

9. WASTE MANAGEMENT ISSUES

Introduction

- 9.1 This section identifies the types of waste which are likely to be generated during the construction and operation phases of the Project, and evaluates the potential environmental impacts that may result from the waste generation.
- 9.2 Mitigation measures and good site practices, including waste handling, storage and disposal, have been recommended with reference to relevant waste legislation and management guidelines. Handling and disposal of contaminated sediments have also been discussed.

Environmental Legislation

- 9.3 The criteria and guidelines for assessing waste management implications are outlined in Annex 7 and Annex 15 of the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM), respectively.
- 9.4 The following legislation also cover the handling, treatment and disposal of waste in Hong Kong:
- Waste Disposal Ordinance (Cap. 354);
 - Waste Disposal (Chemical Waste) (General) Regulation (Cap. 354C);
 - 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); and
 - Dumping at Sea Ordinance (Cap. 466).

Waste Disposal Ordinance (Cap. 354)

- 9.5 The *Waste Disposal Ordinance* (WDO) prohibits any unauthorized disposal of waste. Construction waste, defined under Cap. 354N of the WDO, refers to a substance, matter or thing which is generated from construction works. It includes all abandoned materials, whether processed or stockpiled or not, before being abandoned, but does not include sludge, screenings or matter removed or generated from desludging, desilting or dredging works. Under the WDO, waste can be disposed of only at designated waste disposal facilities licensed by the Environmental Protection Department (EPD).

Waste Disposal (Chemical Waste) (General) Regulation (Cap. 354C)

- 9.6 Under the WDO, the *Chemical Waste (General) Regulation* provides regulations for chemical waste control, and administers the possession, storage, collection, transport and disposal of chemical waste. EPD has also issued the *Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes* (1992), which details how the chemical waste producers should comply with the regulations on chemical waste.

Land (Miscellaneous Provisions) Ordinance (Cap. 28)

- 9.7 The inert portion of Construction and Demolition (C&D) materials (including rocks, soil, broken concrete, building debris, etc.) may be taken to Public Fill Reception Facilities (PFRFs). PFRFs usually form part of land reclamation schemes and are operated by the Civil Engineering and Development Department (CEDD) and others. The *Land (Miscellaneous Provisions) Ordinance* requires that individuals or companies who deliver public fill to the public fill reception facilities are required to obtain Dumping Licences. The licences are issued by CEDD under delegated authority from the Director of Lands.
- 9.8 Individual licences and windscreen stickers are issued for each vehicle involved. Under the licence conditions, public fill reception facilities will only accept soil, sand, rubble, brick, tile, rock, boulder, concrete, asphalt, masonry or used bentonite. In addition, in accordance with paragraph 12 of the Development Bureau Technical Circular (Works) No.6/2010, Public Fill Committee will advise on the acceptance criteria. The material will, however, be free from marine mud, household refuse, plastic,

metal, industrial and chemical wastes, animal and vegetable matter and any other materials considered unsuitable by the public fill reception facility supervisor.

Public Health and Municipal Services Ordinance (Cap. 132)

- 9.9 The *Public Cleansing and Prevention of Nuisances Regulation* provides control on illegal tipping of waste on unauthorized (unlicensed) sites.

Waste Disposal (Charges for Disposal of Construction Waste) Regulation (Cap. 354N)

- 9.10 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 PFRF for disposal must consist entirely of inert material.

Dumping at Sea Ordinance (Cap. 466) (DASO)

- 9.11 This Ordinance came into operation in April 1995 and empowers the Director of Environmental Protection (DEP) to control the disposal and incineration of substances and particles at sea for the protection of the marine environment. Under the Ordinance, a dumping permit from the DEP is required for the disposal of regulated substances within and outside the waters of Hong Kong. The permit contains terms and conditions which include the following specifications:

- Type and quantity of substances permitted to be dumped;
- Location of the disposal grounds;
- Requirement of equipment for monitoring the disposal operations; and
- Environmental monitoring requirements.

- 9.12 Marine disposal of any dredged/excavated sediment is subject to control under the *Dumping at Sea Ordinance*. Dredged/excavated sediment destined for marine disposal is classified based on its contaminant levels with reference to the *Environment, Transport and Works Bureau Technical Circular (Works) No. 34/2002 - Management of Dredged/Excavated Sediment* (ETWB TC(W) No. 34/2002). The ETWB TC(W) No. 34/2002 stipulated a set of sediment quality criteria or Chemical Exceedance Levels (CEL) for contaminants including metals, metalloid and organic pollutants. Details of ETWB TC(W) No. 34/2002 are discussed in the section below.

Environmental Guidelines

- 9.13 Other guidelines which detail how the Contractor should comply with are as follow:
- A Guide to the Registration of Chemical Waste Producers, Environmental Protection Department, Hong Kong;
 - A Guide to the Chemical Waste Control Scheme, Environmental Protection Department, Hong Kong;
 - Code of Practice on Package, Labelling and Storage of Chemical Wastes (1992), Environmental Protection Department, Hong Kong;
 - Works Branch Technical Circular (WBTC) No. 2/93, Public Dumps;
 - Works Branch Technical Circular No. 2/93B, Public Filling Facilities;
 - Section 4.1.3, Chapter 4 of Project Administration Handbook Management of Construction/Demolition Materials including Rocks;
 - ETWB TC(W) No. 34/2002 - the Environment, Transport and Works Bureau Technical Circular (Works) No. 34/2002 - Management of Dredged/Excavated Sediment;
 - DEVB TC(W) No. 6/2010, Trip-ticket System for Disposal of Construction and Demolition Materials; and
 - ETWB TC(W) No. 19/2005, Environmental Management on Construction Sites.

