

Harbour City Estates Limited

Maintenance Dredging for Ocean Terminal and Sea Water Pump House

Project Profile

September 2004

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1 BASIC INFORMATION

1.1 PROJECT TITLE

- 1.1.1 The title of the project is “*Maintenance Dredging for Ocean Terminal and Sea Water Pump House*” (hereafter referred to as the Project).

1.2 PURPOSE AND NATURE OF THE PROJECT

- 1.2.1 Harbour City Estates Limited is planning to conduct maintenance dredging for navigation improvement for Ocean Terminal Pier and reinstatement of the designed seabed level in front of the sea water pump room.
- 1.2.2 The Project works are to be carried out to provide adequate draft for large capacity cruises visiting Hong Kong. In particular, a large capacity cruise, Queen Elizabeth 2, will arrive at the Ocean Terminal Pier in early March 2005. The existing depth of the terminal is comparatively shallow and prohibits the cruise anchoring along the shore and thus deepening of the terminal is essential.

1.3 NAME OF THE PROJECT PROPONENT

- 1.3.1 Harbour City Estates Limited

1.4 LOCATION AND SCALE OF THE PROJECT AND HISTORY OF SITE

Location of the Project

- 1.4.1 There will be three areas required to be dredged in this Project. These areas are located in Victoria Harbour at Tsim Sha Tsui. The northern area, Area A, is in front of the sea water pumping station just facing Pacific Club Kowloon. The middle area, Area B, is the North Berth of Ocean Terminal and is enclosed by Pacific Club Kowloon and Ocean Terminal. The southern area, Area C, is the South Berth of Ocean Terminal and is situated in between Ocean Terminal and Star Ferry Pier.
- 1.4.2 The designed dredging levels for the dredging areas are varied, from -11mCD to -9mCD. The location and details of the dredging areas are illustrated in Figure 1.
- 1.4.3 According to the hydrographic survey conducted on December 2003, the estimated dredging volume for this Project is about 46,000m³. The daily dredging rate will be varied, with the maximum rate of approximately 5,000m³ per day.

History of Site

- 1.4.4 The site area comprises the berths of Ocean Terminal Pier and the area in front of the sea water pump house of Harbour City, which commenced operation in 1966. Maintenance dredging is required to remove the silt/sediment accumulated on the seabed to ensure normal operation of Ocean Terminal. A sediment quality assessment was carried out in 1999 for the dredging works in the vicinity of the Project area. The sediment was classified as Class C in accordance with the obsolete *Works Branch Technical Circular No. 22/92*.
- 1.4.5 An updated sediment quality assessment was carried out in August 2004 in accordance with *Practice Note for Authorized Persons and Registered Structural Engineers 252, Management*

Framework for Disposal of Dredged/Excavated Sediment” (hereinafter called “Practice Note 252”) issued by Buildings Department under the Dumping at Sea Ordinance, Cap. 466 (DASO) for obtaining Marine Dumping Permit for the Project. Samples of the sediment were tested and were classified as Category H. (The details of the sediment quality assessment are provided in Section 4.4).

- 1.4.6 There are currently two sea water intakes (I1 and I2) located in the vicinity of the site area. Sea water is extracted through the sea water intakes for cooling the chiller plants of Harbour City. The main intake (I1) operates with a flow of 302,400m³ per day. There is another seawater intake (I3) located near Star Ferry Pier and is about 65m away from the Area C. The seawater intake provides flushing water for the toilets located in the pier
- 1.4.7 In addition, the declared monument, Former Kowloon-Canton Railway Clock Tower is located within 500m from the dredging sites.

1.5 NUMBER AND TYPES OF DESIGNATED PROJECTS TO BE COVERED BY THE PROJECT PROFILE

- 1.5.1 There is only one designated project covered in this Project Profile.
- 1.5.1.1 The Project is classified as a designated project under Schedule 2 Part I – Category C12 of the Environmental Impact Assessment Ordinance (Cap. 499) as three sea water intakes of Harbour City fall within 100m of the dredging sites, and the dredging operation is less than 500m from the nearest boundary of the site of cultural heritage, Former Kowloon-Canton Railway Clock Tower.

1.6 NAME AND TELEPHONE NUMBER OF CONTACT PERSONS

<u>Name</u>	<u>Designation</u>	<u>Telephone No.</u>	<u>Fax No.</u>
Mr. H.S. Ng	Technical Manager, Harbour City Estates Limited	2118 8590	2118 8068
Dr. Priscilla Choy	Environmental Consultant, Cinotech Consultants Limited	2151 2089	3107 1388
Mr. Alan Mong	Site Agent, China Harbour Engineering Company (Group)	2727 0128	2379 5931

2 OUTLINE OF PLANNING AND IMPLEMENTATION PROGRAMME

2.1 PROJECT PLANNING AND IMPLEMENTATION

2.1.1 Harbour City Estates Limited is the Project Proponent with overall responsibility for the planning, design, construction of the Project. The Project Proponent has commissioned China Harbour Engineering Company (Group) (CHEC, hereinafter called the Contractor) to carry out the dredging works. The Contractor subsequently appointed Cinotech Consultants Limited (Cinotech) as the Environmental Consultant to provide environmental consultancy services for the Project.

2.2 PROJECT TIME-TABLE

2.2.1 The maintenance dredging will approximately lasts for three months and is tentatively scheduled to be carried out between November 2004 and January 2005 provided that the Environmental Permit and Marine Dumping Permit are obtained.

2.3 INTERACTIONS WITH OTHER PROJECTS

2.3.1 There is currently a construction site near the dredging areas at Hong Kong China Ferry Terminal. The activities at the identified site are concrete reinstatement works and no dredging works are involved. The said project is scheduled to be completed in late 2004.

