

**Central Reclamation, Phase III
Environmental Monitoring & Audit
Monthly Report No. 20
March 2005**

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ACL	Atkins China Limited
CEDD	Civil Engineering and Development Department
CRIII	Central Reclamation Phase III
EIA	Environmental Impact Assessment
EIAO	Environmental Impact Assessment Ordinance
EM&A	Environmental Monitoring and Audit
EPD	Environmental Protection Department
ER	Engineer's Representatives
ET	Environmental Team
IEC	Independent Environmental Checker
LCSD	Leisure and Cultural Services Department
LCSVO-JV	Leighton China State Van Oord Joint Venture
TDD	Territory Development Department
TSP	Total Suspended Particulates
WMP	Waste Management Plan

Executive Summary

The Central Reclamation Phase III (CRIII) Works, Contract No. HK 12/02, was awarded to Leighton China State Van Oord Joint Venture (LCSVO-JV) by the Territory Development Department (now called the Civil Engineering and Development Department (CEDD) after the merger of the Civil Engineering Department and the Territory Development Department on 1 July 2004), Hong Kong Islands and Islands Development Office. The works under the Contract HK 12/02 commenced on 28 February 2003. Contract HK 16/03 for the CRIII Hinterland Drainage Improvement Works was awarded to Wang Kee Construction Co. Ltd. and works for this contract commenced on 17 December 2003.

Atkins China Limited (ACL) has been appointed by CEDD to implement the Environmental Monitoring and Audit (EM&A) programme that was identified in the EIA Report for the CRIII Project and is providing Environmental Team (ET) services during the duration of the construction works.

This is the twentieth Monthly EM&A Report under the EIAO for the works specified in Section 1.3 of the CRIII EIA Report. This report summarises the monitoring results and audit findings of the EM&A programme during the reporting period from 1 to 31 March 2005.

Environmental Monitoring and Audit Progress

The monthly EM&A programme was undertaken in accordance with the EM&A Manual. A summary of the monitoring activities performed in this reporting month is listed below:

- Environmental site inspections were undertaken on 3, 10, 17 and 31 March 2005.
- Noise monitoring was performed continuously for 24 hours.
- Water quality monitoring was undertaken on the following days:
 - 2 March 2005
 - 4 March 2005
 - 7 March 2005
 - 9 March 2005
 - 11 March 2005
 - 14 March 2005
 - 16 March 2005
 - 18 March 2005
 - 21 March 2005
 - 23 March 2005
 - 25 March 2005
 - 28 March 2005
 - 30 March 2005

- The Contractor's proposal for temporary storage of caissons for Deliveries 7&8, which constitutes a variation to FEP Condition 3.2(a), was certified and verified by the ET and IEC on 18 March 2005.
- The Contractor's proposal of temporary noise barriers for DSD entrustment works at Lung Wui Road were certified and verified by the ET and IEC on 14 March 2005.

Exceedance of Action and Limit Levels

There was no environmental air quality monitoring required during the reporting period.

No noise quality exceedances were recorded during March 2005.

Elevated SS levels were recorded on 4, 7, 23, 25 and 30 March 2005.

The SS exceedances recorded on 4 and 7 March were found to be caused by the sand filling works at IRAE. All parties were immediately informed of the exceedances and the Contractor implemented mitigation measures to reduce and prevent further SS impacts. These measures include replacing the geotextile for Central Barrack's seawater intake silt screen using an improved fixing method and using a revised sand filling method to minimise SS dispersion.

The SS exceedances recorded on 23 and 25 March at IRAE were investigated and found to be due to high spots of sand fill being carried away by tidal currents. All parties were immediately informed of the exceedances and the Contractor carried out a sounding survey to locate the high spots and subsequently trimmed down these high spots to mitigate the dispersion effect. The Contractor was advised to carry out preventative actions for sand filling operations to avoid reoccurrence of this situation in the future. The Contractor was also reminded that they are responsible for achieving the water quality requirements for the project and to ensure that all mitigation measures are implemented effectively.

The SS exceedance recorded on 30 March was investigated and was found to be due to sand filling and vessel movements near the PLA intake. The propellers of marine vessels in the area likely caused the dispersion of SS. However, the affected area is mainly localised at the eastern end of IRAE since the current flow within IRAE is low. The Contractor and all relevant parties were immediately notified of the exceedance and the Contractor has agreed to slow down the speed of marine vessels whenever possible. Further, the Contractor advised that the PLA intake would be relocated to the western edge of IRAE in early April 2005, which would improve water quality at the intake.

No DO exceedances were recorded during the reporting month.

Complaint Log

No environmental complaints were received during the reporting period.

Notifications of Summons and Prosecutions

There were no notifications of summons or prosecutions received with regard to the environment during this reporting period.

Site Inspection and Audit

Environmental site inspections for the CRIII project works area were undertaken on 33, 10, 17 and 31 March 2005.

Key Works for the Coming Month

Future key works are as follows:

- Architectural works for Pier 7;
- Piling work and preparation work for concreting at Public Pier West;
- Pile cap and beam construction at Pier 8;
- Cooling water main construction at Lung Wui Road;
- Sand filling works at IRAE;
- Central Terminal Building (CTB) superstructure and sub-structure works;
- Seawall construction at IRAE;
- Advanced rock filling works at FRAW and FRAE for temporary caisson storage;
- In-situ work to caisson and pumping stations at IRAE;
- Temporary seawall construction at IRAE;
- Filter layer filling behind caisson units at IRAE;
- Piling works for Man Yiu Street Footbridge;
- Excavation to bored piling at Eastern Seawall;
- Rock filling works behind caisson units at IRAE;
- Temporary seawater cooling main construction for Central Barracks and relocation of water quality monitoring station M4; and
- Maintenance and necessary repair works for seawater intake silt screens.

