10 Water Quality Impact Assessment

10.1 Introduction

This chapter presents the assessment of potential water quality impacts, which may arise during the construction and operation of the stabling sidings at Hung Hom Freight Yard. The Project also covers the modification of Hung Hom (HUH) and construction of Kai Tak (KAT) and Diamond Hill (DIH) stations designed based on the HHS option. Construction runoff, sewage from site workforce and drainage diversion are potential sources of water quality impact during the construction phase. Operational water quality impact includes track run-off and seepage from tunnel section.

Mitigation measures have been proposed to alleviate the potential water quality impact. Adverse residual impacts during the construction and operational phases are not anticipated.

10.2 Legislation and Standards

The relevant legislation and associated guidance applicable to the present study for the assessment of water quality impacts include:

- Water Pollution Control Ordinance (WPCO) CAP 358, Water Quality Objectives (WQOs) for the and Victoria Harbour Water Control Zone (VHWCZ);
- Technical Memorandum for Effluents Discharged into Drainage and Sewerage Systems Inland and Coastal Waters (TM on Effluent Standards under WPCO), Effluents discharge limits for the Victoria Harbour Water Control Zone;
- Environmental Impact Assessment Ordinance (EIAO) (Cap. 499), Technical Memorandum on Environmental Impact Assessment Process (TM-EIAO);
- ProPECC PN 5/93 "Drainage Plan subject to Comment by the Environmental Protection Department";
- ProPECC PN 1/94 "Construction Site Drainage"; and
- "Recommended Pollution Control Clauses for Construction Contracts (RPCC)" issued by EPD.

10.3 Baseline Conditions

10.3.1 Marine Water Quality Monitoring Stations Near to Project Site

The representative marine water quality monitoring stations in the vicinity of the Project site are VM2, VM4, VM5 and VM6 at the Victoria Harbour. Locations of monitoring stations are shown in **Figure 10.1**. Water quality parameters monitored at these stations are given in EPD's Marine Water Quality Report 2009[10-1], and the key parameters are summarised in **Table 10.1**.

Table 10.1: Marine Water Quality of Victoria Harbour in Year 2009

Parameter	WQO	Monitoring Station			
		Victoria Harbour			
		VM2	VM4	VM5	VM6
Temperature (°C)	Change due to waste discharge not to exceed 2°C	23.8 (18.7 – 28.5)	23.8 (18.6 – 28.6)	24 (18.7 – 28.6)	24 (18.7 – 28.6)
Salinity (ppt)	Change due to waste discharge not exceed 10% of natural ambient level	31.7 (22.5 – 33.5)	31.8 (24.9 – 33.6)	31.2 (21.4 – 33.4)	31.4 (23.6 – 33.3)

Parameter	WQO	Monitoring Station			
		Victoria Harbour			
		VM2	VM4	VM5	VM6
Dissolved Oxygen (mg/L)	Depth average: ≥ 4 mg/L for 90% of samples	5.6 (4.1 – 7.0)	5.3 (4.1 – 6.7)	5.2 (4.5 – 6.8)	5.1 (4.5 – 6.3)
Dissolved Oxygen, Bottom (mg/L)	Bottom: ≥ 2 mg/L for 90% of samples	5.5 (4.2 – 7.0)	5.1 (2.6 – 6.8)	5.2 (4.4 – 6.8)	5.0 (3.4 – 6.6)
SS (mg/L)	Waste discharge not to raise the natural ambient level by 30% nor cause the accumulation of suspended solids which may adversely affect aquatic communities	5.2 (2.7 – 8.3)	5.8 (3.5 – 7.5)	5.7 (3.3 – 9.1)	6 (3.2 – 10.7)
BOD_5 (mg/L)	N/A	0.7 (<0.1 – 1.2)	0.7 (0.2 – 1.2)	0.8 (0.3 – 1.5)	0.8 (0.1 – 1.7)
NH_3-N (mg/L)	N/A	0.08 (0.041 – 0.200)	0.1 (0.049 – 0.203)	0.12 (0.062 – 0.203)	0.14 (0.069 – 0.227)
Unionised Ammonia (mg/L)	Annual mean not to exceed 0.021 mg/L	0.003 (0.002 – 0.006)	0.004 (0.001 – 0.007)	0.005 (0.002 – 0.011)	0.005 (0.001 – 0.009)
TIN (mg/L)	Annual mean depth-averaged TIN not to exceed 0.4 mg/L	0.21 (0.07 – 0.60)	0.24 (0.08 – 0.57)	0.29 (0.12 – 0.63)	0.32 (0.15 – 0.6)
Chlorophyll-a (µg/L)	N/A	3.1 (0.7 – 9.1)	3.3 (0.7 – 8.3)	3.9 (0.7 – 10.1)	3.7 (0.8 – 11.4)
E. coli (cfu 100mL)	N/A	710 (100 –9400)	2000 (510 – 8700)	3900 (160 – 19000)	2500 (200 – 11000)