3 MAJOR ELEMENTS OF THE SURROUNDING ENVIRONMENT

3.1 SURROUNDING ENVIRONMENT OF THE PROJECT

3.1.1 The dredging areas are located in Victoria Harbour at Tsim Sha Tsui. The surrounding environment at the areas is characterized by heavy marine traffic offshore especially in the form of smaller vessels and ferries. The water quality of the Victoria Harbour has been affected by sewage discharges with high *E. coli* concentrations, ammonia and inorganic nitrogen, though improvement was observed since the implementation of Harbour Area Treatment Scheme (HATS) Stage I in 2002.

3.2 SENSITIVE RECEIVERS AND THE NATURAL ENVIRONMENTAL WHICH MIGHT BE AFFECTED BY THE PROJECT

Noise Sensitive Receivers

3.2.1 Noise from marine activities dominates the study area. The closest noise sensitive receivers (NSRs) to the dredging areas are Marco Polo Prince (NSR1), Marco Polo Gateway (NSR2), Marco Polo Hong Kong (NSR3), the Gateway Tower 5 (NSR4) and Pacific Club Kowloon (NSR5). The locations of the hotels are shown in Figure 2.

Air Quality Sensitive Receivers

3.2.2 Air quality sensitive receivers (ASRs) include those identified above as noise sensitive receivers.

Water Quality Sensitive Receivers

3.2.3 Water quality sensitive receivers include the two sea water intakes for chiller plants of Harbour City (I1 and I2) and the flushing seawater intake of Star Ferry Pier (I3). In addition to these specific sensitive receivers, Victoria Harbour Water Control Zone itself is also a sensitive receiver. The locations of the seawater intake points are shown in Figure 2.

Ecology Sensitive Receivers

3.2.4 It is anticipated that there will be no marine or terrestrial ecology of significant interest due to the disturbed nature in the vicinity of the dredging areas. No sensitive ecological receivers are identified.

Visually Sensitive Receivers

3.2.5 The dredging areas are highly visible to members of the public and are located offshore of popular tourist areas. The residents of the three said hotels are also the potential visually sensitive receivers.

Sites of Cultural Heritage

3.2.6 The declared monument, Former Kowloon-Canton Railway Clock Tower is about 150m away from the dredging areas. The location of the Clock Tower is also shown in Figure 2.

4 POSSIBLE IMPACT ON THE ENVIRONMENT

4.1 OUTLINE PROCESSES INVOLVED

4.1.1 Different kinds of equipment will be deployed for executing the dredging works and are listed below:

- Grab dredger (1 no.)
- Tug boats [2 nos.: during daytime 0700-1900 on normal working days, 1 no.: during evening time 1900-2300 and general holidays (including Sundays) during the daytime and evening (0700 to 2300 hours)]
- Derrick lighter (1 no.)

4.1.2 The derrick lighter will be adopted at where the working space is limited, i.e., Area A which is the smallest among the three dredging areas.

4.1.3 The grab dredger or the derrick lighter will be manoeuvred into position by tug boats and then anchored at the dredging area. Sediment will be dredged row-by row. Each dredging row is about 15m × 150m and 5m × 25m for the grab dredger and the derrick lighter respectively.

4.1.4 All dredged sediment will be loaded into split hopper barges for transporting to a dumping pit. The capacity of each split hopper barge is around 1000m³ (bulk volume). The hopper barge will be towed by a tug boat to the designated dumping pit for disposal. The operations of the tug boats will be of short duration and will not take place simultaneously with the dredging operations.

4.2 NOISE IMPACT

4.2.1 Noise during the maintenance dredging works will be mainly generated by the tug boats during manoeuvring operations and by the grab dredger and derrick lighter during dredging operations. The construction activities will involve the use of the Powered Mechanical Equipment (PME) as stated in Section 4.1.1 during the daytime and restricted hours [evening time 1900-2300 on normal working days and general holidays (including Sundays) during the daytime and evening (0700 to 2300 hours)] so the application of a Construction Noise Permit (CNP) under Noise control Ordinance (NCO) is essential. No dredging works are planned to be carried out during nighttime (2300-0700hours).

4.2.2 Due to the heavy marine traffic during daytime on normal working days, the dredging operations in the busy part of the harbour are unlikely to generate adverse noise impacts at the NSRs. In accordance with the calculating procedures as stipulated in EPD's Technical Memorandum on Noise from Construction Work other than Percussive Piling (GW-TM), construction noise levels arising from the dredging works at the five NSRs were predicted between 63 and 72dB(A). As a result, the predicted noise levels at all the identified NSRs would be well below the noise standard for normal daytime noise for construction activities, 75dB(A). (Table 1B of the Technical Memorandum on Environmental Impact Assessment Process) The noise level calculations are provided in Appendix A.

4.2.3 For the dredging works to be carried out during restricted hour, i.e., during evening time 1900-2300 on normal working days and general holidays (including Sundays) during the daytime and evening (0700 to 2300 hours), the number of tug boat to be employed will be reduced to one and the dredging area will also be reduced to the areas as shown in Figure 3 in order to mitigate the noise impact on the NSRs. According to Table 1 in GW-TM, the Area Sensitivity Rating (ASR) of the five NSRs under consideration is B. Table 2 in TM indicates that the Basic Noise

Level (BNL) of all NSRs in this assessment during evening time (1900 to 2300 hours) is 65dB(A). A 3dB(A) reduction has been adopted on the BNL for consideration of multiple permit situation as a CNP was issued for the construction works at Hong Kong China Ferry Terminal during evening time. The noise criteria during evening is therefore 62dB(A). The noise levels at the five NSRs are predicted between 56 and 62 dB(A), so the noise impact arising from the dredging works during evening would be considered acceptable. The noise level calculations for the dredging works during evening are also provided in Appendix A.