1. INTRODUCTION

1.1 Basic Project Information

The Territory Development Department (now called the Civil Engineering and Development Department (CEDD) after the merger of the Civil Engineering Department and the Territory Development Department on 1 July 2004) of Hong Kong Special Administrative Region (HKSAR) is constructing the Central Reclamation Phase III Project (CRIII).

The Main Works Contract HK 12/02 for CRIII commenced on 28th February 2003. Leighton-China State-Van Oord Joint Venture (LCSVO-JV) was awarded the Contract No. HK 12/02 for the construction of the CRIII Engineering Works. Contract HK 16/03 for the CRIII Hinterland Drainage Improvement Works was awarded to Wang Kee Construction Co. Ltd. and works for this contract commenced on 17 December 2003.

Atkins China Limited (ACL) has been commissioned by TDD (now called CEDD) to undertake the environmental monitoring and audit work for the project in accordance with the Environmental Permit (EP No. EP-122/2002) issued to TDD on 7 March 2002. The CRIII Project Organisation is shown in **Annex A**.

This is the twentieth monthly EM&A Report under the EIAO, which presents the results of EM&A work conducted during the period from 1 to 31 March 2005, inclusive.

2. ENVIRONMENTAL STATUS

2.1 Works Undertaken

The works undertaken during the reporting month include, but not limited to, pile cap and beam works at Pier 8, sand filling works and rock profile trimming at IRAE, advanced rock filling at FRAW, in-situ work for pumping stations, laying of filter layer to rock mound at IRAE, seawall construction at IRAE, landside cooling watermain works, superstructure works for the Central Terminal Building (CTB), temporary intake pile construction for Central Barracks, land piling for the Man Yiu Street footbridge, void grouting works at Culvert F, rock excavation to bored piling at Eastern Seawall, PLA temporary intake pipes installation and maintenance and necessary repair work for seawater intake silt screens.

2.2 Environmental Permits

A summary of the status of all environmental permits, license, and/or notification to EPD for this project during the reporting period are presented in **Table 2.1**.

Table 2.1 - Summary of the Environmental License / Permit Status

Item	Item Description	Date of Application	Permit Status
1	<i>Application for Renewal of Admission Ticket for Disposal of Waste to Landfill (Ref. H2189/U2c/12823/MP/DC/ST/ec).</i>	23 March 2005	–
2	<i>Application for Renewal of Construction Noise Permit No GW-RS0453-04 (Ref. H2189/U2c/12794/MP/DC/ST/ec).</i>	22 March 2005	–
3	<i>Application for Construction Noise Permit for Public Pier West (Ref. H2189/U2c/12747/MP/EY/DS/ST/ec).</i>	19 March 2005	–
4	<i>Application of Construction Noise Permit for Unloading, Transporting and Storage of Pre-cast Caisson Units in Victoria Harbour (Ref. H2189/U2c/12748/MP/EY/ST/ec).</i>	19 March 2005	–
5	<i>Test Report for Treated Effluent under Waste Water Discharge Licence No. EP880/W10/XX0195 (Ref. H2189/U2c/12730/MP/DC/ST/ec).</i>	18 March 2005	–
6	<i>Application for Renewal of Construction Noise Permit (GW-RS0610-04) for IRAW including Pier 7, Pier 8 & Public Pier West (Ref. H2189/U2c/12642/MP/DC/JA/ST/cm).</i>	15 March 2005	–
7	<i>Application for a Permit to Dump Material (Category L Sediment) at Sea Under the Dumping at Sea Ordinance – Supplementary Information (Ref. H2189/U2c/12593/MP/EY/DS/ST/ec).</i>	11 March 2005	–
8	<i>Application for a Permit to Dump Material (Category H & M Sediment) at Sea Under the Dumping at Sea Ordinance – Supplementary Information (Ref. H2189/U2c/12594/MP/EY/DS/ST/ec).</i>	11 March 2005	–
9	<i>Application of Construction Noise Permit for IRAE, FRAE & Caissons at IRAE (Ref. H2189/U2c/12567/MP/EY/DS/ST/ec).</i>	10 March 2005	–
10	<i>Application for a Permit to Dump Material (Category L Sediment) at Sea Under the Dumping at Sea Ordinance – Supplementary Information (Ref. H2189/U2c/12550/MP/ET/DS/ST/wl).</i>	9 March 2005	–
11	<i>Application for a Permit to Dump Material (Category H & M Sediment) at Sea Under the Dumping at Sea Ordinance – Supplementary Information (Ref. H2189/U2c/12551/MP/ET/DS/ST/wl).</i>	9 March 2005	–
12	<i>Public Notice for Application of Licence under Water Pollution Control Ordinance (Ref. H2189/U2c/12501/MP/EY/DS/JA/ST/ec).</i>	7 March 2005	–
13	<i>Surrender of Existing Construction Noise Permit No. GW-RS0044-05 (Ref. H2189/U2c/12426/MP/DC/CKA/ST/ec).</i>	3 March 2005	–
14	<i>Application for Renewal of Construction Noise Permit No. GW-RS0031-05 (Ref. H2189/U2c/12380/MP/EY/DS/ST/ec).</i>	1 March 2005	–

2.3 Environmental Document Submission

A summary of the status of the submissions provided during the reporting month is presented in

Table 2.2 - Summary of the Contractor's Environmental Related Document Submissions to the Engineer's Representatives (ER)

Table 2.2.