- 9.14 Current policy related to the disposal of C&D materials is documented in the *WBTC No. 2/93, 'Public Dumps'*. C&D materials that are wholly inert, namely public fill, should not be disposed of at landfill, but be taken to PFRFs, which usually form part of reclamation schemes. The Land (Miscellaneous Provisions) Ordinance requires the dumping licenses to be obtained by individuals or companies who deliver public fill to PFRFs. The CEDD issues the licenses under delegated powers from the Director of Lands.
- 9.15 In accordance with the DEVB TC(W) No.6/2010 '*Trip Ticket System for Disposal of Construction and Demolition Materials*', 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 site, the project office shall write to the Public Fill Committee (PFC) through 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 DEP in terms of the availability of landfill facilities 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 of the appropriate landfill facilities (e.g. SENT Landfill at Tseung Kwan O, NENT Landfill at Ta Kwu Ling and WENT Landfill at Nim Wan) for disposal.
- 9.16 Further measures are introduced under Section 4.1.3, Chapter 4 of Project Administration Handbook, that management of C&D materials, including rocks are strengthened and their generation at sources are minimized. The enhancement measures include: (i) drafting of a Construction and Demolition Material Management Plan (C&DMMP) at an early design stage to minimize C&D materials generation and encourage proper management of such materials; (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 the preparation of the Waste Management Plan (WMP) and to minimize C&D materials generation during construction. Projects generating C&D materials or importing fill material less than 50,000m³ are exempted from the C&DMMP.
- 9.17 The ETWB TC(W) No. 34/2002 sets out the procedure for seeking approval to and the management framework for marine disposal of dredged/ excavated sediment. This Practice Note outlines the requirements to be followed in assessing and classifying the sediment and explains the marine disposal arrangement for the classified material. The sediment quality criteria for the classification of sediment were referred as the *Lower Chemical Exceedance Level (LCEL)* and *Upper Chemical Exceedance Level (UCEL)*. The LCEL and UCEL are presented in Appendix A of ETWB TC(W) No. 34/2002. Subject to the results of the chemical screening, biological screening may be required to determine the disposal requirement of the sediment.
- 9.18 The final determination of the appropriate disposal options, routing and the allocation of a permit to dispose of material at a designated site shall be determined in accordance with ETWB TC(W) No. 34/2002. Three types of disposal options for dredged / excavated sediments were stipulated in the ETWB TC(W) No. 34/2002: Type 1 – Open Sea Disposal or Open Sea Disposal in Dedicated Sites, Type 2 – Confined Marine Disposal and Type 3 – Special Treatment / Disposal. For Type 3 disposal, the Authorized Persons / Registered Structural Engineers shall be responsible for identifying and agreeing with the DEP the most appropriate treatment and/or disposal arrangement. The determination of the appropriate disposal options shall be based on the sediment classification and if necessary, the biological screening results.

Assessment Approach and Methodology

- 9.19 The methodology for assessing the potential waste management impacts during construction and operation of the Project includes the following tasks:
- Estimation of types and quantities of the wastes generated¹;

¹ The quantities of waste generated shown in this EIA are estimates only and will be subject to further review during the detailed design and construction stage.

- Assessment of potential impacts from the management of the waste with respect to potential hazards, air and odour emissions, noise, wastewater discharge and public transport;
- Evaluation of the opportunities for reducing waste generation;
- Identification of disposal options for each type of waste; and
- Assessment of impacts on the capacity of waste collection, transfer and disposal facilities.

Identification of Waste Sources

9.20 The types of waste generated and their respective sources during the construction phase and operation phase are tabulated in [Table 9.1](#).

Table 9.1 Identification of Waste Types and Sources in Construction and Operation Phases of the Project

Waste Types	Sources of Waste Identified	Examples
Construction Phase		
Construction and Demolition (C&D) Materials	<ul style="list-style-type: none"> • Excavated materials, generated from Cut-and-Cover (C&C) method • Materials from site formation and demolition works 	<ul style="list-style-type: none"> • <i>Inert C&D materials</i> (i) Rocks (ii) Soft materials (fill, etc.) (iii) Artificial Hard Materials (AHM) (concrete, etc) • <i>Non – inert C&D materials</i> (i) Timbers, papers and plastic etc.
Sediments	<ul style="list-style-type: none"> • Excavation to depths at or below underlying marine sediments and within reclaimed land. • Sediment might be generated within reclaimed land from the construction of (i) railway alignment from south of Chatham Road North Interchange to HUH, (ii) construction of HUH using C&C method and (iii) ventilation shafts. The works area where sediment is likely to be generated is shown in Figure NEX2213/C/361/ENS/M58/501 and NEX2213/C/361/ENS/M58/502. 	<ul style="list-style-type: none"> • Marine deposits, Anthropogenic Mud
Chemical waste	<ul style="list-style-type: none"> • Plant operations and maintenance • Maintenance of mechanical equipments • Building Demolition 	<ul style="list-style-type: none"> • Oil and grease; scrap batteries; used paint and cleaners etc. • Asbestos
General refuse	<ul style="list-style-type: none"> • Construction works and site-based staff and workers 	<ul style="list-style-type: none"> • Food waste, containers, cans and waste papers etc.
Operation Phase		
Chemical waste	<ul style="list-style-type: none"> • Maintenance of facilities and equipments • Renovation work 	<ul style="list-style-type: none"> • Used paint, lubricants and used batteries etc.

Waste Types	Sources of Waste Identified	Examples
General refuse	• Staff and passengers	• Food waste, containers, cans and waste papers etc.
Industrial waste	• Maintenance activities of ventilation buildings, stations and railway	• Scrap materials like metals etc.

Predicted and Evaluation of Waste Impacts for Construction Phase

9.21 The types of waste generated during construction phase include:

- C&D Materials generated from demolition, excavation and site formation works;
- Sediments;
- Chemical Waste; and
- General Refuse.

Construction and Demolition Materials

9.22 Owing to the combined effects from urban setting and nature of engineering constraints, the available schemes for construction of railway facilities and tunnels are limited, hindering the minimization of generation. Notwithstanding, the following measures have been taken to minimize quantity of C&D materials:

- Constant design reviews in striving to optimise the scheme proposals;
- Minimal interference with existing structures to reduce the quantity of demolition materials;
- Proposed use of prefabricated materials where possible; and
- Reuse of existing structures in the design where possible.

9.23 Demolition materials (Artificial Hard Material (AHM)), such as bituminous materials, broken concrete and building debris, are from the demolition works for the existing structures, such as International Mail Centre, running shed, etc. Approximately 16,000m³ of AHM, (including 1600m³ of bituminous materials) would be generated. Materials recovered should be recycled or reused as far as possible. Metals would be separated from AHM, which would be disposed of at PFRFs.

9.24 Excavated materials, which include rocks and soft materials, would be generated from excavation of Hung Hom Station (HUH), tunnels and ventilation buildings. It is estimated that the total excavated C&D materials would be in the order of 370,000m³ (sum of rock and soft materials).

9.25 The following non-inert C&D materials would also be generated during construction phase:

- Timber from formwork;
- Vegetation from site formation; and
- Papers & plastics.

9.26 About 8,000m³ of non-inert C&D materials would be generated, which would be reused and recycled as much as possible before disposal of at landfills. It is the Contractor's responsibility to separate the inert and non-inert C&D materials on site.

