should be maintained for replacements when necessary. Backup monitoring equipment shall also be made available so that monitoring can proceed uninterrupted even when some equipment is under maintenance, calibration, etc.

3.4 Baseline Monitoring Programme

- 3.3.1. The baseline monitoring was undertaken at the four water monitoring stations, 3 days per week, at mid-flood and mid-ebb tides, for 4 weeks prior to the commencement of dredging work in the ex-Wan Chai Cargo Working Area and the Causeway Bay Typhoon Shelter.
- 3.3.2. Due to amber rainstorm warning and thunderstorm during mid-ebb on 19 May 2010, baseline water quality was considered to be substantially affected by urban runoff and did not represent the normal impact condition. At such, the baseline measurement for this tide has been postponed to mid-ebb on 12 June 2010.
- 3.3.3. There are no marine construction activities in the vicinity of the stations. The supplementary baseline monitoring programme is presented in [Appendix 3.2](#).

4. MONITORING RESULT

4.1 Water Quality Monitoring Results

4.1.1. The baseline DO monitoring was carried out 3 days for 4 weeks between 14 May and 12 June 2010 at the four monitoring stations. During the monitoring period, the weather condition was mainly cloudy. There are no marine construction activities observed in the vicinity of the stations.

4.1.2. The baseline DO monitoring results are presented in **Appendix 4.1**. Summary of DO monitoring results during mid-flood and mid-ebb are shown in **Table 4.1**.

Table 4.1 Summary of Baseline Dissolved Oxygen Results

DO (mg/L)		C6	C7	Ex-WPCWA SW	Ex-WPCWA SE
Station					
Surface	Avg.	3.82	4.11	4.37	4.49
	Min.	1.42	3.60	3.66	3.95
	Max.	4.63	4.73	5.29	5.03
Middle	Avg.	3.87	4.02	4.05	4.22
	Min.	2.02	2.24	3.09	2.82
	Max.	5.85	5.88	5.26	5.41
Bottom	Avg.	3.73	3.76	3.98	3.83
	Min.	2.20	2.42	3.24	3.76
	Max.	4.80	4.55	5.10	3.90

5. REVIEW OF WATER QUALITY AND IMPACT MONITORING

5.1 Water Quality Monitoring Results

5.1.1. The criteria for determining the Action and Limit Levels of the water quality for the construction phase monitoring are shown in **Table 5.1a**.

Table 5.1a Action Levels for Water Quality

Parameters	Action Level	Limit Level
DO in mg/L	5 percentile of baseline data or < 2.1 mg/L	1 percentile of baseline data or < 2.mg/L

Remarks:

1. All the figures given in the table are used for reference only and EPD may amend the figures whenever it is considered as necessary.

5.1.2. It is recommended that EPD routine marine water quality monitoring data at the relevant stations should be used to determine the monthly variation of the DO level in the Victoria Harbour.

5.1.3. It is considered that use of EPD routine monitoring results for establishing the background water quality cannot address the above potential water quality concern. In addition, most of the sensitive receivers (i.e. the seawater intakes) are located at the waterfront and are potentially affected by the pollutants discharged from the nearby storm outfalls. On the other hand, all the EPD routine monitoring stations are located further away from the waterfront in the main harbour channel which may not be representative of the local water quality characteristics at the seawater intake points.

5.1.4. As such, three depth data of EPD routine marine water quality monitoring data will be used for deriving the two sets of Action and Limit levels for dry and wet seasons respectively for each intake.

5.1.5. According to the location of the EPD routine monitoring stations in the diagram below, the closet monitoring station will be used for comparison purpose.



5.1.6. Overlaying with **Fig. 3.1**, the correlation of all baseline monitoring stations and the EPD monitoring stations will be VM5.

5.1.7. The monthly DO pattern derived from the EPD monitoring data for 2006 to 2008 are used to compare the baseline monitoring data collected at the intake points to take account the seasonal fluctuation in the background DO level. Summary of EPD monitoring data for 2006 to 2008 can be referred in [Appendix 5.1](#) and **Table 5.1b** represents the background DO conditions during the wet season (April-September) and dry season (October-March).

