

6.0 WATER QUALITY

6.1 Introduction

This section presents the potential water quality impacts associated with the construction and operation phases of the Lei Yue Mun Road Underpass. The project area is located in-land. All construction works for the underpass will be land-based and thus direct impacts on marine water quality will not arise.

6.2 Description of the Environment

Victoria Harbour is the downstream receiving water body and is located outside the construction area, at a distance of approximately 360m from the nearest works area at the western slip roads. There are a number of small streams and surface drainage channels on the hillslopes to the east of Lei Yue Mun Road. These streams enter culverts that join the existing stormwater drainage system in the area.

6.3 Environmental Legislation, Policies, Standards and Criteria

The Water Pollution Control Ordinance (Cap.358) provides the major statutory framework for the protection and control of water quality in Hong Kong. According to the Ordinance and its subsidiary legislation, all Hong Kong waters are divided into Water Control Zones (WCZ). The project area is located within the Victoria Harbour WCZ.

All discharges during the construction and operation phases are required to comply with the *Technical Memorandum (TM) on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters* issued under Section 21 of the WPCO which defines acceptable discharge limits to different types of receiving waters. Under the TM, effluents discharged into foul sewers, storm water drains, inland and coastal waters are subject to pollutant concentration standards for particular volumes of discharge. These are defined by EPD and specified in license conditions for any new discharge within a WCZ.

6.4 Description of Assessment Methodologies

The water sensitive receivers that may be affected by the construction works for the Project will first be identified. Potential sources of water quality impact that may arise during the construction and operation phases of the Project will be described. This task will include identifying pollutants from point discharges and non-point sources to surface run-off, and examining the possibility of groundwater at the project site being contaminated by any leachate seepage or migration from the nearby restored Sai Tso Wan Landfill. All the identified sources of potential water quality impact will then be evaluated and their impact significance determined. The need for mitigation measures to reduce any identified adverse impacts on water quality to acceptable levels will also be determined.

6.5 Identification, Prediction and Evaluation of Water Quality Impacts

Construction Phase

Potential sources of water quality impacts associated with the construction of the underpass have been identified and they include:

- Construction run-off and drainage.
- Sewage effluent produced by the on-site workforce.
- General construction activities.
- Diversion of existing watercourses or drainage.
- Groundwater discharge during underpass excavation.

Construction Runoff and Drainage

During excavation works for the Underpass and works for the cut slopes along Kai Tin Road, soil surfaces would be exposed and an elevated level of suspended particles would be present in the surface run-off. Sediment laden runoff may carry pollutants (adsorbed onto the particle surfaces) into the stormwater drainage system. Sources of water pollution include release of grouting and cement materials with rain wash, wash water from dust suppression sprays, and fuel, oil and lubricants from maintenance of construction vehicles and mechanical equipment.

Mitigation measures should be implemented to control construction site runoff, and to minimize the chances of introducing sediment and pollutants into the stormwater drainage system and into the ultimate receiving waters of Victoria Harbour. With the implementation of adequate construction site drainage and the provision of sediment removal facilities, it is anticipated that unacceptable water quality impacts would not arise.

General Construction Activities

On-site construction activities may cause water pollution from the following:

- Uncontrolled discharge of debris and rubbish such as packaging, construction waste and refuse; and
- Spillages of liquids stored on-site, such as oil, diesel and solvents etc, are likely to result in water quality impacts if they enter adjacent streams or drains.

Good construction practices and site management should be observed to ensure that litter, fuels and solvents do not enter nearby streams and stormwater drains.

Sewage Effluent

Domestic sewage would be generated from the workforce during the construction phase. It is unlikely that sewage generated from the site would have a significant water quality impact, provided that sewage is not discharged directly into stormwater drains or streams adjacent to the construction site and temporary sanitary facilities, such as portable chemical toilets, are used on-site and properly maintained.

Diversion of existing watercourses or drainage

Temporary or permanent diversion of stream courses or surface drainage channels may be necessary due to the cut slopes along Kai Tin Road and culverts may be installed. An acceptable hydraulic performance should be maintained to avoid channel overflow during heavy rainfall.

