

4.2.7 Water Sampling Equipment

- 4.2.7.1 A transparent PVC or glass cylinder, which has a volume of not less than 2 litres and can be sealed at both ends with cups, should be used for collection of water samples at various depths. The water sampler should be equipped with a positive latching system. During water sampling, a messenger is released to trigger the closure of the water sampler at suitable water depth.
- 4.2.7.2 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 3 monthly intervals throughout all stages of the water quality monitoring. Responses of sensors and electrodes should be checked with certified standard solutions before each use. Wet bulb calibration for a DO meter should be carried out before measurement at each monitoring location.
- 4.2.7.3 For the on site calibration of field equipment, the BS 127:1993, “Guide to Field and on-site test methods for the analysis of waters” should be observed.
- 4.2.7.4 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 some equipment is under maintenance, calibration, etc.

4.3 Laboratory Measurement / Analysis

- 4.3.1 Water samples should be analysed in a HOKLAS or other international accredited laboratory. Water samples of about 2 litres should be collected at the monitoring stations for carrying out the laboratory analysis. The analysis should commence within 24 hours after collection of the water samples and should follow the standard methods presented in **Table 4.1** or equivalent methods subject to DEP’s approval.

Table 4.1 Analytical Methods for Analysis of Water Samples

Parameters	Standard Method
Suspended solids (SS)	APHA 2540D
Total inorganic nitrogen (TIN)	APHA 4500-N _{org} /NO ₃
Ammonia nitrogen (NH ₃ -N)	APHA 4500-NH ₃
Zinc (Zn)	APHA 3113
Polychlorinated biphenyls (PCBs)	USEPA 8270B (GC/MS) or equivalent methods subject to approval of DEP
Tributyltin (TBT)	Krone et al. (1989) - GC/MS or equivalent methods subject to approval of DEP
Polycyclic aromatic hydrocarbons (PAHs)	USEPA 8270B - GC/MS or equivalent methods subject to approval of DEP

Note:

1. APHA – American Public Health Association. Standard Methods 19th Edition (1995).
2. Krone et al. (1989). A method for analysis of butyltin species and measurement of butyltins in sediment and English Sole livers from Puget Sound. Marine Environmental Research 27(1989), 1-18.

- 4.3.2 There are no assessment criteria for defining allowable concentrations of organic micro-pollutants in the receiving water. USEPA Standards and the European Community Standards were used in the Final EIA as the assessment criteria for PCBs, PAHs and TBT. In order to compare with the assessment criteria, the recommended detection limits for PCBs, PAHs and TBT are 0.00017 µg/L, 0.2 µg/L and 0.002 µg/L respectively.

- 4.3.3 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 should be approved by the DEP. The laboratory analysis should be witnessed by the ER. The EMT Leader should provide the ER 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.

4.3.4 For the testing methods of other parameters as recommended by EIA or required by DEP, detailed method procedures should be submitted to DEP for approval prior to the commencement of monitoring programme. If in-house or non-standard methods are proposed, details of the method verification may also be required to submit to DEP. In any circumstance, the sample testing should have comprehensive quality assurance and quality control programmes. The laboratory should prepare to demonstrate the programmes to DEP or his representatives when requested.

4.4 Monitoring Locations

4.4.1 The water quality monitoring locations are shown in **Drawing No. 22936/EN/186**. There are in total 8 water quality monitoring stations (M1 to M8) and 2 control stations (C1 and C2). The sensitive receivers located in the close proximity to the development area have been selected as the water quality monitoring stations. Based on the sediment plume modelling results, these sensitive receivers are likely to be affected during dredging and filling. The two control stations have been selected in areas not to be affected by the dredging and filling operations. **Table 4.2** presents the co-ordinates of the stations.

Table 4.2 Co-ordinates of the Water Quality Monitoring Stations

Station	Easting	Northing
M1	836681.70	817703.65
M2	838065.57	818425.84
M3	841853.58	817546.18
M4	842635.06	816243.00
M5	836513.46	816210.42
M6	838391.19	817296.41
M7	840214.61	816948.89
M8	841300.03	816427.61
C1	832377.65	818236.04
C2	844176.87	815209.56

4.4.2 The status and locations of water quality sensitive receivers and the marine activity sites may change after issuing this Manual. If such cases exist, the EMT Leader should propose updated monitoring locations and seek approval from DEP. When alternative monitoring locations are proposed, they should be chosen based on the following criteria:

- (a) at locations close to and preferably outside the affected area of the sediment plume generated by dredging and filling works;
- (b) close to the sensitive receivers, which are directly or likely to be affected;
- (c) for monitoring locations located in the vicinity of the sensitive receivers, care should be taken to cause minimal disturbance during monitoring; and
- (d) at two or more control stations which should be at locations representative of the project site in its undisturbed condition. Control stations should be located both upstream and down stream of the working area, wherever practicable.

4.4.3 Competent staff should be deployed to carry out the water quality monitoring. Measurements should be taken at 3 water depths, namely, 1m below water surface, mid-depth and 1m above seabed, except where the water depth less than 6m, the mid-depth station may be omitted. Should the water depth be less than 3m, only the mid-depth station should be monitored. The EMT Leader should seek approval from DEP on all the monitoring stations.

4.4.4 It is also proposed to perform water quality monitoring to determine the need for maintenance