4.8 Water Quality Mitigation Measures

4.8.1 The EIA report has recommended water quality control and mitigation measures. The Contractor should be responsible for the design and implementation of these measures.

4.8.2 Recommended mitigation measures to minimise the adverse impacts on water quality during construction and operation phases are detailed in Sections 4.8.4 and 4.8.5 below.

4.8.3 In the event that the recommended measures are not sufficient to restore the water quality to an acceptable level, upon the advice of the EAT Leader the Contractor shall liaise with the EAT Leader on some other mitigation measures. The Contractor shall also propose the mitigation measures to ER for approval and carry out the mitigation measures accordingly.

4.8.4 *Construction Phase*

Nullah and Box Culvert Diversion

- Release of construction wastes into the diverted section of the nullah should be avoided;
- Good housekeeping should be adopted to reduce generation of construction wastes and the potential water pollution;
- Stockpiles of construction and dusty materials should not be placed near the diverted section of the nullah and box culverts when carrying out of diversion works, so as to avoid the release of dusty materials into the water;
- Construction activities which generate a large amount of wastewater should be carried out in a distance away from the diverted section, wherever practicable; and
- Surface channels should be provided along the edge of the diverted section of the nullah to intercept site runoff.

Dredging and Filling

- Filling activities should be carried out behind a temporary protective structure such as seawall or rock-filled barrier. The barrier could be built using rock fill at the boundary of the reclamation zone;
- Tightly closed grabs should be used to reduce sediment loss during dredging and raising of the grabs from the seabed to the dredgers. The descent speed of grabs should be controlled to minimise the disturbance to the seabed;
- Sealed grab dredgers should be used for dredging;
- The grabs should be fully-enclosed to minimise sediment loss during raising of the grabs;
- The decks of all barges should be clean and tidy to avoid any substances that might be washed to the water during loading;
- Sediment loading should be carried out carefully to minimise splashing of sediments;
- Overloading of barges should not be allowed and sufficient freeboard should be maintained to ensure that there would be no spill over of the dredged material during loading and transport;
- The bottom opening of barges should be tightly sealed to prevent leakage of the dredged material during transport of the sediments to disposal site;
- The speed of vessels in the dredging area should be reduced to prevent generation of turbulence from moving vessels; and
- Silt curtains should be provided to restrict the spreading of sediment plumes.

Construction Site Runoff

- Discharge licence should be applied from EPD;
- Suitable wastewater treatment systems or facilities should be provided on site to meet the discharge requirements specified in the discharge licence;
- Perimeter channels should be provided in advance of site formation and earthworks to

intercept runoff at site boundary;

- Drainage channels should be provided on site to convey storm water to sand/silt traps for removal of soil particles;
- Regular cleaning and maintenance of the sediment removal facilities should be implemented to ensure that the facilities are in normal function at all times;
- Provision of earth bunds or sand bags in areas where a large amount of exposed soils exists would be required;
- The construction works should be properly programmed to minimise soil excavation in rainy seasons to prevent soil erosion from exposed soil surfaces;
- Excavated trench should be backfilled in short sections;
- Exposed stockpiles should be covered with tarpaulin or impervious sheets before a rainstorm occurs;
- Suitable locations should be selected on site to place the stockpiles so as to avoid release of materials into the drainage channels;
- Final surface of earthworks should be compacted and protected by permanent work
- Hydroseeding could be used to protect exposed sloe surfaces;
- Intercepting channels should be provided to prevent storm runoff from washing across exposed soils surfaces; and
- It is recommended to pave haul roads with concrete and protect temporary access roads using crushed stone or gravel.

Wastewater and Sewage Generated from Construction Activities

- Wastewater generated from foundation construction and related activities should be collected and discharged into storm drains after removal of silt and sand in a sedimentation facility;
- The quality of the discharged effluent in terms of suspended solids, pH, COD and other contaminated as specified in the discharge licence should be monitored to check for compliance with the licence's requirements;
- Reuse of the treated effluent for vehicle washing, dust suppression and cleaning is recommended;
- Use of bentonite slurry in diaphragm wall and bore-pile construction should be reconditioned and reused, wherever practicable, to minimise the volume of used slurry to be disposed of;
- It is recommended to provide sediment settling facilities to remove the fine concrete particles contained in wastewater generated from washing of concrete lorry prior to discharging this kind of wastewater into the final sedimentation facilities;
- Suitable pH adjustment facilities would be required to lower than pH value of wastewater to an acceptable range;
- Wheel washing facilities should be provide at all site exists to ensure that earth, mud and debris would not be carried out of the construction site by vehicles;
- The wheel washing wastewater should be diverted to the sedimentation facilities for removal of silt and sand before discharging into storm drains;
- The road section between the construction site exit and the public road should be properly paved to reduce vehicle tracking of soil and to prevent site runoff from entering storm drains;
- Building construction involves a large variety of construction activities. Wastewater would be generated from concreting, plastering, cleaning and polishing, internal decoration and similar activities. Direct discharge of wastewater into storm drains would pollute the water quality of the receiving water body. A suitably designed wastewater collection system should be provided on site to divert all the wastewater to the sedimentation facility. If necessary, pH adjustment should be undertaken to neutralise the wastewater;