Item	Document Title	Version	Date of Submission to ER
1	<i>New Construction Noise Permit GW-RS0170-05 (Ref. H2189/C1/12856/MP/EY/ST/atm).</i>	-	24 March 2005
2	<i>New Construction Noise Permit GW-RS0140-05 (Ref. H2189/C1/12750/MP/DC/ST/atm).</i>	-	19 March 2005
3	<i>New Marine Dumping Permits (EP/MD/05-0129 & EP/MD/05-130) (Ref. H2189/C1/12719/MP/EY/JA/ST/atm).</i>	-	17 March 2005
4	<i>Temporary Noise Barrier for DSD Entrustment Works at Lung Wui Road (Ref. H2189/C1/12669/MP/DC/CKA/ST/atm).</i>	-	16 March 2005
5	<i>Daily Collection of Floating Debris (Ref. H2189/C1/12660/MP/EY/ST/atm).</i>	-	15 March 2005
6	<i>New Construction Noise Permits GW-RS0125-05 & GW-RS0126-05 (Ref. H2189/C1/12563/MP/DC/ST/atm).</i>	-	10 March 2005
7	<i>Temporary Caisson Storage for Delivery 7 & Delivery 8 (Ref. H2189/C1/12475/MP/EY/ST/atm).</i>	-	5 March 2005
8	<i>New Construction Noise Permits GW-RS0125-05</i>	-	2 March 2005

A summary of the Environmental Certification Sheet submissions to EPD during the reporting month is presented in **Table 2.3**.

Table 2.3 - Summary of Environmental Certification Sheet Submissions to the Environmental Protection Department (EPD)

No	Certification Subject	Letter Ref.	Date of Submission to EPD	Approved Status
1	<i>Temporary Noise Barrier for DSD Entrustment Works at Lung Wui Road</i>	<i>3128/HK12/02 M45/200/OC7018/SB/al</i>	<i>23 March 2005</i>	-
2	<i>Temporary Caisson Storage for Delivery 7&8</i>	<i>3128/HK12/02 M45/200/OC7002/SB/al</i>	<i>18 March 2005</i>	-
3	<i>Certification of Monthly Environmental Report No. 19 - February 2005</i>	<i>3128/NK12/02 M45/200/OC6976/AC/al</i>	<i>14 March 2005</i>	-

2.4 Environmental Meetings

An environmental meeting was held on 7 March 2005 between the Contractor, CEDD, EPD, ER and ET to discuss the excavated material from bore piling works at the Eastern Seawall. During the meeting, EPD and the Contractor agreed on a method to determine the interface profile between contaminated and uncontaminated sediments. The Contractor was also asked to suspend all excavation works until the necessary dumping permits have been issued.

The Contractor met with the ER and ET on 10 March 2005 to discuss sand filling operations and the water quality exceedances recorded in early March. During the meeting, the Contractor agreed to replace the geotextile covering the silt screens at monitoring station M4 and M5. The Contractor also advised that they would revise the fixing method of the geotextile to the silt screens to improve their effectiveness. In addition, the Contractor advised that their method of sand filling has changed to placing sand on the existing sand bund rather than the previous bottom dumping method. This method should reduce SS dispersion during sand filling operations.

Another environmental meeting was held amongst the Contractor, RE and ET on 29 March 2005 to discuss the Contractor's proposal for the temporary outfall of Culvert J. During the meeting, the proposal for temporary storage of remaining caisson units in IRAW and FRAE was also discussed. Initial comments on the proposals were provided to the Contractor and they are in the process of making amendments to the proposal.

2.5 Environmental Monitoring Locations

The environmental monitoring locations are provided in **Annex C**.

3. EM&A REQUIREMENTS

3.1 Summary of Impact EM&A Requirements

The EM&A programme requires environmental monitoring for air quality, noise, water quality, waste management and landscape and visual aspects as specified in the CRIII Project EIA. The EM&A requirements for each issue area are described in subsequent sections including:

- All required monitoring parameters;
- Action and Limit Levels; and
- Event-Action Plans.

A summary of impact EM&A requirements is presented in **Table 3.1**.

Table 3.1 - Summary of Impact EM&A Requirements

Parameters	Descriptions	Locations	Frequencies	Duration
TSP	24-Hour TSP	2 Locations	Once every 6 days	During dust generating construction works
	1-Hour TSP	2 Locations	Three times in every 6 days	During dust generating construction works
Noise	Leq (30 mins), L ₁₀ , L ₉₀ .	1 Location	Continuous measurements	Two weeks before Construction and During Construction
Water Quality	Dissolved Oxygen; Salinity; Temp; Suspended Solids; Turbidity.	14 Locations	3 times a week, Mid-ebb/flood tides	During Marine Works
Waste	On-Site Waste Audit	Active Work Sites	Periodically	During Construction
	On-Site Waste Inspection			
Landscape and Visual	Audits to ensure effective implementation of mitigation measures			During Construction
General Site Conditions	Environmental Site Inspection	Works areas and areas affected by works	Periodically	During Construction

3.2 Environmental Quality Performance Limits

Environmental Quality Performance Limits for air, noise and water quality as provided in the Baseline Monitoring Report (Final) are shown in Annex D.