Table 5.1b Background DO conditions at EPD monitoring station VM5 – 2006 to 2008

DO (mg/L)	Surface			Middle			Bottom		
	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.
Wet Season 2006	5.1	4.5	5.6	5.0	4.3	5.6	4.7	3.8	6.2
Dry Season 2006	6.2	5.6	6.9	6.2	5.7	7.0	6.4	5.7	7.3
Variation in Avg.	20.78%	-	-	24.09%	-	-	35.76%	-	-
Wet Season 2007	5.3	3.5	8.7	4.7	3.9	6.1	3.7	2.1	5.4
Dry Season 2007	5.5	3.8	6.8	5.7	4.2	6.9	6.0	4.6	7.4
Variation in Avg.	3.87%	-	-	21.33%	-	-	63.52%	-	-
Wet Season 2008	5.0	3	7	4.9	3.1	6	4.4	3	5.9
Dry Season 2008	4.9	4.4	5.5	5.6	4.7	6.8	5.7	4.8	6.8
Variation in Avg.	-1.15%	-	-	14.96%	-	-	27.85%	-	-
Mean Variation %	7.83%	-	-	20.13%	-	-	42.37%	-	-

5.1.8. The observed DO variation indicates the dry season DO at all monitoring stations expected to be raised by a certain degree compared with the wet season DO except for the data of 2006 on the surface level in a negative is resulted. So the all the nearby water intakes could follow a similar trend will have an increase in the background DO.

5.1.9. For the baseline data taken during the wet season, the derivation of the dry season shall be adjusted with wet season DO Action and Limit Levels multiplied with mean DO variation percentage of 2006 to 2008 to account for the seasonal fluctuation.

5.1.10. Based on results in Tables 5.1a and 5.1b, action and limit level are determined by 5%-ile and 1%-ile of baseline data except the limit level of C6 are lower then 2.0mg/L.

Table 5.1c Action and Limit Levels for Dissolved Oxygen Monitoring

Station	Depth	Action Level		Limit Level	
		Dry Season	Wet Season	Dry Season	Wet Season
C6	Surface and Middle	3.13	2.60	2.00	2.00
	Bottom	4.14	2.91	3.33	2.34
C7	Surface and Middle	3.87	3.31	3.09	2.57
	Bottom	3.91	2.75	3.53	2.48
Ex-WPCWA SW	Surface and Middle	3.84	3.19	3.73	3.10
	Bottom	4.71	3.31	4.63	3.25
Ex-WPCWA SE	Surface and Middle	4.26	3.55	3.61	3.00
	Bottom	5.36	3.76	5.35	3.76

6. CONCLUSION

- 6.0.1. The supplementary baseline DO monitoring was carried out 3 days per week for four weeks between 14 May and 12 June 2010 at all designated locations. During the monitoring period, the weather condition was mainly cloudy. There are no marine construction activities observed in the vicinity of the stations.
- 6.0.2. No marine construction activity was observed during the period of baseline water quality monitoring.
- 6.0.3. In summary, the water quality impact monitoring shall be proceeded in accordance with the methodology and the derived water quality limits as laid down in this report upon the commencement of the temporary reclamation in the ex-Wan Chai Public Cargo Working Area and the Causeway Bay Typhoon Shelter.