Notes:
[1] Data presented are depth averaged, except as specified.
[2] Data presented are annual arithmetic mean except for *E. coli*, which are geometric mean values
[3] Data enclosed in brackets indicate the ranges
[4] Bolded cells indicate non-compliance with the WQOs for a parameter

Victoria Harbour is a major tidal channel with considerable assimilative capacity. With the implementation of the Harbour Area Treatment Scheme (HATS) Stage 1, the improvement of water quality in the eastern side of Victoria Harbour has been sustained. Compliance rate of 93% of the WQOs has been achieved in the Victoria Harbour WCZ in 2009. The increase of compliance was mainly due to the full compliance with TIN objective at all ten stations in the Victoria Harbour WCZ in 2009, compared with the compliance at only six stations in 2008. The decreasing trend in *E. coli* and increasing trend in DO level in the Victoria Harbour WCZ, particularly on the eastern side, continued in 2009.

10.3.2 River Water Quality Monitoring Stations Near to Project Site

The representative river water quality monitoring stations in the vicinity of the Project site are KN1, KN2, KN3, KN4, KN5 and KN7 at Kai Tak Nullah (see **Figure 10.2** for their locations). Water quality parameters monitored at these stations are given in EPD's River

Water Quality Report 2009[10-2], and the major parameters are summarized in **Table 10.2** below.

Table 10.2: River Water Quality of Kai Tak Nullah in Year 2009

Parameter	WQO	Kai Tak Nullah					
		Monitoring Station					
		KN1	KN2	KN3	KN4	KN5	KN7
Dissolved Oxygen (mg/L)	≥ 4 mg/L	6.6 (5.1 – 7.5)	7.0 (6.3 – 7.7)	7.2 (7.1 – 8)	7.9 (6.8 – 8.5)	7.9 (7.1 – 8.7)	7.4 (7.0 – 8.4)
pH	Not to exceed the range of 6.0-9.0 units	7.1 (6.9 – 7.6)	7.3 (7.0 – 7.6)	7.3 (7.1 – 7.7)	7.3 (7.0 – 7.6)	7.3 (6.9 – 7.5)	7.2 (6.9 – 7.4)
SS (mg/L)	Annual median not to exceed 25 mg/L	4 (3 – 32)	8 (3 – 24)	6 (4 – 19)	11 (3 – 38)	5 (3 – 12)	5 (2 – 11)
BOD_5 (mg/L)	≤ 5 mg/L	4 (<1 – 6)	3 (2 – 6)	4 (2 – 8)	6 (2 – 31)	3 (1 – 8)	3 (1 – 10)
COD (mg/L)	≤ 30 mg/L	26 (18 – 40)	28 (23 – 34)	29 (23 – 39)	32 (19 – 50)	27 (19 – 34)	31 (19 – 33)
E. coli (cfu / 100mL)	≤ 1000 cfu/100mL, geometric mean of the most recent 5 consecutive samples taken at intervals of between 7 and 21 days	85000 (8000 – 880000)	35000 (6000 – 120000)	56000 (11000 – 240000)	87000 (7800 – 1300000)	21000 (8500 – 52000)	23000 (8000 – 40000)
NH_4-N (mg/L)	N/A	0.74 (0.33 – 2.80)	0.49 (0.1 – 1.6)	0.48 (0.13 – 1.5)	0.57 (0.09 – 2.20)	0.27 (0.08 – 1.70)	0.26 (0.08 – 1.5)

Notes:

[1] Data presented are annual median except for *E. coli*, which are annual geometric mean values.