- The newly constructed manholes should be covered and temporarily sealed to prevent debris and wastewater from entering the drainage systems. Similar approach should be taken to prevent pollutants to get into the water supply and drainage pipes during building construction;
- The drainage which serves open filling points should be connected to a petrol interceptor before discharging into storm drains. If vehicle wash bays and lubrication bays are present on site, these facilities should be located in roofed areas. The drainage serving these areas should be connected to a petrol interceptor prior to discharging into a foul sewer;
- Emergency plans should be developed to deal with accidental spillage of chemicals. Leakage and spillage should be contained and cleaned up immediately to minimise the pollution to water quality. If chemical wastes are generated from the construction activities, the chemical waste disposal should comply with the Waste Disposal Ordinance;
- Sewage generated from workforce should be discharged into a foul sewer. Grease traps, which are capable of providing at least 20 minutes retention time during peak flow, should be provided to reduce the oil and grease contents in wastewater prior to discharging into a foul sewer. In case where a foul sewer is not available, suitable sewage collection and storage systems should be provided on site to hold the sewage. The stored sewage should be collected and disposed of by a licensed waste collector on a regular basis. Installation of a sewage treatment facility is an alternative to treat the sewage to acceptable discharge standards; and
- It is recommended to provide chemical toilets in buildings under construction and in areas where the construction activity involves a large number of workers for collection of toilet wastes. Cleaning of toilet wastes should be carried out regularly by a licensed waste collector. All the cleaning and waste disposal records should be properly filed.

Ground Improvement

- A sand blanket should be placed on top of the undredged sediments during dredging to minimise the disturbance to the sediments.
- Vertical sand drains or band drains could be used to release the excess pore water from the compressible soils/sediments during consolidation. Suitable surface drains should be provided at the outlet of sand drains or band drains to collect the pore water. Temporary retention structures with a large surface area could be used to store the collected pore water. Evaporation of pore water from the retention structures reduces the volume of pore water and disposal of pore water could be minimised. In case where discharge of the collected pore water is required, silt traps or wastewater treatment systems should be provided to remove the suspended solids and contaminants prior to final discharge. The quality of treated effluent should comply with the criteria specified in the Technical Memorandum on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters.
- The ground improvement work should be properly planned and competent persons should be deployed for carrying out the work.
- A sand blanket should be placed on top of the sediments to minimise the disturbance to the sediments when carrying out the soil mixing operation for the field trials of DCM. Release of leachate should be controlled to avoid the potential impacts to the surrounding environment.
- The injection rate of the cement slurry into the sediments should be controlled to avoid leaching out of cement slurry. The slurry waste generated during the DCM process should be properly disposed of.
- The treatment work should be properly planned and competent persons should be deployed for carrying out the work. It is recommended to carry out monitoring during the trials to assess the residual environmental impacts arising from the application of the DCM method.

Groundwater Discharge during Dewatering

- Sedimentation tanks should be provided to remove the suspended solids in groundwater

extracted during excavation and construction of foundation to levels that are in compliance with the EM requirements prior to final discharge;

- Excavation should be carried out during the dry season to avoid contaminated runoff leading to water pollution;
- Excavated material should be covered to reduce exposure of contaminated soil to rainwater;
- The groundwater extracted from the excavation site could be recharged into the groundwater table through groundwater recharge wells, which could be built near the excavation site, to minimise discharges of groundwater into the nearshore water;
- For discharging groundwater during dewatering, the benzene, toluene and tetrachlororethylene concentrations should be monitored; and
- The groundwater should be collected and treated to the standards as recommended by the USEPA prior to final discharge.

4.8.5 *Operational Phase*

Water Quality in Extended Sections of Nullahs and Box Culverts

- Water quality monitoring for extended sections of nullahs and box culvert formulated in this Manual should be implemented so that the deterioration of water quality within the nullahs and box culvert can be detected; and
- Regular maintenance work should be carried out in accordance with the O&M Plan for Box Culvert when the deposition of debris and silt are above the trigger level. Environmental mitigation measures included in the O&M Plan for Box Culvert including odour mitigation measures should be followed in carrying out the maintenance work.

Cooling Water Discharges

- The concentrations of chlorine and biocide should be suitably controlled to avoid release of excess chemicals into the receiving water body; and
- Maintenance of DCS needs to be implemented on a regular basis to ensure the normal operation of the system.

Storm and Emergency Overflows

- Stormdrains should be diverted away from the typhoon shelter and the marina;
- For the storm overflows into the Kwun Tong Typhoon Shelter, the overflow weirs should be set at a level of 2.5m m.P.D or above. The overflow structure should be so designed to avoid, during dry weather condition, the overflow of the dry weather flows, which tends to form a thin surface layer on top of the seawater due to the lower density, into the typhoon shelter;
- For the emergency overflow from KTPTW, a by-pass pipe should be provided to convey the emergency overflow along the new breakwater (eastern arm of KTTS) and to discharge at the end of the breakwater to allow quick dispersion of the sewage plume;
- For the emergency overflow from TKWSTW, an emergency bypass along the proposed box culvert (Outfall P1) plus a 150m submarine outfall should be provided to allow discharging into more open water;
- To avoid the impacts due to the emergency overflows from TKWPTW and KTPTW to the WSD's seawater intakes at Tai Wan and Cha Kwo Ling, the seawater extracted from the intake points should be monitored for *E. coli* and SS levels; and
- The management of the two sewage treatment works should inform WSD to take protective measures when emergency overflow occurs.