Groundwater discharge during underpass excavation

A potential source of water quality impact during the excavation works for the underpass construction is the discharge of contaminated groundwater. Any leachate migration from the nearby Sai Tso Wan Landfill may have resulted in contamination of groundwater at the construction works areas. Monitoring results of groundwater and surface water quality at the Sai Tso Wan Landfill have been reviewed to determine whether there is any leachate seepage or migration from the landfill site towards the project site.

As discussed in Section 5.5, the major groundwater flow within the landfill site is from the southeast to the northwest of the landfill, with minor seepage towards the south. There are 8 groundwater monitoring wells installed around the perimeter of the Sai Tso Wan Landfill (Figure L-5). The monitoring results for the restoration works period (from March 1997 to May 1998) at the Sai Tso Wan Landfill are reviewed in the Annual Environmental Audit Report submitted under the Urban Landfills Restoration Contract.¹ All 5 up gradient wells and the down-gradient well GW8 were reported to show no sign of leachate contamination with low chemical oxygen demand (COD), Total Kjeldahl Nitrogen (TKN) and chloride concentrations. For the down gradient wells GW1 and GW7, some groundwater samples were reported to contain high TKN concentrations (up to 710 mg/l). The Annual Environmental Audit Report stated that this indicated that groundwater contamination by leachate probably occurred at these two wells. For the other monitoring wells, there was no sign of contamination of groundwater due to the measured low TKN levels. The results of surface water quality monitoring during the restoration works period showed low concentrations of COD and ammoniacal nitrogen, indicating that the surface water was not contaminated by leachate. Based on the monitoring results of ground water quality and surface water quality, it is considered unlikely that the groundwater at the project site to the east of the landfill is contaminated by leachate.

Operation Phase

The only identified potential source of impact on water quality during the operation phase is runoff from the road surfaces. A surface water drainage system will be provided to collect the road runoff. The road runoff may contain minimal amounts of oil, grease and grit that may cause downstream water quality impacts to the receiving waters of Victoria Harbour if uncontrolled.

¹ Annual Environmental Audit Report, January 1999. Urban Landfills Restoration Contract. Contract No. EP/SP/28/95. Hong Kong Landfill Restoration Group Limited.

6.6 Mitigation Measures

Construction Phase

Proposed mitigation measures for containing and minimising construction phase water quality impacts are summarised below.

Construction runoff and drainage

The site practices outlined in ProPECC PN 1/94 "Construction Site Drainage" should be followed as far as practicable in order to minimise surface runoff and the chance of erosion, and also to retain and reduce any suspended solids prior to discharge. These practices include, *inter alia*, the following items:

- Provision of perimeter channels to intercept storm-runoff from outside the site. These should be constructed in advance of site formation works and earthworks.
- Sand/silt removal facilities such as sand traps, silt traps and sediment basins should be provided to remove sand/silt particles from runoff to meet the requirements of the Technical Memorandum standard under the Water Pollution Control Ordinance. These facilities should be properly and regularly maintained.
- Careful programming of the works to minimise soil excavation works during rainy seasons.
- Exposed soil surface should be protected by paving as soon as possible to reduce the potential of soil erosion.
- Trench excavation should be avoided in the wet season, and if necessary, these should be excavated and backfilled in short sections.
- Open stockpiles of construction materials on site should be covered with tarpaulin or similar fabric during rainstorms.

General Construction Activities

Debris and rubbish generated on-site should be collected, handled and disposed of properly to avoid entering the nearby streams and stormwater drains. All fuel tanks and storage areas should be provided with locks and be sited on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank. Open drainage channels and culverts near the works areas should be covered to block the entrance of large debris and refuse.

Sewage Effluent

Temporary sanitary facilities, such as portable chemical toilets, should be employed on-site. A licensed contractor would be responsible for appropriate disposal and maintenance of these facilities.

Operation Phase

A surface water drainage system will be provided to collect road runoff. The following measures are recommended to ensure road runoff will comply with the standards stipulated in the Technical Memorandum for discharges into storm water drains:

- The road drainage should be directed through oil and grit interceptors to remove oil, grease and sediment before entering the public stormwater drainage system.
- Silt traps and oil interceptors should be regularly cleaned and maintained in good working condition.
- Oily contents of the oil interceptors should be collected and transferred to an appropriate disposal facility.

6.7 Residual Impact

With the adoption and incorporation of the above recommended mitigation measures for both the construction and operation phases, no unacceptable residual impacts on water quality impact are anticipated.