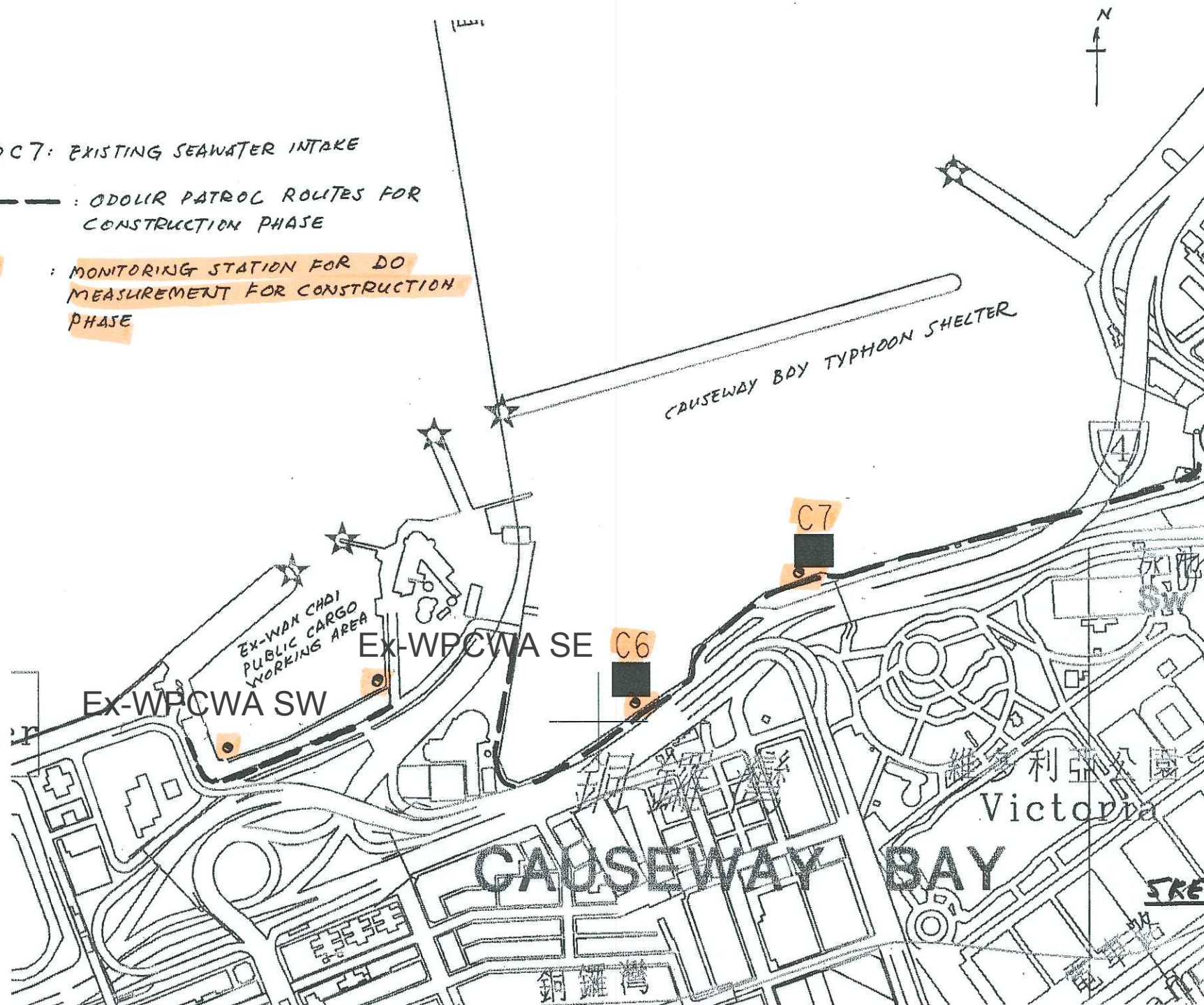
Figure 3.1

Locations of Water Monitoring Stations

C6 AND C7: EXISTING SEAWATER INTAKE

— — — — — : ODOLIR PATROL ROUTES FOR CONSTRUCTION PHASE

● : MONITORING STATION FOR DO MEASUREMENT FOR CONSTRUCTION PHASE



SKETCH A



Appendix 3.1

Copies of Calibration Certificates



CERTIFICATE OF ANALYSIS

CONTACT: MS CHERRY MAK
CLIENT: LAM ENVIRONMENTAL SERVICES LIMITED
ADDRESS: 11/F, CENTRE POINT,
181-185 GLOUCESTER ROAD,
WAN CHAI
PROJECT: MARINE WATER QUALITY MONITORING AT
WSD INTAKES AND COOLING INTAKES

Batch: HK1006496
LABORATORY: HONG KONG
DATE RECEIVED: 29/03/2010
DATE OF ISSUE: 30/03/2010
SAMPLE TYPE: EQUIPMENT
No. of SAMPLES: 1

COMMENTS

The calibration procedure used for the analysis has been applied for the calibration of the above instrument.