3.3 Event Action Plan

The Event Action Plans for air, noise and water quality as provided in the Baseline Monitoring Report (Final) are shown in **Annex E**.

3.4 Implementation of Environmental Measures

The Contractor is required to implement mitigation measures listed in the EIA Report, EM&A Manual and Further Environmental Permit. During routine site inspections, the Contractor's implementation of mitigation measures is reviewed. With regard to mitigation measures for water quality, the Contractor has installed floating type impervious silt curtains for sand filling works at IRAE to reduce SS dispersion. Further, the Contractor carried out daily visual inspection of the silt screens for seawater intakes. Floating debris in the project area was collected at least once everyday and in the water body near cooling water intakes debris was collected at least three times a day. Bi-weekly diving inspections for the silt screens were also carried out during the reporting month.

4. MONITORING RESULTS

4.1 Impact Monitoring Schedule in March 2005

Regular site inspections were carried out to assess whether the project's environmental protection and pollution control measures are in compliance with the contract specifications. Inspections were conducted on 3, 10, 17 and 31 March 2005.

Air quality monitoring has not commenced yet as no significant work areas or construction activities with the potential to impact air quality are within range of the closest air quality sensitive receivers (ASR).

Continuous 24-hour noise monitoring was conducted during this reporting period.

Impact water quality monitoring at all monitoring stations was undertaken during this reporting month. The water quality monitoring schedule for March 2005 is presented in **Table 4.1**.

Table 4.1 - Water Quality Monitoring Programme (Seawater Intakes Stations)

Date of Sampling	Tidal State	Timing of Sampling
2 March 2005	Mid Ebb	14:47 – 17:55
	Mid Flood	08:39 – 11:25
4 March 2005	Mid Ebb	15:25 – 18:15
	Mid Flood	09:08 – 12:20
7 March 2005	Mid Ebb	09:03 – 12:32
	Mid Flood	13:46 – 16:55
9 March 2005	Mid Ebb	10:35 – 13:40
	Mid Flood	15:13 – 18:10
11 March 2005	Mid Ebb	12:08 – 15:15
	Mid Flood	07:26 – 10:50
14 March 2005	Mid Ebb	13:19 – 16:14
	Mid Flood	07:36 – 10:58
16 March 2005	Mid Ebb	14:48 – 17:39
	Mid Flood	08:24 – 11:14
18 March 2005	Mid Ebb	15:23 – 18:26
	Mid Flood	07:36 – 10:40
21 March 2005	Mid Ebb	15:23 – 17:41
	Mid Flood	08:45 – 11:42
23 March 2005	Mid Ebb	09:57 – 12:28
	Mid Flood	15:19 – 17:53
25 March 2005	Mid Ebb	10:20 – 12:53
	Mid Flood	15:25 – 17:58
28 March 2005	Mid Ebb	12:11 – 14:43

Date of Sampling	Tidal State	Timing of Sampling
30 March 2005	Mid Flood	07:20 – 10:32
	Mid Ebb	13:06 – 16:26
	Mid Flood	06:55 – 10:40

4.2 Monitoring Methodology

4.2.1 Air Quality Monitoring

Air quality monitoring will be performed in accordance with the methodology described in the EM&A Manual once construction activities requiring air quality monitoring commence. The locations of the monitoring stations at City Hall and PLA Headquarters are shown in **Annex C**.

4.2.2 Noise Quality Monitoring

Continuous 24-hour noise monitoring was performed in accordance with the methodology described in the EM&A Manual in the reporting period. The location of the noise monitoring station at City Hall is shown in **Annex C**.

4.2.3 Water Quality Monitoring

Water quality monitoring was performed in accordance with the methodology described in the EM&A Manual. Monitoring for the reporting month was conducted at all stations, which comprises of 6 marine-based stations and 8 seawater intake stations. The locations of the monitoring stations are shown in **Annex C**.

4.3 Monitoring Equipment

4.3.1 Air Quality

The equipment that is used for air quality monitoring is listed in **Table 4.2**.

Table 4.2 - Equipment for Air Quality Monitoring

Parameter Measured	Equipment
24-Hour Sampling	High Volume Sampler Model GS2310 by Anderson Instruments to be used for both monitoring stations.
1-Hour Sampling	MicroDust pro Aerosol Monitoring System to be used for both monitoring locations.

4.3.2 Noise Quality

The equipment used for continuous noise quality monitoring is listed in **Table 4.3**.

Table 4.3 - Noise Monitoring Equipment

Equipment	Model
Integrated Sound Level Meter (SLM)	B&K 2238
Calibrator	B&K 4231, Class 1

4.3.3 Water Quality

The equipment that was used for water quality monitoring is listed in **Table 4.4**.