4.3 AIR QUALITY IMPACT

4.3.1 Dust generation is not considered to be a problem associated with the removal of wet marine sediments. Although the marine sediments are classified as Category H in accordance with Practice Note 252, odour problems are not expected to be significant and have not been reported as arising in previous dredging works, for example, the Central Reclamation Phase III project. No adverse air quality impacts are therefore anticipated from the dredging works.

4.4 WASTE MANAGEMENT

4.4.1 The major concern on waste management of the Project is the disposal of the dredged sediment. An updated sediment quality assessment was carried out in August 2004 in accordance with Practice Note 252 issued by Buildings Department under the Dumping at Sea Ordinance, Cap. 466 (DASO) for obtaining Marine Dumping Permit for the Project.

4.4.2 A total of 8 sampling stations in which 11 samples were collected to determine the sediment quality according to the approved Sediment Quality Assessment Plan by EPD. The locations of the sampling points are presented in Figure 4. All 11 samples were tested and classified as Category H but no contaminant levels exceed 10 times the Lower Chemical Exceedance Levels (LCEL). The analysis results and the classification of the samples are presented in Appendix B.

4.4.3 Based on the sediment sampling and analysis results, the procedures stipulated in Practice Note 252 would be followed and a submission to the Marine Fill Committee for appropriate dumping site would be made. According to Practice Note 252, the dredged sediment would likely be disposal of by Type 2 – Confined Marine Disposal at East Sha Chau mud pits. Environmental studies have been carried out at the disposal area and the acceptability of the disposal operation has already been established. Provided that the mitigation measures stipulated in Section 5.1 are implemented, no adverse environmental impact due to sediment management is anticipated.

4.5 WATER QUALITY IMPACT

4.5.1 The principal impact of concern on water quality impact is associated with the loss of fine sediment to suspension during the dredging of Category H marine sediment. In addition, nutrients in the sediment lost to suspension and the introduction of an additional sediment oxygen demand into the water column could also impact on water quality. Mouchel 1999 concluded that for the rate of sediment loss likely to be associated with grab dredging operations, sediment oxygen demand and nutrient loss, even for contaminated sediments in poorly flushed areas (e.g., the study area), has a very minor impact on local water quality and would not result in any additional exceedance of the Water Quality Objectives set for Victoria Harbour Water Control Zone.

4.5.2 Nevertheless, due to the close proximity of the main seawater intake (I1), which operates with a flow of 302,400m³ per day to dredging area A, the localized losses of sediment to suspension may affect the water quality at I1. A silt curtain, which details are shown in Figure 5, would be deployed around the intake of I1. The silt curtain is a permeable fabric which allows water to

pass through but prevents the transport of fine sediment through fabric. Silt curtains have been proved to be very effective in preventing suspended sediment from entering the surrounded area.

- 4.5.3 On the other hand, the seawater intake I2 is located beneath Ocean Terminal. The area is a poorly flushed area, and therefore re-suspension of sediment at this area is not anticipated and hence the use of silt curtain is not required. Similarly, the seawater intake of Star Ferry (I3) also located in a poorly flushed area, and is further away from the dredging sites. The anticipated impact would therefore be smaller.
- 4.5.4 There is no specific requirement on the seawater quality at the abstraction points of seawater intakes for chiller plants (I1 and I2). For the flushing water intake I3, the Water Supplies Department has specified a set of water quality criteria for flushing water at the seawater intake. The target limit for suspended solids (SS) at flushing seawater intakes is 10 mg L⁻¹ or less. In order to ensure that the dredging works do not affect the normal operation of the three sea water intake, water quality monitoring will be performed. Additional mitigation measures will be adopted once exceedances of the suspended solids Action/Limit levels are detected. The environmental monitoring requirements are stipulated in Appendix C.

4.6 ECOLOGY

- 4.6.1 No ecological impact is anticipated to be generated by the dredging works as the study area has been subject to significant disturbance over the years and are not known to host any marine ecology of specific importance. The only potential impact to the local marine ecology would be through the loss of fine sediment to suspension but any resultant increases in suspended sediment concentrations are anticipated remain within the natural range of concentrations encountered in the harbour.

4.7 VISUAL IMPACTS

- 4.7.1 As presented in Section 3.2.5, the dredging areas are highly visible to members of the public and are located offshore of popular tourist areas. The residents in the nearby three hotels are also visually sensitive to the dredging works. However, visual impacts arising from the Project works are not considered to be significant as the equipment to be deployed is small vessels and when set against the background of the generally very busy port with many vessels movements each day. In addition, the impact would be temporary due to the short duration of the dredging works.

4.8 CULTURAL HERITAGE

- 4.8.1 Since the activities for the Project works are all marine-based, it is not anticipated to have any environmental impact on the land-based Former Kowloon-Canton Railway Clock Tower, which is over 140m away from the dredging areas.

5 ENVIRONMENTAL PROTECTION MEASURES TO BE INCORPORATED IN THE DESIGN AND ANY FURTHER ENVIRONMENTAL IMPLICATION

5.1 DESCRIBE MEASURES TO MINIMISE ENVIRONMENTAL IMPACTS

5.1.1 The major potential environmental impact is the dredging losses to suspension and the principal sensitive receivers which may suffer adverse impacts are seawater intakes close to the works. However, by employing good working practices and active mitigation measures as detailed in the following sections, the potential adverse impact can be minimized.