NOTES

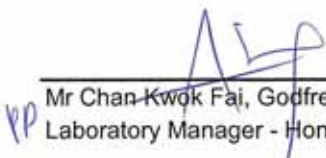
This is the Final Report and supersedes any preliminary report with this batch number.
Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

ISSUING LABORATORY: HONG KONG

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Sydney	Kuala Lumpur	Amtofagasta
Newcastle	Bogor	Lima

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*Abbreviations: % SPK REC denotes percentage spike recovery
CHK denotes duplicate check sample
LOR denotes limit of reporting
LCS % REC denotes Laboratory Control Sample percentage recovery*

CERTIFICATE OF ANALYSIS




Batch: HK1006496
Date of Issue: 30/03/2010
Client: LAM ENVIRONMENTAL SERVICES LIMITED
Client Reference:

Calibration of Multimeter

Item : Sonde Environmental Monitoring System Model No.: 600 XL
ALS Lab ID: HK1006496 -001 Equipment No.: N/A
Date of Calibration: 29 March, 2010 Serial No.: 05C1607

Testing Results :

	Expected Reading	Recording Reading	Testing Method:
pH	4.00	3.92	APHA (20th edition), 4500-H ⁺ B
	7.00	7.06	
	10.0	9.89	
	Allowing Deviation	± 0.2 unit	
Conductivity	1412 uS/cm	1421 uS/cm	Testing Method: APHA (20th edition), 2510B
	12890 uS/cm	12279 uS/cm	
	50000 uS/cm	50028 uS/cm	
	Allowing Deviation	± 10%	
Temperature	22.0 °C	21.4 °C	Testing Method: In-House Method
	34.5 °C	34.5 °C	
	Allowing Deviation	±2.0°C	
Salinity	10.0 g/L	10.1 g/L	Testing Method: APHA (20th edition), 2520 A and B
	20.0 g/L	19.3 g/L	
	30.0 g/L	30.1 g/L	
	Allowing Deviation	± 10%	
DO	4.98 mg/L	5.15 mg/L	Testing Method: APHA (20th edition), 4500-OC & G
	6.21 mg/L	6.36 mg/L	
	8.34 mg/L	8.39 mg/L	
	Allowing Deviation	± 0.2 mg/L	


Mr Chan Kwok Fai, Godfrey
Laboratory Manager - Hong Kong



Appendix 3.2

Supplementary Baseline DO Monitoring Programme

Contract No. HK/2009/05
Wan Chai Development Phase II and Central-Wan Chai Bypass
Sampling, Field Measurement and Testing Works (Stage 1)

Dissolved Oxygen (DO) Baseline Monitoring Schedule

May - June 2010

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
9-May	10-May	11-May	12-May	13-May	14-May	15-May
					WQM Mid-ebb: 12:21 Mid-flood: 19:16	
16-May	17-May	18-May	19-May	20-May	21-May	22-May
	WQM Mid-flood: 7:06 Mid-Ebb: 14:27		WQM Mid-flood: 8:46 Mid-ebb: 16:23		Public Holiday	WQM Mid-flood: 13:10 Mid-Ebb: 19:49
23-May	24-May	25-May	26-May	27-May	28-May	29-May
	WQM Mid-ebb: 9:37 Mid-flood: 15:55		WQM Mid-ebb: 11:06 Mid-flood: 17:58		WQM Mid-ebb: 12:28 Mid-flood: 19:42	
30-May	31-May	1-Jun	2-Jun	3-Jun	4-Jun	5-Jun
	WQM Mid-flood: 7:16 Mid-Ebb: 14:31		WQM Mid-flood: 8:22 Mid-Ebb: 15:45		WQM Mid-flood: 10:03 Mid-Ebb: 17:01	
6-Jun	7-Jun	8-Jun	9-Jun	10-Jun	11-Jun	12-Jun
	WQM Mid-flood: 2:12 Mid-ebb: 8:58			WQM Mid-ebb: 10:45 Mid-flood: 17:42		WQM Mid-ebb: 12:01

Notes:

1. The tidal range of selected individual flood and ebb tides are not less than 0.5m. The interval between 2 sets of monitoring should be less than 36 hours.
2. Duplicate in-situ measurements should be carried out in each sampling events at the proposed four monitoring stations.
3. Actual monitoring will subject to change due to any safety concern or adverse weather condition.
4. Due to the adverse weather during mid-ebb on 19 May 2010, the baseline measurement for this tide was be postponed to 12 June 2010.