[2] Data enclosed in brackets indicate the ranges

Kai Tak Nullah's catchment includes some of the most densely populated areas of Kowloon. According to EPD's River Water Quality Report 2009, the water quality of Kai Tak Nullah in 2009 was better when compared with 2008, with three of the six monitoring stations achieving an 'Excellent' WQI grading, and the remaining three graded 'Good', as compared with the five 'Good' and one 'Fair' grading in 2008. Levels of DO, pH and SS of these monitoring stations in Kai Tak Nullah generally complied with the respective WQOs while exceedances were found in levels of BOD_5, COD and *E. coli*. However, the water quality in the nullah has seen marked improvement with noticeable decrease in *E. coli* and BOD_5 levels as compared with previous years due to the Tolo Harbour Effluent Export Scheme.

10.4 Water Sensitive Receivers

Within the study area of the Project, there is only one water receiving body in the vicinity of the construction of DIH. The upper end of Kai Tak Nullah at former Tai Hom Village is the only WSR on Kowloon side. Although the nullah is no longer in use after demolition of former Tai Hom Village, it still acts as a channel connecting to Victoria Harbour.

There is no marine biological sensitive receiver such as fish culture zone, shellfish culture zone, marine park/reserve and commercial fishing ground in the vicinity of SCL (HHS).

In addition, no marine works will be required for the Project.

The representative Water Sensitive Receiver (WSR) in the vicinity of the Project site is summarized in **Table 10.3** below and shown in **Figure 10.3**.

Table 10.3: Water sensitive receivers

WSR No.	WSRs Description	Works Area
WSR 1	Kai Tak Nullah	Construction of DIH

Since there is no planned/existing activity that may affect the water quality at WSR1 (Kai Tak Nullah) and the nearby nullah sections, the water quality at the closest monitoring station, i.e. Station KN7 (see **Table 10.2**) which was graded ""Excellent" of Water Quality Index (WQI) in 2009, could be adopted as the baseline water quality.

10.5 Construction Phase Water Quality Impact Assessment

The site will be maintained by good site practices and there will be no direct discharge of wastewater into Victoria Harbour during the construction phase. Since direct discharge of wastewater would not be anticipated, quantitative prediction will not be applicable and qualitative approach has been adopted in the assessment. Water quality issues relevant to the construction phase are described in the following sections.

10.5.1 Pollution Sources from Construction Activities

Potential water pollution sources during construction phase will include sources mainly from land-based activities as follows:

- Construction runoff;
- Runoff from tunnelling activities and underground works (mainly at DIH);
- Sewage effluent due to workforce on site;
- Drainage diversion near HUH and DIH;
- Groundwater seepage; and
- Accidental Spillage.

10.5.1.1 Construction Runoff

Construction site runoff comprises:

- Runoff and erosion from site surfaces, drainage channels, earth working areas and stockpiles;
- Wash water from dust suppression sprays and wheel washing facilities; and
- Fuel, oil, solvents and lubricants from maintenance of construction machinery and equipment.

Construction runoff may cause physical, biological and chemical effects. The physical effects include potential blockage of drainage channels and increase of Suspended Solid (SS) levels in VHWCZ.

Local flooding may also occur in heavy rainfall situations. The chemical and biological effects caused by the construction runoff are highly dependent upon its chemical and nutrient content.

Runoff containing significant amounts of concrete and cement-derived material may cause primary chemical effects such as increasing turbidity and discoloration, elevation in pH, and accretion of solids. A number of secondary effects may also result in toxic effects to water biota due to elevated pH values, and reduced decay rates of faecal micro-organisms and photosynthetic rate due to the decreased light penetration.

