

9 WASTE MANAGEMENT IMPLICATIONS

9.1 Introduction

- 9.1.1 This section identifies the types of solid wastes that are likely to be generated during the construction and operational phases of the Project and evaluates the potential environmental impacts that may result from these wastes. During construction phase, the main solid waste issues would be related to dredged marine sediment and construction and demolition (C&D) material generated from dredging operations, demolition of the remaining structures, and various civil works for the construction of buildings and infrastructure within the Project boundary. During operational phase of the Project, the major solid wastes are municipal wastes generated from different land uses within the development.

9.2 Environmental Legislation, Policies, Plans, Standards and Criteria

- 9.2.1 The criteria and guidelines for assessing waste management implications are set out in Annex 7 and Annex 15 of the Technical Memorandum on Environmental Impact Assessment Ordinance (EIAO-TM), respectively.
- 9.2.2 The following legislation relates to the handling, treatment and disposal of wastes in the Hong Kong SAR and has been used in assessing potential impacts:
- Waste Disposal Ordinance (Cap. 354)
 - Waste Disposal (Chemical Waste) (General) Regulation (Cap. 354)
 - Land (Miscellaneous Provisions) Ordinance (Cap. 28)
 - Public Health and Municipal Services Ordinance (Cap. 132) - Public Cleansing and Prevention of Nuisances Regulation
 - Waste Disposal (Charges for Disposal of Construction Waste) Regulation (Cap. 354N)
 - Dumping at Sea Ordinance (Cap. 466)

Waste Management

- 9.2.3 The Waste Disposal Ordinance (WDO) prohibits the unauthorised disposal of wastes. Construction waste is defined as any substance, matter or thing that is generated from construction work and abandoned, whether or not it has been processed or stockpiled before being abandoned, but does not include any sludge, screenings or matter removed in or generated from any desludging, desilting or dredging works. Under the WDO, wastes can be disposed of only at designated waste disposal facilities.
- 9.2.4 Under the WDO, the Chemical Waste (General) Regulation (1992) provides regulations for chemical waste control, and administers the possession, storage, collection, transport and disposal of chemical wastes. The Environmental Protection Department (EPD) has also issued a guideline document, the *Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes* (1992), which details how the Contractor should comply with the regulations on chemical wastes.
- 9.2.5 The Public Cleansing and Prevention of Nuisances Regulation provides control on illegal tipping of wastes on unauthorised (unlicensed) sites.

Dredged Marine Sediment

- 9.2.6 The ETWB TCW No. 34/2002 sets out the procedure for seeking approval to dredge / excavate sediment and the management framework for marine disposal of dredged / excavated sediment. This Technical Circular outlines the requirements to be followed in assessing and classifying the sediment and explains the marine disposal arrangement for the classified material.

- 9.2.7 Dumping permits from EPD are required in accordance with the Dumping at Sea Ordinance for marine disposal of dredged materials.

Chemical Waste

- 9.2.8 Under the Waste Disposal (Chemical Waste) (General) Regulations, all producers of chemical waste must register with EPD and treat their wastes, either utilising on-site plant licensed by EPD, or arranging for a licensed collector to transport the wastes to a licensed facility. The regulation also prescribes the storage facilities to be provided on site, including labelling and warning signs, and requires the preparation of written procedures and training to deal with emergencies such as spillages, leakages or accidents arising from the storage of chemical wastes.

Construction and Demolition (C&D) Materials

- 9.2.9 The current policy related to the disposal of C&D material is documented in the Works Branch Technical Circular No. 2/93, 'Public Dumps'. Construction and demolition materials that are wholly inert, namely public fill, should not be disposed of to landfill, but taken to public filling areas, which usually form part of reclamation schemes. The Land (Miscellaneous Provisions) Ordinance requires that dumping licences be obtained by individuals or companies who deliver public fill to public filling areas. The Civil Engineering and Development Department (CEDD) issues the licences under delegated powers from the Director of Lands.
- 9.2.10 Under the Waste Disposal (Charges for Disposal of Construction Waste) Regulation, enacted in January 2006, construction waste delivered to a landfill for disposal must not contain more than 50% by weight of inert material. Construction waste delivered to a sorting facility for disposal must contain more than 50% by weight of inert material, and construction waste delivered to a public fill reception facility for disposal must consist entirely of inert material. In accordance with the Environment, Transport and Works Bureau (ETWB) TCW No. 31/2004 "Trip Ticket System for Disposal of Construction and Demolition Materials", for all contracts that are expected to generate inert C&D materials (e.g. soil, broken rock, broken concrete and building debris etc.) requiring disposal from the site, the project office shall write to the Public Fill Committee (PFC) through the Secretary of the PFC to request a designated disposal ground for incorporation into the tender documents. For contracts where the estimated amount of non-inert C&D materials requiring disposal at landfill facilities equal or exceed 50m³, the project office shall seek confirmation from the Director of Environmental Protection (DEP) as to whether landfill facilities will be available for disposal of such materials. The DEP will designate landfill facilities, if available, for the contract. Where the estimated amount of non-inert C&D materials to be generated from the contract is less than 50m³, the project office is not required to apply to DEP for designated landfill facilities. However, the project office should still specify in the tender documents appropriate landfill facilities (e.g. Outlying Islands Transfer Facilities managed by the EPD, SENT Landfill at Tseung Kwan O, NENT Landfill at Ta Kwu Ling and WENT Landfill at Nim Wan).