For enquiry on day-to-day monitoring matters, please contact Mr. Derek Lo at 9108 0531.

For enquiry on the schedule, please contact Ms. Cherry Mak at 9237 6460..



Appendix 4.1

Baseline DO Monitoring Results



Baseline Dissolved Oxygen Monitoring at Ex-WPCWA SE - South-eastern corners of the ex-Wai Chai Public Cargo Works Area: Mid-Flood Tide

Date	Time	Weather Condition	Overall Depth, m	Sampling Depth		Water Temperature		pH		Salinity		DO Saturation		DO						
				m		°C		-		ppt		%		mg/L						
						Value	Average	Value	Average	Value	Average	Value	Average	Value	Average					
31/05/2010	09:52	Cloudy	3.0	Surface	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	09:54			Middle	1.5	25.78	25.79	25.8	7.96	7.97	8.0	31.48	31.47	31.5	53.7	54.5	54.1	3.67	3.71	3.69
	09:56			Bottom	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02/06/2010	09:05	Rainy	4.0	Surface	1.0	25.53	25.51	25.5	8.07	8.07	8.1	31.96	31.91	32.2	56.1	58.9	57.2	3.89	4.01	3.95
	09:07			Middle	2.0	25.52	25.52	25.5	8.06	8.06	8.1	32.02	32.27	32.2	55.6	55.8	57.2	3.83	3.80	3.82
	09:09			Bottom	3.0	25.53	25.56	25.5	8.05	8.05	8.1	32.61	32.65	32.2	61.5	55.0	57.2	4.06	3.74	3.90
04/06/2010	-	Cloudy	2.0	Surface	-	-	-	25.5	-	-	7.7	-	-	32.2	-	-	58.7	-	-	-
	10:55			Middle	1.0	25.48	25.48	25.5	7.74	7.74	7.7	32.17	32.18	32.2	58.7	58.7	58.7	4.02	4.01	4.02
	-			Bottom	-	-	-	25.5	-	-	7.7	-	-	32.2	-	-	58.7	-	-	-
07/06/2010	-	Cloudy	2.0	Surface	-	-	-	25.6	-	-	7.8	-	-	32.3	-	-	52.3	-	-	-
	02:55			Middle	1.0	25.60	25.60	25.6	7.83	7.83	7.8	32.28	32.28	32.3	52.1	52.4	52.3	3.54	3.56	3.55
	-			Bottom	-	-	-	25.6	-	-	7.8	-	-	32.3	-	-	52.3	-	-	-
10/06/2010	-	Drizzle	3.0	Surface	-	-	-	26.0	-	-	7.8	-	-	31.2	-	-	56.8	-	-	-
	17:06			Middle	1.5	26.01	26.01	26.0	7.76	7.77	7.8	31.13	31.17	31.2	57.8	55.7	56.8	3.93	3.79	3.86
	-			Bottom	-	-	-	26.0	-	-	7.8	-	-	31.2	-	-	56.8	-	-	-