9.27 The total volume of inert C&D materials generated from demolition, excavation and site formation works is estimated to be about 386,000m³. With limited space within the project sites, it is not practicable to stockpile the excavated materials for subsequent backfilling. All of the excavated materials have, therefore, to be exported off-site. The inert C&D materials generated would be reused as far as practicable at other concurrent project. Flexibility would be also allowed for contractor to deliver good quality rock to local quarries. A summary of inert C&D materials generated during construction phase is shown in [Table 9.2](#). Detailed yearly waste breakdown was provided in [Appendix 9.1](#).

Table 9.2 Summary of Inert Construction and Demolition Materials Quantities Generated

Works Area	Rock (Grade I to III) (m ³)	Soft Material (Fill, etc.) (m ³)	AHM (m ³)	Off Site Disposal (m ³)	Disposal Site
HUH North Approach Tunnel	0	152,000	2,000	154,000	Surplus Material will be reused in concurrent projects such as HZMB project, or delivered to PFRFs. The exact C&D materials to be re-used will be determined when the contractors are on board and may be subject to change throughout the construction period.
Hung Hom Station	0	138,000	0	138,000	
South Approach Tunnel	2,000	77,000	2,000	81,000	
Hung Hom Cooling Tower	0	1,000	0	1,000	
International Mail Centre (Demolition)	0	0	12,000	12,000	
Total	2,000	368,000	16,000	386,000	

Note: The quantities shown above are estimates only and will be subject to further review during the detailed design and construction stage.

9.28 The other possibilities of reusing the inert C&D materials in other concurrent projects or outlets include following projects:

- The Hong Kong-Zhuhai-Macau Bridge (HZMB) (consists of two parts: Hong Kong Link Road (HKLR) and Hong Kong Boundary Crossing Facilities (HKBCF));
- The Tuen Mun-Chek Lap Kok Link (TMCLKL);
- Central Wanchai Bypass (CWB) and Wanchai Development Phase II (WDII);
- If all reuse outlets of C&D materials are exhausted during the construction phase, the C&D Materials would be disposed of at Taishan, China as a last resort.

The abovementioned projects are not exhaustive and continuous liaison with other projects on the reuse of the materials generated from this Project would be conducted.

9.29 Surplus inert C&D materials generated from the Project are proposed to be delivered to two PFRFs operated by CEDD which are Tuen Mun Area 38 Fill Bank and Tseung Kwan O Area 137 Fill Bank. A C&DMMP had been submitted to and subsequently endorsed by PFC on 12 August 2011. The PFC endorsement memo is attached in [Appendix 9.9](#). The Project Proponent should ensure all the mitigation measures mentioned in the C&DMMP and conditions stated in the endorsement memo will be complied with.

9.30 For non-C&D materials, agreement has been obtained from EPD that the North East New Territories Landfill (NENT) is the designated disposal location. The confirmation from EPD was attached in [Appendix 9.2](#).

Sediments

Sediment Sampling and Testing Plan

9.31 The classification of the excavated sediments and the determination of the corresponding disposal options were based on the findings of the site investigation works conducted under this EIA Study. A Sediment Sampling and Testing Plan (SSTP) was prepared, making reference to ETWB TC(W) No. 34/2002 and under Clause 3.4.4.2 (iii)(a) of the Study Brief, to present the sampling and testing requirements of the site investigation for EPD agreement. The SSTP should be referred to for detailed methodology for sediment sampling and testing. The SSTP was agreed by EPD on 13 July 2009 and is attached in [Appendix 9.3](#) of this Report.

9.32 In view of prolonged application procedure for the excavation permits for sediment sampling and the tight programme of the Project, the site investigation (SI) works was commenced in April 2009 and completed in August 2009. The sampling works were conducted by Gammon Construction Limited

and the laboratory testing was carried out by ALS Technichem (HK) Pty. Ltd., an HOKLAS accredited laboratory.

- 9.33 Subsequent to the SI works completed in August 2009, the Project alignment to the north of the Hung Hom Station has been slightly shifted. A Supplementary Sediment Sampling and Testing Plan (Supplementary SSTP) was thus prepared to review the assessment methodology. Based on the revised design and works areas, addition of three sampling locations and removal of sampling location 2209/SCL/EDH255 (proposed in the SSTP agreed on 13 July 2009) from the sampling plan were recommended in the Supplementary SSTP. The Supplementary SSTP, which is attached as [Appendix 9.4](#), was agreed by EPD on 23 November 2010 and should be referred to for detailed justification on the revised sampling plan.
- 9.34 The SI works proposed in the Supplementary SSTP was commenced in October 2010 and completed in November 2010. The sampling works were conducted by Geotechnics & Concrete Engg. (H.K.) Ltd. and the laboratory testing was carried out by ALS Technichem (HK) Pty. Ltd.
- 9.35 Based on the agreed SSTP and Supplementary SSTP, a total of 17 boreholes using rotary drilling method were sunk within the reclaimed area where there are potential sediment excavations during the construction works. The area would include the proposed alignment south of Chatham Road North Interchange and the new Hung Hom Station (HUH). Of the 17 borehole locations, 13 were conducted within the proposed HUH whereas 4 were sunk along the proposed alignment. As far as possible, the sampling locations were proposed at a grid spacing of approximately 100 x 100m. Sediment sampling at each sampling location was initiated at depths where marine deposits were firstly encountered and samples were generally taken at 0 – 0.9m below top level of marine deposit, 0.9m down, 1.9m down, 2.9m down and then every 3m down to the end of the marine deposit layer or base of excavation. The as-built sampling locations are shown in [Figure Nos. NEX2213/C/361/ENS/M58/501](#) and [NEX2213/C/361/ENS/M58/502](#).
- 9.36 Due to site constraints, the following sampling locations were slightly shifted from the original position as proposed in the agreed SSTP:
- 2209/SCL/EDH230 – Relocated as requested by Freight Yard in order to suit their operation requirements
 - 2209/SCL/EDH234 – Relocated as requested by Freight Yard in order to suit their operation requirements
 - 2209/SCL/EDH235 – Relocated as requested by Freight Yard in order to suit their operation requirements
- 9.37 2209/SCL/EDH238 – Relocated as the original location may encounter underground structure as revealed from the inspection pits
- 9.38 It should be noted that minor changes have been made after EPD's agreement on Supplementary SSTP to the following sampling ID. The changes are shown in [Table 9.3](#) below and are adopted in the remaining part of this section.

Table 9.3 Changes of Sampling ID

Sampling ID Proposed in Supplementary SSTP	As-built Sampling ID
SED001	11202/SCL/EDH285
SED002	11202/SCL/EDH286
SED003	11202/SCL/EDH287

- 9.39 In addition, grab samples were also collected from EPD's routine marine sediment monitoring station PS6 at Port Shelter (850434E, 820057N) on 5 May 2009 and 9 December 2010 as the reference sediment samples.