- 9.2.11 Measures have been introduced under ETWB TCW No. 33/2002, “Management of Construction and Demolition Material Including Rock” to enhance the management of construction and demolition material, and to minimize its generation at source. The enhancement measures include: (i) drawing up a Construction and Demolition Material Management Plan (C&DMMP) at the feasibility study or preliminary design stage to minimize C&D material generation and encourage proper management of such material; (ii) vetting of the C&DMMP prior to upgrading of the project to Category A in the Public Works Programme; and (iii) providing the contractor with information from the C&DMMP in order to facilitate him in the preparation of the Waste Management Plan (WMP) and to minimize C&D material generation during construction. Projects generating C&D material less than 50,000m³ or importing fill material less than 50,000m³ are exempt from the C&DMMP. The new ETWB TCW No. 19/2005 “Environmental Management on Construction Sites” includes procedures on waste management requiring contractors to reduce the C&D material to be disposed of during the course of construction. Under ETWB TCW No. 19/2005, the contractor is required to prepare and implement an Environmental Management Plan (EMP) and the WMP becomes part of the EMP. Besides, ETWB TCW No.31/2004 “Trip Ticket System for Disposal of Construction and Demolition Materials” promulgates the latest trip ticket system for public works contracts including capital works contracts, term contracts and design and build contracts, where C&D materials including waste generated on site require disposal.

9.3 Assessment Methodology

Construction Phase

- 9.3.1 The criteria for assessing waste management implications are outlined in Annex 7 of the EIAO-TM. The methods for assessing potential waste management impacts during the construction phase of the Project follow those presented in Annex 15 of the EIAO-TM and include the following:

- Estimation of the types and quantities of the wastes generated.
- Assessment of potential impacts from the management of solid waste with respect to potential hazards, air and odour emissions, noise, wastewater discharge and transport.
- Assessment of impacts on the capacity of waste collection, transfer and disposal facilities.

Operational Phase

- 9.3.2 The quantity of domestic waste generation during the operational phase was estimated from the population, land uses and the program of the proposed development. A capita disposal rate of domestic waste was adopted for estimate waste generation. According to “Monitoring of Solid Waste in Hong Kong 1999 prepared by EPD”, the per capita disposal rate of domestic waste in 2016 is 1.48 kg/person /day.
- 9.3.3 The commercial and industrial (C&I) waste generated from the passengers at the proposed Cruise Terminal and employee from the commercial activities are the other sources of waste generation. The quantity of waste arising was estimated using the latest available information on the planned employment population at the time of reporting. A projected generation rate of C&I waste of 0.58 kg/person/day was adopted for the assessment, as forecasted in the Monitoring of Solid Waste in Hong Kong 1999 prepared by EPD.

9.4 Identification of Key Environmental Impacts

Construction Phase

9.4.1 The construction phase activities to be carried out for the proposed Project would generate a variety of wastes that can be divided into distinct categories based on their composition and ultimate method of disposal. The identified waste types include:

- Dredged marine sediment
- C&D material
- Chemical waste
- General refuse

9.4.2 Each type of waste arising is described below, together with an evaluation of the potential environmental impacts associated with the generation, handling, storage and transport of the waste.

Dredged Marine Sediment

Cruise Terminal

9.4.3 Dredged marine sediment would be generated from the dredging of the seabed to provide the manoeuvring basin for the cruise terminal. Environmental impacts of dredged marine sediment have been addressed in the approved EIA Report on Dredging Works for Proposed Cruise Terminal at Kai Tak (EIAO Register No. AEIAR-115/2007) (CT Dredging EIA) and are extracted below.

9.4.4 The total volume of dredged sediment generated from the dredging of the seabed to provide the manoeuvring basin for the cruise terminal is estimated to be approximately 1.38 Mm³ during construction phase. Based on the results of the chemical and biological screening, approximately 430,000 m³ was classified as contaminated dredged sediment (Category M and H) requiring Type 1 – Open Sea Disposal (Dedicated Sites) or Type 2 - Confined Marine Disposal, and approximately 950,000 m³ was classified as Category L sediment suitable for Type 1 - Open Sea Disposal in accordance with ETWB TCW No. 34/2002.

9.4.5 The total volume of dredged sediment generated from maintenance dredging during operational phase is estimated to be approximately 350,000 m³ every 5 to 10 years. Prior to any maintenance dredging, sediment sampling and testing will be carried out in accordance with the ETWB TCW No. 34/2002 to determine the contamination level of the dredged sediment. The most appropriate open sea or confined marine disposal site will be allocated for proper disposal of the dredged sediment on the basis of the chemical and biological test results in accordance with the ETWB TCW No. 34/2002.

9.4.6 The dredging rationale for the dredging works for the proposed cruise terminal has been submitted and accepted by the Secretary of Marine Fill Committee (see **Appendix 9.1**) prior to the approval of the CT Dredging EIA. As stated in the approved CT Dredging EIA, it will be the responsibility of the contractor to satisfy the appropriate authorities that the contamination levels of the marine sediment to be dredged have been analysed and recorded. According to the ETWB TCW No. 34/2002, this will involve the submission of a formal Sediment Quality Report to DEP, prior to the dredging contract being tendered. The project proponent and his contractor for the dredging works shall apply for allocation of marine disposal sites and all necessary permits from relevant authorities for the disposal of dredged sediment.