- All construction plant for dredging should be designed and maintained to minimise the risk of sediment being released into the water column
- Mechanical grabs should be designed to ensure they can close completely and seal tightly to prevent sediment loss while being lifted;
- The grab should not be allowed to swing when placing spoil in the hopper and should be empty before being positioned over the sea to begin each grab;
- No pipe leakage should be allowed on plant, if pipe leakage is found, the plant should not operate upon the leakage is repaired;
- All dredged excess materials on decks of hopper barge should be cleaned before the barges leave the site. In addition, all these excess materials should not be dumped into the sea except the designated dumping pit;
- Adequate freeboard should be maintained on barges to ensure that decks are not washed by wave action;
- All hopper barges for transporting dredged materials should be fitted with tight fittings seals their bottom openings to prevent leakage of materials; and
- Silt curtains should be used around seawater intake I1 to directly protect the intake. The details of the silt curtain to be deployed for this Project are provided in Figure 5.
- Water quality monitoring for dissolved oxygen and suspended solids will be carried out at the three seawater intake points during the course of maintenance dredging. The monitoring requirements are stipulated in Appendix C.

5.1.2 Since the dredging works are to be carried out during restricted hours (evening time), the construction noise impact during evening time is also of concern. In order to reduce the noise impact on the NSRs, the following mitigation measure will be adopted:

- The number of tug boat to be employed should be reduced to one; and
- The dredging area should be reduced as shown in Figure 3.

5.2 POSSIBLE SEVERITY, DISTRIBUTION AND DURATION OF ENVIRONMENTAL EFFECTS

5.2.1 Potential environmental impacts identified will mainly be associated with the dredging period (approximately 3 months). As such the effects are considered to be temporary and short term. With the implementation of appropriate mitigation measures, no insurmountable impacts are expected.

5.3 COMMENT ON FURTHER IMPLICATIONS

History of Similar Projects

5.3.1 MTR Corporation proposed to carry out *IMT Dredging Works* at Wan Chai and Tsim Sha Tsui in 1999 and applied environmental permit directly in accordance with EIAO process. The dredging volume is about 25,500m³ and the dredging area is within 100m of two seawater intakes. The works were carried out and no adverse environmental impact was report.

5.3.2 Maintenance dredging at Ocean Terminal was carried out in 1999. No adverse environmental impact was reported.

Public Consultation to Date

5.3.3 There has been no public consultation to date.

Public Interest and Political Sensitivity

5.3.4 The dredging works enable navigation improvement for Ocean Terminal Pier, so as to provide adequate draft for large capacity cruises visiting Hong Kong. In particular, the worldwide class cruise, Queen Elizabeth 2 is scheduled to arrive at Ocean Terminal in early March 2005. The maintenance dredging works are essential to enable the cruise from berthing at the terminal.

5.3.5 In addition, the dredging works are of public interest as the works are also conducted for reinstatement of the designed seabed level in front of the sea water pump room, i.e., for the normal operation of the public facilities.

5.3.6 The works are not considered to be politically sensitive.

6 USE OF PREVIOUSLY APPROVED EIA REPORTS

6.1.1 No previous EIA Report has been approved or submitted for the subject Project.

7 REFERENCES

7.1.1 Mouchel Asia Limited, 1999. *Project Profile for IMT Dredging Works*. MTR Corporation.

7.1.2 Atkins China Ltd, 2001. *Central Reclamation, Phase III – Environmental Impact Assessment Report*. Territory Development Department.

FIGURES

**APPENDIX A
NOISE LEVELS CALCULATIONS**

**APPENDIX B
SEDIMENT SAMPLING TEST RESULTS**

**APPENDIX C
ENVIRONMENTAL MONITORING
REQUIREMENTS**

1 INTRODUCTION

1.1 BACKGROUND

- 1.1.1 Harbour City Estates Limited (hereinafter called the “Project Proponent”) is planning to conduct maintenance dredging for navigation improvement for Ocean Terminal Pier and reinstatement of the designed seabed level in front of the sea water pump room.
- 1.1.2 The Project works are to be carried out to provide adequate draft for large capacity cruises visiting Hong Kong. In particular, a large capacity cruise, Queen Elizabeth 2, will arrive at the Ocean Terminal Pier in early March 2005. The existing depth of the terminal is comparatively shallow and prohibits the cruise anchoring along the shore and thus deepening of the terminal is essential.
- 1.1.3 China Harbour Engineering Company (Group) (hereinafter called the “Contractor”) was commissioned by the Project Proponent to carry out the dredging work. There are currently two sea water intakes located in the vicinity of the site area. Seawater is extracted through the sea water intakes for cooling the chiller plants of Harbour City. Another sea water intake of Star Ferry is located about 65m away from the dredging site. The locations of the dredging areas and the seawater intakes are shown in Figure 2 of the Project profile.

1.2 PURPOSE OF THIS DOCUMENT

- 1.2.1 The purpose of this document is to guide the setup of an Environmental Monitoring and Audit (EM&A) programme to monitor the water quality, to assess the effectiveness of the recommended mitigation measures and to identify the further need for additional mitigation measures or remedial action.

1.3 ENVIRONMENTAL MONITORING AND AUDIT REQUIREMENTS

- 1.3.1 It was identified the likely environmental impacts during the dredging works are mainly on the water quality of the three seawater intakes. In order to ensure the seawater intakes are not affected by the dredging works, baseline and compliance monitoring for water quality are required and are described in detail in the subsequent sections.

1.4 PROJECT ORGANISATION

- 1.4.1 An Environmental Team (ET) will be employed by the Contractor and undertake the EM&A works. The ET Leader will have relevant professional qualifications, or have sufficient relevant EM&A experience subject to approval of the Environmental Protection Department (EPD).
- 1.4.2 Appropriate staff will be included in the ET under the supervision of the ET Team Leader, to fulfill the EM&A duties specified in this document.
- 1.4.3 The duties and responsibilities of the Contractor and the ET comprise the following:

Contractor

- Employ the ET to undertake EM&A works, including laboratory analysis and reporting of environmental monitoring and audit;
- Provide assistance to the ET in carrying out environmental monitoring and audit;
- Submit proposals on mitigation measures in case of exceedances of the Action/Limit levels in accordance with the Event and Action Plans; and
- Implement measures to reduce impact where the Action/Limit levels are exceeded.