Chemical and Biological Screening

- 9.40 Chemical and biological screening of sediment samples were carried out according to the agreed SSTP and Supplementary SSTP with reference to ETWB TC(W) No. 34/2002. Each sample was tested for chemical screening with parameters as stated in ETWB TC(W) No. 34/2002.

- 9.41 A total of 39 samples had been collected and tested and sediments were encountered in all of the sampling locations except 2209/SCL/EDH122 (P), 2209/SCL/EDH238, 2209/SCL/EDH240.
- 9.42 The chemical screening results are presented in [Appendix 9.5](#) whereas a summary of the results are shown in [Table 9.4](#).
- 9.43 For HUH, the top of the underlying marine deposit layers encountered during the site investigation vary from sampling locations; with depths of about 6 to 19 m below ground level (m bgl) in the works area. Based on the site investigation results, most of the sediment samples collected were classified as Category L (52.2%) with about 8.7% and 39.1% of sediment samples classified as Category M and H respectively. Category H sediments were identified in 7 sampling locations out of 13, with contaminants Cu, Pb, Zn and Hg exceeded the UCEL. On the other hand, Category M sediments were found in 1 sampling location out of 13, with contaminant Zn exceeded the LCEL but equal to or below the UCEL. Total PCBs level of all samples were below the reporting limit whereas no LCEL exceedance was identified for contaminants Cd, Cr, Ni, Ag and LMW PAHs.
- 9.44 For the area within proposed alignment, the depth of underlying marine deposit layer encountered was 5 to 13 m bgl. 16 sediment samples were collected in the area. 13 of them are classified as Category L (81.3%) with contaminants level below LCEL. Cd, Hg, Ag, PCB, LMW PAHs and HMW PAHs were below reporting level in these samples. One sediment sample is classified to be Category M (6.3%) with contaminant Pb exceeded the LCEL but below the UCEL; another sediment sample is classified as Category H (6.3%) with contaminant Pb exceeded the UCEL. A single sediment sample was detected with HMW PAHs exceeded 10 times LCEL and classified to be Category H (> 10 LCEL) requiring biological screening test with dilution. Total PCBs level of all samples were below the reporting limit whereas no LCEL exceedance was identified for contaminants Cd, Cr, Cu, Ni, As and Ag.
- 9.45 It should be noted that there were insufficient amount of interstitial water available from all of the sediment samples for analysis and as a result, TBT testing was not conducted in the chemical screening exercise under this EIA Study.

Table 9.4 Summary of Chemical Screening Results

Category	No. of Samples under each Category	Percentage of Total Number of Samples
Category L (at or below LCEL)	25	64.1%
Category M (above LCEL but at or below UCEL)	3	7.7%
Category H (above UCEL)	10	25.6%
Category H (above UCEL with contaminant/s levels exceeding 10 times the LCEL)	1	2.6%
Total:	39	100%

- 9.46 Based on the chemical screening results above, Tier III biological screening was conducted for the Category M sediment samples. The results of the biological screening are attached in [Appendix 9.6](#) and summarized in [Table 9.5](#).

Table 9.5 Summary of Biological Screening Results

Sampling ID (Depth)	Classification of Sediment	Biological Screening Results
2209/SCL/EDH233P (11.20-12.10m)	Category M	Fail
2209/SCL/EDH233P (12.55-13.00m)	Category M	Fail
11202/SCL/EDH286 (6.20-7.10m)	Category M	Fail
11202/SCL/EDH287 (6.70-7.60m)	Category H (> 10 x LCEL)	Pass

Sediment Disposal Options and Quantities

- 9.47 Based on the chemical and biological screening results, the disposal options for each of the sediment samples were determined in accordance with the ETWB TC(W) No. 34/2002 and summarized in [Appendix 9.5](#).
- 9.48 The quantities of sediments under each disposal type is estimated with consideration of (i) the excavation profiles for the railway / HUH construction, (ii) depths and thickness of underlying marine deposits and (iii) disposal options at each sampling locations and corresponding depths as based on the chemical and biological screening results under this EIA Study. The estimated quantities for each disposal type are presented in [Table 9.6](#). The total volume of sediment generated is estimated to be approximately 99,200m³. To ensure disposal space is allocated for the Project, a request for reservation of disposal space was sought from MFC. The dredging rationale was submitted to and subsequently approved by MFC. Relevant correspondences are attached as [Appendix 9.7](#).

Table 9.6 Disposal Quantity for Marine Sediment

Disposal Options	Corresponding Category	Disposal Quantity (m ³)
Type 1 – Open Sea Disposal	Category L Sediment	62,200
Type 1 – Open Sea Disposal (Dedicated Sites) at disposal site(s) allocated by MFC	Category M Sediment (passed the biological screening)	0
Type 2 – Confined Marine Disposal at disposal site(s) allocated by MFC	Category M Sediment (failed the biological screening) and Category H Sediment (does not require biological screening)	37,000
	Total	99,200

Note: The quantities shown above are estimates only and will be subject to further review during the detailed design and construction stage.

Excavation, Transportation and Disposal

- 9.49 To minimise any potential adverse impacts arising from the excavated marine sediment, the sediment should be excavated, transported and disposed of in a manner that would minimise adverse impacts to air quality, noise and water quality. Mitigation measures to minimise potential environmental impacts are recommended in **Sections 9.84 to 9.93**.
- 9.50 Based on the findings of the air quality and noise impact assessments (refer to Sections 5 and 6 of the Report), adverse air quality and noise impacts associated with sediment excavation activities are not anticipated. In addition, as there would be no marine based dredging for the construction works, the possible water quality impacts would be restricted to the activities associated with marine transportation and disposal of sediment. It is expected that adverse water quality impacts would not be anticipated if mitigation measures as proposed in **Sections 9.84 to 9.93** are properly implemented.
- 9.51 Based on the above and with the implementation of the recommended mitigation measures, no unacceptable impacts would be expected from the excavation, transportation and disposal of the excavated sediment.

Chemical Waste

- 9.52 The maintenance and servicing of construction plant, equipment and vehicles involve the use of a variety of chemicals and generate chemical wastes. The possible chemical waste that would be generated during the course of construction works includes:
- Oil and grease associated with plant maintenance;
 - Hydraulic fluid from plant machinery;
 - Asbestos waste from building demolition
 - Scrap batteries from vehicle maintenance; and
 - Used paint, cleaners, solvents used in maintaining mechanical equipments.

