

**Central Reclamation, Phase III  
Environmental Monitoring & Audit  
Monthly Report No. 9  
April 2004**

|                        |  |                    |   |
|------------------------|--|--------------------|---|
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|                        | <i>Name</i>  | <i>Sign</i>        | <i>Date</i>   |
| <i>Prepared by :</i>   | Albert Chan, ACL - Environmental<br>Consultant   | _____              | 10 May 2004   |
| <i>Reviewed by :</i>   | Susana Bezy, ACL – ET Leader   | _____              | 10 May 2004   |
| <i>Authorised by :</i> | Jon Varndell, ACL – Project Mgr  | _____              | 10 May 2004   |
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| <i>Copy No</i>         | <i>Issue to</i>  | <i>Attention</i>   | <i>Corr. Ref.</i>                                       |
| 1                      | TDD  | Mr H H Yeung       | 3128/M45/200/OC5962/al                                  |
| 2, 3                   | EPD  | Mr M W Ho          | 3128/M45/200/OC5962/al                                  |
| 4                      | EPD (LCO)  | Mr Allan Hung      | 3128/M45/200/OC5962/al                                  |
| 5                      | Leighton-China State-Van Oord JV   | Mr Malcolm Plummer | 3128/M45/200/OC5962/al                                  |
| 6                      | CRIII Sites/PRE  | Mr Douglas Miller  | 3128/M45/200/OC5962/al                                  |
| 7                      | Independent Checker (Environment)  | Mr Bill Douglas    | 3128/M45/200/OC5962/al                                  |
| 8                      | Environmental Team Leader  | Ms Susana Bezy     | 3128/M45/200/OC5962/al                                  |
| 9                      | Office Copy  |                    |   |
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|          |   |
|----------|---|
| ACL      | Atkins China Limited                        |
| 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 Works, Contract No. HK 12/02, was awarded to Leighton China State Van Oord Joint Venture (LCSVO-JV) by the Territory Development Department (TDD), 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 TDD 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 ninth 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 30 April 2004.

### ***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 1, 8, 15, 22 and 29 April 2004.
- Noise monitoring was performed continuously for 24 hours.
- Water quality monitoring was undertaken on the following days:
  - 2 April 2004
  - 5 April 2004
  - 7 April 2004
  - 9 April 2004
  - 12 April 2004
  - 14 April 2004
  - 16 April 2004
  - 19 April 2004
  - 21 April 2004
  - 23 April 2004
  - 26 April 2004
  - 28 April 2004
  - 30 April 2004

### ***Exceedance of Action and Limit Levels***

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

The noise monitoring carried out during the reporting did not find any exceedances that were attributable to the project works. Although the continuous monitoring data indicated several instances where the Leq (30 minutes) exceeded 75 dB(A), investigations into these levels found that they were due to local noise conditions at the City Hall monitoring location and were not due to the project. Previous off-site inspections carried out by the IEC noted that the main sources of noise near City Hall were from helicopter and vehicle traffic and passer-by activities in the area.

From the analysis of water quality monitoring results collected during the reporting period, no exceedances were identified as directly attributable to the project marine works. However, the dissolved oxygen (DO) and suspended solids (SS) levels exceeded the Action and Limit Levels on one occasion and six occasions respectively. Investigations found that they were due to natural variation in ambient conditions and/or local influencing factors. A review of the monitoring results showed that control stations located outside the project's influence had similar values as marine impact stations and seawater intake monitoring data showed variable results with localised exceedances near stormwater outfalls. These findings were similar to the conditions observed during baseline monitoring and silty discharges from outfalls within the project area were documented during the reporting month.

### ***Complaint Log***

There were no environmental complaints received during this 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 1, 8, 15, 22 and 29 April 2004. No environmental non-conformance and deficiencies were observed during the site inspections.

