7 WATER QUALITY IMPACT

7.1 Introduction

7.1.1 Water quality impact during the proposed dredging works of this Project will be minimized through implementation of the mitigation measures recommended in the EIA study. Implementation of regular site audits is recommended to ensure that the recommended mitigation measures are to be properly undertaken during the proposed dredging works. It can also provide an effective control of any malpractices and therefore achieve continual improvement of environmental performance on site.

7.1.2 The EIA Report has identified that suspended solids (SS) would be the most critical water quality parameter during the dredging operations. Marine water quality monitoring for SS and turbidity is therefore recommended to be carried out at selected WSD flushing water intakes. The monitoring should include baseline and impact monitoring. The impact monitoring should be carried out during the proposed marine works for construction of the cruise terminal, 600 m runway opening, public landing steps cum fireboat berth and Road T2. Detailed construction phase baseline and impact monitoring programme shall follow the same requirements stipulated in the Approved *EIA for Dredging Works for the Proposed Cruise Terminal at Kai Tak* and is therefore not repeated under this Section.

7.1.3 With regards to the proposed bioremediation for the sediment at Kai Tak Approach Channel (KTAC) and Kwun Tong Typhoon Shelter (KTTS), water quality monitoring and audit is also recommended to be carried out during and for a period of one year after the bioremediation treatment operation to ensure that the proposed treatment operation would not result in unacceptable impact. Sediment quality monitoring will also be implemented during the full scale sediment treatment operation following the requirements as specified in Annex A of the EIA report (refer to Section 6.5.9 of Annex A) for the pilot scale field test.

7.1.4 No unacceptable water quality impact would be anticipated during operation of the Project. A water quality monitoring and audit programme will be implemented before and after opening a 600 m gap at the runway to ascertain the runway opening would not result in unacceptable impact and to confirm the water quality impacts predicted under operational phase of the Project. An algal bloom / red tide monitoring programme and action plan will also be implemented to ascertain the runway opening and bioremediation for the sediment at KTAC and KTTS would not result in unacceptable impact.

7.1.5 The following monitoring programmes are given in this Section:

- Marine water quality monitoring and audit programme for the proposed sediment treatment operation;
- Marine water quality monitoring and audit requirements before and after opening a 600 m gap at the runway;
- Red tide monitoring programme and action plan.

7.2 Marine Water Quality Monitoring Schedule and Stations

Baseline Monitoring

7.2.1 Baseline monitoring shall be carried out to obtain the ambient marine water quality information during the period one year before commencement of the Project works including the bioremediation for the sediment at KTAC and KTTS as well as the construction of the runway opening. Marine water quality monitoring shall be carried out at the locations illustrated in **Appendix E** and **Table 7.1**. The monitoring locations include seven stations within the approach channel (AC1-7), one station at the KTTS (KT1), three stations at inner Kowloon Bay (IB1-3), one station at outer Kowloon Bay (OB1), two stations in the Victoria Harbour adjacent to the Kowloon Bay (VH1-2) and three stations at the WSD flushing water intakes. The coordinates of the proposed monitoring locations are listed in **Table 7.1**. These stations represent the areas which would potentially have water quality change due to the 600 m runway opening as predicted by the water quality model. The locations of the monitoring station may change after issuing this Manual. Any necessary change in the monitoring locations shall be reviewed and agreed by the EPD before the commencement of the monitoring.

Table 7.1 Proposed Marine Water Quality Monitoring Stations

Station (refer to Appendix E)	Easting	Northing
AC1	838736.55	820147.04
AC2	838807.83	820218.32
AC3	838952.22	819920.71
AC4	839030.88	819988.82
AC5	839214.12	819690.85
AC6	839278.27	819755.00
AC7	839418.24	819545.62
KT1	840260.66	819010.57
IB1	838265.60	819861.53
IB2	838456.29	819465.93
IB3	838054.63	819176.01
OB1	839182.22	819134.25
VH1	837739.09	817553.42
VH2	840243.13	817588.53
WSD Intake at Tai Wan	838132.71	817798.61
WSD Intake at Cha Kwo Ling	841528.70	817713.39
WSD Intake at Quarry Bay	839863.48	817077.46

Bioremediation for the Sediment at KTAC and KTTS

7.2.2 The water quality monitoring locations shall be at the locations likely to be affected by bioremediation. Two monitoring locations in the vicinity of the works area (i.e. one 100 m upstream and one 100 m downstream of the works area) shall be selected as the impact monitoring stations.

