

10 WASTE MANAGEMENT IMPLICATIONS

Introduction

- 10.1 This section identifies the types of wastes that are likely to be generated during the construction and operation phases of the Project and evaluates the potential environmental impacts that may result from these wastes. The main solid waste arising during the construction phase would be construction and demolition (C&D) material generated from civil works. Mitigation measures and good site practices, including waste handling, storage and disposal, are recommended with reference to the applicable waste legislation and guidelines.

Environmental Legislation, Policies, Plans, Standards and Criteria

- 10.2 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.
- 10.3 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 Management

- 10.4 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.
- 10.5 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.
- 10.6 The Public Cleansing and Prevention of Nuisances Regulation provides control on illegal tipping of wastes on unauthorised (unlicensed) sites.

Construction and Demolition (C&D) Materials

- 10.7 The current policy related to the dumping 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 & Development Department (CEDD) issues the licences under delegated powers from the Director of Lands.
- 10.8 Under the Waste Disposal (Charges for Disposal of Construction Waste) Regulation, enacted in January 2005, 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.

- 10.9 Measures have been introduced under Environment, Transport and Works Bureau (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; and (ii) 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 50,000 m³ or importing fill material less than 50,000 m³ are exempted 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. A Waste Management Plan should be submitted by the contractor as part of the Environmental Management Plan prior to the commencement of construction works.

Assessment Methodology

- 10.10 The methodology for assessing potential waste management impacts during the construction phase of the Project included the following tasks:
- Estimation of the types and quantities of wastes generated.
 - Assessment of potential impacts from the management of solid waste with respect to potential hazards, air and odour emissions, noise and wastewater discharges.
 - Identification of disposal options for each type of waste.
 - Assessment of impacts on the capacity of waste collection, transfer and disposal facilities.

Identification and Evaluation of Environmental Impacts

Construction Phase

- 10.11 The construction 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:
- Construction and demolition (C&D) materials
 - General refuse
 - Chemical waste
- 10.12 Each type of waste arising is described below, together with an evaluation of the potential environmental impacts associated with generation, handling, storage and transport of the waste.

Construction and Demolition Material

- 10.13 Construction and demolition (C&D) material would be generated from excavation works for the foundations of the proposed chlorination plant and dechlorination plant, and from excavation works for the proposed pipe trenches leading from the barge unloading point to the chlorination plant, and from the chlorination plant to the proposed day tank. The C&D material would comprise mostly reclamation fill material, with an estimated total quantity of approximately 9,000 m³ (based on the preliminary design information provided by DSD). A small portion of the C&D material (approximately 10-15% of the total quantity) would comprise artificial hard material and rock (from piles for the chlorination plant). Non-inert C&D material, i.e. C&D waste, would be generated from site clearance for the chlorination plant which would involve removal of surface vegetation and tree pruning, and wooden waste may be generated during dismantling of formwork. The amount of C&D material to be generated would be quantified in the site Waste Management Plan to be prepared by the Contractor.
- 10.14 The C&D material should be re-used on-site as far as possible to minimize the net amount of C&D material generated from the Project. It is expected that an amount of approximately 1,500 m³ of

reclamation fill material, could be re-used as backfill material on top of the proposed pipe trenches.

- 10.15 Since the construction activities for the proposed pipe trenches would be located near the waterfront, improper management of C&D materials may introduce debris and pollutants to the coastal waters, and mitigation measures, including adoption of good site practices, would be required for control of impacts.

General Refuse

- 10.16 The construction workforce would generate refuse comprising food scraps, waste paper, empty containers, etc. Such refuse should be properly managed so 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 or pest and vermin problem. Waste storage areas should be well maintained and cleaned regularly. With the implementation of good waste management practices at the site, adverse environmental impacts are not expected to arise from the storage, handling and transportation of workforce wastes.

Chemical Waste

- 10.17 The maintenance and servicing of construction plant and equipment may generate some chemical wastes such as cleaning fluids, solvents, lubrication oil and fuel. Maintenance of vehicles may also involve the use of a variety of chemicals, oil and lubricants. 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 on-site 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. The amount of chemical waste to be generated will be quantified in the site Waste Management Plan to be prepared by the Contractor.
- 10.18 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
- 10.19 Materials classified as chemical wastes will require special handling and storage arrangements before removal for appropriate treatment at the approved Chemical Waste Treatment Facility. Wherever possible opportunities should be taken to reuse and recycle materials. Mitigation and control requirements for chemical wastes are detailed in Section 10.26. Provided that the handling, storage and disposal of chemical wastes are in accordance with these requirements, adverse environmental impacts are not expected to result.

Operation Phase

Types of Waste Arising

- 10.20 A chemical supplier has advised that cleaning of the storage tanks for the chlorination and dechlorination chemicals would not be required. The storage tanks may need rinsing with tap water to remove any settled silt in the tanks due to iron or hardness. The sodium hypochlorite solution would need to be neutralized with bisulphite solution prior to discharge to the foul sewer. A chemical supplier advised that the storage tanks are recommended to be inspected at intervals of 12 to 18 months to check if significant accumulation of silt is observed. In the event that minor chemical wastes are produced during operation and maintenance of the Project, the mitigation and control requirements for chemical wastes are detailed in Section 10.28. Provided that the handling, storage and disposal of chemical wastes are in accordance with these requirements, adverse environmental impacts are not expected to result.