Runway Opening

- 9.4.7 Opening a 600m wide gap at the northern end of the former Kai Tak Airport runway was considered under the KTPR as a potential mitigation measure to improve the water circulation and water quality in Kai Tak Approach Channel. The opening would be covered by a piled deck. Demolition of existing runway will involve excavation of bulk fill and dredging to about -6.5mPD. The proposed construction method adopts an approach where the existing seawall at the runway will not be removed until completion of all excavation and dredging works for demolition of the runway. Thus, excavation of bulk fill material will be carried out behind the existing seawall and the estimated C&D materials from land-based excavation are presented in Section 9.4.24 below. Dredging will be required to remove the built up sediment along the existing seawalls at the gap opening location prior to the removal of the seawall facing the To Kwa Wan Typhoon Shelter (TKWTS). The dredging volume involved is estimated to be about 3,200 m³.
- 9.4.8 In accordance with the ETWB TCW No. 34/2002, Management of Dredged / Excavated Sediment, sediments are classified into Category L, M and H according to the concentration of the contaminants. With reference to the approved EIA Report of the Comprehensive Feasibility Study for the Revised Scheme of South East Kowloon Development (SEKDCFS EIA) (EIAO Register No. AEIAR-044/2001), sediment sampling and analysis had been carried out in the vicinity of the To Kwa Wan Typhoon Shelter (TKWTS), Kwun Tong Typhoon Shelter (KTTS), and Kai Tak Approach Channel (KTAC).
- 9.4.9 From the results of the SEKDCFS EIA, the sediment samples collected from the 2 locations near the seawall of proposed gap opening facing TKWTS (sampling locations KB6 and KB7) were all classified as Category H material. In view of the proximity of the proposed dredging areas to these 2 sampling locations, it is likely that the dredged sediments from the proposed dredging areas along the seawalls would also be highly contaminated. These sediments must be dredged and transported with great care in accordance with ETWB TCW No. 34/2002.
- 9.4.10 The dredging rationale together with the estimated dredged sediment quantity for the dredging works for the proposed runway opening was approved by the Marine Fill Committee in August 2008 (see **Appendix 9.2**). The dredged contaminated sediment must be effectively isolated from the environment upon final disposal and shall be disposed of at the disposal site(s) to be allocated by MFC.
- 9.4.11 It will be the responsibility of the dredging contractor to satisfy the appropriate authorities that the contamination levels of the marine sediment to be dredged have been analysed and recorded. According to the ETWB TCW No. 34/2002, this will involve the submission of a formal Sediment Quality Report (SQR) by the project proponent to the DEP, prior to the dredging contract being tendered. The project proponent and his contractor for the dredging works shall apply for allocation of marine disposal sites and all necessary permits from relevant authorities for the disposal of dredged sediment.

Localized Maintenance Dredging of KTAC

- 9.4.12 As part of the odour mitigation measures for KTAC, it is proposed to carry out localized maintenance dredging around the discharge locations of KTN and JVC, and along the seawall of the runway facing KTAC. The purpose of the localized maintenance dredging to remove the most odorous sediment deposited around the KTN and JVC discharge locations. The dredging will also provide at least 3.5m water depth over the entire KTAC so that the odour emissions from the sediment could be suppressed by the water column above. The dredging volume involved is estimated to be about 120,000 m³.

- 9.4.13 From the results of the SEKDCFS EIA, the sediment samples collected from all the 7 locations at KTAC (sampling locations AC1 to AC7) were all classified as Category H material. In view of the proximity of the proposed localised dredging areas to these sampling locations, it is likely that the dredged sediments from the proposed dredging areas in KTAC would also be highly contaminated. These sediments must be dredged and transported with great care in accordance with ETWB TCW No. 34/2002.
- 9.4.14 The dredging rationale together with the estimated dredged sediment quantity for the localised maintenance dredging at KTAC was approved by the Marine Fill Committee in August 2008 (see **Appendix 9.2**). The dredged contaminated sediment must be effectively isolated from the environment upon final disposal and shall be disposed of at the disposal site(s) to be allocated by MFC.
- 9.4.15 It will be the responsibility of the dredging contractor to satisfy the appropriate authorities that the contamination levels of the marine sediment to be dredged have been analysed and recorded. According to the ETWB TCW No. 34/2002, this will involve the submission of a formal SQR by the project proponent to the DEP, prior to the dredging contract being tendered. The project proponent and his contractor for the dredging works shall apply for allocation of marine disposal sites and all necessary permits from relevant authorities for the disposal of dredged sediment.