- 9.53 It is difficult to quantify the amount of chemical waste that would arise from the construction activities since it would depend on the Contractor's on-site maintenance requirements and the amount of plant utilized. However, it is anticipated that the quantity of chemical waste, such as lubrication oil and solvent produced from plant maintenance, would be small and in the order of a few cubic metres per month. The amount of chemical waste to be generated would be quantified in the WMP to be prepared by the Contractors.
- 9.54 As stipulated in the *Waste Disposal (Chemical Waste) (General) Regulations*, chemical wastes arisen during the construction phase may pose environmental, health and safety hazards if not stored and disposed of appropriately. These hazards may include:
- Toxic effects to workers;
 - Adverse impacts on water quality from spills; and
 - Fire hazard.
- 9.55 Chemical waste will be collected by licensed collectors and disposed of at the Chemical Waste Treatment Centre (CWTC) at Tsing Yi. Wherever possible opportunities should be taken to reuse and recycle materials. Mitigation and control requirements for chemical wastes are detailed in **Sections 9.94 to 9.99**
- 9.56 The handling, storage and disposal of chemical waste would follow the *Code of Practice on Packaging, Labelling and Storage of Chemical Wastes* published by EPD and the anticipated adverse environmental impacts would be negligible.
- 9.57 Asbestos waste is categorized as chemical waste under the Waste Disposal (Chemical Waste) Regulation. The Project Proponent should conduct an asbestos investigation by a registered asbestos consultant prior to demolition of existing building structure. The investigation should reveal the presence, quantity and location of Asbestos Containing Materials (ACM).
- 9.58 Asbestos waste will be handled in accordance with the Code of practice on the Handling, Transportation and Disposal of Asbestos Waste issued by the Environmental Protection Department.

General Refuse

- 9.59 During the construction period, the workforce would generate refuse comprising food scraps, waste paper, empty containers, etc. Accidental or intentional release of these refuse to the surrounding environment is not permitted and may cause negative environmental impacts. Storage of general refuse on-site will generate adverse environmental impacts like water contamination, odour nuisance and visual impact if they are not managed in a proper manner. The site may also attract vermin and pests if the waste containers are not cleaned or maintained properly and frequently.
- 9.60 The number of construction workers to be employed on the Project is estimated to be about 846 workers. Based on a generation rate of 0.65 kg per worker per day, approximately 550 kg of general refuse will be generated daily during the construction period.
- 9.61 The refuse should be stored in enclosed bin to avoid adverse impacts to the surroundings. Recycling bins should be provided to maximize reuse and recycle volume. A reputable licensed collector should be employed to collect the general refuse for later disposal of at landfills.
- 9.62 With proper implementation of waste management practices as described in **Sections 9.100 to 9.104** it is anticipated that the secondary environmental impacts from collection and handling of general refuse would be minimal.

Evaluation of Environmental Impacts for Operation Phase

- 9.63 During the operation phase, it is anticipated that the volume of waste generation would be insignificant and the waste to be generated including:
- Chemical waste;
 - General refuse; and
 - Industrial waste.

Chemical Waste

- 9.64 Chemical wastes such as paints, lubricants and used batteries may be generated during maintenance activities in stations, ventilation buildings and railways. This waste may pose environmental, health and safety hazards. Measures as stipulated in the *Waste Disposal (Chemical Waste) (general) Regulation* and the *Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes* would be strictly followed for the handling and disposal of chemical waste.
- 9.65 Should any chemical waste be generated, the operator must register with EPD as a chemical waste producer. The chemical waste would be readily accepted for disposal of at the CWTC at Tsing Yi. This chemical waste should be collected periodically in drum-type containers by licensed chemical waste collectors. With proper storage, handling and disposal of this waste, no adverse environmental impact is anticipated.

General Refuse

- 9.66 During the operation phase, general refuse would be generated by staff and passengers and any commercial operators. This waste includes food waste, paper, wood, plastic, office waste etc. Plastics, papers and other recyclable wastes should be separated from general refuse and recycled as far as possible. The remaining refuse would be collected by licensed collectors and disposed of at landfills.

Industrial Waste

- 9.67 Maintenance activities, which would be conducted in station and ventilation buildings, would generate industrial waste including scrap materials from rail and carriage maintenance, used fluorescent tubes, used welding rods, cleansing materials and discarded electronic equipment. Steel would be sorted out as far as possible before collection by licensed collectors.
- 9.68 [Table 9.7](#) provides a summary on the recommended disposal methods of different wastes generated from the operation phase of the Project.

Table 9.7 Summary of Waste Disposal for Operation Phase

Type of Waste	Proposed Disposal Methods
Chemical Waste	Recycled by licensed facility or disposal of at CWTC
General Refuse	Reuse, recycle as much as possible before disposal of at landfills
Industrial Waste	Sorted and recycled before collection by licensed collectors

- 9.69 The anticipated potential environmental impacts arisen from the handling, storage and disposal of waste in operation phase would be insignificant provided that the mitigation measures stated in **Sections 9.104 to 9.109** are strictly followed.

Mitigation Measures for Construction Phase

Waste Management Hierarchy

- 9.70 The waste management hierarchy has been applied in the assessment and development of mitigation measures for waste which aims at evaluating the desirability of waste management methods and includes the followings in descending preference:
 - Avoidance and reduction of waste generation;
 - Reuse of materials as far as practicable;
 - Recovery and recycling of residual materials where possible; and
 - Treatment and disposal according to relevant laws, guidelines and good practices.
- 9.71 Based on the waste management hierarchy, waste reduction measures are recommended as follow to reduce impacts and costs arisen from the Project. Recommendations of good site practices and waste reduction measures would be stated in order to achieve avoidance and minimization of waste

generation in the hierarchy. Environmental Management Plan (EMP) and trip-ticket system are recommended for monitoring management of waste. Specific measures targeting the mitigation of impacts in works areas and the transportation of spoil off-site would be provided to minimize the potential impacts to the surrounding environment together with recommendations on sediments management.

Good Site Practices and Waste Reduction Measures

9.72 Adverse impacts related to waste management are not expected to arise, provided that good site practices are strictly followed. Recommendations for good site practices during the construction phase include:

- Prepare a WMP approved by the Engineer/Supervising Officer of the Project based on current practices on construction sites;
- Training of site personnel in, site cleanliness, proper waste management and chemical handling procedures;
- Provision of sufficient waste disposal points and regular collection of waste;
- Appropriate measures to minimize windblown litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers;
- Regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors; and
- Separation of chemical wastes for special handling and appropriate treatment.