7.2.3 In addition to the impact monitoring stations, three control stations shall also be included for comparing the water quality from potentially impacted sites with the ambient water quality. They shall be sited outside the area of influence of the works, as far as practicable, not affected by any other works. If necessary, the water quality information collected under the baseline monitoring programme shall be used as reference to assess the potential impacts from the bioremediation works. The detailed programme or phasing of the bioremediation works as well as the proposed monitoring locations shall be submitted to EPD for approval before each phase of the bioremediation works commences.

Impact from the 600 m Runway Opening

7.2.4 Marine water quality monitoring shall be carried out during the first year of Project operation with the 600 m runway opening. The monitoring locations shall be the same as the baseline monitoring stations as shown in **Table 7.1** to assess the potential water quality change due to the 600 m runway opening and to confirm the model predictions made in the EIA. The locations of the monitoring station may change after issuing this Manual. Any necessary change in the monitoring locations shall be reviewed and agreed by the EPD before the commencement of the monitoring.

7.3 Marine Water Quality Sampling Frequency and Method

Baseline Monitoring

7.3.1 The baseline marine water quality monitoring shall be performed over one year before construction of the Project. At least 4 survey events shall be undertaken over one year to give adequate coverage of different tidal states during both wet and dry seasons. During each survey event, sampling shall be taken at 2 tide conditions (mid-flood and mid-ebb). The purpose of the baseline monitoring is to establish ambient conditions without the Project. The baseline monitoring shall be ceased in the events of any emergency sewage discharges. There should not be any marine construction activities in the vicinity of the stations during the baseline monitoring.

7.3.2 For all the monitoring stations, sampling shall be taken at three water depths, namely, 1m below water surface, mid-depth and 1m above sea bed, except where the water depth is less than 6m, in which case the mid-depth station may be omitted. Shall the water depth be less than 3m, only the mid-depth station will be monitored. For the WSD intake points, the monitoring shall be conducted at the appropriate vertical levels of the abstraction points of these intakes to collect water quality information. At each monitoring station, duplicate samples shall be collected at each water depth. Sufficient volume of each water sample shall be collected for analysis to achieve the required detection limit. *In-situ* measurements at DO, pH, salinity, temperature and turbidity shall be taken at 0.5m depth intervals at all the marine water quality monitoring stations. The proposed water quality monitoring programme and schedule should be submitted to EPD at least 1 week before the first day of the monitoring. EPD should also be notified immediately for any changes in schedule.

Bioremediation for the Sediment at KTAC and KTTS

7.3.3 Monitoring is required for the period from commencement of and throughout the duration of bioremediation works and during the first year after completion of the bioremediation works. The monitoring shall be carried out at the designated locations three times per week, at mid-flood and mid-ebb tides. The interval between two sets of monitoring shall not be less than 36 hours except where there are exceedances of AL levels, in which case monitoring frequency shall be increased. During each sampling occasion, measurements shall be taken at three water depths, namely, 1 m below water surface, mid-depth and 1 m above sea bed, except where the water depth is less than 6 m, in which case the mid-depth station may be omitted. Shall the water depth be less than 3 m, only the mid-depth station will be monitored.

7.3.4 The proposed water quality monitoring schedule should be submitted to EPD at least 1 week before the first day of the monitoring. EPD should also be notified immediately for any changes in schedule. If the monitoring data collected at the monitoring stations indicate that the Action or Limit Levels as shown in **Table 7.3** are exceeded, appropriate actions should be taken in accordance with the Event and Action Plan in **Table 7.4**.