**Baseline Dissolved Oxygen Monitoring at C7 - Windsor House
Mid-Ebb Tide**

Date	Time	Weather Condition	Overall Depth, m	Sampling Depth		Water Temperature		pH		Salinity		DO Saturation		DO						
				m	m	°C		-		ppt		%		mg/L						
						Value	Average	Value	Average	Value	Average	Value	Average	Value	Average					
31/05/2010	-	Cloudy	3.0	Surface	-	-	-	25.8	-	-	-	-	-	-	-	-	-	-		
	15:25			Middle	1.5	25.76	25.76	25.8	8.06	8.03	8.0	31.57	31.58	31.6	69.2	68.5	68.9	4.76	4.65	4.71
	-			Bottom	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02/06/2010	14:18	Rainy	4.0	Surface	1.0	25.45	25.47	25.5	8.00	8.02	8.0	32.43	32.43	32.6	69.8	69.2	62.3	4.74	4.72	4.73
	14:20			Middle	2.0	25.54	25.58	25.5	8.00	8.01	8.0	32.61	32.65	32.6	61.5	60.3	62.3	4.16	4.08	4.12
	14:22			Bottom	3.0	25.61	25.61	25.5	7.99	8.05	8.0	32.68	32.75	32.6	56.6	56.4	62.3	3.81	3.87	3.84
04/06/2010	-	Misty	3.0	Surface	-	-	-	25.6	-	-	7.8	-	-	32.1	-	-	47.3	-	-	-
	17:33			Middle	1.5	25.60	25.60	25.6	7.75	7.75	7.8	32.20	32.02	32.1	47.5	47.0	47.3	3.24	3.20	3.22
	-			Bottom	-	-	-	25.6	-	-	7.8	-	-	32.1	-	-	47.3	-	-	-
07/06/2010	-	Cloudy	3.0	Surface	-	-	-	25.9	-	-	7.8	-	-	32.4	-	-	53.3	-	-	-
	08:40			Middle	1.5	25.90	25.90	25.9	7.80	7.80	7.8	32.39	32.38	32.4	53.7	52.8	53.3	3.62	3.57	3.60
	-			Bottom	-	-	-	25.9	-	-	7.8	-	-	32.4	-	-	53.3	-	-	-
10/06/2010	-	Rainy	2.0	Surface	-	-	-	25.8	-	-	8.0	-	-	28.1	-	-	58.8	-	-	-
	11:35			Middle	1.0	25.81	25.81	25.8	7.98	7.99	8.0	28.09	28.09	28.1	58.8	58.7	58.8	4.09	4.08	4.09
	-			Bottom	-	-	-	25.8	-	-	8.0	-	-	28.1	-	-	58.8	-	-	-
12/06/2010	-	Cloudy	2.0	Surface	-	-	-	26.6	-	-	7.8	-	-	31.0	-	-	63.0	-	-	-
	13:43			Middle	1.0	26.60	26.61	26.6	7.76	7.76	7.8	30.96	30.96	31.0	63.3	62.6	63.0	4.27	4.22	4.25
	-			Bottom	-	-	-	26.6	-	-	7.8	-	-	31.0	-	-	63.0	-	-	-



Appendix 5.1

Summary of EPD monitoring data for 2006 to 2008

Summary of EPD monitoring data for 2006 (Wet Season)

Water Control Zone	Station	Dates	Sample No	Depth	Dissolved Oxygen (mg/L)
Victoria Harbour	VM5	20/4/2006	1	Surface Water	5.3
Victoria Harbour	VM5	18/5/2006	1	Surface Water	4.7
Victoria Harbour	VM5	1/6/2006	1	Surface Water	5.3
Victoria Harbour	VM5	3/7/2006	1	Surface Water	5.3
Victoria Harbour	VM5	4/8/2006	1	Surface Water	5.6
Victoria Harbour	VM5	4/9/2006	1	Surface Water	5
Victoria Harbour	VM5	5/10/2006	1	Surface Water	4.5
Victoria Harbour	VM5	20/4/2006	1	Middle Water	5.6
Victoria Harbour	VM5	18/5/2006	1	Middle Water	4.8
Victoria Harbour	VM5	1/6/2006	1	Middle Water	4.9
Victoria Harbour	VM5	3/7/2006	1	Middle Water	4.9
Victoria Harbour	VM5	4/8/2006	1	Middle Water	5.6
Victoria Harbour	VM5	4/9/2006	1	Middle Water	5.1
Victoria Harbour	VM5	5/10/2006	1	Middle Water	4.3
Victoria Harbour	VM5	20/4/2006	1	Bottom Water	6.2
Victoria Harbour	VM5	18/5/2006	1	Bottom Water	5.1
Victoria Harbour	VM5	1/6/2006	1	Bottom Water	4.5
Victoria Harbour	VM5	3/7/2006	1	Bottom Water	3.8
Victoria Harbour	VM5	4/8/2006	1	Bottom Water	5.5
Victoria Harbour	VM5	4/9/2006	1	Bottom Water	3.8
Victoria Harbour	VM5	5/10/2006	1	Bottom Water	4.1