Table 4.4 - Equipment Used for Marine Water Quality Monitoring

Parameter Measured	Equipment
Dissolved Oxygen and Temperature Measuring Equipment	<p>A Dissolved Oxygen meter YSI model 58 was used.</p> <ul style="list-style-type: none"> This instrument was portable and weatherproof and used a DC power source. The equipment was capable of measuring; DO levels in the range of 0-20 mg/l and 0-200% saturation; and Temperature of between 0 - 45 degree Celsius. The equipment had a membrane electrode with an automatic temperature compensation complete with a cable. In addition, a Wirling Psychrometer was used as a reference thermometer during the sampling.
Turbidity Measurement Instrument	A Turbidimeter, HACH model 2100P was used for determining turbidity levels. The instrument is portable and weatherproof and uses a DC power source. The instrument includes a photoelectric sensor capable of measuring turbidity between 0-1000 NTU.
PH	A MP125 pH Meter from Mettler Toledo was used to measure pH.
Salinity / Conductivity Meter	A Salinity / Conductivity meter YSI model 63 and model 30 was used for determining salinity concentrations.
Sample Containers and Storage	Water samples for SS analysis were stored in high density polythene bottles with no preservative added, packed in ice and delivered to the laboratory, and analysed as soon as possible after collection.

4.3.4 Equipment Calibration

The calibration frequencies of the monitoring equipment are provided in **Table 4.5**.

Table 4.5 - Equipment Calibration Frequencies

Equipment	Calibration Frequency	Latest Calibration Date
Dissolved Oxygen Meter	Every 6 months	28 January 2005
Turbidimeter	Every 3 months for secondary standards; meter is calibrated prior to each measurement to the secondary standards	26 January 2005
pH Meter	Prior to each sampling day	–
Pyschrometer	Every 6 months	19 February 2005
Integrated SLM	Every year	20 August 2004

4.4 Impact Monitoring Results

4.4.1 Air Quality & Noise Monitoring Results

No air quality monitoring work was undertaken during the reporting period as no significantly dusty construction activities with the potential to impact air quality are within range of the closest air quality sensitive receivers.

Noise quality monitoring work was undertaken during the reporting period. The noise monitoring results are provided in **Annex F**. Graphical representation of the noise monitoring data is provided in **Annex G**.

4.4.2 Water Quality Monitoring Results

Water quality monitoring was undertaken at all water quality monitoring locations during the reporting period. The water quality monitoring results from this reporting period are presented in **Annex H**. Graphical representation of the water quality data is provided in **Annex I**. Summaries of the results are provided in **Tables 4.5 to 4.9**.

Marine-Based Stations

Monitoring stations M8 and M10 were selected as the marine-based impact stations as they are located outside the predicted influence of the dredging and reclamation works. The detection of water quality degradation at these two stations may indicate that project marine works are adversely affecting water quality in Victoria Harbour. Stations M7 and M9 are within the expected influence of the reclamation activities and are located along the works area boundary (or extent of the predicted sediment plume). As such, M7 and M9 are used as indicator stations to note any significant elevations in SS, turbidity or reductions in DO that may affect the marine-based impact monitoring stations.

Table 4.5 is a summary of the marine-based stations monitoring results during mid-ebb tide.

Table 4.5 - Summary of Mid-Ebb Results for Marine-Based Stations

Station		Parameter				
		DO (S&M) mg/L	DO (B) mg/L	DO % Sat. (DA)	Turbidity (DA) NTU	SS (DA) mg/L
C1	min	6.5	6.3	79	2.6	3
	max	7.8	7.1	94	6.1	7
	avg	6.9	6.6	84	4.0	5
	sd	0.3	0.2	4	0.9	1
C2	min	6.3	6.1	76	2.4	3
	max	7.8	7.2	94	4.2	6
	avg	7.0	6.7	85	3.3	5
	sd	0.4	0.3	5	0.7	1
M7	min	6.3	6.1	77	2.5	3
	max	7.1	7.4	90	5.4	8
	avg	6.5	6.5	81	4.1	5

Station		Parameter				
		DO (S&M) mg/L	DO (B) mg/L	DO % Sat. (DA)	Turbidity (DA) NTU	SS (DA) mg/L
	sd	0.3	0.3	4	0.8	1
M8	min	6.3	6.2	77	2.6	4
	max	8.0	7.7	99	5.2	7
	avg	6.8	6.7	84	3.9	5
	sd	0.4	0.4	6	0.8	1
M9	min	6.3	6.1	76	2.5	4
	max	7.6	7.7	96	6.0	7
	avg	6.6	6.6	82	4.5	5
	sd	0.3	0.4	5	1.3	1
M10	min	6.4	6.3	78	2.6	3
	max	7.9	7.4	96	5.2	8
	avg	6.7	6.7	83	3.8	5
	sd	0.4	0.3	5	0.8	1

As **Table 4.5** shows, DO levels at marine-based impact stations (M8 & M10) in the surface to middle layer during mid-ebb survey ranged between 6.2 and 8.0 mg/L with an average value of 6.8 mg/L and DO measurements in the bottom layer ranged from 6.2 to 7.7 mg/L with an average level of 6.7 mg/L. Similar DO levels were recorded at the control stations at which DO levels in the surface to middle layer during mid-ebb survey ranged from 6.3 to 7.8 mg/L with an average value of around 6.9 mg/L; DO measurements in the bottom layer ranged between 6.1 and 7.2 mg/L with an average level of 6.7 mg/L.