Impact from the 600 m Runway Opening

7.3.5 The marine water quality monitoring shall be performed during the first year of Project operation with the 600 m gap opened at the runway. Similar to the baseline monitoring, at least 4 operational phase survey events shall be undertaken over one year to give adequate coverage of different tidal states during both wet and dry seasons. During each survey event, sampling shall be taken at 2 tide conditions (mid-flood and mid-ebb). The operation phase monitoring shall be ceased in the events of any emergency discharges and the monitoring programme after the first year of operation of the Project will be subject to the first year review. Similar to the baseline monitoring, no marine construction activities should be conducted in the vicinity of the stations during the impact monitoring period.

7.3.6 Similar to the baseline monitoring, sampling shall be taken at three water depths, namely, 1m below water surface, mid-depth and 1m above sea bed, except where the water depth is less than 6m, in which case the mid-depth station may be omitted. Shall the water depth be less than 3m, only the mid-depth station will be monitored. For the WSD intake points, the monitoring shall be conducted at the appropriate vertical levels of the abstraction points of these intakes to collect water quality information. At each monitoring station, duplicate samples shall be collected at each water depth. Sufficient volume of each water sample shall be collected for analysis to achieve the required detection limit. *In-situ* measurements at DO, pH, salinity, temperature and turbidity shall be taken at 0.5m depth intervals at all the marine water quality monitoring stations.

7.4 Marine Water Quality Monitoring Parameters

Baseline Monitoring Before Construction of the Project

7.4.1 Parameters measured *in-situ*:

- Dissolved oxygen (DO);
- pH;
- Water Temperature;
- Salinity;
- Secchi disc depth; and
- Turbidity.

7.4.2 Parameters measured in laboratory:

- Suspended Solids (SS);
- *E.coli*;
- 5-day Biochemical Oxygen Demand (BOD_5):
- Ammonia Nitrogen (NH_3-N);
- Unionized Ammonia (UIA);
- Total Kjeldahl Nitrogen (TKN);
- Nitrite-nitrogen (NO_2-N);
- Nitrate-nitrogen (NO_3-N);
- Ortho-phosphate (PO_4);
- Total Phosphorous (TP);
- Cadmium (Cd);
- Chromium (Cr);
- Copper (Cu);
- Mercury (Hg);
- Nickel (Ni);
- Lead (Pb);
- Silver (Ag); and
- Zinc (Zn).

Monitoring for Bioremediation of the Sediment at KTAC and KTTS

7.4.3 Parameters measured *in-situ*:

- Dissolved oxygen (DO); and
- Turbidity.

7.4.4 Parameters measured in laboratory:

- Suspended Solids (SS);
- Nitrate-nitrogen (NO_3-N);
- Cadmium (Cd);
- Chromium (Cr);
- Copper (Cu);
- Mercury (Hg);
- Nickel (Ni);
- Lead (Pb);
- Silver (Ag); and
- Zinc (Zn).

Impact Monitoring During Operation of the 600 m Runway Opening

7.4.5 Parameters measured *in-situ*:

- Dissolved oxygen (DO);
- pH;
- Water Temperature;
- Salinity;
- Secchi disc depth; and
- Turbidity.

7.4.6 Parameters measured in laboratory:

- Suspended Solids (SS);
- *E.coli*;
- 5-day Biochemical Oxygen Demand (BOD_5):
- Ammonia Nitrogen (NH_3-N);
- Unionized Ammonia (UIA);
- Total Kjeldahl Nitrogen (TKN);
- Nitrite-nitrogen (NO_2-N);
- Nitrate-nitrogen (NO_3-N);
- Ortho-phosphate (PO_4); and
- Total Phosphorous (TP).

7.5 Field Log for Marine Water Quality Monitoring

7.5.1 Other relevant data should also be recorded, including monitoring location / position, time, water depth, sampling depth, pH, salinity, DO saturation, water temperature, tidal stages, weather conditions and any special phenomena or work underway nearby.

7.5.2 A sample data record sheet is shown in **Appendix B** for reference.

7.6 Marine Water Quality Monitoring Equipment

Dissolved Oxygen and Temperature Measuring Equipment

7.6.1 The instrument should be a portable and weatherproof DO measuring instrument complete with cable and sensor, and use a DC power source. The equipment should be capable of measuring:

- a DO level in the range of 0 - 20 mg L^{-1} and 0 - 200% saturation; and
- a temperature of 0 - 45 degree Celsius.