Summary of EPD monitoring data for 2006 (Dry Season)

Water Control Zone	Station	Dates	Sample No	Depth	Dissolved Oxygen (mg/L)
Victoria Harbour	VM5	3/1/2006	1	Surface Water	6.9
Victoria Harbour	VM5	2/2/2006	1	Surface Water	6.5
Victoria Harbour	VM5	13/3/2006	1	Surface Water	6.2
Victoria Harbour	VM5	2/11/2006	1	Surface Water	5.6
Victoria Harbour	VM5	4/12/2006	1	Surface Water	5.6
Victoria Harbour	VM5	3/1/2006	1	Middle Water	7
Victoria Harbour	VM5	2/2/2006	1	Middle Water	6.5
Victoria Harbour	VM5	13/3/2006	1	Middle Water	6.2
Victoria Harbour	VM5	2/11/2006	1	Middle Water	5.7
Victoria Harbour	VM5	4/12/2006	1	Middle Water	5.8
Victoria Harbour	VM5	3/1/2006	1	Bottom Water	7.3
Victoria Harbour	VM5	2/2/2006	1	Bottom Water	6.9
Victoria Harbour	VM5	13/3/2006	1	Bottom Water	6.3
Victoria Harbour	VM5	2/11/2006	1	Bottom Water	5.7
Victoria Harbour	VM5	4/12/2006	1	Bottom Water	5.8

Summary of EPD monitoring data for 2007 (Wet Season)

Water Control Zone	Station	Dates	Sample No	Depth	Dissolved Oxygen (mg/L)
Victoria Harbour	VM5	12/4/2007	1	Surface Water	5.1
Victoria Harbour	VM5	3/5/2007	1	Surface Water	4
Victoria Harbour	VM5	22/6/2007	1	Surface Water	7
Victoria Harbour	VM5	23/7/2007	1	Surface Water	8.7
Victoria Harbour	VM5	23/8/2007	1	Surface Water	5.1
Victoria Harbour	VM5	17/9/2007	1	Surface Water	3.8
Victoria Harbour	VM5	10/10/2007	1	Surface Water	3.5
Victoria Harbour	VM5	12/4/2007	1	Middle Water	5
Victoria Harbour	VM5	3/5/2007	1	Middle Water	4.1
Victoria Harbour	VM5	22/6/2007	1	Middle Water	5.1
Victoria Harbour	VM5	23/7/2007	1	Middle Water	6.1
Victoria Harbour	VM5	23/8/2007	1	Middle Water	4.9
Victoria Harbour	VM5	17/9/2007	1	Middle Water	3.9
Victoria Harbour	VM5	10/10/2007	1	Middle Water	3.9
Victoria Harbour	VM5	12/4/2007	1	Bottom Water	5.4
Victoria Harbour	VM5	3/5/2007	1	Bottom Water	4.1
Victoria Harbour	VM5	22/6/2007	1	Bottom Water	4.1
Victoria Harbour	VM5	23/7/2007	1	Bottom Water	2.1
Victoria Harbour	VM5	23/8/2007	1	Bottom Water	2.2
Victoria Harbour	VM5	17/9/2007	1	Bottom Water	3.8
Victoria Harbour	VM5	10/10/2007	1	Bottom Water	3.9

Summary of EPD monitoring data for 2007 (Dry Season)