10.5.1.2 Tunnelling Activities and Underground Works

During construction works and rainfall, surface runoff and groundwater seepage pumped out would have high SS content. The situation would be worse during wet seasons.

Surface runoff may also be contaminated by bentonite and grouting chemicals that would be required for the construction of bored tunnel (for tunnel boring and ground treatment) at DIH and diaphragm walls for cut-&-cover at DIH and tunnel section at KAT. In addition, wastewater from construction works will also contain a high concentration of SS.

10.5.1.3 Sewage Effluent

Sewage effluents will arise from the sanitary facilities used by the construction workforce. The characteristics of sewage would include high levels of BOD_5, Ammonia and *E. coli* counts.

Sewage from chemical toilets will also be generated. The sludge needs to be properly managed to minimize odour and potential health risks to the workforce by attracting pests and other disease vectors.

The number of construction workers to be employed on site is not available at this stage, but is anticipated to be over 450 staff in the peak period. As the workers will be scattered within the construction site, the most effective solution will be to provide adequate number of portable toilets within the site to ensure that sewage from site staff is properly collected. Depending on site conditions, land availability and site activities, the locations and number of portable toilets will be determined in the Environmental Management Plan (EMP) to be submitted by the Contractor. No adverse water quality impact is envisaged provided that maintenance by licensed contractors is conducted regularly.

10.5.1.4 Drainage Diversion

Drainage diversion will be undertaken near HUH and DIH. A Drainage Impact Assessment will be prepared and submitted by the Project Proponent separately. The assessment will identify the diversion or upgrading of the existing drainage infrastructure. The potential water quality impact associated with the drainage diversion or upgrading will be from the run-off and erosion from site surfaces and earth working areas. Small amount of wastewater may be released during the disconnection of various drainage systems.

10.5.1.5 Groundwater Seepage

The construction of DIH and KAT, as well as the refuge sidings at KAT will be constructed by a combination of open-cut and cut-&-cover method. Construction methodology using diaphragm wall (D-wall) techniques can minimise the intrusion of groundwater during excavation. It involves excavation of a narrow trench that is kept full of slurry, which exerts hydraulic pressure against the trench walls and acts as a shoring to prevent collapse. Slurry trench excavations can be performed in all types of soil, even below the ground water table.

The construction usually begins with the excavation of discontinuous primary panels of typically up to 6m long and down to the rockhead. In order to provide an effective cut-off to ground water flow, the walls will need to be toe grouted. Once the excavation of a panel is completed, a steel reinforcement cage will be placed in the centre of the panel. Concrete is then poured in one continuous operation. Once the primary panels are set, secondary panels will be constructed between the primary panels and the process then repeats to create a continuous wall. It should be noted that this slurry trench method will reduce the gap between the panels to the practicable minimum. After this, soil excavation will be commenced. The intrusion of groundwater through D-wall panels during soil excavation is therefore considered insignificant.

10.5.1.6 Groundwater from Contaminated Area

As the Study Area of this Project overlaps with part of the assessment area under the EIA study for the SCL (MKK-HUH) and SCL (TAW-HUH), relevant documents from these 2 EIA studies have been reviewed. According to the approved CARs of SCL (MKK-HUH) and SCL (TAW-HUH), site investigation (SI) works were carried out from March 2008 to December 2010 and February 2009 to August 2009 respectively. A total of 14 groundwater samples had been tested and it is confirmed that no contaminated site was identified within the Study Area of this Project according to the SI results. Groundwater quality is therefore not anticipated to be affected by the discharge/ recharge of groundwater generated from the Project.

10.5.1.7 Accidental Spillage

The site coverage would be rather large during the construction phase. The soil of site area may be potentially contaminated by accidental spillage of grouting materials, surplus adhesives, lubrication oil, grease, acidic/alkaline solutions, petroleum products, chemical solvents, etc. Site runoff may wash the contaminated soil into stormwater drains or watercourses and cause potential water quality impact.