7.6.2 It should have a membrane electrode with automatic temperature compensation complete with a cable (for example, YSI model 59 meter, YSI 5739 probe, YSI 5795A submersible stirrer with reel and cable or an approved similar instrument). Sufficient stocks of spare electrodes and cables should be available for replacement where necessary.

7.6.3 Should salinity compensation not be built-in to the DO equipment, in-situ salinity should be measured to calibrate the DO equipment prior to each DO measurement.

Turbidity Measurement Instrument

7.6.4 Turbidity should be measured in situ by the nephelometric method. The instrument should be portable and weatherproof using a DC power source complete with cable, sensor and comprehensive operation manuals. It should have a photoelectric sensor capable of measuring turbidity between 0 - 1000 NTU (for example, Hach model 2100P or an approved similar instrument). The cable should not be less than 25m in length. The meter should be calibrated in order to establish the relationship between NTU units and the levels of suspended solids. The turbidity measurement should be carried out on split water sample collected from the same depths of suspended solids samples.

Sampler

7.6.5 A water sampler is required. It should comprise a transparent PVC cylinder, with a capacity of not less than 2 litres, which can be effectively sealed with latex cups at both ends. The sampler should have a positive latching system to keep it open and prevent premature closure until released by a messenger when the sampler is at the selected water depth (for example, Kahlsico Water Sampler or an approved similar instrument).

Water Depth Detector

7.6.6 A portable, battery-operated echo sounder should be used for the determination of water depth at each designated monitoring station. This unit can either be hand held or affixed to the bottom of the work boat, if the same vessel is to be used throughout the monitoring programme.

pH

7.6.7 The instrument shall consist of a potentiometer, a glass electrode, a reference electrode and a temperature-compensating device. It shall be readable to 0.1pH in a range of 0 to 14. Standard buffer solutions of at least pH 7 and pH 10 shall be used for calibration of the instrument before and after use. Details of the method shall comply with APHA, 19th ed. 4500-HTB.

Salinity

7.6.8 A portable, salinometer capable of measuring salinity in the range 0 – 40 mg/L shall be provided for measuring salinity of the water at each monitoring location.

Sample Containers and Storage

7.6.9 Water samples for SS should be stored in high density polythene bottles, packed in ice (cooled to 4°C without being frozen) and delivered to the laboratory and analysed as soon as possible after collection. Sufficient volume of samples should be collected to achieve the detection limit.

Monitoring Position Equipment

7.6.10 A hand-held or boat-fixed type digital Differential Global Positioning System (DGPS) with way point bearing indication or other equipment instrument of similar accuracy, should be provided and used during water quality monitoring to ensure the monitoring vessel is at the correct location before taking measurements. DGPS or the equivalent instrument, calibrated at appropriate checkpoint (e.g. Quarry Bay Survey Nail at Easting 840683.49, Northing 816709.55) should be provided and used to ensure the monitoring station is at the correct position before taking measurement and water samples.

Calibration of In-Situ Instruments

7.6.11 All *in-situ* monitoring instruments should be checked, calibrated and certified by a laboratory accredited under HOKLAS or any other international accreditation scheme before use and subsequently re-calibrated at three monthly intervals throughout all stages of the water quality monitoring programme. Responses of sensors and electrodes should be checked with certified standard solutions before each use. Wet bulb calibration for a DO meter should be carried out before measurement at each monitoring location.

7.6.12 For the on site calibration of field equipment, the BS 127:1993, Guide to Field and On-Site Test Methods for the Analysis of Water should be observed.

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

7.7 Laboratory Measurement / Analysis for Marine Water Quality Samples

7.7.1 Water samples collected at the monitoring stations shall be analyzed at the laboratory for the specified parameters. Sufficient water samples of not less than 1 litre should be collected at the monitoring stations for carrying out the laboratory determinations. The suggested testing method and lowest detection limit are provided in **Table 7.2**.