Mitigation of Adverse Environmental Impacts

Construction Phase

Good Site Practices

- 10.21 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 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 handling procedures
 - Provision of sufficient waste disposal points and regular collection of waste
 - Appropriate measures to minimise 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.
 - Separation of chemical wastes for special handling and appropriate treatment at the Chemical Waste Treatment Facility.

Waste Reduction Measures

- 10.22 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:
- 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 minimise the potential for damage or contamination of construction materials
 - Plan and stock construction materials carefully to minimise amount of waste generated and avoid unnecessary generation of waste.
 - A recording system for the amount of wastes generated, recycled and disposed (including disposal sites) should be proposed.
 - Training should be provided to workers about the concepts of site cleanliness and appropriate waste management procedures, including waste reduction, reuse and recycle.
- 10.23 In addition to the above measures, specific mitigation measures are recommended below for the identified waste arising to minimise environmental impacts during handling, transportation and disposal of these wastes.

General Refuse

- 10.24 General refuse should be stored in enclosed bins or compaction units separate from C&D material. A reputable waste collector should be employed by the contractor to remove general refuse from the site, separately from C&D material. Preferably an enclosed and covered area should be provided to reduce the occurrence of 'wind blown' light material.

Construction and Demolition Material

- 10.25 In order to minimise impacts resulting from collection and transportation of C&D material for off-site disposal, the excavated material generated from excavation works for the proposed chlorination plant, dechlorination plant, day tank and pipe trenches should be reused on-site as backfilling material as far as practicable. The surplus excavated material should be disposed of at the designated public fill reception facility, as agreed with the Secretary of the Public Fill Committee, for other beneficial uses. C&D waste generated from site clearance and dismantling of formwork would require disposal to the designated landfill site. In order to monitor the disposal of C&D material at the public fill reception facility and landfill and to control fly-tipping, a trip-ticket system should be included. One may make reference to ETWB TCW No. 31/2004 for details.

Chemical Wastes

- 10.26 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*. Good quality containers compatible with the chemical wastes should be used, and incompatible chemicals should be stored separately. Appropriate labels should be securely attached on each chemical waste container indicating the corresponding chemical characteristics of the chemical waste, such as explosive, flammable, oxidizing, irritant, toxic, harmful, corrosive, etc. The Contractor shall use a licensed collector to transport and dispose of the chemical wastes, to either the approved Chemical Waste Treatment Centre, or another licensed facility, in accordance with the Waste Disposal (Chemical Waste) (General) Regulation.
- 10.27 **Table 10.1** 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 10.1 Summary of Waste Handling Procedures and Disposal Routes for Construction Phase

Waste Material Type	Generated from works item	Total Quantity Generated	Quantity to be disposed off-site	Disposal	Handling
Inert C&D Material i.e. public fill	Excavation works	9,000 m ³	7,500 m ³	To be reused on-site (1,500 m ³) To be disposed to the designated public fill reception facility for other beneficial uses (7,500 m ³)	Segregate C&D material to avoid contamination from other wastes
C&D waste	Site clearance and dismantling of formwork	1,500 m ³	1,500 m ³	To be disposed to the designated landfill site	

Waste Material Type	Generated from works item	Total Quantity Generated	Quantity to be disposed off-site	Disposal	Handling
General Refuse	Waste paper, discarded containers, etc. generated from workforce	insignificant	insignificant	Refuse station for compaction and containerisation and then to landfill	Provide on-site refuse collection points
Chemical Waste	Cleansing fluids, solvent, lubrication oil and fuel from construction plant and equipment	Few cubic metres per month (preliminary estimate)	Few cubic metres per month (preliminary estimate)	Chemical Waste Treatment Centre	Recycle on-site or by licensed companies. Stored on-site within suitably designed containers

Operation Phase

- 10.28 In the event that minor chemical wastes are produced during operation and maintenance of the Project, the Waste Disposal Ordinance (Cap 354) and its subsidiary regulations in particular the Waste Disposal (Chemical Waste) (General) Regulation should be observed and complied with for control of chemical wastes. The *Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes* published under the Waste Disposal Ordinance details the requirements to deal with chemical wastes. General requirements are given as follows:
- Suitable containers should be used to hold the chemical wastes to avoid leakage or spillage during storage, handling and transport.
 - Chemical waste containers should be suitably labeled, to notify and warn the personnel who are handling the wastes, to avoid accidents.
 - Storage area should be selected at a safe location on site and adequate space should be allocated to the storage area.

Evaluation of Residual Impacts

- 10.29 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 and operation of the proposed Project.

Environmental Monitoring and Audit

- 10.30 Waste management would be the contractor's responsibility to ensure that all wastes produced during the construction of the Project are handled, stored and disposed of in accordance with good waste management practices and EPD's regulations and requirements. The recommended mitigation measures shall form the basis of the site Waste Management Plan to be developed by the Contractor in the construction stage.

Conclusion

- 10.31 Waste types generated by the construction activities are likely to include C&D material (from excavation works), general refuse from the workforce, and chemical waste from the maintenance of construction plant and equipment. 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 are not expected during the construction phase.
- 10.32 In the event that minor chemical wastes are produced during operation and maintenance of the Project, the relevant mitigation and control requirements for chemical wastes should be observed. Provided that the handling, storage and disposal of chemical wastes are in accordance with the requirements, adverse environmental impacts are not expected to result during the operation phase.