10.6 Operational Phase Water Quality Impact

There will be no direct discharge of wastewater into the Victoria Harbour during the operational stage. Hence, quantitative water quality dispersion modelling is considered not necessary. Other water quality issues relevant to the operational phase are described in the following sections.

10.6.1 Pollution Sources & Prediction of Impacts

Potential sources of water quality impact during the operational phase are summarised below:

- Track runoff from train stabling sidings under the podium and tunnel (covered section);
- Track runoff from fan area to the north of stabling sidings and launching/ retrieval tracks to the south of stabling sidings (open track section);
- Station runoff; and
- Sewage from station and train stabling sidings operation.

10.6.1.1 Track Runoff from Train Stabling Sidings and Tunnel (Covered Section)

Track runoff from the train stabling sidings under the podium structure and tunnel (covered section) is expected to contain limited amounts of oil and grease. Since all tracks are contained in concrete tunnel box, there will be no rainwater runoff. The tunnel wall will be equipped with water-tight liner and design for no seepage. The amount of groundwater seepage into the tunnel will be insignificant. Where oils and lubricating fluids could be spilled and light maintenance activities such as track washing would be conducted occasionally, runoff should be diverted to silt traps and oil/ grease interceptors before discharge to the public foul system. No adverse water quality impact is anticipated.

10.6.1.2 Track Runoff from Fan Area and Launching/ Retrieval Tracks (Open Track Section)

Track runoff from the fan area and launching/ retrieval tracks is expected to contain limited amounts of oil and grease. Where oils and lubricating fluids could be spilled and track washing would be conducted occasionally, runoff should be diverted to silt traps and oil/ grease interceptors before discharge to the existing public storm water drain system. No adverse water quality impact is anticipated.

10.6.1.3 Station Runoff

Rainwater runoff from the station structure and associated facilities at HUH would not be contaminated and hence has no adverse water quality impact.

10.6.1.4 Sewage from Station

A separate consultant will be appointed by the Project Proponent to conduct the detailed design of sewer for HUH, KAT and DIH. A Sewerage Impact Assessment will be conducted and submitted to the relevant government departments for approval separately. The typical Average Dry Weather Flow (ADWF) for a train station (without top-side properties) would be about 0.8l/s, which would be equivalent to about 55m^3/day, assuming 19 hours of operation. It is therefore anticipated that the ADWF for each station would be of similar order and probably in the order of 50-100m^3 /day. Given the small quantity of the ADWF for each station, the capacity of the existing foul sewer is adequate for the proposed sewage discharge. Hence, no water quality impact is anticipated.

10.6.1.5 Sewage from Train Stabling Sidings Operation

Sewage effluents generated by the on-site work force will be discharged to the public foul system and potential water quality impact is therefore not anticipated.

Only inspection and some minor maintenancewould be conducted in the siding area. These routine operational activities of the train stabling sidings may release oil and grease residues. These oily and greasy residues can be dripped, washed or spilled onto the ground surface within a working area. In areas where runoff could be contaminated by oil and grease from those minor maintenance activities, oil interceptors are recommended for separating oil from water prior to discharge. As the sewage will be treated as necessary to satisfy the discharge standards in the TM on Effluent Standards under WPCO, no adverse water quality impacts would be expected.

10.7 Mitigation Measures

10.7.1 Construction Phase

In accordance with the Practice Note for Professional Persons on Construction Site Drainage, Environmental Protection Department, 1994 (ProPECC PN 1/94), construction phase mitigation measures shall include the following:

10.7.1.1 Construction Runoff and Site Drainage

- At the start of site establishment, perimeter cut-off drains to direct off-site water around the site should be constructed with internal drainage works and erosion and sedimentation control facilities implemented. Channels (both temporary and permanent drainage pipes and culverts), earth bunds or sand bag barriers should be provided on site to direct stormwater, e.g. Kai Tak Nullah (WSR 1), to silt removal facilities. The design of the temporary on-site drainage system will be undertaken by the contractor prior to the commencement of construction.
- The dikes or embankments for flood protection should be implemented around the boundaries of earthwork areas. Temporary ditches should be provided to facilitate the runoff discharge into an appropriate watercourse, through a site/sediment trap. The sediment/silt traps should be incorporated in the permanent drainage channels to enhance deposition rates.
- The design of efficient silt removal facilities should be based on the guidelines in Appendix A1 of ProPECC PN 1/94, which states that the retention time for silt/sand traps should be 5 minutes under maximum flow conditions. Sizes may vary depending upon the flow rate, but for a flow rate of 0.1 m^3/s a sedimentation basin of 30m^3 would be required and for a flow rate of 0.5 m^3/s the basin would be 150 m^3. The detailed design of the sand/silt traps shall be undertaken by the Contractor prior to the commencement of construction.
- All exposed earth areas should be completed and vegetated as soon as possible after earthworks have been completed, or alternatively, within 14 days of the cessation of earthworks where practicable. Exposed slope surfaces should be covered by tarpaulin or other means.

- All drainage facilities and erosion and sediment control structures should be regularly inspected and maintained to ensure proper and efficient operation at all times and particularly following rainstorms. Deposited silt and grit should be removed regularly and disposed of by spreading evenly over stable, vegetated areas.
- Measures should be taken to minimise the ingress of site drainage into excavations. If the excavation of trenches in wet periods is necessary, they should be dug and backfilled in short sections wherever practicable. Water pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities.
- Open stockpiles of construction materials (for example, aggregates, sand and fill material) of more than $50m^3$ should be covered with tarpaulin or similar fabric during rainstorms. Measures should be taken to prevent the washing away of construction materials, soil, silt or debris into any drainage system.
- Manholes (including newly constructed ones) should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris being washed into the drainage system and storm runoff being directed into foul sewers.
- Precautions be taken at any time of year when rainstorms are likely, actions to be taken when a rainstorm is imminent or forecasted, and actions to be taken during or after rainstorms are summarised in Appendix A2 of ProPECC PN 1/94. Particular attention should be paid to the control of silty surface runoff during storm events, especially for areas located near steep slopes.
- All vehicles and plant should be cleaned before leaving a construction site to ensure no earth, mud, debris and the like is deposited by them on roads. An adequately designed and sited wheel washing facilities should be provided at every construction site exit where practicable. Wash-water should have sand and silt settled out and removed at least on a weekly basis to ensure the continued efficiency of the process. The section of access road leading to, and exiting from, the wheel-wash bay to the public road should be paved with sufficient backfall toward the wheel-wash bay to prevent vehicle tracking of soil and silty water to public roads and drains.
- Oil interceptors should be provided in the drainage system downstream of any oil/fuel pollution sources. The oil interceptors should be emptied and cleaned regularly to prevent the release of oil and grease into the storm water drainage system after accidental spillage. A bypass should be provided for the oil interceptors to prevent flushing during heavy rain.
- Construction solid waste, debris and rubbish on site should be collected, handled and disposed of properly to avoid water quality impacts. Requirements for solid waste management are detailed in **Section 11** of this EIA Report.
- All fuel tanks and storage areas should be provided with locks and sited on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank to prevent spilled fuel oils from reaching water sensitive receivers nearby.
- By adopting the above mitigation measures with Best Management Practices (BMPs) it is anticipated that the impacts of construction site runoff from the construction site will be reduced to an acceptable level before discharges.
- All the earth works involving should be conducted sequentially to limit the amount of construction runoff generated from exposed areas during the wet season (April to September) as far as practicable.
- In general, no direct wastewater discharge should be allowed to Kai Tak Nallah, unless a discharge license has been obtained in accordance with the requirements of the WPCO.