Table 7.2 Suggested Analytical Methods and Detection Limit

Determinant	Suggested Method	Suggested Detection Limit
Cadmium (Cd)	APHA 17ed 3111, 3113 and 3120 as appropriate	0.001 mg/L
Chromium (Cr)		0.01 mg/L
Copper (Cu)		0.01 mg/L
Silver (Ag)		0.01 mg/L
Nickel (Ni)		0.01 mg/L
Zinc (Zn)		0.01 mg/L
Lead (Pb)		0.01 mg/L
Mercury (Mg)	APHA 17ed 3112	0.001 mg/L *
Suspended Solids	APHA 17ed 2540D	1 mg/L
5-day Biochemical Oxygen Demand	APHA 19ed 5210B	1 mg/L
Ammonia Nitrogen	APHA 19ed 4500-NH_3 F	0.02 mg/L
Unionized Ammonia	By calculation	0.001 mg/L
Total Kjeldahl Nitrogen	APHA 19ed 4500-Norg	0.01 mg/L
Nitrite-nitrogen	APHA 19ed 4500-NO2- B	0.01 mg/L
Nitrate-nitrogen	APHA 19ed 4500-NO3- E	0.02 mg/L
E. coli	EPD HKSAR, Wat. Sci. Tech. Vol.35, No. 11-12, pp 409-413	1 CFU per 100 ml
Ortho-phosphorus	APHA 19ed 4500- P.E	0.01 mg/L
Total Phosphorus	APHA 19ed 4500-P.B.E	0.01 mg/L

7.7.2 The testing of all parameters should be HOKLAS accredited (or if not, approved by EPD) and comprehensive quality assurance and control procedures in place in order to ensure quality and consistency in results.

7.7.3 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 should be submitted to EPD for approval prior to the commencement of monitoring programme. EPD may also request the laboratory to carry out analysis of known standards provided by EPD for quality assurance. The QA/QC should be in accordance with the requirement of HOKLAS or international accredited scheme. The QA/QC results should be reported. The testing methods and related proposal should be checked and certified by IEC before submission to EPD for approval.

7.7.4 Additional duplicate samples may be required by EPD for inter laboratory calibration. Remaining samples after analysis should be kept by the laboratory for 3 months in case repeat analysis is required. If in-house or non-standard methods are proposed, details of the method verification may also be required to submit to EPD. In any circumstance, the sample testing should have comprehensive quality assurance and quality control programmes. The laboratory should prepare to demonstrate the programmes to EPD or EPD's representatives when requested.

7.8 Event and Action Plan for Marine Water Quality Monitoring

Monitoring for Bioremediation of the Sediment at KTAC and KTTS

7.8.1 The water quality assessment criteria, namely Action and Limit Levels are shown in **Table 7.3**. If the monitoring results of the water quality parameters at any designated monitoring stations indicate that the water quality assessment criteria are exceeded, the actions in accordance with the Event and Action Plan in **Table 7.4** should be carried out.

7.8.2 The ET Leader should assess the potential water quality impacts based on the monitoring data. The performance of the environmental management system (i.e. of the overall EM&A programme) should be reviewed by the ET Leader on a quarterly basis. The findings of this review should be included in the quarterly EM&A summary reports, together with any recommendations to improve the performance of the EM&A programme.

Table 7.3 Action and Limit Levels for Marine Water Quality

Parameters	Action	Limit
DO in mg L^{-1} (Bottom)	0.01	0.01
SS in mg L^{-1} (Bottom)	120% of upstream control station's SS at the same tide of the same day or 95 percentile of baseline data.	130% of upstream control station's SS at the same tide of the same day. or 99 percentile of baseline data.
Turbidity in NTU	120% of upstream control station's SS at the same tide of the same day or 95 percentile of baseline data.	130% of upstream control station's SS at the same tide of the same day or 99 percentile of baseline data.
Nitrate-Nitrogen in mg L^{-1} (depth average)	120% of upstream control station's nitrate-nitrogen (depth average) at the same tide of the same day + 0.9 mg/L of anticipated increase due to nitrate injection or 95 percentile of baseline data + 0.9 mg/L of anticipated increase due to nitrate injection	130% of upstream control station's nitrate-nitrogen (depth average) at the same tide of the same day + 0.9 mg/L of anticipated increase due to nitrate injection or 99 percentile of baseline data + 0.9 mg/L of anticipated increase due to nitrate injection
Heavy metals (Cr, Cd, Cu, Zn, Ag, Hg, Ni and Pb)	120% of upstream control station's level at the same tide of the same day or 95 percentile of baseline data.	130% of upstream control station's level at the same tide of the same day or 99 percentile of baseline data.