### ***Future Key Issues***

Future Key Issues are as follows:

- Based on recent marine ground surveys, the Contractor has estimated that the volume of sediment to be dredged will be increased and that the new values will exceed the maximum dredging volume stipulated in the Environmental Permit (FEP-01/122/2003). The implications of this change with regard to the EIA were reviewed. It was noted that an increase in dredging quantity would not alter the findings of the water quality assessment since the Contractor is not proposing an increase in the dredging rates. Certification and verification for the variation of FEP Condition 3.2(b) for the maximum dredging volume has been issued.
- The temporary installation of pre-cast seawall caissons in IRAW is planned for 5 May and 6 May 2004. Cinotech Consultants Ltd. on behalf of the Contractor has conducted an

environmental review of the unloading operation in April 2004. The review did not find any significant environmental impacts with the planned works.

- The Jet Grout Column Trials in the marine environment commenced on 22 April 2004. However, due to technical difficulties with the equipment, the scheduled trials have been postponed until early May 2004. EPD has been notified on the trial. As the jet grouting may have the potential to impact water quality, the trials will be monitored closely and a water quality monitoring programme have been set up for the trials in the marine environment.

## **1. INTRODUCTION**

### **1.1 Basic Project Information**

The Territory Development Department (TDD) of the 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. Construction works undertaken during the reporting month include dredging, reclamation up to the original seabed level only, marine site investigation, demolition preparation work at General Post Office (GPO) Walkway and remedial works at Culvert F.

Atkins China Limited (ACL) has been commissioned by TDD 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 ninth monthly EM&A Report under the EIAO, which presents the results of EM&A work conducted during the period from 1 to 30 April 2004, inclusive.

## **2. ENVIRONMENTAL STATUS**

### **2.1 Works Undertaken**

The works undertaken during the reporting month include dredging for the seawall foundation at IRAE, rockfilling, marine piling at IRAW, superstructure works for Pier No. 7 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    | LCSVO-JV submitted a letter informing the termination of employment  | 27 April 2004       | –             |
| 2    | LCSVO-JV submitted an Application for Renewal of Construction Noise Permit GW-TS0489-03 for the use of Powered Mechanical Equipment other than percussive piling in Victoria Harbour during night-time                           | 26 April 2004       | –             |
| 3    | LCSVO-JV submitted an Application for Construction Noise Permit for Grouting Works of Pre-bored H-pile (Ref. H2189/U2c/6550/MP/DC/CKA/ST/cm)   | 26 April 2004       | –             |
| 4    | LCSVO-JV submitted updated application material for an Application for a Permit to Dump Material (Uncontaminated Sediment) at Sea Under the Dumping at Sea Ordinance (Ref. H2189/U2c/6398/MP/EY/ST/cm)                           | 15 April 2004       | –             |
| 5    | LCSVO-JV submitted an Application for a Construction Noise Permit for Grouting Works of Pre-bored H-pile (Ref. H2189/U2c/6326/MP/DC/CKA/ST/ec)   | 9 April 2004        | –             |
| 6    | LCSVO-JV submitted an Application for Construction Noise Permit for Unloading and Temporary Storage of Pre-cast Seawall Units (Ref. H2189/U2c/6287/MP/EY/MB/ST/atm).   | 8 April 2004        | –             |
| 7    | LCSVO-JV submitted an Application for a Permit to Dump Material (Contaminated Sediment) at Sea Under the Dumping at Sea Ordinance (Ref. H2189/U2c/6246/MP/CST/EY/ST/atm).  | 6 April 2004        | –             |
| 8    | LCSVO-JV submitted additional information for an Application for a Permit to Dump Material (Uncontaminated Sediment) at Sea under the Dumping at Sea Ordinance (Ref. H2189/U2c/6216/MP/CST/EY/ST/ec).                            | 3 April 2004        | –             |
| 9    | LCSVO-JV submitted a letter informing the termination of employment of hopper barge (SB4) for dumping operation under two valid Marine Dumping Permits No. EP/MD/04-133 and EP/MD/04-134 (Ref. H2189/U2c/6171/MP/CST/EY/ST/atm). | 1 April 2004        | –             |

### 2.3 Environmental Document Submission

A summary of the status of the submissions provided during the reporting month is presented in **Table 2.2**.