9.73 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:

- Sorting of demolition debris and excavated materials from demolition works to recover reusable/ recyclable portions (i.e. soil, broken concrete, metal etc.);
- 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 by providing separate labelled bins to enable this waste to be segregated from other general refuse generated by the workforce;
- Proper storage and site practices to minimize the potential for damage or contamination of construction materials;
- Plan and stock construction materials carefully to minimize amount of waste generated and avoid unnecessary generation of waste; and
- Training should be provided to workers about the concepts of site cleanliness and appropriate waste management procedures, including waste reduction, reuse and recycle.

9.74 The Contractor shall prepare and implement a WMP as part of the EMP in accordance with ETWB TCW No. 19/2005 which describes the arrangements for avoidance, reuse, recovery, recycling, storage, collection, treatment and disposal of different categories of waste to be generated from the construction activities. Such a management plan should incorporate site specific factors, such as the designation of areas for segregation and temporary storage of reusable and recyclable materials. The EMP should be submitted to the Engineer for approval. The Contractor should implement the waste management practices in the EMP throughout the construction stage of the Project. The EMP should be reviewed regularly and updated by the Contractor.

9.75 In addition to the above good site practices and waste reduction measures, possibilities of reusing the C&D materials in other concurrent projects is stated in **Section 9.28**.

Storage, Collection and Transportation of Waste

9.76 Storage of materials on site may induce adverse environmental impacts if not properly managed. Storage or stockpiling of C&D waste is not anticipated as the C&D materials generated would be

removed from site immediately; however, should any temporary storage or stockpiling of waste is required, recommendations to minimize the impacts include:

- Waste, such as soil, should be handled and stored well to ensure secure containment, thus minimizing the potential of pollution;
- Maintain and clean storage areas routinely;
- Stockpiling area should be provided with covers and water spraying system to prevent materials from wind-blown or being washed away; and
- Different locations should be designated to stockpile each material to enhance reuse.

9.77 Waste haulier with appropriate permits should be employed by the Contractor for the collection and transportation of waste from works areas to respective disposal outlets. The following suggestions should be enforced to minimise the potential adverse impacts:

- Remove waste in timely manner;
- Waste collectors should only collect wastes prescribed by their permits;
- Impacts during transportation, such as dust and odour, should be mitigated by the use of covered trucks or in enclosed containers;
- Obtain relevant waste disposal permits from the appropriate authorities, in accordance with the Waste Disposal Ordinance (Cap. 354), Waste Disposal (Charges for Disposal of Construction Waste) Regulation (Cap. 345) and the Land (Miscellaneous Provisions) Ordinance (Cap. 28);
- Waste should be disposed of at licensed waste disposal facilities; and
- Maintain records of quantities of waste generated, recycled and disposed.

9.78 Implementation of trip ticket system with reference to DEVB TC(W) No. 6/2010, Trip Ticket System for Disposal of Construction & Demolition Materials, to monitor disposal of waste and to control fly-tipping at PFRFs or landfills. A recording system for the amount of waste generated, recycled and disposed (including disposal sites) should be proposed.

9.79 In addition to the above measures, other specific mitigation measures on handling the C&D materials, sediments and materials generated from site formation and demolition work are recommended as follow.

Sorting of C&D Materials

9.80 Concerning the necessity of maximising reuse for the Project, it is paramount for sorting to be performed to recover the inert materials, reusable and recyclable materials before disposal off-site. All surplus C&D materials arising from or in connection with the works shall become the property of the Contractor when it is removed unless otherwise stated. The Contractor will be responsible for devising a system to work for sorting of C&D materials and promptly removing all sorted and process materials arising from the construction activities. The system should be included in the EMP, identifying the source of generation, estimated quantity, arrangement for sorting, collection, temporary storage areas (if any) and frequency of collection by recycling Contractors or frequency of removal off-site.

9.81 It is recommended that specific areas should be provided by the Contractors for sorting and to provide temporary storage areas (if required) for the sorted materials. The materials could be segregated according to the categories as shown below:

- Excavated materials suitable for reuse at other concurrent projects;
- Excavated materials for delivery to PFRFs;
- Sediments for delivery to sea disposal; and
- Non-inert C&D materials for delivery to landfills.

9.82 The C&D materials should at least be segregated into inert and non-inert materials, in which the inert portion could be reused and recycled as far as practicable before delivery to PFRFs as

mentioned for beneficial use in other projects. Measures should be taken to prevent unsuitable rocks from ending up at concrete batching plants and being turned into concrete for structural use. Liaisons with other projects for reuse of C&D materials have been commenced and the details are attached in [Appendix 9.8](#). While opportunities for reusing the non-inert portion should be investigated before disposal at designated landfills. Feasibility of disposing C&D material directly to alternative disposal sites in Mainland will be further explored at the early stage of the Project.

- 9.83 Possibility of reusing the spoil in the Project will be continuously investigated, it includes backfilling to cut and cover construction works for the Hung Hom south and north approach tunnels.

Sediments

- 9.84 From the above, the estimated total volume of sediments generated is approximately 99,200 m³. In terms of disposal options, the estimated volume of sediments suitable for Type 1 open sea disposal is approximately 62,200 m³ and the estimated volume of sediments requiring Type 2 confined marine disposal is approximately 37,000 m³.
- 9.85 The basic requirements and procedures for excavated sediment disposal specified under ETWB TC(W) No. 34/2002 shall be followed. MFC is responsible for the provision and management of disposal capacity and facilities for the excavated sediment, while the permit of marine dumping is required under the *Dumping at Sea Ordinance* and is the responsibility of the DEP.
- 9.86 The Project Proponent should agree in advance with MFC of CEDD on the site allocation. Subject to the final decision by MFC, Type 1 sediments are typically disposed to South Cheung Chau and/or East of Ninepin as open sea disposal while Type 2 sediments are disposed to East Sha Chau as confined marine disposal. A request for reservation of disposal space is being sought from MFC and the letter is attached in [Appendix 9.7](#).
- 9.87 Separate SSTP and Supplementary SSTP prepared in accordance with ETWB TC(W) No. 34/2002 were approved by EPD in April 2010 and November 2010, respectively, for allocation of sediment disposal sites and application of marine dumping permit as required under DASO. Site investigation, based on the separate sampling and testing plan, shall then be carried out in order to confirm the disposal arrangements for the proposed excavated sediments. A Sediment Quality Report (SQR) shall then be required for EPD agreement prior to the tendering of the construction contract, discussing in details the site investigation, testing results as well as the delineation of each of the categories of excavated materials and the corresponding types of disposal.
- 9.88 The excavated sediments is expected to be loaded onto the dumping trucks and transferred to the barging point where the sediments would be transported via barge to the existing designated disposal sites allocated by the MFC. The excavated sediment would be disposed of according to its determined disposal options and ETWB TC(W) No. 34/2002.
- 9.89 Requirements of the *Air Pollution Control (Construction Dust) Regulation*, where relevant, shall be adhered to during excavation, transportation and disposal of sediments.
- 9.90 Stockpiling of contaminated sediments should be avoided as far as possible. If temporary stockpiling of contaminated sediments is necessary, the excavated sediment should be covered by tarpaulin and the area should be placed within earth bunds or sand bags to prevent leachate from entering the ground, nearby drains and/or surrounding water bodies. The stockpiling areas should be completely paved or covered by linings in order to avoid contamination to underlying soil or groundwater. Separate and clearly defined areas should be provided for stockpiling of contaminated and uncontaminated materials. Leachate, if any, should be collected and discharged according to the Water Pollution Control Ordinance (WPCO).
- 9.91 In order to minimise the potential odour / dust emissions during excavation and transportation of the sediment, the excavated sediments should be wetted during excavation / material handling and should be properly covered when placed on trucks or barges. Loading of the excavated sediment to the barge should be controlled to avoid splashing and overflowing of the sediment slurry to the surrounding water.
- 9.92 The barge transporting the sediments to the designated disposal sites should be equipped with tight fitting seals to prevent leakage and should not be filled to a level that would cause overflow of materials or laden water during loading or transportation.