Remarks: 1. For turbidity and SS, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.
2. All the figures given in the table are used for reference only and EPD may amend the figures whenever it is considered as necessary.

7.8.3 With respect to the Action Limit (AL) level for nitrate-nitrogen, reference has been made to the tolerable levels in similar project sites in Shing Mun River and Sam Ka Tsuen Typhoon Shelter as well as the *in-situ* bioremediation pilot scale field test performed at KTAC in 2006 where bioremediation works involving nitrate-injection have previously been undertaken. During the bioremediation process, it is inevitable that there will be some minor disturbance to the sediment and therefore a potential for release of in-situ nitrate-nitrogen levels into the water column. It is proposed that a factor of + 0.9 mg/L (based on similar bioremediation projects in Hong Kong) is adopted on top of the calculated AL levels. In case it is more desirable to use the water quality information collected under the baseline monitoring programme to assess the effect of the proposed bioremediation works, the relevant baseline water quality information as well as the associated Action and Limit Levels shall be submitted and reported in the Baseline Marine Water Quality Monitoring Report for agreement with EPD before commencement of any bioremediation work and impact monitoring work.

Impact from the 600 m Runway Opening

Analysis of Monitoring Data and Follow-up Actions

7.8.4 Once the operation phase monitoring programme for the year is complete, the operation phase monitoring data obtained for the year should be compared with the baseline monitoring data using appropriate statistical analysis technique to determine the change of contaminant concentrations in marine water after implementation of the Project. Based on the review and analysis of the monitoring data, the effectiveness of the 600 m runway opening for improving the water quality in the marine water shall be determined. Also, the need for further water quality control or mitigation measures to the Project operation shall be identified.

Table 7.4 Event and Action Plan for Marine Water Quality

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
Action level being exceeded by one sampling day	1. Repeat in-situ measurement to confirm findings; 2. Identify source(s) of impact; 3. Inform IEC and Contractor; 4. Check monitoring data, all work process and Contractor's working methods; 5. Discuss mitigation measures with IEC and Contractor; (The above actions should be taken within 1 working day after the exceedance is identified) 6. Repeat measurement on next day of exceedance.	1. Discuss with ET and Contractor on the mitigation measures; 2. Review proposals on mitigation measures submitted by Contractor and advise the ER accordingly; 3. Assess the effectiveness of the implemented mitigation measures. (The above actions should be taken within 1 working day after the exceedance is identified)	1. Discuss with IEC on the proposed mitigation measures; 2. Make agreement on the mitigation measures to be implemented. (The above actions should be taken within 1 working day after the exceedance is identified)	1. Inform the ER and confirm notification of the non-compliance in writing; 2. Rectify unacceptable practice; 3. Check all work process and methods; 4. Consider changes of working methods or slow down the work process; 5. Discuss with ET and IEC and propose mitigation measures to IEC and ER; 6. Implement the agreed mitigation measures. (The above actions should be taken within 1 working day after the exceedance is identified)
Action level being exceeded by more than one consecutive sampling days	1. Identify source(s) of impact; 2. Inform IEC and Contractor; 3. Check monitoring data, all work process and Contractor's working methods; 4. Discuss mitigation measures with IEC and Contractor; 5. Ensure mitigation measures are implemented; 6. Prepare to increase the monitoring frequency to daily; The above actions should be taken within 1 working day after the exceedance is identified) 7. Repeat measurement on next working day of exceedance.	1. Discuss with ET and Contractor on the mitigation measures; 2. Review proposals on mitigation measures submitted by Contractor and advise the ER accordingly; 3. Assess the effectiveness of the implemented mitigation measures. (The above actions should be taken within 1 working day after the exceedance is identified)	1. Discuss with IEC on the proposed mitigation measures; 2. Make agreement on the mitigation measures to be implemented; 3. Assess the effectiveness of the implemented mitigation measures. (The above actions should be taken within 1 working day after the exceedance is identified)	1. Inform the Engineer and confirm notification of the non-compliance in writing; 2. Rectify unacceptable practice; 3. Check work process and methods; 4. Consider changes of working methods or slow down the work process; 5. Discuss with ET and IEC and propose mitigation measures to IEC and ER within 3 working days; 6. Implement the agreed mitigation measures. (The above actions should be taken within 1 working day after the exceedance is identified)