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

| Item | Document Title  | Version | Date of Submission to ER |
|------|---|---------|--------------------------|
| 1    | <i>Advance Notification of Night-time Construction Work (PLA)</i>   | -       | 29 April 2004            |
| 2    | <i>Construction Noise Permit GW-TS0169-04</i>   | -       | 29 April 2004            |
| 3    | <i>Marine Dumping Permits (EP/MD/05-003)</i>  | -       | 26 April 2004            |
| 4    | <i>Environmental Review of Submergence and Unloading of IRAW Package 1 Area</i>   | -       | 23 April 2004            |
| 5    | <i>Installation Method Statement - IRAW Package 1 Storage</i>   | 0       | 19 April 2004            |
| 6    | <i>Alternative Design - ESW JG Foundation Marine Trial, Supplementary Information to Detail Method Statement and Environmental Issues</i> | -       | 13 April 2004            |
| 7    | <i>Construction Noise Permits (GW-TS0134-04 and GW-TS0135-04)</i>   | -       | 9 April 2004             |
| 8    | <i>Proposed Sand Filling Method and Sequence at IRAE</i>  | -       | 7 April 2004             |
| 9    | <i>Proposed Sand Filling Method and Sequence at IRAW</i>  | -       | 1 April 2004             |

A summary of the Environmental Certification Sheet submissions to EPD for the Month of April 2004 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>Variation of FEP Condition 3.2(b) - Maximum Dredging Volume</i>      | 3128/M45/200/OC5926/AC/al | 26 April 2004             | -               |
| 2  | <i>Certification of Monthly Environmental Report No. 8 - March 2004</i> | 3128/M45/200/OC5887/AC/al | 14 April 2004             | -               |

## **2.4 Environmental Meetings**

No environmental meetings were held during the reporting month.

## **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 <sub>10</sub> , L <sub>90</sub> .                         | 1 Location                              | Continuous measurements             | Two weeks before Construction and During Construction |
| Water Quality           | Dissolved Oxygen;<br>Salinity;<br>Temp;<br>Suspended Solids;<br>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 carried out daily visual inspection of the silt screens for seawater intakes. Bi-weekly diving inspections for the silt screens were also carried out in April 2004. During the reporting month, there were no records of the Contractor not implementing relevant mitigation measures.

#### 4. MONITORING RESULTS

##### 4.1 Impact Monitoring Schedule in April 2004

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 1, 8, 15, 22 and 29 April 2004.

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

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 April 2004 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 April 2004     | Mid Ebb     | 09:28 - 12:02      |
|                  | Mid Flood   | 14:02 - 16:23      |
| 5 April 2004     | Mid Ebb     | 11:13 - 14:19      |
|                  | Mid Flood   | 15:43 - 18:36      |
| 7 April 2004     | Mid Ebb     | 12:16 - 15:05      |
|                  | Mid Flood   | 07:20 - 10:13      |
| 9 April 2004     | Mid Ebb     | 13:26 - 15:46      |
|                  | Mid Flood   | 07:22 - 10:17      |
| 12 April 2004    | Mid Ebb     | 15:24 - 17:48      |
|                  | Mid Flood   | 07:32 - 10:30      |
| 14 April 2004    | Mid Ebb     | 07:43 - 10:32      |
|                  | Mid Flood   | 13:02 - 15:38      |
| 16 April 2004    | Mid Ebb     | 09:45 - 12:35      |
|                  | Mid Flood   | 14:32 - 17:28      |
| 19 April 2004    | Mid Ebb     | 10:30 - 13:21      |
|                  | Mid Flood   | 15:46 - 18:05      |
| 21 April 2004    | Mid Ebb     | 10:54 - 13:54      |
|                  | Mid Flood   | 15:48 - 18:05      |
| 23 April 2004    | Mid Ebb     | 12:47 - 15:19      |
|                  | Mid Flood   | 07:50 - 11:08      |
| 26 April 2004    | Mid Ebb     | 14:44 - 17:12      |
|                  | Mid Flood   | 07:28 - 10:40      |
| 28 April 2004    | Mid Ebb     | 15:14 - 17:43      |

| Date of Sampling | Tidal State | Timing of Sampling |
|------------------|-------------|--------------------|
|                  | Mid Flood   | 07:50 - 10:57      |
| 30 April 2004    | Mid Ebb     | 08:10 - 10:45      |
|                  | Mid Flood   | 12:44 - 15:01      |