Environmental Team (ET)

- Monitor the environmental parameters as required in this document;
- Analyze the environmental monitoring and audit data;
- Review the EM&A programme to confirm the adequacy of mitigation measures implemented and the validity of the Project Profile predictions and to identify and adverse environmental impacts arising;
- Investigate and audit the Contractor's site practice, equipment and work methodologies with respect to pollution control and environmental mitigation, and effect proactive action to pre-empt problems;
- Audit and prepare EM&A reports on the environmental monitoring data and site environmental conditions;
- Report the environmental monitoring and audit results to the IEC, the Contractor, the ER and EPD; and
- Recommend suitable mitigation measures to the Contractor in the case of exceedance of the Action/Limit levels in accordance with the Event and Action Plans.

2 WATER QUALITY MONITORING

2.1 WATER QUALITY PARAMETERS

2.1.1 In order to ensure that any deterioration in water quality can be readily detected and timely action taken to rectify the situation, a water quality monitoring programme is required. The following water quality parameters will be included in the monitoring programme.

Table C2.1 Water Quality Parameters

Phase	Water Quality Parameters
Construction	<ul style="list-style-type: none"> • Temperature (°C) • pH (pH unit) • turbidity (NTU) • water depth (m) • salinity (mg/L) • dissolved oxygen (DO) (mg/L and % of saturation) • suspended solids (SS) (mg/L)

2.2 MONITORING EQUIPMENT

2.2.1 For water quality monitoring, the following equipments will be supplied by the ET and approved by the EPD.

Dissolved Oxygen (DO) and Temperature Measuring Equipment

2.2.2 The instrument for measuring dissolved oxygen and temperature will be portable and weatherproof complete with cable, sensor, comprehensive operation manuals and use DC power source. It will be capable of measuring:

- a dissolved oxygen level in the range of 0-20 mg/L and 0-200% saturation; and
- a temperature of 0-45 degree Celsius.

2.2.3 It will have a membrane electrode with automatic compensation complete with a cable.

2.2.4 Sufficient stocks of spare electrodes and cables will be available for replacement where necessary (e.g. YSI model 59 meter, YSI 5739 probe, YSI 5795A submersible stirrer with reel and cable or an approved similar instrument).

2.2.5 In situ salinity will be measured to calibrate the DO equipment prior to each DO measurement if salinity compensation is not built-in in the DO equipment.

Turbidity

2.2.6 Turbidity will be measured *in situ* by the nephelometric method. The instrument will be portable and weatherproof using a DC power source complete with cable, sensor and comprehensive operation manuals. The equipment will be capable of measuring turbidity between 0-1000 NTU. The probe cable will not be less than 25m in length.

Suspended Solids (SS)

2.2.7 A water sampler, consisting of a transparent PVC or glass cylinder of a capacity of not less than two litres which can be effectively sealed with cups at both ends will be used (Kahlsico Water Sampler 13SWB203 or an approved similar instrument). The water sampler will have a

positive latching system to keep it open and prevent premature closure until released by a messenger when the sampler is the selected water depth.

- 2.2.8 Water samples for SS will be collected in high density polythene bottles, packed in ice and delivered to HOKLAS accredited laboratory for analysis as soon as possible after collection.

Water Depth Detector

- 2.2.9 A portable, battery-operated echo sounder (Seafarer 700 or a similar approved instrument) will be used for the determination of water depth at each designated monitoring station. This unit can either be hand held or affixed to the underside of the survey boat, if the same vessel is to be used throughout the monitoring programme.

Salinity

- 2.2.10 A portable salinometer capable of recording within the range of 0-40 ppt will be used for salinity measurements.

Water Sampling for Laboratory Analysis

- 2.2.11 A water sampler as detailed in Section 2.27 will be used to collect samples for laboratory analysis.

Sample Container and Storage

- 2.2.12 Following collection, water samples for SS analysis will be stored in high density polythene bottles with no preservative added, packed in ice (cooled to 4°C without being frozen), delivered to the laboratory and analysed as soon as possible.

Calibration of In Situ Instruments

- 2.2.13 All *in situ* monitoring instruments will be checked, calibrated and certified by a laboratory accredited under HOKLAS or other international accreditation scheme before use, and subsequently re-calibrated at 3 monthly intervals throughout all stages of the water quality monitoring.
- 2.2.14 For the on site calibration of field equipment, the BS 1427:1993, "Guide to Field and on-site test methods for the analysis of waters" will be observed.
- 2.2.15 Sufficient stocks of spare parts will be maintained for replacements when necessary. Backup monitoring equipment will also be made available so that monitoring can proceed uninterrupted even when some equipment is under maintenance, calibration, etc.

Laboratory Analytical Methods

- 2.2.16 Analysis of SS will be carried out in a HOKLAS or other international accredited laboratory. The following table shows the standard test methods of the proposed determinants for laboratory analysis.