Water Control Zone	Station	Dates	Sample No	Depth	Dissolved Oxygen (mg/L)
Victoria Harbour	VM5	15/1/2007	1	Surface Water	6.2
Victoria Harbour	VM5	1/2/2007	1	Surface Water	6.8
Victoria Harbour	VM5	7/3/2007	1	Surface Water	5.5
Victoria Harbour	VM5	8/11/2007	1	Surface Water	5.3
Victoria Harbour	VM5	4/12/2007	1	Surface Water	3.8
Victoria Harbour	VM5	15/1/2007	1	Middle Water	6.6
Victoria Harbour	VM5	1/2/2007	1	Middle Water	6.9
Victoria Harbour	VM5	7/3/2007	1	Middle Water	5.6
Victoria Harbour	VM5	8/11/2007	1	Middle Water	5.3
Victoria Harbour	VM5	4/12/2007	1	Middle Water	4.2
Victoria Harbour	VM5	15/1/2007	1	Bottom Water	7.4
Victoria Harbour	VM5	1/2/2007	1	Bottom Water	6.9
Victoria Harbour	VM5	7/3/2007	1	Bottom Water	5.7
Victoria Harbour	VM5	8/11/2007	1	Bottom Water	5.3
Victoria Harbour	VM5	4/12/2007	1	Bottom Water	4.6

Summary of EPD monitoring data for 2008 (Wet Season)

Water Control Zone	Station	Dates	Sample No	Depth	Dissolved Oxygen (mg/L)
Victoria Harbour	VM5	23/4/2008	1	Surface Water	4.7
Victoria Harbour	VM5	19/5/2008	1	Surface Water	5.2
Victoria Harbour	VM5	11/6/2008	1	Surface Water	7
Victoria Harbour	VM5	2/7/2008	1	Surface Water	4.3
Victoria Harbour	VM5	4/8/2008	1	Surface Water	6.6
Victoria Harbour	VM5	19/9/2008	1	Surface Water	3
Victoria Harbour	VM5	8/10/2008	1	Surface Water	3.9
Victoria Harbour	VM5	23/4/2008	1	Middle Water	5.2
Victoria Harbour	VM5	19/5/2008	1	Middle Water	5.1
Victoria Harbour	VM5	11/6/2008	1	Middle Water	5.2
Victoria Harbour	VM5	2/7/2008	1	Middle Water	5.1
Victoria Harbour	VM5	4/8/2008	1	Middle Water	6
Victoria Harbour	VM5	19/9/2008	1	Middle Water	3.1
Victoria Harbour	VM5	8/10/2008	1	Middle Water	4.4
Victoria Harbour	VM5	23/4/2008	1	Bottom Water	5.5
Victoria Harbour	VM5	19/5/2008	1	Bottom Water	5
Victoria Harbour	VM5	11/6/2008	1	Bottom Water	3.8
Victoria Harbour	VM5	2/7/2008	1	Bottom Water	3.4
Victoria Harbour	VM5	4/8/2008	1	Bottom Water	5.9
Victoria Harbour	VM5	19/9/2008	1	Bottom Water	3
Victoria Harbour	VM5	8/10/2008	1	Bottom Water	4.5

Summary of EPD monitoring data for 2008 (Dry Season)

Water Control Zone	Station	Dates	Sample No	Depth	Dissolved Oxygen (mg/L)
Victoria Harbour	VM5	3/1/2008	1	Surface Water	4.7
Victoria Harbour	VM5	1/2/2008	1	Surface Water	4.4
Victoria Harbour	VM5	28/3/2008	1	Surface Water	5.3
Victoria Harbour	VM5	5/11/2008	1	Surface Water	4.6
Victoria Harbour	VM5	10/12/2008	1	Surface Water	5.5
Victoria Harbour	VM5	3/1/2008	1	Middle Water	5.7
Victoria Harbour	VM5	1/2/2008	1	Middle Water	6.8
Victoria Harbour	VM5	28/3/2008	1	Middle Water	5.2
Victoria Harbour	VM5	5/11/2008	1	Middle Water	4.7
Victoria Harbour	VM5	10/12/2008	1	Middle Water	5.6
Victoria Harbour	VM5	3/1/2008	1	Bottom Water	6.1
Victoria Harbour	VM5	1/2/2008	1	Bottom Water	6.8
Victoria Harbour	VM5	28/3/2008	1	Bottom Water	5.2
Victoria Harbour	VM5	5/11/2008	1	Bottom Water	4.8
Victoria Harbour	VM5	10/12/2008	1	Bottom Water	5.50