Public Landing Steps cum Fireboat Berth

- 9.4.16 A section of about 100m of the existing seawall at the former Kai Tak Airport runway will need to be re-constructed for the proposed public landing steps cum fireboat berth under KTD. Seawall reconstruction would involve excavation and dredging at and near the existing seawall of the runway. The estimated volume of dredged sediment generated from this activity would be approximately 600m³.
- 9.4.17 In accordance with the ETWB TCW No. 34/2002, Management of Dredged / Excavated Sediment, sediments are classified into Category L, M and H according to the concentration of the contaminants. A Sediment Sampling and Testing Plan (SSTP) for two sampling locations in the vicinity of the proposed public landing steps cum fireboat berth (namely sampling locations VC1 and VC2) has been prepared and accepted by EPD as per EIA Study Brief No. ESB 152/2006 S.3.4.7.6(k) and S.3.4.9.2(iii) (**Annex 18.4**). Marine site investigation was then carried out in accordance with the accepted SSTP in April and May 2007. The chemical testing laboratory results (**Appendix 9.3**) indicates that the sediments samples collected at the two sampling locations were classified as Category L material. That is, all sediment samples are with all contaminant levels not exceeding the Lower Chemical Exceedance Level (LCEL). The materials must be dredged, transported and disposed of in a manner, which minimizes the loss of contaminants either into solution or by resuspension.
- 9.4.18 The dredging rationale together with the estimated dredged sediment quantity for the public landing steps cum fireboat berth was approved by the Marine Fill Committee in August 2008 (see **Appendix 9.2**). It will be the responsibility of the dredging contractor to satisfy the appropriate authorities that the contamination levels of the marine sediment to be dredged have been analysed and recorded. According to the ETWB TCW No. 34/2002, this will involve the submission of a formal SQR by the project proponent to the DEP, prior to the dredging contract being tendered. The project proponent and his contractor for the dredging works shall apply for allocation of marine disposal sites and all necessary permits from relevant authorities for the disposal of dredged sediment.

Immersed Tunnel Sections of Road T2 and CKR

- 9.4.19 The CKR and Road T2 will join up to provide an east-west road link across Kowloon, from Tseung Kwan O in the east to West Kowloon in the west. Road T2 includes an immersed tube section from Cha Kwo Ling to the South Apron area of the former airport. The road is then at-grade connecting to CKR near the north end of the former runway. The CKR then enters a short section of immersed tube in inner Kowloon Bay before entering a tunnel beneath To Kwa Wan. Both the immersed tube sections of Road T2 and CKR will require dredging. The estimated volume of dredged sediment generated from these two activities would be approximately 2,620,000 m³ in total (2,260,000 m³ for T2 and 360,000 m³ for CKR) which are subject to the actual construction methods to be adopted.
- 9.4.20 From the results of the SEKDCFS EIA, the sediment samples collected from the 4 locations near the proposed alignment of the T2 tunnel (sampling locations KT1, KT2, KT3 and KT4) and the 2 locations near the proposed alignment of the CKR tunnel (sampling locations KB3 and KB6) were all classified as Category H material. In view of the proximity of the proposed dredging areas to these 6 sampling locations, it is likely that the dredged sediments from the proposed dredging areas along the proposed alignment of the immersed tunnels would also be highly contaminated. These sediments must be dredged and transported with great care in accordance with ETWB TCW No. 34/2002.
- 9.4.21 The dredging rationale together with the estimated dredged sediment quantity for the immersed tunnel sections of Road T2 and CKR was approved by the Marine Fill Committee in August 2008. The dredged contaminated sediment must be effectively isolated from the environment upon final disposal and shall be disposed of at the disposal site(s) to be allocated by MFC.
- 9.4.22 It will be the responsibility of the dredging contractor to satisfy the appropriate authorities that the contamination levels of the marine sediment to be dredged have been analysed and recorded. According to the ETWB TCW No. 34/2002, this will involve the submission of a formal SQR by the project proponent to the DEP, prior to the dredging contract being tendered. The project proponent and his contractor for the dredging works shall apply for allocation of marine disposal sites and all necessary permits from relevant authorities for the disposal of dredged sediment.

Relocation of the Hong Kong China Gas (HKCG) Submarine Gas Main

- 9.4.23 An existing twin 400mm diameter submarine gas mains is located to the west of the former Kai Tak Airport runway which serves as a strategic gas supply to Hong Kong Island. Since a section of the submarine gas mains would fall within the manoeuvring area of the proposed second berth of the Cruise Terminal, according to the HKCG diversion schedule, gas mains will be carried out between 2010 to 2012 in order to cater for the dredging works for the Cruise Terminal. The tentative alignment of the new submarine gas main is indicated in **Figure 9.1**, which is in a preliminary stage and subject to further investigation and studies to confirm its feasibility and exact location. The estimated volume of dredged sediment generated from the dredging works for the new submarine gas main in would be approximately 442,000 m³.
- 9.4.24 From the results of the SEKDCFS EIA, the sediment samples collected from the 3 locations near the proposed alignment of the new HKCG submarine gas mains (sampling locations KB3, KB4 and KB5) were all classified as Category H material. In view of the proximity of the proposed dredging area to these 3 sampling locations, it is likely that the dredged sediments from the proposed dredging area for the new HKCG submarine gas mains would also be highly contaminated. These sediments must be dredged and transported with great care in accordance with PNAP 252.

- 9.4.25 The dredging rationale together with the estimated dredged sediment quantity for the new submarine gas mains was submitted to the Secretary of Marine Fill Committee in July 2007. The dredged contaminated sediment must be effectively isolated from the environment upon final disposal and shall be disposed of at the disposal site(s) to be allocated by MFC.
- 9.4.26 It will be the responsibility of the dredging contractor to satisfy the appropriate authorities that the contamination levels of the marine sediment to be dredged have been analysed and recorded. According to the ETWB TCW No. 34/2002, this will involve the submission of a formal Sediment Quality Report (SQR) by the project proponent to the DEP, prior to the dredging contract being tendered. The project proponent and his contractor for the dredging works shall apply for allocation of marine disposal sites and all necessary permits from relevant authorities for the disposal of dredged sediment.
- 9.4.27 The estimated volume of dredged marine sediment generated from the above dredging activities are summarized in **Table 9.1(a) & Table 9.1(b)**. The location / extent of the proposed dredging works are shown in **Figure 9.1**.