SS levels during mid-ebb tide ranged from 3 to 8 mg/L with an average value of 5 mg/L at the marine-based impact stations (M8 & M10), which is comparable to results from the control stations in which SS content ranged from 3 to 7 mg/L with an average of 5 mg/L. Generally, the results showed no clear gradient effect, which indicates that marine works are not adversely affecting marine water quality outside the work site boundary in Victoria Harbour. Marine water quality at impact monitoring stations was found to be similar to that at the control stations also indicating that project marine works were generally not adversely affecting water quality in Victoria Harbour.

Table 4.6 is a summary of monitoring results from marine-based stations during mid-flood tide.

Table 4.6 - Summary of Mid-Flood Results for Marine-Based Stations

Station		Parameter				
		DO (S&M) mg/L	DO (B) mg/L	DO % Sat. (DA)	Turbidity (DA) NTU	SS (DA) mg/L
C1	min	6.6	6.3	79	2.4	3
	max	7.9	8.0	99	5.6	7
	avg	6.9	6.8	85	3.6	5
	sd	0.4	0.5	6	0.9	1
C2	min	6.6	6.4	80	2.0	4
	max	7.6	7.4	94	4.5	6
	avg	7.0	6.7	86	3.2	5

Station		Parameter				
		DO (S&M) mg/L	DO (B) mg/L	DO % Sat. (DA)	Turbidity (DA) NTU	SS (DA) mg/L
	sd	0.3	0.3	4	0.7	1
M7	min	5.8	5.7	74	3.0	3
	max	6.7	7.0	84	5.7	7
	avg	6.3	6.4	79	4.3	5
	sd	0.3	0.4	4	0.8	1
M8	min	6.3	6.4	79	2.7	3
	max	7.5	7.3	92	5.2	9
	avg	6.8	6.7	84	3.7	5
	sd	0.3	0.3	3	0.9	2
M9	min	5.0	4.9	64	2.7	3
	max	7.0	7.1	87	5.3	7
	avg	6.4	6.3	79	4.1	5
	sd	0.5	0.5	6	0.8	1
M10	min	5.2	5.2	67	2.5	3
	max	7.2	7.3	89	5.0	7
	avg	6.6	6.5	81	3.6	5
	sd	0.5	0.5	5	0.7	1

During mid-flood tide, DO levels at marine-based impact stations (M8 & M10) in the surface to middle layer ranged from 5.2 to 7.5 mg/L with an average level of 6.7 mg/L while DO values in the bottom layer ranged between 5.2 and 7.3 mg/L with an average of 6.7 mg/L. Similar DO concentrations were recorded at the control stations in the surface to middle layer during mid-flood survey ranged between 6.6 and 7.9 mg/L with an average value of 7.0 mg/L and DO results in the bottom layer ranged from 6.3 and 8.0 mg/L with an average of 6.7 mg/L.

SS content ranged between 3 and 9 mg/L (for stations M8 & M10) with an average of 5 mg/L during mid-flood tide and ranged from 3 to 7 mg/L with an average value of 5 mg/L at the control stations. Again, the results showed no clear gradient effect and no significant difference between control stations and marine-based impact stations. Therefore, the marine-based station results indicate that during the reporting month the dredging works were not adversely affecting water quality outside the work site boundary.

Seawater Intake Stations

Table 4.7 is a summary of monitoring results from seawater intake stations during mid-ebb tide.

Table 4.7 - Summary of Mid-Ebb Results for Seawater Intake Stations

Station		Parameter			
		DO mg/L	DO % Sat.	Turbidity NTU	SS mg/L
M1	min	5.8	68	5.1	4
	max	6.5	82	9.1	11
	avg	6.2	75	6.4	8
	sd	0.2	4	1.2	2

Station		Parameter			
		DO mg/L	DO % Sat.	Turbidity NTU	SS mg/L
M2	min	5.5	64	4.3	6
	max	6.5	79	12.8	13
	avg	5.9	72	6.9	9
	sd	0.3	4	2.1	2
M3	min	5.2	49	3.6	4
	max	6.6	80	6.8	11
	avg	5.9	72	5.3	7
	sd	0.6	8	1.0	2
M4	min	5.8	69	2.9	4
	max	6.3	79	13.5	19
	avg	6.0	73	6.6	9
	sd	0.2	3	2.8	4
M5	min	5.6	67	4.5	5
	max	6.5	78	20.6	23
	avg	6.0	73	9.1	12
	sd	0.2	3	5.0	6
M6	min	5.8	67	3.4	5
	max	6.4	81	10.1	12
	avg	6.1	75	5.2	7
	sd	5.8	67	3.4	5
M11	min	5.9	69	3.3	4
	max	6.8	84	7.8	9
	avg	6.3	76	5.0	7
	sd	0.3	4	1.3	1
M12	min	5.8	68	2.9	5
	max	6.3	80	7.0	9
	avg	6.1	74	4.6	6
	sd	0.1	4	1.2	1

Seawater intake results during mid-ebb tide, **Table 4.7**, show that DO levels ranged from 4.2 to 6.8 mg/L with an average of 6.1 mg/L. SS ranged between 4 and 23 mg/L with an average value of 8 mg/L. Elevated SS levels were recorded on 4 and 25 March during mid-ebb tide sampling.

Table 4.8 is a summary of monitoring results from seawater intake stations during mid-flood tide.