9.93 In order to minimise the exposure to contaminated materials, workers should, when necessary, wear appropriate personal protective equipments (PPE) when handling contaminated sediments. Adequate washing and cleaning facilities should also be provided on site.

Chemical Wastes

9.94 If chemical wastes are produced at the construction site, the Contractor would be required to register with the EPD as a chemical waste producer and to follow the guidelines stated in the *Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes*. Containers used for storage of chemical waste should :

- Be compatible with the chemical wastes being stored, maintained in good condition and securely sealed;
- Have a capacity of less than 450 litres unless the specifications have been approved by EPD; and
- Display a label in English and Chinese in accordance with instructions prescribed in Schedule 2 of the Waste Disposal (Chemical Waste)(General) Regulation.

9.95 The Chemical storage area should:

- Be clearly labelled to indicate corresponding chemical characteristics of the chemical waste and used for storage of chemical waste only;
- Be enclosed on at least 3 sides;
- Have an impermeable floor and bunding, of capacity to accommodate 110% of the volume of the largest container or 20% by volume of the chemical waste stored in that area, whichever is the greatest;
- Have adequate ventilation;
- Be covered to prevent rainfall from entering; and
- Be properly arranged so that incompatible materials are adequately separated.

9.96 Lubricants, waste oils and other chemical wastes would be generated during the maintenance of vehicles and mechanical equipments. Used lubricants should be collected and stored in individual containers which are fully labelled in English and Chinese and stored in a designated secure place. These chemical wastes should be sent to oil recycling companies, if possible, and the empty oil drums should be collected by appropriate companies for reuse or refill. They should not be allowed to discharge into water courses, either by direct discharge, or as contaminants carried in surface water runoff from the construction site.

9.97 A trip-ticket system should be operated in accordance with the *Waste Disposal (Chemical Waste) (General) Regulation* to monitor all movements of chemical waste. The Contractor shall employ a licensed collector to transport and dispose of the chemical wastes, to either the approved CWTC at Tsing Yi, or another licensed facility, in accordance with the *Waste Disposal (Chemical Waste) (General) Regulation*.

9.98 All storage of asbestos waste should be carried out properly in a secure place isolated from other substances so as to prevent any possible release of asbestos fibres into the atmosphere and contamination of other substances. The storage area should bear warning panels to alert people of the presence of asbestos waste. Collection, transportation and disposal of asbestos waste will follow the trip-ticket system.

9.99 A licensed asbestos waste collectors will be appointed to collect the asbestos waste and deliver to the designated landfill for disposal. The Project Proponent should notify to EPD in advance for disposal of asbestos waste. After processing the notification, EPD will issue specific instructions and directions for disposal. The waste producer must strictly follow these directions.

General Refuse

9.100 General refuse should be stored in enclosed bins or compaction units separate from C&D materials and chemical waste. A reputable waste collector should be employed by the contractor to remove general refuse from the site, separately from C&D materials and chemical wastes. Preferably, an

enclosed and covered area should be provided to reduce the occurrence of wind blown light material.

- 9.101 The recyclable component of general refuse, such as aluminium cans, paper and cleansed plastic containers should be separated from other waste. Provision and collection of recycling bins for different types of recyclable waste should be set up by the Contractor. The Contractor should also be responsible for arranging recycling companies to collect these materials.
- 9.102 The Contractor should carry out an education programme for workers in avoiding, reducing, reusing and recycling of materials generation. Posters and leaflets advising on the use of the bins should also be provided in the sites as reminders.
- 9.103 [Table 9.8](#) provides a summary of the various waste types likely to be generated during the construction activities for the Project, together with the recommended handling and disposal methods.

Table 9.8 Summary of Waste Generation and Recommended Disposal Methods for Construction and Demolition Works

Waste Materials Type	Generation from work items	Materials Generated	Disposal Quantity	Handling methods/Reuse	Destinations
C&D Materials	Excavation, Demolition Works, Site Formation and Construction of Tunnels and Station	Inert C&D materials – Rock, Soft Materials and AHM	386,000m ³	<ul style="list-style-type: none"> • Segregation from non-inert C&D materials during stockpiling and transportation • Stockpile area (if required) should be well managed with covers and water spraying system • Delivered to other concurrent projects or to PFRFs for beneficial use in other projects 	<ul style="list-style-type: none"> • Other concurrent projects (e.g. HZMB, TMCLKL) • PFRFs
		Non-inert C&D materials – Timber, Papers & Plastics	8,000 m ³	<ul style="list-style-type: none"> • Segregation from inert C&D materials during stockpiling and transportation • Reusable materials should be separated and recycled as far as practicable 	<ul style="list-style-type: none"> • Landfills
Sediment	Excavation to depths at or below underlying marine sediments and within reclaimed land. Works areas include the construction of (i) railway alignment, south of Chatham Road North Interchange to HUH, (ii) ventilation shafts and (iii) HUH.	Category L Sediment	62,200 m ³	<ul style="list-style-type: none"> • Type 1 – Open Sea Disposal - gazetted marine disposal ground allocated by MFC • Mitigation measures as per Sections 9.84 to 9.93. 	Final disposal site shall be determined by MFC; typically South Cheung Chau / East of Ninepin.
		Category M Sediment (failed the biological screening) <u>and</u> Category H Sediment (does not require the biological screening)	37,000 m ³	<ul style="list-style-type: none"> • Type 2 – Confined Marine Disposal at disposal site(s) allocated by MFC • Mitigation measures as per Sections 9.84 to 9.93 	Final disposal site shall be determined by MFC; typically East Sha Chau