## 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 | 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"> <li>This instrument was portable and weatherproof and used a DC power source. The equipment was capable of measuring:</li> <li>DO levels in the range of 0-20 mg/l and 0-200% saturation; and</li> <li>Temperature of between 0 - 45 degree Celsius.</li> <li>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.</li> </ul> |
| Turbidity Measurement Instrument                     | <p>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.</p>   |
| pH   | <p>A MP125 pH Meter from Mettler Toledo was used to measure pH.</p>  |
| Salinity / Conductivity Meter                        | <p>A Salinity / Conductivity meter YSI model 63 and model 30 was used for determining salinity concentrations.</p>   |
| Sample Containers and Storage                        | <p>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.</p>   |

#### 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 work areas or 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 | 5.4           | 4.8         | 69.2           | 3.1                | 4            |
|         | max | 8.0           | 7.6         | 109.8          | 6.8                | 9            |
|         | avg | 6.1           | 6.0         | 82.1           | 5.0                | 6            |
|         | sd  | 0.7           | 0.7         | 10.8           | 1.0                | 2            |
| C2      | min | 5.5           | 5.1         | 72.6           | 3.1                | 4            |
|         | max | 6.9           | 6.9         | 96.8           | 5.9                | 8            |
|         | avg | 6.1           | 6.0         | 82.4           | 4.4                | 5            |
|         | sd  | 0.5           | 0.5         | 7.5            | 0.8                | 1            |
| M7      | min | 4.9           | 4.8         | 65.9           | 3.4                | 4            |
|         | max | 6.6           | 6.4         | 91.1           | 8.1                | 9            |
|         | avg | 5.7           | 5.5         | 76.4           | 5.0                | 6            |
|         | sd  | 0.5           | 0.5         | 7.3            | 1.3                | 1            |
| M8      | min | 4.8           | 5.0         | 64.8           | 3.1                | 4            |
|         | max | 6.7           | 6.5         | 92.4           | 7.4                | 10           |
|         | avg | 5.7           | 5.7         | 77.9           | 5.2                | 6            |
|         | sd  | 0.5           | 0.6         | 8.0            | 1.3                | 2            |

| Station |     | Parameter     |             |                |                    |              |
|---------|-----|---------------|-------------|----------------|--------------------|--------------|
|         |     | DO (S&M) mg/L | DO (B) mg/L | DO % Sat. (DA) | Turbidity (DA) NTU | SS (DA) mg/L |
| M9      | min | 5.0           | 5.1         | 68.7           | 3.4                | 4            |
|         | max | 7.0           | 6.8         | 96.6           | 11.4               | 13           |
|         | avg | 5.8           | 5.7         | 79.0           | 5.7                | 7            |
|         | sd  | 0.6           | 0.5         | 8.4            | 2.1                | 2            |
| M10     | min | 5.4           | 5.2         | 69.3           | 3.7                | 5            |
|         | max | 7.0           | 6.3         | 94.3           | 7.1                | 9            |
|         | avg | 5.9           | 5.7         | 79.1           | 5.2                | 7            |
|         | sd  | 0.5           | 0.4         | 6.7            | 1.0                | 2            |

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 4.8 and 7.0 mg/L with an average value of 5.8 mg/L and DO measurements in the bottom layer ranged from 5.0 to 6.5 mg/L with an average level of 5.7 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 5.4 to 8.0 mg/L with an average value of around 6.1 mg/L; DO measurements in the bottom layer ranged between 4.8 and 7.6 mg/L with an average level of 6.0 mg/L.