Table 4.8 - Summary of Mid-Flood Results for Seawater Intake Stations

Station		Parameter			
		DO mg/L	DO % Sat.	Turbidity NTU	SS mg/L
M1	min	5.4	68	4.5	5
	max	6.7	81	9.0	12
	avg	6.1	74	6.4	8
	sd	5.4	68	4.5	5

Station		Parameter			
		DO mg/L	DO % Sat.	Turbidity NTU	SS mg/L
M2	min	5.5	67	3.6	5
	max	6.5	78	8.8	16
	avg	6.0	73	6.3	9
	sd	0.3	5	1.7	3
M3	min	5.6	64	3.6	5
	max	6.4	80	9.1	14
	avg	5.9	72	5.7	8
	sd	0.3	5	1.7	3
M4	min	5.4	65	4.4	5
	max	6.4	77	60.6	77
	avg	5.9	72	11.4	15
	sd	0.3	4	15.2	19
M5	min	4.9	63	3.2	4
	max	6.3	77	6.9	13
	avg	5.8	70	4.6	6
	sd	0.4	5	1.2	2
M6	min	5.4	62	3.1	4
	max	6.1	77	6.6	12
	avg	5.9	71	4.9	7
	sd	0.2	5	1.2	3
M11	min	5.6	68	2.8	4
	max	6.5	81	6.9	9
	avg	6.1	74	4.9	6
	sd	0.2	5	1.0	2
M12	min	5.5	67	2.5	4
	max	6.5	82	6.7	10
	avg	6.0	73	4.7	6
	sd	0.3	4	1.1	2

During mid-flood survey, **Table 4.8** shows that DO levels at seawater intake stations ranged from 4.9 to 6.7 mg/L with an average of 6.0 mg/L. SS ranged from 4 to 77 mg/L with an average SS content of 8 mg/L. The above results show that water quality during mid-flood tide was also generally good. Elevated SS levels were found on 7, 23 and 25 March during mid-flood tide sampling.

4.4.3 Waste Management

No waste management audit was scheduled within this reporting period. The arrangement of waste management audit is detailed in the Waste Management Plan.

4.4.4 Landscape and Visual

As the major construction activities undertaken during the reporting month were related to marine works, the landscape and visual impacts are considered to be minimal.

5. ENVIRONMENTAL COMPLAINT AND NON-COMPLIANCE

5.1 Environmental Exceedances

The total number of exceedances for air, noise and water quality are presented in following sections.

5.1.1 Air Quality

No air quality monitoring work was undertaken during the reporting period.

5.1.2 Noise Quality

No noise quality exceedances were recorded during the reporting period.

5.1.3 Water Quality

Water quality was found to be generally good during the reporting month. However, elevated SS levels were recorded on 4, 7, 23, 25 and 30 March 2005.

The SS exceedances recorded on 4 and 7 March were found to be caused by the sand filling works at IRAE. All parties were immediately informed of the exceedances and the Contractor implemented mitigation measures to reduce and prevent further SS impacts. These measures include replacing the geotextile for Central Barrack's seawater intake silt screen using an improved fixing method and using a revised sand filling method to minimise SS dispersion.

The SS exceedances recorded on 23 and 25 March were investigated and found to be due to high spots of sand fill behind the PLA caisson units in IRAE. The dispersion of these high spots of sand fill was likely assisted with the tidal current. All parties were immediately informed of the exceedances and the Contractor carried out a sounding survey to locate the high spots and subsequently trimmed down these high spots to mitigate the dispersion effect. The Contractor was advised to carry out preventative actions for sand filling operations to avoid reoccurrence of this situation in the future. The Contractor was also reminded that they are responsible for achieving the water quality requirements for the project and to ensure that all mitigation measures are implemented effectively.

The SS exceedance recorded on 30 March was investigated and was found to be due to sand filling and vessel movements near the PLA intake. The propellers of marine vessels in the area likely caused the dispersion of SS. However, the affected area is mainly localised at the eastern end of IRAE since the current flow within IRAE is low. The Contractor and all relevant parties were immediately notified of the exceedance and the Contractor has agreed to slow down the speed of marine vessels whenever possible. Further, the Contractor advised that the PLA intake would be relocated to the western edge of IRAE in early April 2005, which would improve water quality at the intake.

No DO exceedances were recorded during the reporting month.

5.1.4 Waste Management

No non-compliances with regard to waste management were recorded in the reporting month.

5.1.5 Landscape and Visual

No non-compliance with regard to landscape and visual aspects were recorded in the reporting month.

5.1.6 Site Environmental Audit

No environmental non-compliances were found during environmental site inspections conducted during the reporting period.

A summary of the findings from the site inspections conducted during the reporting month is provided in **Table 5.1**.

Table 5.1 - Summary of Environmental Site Inspections

Date of Inspection	Observations	Action(s)
3 March 2005	The additional silt curtain for the PLA seawater intake was not securely fixed to the seawall.	The Contractor was asked to secure the floating silt curtain.
10 March 2005	No deficiencies were observed	No actions are required.
17 March 2005	An oil container at CR-13 was found without a drip tray.	The Contractor provided a drip tray for the container.
	A concrete pump truck parked at IRAW was found to be leaking diesel fuel.	The Contractor was asked to immediately repair the fuel leak and to properly clean the spillage area.
	Some leaked oil/grease was found underneath a compressor at IRAW.	The Contractor was asked to repair the leaking equipment and to provide a spill tray for the compressor.
23 March 2005	No deficiencies were observed	No actions are required.
30 March 2005	No deficiencies were observed	No actions are required.