Table 9.1(a) Summary of Estimated Dredged Marine Sediment

| Projects | Disposal Site | Estimated Quantity and Category |
|---|---|--|
| Cruise terminal (Manoeuvring basin) | Type 1 – Open Sea Disposal – gazetted marine disposal ground allocated by MFC | <ul style="list-style-type: none">• 950,000 m³ Category L |
| | Type 1 – Open Sea Disposal (Dedicated Sites) or Type 2 – Confined Marine Disposal, to be allocated by MFC | <ul style="list-style-type: none">• 430,000 m³ Category M and H |
| 600m runway opening | Subject to final allocation of the disposal sites by MFC | <ul style="list-style-type: none">• 3,200 m³ Category H |
| Localized maintenance dredging of KTAC | | <ul style="list-style-type: none">• 120,000 m³ Category H |
| Public landing step cum fireboat berth | | <ul style="list-style-type: none">• 600 m³ Category L |
| Immersed tunnel section of Road T2 (including the dredging required for the associated reconstruction of a section of the existing Kwun Tong Submarine Outfall) | | <ul style="list-style-type: none">• 2,260,000 m³ Category H |
| Immersed tunnel section of CKR | | <ul style="list-style-type: none">• 360,000 m³ Category H |
| Relocation of the Hong Kong China Gas Submarine Main | | <ul style="list-style-type: none">• 442,000 m³ Category H |
| | | Total: 4,565,800 m ³ |

Table 9.1(b) Summary of Estimated Maintenance Dredging Project

| Projects | Disposal Site | Estimated Quantity and Frequency |
|--|--|--|
| Cruise terminal (Maintenance Dredging Project) | Subject to final allocation of the disposal sites by MFC | • 350,000 m ³ every 5 to 10 years |

Construction and Demolition Materials

- 9.4.28 Construction and demolition (C&D) material arising from construction activities such as site clearance, excavation works, demolition of 600m runway opening, Trunk Road T2, Kai Tak Nullah modification works, site formation and various civil works for the construction of buildings and infrastructure within the Project boundary. The inert materials would be re-used on-site or in other projects as far as possible and delivered to the public fill reception facilities or other designated sites as advised by the Secretary of Public Fill Committee as the last resort. The estimated quantity of C&D material generated and reused from major construction activities are summarized in **Table 9.2a**. The schedule of quantities of C&D material generated is shown in **Table 9.2b**.

Table 9.2a Summary of Estimated C&D Material

| Projects | Estimated Quantity | Reused Quantity | Disposal Site (Landfill or Public Fill) |
|--|--------------------------|------------------------|--|
| 600m runway opening | | | Public fill / on-site reuse |
| Grade II or above rock | 130,000 m ³ | 46,000 m ³ | |
| Grade III or below rock | - | - | |
| Insert soft C&D materials | 1,860,000 m ³ | 929,000 m ³ | |
| Sub-total | 1,990,000 m ³ | 975,000 m ³ | |
| Trunk Road T2 | | | Public fill / on-site reuse |
| Grade II or above rock | 18,000 m ³ | 18,000 m ³ | |
| Grade III or below rock | - | - | |
| Insert soft C&D materials | 485,000 m ³ | 185,000 m ³ | |
| Sub-total | 503,000 m ³ | 203,000 m ³ | |
| Kai Tak Nullah modification works | | | Public fill / on-site reuse |
| Grade II or above rock | - | - | |
| Grade III or below rock | - | - | |
| Insert soft C&D materials | 600,000 m ³ | 300,000 m ³ | |
| Sub-total | 600,000 m ³ | 300,000 m ³ | |
| Site Formation cum Marine Works for Cruise Terminal | | | Inert C&D material to be disposed off-site to the designated public fill reception facility, C&D material should be reused as far as practicable |
| Grade II or above rock | 58,000 m ³ | 52,000 m ³ | |
| Grade III or below rock | 211,000 m ³ | 148,000 m ³ | |
| Insert soft C&D materials | 689,000 m ³ | 37,000 m ³ | |
| Sub-total | 958,000 m ³ | 237,000 m ³ | |
| Central Kowloon Route (depressed road and tunnel sections in North Apron) | | | Public fill / on-site reuse |
| Grade II or above rock | - | - | |
| Grade III or below rock | - | - | |
| Insert soft C&D materials | 304,000 m ³ | 66,000 m ³ | |
| Sub-total | 304,000 m ³ | 66,000 m ³ | |
| Shatin to Central Link (To Kwa Wan Station and the Kai Tak Station) | | | Public fill / on-site reuse |
| Grade II or above rock | - | - | |
| Grade III or below rock | - | - | |
| Insert soft C&D materials | 717,000 m ³ | 282,000 m ³ | |
| Sub-total | 717,000 m ³ | 282,000 m ³ | |