SS levels during mid-ebb tide ranged from 4 to 10 mg/L with an average value of 6 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 4 to 9 mg/L with an average of 6 mg/L. The results showed no clear gradient effect (high SS and low DO levels from near-field stations M7 and M9 to far-field stations M8 and M10), which indicates that dredging 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 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 | 5.2           | 5.1         | 68.7           | 3.5                | 4            |
|         | max | 7.6           | 8.3         | 110.3          | 7.9                | 11           |
|         | avg | 6.0           | 6.0         | 82.2           | 5.2                | 6            |
|         | sd  | 0.6           | 0.8         | 10.6           | 1.4                | 2            |
| C2      | min | 5.4           | 5.3         | 71.1           | 2.1                | 4            |
|         | max | 6.8           | 6.6         | 90.7           | 6.4                | 8            |
|         | avg | 6.1           | 6.0         | 82.5           | 4.2                | 5            |
|         | sd  | 0.4           | 0.4         | 5.9            | 1.3                | 1            |
| M7      | min | 5.0           | 4.8         | 66.2           | 3.1                | 4            |
|         | max | 6.5           | 6.6         | 91.5           | 6.0                | 8            |
|         | avg | 5.7           | 5.6         | 76.8           | 4.8                | 6            |

| Station |     | Parameter     |             |                |                    |              |
|---------|-----|---------------|-------------|----------------|--------------------|--------------|
|         |     | DO (S&M) mg/L | DO (B) mg/L | DO % Sat. (DA) | Turbidity (DA) NTU | SS (DA) mg/L |
|         | sd  | 0.5           | 0.5         | 6.7            | 1.0                | 2            |
| M8      | min | 5.0           | 4.8         | 65.2           | 2.4                | 4            |
|         | max | 6.8           | 6.7         | 91.9           | 6.9                | 9            |
|         | avg | 5.8           | 5.7         | 78.6           | 4.8                | 6            |
|         | sd  | 0.6           | 0.6         | 8.0            | 1.3                | 2            |
| M9      | min | 4.8           | 4.7         | 63.3           | 3.0                | 4            |
|         | max | 6.6           | 6.8         | 93.0           | 7.7                | 9            |
|         | avg | 5.7           | 5.6         | 76.8           | 4.8                | 6            |
|         | sd  | 0.6           | 0.6         | 8.1            | 1.4                | 1            |
| M10     | min | 4.9           | 4.8         | 64.5           | 3.2                | 4            |
|         | max | 6.7           | 6.5         | 87.4           | 7.6                | 8            |
|         | avg | 5.9           | 5.7         | 78.8           | 4.9                | 6            |
|         | sd  | 0.5           | 0.5         | 7.1            | 1.4                | 1            |

During mid-flood tide, DO levels at marine-based impact stations (M8 & M10) in the surface to middle layer ranged from 4.9 to 6.8 mg/L with an average level of 5.8 mg/L while DO values in the bottom layer ranged between 4.8 and 6.7 mg/L with an average of 5.7 mg/L. Similar DO concentrations were recorded at the control stations in the surface to middle layer during mid-flood survey ranged between 5.2 and 7.6 mg/L with an average value of 6.1 mg/L and DO results in the bottom layer ranged from 5.1 and 8.3 mg/L with an average of 6.0 mg/L.

SS content ranged between 4 and 9 mg/L (for stations M8 & M10) with an average of 6 mg/L during mid-flood tide and ranged from 4 to 11 mg/L with an average value of 6 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 | 4.5       | 61.3      | 4.2           | 6       |
|         | max | 6.5       | 91.8      | 9.2           | 10      |
|         | avg | 5.4       | 74.3      | 6.3           | 8       |
|         | sd  | 0.5       | 8.4       | 1.6           | 1       |