10.7.1.2 Tunnelling Works and Underground Works

- Cut-&-cover/ open cut tunnelling work should be conducted sequentially to limit the amount of construction runoff generated from exposed areas during the wet season (April to September) as far as practicable.
- Uncontaminated discharge should pass through sedimentation tanks prior to off-site discharge.
- The wastewater with a high concentration of SS should be treated (e.g. by sedimentation tanks with sufficient retention time) before discharge. Oil interceptors would also be required to remove the oil, lubricants and grease from the wastewater.
- Direct discharge of the bentonite slurry (as a result of D-wall and bored tunnelling construction) is not allowed. It should be reconditioned and reused wherever practicable. Temporary storage locations (typically a properly closed warehouse) should be provided on site for any unused bentonite that needs to be transported away after all the related construction activities are completed. The requirements in ProPECC PN 1/94 should be adhered to in the handling and disposal of bentonite slurries.

10.7.1.3 Sewage Effluent

Adequate numbers of portable toilets should be provided for handling the construction sewage generated by the workforce. The portable toilets should be maintained in a reasonable state, which will not deter the workers from utilizing these portable toilets. Overnight sewerage should be collected by licensed collectors regularly.

10.7.1.4 Groundwater Seepage

As some proposed works areas at Hung Hom are near Victoria Harbour, high ground water level regime due to both tidal effects and rainwater infiltration is anticipated. Appropriate measures will be deployed to minimize the intrusion of groundwater into excavation works areas. In case seepage of groundwater occurs, groundwater should be pumped out from the works areas and discharged into the storm system via silt removal facilities. Groundwater from dewatering process should also be discharged into the storm system via silt traps.

10.7.1.5 Groundwater from Contaminated Area

Groundwater quality is not anticipated to be affected by the discharge/ recharge of groundwater generated from the Project since no contaminated site was identified. Thus, mitigation measures are not required, provided that the groundwater would be discharged in accordance with the requirements of the TM-Water.

10.7.1.6 Accidental Spillage

In order to prevent accidental spillage of chemicals, proper storage and handling facilities should be provided. All the tanks, containers, storage area should be bunded and the locations should be locked as far as possible from the sensitive watercourse and stormwater drains. The Contractor should register as a chemical waste producer if chemical wastes would be generated. Storage of chemical waste arising from the construction activities should be stored with suitable labels and warnings. Disposal of chemical wastes should be conducted in compliance with the requirements as stated in the Waste disposal (Chemical Waste) (General) Regulation.

10.7.2 Operational Phase

Mitigation measures are only required to mitigate runoff from train stabling sidings during the operational phase. The following mitigation measures during operational phase are recommended:

- Track runoff from train stabling sidings (covered section) and tunnel should pass through oil/grit interceptors/chambers to remove oil, grease and sediment before being pumped to the public foul drainage system;
- Track runoff from the fan area and launching/ retrieval tracks (open track section)should pass through oil/grit interceptors/chambers to remove oil, grease and sediment before being pumped to the public storm water drain system;
- The silt traps and oil interceptors should be cleaned and maintained regularly; and
- Oily contents of the oil interceptors should be transferred to an appropriate disposal facility, or to be collected for reuse, if possible.

10.8 Cumulative Impacts

Information on concurrent projects is presented in **Section 1**. As discussed in **Section 10.5**, there would be no direct discharge of wastewater and it is considered that quantitative prediction in cumulative impact is not applicable. As all the Project works would be land-based and provided that proper mitigation measures will be implemented by these concurrent projects, the water quality impact generated from these projects would be localized and no adverse cumulative water quality impacts would be expected.

10.9 Residual Impacts

Adverse residual impacts during the construction and operational phases are not anticipated provided that the above mitigation measures are implemented.

10.10 Conclusion

Potential water pollution sources have been identified as construction runoff, sewage from site workforce, groundwater seepage and accidential spillage. Mitigation measures including covering excavated materials and providing sedimentation tanks on-site etc are recommended to mitigate any adverse water quality impacts.

The operational water quality impact for track run-off and tunnel seepage will have no adverse water quality impact provided that mitigation measures are incorporated in the design.

All proposed mitigation measures are defined in the Environmental Mitigation Implementation Schedule.

10.11 References

[10-1] EPD (2009) Marine Water Quality Report 2009

[10-1] EPD (2009) River Water Quality Report 2009