Table 9.2a Summary of Estimated C&D Material (Con't)

| | | | |
|---|--|--------------------------------|-----------------------------|
| Public landing steps cum fireboat berth | | 665,200 m ³ | Public fill / on-site reuse |
| Grade II or above rock | 530 m ³ | | |
| Grade III or below rock | 8,590 m ³ | | |
| Insert soft C&D materials | 67,880 m ³ | | |
| Sub-total | 77,000 m ³ | | |
| New sewage pumping stations serving the planned Kai Tak Development (including PS 6) | | | Public fill / on-site reuse |
| Grade II or above rock | - | | |
| Grade III or below rock | - | | |
| Insert soft C&D materials | 54,000 m ³ | | |
| Sub-total | 54,000 m ³ | | |
| Decommissioning of the remaining parts of the former Kai Tak Airport and decommissioning of the south apron area | | | Landfill / public fill |
| Grade II or above rock | - | | |
| Grade III or below rock | - | | |
| Insert soft C&D materials | 43,250 m ³ | | |
| Sub-total | 43,250 m ³ (9,500 m ³ for demolition of ex-GFS Building 5,000 m ³ for demolition of ASDE radar tower 28,750 m ³ for decommissioning and decontamination of the south apron) | | |
| New Distributor Roads Serving the Planned KTD | | | Public fill / on-site reuse |
| Grade II or above rock | - | | |
| Grade III or below rock | - | | |
| Insert soft C&D materials | 2,217 m ³ | | |
| Sub-total | 2,217 m ³ | | |
| Other miscellaneous works¹ | | | Public fill / on-site reuse |
| Grade II or above rock | 4,470 m ³ | | |
| Grade III or below rock | 4,410 m ³ | | |
| Insert soft C&D materials | 688,653 m ³ | | |
| Sub-total | 697,533 m ³ | | |
| Total | 5,946,000 m³ | 2,728,200 m³ | |

¹ Other miscellaneous works include public landing steps, sewage pumping stations, decommissioning works, underpass, underground shopping streets, subways, box culverts, roadworks, drains and sewers etc

Table 9.2b Schedule of Quantities of C&D Materials Generated

| Year | Grade I/II rock(m ³) | Grade III rock (m ³) | Soft material (m ³) | Other material (m ³) |
|------|----------------------------------|----------------------------------|---------------------------------|----------------------------------|
| 2008 | - | - | 11,000 m ³ | - |
| 2009 | 30,000 m ³ | 105,000 m ³ | 421,000 m ³ | - |
| 2010 | 77,000 m ³ | 119,000 m ³ | 1,296,000 m ³ | - |
| 2011 | 85,000 m ³ | - | 1,504,000 m ³ | - |
| 2012 | 18,000 m ³ | - | 1,015,000 m ³ | - |
| 2013 | - | - | 802,000 m ³ | - |
| 2014 | - | - | 312,000 m ³ | - |
| 2015 | - | - | 112,000 m ³ | - |
| 2016 | - | - | 39,000 m ³ | - |
| 2017 | - | - | - | - |
| 2018 | - | - | - | - |

Chemical Waste

- 9.4.29 The maintenance and servicing of construction plant and equipment may generate some chemical wastes such as cleaning fluids, solvents, lubrication oil and fuel. It is difficult to quantify the amount of chemical waste that will arise from the construction activities since it will be dependent on the contractor's maintenance requirements and the amount of plant utilised. However, it is anticipated that the quantity of chemical waste, such as lubricating oil and solvent produced from plant maintenance, would be small and in the order of a few cubic metres per month for each works package. The amount of chemical waste to be generated will be quantified in the site Waste Management Plan to be prepared by the contractor(s) of the respective works package.
- 9.4.30 Chemical wastes arising during the construction phase may pose environmental, health and safety hazards if not stored and disposed of in an appropriate manner as stipulated in the Waste Disposal (Chemical Waste) (General) Regulations. The potential hazards include:
- Toxic effects to workers
 - Adverse impacts on water quality from spills
 - Fire hazards
- 9.4.31 Materials classified as chemical wastes will require special handling and storage arrangements before removal for appropriate treatment at the Chemical Waste Treatment Facility (CWTF) or other licensed facility. Wherever possible, opportunities should be taken to reuse and recycle materials. Mitigation and control requirements for chemical wastes are detailed in **Section 9.5** below. Provided that the handling, storage and disposal of chemical wastes are in accordance with these requirements, adverse environmental impacts would not be expected to result.

General Refuse

- 9.4.32 The construction workforce would generate general refuse comprising food scraps, waste paper, empty containers, etc. As the introduction of these wastes is likely to have detrimental effects on water quality in the area, such refuse should be properly managed so that intentional or accidental release to the surrounding environment does not occur. Disposal of refuse at sites other than approved waste transfer or disposal facilities shall be prohibited. Effective collection of site wastes would be required to prevent waste materials being blown around by wind, flushed or leached into the marine environment, or creating an odour nuisance. The waste storage area should be well maintained and cleaned regularly so as to prevent from attracting pests and vermin to the work sites.

- 9.4.33 With the implementation of waste management practices at the site (as recommended in **Section 9.5** below), adverse environmental impacts on potential hazard, air and odour emissions, noise, wastewater discharge, and public transport would not be expected from the storage, handling and transportation of refuse.

Operational Phase

- 9.4.34 With reference to the preliminary development schedule of the Kai Tak Development (**Appendix 2.1**), the residential, employment population and passenger from the proposed cruise terminal has been estimated to about 85420, 83940 and 9400 respectively. Based on the waste generation rates stated in “Monitoring of Solid Waste in Hong Kong 1999”, the forecasted quantities of domestic waste and C&I waste are 126 tonne/day (tpd) and 54 tpd, respectively. It is estimated that the total waste (domestic and C&I wastes) generated from the Project would be about 180 tpd.
- 9.4.35 Domestic and C&I wastes will be collected by licensed waste collector and delivered to the landfill sites in Hong Kong by refuse collection vehicles for final disposal. Therefore, it is anticipated that no adverse impact will be arising.