| Station |     | Parameter |           |               |         |
|---------|-----|-----------|-----------|---------------|---------|
|         |     | DO mg/L   | DO % Sat. | Turbidity NTU | SS mg/L |
| M2      | min | 4.1       | 55.4      | 3.9           | 7       |
|         | max | 5.6       | 79.3      | 29.3          | 47      |
|         | avg | 5.0       | 68.3      | 9.2           | 14      |
|         | sd  | 0.5       | 7.4       | 6.3           | 11      |
| M3      | min | 4.1       | 58.8      | 4.0           | 5       |
|         | max | 6.1       | 85.8      | 7.7           | 10      |
|         | avg | 5.4       | 73.2      | 5.7           | 8       |
|         | sd  | 0.6       | 7.8       | 1.2           | 1       |
| M4      | min | 4.7       | 63.9      | 3.6           | 5       |
|         | max | 6.2       | 87.0      | 8.6           | 15      |
|         | avg | 5.3       | 72.2      | 6.1           | 8       |
|         | sd  | 0.5       | 6.3       | 1.2           | 2       |
| M5      | min | 4.6       | 64.8      | 4.0           | 5       |
|         | max | 6.1       | 86.3      | 21.9          | 28      |
|         | avg | 5.4       | 74.1      | 6.7           | 9       |
|         | sd  | 0.5       | 6.8       | 4.7           | 6       |
| M6      | min | 4.6       | 65.3      | 3.9           | 5       |
|         | max | 6.2       | 87.0      | 11.6          | 18      |
|         | avg | 5.5       | 74.3      | 6.1           | 8       |
|         | sd  | 4.6       | 65.3      | 3.9           | 5       |
| M11     | min | 4.9       | 66.5      | 3.3           | 5       |
|         | max | 6.1       | 85.3      | 7.5           | 10      |
|         | avg | 5.4       | 73.6      | 5.7           | 7       |
|         | sd  | 0.4       | 6.3       | 1.2           | 2       |
| M12     | min | 4.6       | 65.0      | 3.8           | 5       |
|         | max | 6.2       | 87.3      | 8.3           | 11      |
|         | avg | 5.4       | 74.2      | 5.7           | 8       |
|         | sd  | 0.4       | 6.1       | 1.4           | 2       |

Seawater intake results during mid-ebb tide, Table 4.7, show that DO levels ranged from 4.1 to 6.2 mg/L with an average of 5.1 mg/L. SS ranged between 4 and 15 mg/L with an average value of 8 mg/L. The monitoring results show that water quality at seawater intake stations was generally good. Only a few elevated SS levels, such as at stations M4 and M11, were found during the reporting month. The poor water quality at these stations are likely due to adverse impacts from outfalls located adjacent to the station. During the reporting month silty discharges from outfalls were observed and documented near stations M4 and M5 on 1, 7, 9 and 10 April 2004. Observations noted that the large patches of brown silty water generally dispersed westwards after discharge from the outfall. On 19 April 2004, a dark murky discharge was observed from an outfall between station M4 and M5. A figure showing the location of various outfalls along the seawall within the project area is shown in **Annex C**.

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 | 4.8       | 66.2      | 3.8           | 5       |
|         | max | 6.2       | 87.5      | 11.0          | 18      |
|         | avg | 5.3       | 73.3      | 6.4           | 8       |
|         | sd  | 4.8       | 66.2      | 3.8           | 5       |
| M2      | min | 4.4       | 61.3      | 4.0           | 6       |
|         | max | 6.5       | 91.6      | 11.5          | 17      |
|         | avg | 5.2       | 71.4      | 7.4           | 11      |
|         | sd  | 0.7       | 10.2      | 2.5           | 4       |
| M3      | min | 4.4       | 60.0      | 4.3           | 6       |
|         | max | 6.3       | 88.4      | 8.8           | 12      |
|         | avg | 5.2       | 71.3      | 6.1           | 8       |
|         | sd  | 0.5       | 7.8       | 1.4           | 2       |
| M4      | min | 4.7       | 63.8      | 3.2           | 4       |
|         | max | 6.1       | 86.0      | 9.3           | 18      |
|         | avg | 5.4       | 73.5      | 5.9           | 8       |
|         | sd  | 0.5       | 7.6       | 1.7           | 4       |
| M5      | min | 4.4       | 60.0      | 3.5           | 4       |
|         | max | 5.8       | 81.7      | 9.2           | 16      |
|         | avg | 5.3       | 72.5      | 5.5           | 7       |
|         | sd  | 0.4       | 6.9       | 1.6           | 3       |
| M6      | min | 4.4       | 60.3      | 3.2           | 4       |
|         | max | 5.8       | 81.2      | 7.7           | 10      |
|         | avg | 5.2       | 70.9      | 5.4           | 7       |
|         | sd  | 0.4       | 7.0       | 1.1           | 2       |
| M11     | min | 5.0       | 67.1      | 3.5           | 5       |
|         | max | 6.2       | 85.9      | 8.4           | 10      |
|         | avg | 5.4       | 74.4      | 5.5           | 7       |
|         | sd  | 0.3       | 5.6       | 1.5           | 2       |
| M12     | min | 4.8       | 63.5      | 3.9           | 4       |
|         | max | 5.7       | 82.2      | 7.4           | 10      |
|         | avg | 5.2       | 71.4      | 5.5           | 7       |
|         | sd  | 0.3       | 5.9       | 1.0           | 2       |