Table C2.2 Methods for Laboratory Analysis for Water Samples

Parameters (Unit)	Suggested Method
SS (mg/L)	APHA 2540 D

Notes:

APHA = American Public Health Association: Standard Methods for the Examination of Water and Wastewater Ed 19

- 2.2.17 The testing laboratory will be HOKLAS accredited (or if not, approved by the EPD) and comprehensive quality assurance and control procedures in place in order to ensure quality and consistency in results.
- 2.2.18 If a site laboratory is set up or a non-HOKLAS and non-international accredited laboratory is hired for carrying out the laboratory analysis, the laboratory equipment, analytical procedures, and quality control will be approved by EPD. All the analysis will be witnessed by the EPD.
- 2.2.19 The ET will provide the Contractor with one copy of the relevant chapters of the "Standard Methods for the Examination of Water and Wastewater" updated edition and any other relevant document for his reference.
- 2.2.20 For the testing methods of other parameters as recommended by EPD, detailed testing methods, pre-treatment procedures, instrument use, quality assurance/quality control (QA/QC) details (such as blank, spike recovery, number of duplicate samples per batch, etc.), detection limits and accuracy will be submitted to EPD for approval prior to the commencement of monitoring programme. The QA/QC will be in accordance with the requirement of HOKLAS or international accredited scheme. The QA/QC results will be reported. EPD may also request the laboratory to carry out analysis of known standards provided by EPD for quality assurance. Additional duplicate samples may be required by EPD for inter laboratory calibration. Remaining samples after analysis will be kept by the laboratory for 3 months in case repeat analysis is required. If in-house or nonstandard methods are proposed, details of the method verification may also be required for submission to EPD. In any circumstance, the sample testing will have comprehensive quality assurance and quality control programmes. The laboratory will prepare to demonstrate the programmes to EPD.

2.3 MONITORING LOCATIONS

- 2.3.1 The water quality monitoring locations will be just in front of the three seawater intakes (I1, I2 and I3) which locations are shown in Figure 2 of the Project Profile.

2.4 BASELINE MONITORING

- 2.4.1 Baseline conditions for water quality will be established and agreed upon with EPD prior to the commencement of works. The purpose of the baseline monitoring is to establish ambient conditions prior to the commencement of the works for reference.
- 2.4.2 The baseline conditions will normally be established by measuring all the water quality parameters as illustrated in Table C2.1. The measurements will be taken at all designated monitoring stations (i.e. I1, I2 and I3), 3 days per week for a consecutive two weeks, at mid-flood and mid-ebb tides, at three depth locations (i.e. 1 m below surface, mid-depth and 1m from bed) prior to the commencement of dredging works. The interval between two sets of monitoring will not be less than 36 hours and the baseline monitoring schedule will be submitted to EPD at least one week prior to the commencement of the baseline monitoring. Flow rates and sample depth will be also recorded, where appropriate. Also, all seasonal variations such as rainfall, tidal flow, typhoons and shipping activities will be assessed.
- 2.4.3 Measurements will be taken at 3 water depths, namely, 1m below water surface, mid-depth and 1m above sea bed, except where the water depth less than 6 m, the mid-depth station may be omitted. If the water depth be less than 3 m, only the mid-depth station will be monitored.
- 2.4.4 There will not be any marine construction activities in the vicinity of the stations during the baseline monitoring.

2.4.5 In exceptional cases when insufficient baseline monitoring data or questionable results are obtained, the ET Leader will seek approval from EPD on an appropriate set of data to be used as baseline reference.

2.5 IMPACT MONITORING

2.5.1 During the course of the marine works, monitoring will be undertaken three days per week, at mid-flood and mid-ebb tides, with sampling/measurement at the designated monitoring stations (i.e. I1, I2 and I3). The interval between two sets of monitoring will not be less than 36 hours except where there are exceedances of the Action/Limit levels, in which case the monitoring frequency will be increased.

2.5.2 Measurements will be taken at 3 water depths, namely, 1m below water surface, mid-depth and 1 m above sea bed, except where the water depth less than 6 m, the mid-depth station may be omitted. When the water depth be less than 3 m, only the mid-depth station will be monitored.

2.5.3 The Action/Limit levels will be derived with agreement from EPD following the completion of the baseline monitoring. The Action/Limit levels will be calculated as outlined in Table C2.3.

2.5.4 It should be noted that there is no specific requirement on the seawater quality at the abstraction points of the two seawater intakes for chiller plants of Harbour City (I1 and I2). However, in order to ensure the water quality of the seawater for the seawater intake is acceptable, the threshold criteria of SS specified by users of several cooling water intakes (for example, Queen Mary Hospital Intake and Wah Fu Estate Intake), 140 mg/L will also be adopted as the Limit level for I1 and I2. This level was treated as recommended threshold level cooling seawater intakes for Central Reclamation Phase III project.

2.5.5 For the flushing seawater intake I3, the Water Supplies Department has specified a set of water quality criteria for flushing water at the seawater intake. The target limit for suspended solids (SS) at flushing seawater intakes is 10 mg L⁻¹ or less and is also adopted as the Limit level for I3.

Table C2.3 Action and Limit Levels for Water Quality Monitoring

Parameter (unit)	Seawater Intake Point	Action Level	Limit Level
SS (mg/L) Depth average	I1 and I2	95%-ile of baseline data	99%-ile of baseline data or 140mg/L
	I3		99%-ile of baseline data or 10mg/L

Notes:

1. Non-compliance of the water quality criteria occur when monitoring result is higher than the criteria.
2. All the figures given in the table are used for reference only and the EPD may amend the figures whenever it is considered as necessary

2.6 EVENT AND ACTION PLAN FOR WATER QUALITY

2.6.1 When the monitoring results of the water quality parameters at any designated monitoring stations exceed the water quality Action/Limit levels, the actions in accordance with the Event Action Plans in Table C2.4 will be carried out.