9.5 Mitigation of Environmental Impacts

Good Site Practices

- 9.5.1 It is not anticipated that adverse waste management related impacts would arise, provided that good site practices are adhered to. Recommendations for good site practices during construction activities include:
- Nomination of an approved person, such as a site manager, to be responsible for good site practices, arrangements for collection and effective disposal to an appropriate facility, of all wastes generated at the site.
 - Training of site personnel in proper waste management and chemical waste handling procedures.
 - Provision of sufficient waste disposal points and regular collection for disposal.
 - Appropriate measures to minimise windblown litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers.
 - A recording system for the amount of wastes generated, recycled and disposed of (including the disposal sites).

Waste Reduction Measures

- 9.5.2 Good management and control can prevent the generation of a significant amount of waste. Waste reduction is best achieved at the planning and design stage, as well as by ensuring the implementation of good site practices. Recommendations to achieve waste reduction include:
- Sort C&D waste from demolition of the remaining structures to recover recyclable portions such as metals.
 - Segregation and storage of different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal.
 - Encourage collection of aluminium cans, PET bottles and paper by providing separate labelled bins to enable these wastes to be segregated from other general refuse generated by the work force.
 - Any unused chemicals or those with remaining functional capacity shall be recycled.
 - Proper storage and site practices to minimise the potential for damage or contamination of construction materials.

Measures for Dredged Marine Sediment

- 9.5.3 The basic requirements and procedures for dredged sediment disposal are specified under the ETWB TCW No. 34/2002. The management of the dredging, use and disposal of marine mud is monitored by the MFC, while the licensing of marine dumping is required under the Dumping at Sea Ordinance and is the responsibility of the Director of Environmental Protection (DEP).
- 9.5.4 The dredged marine sediments would be loaded onto barges and transported to the designated disposal sites allocated by the MFC depending on their level of contamination. Sediment classified as Category L would be suitable for Type 1 - Open Sea Disposal. Contaminated sediment would require either Type 1 – Open Sea Disposal (Dedicated Sites), Type 2 - Confined Marine Disposal or Type 3 – Special Treatment / Disposal and must be dredged and transported with great care in accordance with ETWB TCW No. 34/2002. If any sediment suitable for Type 3 disposal is identified, it is the responsibility of the project proponent, in consultation with DEP, to identify and agree with him/her, the most appropriate treatment and/or disposal arrangement.
- 9.5.5 It will be the responsibility of the dredging contractor to satisfy the appropriate authorities that the contamination levels of the marine sediment to be dredged have been analysed and recorded. According to the ETWB TCW No. 34/2002, this will involve the submission of a formal SQR to the DEP, prior to the dredging contract being tendered. The contractor for the dredging works shall apply for allocation of marine disposal sites and all necessary permits from relevant authorities for the disposal of dredged sediment. During transportation and disposal of the dredged marine sediments requiring Type 1, Type 2, and Type 3 disposal, the following measures should be taken to minimise potential impacts on water quality:
- Bottom opening of barges shall be fitted with tight fitting seals to prevent leakage of material. Excess material shall be cleaned from the decks and exposed fittings of barges and hopper dredgers before the vessel is moved.
 - Monitoring of the barge loading shall be conducted to ensure that loss of material does not take place during transportation. Transport barges or vessels shall be equipped with automatic self-monitoring devices as required under the Dumping at Sea Ordinance and as specified by the DEP.
 - Barges or hopper barges shall not be filled to a level that would cause the overflow of materials or sediment laden water during loading or transportation.
- 9.5.6 Negligible dust impacts would be expected from dredging activities. In order to further ensure compliance with the Air Quality Objectives at the air sensitive receivers, requirements of the Air Pollution Control (Construction Dust) Regulation, where relevant, shall be adhered to during dredging operations. The dredged sediment placed on barge should be properly covered as far as practicable to minimise the potential odour emissions during the dredging operation and transportation of the dredged sediment.

Measures for Construction and Demolition Materials

- 9.5.7 Mitigation measures and good site practices should be incorporated into the contract document to control potential environmental impact from handling and transportation of C&D material. The mitigation measures include:
- Where it is unavoidable to have transient stockpiles of C&D material within the Project work site pending collection for disposal, the transient stockpiles shall be located away from waterfront or storm drains as far as possible.
 - Open stockpiles of construction materials or construction wastes on-site should be covered with tarpaulin or similar fabric.
 - Skip hoist for material transport should be totally enclosed by impervious sheeting.