Waste Materials Type	Generation from work items	Materials Generated	Disposal Quantity	Handling methods/Reuse	Destinations
Chemical Waste	Maintenance and Operation of Equipments and Machineries	Oils and grease hydraulic fluids, paints, solvents, cleaners etc.	Few cubic metres per month	<ul style="list-style-type: none"> • Store in compatible containers in designated area on site • To be collected and recycled by licensed collectors • All storage of asbestos waste should be carried out properly in a secure place isolated from other substance and bear warning panels to alert people of the presence of asbestos waste 	Chemical Waste Treatment Centre at Tsing Yi
	Building Demolition	Asbestos Containing Materials			Designated Landfill to be determined by EPD
General Refuse	Resident Workers	Food waste, plastic, aluminium cans, waste papers etc.	260 kg/day	<ul style="list-style-type: none"> • Provide on-site collection points together with recycling bins • Collected by licensed collectors 	Landfills

Note: The quantities shown above are estimates only and will be subject to further review during the detailed design and construction stage.

Mitigation Measures for Operation Phase

- 9.104 As mentioned in **Section 9.63**, the anticipated volume of waste generation in operation phase is insignificant. Nevertheless, mitigation measures are recommended for the identified waste types in order to minimise the potential impacts to the environment.

Chemical Waste

- 9.105 The requirements given in the *Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes* would be followed in handling of chemical waste as in construction phase. A trip-ticket system would be adopted by the operator to monitor disposal of chemical waste.
- 9.106 Non-recyclable chemical waste should be disposed of at appropriate facility like CWTC by licensed collectors. Recyclable chemical waste should be collected and transported off-site by licensed collectors.

General Refuse

- 9.107 Recycling of waste paper, aluminium cans and plastic bottles should be encouraged, it is recommended to place clearly labelled recycling bins at designated locations which could be accessed conveniently. Other general refuse should be separated from chemical and industrial waste by providing separated bins for storage to maximize the recyclable volume.
- 9.108 A reputable licensed waste collector should be employed to remove general refuse on a daily basis to minimize odour, pest and litter impacts.

Industrial Waste

- 9.109 Industrial waste, generated mainly from the maintenance works, should be separated from other types of waste during disposal. Moreover, steel should be sorted out for their resalable value. A licensed collector should be employed for the collection of industrial waste.

Impacts Caused by Handling, Collection and Disposal of Waste

- 9.110 The assessment has covered the following area: potential hazard, air and odour emission, noise and wastewater discharge. With the implementation of mitigation measures recommended in the **Sections 9.70 to 9.109**, impacts from the above mentioned issue is expected to be minimal. The issue would be addressed in other relevant sections of this EIA report.

Evaluation of Residual Impacts

- 9.111 With the implementation of the recommended mitigation measures for the handling, transportation and disposal of the identified waste arisings, no adverse residual impact is expected during both construction and operation phases.

Environmental Monitoring and Audit Requirements

Construction Phase

- 9.112 During the construction period, it is the Contractor's responsibility to ensure that all the waste produced during the construction of the Project are handled, stored and disposed of in accordance with good waste management practices, relevant legislation and waste management guidelines.
- 9.113 Waste materials generated during construction activities, such as C&D materials, are recommended to be audited at regular intervals to ensure that proper storage, transportation and disposal practices are implemented. This measure ensures the proper disposal of waste. The Contractor would be responsible for the implementation of any mitigation measures to minimize waste or mitigate problems arisen from waste materials.
- 9.114 A WMP, as part of the EMP should be prepared in accordance with ETWB TC(W) No.19/2005 and submitted to the Engineer for approval. The recommended mitigation measures should form the basis of the WMP. The monitoring and auditing requirement stated in ETWB TC(W) No.19/2005 should be followed with regard to the management of C&D materials.

Operation Phase

- 9.115 It is expected that large quantities of waste would not be generated from the operation of the Project and adverse environmental impacts would not be anticipated with the implementation of good waste management practices. Waste monitoring and audit programme for the operation phase of the Project will not be required.

Conclusion

- 9.116 C&D materials (from excavation of shafts and tunnels, demolitions of existing structures), sediment, general refuse (from workforce) and chemical waste (from maintenance of construction plant and equipment) would be generated during the construction phase. Provided that these wastes are handled, transported and disposed of using approved methods and that the recommended good site practices are strictly followed, adverse environmental impacts would not be expected.
- 9.117 Reduction measures have been recommended to minimise the amount of materials generated in the Project. Approximately 386,000 m³ of inert materials and 8,000 m³ of non-inert materials would be generated during the construction phase of the Project which would be reused (i.e. other concurrent projects) as far as practicable before off-site disposal. Opportunities in minimisation of generation and maximisation of reuse would be continually investigated during the detailed design and construction phases. The remainder of materials would be disposed of to designated outlets.
- 9.118 The main waste types generated during the operation of the Project would be general refuse (from the passengers, staff and any commercial operators at station, ventilation buildings and shafts), industrial waste (from the maintenance activities) and chemical waste (from operational activities). The handling, collection, transportation and disposal practices of the identified waste generated should follow the current practices at other operating railway lines. Adverse impacts would not be anticipated if the mitigation measures are strictly followed.
- 9.119 The total volume of dredged/ excavated sediment generated from the Project is estimated to be approximately 99,200 m³. Based on the results of the chemical and biological screening, approximately 62,200 m³ sediment is suitable for Type 1 – Open Sea Disposal, and 37,000 m³ sediment requires Type 2 – Confined Marine Disposal in accordance with ETWB TC(W) No. 34/2002.
- 9.120 Separate sampling and testing plan and supplementary sampling and testing plan prepared in accordance with ETWB TC(W) No. 34/2002 were approved by EPD in April 2010 and November 2010, respectively, for allocation of sediment disposal sites and application of marine dumping permit under DASO. A Sediment Quality Report (SQR), presenting findings of the sampling and testing works and in accordance with ETWB TC(W) No. 34/2002, will also be required for EPD approval. The final disposal sites for the sediment will be determined by the MFC prior to the commencement of the dredging/excavation activities. With the implementation of the recommended mitigation measures detailed in **Sections 9.84 to 9.93** and in accordance with the requirements of ETWB TC(W) No. 34/2002, no adverse environment impacts would be expected from excavation, transportation and disposal of marine sediment.