Table C2.4 Event and Action Plans for Water Quality

EVENT	ACTION		
	ET	Project Proponent	Contractor
ACTION LEVEL			
Action level being exceeded by one sampling day	<ol style="list-style-type: none"> 1. Repeat in situ measurement to confirm findings; 2. Identify source(s) of impact; 3. Inform Contractor and Project Proponent; 4. Check monitoring data, all plant, equipment and Contractor's working methods. 5. Discuss mitigation measures with Contractor 6. Repeat measurement on next day of exceedance. 	<ol style="list-style-type: none"> 1. Discuss with Contractor on the proposed mitigation measures; and 2. Make agreement on the mitigation measures to be implemented. 	<ol style="list-style-type: none"> 1. Inform the Project Proponent and confirm notification of the non-compliance in writing; 2. Rectify unacceptable practice; 3. Check all plant and equipment; 4. Consider changes of working methods; 5. Discuss with ET and propose mitigation measures to Project Proponent; 6. Implement the agreed mitigation measures.
Action level being exceeded by two or more consecutive sampling days	<ol style="list-style-type: none"> 1. Repeat in-situ measurement to confirm findings; 2. Identify source(s) of impact; 3. Inform Project Proponent and Contractor; 4. Check monitoring data, all plant, equipment and Contractor's working methods; 5. Discuss mitigation measures with Project Proponent and Contractor; 6. Ensure mitigation measures are implemented; 7. Prepare to increase the monitoring frequency to daily; 8. Repeat measurement on next day of exceedance. 	<ol style="list-style-type: none"> 1. Discuss with Contractor on the proposed mitigation measures; 2. Make agreement on the mitigation measures to be implemented; and 3. Assess the effectiveness of the implemented mitigation measures. 	<ol style="list-style-type: none"> 1. Inform the Engineer and confirm notification of the non-compliance in writing; 2. Rectify unacceptable practice; 3. Check all plant and equipment and 4. Consider changes of working methods; 5. Discuss with ET and propose mitigation measures to Project Proponent within 3 working days; 6. Implement the agreed mitigation measures.

EVENT	ACTION		
	ET	Project Proponent	Contractor
LIMIT LEVEL			
Limit level being exceeded by one sampling day	<ol style="list-style-type: none"> 1. Repeat measurement on next of exceedance to confirm findings; 2. Identify source(s) of impact; 3. Inform Contractor, Project Proponent and EPD; 4. Check monitoring data, all plant, equipment and Contractor's working methods; 5. Discuss mitigation measures with Contractor; 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of failure in writing 2. Discuss with ET and Contractor on the proposed mitigation. 3. Request Contractor to view the working methods. 4. Ensure mitigation measures are properly implemented. 	<ol style="list-style-type: none"> 1. Inform the Project Proponent and confirm notification of the non-compliance in writing; 2. Rectify unacceptable practice; 3. Check all plant and equipment and consider changes of working methods; 4. Discuss with ET and Project proponent and propose mitigation measures to Project Proponent within 3 working days; 5. Implement the agreed mitigation measures.
Limit level being exceeded by two or more consecutive sampling days	<ol style="list-style-type: none"> 1. Repeat measurement on next of exceedance to confirm findings; 2. Identify source(s) of impact; 3. Inform Contractor, Project Proponent and EPD; 4. Check monitoring data, all plant, equipment and Contractor's working methods; 5. Discuss mitigation measures with Project Proponent and Contractor; 6. Ensure mitigation measures are implemented; 7. Increase the monitoring frequency to daily until no exceedance of Limit level for two consecutive days; 	<ol style="list-style-type: none"> 1. Discuss with ET and Contractor on the proposed mitigation measures; 2. Request Contractor to critically review the working methods; 3. Make agreement on the mitigation measures to be implemented; 4. Ensure mitigation measures are properly implemented; 5. Consider and instruct, if necessary, the Contractor to slow down all or part of the construction activities until no exceedance of Limit level 	<ol style="list-style-type: none"> 1. Take immediate action to avoid further exceedance 2. Discuss with ET and propose mitigation measures to Project Proponent within 3 working days; 3. Implement the agreed mitigation measures; 4. Resubmit proposals of mitigation measures if problem still not under control; 5. As directed by the Project Proponent, to slow down all or part of the construction activities until no exceedance of the Limit level.

3 REPORTING

3.1 GENERAL

3.1.1 The following reporting requirements based upon a paper documented approach. However, the same information can be provided in an electronic medium upon agreeing the format with EPD. All monitoring data (baseline and impact) will also be submitted in diskettes in a format agreed by EPD as requested.

3.2 BASELINE MONITORING REPORT

3.2.1 The ET Leader will prepare and submit a Baseline Environmental Monitoring Report to EPD at least one week before the commencement of construction of the Project. Copies of the Baseline Environmental Monitoring Report will be submitted to each of the three parties: the Contractor, the Project Proponent and the EPD. The ET Leader will liaise with the relevant parties on the exact number of copies they want. The format and content of the report, and the representation of the baseline monitoring data will be in a format to the satisfaction of EPD and include, but not be limited to the following:

- (a) Up to half a page executive summary;
- (b) Brief project background information;
- (c) drawings showing locations of the baseline monitoring stations;
- (d) monitoring results (in both hard and diskette copies) together with the following information:
 - monitoring methodology;
 - equipment used and calibration details;
 - parameters monitored;
 - monitoring locations (and depth); and
 - monitoring date, time, frequency and duration;
- (e) details on influencing factors, including:
 - major activities, if any, being carried out on the site during the period;
 - weather conditions during the period; and
 - other factors which might affect the results.
- (f) determination of the Action and Limit Levels for each monitoring parameter and statistical analysis of the baseline data, the analysis will conclude if there is any significant difference between impact stations for the parameters monitored;
- (g) revisions for inclusion in the EM&A requirement, and
- (h) comments and conclusions.

3.3 EM&A REPORTS

- 3.3.1 The results and findings of all EM&A work required in this document will be recorded in the monthly EM&A reports prepared by the ET Leader. The EM&A report will be prepared and submitted within two weeks after the end of each reporting month, with the first report due in the month after construction commences. A maximum of 3 copies of each monthly EM&A report will be submitted to each of the three parties: the Contractor, the Project Proponent and EPD. Before submission of the first EM&A report, the ET Leader will liaise with the parties on the exact number of copies and format of the monthly reports in both hard copy and electronic medium requirement.
- 3.3.2 The ET Leader will review the number and location of monitoring stations and parameters to monitor every 6 months or on as needed basis in order to cater for the changes in surrounding environment and nature of works in progress.