During mid-flood survey, Table 4.8 shows that DO levels at seawater intake stations ranged from 4.1 to 6.2 mg/L with an average of 5.1 mg/L. SS ranged from 5 to 32 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. Again, a few localised high SS levels were found but these were found to be not due to project works. The few instances of poor water quality at several seawater intake stations were due to adverse impacts from outfalls located adjacent to the stations. The instance of high SS at station M11 was caused by seawater intake maintenance work carried out by the intake operator and not due to project works. As mentioned previously, large quantities of silty

discharges from outfalls near stations M4 and M5 have been observed and documented on various occasions during the reporting month. A figure showing the location of various outfalls along the seawall within the project area is shown in **Annex C**.

#### **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 works undertaken during the reporting month were related to site investigation works, demolition works and dredging 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 exceedances of noise quality attributable to project works were observed during the reporting period. Although there were a few instances where the Leq (30 minutes) was found to be above 75 dB(A), these levels were determined to be not due to project works. The noise levels above 75 dB(A) recorded on 9 and 12 April were due to increased passer-by activities during the public holidays.

The noise monitoring station situated at City Hall is under the influence of a variety of noise sources in the area that include helicopter traffic and vehicle movement at the drop off area in front of City Hall. Pedestrian activity in the area is another contributor of noise and tour groups also frequent the site.

#### **5.1.3 Water Quality**

Based on investigations and analyses of water quality monitoring results collected during the reporting month, it was found that no exceedances of the Action and Limit Levels were attributable to the project marine works. Although DO levels below the Action Level were observed at seawater intake stations, investigations found that they were due to natural variation or changes in ambient conditions and not caused by the project marine works. It was noted that during the reporting month, water quality at marine-based impact monitoring stations (M8 and M10) was found to be similar to the control stations.

The April 2004 monitoring results showed on a few occasions elevated concentrations of SS were recorded above the Action and/or Limit Level at seawater intake stations. Investigations into these monitoring results found that the SS levels are likely attributed to discharge influences from outfalls located in proximity of seawater intake monitoring stations. All of the higher SS concentrations recorded were shown to be localised conditions as no increased SS levels were detected at the marine-based impact stations and no unusual concentrations were measured at adjacent monitoring stations during the same time. High SS levels were often recorded at locations (stations M1 to M6) with outfalls and stormwater culverts that discharge into the harbour. Baseline monitoring results showed similar localised elevated concentrations of SS.

#### **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 joint site inspection with the IEC was conducted on 22 April 2004, and the IEC's site inspection report is provided in **Annex L**.

During a site inspection conducted on 15 April 2004, it was observed that an external contractor was carrying out maintenance work for Hongkong and Shanghai Banking Corporation's (HSBC) seawater pumping station. These works were likely responsible for the elevated SS levels at the adjacent seawater intake monitoring station.

The Contractor commenced the Jet Grout Column Trial on the morning of 22 April 2004. Pre-drilling was first undertaken and field observations noted that the water inside the silt curtain enclosure turned into a dark murky colour within 15 minutes of the test. The water outside the silt curtain however was unaffected. Grout injection was then initiated once the drill rod reached bottom level and within 5 minutes the water inside the curtain turned into a murky brown colour. Around 10 minutes after the grout injection, a small breach in the silt curtain was noticed near the surface level and a small brown patch of water outside the silt curtain could be seen. At around the same time, the jet grouting equipment experienced a mechanical failure and the trial was then terminated. Visual inspections by field staff noted that the water inside silt curtain returned to normal conditions after approximately 6 hours from the start of the trial. The Contractor also began to repair the silt curtain and has postponed the next trial test until all necessary repairs have been completed.