EVENT	ACTION			
	ET	**IEC**	**ER**	**CONTRACTOR**
Limit level being exceeded by one sampling day	1. Repeat in-situ measurement to confirm findings; 2. Identify source(s) of impact; 3. Inform IEC, Contractor and EPD; 4. Check monitoring data, all work process and Contractor's working methods; 5. Discuss mitigation measures with IEC, ER and Contractor; 6. Ensure mitigation measures are implemented; 7. Increase the monitoring frequency to daily until no exceedance of Limit Level. (The above actions should be taken within 1 working day after the exceedance is identified)	1. Discuss with ET and Contractor on the mitigation measures; 2. Review proposals on mitigation measures submitted by Contractor and advise the ER accordingly; 3. Assess the effectiveness of the implemented mitigation measures. (The above actions should be taken within 1 working day after the exceedance is identified)	1. Discuss with IEC, 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. Assess the effectiveness of the implemented mitigation measures. (The above actions should be taken within 1 working day after the exceedance is identified)	1. Inform the Engineer and confirm notification of the non-compliance in writing; 2. Rectify unacceptable practice; 3. Check all work process and methods; 4. Consider changes of working methods or slow down the work process; 5. Discuss with ET, IEC and ER and propose mitigation measures to IEC and ER within 3 working days; 6. Implement the agreed mitigation measures. (The above actions should be taken within 1 working day after the exceedance is identified)

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
Limit level being exceeded by more than one consecutive sampling days	1. Identify source(s) of impact; 2. Inform IEC, Contractor and EPD; 3. Check monitoring data, all work process and Contractor's working methods; 4. Discuss mitigation measures with IEC, ER and Contractor; 5. Ensure mitigation measures are implemented; 6. Increase the monitoring frequency to daily until no exceedance of Limit level for two consecutive days. (The above actions should be taken within 1 working day after the exceedance is identified)	1. Discuss with ET and Contractor on the mitigation measures; 2. Review proposals on mitigation measures submitted by Contractor and advise the ER accordingly; 3. Assess the effectiveness of the implemented mitigation measures. (The above actions should be taken within 1 working day after the exceedance is identified)	1. Discuss with IEC, 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. Assess the effectiveness of the implemented mitigation measures; 5. Consider and instruct, if necessary, the Contractor to slow down or to stop all or part of the marine work until no exceedance of Limit level. (The above actions should be taken within 1 working day after the exceedance is identified)	1. Inform the ER and confirm notification of the non-compliance in writing; 2. Rectify unacceptable practice; 3. Check all work process and methods; 4. Consider changes of working methods or slow down the work process; 5. Discuss with ET , IEC and ER and propose mitigation measures to IEC and ER within 3 working days; 6. Implement the agreed mitigation measures; 7. As directed by the Engineer, to slow down or to stop all or part of the marine work. (The above actions should be taken within 1 working day after the exceedance is identified)

7.9 Red Tide Monitoring Programme and Action Plan

7.9.1 The potential impacts from red tide or harmful algal blooms (HABs) that may arise in the KTD area during operational phase will be managed and responded under the routine red tide monitoring and management protocol and response plan currently adopted by the government in Hong Kong. AFCD shall be acting as the coordinator of the Red Tide Reporting Network, to receive reports of red tide, conduct investigation and provide warning of the risk associated and appropriate mitigation measures. The objectives of this red tide monitoring programme are to provide coordination of monitoring and response to red tides/HABs and fish kills and to compile and synthesize data necessary to effectively manage fisheries resources, protect human health and the marine ecosystems. Details of the existing red tide monitoring and management plan are provided in the website (http://www.hkredtide.org/). An outline of the red tide monitoring and management framework is highlighted in the subsequent sections for reference.