First Monthly EM&A Report

- 3.3.3 The first monthly EM&A report will include at least the following:
- (a) executive summary 1-2 pages;
 - breaches of Action/Limit levels;
 - Complaint Log;
 - Notifications of any summons and successful prosecutions;
 - Reporting Changes;
 - Future key issues.
 - (b) Basic project information;
 - Project organization including key personnel contact names and telephone numbers;
 - Construction Programme with fine tuning of construction activities showing the inter-relationship with environmental protection/mitigation measures for the month;
 - Management structure; and
 - Works undertaken during the month;
 - (c) Environmental Status
 - Works undertaken during the month with illustrations (such as location of works)
 - Drawing showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations.
 - (d) a brief summary of EM&A requirements including:
 - all monitoring parameters;
 - environmental quality performance limits (Action/Limit levels);
 - Event-Action Plans;
 - environmental mitigation measures, as recommended in the Project Profile and
 - environmental requirements in contract documents;
 - (e) Implementation Status
 - advice on the implementation status of environmental protection and pollution control/mitigation measures, as recommended in the Project Profile, summarized in the updated implementation schedule; and
 - advice on the status of submissions required under the EP and the status of compliance with EP's conditions.

- (f) Monitoring results (in both hard and diskette copies)
 - monitoring methodology
 - name of laboratory and types of equipment used and calibration details
 - parameters monitored
 - monitoring locations (and depth)
 - monitoring date, time, frequency, and duration;
 - weather conditions during the period;
 - any other factors which might affect the monitoring results;
 - QA/QC results and detection limits and
 - all monitoring results will be tabulated with exceedances highlighted for ease of referencing.

- (g) Report on non-compliance, complaints, notifications of summons and successful prosecutions
 - record of all non-compliance (exceedances) of the environmental quality performance limits;
 - record of all complaints received (written or verbal) for each media, including locations and nature of complaints, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
 - record of all notifications of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislations, including locations and nature of the breaches, investigation, follow-up action taken, results and summary;
 - review of the reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures; and
 - description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance

- (h) Others
 - an account of the future key issues as reviewed from the works programme and work method statements;
 - advice on the solid and liquid waste management status; and
 - submission of implementation status proforma, proactive environmental protection proforma, regulatory compliance proforma, site inspection proforma, data recovery schedule and complaint log summarizing the EM&A of the period.

Subsequent Monthly EM&A Reports

3.3.4 The subsequent monthly EM&A reports will include the following:

- (a) Executive Summary (1-2 pages)
 - Breaches of Action/Limit levels
 - Complaint Log
 - Notifications of any summons and successful prosecution
 - Reporting Changes
 - Future key issues

- (b) Environmental Status
 - Construction Programme with fine tuning of construction activities showing the inter-relationship with environmental protection/mitigation measures for the month
 - Works undertaken during the month with illustration including key personnel contact names and telephone numbers; and
 - Drawing showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations

- (c) Implementation Status
 - advice on the implementation status of environmental protection and pollution control/mitigation measures, as recommended in the project profile, summarized in the updated implementation schedule.
 - advice on the status of submissions required under the EP and the status of compliance with EP's conditions.

- (d) Monitoring Results (in both hard and diskette copies)
 - Monitoring methodology
 - Name of laboratory and types of equipment used and calibration details
 - Parameters monitored
 - Monitoring locations (and depth)
 - Monitoring date, time, frequency, and duration;
 - Weather conditions during the period;
 - Any other factors which might affect the monitoring results;
 - QA/QC results and detection limits
 - all monitoring results will be tabulated with exceedances highlighted for ease of referencing.

- (e) Report on non-compliance, complaints, notifications of summons and successful prosecutions
 - Record of all non-compliance (exceedances) of the environmental quality performance limits;
 - Record of all complaints received (written or verbal) for each media, including locations and nature of complaints, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary of complaints;
 - Record of all notifications of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislations, including locations and nature of the breaches, investigation, follow-up action taken, results and summary;
 - Review of the reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures; and
 - A description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance

- (f) Others
 - An account of the future key issues as reviewed from the works programme and work method statements;
 - Advice on the solid and liquid waste management status.

- (g) Appendix
 - Water quality Action/Limit levels
 - Graphical plots of trends of monitored parameters at key stations over the past four reporting periods for representative monitoring stations annotated against the following:
 - i) major activities being carried out on site during the period;
 - ii) weather conditions during the period; and
 - iii) any other factors which might affect the monitoring results
 - Monitoring schedule for the present and next reporting period
 - Cumulative statistics on complaints, notifications of summons and successful prosecutions; and
 - outstanding issues and deficiencies

3.4 DATA KEEPING

- 3.4.1 The site document such as the monitoring field records, laboratory analysis records, site inspection forms, etc. are not required to be included in the monthly EM&A reports for submission. However, the document will be well kept by the ET Leader and be ready for inspection upon request. All relevant information will be clearly and systematically recorded in the document. The monitoring data will also be recorded in magnetic media form, and the software copy can be available upon request. All the documents and data will be kept for at least one year after completion of the Contract.
- 3.4.2 A software copy of the monitoring data (including baseline data) will be submitted to EPD per request.

3.5 INTERIM NOTIFICATIONS OF ENVIRONMENTAL QUALITY LIMIT EXCEEDANCES

- 3.5.1 With reference to Event/Action Plan in Table C2.4, when the Action/Limit levels are exceeded, the ET will immediately notify the Contractor, the Project Proponent and EPD, as appropriate. The notification will be followed up with advice to EPD on the results of the investigation, proposed action and success of the action taken, with any necessary follow-up proposals.