5.2 Environmental Complaint and Prosecution

No environmental complaints and no prosecution notices or summons were received during the reporting month.

5.3 Environmental Enquiries

No environmental enquiries were received during the reporting month.

6. FORECAST AND SCHEDULE

6.1 Key Works for the Coming Month

The key issues to be considered in the coming month include the following:

- Architectural works for Pier No. 7;
- Pile shaft excavation and obstruction removal at Public Pier West;
- Piling works including pile cap and beam construction at Pier 8;
- Sand filling at IRAE;
- Land piling works and substructure construction for the Central Terminal Building (CTB);
- Land piling work for the Man Yiu Street Footbridge;
- Seawall construction at IRAE;
- PLA temporary intake pipe construction;
- Cooling water mains work at Lung Wui Road;
- In-situ work to installed caissons and pumping stations at IRAE;
- Dredging and rock filling for temporary storage of caisson units at FRAW;
- Install filter layer to rock mound at IRAE;
- Remedial work for Culvert F;
- Rock excavation to bored piling at Eastern Seawall;
- Ballast material filling to caisson units and IRAE;
- Temporary seawater cooling main construction for Central Barracks and relocation of water quality monitoring station M4; and
- Maintenance and necessary repair works for seawater intake silt screens.

6.2 Monitoring Schedules for the Coming Months

Based on the Contractor's programme, the Environmental Monitoring Programme for the next three months is planned as follows:

TSP (24 hr and 1 hr monitoring)

Upon commencement of significant dust generating activities within range of the closest air quality sensitive receiver, dependent upon the Contractor's programme.

Noise (Continuous Measurements)

The noise monitoring programme throughout the entire construction period is 24-hour continuous.

Water Quality Monitoring

The water quality monitoring schedule for the upcoming months is provided in the following table.

Table 6.1 - Water Quality Monitoring Programme

Date of Sampling	Sampling Time	
1 April 2005	09:03	16:58
4 April 2005	09:20	13:43
6 April 2005	11:01	16:23
8 April 2005	12:00	17:00
11 April 2005	08:30	13:55
13 April 2005	08:30	15:08
15 April 2005	08:30	16:33
18 April 2005	08:30	17:00
20 April 2005	10:26	15:28
22 April 2005	11:18	17:00
25 April 2005	08:30	13:30
27 April 2005	08:30	13:59
29 April 2005	08:30	15:45
2 May 2005	08:30	17:00
4 May 2005	09:52	15:16
6 May 2005	11:10	17:00
9 May 2005	08:30	13:30
11 May 2005	08:30	14:06
13 May 2005	08:30	15:04
16 May 2005	08:30	17:00
18 May 2005	08:53	13:37
20 May 2005	10:09	16:06
23 May 2005	11:46	17:00
25 May 2005	08:30	13:30
27 May 2005	08:30	14:56
30 May 2005	10:37	17:00
1 June 2005	08:30	13:51
3 June 2005	10:07	16:16
6 June 2005	12:00	17:00
8 June 2005	12:00	17:30
10 June 2005	08:30	14:19
13 June 2005	08:30	17:00
15 June 2005	10:46	17:00

Date of Sampling	Sampling Time	
17 June 2005	08:35	14:28
20 June 2005	10:41	17:00
22 June 2005	12:00	17:00
24 June 2005	08:30	13:59
27 June 2005	09:33	16:35
29 June 2005	12:00	17:00

6.3 Construction Programme for the Next 3 Months

The construction programme for the next 3 months is provided in **Annex B** and will be updated by the Contractor.

The ET will follow the Contractor's proposed programme to ensure the compliance of environmental performance and proper implementation of all necessary mitigation measures.

7. CONCLUSION

Generally, the ambient water quality was found to be in generally good condition for March 2005. However, exceedances of the water quality criteria were recorded on four occasions.

SS exceedances were recorded on 4, 7, 23, 25 and 30 March 2005. The SS exceedances recorded on 4 and 7 March were found to be caused by the sand filling works at IRAE while the exceedances on 23 and 25 March were found to be due to high spots of sand fill being carried away by tidal currents. The SS exceedance recorded on 30 March was investigated and was found to be due to sand filling works and vessel movements near the PLA intake. All parties were immediately informed of the exceedances and the Contractor implemented mitigation measures to reduce and prevent further SS impacts. These measures include replacing the geotextile for Central Barrack's seawater intake silt screen using an improved fixing method and using a revised sand filling method to minimise SS dispersion. In addition, the Contractor carried out a sounding survey to locate the high spots and subsequently trimmed down these high spots to mitigate the dispersion effect. Marine vessel movements would also be reduced whenever possible to minimise the dispersion of SS near sand filling areas.

The Contractor noted that the PLA intake would be relocated to the western edge of IRAE in early April 2005. Monitoring station M4 would be relocated in tandem with this change. The relocation would improve water quality at the intake.

The Contractor was advised to carry out preventative actions for sand filling operations to avoid reoccurrence of similar situations in the future. The Contractor was also reminded that they are responsible for achieving the water quality requirements for the project and to ensure that all mitigation measures are implemented effectively.

No DO exceedances were recorded during the reporting month.

The monitoring work for this reporting month has been independently verified by the Independent Environmental Checker (IEC) and has been found to be in compliance with the requirements of the EM&A programme.