Information Network

7.9.2 Red Tide Reporting Network: Following any sighting of seawater discoloration in the KTD waters as reported by staff of government departments working at sea as well as the public and stakeholders of this Project, AFCD shall conduct investigation to assess the risk involved, issue warnings to marine fish farmer as necessary and forward the information to concerned departments such as EPD, Food and Environmental Hygiene Department (FEHD), Leisure and Cultural Services Department (LCSD) and Department of Health (DH) for appropriate actions.

7.9.3 Phytoplankton Monitoring Programme: Routine phytoplankton monitoring is currently carried out by EPD to monitor the phytoplankton populations at 25 stations across the Hong Kong water including two EPD stations, namely VM4 and VM1 respectively, close to the KTD area. Under the phytoplankton monitoring programme, monthly samples are collected from one metre below the surface of the water for laboratory analysis to identify and count the phytoplankton species in each sample, and compare the results geographically between stations and over time. The aim of the phytoplankton monitoring programme is to identify changes in the phytoplankton community and to detect the presence of any toxic species of phytoplankton.

7.9.4 Routine phytoplankton monitoring is also carried out by AFCD to detect presence of toxic algae or development of harmful red tides, in order to provide early warning to mariculturists and other concerned parties. Phytoplankton samples are collected by AFCD weekly from six core stations (i.e. 1 in Western Buffer WCZ near Ma Wan, 1 in Southern WCZ near Lama Island, 1 in Port Shelter, 1 in Tolo Harbour and 2 in Mirs Bay) and fortnightly from five more offshore stations (1 in North Western WCZ, 2 in Southern WCZ, 1 in Port Shelter and 1 in Mirs Bay) year round, as well as five seasonal stations (at Lamma Island, Tung Lung Chau, Tolo Harbour, Port Shelter and Mirs Bay respectively) during red tide peak season. Sampling frequency would be stepped up when harmful algal species or abnormally high phytoplankton population was detected.

7.9.5 Seafood Surveillance and Report of Human Intoxication: Routine surveillance for biotoxins in seafood at import control, wholesale and retailed markets is carried out by FEHD. In addition, FEHD will step up the surveillance in response to the presence of toxic algae from AFCD's phytoplankton monitoring programme. Shellfish containing algal toxins exceeding the safety limit will be confiscated. Cases of human intoxication by shellfish poisons will be reported to DH. DH with assistance from FEHD will trace the source of incriminated shellfish and stop the sale of these shellfish.

Departmental Action Plans

7.9.6 The action plans include the Mariculture Action Plan to be implemented by AFCD, the Algal Biotoxin Action Plan by FEHD and DH and the Beach Action Plan by LCSD. The actions taken and monitoring results are forwarded to AFCD for coordination. Joined press release or conference will be arranged as needed.

Other Activities

7.9.7 Public Communication and Education: To inform the public and mariculturists about the latest red tide situation, the webpage (http://www.hkredtide.org/) is updated weekly and press release is issued upon occurrence of red tide. A set of posters and leaflets on red tide is produced and distributed to public including understanding of red tide/HAB, impacts of fish culture, implication on seafood safety and swimming at beach. Webpages and leaflets on shellfish toxins are published by FEHD.

7.10 Mitigation of Adverse Environmental Impacts

7.10.1 Mitigation measures for water quality control have been recommended in the EIA Report. The Contractor should be responsible for the design and implementation of these measures.

7.10.2 Recommended mitigation measures to minimize the adverse impacts on water quality during the proposed dredging are listed in the implementation schedule given in **Appendix A4**.