A comprehensive monitoring programme for these works has been undertaken. The results of the monitoring will be provided in the next monthly report.

## **5.2 Environmental Complaint and Prosecution**

No environmental complaints, prosecution notices or summons were received during the reporting period.

## **5.3 Environmental Enquiries**

TDD received three enquiries regarding the dumping of rock fill during the reporting month. The first enquiry, addressed to EPD and received on 9 April 2004, questioned whether rock fill material used for the project are obtained from approved sources. An investigation conducted by the ER showed that all rock fill sources have been previously approved. The other two enquiries received on 19 April 2004 were also investigated and the response was that only suitable rock fill materials are used for the reclamation.

The ER carries out inspections of the Contractor's supply of rock fill to ensure the quality and correct grading of rock. Rejected materials are returned back to the originator. Additionally, silt curtains are placed around the grab when depositing rock fill to avoid dispersion of suspended solids and the water quality monitoring programme did not find any exceedances attributable to the rock filling activities.

## 6. FORECAST AND SCHEDULE

### 6.1 Key Issues for the Coming Month

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

- The dredging works at IRAE will continue and is expected to be completed by mid May 2004;
- Temporary installation of pre-cast caissons in IRAW;
- Marine piling at IRAW;
- Mobilisation for landside piling at the Central Terminal Building (CTB);
- The Jet Grout Column trial will recommence;
- Erection of formworks at Pier No. 7; and
- Maintenance and necessary repairs to the seawater intake silt screens.

### 6.2 Monitoring Schedules for the Next 3 Months

The construction works scheduled in April 2004 include dredging at IRAE, site investigation works and desilting work for the Culvert F remedial works. 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 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 next 3 months is provided in the following table.

**Table 6.1 - Water Quality Monitoring Programme**

| Date of Sampling | Sampling Time |       |
|------------------|---------------|-------|
| 3 May 2004       | 11:16         | 17:00 |
| 5 May 2004       | 12:00         | 17:00 |
| 7 May 2004       | 08:30         | 14:00 |
| 10 May 2004      | 08:45         | 17:00 |
| 12 May 2004      | 11:47         | 17:00 |
| 14 May 2004      | 09:38         | 15:01 |
| 17 May 2004      | 11:29         | 17:00 |

| Date of Sampling | Sampling Time |       |
|------------------|---------------|-------|
| 19 May 2004      | 12:00         | 17:30 |
| 21 May 2004      | 08:00         | 13:30 |
| 24 May 2004      | 08:30         | 15:05 |
| 26 May 2004      | 08:30         | 16:53 |
| 28 May 2004      | 11:54         | 17:00 |
| 31 May 2004      | 10:06         | 16:25 |
| 2 June 2004      | 11:27         | 17:00 |
| 4 June 2004      | 08:00         | 13:30 |
| 7 June 2004      | 08:30         | 15:48 |
| 9 June 2004      | 10:21         | 17:00 |
| 11 June 2004     | 08:30         | 14:00 |
| 14 June 2004     | 10:31         | 16:54 |
| 16 June 2004     | 11:30         | 17:00 |
| 18 June 2004     | 12:00         | 17:30 |
| 21 June 2004     | 08:30         | 14:17 |
| 23 June 2004     | 08:30         | 15:38 |
| 25 June 2004     | 10:10         | 17:00 |
| 28 June 2004     | 08:44         | 15:07 |
| 30 June 2004     | 10:20         | 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**

During the reporting period, no exceedances of environmental performance criteria were found to be caused by the project works. The water quality was found to be generally good, but a few localised elevated SS concentrations and one low DO level has been recorded. These levels were investigated and are attributed to either ambient conditions or adverse influencing factors unrelated to project marine works. It was found that discharges from outfalls and stormwater culverts located near seawater intake monitoring stations are major influencing factors that adversely impact water quality within the works site area.

The marine-based impact monitoring stations established to monitor the overall impact of the reclamation activities on water quality in Victoria were shown to have similar results as the control stations which are located outside the influence of project works. As such, the water quality monitoring results did not indicate that the marine works were adversely affecting water quality outside the works boundary in Victoria Harbour.

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.