- Every vehicle should be washed to remove any dusty materials from its body and wheels before leaving a construction site.
 - The area where vehicle washing takes place and the section of the road between the washing facilities and the exit point should be paved with concrete, bituminous materials or hardcores.
 - The load of dusty materials carried by vehicle leaving a construction site should be covered entirely by clean impervious sheeting to ensure dust materials do not leak from the vehicle.
 - All dusty materials should be sprayed with water prior to any loading, unloading or transfer operation so as to maintain the dusty materials wet.
 - The height from which excavated materials are dropped should be controlled to a minimum practical height to limit fugitive dust generation from unloading.
- 9.5.8 When delivering inert C&D material to public fill reception facilities, the material shall consist entirely of inert construction waste and of size less than 250mm or other sizes as agreed with the Secretary of the Public Fill Committee. In order to monitor the disposal of the surplus C&D material at the designed public fill reception facility and to control fly tipping, a trip-ticket system as stipulated in the ETWB TCW No. 31/2004 “Trip Ticket System for Disposal of Construction and Demolition Materials” should be included as one of the contractual requirements and implemented by an Environmental Team undertaking the Environmental Monitoring and Audit work. An Independent Environmental Checker should be responsible for auditing the results of the system.

Measures for Chemical Waste

- 9.5.9 After use, chemical wastes (for example, cleaning fluids, solvents, lubrication oil and fuel) should be handled according to the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes. Spent chemicals should be collected by a licensed collector for disposal at the CWTF or other licensed facility, in accordance with the *Waste Disposal (Chemical Waste) (General) Regulation*.

Measures for General Refuse

- 9.5.10 General refuse should be stored in enclosed bins or compaction units separate from C&D material. A licensed waste collector should be employed by the contractor to remove general refuse from the site, separately from C&D material. Effective collection and storage methods (including enclosed and covered area) of site wastes would be required to prevent waste materials from being blown around by wind, wastewater discharge by flushing or leaching into the marine environment, or creating odour nuisance or pest and vermin problem.

9.6 Evaluation of Residual Environmental Impacts

- 9.6.1 With the implementation of the recommended mitigation measures for the handling, transportation and disposal of the identified waste arisings, no residual impact is expected to arise during the construction of the proposed Project.

9.7 Environmental Monitoring and Audit

- 9.7.1 Waste management will be the contractor’s responsibility to ensure that all wastes produced during the construction activities are handled and disposed of in accordance with the recommended mitigation measures and EPD’s regulations and requirements. The mitigation measures recommended in **Section 9.5** above should form the basis of the Environmental Monitoring and Audit requirements in the construction stage.

9.8 Summary

- 9.8.1 Wastes generated by the Project are likely to include dredged marine sediment and construction and demolition (C&D) material generated from 600m runway opening, site formation and various civil works for the construction of buildings and infrastructure within the Project boundary, as well as general refuse from the workforce and chemical waste from the maintenance of construction plant and equipment and from the soil remediation process. It is estimated that approximately 4,565,800 m³ of dredged sediment and approximately 5,946,000 m³ of C&D material would be generated from the Project. During operational phase of the Project, the major solid wastes are municipal wastes generated from different land uses within the development.
- 9.8.2 The total volume of dredged sediment generated from the dredging of the seabed to provide the manoeuvring basin for the cruise terminal is estimated to be approximately 1.38 Mm³ during construction phase. Based on the results of the chemical and biological screening, approximately 430,000 m³ was classified as contaminated dredged sediment (Category M and H) requiring Type 1 – Open Sea Disposal (Dedicated Sites) or Type 2 - Confined Marine Disposal, and approximately 950,000 m³ was classified as Category L sediment suitable for Type 1 - Open Sea Disposal in accordance with ETWB TCW No. 34/2002.
- 9.8.3 The total volume of dredged sediment generated from maintenance dredging for the cruise terminal is estimated to be approximately 350,000 m³ every 5 to 10 years. Prior to any maintenance dredging, sediment sampling and testing will be carried out in accordance with the ETWB TCW No. 34/2002 to determine the contamination level of the dredged sediment.
- 9.8.4 The total volume of dredged sediment generated from 600m runway opening, localized maintenance dredging at KTAC, and immersed tunnel sections of Road T2 & CKR are estimated to be approximately 3,200 m³, 120,000 m³ and 2,620,000 m³ respectively. With reference to the sediment sampling results presented in the SEKDCFS EIA for locations around the proposed dredging areas, the dredged sediment is likely to be highly contaminated and would require confined marine disposal.
- 9.8.5 The total volume of dredged sediment generated from the existing seawall to be re-constructed for the proposed public landing step cum fireboat berth is estimated to be approximately 600m³. From the results of recent site investigation around the proposed marine works area, the dredged sediment is likely to be classified as Category L material. The materials must be dredged, transported and disposed of in a manner, which minimizes the loss of contaminants either into solution or by resuspension.
- 9.8.6 It will be the responsibility of the dredging contractors of the respective dredging operations to satisfy the appropriate authorities that the contamination levels of the marine sediment to be dredged have been analysed and recorded. According to the ETWB TCW No. 34/2002, this will involve the submission of a formal SQR to the DEP, prior to the dredging contract being tendered. The contractor for the dredging works shall apply for allocation of marine disposal sites and all necessary permits from relevant authorities for the disposal of dredged sediment.
- 9.8.7 The total volume of C&D material generated from the major construction activities of the Project are estimated to be approximately 5,946,000 m³ and 2,728,200m³ out of this total volume is estimated to be reused during construction phase. Other wastes generated from the Project are likely to include chemical waste from the maintenance of construction plant and equipment and general refuse from the construction workforce.
- 9.8.8 Mitigation measures are recommended in this EIA to minimise potential environmental impacts associated with handling and disposal of different wastes arising from the Project. Provided that the recommended mitigation measures are properly followed, adverse environmental impacts would not be expected from the Project.